Appendix A. Field Logs
- A-1 Drilling Logs
- A-2 Well Development Logs
- A-3 Well Construction Diagrams
- A-4 Groundwater Sample Collection Logs
- A-5 Vapor Sample Collection Logs
- A-6 Photograph Logs

Appendix B. Onsite Laboratory Screening Sample Analytical Reports

Appendix C. Offsite Laboratory Definitive Soil Sample Analytical Reports

Appendix D. Data Verification Reports

Appendix E. Physical Parameter Testing Reports

Appendix F. Matrix Diffusion Testing Report

Appendix G. Borehole Hydrophysical and Geophysical Reports

Appendix A. Field Logs

A-1 Drilling Logs

DRILLING LOG

HOLE NO. **MW74**

COMPANY NAME: RMC Consultants, Inc.	DRILLING SUBCONTRACTOR: Yellow Jacket Drilling Services, Inc.	SHEET 1 OF 22 SHEETS
PROJECT: Atlas D Missile Site 4 RI Addendum 2017-2018 Tasks	LOCATION: Atlas D Missile Site 4 – Laramie County, Wyoming	
NAME OF DRILLER: Jose Munguia	MANUFACTURER'S DESIGNATION OF DRILL: TSI 150T SONIC RIG	
SIZES AND TYPES OF DRILLING EQUIPMENT: Sonic Drill Rig; 10-in. diam core barrel (17-ft.); 8-in. diam. drill casing (150-ft.); 9-in. diam. drill casing (156-ft.+); 8-in. diam. drill casing (156ft-TD); 7-in. diam. core barrel (150ft-TD)	HOLE LOCATION: Flame Pit at Bldg. 1; 213897.98 ft N, 661088.91 ft E	
	SURFACE ELEVATION: 7257.6 ft MSL	
	DATE STARTED: 7/30/2017	DATE COMPLETED: 8/9/2017
OVERBURDEN (OGALLALA FM. or ALLUVIAL) THICKNESS: 36 feet of Ogallala Fm.	DEPTH GROUNDWATER ENCOUNTERED: 65 ft MSL	
DEPTH DRILLED INTO WHITE RIVER FORMATION: WRF: 324 ft thick; Goose Egg Fm. @ 360 ft bgs	DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: 10/17/17 MW74-104: 47.6' bgs MW74-263: 46.6' bgs MW74-359: 59.7' bgs	
TOTAL DEPTH OF HOLE: 378 ft	OTHER WATER LEVEL MEASUREMENTS	

GEOTECHNICAL SAMPLES	DISTURBED: 3	UNDISTURBED: none	CORED INTERVAL: Surface to Total Depth

SAMPLES FOR CHEMICAL ANALYSIS	VOCs – onsite	VOCs – offsite	OTHER	OTHER	OTHER	TOTAL CORE RECOVERY
	39	36				99 %

DISPOSITION OF HOLE	2-in. diam. NESTED MONITORING WELLS: TD: 107.3 ft bgs TD: 265.4 ft bgs TD: 362 ft bgs	SIGNATURE OF INSPECTOR: Todd Margulies

ELEV.	x DEPTH	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE ID.	ANALYTICAL SAMPLE ID.	Recovery (ft/ft) & REMARKS
	0	Dark yellowish-brown (10YR 4/4) SILT (ML) w/ sand and gravel, moist, heavy reaction w/ 10% HCL, 5-10% sand and gravel, fine to medium gravel, sub-angular/sub-rounded, pieces of wood, few cobbles		PID Headspace (ppm)		FEW4-MW74-(0.5)	1100 Begin drilling
				0.8			6'/6'
	2	2'-4.5'- brown (10YR 5/3) SILT (ML) w/ gravel and clay, moist, heavy reaction w/ 10% HCL, 20% gravel, 25% clay, gravel is fine to medium, sub-angular/sub-rounded, variegated, cobbles				FEW4-MW74-(2.5)	0-6'
				0.2			
	4	4.5'-6'- very dark grayish-brown (10YR 3/2), silty SAND (SM) w/ fine to medium gravel, dry to slightly moist, little to no reaction w/ 10% HCL, gravel is sub-angular/sub-rounded, few cobbles					
	6	Variegated, coarse SAND (SW) w/ 10-15% gravel, fine to medium, sub-angular/sub-rounded, moist, little to reaction w/ 10% HCL, a few cobbles					
	8	7.5'-10'- brown (10YR 5/3) to very pale brown (10YR 7/3), clayey SILT (ML) w/ <5% gravel, fine to medium, sub-angular/sub-rounded, clay has low to medium plasticity					
				0.8		FEW4-MW74-(9.0)	
	10						

DRILLING LOG

HOLE NO. **MW74**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 2 OF 22 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	10	Pale brown (10YR 6/3), silty CLAY (CL) with fine gravel, low to medium plasticity moist, heavy reaction with 10% HCL		PID Headspace (ppm)			
	12	Same as 10'-12' with color change to light brownish-gray (10YR 6/2) and increase in silt					10'/10' 6-16'
	14	Dark grayish-brown (10YR 4/2) silty SAND (SM) w/ minor gravel (10%), fine, sub-rounded/sub-angular, moist, heavy reaction with 10% HCL, coarse grained 15'-17'- variegated SAND (SP) w/ gravel, coarse grained, moist, little to no reaction with 10% HCL, gravel is fine to coarse, sub-angular/sub-rounded, few cobbles					
	16						
	18	Brown (10YR 5/3) gravelly SILT (ML), 30% gravel, w/ 10% clay, moist, heavy reaction with 10% HCL, gravel is fine to course, sub-angular/ sub-rounded, clay low plasticity, cobbles					
	20	Grayish-brown (10YR 5/2), silty CLAY (CL) w/ gravel/cobbles, low to medium plasticity, moist, heavy reaction with 10% HCL, 10-20% gravel, fine to course, sub-rounded/ sub-angular, cobbles 20'-22'- grayish-brown (10YR 5/2), clayey, silty GRAVEL (GW-GM), moist, heavy reaction with 10% HCL, gravel is fine to coarse, sub-angular/ sub-rounded, 25%-35% clay and silt					10'/10' 16-26'
	22						
	24	Grayish-brown (10YR 5/2), gravelly SAND (SW), 25% gravel, fine to medium, sub-rounded/ sub-angular, heavy reaction with 10% HCL, dry					
	26	Very pale brown (10YR 7/3), silty CLAY (CL) , trace (<5%) gravel, moist to wet, medium plasticity.					
	28						

DRILLING LOG

HOLE NO. **MW74**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 3 OF 22 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	28			PID Headspace (ppm)			
	30	Plasticity increase to high (CH)					
		Dark grayish-brown (10YR 4/2), sandy GRAVEL (GP), moist, no reaction with 10% HCL, very coarse grained sand, gravel is fine to coarse, sub-rounded/sub-angular, cobbles.					
	32	Variegated SAND (SW), w/ 15% gravel, fine to medium, sub-rounded/sub-angular, moist, medium reaction with 10% HCL					
	34						
	36	**White River Formation** - Light yellowish-brown (10 YR 6/4) CLAY (CH), with minor gravel, caliche, moist, little reaction with 10% HCL, gravel is fine, sub-rounded/sub-angular, high plasticity, few cobbles					
	38						
	40						
	42	Increased silt, medium plasticity (CL)					
		Yellowish-brown (10YR 5/4), clayey SILT (ML), with 15% gravel, cobbles, moist, little to no reaction with 10% HCL, caliche, small sub-rounded/sub-angular gravel, variegated					
	44						
	46						

DRILLING LOG

HOLE NO. **MW74**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 4 OF 22 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	46	Pale brown (10YR 6/3), silty CLAY (CL) interbedded w/ (10YR 6/3) clayey SILT (ML), clay low to medium plasticity, moist to wet, gravel is fine, sub-rounded/sub-angular, minor claystone pieces, light to no reaction w/ 10% HCL		PID Headspace (ppm)			10'/10' 46-56'
	48						
	50						
	52						
	54						
	56	Yellowish-brown (10YR 5/4), silty CLAY (CL), interbedded w/ same color clayey SILT (ML), clay low to medium plasticity, wet, increase in claystone from 46-56', light to moderate reaction w/ 10% HCL		14.8		FEW4-MW74-(56.0) & FEW4 MW74-(57.0) DUP	
	58						10'/10' 56-66'
	60						
	62						
	64						

DRILLING LOG

HOLE NO. **MW74**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 5 OF 22 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	64			PID Headspace (ppm)			
				11.4		FEW4-MW74-(65.0)	
						FEW4-MW74-(65.0)	Water sample
	66	Pale brown (10YR 6/3), clayey SILT (ML), moist, clay is slightly plastic, numerous claystone clasts present, little to no reaction w/ 10% HCL					
	68						10'/10' 66-76'
	70						
	72						
	74			0.9		FEW4-MW74-(75.0)	
	76	Same as 66-76' w/ interbedded, pale brown (10YR 6/3) silty CLAY (CL), low to medium plasticity					
	78						10'/10' 76-86'
	80						
	82						

DRILLING LOG

HOLE NO. **MW74**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 6 OF 22 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	82			PID Headspace (ppm)			
	84						
		85-86'- increase in very hard claystone layers w/ manganese oxide, many blows w/ rock hammer to break		1.1		FEW4-MW74-(85.0)	
	86	Light yellowish-brown (10YR 6/4), interbedded clayey SILT (ML) and silty CLAY (CL), moist, low to medium plasticity, numerous claystone clasts and small layers (2-3"), medium reaction w/10% HCL					
	88						
	90						10'/10' 86-96'
	92						
	94			10.8		FEW4-MW74-(94.0)	
		Same as 86-95' w/ numerous very hard claystone pieces, dry to moist "rubble", heavy reaction with 10 % HCL					Stop drilling @96' on 8/24/17 1650
	96	96'-108'- pale brown (10YR 6/3), silty CLAY (CL), interbedded w/ (10YR 6/3) clayey SILT (ML), CL has medium plasticity, wet to saturated, little reaction w/ 10% HCL, clasts and layers of hard claystone present					Continue drilling 8/25/17 0810, drilling dry
	98						
	100						

DRILLING LOG

HOLE NO. **MW74**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 7 OF 22 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	100			PID Headspace (ppm)			
		Same as above, pale brown (10YR 6/3), silty CLAY (CL), interbedded w/ (10YR 6/3) clayey SILT (ML), CL has medium plasticity, wet to saturated					
	102						12'/12' 96-108'
					FEW4 MW74-(104) for Grain size and Atterberg Lmits		
	104			0.8		FEW4 MW74-(104.0) & MW74-(105.0) DUP	
	106						
	108						
		Pale brown (10YR 6/3), clayey SILT (ML) interbedded w/ pale brown (10YR 6/3), silty CLAY (CL), low to medium plasticity, little to no reaction w/ 10% HCL, wet to slightly saturated, clasts, and 2-3" layers of hard claystone, heavy reaction w/ 10% HCL					
	110						17'/17' 108-125'
	112				FEW4-MW74-(114.0)		
	114			0.2		FEW4-MW74-(114.0)	
	116						
	118						

DRILLING LOG

HOLE NO. **MW74**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 8 OF 22 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	118			PID Headspace (ppm)			
		S.A.A. - Pale brown (10YR 6/3), clayey SILT (ML) interbedded w/ pale brown (10YR 6/3), silty CLAY (CL),					
	120						
	122						
	124						
		Pale brown (10YR 6/3), silty CLAY (CL), low to slightly medium plasticity, soft to very soft, moist to wet, moderate reaction w/ 10% HCL, interbedded w/ pale brown (10YR 6/3), clayey SILT (ML), wet, hard to very hard, claystone clasts/layers present, heavy reaction w/ 10% HCL		0.2		FEW4-MW74-(125.0)	Drillers using clean water
	126						
	128						15'/15' 125-140'
	130						
	132						
	134			0.7		FEW4-MW74-(134.0)	
	136						

DRILLING LOG

HOLE NO. **MW74**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 9 OF 22 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	136			PID Headspace (ppm)			
	138						
	140	Pale brown (10YR 6/3), clayey SILT (ML) interbedded w/ pale brown (10YR 6/3), silty CLAY (CL), soft to hard, low to medium plasticity, moist to slightly wet, little reaction w/10% HCL, numerous small to medium size clasts, and 2-4” layers of claystone, heavy reaction w/10% HCL, minor manganese oxide, few areas of fat clay (CH), w/high plasticity					
	142						16’/16’ 140-156’
	144			0.4		FEW4-MW74-(144.0)	
	146						
	148						
	150						
	152						
	154			0.4		FEW4-MW74-(154.0)	

DRILLING LOG

HOLE NO. **MW74**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 10 OF 22 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	154			PID Headspace (ppm)			
	156	Pale brown (10YR 6/3) CLAYSTONE, hard to very hard, dry to slightly moist, possible vertical fracture @ 157' w/major manganese oxide present, elsewhere in run minor manganese oxide, heavy reaction w/10% HCL		0.4		FEW4-MW74-(157.0)	Drillers using mud
	158	159-171.50' – portions of core fell out on deck causing additional mechanical breaks					21'/21' 156-177'
	160						
	162						
	164						
	166			0.4		FEW4-MW74-(167.0)	
	168						
	170						
	172						

DRILLING LOG

HOLE NO. **MW74**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 11 OF 22 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	172	S.A.A. - Very pale brown (10YR 7/3) CLAYSTONE, hard, dry to slightly moist, interbedded w/ clayey SILT (ML), low plasticity, dry to slightly moist, heavy reaction w/ 10% HCL for both		PID Headspace (ppm)			
	174						
	176	Very pale brown (10YR 7/3) CLAYSTONE, hard, dry, heavy reaction w/ 10% HCL		0.2		FEW4-MW74-(177.0)	21'/21' 177-198' Almost entire core dropped out of core barrel = numerous mechanical breaks
	178						
	180						
	182						
	184						
	186			0.0		FEW4-MW74-(187.0)	
	188						
	190						

DRILLING LOG

HOLE NO. **MW74**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 12 OF 22 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	190			PID Headspace (ppm)			
		Very pale brown (10YR 7/4), clayey SILT (ML), dry to slightly moist, light reaction w/ 10% HCL, interbedded w/ very pale brown (10YR 7/4), silty CLAY (CL), slight to medium plasticity, dry to slightly moist, light reaction w/ 10% HCL, claystone clasts/layers 1-2", minor manganese oxide					
	192						
	194						
	196						
				0.0		FEW4-MW74-(197.0)	
	198	Core is broken up from 198-202' possible fracture zone, silty CLAYSTONE, moderately hard, able to gouge ½" w/ knife, dry to slightly moist, massive					
	200						21'/21' 198-219'
	202			0.6		FEW4-MW74-(202.0)	
	204						
	206						
	208						

DRILLING LOG

HOLE NO. **MW74**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 13 OF 22 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	208			PID Headspace (ppm)			
	210	Increase in silt content, clayey SILT (ML) w/ slight plasticity, core is cohesive					
	212	Light yellowish-brown (10YR 6/4), silty CLAY (CL), stiff, low plasticity, dry to slightly moist		0.6		FEW4-MW74-(212.0) & FEW4-MW74-(213.0) DUP	
	214						
	216	216.5'-219'- brown (10YR 5/3) SILT (ML), w/ trace clay, hard cohesive cores, mostly non-plastic					
	218						
	220	Yellowish-brown (10YR 5/4), clayey SILT (ML), w/ 10-15% sand, m-c, fine gravel, moist, very stiff					
	222	~ 20% manganese oxide present in dendritic pattern		0.2		FEW4-MW74-(222.0)	21'/21'
	224	Harder material @223', difficult to break cores w/ rock hammer, yellowish-brown CLAYSTONE					
	226						

DRILLING LOG

HOLE NO. **MW74**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 14 OF 22 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	226	Same as above- yellowish-brown (10YR 6/4), silty CLAYSTONE to clayey SILTSTONE, moderately hard		PID Headspace (ppm)			
	228						
	230						
	232			0.3		FEW4-MW74-(232.0)	
	234	Not as hard as above, can readily gouge core 1" w/ knife, CLAY (CL) w/ low plasticity, moist, no silt					
	236						
	238						
	240	238.5'-240'- pale brown (10YR 6/2) SILT (ML), dry to slightly moist, trace clay, core is cohesive, moderate reaction w/ 10% HCL					
	242	Light yellowish-brown, silty CLAYSTONE, fairly hard, massive, w/ 5% fine gravel, appears dry to damp, breaks w/ semi-conchoidal fractured surfaces		0.1		FEW4-MW74-(242.0)	
	244						

DRILLING LOG

HOLE NO. **MW74**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 15 OF 22 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	244	Same as above- hard CLAYSTONE, massive, dry to damp, w/ 0.5mm black biotite flakes (<1%), it is fairly difficult to break cores w/ hammer		PID Headspace (ppm)			
	246						21'/21' 240-261'
	248						
	250						
	252	Brown CLAY (CH), stiff, plastic, moist					
	254						
	256			0.1		FEW4-MW74-(256.0)	
	258						
	260						
	262	Light yellowish-brown, silty CLAYSTONE, fairly hard, damp		0.7		FEW4-MW74-(262.0)	Sub-vertical fracture 261-262.5'

DRILLING LOG

HOLE NO. **MW74**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 16 OF 22 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	262	Silty CLAYSTONE, moderately hard, massive, sub-vertical fracture 261-262.5’		PID Headspace (ppm)	FEW4 MW74-(262) for Grain size and Atterberg Lmits		
	264	263.8-264.8’- whitish (10YR 8/1) clay (CL), dry, massive, fairly friable/soft, soapy feel/talc- like, light-weight					
	266	264.8-268’ – light yellowish-brown (10YR 8/1), silty CLAYSTONE, competent/massive					
	268	268-269’: White (10YR 8/1) CLAY/ CLAYSTONE, similar to light brown material Light yellowish-brown, silty CLAYSTONE, moderately hard, massive, damp (little observable moisture)					20’/20’ 261-281’
	270						
	272						
	274						
	276			0.1		FEW4-MW74-(276.0)	
	278	276.5’- 280’- light reddish-brown (5YR) CLAY (CH), softer than above (stiff), fingernail test yields a very shiny surface, material is dense, tough, very difficult to wet for thread test					
	280						

DRILLING LOG

HOLE NO. **MW74**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 17 OF 22 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	280	Light reddish-brown CLAY, same as above		PID Headspace (ppm)			
	282	Light brown (7.5YR 6/4) SILTSTONE w/ ~5% m-c sand, moderately hard, damp to dry, solid, grades downward to moderately hard silty CLAY (CL), color grades through reddish-brown to brown					
	284						
	286						19'/19' 281-300'
	288						
	290	Brown CLAY (CH), moist, stiff, cohesive				FEW4-MW74-(289.0)	
	292						
	294						
	296	Slightly more silt than above, color change to light yellowish-brown, massive, dry				FEW4-MW74-(296.0)	
	298						

DRILLING LOG

HOLE NO. **MW74**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 18 OF 22 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	298	Very pale brown (10YR 7/4), silty CLAY (CL) w/ trace fine gravel, gravel particles are quite weathered /decomposed (soft gray red claystone particles)		PID Headspace (ppm)			
	300	299-301' – gravelly CLAY (CL) w/ silt, a few 3-4" cobbles, moist, cohesive, gravel (20%) is f-m-c, sub-round; w/ some red decomposed silty material					
	302	Yellowish-brown CLAY (CL), trace silt, fairly hard, damp to moist, essentially a claystone but can be penetrated w/knife, scattered sub-mm biotite specks throughout					Drill water has washed core so it is only 4 inches in diameter
	304						
	306						
	308	Color change to grayish-brown, softer, damp, CLAY (CL), slight increase in silt, cores separate into 3" segments/discs (irregular surfaces), blocky, somewhat cohesive in natural state, wetted material is slightly plastic					Cores are 6-7 inches diam. as usual
	310					FEW4-MW74-(310.0)	
	312						19.5'/20' 300-320'
	314						
	316						

DRILLING LOG

HOLE NO. **MW74**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 19 OF 22 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	316	Light olive brown (2.5 YR 5/4), silty CLAYSTONE, damp, moderately hard, hammer blows gouge/dent cores, but very difficult to break open core, material has rust colored (orange) fine sand sized minerals that smear into clay w/ fingernail pressure, (<1%), no reaction to 10% HCL		PID Headspace (ppm)		FEW4-MW74-(317.0)	
	318						
	320						
	322						
	324	Light gray (2.5YR 7/2), very hard layer of CLAYSTONE (hammer only chips surface), moderate reaction to 10% HCL					
	326	325.5'-327'- light yellowish-brown (2.5YR 6/4) CLAYSTONE, moderately hard as above Hard layer w/white laminae @ 329.5'that gives strong reaction to HCL				FEW4-MW74-(327.0)	20'/20' 320-340'
	328						
	330	Light olive brown (2.5YR 5/4) silty CLAY (CL), stiff, damp					
	332						
	334	Gravelly CLAY (CL) w/ silt, damp to moist, gravel (~40%) is f-m-c, sub-angular					gravelly clay 333-334.5'

DRILLING LOG

HOLE NO. **MW74**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 20 OF 22 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	334	334.5'-340'- yellowish-brown (10YR 5/4), silty CLAY/clayey SILT (CL/ML), moist, medium plasticity		PID Headspace (ppm)			
	336						
	338						
	340	Light yellowish-brown, silty CLAYSTONE w/ trace f-m gravel, moderately hard, massive					
	342	Same as above without gravel					
	344						16'/18' 340-358'
	346	Sandy interval 346.4-346.8'					
	348					FEW4-MW74-(348.0)	
	350						
	352						

DRILLING LOG

HOLE NO. **MW74**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 21 OF 22 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	352	Gravelly SILT (ML) w/ 20% clay, a few 4-6” cobbles, cored through 10” cobble		PID Headspace (ppm)			
	354	354.4-355.2’: gravel (30%) is mostly coarse, sub-angular/sub-rounded, matrix is clayey SILT (ML), brown to grayish-brown, very moist			FEW4 MW74-(354) for Grain size and Atterberg Lmits	FEW4-MW74-(354.0)	
	356						
	358	358-360’: presumed same as above, appears to have been washed away by drilling fluid					
	360	Goose Egg Formation @360’ Reddish-brown CLAYSTONE, uniform, massive, moderately hard, dry					
	362					FEW4-MW74-(362.0)	18’/20’ 358-378’
	364						
	366						
	368						
	370						

DRILLING LOG

HOLE NO. **MW74**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 22 OF 22 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	372			PID Headspace (ppm)			
		Same as above - Reddish-brown CLAYSTONE, uniform, massive, moderately hard, dry					
	374						
	376						
		End of Boring at 378 ft bgs					
	378						

DRILLING LOG

HOLE NO. **MW75**

COMPANY NAME: RMC Consultants, Inc.	DRILLING SUBCONTRACTOR: Yellow Jacket Drilling Services, Inc.	SHEET 1 OF 22 SHEETS

PROJECT: Atlas D Missile Site 4 RI Addendum 2017-2018 Tasks	LOCATION: Atlas D Missile Site 4 – Laramie County, Wyoming
NAME OF DRILLER: Jose Munguia	MANUFACTURER'S DESIGNATION OF DRILL: TSI 150T SONIC RIG
SIZES AND TYPES OF DRILLING EQUIPMENT: Sonic Drill Rig; 10-in. diam core barrel (17-ft.); 8-in. diam. drill casing (150-ft.); 9-in. diam. drill casing (156-ft.+); 8-in. diam. drill casing (156ft-TD); 7-in. diam. core barrel (150ft-TD)	HOLE LOCATION: Northeast corner Building 2; 214168.54 ft N, 662343.01 ft E
	SURFACE ELEVATION: 7259.6 ft msl
	DATE STARTED: 8/8/2017 — DATE COMPLETED: 8/21/2017
OVERBURDEN (OGALLALA FM. or ALLUVIAL) THICKNESS: 77.8 feet of Ogallala Fm.	DEPTH GROUNDWATER ENCOUNTERED: 65 ft MSL
DEPTH DRILLED INTO WHITE RIVER FORMATION: 309 ft	DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: 10/18/17 MW75-93: 75.5 ft bgs MW75-308: 65.1 ft bgs MW75-377: 132.9 ft bgs
TOTAL DEPTH OF HOLE: 387 ft	OTHER WATER LEVEL MEASUREMENTS

GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	CORED INTERVAL
	3 - grain size/Atterbergs	1 - Physical parameters	Surface to Total Depth

SAMPLES FOR CHEMICAL ANALYSIS	VOCs – onsite	VOCs – offsite	OTHER	OTHER	OTHER	TOTAL CORE RECOVERY
	35	31				90.1 %

DISPOSITION OF HOLE	2-in. diam. NESTED MONITORING WELLS	SIGNATURE OF INSPECTOR
	TD: 95.6 ft bgs TD: 310.3 ft bgs TD: 383.6 ft bgs	Todd Margulies

ELEV.	DEPTH (x)	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE ID.	ANALYTICAL SAMPLE ID.	Recovery (ft/ft) & REMARKS
	0	Topsoil w/ roots Light yellowish-brown (10YR 6/4) silty SAND w/ gravel (SM), dry, loose, sand is mostly fine grained w/~30% medium and coarse grained present		PID Headspace (ppm)			0857 begin drilling
	2						5'/5'
	4	~30% fine to coarse gravel, sub-rounded/sub-angular					
	6	Well graded SAND w/ ~30-40% fine to coarse gravel (SW) and <5% silt; trace 3"-5" cobbles and 1-2% caliche, loose, dry to slightly moist					
	8						7'/7'
	10						

DRILLING LOG

HOLE NO. **MW75**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jennifer Hussey

SHEET 2 OF 22 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	10			PID Headspace (ppm)			
	12	11.5'-13'- light yellowish-brown to light olive brown (2.5YR 6/3-6/4) silty CLAY w/ sand and gravel (CL), slightly moist to moist, ~15% caliche @ 13': 8" lens of light gray SILT (ML) w/ sand and gravel, loose					3'/3' 12-15'
	14	Very pale brown (10YR 7/3) clayey SILT/silty CLAY (ML/CL) w/ fine to medium gravel and caliche, cohesive -					
	16	5" cobble and increase in gravel, sub-angular					
	18	Similar to above: clayey SILT w/ gravel (ML), moist, slight plasticity, trace (~5%) cobbles (~3 in.)					10'/10' 15-25'
	20	Some sand (fine to medium grained) in w/ clayey, gravelly SILT (ML)					
	22	20.5'-24'- increase in clay content, clayey, SANDY SILT w/ gravel (ML/SC), moist, slight plasticity, fine to coarse sand					10'/10' 16-26'
	24	Increase in coarse gravel (1-3" in diameter), sub-angular/angular, 7" cobble observed Brown to yellowish-brown (10YR 5/3-5/4) silty SAND w/ fine to coarse gravel (SM), loose, slightly moist					cobbles present 24-25'
	26	Increase in SILT- gravelly SILT (ML) @ 26', change in color to light gray, fines - SILT (ML) w/gravel and ~15% cobbles					
	28						

DRILLING LOG

HOLE NO. **MW75**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jennifer Hussey

SHEET 3 OF 22 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	28	Similar to above- light gray, gravelly SILT (ML), loose, dry		PID Headspace (ppm)			8'/8'
	30						
	32	Core is cohesive, light brown to light yellowish-brown clayey SILT (ML) w/fine to coarse gravel and cobbles ranging 3"-6", caliche, 4" lens of fine to medium grained sand @ 32'					
	34	Increase in gravel content and not as clayey @ 34-35'					
	36	Very pale brown (10YR 7/3) silty SAND w/ gravel (SM), loose, cobbles (3"-5"), dry, sand is ~70% fine grained and 30% medium to coarse grained					12'/12' 33-45'
	38	36.5'-38'- pale brown to brown gravelly SILT (ML) w/some (~15%) sand, loose, micaceous					
	40	Core is cohesive; able to thread w/fingers, clayey SILT (ML), angular gravel (fine to coarse)					
	42	Pale brown gravelly SILT (ML)					
	44	42.8'-43.4'- Dark yellowish-brown (10YR 4/3) micaceous silt lens. Silty SAND w/ gravel (SW-SM), loose, dry, well graded sand is ~65% fine grained and 35% medium to coarse grained					
	46	Brown to dark brown (10YR 4/3-3/3), w/ brassy pyrite specs					

DRILLING LOG

HOLE NO. **MW75**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jennifer Hussey

SHEET 4 OF 22 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	46	Same as above- silty, well graded SAND w/ gravel (SW-SM), w/ 3”-6” cobbles, loose, micaceous, silt increases @ 46.5’ (ML), trace clay 47.5’-49’, silt w/slight plasticity, fine to coarse gravel		PID Headspace (ppm)			
	48						10’/10’
	50	Light yellowish-brown (2.5YR 6/3) gravelly SILT (ML), loose, dry, ~45% gravel (fine to coarse), a few 3” cobbles					
	52	Dark yellowish-brown (10YR 4/4) @ 51.5’, abundant brassy pyrite specks, weak reaction w/ 10% HCL					
	54	Very pale brown (10YR 8/2) SILT (ML), dry, semi-loose but cohesive when squeezed w/fingers					
	56	moist and clayey @ 56’, clayey SILT (ML) w/ slight to low plasticity					
		SILT (ML) w/ very slight plasticity, clay <5%					
	58						5’/5’
		Same as above- w/ fine to coarse gravel, sub-angular					
	60						
		Brown (7.5YR 5/4) and dark grayish-brown (10YR 4/2) SILT; coarse material in w/ silt ~61’-63’, 3”-4” cobbles w/ 8” cobble @ 62’, slightly moist, micaceous					
	62						
		Yellowish-brown (10YR 5/4) silty SAND w/ gravel (SW-SM), loose, dry, sand is well graded, a few 3” cobbles, micaceous					
	64						

DRILLING LOG

HOLE NO. **MW75**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jennifer Hussey

SHEET 5 OF 22 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	64			PID Headspace (ppm)			
		Grades to a gravelly SILT (ML), trace clay from 65-66’					
	66						12’/12’
		Pale brown (10YR 6/3) gravelly SILT (ML) w/ cobbles and some (~15%) sand, dry, loose					
	68						
	70						
		Drilled through large cobble, rock flour- very fine (gray pulverized rock)					Hard drilling @ 71’
	72	Change in color: olive brown (2.5YR 4/3), very moist to wet, gravelly SILT (ML) w/ trace clay, slightly cohesive, small lens of clayey SILT, wet					
		73.5’-75’- Rock flour- very fine, pulverized rock, large cobble @ 74’, increase in coarse gravel and 3”-6” cobbles, moderate reaction w/ 10% HCL					3’/3’
	74						
		Brown (10YR 5/3), silty, gravelly SAND (SW-SM), wet to saturated @75-76’, loose, some cobbles, well graded sand, fine to coarse grained					Driller notes easy drilling from 75-85’
	76						
	78	**White River Formation** – sharp contrast in color to a strong brown (7.5YR 5/4) to reddish brown (5YR 5/4), silty CLAY (CL), moist, low plasticity, uniform					10’/10’
	80			0.8		FEW4-MW75-(80.0)	
		Drilled through large cobble @ 80.7’, very fine to fine gravel and ~15% coarse sand observed in w/clay				FEW4-MW75-80	Water sample
	82						

DRILLING LOG

HOLE NO. **MW75**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jennifer Hussey

SHEET 6 OF 22 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	82	Light brown (7.5YR 6/4) SILT w/ sand and gravel (ML), moist, slight plasticity, grades to a clayey SILT w/ sand and gravel @ 83'		PID Headspace (ppm)			
	84	Light yellowish-brown (10YR 6/4) silty CLAY to clayey SILT (CL/ML), moist, very stiff, low plasticity					
		Loose mostly fine GRAVEL (GM) w/ coarse sand, silty- most fines washed out					Continue drilling dry
	86	86'-100'- cores are cohesive, light yellowish-brown clayey SILT (ML) w/ trace 0.5 mm caliche- white inclusions, moist, medium stiff to stiff, interbedded soft clayey lenses w/low to medium plasticity and some hard, blocky claystone pieces in w/clayey SILT					
	88						
	90			9.2	FEW4-MW75-(90) for grain size and Atterberg Limits	FEW4-MW75-(90.0)	9'/9' 85-94'
	92						
	94						
	96						
		Harder 97-98'- hard claystone/siltstone					11'/11'
	98						
	100			12.6		FEW4-MW75-(100.0)	

DRILLING LOG

HOLE NO. **MW75**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jennifer Hussey

SHEET 7 OF 22 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	100	Broken up core- hard claystone/siltstone 100'-101', very little moisture		PID Headspace (ppm)			
		Return to cohesive cores, brown (10YR 5/3) clayey SILT (ML), moist,					
	102	increase in plasticity @ 102.5', silty clay w/ low plasticity (CL)					
	104	Core breaks into platy hard claystone pieces, moderately cemented- can break most pieces w/ hands Light yellowish-brown (10YR 6/4) clayey SILT (ML) w/scattered (~10%) caliche, alternating w/hard 3"-4" thick claystone w/trace manganese oxide					Driller notes tight Formation
	106						
		Soft zone from ~107'-110.5' of CLAY (CL/CH) w/ high plasticity, very moist to wet, thumb can easily penetrate 1" of core in soft clay					
	108						
	110	Yellowish-brown (10YR 5/4) CLAY (CL) of low to medium plasticity, some caliche, medium stiff to stiff w/ some soft lenses, very moist to wet				FEW4-MW75-(110.0) & FEW4-MW75-(111.0) DUP	
	112						14'/14' 105-119'
	114						
	116						
		Silty CLAY (CL), increase in silt @ 117'					
	118						

DRILLING LOG

HOLE NO. **MW75**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jennifer Hussey

SHEET 8 OF 22 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	118			PID Headspace (ppm)			Drilling w/water starting @ 119’
		Top 5’ of returns (119-125’) consist of broken up claystone cores- may indicate a fractured zone					
	120	Light yellowish-brown (10YR 6/4), hard to very hard CLAYSTONE w/ dendritic manganese oxide (~5%)					
	122						
		No weathering/staining or slickensides observed along broken core surfaces		0.9		FEW4-MW75-(123.0)	
	124						
	126	0.7’ length of solid intact core of CLAYSTONE					
		127-141’- not as hard as above, cohesive cores					~20’/22’
	128	Yellowish-brown (10YR 5/4) SILT (ML) w/ very trace clay (<5%), non-plastic to slight plasticity, medium stiff, very moist to wet along some fresh surfaces of core					
	130						
	132			0.5		FEW4-MW75-(133.0)	
	134						
	136						

DRILLING LOG

HOLE NO. **MW75**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jennifer Hussey

SHEET 9 OF 22 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	136			PID Headspace (ppm)			
	138	138-138.5'- very hard claystone Yellowish-brown SILT (ML), interior of core is wet, medium stiff to stiff, uniform					
	140			0.2		FEW4-MW75-(141.0)	
	142	6' of no recovery in 24' run from 141-165'					
	144						
	146						
		Very hard, yellowish-brown claystone - solid core 147-148'					9" casing advanced to 147' 18'/24' 141-165'
	148	Not as hard, cohesive cores consisting of brown (10YR 5/3) SILT (ML), medium stiff, can break core apart w/ knife, crumbles into silt and some blocky hard silty claystone pieces, wet					
	150			0.6		FEW4-MW75-(151.0)	
		Hard, silty CLAYSTONE @ 151-152.5'					
	152						
	154						

DRILLING LOG

HOLE NO. **MW75**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jennifer Hussey

SHEET 10 OF 22 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	154	Similar to above- brown to yellowish-brown SILT (ML) w/ some clayey silt lenses w/ slight plasticity and alternating harder layers of silty claystone		PID Headspace (ppm)			
	156						
	158	Brown, hard CLAYSTONE, trace manganese oxide, sparkles in sun, can readily break core apart w/ rock hammer, breaks into 1"-2" layers, can break some pieces apart w/ hand pressure					
	160			0.2		FEW4-MW75-(161.0)	
	162	Becomes harder					
	164						
	166	Solid, very hard cores of claystone 165-169', possible fractured zone @ 165.5-166.5', broken up claystone core w/ vertical break Brown, CLAYSTONE, very hard, requires repeated blows w/ hammer to break core, massive					
	168						
	170	Becomes softer, able to gouge core 1" w/ knife, clayey SILT (ML) w/ 2" layers of siltstone/claystone		0.0		FEW4-MW75-(171.0)	
	172						

DRILLING LOG

HOLE NO. **MW75**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jennifer Hussey

SHEET 11 OF 22 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	172	Same as above- light yellowish-brown to yellowish-brown (10YR 6/4-5/4), alternating between clayey SILT (ML) and hard SILTSTONE/CLAYSTONE		PID Headspace (ppm)			
	174						
	176						21'/21' 165-186'
	178	Becomes brittle and silty @ 178', brittle pieces crumble into silt w/ finger pressure, mostly non-plastic (clay is absent)					
	180						
				0.0		FEW4-MW75-(181.0)	
	182						
	184	Brown to yellowish-brown, clayey SILT/SILTSTONE w/ hard layers- although able to break core apart w/rock hammer					
	186	Light yellowish-brown CLAYSTONE, hard, moist, w/ trace silt, uniform/massive w/ a few ½" vugs, also a few clasts/concretions of harder claystone, clasts are 2-3", spheroidal					
	188						
	190						

DRILLING LOG

HOLE NO. **MW75**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jennifer Hussey

SHEET 12 OF 22 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	190	Same as above- hard claystone, massive, solid w/ a few very hard oblate concretions		PID Headspace (ppm)			
				0.1		FEW4-MW75-(191.0)	
	192						
					FEW4-(193-194) for physical parameters		
	194						
	196						
	198						
	200						
	202						
		Light yellowish-brown silty CLAYSTONE, softer than above, can be crumbled w/ moderate hand pressure, slightly blocky texture, medium plasticity (CL), moist					
	204						
				0.0		FEW4-MW75-(205.0)	
	206						
	208						

DRILLING LOG

HOLE NO. **MW75**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jennifer Hussey

SHEET 13 OF 22 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	208			PID Headspace (ppm)			
		Yellowish-brown (10YR 5/4) SILTSTONE w/ trace clay, very hard, many blows w/ rock hammer to break, small vugs on surface, few small clasts present, mechanical breaks, little to no reaction w/10% HCL, massive, dense, moist, minor caliche					Resume drilling 8/20/17, 0830
	210						
	212			15.4		FEW4-MW75-(213.0)	
	214	poor recovery, Variegated cobbles remaining (medium to large), sand washed, wet, w/ some fine to medium sub-angular/sub-rounded gravel, little to no reaction w/ 10% HCL					10'/16' 209-225'
	216						
	218						
	220	Well cemented conglomerate w/ variegated gravel, heavy reaction w/ 10% HCL					
	222						
	224	Less well cemented, sandy, 5% clay		24.7		FEW4-MW75-(225.0) & FEW4-MW75-(226.0) DUP	
		Washed- No Recovery 225-229'					
	226						

DRILLING LOG

HOLE NO. **MW75**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jennifer Hussey

SHEET 14 OF 22 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	226	Washed- No Recovery 225-229’		PID Headspace (ppm)			
	228						
		Well cemented conglomerate w/ variegated gravel, heavy reaction w/10% HCL					17’/21’ 225-241’
	230						
	232						
		Light yellowish brown (10YR 6/4) to light gray (10YR 7/2) SILT/CLAYSTONE, hard, numerous blows w/ rock hammer to break, little fine gravel, sub-angular/sub-rounded, minor manganese oxide, slight to medium reaction w/10% HCL, dry to slightly moist					
	234						
				2.0		FEW4-MW75-(235.0)	
	236						
	238						
		Pale brown (10YR 6/3) clayey SILT (ML), very slightly plastic, hard but crumbles upon breakage, dry to very slightly moist, little to no reaction w/10% HCL					
	240						
	242						
	244						

DRILLING LOG

HOLE NO. **MW75**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jennifer Hussey

SHEET 15 OF 22 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	244	Pale brown (10YR 6/3) clayey SILT (ML)		PID Headspace (ppm)			
				1.5		FEW4-MW75-(245.0)	
	246	Pale brown (10YR 6/3) SILTSTONE w/ minor clay, very hard, dense, massive, many blows from hammer to break, slight reaction w/10% HCL, dry to slightly moist, manganese oxide, calcite present					Majority of core was either broken by sledge coming out of core barrel or hit deck = mechanical breaks
	248						
	250						
	252						20'/20' 246-266'
	254						
				1.3		FEW4-MW75-(255.0)	
	256						
	258						
	260	Brown (10YR 4/3) SILT (ML) w/ clay, low plasticity, moist, crumbles, heavy reaction w/ 10% HCL (259.4-260') Light yellowish-brown (10YR 6/4) clayey SILT (ML), low plasticity, dry to slightly moist, crumbly, platey, minor manganese oxide, little-no reaction w/ HCl, few small clay clasts					
	262						

DRILLING LOG

HOLE NO. **MW75**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jennifer Hussey

SHEET 16 OF 22 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	262	Same as above - Light yellowish-brown (10YR 6/4) clayey SILT (ML), low plasticity, dry to slightly moist,		PID Headspace (ppm)			
	264			0.5		FEW4-MW75-(265.0)	
	266	Light yellowish-brown (10YR 6/4) CLAYSTONE w/ silt, hard- scratch w/fingernail but many blows to break w/rock hammer, little to no reaction w/ 10% HCL, minor manganese oxide/biotite/calcite/caliche, dry to slightly moist, vugs present on surface					20'/20' 266-286' majority of core dropped out of core barrel on deck = many mechanical breaks
	268						
	270						
	272						
	274			0.0		FEW4-MW75-(275.0)	
	276						
	278						
	280						

DRILLING LOG

HOLE NO. **MW75**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jennifer Hussey

SHEET 17 OF 22 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	280			PID Headspace (ppm)			
		Yellowish-brown (10YR 5/4) CLAYSTONE, w/ fine gravel, sub-angular/sub-rounded gravel (30%), sand <5%, silt <5%, moderate reaction w/ 10% HCL, moist to slightly wet, gravel variegated					
	282						
	284						
		284.5-286'- brown (10YR 4/3) CLAYSTONE w/ silt and clay, clay is (CL), medium plasticity, moist, few clasts, little to no reaction w/ 10% HCL		0.5		FEW4-MW75-(285.0)	
	286	Brown (10YR 5/3) to yellowish-brown (10YR 5/4) CLAYSTONE w/ gravel and silt, gravel fine to medium, sub-rounded/sub-angular, little to no reaction w/ 10% HCL, surface vuggy					
	288						14'/19' 286-305'
	290						
	292			2.1		FEW4-MW75-(293.0)	
		Well cemented conglomerate, variegated gravel is fine to medium, very hard, no reaction w/ 10% HCL					
	294	294-299'- No Recovery Assumed sand & gravel					~294-299' washed out
	296						
	298						

DRILLING LOG

HOLE NO. **MW75**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jennifer Hussey

SHEET 18 OF 22 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	298	294-299'- No Recovery Assumed sand & gravel		PID Headspace			
	300	Well cemented conglomerate, fine to medium gravel, variegated, no reaction w/10% HCL					
	302	Yellowish-brown (10YR 5/4) gravelly SAND (SW) w/clay (CH), high plasticity, moist, moderate reaction w/10% HCL, gravel fine to medium, sub-angular/sub-rounded, fairly fine-grained sand, minor silt					
	304	Light brownish-gray (10YR 6/2) silty GRAVEL (GM), gravel variegated, fine to medium, sub-angular/sub-rounded, dry, heavy reaction w/10% HCL, >10% silt		16.6	FEW4-MW75-(304) for grain size and Atterberg Limits	FEW4-MW75-(304.0)	
	306	305-312'- No Recovery Assumed silty sand and/or gravel					
	308						14'/21' 305-326' 305-312' washed per driller
	310						
	312	Very pale brown (10YR 7/3) CLAYSTONE w/ minor silt, hard, minor manganese oxide, calcite, dry to slightly moist, little gravel, surface of core vuggy, slight reaction w/10% HCL,		0.0		FEW4-MW75-(314.0)	core broken w/ mechanical breaks
	314	possible oblique fracture, slight increase in fine gravel					
	316						

DRILLING LOG

HOLE NO. **MW75**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jennifer Hussey

SHEET 19 OF 22 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	316	Same as above - Very pale brown (10YR 7/3) CLAYSTONE w/ minor silt, hard		PID Headspace (ppm)			
	318						
	320						
	322					FEW4-MW75-(323.0)	
	324			0.0			
	326	Light yellowish-brown (10YR 6/4) clayey SILT (ML) w/very slight plasticity, little fine to medium, variegated, sub-angular/sub-rounded gravel, moist, little to no reaction w/ 10% HCL, few pieces of claystone					
	328						20'/20' 326-346'
	330	Yellowish-brown (10YR 5/4) CLAYSTONE, hard, numerous blows to break, minor manganese oxide, moist, little to no reaction w/ 10% HCL, minor vugs					
	332						
	334			0.0		FEW4-MW75-(333.0)	

DRILLING LOG

HOLE NO. **MW75**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jennifer Hussey

SHEET 20 OF 22 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	334	Same as above - Yellowish-brown (10YR 5/4) CLAYSTONE, hard		PID Headspace (ppm)			
	336						
	338						
	340						
		341.5'-346'- yellowish-brown (10YR 5/4) silty CLAYSTONE, less hard than 329-341.5', interbedded CLAY (CH), high plasticity, moist, little to no reaction w/10% HCL, minor biotite, caliche, indent clay w/ thumb ½"					
	342						
	344			0.0		FEW4-MW75-(344.0) & FEW4-MW75-(345.0) DUP	
	346	346'-347'- No Recovery Assumed S.A.A.					
		Yellowish-brown (10YR 5/4) CLAYSTONE w/ silt, hard, numerous blows to break, dry to moist, little to no reaction w/ 10% HCL, minor biotite					22'/23' 346-369'
	348						
	350						
	352						

DRILLING LOG

HOLE NO. **MW75**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jennifer Hussey

SHEET 21 OF 22 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	352	Same as above - Yellowish-brown (10YR 5/4) CLAYSTONE		PID Headspace (ppm)			
	354						
				0.0		FEW4-MW75-(355.0)	
	356						
	358						
	360						
	362						
		Pale brown (10YR 6/3) clayey SILT (ML) w/ gravel, gravel is fine, sub-angular/sub-rounded, variegated, dry, little to no reaction w/10% HCL					
	364	Grayish-brown (10YR 5/2) CLAY (CL) w/ gravel and silt, wet, high plasticity, moderate reaction w/10% HCL					
	366			0.7		FEW4-MW75-(366.0)	
		Very pale brown (10YR 7/3) SILTSTONE w/ minor fine gravel, sub-angular/sub-rounded, dry; heavy reaction w/ 10% HCL					
	368						
		Dark yellowish-brown (10YR 4/4) CLAYSTONE w/ gravel, small amount fine sand, variegated fine to medium gravel, sub-angular/sub-rounded; moist-wet					Chadron Formation
	370						

DRILLING LOG

HOLE NO. **MW75**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jennfier Hussey

SHEET 22 OF 22 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	370	4" conglomerate layer @370', well cemented, underlain by Dark yellowish-brown (10YR 4/4) CLAYSTONE w/ gravel		PID Headspace (ppm)			
		No recovery – washed - Assumed silt/sand and gravel					
	372						
	374						
	376	Variegated gravel, fine to coarse, w/ cobbles, washed of most sand, wet, 4" conglomerate layer at 376'					
	378						13'/18' 369-387'
		Variegated, gravelly SAND w/ clay, gravel (30%) is fine to coarse, sub-angular/sub-rounded, clay is medium plasticity; wet, moderate reaction w/10% HCL			FEW4-MW75-(380.0) for grain size and Atterberg Limits	FEW4-MW75-(380.0)	
	380	380-381': w/ less sand than above, more clay		0.5			
		Light gray (10YR 7/1) SILT/CLAYSTONE, hard, "smooth", dry, little to no reaction w/10% HCL					
	382						
	384						
		color change to very pale brown (10YR 7/3)					
	386					FEW4-MW75-(387.0)	
		End of boring @ 387'		0.0			08/21/17, 1630, TD @ 387'
	388						

DRILLING LOG

HOLE NO. **MW76**

COMPANY NAME: RMC Consultants, Inc.	DRILLING SUBCONTRACTOR: Yellow Jacket Drilling Services, Inc.	SHEET 1 OF15 SHEETS
PROJECT: Atlas D Missile Site 4 RI Addendum 2017-2018 Tasks	LOCATION: Atlas D Missile Site 4 – Laramie County, Wyoming	
NAME OF DRILLER	MANUFACTURER'S DESIGNATION OF DRILL: TSI 150T SONIC RIG	
SIZES AND TYPES OF DRILLING EQUIPMENT: Sonic Drill Rig; 7-in. diam. core barrel (10-ft.); 8-in. diam. drill casing; 9-in. diam. drill casing (150ft-TD)	HOLE LOCATION: Next to MW66; 214375.05 ft N, 663242.06 ft E	
	SURFACE ELEVATION: 7244.24ft MSL	
	DATE STARTED: 9/9/17	DATE COMPLETED: 9/11/17
OVERBURDEN (OGALLALA FM. or ALLUVIAL) THICKNESS: 89'	DEPTH GROUNDWATER ENCOUNTERED: ~89' bgs on 9/9/17	
DEPTH DRILLED INTO WHITE RIVER FORMATION: WRF: 89' to 254' bgs	DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: 10/17/17 MW76-87: 81.07 MW76-123: 95.85 MW76-	
TOTAL DEPTH: 255, 239.3 254ft. bgs	OTHER WATER LEVEL MEASUREMENTS	

GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	CORED INTERVAL
	3 - grain size/Atterbergs	2 - physical parameters	Surface to Total Depth

SAMPLES FOR CHEMICAL ANALYSIS	VOCs – onsite	VOCs – offsite	OTHER	OTHER	OTHER	TOTAL CORE RECOVERY
	27	31				91.5 %

DISPOSITION OF HOLE	2-in. diam. NESTED MONITORING WELLS	SIGNATURE OF INSPECTOR
	TD: 89.8 ft bgs TD: 125.8 ft bgs TD: 257.2 ft bgs	John Heil

ELEV.	DEPTH	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE ID.	ANALYTICAL SAMPLE ID.	Recovery (ft/ft) & REMARKS
	0	(10YR 4/4), sandy SILT (ML) w/ gravel, trace clay; sand is f-m-c; gravel (~20%) is f-m; dry, no reaction to 10% HCL		PID Headspace (ppm)			9/9/17, 0830 begin drilling
	2						Surface to 6': 6'/6'
	4	Light gray (10YR 7/2) SILT (ML) w/ gravel, w/ clay; gravel (15%) is f-m-c, dry to damp					
	6	Same as above					
	8	Two cobbles @ 8' (around 8" in diameter)					6-16': 9.5'/10'
	10						

DRILLING LOG

HOLE NO. **MW76**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: John Heil

SHEET 2 OF 15 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	10	Same as above –Silt with gravel and clay		PID Headspace (ppm)			
	12						
	14	Pale brown (10YR 6/3) gravelly SILT (ML) w/ sand and cobbles, 30 % gravel (f-m-c), 10% cobbles (~ 5” diameter), well graded, moist, weak reaction to 10% HCL					
	16	(10YR 6/3), SILT (ML) w/ 10% sand (f-m), 15% gravel (f-m-c), dry to damp, strong reaction to 10% HCL; with fine shiny material (mica, pyrite?)					
	18						
	20						16-26’: 10’/10’
	22						
	24						
	26	Same as above 26-27’: wet from drilling fluid					
	28						

DRILLING LOG

HOLE NO. **MW76**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: John Heil

SHEET 3 OF 15 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	28			PID Headspace (ppm)			
		(10YR 6/3) gravelly, sandy SILT (ML) w/~ 1" layers of partially cemented clay w/ gravel, 1'gravelly clay layer (CL) @ 29', caliche nodules (1-3" diameter), mica or pyrite flakes, dry to damp – moisture is most likely from drilling fluid, strong reaction to 10% HCL					26-32': 7.5'/8' Drillers washed out fines from 29-29.5'
	30						
	32						
	34				FEW4-MW77-(35) for grain size/ Atterberg Limits		
	36						
		37-42' fines washed out by drillers. m-c gravel & cobbles left over, ~ 2' in core bag					
	38						
	40						
	42						14'/19'
		42-42.5' sandy CLAY layer, very pale brown (10YR 8/2) and yellowish brown (10YR 5/6) (CL), low to medium plasticity, caliche nodules (1-3"), moist, strong reaction to 10% HCL					
	44	fines washed out from 42.5-44" ,					
	46						

DRILLING LOG

HOLE NO. **MW76**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: John Heil

SHEET 4 OF 15 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	46	44-49' (10YR 6/3), gravelly CLAY (CL) w/ trace sand and silt, sand f-m-c; low to medium plasticity, moist, color change to dark brown @48', moderate reaction to 10% HCL		PID Headspace (ppm)			
	48						
	50	Light yellowish-brown (10YR 6/4) gravelly SILT (ML) w/ sand, f-m gravel (35%), coarse sand, dry, large (9") cobbles @ 50' & 55', strong reaction to 10% HCL					
	52						
	54						
	56	Variegated sandy, gravelly conglomerate w/ cobbles, coarse sand, f-m-c gravel, angular, well graded, very hard, ~ 3' of residual gravel, cobbles & conglomerate pieces 56-64' (washed interval), no reaction to 10% HCL					
	58						6'/10'
	60						
	62						
	64						

DRILLING LOG

HOLE NO. **MW76**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: John Heil

SHEET 5 OF 15 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	64	Light yellowish-brown (10YR 6/4) gravelly SILT (ML) w/trace cobbles, f-m-c gravel (30%), well graded, wet (64-65', drillers), otherwise dry,		PID Headspace (ppm)			10% HCL Reaction: Strong
	66	66-72'- variegated gravel & cobbles, fines washed away by drillers, ~ 3' of gravel and cobbles remain in core barrel.					
	68						11'/14'
	70						
	72	Light yellowish-brown (10YR 6/4) gravelly SILT w/ sand (ML), f-m gravel (30%), f-m-c sand, wet in areas (drillers) but overall dry, w/ 1-2" moderately cemented clay w/ gravel layers (10YR 8/3), dry, strong reaction to 10% HCL					
	74						
	76						
	78						
	80	80-84'- variegated, sandy, gravelly conglomerate w/ cobbles, m-c gravel, cobbles are 6-8" in size, fines washed away by drillers, ~2'/4' of core recovered					7'/9'
	82						

DRILLING LOG

HOLE NO. **MW76**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: John Heil

SHEET 6 OF 15 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	82	Poor recovery, rounded gravel and cobbles residual in core, fines washed out		PID Headspace (ppm)			
	84	(10YR 6/4), gravelly SILT w/ sand (ML) w/ 1-2" layers of (10YR 8/3) moderately cemented, gravelly CLAY (CL), wet in areas (drillers) but overall dry, around 25% gravel, strong reaction to 10% HCL					
	86						
	88						
	90	White River Formation & water encountered @ 89' bgs. Yellowish-brown (10YR 5/6) alternating layers of silty CLAY (CL) and clayey SILT (ML), stiff w/ 1-2" hard claystone layers, free water can be observed on some of the bedding planes, medium plasticity, hard claystone clasts (1-3"), rip-up clasts? moist to wet, moderate reaction to 10% HCL		0.6	FEW4-MW76-(90) for grain size/ Atterberg Limits	FEW4-MW76-(90.0)	Water encountered at 89' bgs 17'/17'
	92						
	94						
	96						
	98						
	100			0.4		FEW4-MW76-(100.0)	

DRILLING LOG

HOLE NO. **MW76**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: John Heil

SHEET 7 OF 15 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	100			PID Headspace (ppm)			
	102						
	104						9/9/17. 1745 drillers stop for the day @ 106' bgs
	106	Yellowish-brown (10YR 5/4) alternating layers of silty CLAYSTONE and clayey SILTSTONE, dense, hard, small black minerals present (magnesium oxide?) 1mm, core came out as broken up fragments (1-6"), possible fracture zone, moist, no reaction to 10% HCL					9/10/17, 0845 begin drilling @106'bgs
	108						
	110			0.3		FEW4-MW76-(110.0)	
	112	Brown (10YR 5/3) alternating layers of silty CLAY (CL) and clayey SILT (ML), dense, stiff, competent, medium plasticity, contains hard claystone clasts (rip-up clasts?) 1-3", damp but moist to wet around claystone clasts, 1mm black mineral masses (magnesium oxide?), slight reaction to 10% HCL					24'/24'
	114						
	116						
	118						

DRILLING LOG

HOLE NO. **MW76**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: John Heil

SHEET 8 OF 15 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	118			PID Headspace (ppm)			
	120	Possible fracture @ 120'-121', slickensides are visible, ~ 45-degree fracture, tight black mineral staining (magnesium oxide) @ 121' on claystone clast where water can be seen in the soil		0.2	FEW4-MW76-(120) for grain size/ Atterberg Limits	FEW4-MW76-(120.0)	
	122						
	124						
	126						
	128						
	130			0.8			
	132						22'/30' Driller believes that 130-138' was washed away by fluids
	134						
	136						

DRILLING LOG

HOLE NO. **MW76**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: John Heil

SHEET 9 OF 15 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	136			PID Headspace (ppm)			
	138	138-143' (10YR 5/6) clayey SILTSTONE, dense, hard, broken up into fragments (1-7"), possible fracture zone, moist and wet in areas (drillers?), takes repeated blows from hammer to break, slight reaction to 10% HCL					
	140			2.7		FEW4-MW76-(140.0) & FEW4-MW76-(141.0) DUP	
	142						
	144	Yellowish-brown (10YR 5/6), alternating layers of silty CLAY (CL) and clayey SILT (ML), soft to stiff, moist to wet, low to medium plasticity, water is visible around harder areas when core is broken up, hard claystone clasts (1-4"), water can be seen on exterior of clasts but are dry on the interior, small 1mm black minerals (magnesium oxide), No reaction to 10% HCL					
	146						
	148						
	150			0.4		FEW4-MW76-(150.0)	
	152						
	154						

DRILLING LOG

HOLE NO. **MW76**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: John Heil

SHEET 10 OF 15 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	154			PID Headspace (ppm)			
	156						
	158						
	160	(10YR 5/6), clayey SILTSTONE, dense, hard to very hard, broken up into fragments, moist, strong reaction to 10% HCL. vertical fracture (tight) @ 160-161' and 164-165', dendritic black mineralization (magnesium oxide) present inside 164-165' fracture		0.6		FEW4-MW76-(160.0)	
	162						
	164			1.7		FEW4-MW76-(164.0)	22'/22'
	166						
	168				FEW4-MW76-(167-168) "6NMR" for Eff. Porosity by NMR	FEW4-MW76-(170.0)	
	170	Yellowish-brown (10YR 5/6), alternating layers of silty CLAY (CL) and clayey SILT (ML) w/ 1-3" layers of hard claystone		0.8			
	172						

DRILLING LOG

HOLE NO. **MW76**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: John Heil

SHEET 11 OF 15 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	172	Silty CLAY (CL) and clayey SILT (ML), moist to wet, soft to stiff, low to medium plasticity, w/ 1-2" claystone clasts, a few caliche nodules (1"), weak reaction to 10% HCL		PID Headspace (ppm)			
	174						
	176						
	178						
	180			2.1		FEW4-MW76-(180.0) & FEW4-MW76-(181.0) DUP	
	182	Yellowish-brown (10YR 5/6) clayey SILTSTONE, hard to very hard, dense, 1 mm black minerals (magnesium oxide), broken into fragments from 182-184.5' but otherwise competent cores, possible fracture zone 182-184.5' and possible tight vertical fracture @ 190', dry to moist, no reaction to 10% HCL					9/10/17 1425 lightning delay 1530 due to weather drillers done for the day @ 182' 9/11/17 0745 cont. drilling@182'
	184				FEW4-MW76-(185-186) "7NMR" for Eff. Porosity by NMR		
	186						
	188						20'/20'
	190			1.0		FEW4-MW76-(190.0)	

DRILLING LOG

HOLE NO. **MW76**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: John Heil

SHEET 12 OF 15 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	190			PID Headspace (ppm)			
	192						
	194	Light yellowish-brown (10YR 6/4) alternating layers of silty CLAY (CL) and clayey SILT (ML) w/ claystone clasts (1-2") and 1-3" layers of hard, dense claystone, moist to wet, water is visible on top/bottom of claystone layers and claystone clasts, low to medium plasticity, soft, stiff, moderate reaction to 10% HCL					
	196						
	198						
	200			0.5		FEW4-MW76-(200.0)	
	202	Dark yellowish-brown (10YR 4/4) clayey SILTSTONE, hard, dense, mostly competent cores, trace 1mm black minerals (magnesium oxide), dry to moist					
	204						20'/20'
	206						
	208						

DRILLING LOG

HOLE NO. **MW76**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: John Heil

SHEET 13 OF 15 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	208			PID Headspace (ppm)			
	210	possible tight vertical fracture @ 210’		0.1		FEW4-MW76-(210.0)	
	212						
	214	(10 \YR 6/4), alternating layers of clayey SILT (ML) and silty CLAY (CL) w/ 1-2” claystone clasts, soft to stiff, low to medium plasticity, competent, 1” elongated calcite masses, moist to wet, strong reaction to 10% HCL					
	216						
	218						
	220			0.9		FEW4-MW76-(220.0)	
	222						
	224	Pale brown (10YR 6/3) silty CLAYSTONE with trace sand, hard to very hard, dense, massive, mostly competent cores, ½-1” black mineral masses (magnesium oxide), dry to moist, slight to moderate reaction to 10% HCL					19’/19’
	226						

DRILLING LOG

HOLE NO. **MW76**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: John Heil

SHEET 14 OF 15 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	226			PID Headspace (ppm)			
		Trace coarse sand, fine gravel 227-232’					
	228						
	230						
	232						
		Brown (10YR 4/3), alternating layers of silty CLAY (CL) and clayey SILT (ML), soft to stiff, low to medium plasticity, 1-2” claystone clasts @ 232-234’, dominantly dry to moist except wet around claystone clasts (232-234’), breaks along bedding planes (1-6” thickness), weak reaction to 10% HCL		0.1		FEW4-MW76-(233.0)	
	234						
	236						
	238						
	240			0.0		FEW4-MW76-(240.0)	
		(10YR 5/6), clayey SILTSTONE w/ sand and fine gravel (15%), f-m-c sand, hard/dense, competent, dry, weak reaction to 10% HCL					14’/14’
	242						
	244						

DRILLING LOG

HOLE NO. **MW76**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: John Heil

SHEET 15 OF 15 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	244	(10YR 6/4), alternating layers of clayey SILT (ML) and silty CLAY (CL) w/ trace sand and gravel, f-m sand and fine gravel, stiff/hard, competent, low to medium plasticity, ½ - 1" claystone clasts, dominantly moist to damp, wet around claystone clasts, trace 1mm black mineral (magnesium oxide)		PID Headspace (ppm)			
	246						
	248						
	250			0.7	FEW4-MW76-(250) for grain size/ Atterberg Limits	FEW4-MW76-(250.0)	
	252						
	254	End of Boring					9/11/17 1415 TD @ 254'
	256						
	258						
	260						
	262						

DRILLING LOG

HOLE NO. **MW77**

COMPANY NAME: RMC Consultants, Inc.	DRILLING SUBCONTRACTOR: Yellow Jacket Drilling Services, Inc.	SHEET 1 OF 15 SHEETS
PROJECT: Atlas D Missile Site 4 RI Addendum 2017-2018 Tasks	LOCATION: Atlas D Missile Site 4 – Laramie County, Wyoming	
NAME OF DRILLER: Jose Munguia	MANUFACTURER'S DESIGNATION OF DRILL: TSI 150T SONIC RIG	
SIZES AND TYPES OF DRILLING EQUIPMENT: Sonic Drill Rig; 7-in. diam. core barrel (10-ft.); 8-in. diam. drill casing (250-ft.)	HOLE LOCATION: ~25'NE of MW69; 216150.44 ft N, 664997.25 ft E	
	SURFACE ELEVATION: 7071.82 ft MSL	
	DATE STARTED: 7/27/17,1400	DATE COMPLETED: 7/30/17
OVERBURDEN (OGALLALA FM. or ALLUVIAL) THICKNESS: 6ft bgs	DEPTH GROUNDWATER ENCOUNTERED: 07/28/17, 0845, 77.3' bgs, 07/28/17, 0920, 77.0'	
DEPTH DRILLED INTO WHITE RIVER FORMATION: 250ft. bgs	DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: 8/10/17 - MW77-Temp (4" PVC): 26.5 ft bgs	
TOTAL DEPTH OF HOLE: 256ft. bgs	OTHER WATER LEVEL MEASUREMENTS: 10/17/17 MW77-40: 25.4 ft bgs MW77-129: 26.2 ft bgs MW77-255:	

GEOTECHNICAL SAMPLES	DISTURBED: 3 - grain size/Atterberg Limits	UNDISTURBED: 1 - physical parameters	CORED INTERVAL: Surface to Total Depth

SAMPLES FOR CHEMICAL ANALYSIS	VOCs – onsite	VOCs – offsite	OTHER	OTHER	OTHER	TOTAL CORE RECOVERY
	27	25				91.5 %

DISPOSITION OF HOLE	2-in. diam. NESTED MONITORING WELLS	SIGNATURE OF INSPECTOR
	TD: 45.1 ft bgs TD: 131.4 ft bgs TD: 256.9 ft bgs	Todd Margulies, John Heil

ELEV.	DEPTH	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE ID.	ANALYTICAL SAMPLE ID.	Recovery (ft/ft) & REMARKS
				PID Headspace (ppm)			
		Dark yellowish-brown (10YR 4/4) SILT (ML), loose, dry, small amount of clay present (<5%), no reaction w/ 10% HCL					
	2	Dark yellowish-brown (10YR 4/4) SILT (ML) w/ gravel (f-c), sub-rounded/angular, w/ sand, loose, dry, no reaction w/10% HCL					Drillers using fluids (mud) from start 5.5'/6'
	4						
	6	**White River Formation** @ 6' bgs Pale brown (10YR 6/3) CLAY (CL), moist, low to medium plasticity, slight to moderate reaction w/10% HCL					9'/10'
	8						
	10						

DRILLING LOG

HOLE NO. **MW77**

PROJECT: Atlas D Missile Site 4 – FY Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 2 OF 15 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	10	Same as above – Pale brown CLAY (CL)		PID Headspace (ppm)			
	12						
	14						
	16	Very pale brown (10YR 7/3) silty CLAY (CL), low to medium plasticity, dry to moist, moderate reaction w/ 10% HCL					
	18						18.5'/20'
	20						
	22						
	24						
	26	Same as above w/ increase in silt, dry					
	28			1.1		FEW4-MW77-(28.0)	

DRILLING LOG

HOLE NO. **MW77**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 3 OF 15 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	28			PID Headspace (ppm)			
		S.A.A. - Very pale brown (10YR 7/3) silty CLAY (CL),					
	30						
		Numerous Horizontal Cracks in Core from 30 – 36 feet					
	32						
	34						
				0.2		FEW4-MW77-(35.0)	Stop Drilling
	36	Yellowish-brown (10YR 5/4) CLAYSTONE, very dense/hard, moderate reaction w/10% HCL					Resume drilling 7/28/17, 0815
	38						
	40						
						FEW4-MW77-41	Water Sample 20'/20'
	42						
	44						
				0.2		FEW4-MW77-(45.0)	
	46						

DRILLING LOG

HOLE NO. **MW77**

PROJECT
Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR

SHEET 4
OF 15 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	46			PID Headspace (ppm)			
		Yellowish (10YR 5/4) CLAYSTONE, very dense, hard, fractured zone 49-50', moderate reaction w/10% HCL					
	48						
	50						
		Yellowish-brown (10YR 5/4) silty CLAY (CL), low to medium plasticity, dry to slightly moist, slight to moderate reaction w/10% HCL					
	52						
	54			0.6		FEW4-MW77-(55.0)	
	56	Brown (10YR 5/3) CLAYSTONE, very dense, hard, small amounts of caliche, dry to moist, moderate reaction w/10% HCL					
	58	mechanical breaks in core 57-71'					Portion of core dropped out of core barrel on to deck-broken up
	60						
	62						
	64						

DRILLING LOG

HOLE NO. **MW77**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 5 OF 15 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	64	S.A.A. - brown (10YR 5/3) CLAYSTONE, very dense, hard		PID Headspace (ppm) 0.5		FEW4-MW77-(65.0)	20'/20'
	66						
	68						
	70						
	72	Brown (10YR 5/3) silty CLAY (CL), low to medium plasticity, dry to moist, broken pieces of claystone (2-5"), moderate reaction w/10% HCL		0.2		FEW4-MW77-(73.0) & DUP FEW4-MW77-(74.0)	
	74						
	76	Brown (10YR 5/3),CLAYSTONE, very dense, hard, dry (wet from drill mud), all core breaks are mechanical, moderate to strong reaction w/10% HCL					
	78						
	80						
	82						

DRILLING LOG

HOLE NO. **MW77**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 6 OF 15 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	82	S.A.A - Brown (10YR 5/3),CLAYSTONE, very dense, hard		PID Headspace (ppm)			
	84			0.0	FEW4-MW77-(85-86) "4NMR" for physical parameters	FEW4-MW77-(85.0)	21'/21'
	86						
	88						
	90						
	92						
	94						
	96	Yellowish-brown (10YR 5/4) silty CLAY (CL), low to medium plasticity, moist to dry, contains pieces of broken claystone, hard, dense, dry, moderate reaction w/10% HCL		0.2		FEW4-MW77-(96.0)	Portion of core dropped out of core barrel on to deck
	98	Pale brown (10YR 6/3) Claystone, hard, dense, dry, moderate reaction w/10% HCL All breaks in core are mechanical					
	100						

DRILLING LOG

HOLE NO. **MW77**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 7 OF15 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	10 0			PID Headspace (ppm)			
		S.A.A. - Pale brown (10YR 6/3) Claystone, hard, dense, dry					
	102						
	104						18'/19'
				0.0		FEW4-MW77-(105.0)	
	106						
	108						
	110						
	112						
	114	Pale brown (10YR 6/3) CLAY (CH) w/ broken claystone pieces (hard/dense), clay has high plasticity, moist to wet, moderate-heavy reaction w/ 10%HCl		0.3		FEW4-MW77-(115.0)	Stop 7/28/17, 1450 hydraulic hose to jaws broke 7/29/17, 0815 continue drilling
	116	Light yellowish-brown (10YR 6/4) CLAYSTONE, hard, dense, uniform, damp to moist, sub-vertical fracture 117-118', no separation, no weathering					
	118						

DRILLING LOG

HOLE NO. **MW77**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 8 OF 15

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	118	Same as above- Light yellowish-brown CLAYSTONE, hard, dense, uniform, damp (very little observable moisture)		PID Headspace (ppm)			
	120						
	122						
	124						
	126	Sub-vertical fracture 125.5-126.0', no separation, no staining/weathering		1.2		FEW4-MW77-(126.0)	
	128						
	130						
	132						
	134	133.5'- Same as above- w/ trace silt, less competent, chips of material are hard		1.2	FEW4-MW77-(134) for grain size/ Atterberg Limits	FEW4-MW77-(134.0)	Moist zone 134-134.5'
	136	Same as above but soft, lighter color, very pale brown (10YR 7/4)					

DRILLING LOG

HOLE NO. **MW77**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 9 OF 15

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	136			PID Headspace (ppm)			
	138	Same as above- Yellowish- brown (10YR 6/4) CLAYSTONE, hard, dense, massive, stiff, most core comes out of hole in pieces except 147-149', core is moist to dry on the interior, breaks along conchoidal fractures, semi-tight, Oblique fracture @ 139', fracture is filled w/ black mineral (biotite) and subhedral to euhedral calcite crystals, calcite crystals are 1-2mm, slickensides are present on fractured surface, strong reaction w/ 10% HCL		0.9		FEW4-MW77-(139.0)	JNH logging w/JM oversight
	140						
	142						
	144			0.8		FEW4-MW77-(145.0)	
	146						
	148						
	150	trace silt from 149-153'					
	152						
	154						

DRILLING LOG

HOLE NO. **MW77**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 10 OF 15 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	154	Yellowish-brown CLAY (CL), damp to wet, trace hard claystone clasts (~2%), 2” in diameter and very hard, water present along claystone clasts, strong reaction w/10% HCL		PID Headspace (ppm)			
				1.1		FEW4-MW77-(155.0)	18’/19’
	156						
	158						
		(10 YR 6/4) CLAYSTONE, dense, massive, very hard, dry to moist, core is almost completely intact coming out of core barrel; w/ black masses (magnesium oxide?) 1-2” in diameter, weak reaction w/10% HCL					
	160						
	162						
	164						
	166						
	168						
		Oblique, ~45 degree fracture @ 169’, slickensides present, tight					
				0.7		FEW4-MW77-(169.0)	
	170						
	172						

DRILLING LOG

HOLE NO. **MW77**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 11 OF 15 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	172			PID Headspace (ppm)			
	174	Sandy CLAYSTONE w/ gravel (~5%), sand is f-m-c, poorly sorted, round/sub-rounded					
	176	Silty CLAY (CL), moist to wet, low plasticity, a few hard clay layers (~1" thick, contain water), no reaction w/ 10% HCL		0.9		FEW4-MW77-(177.0)	
	178	(10YR 6/4) CLAYSTONE w/ trace silt, dense, very hard, stiff, dry to moist, black masses (magnesium oxide) ¼" -1" in diameter, massive, core is intact, breaks into 1-3' lengths, weak reaction w/ 10% HCL					
	180	Vertical tight fracture w/ slickensides @ 179-181', calcite present on lower part of fracture (180-181'), calcite nodule (3"x 1")					
	182			1.4		FEW4-MW77-(182.0)	
	184						
	186						
	188						
	190						

DRILLING LOG

HOLE NO. **MW77**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 12 OF 15 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	190	(Same as above silty CLAYSTONE		PID Headspace (ppm)			18'/19'
	192	192-193'- oblique, tight, near vertical fracture w/ slickensides					
	194	Oblique, ~45-degree fracture, tight slickensides Same as above but poorly consolidated, breaks into ½"-4" pieces, weak reaction w/ 10% HCL		1.2		FEW4-MW77-(195.0)	1330 drillers stop for lunch, storm moves in 1530 continue drilling
	196	Dark yellowish-brown (10YR 4/4) silty CLAYSTONE w/ trace sand (~5%), sand is coarse grained, angular, and red in color (chert?); dense, massive, very hard, ~80% intact, moist, no reaction w/ 10%HCL					
	198						
	200			1.1		FEW4-MW77-(200.0)	
	202	201-202' - Tight near-vertical fracture, slickensides					
	204	Yellowish-brown (10YR 5/4) CLAYSTONE w/ trace sand (~5%), dense, massive, very hard, moist, sand is m-c grained, sub-angular and red (chert?), core is 100% intact, no reaction w/ 10% HCL					
	206	– –					
	208						

DRILLING LOG

HOLE NO. **MW77**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 13 OF 15 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	208			PID Headspace (ppm)			
	210	Dark yellowish-brown (10YR 4/4) silty CLAYSTONE w/ trace sand, very similar to 196-204', dense, massive, hard, ~90% intact, no reaction w/ 10% HCL					20'/22'
	212	Clayey SILT (ML), stiff, moist, contains 2"-3" hard claystone inclusions (~5%), low plasticity, breaks into 1-12" pieces coming out of the core barrel, trace (~1%) coarse sand, slight reaction w/ 10% HCL					
	214			1.8		FEW4-MW77-(215.0)	
	216						
	218	Dark yellowish-brown (10YR 4/4) silty CLAYSTONE w/ trace sand, very hard, dense, massive, black (magnesium oxide) masses, 1-3" in diameter, large vertical semi-tight fracture from 220-224', slickensides, black mineral on fractured surface (magnesium oxide – dendritic), moist to dry, no reaction w/ 10% HCL					
	220						
	222						
	224			1.1		FEW4-MW77-(224.0)	
	226	Yellowish-brown (10YR 5/4) CLAYSTONE, very hard, dense w/ darker clay clasts/inclusions					

DRILLING LOG

HOLE NO. **MW77**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 14 OF 15

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	226	CLAYSTONE, hard, massive, contains dark brown clay nodules (~10%, ~1 cm in diameter), sub-rounded/rounded		PID Headspace (ppm)			
	228						
		(10YR 5/3), silty CLAYSTONE, very hard, dense, trace m-c sand (~1%), moist, biotite flakes (5%, ~1mm).					
	230						20'/21'
		Alternating layers of (10YR 3/4) clayey SILT (ML) (3-5") and claystone (1-2"); (ML) has low to moderate plasticity, soft to stiff, moist to damp, claystone layers are very hard, dense, moist, contains trace sand (5%), m-c grained, sub-angular/sub-rounded, ~1mm biotite flakes (~5%), slight reaction w/ 10% HCL					
	232						
	234					FEW4-MW77-(235.0)	
				0.9			
	236						
	238						7/30/17, 0745 continue drilling
	240						
		Light yellowish brown (10YR 6/4) Claystone with trace sand (~10%) and trace silt, massive, dense, very hard, sand is fine-coarse, sub-rounded/sub-angular, red (chert)					
	242						5'/9'
	244						

DRILLING LOG

HOLE NO. **MW77**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 15 OF 15

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	244	Sand content increases (~20%) and fine gravel is present (~10%), sandy CLAYSTONE		PID Headspace (ppm)			
				20.3 (moisture in bag)		FEW4-MW77-(245.0)	
	246	Sandy CLAYSTONE w/ gravel, sand and gravel content increases, 40% sand, m-c grained, 15% gravel f-m, sub-angular/sub-rounded, no reaction with 10%HCL					
	248						1740 drillers stop @ 248' w/ casing @246'
		Olive brown (2.5YR 4/3) silty SAND (SM) w/ varying amounts of gravel and cobbles, gravel varies from ~50% (248-252') and ~20% (252-256'), cobbles are present @ 248-252', 2-4" in diameter, sub-angular/sub-rounded, gravel (~10%) is f-m-c, sub-angular/sub-rounded, poorly sorted, sand is f-m-c, sub-angular/sub-rounded, variegated in color, no reaction with 10% HCL					07/30/17 0745 continue drilling
	250						
	252						
	254			45.0 (moisture in bag)		FEW4-MW77-(254.0)	6'/8'
							0820 drillers TD= 256'bgs
		End of Boring @ 256'					
	256						

DRILLING LOG

HOLE NO. **MW80**

COMPANY NAME: RMC Consultants, Inc.	DRILLING SUBCONTRACTOR: Yellow Jacket Drilling Services, Inc.	SHEET 1 OF 18 SHEETS

PROJECT: Atlas D Missile Site 4 RI Addendum 2017-2018 Tasks	LOCATION: Atlas D Missile Site 4 – Laramie County, Wyoming
NAME OF DRILLER: Jose Mungula	MANUFACTURER'S DESIGNATION OF DRILL: TSI 150T SONIC RIG
SIZES AND TYPES OF DRILLING EQUIPMENT: Sonic Drill Rig; 7-in. diam. core barrel (10-ft.); 8-in. diam. drill casing; 9-in. diam. drill casing	HOLE LOCATION: West end of Blgd.1; 213855.31, 661401.63
	SURFACE ELEVATION: 7272.3ft MSL
	DATE STARTED: 8/12/17 — DATE COMPLETED: 8/15/17
OVERBURDEN (OGALLALA FM. Thickness): 66 feet	DEPTH GROUNDWATER ENCOUNTERED: Wet @ 68' while drilling
DEPTH DRILLED INTO WHITE RIVER FORMATION: 235 ft - WRF 66 feet to 301 feet bgs	DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: 10/18/17 MW80-128:71.45 MW80-223:72.42 MW80-284:
TOTAL DEPTH OF HOLE: 66 66 301' bgs	OTHER WATER LEVEL MEASUREMENTS

GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	CORED INTERVAL
	3 for grain size/Atterbergs	6 for physical parameters	Surface to Total Depth

SAMPLES FOR CHEMICAL ANALYSIS	VOCs – onsite	VOCs – offsite	OTHER	OTHER	OTHER	TOTAL CORE RECOVERY
	33	29				96%

DISPOSITION OF HOLE	2-in. diam. NESTED MONITORING WELLS	SIGNATURE OF INSPECTOR
	TD: 130.6 ft bgs TD: 224.6 ft bgs TD: 286 ft bgs	

ELEV.	DEPTH	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE ID.	ANALYTICAL SAMPLE ID.	Recovery (ft/ft) & REMARKS
		Topsoil/Roots 0-6" Brown, (10YR 4/3) clayey SAND (SC) w/sub-angular gravel, mostly fine, moist		PID Headspace (ppm) 3.5		FEW4-MW80-(0.5)	1510 Begin Drilling
	2	Increase in clay @ 2', sandy, gravelly CLAY (CL), moist, f -c gravel		16.4		FEW4-MW80-(2.5)	
	4	Very dark brown (7.5YR 2.5/2) SILT w/ trace clay (ML), some cohesiveness, moist, micaceous					6'/6'
	6	Strong brown (7.5YR 4/4) clayey SILT (ML) w/ trace coarse gravel, breaks in a semi-platy manner @ 6', slight plasticity and cohesiveness					
	8	Light olive brown (2.5YR 5/3) silty SAND w/ gravel (SW-SM), well graded sand (f-m-c) ~15% gravel, sub-angular/sub-rounded, mostly fine but some coarse sized gravel		16.5		FEW4-MW80-(9.0)	
	10						

DRILLING LOG

HOLE NO. **MW80**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jennifer Hussey

SHEET 2 OF 18 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	10	Same as above (SW-SM) w/ increase in coarse sand and gravel (~25%), reacts w/ 10% HCL		PID Headspace (ppm)			
	12	Change in color to light gray (2.5YR 7/2)					
	14	Increase in silt content 13-14': clayey SILT (ML)					
	16	7" cobble @ 15' Pale yellow (2.5YR 7/3) silty CLAY/clayey SILT (CL/ML) w/~15% sand and f-c gravel, moist, low plasticity, reacts vigorously w/10%HCL Increase in gravel content @ 17'					
	18	Broken cobble @ 18'					
	20	Light yellow (2.5YR 6/3) silty, well-graded SAND w/ gravel (SM), loose, slightly moist, gravel is f-c, up to 3" in diameter					
	22	Gravelly SAND w/ silt (SW-SM), loose, slightly moist to moist, well graded f-c sand and f-c gravel, sub-angular/angular					
	24	Light olive brown (2.5YR 5/3), increase in fine sand and silt, SAND/gravel/silt mixture (SM), pyrite/mica present					20'/20' 6-26'
	26	Change in color: very pale brown (10YR 7/3), soft clay (CL/CH)					
	28						

DRILLING LOG

HOLE NO. **MW80**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jennifer Hussey

SHEET 3 OF 18 SHEETS

ELEV. ft MSL	DEPTH ft CV	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	28	Same as above – sticky CLAY (CL/CH) w/ sand and gravel, elastic, high plasticity, moist, soft		PID Headspace (ppm)			
	30						
	32	Increase in silt, clayey silt/sand mix w/ f-c gravel and trace cobbles, white precip reacts vigorously w/ 10% HCL					10'/10' 26-36'
		Clayey SILT (ML) w/some m-c sand and gravel, moist					
	34	Light yellowish-brown (2.5YR 6/3), 4"-6" cobbles in w/ silty CLAY and clayey SILT (CL/ML), w/ sand and gravel, moist, low plasticity					
	36	Very dark grayish brown (2.5YR 3/2) @ 35.5', silt/SAND/gravel mix (SM), loose, slightly moist, 3"-5" cobbles present, f-c gravel, sub-angular/angular, sand consists of 60% fine grained and 40% m-c grained					
	38						
	40	Brown (10 YR 4/3) silty, well-graded SAND w/ fine gravel (SM), loose, increase in fines @ 39'					
	42	Brown (7.5YR 5/3) well-graded SAND w/ gravel (SW), loose, slightly moist, gravel is mostly fine and sub-rounded/sub-angular					
	44						10'/10' 36-46'
		Same as above but silty and cobbles present, moderate reaction w/10% HCL					
	46						

DRILLING LOG

HOLE NO. **MW80**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jennifer Hussey

SHEET 4 OF 18 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	46	Hard drilling through cobble (>7") Brown (10 YR 5/3) clayey, silty, well-graded SAND w/ gravel (SM), slightly cohesive, loose, slightly moist to moist		PID Headspace (ppm)			
	48						
		Increase in clay content @ 49', ~6" lens of silty CLAY (CL)					
	50	Silt/SAND/gravel mixture (SM) w/ some (<15%) cobbles					7'/7' 46-53'
		Very pale brown (10YR 8/2) clayey SILT w/ sand and gravel (ML), slight plasticity					
	52						
		4" gray clay lens @ 53'					
		Light yellowish-brown (10YR 6/4) well-graded SAND w/ gravel (SW), loose, moist, grades to a silty SAND w/ gravel (SM), damp Fine SANDS (SP) @ 54.5'					
	54						
		55.5'- silty, gravelly, well-graded SAND (SW-SM), loose, slightly moist					
	56						
		57.4-58.3'- Very moist silty CLAY lens w/ gravel					10'/10' 56-66'
	58						
		Dark gray silty, well-graded SAND w/ gravel (2.5YR 4/1) (SW-SM)					
		Light brown (7.5YR 6/4) silty CLAY (CL) w/ low plasticity, very moist, possible perched zone					
	60						
		Dry to slightly moist, sandy SILT (ML) w/ gravel, trace (<5%) clay, damp					
	62						
	64						

DRILLING LOG

HOLE NO. **MW80**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jennifer Hussey

SHEET 5 OF 18 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	64	Brown (7.5YR 5/4) clayey SILT w/ sand and gravel (ML), very moist to damp but no free water observed, gravel is sub-rounded		PID Headspace (ppm) 0.6		FEW4-MW80-(65.0)	Driller notes easier drilling and possible water, stop for day @ 65’
	66	White River Formation @ 66’ Light yellowish-brown (10YR 6/4) CLAY (CL) w/ medium plasticity, lens @ 67’ of white waxy inclusions- 1” nodule reacts moderately to vigorously w/ 10% HCL, wet along fresh surfaces					8/13/17-no water detected @ 66’ at 0724 0740 Continue drilling MW80
	68						
	70						10’/10’ 66-76’
	72	Clay is soft 71-76’, increase in plasticity (high), sticky (CL/CH), very moist					
	74	Some hard claystone pieces/layers in w/ CLAY (CL/CH) Very minor to no reaction w/10% HCL		10.2		FEW4-MW80-(74.0)	
	76	Similar to above w/ trace silt, light yellowish-brown (10YR 6/4) CLAY (CL), medium to high plasticity, very moist, medium stiff to soft, can easily gouge core 1” w/ knife, minor reaction w/ 10% HCL					10’/10’ 76-86’
	78						
	80						
	82						

DRILLING LOG

HOLE NO. **MW80**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jennifer Hussey

SHEET 6 OF 18 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	82			PID Headspace (ppm)			
	84	Yellowish-brown (10YR 5/4) silty CLAY (CL), low to medium plasticity, very moist, some moderately cemented claystone pieces (can break apart w/fingers) w/trace manganese oxide, no reaction w/10% HCL		3.5		Water: FEW4-MW80-85.0 Soil: FEW4-MW80-(85.0) and DUP (86.0)	0910 DTW = 90.48' top of jaws (~84.8' bgs) 0927 DTW = 89.35' top of jaws (~83.35' bgs)
	86						
	88	Light yellowish-brown (10YR 6/4) fat CLAY (CH) of high plasticity, soft, moist to very moist					
	90	Intermittent CL and CH/CL, cores (cohesive) can be easily indented 1" w/knife, soft to medium stiff					
	92						10'/10' 86-96'
	94	Trace silt in w/ CLAY (CL) Light yellowish-brown (10YR 6/4) silty CLAY (CL), moist, low to medium plasticity, stiff, minor reaction w/10% HCL		6.3		FEW4-MW80-(95.0)	
	96	Yellowish-brown (10YR 5/4) SILTSTONE, medium hard, breaks w/few blows of rock hammer, no reaction w/10% HCL, moist					
	98				FEW4-MW80-(98-99) for Matrix Diffusion testing		18'/18' 96-114'
	100						

DRILLING LOG

HOLE NO. **MW80**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jennifer Hussey

SHEET 7 OF 18 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	100			PID Headspace (ppm)			
	102						
	104	Light yellowish-brown (10YR 6/4) alternating fat CLAY (CH) w/ high plasticity and silty CLAY (CL), low to medium plasticity, moist, easily broken apart by hand, minor reaction w/ 10% HCL		10.8		FEW4-MW80-(105.0)	
	106						
	108						
	110	Pale brown (10YR 6/3) silty CLAY (CL) (low to medium plasticity)/clayey SILT (ML), moist, easily broken apart, heavy reaction w/ 10% HCL, a few light gray (10YR 7/2) SILTSTONE layers (lens) present in run, very hard, dry, heavy reaction w/10% HCL					
	112			6.0		FEW4-MW80-(113.0)	
	114	Yellowish-brown (10YR 5/4) SILTSTONE, possible slickensides, very hard, dense, moist, minor reaction w/10% HCL, many blows w/ rock hammer to break, biotite, minor caliche Vugs present 114-120', manganese oxide present					12'/12' 114-126'
	116						
	118						

DRILLING LOG

HOLE NO. **MW80**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jennifer Hussey

SHEET 8 OF 18 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	118	S.A.A. - Yellowish-brown (10YR 5/4) SILTSTONE, possible slickensides, very hard, dense, moist,		PID Headspace (ppm)			
	120						
	122				FEW4-MW80-(121-122) for Matrix Diffusion testing		
		Light brownish-gray (10YR 6/2) silty CLAY (CL), low plasticity, grading to clayey SILT (ML), small, hard clasts present, heavy reaction w/ 10% HCL, dry to moist					
	124			66.6		FEW4-MW80-(125.0)	
		Yellowish-brown (10YR 5/4) SILTSTONE, hard to very hard, dense, massive, manganese oxide present, moist, little to no reaction w/ 10% HCL			FEW4-MW80-(125) for grain size and Atterberg Limits		Stop 8/13/17 1830 Start 8/14/17 0700 @126'
	126						
	128						21'/22' 126-148'
	130						Mechanical Breaks. Portions of core fell out of core barrel onto deck
	132				FEW4-MW80-(132-133) for NMR porosity	MW80-(132-133) 1 NMR	
	134			4.5		FEW4-MW80-(135.0)	
	136						

DRILLING LOG

HOLE NO. **MW80**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jennifer Hussey

SHEET 9 OF 18 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	136			PID Headspace (ppm)			
	138						
	140						
	142				FEW4-MW80-(143-144) for Matrix Diffusion testing		
	144	Brown (10YR 5/3) clayey SILT (ML) / silty CLAY (CL), low to medium plasticity, moist, no reaction w/10% HCL, pieces of brown (10YR 5/3) siltstone in core		4.2		FEW4-MW80-(145.0) & DUP FEW4-MW80-(146.0)	9" casing to 146'
	146						
	148	Yellowish-brown (10YR 5/4) SILTSTONE, hard to very hard, dense, massive, moist, little to no reaction w/10% HCL, manganese oxide present, a few vugs present in run					20'/20' 148-168'
	150						
	152						
	154						

DRILLING LOG

HOLE NO. **MW80**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jennifer Hussey

SHEET 10 OF 18 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	154	154-156' core is broken up "rubble", possible fracture zone		PID Headspace (ppm)			
				3.7		FEW4-MW80-(155.0)	
	156						
	158						
	160	Light yellowish-brown (10 R 6/4) silty CLAY (CL), low to medium plasticity, to clayey SILT (ML), small clasts present as well as pieces of siltstone, CL/ML little to no reaction w/10% HCL, siltstone-heavy reaction w/ 10% HCL, moist					
	162						
	164			1.2		FEW4-MW80-(165.0)	
	166						
	168	No Recovery 168-170- assumed siltstone, washed					
	170	Yellowish-brown (10YR 5/4) SILTSTONE, hard to very hard, dense, moist, heavy reaction w/10% HCL, a few vugs present, manganese oxide present large vugs 170-172'					19'/21' 168-189'
	172						

DRILLING LOG

HOLE NO. **MW80**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jennifer Hussey

SHEET 11 OF 18 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	172	S.A.A. - Yellowish-brown (10YR 5/4) SILTSTONE, hard to very hard, dense, moist, a few vugs present, heavy reaction w/ 10% HCL,		PID Headspace (ppm)			
	174			4.5		FEW4-MW80-(175.0)	
	176				FEW4-MW80-(177-178) for physical parameters including NMR porosity		
	178						
	180						
	182						
	184	Yellowish-brown (10YR 5/4) SILTSTONE w/ clay (<5%), not nearly as hard as 170-183', crumbly, moist, little to no reaction w/ 10% HCL		5.1		FEW4-MW80-(185.0)	
	186						
	188						
	190	No Recovery 189-192', assumed crumbly siltstone					

DRILLING LOG

HOLE NO. **MW80**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jennifer Hussey

SHEET 12 OF 18 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	190			PID Headspace (ppm)			
	192	Yellowish-brown (10YR 5/4) SILTSTONE, hard to very hard, many blows w/rock hammer to break, dense, massive, moist, little to no reaction w/ 10% HCL, manganese oxide present, vugs present					
	194						
	196			0.5		FEW4-MW80-(197.0)	
	198						
	200	Yellowish-brown (10YR 6/3) to yellowish-brown (10YR 5/4) clayey SILT (ML)/silty CLAY (CL), clay is medium plasticity, moist, medium reaction w/ 10% HCL, manganese oxide present, pieces of hard silt/claystone periodically present, clay varies from CL-CH (fat), high plasticity					24'/27' 189-216'
	202						
	204			2.6		FEW4-MW80-(205.0)	
	206						
	208						

DRILLING LOG

HOLE NO. **MW80**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jennifer Hussey

SHEET 13 OF 18 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	208	S.A.A. -Yellowish-brown (10YR 6/3) to yellowish-brown (10YR 5/4) clayey SILT (ML)/silty CLAY (CL), clay is medium plasticity, moist,		PID Headspace (ppm)			
	210						
	212	Yellowish-brown (10YR 5/4) SILTSTONE, w/ minor clay (<5%), crumbly, low to medium reaction w/10% HCL					
	214			0.8	FEW4-MW80-(215) for grain size and Atterberg Limits	FEW4-MW80-(215.0)	
	216	Variegated, well cemented, very hard conglomerate w/ loose gravel/cobbles, small amount of sand, little reaction w/ 10% HCL, wet					Stop drilling 8/14/17 1430 Continue 8/15/17 0715 @216'
	218						
	220						17'/17' 216-233'
	222	Same composition as 216-221' but decrease in competent conglomerate and increase in loose gravel/cobbles, surface of core is vuggy					
	224	Light yellowish-brown (10YR 6/4) SILTSTONE w/ clay (<5%), medium hard, moist, little to no reaction w/ 10% HCL, small amount of manganese oxide present		0.2		FEW4-MW80-(225.0)	
	226						

DRILLING LOG

HOLE NO. **MW80**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jennifer Hussey

SHEET 14 OF 18 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	226			PID Headspace (ppm)			
		Light yellowish-brown (10YR 6/4) SILTSTONE					
	228						
	230						
	232						
				0.5		FEW4-MW80-(233.0) & DUP FEW4-MW80-(234.0)	
	234	Light yellowish-brown (10YR 6/4) SILTSTONE, very hard, dense, massive, dry to slightly moist, moderate reaction w/10% HCL, manganese oxide present, few vugs on surface of core, small amount of sand and gravel (<5%)					
	236						21'/21' 233-254'
	238						
	240						
	242						
	244						

DRILLING LOG

HOLE NO. **MW80**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jennifer Hussey

SHEET 15 OF 18 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	244	Pale brown (10YR 6/3) SILTSTONE, medium hard, dry, clay present (<5%), portions crumbly, clay low to medium plasticity, little to no reaction w/ 10% HCL		PID Headspace (ppm) 0.2		FEW4-MW80-(245.0)	
	246						
	248						
	250						
	252						
	254	Brown (10YR 5/3) SILTSTONE w/ minor sand (<5%), very hard, dense, little to no reaction with 10% HCL, numerous vugs to 262.5', lots of manganese oxide		0.1		FEW4-MW80-(254.0)	
	256						
		Possible fracture-slickensides?		0.1		FEW4-MW80-(257.0)	19'/19' 254-273'
	258	258-260' increase in sand (>10%)					Large Portion of core slipped out of core barrel onto deck- mechanical breaks
	260						
	262						

DRILLING LOG

HOLE NO. **MW80**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jennifer Hussey

SHEET 16 OF 18 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	262	262.5'- Dark yellowish-brown (10YR 4/4) SILTSTONE w/ clay, clay is medium to high plasticity, moist, medium stiff, little to no reaction w/ 10% HCL, occasional fine sub-rounded gravel present		PID Headspace (ppm)			
	264						
	266						
	268						
		Brown (10YR 5/3) to dark brown (10YR 4/3) SILTSTONE w/ clay and gravel, gravel increases towards 273', clay is medium to high plasticity, moist, dry towards 273', no reaction w/ 10% HCL, gravel sub-rounded/sub-angular		2.3		FEW4-MW80-(269.0)	
	270						
	272						
				2.2		FEW4-MW80-(273.0)	
	274	No Recovery 273-279 (washed), assumed sand and gravel					
	276						12'/18' 273-291'
		Residual material is variegated gravel/cobbles (GW/GP), <1% sand (washed) wet (drilling fluids)					
	278						
	280						

DRILLING LOG

HOLE NO. **MW80**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jennifer Hussey

SHEET 17 OF 18 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	280	Low recovery 279-283': Residual material is variegated gravel/cobbles, <1% sand (washed) wet (drilling fluids)		PID Headspace (ppm)			
	282						
	284	Variegated, clayey SAND w/ gravel (SC), ~20% fine gravel, sub-rounded/sub-angular, clay is grayish-brown (10YR 5/2), high plasticity, all has heavy reaction w/ 10% HCL, moist to wet		1.0	FEW4-MW80-(284) for grain size and Atterberg Limits	FEW4-MW80-(284.0)	
	286	6" well cemented conglomerate centered at 286'					
	288	Yellowish-brown (10YR 5/4), SILTSTONE, medium hard, crumbly w/ clay(<5%), medium to high plasticity, dry to moist, little to no reaction w/10% HCL					
	290						
	292	Yellowish-brown (10YR 5/6) SILTSTONE w/ sand and gravel (<5%, both), moist, medium hard, slight reaction w/ 10% HCL, gravel is variegated, sub-rounded/sub-angular					
	294	292.5'- Yellowish-brown (10YR 5/4) SILT (ML) w/ gravelly and sand (5-10%, both), moist, to same color silty, gravelly SAND (SM) (Fines), little to no reaction w/10% HCL, gravel is sub-rounded/sub-angular 294.5'- Brown (10 R 5/3) SILTSTONE w/few fine gravel, clay is medium to high plasticity, little to no reaction w/10% HCL		0.4		FEW4-MW80-(294.0)	10'/10' 291-301'
	296						
	298						

DRILLING LOG

HOLE NO. **MW80**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jennifer Hussey

SHEET 18 OF 18 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	298	Gravel decrease from 298-301'		PID Headspace (ppm)			
	300					FEW4-MW80-(301.0)	301' TD 8/15/17 @1420
		End of Boring		0.1			
	301						

DRILLING LOG

HOLE NO. **MW81**

COMPANY NAME: RMC Consultants, Inc.	DRILLING SUBCONTRACTOR: Yellow Jacket Drilling Services, Inc.	SHEET 1 OF 18 SHEETS
PROJECT: Atlas D Missile Site 4 RI Addendum 2017-2018 Tasks	LOCATION: Atlas D Missile Site 4 – Laramie County, Wyoming	
NAME OF DRILLER: Cliff Hillman	MANUFACTURER'S DESIGNATION OF DRILL: TSI 150T SONIC RIG	
SIZES AND TYPES OF DRILLING EQUIPMENT: Sonic Drill Rig; 7-in. diam core barrel (10-ft); 9-in. diam. drill casing (150'); 8-in. diam. drill casing (150'+)	HOLE LOCATION: West End of Bldg 2 Flame Pit; 214093.9 ft N, 661665.1 ft E	
	SURFACE ELEVATION: 7262.5 ft MSL	
	DATE STARTED: 7/20/17: 1320	DATE COMPLETED: 7/24/17: 1015
OVERBURDEN (OGALLALA FM.THICKNESS): 61 feet	DEPTH GROUNDWATER ENCOUNTERED: ~ 61 feet bgs	
DEPTH DRILLED INTO WHITE RIVER FORMATION: WRF: 61 feet to 302 feet bgs	DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: 10/18/17 MW81-100: 63.5' bgs MW81-207: 61.4' bgs MW81-279: 53.9' bgs	
TOTAL DEPTH OF HOLE: 302' bgs	OTHER WATER LEVEL MEASUREMENTS: 7/28/17 MW81-Temp; 64.18 ft TOC	

GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	CORED INTERVAL
	3 grain size/Atterbergs	1 physical parameters	Surface to Total Depth

SAMPLES FOR CHEMICAL ANALYSIS	VOCs – onsite	VOCs – offsite	OTHER	OTHER	OTHER	TOTAL CORE RECOVERY
	33	31				97 %

DISPOSITION OF HOLE	2-in. diam. NESTED MONITORING WELLS	SIGNATURE OF INSPECTOR
	TD: 105.9 ft bgs TD: 212.2 ft bgs TD: 284.2 ft bgs	Jennifer Hussey, Todd Margulies

ELEV.	DEPTH	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE ID.	ANALYTICAL SAMPLE ID.	Recovery (ft/ft) & REMARKS
		Very dark grayish-brown (10YR 3/2) sandy SILT (ML) w/ 10% gravel, dry to very slightly moist, no reaction w/ 10% HCL, fine to medium gravel, angular		PID Headspace (ppm) 0.4		FEW4-MW81-(0.5)	
	2	Light brownish-gray (10YR 6/2) silty SAND (SW) w/ 5% gravel, dry, moderate to heavy reaction w/ 10% HCL, fine to medium gravel, angular		0.6		FEW4-MW81-(2.0)	
	4	Brown (10YR 5/3) silty SAND (SW) w/ 15% gravel, dry, moderate to heavy reaction w/ 10% HCL, fine to medium gravel, angular					6'/6'
	6	Very dark grayish-brown (10YR 3/2) gravelly SAND (SW), 30% gravel dry, slight reaction w/ 10% HCL, fine to medium gravel, angular					
	8						10'/10'
				0.8		FEW4-MW81-(9.0)	
	10						

DRILLING LOG

HOLE NO. **MW81**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 2 OF 18 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	10	Light gray (10YR 7/1) clayey SAND (SC) w/gravel (<5%), clay seams 11-12', 13-14'(increase clay content of medium plasticity), dry to slightly moist, slight reaction w/10% HCL, fine to medium gravel, angular		PID Headspace (ppm)			
	12						
	14						
	16	Light brownish-gray (10YR 6/2) gravelly CLAY (CL) w/25% silt and sand, medium plasticity, slightly moist, heavy reaction w/ 10% HCL					7'/7'
	18	Pale brown (10YR 6/3) clayey, sandy GRAVEL (GC), very slightly moist, heavy reaction w/10% HCL, angular, few cobbles					
	20			1.0		FEW4-MW81-(20.0)	
	22	Pale brown (10YR 6/3) sandy GRAVEL (GC), decrease in clay content from 22-23', heavy reaction w/10% HCL, dry 23'-28'- white (10YR 8/2) to dark yellowish-brown (10YR 4/4) clayey SAND (SC) w/15-20% gravel, few cobbles, wet, moderate to heavy reaction w10% HCL					Drillers using water to advance
	24						13'/13/
	26						
	28						

DRILLING LOG

HOLE NO. **MW81**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 3 OF 18 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	28	Brown (10YR 5/3) gravelly SAND (SW), dry, 10% gravel, rounded to angular		PID Headspace (ppm)			
	30			0.4		FEW4-MW81-(30.0)	
	32	Same as above w/ color change, light gray (10YR 7/1)					
	34	Dark yellowish-brown (10YR 4/6) gravelly SAND (SW), moist, 40% gravel, rounded to angular, slight reaction w/10% HCL					7/20/17, 1725 Stop drilling
	36	Grayish-brown (10YR 5/2) SAND (SW) w/gravel ~25-35%, dry, gravel is sub-rounded to angular, slight reaction w/10% HCL, few cobbles					7/21/17 0835 Continue drilling @ 36'; start dry to 85'
	38						8'/8'
	40			1.3		FEW4-MW81-(40.0)	
	42						
	44	Same as above to 49'					
	46						

DRILLING LOG

HOLE NO. **MW81**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 4 OF 18 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	46			PID Headspace (ppm)			
	48						7'/7'
	50	Pale brown (10YR 6/3) silty CLAY (CL), low to medium plasticity, dry to slightly moist, little (<5%) fine gravel, sub-rounded, couple cobbles, very small amount of rock flour, moderate to strong reaction w/10% HCL Same as above but wet from drilling fluid		0.7		FEW4-MW81-(50.0)	
	52	White (10YR 8/2) to light gray (10YR 7/2), clayey SAND (SC) w/some fine sub-rounded/sub-angular gravel, <15% gravel, dry, few cobbles, minor caliche, strong reaction w/10% HCL					5'/5'
	54						
	56	Same as above w/increase in gravel to 20-25% and a few more cobbles					
	58						5'/5'
	60			0.9		FEW4-MW81-(60.0)	
	62	White River Formation encountered at 61' bgs, yellowish-brown (10YR 5/4) CLAY (CH), stiff, high plasticity, moist to wet					~61' 1st water White River Formation
	64						

DRILLING LOG

HOLE NO. **MW81**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 5 OF 18 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	64	Yellowish-brown (10YR 5/4) CLAY (CH), high plasticity, moist to wet, stiff		PID Headspace (ppm)			
	66						15'/15'
	68					FEW4-MW81-68 VOC's	
	70			0.7		FEW4-MW81-(70.0)	
	72						W.L. = 75' rising 7/21/17 1040 74.7' 7/21/17 1049
	74						3'/3'
	76	Same as above					
	78						6'/6'
	80	Same as above- w/ increase in silt and decrease in plasticity to medium/low, yellowish-brown, almost (10YR 5/4) clayey SILT (ML), fine silt, moist to damp		0.8		FEW4-MW81-(80.0)	
	82						

DRILLING LOG

HOLE NO. **MW81**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 6 OF 18 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	82	S.A.A - yellowish-brown (10YR 5/4) clayey SILT (ML)		PID Headspace (ppm)			
	84						Drillers mix mud to drill
	86	Entire 21' run (85-106') alternates between yellowish-brown (10YR 5/4) silty CLAY (CH), moist to wet, stiff, high plasticity and yellowish-brown (10YR 5/4) clayey SILT (ML), low to moderate plasticity, moist, these are also somewhat interbedded					
	88						
	90			1.6		FEW4-MW81-(90.0) & FEW4-MW81-(91.0) DUP	85-106 ft 21'/21'
	92						
	94						
	96						
	98						
	100			4.0		FEW4-MW81-(100.0)	

DRILLING LOG

HOLE NO. **MW81**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 7 OF 18 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	100	S.A.A. - alternates between yellowish-brown (10YR 5/4) silty CLAY (CH), moist to wet, stiff, high plasticity and yellowish-brown (10YR 5/4) clayey SILT (ML), moist to damp		PID Headspace (ppm)	MW81-(100) for grain size and Atterberg Limits		
	102						
	104						
	106						
	108	Same as 85-106' w/large hard clast @ 107'					16'/16'
	110			2.1		FEW4-MW81-(110.0)	
	112	111'-112' hard clast zone (fine-medium)					
	114						
	116						
	118	6" hard clast zone @ 117', clast zones highly reactive w/ 10% HCL					

DRILLING LOG

HOLE NO. **MW81**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 8 OF 18

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	118			PID Headspace (ppm)			
	120			2.3		FEW4-MW81-(120.0)	
	122	Same as 106-122', hard clast/mudstone zone @ 123' (4-6"), strong reaction w/ 10% HCL, entire run wet, overall run more silty CLAY (CH), high plasticity, than clayey SILT (ML), low to medium plasticity, however both are present					122-136' 14'/14'
	124						
	126						
	128						
	130			2.7		FEW4-MW81-(130.0)	
	132						
	134						
	136						7/21/17 1530 Stop drilling

DRILLING LOG

HOLE NO. **MW81**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 9 OF 18 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	136	Very pale brown (10YR 7/3) silty CLAY (CH) to very pale brown (10YR 7/3) clayey SILT (ML) (139-140') Intermixed claystone/mudstone throughout run, very hard, CH is high plasticity, ML low to medium plasticity, all moist to damp, clay has moderate reaction w/ 10% HCL, claystone/mudstone has high reaction w/ 10% HCL		PID Headspace (ppm)			07/21/17 0900 Continue drilling @ 136'
	138						
	140			0.2		FEW4-MW81-(140.0)	
	142						136-156' 20'/20'
	144						
	146						
	148						
	150			0.1		FEW4-MW81-(150.0)	
	152						
	154						

DRILLING LOG

HOLE NO. **MW81**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 10 OF 18 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	154			PID Headspace (ppm)			
	156	Very pale brown (10YR 7/3) to brown (10YR 5/3), clayey SILT (ML) to silty CLAY (CL), low to medium plasticity, dry to moist, very hard, silt/mud/claystone present, 2-3" silt/clay/mudstone layers @ 159', 161', 163', 169', mild to heavy reaction w/10% HCL					
	158						
	160			0.4		FEW4-MW81-(160.0) & DUP FEW4-MW81-(161.0)	
	162						156-174' 18'/18'
	164						
	166						
	168						
	170			0.7		FEW4-MW81-(170.0)	
	172						

DRILLING LOG

HOLE NO. **MW81**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 11 OF 18 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	172			PID Headspace (ppm)			
	174	Yellowish-brown (10YR 5/4) clayey SILT (ML) to silty CLAY (CH), ML-low to medium plasticity CH- high plasticity, slight decrease in intermittent silt/clay/ mudstone, mild to heavy reaction w/10% HCL, moist					
	176						
	178						
	180			2.8		FEW4-MW81-(180.0)	
	182						174-194 20'/20'
	184						
	186						
	188						
	190			1.5		FEW4-MW81-(190.0)	

DRILLING LOG

HOLE NO. **MW81**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 12 OF 18 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	190			PID Headspace (ppm)			
	192						
	194	Same as above, w/ 202-205' containing 2-5" silt/clay/mudstone layers					
	196						
	198						194-206' 12'/12'
	200			0.9	MW81-(200) for grain size and Atterberg Limits	FEW4-MW81-(200.0)	
	202						
	204						
	206	Variegated sandy GRAVEL w/ cobbles (GP), sub-angular/angular, orange staining on cobble, dry, fracture zone					10% HCL Reaction: Heavy
	208	Dark grayish-brown (10YR 4/2) gravelly CLAY (CL) w/ trace sand (<5%), clay has high plasticity, gravel is sub-rounded to angular, moist to wet					10% HCL Reaction: Moderate to Heavy

DRILLING LOG

HOLE NO. **MW81**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 13 OF 18 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	208			PID Headspace (ppm)			
	210	Very pale brown (10YR 7/3) silty CLAY (CL) w/ small amount of sand (<5%), low to medium plasticity, friable, a few 2-3" silt/clay/mudstone layers in 5' portion of run that are very hard, medium to heavy reaction w /HCL, dry to very slightly moist		1.8		FEW4-MW81-(210.0)	9'/10'
	212						
	214						
		Dark yellowish-brown (10YR 4/4) gravelly SAND (SW), gravel is sub-rounded/sub-angular, dry to slightly moist					10 % HCL Reaction: Heavy
	216	Very pale brown (10YR 7/3) clayey SILT (ML), hard silt/mud/claystone, low to no plasticity, dry, a couple small pieces of gravel @ 220', heavy reaction w/10% HCL					10'/10'
	218						
	220					FEW4-MW81-(220.0)	
	222						
	224						
	226						

DRILLING LOG

HOLE NO. **MW81**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 14 OF 18 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	226	Brown (10YR 5/3) silty CLAY (CH) to brown (10YR 5/3) clayey SILT (ML), CH has high plasticity, ML-slight plasticity, majority of run saturated due to drilling fluid, little to slight reaction w/10% HCL		PID Headspace (ppm)			Start 7/23/17, 0830
	228						
	230						
	232			0.5		FEW4-MW81-(232.0)	
	234						18'/24' Core disturbed due to rod/core barrel recovery wasting hole
	236						
	238						
	240			0.6		FEW4-MW81-(240.0)	
	242						
	244						

DRILLING LOG

HOLE NO. **MW81**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 15 OF 18 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	244	Same as above- brown silty CLAY (CH) to clayey SILT (ML)		PID Headspace (ppm)			
	246						
	248						
	250	Yellowish-brown (10YR 5/6) CLAYSTONE, very hard, dry, w/ trace (<1%) medium sand		0.3		FEW4-MW81-(250.0)	Repeated hammer blows won't break core
	252	Oblique (45-degree) fracture w/ slickensides, tight					
	254	No reaction to HCL					
	256						
	258	Black mineral patches 1-2" (biotite?)			FEW4-MW81-(257-280) for physical parameters		
	260	Pale brown (10YR 6/3) Sandstone, sand is f-m-c, well cemented				FEW4-MW81-(260.0)	
		Gravelly SILTSTONE w/ sand, dry					
	262	Yellowish-brown silty CLAY (CL)					

DRILLING LOG

HOLE NO. **MW81**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 16 OF 18 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	262	Same as above- light yellowish-brown (10YR 6/4) silty CLAY (CL), moderately cohesive, very stiff, low plasticity, dry, core breaks along horizontal planes		PID Headspace (ppm)			
	264						
	266	Yellowish-brown (10YR 5/4) SILTSTONE, very hard, w/ 5% medium sand, semi-conchoidal fracture surfaces when broken w/ hammer, w / 1-2 mm caliche flakes, also black biotite masses/patches					
	268			0.2	MW81-(269) for grain size and Atterberg Limits	FEW4-MW81-(269.0)	
	270	Gravel zone w/ cobbles, finer material washed out w/ drilling fluid, likely a gravelly sand or gravelly silt, some residual coarse sand present, cobbles are up to 4”					
	272						
	274						
	276						
	278						
	280						

DRILLING LOG

HOLE NO. **MW81**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 17 OF 18 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	280	Same as above, gravelly SAND w/ cobbles, fines washed out by drilling fluid		PID Headspace (ppm)			
	282						
	284						07/23/17 1800 stop drilling 07/24/17 0850 resume drilling @ 285'
	286	Intact core at bottom of core run: silty SAND (SM) w/ gravel, cobbles Conglomerate, very hard, f-m-c gravel (60%) w/ ~5% 2-4" cobbles, matrix of coarse sand w/trace silt, moderate to strong reaction w/ 10% HCL, core broken up by drill action where cobbles are present					
	288						
	290						
	292						
	294						
	296	296.5'- Pale brown (10YR 6/3) SILT (ML), trace clay w/ <1% medium gravel, stiff, dry to damp w/ 1mm black flakes (biotite?)					
	298						

DRILLING LOG

HOLE NO. **MW81**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 18 OF 18 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	298	Yellowish-brown layered gravelly SILT w/ trace clay (ML) and brown, gravelly CLAY w/ trace silt (CL), 2-6" layers, moderately cemented, gravel is f-m, 20-30%, moist		PID Headspace (ppm)			
	300					FEW4-MW81-(300.0)	
	302	End of Boring					

DRILLING LOG

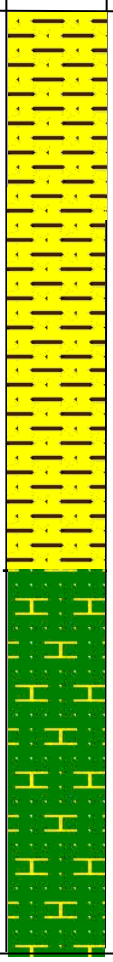
HOLE NO. **MW82**

COMPANY NAME: RMC Consultants, Inc.	DRILLING SUBCONTRACTOR: Yellow Jacket Drilling Services, Inc.	SHEET 1 OF 18 SHEETS
PROJECT: Atlas D Missile Site 4 RI Addendum 2017-2018 Tasks	LOCATION: Atlas D Missile Site 4 – Laramie County, Wyoming	
NAME OF DRILLER: Cliff Hillman	MANUFACTURER'S DESIGNATION OF DRILL: TSI 150T SONIC RIG	
SIZES AND TYPES OF DRILLING EQUIPMENT: Sonic Drill Rig; 7-in. diam core barrel (10-ft.); 8-in. diam. drill casing (146 ft. +); 9-in. diam. drill casing (0-146ft.)	HOLE LOCATION: 400 feet east of Bldg 1; 213787.57 ft N, 661791.73 ft E	
	SURFACE ELEVATION: 7261.9ft MSL	
	DATE STARTED: 08/17/17	DATE COMPLETED: 08/19/17
OVERBURDEN (OGALLALA FM.) THICKNES: 63 feet	DEPTH GROUNDWATER ENCOUNTERED: 68.4' bgs 08/17/17, 1745, 64.7' bgs 08/18/17, 0745	
DEPTH DRILLED INTO WHITE RIVER FORMATION: WRF: 63 ft to 306 feet bgs	DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: 10/8/17 MW82-83: 66.51 MW82-132: 66.39 MW82-161: 66.63	
TOTAL DEPTH OF HOLE: 306' bgs	OTHER WATER LEVEL MEASUREMENTS	

GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	CORED INTERVAL
	3 grain size/Atterbergs	1 physical parameters	Surface to Total Depth

SAMPLES FOR CHEMICAL ANALYSIS	VOCs – onsite	VOCs – offsite	OTHER	OTHER	OTHER	TOTAL CORE RECOVERY
	31	27				97.5 %

DISPOSITION OF HOLE	2-in. diam. NESTED MONITORING WELLS	SIGNATURE OF INSPECTOR
	TD: 85.8 ft bgs TD: 134.7 ft bgs TD: 163.8 ft bgs	Todd Margulies

ELEV.	DEPTH	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS PID Headspace (ppm)	GEOTECH SAMPLE ID.	ANALYTICAL SAMPLE ID.	Recovery (ft/ft) & REMARKS
	0	Dark yellowish-brown (10YR 4/4) SILT (ML) w/ gravel and clay (both <5%), dry, moderate to heavy reaction w/ 10% HCL, roots present, gravel is fine, sub-angular/sub-rounded		0.1		FEW4-MW82-(0.5)	Drilling dry for most part, will add 1-2 gallons/run to keep core barrel cooler; therefore moisture most likely from this as well as color changes
	2	2'-6'- Gray (10YR 5/1) SILT (ML) w/ gravel and sand, gravel (15%) is fine, sub-rounded/sub-angular, sand (<5%), moist, little to reaction w/ 10% HCL, variegated		0.0		FEW4-MW82-(2.5)	
	4						
	6	Very pale brown (10YR 7/2) to light gray (10YR 7/1) silty CLAY (CL) w/ trace gravel (<5%), medium plasticity, moderate to heavy reaction w/ 10% HCL, fine gravel, sub-rounded/sub-angular, moist					10'/10' 0-10'
	8			0.6		FEW4-MW82-(9.0)	
	10						

DRILLING LOG

HOLE NO. **MW82**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 2 OF 18 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	10	S.A.A - silty CLAY (CL) w/ trace gravel		PID Headspace (ppm)			6'/6' 10-16'
	12	Large cobble @ 13'					
	14	Gravel increases 14-16' to ~10%, also in size (medium)					
	16						
	18	Dark yellowish-brown (10YR 4/4) gravelly SAND (SW), moist, heavy reaction w/ 10% HCl, gravel is variegated, fine to medium, sub-angular/sub-rounded					
	20	20'-22'- Light brownish-gray (10YR 6/2) SILT (ML) w/ gravel (<10%), fine gravel, sub-rounded /sub-angular, <2% sand, dry					10% HCL Reaction: Heavy
	22	Light brownish-gray (10YR 6/2) clayey SILT (ML)/silty CLAY (CL) w/ gravel, moist, medium to heavy reaction w/ 10% HCL, fine gravel, variegated, sub-rounded/sub-angular					10'/10' 16-26'
	24	Very pale brown (10YR 7/3) silty CLAY w/ gravel (CL), medium plasticity, moist, heavy reaction w/ 10% HCL, gravel is variegated, <5%					
	26	Brown/dark brown (10YR 4/3) gravelly SAND (SW), 25% variegated, fine to medium gravel, angular to sub-rounded, moist, moderate reaction w/ 10% HCL, few medium cobbles					
	28						

DRILLING LOG

HOLE NO. **MW82**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 3 OF 18 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	28	Grayish-brown (10YR 5/2) gravelly SAND (SW), 30% fine to coarse gravel, variegated, sub-angular/sub-rounded, moist, heavy reaction w/ 10% HCL, few cobbles		PID Headspace (ppm)			
	30						
	32	Same as 28-32' w/ silt increasing, dry					10'/10' 26-36'
	34						
	36	Brown/dark brown (10YR 4/3) gravelly SAND w/ cobbles (SW), 30-40% gravel, variegated, angular to sub-rounded, moist, mild reaction w/ 10% HCL, small to medium cobbles					
	38						
	40						9'/10' 36-46'
	42	Same as 36-42' w/ light gray (10YR 7/2), increase in silt					
	44						Core bag ripped on deck-lost ~1', 44-45'
	46						

DRILLING LOG

HOLE NO. **MW82**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 4 OF 18 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	46	Very pale brown (10YR 7/3) clayey SILT w/ gravel (ML), clay is slight to medium plasticity, moist, heavy reaction w/ 10% HCL, 5-10% gravel, variegated (mostly) gray, sub-rounded/sub-angular		PID Headspace (ppm)			
	48	Brown to dark brown (10YR 4/3) gravelly SAND w/ silt and clay (SW), 10% gravel, angular to sub-rounded, variegated silt and clay (<5%), moist, moderate to heavy reaction w/ 10% HCL					
	50						10'/10' 46-56'
	52	Grayish-brown (10YR 5/2) gravelly SAND (SW), 10% gravel, variegated, angular to sub-rounded, slightly moist, light reaction w/ 10% HCL					
	54	Same as 52-54' w/ color change to light gray (10YR 7/1), dry, increase in silt					
	56	Dark yellowish-brown (10YR 4/4) gravelly SAND (SW), 20-30% gravel, fine to medium, variegated, angular to sub-rounded, light reaction w/ 10% HCL, slightly moist					
	58						10'/10' 56-66'
	60	Light yellowish-brown (10YR 6/4) gravelly CLAY (CL) w/ 25% sand, clay is medium plasticity, moist, heavy reaction w/ 10% HCL "basal layer of Ogallala Fm."					
	62						
	64	**White River Formation** @ 63'Light yellowish-brown (10YR 6/4) CLAY (CL/CH), medium to high plasticity, moist,					10% HCL Reaction: Little to none

DRILLING LOG

HOLE NO. **MW82**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 5 OF 18 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	64			PID Headspace (ppm)			
	66	Pale brown (10YR 6/3) CLAY (CH), “fat”, soft, high plasticity, moist to very moist, slight reaction w/ 10% HCL, very little fine gravel					
	68						Water at 68.4’ bgs 1745
	70						
	72						
	74	Pale brown (10YR 6/3) sandy CLAY (CL), moist to wet, soft, clasts present, slight to moderate reaction w/ 10% HCL		0.4		FEW4-MW82-74.0 FEW4-MW82-(75.0) & FEW4-MW82-(76.0) DUP	Water sample
	76						
	78	Yellowish-brown (10YR 5/6) SAND (SW) w/ fine gravel and clay (5-10%), wet to saturated, very slight reaction w/ 10% HCL, few cobbles					
	80						
	82						

DRILLING LOG

HOLE NO. **MW82**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 6 OF 18 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	82	Yellowish-brown (10YR 5/6) SAND (SW) w/ fine gravel and clay (5-10%), wet to saturated		PID Headspace (ppm) 2.5	FEW4-MW82-(83) for grain size & Atterberg Limits	FEW4-MW82-(83.0)	
	84	Light brownish-gray (10YR 6/2) gravelly CLAY (CL) w/ sand and silt, moist to wet, medium plasticity, ~15%, gravel, <5%, sand/silt, moderate reaction to 10% HCL, gravel is fine to medium, sub-angular/sub-rounded, medium soft					Stop drilling 08/17/17 1730 Continue drilling 08/18/17 0910 @84' 4'/4' 84-88'
	86						
	88	Grayish-brown (10YR 5/2) gravelly CLAY (CL) w/ sand, silt, cobbles, moist, low to medium plasticity, ~20% gravel (fine to medium), sub-rounded/sub-angular, ~5% sand/silt/cobbles (medium), medium reaction w/ 10% HCL, medium soft to slightly stiff					
	90						
	92						16'/16' 84-104'
	94	Yellowish-brown (10YR 5/4) silty SAND (SP-SM), fine grained sand/silt mix, little gravel, slightly moist, slight reaction w/ 10% HCL, 5% clay/gravel, sub-rounded/sub-angular		0.9		FEW4-MW82-(95.0)	
	96						
	98	-2" silt/claystone @98' Same as 94-98' w/ color change to yellowish-brown (10YR 5/6), increase in gravel/clay ~10%					
	100						

DRILLING LOG

HOLE NO. **MW82**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 7 OF18 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	100	2-4" of siltstone @ 100'		PID Headspace (ppm)			
		silty SAND (SM), fine grained sand/silt mix, little gravel					
	102	Grayish-brown (10YR 5/2) silty CLAY (CL) w/ little gravel, low to medium plasticity, dry to slightly moist, heavy reaction w/ 10% HCL, 3 (2") layers of siltstone present					
	104	Pale brown (10YR 6/3) CLAY w/ silt (CL), medium plasticity, moist, light reaction w/ 10% HCL, pieces of claystone (2-4") w/ heavy reaction to 10% HCL		0.8		FEW4-MW82-(105.0)	
	106						
	108						12'/12' 104-116'
	110						
	112						
	114			1.1		FEW4-MW82-(115.0)	
	116	Same as 104-116'					
	118						

DRILLING LOG

HOLE NO. **MW82**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 8 OF 18

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	118	S.A.A. - Pale brown (10YR 6/3) CLAY w/ silt (CL)		PID Headspace (ppm)			
	120						10'/10' 116-126'
	122						
	124			0.2		FEW4-MW82-(125.0) & FEW4-MW82-(126.0) DUP	
	126	Brown (10YR 5/3) silty CLAY (CL), medium plasticity, moist to very moist, slightly-medium stiff, medium to heavy reaction w/ 10% HCL, pieces of claystone throughout					
	128						20'/20' 126-146'
	130						
	132						
	134	Brown (10YR 5/3) clayey SILT (ML), moist to very moist, slight to medium reaction w/ 10% HCL, increase in clay/siltstone w/ heavy reaction w/ 10% HCL		0.8	FEW4-MW82-(135) for grain size & Atterberg Limits	FEW4-MW82-(135.0)	
	136						

DRILLING LOG

HOLE NO. **MW82**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 9 OF 18 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	136	S.A.A. - Brown (10YR 5/3) clayey SILT (ML)		PID Headspace (ppm)			
	138						
	140						
	142						
	144			0.2		FEW4-MW82-(145.0)	
	146	Pale brown (10YR 6/3) silty CLAY/clayey SILT (CL/ML), moist to very moist, low plasticity where more clayey, slight to medium reaction w/ 10% HCL, claystone/siltstone (2") layers in run					
	148						
	150						
	152				FEW4-MW82-(154) for grain size & Atterberg Limits		
	154			0.4		FEW4-MW82-(154.0)	

DRILLING LOG

HOLE NO. **MW82**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 10 OF 18 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	154	Brown (10YR 4/3) SAND (SM) w/ silt, wet, slight reaction w/ 10% HCL		PID Headspace (ppm)			
		Same as 146-154' CLAY/clayey SILT (CL/ML)					
	156	Brown (10YR 4/3) SAND (SM) w/ silt and clay, very moist to wet, light reaction w/ 10% HCL, minor silt/claystone, very fine-grained sand/silt mixture					
	158						
	160						20'/20' 156-176'
	162						
	164	Light yellowish-brown (10YR 6/4) clayey SILT (ML) and silty CLAY (CL), low to medium plasticity, moist to very moist, fine to medium gravel <5% 164-168' pieces of clay/mudstone present		0.5		FEW4-MW82-(164.0)	
	166						
	168						
	170						
	172						

DRILLING LOG

HOLE NO. **MW82**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 11 OF 18 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	172	S.A.A. - clayey SILT (ML) and silty CLAY (CL)		PID Headspace (ppm)			
	174	Increase Claystone clasts @ 174'		0.0		FEW4-MW82-(175.0)	
	176	Light yellowish-brown (10YR 6/4) clayey SILT (ML), very slightly plastic, dry, hard, slightly reaction w/ 10% HCL, platy, few small pieces of silt/claystone					12'/12' 176-188'
	178						
	180						
	182						
	184			0.8		FEW4-MW82-(185.0)	
	186						
	188	Light yellowish-brown (10YR 6/4) interbedded clayey SILT (ML)/silty CLAY (CL), ML first part of run, CL towards bottom of run, CL is medium plasticity, dry, medium hard, slight reaction w/ 10% HCL, platy					
	190						

DRILLING LOG

HOLE NO. **MW82**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 12 OF 18 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	190	S.A.A. - silty CLAY (CL)		PID Headspace (ppm)			
	192						10'/10' 188-198'
	194					FEW4-MW82-(195.0)	
	196	Increase in hardness, clay content		0.9			
	198	No recovery 198-199, assumed silt/siltstone washed out					Drive 8" casing 0-198', drilling w/ mud
	200	Brown (10YR 5/3) SILTSTONE, hard to very hard; minor fine gravel, sand, light to medium reaction w/ 10% HCL, small amount of biotite present			FEW4-MW82-(201-202) for physical parameters		
	202						
	204						
	206			0.1		FEW4-MW82-(206.0)	
	208						

DRILLING LOG

HOLE NO. **MW82**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 13 OF 18 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	208	S.A.A. - Brown (10YR 5/3) SILTSTONE, hard to very hard; minor fine gravel, sand		PID Headspace (ppm)			
	210						
	212	Very pale brown (10YR 7/3) silty CLAY (CL), low to medium plasticity, dry, medium hard, light reaction w/ 10% HCL					
	214						21'/22' 198-220'
	216			0.0		FEW4-MW82-(215.0) & FEW4-MW82-(216.0) DUP	
	218						
	220	Brown (10YR 5/3) SILTSTONE, hard to very hard, little to no reaction w/ 10% HCL, minor biotite					220-230' Core dropped on deck- numerous mechanical breaks
	222						
	224			0.0		FEW4-MW82-(224.0)	
	226						

DRILLING LOG

HOLE NO. **MW82**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 14 OF 18 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	226	S.A.A. - Brown (10YR 5/3) SILTSTONE, hard to very hard		PID Headspace (ppm)			
	228						
	230	Pale brown (10YR 6/3) interbedded silty CLAY (CL)/clayey SILT (ML), low to medium plasticity, dry to slightly moist, little to no reaction w/ 10% HCL					20'/20' 220-240'
	232						
	234			0.0		FEW4-MW82-(235.0)	
	236						
	238						Stop 08/18/17 1750,
	240	No Recovery Assumed silty CLAY/clayey SILT					Continue 08/19/17, 1030 @ 240'
	242						240-244' washed due to broken rod retrieval 08/20/17
	244			0.2		FEW4-MW82-(244.0)	

DRILLING LOG

HOLE NO. **MW82**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 15 OF 18 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	244	Very pale brown (10YR 7/3) SILTSTONE, very hard, many blows w/ rock hammer to break, little fine gravel present, dry, heavy reaction w/ 10% HCL, minor manganese oxide, dense, massive		PID Headspace (ppm)			
	246						
	248						16'/20' 240-260'
	250						
	252	Very pale brown (10YR 7/3) clayey SILT (ML), alternating w/ very pale brown (10YR 7/3) silty CLAY (CL), low to medium plasticity, dry to slightly moist, moderate reaction w/ 10% HCL, pieces of siltstone present 2-3", minor manganese oxide		0.6		FEW4-MW82-(252.0)	
	254						
	256						
	258						
	260	Pale brown (10YR 7/3) SILTSTONE, hard to very hard, little fine gravel, manganese oxide, calcite, moderate reaction w/ 10% HCL, dry, dense, massive					
	262						

DRILLING LOG

HOLE NO. **MW82**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 16 OF 18 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	262	S.A.A. - Pale brown (10YR 7/3) SILTSTONE, hard to very hard		PID Headspace (ppm)			
	264			0.3		FEW4-MW82-(264.0)	
	266						
	268						23'/23' 260-283'
	270	Color change to yellowish-brown (10YR 5/4), little less hard, decreasing calcite, manganese oxide					
	272	Light yellowish-brown (10YR 6/4) clayey SILT (ML) w/ occasional interbedded silty CLAY (CL), low to medium plasticity, slight reaction w/ 10% HCL, dry					
	274			0.2		FEW4-MW82-(275.0)	
	276						
	278						
	280						

DRILLING LOG

HOLE NO. **MW82**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 17 OF 18 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	280	Pale brown (10YR 6/3) CLAY (CH), high plasticity, slight reaction w/ 10% HCL, moist		PID Headspace (ppm)			
	282	Light yellowish-brown (10YR 6/4) SILTSTONE, hard, heavy reaction w/ 10% HCL, dry manganese oxide No recovery 283-284', assumed Siltstone washed out					
	284	Pale brown (10R 6/3) SILTSTONE, very hard, dense, massive, slight to moderate reaction w/ 10% HCL, dry to slightly moist, manganese oxide present		0.1		FEW4-MW82-(285.0)	
	286						
	288						22'/23' 283-306'
	290						
	292						
	294						
	296						
	298						

DRILLING LOG

HOLE NO. **MW82**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 18 OF 18 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	298	S.A.A. - Pale brown (10R 6/3) SILTSTONE, very hard, dense, massive,		PID Headspace (ppm) 0.0		FEW4-MW82-(299.0)	
	300	Light yellowish-brown (10YR 6/4) clayey SILT (ML)/silty CLAY (CL), low to medium plasticity, dry to very slightly moist, moderate to heavy reaction w/ 10% HCL, pieces of siltstone interbedded in this portion of run, hard					
	302						
	304						
	306	End of Boring		0.2		FEW4-MW82-(306.0)	TD @ 306' 08/19/17, 1450

DRILLING LOG

HOLE NO. **MW83**

COMPANY NAME: RMC Consultants, Inc.	DRILLING SUBCONTRACTOR: Yellow Jacket Drilling Services, Inc.	SHEET 1 OF 16 SHEETS
PROJECT: Atlas D Missile Site 4 RI Addendum 2017-2018 Tasks	LOCATION: Atlas D Missile Site 4 – Laramie County, Wyoming	
NAME OF DRILLER: Cliff Hillman	MANUFACTURER'S DESIGNATION OF DRILL: TSI 150T SONIC RIG	
SIZES AND TYPES OF DRILLING EQUIPMENT: Sonic Drill Rig; 7-in. diam. core barrel; 9-in. diam. drill casing (148-ft.); 8-in. diam. drill casing (148-ft +)	HOLE LOCATION: Halfway between MW62/MW66; 214463.09 ft N, 662824.95 ft E	
17	SURFACE ELEVATION: 7244.2 ft msl	
	DATE STARTED: 7/25/17	DATE COMPLETED: 7/28/17
OVERBURDEN (OGALLALA FM. thickness): 82.5 ft	DEPTH GROUNDWATER ENCOUNTERED: 07/25/17, 0955: 79.6'bgs 07/25/17, 1015: 75.7' bgs	
DEPTH DRILLED INTO WHITE RIVER FORMATION: 197.5 ft; White River Fm. 82.5 – 280 ft bgs	DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: 10/23/17 MW83-88: 74.8' bgs MW83-129: 87.7' bgs MW83-271: 49.5' bgs	
TOTAL DEPTH OF HOLE: 280 ft	OTHER WATER LEVEL MEASUREMENTS: 7/30/17 MW83-Temp: 92' bgs	

GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	CORED INTERVAL
	3 grains size/Atterbergs	1 physical parameters	Surface to Total Depth

SAMPLES FOR CHEMICAL ANALYSIS	VOCs – onsite	VOCs – offsite	OTHER	OTHER	OTHER	TOTAL CORE RECOVERY
	27	24				99 %

DISPOSITION OF HOLE	2-in. diam. NESTED MONITORING WELLS			SIGNATURE OF INSPECTOR
	TD: 91.1ft bgs	TD: 131.4 ft bgs	TD: 273.3 ft bgs	Todd Margulies

ELEV.	DEPTH	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE ID.	ANALYTICAL SAMPLE ID.*	Recovery (ft/ft) & REMARKS
	0	Dark brown (7.5YR 3/4), silty SAND (SM), <5% gravel (fine), dry, no reaction w/10% HCL		PID Headspace 0.6		FEW4-MW83-(0.5)	*TestAmerica Lab/Onsite Lab Screening Sample
	2	Dark grayish-brown (10YR 4/2), gravelly SAND (SW) w/ small amount <5% clay, fine to medium sized, sub-angular/angular gravel, medium to strong reaction w/10% HCL, dry		0.6		FEW4-MW83-(2.0)	6'/6'
	4						
	6						
	8	Dark yellowish-brown (10YR 4/4) to grayish-brown (10YR 5/2), SAND with 15% gravel, w/ <5% cobbles, cobbles, gravel is sub-rounded/sub-angular, fine to large cobbles, dry to moist, medium to strong reaction w/ 10% HCL		1.0		FEW4-MW83-(9.0)	6-16' 10'/10'
	10						

DRILLING LOG

HOLE NO. **MW83**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 2 OF 16 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	10	Same as above - SAND w/ 15% gravel, cobbles		PID Headspace (ppm)			
	12						
	14						
	16	Same as above w/ increasing gravel to 20-25%, dry to slightly moist					
	18						16-24': 8'/8'
	20						
	22						
	24	Same as above, slight increase/presence of clay 26'-27'					
	26						
	28						

DRILLING LOG

HOLE NO. **MW83**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 3 OF 16 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	28			PID Headspace (ppm)			
	30						24-36': 12'/12'
	32						
	34	Grayish-brown (10YR 5/2), gravelly SAND w/ clayey SILT (SW), fine gravel, sub-rounded to angular (15-20%), ML is light gray (10YR 7/2), low plasticity, all dry					
	36	35-35.5': Dark yellowish-brown (10YR 4/6), clayey SILT (ML), very slight plasticity, dry 36'- 38': Very pale brown (10YR 7/3), gravelly CLAY (CL), low to medium plasticity, dry to moist, fine to medium gravel 10%, sub-rounded/sub-angular					10 % HCL Reaction: Strong 10% HCL Reaction: Moderate
	38	Light brownish-gray (10YR 6/2), gravelly SAND (SW), fine gravel, sub-rounded/sub-angular (20%), variegated, dry, strong reaction w/ 10% HCL					
	40						36-46': 9'/10'
	42	Dark yellowish-brown (10YR 4/4), gravelly SAND (SW) w/ clay(<5%) and cobbles (<5%), variegated, gravel fine to medium, moist, strong reaction w/ 10% HCL					
	44	Grayish-brown (10YR 5/2), SAND (SW) w/ few cobbles (med), <5% variegated gravel, fine to medium, dry, strong reaction w/ 10% HCL					
	46						

DRILLING LOG

HOLE NO. **MW83**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 4 OF 16 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	46	Grayish-brown (10YR 5/2), gravelly SAND (SW), gravel fine to medium, variegated, sub-rounded/sub-angular, dry, moderate to strong reaction w/ 10% HCL		PID Headspace (ppm)			
	48						
	50						46-56': 10'/10'
	52						
	54	Large cobbles @ 54'					
	56						Stop Drilling 07/25/17 at 1725 Continue 07/26/17 at 0830 @ 56'
	58	Gray (10YR 6/1), to brown (10YR 5/3), gravelly, silty SAND (SW), few cobbles, gravel fine to medium, sub-rounded/sub-angular, variegated in color, dry, moderate to strong reaction w/ 10% HCL, silty clay present in run <5%					
	60						56-66': 10'/10'
	62						
	64						

DRILLING LOG

HOLE NO. **MW83**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 5 OF 16 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	64			PID Headspace (ppm)			
		Same as above - gravelly, silty SAND (SW), w/ a few cobbles					
	66						
	68						
	70						66-76': 10'/10'
	72	Light gray (10YR 7/2), gravelly, sandy SILT (ML), fine to medium gravel, sub-rounded/sub-angular, variegated, dry, moderate to strong reaction w/ 10% HCL					
	74	Brown to dark brown (10YR 4/3), gravelly, clayey SAND (SP), fine to medium gravel, sub-rounded/sub-angular, variegated, clay is gray (10YR 5/1), silty, medium plasticity, all moist to wet, moderate to strong reaction w/ 10% HCL		1.3		FEW4-MW83-(75.0)	Drillers think H_2O ~75'-76'
	76	Light gray (10YR 7/2), gravelly, sandy SILT (SM), mostly fine to medium gravel, sub-rounded/sub-angular, few cobbles, moderate to strong reaction w/ 10% HCL, dry					76-83': 7/7'
	78	small 3" silty clay seam @79'				FEW4-MW83-79	Water Sample
	80						
	82						

DRILLING LOG

HOLE NO. **MW83**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 6 OF 16 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	82	Grayish-brown (10YR 5/2), gravelly SAND (SW), medium to coarse gravel, moist		PID Headspace (ppm)			
		White River Formation:					White River Formation contact at 82.5'
	84	82.5'- 83': Yellowish-brown (10YR 5/4), silty CLAY (CL/CH), medium-high plasticity, dense, stiff, moderate reaction w/ 10% HCL			FEW4-MW83-(85) for grain size & Atterberg Limits		
		83'- 86': Dark yellowish-brown (10YR 4/4), CLAY (CH), high plasticity, moist, little to no reaction w/ 10% HCL, some interbedded layers of dark yellowish-brown (10YR 4/4), silty CLAY (CL), low to medium plasticity, moist, little to no reaction w/ 10% HCL		1.1		FEW4-MW83-(85.0)	86-86': 3'/3'
	86						
		Dark brown (10YR 4/3), CLAY (CH), high plasticity, moist to damp, moderate reaction w/ 10% HCL, dense, stiff					
	88						
	90						86-96': 10'/10'
	92	At 91' ~1" sand/gravel layer, variegated gravel, caliche					
		Yellowish brown (10YR 5/4) CLAY (CH), high plasticity, dense, stiff, little to moderate reaction w/ 10% HCL, moist					
	94			0.4		FEW4-MW83-(95.0)	
	96						
	98						
		S.A.A. w/ a few interbedded layers of very pale brown (10YR 7/3), silty CLAY (CL), low to medium plasticity, moderate to high reaction w/ 10% HCL, dry to moist					
	100						

DRILLING LOG

HOLE NO. **MW83**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 7 OF 16 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	100	Yellowish brown (10YR 5/4) CLAY w/ interbedded layers of very pale brown (10YR 7/3), silty CLAY (CL)		PID Headspace (ppm)			
	102						96-106': 10'/10'
	104						
				6.1		FEW4-MW83-(105.0) & DUP FEW4-MW83-(106.0)	
	106	Same as above, moist to wet, w/ a few small (<2") to medium 5-6" clasts					
	108						
	110				FEW4-MW83-(111-112) for physical parameters		106-126': 20'/20'
	112						
	114					FEW4-MW83-(115.0)	
				7.1			
	116						
	118						

DRILLING LOG

HOLE NO. **MW83**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 8 OF 16

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	118	S.A.A. - Yellowish brown (10YR 5/4) CLAY w/ interbedded layers of very pale brown (10YR 7/3), silty CLAY (CL)		PID Headspace (ppm)			
	120						
	122						
	124			12.6		FEW4-MW83-(124.0)	
	126	Brown (10YR 5/3) CLAY (CH), high plasticity, soft to stiff, moist to wet, little to no reaction w/10% HCL, interbedded w/ layers of brown (10YR 5/3), silty CLAY (CL), medium plasticity, soft to stiff, wet, little to no reaction w/10% HCL					
	128						
	130						126-146': 20'/20'
	132			625.0		FEW4-MW83-(133.0)	
	134	@133' soft and wet					
	136						

DRILLING LOG

HOLE NO. **MW83**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 9 OF 16 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	136	Brown (10YR 5/3) CLAY (CH), high plasticity, soft, wet, little to no reaction w/10% HCL, interbedded w/ layers of brown (10YR 5/3), silty CLAY (CL)		PID Headspace (ppm)			
	138						
	140						
	142				FEW4-MW83-(143-144) 5NMR		
	144			111.0		FEW4-MW83-(145.0)	
	146						Stop drilling 07/26/17: 1800 Continue 07/27/17: 0915 @ 146’
	148	Pale brown (10YR 6/3) CLAY (CH), high plasticity, moist, soft to stiff, little to no reaction w/10% HCL, interbedded w/ layers of pale brown (10YR 6/3) silty CLAY (CL), low to medium plasticity, medium stiff, little to no reaction w/10% HCL, clasts from 2”-6”		4.1		FEW4-MW83-(149.0)	
	150						146-166’: 20’/20’
	152						
	154						

DRILLING LOG

HOLE NO. **MW83**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 10 OF 16 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	154	S.A.A. - Pale brown (10YR 6/3) CLAY (CH), high plasticity, moist, soft to stiff, little to no reaction w/10% HCL, interbedded w/ layers of pale brown (10YR 6/3) silty CLAY (CL), low to medium plasticity, medium stiff, clasts from 2”-6”		PID Headspace (ppm)			
	156			3.2		FEW4-MW83-(157.0)	
	158						
	160						
	162						146-166’: 20’/20’
	164						
	166						
	168			0.2		FEW4-MW83-(169.0)	
	170						
	172						

DRILLING LOG

HOLE NO. **MW83**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 11 OF 16 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	172	S.A.A. - Pale brown (10YR 6/3) CLAY (CH), high plasticity, moist, soft to stiff, little to no reaction w/ 10% HCL, interbedded w/ layers of pale brown (10YR 6/3) silty CLAY (CL), low to medium plasticity, medium stiff, w/ 2-6" clasts of harder claystone		PID Headspace (ppm)			
	174						
	176						
	178	178'-186': mud/clay/siltstones (hard, friable) present, slight to moderate reaction w/ 10% HCL		0.2		FEW4-MW83-(178.0)	
	180						
	182						
	184			0.2		FEW4-MW83-(185.0)	
	186	Pale brown (10YR 6/3) CLAY (CH), high plasticity, moist to slightly wet, soft to stiff, little to no reaction w/ 10% HCL, interbedded layers of pale brown (10 YR 6/3) silty CLAY (CL) with low to medium plasticity, moist, medium stiff, little to moderate reaction w/ 10% HCL, and pieces of clay/mud/ siltstones, hard, dense, high reaction w/ 10% HCL					
	188				FEW4-MW83-(189) for grain size & Atterberg Limits		
	190						

DRILLING LOG

HOLE NO. **MW83**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 12 OF 16 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	190	Pale brown (10YR 6/3) CLAY (CH), high plasticity, moist to slightly wet, soft to stiff, little to no reaction w/ 10% HCL, interbedded w/ layers of pale brown (10 YR 6/3) silty CLAY (CL) with low to medium plasticity, moist, medium stiff, little to moderate reaction w/ 10% HCL, and pieces of clay/mud/ siltstones, hard, dense, high reaction w/ 10% HCL		PID Headspace (ppm)			
	192			0.1		FEW4-MW83-(193.0)	
	194						
	196						186-206': 20'/20'
	198						
	200						
	202						
	204			0.2		FEW4-MW83-(204.0)	
	206						
	208						

DRILLING LOG

HOLE NO. **MW83**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 13 OF 16 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	208	Interbedded layers of pale brown (10YR 6/3) CLAY (CH), high plasticity, soft to dense, moist, little to no reaction w/ 10% HCL, (10YR 6/3) silty CLAY (CL), low to medium plasticity, dry to moist, and pale brown (10YR 6/3) clayey SILT (ML), slight plasticity, dry to moist, low reaction w/ 10% HCL, mud/clay/siltstones not present 208-216’		PID Headspace (ppm)			206-216’: 10’/10’
	210						
	212			0.0		FEW4-MW83-(212.0) & DUP FEW4-MW83-(213.0)	
	214						
	216	Same as above (ML), w/o clasts 216-218’: moist to damp					216-226’: 10’/10’
	218						
	220	220-226’: dry to moist					
	222						
	224			0.0		FEW4-MW83-(225.0)	
	226						

DRILLING LOG

HOLE NO. **MW83**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 14 OF 16 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	226	Brown (10YR 5/3) CLAYSTONE, dense, very hard, little to no reaction w/10% HCL		PID Headspace (ppm)			
	228						
	230						
	232						
	234						
	236						
	238						
				0.2		FEW4-MW83-(239.0)	
		@ 239.5' oblique 45° fracture					
	240						
	242						
				0.0		FEW4-MW83-(244.0)	
	244						

DRILLING LOG

HOLE NO. **MW83**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 15 OF 16 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	244	Dark brown (10YR 4/3) gravelly, cobbly SAND (SW) w/ clay and silt, 25% gravel, 10% cobbles (medium), moderate reaction w/10% HCL		PID Headspace (ppm)			
	246	Brown (10YR 5/3) CLAYSTONE, dense, very hard, little to no reaction w/ 10% HCL					246-252': 16'/16'
	248						
	250						
	252						
	254	Light yellowish-brown (10YR 6/4) CLAY (CH), high plasticity, soft to dense, moist, little to no reaction w/10% HCL		0.2		FEW4-MW83-(255.0)	
	256						
	258	Grayish-brown (10YR 5/2) CLAY (CH), high plasticity, soft-dense, moist, little to no reaction w/10% HCL					
	260	Brown (10YR 5/3) gravelly CLAY (CL) w/silt, ~equal parts gravel/clay, clay has high plasticity, gravel fine to medium, variegated, no reaction w/10% HCL					Stopped drilling at 1700 on 7/27/17 at depth of 262'
	262						

DRILLING LOG

HOLE NO. **MW83**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 16 OF 16 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	262	Light yellowish-brown (10YR 6/4) gravelly CLAY (CL), gravel is fine, sub-rounded/sub-angular, clay is hard, somewhat fissile, black, red gravel, wet		PID Headspace (ppm)			Resume drilling 7/28/17
	264	Gray gravelly sand, wet, a few 3" to 4" cobbles, gravel is ~30%			FEW4-MW83-(265) for grain size & Atterberg Limits	FEW4-MW83-(265.0)	
	266						
	268						
	270	Cored through a large cobble (~11") @ 270'					
		Light yellowish-brown to brown CLAY (CH), trace silt, 5-10% coarse gravel, stiff, damp, dense					
	272					FEW4-MW83-(272.0)	
	274						
	276	276-280': (CL)					
	278	-2" hard layer @ 277.8' w/ trace fine gravel (sub-rounded) 278-280': soft (CL), cohesive, more silt					
	280						TD = 280' on 07/28/17

DRILLING LOG

HOLE NO. **MW84**

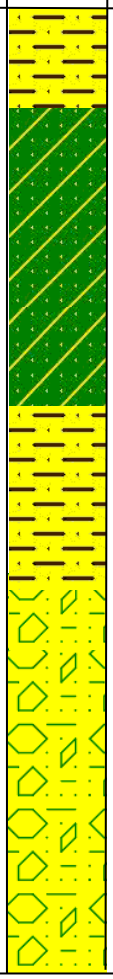
COMPANY NAME: RMC Consultants, Inc.	DRILLING SUBCONTRACTOR: Yellow Jacket Drilling Services, Inc.	SHEET 1 OF 24 SHEETS

PROJECT: Atlas D Missile Site 4 RI Addendum 2017-2018 Tasks	LOCATION: Atlas D Missile Site 4 – Laramie County, Wyoming
NAME OF DRILLER: Jose Munguia	MANUFACTURER'S DESIGNATION OF DRILL: TSI 150T SONIC RIG
SIZES AND TYPES OF DRILLING EQUIPMENT: Sonic Drill Rig; 7-in. diam core barrel (10-ft.); 9-in. diam. drill casing (148-ft.); 8-in. diam. drill casing (150-ft.+)	HOLE LOCATION: 214484.24, 665218.6
	SURFACE ELEVATION: 7148.03ft MSL
	DATE STARTED: 7/30/2017 — DATE COMPLETED: 8/9/2017
OVERBURDEN (OGALLALA FM. or ALLUVIAL) THICKNESS: 82 feet	DEPTH GROUNDWATER ENCOUNTERED: 82ft MSL
DEPTH DRILLED INTO WHITE RIVER FORMATION: WRF: 82 ft bgs; Chadron @ 347 feet bgs	DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: 12/5/17 MW84-99: 97.50 11/30/17 MW84-258: 82.07 11/29/17 MW84-298: 100.41
TOTAL DEPTH OF HOLE: 408'	OTHER WATER LEVEL MEASUREMENTS: 8/13/17 MW84-Temp: 92' bgs

GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	CORED INTERVAL
		FEW4-MW84-(259-260)	Surface to Total Depth

SAMPLES FOR CHEMICAL ANALYSIS	VOCs – onsite	VOCs – offsite	OTHER	OTHER	OTHER	TOTAL CORE RECOVERY
	36	32				95.9 %

DISPOSITION OF HOLE	2-in. diam. NESTED MONITORING WELLS	SIGNATURE OF INSPECTOR
	TD: 101.6 ft bgs; TD: 260.0 ft bgs; TD: 300 ft bgs	Todd Margulies

ELEV.	DEPTH	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE ID.	ANALYTICAL SAMPLE ID.	Recovery (ft/ft) & REMARKS
	0	Brown topsoil w/ roots (grass), silt, trace fine gravel		PID Headspace (ppm)			1350 begin drilling MW84
		Dark brown clayey SILT (ML), soft to stiff, moderate plasticity, moist					
	2						6'/6'
	4	Brown (7.5YR 5/4) SILT (ML), dry, loose from drill action					
	6	Strong brown (7.5YR 5/6) gravelly SILT (ML), dry, loose, 30-40% f-m-c gravel (mostly sub-angular, some sub-rounded)					
	8						
	10						

DRILLING LOG

HOLE NO. **MW84**

PROJECT: Atlas D Midtown Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 2 OF 24 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	10	Brown (10YR 5/3) gravelly SILT (ML), dry, loose, f-m gravel (10%)		PID Headspace (ppm)			
	12	Brown to grayish-brown gravelly SILT (ML), trace f-m sand, damp, 30-40% medium to coarse gravel, sub-rounded, no reaction to 10% HCL					
	14						
	16	Light brown (7.5YR 6/4) SILT, trace fine grained					
	18	Brown to grayish-brown gravelly SILT (ML) w/ cobbles, 30-40% f-m-c gravel, trace f-m-c sand w/ none to 10% clay, cobbles (10%), up to 6” diameter, generally dry to damp (ML), slight reaction to 10% HCL					
	20						
	22						
	24	Grayish-brown gravelly SILT (ML) w/10% cobbles up to 3”, gravel (10-20%) is angular/ sub-angular, as are cobbles, dry to damp, strong reaction to 10% HCL					
	26						
	28						

DRILLING LOG

HOLE NO. **MW84**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 3 OF 24 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	28	Pale brown gravelly SAND (SP), sand is mostly medium w/ 10% coarse grained, gravel (10%) is sub-angular, a few 3-4" cobbles		PID Headspace (ppm)			
	30	Gravel increasing to 20% (f-m-c), color is grayish brown					
	32	Light brown gravelly coarse SAND w/silt (SP-SM), gravel (40%) is mostly fine to medium, sub-angular, damp, generally loose except silt (~15%) allows for clumping when squeezed w/hand					
	34						
	36	Light brown (7.5YR 6/4) gravelly SILT w/ clay (ML), also a few 3" cobbles, gravel (10-20%) is f-m-c, trace clay gives moderate cohesivity, damp to moist					
	38						
	40						
	42	Light yellowish-brown clayey SILT (ML), moderate plasticity					
	44	Gravelly SILT w/ clay (ML), moist, gravel (5%) is m-c, some caliche, gravel increasing 43-46' to ~10%, f-m-c, generally dry					
	46						

DRILLING LOG

HOLE NO. **MW84**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 4 OF 24 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	46	Grayish-brown (10YR 5/2) gravelly SAND (SW), dry, gravel (15%) is mostly f-m, abundant red chert grains		PID Headspace (ppm)			
	48	Light brownish-gray (10YR 6/2) gravelly SILT w/cobbles (ML), gravel (~40%) is f-m-c, sub-angular, dry					
	50						
		Brown (7.5YR 5/4) SILT, trace clay (ML), damp					
	52						
		Light yellowish-brown (2.5YR 6/3) to light brownish-gray (2.5YR 6/2) gravelly SILT (ML), generally dry w/a few 5-8" cobbles, gravel (10-20%) is sub-angular/sub-rounded					
	54						
	56						
	58						
	60						
	62						

DRILLING LOG

HOLE NO. **MW84**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 5 OF 24 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	64	Same as above, gravelly SILT, trace clay		PID Headspace (ppm)			
	66	Grayish-brown SAND w/ 20-30% f-m-c gravel (SW), sand is mostly fine, dry, loose					
	68						
	70						
	72						
	74						
	76	Slightly more silt than above					
	78	Gray gravelly SILT w/ cobbles, dry, silt is powdery (fine silt), gravel is mostly coarse (~20% gravel), cobbles up to 6”					
	80	Pale brown gravelly/cobbly clay, quite stiff to slightly indurated, clay is quite stiff, but has some silt (ML), damp to moist					
	82						

DRILLING LOG

HOLE NO. **MW84**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 6 OF 24 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	82	**White River Formation** @ 82 ft bgs. Pale brown (10YR 6/3) silty CLAY (CL), low to medium plasticity, dry to slightly moist, low to moderate reaction w/ 10% HCL, few small <2" clasts present 94-96'		PID Headspace (ppm)			
	84						
	86					FEW4-MW84-87.0	Water sample 14'/14'
	88						
	90			FEW4-MW84-(91) for grain size & Atterberg Limits 0.2		FEW4-MW84-(91.0)	
	92						
	94						
	96	Brown (10YR 5/3) silty CLAY (CL), medium plasticity, dry to slightly moist, low to moderate reaction w/ 10% HCL, very pale brown (10YR 7/3) clasts present in run, heavy reaction w/ 10% HCL, some brown (10YR 5/3) CLAY (CH) present, high plasticity, low to moderate reaction w/ 10% HCL, moist (10%)					Continue drilling @ 0940
	98			0.4			
	100						

DRILLING LOG

HOLE NO. **MW84**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 7 OF 24 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	100			PID Headspace (ppm)			
				1.1		FEW4-MW84-(101.0)	
	102	Yellowish-brown (10YR 5/4) silty, gravelly, CLAY (CL), low to slightly medium plasticity, moist, little to no reaction w/ 10% HCL, fine gravel, sub-rounded/sub-angular (25%), caliche present					
	104	Brown (10YR 5/3) CLAY (CH), high plasticity, moist, light reaction w/ 10% HCL					14'/14'
	106						
	108	Interbedded pale brown (10YR 6/3) CLAY (CH), high plasticity, moist, light reaction w/ 10% HCL, yellowish-brown (10YR 5/4) silty CLAY (CL), low plasticity, dry to moist, light reaction w/ 10% HCL and light gray (10YR 7/2), very dense/hard CLAYSTONE pieces/layers (2-5"), dry, heavy reaction w/ 10% HCL					
	110						
	112			1.4		FEW4-MW84-(113.0) & FEW4-MW84-(114.0) DUP	
	114						
	116	Yellowish-brown (10YR 5/4) clayey SILT (ML), moist, slight reaction w/ 10% HCL to yellowish-brown (10YR 5/4) silty CLAY (CL), low plasticity, moist, low reaction w/ 10% HCL					
	118						

DRILLING LOG

HOLE NO. **MW84**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 8 OF 24 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	118	Small pieces of claystone present		PID Headspace (ppm)			
	120	Light gray (10YR 7/2) CLAYSTONE, dry, very hard, dense, heavy reaction w/ 10% HCL Increase in claystone pieces from 116-119' (2-5")					
	122						
	124	Color change to pale brown (10YR 6/3), dryer		1.5		FEW4-MW84-(125.0)	
	126	Yellowish-brown (10YR 5/4) silty CLAY (CL) to yellowish-brown (10YR 5/4) clayey SILT (ML), clay is low to slightly medium plasticity, moist to wet, medium to high reaction w/ 10% HCL, few fine clasts present, few fine to medium claystone pieces present, entire run very similar, soft to stiff					
	128						
	130						20'/20'
	132						
	134			0.7		FEW4-MW84-(135.0)	
	136						

DRILLING LOG

HOLE NO. **MW84**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 9 OF 24 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	136	Same as above: Yellowish-brown (10YR 5/4) silty CLAY (CL) to yellowish-brown (10YR 5/4) clayey SILT (ML)		PID Headspace (ppm)			
	138						
	140						
	142						
	144			0.4		FEW4-MW84-(145.0)	
	146						
	148	Yellowish-brown (10YR 5/4) clay (CH), high plasticity, wet, low reaction w/ 10% HCL, interbedded w/ yellowish-brown (10YR 5/4) silty CLAY (CL), low to medium plasticity, moist, and yellowish-brown (10YR 5/4) clayey SILT (ML), moderate reaction w/ 10% HCL, slightly moist, few clasts (small) and claystone pieces, soft to stiff					
	150						16'/16'
	152						
	154						

DRILLING LOG

HOLE NO. **MW84**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 10 OF 24 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	154			PID Headspace (ppm)			
		Same as above: Yellowish-brown (10YR 5/4) clay (CH), high plasticity, wet, low reaction w/ 10% HCL, interbedded w/ yellowish-brown (10YR 5/4) silty CLAY (CL), low to medium plasticity, moist, and yellowish-brown (10YR 5/4) clayey SILT (ML),		1.7		FEW4-MW84-(155.0)	
	156						
	158						
	160						
	162	Same as 146-162' w/ increase in (CL) and decrease in (CH)		0.7		FEW4-MW84-(162.0)	
	164						
	166						14'/14'
	168						
	170						
	172						

DRILLING LOG

HOLE NO. **MW84**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 11 OF 24 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	172	S.A.A. - yellowish-brown (10YR 5/4) silty CLAY (CL)		PID Headspace (ppm)			
	174			0.3		FEW4-MW84-(175.0)	
	176	Claystone rubble zone Pale brown (10YR 6/3) silty CLAY (CL), low to medium plasticity, moist to wet, soft to medium stiff, low to moderate reaction w/ 10% HCL and pale brown (10YR 6/3) clayey SILT (ML), moist, low to moderate reaction w/ 10% HCL,					
	178	Core contains lots of pale brown (10YR 6/3) claystone pieces, hard					10'/10'
	180						
	182						
	184			0.5		FEW4-MW84-(185.0)	
	186	Same as above					
	188						
	190						

DRILLING LOG

HOLE NO. **MW84**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 12 OF 24 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	190			PID Headspace (ppm)			
	192	Very pale brown (10YR 7/3) clayey SILT (ML), dry to very slightly moist, hard, heavy reaction w/ 10% HCL, numerous horizontal cracks (fractures), along silt seams					
	194			0.2		FEW4-MW84-(195.0)	
	196						
	198						
		Increase in clay					
	200	Very pale brown (10YR 7/3) silty CLAY (CL), low to medium plasticity, dry to moist, slight to moderate reaction w/ 10% HCL, medium stiff		0.6		FEW4-MW84-(200.0)	
	202						
	204						12'/12'
	206						
	208						

DRILLING LOG

HOLE NO. **MW84**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 13 OF 24 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	208	Very pale brown (10YR 7/3) silty CLAY (CL)		PID Headspace (ppm)			
	210						
	212	Pale brown (10YR 6/3) SILTSTONE, dense, massive, moderate reaction w/ 10% HCL, dry to slightly moist		0.3		FEW4-MW84-(212.0)	Drillers start wet drilling
	214						
	216						
	218	<5% gravel, appears (fine), variegated					
	220						
	222	Same as 212-222' w/ increase in gravel to 10%, wet outside of cores, inside core dry to very slightly moist					
	224	Brown (10YR 5/3) silty CLAY (CL)/clayey SILT (ML), low to medium plasticity, dry to slightly moist, little to no reaction w/ 10% HCL		1.0		FEW4-MW84-(225.0)	Stop drilling 07/31/17, 1900 @ 226'
	226						

DRILLING LOG

HOLE NO. **MW84**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 14 OF 24 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	226	Brown (10YR 5/3) CLAYSTONE, dense, hard, moderate reaction w/ 10% HCL, moist		PID Headspace (ppm)			Continue drilling 08/01/17, 0915 @ 226’
	228						
	230						
	232	Fracture @ 232’, slickensides present, elongated minerals (biotite)		1.0		FEW4-MW84-(232.0)	
	234						22’/22’
	236						
	238						
	240						
	242	Pale brown (10YR 6/3) to brown (10YR 5/3) CLAYSTONE, medium to hard, moderate reaction w/ 10% HCL, moist, brown (10YR 5/3) silty CLAY (CL), medium plasticity, moist, light reaction w/ 10% HCL					
	244						

DRILLING LOG

HOLE NO. **MW84**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 15 OF 24 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	244			PID Headspace (ppm)			
				1.2		FEW4-MW84-(245.0)	
	246						
	248	Pale brown (10YR 6/3) SILTSTONE/CLAYSTONE, very hard, dense, dry to very slightly moist, moderate to heavy reaction w/ 10% HCL					Majority of core dropped out of core barrel onto deck-all mechanical breaks except @ 256'
	250						
	252						
	254				FEW4-MW84-(256) for grain size & Atterberg Limits		
	256	Fracture @ 256', slickensides present		1.0		FEW4-MW84-(256.0)	
	258						
					FEW4-MW84-(259-260) for physical parameters		
	260						
	262						

DRILLING LOG

HOLE NO. **MW84**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 16 OF 24 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	262			PID Headspace (ppm)			
		Brown (10YR 5/3) silty CLAY (CL)/clayey SILT (ML), low plasticity, moist, little to no reaction w/ 10% HCL, medium hard, stiff					
	264						
				0.3		FEW4-MW84-(265.0)	
	266					FEW4-MW84-(266.0) DUP	
		Pale brown (10YR 6/3) SILTSTONE w/ sand, hard, slight reaction w/ 10% HCL, w/ fine variegated gravel (10-15%), sub-rounded/sub-angular, dry					
	268						
		Pale brown (10YR 6/3) SILTSTONE, very hard, dense, massive, no reaction w/ 10% HCL, dry, biotite, caliche					
	270						20'/20'
	272						
	274			0.2		FEW4-MW84-(275.0)	
	276						
	278						
		Pale brown (10YR 6/3) gravelly SILTSTONE w/ sand, hard,					
	280						

DRILLING LOG

HOLE NO. **MW84**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 17 OF 24 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	280	SILTSTONE w/ sand, hard, slight reaction w/ 10% HCL, fine to coarse variegated gravel (10%), sub-rounded/sub-angular, dry		PID Headspace (ppm)			
	282	280.5'- Yellowish-brown (10YR 5/4) SILTSTONE, slight reaction w/ 10% HCL, dry, biotite, hard					
	284						
	286	Pale brown (10YR 6/3) gravelly SANDSTONE w/ silt and clay, slight reaction w/ 10% HCL, fine to medium gravel, variegated, sub-rounded/sub-angular, dry		0.7		FEW4-MW84-(286.0)	
	288						
	290						11.5'/21'
	292	No recovery 287'-296' Assumed sand and gravel					
	294						294-300 core barrel slipped down, and core washed
	296	Light yellowish-brown (10YR 6/4) gravelly SAND (SW), at least 25-35% gravel, variegated, sub-rounded/sub-angular, fine to coarse, difficult to estimate % gravel, due to washing, wet		2.2	FEW4-MW84-(297) for grain size & Atterberg Limits	FEW4-MW84-(297.0)	
	298						

DRILLING LOG

HOLE NO. **MW84**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 18 OF 24 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	298			PID Headspace (ppm)			
	300	Pale brown (10YR 6/3) SILTSTONE, dry, very hard, slight reaction w/ 10% HCL, little biotite					
	302	Pale brown (10YR 6/3) clayey SILT (ML), slight to no plasticity, dry, little reaction w/ 10% HCL					
	304						
	306	Pale brown (10YR 6/3) SILTSTONE, dry, very hard, slight reaction w/ 10% HCL, little biotite		1.3		FEW4-MW84-(307.0)	
	308	No recovery 308-310’					Stop drilling 08/01/17, 1700 Continue drilling 08/08/17, 1330
	310	Yellowish-brown (10YR 5/4) SILTSTONE, very hard, dense, massive, moderate reaction w/ 10% HCL, slightly moist Fracture @ 311’, slickensides, biotite, small amount of caliche		0.1		FEW4-MW84-(311.0)	19’/21’
	312						
	314	Light yellowish-brown (10YR 6/4) SILT/CLAYSTONE, medium hard, light to moderate reaction w/ 10% HCL, biotite, possible caliche, slightly moist					
	316						

DRILLING LOG

HOLE NO. **MW84**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 19 OF 24 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	316	Light yellowish-brown (10YR 6/4) SILT/CLAYSTONE,		PID Headspace (ppm)			
	318						
	320						
	322	Brown (10YR 5/3) SILT/MUDSTONE w/ clay (~10%), medium stiff, few clasts, decrease in biotite, light to moderate reaction w/ 10% HCL, few fine gravel particles (<5%), dry to slightly moist					
	324	Gravel decreases to 329’ Clay decreases to 329’		0.0		FEW4-MW84-(324.0) FEW4-MW84-(325.0) DUP	
	326						
	328						
	330	Yellowish-brown (10YR 5/4) SILTSTONE, very hard, massive, no reaction w/ 10% HCL					21’/21’ 329-342’ Core slipped out of core barrel onto deck causing mechanical breaks
	332						
	334						

DRILLING LOG

HOLE NO. **MW84**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 20 OF 24 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	334			PID Headspace (ppm)			
	336	Possible fracture @ 336', biotite, angular		0.1		FEW4-MW84-(336.0)	
	338						
	340						
	342	Pale brown (10YR 6/3) SILTSTONE, medium hard, little to no reaction w/ 10% HCL, clay present (<5%), dry to slightly moist					
	344						
	346						
	348	Light yellowish-brown (10YR 6/4) gravelly SAND (SW) w/ silt (<5%), clay (<5%), 10-15% gravel, variegated, little to no reaction w/ 10% HCL, moist, gravel increases in size 349-350' (medium), slight increase in clay 349-350', and color change to grayish-brown (10YR 5/2), medium plasticity "Chadron" –type material		0.0		FEW4-MW84-(349.0)	Stop drilling 08/08/17, 1810 Continue 08/09/17, 0835 @ 350'
	350	No recovery 350-354 –washed Assumed sand and gravel					
	352						

DRILLING LOG

HOLE NO. **MW84**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 21 OF 24 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	352	No recovery 350-354 ft – assumed sand & gravel		PID Headspace (ppm)			
	354	Light yellowish-brown (10YR 6/4) gravelly SAND (SW) w/ silt (<5%) and clay (<5%), 25% gravel, variegated, little to no reaction w/ 10% HCL, moist to wet, clay is grayish-brown (10YR 5/2), medium plasticity					14'/18'
	356						
	358	Same as above w/ decrease in gravel to <5%, slight increase in clay		0.0		FEW4-MW84-(359.0)	
	360	Gray (10YR 6/1) GRAVEL (SP) w/ sand (5%) and cobbles, wet, slight reaction w/ 10% HCL, gravel is sub-rounded/sub-angular					
	362	hard cemented conglomerate layer 362-363',					
	364	Light yellowish-brown (10YR 6/4) gravelly SAND (SW) w/ silt (<5%) and clay (<5%), 25% gravel, moderate reaction w/ 10% HCL, dry to slightly moist, sub-rounded/sub-angular, fine to medium gravel, variegated, hard					
	366	Pale brown (10YR 6/3) SILTSTONE w/ clay (5%), dry to slightly moist, hard, little to no reaction w/ 10% HCL		0.0		FEW4-MW84-(367.0)	
	368	Brown (10YR 5/) SILTSTONE w/ clay, clay is medium plasticity, moist, no reaction w/ 10% HCL, biotite, hard, dense, massive					
	370						

DRILLING LOG

HOLE NO. **MW84**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 22 OF 24 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	370	S. A. A. - Brown (10YR 5/) SILTSTONE w/ clay, clay is medium plasticity, moist, no reaction w/ 10% HCL, biotite, hard, dense, massive		PID Headspace (ppm)			
	372						
	374			0.0		FEW4-MW84-(374.0)	
		No recovery- washed 374-376’					
	376	376-377’- Light yellowish-brown (10YR 6/4) gravelly SAND (SW) w/silt (<5%), clay (<5%), ~30% f-m gravel, angular to rounded, moist to wet, moderate reaction w/10% HCL, partially cemented 377-380’- Gray (10YR 6/1) fine to coarse gravel w/cobbles (GP), wet, little to no reaction w/10% HCL, sub-angular/sub-rounded, moist, likely all sand washed out of this interval along w/ 374-376’					18’/20’
	378						
	380	380-381’- Light yellowish-brown (10 YR 6/4), gravelly SAND (SW) w/silt (10%), clay (5%), 15-20% gravel, fine to medium, sub-angular/sub-rounded					10% HCL Reaction: None
		381-388’- Brown (10YR 5/3) SILTSTONE w/ clay, clay is medium plasticity, moist, no reaction w/10% HCL, hard, few clasts, biotite, possible faint iron oxide stain, caliche					
	382						
	384			0.0		FEW4-MW84-(384.0)	
	386						
	388						

DRILLING LOG

HOLE NO. **MW84**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 23 OF 24 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	388	Brown (10YR 5/3) gravelly SAND (SW) w/ silt, 25% gravel, fine, sub-rounded/sub-angular, moist, no reaction w/10% HCL		PID Headspace (ppm)			
	390						
	392	Same as 388-392' w/finer grained sand and decrease in gravel to <5%					
	394	Dark yellowish-brown (10YR 4/4) SILT/MUDSTONE, very hard, dense, massive, no reaction w/10% HCL, moist, biotite, few clasts					20'/20'
	396						
	398						
		Fracture w/slickensides @ 399'		0.0		FEW4-MW84-(399.0) & FEW4-MW84-(400.0) DUP	
	400	Light brownish-gray (10YR 6/2) SILTSTONE w/clay, medium hard, moist, no reaction w/10% HCL, clay is light brownish-gray (10 YR 6/2), medium plasticity					
	402						
	404						
	406						

DRILLING LOG

HOLE NO. **MW84**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 24 OF 24 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	406	Light brownish-gray (10YR 6/2) SILTSTONE		PID Headspace (ppm)			
	408	End of boring @ 408’					TD 408’ 08/09/17, 1530

DRILLING LOG

HOLE NO. **MW85**

COMPANY NAME: RMC Consultants, Inc.	DRILLING SUBCONTRACTOR: Yellow Jacket Drilling Services, Inc. .	SHEET 1 OF 15 SHEETS
PROJECT: Atlas D Missile Site 4 RI Addendum 2017-2018 Tasks	LOCATION: Atlas D Missile Site 4 – Laramie County, Wyoming	
NAME OF DRILLER: Cliff Hillman	MANUFACTURER'S DESIGNATION OF DRILL: TSI 150T SONIC RIG	
SIZES AND TYPES OF DRILLING EQUIPMENT: Sonic Drill Rig; 7-in. diam core barrel (10-ft); 8-in. diam. drill casing; 9-in. diam. drill casing	HOLE LOCATION: 1,040 feet east of L&SB #2; 214039.85 ft N, 663348.12 ft E	
	SURFACE ELEVATION: 7,246 ft msl	
	DATE STARTED: 8/24/2017	DATE COMPLETED: 8/25/2017
OVERBURDEN (OGALLALA FM. or ALLUVIAL) THICKNESS: 95 ft	DEPTH GROUNDWATER ENCOUNTERED: 84.4'bgs	
DEPTH DRILLED INTO WHITE RIVER FORMATION: 154 ft	DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: 85.0 ft bgs on 9/8/17 in 4" PVC Temporary well	
TOTAL DEPTH OF HOLE: 249 ft	OTHER WATER LEVEL MEASUREMENTS	

GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	CORED INTERVAL
	3 for Grain size& Atterberg Limits	None	Surface to Total Depth

SAMPLES FOR CHEMICAL ANALYSIS	VOCs – onsite	VOCs – offsite	OTHER	OTHER	OTHER	TOTAL CORE RECOVERY
	16 soil, 1 water	16 soil				97 %

DISPOSITION OF HOLE	2-in. diam. NESTED MONITORING WELLS	SIGNATURE OF INSPECTOR
	TD: 94.6 ft bgs; TD: 153.6 ft bgs; TD: 207.6 ft bgs	Jen Hussey

ELEV.	DEPTH	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE ID.	ANALYTICAL SAMPLE ID.	Recovery (ft/ft) & REMARKS
		Yellowish-brown sand/gravel/silt mixture (SM), loose, dry		PID Headspace (ppm)			1036-begin advancing 8" core barrel
7244	2	Brown @ 2'					
		Increase in fines, w/ well graded sand and f-c gravel					
7242	4	Pale brown clayey SILT (ML), slightly cohesive-can be threaded w/fingers, dry to slightly moist					6'/6' 0-6'
7240	6	5.5'- sandy gravelly SILT (ML/SM), loose, sand is well-graded (f-c), a few cobbles @ 7-9', f-c gravel, sub-angular/angular					
7238	8	~7" cobble @ 8'					
7236	10						

DRILLING LOG

HOLE NO. **MW85**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jen Hussey

SHEET 2 OF 15 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
7236	10	Same as above, gravelly SILT with sand		PID Headspace (ppm)			
7234	12	a few cobbles up to 5” in diameter Color change from yellowish-brown to gray, loose sandy SILT w/gravel (ML)					
7232	14	14’- increase in gravel (f-c) and coarse sand, gravelly, well-graded SAND w/ silt (SW-SM), loose, dry					
7230	16	cobbles 3-5” diameter present 16-20’					10’/10’ 16-26’
7228	18						
7226	20	Similar to above w/trace cobbles, brown to yellowish-brown (10YR 5/3-5/4) loose, gravelly, well-graded SAND w/ <15% silt (SW-SM)					
7224	22	Increase in fines (silt), silty SAND w/ gravel (SM)					
7222	24	Grades to a pale brown (10YR 6/3) sandy SILT (ML) w/ f-c grained gravel, loose, dry					
7220	26	Very pale brown (10YR 7/3) SILT w/sand and gravel (ML), trace (<5%) clay, silt has slight plasticity, slightly moist, slightly cohesive when squeezed w/fingers					
7218	28						

DRILLING LOG

HOLE NO. **MW85**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jen Hussey

SHEET 3 OF 15 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
7218	28	Non-plastic and increase in m-c grained SAND (SM) w/ silt and gravel, loose		PID Headspace (ppm)			
7216	30	Clayey lense, silty CLAY to clayey SILT w/ sand (CL/ML), <15% gravel and a few cobbles					
7214	32	Return to very pale brown SILT w/sand and gravel (ML), loose, dry					10'/10' 26-36'
7212	34						
7210	36	Brown (10YR 5/3) SAND w/ <15% silt and gravel (SW-SM), loose, sand is predominantely fine grained w/~25% m-c grained sand					
7208	38						
7206	40	Increase in silt content and in coarse grained sand; brown to yellowish-brown (10YR 5/3-5/4) silt-sand mixture w/ angular gravel (SW-SM), dry, loose					
7204	42	Color change to very pale brown (10YR 7/2), clayey SILT (ML) w/ slight plasticity, ~15% gravel					42-44': core is partially cohesive
7202	44	Silt-sand-gravel mixture (ML), loose, sand is well graded (~60% fine and 40 % m-c grained), a few 3" cobbles					
7200	46						

DRILLING LOG

HOLE NO. **MW85**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jen Hussey

SHEET 4 OF 15 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
7200	46			PID Headspace (ppm)			
7198	48	Brown (7.5YR 5/4) well graded SAND (f-c grained) w/ gravel, sub-rounded/sub-angular, <15% silt (SW-SM), loose, dry					10'/10' 46-56'
7196	50	Increase in fines @ 51'					
7194	52	A few cobbles in w/ silty SAND w/ gravel (SW-SM), loose, gravel is f-c					
7192	54						
7190	56						
7188	58	Increase in gravel content, large (9") cobble @ 58'					
7186	60	Slightly clayey, slight cohesiveness @ 59', brown (10YR 5/3) silty, gravelly, SAND (SW-SM), slightly moist, sand is well-graded, f-m-c grained					
7184	62	a few cobbles ranging from 3-5" in size, 8" cobble @ 62'					10'/10' 56-66'
7182	64						

DRILLING LOG

HOLE NO. **MW85**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jen Hussey

SHEET 5 OF 15 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
7182	64			PID Headspace (ppm)			
7180	66	Yellowish-brown (10YR 5/4) SAND w/ gravel (SW), dry, loose, sand is well graded f-c grained), gravel is f-c, sub-rounded, a few cobbles present					
7178	68						
7176	70	70.5'- increase in fines, grades to a silty SAND w/ gravel (SM), dry, loose, a few 3" cobbles					
7174	72						
7172	74						
7170	76						
7168	78	Sharp color change from gray to reddish-brown, gravelly SAND, well graded (SW-SM), some silt (~5-15%), loose, slightly moist to moist @ 81.5', brown (10YR 5/3-4/3), a few 3-4" cobbles					
7166	80						
7164	82						

DRILLING LOG

HOLE NO. **MW85**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jen Hussey

SHEET 6 OF 15 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
7164	82			PID Headspace (ppm)			83-84' core is cohesive
7162	84	Very moist to wet @ 83', dark grayish-brown (10YR 4/2) SILT (ML) w/ sand and gravel, slight plasticity wet: 83-86'					Driller notes he believes H2O encountered last 3' of run but lost 84-86' recovery
7160	86	Cohesive core 86-87', clayey SILT (ML) w/ sand and f-c gravel, moist				FEW4-MW85-(86.0)	4'/4' 84-88'
7158	88	Light gray (10YR 7/2) SAND/GRAVEL/ SILT mixture w/cobbles (ML), loose, dry to slightly moist,			FEW4-MW85-88 for grain size analysis & Atterberg Limits		
7156	90	grades to a SILT w/sand and gravel (ML) and cobbles				FEW4-MW85-90	Water Sample 1559 DTW = 90.4' top of jaws-6' above surface
7154	92						8'/8' 88-96'
7152	94						WRF contact ~95 bgs
7150	96	White River Formation @ 95' Color change to light brown (7.5YR 6/3) to very pale brown (10YR 7/3), dry Clay is softer @ 96', pale brown (10YR 6/3-5/3), silty CLAY (CL) w/low plasticity, slightly moist, trace (<10%) manganese oxide, consolidated cores breaks along horizontal planes		0.7		FEW4-MW85-(96.0)	
7148	98						
7146	100						

DRILLING LOG

HOLE NO. **MW85**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jen Hussey

SHEET 7 OF 15 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
7146	100	Same as above- brown silty CLAY (CL), w/ low plasticity, moist, ~10% manganese oxide, caliche present @ 101-104', strong reaction w/10% HCL, cores break along horizontal silty planes, medium stiff to stiff		PID Headspace (ppm)			Abundant caliche 101-102'
7144	102						10'/10' 96-106'
7142	104	Fine to coarse gravel in w/ silty CLAY (CL), moist, low plasticity, core easily penetrated 1" w/knife a few 3" cobbles @ 105',		0.3		FEW4-MW85-(105.0)	
7140	106	Pale brown to brown (10YR 6/3-5/3) clayey SAND w/ fine gravel (SC), very moist, cores are cohesive					10'/10' 106-116'
7138	108	108.5'- increase in gravel content, strong reaction w/10% HCL, caliche present				FEW4-MW85-(109.0)	
7136	110	Brown (10YR 5/3) SILT (ML) w/trace clay, slightly moist, trace (<5%) manganese oxide, cores broken along horizontal planes ~2" thick, no reaction w/10% HCL		1.3			
7134	112						
7132	114						
7130	116	A little softer than above					
7128	118						

DRILLING LOG

HOLE NO. **MW85**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jen Hussey

SHEET 8 OF 15 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
7128	118	Same as above- brown (10YR 5/3) SILT (ML) w/trace clay, slightly moist, medium stiff, cores are cohesive and easily gouged 1" w/ knife		PID Headspace (ppm) 0.4		FEW4-MW85-(118.0)	
7126	120						7'/7' 117-123'
7124	122	Increase in clay fraction/fines = clayey SILT (ML) w/ slight plasticity, slightly moist to moist					
7122	124	123-136' yellowish-brown (10YR 5/4), uniform cohesive cores, SILT w/ trace clay (ML) and some clayey SILT (ML) w/ slight plasticity, slightly moist, medium stiff, moderate reaction w/10% HCL					
7120	126						
7118	128			1.3		FEW4-MW85-(128.0)	
7116	130						13'/13' 123-136'
7114	132						
7112	134	Strong reaction w/10% HCL - caliche					1805 stop drilling for day; drilled dry 0-136'
7110	136						

DRILLING LOG

HOLE NO. **MW85**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jen Hussey

SHEET 9 OF 15 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
7110	136	Pale brown (10YR 6/3) CLAY to silty CLAY (CL) w/ varying amounts of silt, moist, low to medium plasticity, hard claystone rip up pieces, up to 2" in diameter 137.5-139'		PID Headspace (ppm)			08/25/17 0750 resume drilling @ 136'
7108	138					FEW4-MW85-(138.0)	
7106	140	Smaller, hard rip up claystone clasts in w/ silty clay (CL)					10//10' 136-146'
7104	142						
7102	144	increase in silt content (CL/ML), grades to a clayey SILT (ML), Yellowish-brown (10YR 5/4), w/ slight plasticity, moist					
7100	146						
7098	148	Interior of cohesive core is wet Decrease in clay content, SILT (ML), mostly non-plastic, slightly moist, trace clay (<5%)		0.5	FEW4-MW85-148 for grain size analysis & Atterberg Limits	FEW4-MW85-(148.0)	9" casing is to 148'
7096	150	150-152'- sample core crumbles easily into weakly cemented silt pieces when gouged w/ knife					
7094	152						
7092	154						

DRILLING LOG

HOLE NO. **MW85**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jen Hussey

SHEET 10 OF 15 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
7092	154	Same as above- cohesive cores, brown (10YR 5/3) SILT (ML), slightly moist, medium stiff, easily gouged 1" w/knife, crumbles into loose silt and weakly cemented silt pieces that can be readily broken w/ finger pressure		PID Headspace (ppm)			
7090	156						
7088	158	Cores 157-160' broken in horizontal (1-2' thick) planes, moderate to strong reaction w/ 10% HCL		0.1		FEW4-MW85-(158.0)	20'/20' 146-166'
7086	160						
7084	162						
7082	164						
7080	166	Same as above, cohesive cores, SILT (ML), slightly moist, stiff, doesn't crumble when hit w/ rock hammer, more cohesive than above material from 154-160'					
7078	168			0.1		FEW4-MW85-(168.0)	
7076	170						10'/10' 166-176'
7074	172	Increasing clay content, clayey SILT (ML) w/ slight plasticity					

DRILLING LOG

HOLE NO. **MW85**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jen Hussey

SHEET 11 OF 15 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
7074	172	Similar to above- alternating SILT, clayey SILT, and some silty CLAY (ML/CL)		PID Headspace (ppm)			Drilling dry
7072	174						
7070	176	Brown to yellowish-brown (10YR 5/3-5/4) SILT (ML), slightly moist, non-plastic to very slight plasticity, trace clay, trace manganese oxide, brassy-colored specks (<1mm), sparkle in sun, uniform, cohesive cores					
7068	178			0.1		FEW4-MW85-(178.0)	
7066	180	Strong reaction w/10% HCL 180-182’					12’/12’ 176-188’
7064	182						
7062	184	Grades to a silty CLAY (CL) w/ low plasticity, dry to slightly moist, cores are very cohesive and difficult to break apart w/ rock hammer, stiff, some interbedded silty lenses in w/clay					
7060	186						Driller notes that he’s going to switch from drilling dry to using H2O @ 188’ since drilling is getting hard
7058	188	Yellowish-brown (10YR 5/4), solid cores of hard to very stiff CLAYSTONE, silty		0.1		FEW4-MW85-(188.0)	
7056	190						

DRILLING LOG

HOLE NO. **MW85**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jen Hussey

SHEET 12 OF 15 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
7056	190	Same as above- yellowish-brown (10YR 5/4), very stiff to hard CLAYSTONE, solid, intact cores (breaks are mechanical made during retrieval from core barrel), massive, <5% manganese oxide, specs sparkle in sun on fresh core surfaces		PID Headspace (ppm)			
7054	192						
7052	194						Vertical mechanical break 195-196’
7050	196						
7048	198	Possible fracture zone 198-200’, partially broken up claystone core, vertical break @ 198-199’, no indication of weathering/staining		0.0		FEW4-MW85-(199.0)	
7046	200	Return to hard CLAYSTONE, solid/intact core, only tip of knife able to gouge core					21’/21’ 188-209’
7044	202						
7042	204	Brown (10YR 6/3) SILT (ML), not as hard as above - knife able to gouge core 1” w/ moderate effort, dry, moderate to strong reaction w/10% HCL					
7040	206						
7038	208	206.5’- yellowish-brown (10YR 5/4) clayey, gravelly, SILT w/ sand (ML)					

DRILLING LOG

HOLE NO. **MW85**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jen Hussey

SHEET 13 OF 15 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
7038	208	Same as above- gravelly Sand and silt w/ trace clay, patches of brick red and greenish coloring in fines-silty matrix, gravel predominately fine but also coarse present		PID Headspace (ppm)	FEW4-MW85-208 for grain size analysis & Atterberg Limits	FEW4-MW85-(208.0)	
7036	210	Brown (10YR 5/3), CLAYSTONE, hard, solid core, sparkles in sun on fresh surfaces, trace manganese oxide					
7034	212						
7032	214	Limited recovery- fines likely washed out; gravel and cobble zone w/ strong iron stained silt					~14'/20' 209-219'
7030	216						
7028	218	Sundance Formation: Very hard Sandstone, fine-grained cemented sand w/ ~30% m-c grains, strong iron staining throughout, and strong red-brick colored striations ~2mm-3mm wide, bedding planes observable, dipping at ~45º, with extensive cross-bedding		0.0		FEW4-MW85-(218.0)	Encounter a different formation @ 218'
7026	220	Strong iron staining along entire surface of broken core, very hard solid cores, unable to gouge w/ tip of knife					Driller reports fast drilling 217-224'; returns may have washed out resulting in poor recovery
7024	222						Unable to break apart cores w/ rock hammer; can only chip away pieces
7022	224	Same- very hard sandstone cores, well cemented, f-c grained sand, increase in m-c grained sand, solid cores w/ soupy orange-brown fine-grained sand along exterior surface of cores 218-228'					
7020	226						

DRILLING LOG

HOLE NO. **MW85**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jen Hussey

SHEET 14 OF 15 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
7020	226	Same as above, very hard fine grained sandstone, well cemented/solid cores, surface of broken core looks sandy		PID Headspace (ppm)			
7018	228			0.0		FEW4-MW85-(228.0)	
7016	230	229-246'- White (10YR 8/1-8/2), very hard solid cores of SILTSTONE/very fine SANDSTONE, unable to gouge cores w/ tip of knife- extremely hard to break off pieces w/rock hammer, strong iron staining, very fine-grained sandstone w/laminar banding (mauve, tan, light gray, orangish colors) observed on exterior of cores					Sundance Formation
7014	232						
7012	234						
7010	236	Buff-whitish SILTSTONE					
7008	238	Oblique fracture 238-239', broken up cores of SILTSTONE/very fine-grained SANDSTONE, sugary texture, possible fracture zone (breaks don't appear mechanical)					
7006	240						
7004	242	Return to solid intact cores @ 241'					
7002	244						

DRILLING LOG

HOLE NO. **MW85**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jen Hussey

SHEET 15 OF 15 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
7002	244	Same as above: hard Siltstone/v. fine-grained sandstone		PID Headspace (ppm)			
7000	246	Much softer, cohesive cores can be carved w/knife, clayey SILT (ML) w/ low plasticity, mottled- light gray and mauvish-brown w/ trace iron staining,					Possibly encounter Chugwater Formation at 246' bgs
6998	248	dark mauve and light gray, very fine grained cemented pieces (mudstone) w/ orange-reddish bands in w/ fine grained soupy mixture					
		End of Boring @ 249' bgs					
6996	250						

DRILLING LOG

HOLE NO. **MW86**

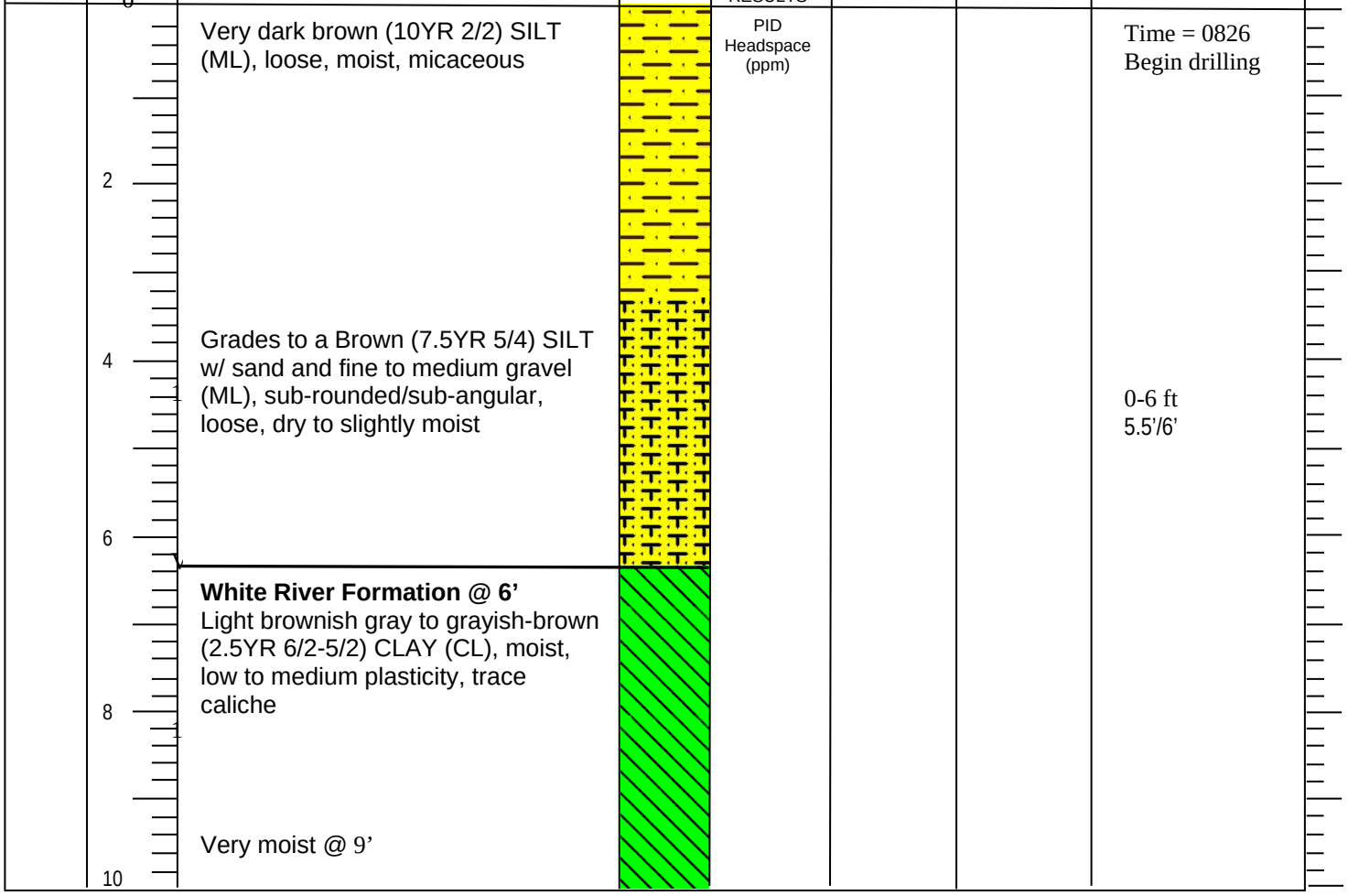
COMPANY NAME: RMC Consultants, Inc.	DRILLING SUBCONTRACTOR: Yellow Jacket Drilling Services, Inc.	SHEET 1 OF 22 SHEETS
PROJECT: Atlas D Missile Site 4 RI Addendum 2017-2018 Tasks	LOCATION: Atlas D Missile Site 4 – Laramie County, Wyoming	
NAME OF DRILLER: Jose Munguia	MANUFACTURER'S DESIGNATION OF DRILL: TSI 150T SONIC RIG	
SIZES AND TYPES OF DRILLING EQUIPMENT: Sonic Drill Rig; 7-in. diam core barrel; 9-in. diam. drill casing (150-ft.); 8-in. diam. drill casing (150-ft.+)	HOLE LOCATION: Near Hall Well 216063.48 ft N, 665881.93 ft E	
	SURFACE ELEVATION: 7039.54 ft MSL	
	DATE STARTED: 07/31/17	DATE COMPLETED: 08/10/17
OVERBURDEN (OGALLALA FM) THICKNES: 6 feet	DEPTH GROUNDWATER ENCOUNTERED: 9 ft bgs	
DEPTH DRILLED INTO WHITE RIVER FORMATION: WRF: 6 to 380 ft bgs	DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: 10/17/17 MW86-53: 3.9' bgs MW86-199: 8.0' bgs MW86-353: 8.7' bgs	
TOTAL DEPTH OF HOLE: 388 ft bgs	OTHER WATER LEVEL MEASUREMENTS: 8/16/17 MW86-Temp: 7.29' TOC	

GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	CORED INTERVAL
	3 grain size/Atterbergs	1 physical parameters	Surface to Total Depth

SAMPLES FOR CHEMICAL ANALYSIS	VOCs – onsite	VOCs – offsite	OTHER	OTHER	OTHER	TOTAL CORE RECOVERY
	41	39				96.4 %

DISPOSITION OF HOLE	2-in. diam. NESTED MONITORING WELLS	SIGNATURE OF INSPECTOR
	TD: 55.9 ft bgs TD: 201.7 ft bgs TD: 355.1 ft bgs	

ELEV.	DEPTH	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE ID.	ANALYTICAL SAMPLE ID.	Recovery (ft/ft) & REMARKS
	0	Very dark brown (10YR 2/2) SILT (ML), loose, moist, micaceous		PID Headspace (ppm)			Time = 0826 Begin drilling
	2						
	4	Grades to a Brown (7.5YR 5/4) SILT w/ sand and fine to medium gravel (ML), sub-rounded/sub-angular, loose, dry to slightly moist					0-6 ft 5.5'/6'
	6	**White River Formation @ 6'** Light brownish gray to grayish-brown (2.5YR 6/2-5/2) CLAY (CL), moist, low to medium plasticity, trace caliche					
	8						
	10	Very moist @ 9'					



DRILLING LOG

HOLE NO. **MW86**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jennifer Hussey

SHEET 2 OF 22 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	10	Grades to a Light yellowish-brown (10YR 6/4) CLAY (CL) w/ trace silt, moist, low plasticity		PID Headspace (ppm)			6-16': 10'/10'
	12	Increase in silt; silty CLAY (CL), slightly moist, stiff					
	14			0.1		FEW4-MW86-(15.0)	
	16	Light yellowish-brown (10YR 6/4) silty CLAY (CL) w/ trace manganese oxide, cohesive, stiff to very stiff, dry to slightly moist				FEW4-MW86-(16.0) Dup.	Water sample 0904 DTW= 25.6' from jaws (6'2" from ground surface to jaws) 0924 DTW = 16.7' bgs
	18						
	20	Clay minerals- "brassy" specks (pyrite), observed in clay					
	22	Increase in silt content, core from 21-23' breaks in platy manner, very low plasticity, very stiff, dry, trace manganese oxide					
	24	Light yellowish-brown (10YR 6/4) CLAY w/ interleyered silty CLAY (CL), slightly moist, very stiff, low plasticity, ~10 % manganese oxide				FEW4-MW86-(25.0)	3'/3' 23-26'
	26	Hard CLAYSTONE, core is broken along vertical and oblique breaks/fractures, wet/soupy, difficult to determine whether breaks are mechanical, increase in manganese oxide (~40%), some dendritic manganese oxide observed along broken core surfaces		0.2			
	28			0.1		FEW4-MW86-(28.0)	

DRILLING LOG

HOLE NO. **MW86**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jennifer Hussey

SHEET 3 OF 22 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	28	Yellowish-brown (10YR 5/4) CLAY (CL), core not solid or as hard as above, material is cohesive, core readily indented w/ knife, moist, low plasticity, very stiff pieces, trace manganese oxide		PID Headspace (ppm)			
	30						
	32						
	34	Not as stiff, softer than above					26-46 ft: 20'/20'
	36						
	38	Yellowish-brown (10YR 6/4) silty CLAY (CL) of very low plasticity, slightly moist, very stiff, trace (<10%) manganese oxide, cores are broken horizontally along silty surfaces, clay mineral specks (pyrite?) sparkle in sun					
	40			0.0		FEW4-MW86-(40.0)	
	42						
	44						
	46	Increase in silt @ 45-46', CLAY w/ silty lenses (CL), appears weathered w/ manganese oxide					

DRILLING LOG

HOLE NO. **MW86**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jennifer Hussey

SHEET 4 OF 22 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	46			PID Headspace (ppm)			
		No Recovery ~46-52 Assumed silty material					
	48						
	50						
	52			0.4	FEW4-MW86-(52) for grain size & Atterberg Limits	FEW4-MW86-(52.0)	
		Top 1' of returns consist of a fractured (vertical) core w/ smooth surface (possible slickensides), very hard, solid core, SILTSTONE/CLAYSTONE w/ trace manganese oxide observed along fractured surface and some dendritic patterns					
	54	Core readily indented w/ knife @ 54-56' and crumbles into silty CLAYSTONE pieces w/ <1mm trace dark minerals					46-66 ft: 14'/20'
	56	Light yellowish-brown to yellowish-brown, very hard CLAYSTONE, only tip of knife able to indent core					56-62' massive, solid, very hard cores, requires strong hammer blows to break
	58	Weathered vertical cavity (10 mm wide) along surface of solid core w/ manganese oxide precipitate in cavity, moderate reaction w/ 10% HCL along cavity interior					
	60						
		Mechanical break in core					
	62	Light yellowish-brown (10YR 6/4) CLAY (CL), not as hard as above, consolidated cores stiff to very stiff, low to medium plasticity, slightly moist		0.1		FEW4-MW86-(62.0)	
	64						

DRILLING LOG

HOLE NO. **MW86**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR:

SHEET 5 OF 22 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	64	Grades to a silty CLAY (CL) w/ blocky claystone pieces, able to gouge core w/ knife, cohesive when squeezed		PID Headspace (ppm)			
	66	66-82'- hard, solid cores, massive, only tip of knife able to gouge core, light yellowish-brown (10YR 6/4) silty CLAYSTONE, moist, weakly cemented, sparkles in sun, mineral may be pyrite					
	68						
	70						
	72	All breaks appear mechanical- made during retrieval from core barrel, trace manganese oxide observed along broken core surfaces		0.7		FEW4-MW86-(72.0)	20'/20'
	74				FEW4-MW86-(74-75) for NMR porosity		
	76						
	78	Pale brown to light yellowish-brown (10YR 6/3-6/4), very hard, only small pieces break off w/ strong hammer blows, minor to no reaction w/ 10% HCL, trace (<1%) manganese oxide, very tiny mineral specks "brassy" unable to determine type			FEW4-MW86-(78-79) for physical parameters		
	80						
	82			0.3		FEW4-MW86-(82.0)	

DRILLING LOG

HOLE NO. **MW86**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jennifer Hussey

SHEET 6 OF 22 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	82	Light yellowish-brown to yellowish-brown (10YR 6/4-5/4) CLAY w/ some silt (CL), slightly moist, caliche @ 83', not as hard as above		PID Headspace (ppm)			softer cores 82-86', readily penetrated 1" w/ knife
	84	Silt content increases @ 84': silty CLAY (CL), very low plasticity, specks (pyrite?) noticeable in sunlight					
	86	No recovery 86-90' Assumed silty material					
	88						
	90	Brown (10YR 5/3) CLAYSTONE, hard, uniform solid cores, vertical break at 91', possible fracture (no staining or evidence of weathering), minor to no reaction w/ 10% HCL, trace (<5%) manganese oxide					Harder material (only tip of knife can gouge core)
	92			0.0		FEW4-MW86-(92.0)	20'/24' 86-110'
	94						
	96	Broken up cores, very hard CLAYSTONE, possible fractured zone ~96-100'					
	98						
	100						

DRILLING LOG

HOLE NO. **MW86**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jennifer Hussey

SHEET 7 OF 22 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	100	Not solid core as above 100-104.5', broken semi-platy pieces of Claystone in w/ soupy, silty clay mixture		PID Headspace (ppm)			
	102	Able to break some claystone pieces w/ moderate finger pressure while other pieces can't be broken and are well cemented		0.4		FEW4-MW86-(102.0)	
	104	104.5'- yellowish-brown (10YR 6/4), medium stiff to stiff CLAY (CL) w/ low plasticity, very trace caliche					
	106						
	108	Same as above, w/ weakly cemented claystone, very stiff to hard, brassy specks of clay minerals sparkle in sun					
	110	Light yellowish-brown to yellowish-brown (10YR 6/4-5/4) hard CLAYSTONE, solid cores, uniform, fresh surface of cores sparkles in sun					
	112			0.4		FEW4-MW86-(112.0)	
	114	Vertical break 114-115' in claystone core, moderate to strong reaction w/ 10% HCL, some (~5%) medium grained sand within claystone, when core is dry 114-115' looks more like a fracture than mechanical break, no weathering or staining observed on surface (likely tight fracture), appears to be vertical fracture @ 116' w/ zero separation (tight fracture)					19'/19' 110-129'
	116						
	118			0.1		FEW4-MW86-(118.0)	

DRILLING LOG

HOLE NO. **MW86**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jennifer Hussey

SHEET 8 OF 22 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	118	Yellowish-brown, very hard CLAYSTONE, solid cores, massive, medium sand grains within (<5%)		PID Headspace (ppm)			
	120						
		Trace (<1%) coarse grained observed in addition to medium grained sand within claystone, no reaction w/ 10% HCL					
	122						
		Yellowish-brown (10YR 5/4), sand grains absent @ 123', cohesive cores readily gouged 1" w/ knife, able to easily break into pieces w/ fingers, crumbles into very stiff, cemented clay pieces and material that is cohesive when squeezed, moist					
	124						
	126	Yellowish-brown CLAY (CL) w/ brittle clay pieces, low plasticity, moist to wet					
		127-129'- broken hard claystone pieces w/ dark minerals and trace medium grained sand, mild reaction w/ 10% HCL		0.2		FEW4-MW86-(128.0)	
	128						
		Yellowish-brown (10YR 5/4), hard CLAYSTONE, solid cores, only tip of knife able to gouge surface of core, fresh surface sparkles in sun, trace dark minerals (5-10%), 129-141':trace (<5%) manganese oxide, mild reaction w/ 10% HCL					
	130						
	132						Massive/ uniform cores from 129-141'
	134						129-150 ft: 21'/21'
	136			0.2		FEW4-MW86-(136.0)	

DRILLING LOG

HOLE NO. **MW86**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jennifer Hussey

SHEET 9 OF 22 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	136	Same as above- solid cores, hard, claystone, massive, very trace (~1-2%), dark mineral specks (1-2mm)		PID Headspace (ppm)			
	138						
	140	Yellowish-brown CLAY (CL) w/ low plasticity, moist, stiff, caliche, not as hard as above-able to gouge core 1” w/ knife					21’/21’ 129-150’
	142						
	144	Some hard claystone pieces in w/ CLAY					
	146	Cohesive core-when broken apart w/ hammer pieces crumble into clay w/ silt, trace dark mineral specks (1mm), clay has low plasticity, moist, knife gouges core 1” easily, little to no reaction w/ 10% HCL		0.5		FEW4-MW86-(146.0)	
	148						
	150	Solid cores from 150-162’ Yellowish-brown (10YR 6/4), hard to very hard CLAYSTONE, ~5% dark minerals, trace manganese oxide, massive/uniform, no fractures (only mechanical breaks from core barrel), very little to reaction w/ 10% HCL, sparkles in sun					1505: Stop drilling for day @150’ 08/01/17 1045: continue drilling, advancing 20’ core barrel from 150’bgs
	152						
	154						

DRILLING LOG

HOLE NO. **MW86**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jennifer Hussey

SHEET 10 OF 22 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	154	Same as above-yellowish-brown, very hard CLAYSTONE, silty when core is chipped away w/ rock hammer, only tip of knife able to gouge core		PID Headspace (ppm)			
	156			0.3		FEW4-MW86-(156.0)	
	158						
	160	Vertical open cavity (2-6mm wide) observed along outer surface of core 160-161'					150-170 ft: 19'/20'
	162	Brown to yellowish-brown (10YR 5/8-5/4), slightly moist, very stiff to hard Clay/Claystone, ~5% manganese oxide mineral specks (<1mm) sparkle in sun, no visible reaction w/ 10% HCL, knife readily indents cores 1" except for areas w/ hard claystone					162-170': When hit w/ hammer cores crumble into brittle-cemented clay pieces or silty clay and hard claystone pieces
	164	164-168'- whitish hard precipitate, reacts strongly w/ 10% HCL					
	166			0.4		FEW4-MW86-(166.0)	
	168	Yellowish-brown, very stiff core that crumbles w/ finger pressure into CLAY (CL) w/ silt, low plasticity, cemented clay pieces, slightly moist to moist, reacts strongly w/ 10% HCL					
	170						
	172						

DRILLING LOG

HOLE NO. **MW86**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jennifer Hussey

SHEET 11 OF 22 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	172	Some open cavities along core surface @ 172’ 172-184’- yellowish-brown (10YR 5/4), solid cores, hard to very hard CLAYSTONE, massive, no apparent fractures, no visible reaction w/ 10% HCL, fresh surface of claystone sparkles in sun-specks of clay minerals flash a brassy color (pyrite)		PID Headspace (ppm)			
	174						
	176			1.2		FEW4-MW86-(176.0)	
	178						20’/20’ 170-190’
	180						
	182						
	184	Broken up core consists of yellowish-brown claystone pieces and silty clay					
	186	CLAY w/ silt and trace fine gravel (<5%) (CL), low plasticity, consolidated, hard core crumbles into weakly cemented silty clay pieces when carved w/ knife					
	188	Gravel content and size increases @ 188’, gravelly (30-40%) Clay (yellowish-brown) w/ <15% m-c grained sand, f-c gravel (up to 65 mm), sub-rounded/rounded		0.2	FEW4-MW86-(189) for grain size & Atterberg Limits	FEW4-MW86-(189.0)	
	190						

DRILLING LOG

HOLE NO. **MW86**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jennifer Hussey

SHEET 12 OF 22 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	190	Same as above- gravelly CLAY (CL), cores (consolidated) are very difficult to break w/ rock hammer		PID Headspace (ppm)			
	192	Gravel is absent @ 192' yellowish-brown CLAYSTONE, hard, ~10% dark minerals (1mm) – biotite					
	194	Trace (<5%) m-c grained sand in cemented clay matrix, solid cores (requires repeated blows w/ rock hammer to break off pieces)					
	196						
	198	Trace (<1%) manganese oxide		0.3		FEW4-MW86-(199.0)	20'/21' 190-211'
	200	Becomes softer – not as hard as above, can gouge core fairly easily w/ knife, core (consolidated) breaks apart w/ rock hammer, crumbles w/ finger pressure into cemented clay pieces w/ some manganese oxide staining and silty clay that is cohesive when squeezed w/ slight plasticity					
	202						
	204						
	206						
	208	207-208' lens of yellowish-brown CLAY (CL), soft to medium stiff, low plasticity, moist					

DRILLING LOG

HOLE NO. **MW86**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR:

SHEET 13 OF 22 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	208	Same as above- yellowish-brown, consolidated clay cores, intermittent cemented clay pieces and silty CLAY, can mold with fingers		PID Headspace (ppm)			
				0.6		FEW4-MW86-(209.0) & FEW4-MW86-(210.0) DUP	
	210	209-211'- cores crumble into brittle pieces of silt, dry, reacts w/ 10% HCL					
	212	213-22'- solid cores, CLAYSTONE, massive					
	214						
	216	Light yellowish-brown (10YR 6/4-5/4) CLAYSTONE, possible vertical fracture, no signs of weathering/staining, ~5% dark minerals (~1mm-3mm), hard to very hard, only tip of knife able to indent core surface		1.5		FEW4-MW86-(216.0)	
	218						21'/21' 211-232'
	220						
		Small lens (~2" wide) of white chalky/waxy inclusions-reacts strongly w/ 10% HCL					
	222	Becomes softer @ 222' Dark yellowish-brown (10YR 4/6) silty CLAY (CL), moist, stiff to very stiff, low plasticity, crumbles into fines, silty lenses and silty clay cohesive when squeezed					silty @ 222'
	224						
				1.1		FEW4-MW86-(226.0)	
	226						

DRILLING LOG

HOLE NO. **MW86**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jennifer Hussey

SHEET 14 OF 22 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	226	Silty @ 226’		PID Headspace (ppm)			
	228	Increase in silt; crumbles into fines Yellowish-brown, clayey SILT (ML) w/ slight plasticity, slightly moist to moist, <5% dark minerals					
	230	230.5’- interbedded lean clay w/ moderate plasticity, silty CLAY and claystone/siltstone pieces (brittle), moist, very stiff					
	232	Possible fracture (vertical), may be a mechanical break 232-243’ – solid cores of hard CLAYSTONE					
	234	Brown to yellowish-brown (10YR 5/3-5/4), able to indent core ~ ¼” to ½” w/ knife, slightly moist, minor reaction w/ 10% HCL, trace (<5%) manganese oxide					
	236						
	238	Only tip of knife able to indent solid core, little to no reaction w/ 10% HCL		0.0		FEW4-MW86-(238.0)	232-252 ft: 20’/20’
	240	Trace dark minerals (1-2mm), some rectangular shaped biotite?					
	242	Yellowish-brown (10YR 5/3) claystone pieces in w/ cohesive CLAY (CL) w/ low plasticity, moist, not as hard @ 243’					
	244						

DRILLING LOG

HOLE NO. **MW86**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jennifer Hussey

SHEET 15 OF 22 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	244	Easily indented 1" w/ knife		PID Headspace (ppm)			
	246	Brown (10YR 5/3) claystone pieces in CLAYEY (CL) matrix, moist, some silt, can be threaded (low plasticity), minor to no reaction w/ 10% HCL					243-252'- cohesive, not solid cores
	248	Brown CLAY (CL), low to medium plasticity, medium stiff, easily indented 1" w/ knife		0.0		FEW4-MW86-(248.0)	
	250						
	252	No Recovery 252-255 Assumed silty clay washed from top of core run					
	254						
	256	Hard to very hard solid cores of CLAYSTONE, massive, difficult to break cores w/ rock hammer, fine sands (sparkle in sun) in w/ claystone, manganese oxide present, f-c gravel (up to 40mm) and f-c grained sand in claystone, brown (10YR 5/3)					18'/21' 252-273'
	258						
				0.0		FEW4-MW86-(259.0)	
	260	Light yellowish-brown (2.5YR 6/3), well graded SAND w/ clay and gravel (SW-SC), well cemented. Sand is mostly f-m grained and ~15% coarse grained, moist, minor to no reaction w/ 10% HCL					
	262						

DRILLING LOG

HOLE NO. **MW86**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jennifer Hussey

SHEET 16 OF 22 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	262	Light gray to light brownish-gray, SILTSTONE, hard solid core, w/ fine sand		PID Headspace (ppm)			
		Brown (10YR 5/3), hard CLAYSTONE w/ fine sand and silt, able to gouge core ~ ¼" to ½" w/ knife					
	264	Not as hard @264'; easily gouge 1" w/ knife 264-273'- brown CLAY (CL) w/ low plasticity, very stiff, moist, consolidated cores			FEW4-MW86-(265) for grain size & Atterberg Limits		
	266						
	268			0.0		FEW4-MW86-(269.0)	
	270						
	272						
		Light yellowish-brown (10YR 6/4) silty CLAYSTONE w/ trace sand (~5%), hard, moist, dense, sand is f-m-c grained, poorly sorted, sub-rounded/rounded, biotite specks (~10%)					1720: Done drilling for day 08/09/17, 0745: resume drilling @ 273'
	274			0.0		FEW4-MW86-(275.0)	
	276						
	278						20'/20
	280						

DRILLING LOG

HOLE NO. **MW86**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jennifer Hussey

SHEET 17 OF 22 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	280	Light yellowish-brown (10YR 6/4) silty CLAYSTONE w/ trace sand (~5%), trace gravel, hard, moist, dense, Gravel is f-m, sub-angular/sub-rounded, moderately sorted, more silt than 273-280'		PID Headspace (ppm)			
	282	White mineral nodule @ 282.5', ~2" in diameter, chalky, soft, can scratch w/ fingernail					
	284						
	286						
		Brown, clayey SILT (ML), generally soft to stiff, massive, moist, ~1.5" hard layer @ 287'		0.0		FEW4-MW86-(287.0)	
	288						
	290						
	292						
		Light yellowish-brown CLAYSTONE, very hard, trace silt, cores need to be broken coming out of core barrel, ~1mm black mineral (manganese oxide?),dense, massive, uniform except a thin (~3") zone of amorphous mineralization w/ in claystone @ 296' (grayish area is not rip-up clasts but blobs and stringers), damp to moist		0.0		FEW4-MW86-(295.0)	
	294						
	296						
	298						

DRILLING LOG

HOLE NO. **MW86**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jennifer Hussey

SHEET 18 OF 22 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	298	S.A.A> - Light yellowish-brown CLAYSTONE, very hard, trace silt		PID Headspace (ppm)			
	300						
	302						
	304	Light yellowish-brown, clayey SILT (ML), slightly cohesive to non-cohesive based on clay content, generally soft to stiff, dry to moist, ~1mm black inclusions (manganese oxide?) <1%		0.0		FEW4-MW86-(305.0) & FEW4-MW86-(306.0) DUP	
	306						
	308						
	310						
	312			0.0		FEW4-MW86-(313.0)	
	314	Light yellowish-brown to brownish-yellow (10YR 6/4-6/6), very hard CLAYSTONE w/ f-c gravel, only tip of knife gouges core 315'- very hard CLAYSTONE, w<5% dark minerals and ~10% scattered white/chalky inclusions, ~1-6mm diameter, trace (kaolinite?) <5%) coarse sand & fine gravel present					
	316						

DRILLING LOG

HOLE NO. **MW86**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jennifer Hussey

SHEET 19 OF 22 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	316	Yellowish-brown (10YR 5/4), hard CLAYSTONE w/ <1%, manganese oxide and <5% medium grained sand, only trace (~1%) white chalky kaolinite 316-322'- hard, solid, claystone cores, massive		PID Headspace (ppm)			
	318						
	320						
	322	Softer than above- can easily gouge core w/ 1" knife					
	324	Light yellowish to orangish-brown silty CLAY (CL/ML), very stiff, low plasticity, moist		0.0		FEW4-MW86-(325.0)	
	326	Grades to a silt/clayey SILT (ML), cohesive when squeezed, same color as above, 326-330' same					21'/21' 313-334'
	328						
	330	Light brown (7.5YR 6/4) clayey SILT (ML) w/ orangish tint, slightly cohesive w/ varying clay content					
	332	Light brown (7.5YR 6/4) to brown (7.5YR 5/4) CLAY (CL) w/ medium plasticity, moist, medium stiff					
	334						

DRILLING LOG

HOLE NO. **MW86**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jennifer Hussey

SHEET 20 OF 22 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	334	Hard, solid/massive cores from 334-341' strong brown (7.5YR 5/6), hard SILTSTONE, uniform, minor reaction w/ 10% HCL, very fine specks sparkle in sun		PID Headspace (ppm)		FEW4-MW86-(334.0)	
	336						
	338	Sub-rounded, fine gravel (~10%) in w/ siltstone, trace clay present					
	340						
		~1.5' lens (341-342.5') of brown (7.5YR 5/4) clayey, silty, SAND (SCSM) w/ 10-15% fine gravel, sand is mostly fine grained w/ ~25% m-c grained		0.0		FEW4-MW86-(341.0)	
	342	Brown (7.5YR 5/4), clayey SILT (ML) w/ slight plasticity, moist, very stiff					
	344	Softer @ 344'-easily gouged core 1" w/ knife					20'/20' 334-354' Consolidated cores 341-354'
	346	346-352'- similar to above, yellowish-brown (10YR 5/6) SILT to clayey SILT (ML) w/ varying clay content, moist, very stiff, slight plasticity; some zones can be threaded w/ increase in plasticity and clay content					
	348						
	350						
	352						

DRILLING LOG

HOLE NO. **MW86**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jennifer Hussey

SHEET 21 OF 22 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	352	Broken up core of siltstone/claystone pieces that crumble into fines, trace fine gravel (<5%), specks sparkle in sun, dry		PID Headspace (ppm)		FEW4-MW86-(353.0)	
	354	8" lens of Silty SAND (SM), dense w/ trace clay, sand is primarily fine-grained w/ ~20% m-c grained					
	356	Very hard solid cores @ 355-360', massive. Light yellowish-brown (10YR 6/4) CLAYSTONE w/ <5% dark minerals, very stiff to hard, slightly moist, requires strong hammer blows to break cores apart, minor reaction w/ 10% HCL					
	358						
	360	Silty @ 360'; grades to a Light yellowish-brown (10 R 6/4), clayey SILT (ML), very stiff, slightly moist, sub-rounded fine gravel in with clayey silt matrix					
	362			0.0		FEW4-MW86-(362.0)	19'/19' 354-373'
	364						Consolidated cores from 360-373'
	366						Softer @ 367-369', able to gouge core easily w/ knife
	368	Yellowish-brown, consolidated core; pieces broken off w/ rock hammer crumble (w/ finger pressure) into silt, slight plasticity, non-cohesive to slight cohesiveness					
	370						

DRILLING LOG

HOLE NO. **MW86**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jennifer Hussey

SHEET 22 OF 22 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	370	Brown clayey Silt (ML), very stiff, low plasticity, slightly moist		PID Headspace (ppm)			
	372			0.0		FEW4-MW86-(372.0)	
	374	373-377'- hard, solid cores: 373-373.8: silty, f-m grained, dense SAND (SW-SM) mod. cemented, can break pieces w/ hands, increase in fines @ 373.8': silty CLAYSTONE w/ trace m-c grained sand, very stiff, ~10-15% 1mm specks of dark minerals					Stop drilling for day @374 ft 08/10/17 0800: continue drilling @ 374'
		@ 375'- dense silty/clayey cemented SAND, mostly f-m grained and trace coarse gravel, very minor reaction w/ 10% HCL					
	376	@376 - Yellowish-brown (10YR 5/4), hard CLAYSTONE w/ trace lenses of silt that react moderately w/ 10% HCL					0925: driller report slow hard drilling and no indication of loss of H2O
	378	Formation change @ 377'- cobble zone- broken up cobbles and yellowish-brown (10YR 6/4) CLAYSTONE patches of abundant (~40%) manganese oxide on surface of broken cobble Light brown-reddish yellow (7.5YR 6/4-6/6) CLAYSTONE/SILTSTONE, medium to strong iron stained silt					Encounter a formation below the White River @ 377 ft Likely Cloverly Formation
	380	380'- mottled coloring, gray and orangish-brown CLAYSTONE, some silt, feels slightly soapy, minor reaction w/ 10% HCL					
	382	@ 382 - Strong iron stained specks (1-3mm) in CLAYSTONE w/ 1mm strands of silt, manganese oxide (trace)		0.0		FEW4-MW86-(382.0)	*See photos
	384	@ 384' Orangish-brown CLAY (CL) w/ low plasticity, rip-up claystone pieces, streaks of iron staining apparent when hit w/ rock hammer, white flecks and clasts scattered throughout					
	386	@ 386' - Change to a deeper orangish-brown CLAY w/ gravel and trace cobbles (~2.-5"), variegated w/ white and mauve colors, white chalky areas react strongly w/ HCl, white, hard, angular, very fine-grained clasts/inclusions w/ in clayey matrix, dk brick red alterations					
	388						TD = 388' bgs

DRILLING LOG

HOLE NO. **MW95**

COMPANY NAME: RMC Consultants, Inc.	DRILLING SUBCONTRACTOR: Yellow Jacket Drilling Services, Inc.	SHEET 1 OF 21 SHEETS
PROJECT: Atlas D Missile Site 4 RI Addendum 2017-2018 Tasks	LOCATION: Atlas D Missile Site 4 – Laramie County, Wyoming	
NAME OF DRILLER: Jose Munguia	MANUFACTURER'S DESIGNATION OF DRILL: TSI 150T SONIC RIG	
SIZES AND TYPES OF DRILLING EQUIPMENT: Sonic Drill Rig; 7-in. diam core barrel (10-ft.); 8-in. diam. drill casing; 9-in. diam. drill casing	HOLE LOCATION: Eastern King Ranch, south of gravel pit; 216050.5 ft N, 713890.2 ft E	
	SURFACE ELEVATION: 6512.8 ft	
	DATE STARTED: 09/14/17	DATE COMPLETED: 09/17/17
OVERBURDEN (OGALLALA FM. thickness): 279 feet	DEPTH GROUNDWATER ENCOUNTERED: ~90 ft bgs	
DEPTH DRILLED INTO WHITE RIVER FORMATION: 79 ft; White River Fm.: 279 – 358 feet bgs	DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: 92.0 ft bgs on 9/27/17 in 4" PVC Temporary well	
TOTAL DEPTH OF HOLE: 358' bgs	OTHER WATER LEVEL MEASUREMENTS	

GEOTECHNICAL SAMPLES	DISTURBED: 3 for Grain size& Atterberg Limits	UNDISTURBED: None	CORED INTERVAL: Surface to Total Depth			
SAMPLES FOR CHEMICAL ANALYSIS	VOCs – onsite	VOCs – offsite: 21 soil, 1 water	OTHER	OTHER	OTHER	TOTAL CORE RECOVERY: 83 %
DISPOSITION OF HOLE	2-in. diam. NESTED MONITORING WELLS: TD: 167.2 ft bgs; TD 205.2 ft bgs; TD: 290.1 ft bgs		SIGNATURE OF INSPECTOR: Jen Hussey			

ELEV.	DEPTH	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE ID.	ANALYTICAL SAMPLE ID.*	Recovery (ft/ft) & REMARKS
				PID Headspace (ppm)			
		Dark brown topsoil w/roots and very fine gravel					
		Very pale brown (10 YR 7/3), loose, very fine SAND (SP), well sorted					
6510.8	2						
		~15% gravel @3', primarily fine grained SAND w/~15-20% m-c grained sand also present, dry					
							6'/6' (0-6')
6508.8	4						
		Yellowish brown (10YR 5/4), material (fines) is slightly to moderate cohesive clayey SILT (ML) to very fine SAND (SW) w/ low plasticity,					
6506.8	6						
		coarse material @ 7' well-graded Sand w/ ~15% fine gravel					
							10'/10' (6-16')
6504.8	8						
		Strong brown (7.5YR 5/6), increase in gravel content, gravelly SAND (SW), well-graded, loose, slightly moist					
6502.8	10						

DRILLING LOG

HOLE NO. **MW95**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jen Hussey

SHEET 2 OF 21 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
6502.8	10	Same as above (SW) but brown (7.5YR 5/4), loose, poorly sorted Sand (f-c grained), gravelly (mostly fine gravel)		PID Headspace (ppm)			
6500.8	12	Color change to brown to strong brown (7.5 YR 5/4-5/6), fairly even distribution in sand grain size (f-m-c)					
6498.8	14						
6496.8	16	Decrease in fine-grained sand, sand is mostly m-c grained w/ ~5-10% fine grained					
6494.8	18	Light brown (7.5YR 6/4), silty SAND w/ gravel (SM), weakly cemented fines: silt/very fine sand, w/ accessory medium and coarse sand grains					
6492.8	20	Change to light brown (7.5YR 6/3-6/4), loose, well-graded SAND w/ silt and gravel (SW-SM), dry Core @ 20' crumbles into weakly cemented pieces					10'/10' (16-26')
6490.8	22						
6488.8	24	Similar to above but reddish-yellow to strong brown (7.5YR 6/6-5/6), loose well-graded SAND (f-c) w/ gravel (SW), slightly moist, gravel is mostly fine, sub-rounded					
6486.8	26	Increase in fine to very fine sand, loose Reddish-yellow to strong brown gravelly SAND (SW), well-graded, loose, increase in fine gravel content					
6484.8	28						

DRILLING LOG

HOLE NO. **MW95**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jen Hussey

SHEET 3 OF 21 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	28	Same as above- light brown to reddish-yellow (7.5YR 6/4-6/6), well-graded SAND w/ gravel (SM), loose, dry to slightly moist		PID Headspace (ppm)			5'/5' (26-31')
	30						
	32	Increase in coarse grained sand and decrease in fine grained sand					5'/5' (31-36')
	34	~50% fine grained sand, ~35% medium grained and 15% coarse grained Well-graded SAND (SW) w/ ~15-20% gravel, loose, gravel is primarily fine (<0.75"in diameter)					
	36	Light yellowish-brown (10YR 6/4), SAND (SP), mostly fine grained w/ ~15% medium gained and trace coarse grained					
	38	Sand is well-graded and fairly evenly distributed grain size (f-m-c), loose, w/ ~15% fine gravel (SW), dry to slightly moist					10'/10' (36-46')
	40						
	42						
	44						
	46						

DRILLING LOG

HOLE NO. **MW95**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jen Hussey

SHEET 4 OF 21 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	46	Light brown (7.5YR 6/4) loose SAND w/ gravel (SW), well-graded, coarse sand is sub-angular/sub-rounded, gravel is <1" in diameter		PID Headspace (ppm)			
	48						
	50	Lens of pale brown (10YR 6/3), CLAY (CL) of low plasticity, slightly moist to moist					10'/10' 46-56'
	52	Clay is soft- easily molded w/fingers @ 52'					
		53-54'- cohesive core breaks into platy pieces w/ some silt and very fine sand lenses					
	54	Light brown (7.5YR 6/4), return to loose SAND w/ ~10% gravel, dry to slightly moist, ~60% of sand is fine grained, 40% is m-c grained					
	56						
	58						
	60	Increase in fine grained sand and very fine grained sand (SP), poorly graded, loose, some very weakly cemented pieces that crumble into very fine sand					7'/7' (56-63')
	62						
		Brown (10YR 5/3) soft CLAY (CL), silty, low plasticity, moist					
	64						

DRILLING LOG

HOLE NO. **MW95**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jen Hussey

SHEET 5 OF 21 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	64	Very pale brown (10YR 7/3) SILT to very fine grained SAND (ML), dry fines to 71’		PID Headspace (ppm)			
	66						66’start using drill mud while drilling
		Trace (<5%) clay, silt is non-plastic					
	68						12’/12’ (63-75’)
	70						
		Material is cohesive, clayey, soft to medium stiff, silty CLAY (CL), slightly moist					
	72						
		Light yellowish-brown (10YR 6/4), very fine sand					
	74	Brown (10YR 5/3), clayey SILT (ML), slightly moist, grades to a silty CLAY (CL) @ 75’					6’/6’ (75-81’)
	76						
		76.5’- Pale brown (10YR 6/3), silty well-graded SAND w/ gravel (SM), dry, loose,					
	78	returns from 78-80’ consist of weakly cemented pieces that crumble into silt and very fine sand in with loose, f-c grained sand, gravel is f-c @ 80’					
	80	Trace clay @ 80’					
		Trace clay @ 81’					
	82						

DRILLING LOG

HOLE NO. **MW95**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jen Hussey

SHEET 6 OF 21 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	82	Pale brown (10YR 6/3) very fine grained SAND (ML), trace (<5%) clay, cores are cohesive and break into thin platy pieces		PID Headspace (ppm)			
	84						
	86	85.5'- Slight increase in clay content, (ML), SILT to very fine grained SAND, material is cohesive when squeezed w/ fingers, slight plasticity, slightly moist to moist					11'/11' (81-92')
	88	increase in moisture @ 88-91'					
	90	Whitish, weakly cemented nodules and lenses within pale brown, very fine-grained SAND (ML)					
	92	92'- Light yellowish-brown to yellowish-brown (10YR 6/4-5/4) very fine sand (ML), moist					Driller reports going to start drilling w/H2O for next run starting @ 92' b/c material is getting hard to drill through
	94	Very dense/very stiff consolidated cores of very fine sand, able to break pieces apart w/ fingers					Hard Drilling starting @94'
	96	Solid, very hard cores from ~96.2-98.5', unable to break cores apart w/ repeated hammer blows					
	98	98.5'- Yellowish-brown (10YR 5/4) clayey SILT (ML) w/ slight to low plasticity, moist					
	100						

DRILLING LOG

HOLE NO. **MW95**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jen Hussey

SHEET 7 OF 21 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	100	Core breaks apart into brittle pieces of very fine material-silt and clay size fractions, color is brown and whitish-buff colored, weakly cemented silt that reacts vigorously w/ 10% HCL, dry		PID Headspace (ppm)			Hard drilling
	102						15'/15' Driller cuts water @ 102', drilling dry
		Core is cohesive, consisting of very fine sands, trace clay, some portions can be threaded, moist, very stiff					
	104						Driller notes drilling is a little easier @ 105'
	106	Buff-colored silty lenses that react vigorously w/ 10% HCL, dry					1730: stop drilling for day
		Very hard solid core of cemented SANDSTONE, very fine grained sandy matrix w/ medium and coarse grained sand clasts and some fine gravel, hollow/open vertical cavities observed along broken core surface					09/15/17 0730: continue drilling @ 107'
	108						
		Limited return (~3') from 109-118', fines and sand likely washed out, gravelly (f-c) cobble zone w/ sand (mostly washed out), cobbles are up to 5" in diameter					
	110						Driller notes drilling seems a little easier @ 111', possibly hit gw-unable to determine w/ certainty since drilling w/ H2O due to nature of hard material
	112						
							Lost ~6' of returns from 109-118'; fines/sand washed out in cobble/gravel zone
	114						
	116					FEW4-MW95-(117)	Collected groundwater sample
	118						

DRILLING LOG

HOLE NO. **MW95**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jen Hussey

SHEET 8 OF 21

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	118	Loose sand-primarily m-c grained		PID Headspace (ppm)			
	120	Well graded f-m-c grained SAND (SW), loose, abundant, reddish-orange clasts, overall color brown to strong brown		0.8		FEW4-MW95-(121.0)	
	122	Decrease in coarse SAND, better sorted w/ mostly medium grained sand and some fine grained, loose (SP)					
	124	Light brown (7.5YR 6/4) w/ abundant orangish sand clasts, well-graded (f-m-c) SAND (SW), loose, sand is mostly medium and coarse grained					
	126	Light brownish-gray (10YR 6/2), increase in fines-primarily very fine sand w/ medium grained sand, trace clay					
	128	Very hard solid core of light gray SANDSTONE, f-m grained w/ lenses of coarse sand and trace fine gravel visible from surface of core, highly cemented and unable to break apart w/rock hammer					
	130	broken up zone of cobbles, gravel and very fine sand		0.1		FEW4-MW95-(131.0)	
	132	Hard solid core at 131.5' w/ hollow vugs/cavities weathered out on sandstone core surface, Light gray (10YR 7/2) cemented very fine to fine SAND w/ some medium grains observed, able to break pieces apart w/fingers, broken up sandstone @ 133.5'					
	134						
	136						

DRILLING LOG

HOLE NO. **MW95**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jen Hussey

SHEET 9 OF 21 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	136	Yellowish-brown (10YR 5/4) solid cores, cemented fine grained SAND w~ 20% m-c grains, hard, able to break core apart w/ repeated hammer blows		PID Headspace (ppm)			
	138	very hard 138-140’					
	140	Similar to above w/~10 % fine gravel		0.0		FEW4-MW95-(141.0)	22’/22’ (128-150’)
	142	No reaction w/ 10% HCL, consolidated cores of primarily very fine to fine Sand and <15% m-c grained sand, trace fine gravel, outside of cores appear clayey from ~142-150’, fine sand is cohesive when squeezed, slight plasticity					
	144						
	146	145.5-147’- patches of whitish very fine cemented material that reacts vigorously w/ 10% HCL					
	148	Yellowish-brown (10YR 5/6) cohesive core, SILT (ML), very stiff, slightly moist, some thin layers of clayey SILT w/ slight plasticity, none to minor reaction w/ 10% HCL					
	150	Yellowish-brown silty, very fine SAND (SM) w/ 15-20% m-c grained, no reaction w/ 10% HCL, hard consolidated cores		0.0			
	152					FEW4-MW95-(151.0)	
	154	Increase in m-c grained sand in w/ very fine sand					

DRILLING LOG

HOLE NO. **MW95**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jen Hussey

SHEET 10 OF 21 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	154	Yellowish-brown (10YR 5/4) consolidated cores of SAND, 70% fine grained and 30% m-c grained, break apart fairly easy w/ hammer blows, very dense		PID Headspace (ppm)			
	156						
	158						
	160						~17'/21' (150-171')
	162	Some gravel in w/ soupy sandy mixture					
		162.5'- Not hard/dense like above, loose, yellowish-brown to pale brown, silty well-graded SAND (SW-SM) w/ trace fine gravel		0.2	FEW4-MW95-(163) for grain size & Atterberg Limits	FEW4-MW95-(163.0)	
	164						
	166						
	168	Brown (10YR 5/3) clayey/silty SAND-gravel mixture (SM/SC), gravel is f-c, sub-rounded					
	170	Loose, silty, well-graded sand (f-m-c) and gravel, strong reaction w/ 10% HCL				FEW4-MW95-(171.0)	
	172						

DRILLING LOG

HOLE NO. **MW95**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jen Hussey

SHEET 11 OF 21 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	172	Top 2’ of returns consist of loose, f-c gravel and cobbles, broken up cobbles up to 5” in diameter, followed by very hard, solid cores of a well-cemented conglomerate consisting of a f-m-c sandy matrix w/ gravel and cobbles, unable to break apart w/ repeated hammer blows		PID Headspace (ppm)			Limited recovery from ~171-178’ due to sands washing out
	174						
	176						
	178						~11’/17’ 171-188’
	180						
	182						
	184	Pale brown to brown (10YR 6/3-5/3), silty SAND (f-m-c) w/ fine gravel (SW-SM), vigorous reaction w/10% HCL, core is cohesive from 184-186’		0.5		FEW4-MW95-(185.0) & DUP FEW4-MW95-(186.0)	Drilled dry last 4’ of run
	186	Loose pulverized gravel and silt/sand mix, vigorous reaction w/ 10% HCL					
	188	Very hard solid cores, unable to break apart w/rock hammer, very hard, well cemented conglomerate - silty sand and gravel					9/16/17 Retrieve 188-209’ at 1045
	190						

DRILLING LOG

HOLE NO. **MW95**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jen Hussey

SHEET 12 OF 21 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	190			PID Headspace (ppm)			Limited recovery between 190.5-204'; only 6 ft of returns
		Lost ~7.5' of recovery between ~190.5'-204' top 2' of returns consist of loose cobbles and gravel (f-c), most of the sand has washed out, followed by ~4' of very hard broken up cores (solid) of a well-cemented conglomerate consisting of f-c sand and gravel; w/ loose cobbles					
	192						
	194						Driller noted returns washing out @ 194-197' in cobble/gravel zone, unable to collect sample from this interval
	196						
	198						~13.5'/21' 188-209'
	200						
	202						
	204			0.7		FEW4-MW95-(204.0)	
		Pale brown to brown, clayey/silty SAND w/ gravel (SC/SM), cohesive cores easily broken apart w/ rock hammer, clay content varies -some clayey silt layers have low plasticity, interbedded w/ sandy-cemented layers					
	206						
	208						

DRILLING LOG

HOLE NO. **MW95**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jen Hussey

SHEET 13 OF 21 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	208	Same as above (SC/SM)		PID Headspace (ppm)		FEW4-MW95-(209.0)	
	210	Limited recovery from 209-223' (only 5') in washed out cobble zone and with very hard broken up solid cores of cemented conglomerate consisting of well graded sand and f-c gravel, abundant coarse sand and gravel (mostly sub-rounded)					
	212						
	214						9'/18' 209-227'
	216						
	218						
	220						
	222					FEW4-MW95-(224.0)	
	224	Brown (7.5YR 5/4), silty SAND w/ gravel (SM), sand is well graded (f-m-c) w/ abundant reddish-orange grains, minor reaction w/ 10% HCL		0.0			
	226	Interbedded w/1"-2.5" thick layers from 225-226.5' of very hard cemented coarse sand, fine gravel					10% HCL Reaction: Strong

DRILLING LOG

HOLE NO. **MW95**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jen Hussey

SHEET 14 OF 21 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	226			PID Headspace (ppm)			
		Limited recovery in sample core run from 227-248', returns consist of very hard/solid broken cores of a conglomerate (sand and gravel), sand is fine to coarse w/ zones of abundant coarse material (coarse sand and fine to coarse gravel)					
	228						
	230						
	232	A few washed out 3" cobbles in returns					~7.5'/21' 227-248'
		Minor to moderate reaction w/ 10% HCL along fresh, broken surfaces					
	234						
		Pale brown (10YR 5/4), conglomerate is matrix supported @ 235', consisting of fines (silt and clay fractions) w/ only minor reaction to 10% HCL, m-c grained sand and fine gravel				FEW4-MW95-(235.0)	
	236						
	238	Chert-pebble conglomerate @ 238'					
		Both clast and matrix supported conglomerates observed in cores from 227-248'					
		clast supported conglomerates w/ fine matrix filling voids tend to be cemented w/material that reacts strongly w/ 10% HCL					
	240						
	242						
	244						

DRILLING LOG

HOLE NO. **MW95**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jen Hussey

SHEET 15 OF 21 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	244			PID Headspace (ppm)			
	246	Non-cemented gravel				FEW4-MW95-(247.0)	Don't submit sample – all gravel
	248	Minimal returns 248-269' Same as above 3.5' of returns consist of washed out cobbles (up to 6") and f-c gravel (most of sand has washed out) and broken cores of very hard conglomerate (both matrix and clast supported),					
	250	conglomerate consists of gravel and sand (abundant coarse grained), sand clasts are mostly 2-5mm in size, sub-rounded/sub-angular, minor to moderate reaction w/ 10% HCL (varies upon cemented vs. fine matrix)					
	252						3.5'/21'
	254						Matrix is not suitable for sampling
	256						
	258						
	260						
	262						

DRILLING LOG

HOLE NO. **MW95**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jen Hussey

SHEET 16 OF 21 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	262			PID Headspace (ppm)			
	264						
	266						Bottom of returns-soupy sand, saturated
	268	2’ of returns, gravel w/ cobbles and some sand –mostly coarse grained observed; fines washed out					
	270						~23’/30’
	272						
	274						
	276						
	278						White River Formation contact ~279’ bgs
		Brown (10YR 5/3) CLAY (CL), cohesive core, very stiff		0.0		FEW4-MW95 - (279.0)	
	280						

DRILLING LOG

HOLE NO. **MW95**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jen Hussey

SHEET 17 OF 21 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	280	Same as above		PID Headspace (ppm)			
	282	~2' of returns: loose, f-c sand and gravel, some fines -likely washed out, soupy					
	284						
	286	Brown (7.5YR 5/4) CLAY (CL) w/ low plasticity, medium stiff to stiff					Cohesive cores from 285-299'
	288						
	290	Soft, increase in plasticity, moist to very moist, portions of CLAY feel "sticky" (CH)		0.6		FEW4-MW95-(289.0 & DUP FEW4-MW95-(290.0)	
	292						
	294	CLAY (CL) w/ low plasticity, trace silt					
	296						
	298	297.5'- Silty CLAY (CL)					

DRILLING LOG

HOLE NO. **MW95**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jen Hussey

SHEET 18 OF 21 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	298	Same as above- CLAY (CL) w/ thin silty interlayers		PID Headspace (ppm)			
	300	Brown (10YR 5/3, very stiff to hard CLAYSTONE w/ ~5% manganese oxide, uniform, able to gouge core ¼" w/ knife, solid intact cores-requires hammer to break apart and retrieve from core barrel		0.0		FEW4-MW95-(300.0)	9/17/17 Retrieve cores 299-319' at 0935 19.5'/20'
	302						Consolidated cores to 315'
	304						
	306	305.5'- Silty CLAY (CL), not quite as stiff/hard as above, able to gouge core ~ ½" w/ knife					
		Sandy lens, silty, mostly f-m grained sand, very dense, core readily indented by thumbnail					
	308	Brown, very stiff CLAYSTONE w/ some thin silty layers, ~5% manganese oxide					
	310	Increase in silt content, SILT (ML), non-plastic, very stiff		0.5		FEW4-MW95-(310.0) & DUP FEW4-MW95-(311.0)	
	312						
	314	313.5'- SILTY, very fine sand (ML), moderately cemented					
		Silty well-graded SAND w/~15% fine gravel (SM), loose, f-c sand					
	316						

DRILLING LOG

HOLE NO. **MW95**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jen Hussey

SHEET 19 OF 21 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	316	Same as above- Brown (7.5YR 5/4), loose, silty SAND w/ reddish orange clasts (SM)		PID Headspace (ppm)			
		Brown to yellowish-brown clayey Sand with gravel (SC), with white, soft/chalky material 318-319', possibly white ash bed, very fine, sparkles in sun, no reaction w/ 10% HCL					
	318						
		319'- Hard solid cores, mostly SILTSTONE, some silty claystone, well-cemented fines (silt, clay fractions)					
	320					FEW4-MW95-(321.0)	
				0.6			
	322						
	324						
		Very hard 324-330', difficult to chip pieces off cores, unable to break cores apart w/ repeated hammer blows					21'/21'
	326						
		Fine grained sandstone observed along mechanical break @ 327-329'					
	328						
	330						
		Brown claystone @ 331'					
	332						
		332.5'- Brown (7.5YR 5/3) CLAY (CL), very stiff-indented/carved easily w/knife		0.7		FEW4-MW95-(333.0)	Cores from 332.5-340' are cohesive
	334						

DRILLING LOG

HOLE NO. **MW95**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jen Hussey

SHEET 20 OF 21 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	334	Same as above- Cohesive cores of brown CLAY (CL) w/ medium plasticity, uniform		PID Headspace (ppm)			
	336						
		Thin clayey silt lens @ 337’					
	338						
	340	Clay is silty @ 340’ Brown (7.5YR 5/3) CLAYSTONE, hard to solid cores, uniform, ~5% manganese oxide					
	342						18’/18’
	344			1.1		FEW4-MW95-(344.0)	
		Softer @ 345’, Brown (7.5 YR 5/3) CLAY (CL), stiff to medium stiff, broken up claystone and clay, cores are cohesive, can easily gouge 1” w/knife					
	346						
	348						
		Same as above- some rip-up claystone pieces in w/ CLAY (CL)					
	350			0.4		FEW4-MW95-(350.0)	
		grades to a silty clay					
	352						

DRILLING LOG

HOLE NO. **MW95**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jen Hussey

SHEET 21 OF 21 SHEETS

ELEV. ft MSL	DEPTH ft bgs	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	352			PID Headspace (ppm)			
	354	Same as above but cores are broken along silty horizontal planes, reacts moderately w/ 10% HCL					
	356						09/17/17
	358	End of Boring @ 358’					1345: finish drilling MW95
	360						
	362						
	364						
	366						
	368						

DRILLING LOG

HOLE NO. **MW97**

COMPANY NAME: RMC Consultants, Inc.	DRILLING SUBCONTRACTOR: Yellow Jacket Drilling Services, Inc.	SHEET 1 OF 25 SHEETS

PROJECT: Atlas D Missile Site 4 RI Addendum 2017-2018 Tasks

LOCATION: Atlas D Missile Site 4 – Laramie County, Wyoming

NAME OF DRILLER: Cliff Hillman

MANUFACTURER'S DESIGNATION OF DRILL: TSI 150T SONIC RIG

SIZES AND TYPES OF DRILLING EQUIPMENT: Sonic Drill Rig; 7-in. diam core barrel; 9-in. diam. drill casing; 8-in. diam. drill casing

HOLE LOCATION: Hayfield east of Ranch Headquarters 206971.35 ft N, 715972.63 ft E

SURFACE ELEVATION: 6363.58' MSL

DATE STARTED: 09/13/17 DATE COMPLETED: 09/19/17

OVERBURDEN (OGALLALA FM. THICKNES): ~157 – 185 feet

DEPTH GROUNDWATER ENCOUNTERED: 10.75 feet bgs

DEPTH DRILLED INTO WHITE RIVER FORMATION: WRF possibly @ 157' bgs; solid WRF at 185' bgs

DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: 9/28/17 – Temp well SWL = 290.33 ft TOC

TOTAL DEPTH OF HOLE: 428' bgs

OTHER WATER LEVEL MEASUREMENTS: 11/18/17 MW97-266 SWL: 229.3' bgs

GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	CORED INTERVAL
	2 grain size/Atterbergs	none	Surface to Total Depth

SAMPLES FOR CHEMICAL ANALYSIS	VOCs – onsite	VOCs – offsite	OTHER	OTHER	OTHER	TOTAL CORE RECOVERY
	46	41				94.1 %

DISPOSITION OF HOLE: 2-in. diam. NESTED MONITORING WELLS; TD: 268.5 ft bgs TD: 331.3 ft bgs

SIGNATURE OF INSPECTOR: Todd Margulies

ELEV.	DEPTH (ft)	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE ID.	ANALYTICAL SAMPLE ID.	Recovery (ft/ft) & REMARKS
	0	Topsoil/grass roots		PID Headspace (ppm)			Begin drilling 1106
		Very dark grayish-brown (10YR 3/2), SILT w/ 10% gravel (ML), gravel is fine, variegated, sub-angular/sub-rounded, dry, moderate to heavy reaction w/ 10% HCL					
	2	2'- Dark brown (10YR 3/3) SILT (ML), w/ gravel (15%), gravel fine, variegated, sub-angular/sub-rounded, dry, heavy reaction w/10% HCL, <5% fine sand					6'/6' 0-6'
	4	Brown to dark brown (10YR 4/3) silty CLAY (CL), medium plasticity, dry, caliche present, soft to stiff, heavy reaction w/ 10% HCL, cobbles					
	6	Dark yellowish-brown (10YR 4/4), silty SAND (SW), 10% gravel, <10% silt, iron oxide staining, wet. Gravel is fine, variegated, sub-angular/sub-rounded					6-7' wet (drilling fluid) little to no reaction w/ 10% HCL
	8	@7'- Variegated gravelly SAND (SW), 30-40% fine to coarse gravel, sub-angular/sub-rounded, moist to very moist to 10', wet 10-11', little to no reaction w/ 10% HCL					5'/5' 6-11'
	10						

DRILLING LOG

HOLE NO. **MW97**

PROJECT Atlas D Missile Site 4 – FY Addendum 2017-2018 Tasks

INSPECTOR Todd Margulies

SHEET 2 OF 25 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	10			PID Headspace (ppm)			
		Variegated gravelly SAND (SW), f-c sand, fine to coarse variegated gravel, sub-angular/sub-rounded, little to no reaction w/ 10% HCL, very wet to saturated, few cobbles		0.4		FEW4-MW97-(11.0)	Drillers think H2O@ 11' 1212: water @10.75' bgs
	12					FEW4-MW97-12 (water sample)	8'/8' 11-19'
	14						
	16						
	18						
		No Recovery 17-20.4 ft; assumed sandy/gravelly material washed out					
	20						
		Variegated, gravelly SAND (SW), f-c sand, gravel fine, sub-angular/sub-rounded, saturated, little to no reaction w/ 10% HCL, 25% gravel		0.8		FEW4-MW97-(21.0) & DUP FEW4-MW97-(22.0)	6'/7' 19-26'
	22						
	24						
		24-26 ft: Increase in gravel to 40%, increase in coarser gravel, cobbles					
	26						
		Variegated, SAND (SW), f-c grained, w/ 10-15% fine to coarse gravel, sub-angular/sub-rounded, very wet. 2-3" clay @ 27', silty, medium to high plasticity, little to no reaction w/ 10% HCL					
	28						

DRILLING LOG

HOLE NO. **MW97**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 3 OF 25 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	28	Variegated, sandy GRAVEL (GW), fine to coarse, sub-angular/sub-rounded, very wet, little to no reaction w/ 10% HCL		PID Headspace (ppm)			
	30	Pale brown (10YR 6/3) silty CLAY w/ <5% sand (CL), soft to medium soft, medium to almost high plasticity (CH), moist, moderate to heavy reaction w/ 10% HCL		1.7		FEW4-MW97-(31.0)	
	32						10'/10' 26-36'
	34						
	36	Pale brown (10YR 6/3) silty, sandy CLAY (CL), soft to slightly stiff, moist, medium plasticity, heavy reaction w/ 10% HCL					
	38						10'/10' 36-46'
	40			1.2		FEW4-MW97-(41.0)	
	42						
	44	Light yellowish-brown (10YR 6/4) SAND (SW) w/ gravel <5%, silt <5%, moist, gravel is fine, variegated, sub-angular/sub-rounded, moderate reaction w/ 10% HCL					
	46						

DRILLING LOG

HOLE NO. **MW97**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 4 OF 25 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	46	Light gray (10YR 7/2) silty, sandy CLAY (CL), medium plasticity, slightly moist, except 46-48' saturated (drillers), soft to slightly stiff, heavy reaction w/ 10% HCL		PID Headspace (ppm)			
	48						
							10'/10; 46-56'
	50			1.6		FEW4-MW97-(51.0)	
	52						
	54	Increase sand, decrease clay, light gray (10YR 7/2), silty, clayey SAND (SM/SC)					
	56	Light grayish-brown (10YR 6/2) CLAY (CL), with 10% gravel; also with ~10% sand, silt <5%; gravel fine to medium, sub-angular/sub-rounded, moist, medium plasticity, slight to moderate reaction w/ 10% HCL					
	58						10'/10' 56-66'
	60	Pale brown (10YR 6/3) gravelly SAND (SW), f-c grained, gravel is fine to medium, variegated, sub-angular/sub-rounded, trace silt, moist, little to no reaction w/ 10% HCL, trace clay		1.3		FEW4-MW97-(61.0)	
	62	Light gray (10YR 7/2) SILT (ML) w/ <5% gravel, dry to slightly moist, gravel is fine, variegated, sub-angular/sub-rounded, heavy reaction w/ 10% HCL					
	64						

DRILLING LOG

HOLE NO. **MW97**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 5 OF 25 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	64	Yellowish-brown (10YR 5/4) gravelly CLAY (CL), low to medium plasticity, medium stiff, slightly moist, gravel is variegated, fine to coarse, sub-angular/sub-rounded, moist, few cobbles		PID Headspace (ppm)			Slight reaction w/ 10% HCL
	66	Pale brown (10YR 6/3) gravelly, clayey SAND (SP), moist, gravel is fine, variegated, sub-angular/sub-rounded, heavy reaction w/ 10% HCL					10'/10' 66-76'
	68						
	70	Pale brown (10YR 6/3) gravelly CLAY (CL), medium stiff to stiff, slightly moist, medium plasticity, moderate to heavy reaction w/ 10% HCL, gravel is fine to medium, variegated, sub-angular/sub-rounded		0.8		FEW4-MW97-(71.0)	
	72						
	74						
	76	Light brownish-gray (10YR 6/2) gravelly, silty CLAY (CL) w/ <5% sand, moist, medium plasticity, gravel is fine to medium, variegated, sub-angular/sub-rounded, moderate reaction w/ 10% HCL					Stop drilling 9/13/17, 1700 Start 9/14/17, 0840
	78						12'/12' 76-88'
	80			0.2		FEW4-MW97-(81.0)	
	82						

DRILLING LOG

HOLE NO. **MW97**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 6 OF 25 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	82	Variegated, silty, sandy GRAVEL (GP), 20-25% silt/sand, gravel is fine to medium, sub-angular/sub-rounded, dry, heavy reaction w/ 10% HCL, 2-3 pieces of conglomerate in 2'		PID Headspace (ppm)			
	84	Light gray (10YR 7/2) silty CLAY (CL)/clayey SILT (ML), low plasticity, w/ small variegated, sub-angular/sub-rounded gravel, dry to slightly moist, heavy reaction w/ 10% HCL					
	86	Same as 84-86' w/ color change to pale brown (10YR 6/2), increase in gravel, fine to medium, few large cobbles					
	88	Same as 86-88'					
	90	Light gray (10YR 7/2) gravelly SAND (SW) to light gray (10YR 7/2) sandy GRAVEL (GW), sand f-c, gravel variegated, fine to coarse, sub-angular/sub-rounded, dry, heavy reaction w/ 10% HCL, cobbles		1.3		FEW4-MW97-(91.0)	8'/8' 88-96'
	92						
	94						
	96	96-109': No Recovery Assumed sandy/ gravelly material washed out					Drillers attempted to drill 20' run, wet, very poor recovery (7'/20') so will switch back to 10' dry runs, therefore no sample between 91.0' - 111.0'
	98						
	100						

DRILLING LOG

HOLE NO. **MW97**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 7 OF 25 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	100			PID Headspace (ppm)			
	102						
	104	96-109': No Recovery Assumed sandy/ gravelly material washed out					7'/20' 96-116'
	106						
	108						
	110	Residual cobbles – All washed					
	112	Variegated gravelly SAND (SW), f-c grained, gravel fine to coarse, sub-angular/sub-rounded, wet to saturated (drill fluid) to 115', dry 115-116', little to no reaction w/ 10% HCL to 115', moderate to heavy reaction w/ 10% HCL 115-116', <5% clay		1.7		FEW4-MW97-(111.0) & DUP FEW4-MW97-(112.0)	
	114						
	116	Brown (10YR 5/3) gravelly, sandy CLAY (CL), medium plasticity, moist, gravel fine, variegated, sub-angular/sub-rounded, little to no reaction w/ 10% HCL					
	118						

DRILLING LOG

HOLE NO. **MW97**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 8 OF 25 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	118	S.A.A. - Brown (10YR 5/3) gravelly, sandy CLAY (CL)		PID Headspace (ppm)			
	120			0.0		FEW4-MW97-(121.0)	10'/10' 116-126'
	122	Variegated, gravelly, clayey SAND (SW) w/ cobbles, gravel 25%, fine to coarse, sub-angular/sub-rounded, sand f-c grained, dry to moist, slight to moderate reaction w/ 10% HCL					
	124	Variegated gravelly SAND (SP), coarse sand, gravel fine to medium, sub-angular/sub-rounded, very moist, wet, little to no reaction w/ 10% HCL					
	126	Yellowish-brown (10YR 5/6), gravelly fine to med. SAND (SW) w/ <5% clay, gravel fine to medium, variegated, sub-angular/sub-rounded, moist, little to no reaction w/ 10% HCL					
	128						10'/10' 126-136'
	130	130-132': Variegated, sandy GRAVEL (GP)/gravelly SAND (SP), gravel fine, sub-angular/sub-rounded, wet to saturated, little to no reaction w/ 10% HCL		0.4		FEW4-MW97-(131.0)	
	132	132-141': Same as 126-130'					
	134						
	136						

DRILLING LOG

HOLE NO. **MW97**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 9 OF 25 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	136	Yellowish-brown (10YR 5/6), gravelly SAND (SW) w/ clay <5%, f-m grained, gravel f-m, variegated, sub-angular/sub-rounded, moist, little to no reaction w/ 10% HCL		PID Headspace (ppm)			5'/5' 136-141'
	138						
	140						Artesian conditions encountered starting at 130 ft, water flows from casing when drive head is disconnected after core run
		Brown (10YR 5/3) gravelly, sandy CLAY (CL), gravel variegated, fine to coarse, sub-angular/sub-rounded, low plasticity, moist, little to no reaction w/ 10% HCL, few cobbles		1.2		FEW4-MW97-(141.0)	
	142						
	144	Variegated, gravelly SAND w/ <5% clay (SP), coarse grained, gravel fine to coarse, sub-angular/sub-rounded, wet, little to no reaction w/ 10% HCL					
	146						
	148						11'/11' 141-152'
	150	Pale brown (10YR 6/3) gravelly sandy CLAY (CL), gravel fine to coarse, variegated, sub-angular/sub-rounded, moist, little to no reaction w/ 10% HCL		0.8		FEW4-MW97-(151.0)	
	152	Variegated gravelly SAND/sandy GRAVEL (SP/GP), w/ <5% clay. coarse grained, gravel fine to medium, sub-angular/sub-rounded, wet, little to no reaction w/ 10% HCL					
	154						

DRILLING LOG

HOLE NO. **MW97**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 10 OF 25 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	154			PID Headspace (ppm)			
	156						First possible showing of White River Formation
	158	Brown (10YR 5/3) silty CLAY w/ trace fine gravel (CL), hard, stiff, medium plasticity, moist, little to no reaction w/ 10% HCL					12'/12' 152-164'
	160						Artesian conditions encountered 130-170 ft, max of 30-40 gpm estimated, with hole open 136-164 ft
				3.6		FEW4-MW97-(161.0)	
	162						
	164	Variegated gravelly SAND w/ <5% clay to sandy GRAVEL (SP/GP), coarse grained, gravel fine to medium, sub-angular/sub-rounded, wet, little to no reaction w/ 10% HCL					
	166						Flow reduced to 5 gpm upon casing advance to 167 ft
	168	Brown (10YR 5/3) gravelly sandy CLAY (CL), low to medium plasticity, gravel fine to medium, variegated, sub-angular/sub-rounded, moist to very moist, little to no reaction w/ 10% HCL					12'/12' 164-176'
	170						
				0.5		FEW4-MW97-(171.0)	
	172						

DRILLING LOG

HOLE NO. **MW97**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 11 OF 25 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	172	Same as 164-168' gravelly SAND to sandy GRAVEL (SP/GP), w/ <5% clay		PID Headspace (ppm)			
	174	Finer grained sand to 176'					Stop drilling 9/14/17, 1800
	176	Brown (10YR 5/3) silty CLAY (CL), stiff, hard, medium plasticity, moist, little to no reaction w/ 10% HCL 177-177.5'- layer of variegated, fine to medium gravel, wet, sub-ang./sub-round.					Start 9/15/17, 0815
	178	Brown (10YR 5/3) silty CLAY (CL)					
	180						10'/10' 176-186'
	182			0.0		FEW4-MW97-(181.0)	
	184	Variegated, fine to coarse GRAVEL (GW), sub-angular/sub-rounded, wet to saturated, little to no reaction w/ 10% HCL					
	186	Brown (10YR 5/3) silty CLAY (CL), stiff/hard, medium plasticity, moist, little to no reaction w/ 10% HCL Pale brown (10YR 6/3) silty CLAY (CL), stiff to very stiff, low to medium plasticity, dry to slightly moist, little to no reaction w/ 10% HCL					Solid White River Formation 185-186'
	188						5'/5' 186-191'
	190	couple small to medium claystone clasts @ 190-191'					Driller says clay "stretches", more recovery than feet drilled

DRILLING LOG

HOLE NO. **MW97**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 12 OF 25 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	190			PID Headspace (ppm)			
		Same as 186-191’ Pale brown (10YR 6/3) silty CLAY (CL), stiff to very stiff		0.0		FEW4-MW97-(191.0)	
	192						7’/7’ 191-198’
							Artesian flow mostly cased off, a small amount of seepage from around the outside of the casing is still observed
	194						
		195-198’- dryer, 2-3” layered clasts interbedded w/ clay, hard					
	196						
	198	Brown (10YR 5/3) to pale brown (10YR 6/3), silty CLAY (CL), medium plasticity, dry to slightly moist, stiff to very stiff, slight reaction w/ 10% HCL, a few clasts present in run as well as clayey SILT (ML) layers					
	200			0.2		FEW4-MW97-(201.0)	
	202						
	204						10’/10’ 198-208’
	206						
	208						

DRILLING LOG

HOLE NO. **MW97**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 13 OF 25 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	208	Brown (10YR 5/3) clayey SILTSTONE, medium hard to hard, moist, little to no reaction w/ 10% HCL, manganese oxide present, few vugs on surface		PID Headspace (ppm)			Majority of core fell out of core barrel; lots of mechanical fractures
	210			0.0		FEW4-MW97-(211.0)	
	212						18'/18' 208-226'
	214						
	216						
	218						
	220			1.3		FEW4-MW97-(221.0)	
	222	Yellowish-brown (10YR 5/6) clayey SILT (ML)/silty CLAY (CL), low plasticity, dry to slightly moist, slight reaction w/ 10% HCL, few small clasts					
	224						
	226						

DRILLING LOG

HOLE NO. **MW97**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 14 OF 25 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	226			PID Headspace (ppm)			Majority of core fell out of core barrel on to deck, many mechanical breaks
		No Recovery Assumed silty material washed out					
	228						
		Brown (10YR 5/3) clayey SILTSTONE, hard to very hard, many blows w/ rock hammer to break, dry to slightly moist, light reaction w/ 10% HCL, manganese oxide present					17'/20' 226-246'
	230						
				1.0		FEW4-MW97-(231.0)	
	232						
	234						
	236						
	238						
	240						
				0.6		FEW4-MW97-(241.0)	
	242						
	244						

DRILLING LOG

HOLE NO. **MW97**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 15 OF 25 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	244	Pale brown (10YR 6/3) clayey SILT (ML)/silty CLAY (CL), low plasticity, dry to slightly moist, “crumbly”, light reaction w/ 10% HCL		PID Headspace (ppm)			Stop drilling 9/15/17, 1730 Start 9/16/17, 1000
	246	Pale brown (10YR 6/3) clayey SILTSTONE, very hard- many blows w/ rock hammer to break, moist, little to no reaction w/ 10% HCL, manganese oxide present, minor caliche, calcite					20’/20’ 246-266’
	248						
	250			0.3		FEW4-MW97-(251.0)	Core fell out of core barrel- many mechanical breaks
	252						
	254						
	256						
	258						
	260	Yellowish-brown (10YR 5/4) gravelly silty SAND (SW), f-c grained, gravel fine to coarse, variegated, sub-angular/sub-rounded, little to no reaction w/ 10% HCL, wet, loose		0.7	FEW4-MW97-(261) for grain size & Atterberg Limits	FEW4-MW97-(261.0) & DUP FEW4-MW97-(262.0)	
	262						

DRILLING LOG

HOLE NO. **MW97**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 16 OF 25 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	262	Brown (10YR 5/3) sandy CLAY (CL), medium plasticity, medium stiff, sand 20%, f-c grained; w/ <10% gravel, fine to coarse, variegated, sub-angular/sub-rounded, moist/slightly wet, little to no reaction w/ 10% HCL		PID Headspace (ppm)			
	264						
	266	No Recovery 267-268; assumed same as above					
	268	Very pale brown (10YR 7/3) SILTSTONE, hard to very hard- many blows w/ rock hammer to break, dry, light reaction w/ 10% HCL					Core fell out of core barrel- many mechanical breaks
	270	269-269.5'- 6" layer of conglomerate, well cemented, minor manganese oxide present		0.1		FEW4-MW97-(271.0)	
	272						18'/20' 266-286'
	274						
	276						
	278						
	280						

DRILLING LOG

HOLE NO. **MW97**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 17 OF 25 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	280	S.A.A. - hard to very hard SILTSTONE		PID Headspace (ppm) 0.2		FEW4-MW97-(281.0)	
	282	Yellowish-brown (10YR 5/4) clayey SILT (ML), dry, moderate reaction w/ 10% HCL					
	284	Same as 282-284' w/ color change to very pale brown (10YR 7/4)					
	286	No Recovery 286-287.5'; assumed same as above					
	288	Yellowish-brown (10YR 5/4) SILTSTONE, medium hard to hard, dry to slightly moist, slight reaction w/ 10% HCL, few medium sized clasts present, minor manganese oxide					20.5'/22' 286-308' Majority of core fell out of core barrel-many mechanical breaks
	290			0.4		FEW4-MW97-(291.0)	
	292	Yellowish-brown (10YR 5/6) SILT (ML), "crumbly", dry, light reaction w/ 10% HCL					
	294						
	296						
	298						

DRILLING LOG

HOLE NO. **MW97**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 18 OF 25 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	298	S.A.A. - Yellowish-brown (10YR 5/6) SILT (ML)		PID Headspace (ppm)			
	300			0.8		FEW4-MW97-(301.0)	
	302						
	304						
	306	Very pale brown (10YR 7/4) SILT (ML), “crumbly”, dry, moderate reaction w/ 10% HCL					Stop 9/16/17, 1620 Start 9/17/17, 1100
	308	Yellowish-brown (10YR 5/4) SILT (ML) w/ clay <5%, dry to slightly moist, slight reaction w/ 10% HCL, portions of run are blocky/harder vs. portions that are crumbly/softer intermixed					308-326’ drilled 9/16/17 and core remained in core barrel overnight due to mechanical breakdown after being drilled
	310			1.5		FEW4-MW97-(311.0)	
	312						
	314						
	316						

DRILLING LOG

HOLE NO. **MW97**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 19 OF 25 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	316	S.A.A. - Yellowish-brown (10YR 5/4) SILT (ML) w/ clay <5%		PID Headspace (ppm)			
	318						18'/18' 308-326'
	320				FEW4-MW97-(321) for grain size & Atterberg Limits	FEW4-MW97-(321.0)	
	322			2.5			
	324						
		Color change to very pale brown (10YR 7/4), dry					
	326						Majority of core fell out of core barrel on to deck-many mechanical breaks
		Yellowish-brown (10YR 5/4) SILT (ML), wet to saturated (drill fluids), slight reaction w/ 10% HCL					
	328						
							20'/20' 326-346'
	330	Light yellowish-brown (10YR 6/4) SILTSTONE, medium hard, moist, slight reaction w/ 10% HCL		1.2		FEW4-MW97-(331.0)	
	332						
	334						

DRILLING LOG

HOLE NO. **MW97**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 20 OF 25 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	334	Yellowish-brown (10YR 5/4) SILT (ML) w/ clay (<5%), very slight plasticity, blocky to fine, moist, slight to moderate reaction w/ 10% HCL		PID Headspace (ppm)			
	336						
	338						
	340						
				1.3		FEW4-MW97-(341.0)	
	342	Color change to very pale brown (10YR 7/4), dry					
	344						
	346						
		No Recovery 346-348.5'; assumed same as above					
	348						
		Brown (10YR 5/3) SILT (ML), saturated (in drill rod), slight reaction w/ 10% HCL					20.5'/23' 346-369'
	350						
		Light yellowish-brown (10YR 6/4) SILTSTONE, moist, hard, slight reaction w/ 10% HCL, minor manganese oxide		1.9		FEW4-MW97-(351.0)	
	352						

DRILLING LOG

HOLE NO. **MW97**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 21 OF 25 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	352	S.A.A. - Light yellowish-brown (10YR 6/4) SILTSTONE		PID Headspace (ppm)			
	354						
	356	Dark yellowish-brown (10YR 4/4) SILT (ML) w/ fine sand and fine gravel, both <10%, gravel variegated, sub-angular/sub-rounded, moist, little to no reaction w/ 10% HCL					
	358	--6" layer of gravelly sandy SILTSTONE, Pale brown (10YR 6/3) fine gravel, variegated, fine, sub-angular/sub-rounded, very hard, heavy reaction w/ 10% HCL, dry to slightly moist					
	360						
	362	Pale brown (10YR 6/3) clayey SILT (ML)/silty CLAY (CL), low to medium plasticity, moist to very moist, slight to moderate reaction w/ 10% HCL, small 1-2" clasts present		1.6		FEW4-MW97-(361.0)	
	364						
	366						
	368	368-369'- Dry					Drilled to 369' and core remained in core barrel overnight due to casing being stuck
	370	Pale brown (10YR 6/3) clayey SILT (ML) interbedded w/ pale brown (10YR 6/3) silty CLAY (CL), low plasticity, moist					

DRILLING LOG

HOLE NO. **MW97**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 22 OF 25 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	370	S.A.A. - Pale brown (10YR 6/3) clayey SILT (ML) interbedded w/ pale brown (10YR 6/3) silty CLAY (CL), low plasticity, moist to very moist, light reaction w/ 10% HCL,		PID Headspace (ppm)			
				0.5		FEW4-MW97-(371.0)	
	372	w/ interbedded layers of pale brown (10YR 6/3), hard SILTSTONE, dry to slightly moist, slight to moderate reaction w/ 10% HCL, minor manganese oxide					22'/23' 369-392'
	374	373-376'- possible vertical fracture					
	376						
	378						
	380			0.5		FEW4-MW97-(381.0) & DUP FEW4-MW97-(382.0)	
	382						
	384						
	386						
	388						

DRILLING LOG

HOLE NO. **MW97**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 23 OF 25 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	388			PID Headspace (ppm)			
	390						
				0.4		FEW4-MW97-(391.0)	
	392	Light yellowish-brown (10YR 6/4) SILTSTONE, hard to medium hard, dry, light reaction w/ 10% HCL, minor manganese oxide, calcite					16'/16' 392-408'
	394						
	396						
	398						
	400			0.2		FEW4-MW97-(401.0)	
	402						
		Interbedded pale brown (10YR 6/3) clayey SILT (ML)/silty CLAY (CL), low to medium plasticity, moist to dry, light reaction w/ 10% HCL					
	404						
	406						

DRILLING LOG

HOLE NO. **MW97**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 24 OF 25 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	406			PID Headspace (ppm)			Stop 9/18/17, 1735 Start 9/19/17, 0800
	408	Very pale brown (10YR 7/3) SILTSTONE, hard to very hard, many blows w/ rock hammer to break, dry, heavy reaction w/ 10% HCL, minor manganese oxide, caliche					
	410						
	412			2.7		FEW4-MW97-(413.0)	
	414						
	416						
	418						
	420	Interbedded very pale brown (10YR 7/3) clayey SILT (ML)/silty CLAY (CL), low to medium plasticity, portions blocky, dry to moist, moderate to heavy reaction w/ 10% HCL, clasts present		2.4		FEW4-MW97-(421.0)	
	422						
	424						

DRILLING LOG

HOLE NO. **MW97**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 25 OF 25 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
	424	S.A.A. - Interbedded very pale brown (10YR 7/3) clayey SILT (ML)/silty CLAY (CL), low to medium plasticity, portions blocky, dry to moist, moderate to heavy reaction w/ 10% HCL, clasts present		PID Headspace (ppm)			
	426						
	428	End of Boring @ 428' bgs					TD @ 428' bgs 09/19/17, 1020

DRILLING LOG

HOLE NO. **MW101**

COMPANY NAME: RMC Consultants, Inc.	DRILLING SUBCONTRACTOR: Yellow Jacket Drilling Services, Inc. .	SHEET 1 OF 18 SHEETS
PROJECT: Atlas D Missile Site 4 RI Addendum 2017-2018 Tasks well	LOCATION: Atlas D Missile Site 4 – Laramie County, Wyoming	
NAME OF DRILLER: Cliff Hillman	MANUFACTURER'S DESIGNATION OF DRILL: TSI 150T SONIC RIG	
SIZES AND TYPES OF DRILLING EQUIPMENT: Sonic Drill Rig; 7-in. diam core barrel; 9-in. diam. drill casing (150'+); 8-in. diam. drill casing; 10-in. diam. drill casing (8-10')	HOLE LOCATION: 1,450 feet east of L&SB #3; 213224.41 ft N, 664115.67 ft E	
	SURFACE ELEVATION: 7232.76 ft msl	
	DATE STARTED: 9/9/2017	DATE COMPLETED: 9/10/2017
OVERBURDEN (OGALLALA FM. or ALLUVIAL) THICKNESS: 98 ft	DEPTH GROUNDWATER ENCOUNTERED: 105.2 ft bgs	
DEPTH DRILLED INTO WHITE RIVER FORMATION: 208 ft	DEPTH TO WATER AND ELAPSED TIME AFTER DRILLING COMPLETED: 97.7 ft bgs on 9/14/17 in Temporary 4" PVC well	
TOTAL DEPTH OF HOLE: 306 ft	OTHER WATER LEVEL MEASUREMENTS	

GEOTECHNICAL SAMPLES	DISTURBED	UNDISTURBED	CORED INTERVAL
	3 for Grain size& Atterberg Limits	None	Surface to Total Depth

SAMPLES FOR CHEMICAL ANALYSIS	VOCs – onsite	VOCs – offsite	OTHER	OTHER	OTHER	TOTAL CORE RECOVERY
	23 soil, 1 water	23 soil				%

DISPOSITION OF HOLE	2-in. diam. NESTED MONITORING WELLS	SIGNATURE OF INSPECTOR
	TD: 108.4 ft bgs TD: 140.4 ft bgs TD: 240.4 ft bgs	

ELEV.	DEPTH	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE ID.	ANALYTICAL SAMPLE ID.	Recovery (ft/ft) & REMARKS
				PID Headspace (ppm)			
		Dark yellowish-brown (10YR 3/6), SILT (ML) w/ fine to medium, sub-angular/sub-rounded gravel (<5%), roots present, no reaction w/10% HCL					
7230.8	2						6'/6' 0-6'
		Yellowish-brown (10YR 5/4) sandy, gravelly SILT (ML), sand <5%, gravel <10%, fine to medium, sub-angular/sub-rounded, medium reaction w/ 10% HCL					
7228.8	4						
		Dark yellowish-brown (10YR 4/4) silty, gravelly SAND (SP) w/ clay (<5%), gravel fine to medium, sub-angular/sub-rounded, sand fine to medium grained, moderate to heavy reaction w/ 10% HCL, dry					
7226.8	6	6'- variegated SAND w/gravel (SW), medium grained, gravel fine to medium, sub-angular/sub-rounded, light to moderate reaction w/10% HCL,dry					9'/10' 6-16'
7224.8	8						
		Medium to large cobbles from 8-12'					
7222.8	10						

DRILLING LOG

HOLE NO. **MW101**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 2 OF 18 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
7222.8	10	Same as above, SAND w/ gravel (SW), medium grained, gravel fine to medium, sub-angular/sub-rounded, light to moderate reaction w/10% HCL,dry		PID Headspace (ppm)			
7220.8	12	Same as 6-12' w/ increase in gravel/cobbles (25%), sand a little coarse grained, dry					
7218.8	14						
7216.8	16	Yellowish-brown (10YR 5/4) gravelly SAND (SW), gravel (25-35%) variegated, fine to medium, sub-angular/sub-rounded, small to medium cobbles (<5%), heavy reaction w/10% HCL, dry					10'/10' 16-26'
7214.8	18						
7212.8	20	Same as 16-20' w/ increase in gravel (40%) and <5% very pale brown (10YR 8/3) silty clay, low plasticity, dry					
7210.8	22						
7208.8	24	Very pale brown (10 YR 7/3) SILT (ML) w/ fine to medium gravel (15%), sub-angular/sub-rounded, variegated, <5% clay, low plasticity, dry to very slightly moist, heavy reaction w/10% HCL					
7206.8	26	Dark yellowish-brown (10YR 6/4) to brown (10YR 5/3) gravelly SAND (SW), f-m grained sand, f-m gravel, sub-angular/sub-rounded, variegated (15-25%), light to moderate reaction w/10% HCL, dry					
7204.8	28						

DRILLING LOG

HOLE NO. **MW101**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 3 OF 18 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
7204.8	28	Same as above: gravelly SAND (SW), f-m grained sand, f-m gravel, sub-angular/sub-rounded, variegated (15-25%)		PID Headspace (ppm)			
7202.8	30						
7200.8	32						10'/10' 26-36'
7198.8	34	Yellowish-brown (10YR 5/6) SILT (ML) w/<10% fine variegated gravel, sub-angular/sub-rounded, <5% clay w/low plasticity, dry					
7196.8	36	Grayish-brown (10YR 5/2) gravelly SAND (SP), f-c grained, gravel fine to coarse, sub-angular/sub-rounded, variegated, small to medium cobbles, medium reaction w/10% HCL, dry, silt present throughout- increasing from 42-44'					
7194.8	38						
7192.8	40						10'/10' 36-46'
7190.8	42						
7188.8	44	Very pale brown (10YR 7/3) sandy, clayey SILT w/ gravel (ML), sand/ clay/gravel <10%, gravel variegated, fine, sub-angular/sub-rounded, low plasticity, heavy reaction w/10% HCL					
7186.8	46						

DRILLING LOG

HOLE NO. **MW101**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 4 OF 18 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
7186.8	46	Light brownish gray (10YR 6/2), fine to medium grained SAND (SP) w/ silt and gravel, silt 5-10%, gravel 20-30%, fine to coarse, variegated, sub-angular/sub-rounded, cobbles present throughout run, heavy reaction w/10% HCL		PID Headspace (ppm)			
7184.8	48						
							10'/10' 46-56'
7182.8	50						
7180.8	52						
7178.8	54						
7176.8	56	Light brownish-gray (10YR 6/2) gravelly SAND (SW), gravel fine to medium, variegated, sub-rounded/sub-angular, small to medium cobbles throughout run, silt 25% 62-63'; w/ <5% low plasticity clay 64-66', dry					
7174.8	58						
7172.8	60						
							10'/10' 56-66'
7170.8	62						
7168.8	64						

DRILLING LOG

HOLE NO. **MW101**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 5 OF 18 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
7168.8	64	Light brownish-gray (10YR 6/2) gravelly SAND (SW) w/ trace clay,, gravel fine to medium, variegated, sub-rounded/sub-angular, small to medium cobbles		PID Headspace (ppm)			
7166.8	66	Grayish-brown (10YR 5/2), gravelly SAND (SP), fine to coarse grained, gravel fine to large, variegated, sub-angular/sub-rounded, some silt present from 68-71', cobbles throughout run, low plasticity clay 71-76' (<5%), dry, medium to heavy reaction w/10% HCL					
7164.8	68						
7162.8	70						10'/10' 66-76'
7160.8	72						
7158.8	74						
7156.8	76	Same as 66-76', increase in cobbles from 82-86' (large)					
7154.8	78						10'/10' 76-86'
7152.8	80						
7150.8	82						

DRILLING LOG

HOLE NO. **MW101**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 6 OF 18 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
7150.8	82	S.A.A. Grayish-brown (10YR 5/2), gravelly SAND (SP), fine to coarse grained, gravel fine to large, variegated, sub-angular/sub-rounded, w/ increased cobbles relative to 76'-80'		PID Headspace (ppm)			
7148.8	84						
7146.8	86	Light brownish-gray (10YR 6/2), gravelly SAND w/clay/cobbles (SP), gravel fine to medium, variegated, sub-angular/sub-rounded, clay-medium plasticity 90-93' (10-15%), dry to slightly moist, heavy reaction w/ 10% HCL, cobbles medium to large					7'/7' 86-93'
7144.8	88						
7142.8	90						
7140.8	92			11.2		FEW4-MW101-92	
		93-94' No Recovery					
7138.8	94	Light brownish-gray (10YR 6/2) gravelly, clayey SAND (SP), saturated, fine to medium gravel, variegated, sub-angular/sub-rounded, little reaction w/10% HCL, 1'/2' recovery					11'/13' 93-106'
7136.8	96	Brown (10YR 5/3) clayey SILT (ML)/silty CLAY (CL) w/ fine gravel, sub-angular/sub-rounded, variegated clay, low to medium plasticity, slightly moist, heavy reaction w/10% HCL					White River Formation contact @ 96 ft bgs
7134.8	98						
7132.8	100	Pale brown (10YR 6/3) silty CLAY (CL) w/ small amount of gravel, low to medium plasticity, f-m gravel, variegated, sub-angular/sub-rounded, heavy reaction w/10% HCL, slightly moist to slightly wet, wetter 98-103', less so 103-106'					

DRILLING LOG

HOLE NO. **MW101**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 7 OF 15 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
7132.8	100	S.A.A. Pale brown (10YR 6/3) silty CLAY (CL) w/ small amount of f-m gravel, low to medium plasticity, moist to saturated		PID Headspace (ppm)		FEW4-MW101-(101.0)	
				11.0	FEW4-MW101-(101)		
7130.8	102				For grain size & Atterberg Limits		
		less wet 103-106’					
7128.8	104						
		Large cobble					
7126.8	106	Very pale brown (10YR 7/3) silty CLAY (CL), medium plasticity, w/ harder small to medium clasts of same material, moist to wet, heavy reaction w/ 10% HCL					4’/4’ 106-110’
7124.8	108						
7122.8	110	Interbedded (10YR 5/3) clayey SILT (ML)/silty CLAY (CL), CL is low to medium plasticity, all moist to very moist, w/ harder small to medium sized clasts of same material, little to no reaction w/ 10% HCL		13.4		FEW4-MW101-(110.0)	
7120.8	112						16’/16’ 110-126’
7118.8	114						
7116.8	116						
7114.8	118						

DRILLING LOG

HOLE NO. **MW101**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 8 OF 18 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
7114.8	118	S.A.A. - interbedded (10YR 5/3) clayey SILT (ML)/silty CLAY (CL), CL is low to medium plasticity, all moist to very moist, w/ harder small to medium sized clasts of same material		PID Headspace (ppm)			
7112.8	120			2.2		FEW4-MW101-(120.0)	
7110.8	122						
7108.8	124						
7106.8	126	Interbedded (10YR 5/3) clayey SILT (ML)/silty CLAY (CL), CL is low to medium plasticity, all moist, small to coarse clasts throughout run, little to no reaction w/10% HCL on ML/CL, clasts have heavy reaction w/10% HCL					
7104.8	128						
7102.8	130			6.1	FEW4-MW101-(130) For grain size & Atterberg Limits	FEW4-MW101-(130.0)	14'/14' 126-140'
7100.8	132						
7098.8	134						
7096.8	136						

DRILLING LOG

HOLE NO. **MW101**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 9 OF 18 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
7096.8	136	S.A.A.		PID Headspace (ppm)			
7094.8	138						
7092.8	140	Interbedded light yellowish-brown (10YR 6/4) clayey SILT (ML)/silty CLAY (CL), CL is low to medium plasticity, moist, fine to coarse clasts throughout run, low to medium reaction w/10% HCL		21.1		FEW4-MW101-(140.0)	16'/16' 140-156'
7090.8	142						
7088.8	144						
7086.8	146						
7084.8	148						
7082.8	150			130.1		FEW4-MW101-(150.0)	
7080.8	152						
7078.8	154						

DRILLING LOG

HOLE NO. **MW101**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 10 OF 18 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
7078.8	154			PID Headspace (ppm)			
7076.8	156	Yellowish-brown (10YR 5/4) clayey SILT (ML) interbedded w/ (10YR 5/4) silty CLAY (CL), clay has medium plasticity, moist to very moist except 159-160' which is dry, crumbly w/ many small clasts, light to moderate reaction w/ 10% HCL					
7074.8	158					FEW4-MW101-(160.0)	10'/10' 156-166'
7072.8	160			11.3			
7070.8	162						
7068.8	164						
7066.8	166	Interbedded light yellowish-brown (10YR 6/4) clayey SILT (ML)/silty CLAY (CL), CL is medium plasticity, moist, clasts present, little to no reaction w/10% HCL on ML/CL; clasts have heavy reaction w/ 10% HCL					16'/16' 166-182'
7064.8	168					FEW4-MW85-(170.0)	
7062.8	170			0.8			
7060.8	172						

DRILLING LOG

HOLE NO. **MW101**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 11 OF 18 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
7060.8	172	S.A.A. -- interbedded light yellowish-brown (10YR 6/4) clayey SILT (ML)/silty CLAY (CL), CL is medium plasticity, moist, clasts present		PID Headspace (ppm)			
7058.8	174						
7056.8	176						
7054.8	178						
7052.8	180			0.2		FEW4-MW101-(180.0)	
7050.8	182						
7048.8	184	Same as above: Interbedded light yellowish-brown (10YR 6/4) clayey SILT (ML)/silty CLAY (CL), CL is medium plasticity, moist, clasts present, little to no reaction w/10% HCL on ML/CL; clasts give heavy reaction w/ 10% HCL					
7046.8	186						18'/18' 182-200'
7044.8	188						
7042.8	190			2.0		FEW4-MW101-(190.0)	

DRILLING LOG

HOLE NO. **MW101**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 12 OF 15 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
7042.8	190	Same as above: Interbedded light yellowish-brown (10YR 6/4) clayey SILT (ML)/silty CLAY (CL), CL is medium plasticity, moist, clasts present, little to no reaction w/10% HCL on ML/CL; clasts give heavy reaction w/ 10% HCL		PID Headspace (ppm)			
7040.8	192						
7038.8	194						
7036.8	196						
7034.8	198						
7032.8	200	Interbedded pale brown (10YR 6/3) clayey SILT (ML)/silty CLAY (CL), clay has medium plasticity, moist to very moist, decrease in number of clasts except @ 205', low to moderate reaction w/10% HCL		0.7		FEW4-MW101-(200.0)	
7030.8	202						18'/18' 200-218'
7028.8	204						
7026.8	206						
7024.8	208						

DRILLING LOG

HOLE NO. **MW101**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 13 OF 18 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
7024.8	208	S.A.A. - interbedded pale brown (10YR 6/3) clayey SILT (ML)/silty CLAY (CL), clay has medium plasticity, moist to very moist, decrease in number of clasts except @ 205', low to moderate reaction w/10% HCL		PID Headspace (ppm)			
7022.8	210			0.5		FEW4-MW101-(210.0)	
7020.8	212						
7018.8	214						
7016.8	216	Same as 200-216' w/ color change to light brownish-gray (10YR 6/2), three coarse clasts present @ 217-218', heavy reaction w/ 10% HCL					Clasts are same material as surrounding matrix, but harder
7014.8	218	No Recovery 218-219'					Stop drilling 09/09/17, 1700
7012.8	220	Pale brown (10YR 6/3) CLAYSTONE, well cemented, very hard, possible vertical fracture @ 220', manganese oxide in abundance, moderate reaction w/10% HCL, moist		28.7		FEW4-MW101-(220.0)	Continue 09/10/17 0810, Drilling w/ mud
7010.8	222						23'/24' 218-242'
7008.8	224						
7006.8	226						

DRILLING LOG

HOLE NO. **MW101**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 14 OF 18 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
7006.8	226	S.A.A. - Pale brown (10YR 6/3) CLAYSTONE, well cemented		PID Headspace (ppm)			
7004.8	228						
7002.8	230			0.8		FEW4-MW101-(230.0)	
		230.5'-242'- Yellowish-brown (10YR 5/4) clayey SILT (ML), "crumbly", small to large clasts present, moist to wet, a few interbedded yellowish-brown (10YR 5/4) silty CLAY (CL) layers w/ medium plasticity, both low to medium reaction w/ 10% HCL					
7000.8	232						
							23'/24' 218-224'
6998.8	234						
6996.8	236						
6994.8	238				FEW4-MW101-(240) for grain size & Atterberg Limits		
6992.8	240			3.1		FEW4-MW101-(240.0)	
6990.8	242	Pale brown (10YR 6/3) CLAYSTONE, well cemented, very hard, dry to slightly moist, slight reaction w/ 10% HCL, less manganese oxide than 219'-230.5'					
6988.8	244						

DRILLING LOG

HOLE NO. **MW101**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 15 OF 18 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
6988.8	244	S.A.A. - Pale brown (10YR 6/3) CLAYSTONE, well cemented, very hard, dry to slightly moist,		PID Headspace (ppm)			
6986.8	246						
6984.8	248						
6982.8	250			6.6		FEW4-MW101-(250.0)	
6980.8	252	252.5'-265.5'- Interbedded, very pale brown, (10YR 7/3) clayey SILT (ML) and silty CLAY (CL), clay is medium plasticity, all dry to moist, (CL) is medium stiff to stiff, few small clasts present in (ML), slight to moderate reaction w/ 10% HCL					
6978.8	254						
6976.8	256						
6974.8	258						
6972.8	260			0.7		FEW4-MW101-(260.0)	
6970.8	262						

DRILLING LOG

HOLE NO. **MW101**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Todd Margulies

SHEET 16 OF 18 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
6970.8	262			PID Headspace (ppm)			
6968.8	264	No recovery 264-265.5’					
6966.8	266	265.5’-280’- Light brownish-gray (10YR 6/2), CLAYSTONE/SILTSTONE, well cemented, hard to very hard, dry, little to no reaction w/10% HCL, minimal maganese oxide					Majority of core fell out of core barrel on to deck-many mechanical breaks
6964.8	268						
6962.8	270			1.7		FEW4-MW101-(270.0)	20.5’/22’ 264-286’
6960.8	272						
6958.8	274						
6956.8	276						
6954.8	278			0.7			
6952.8	280					FEW4-MW101-(280.0)	

DRILLING LOG

HOLE NO. **MW101**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jen Hussey

SHEET 17 OF 18 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
6952.8	280	Pale brown (10YR 7/3) clayey SILT (ML), some “crumbly” interbedded w/(10YR 7/3), CLAYSTONE/SILTSTONE, hard, well cemented, manganese oxide present, little to no reaction w/10% HCL, some clasts from 280-286’		PID Headspace (ppm)		FEW4-MW101-(280.0)	
				5.1			
6950.8	282						
6948.8	284						
6946.8	286	Brown (10 YR 5/3) CLAYSTONE/SILTSTONE, well cemented, very hard, many blows w/rock hammer to break, small amount of manganese oxide, few fine coarse sand, also fine sub-rounded/angular, variegated gravel, dry, little to no reaction w/10% HCL, surface vuggy					
6944.8	288						
6942.8	290			6.4		FEW4-MW101-(290.0)	
6940.8	292						
6938.8	294	292.5’-302’- light yellowish-brown (10YR 6/4) CLAYSTONE/SILTSTONE, well cemented, very hard, many blows w/rock hammer to break, significant increase in gravel/sand than 286-292.5’, gravel fine to medium, variegated, sub-angular/sub-rounded, sand medium to coarse grained, dry, little to no reaction w/10% HCL, surface vuggy					
6936.8	296						
6934.8	298						

DRILLING LOG

HOLE NO. **MW101**

PROJECT: Atlas D Missile Site 4 – RI Addendum 2017-2018 Tasks

INSPECTOR: Jen Hussey

SHEET 18 OF 18 SHEETS

ELEV. ft MSL	DEPTH ft	DESCRIPTION OF MATERIALS	LITH. GRAPHIC	FIELD SCREENING RESULTS	GEOTECH SAMPLE	ANALYTICAL SAMPLE NO.	Recovery (ft/ft) & REMARKS
6934.8	298	S.A.A. - light yellowish-brown (10YR 6/4) CLAYSTONE/SILTSTONE, well cemented, very hard		PID Headspace (ppm)			
6932.8	300			2.5		FEW4-MW101-(300.0)	
6930.8	302	Dark yellowish-brown (10YR 4/4), gravelly, sandy SILT (ML) w/ clay, gravel 25%, variegated, fine to coarse, sub-angular/sub-rounded; sand 10%, coarse; clay low to medium plasticity, all little to no reaction w/10% HCL, moist					
6928.8	304			7.0		FEW4-MW101-(306.0)	
6926.8	306	End of Boring					
						FEW4-MW101-(280.0)	

.8

A-2 Well Development Logs

WELL DEVELOPMENT LOG

Project Name: Atlas Site 4 RI Addendum
Project No.: E15-019-201
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Field Crew: RM / Katt in yellow jacket
Development Date: 10/19/17
Weather: Sunny, 34° F

Analytical Instruments: pH: YSI 556
Specific Conductivity: YSI 556
Temp: ↓
ORP: ↓
D.O:
Turbidity: Hach 2100 Q

Well ID: MW74-Shallow
Type of Well: Monitoring
Casing Stickup:
CASING VOLUME CALCULATION
Static Water Level: 49.65' T.O.C
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
Well Depth/Diameter: 109.10 T.O.C / 2"

Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV)	Temp (°C)	pH	Sp. Cond. (µS/cm)	Turbidity (NTUs)	PWL (ft TOC)
10/7 1532		3.0	6.57	188.1	9.77	7.65	0.609	>1000	
1540		6.0	6.90	183.8	8.75	8.05	0.820	>1000	
11/7/17 1255	SWL 50.01' TOC								
1318	Pump ON								
1320		7.0	6.19	-83.0	7.82	7.92	0.718	OVER RANGE	57.0
1323		11	2.97	121.2	8.40	7.74	0.677	"	73.0
1327		16	1.86	-128.2	8.58	7.63	0.612	1283	86.0
1331		21	1.49	-125.8	8.72	7.58	0.597	699	95.5
1334		26	1.24	-123.4	8.85	7.59	0.551	841	~~NA~~ 99.5
1338		31	1.25	-119.9	8.92	7.54	0.554	3106	NA
1341		36	1.21	-116.9	8.91	7.53	0.547	OVER RANGE	NA
1342	Pump OFF	37.5	DEWATERED TO PUMP						
1346	WL recovered to 80.0' TOC, 1431 WL = 58.40' TOC								
1433	Pump On								
1438		42.5	2.36	-87.5	8.37	7.63	0.515	1291	73.0
1442		47.5	2.42	-86.9	8.62	7.72	0.510	1580	85.0
1444		52.5	2.54	-86.2	8.60	7.76	0.516	1681	99.0
1445	Pump OFF ~~57.5~~ 55.5		DEWATERED TO PUMP, 1450 WL = 80.0' TOC, 1459 WL = 60.0' TOC						
1504	Pump On								
1507		60.5	2.57	-73.7	8.41	7.78	0.468	901	75.5

Development Equipment: SS Bailer / DEV 219, 11/7/17 TM/JM RECEIVED
LaMotte 2011 Turbidity Meter

Comments: Able to get 1.66" sft bailer down well, Surge block gets stuck near bottom. Did not surge block

Signature(s):

P. 2 of 2

WELL DEVELOPMENT LOG

Project Name: Atlas Site 4 RI Addendum
Project No.: E15-019-201
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Field Crew: TM / TM
Development Date: 11/7/17
Weather: Sunny, 35°

Analytical Instruments: pH: 451 556
Specific Conductivity: 451 556
Temp: "
ORP:
D.O: "
Turbidity: LaMotte 2011

Well ID: MW-4 SHALLOW
Type of Well:
Casing Stickup:
CASING VOLUME CALCULATION
Static Water Level: 50.01' TOC
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
Well Depth/Diameter: 109.10' TOC / 2"

Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV) N/A TM	Temp (°C)	pH	Sp. Cond. (µS/cm)	Turbidity (NTUs)	PWL (ft TOC)
1511		65.5	2.63	~~7.64~~	8.67	7.61	0.463	1202	89.0
1514		70.5	2.42	-81.3	8.76	7.68	0.457	943	93.3
1518		75.5	2.11	-82.5	8.80	7.43	0.446	1129	89.0
1521		80.5	1.63	-80.9	8.80	7.95	0.431	2046	101.0
1525		85.5	1.24	-82.6	8.83	7.94	0.422	2088	NA
1527	Pump OFF	88.5 Decreased to Pump							
11/8/17 0847	SWL = 49.94' TOC								
0922	Pump ON								
0926		93.5	4.48	149.3	8.18	8.38	0.453	43.44	73.0
0930		96.5	3.44	30.3	8.48	8.35	0.451	72.79	84.5
0935		103.5	2.72	-42.6	8.62	8.33	0.448	42.93	88.5
0938		108.5	2.32	-53.9	8.69	8.27	0.443	32.09	94.0
0941		113.5	2.07	-59.7	8.74	8.25	0.435	31.06	96.0
0942	Pump OFF - Development complete								

Development Equipment: Rotoflo

Comments:

Signature(s):

WELL DEVELOPMENT LOG

Project Name: Atlas Site 4 RI Addendum
Project No.: E15-019-201
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Field Crew: RV / Light w/ yellow jacket
Development Date: 10/7/17, 11/9/17,
Weather: Sunny, high winds, ~58°F

Analytical Instruments: pH: YSI -556
Specific Conductivity: YSI - 556
Temp: ↓
ORP: ↓
D.O: ↓
Turbidity: Hach 2100 Q

Well ID: MW-74-Middle
Type of Well:
Casing Stickup:
CASING VOLUME CALCULATION
Static Water Level: 43.26' T.O.C
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
Well Depth/Diameter: 365.87' 10"

Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV)	Temp (°C)	pH	Sp. Cond. (mS/cm)	Turbidity (NTUs)	PWL (ft TOC)
1341		1.5	7.50	150.2	11.16	8.11	0.487	>1000	
11/9/17 0912	SWL = 48.73' TOC								
1045	Pump On								
1046		2.5	6.94	102.6	7.61	8.40	0.511	NA	51.5
1049		6.5	2.38	-179.2	8.07	8.57	0.525	NA	78.5
1053		11.5	1.60	-198.5	8.40	8.70	0.531	NA	102.0
1058		16.5	1.32	-205.0	8.86	8.82	0.551	NA	133.0
1103		21.5	1.17	-208.9	9.39	8.93	0.563	NA	166.0
1107		26.5	1.08	-210.0	9.73	8.98	0.585	NA	193.0
1112		31.5	1.21	-203.7	10.37	8.98	0.655	NA	219.0
1117		36.5	1.01	-200.7	10.98	9.00	0.680	NA	246.0
1118	Pump OFF	37.5	1122 - WL = 245.9' TOC, 1127 - WL = 240.0' TOC,						
	1150 - WL = 220.0' TOC, 1207 - WL = 200.0' TOC, 1232 - WL = 180.0' TOC								
	1315 - WL = 150.4' TOC, 1355 - WL = 130' TOC								
11/10/17 1320	WL = 54.32' TOC								
1325	Resume Pumping								
1330		42.5	2.29	105.8	8.53	7.99	2.251 *		82.5
1337		47.5	1.10	66.4	9.1	7.65	2.285		129.0
1342		52.5	0.72	37.8	9.9	7.52	2.347		161.1
1348		57.5	0.68	57.2	9.9	7.21	2.339		184.0

Development Equipment: SS Bailer / DPU Rig, 11/9/17 TM/JM Redi-Flo 2

Comments: 1.66" 5ft bailer gets stuck @ ~88' below T.O.C
* - Double-checked calibration, sonde is accurate w/ 1.413 standard.

Signature(s): RV

WELL DEVELOPMENT LOG

Project Name: Atlas Site 4 RI Addendum
Project No.: E15-019-201
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Field Crew: JM
Development Date: 11/10/17
Weather: Pthy Cloudy, 50°F, breeze

Analytical Instruments: pH: YSI 556
Specific Conductivity: YSI 556
Temp: "
ORP: "
D.O: "
Turbidity: HACH 2100P

Well ID: MW74 - MIDDLE
Type of Well:
Casing Stickup:
Static Water Level:
Well Depth/Diameter:

CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)

	Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV)	Temp (°C)	pH	Sp. Cond. (µS/cm)	Turbidity (NTUs)	PWL (ft TOC)
11/10	1353		62.5	0.51	15.4	10.6	7.4	2.168	XX –	208.5
	1359		67.5	0.66	-19.9	11.2	7.6	1.772	XX –	237.0
	1404		70.5	0.67	-31.7	12.0	7.6	1.800	XX –	255.0
	1405 – Pump off									
11/15	1135	WL = 52.88' TOC								
	1210 Pump ON									
	1216		75.5	5.04	-107.3	8.33	7.68	0.373	OVER RANGE	90.0
	1221		80.5	3.23	-107.7	8.36	7.67	1.185	860	117.5
	1228		85.5	3.24	-107.3	9.01	7.64	0.516	194	139.0
	1233		90.5	3.25	-111.3	9.58	7.64	0.811	88.6	164.0
	1241		95.5	2.75	-113.8	10.15	7.62	0.767	522	189.5
	1247		100.5	2.94	-120.7	11.29	7.60	0.627	OVER RANGE	217.5
	1253		105.5	2.66	-124.1	11.75	7.60	0.494	OVER RANGE	239.0
	1258		108.5 Pump OFF - Dewatered TC pump. WL 254.0							
11/16	0823	WL = 54.48' TOC								
	0831 Pump 0.1									
	0837		113.5	2.40	-20.3	8.52	7.29	1.806	OVER RANGE	87.0
	0843		118.5	1.69	-50.6	8.97	7.40	1.794	"	117.0
	0848		123.5	1.43	-67.6	9.48	7.44	1.843	503	146.0
	0853		128.5	1.35	-72.6	9.81	7.46	1.896	279	176.7

Development Equipment: 11/15 JM/TM

Comments: **Turbidity meter indicates "UNDER RANGE"; water is very clear.

Signature(s):

WELL DEVELOPMENT LOG

Project Name: Atlas Site 4 RI Addendum
Project No.: E15-019-201
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Field Crew: JM/TM
Development Date: 11/16/17
Weather: Sunny, 35° Breeze

Analytical Instruments: pH: YSI 556
Specific Conductivity: YSI 556
Temp: "
ORP: "
D.O: "
Turbidity: HACH 2100Q

Well ID: MW74 Middle
Type of Well:
Casing Stickup:
CASING VOLUME CALCULATION
Static Water Level:
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
Well Depth/Diameter: 11/17 263.05' TOC/2"

	Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV)	Temp (°C)	pH	Sp. Cond. (µS/cm)	Turbidity (NTUs)	PWL (ft TOC)
11/16	0858		133.5	1.26	-76.7	10.19	7.47	1.935	993	201.0
	0903		138.5	1.16	-78.6	11.29	7.47	1.953	OVER RANGE	229.0
	0907		141.5	1.13	-85.1	11.83	7.46	1.945	"	244.0
	0908	Pump OFF	142.5	Continued Measurements						
11/20	1415	WL = 61.9' TOC								
	1437	Resume pumping								
	1439		63	0.99	-75.5	8.2	7.68	1.571	OVER-RANGE	99
	1442		67	2.28	-77.5	8.8	7.61	1533		
	1444	- Pump off								
	1452	- Pump on								
	1454		71	1.45	-88.5	9.6	7.47	1.541	"	1581
	1456		76	1.05	-104.7	9.5	7.54	1.550	"	
	1458		79	1.02	-115.3	9.9	7.52	1.556	"	201.
	1502		84	0.59	-120.9	10.4	7.57	1.589	"	228
	1506		87	0.59	-115.2	11.0	7.60	1.642	"	245
	1507	Pump Off								

Development Equipment:

Comments:

Signature(s): Joseph Martinucci

WELL DEVELOPMENT LOG

Project Name: Atlas Site 4 RI Addendum
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Development Date 10/17/17

Project No.: E15-019-201
Field Crew: RW / Scott Wallace, JGC, CM
Weather: Sunny, high winds, 55°F

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: Hach 2100Q

Well ID: MW74-Deep
Casing Stickup:
Static Water Level: 55.72' T.O.C
Well Depth/Diameter: 364.50' 2"

Type of Well: Monitoring

CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ___ gal/ft = 1 casing volume (gals)

Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV)	Temp (°C)	pH	Sp. Cond. (µS/cm)	Turbidity (NTUs)	PWL (ft TOC)
1145		3.5	8.49	222.2	10.23	5.00	0.436	>1000	
1202		4.5	5.81	185.1	10.08	7.79	1.254	>1000	
11/2/17 1015	SWL = 62.26' TOC								
1056	Pump On								
1057		5.5	9.00	23.0	7.68	8.77	0.341	11.13	62.0
1100		9.5	3.61	18.1	7.95	8.34	0.390	9.39	93.0
1104		14.5	2.67	15.6	8.89	8.16	0.353	11.11	126.0
1107		19.5	1.64	12.5	8.73	8.13	0.350	11.43	155.0
1110		24.5	1.44	2.6	8.90	8.17	0.346	13.77	180.0
1114		29.5	1.24	-24.6	9.51	8.16	0.345	12.76	212.0
1119		34.5	1.09	-46.5	10.08	8.20	0.348	11.57	241.0
1124		38.5	Pump OFF - Continue Monitoring at 1455 - W.L = 229.58' TOC						
11/9/17 0925	WL = 196.17' TOC								
11/10/17 1410	WL = 169.2' TOC								
11/15 1140	WL = 114.50' TOC								
11/16 1114	WL = 121.12' TOC / TD 364.50' TOC								
11/18 0945	WL = 110.66' TOC								
0949	Pump On								
1000		43.5	3.03	-106.1	9.05	7.03	3.436	12.7	NA
1003		48.5	2.17	-131.9	9.25	7.09	3.433	12.5	182.0

Development Equipment: SS Bailer / DW Rig 11/8/17 TROUBLE SHOOT FLOW, LaMotte Turbidity Meter

Comments: No surge block unable to get large bailer or surge block fast past 90' [illegible] T.O.C. Can get 2" bailer to bottom

Signature(s):

WELL DEVELOPMENT LOG

Project Name: Atlas Site 4 RI Addendum
Project No.: E15-019-201
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Field Crew: TM / JM
Development Date 11/18/17
Weather: Sunny, V. Windy 0 - WINDCHILL

Analytical Instruments: pH: 451 556
Specific Conductivity: 451 556
Temp: "
ORP: "
D.O: "
Turbidity: HACH 2100Q

Well ID: MW 74 Deep
Type of Well:
Casing Stickup:
CASING VOLUME CALCULATION
Static Water Level:
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
Well Depth/Diameter:

Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV)	Temp (°C)	pH	Sp. Cond. (µS/cm)	Turbidity (NTUs)	PWL (ft TOC)
1007		53.5	1.71	-141.0	10.04	7.16	3.154	16.5	214.0
1012	57.5	~~54~~ 57.5 TM	1.43	-149.3	10.64	7.34	2.276	18.3	237.0
1013	Pump OFF - CONTINUE TO MAX 4 Hour - DEVELOPMENT COMPLETE								

11/18

Development Equipment: Redi Flo 2

Comments:

Signature(s):

WELL DEVELOPMENT LOG

Project Name: Atlas Site 4 RI Addendum
Project No.: E15-019-201
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Field Crew: JMH, TM
Development Date 10/3/17
Weather: Sunny, 43°f, breezy

Analytical Instruments: pH: YSI 556
Specific Conductivity: YSI 556
Temp:
ORP:
D.O:
Turbidity: LaMotte 2020 we

Well ID: FEW4-MW75-middle
Type of Well: Nested monitoring
Casing Stickup: 28"
CASING VOLUME CALCULATION
Static Water Level: 67.87 TOC (PVC)
(TD(ft) – DTW(ft)) x 0.17 gal/ft = 1 casing volume (gals)
Well Depth/Diameter: pre development: 312.75/2"
post development: /2"
/211
4 2 9 9 1 5

Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV)	Temp (°C)	pH	Sp. Cond. (µS/cm)	Turbidity (NTUs)	PWL (ft TOC)
10/4/17 0755	begin developing	0.5	10.61	194.4	8.50	8.32	446	9.22	71.05
0805		10	4.69	2.3	9.15	8.10	423	10.99	75.98
0812		20	4.96	-32.6	9.32	8.18	400	8.38	78.0
0818		30	5.35	-25.9	9.31	8.10	384	7.47	79.04
0826		40	5.89	-16.0	9.40	8.11	382	6.00	79.73
0832		50	6.05	-6.4	9.45	8.05	373	4.47	80.15
0840		60	6.30	3.8	9.44	8.10	376	5.15	80.53
0847		70	6.57	3.9	9.51	8.09	370	5.51	80.86
0857		85	6.65	3.7	9.52	8.10	360	4.68	81.12
0858	pump off								

Development Equipment: Redi-flo2

Comments:

Signature(s):

WELL DEVELOPMENT LOG

Project Name: Atlas Site 4 RI Addendum
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Development Date 9/26/17

Project No.: E15-019-201
Field Crew: TM | KATE - YELLOW JACKET
Weather: PARTLY CLOUDY, 60°

Analytical Instruments: pH: 451 556 MPS
Temp: "
D.O: "

Specific Conductivity: 451 556 MPS
ORP: "
Turbidity: HACH 2100Q

Well ID: MW 75 SHALLOW
Casing Stickup: 28"
Static Water Level: 77.91 TOC (PVC)
Well Depth/Diameter: 97.9' | 2"
PRE DEVELOPMENT

Type of Well: MONITORING

CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)

Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV)	Temp (°C)	pH	Sp. Cond. (µS/cm)	Turbidity (NTUs)	PWL (ft TOC)
1429		2.5	10.21	95.2	10.48	8.64	0.671	>1000	
1458		5	15.40	84.5	11.11	8.57	0.695	>1000	
1502		7.5	9.85	95.8	9.94	8.35	0.602	>1000	
1506		10	10.05	104.6	9.37	8.14	0.541	>1000	
1525		12.5	10.37	90.6	10.19	8.37	0.715	>1000	
1529		15	9.97	100.5	9.64	8.26	0.589	>1000	
1533		17.5	9.68	104.8	9.17	8.17	0.560	>1000	
1537		20	9.62	106.8	9.20	8.12	0.505	>1000	
1541		22.5	9.41	109.6	9.14	8.02	0.476	>1000	
1546		25.5	8.53	111.1	8.92	7.99	0.492	>1000	
1551		28	8.64	113.2	8.84	8.01	0.493	>1000	
1600		30.5	9.23	110.1	8.93	8.07	0.467	>1000	
1605		33.5	8.80	110.1	8.72	8.04	0.448	>1000	
1610		36.5	8.87	109.8	8.90	8.04	0.435	>1000	
1615		39	8.90	108.8	8.76	8.07	0.420	>1000	
1621		41.5	8.44	109.0	8.85	8.06	0.410	>1000	
1626		43.5	~~8.64~~ 8.40	107.4	8.64	8.11	0.402	>1000	
1633		46.5	9.30	107.2	8.85	8.15	0.378	>1000	
1641		50.0	9.07	108.8	8.83	8.08	0.367	?	

Development Equipment: 9/26/17 - BAILER / DEV. RIG

Comments: AFTER 2.5 GALLONS - SURGE BLOCK WELL FOR 10 MINUTES. AFTER 10 GALLONS - SURGE AGAIN. AT 46.5 GALLONS H_2O VISUALLY CLEARER BUT STILL OVERRANGE FOR TURBIDITY. 50 GAL TURBIDITY: ~~DIRT~~ DETECTOR SIGNAL TOO LOW / OVER RANGE BUT READING PRE MADE CAL SOLNS. ACCURATELY

Signature(s): Tell Mgr

WELL DEVELOPMENT LOG

Project Name: Atlas Site 4 RI Addendum
Project No.: E15-019-201
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Field Crew: JNH, JH, RW
Development Date 9/29/17
Weather: cloudy, breezy, 45°F

Analytical Instruments: pH: YSI-556
Specific Conductivity: YSI-556
Temp: ↓ ↓
ORP: ↓ ↓
D.O: ↓ ↓
Turbidity: La Motte 2020 we

Well ID: FEW4-mw75-Shallow
Type of Well: Nested monitoring
Casing Stickup: 28"
CASING VOLUME CALCULATION
Static Water Level: 77.81' TOC (2")
(TD(ft) – DTW(ft)) x 0.17 gal/ft = 1 casing volume (gals)
Well Depth/Diameter: pre-development: 98.0' TOC (2")
post development: 98.05

Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV)	Temp (°C)	pH	Sp. Cond. (µS/cm)	Turbidity (NTUs)	PWL (ft TOC)
1257		0	22.37	121.0	9.20	8.30	404	24.2	77.8
1257		2	17.51	124.9	9.35	8.04	425	789	86.85
1300		5	13.18	134.3	9.41	7.66	453	754	88.15
1305		10	9.13	128.5	9.39	7.51	430	25	88.55
1310		15	7.77	113.1	9.43	7.39	454	49	89.89
1315		20	6.59	87.8	9.45	7.39	519	47	91.15
1320		25	6.15	67.7	9.52	7.44	497	42	91.98
1325		30	4.79	39.2	9.68	7.44	486	28	92.59
1330		35	5.05	19.6	9.60	7.49	489	27	92.59
1335		40	5.28	-5.8	9.65	7.45	497	22	92.59
1340		45	5.51	-17.9	9.58	7.47	503	19	92.59
1345		50	Pump off	well dewatered					
1403	water	level = 79.05'							

Development Equipment: Geo-Sub

Comments:

Signature(s):

WELL DEVELOPMENT LOG

Project Name: Atlas Site 4 RI Addendum
Project No.: E15-019-201
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Field Crew: TM / KAHT - YELLOW JACKET
Development Date: 9/27/17
Weather: ~~H. RAIN, Cloudy~~ 48 F

Analytical Instruments: pH: 451 556 MPS
Specific Conductivity: 451 556 MPS
Temp: "
ORP: "
D.O: "
Turbidity: HACH 2100 Q

Well ID: MW 75 DEEP
Type of Well: MONITORING
Casing Stickup: 28"
CASING VOLUME CALCULATION
Static Water Level: 135.59'
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
Well Depth/Diameter: 386.10' / 2"

Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV)	Temp (°C)	pH	Sp. Cond. (µS/cm)	Turbidity (NTUs)	PWL (ft TOC)
1104		3.5	7.35	116.8	8.58	8.36	0.233	463	
1302		7	7.29	123.8	9.00	8.70	0.234	184	
1315		10.5	6.43	135.4	8.89	8.22	0.274	>1000	
1323		14	6.61	138.1	8.88	8.21	0.255	222	
1331		17.5	6.30	143.7	8.99	8.15	0.276	>1000	
1339		21	6.49	146.5	9.10	8.13	0.276	>1000	
1408		24	7.01	163.5	9.03	8.40	0.271	>1000	
1416		27.5	6.70	166.0	8.97	8.25	0.269	>1000	
1423		31	6.91	167.0	9.00	8.19	0.266	>1000	
1430		34.5	6.90	164.9	8.93	8.22	0.251	>1000	
1438		38	6.63	167.3	8.90	8.19	0.265	>1000	
1445		41.5	6.60	166.7	9.01	8.17	0.264	>1000	
1452		45	6.86	164.2	9.06	8.25	0.248	519	
1516		48	7.14	154.7	8.96	8.39	0.259	>1000	
1522		50.5	6.56	154.2	8.92	8.32	0.242	>1000	

Development Equipment: BAILER / DEV. RIG

Comments: AFTER 3.5 GALLONS - SURGE BLOCK WELL FOR 30 MINUTES. AT 38 GALLONS - H_2O DISCHARGE CLEANER BUT STILL READING DISCREPANCY ON TURBIDITY.

Signature(s): Tell Mgl

WELL DEVELOPMENT LOG

Project Name: Atlas Site 4 RI Addendum
Project No.: E15-019-201
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Field Crew: JNH
Development Date 10/3/17
Weather: sunny, 50°f, breezy

Analytical Instruments: pH: YSI 556
Specific Conductivity: YSI 556
Temp:
ORP:
D.O:
Turbidity: Lamotte 2020we

Well ID: FEW4-MW75-Deep
Type of Well: Nested monitoring
Casing Stickup:
CASING VOLUME CALCULATION
Static Water Level: 135.28 'TOC PVC
(TD(ft) – DTW(ft)) x 0.17gal/ft = 1 casing volume (gals)
Well Depth/Diameter: predevelopment: 386.09' TOC / 2"
43 gals

Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV)	Temp (°C)	pH	Sp. Cond. (µS/cm)	Turbidity (NTUs)	PWL (ft TOC)
1105 beg	m developing	0.5	7.40	177.0	9.23	8.09	361	15.77	139.35
1109		5	7.02	174.1	9.17	8.12	367	14.28	140.15
1117		15	5.93	155.1	10.04	7.87	360	25.29	142.85
1123		25	3.61	75.2	10.09	7.83	392	17.12	143.70
1130		35	3.89	24.4	10.15	7.83	393	15.25	144.35
1137		45	2.41	13.5	10.11	7.85	385	14.95	145.15
1144		55	2.43	11.8	10.16	7.87	374	14.56	145.65
1151		65	2.42	11.5	10.14	7.87	369	13.21	145.75
1158		75	2.40	11.3	10.15	7.88	359	12.81	145.76
1205		85	2.43	10.9	10.13	7.88	363	7.92	145.81
1206	pump off, 86 gals removed								

Development Equipment: Redi-Flo2

Comments:

Signature(s):

WELL DEVELOPMENT LOG

Project Name: Atlas Site 4 RI Addendum
Project No.: E15-019-201
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Field Crew: Rw / Catt w/ Yellow jacket
Development Date: 10/8/17
Weather: windy, partly cloudy, ~45°F

Analytical Instruments: pH: YSI 556
Specific Conductivity: YSI 556
Temp: ↓
ORP: ↓
D.O: ↓
Turbidity: Hach 2100 Q

Well ID: MW 76 - Shallow
Type of Well: Monitoring
Casing Stickup:
CASING VOLUME CALCULATION
Static Water Level: 80.94' T.O.C.
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
Well Depth/Diameter: 91.56' T.O.C / 2"

Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV)	Temp (°C)	pH	Sp. Cond. (µS/cm)	Turbidity (NTUs)	PWL (ft TOC)
10/8/17 1507		3.5	7.39	153.7	8.97	8.47	0.509 m	>1000	
1513		7.0	7.90	119.2	8.59	8.35	0.731	>1000	
1519		10.5	8.48	94.4	8.44	8.29	0.607	>1000	

Development Equipment: SS Bailer / Dev Rig

Comments: Surge block for 10 min (1447-1457). Bailed using 10 ft. 1.66" bailer.

Signature(s):

WELL DEVELOPMENT LOG

Project Name: Atlas Site 4 RI Addendum
Project No.: E15-019-201
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Field Crew: JNH, RW
Development Date 10/10/17
Weather: sunny, 27°f, breezy

Analytical Instruments: pH: YSI 556
Specific Conductivity: YSI 556
Temp:
ORP:
D.O:
Turbidity: Lamotte 2020we

Well ID: FEW4-MW76-Shallow
Type of Well: Nested Monitoring
Casing Stickup:
CASING VOLUME CALCULATION
Static Water Level: 81.081 TOC
(TD(ft) – DTW(ft)) x 0.17 gal/ft = 1 casing volume (gals)
Well Depth/Diameter: 91.651
1.7915

Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV)	Temp (°C)	pH	Sp. Cond. (µS/cm)	Turbidity (NTUs)	PWL (ft TOC)
1020	begin developing	0.5	11.11	93.0	7.66	8.12	593	average	
1025		5	10.58	70.6	8.48	8.71	561	average	
1031		10	7.44	68.4	8.88	8.72	520	average	
1037		15	7.71	70.1	8.70	8.60	458	1020	
1045		20	7.91	71.2	8.80	8.47	428	1057	
1050		25	8.01	73.1	8.64	8.32	414	1010	
1057		30	7.88	70.2	8.64	8.19	407	1445	
1103		35	8.22	75.1	8.76	8.07	400	1684	
1109		40	8.10	75.3	8.76	8.07	399	1405	
1115		45	8.15	74.8	8.83	8.08	392	1371	
1120		50	8.17	76.8	8.79	8.05	388	1177	
1127		55	8.38	78.4	8.88	7.89	388	890	
1135		60	8.34	77.5	8.33	7.98	382	779	
1141		65	8.28	79.6	8.81	7.94	383	776	
1147		70	8.27	79.5	8.80	7.94	377	729	
1154		75	8.25	78.8	8.87	7.93	382	730	
1200		80	8.37	79.3	8.88	7.91	380	97.57	
1207		85	8.41	79.2	7.93 8.88	8.88 7.93	377	49.78	
1214		90	8.42	79.1	8.87	7.94	381	48.25	
1221		95	8.44	79.2	8.88	7.92	379	41.22	

1222 pump off

Development Equipment: Redi-flo 2

Comments: 11/4/17: SWL = 81.15' TOC

Signature(s):

WELL DEVELOPMENT LOG

Project Name: Atlas Site 4 RI Addendum
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Development Date: 10/8/17

Project No.: E15-019-201
Field Crew: Rue / Kathryn / Hillary Jacobi
Weather: windy, sunny, ~48°F

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556 ↓
ORP: ↓
Turbidity: Hach 2100 Q

Well ID: MW76-Middle
Casing Stickup:
Static Water Level: 86.03' T.O.C.
Well Depth/Diameter: 127.13' T.O.C / 2"

Type of Well: monitoring

CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)

Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV)	Temp (°C)	pH	Sp. Cond. (µS/cm) m	Turbidity (NTUs)	PWL (ft TOC)
10/8/17									
1358		3.5	5.00	90.2	8.95	9.09	0.763	>1000	
1426		6.5	5.72	145.9	9.50	8.54	0.730	>1000	
well dewatered									

Development Equipment: SS Bailer / Dev Rig

Comments: Bailed with 10 ft 1.66" bailer, Surge block for 10 min. (1403-1413)

Signature(s):

WELL DEVELOPMENT LOG

Project Name: Atlas Site 4 RI Addendum
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Development Date 10/9/17

Project No.: E15-019-201
Field Crew: JMH, RWS
Weather: Sunny, 27°F, breezy

Analytical Instruments: pH: YSI 556
Temp:
D.O:

Specific Conductivity: YSI 556
ORP:
Turbidity: Lamotte 2020 we

Well ID: FEW4-mw76-middle
Type of Well: Vestal Monitoring

Casing Stickup:
Static Water Level: 111.69'
Well Depth/Diameter: 127.20'

CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x 0.17 gal/ft = 1 casing volume (gals)

Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV)	Temp (°C)	pH	Sp. Cond. (µS/cm)	Turbidity (NTUs)	PWL (ft TOC)
1534		0.5	8.57	93.5	6.91	8.09	715	OVERRANGE	111.25
1539	well dewatered - pump off								
10/10/17 0945	WL							→	111.60
11/4/17 1026	WL = 87.90 ft TOC								
1047	Resume pumping - Initial water is brown								
1049		9.0 total	4.08	140.8	9.3	7.75	914	over range	110.0
1052		12.0	3.5	137.2	9.7	7.88	916	2,375	–
1053	De-watered to pump (3 ft off bottom)								
11/5/17 0740	WL = 115.65' TOC								
11/7/17 1443	WL = 110.0' TOC								
11/8/17 1515	WL = 103.33' TOC								
11/9/17 0839	WL = 101.42' TOC								
11/15/17 1405	WL = 90.15' TOC								
1503	Pump ON	13.0	5.50	78.3	9.07	7.65	842	966	
1510		15.5	4.66	71.8	9.71	7.66	851	252	
1511		16 Pump OFF - DEWATERED							
11/27/17 1024	WL = 99.30' TOC								

Development Equipment: Rad-Flo 2

Comments: 1730 D.T.W: 117.39

Signature(s):

WELL DEVELOPMENT LOG

Project Name: Atlas Site 4 RI Addendum
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Development Date: 10/5/17

Project No.: E15-019-201
Field Crew: RW/ Katt M/ Yelka jacket
Weather: Sunny, ~48°F

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556 ↓
ORP: ↓
Turbidity: Hach 2100 Q

Well ID: MW76-Deep
Casing Stickup:
Static Water Level: 31.52 T.O.C
Well Depth/Diameter: 256.42' T.O.C / 2"

Type of Well: monitoring

CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)

Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV)	Temp (°C)	pH	Sp. Cond. (µS/cm)	Turbidity (NTUs)	PWL (ft TOC)
1300		3.0	5.03	-26.5	9.12	7.89	0.288	>1000	
1337		6.5	5.31	-62.7	9.74	7.95	0.295	>1000	
1344		9.5	6.01	-37.7	9.49	8.01	0.284	>1000	

Development Equipment: SS Bailer / Dev Rig

Comments: Surge block for 10 min (1309-1319) well bailed using 10 ft. 1.66" bailer

Signature(s): RW

WELL DEVELOPMENT LOG

Project Name: Atlas Site 4 RI Addendum
Project No.: E15-019-201
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Field Crew: JNH, RW
Development Date 10/9/17
Weather: Sunny, 27°, breezy

Analytical Instruments: pH: YSI 556
Specific Conductivity: YSI 556
Temp:
ORP:
D.O:
Turbidity: Lamotte 2020 we

Well ID: FEW4-MW76-Deep
Type of Well: ~~Vent~~ Monitoring
Casing Stickup:
CASING VOLUME CALCULATION
Static Water Level: 90.95'
(TD(ft) – DTW(ft)) x 0.17 gal/ft = 1 casing volume (gals)
Well Depth/Diameter: 256.53'
28.22

Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV)	Temp (°C)	pH	Sp. Cond. (µS/cm)	Turbidity (NTUs)	PWL (ft TOC)
1450 begin developing		0.5	7.45	102.0	8.21	8.45	314	overrange	95.55
1501		5.0	4.40	73.2	8.81	8.50	318	23.91	~~95~~ 118.55
1506		10.0	6.55	60.1	9.56	8.35	316	17.48	162.25
1511		15.0	4.87	49.4	9.88	8.45	~~313~~ 318	12.53	184.25
1515		20	4.03	47.2	10.42	8.38	318	14.33	225.25
1519		25	4.09	48.6	10.57	8.43	319	17.75	246.90
1521	Pump off - well dewatered, 29 gals removed								
0543									246.95
11/4/17 1022	- WL = 237.24' TOC								
11/6/17 ~~1442~~ 1445	WL = 237.10' TOC								
11/8/17 1511	WL = 236.95' TOC								
11/13/17 1525	WL = 236.20' TOC								
11/21/17 1020	WL = 235.63' TOC								

Development Equipment: Redi-Flo 2

Comments: 1540 D.T.W. 247.39'

Signature(s):

WELL DEVELOPMENT LOG

P. 1062

Project Name: Atlas Site 4 RI Addendum
Project No.: E15-019-201
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Field Crew: TM/KZ
Development Date 10/20/17
Weather: Sunny, 46°-86°, Breezy

Analytical Instruments: pH: YSI 556
Specific Conductivity: YSI 556
Temp: "
ORP: "
D.O: "
Turbidity: LaMotte 2091

Well ID: MW77 Shallow
Type of Well: Monitoring
Casing Stickup: 29"
CASING VOLUME CALCULATION
Static Water Level: 29.01' TOC
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
Well Depth/Diameter: 47.80' TOC / 2"

Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV)	Temp (°C)	pH	Sp. Cond. (µS/cm)	Turbidity (NTUs)	PWL (ft TOC)
10/20 BAILING 1135	BEGIN BAILING								
1148		1	2.81	18.8	9.39	7.88	0.377	OVER RANGE	
1156		2	3.08	26.9	9.18	7.64	0.367	"	
1203		3	3.57	33.4	9.15	7.53	0.364	"	
1208		4	3.73	37.6	8.86	7.55	0.369	"	
1214		5	3.72	43.7	8.95	7.45	0.370	"	
1220		6	3.54	44.6	8.96	7.49	0.372	"	
1225		7	3.54	45.3	8.90	7.50	0.367	"	
1230		8	3.40	45.3	8.72	7.51	0.362	"	
1235		9	3.22	45.9	8.90	7.46	0.367	"	
1240		10	3.21	46.2	8.97	7.51	0.366	"	
1245		11	3.29	46.5	8.85	7.53	0.299	"	
1250		12	3.22	50.6	9.06	7.50	0.366	"	
1257		13	3.80	45.8	9.11	7.65	0.365	"	
1303		14	3.34	52.2	8.97	7.54	0.366	"	
1308		15	3.99	53.5	8.92	7.51	0.359	"	
1314		16	4.12	54.9	8.93	7.52	0.363	"	
1321		17	3.54	56.8	8.98	7.49	0.330	"	
1327		18	3.63	56.6	8.96	7.43	0.399	"	
1345		19	4.22	67.4	9.05	7.76	0.369	"	

Development Equipment: Bailer

Comments: Initial Purge H2O Gray/Very Silty.

Signature(s):

WELL DEVELOPMENT LOG

Project Name: Atlas Site 4 RI Addendum
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Development Date 10/20/17

Project No.: E15-019-201 P2.062
Field Crew: TM/KZ
Weather:

Analytical Instruments: pH: 451 556
Temp: "
D.O: "

Specific Conductivity: 451 556
ORP: "
Turbidity: LAMOTTE 2011

Well ID: MW77 SHALLOW
Casing Stickup: 29"
Static Water Level: 29.01' TOC
Well Depth/Diameter: 47.8' /2"

Type of Well:

CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
3.2 gal

Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV)	Temp (°C)	pH	Sp. Cond. (µS/cm)	Turbidity (NTUs)	PWL (ft TOC)
1350		20	4.97	73.4	8.86	7.52	0.367	over range	
1355		21	4.85	73.2	9.00	7.50	0.378	"	
1400		22	4.68	70.9	9.03	7.47	0.380	"	
1405		23	5.19	65.6	8.96	7.55	0.359	"	
1410		24	4.78	63.7	8.87	7.60	0.360	"	
1414		25	4.53	61.6	8.75	7.58	0.363	"	
1418		26	5.00	61.1	8.67	7.51	0.363	"	
1423		27	5.05	59.5	8.68	7.58	0.358	"	
1426		28	4.88	58.7	8.68	7.56	0.360	"	
1430		29	4.79	57.8	8.65	7.56	0.360	"	
1435		30	4.58	54.7	8.64	7.55	0.362	"	
1550	Pump ON								
1552		32	4.65	-124.2	9.5	8.38	0.345	958	
1557		37	3.27	-66.4	8.59	7.25	0.345	1493	
1602		42	2.86	-42.6	9.61	6.97	0.363	811	
1604		44	Pump OFF - DEWATERED TO Pump.						
1639	Pump ON								
1644		49	5.73	10.6	9.40	7.21	0.347	793	
1648		52	Pump OFF · DEWATERED TO Pump.						

10/24 Pumping

Development Equipment: BAILER / Pump

Comments: FINAL PURGE H_2O STILL GRAY/SILTY. (10/24)

Signature(s):

WELL DEVELOPMENT LOG

Project Name: Atlas Site 4 RI Addendum
Project No.: E15-019-201
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Field Crew: JM, TH
Development Date: 10/26/17, 11/2/17
Weather: 10/26: Snowing lightly, windy, 30°F
11/2: Partly cloudy, 30°F, windy
Analytical Instruments: pH:
Specific Conductivity:
Temp:
ORP:
D.O:
Turbidity:
Well ID: MW77-SHALLOW
Type of Well:
Casing Stickup:
CASING VOLUME CALCULATION
Static Water Level:
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
Well Depth/Diameter: 47.8'

Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV)	Temp (°C)	pH	Sp. Cond. (µS/cm)	Turbidity (NTUs)	PWL (ft TOC)
10/26 1033	Pump On								
1035		54	7.8	7.2	8.3	6.15	339	1051	
		54	7.4	77.5	8.3	7.8	352	186	
11/2/17 1226	WL = 29.28' TOC								
1239	Pump On								
1342		59	5.75	207.1	8.39	7.89	348	20.44	34.3
1346		64	4.13	174.6	8.77	7.15	344	882	40.1
1351		69	3.13	156.6	9.00	6.96	349	767	42.65
1354	Pump OFF	71	DEWATERED TO Pump						
1513	Pump On								
1516		72	5.48	-9.0	8.50	7.81	350	36.21	
1520		76	6.19	11.8	8.91	7.54	347	56.37	36.9
1525		80	5.84	209	9.10	7.44	NA	6837	NA
Pump OFF	DEWATERED TO Pump								
1608	Pump On			~~TMP 79.5~~ 70					29.5
1611		87	5.25	~~5.77~~	~~5.~~ 8.57	7.64	346	12.49	
1615		85	6.19	42.2	8.76	7.61	342	6841	38.2
1619		90	DEWATERED TO Pump						

Development Equipment:

Comments:

Signature(s):

WELL DEVELOPMENT LOG

Project Name: Atlas Site 4 RI Addendum
Project No.: E15-019-201
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Field Crew: JM, TM
Development Date: 11/3/17
Weather: Phy Cloudy 50°F, slight breeze

Analytical Instruments: pH: YSI 556
Specific Conductivity: YSI 556
Temp: "
ORP:
D.O: "
Turbidity: LAMOTTE 2011

Well ID: MW77 - SHALLOW
Type of Well: MONITORING
Casing Stickup: 29"
CASING VOLUME CALCULATION
Static Water Level:
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
Well Depth/Diameter: 47.80' TOC / 2"

Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV)	Temp (°C)	pH	Sp. Cond. (µS/cm)	Turbidity (NTUs)	PWL (ft TOC)
11/3/17 1040	SWL	= 29.07' TOC							
1122	Pump On								
1124		91	6.24	-3.9	8.77	7.53	339	40.58	34.75
1127		95	6.00	21.2	9.15	7.14	340	29.60	37.37
1131		98	5.89	29.2	9.41	7.02	340	27.28	39.96
1134		100	5.55	32.6	9.64	6.95	345	40.81	41.90
1136		102.5	DEWATERED TO PUMP		DEVELOPMENT COMPLETE				

Development Equipment: REDIFLOW Pump

Comments:

Signature(s):

WELL DEVELOPMENT LOG

Project Name: Atlas Site 4 RI Addendum
Project No.: E15-019-201
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Field Crew: TM/KZ
Development Date: 10/20/17
Weather: Sunny, 45°, Wind

Analytical Instruments: pH: 451 556
Specific Conductivity: 451 556
Temp: "
ORP:
D.O: "
Turbidity: LaMotte

Well ID: MW 77 Middle
Type of Well: Monitoring
Casing Stickup: 29"
CASING VOLUME CALCULATION
Static Water Level: 29.34' TOC
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
Well Depth/Diameter: 134.16' TOC / 2"
= 18 gal

Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV)	Temp (°C)	pH	Sp. Cond. (µS/cm)	Turbidity (NTUs)	PWL (ft TOC)
10/20 BAILING 0910	BEGIN BAILING								
0936		1	4.35	21.2	9.57	8.14	0.671	1247	
0950		1.5	4.80	5.8	9.50	8.46	0.665	2520	
1010		2.5	2.57	-27.6	9.66	8.52	0.614	-32 ?	
1030		3.5	2.20	-31.0	9.87	9.88	0.665	-4 ?	
1053		4.5	1.90	-49.4	10.02	8.58	0.689	652	
1112		5.5	1.91	-52.8	9.78	8.57	0.693	784	
1128		6.5	2.28	-29.2	9.81	8.44	0.647 mS	-25	
10/25 PUMPING 1441	Pump on.								
1443		7.5	1.29	-114.1	10.30	7.67	757 uS	>1000	
1449		10	0.26	-136.5	9.9	7.5	723	20.2	
1454		20	0.49	-142.6	10.38	7.68	585	2460	
1455	Pump off - de-watered to pump								
10/26 1016	Begin/Resume pumping								
1018		23	6.71	138.6	8.7	7.7	679	27.6	
1021		27	5.7	128.3	8.8	7.7	701	5.8	
1024		30	5.6	116.9	9.4	7.7	729	16.6	
1026		35	5.6	103.9	9.4	7.7	754	18.5	
1029	Pump off - de-watered to pump - Development complete TM								

Development Equipment: Bailers, Redi-Flo2 submersible

Comments: Initial Purge H_2O Gray/Silty, After 2.5 Gallons H_2O is Lighter Gray And Decrease In Silt. Turbidity Meter Checked W/ 10 NTU STD And Read 9.78 NTU. Final Purge H_2O Lighter Gray/Decreased Silt. 2 1/16" Silt In Bottom Of 5 Gallon Bucket.

Signature(s):

WELL DEVELOPMENT LOG

Project Name: Atlas Site 4 RI Addendum
Project No.: E15-019-201
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Field Crew: JM, TM
Development Date 11/2/17
Weather: Pthy dondy, 30°F, windy

Analytical Instruments: pH: _____ Specific Conductivity: _____
Temp: _____ ORP: _____
D.O: _____ Turbidity: _____

Well ID: MW77 - Middle Type of Well: _____
Casing Stickup: _____ CASING VOLUME CALCULATION
Static Water Level: _____ (TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
Well Depth/Diameter: _____

	Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV)	Temp (°C)	pH	Sp. Cond. (µS/cm)	Turbidity (NTUs)	PWL (ft TOC)
11/2/17	1224	WL =	30.17'	TOC						
	~~1234~~	~~Pump On~~								
	1406	Pump On								
	1409	Pump OFF	No water							
	1448	Pump On								
	1450		36	4.03	19.1	8.77	7.18	715	892	50.0
	1453		40	2.08	23.0	8.89	7.31	652	1431	62.5
	1458		45	1.08	-80.6	9.76	7.40	653	3834	94.0
	1502		50	0.94	-84.4	9.79	7.44	657	[illegible]	117.0
	1504		54	DEWATERED	To pump					
	~~1506~~									
11/3/17	1041	WL =	34.11'	TOC						
	1046	Pump ON								
	1048		56	8.31	44.0	9.04	7.53	610	[illegible]	58.65
	1054		59	7.22	46.5	9.60	7.20	506	11.99	66.40
	1101		64	6.45	29.7	10.01	7.13	527	3.16	90.38
	1106		69	6.28	17.5	10.54	7.12	535	5.79	115.20
	1111		74	6.30	5.04	10.99	7.20	530	10.58	NA
	1113		76	DEWATERED TO	Pump	DEVELOPMENT	COMPLETE			

Development Equipment: _____

Comments: _____

Signature(s): _____

WELL DEVELOPMENT LOG

Project Name: Atlas Site 4 RI Addendum
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Development Date: 10/8 & 10/25

Project No.: E15-019-201
Field Crew: RW / Katt w/ yellow jacket
Weather: Cloudy ~48°F

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556 ↓
ORP:
Turbidity: Hach 2lpc a

Well ID: MW 77-Dlep
Type of Well: Monitoring

Casing Stickup:
Static Water Level: 20.35' TOC
Well Depth/Diameter: ~259.55' TOC / 2"

CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x .17 gal/ft = 1 casing volume (gals)
= 40 gal

Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV)	Temp (°C)	pH	Sp. Cond. (mS/cm)	Turbidity (NTUs)	PWL (ft TOC)
10/8	Bailing								
1621		3.0	5.14	79.6	9.03	7.89	0.491	>1000	
1628	↓	6.5	5.78	100.1	9.44	7.77	0.545	>1000	
1654	↓	10.0	5.25	126.9	9.39	8.01	0.609	>1000	
10/25 1303	Begin pumping		5.04	85.6	13.73	8.99	0.404	31.66	
1308		16	0.94	-121.8	10.55	7.87	0.668	>1000	
1311		20	0.62	-134.6	10.6	7.80	0.700	1160	
1314		25	0.44	-139.1	10.7	7.76	0.669	607	
1318		30	0.39	-141.5	10.8	7.71	0.652	685	
1321		35	0.39	-142.6	10.9	7.57	0.630	—	
1324		40	0.41	-146.2	10.9	7.51	0.614	—	
1331		50	0.44	-149.2	10.9	7.45	0.580	17.5	
1338		60	0.51	-149.5	11.0	7.45	0.559	17.7	
1343		65	0.58	-149.1	11.0	7.42	0.544	18.5	
1347		70	0.64	-147.0	11.1	7.44	0.533	11.9	
1354		80	0.75	-143.2	11.1	7.43	0.522	9.3	
1357		85	0.81	-141.1	11.2	7.45	0.516	8.6	
1358	Pump off - development complete.								

Development Equipment: SS Bailer / Dev Rig

Comments: 3 10 ft 1.66" bailer used. Surge block for 10 min (1637-1647)

Signature(s): RW JM

WELL DEVELOPMENT LOG

Project Name: Atlas Site 4 RI Addendum
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Sampling Date 10/1/17

Project No.: E15-019-201
Field Crew: RW, kraft w/ yellow jacket
Weather: rain, 48° F

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O:

Specific Conductivity: YSI 556 ↓
ORP:
Turbidity: Hach 2100Q

Well ID: MW 80- Shallow
Casing Stickup:
Static Water Level: 71.98' T.O.C
Well Depth/Diameter: 133.73' T.O.C 2"

Type of Well: monitoring

CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)

	Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV)	Temp (°C)	pH	Sp. Cond. (µS/cm)	Turbidity (NTUs)	PWL (ft TOC)
10/1/17	1342		3.0	8.36	143.4	8.36	8.39	0.672	>1000	
	1358		5.5	8.50	99.4	8.49	8.60	0.677	>1000	
	1401		9.0	9.26	100.4	8.51	8.76	0.670	>1000	
	1404		12.5	9.71	102.1	8.35	8.57	0.660	>1000	
	1407		15.5	9.65	91.2	8.34	8.93	0.642	>1000	
	1454		19.0	8.51	119.5	8.58	7.60	0.598	>1000	
	1457		22.0	8.12	112.7	8.71	8.95	0.603	>1000	
	1500		25.5	8.98	96.3	8.66	9.06	0.600	>1000	
	1503		29.0	9.22	86.0	8.56	9.30	0.580	>1000	
	1506		31.0	8.64	88.4	8.39	9.08	0.393	>1000	
	1506	well dewatered								
	1526	continue bailing								
	1529		34.5	8.48	27.2	8.48	8.14	0.496	>1000	
	1533		38.0	9.04	26.8	8.43	8.15	0.554	>1000	
	1536		41.5	9.24	46.3	8.30	8.09	0.537	>1000	
	1539		44	8.56	36.5	8.35	8.15	0.527	>1000	
	1542		46	8.74	39.9	8.31	8.09	0.540	>1000	
	1544		47.5	8.81	46.4	8.31	8.10	0.533	>1000	
	1544	well dewatered								

Development Equipment: SS Bailer / Dev Rig

Comments: initial bailing water is foamy

Signature(s): RW

WELL DEVELOPMENT LOG

Project Name: Atlas Site 4 RI Addendum
Project No.: E15-019-201
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Field Crew: ~~JM, TM~~ JM, TM
Development Date 10/2/17
Weather: snowing, 32°F, breezy

Analytical Instruments: pH: YSI 556
Specific Conductivity: YSI 556
Temp:
ORP:
D.O:
Turbidity: LaMotte 2020 we

Well ID: FEW4-MW80-Shallow
Type of Well: Nested monitoring
Casing Stickup:
CASING VOLUME CALCULATION
Static Water Level: 71.39' TOC PVC
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
Well Depth/Diameter: pre development: 133.78' TOC PVC (2")
post development:

Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV)	Temp (°C)	pH	Sp. Cond. (µS/cm)	Turbidity (NTUs)	PWL (ft TOC)
10/2 1222	SWL = 69.84' TOC								
1250	Begin pumping @ 1 l/gpm								
1251		0.5	05.78	88.0	8.4	7.81	473	31.4	83.7
1254		3.3	4.28	55.5	8.9	8.15	491	1472	101.7
1301		~~8.212~~	3.2	39.4	9.1	8.27	491	2212	106.2
1310		21	2.81	21.3	9.18	8.29	462	1043	106.94
1319		30	3.63	6.3	9.16	8.32	450	—	108.4
1336		47	4.19	-11.8	9.25	8.27	439	31.5	108.3
1345		56	4.35	-11.6	9.25	8.27	435	20.3	108.8
1355		66	4.52	-10.6	9.22	8.27	430	13.8	109.2

Development Equipment: Redi-Flo2

Comments:

Signature(s):

WELL DEVELOPMENT LOG

Project Name: Atlas Site 4 RI Addendum
Project No.: E15-019-201
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Field Crew: RW / katt w/ yellow Jacket
Development Date 10/1/17
Weather: cloudy, ~ 45°F

Analytical Instruments: pH: YSI -556
Specific Conductivity: YSI 556
Temp: ↓
ORP: ↓
D.O: ↓
Turbidity: Hach 2100 Q

Well ID: MW80-middle
Type of Well: monitoring
Casing Stickup:
CASING VOLUME CALCULATION
Static Water Level: 72.26' T.O.C
(TD(ft) – DTW(ft)) x ___ gal/ft = 1 casing volume (gals)
Well Depth/Diameter: 227.72' T.O.C.

	Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV)	Temp (°C)	pH	Sp. Cond. (µS/cm)	Turbidity (NTUs)	PWL (ft TOC)
10/1/17	1036		2.5	8.93	196.6	8.49	8.08	0.580	>1000	
	1043		5.5	7.27	185.1	8.31	8.14	0.625	>1000	
	1048		8.5	7.48	179.8	8.28	8.02	0.749	>1000	
	1052		11.5	8.30	173.1	8.33	8.01	0.801	>1000	
	1056		14.5	9.29	171.6	8.38	7.90	0.925	>1000	
	1151		17.5	8.93	165.0	8.90	8.02	0.727	>1000	
	1155		20.5	8.42	163.8	8.85	8.02	0.700	>1000	
	1159		23.5	7.94	160.1	8.86	8.30	0.555	>1000	
	1203		26.5	8.73	154.5	8.63	8.13	0.586	>1000	
	1206		29.5	9.02	153.0	8.58	8.06	0.546	>1000	
	1210		32.5	9.02	154.4	8.60	8.02	0.529	>1000	
	1213		35.5	9.42	150.9	8.61	8.04	0.523	>1000	
	1216		38.5	9.40	151.2	8.59	8.02	0.511	>1000	
	1220		41.5	9.53	149.9	8.58	8.02	0.494	>1000	
	1223		44.5	9.66	148.4	8.56	8.02	0.461	>1000	
	1227		47.5	9.54	146.5	8.55	8.02	0.475	>1000	
	1231		50.5	9.56	124.8	8.55	8.34	0.479	>1000	

Development Equipment: SS Bailer / Dev. Rig

Comments: Bottom of well is hard, initial water bailed is silty
surge block well for 30 minutes

Signature(s): RW

WELL DEVELOPMENT LOG

Project Name: Atlas Site 4 RI Addendum
Project No.: E15-019-201
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Field Crew: JNH
Development Date 10/2/17
Weather: Snowing, 32°f, breezy

Analytical Instruments: pH: YSI 556
Specific Conductivity: YSI 556
Temp:
ORP:
D.O:
Turbidity: LaMotte 2020 we

Well ID: FEW4-MW80-middle
Type of Well: Nested Monitoring
Casing Stickup:
CASING VOLUME CALCULATION
Static Water Level: 72.35' TOC PVC
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
Well Depth/Diameter: predevelopment: 227.81' TOC (4" PVC)
post development:

Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV)	Temp (°C)	pH	Sp. Cond. (µS/cm)	Turbidity (NTUs)	PWL (ft TOC)
1111 begin developing		0.5	4.20	109.6	8.16	8.95	552	420	78.91
1121			4.60	74.4	8.93	8.55	415	973	81.91
1131			6.69	61.8	8.95	8.30	454	365	92.28
1141			6.63	58.4	9.00	8.16	424	18.82	92.58
1151			6.84	56.8	8.95	8.13	420	26.39	82.69
1152 pump off									

Development Equipment: Redi-Flo 2

Comments:

Signature(s):

WELL DEVELOPMENT LOG

Project Name: Atlas Site 4 RI Addendum
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Development Date 9/30/17 & 10/1/17

Project No.: E15-019-201
Field Crew: JH / Kath w/ Yellow Jacket
Weather: Cloudy, windy, ~55°F

Analytical Instruments: pH: YSI 556 MPS
Temp:
D.O:

Specific Conductivity: YSI 556 MPS
ORP:
Turbidity: HACH 2100Q

Well ID: MW80 – DEEP
Casing Stickup:
Static Water Level: 66.56' TOC
Well Depth/Diameter: 289.11' TOC / 2"

Type of Well: monitoring
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ___ gal/ft = 1 casing volume (gals)

– NA –

Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV)	Temp (°C)	pH	Sp. Cond. (µS/cm)	Turbidity (NTUs)	~~PWL~~ (ft TOC)
9/30/17									
1617		3	5.32	120.5	9.80	7.96	0.575	1009 →	Mid stream
1722		6.5	8.95	123.0	9.43	7.79	0.545	>1000	
1732		10	6.83	120.3	8.93	7.84	0.533	>1000	
1742		13	6.87	121.3	8.81	7.85	0.529	>1000	
10/1/17									
0803		17.5	7.82	219.0	7.74	8.08	0.544	~~>1000~~	
0805		21	7.14	208.7	7.78	7.70	0.509	>1000	
0846		24	7.58	203.2	8.07	7.83	0.499	–	
0911		29	7.50	200.4	8.18	7.92	0.490	>1000	
0932		32	7.48	197.8	8.57	7.98	0.479	–	
0942		35.5	7.48	195.9	8.60	7.99	0.471	>1000	
0953		37.0	8.06	191.5	8.80	8.05	0.457	>1000	

Development Equipment: SS BAILER / DRY. RIG

Comments: Bottom of well is HARD. Initial water bailed is brown/ but begins to clear up w/ ~3 gal Bailed
Surge block well for 35 minutes after 3 gal bailed; increase in silty H_2O following surging

Signature(s):

WELL DEVELOPMENT LOG

Project Name: Atlas Site 4 RI Addendum
Project No.: E15-019-201
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Field Crew: JNH, TM
Development Date 10/3/17
Weather: Cloudy, 38°F, breezy

Analytical Instruments: pH: YSI 556
Specific Conductivity: YSI 556
Temp:
ORP:
D.O:
Turbidity: LaMotte 2020 we

Well ID: FEW4-MW80-deep
Type of Well: Nested monitoring
Casing Stickup:
CASING VOLUME CALCULATION
Static Water Level: 66.63' TOC
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
40 gals
Well Depth/Diameter: predevelopment: 289.2' TOC (PVC) 1/2"
post development:

Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV)	Temp (°C)	pH	Sp. Cond. (µS/cm)	Turbidity (NTUs)	PWL (ft TOC)
1220 begin development		0.5	11.89	180.5	7.52	8.25	430	1050	67.67
1225		5	7.87	116.5	8.29	8.10	432	47.00	68.20
1230		10	7.15	102.2	8.67	8.09	420	25.00	68.49
1235		15	7.13	94.8	8.63	8.07	414	16.36	68.67
1238		20	7.52	90.6	8.64	8.02	411	11.69	68.81
1241		25	7.49	84.5	8.65	8.00	404	7.77	68.96
1246		35	7.52	81.1	8.95	7.95	399	5.57	69.19
1251		45	7.48	72.5	8.68	7.92	398	3.81	69.41
1256		55	7.42	71.1	8.77	7.86	394	3.74	69.56
1302		65	7.41	68.9	8.75	8.02	395	2.79	69.73
1307		75	7.38	65.3	8.74	8.06	387	3.16	69.85
1313		85	7.39	66.0	8.72	7.99	384	2.89	70.00
1314 pump off									

Development Equipment: Redi-flo 2

Comments:

Signature(s):

WELL DEVELOPMENT LOG

Project Name: Atlas Site 4 RI Addendum
Project No.: E15-019-201
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Field Crew: JNK, RW
Development Date: 9/29/17, 9/30/17
Weather: Cloudy, 50°F, breezy

Analytical Instruments: pH: YSI 556
Temp: ↓ ↓
D.O: ↓ ↓
Specific Conductivity: YSI 556 ↓ ↓
ORP:
Turbidity: Lamotte 2020 WE

Well ID: FEW4-MW81-Shallow
Type of Well: Nested monitoring
Casing Stickup: 3"
Static Water Level: 65.77' TOC (PVC, 2")
Well Depth/Diameter: Pre-development: 107.45' (2") (TOC)
post development:

CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)

Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV)	Temp (°C)	pH	Sp. Cond. (µS/cm)	Turbidity (NTUs)	PWL (ft TOC)
1535	begin developing	1.0	4.65	42.0	9.11	9.14	669	overrange	79.05
1538		3.0	3.80	24.8	9.22	8.57	663	overrange	83.10
1542		~~8~~ 6	3.16	-2.9	9.44	8.28	645	overrange	84.21
1547		~~12~~ 8	3.03	-41.3	9.54	8.06	652	overrange	84.72
1552		~~17~~ 11	2.79	-59.4	9.45	7.94	681	overrange	89.25
1557		~~22~~ 14	2.94	-69.5	9.50	7.89	715	overrange	91.15
1602		16	2.98	-76.0	9.48	7.85	681	overrange	93.25
1607		20	2.79	-81.2	9.41	7.82	665	overrange	97.61
1612		22	3.97	-81.3	9.44	7.82	628	overrange	98.75
1616		well dewatered to pump. 24 gal. removed							
9/30/17 0900	cont. developing	22.5		132.1	8.95	8.81	594	965	79.8
0906		27	7.82	124.3	9.35	8.19	571	1606	87.91
0914		32	4.66	53.6	9.46	7.87	583	overrange	90.65
0922		37	4.19	-16.9	9.46	7.64	595	overrange	92.6
0930		42	3.98	-38.8	9.47	7.66	570	overrange	93.02
0938		47	3.73	-38.9	~~7.67~~ 9.46	7.67	542	overrange	96.4
0948		52	3.88	-40.9	9.46	7.75	517	overrange	97.52
0953		57	4.02	-38.1	9.36	7.72	490	overrange	99.4
0955	well dewatered to pump. 57 gallons removed. Allow to recharge								
0958	cont. developing	57.5	3.98	-20.1	918	7.73	490	1982	73.5

Development Equipment: ~~Redi-Flo 2~~ Grosub

Comments: 9/29/17 1620 D.T.W: 87.45' TOC
9/29/17 1630 D.T.W: 74.95' TOC
9/29/17 1717 D.T.W: 66.00' TOC
9/30/17 0755 D.T.W: 65.75' TOC

Signature(s):

Comments cont.
9/30/17 0858 D.T.W: 90.0' TOC
9/30/17 0904 D.T.W: 80.0' TOC
9/30/17 0917 D.T.W: 70.0' TOC
9/30/17 0945 D.T.W 66.11' TOC

WELL DEVELOPMENT LOG

Project Name: Atlas Site 4 RI Addendum
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Development Date 9/30/17

Project No.: E15-019-201
Field Crew: SM, RW
Weather: Sunny, 55°f, breezy

Analytical Instruments: pH: YSI 556
Temp:
D.O:

Specific Conductivity: YSI 556
ORP:
Turbidity: Lamotte 2020 we

Well ID: FTA4MW 81 – Shallow
Casing Stickup:
Static Water Level:
Well Depth/Diameter:

Type of Well: Nested monitoring

CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)

Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV)	Temp (°C)	pH	Sp. Cond. (µS/cm)	Turbidity (NTUs)	PWL (ft TOC)
9/30/17 1002		62	6.28	-0.8	9.33	8.62	504	overrange	90.61
1006		67	5.46	-14.9	9.44	8.21	505	overrange	95.55
1010 well dewatered to pump. 70 gallons removed									
1211 cont. developing		71.5			9.22		484	overrange	72.1
1215		76	11.25	-2.3	9.56	8.36	496	overrange	88.55
1224		81	7.30	-7.7	9.62	8.00	495	overrange	92.57
1230		86	6.18	-16.8	9.60	7.80	485	642	93.20
1237		91	5.90	-19.6	9.61	7.66	465	1298	94.28
1244		96	5.71	-21.5	9.44	7.57	478	1373	97.55
1251		101	5.52	-21.9	9.45	7.53	454	overrange	99.39
1257 well dewatered to pump 101 gallons removed									
1345 WL = 66.3' TOC									
1348 Resume pumping @ ~ 1.5 gpm									
1350		104	9.1	8.8	9.2	7.97	460	948	
1355		110	7.0	9.9	9.3	7.62	450	3064	99.1
1359		113	pump off						
1418 cont. developing		113	5.63	-14.9	9.13	8.01	459	overrange	72.4
1426		118	5.76	-9.8	9.59	7.49	469	overrange	91.4
1430		123	5.50	-13.7	9.55	7.41	463	1464	93.15
1437		128	5.24	-14.3	9.56	7.37	447	1353	96.05
1442		133	5.30	-14.4	9.48	7.35	458	2153	98.25

Development Equipment: GeoSub

Comments: 1013 D.T.W: 90.0' TOC 1019 D.T.W 80.0' TOC 1032 D.T.W 70.0' TOC
1210 D.T.W: 65.74
1303 D.T.W. 90.0' TOC 1308 D.T.W. 80.0' TOC 1322 D.T.W 70.0' TOC

Signature(s):

WELL DEVELOPMENT LOG

Project Name: Atlas Site 4 RI Addendum
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Development Date 9/30/17

Project No.: E15-019-201
Field Crew: SNH, JM, RW
Weather: Sunny, 55°f, breezy

Analytical Instruments: pH: YSI 556
Temp:
D.O.:

Specific Conductivity: YSI 556
ORP:
Turbidity: LaMotte 2020we

Well ID: FEW4-MW81-Shallow
Type of Well: Nested Monitoring

Casing Stickup:
Static Water Level:
Well Depth/Diameter:

CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ___ gal/ft = 1 casing volume (gals)

Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV)	Temp (°C)	pH	Sp. Cond. (µS/cm)	Turbidity (NTUs)	PWL (ft TOC)
1447		138	5.86	-14.8	9.45	7.37	433	overrange	101.28
1452		143	4.70	-48.5	9.45	7.29	462	overrange	103.7
1454	well downtreed to pump, 145 gallons removed								
10/1/17 0825	cont. developing	1435	5.93	191.0	9.06	8.31	483	overrange	~~75.3~~ 75.31
0830		146	5.95	191.2	9.11	8.18	478	41.26	81.15
0832		148	5.92	185.4	9.23	7.97	467	32.87	86.45
0837		153	5.89	183.2	9.35	7.81	475	33.56	89.83
0846		158	5.80	178.4	9.32	7.73	463	30.46	95.0
0847	turn off pump								

Development Equipment: GeoSub

Comments: 10/1/17 0810 D.T.W 65.63' TOC (2")

Signature(s):

WELL DEVELOPMENT LOG

Project Name: Atlas Site 4 RI Addendum
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Development Date 9/28/17

Project No.: E15-019-201
Field Crew: TM / KATT - YELLOW JACKET
Weather: CLOUDY, RAIN, WIND, 42°

Analytical Instruments: pH: 451 556 MPS
Temp: "
D.O: "

Specific Conductivity: 451 556 MPS
ORP: "
Turbidity: HACH 2100 Q

Well ID: MW81 SHALLOW
Casing Stickup: 31"
Static Water Level: 65.79 TOC (PVC)
Well Depth/Diameter: 106.66 / 2"
TOC/PVC

Type of Well: MONITORING

CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)

Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV)	Temp (°C)	pH	Sp. Cond. (µS/cm)	Turbidity (NTUs)	PWL (ft TOC)
0826		3	10.74	159.4	8.19	7.88	0.740	>1000	
0831		6.5	8.70	129.3	8.17	7.60	0.710	>1000	
0836		10	8.13	119.2	8.30	7.47	0.720	>1000	
0840		13.5	7.51	112.0	8.31	7.40	0.745	>1000	
0844		17	7.42	109.3	8.16	7.35	0.778	>1000	
0847		20	7.77	104.3	8.23	7.32	0.795	>1000	
0853		23	6.87	98.4	8.13	7.31	0.807	>1000	
1008		26.5	6.41	93.9	8.60	7.72	0.773	>1000	
1012		30	5.53	85.7	8.55	7.71	0.777	>1000	
1016		33.5	6.24	81.8	8.38	7.71	0.756	>1000	
1020		37	6.07	79.7	8.44	7.69	0.734	>1000	
1024		40.5	6.46	76.2	8.48	7.67	0.705	>1000	
1028		43.5	6.84	74.4	8.26	7.68	0.691	>1000	
1032		47	6.27	73.3	8.28	7.67	0.673	>1000	
1037		50.5	6.09	73.4	8.22	7.65	0.675	>1000	

Development Equipment: BAILER / DEV. RIG

Comments: INITIAL H_2O FOAMY, SILTY, DK BROWN-GRAY. AFTER 23 GALLONS - SURGE BLOCK FOR 30 MINUTES. FINAL H_2O STILL SLIGHTLY FOAMY, BROWN/GRAY

Signature(s): Del Mgl

WELL DEVELOPMENT LOG

Project Name: Atlas Site 4 RI Addendum
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Development Date 9/28/17

Project No.: E15-019-201
Field Crew: TM / KAIT - YELLOW JACKET
Weather: CLOUDY, RAIN, FOG, 45°

Analytical Instruments: pH: YSI 556 MPS
Temp: "
D.O: "

Specific Conductivity: YSI 556 MPS
ORP:
Turbidity: HACH 2100Q

Well ID: MW 81 MIDDLE
Casing Stickup: 31"
Static Water Level: 64.0 TOC (PVC)
Well Depth/Diameter: 212.45 TOC (PVC) / 2"

Type of Well: MONITORING

CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)

Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV)	Temp (°C)	pH	Sp. Cond. (µS/cm)	Turbidity (NTUs)	PWL (ft TOC)
1116		3	6.61	134.1	7.77	7.80	0.482	>1000	
1121		6.5	7.14	109.1	7.92	7.68	0.423	>1000	
1126		10	7.41	105.5	7.79	7.65	0.409	>1000	
1130		13.5	8.46	101.3	7.94	7.65	0.395	>1000	
1134		17	8.54	102.5	8.04	7.63	0.392	>1000	
1353		20.5	8.15	125.1	8.24	7.96	0.415	>1000	
1358		24.5	8.25	118.2	8.31	7.83	0.403	>1000	
1402		27.5	9.13	115.9	8.42	7.73	0.391	>1000	
1405		30.5	9.26	115.7	8.36	7.71	0.387	>1000	
1410		33.5	9.65	118.5	8.27	7.69	0.381	>1000	
1413		36.5	9.46	121.5	8.38	7.59	0.383	>1000	
1417		40.5	9.55	123.4	8.45	7.61	0.388	>1000	
1422		44.5	9.45	122.1	8.39	7.68	0.384	>1000	
1426		47.5	9.84	122.4	8.30	7.65	0.384	>1000	
1430		50.5	9.96	122.9	8.33	7.65	0.389	>1000	

Development Equipment: BAILER / DEV. RIG

Comments: INTIAL PURGE H2O FOAMY, SILTY, BROWN-GRAY, DRILL MUD PRESENT AFTER 17 GALLONS - SURGE BLOCK FOR 30 MINUTES, DRILL MUD GONE, STILL VERY SILTY, ADDED EXTENSION TO BAILER, FINAL H2O LIGHTER IN COLOR (LT. BROWN) YET STILL V. SILTY

Signature(s):

WELL DEVELOPMENT LOG

Project Name: Atlas Site 4 RI Addendum
Project No.: E15-019-201
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Field Crew: RW, JNH
Development Date 9/29/17
Weather: Cloudy, 45°F, breezy

Analytical Instruments: pH: YSI 556
Specific Conductivity: YSI 556
Temp: ↓
ORP: ↓
D.O: ↓
Turbidity: LaMotte 2020 we

Well ID: FEW4-MW81-Middle
Type of Well: Nested Monitoring
Casing Stickup: 31"
CASING VOLUME CALCULATION
Static Water Level: 63.85'
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
Well Depth/Diameter: Pre-development: 212.55' (2")
Post-development: 212.56'

Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV)	Temp (°C)	pH	Sp. Cond. (µS/cm)	Turbidity (NTUs)	PWL (ft TOC)
1639	by m developing	0.1	9.21	-33.1	9.64	8.20	420	626	~~70.07~~
1645		4	5.60	-24.8	9.33	8.01	388	overrange	72.90
1650		10	6.62	-15.5	9.33	7.89	369	1087	83.2
1655		15	8.11	-8.4	9.30	7.91	356	135	85.39
1700		20	8.15	-1.5	9.29	7.75	356	49.25	86.10
1703		25	8.32	1.7	9.29	7.73	355	35.39	86.52
1707		30	8.35	9.5	9.29	7.73	354	2507	86.71
1711		35	8.41	9.7	9.29	7.72	354	17.33	86.85
1715		40	8.39	9.9	9.31	7.72	353	12.15	86.90
1716	pump turned off								

Development Equipment: Redi-flo 2

Comments:

Signature(s):

WELL DEVELOPMENT LOG

Project Name: Atlas Site 4 RI Addendum
Project No.: E15-019-201
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Field Crew: TM / KAAT - YELLOW JACKET
Development Date 9/29/17
Weather: CLOUDY, BREEZY, 45°

Analytical Instruments: pH: YSI 556 MPS
Specific Conductivity: YSI 556 MPS
Temp: "
ORP:
D.O: "
Turbidity: HACH 2100 Q

Well ID: MW81 DEEP
Type of Well: MONITORING
Casing Stickup: 31"
CASING VOLUME CALCULATION
Static Water Level: 56.31 TOC (PVC)
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
Well Depth/Diameter: 287.50 TOC (PVC) / 2"

Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV)	Temp (°C)	pH	Sp. Cond. (µS/cm)	Turbidity (NTUs)	PWL (ft TOC)
0850		3.5	7.40	172.6	7.94	7.98	0.532	>1000	
0854		6.5	7.49	169.5	8.07	7.71	0.496	>1000	
0858		9.5	7.41	168.8	8.10	7.66	0.484	>1000	
0901		12.5	7.89	167.4	8.29	7.64	0.441	>1000	
0905		15.5	7.50	167.4	8.21	7.65	0.474	>1000	
0909		18.5	7.48	166.0	8.15	7.68	0.469	>1000	
1026		21.5	7.91	153.2	8.09	8.22	0.465	>1000	
1031		24.5	7.67	155.7	8.24	7.95	0.463	>1000	
1036		27.5	7.78	155.7	8.26	7.90	0.455	>1000	
1041		30.5	7.72	154.7	8.25	7.90	0.451	>1000	
1045		33.5	7.79	156.3	8.30	7.85	0.444	>1000	
1058		36.5	8.15	166.1	8.24	7.87	0.433	>1000	
1102		39.5	8.28	164.8	8.24	7.88	0.426	>1000	
1107		42.5	8.18	165.9	8.34	7.84	0.426	>1000	
1112		45.5	8.15	166.2	8.31	7.83	0.422	>1000	
1116		48.5	8.46	166.6	8.34	7.82	0.421	>1000	
1120		51.5	8.70	167.1	8.39	7.82	0.417	>1000	

Development Equipment: BAILER / DED. RIG

Comments: INITIAL H_2O BROWN, V SILTY, DRILL MUD PRESENT. AFTER 18.5 GALLONS - SURGE BLOCK FOR 30 MINUTES AFTER SURGING INCREASE IN SILT IN H_2O. FINAL PURGE H_2O LT BROWN, STILL SILTY.

Signature(s):

WELL DEVELOPMENT LOG

Project Name: Atlas Site 4 RI Addendum
Project No.: E15-019-201
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Field Crew: JW, Tm
Development Date 10/3/17
Weather: Partly Cloudy, 39°F. breezy

Analytical Instruments: pH: YSI 556
Specific Conductivity: YSI 556
Temp:
ORP:
D.O:
Turbidity: LaMotte 2020wc

Well ID: FEW4-MW81-Deep
Type of Well: Nested Monitoring
Casing Stickup: 31"
CASING VOLUME CALCULATION
Static Water Level: 57.63' TOC (PVC, 2")
(TD(ft) – DTW(ft)) x ___ gal/ft = 1 casing volume (gals)
Well Depth/Diameter: pre development: 286.05 TOC / 2"

Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV)	Temp (°C)	pH	Sp. Cond. (µS/cm)	Turbidity (NTUs)	PWL (ft TOC)
1430 Begin developing		0.5	9.46	173.2	8.42	8.81	420	overrange	58.45
1440		10	5.04	175.2	8.40	8.35	419	overrange	58.90
1447		~~15~~ 20	5.22	162.2	8.38	8.38	378	2588	59.34
1457		30	5.41	157.7	8.75	8.29	368	1282	59.70
1507		40	5.83	155.9	8.74	8.18	364	1121	59.82
1516		50	6.03	166.9	8.87	8.11	361	782	60.11
1525		60	6.42	162.2	8.64	8.11	360	694	60.10
1534		70	6.38	156.0	8.78	8.10	360	48.9	60.04
1543		80	6.40	153.7	8.76	8.11	360	321	63.70
1552		90	6.36	151.2	8.79	8.06	357	21.7	63.76
1553 pump off									

Development Equipment: Redi-Flo 2

Comments:

Signature(s):

WELL DEVELOPMENT LOG

Project Name: Atlas Site 4 RI Addendum
Project No.: E15-019-201
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Field Crew: JNH
Development Date 10/1/17
Weather: cloudy, 50°f, breezy

Analytical Instruments: pH: YSI 556
Specific Conductivity: YSI 556
Temp:
ORP:
D.O:
Turbidity: LaMotte 2020we

Well ID: FEW4-mw82-Shallow
Type of Well: Nested Monitoring
Casing Stickup:
CASING VOLUME CALCULATION
Static Water Level: 66.49' TOC (PVC, 2")
(TD(ft) – DTW(ft)) x ___ gal/ft = 1 casing volume (gals)
Well Depth/Diameter: predevelopment: 88.83' TOC (PVC)
post development: 88.85' TOC

Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV)	Temp (°C)	pH	Sp. Cond. (µS/cm)	Turbidity (NTUs)	PWL (ft TOC)
1440 begin developing		0.5	6.66	-84.8	8.21	7.80	420	average	67.62
1448		5	2.32	-80.0	8.64	7.79	390	1668	69.27
1452		10	3.26	-76.7	8.63	7.82	379	832	69.28
1458		15	5.01	-56.2	8.70	7.84	369	790	69.28
1502		20	5.28	-50.4	8.69	7.86	368	39.69	69.28
1506		25	5.54	-48.4	8.65	7.86	365	15.77	69.24
1510		30	5.75	-46.9	8.66	7.90	362	7.15	69.24
1511	pump off								

Development Equipment: SS Geo Sub

Comments:

Signature(s):

WELL DEVELOPMENT LOG

Project Name: Atlas Site 4 RI Addendum
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Development Date 9/30/17

Project No.: E15-019-201
Field Crew: JH/
Weather: mostly sunny, breezy, ~

Analytical Instruments: pH: YSI - 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556 "
ORP:
Turbidity: HACH 2100Q

Well ID: MW82 - shallow
Casing Stickup:
Static Water Level: 54.90' TOC
Well Depth/Diameter: 88.41' TOC / 2"

Type of Well: monitoring

CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)

Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV)	Temp (°C)	pH	Sp. Cond. (µS/cm)	Turbidity (NTUs)	~~PWL~~ (ft TOC) -NA-
0854		3	7.12	128.1	9.16	8.14	0.786	>1000	
0900		6	8.10	131.2	8.74	7.83	0.728	>1000	
0906		9	7.41	127.6	8.55	7.76	0.680	>1000	
0913		12.5	8.04	121.7	8.56	7.69	0.623	>1000	
1005		15.5	5.88	104.2	9.34	8.04	0.609	>1000	
1015		19	6.33	102.1	9.06	7.84	0.582	>1000	
1024		22	5.49	94.2	8.87	7.85	0.524	>1000	
1033		25	7.64	88.4	8.86	7.77	0.482	>1000	
1045		28	7.21	81.4	8.91	7.81	0.445	>1000	
1100		32	8.04	85.0	8.93	7.89	0.423	>1000	
1127		35	9.43	73.1	9.15	8.38	0.410	>1000	
1134		38.5	8.32	88.1	8.97	7.85	0.397	>1000	
1141		41.5	8.19	90.1	8.99	7.70	0.383	>1000	

Development Equipment: 1 1/8" - ID x 10' SS Bailer / Dev Rig

Comments: Initial H2O bailed Appears silty & DK. Brown; slightly foamy. After 12.5 gal bailed, surge well for 32 minutes. Decrease in silt observed ~~in H2O~~ w/ 41.5 gal bailed; water is tan

Signature(s): JH

WELL DEVELOPMENT LOG

Project Name: Atlas Site 4 RI Addendum
Project No.: E15-019-201
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Field Crew: JH / Katt w / Yellow Jacket
Development Date 9/29/17
Weather: lt. rain, cloudy ~ 48°F

Analytical Instruments: pH: YSI 556
Specific Conductivity: YSI 556 "
Temp:
ORP:
D.O:
Turbidity: HACH 2100Q

Well ID: MW82 - Middle
Type of Well: monitoring
Casing Stickup:
CASING VOLUME CALCULATION
Static Water Level: 66.52' TOC
(TD(ft) – DTW(ft)) x ___ gal/ft = 1 casing volume (gals)
Well Depth/Diameter: 137.40' TOC

-NA-

Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV)	Temp (°C)	pH	Sp. Cond. (µS/cm)	Turbidity (NTUs)	~~PWL~~ (ft TOC)
1647		3.5	5.18	110.4	8.37	7.93	0.568	>1000	
1650		7.5	6.85	95.1	8.46	7.93	0.558	>1000	
1654		11	5.90	83.2	8.47	7.93	0538	>1000	
1657		15	6.54	78.0	8.44	7.92	0.526	>1000	
1701		18.5	7.47	79.2	8.35	7.92	0.577	>1000	
1705		22.5	6.47	70.0	8.58	7.85	0.496	>1000	
1755		26	5.89	33.8	8.71	7.89	0.456	>1000	
1800		29.5	6.83	36.3	8.42	7.85	0.454	>1000	
1804		33.5	5.72	29.6	8.63	7.78	0.474	>1000	
1807		37	7.48	32.7	8.53	7.79	0.526	>1000	
1815		41	6.46	21.0	8.42	7.70	0.739	>1000	
1819		44.5	6.97	13.7	8.41	7.69	0.868	>1000	
1823		48	7.21	5.8	8.41	7.71	0.869	>1000	
1825		50.5	7.79	8.2	8.40	7.73	0.833	>1000	

Development Equipment: Stainless Steel Bailer / Rev. Rig

Comments: Initial few gallons bailed - grayish-Brown, v. silty, & foamy
AFTER 22.5 gal, surge well for 25 minutes AND then continue bailing.
Water is still silty & Brown w/ 50.5 gal bailed;

Signature(s): JH

WELL DEVELOPMENT LOG

Project Name: Atlas Site 4 RI Addendum
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Development Date 10/1/17

Project No.: E15-019-201
Field Crew: JNH
Weather: Raining, 50°f, breezy

Analytical Instruments: pH: YSI 556
Temp:
D.O:

Specific Conductivity: YSI 556
ORP:
Turbidity: LaMotte 2020 we

Well ID: FEW4-MW82 - middle
Type of Well: Nested Monitoring

Casing Stickup:
Static Water Level: 67.07' TOC (PVC, 2")
Well Depth/Diameter: predevelopment: 137.42' TOC (2", PVC)
post development:

CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)

Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV)	Temp (°C)	pH	Sp. Cond. (µS/cm)	Turbidity (NTUs)	PWL (ft TOC)
1234	begin developing	0.5	1.36	-79.3	8.67	7.44	954	overrange	77.95
1241		5	1.20	-155.3	9.28	7.54	837	overrange	88.95
1244		10	2.47	#6/46.0	9.69	7.68	644	overrange	91.45
1253		15	2.50	-161.2	9.44	7.72	777	1696	102.35
1300		20	3.09	-161.5	9.65	7.78	737	2452	106.28
1305		25	3.62	-157.6	9.67	7.84	638	2190	106.69
1312		30	3.60	-160.4	9.65	7.83	563	2392	114.18
1317		35	3.95	-156.4	9.70	7.88	555	3503	115.75
1323		40	4.11	-154.7	9.72	7.89	531	3611	116.15
1328		45	4.27	-153.3	9.68	7.89	532	overrange	116.49
1333		50	4.51	-150.7	9.74	7.90	504	2634	116.72
1340		55	4.72	-146.6	9.80	7.91	497	2837	116.48
1346		60	4.74	-146.3	9.84	7.90	489	1823	116.03
1350		65	4.36	-144.8	9.78	7.86	530	760	125.78
1357		70	5.21	-137.1	9.86	7.90	442	1883	127.55
1409		75	5.25	-133.1	9.68	9.67	454	2164	126.35
1409		80	5.50	-125.0	9.82	7.88	435	2057	120.0
1419		85	5.78	-117.2	9.75	7.87	427	1596	119.72
1424	Pump off	90 gallons removed							
10/2/17 0747	cont. developing	90.5	12.12	-4.5	8.50	8.77	383	overrange	75.85

Development Equipment: Redi Flo 2

Comments: 10/1/17 1515 D.T.W: 66.47 10/2/17 0735 D.T.W: 66.30

Signature(s):

WELL DEVELOPMENT LOG

Project Name: Atlas Site 4 RI Addendum
Project No.: E15-019-201
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Field Crew: JNH
Development Date 10/2/17
Weather: Snowing, 32°F, breezy

Analytical Instruments: pH: YSI 556
Specific Conductivity: YSI 556
Temp:
ORP:
D.O:
Turbidity: LaMotte 2020we

Well ID: FEW4-mw02 - middle
Type of Well: Nested Monitoring
Casing Stickup:
CASING VOLUME CALCULATION
Static Water Level:
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
Well Depth/Diameter:

Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV)	Temp (°C)	pH	Sp. Cond. (µS/cm)	Turbidity (NTUs)	PWL (ft TOC)
0755		95	8.47	-24.0	9.09	8.39	400	1200	89.75
0801		100	8.05	-24.2	9.12	8.12	401	1009	91.95
0806		105	5.49	64.2	9.41	9.44	399	1030	92.0
0815		110	4.95	21.3	9.52	8.94	392	49.9	95.5
0821		115	4.85	20.9	9.54	8.91	391	15.2	104.3
0826		120	4.82	20.7	9.55	8.90	390	7.2	104.4
0827	pump off								

Development Equipment: Red-Flo 2

Comments:

Signature(s):

WELL DEVELOPMENT LOG

Project Name: Atlas Site 4 RI Addendum
Project No.: E15-019-201
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Field Crew: JH / Katt - Yellow Jacket
Development Date: 9/29/17
Weather: H. RAIN, cloudy ~50F

Analytical Instruments: pH: YSI 556 MPS
Specific Conductivity: YSI 556
Temp:
ORP:
D.O:
Turbidity: HACH 2100Q

Well ID: MW82 - Deep
Type of Well: Monitoring
Casing Stickup:
CASING VOLUME CALCULATION
Static Water Level: 66.78' TOC
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
Well Depth/Diameter: 166.45' TOC / 2"

Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV)	Temp (°C)	pH	Sp. Cond. (µS/cm)	Turbidity (NTUs)	~~PWL~~ -NA- (ft TOC)
1357		3	7.87	175.9	8.53	8.66	0.604	>1000	
1411		6	6.03	156.7	8.42	8.19	0.585	>1000	
1415		9.5	6.51	154.2	8.39	8.10	0.556	>1000	
1420		13.5	6.90	152.2	8.50	8.05	0.517	>1000	
1425		17	6.54	149.0	8.52	7.94	0.503	>1000	
1427		19.5	7.07	149.1	8.52	7.79	0.480	>1000	
1534		22.5	6.12	132.4	8.74	7.87	0.468	>1000	
1540		26	6.13	132.5	8.68	7.81	0.460	>1000	
1545		30	5.67	130.5	8.68	7.81	0.462	>1000	
1549		33.5	7.17	130.5	8.65	7.78	0.442	>1000	
1553		37.5	6.71	128.3	8.66	7.76	0.444	>1000	
1614		41	7.09	121.9	8.67	7.76	0.433	>1000	
1618		45	7.10	121.1	8.59	7.74	0.443	>1000	
1622		48.5	7.19	119.6	8.56	7.74	0.438	>1000	
1624		50.5	7.59	118.0	8.51	7.73	0.439	>1000	

Development Equipment: SS BAILER / Development Rig

Comments: INITIAL water bailed is BROWN / SILTY
After 19.5 gallons, surge block well for 34 minutes; increase in SILT IN H_2O FOLLOWING surging
FINAL BAILER of H_2O is RED-BROWN, SILTY w/ 50.5 gal total bailed

Signature(s):

WELL DEVELOPMENT LOG

Project Name: Atlas Site 4 RI Addendum
Project No.: E15-019-201
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Field Crew: JAH
Development Date 10/1/17
Weather: cloudy, 50°F, breezy

Analytical Instruments: pH: YSI 556
Specific Conductivity: YSI 556
Temp:
ORP:
D.O:
Turbidity: LaMotte 2020 we

Well ID: FEW4-mw82 - Deep
Type of Well: Nested monitoring
Casing Stickup:
CASING VOLUME CALCULATION
Static Water Level: 66.60' TOC (2", PVC)
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
Well Depth/Diameter: predevelopment: 166.48' TOC (2")
post development: 166.55' TOC

Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV)	Temp (°C)	pH	Sp. Cond. (µS/cm)	Turbidity (NTUs)	PWL (ft TOC)
1045 begin developing		0.5	4.89	142.0	8.49	8.03	582	overrange	73.85
1052		5	2.25	69.0	8.76	7.82	554	overrange	80.72
1058		10	2.38	8.0	8.77	7.78	501	overrange	84.46
1104		15	3.06	-14.4	8.85	7.69	454	overrange	84.47
1110		20	4.29	-24.7	8.93	7.67	432	420	86.05
1117		25	4.33	-38.2	8.90	7.62	410	150	86.51
1122		30	4.52	-43.6	8.79	7.63	401	47	87.23
1128		35	4.62	-42.9	8.78	7.61	393	55.94	87.49
1134		40	4.93	-38.8	8.79	8.79	385	49.20	87.62
1140		45	5.10	-33.0	8.77	7.64	383	48.3	88.11
1146		50	5.14	-27.5	8.77	7.63	380	49.98	88.75
1151		55	5.26	-27.3	8.77	7.63	375	48.36	89.21
1156		60	5.32	-27.1	8.77	7.62	370	45.42	89.25
1157	turn pump off								

Development Equipment: SS Geo Sub

Comments: 10/1/17 1015 D.T.W: 66.60' TOC

Signature(s):

WELL DEVELOPMENT LOG

Project Name: Atlas Site 4 RI Addendum
Project No.: E15-019-201
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Field Crew: RW / Icott w/ yellow Tacoma
Development Date 10/8/17
Weather: Sunny, ~43°F

Analytical Instruments: pH: YSI 556
Specific Conductivity: YSI 556
Temp: ↓
ORP:
D.O: ↓
Turbidity: Hach 2100 Q

Well ID: MW 83 shallow
Type of Well: Monitoring
Casing Stickup:
CASING VOLUME CALCULATION
Static Water Level: 79.24' T.O.C
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
Well Depth/Diameter: 94.90' T.O.C. / 2"

Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV)	Temp (°C)	pH	Sp. Cond. (µS/cm)	Turbidity (NTUs)	PWL (ft TOC)
10/8/17 0959		3.5	3.94	87.5	8.32	8.02	0.436	>1000	
1006		5.5	5.63	95.3	8.16	7.88	0.332	>1000	
well dewatered									
1133		8.5	2.77	17.7	8.53	7.79	0.423	>1000	

Development Equipment: SS Bailer / Dev Rig

Comments: Well bailed using 10 ft 1 1/8" bailer. Applied surge block for 10 min. (1054-1104)

Signature(s):

WELL DEVELOPMENT LOG

Project Name: Atlas Site 4 RI Addendum
Project No.: E15-019-201
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Field Crew: JMH
Development Date: 10/8/17
Weather: sunny, 55°f, breezy

Analytical Instruments: pH: YSI 556
Specific Conductivity: YSI 556
Temp:
ORP:
D.O:
Turbidity: LaMotte 2020 we

Well ID: FEW4-mw83 - Shallow
Type of Well: Nested Monitoring
Casing Stickup:
CASING VOLUME CALCULATION
Static Water Level: 76.74' TOC PVC
(TD(ft) – DTW(ft)) x 0.17 gal/ft = 1 casing volume (gals)
Well Depth/Diameter: predevelopment: 96.32' TOC PVC /2"

Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV)	Temp (°C)	pH	Sp. Cond. (µS/cm)	Turbidity (NTUs)	PWL (ft TOC)
1640 begin developing		0.5	3.79	-52.8	8.97	7.69	440	overrange	85.75
1645	pump off, well dewatered, 4 gals removed								
1805 pump on		4.5	1.83	-54.0	8.29	7.87	442	overrange	79.95
1809		7	1.84	-65.7	8.52	7.88	444	overrange	
1811 pump off. 9 gallons removed									
10/9/17 1407 pump on		0.5	11.70	158.7	7.80	7.95	429	overrange	
1410		2.5	7.82	113.6	8.25 7.92	7.92	424	overrange	85.65
1412									87.08
1414		5.0	8.87	85.5	9.14	8.13	418	overrange	89.35
1416	pump off, well dewatered 17 gallons removed								
1705		1.0	8.92	131.4	7.56	9.28	424	overrange	86.25
1707		2.5	7.42	132.2	7.96	9.16	418	overrange	86.82
1710		3.5	7.32	142.5	7.95	8.70	413	overrange	88.70
1713	pump off well dewatered 23 gallons removed								
10/10/17 0919 pump on		23.5		1253	7.87	7.71	421	overrange	
0921		24		122.2	7.81	7.73	420	49.95	
0923		25		120.1	7.91	8.60	410	48.85	
0925		26		121.3	7.97	8.61	408	37.35	
0927		27		123.5	8.26	8.59	402	49.12	
0928 pump off									

Development Equipment: Redi-Flo 2

Comments: 1650 D.T.W 85.0' TOC 1654 D.T.W 84.0' TOC
1658 D.T.W 83.0' TOC 1704 D.T.W 82.0' TOC 1711 D.T.W 81.0' TOC
1722 D.T.W 80.0' TOC 1736 D.T.W 79.0' TOC 1804 D.T.W 78.0' TOC
10/9/17 1410 D.T.W: 76.95' TOC 1630 D.T.W: 79.87' 1647 D.T.W 79.72' TOC
10/10/17 D.T.W 76.86' TOC @ 0915

Signature(s):

WELL DEVELOPMENT LOG

Project Name: Atlas Site 4 RI Addendum
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Development Date 10/5/17

Project No.: E15-019-201
Field Crew: RW / both w/ yellow jacket
Weather: sunny, ~ 45° F

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O:

Specific Conductivity: YSI 556 ↓
ORP:
Turbidity: Hach 2100 Q

Well ID: MW 83=middle
Casing Stickup:
Static Water Level: 90.30' T.O.C
Well Depth/Diameter: 132.38' T.O.C. / 2"

Type of Well: monitoring

CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)

Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV)	Temp (°C)	pH	Sp. Cond. (µS/cm)	Turbidity (NTUs)	PWL (ft TOC)
1031		3.0	4.70	-8.8	8.43	7.95	0.620	>1000	
1043		6.0	4.36	30.7	8.42	7.86	0.531	>1000	

Development Equipment: SS Bailer / Dev Pig

Comments: Initial bailer water is very muddy. Bailed using 5 ft 1 1/8" bailer, unable to surge block - tool gets stuck @ approx 15' below T.O.C

Signature(s): RW

WELL DEVELOPMENT LOG

Project Name: Atlas Site 4 RI Addendum
Project No.: E15-019-201
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Field Crew: JNH
Development Date 10/8/17
Weather: Sunny, 55°f, breezy

Analytical Instruments: pH: YSI 556
Temp:
D.O:
Specific Conductivity: YSI 556
ORP:
Turbidity: Lamotte 2020we

Well ID: FEW4-mw 03 - Middle
Type of Well: Nested Monitoring
Casing Stickup:
CASING VOLUME CALCULATION
Static Water Level: 90.10' TOC PVC
(TD(ft) – DTW(ft)) x 0.17 gal/ft = 1 casing volume (gals)
Well Depth/Diameter: pre development = 132.44 TOC / 2"

Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV)	Temp (°C)	pH	Sp. Cond. (µS/cm)	Turbidity (NTUs)	PWL (ft TOC)
1541 begin developing		0.5	3.36	-59.0	9.02	7.31	592	overrange	99.65
1545		5	1.89	-94.6	9.28	7.44	593	overrange	111.75
1552		10	2.41	-105.3	10.16	7.71	533	3342	113.48
1558		15	3.23	-98.2	10.27	7.71	483	1433	113.45
1605		20	2.85	-94.0	9.99	7.63	514	316.2	119.85
1609		25	2.85	-92.7	9.98	7.67	516	771	120.32
1615		30	2.86	-91.8	10.01	7.59	485	48.41	119.95
1620		35	2.87	-90.5	10.09	7.64	471	28.25	120.18
1627		40	2.85	-89.2	10.14	7.68	467	19.20	120.05
1629 pump off									

Development Equipment: Redi-Flo 2

Comments:

Signature(s):

WELL DEVELOPMENT LOG

Project Name: Atlas Site 4 RI Addendum
Project No.: E15-019-201
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Field Crew: JNH
Development Date 10/8/17
Weather: sunny, 55°F, breezy

Analytical Instruments: pH: YSI 556
Specific Conductivity: YSI 556
Temp:
ORP:
D.O:
Turbidity: Lamotte 2020 we

Well ID: FEW4-mw903 - Deep
Type of Well: Nested monitoring
Casing Stickup:
CASING VOLUME CALCULATION
Static Water Level: 53.08' TOC PVC
(TD(ft) – DTW(ft)) x 0.17 gal/ft = 1 casing volume (gals)
Well Depth/Diameter: predevelopment: 272.48' TOC / 2"
37 gals

Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV)	Temp (°C)	pH	Sp. Cond. (µS/cm)	Turbidity (NTUs)	PWL (ft TOC)
1441	begin developing	0.5	12.02	64.2	9.04	8.30	426	average	55.25
1448		10	6.60	25.6	9.44	7.87	395	average	57.17
1456		20	6.81	15.7	9.51	7.62	390	123.4	58.75
1504		30	6.98	6.5	9.58	7.62	400	605	59.79
1511		40	6.92	6.7	9.53	7.67	393	125.3	60.60
1517		50	6.89	6.2	9.57	7.67	393	49.85	61.02
1523		60	6.76	6.5	9.57	7.68	393	35.63	61.42
1529		70	6.70	6.0	9.54	7.71	386	27.80	61.82
1535		80	6.64	6.3	9.57	7.64	388	35.95	62.15
1536	pump off								

Development Equipment: Redi-Flo 2

Comments:

Signature(s):

WELL DEVELOPMENT LOG

Project Name: Atlas Site 4 RI Addendum
Project No.: E15-019-201
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Field Crew: RW / Katt w/ Yellow Jacket Drilling
Development Date: 10/18/17
Weather: Sunny, 34° F

Analytical Instruments: pH: YSI 556
Specific Conductivity: YSI 556
Temp:
ORP:
D.O:
Turbidity: Hach 2100 Q

Well ID: MW63-D Deep
Type of Well: Monitoring
Casing Stickup:
CASING VOLUME CALCULATION
Static Water Level: 53.12' T.O.C
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
Well Depth/Diameter: 271.63' T.O.C. / 2"

Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV)	Temp (°C)	pH	Sp. Cond. (µS/cm)	Turbidity (NTUs)	PWL (ft TOC)
10/18/17									
0832		3.5	3.49	102.7	8.33	7.46	0.398	>1000	
0845		6.5	4.97	109.7	8.37	7.53	0.352	>1000	
0925		10.0	5.23	146.3	8.63	7.78	0.356	>1000	

Development Equipment: SS Bailer / Dev Rig

Comments: Applied surge block for 10 min. (0855-0905). No silt in well. Well bailed using 10 ft 1.66" bailer

Signature(s):

WELL DEVELOPMENT LOG

Project Name: Atlas Site 4 RI Addendum
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Development Date: 10/6/17

Project No.: E15-019-201
Field Crew: RM / Katt w/ yellow jacket
Weather: Sunny, windy, 52° F

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: Hach 2100 Q

Well ID: MW54- Shallow
Casing Stickup:
Static Water Level: 95.27' T.O.C.
Well Depth/Diameter: 102.00' / 2"

Type of Well: monitoring

CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)

	Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV)	Temp (°C)	pH	Sp. Cond. (µS/cm)	Turbidity (NTUs)	PWL (ft TOC)
10/6/17	1332		2.0	6.59	157.9	9.81	8.60	0.971	>1000	
	1528		3.5	6.36	116.9	9.59	9.12	0.837	>1000	
10/19	1655	- Bailed approx 1/3 gal, only ~2 ft of water in well								
10/20	1750	"	"	"	"	"		"	"	
10/24	1320	"	"	1/2 gal	"	"		"	"	
11/6	1500	- Remove one gal w/ bailer, WL is higher than previously (full bailer)								
11/8	1530	- WL = 93.30' TOC								
BAILING	1550		5.75	5.15	-102.3	9.8	7.6	2.497	>1000 - gray	
	1556		6.0	3.56	-103.9	8.5	7.6	2.596	>1000	"
	1602		7.0	3.00	-99.4	8.4	7.5	2.553	"	"
	1606	- Bailed dry								
11/9	0920		7.25	7.02	200	8.05	8.09	2.427	"	"
BAILING	0925		7.75	7.54	-42.1	7.71	8.07	2.117	"	"
		Bailed dry								
11/17	1530	WL = 99.50 TOC								
	1542		8.00	4.36	70.9	8.36	7.36	2.445	41.5	
	1544		8.25	3.81	77.4	8.50	7.50	2.452	ave range	
	~~1548~~ 1552		8.50	4.52	-110.5	8.25	7.53	2.335	"	
		Bailed dry								

Development Equipment: SS Bailer / DPU Rig

Comments: Initial water from bailer is very silty. Surge black for 15 minutes (1456 - 1512)

Signature(s): RM

WELL DEVELOPMENT LOG

Project Name: Atlas Site 4 RI Addendum
Project No.: E15-019-201
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Field Crew: J.M. - JH
Development Date 11/21/17
Weather: overcast, 35°F, breeze

Analytical Instruments: pH: YSI 556
Specific Conductivity: _____
Temp: _____
ORP: _____
D.O: _____
Turbidity: _____

Well ID: MW84 - SHALLOW
Type of Well: _____
Casing Stickup: _____
CASING VOLUME CALCULATION
Static Water Level: _____
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
Well Depth/Diameter: _____

Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV)	Temp (°C)	pH	Sp. Cond. (µS/cm)	Turbidity (NTUs)	PWL (ft TOC)
11/21 0949	Pump turning on								
0950		9.75	4.5	-34.6	8.5	7.23	2.299	over-	—
1000		9.00	4.5	-36.4	8.3	5.18	2.220	"	—

Development Equipment: _____

Comments: SWL = 99.72 11/21/17 @ 0945

Signature(s): _____

WELL DEVELOPMENT LOG

Project Name: Atlas Site 4 RI Addendum
Project No.: E15-019-201
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Field Crew: RW / Katt w/ yellow jacket
Development Date: 10/6/17
Weather:

Analytical Instruments: pH: YSI 556
Specific Conductivity: YSI 556
Temp: ↓
ORP: ↓
D.O: ↓
Turbidity: Hach 2100 Q
Well ID: MW64- middle
Type of Well: monitoring
Casing Stickup:
CASING VOLUME CALCULATION
Static Water Level: 35.33' TOC
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
Well Depth/Diameter: 262.85' / 2"

Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV)	Temp (°C)	pH	Sp. Cond. (µS/cm)	Turbidity (NTUs)	PWL (ft TOC)
10/6							m		
0926		3.0	6.46	206.3	9.63	7.58	0.611	>1000	
0933		6.0	6.59	174.6	9.58	7.76	0.633	301	
1038		9.0	6.46	174.4	10.00	7.79	0.518	>1000	
1102		12.0	6.99	178.2	9.62	7.74	0.737	>1000	
1110		15.5	7.14	163.5	9.61	8.27	0.616	>1000	
1119		19.0	7.66	160.5	9.55	8.42	0.632	>1000	
1125		22.5	7.59	152.9	9.54	8.41	0.652	>1000	
1222		26.0	7.55	154.9	9.72	8.32	0.596	>1000	
1236		29.5	8.23	156.4	9.66	8.39	0.830	>1000	
1248		33.0	8.47	158.0	9.66	8.43	0.835	>1000	
1312		36.5	9.11	160.9	9.94	8.44	0.855	>1000	
1315		39.5	8.35	161.4	9.53	8.32	0.546	>1000	

Development Equipment: SS Bailer / Dev Rig

Comments: Surge block for 30 minutes (0951 - 1021)

Signature(s): RW

WELL DEVELOPMENT LOG

Project Name: Atlas Site 4 RI Addendum
Project No.: E15-019-201
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Field Crew: JMP
Development Date 10/10/17
Weather: sunny, 37°f, breezy

Analytical Instruments: pH: YSI 556
Specific Conductivity: YSI 556
Temp:
ORP:
D.O:
Turbidity: LaMotte 2020we

Well ID: FEW4-MW84- middle
Type of Well: nested monitoring
Casing Stickup:
CASING VOLUME CALCULATION
Static Water Level: 25.95'
(TD(ft) – DTW(ft)) x ~~0.17 gal/ft = 1 casing volume (gals)~~
Well Depth/Diameter: 262.95'
42gals

Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV)	Temp (°C)	pH	Sp. Cond. (µS/cm)	Turbidity (NTUs)	PWL (ft TOC)
~~10/10/17 0852~~									~~25.95'~~
10/10 [redacted] begin development		0.5	6.90	155.3	8.31	8.00	626	overrange	
1306		10	2.24	78.7	9.29	8.14	855	2534	
1315		20	7.33	12.4	9.81	8.38	777	2433	
1328		30	1.84	-24.7	10.78	8.19	839	overrange	
1339		40	2.36	-40.9	11.68	8.34	930	overrange	
1351		50	2.55	-47.1	12.27	8.37	907	overrange	
1356	pump off, well dewatered. 55 gallons removed								
10/20 1704	Resume pumping								
1705		51	4.5	149.1	9.45	7.7	955	2304	
1709		58	2.99	-13.1	10.2	7.8	806	—	
1714		62	1.93	-41.9	10.5	7.7	797	2420	
1720		67	1.20	-63.4	11.5	7.6	785	1795	
1725		72	1.07	-72.3	11.6	7.6	851	2005	
1730		75	dewatered to pump.						
10/21 1255		76	1.52	127.3	1.32	7.83	934	NOT RANGE	
1259		80	1.71	97.0	9.8	7.83	941	"	
1308		85	0.65	45.7	10.94	7.95	991	"	
1311		90	0.56	27.3	10.72	7.92	1042	"	
1316		95	0.47	-6.7	10.91	7.89	1091	"	

Development Equipment: Redi-Flo2

Comments:

Signature(s):

WELL DEVELOPMENT LOG

Project Name: Atlas Site 4 RI Addendum
Project No.: E15-019-201
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Field Crew: JM, TM
Development Date: 10/21/17
Weather: ☀ Sunny, 45°, windy

Analytical Instruments: pH: _____
Specific Conductivity: _____
Temp: _____
ORP: _____
D.O: _____
Turbidity: _____

Well ID: MW84-MIDDLE
Type of Well: DEEP MONITORING
Casing Stickup: _____
CASING VOLUME CALCULATION
Static Water Level: _____
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
Well Depth/Diameter: _____ 2"

	Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV)	Temp (°C)	pH	Sp. Cond. (µS/cm)	Turbidity (NTUs)	PWL (ft TOC)
10/21	1320		100	0.41	-30.9	11.18	7.94	1123	OUT OF RANGE	
	1326		105	0.34	-54.3	11.96	7.94	1111	"	
	1330		110	0.36	-66.8	13.24	7.99	1146	"	
	1333		115	0.69	-69.5	12.31	7.97	1160	"	
	1335	Pump off 117 - de-watered to pump.								
10/23	1709	Resume pumping								
	1710		118	4.6	214.4	8.9	7.7	744	36.2	
	1715		122	2.9	148.5	9.7	7.7	862	>1000	
	1719		127	2.4	98.1	9.9	7.8	802	–	
	1722		132	2.0	71.5	10.3	7.8	787	>1000	
	1725		137	1.8	48.8	10.4	7.9	769	>1000	
	1728		142	1.6	-32.5	10.7	7.8	783	"	
	1731		147	1.5	17.1	11.0	7.9	815	"	
	1734		152	1.4	-2.0	11.6	7.9	853	"	
	1735	Pump off -								
10/24	Resume pumping at 1217									
	1218		152	7.04	124.2	10.40	11.06	862	25.3	
	1227		157	2.68	127.7	9.88	8.48	733	>1000	
	1232		162	2.26	116.4	10.18	8.42	752	>1000	
	1237		167	1.06	97.4	10.54	8.07	798	>1000	

Development Equipment: _____

Comments: Deep well (artesian) loses head, stops flowing while this well is pumped

Signature(s): _____

WELL DEVELOPMENT LOG

Project Name: Atlas Site 4 RI Addendum
Project No.: E15-019-201
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Field Crew: _____
Development Date _____
Weather: _____

Analytical Instruments: pH: _____
Specific Conductivity: _____
Temp: _____
ORP: _____
D.O: _____
Turbidity: _____

Well ID: MW84-MW22L
Type of Well: _____

Casing Stickup: _____
CASING VOLUME CALCULATION
Static Water Level: _____
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
Well Depth/Diameter: _____

Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV)	Temp (°C)	pH	Sp. Cond. (µS/cm)	Turbidity (NTUs)	PWL (ft TOC)
1244		172	1.17	55.2	11.07	7.87	857	>1000	
1250		177	0.94	18.2	12.17	7.76	889	>1000	
1257		182	0.88	-24.3	12.24	7.74	898	>1000	
1301		187	0.94	-52.4	12.65	7.70	946	>1000	
1305		192	1.04	-65.0	12.76	7.56	955	>1000	
1307		196	Pump OFF						

Development Equipment: _____

Comments: _____

Signature(s): _____

WELL DEVELOPMENT LOG

Project Name: Atlas Site 4 RI Addendum
Project No.: E15-019-201
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Field Crew: DW / Kath w/ yellow jacket
Development Date: 10/5/17 & 10/6/17
Weather: partly cloudy, ~ 51°F

Analytical Instruments: pH: YSI 556
Specific Conductivity: YSI 556
Temp: ↓
ORP: ↓
D.O:
Turbidity: Hach 2100 Q

Well ID: MW84 - Deep
Type of Well: monitoring
Casing Stickup:
CASING VOLUME CALCULATION
Static Water Level: T.O.C
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
Well Depth/Diameter: 302.85' / 2"

Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV)	Temp (°C)	pH	Sp. Cond. (mS/cm)	Turbidity (NTUs)	PWL (ft TOC)
10/5/17									
1702		3.0	7.73	201.6	9.72	7.75	0.367	>1000	
1713		6.5	7.61	172.4	14.69	8.08	0.319	>1000	
10/6/17									
0850		10.0	8.43	242.9	9.56	7.37	0.355	>1000	
		13.2	9.47	239.3	9.57	7.09	0.346	>1000	
10/18 1329	Begin pumping		1529 @		1.5 spm				
1330	~~0.5~~	0.5	5.64	122.6	9.38	8.58	0.393		
1331		2.0	5.22	136.9	9.69	8.23	0.348	>1000	15.2'
1335		8.0	5.62	146.8	10.00	7.83	0.341	>1000	38.3'
1340		15.5	5.45	141.6	10.16	7.76	0.342	>1000	48.9'
1349		29.0	5.73	135.0	10.40	7.64	0.341	>1000	53.75'
1354		36.5	5.75	130.5	10.57	7.67	0.340	>1000	54.89'
1359		44.0	5.80	125.4	10.61	7.68	0.340	669	55.62'
1404		51.5	5.79	121.7	10.64	7.70	0.340	—	56.09'
1409		59.0	5.76	119.5	10.51	7.65	0.340	39.38	56.49'
1414		66.5	5.74	114.5	10.79	7.77	0.340	24.83	56.78'
1419		74.0	5.75	114.1	10.76	7.74	0.340	18.37	57.29'
1424	Pump rate is @ 1.5 spm								~~58.6~~
1425		77.0	5.66	113.6	11.14	7.71	0.340	10.08	~~58.6~~ 58.61'
1430		79.5	5.69	110.2	10.73	7.76	0.340	10.24	58.00'
1435		82.0	5.52	113.4	10.97	7.76	0.340	7.99	57.76'

1435 Development complete

Development Equipment: SS Bailer / DEV Rig (Initial)
Redi-Flo2 submersible

Comments: Surge block for 30 minutes (0753-0823)
1522 water level = 33.05' TOC 1608 24.75' TOC
1532 water level = 30.51' "
1542 water level = 28.79' "

Signature(s):

WELL DEVELOPMENT LOG

Project Name: Atlas Site 4 RI Addendum
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Development Date 10/4/17

Project No.: E15-019-201
Field Crew: RW / KatH w/ Yellow Jacket
Weather: Partly cloudy, 46°F

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: Hach 2100 Q

Well ID: MW85- Shallow
Casing Stickup: _____

Type of Well: monitoring

CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)

Static Water Level: 57.01' T.O.C
Well Depth/Diameter: 97.12' / 2"

Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV)	Temp (°C)	pH	Sp. Cond. (µS/cm)	Turbidity (NTUs)	PWL (ft TOC)
10/4/17 1328		3.5	9.64	176.2	8.98	8.69	0.716	>1000	
1333		6.5	9.75	176.5	8.98	8.67	0.650	>1000	
1333	well dewatered								
1445		10.0	10.86	184.9	9.54	8.39	0.666	>1000	
1449		13.0	11.05	183.1	9.27	8.26	0.618	>1000	
1452		16.0	10.89	188.9	9.17	8.33	0.567	>1000	
~~well dewatered - stop bailing~~									
1457		19.0	11.50	188.7	9.15	8.23	0.529	>1000	

Development Equipment: SS Bailer / Dev Rig

Comments: Surge block well for 20 minutes (MW-1434)

Signature(s): RW

WELL DEVELOPMENT LOG

Project Name: Atlas Site 4 RI Addendum
Project No.: E15-019-201
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Field Crew: JNH
Development Date 10/8/17
Weather: sunny, 37°f, breezy

Analytical Instruments: pH: YSI 556
Specific Conductivity: YSI 556
Temp:
ORP:
D.O:
Turbidity: Lamotte 2020we

Well ID: FTW4-MW85 - Shallow
Type of Well: Nested monitoring
Casing Stickup:
CASING VOLUME CALCULATION
Static Water Level: 87.25' TOC PVC
(TD(ft) – DTW(ft)) x 0.17 gal/ft = 1 casing volume (gals)
Well Depth/Diameter: pre development: 97.15' TOC / 2"
1.7 gals

Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV)	Temp (°C)	pH	Sp. Cond. (µS/cm)	Turbidity (NTUs)	PWL (ft TOC)
0828 begin developing		0.5	9.97	160.2	9.55	8.40	410	overrange	88.35'
0833		5	9.46	156.0	9.76	8.14	409	1020	89.09
0839		10	8.46	160.2	10.22	7.88	401	1242	89.15
0844		16	8.22	146.1	10.18	7.68	394	420	89.16
0850		20	7.92	134.5	10.18	7.63	391	51.70	89.28
0857		25	7.92	128.8	10.11	7.53	389	48.20	89.28
0903		30	7.82	126.3	10.23	7.50	387	25.2	89.28
0904 pump off									

Development Equipment: Redi-Flo 2

Comments:

Signature(s):

WELL DEVELOPMENT LOG

Project Name: Atlas Site 4 RI Addendum
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Development Date 10/4/17

Project No.: E15-019-201
Field Crew: RW / KattW / YellowJacket
Weather:

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O:

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: Hach 2100 Q

Well ID: MW85- Middle
Casing Stickup:
Static Water Level: 85.35' T.O.C
Well Depth/Diameter: 156.93' / 2"

Type of Well: monitoring
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ___ gal/ft = 1 casing volume (gals)

Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV)	Temp (°C)	pH	Sp. Cond. (µS/cm)	Turbidity (NTUs)	PWL (ft TOC)
10/4/17 0948		3.5	9.72	176.5	8.67	8.43	0.518	>1000	
0954		6.5	9.60	169.9	8.93	8.67	0.514	>1000	
0957		9.5	10.08	167.2	8.86	8.72	0.516	>1000	
1000		12.5	10.34	170.1	8.83	8.66	0.520	>1000	
1003		15.5	10.32	171.6	8.79	8.72	0.521	>1000	
1139		18.5	9.54	183.2	9.21	8.17	0.482	>1000	
1142		21.5	9.54	180.4	9.38	8.43	0.485	>1000	
1145		24.5	9.98	178.1	9.37	8.47	0.485	>1000	
1146		27.5	10.16	180.2	9.29	8.45	0.485	>1000	
1152		31.0	10.27	183.3	9.27	8.45	0.488	>1000	
1158		34.5	9.26	186.1	9.32	8.38	0.494	>1000	
1158 well dewatered									
1253		37.5	10.14	191.8	9.37	8.23	0.592	>1000	
1257		40.5	10.53	194.3	9.39	8.25	0.713	>1000	
1301		43.5	10.70	191.6	9.32	8.22	0.720	>1000	
1304		47.0	10.30	193.5	9.35	8.25	0.705	>1000	
1310		50.0	9.35	188.4	9.34	8.24	0.583	>1000	

Development Equipment: SS Bailer / Dev Rig

Comments: Surge block for 30 min. (1037-1107)
water is very foamy

Signature(s): RW

WELL DEVELOPMENT LOG

Project Name: Atlas Site 4 RI Addendum
Project No.: E15-019-201
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Field Crew: JW/H, TM
Development Date 10/5/17
Weather: sunny, 50°f, breezy

Analytical Instruments: pH: YSI 556
Specific Conductivity: YSI 556
Temp:
ORP:
D.O:
Turbidity:

Well ID: FEMW-MW85-middle
Type of Well: Nested monitoring
Casing Stickup:
CASING VOLUME CALCULATION
Static Water Level: 87.10' TOC
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
Well Depth/Diameter: PRE DEVELOPMENT: 156.95' TOC / 2"

Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV)	Temp (°C)	pH	Sp. Cond. (µS/cm)	Turbidity (NTUs)	PWL (ft TOC)
1000 begin developing		0.5	8.38	45.5	~~8~~ 10.32	8.32	650	overrange	95.20
1007		5	8.67	53.9	10.13	8.08	655	1012	111.60
1012		10	9.05	53.2	10.96	8.15	652	915	129.79
1019		15	8.22	49.5	1160	8.28	637	1156	142.16
1022 pump off, well dewatered				17 gals removed					
10/7/17 1820 pump on		17.5	6.81	193.5	10.18	7.75	599	9.73	87.55
1827		23	6.82	189.5	10.52	7.69	601	9.51	115.72
1832		28	6.79	190.3	10.98	7.68	600	9.38	132.7
1838		33	6.78	191.5	11.12	7.67	600	8.25	~~150~~ 143.2
1839 pump off									

Development Equipment: Redi-Flo2

Comments: 1028: D.T.W: 140' TOC 1038 D.T.W 130.0' TOC
10/7/17 ~~D.T.~~ 1817 D.T.W 85.50' TOC

Signature(s):

WELL DEVELOPMENT LOG

Project Name: Atlas Site 4 RI Addendum
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Development Date 10/3/17

Project No.: E15-019-201
Field Crew: RW / Katy w/ yellow Jacket
Weather: partly cloudy, ~ 45°F

Analytical Instruments: pH: YSI-556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI-556 ↓
ORP:
Turbidity: Hach 2100 Q

Well ID: MW85-Deep
Casing Stickup:
Static Water Level: 77.94' T.O.C
Well Depth/Diameter: 214.73' / 2"

Type of Well: monitoring

CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)

	Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV)	Temp (°C)	pH	Sp. Cond. (mS/cm)	Turbidity (NTUs)	PWL (ft TOC)
10/3/17	1534		3.0	6.87	202.2	8.51	8.03	0.474	>1000	
	1542		6.5	7.94	234.2	8.61	8.02	0.391	>1000	
	1704		10.0	9.02	213.9	8.74	8.04	1.043	>1000	
	1713		13.5	8.05	170.6	8.80	8.32	0.870	>1000	
10/4/17	0828		17.0	7.96	179.2	8.57	8.00	0.613	>1000	
	0836		20.5	7.55	134.3	8.62	8.24	0.633	>1000	
	0845		24.0	7.39	102.1	8.61	8.22	0.633	>1000	
	0853		27.5	7.52	100.4	8.65	8.18	0.591	>1000	
	0901		31.0	7.79	104.5	8.63	8.15	0.473	>1000	
	0909		34.5	8.22	113.2	8.67	8.25	0.531	>1000	

Development Equipment: SS Bailer / Dan Rig

Comments: Surge block for 30 minutes (1620-1650)
Water is clear and free of silt after bailing 34.5 gallons

Signature(s): RW

WELL DEVELOPMENT LOG

Project Name: Atlas Site 4 RI Addendum
Project No.: E15-019-201
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Field Crew: JM, JW
Development Date 10/5/17
Weather: sunny, 50°f, breezy

Analytical Instruments: pH: YSI 556
Specific Conductivity: YSI 556
Temp:
ORP:
D.O:
Turbidity: LaMotte 2020 wi2

Well ID: FEWF-MW85-Deep
Type of Well: Nested monitoring
Casing Stickup:
CASING VOLUME CALCULATION
Static Water Level: 78.12' TOC
(TD(ft) – DTW(ft)) x 0.17 gal/ft = 1 casing volume (gals)
Well Depth/Diameter: ~~predevelopment~~: 214.87' TOC
23 gals

Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV)	Temp (°C)	pH	Sp. Cond. (µS/cm)	Turbidity (NTUs)	PWL (ft TOC)
0858 begin development		0.5	7.04	75.3	9.55	7.90	436	overrange	85.31
0903		5	6.90	72.6	9.73	7.90	452	730	102.03
0911		10	6.65	48.6	10.56	8.04	506	3920	128.92
0920		15	3.11	23.3	11.10	8.17	560	overrange	143.22
0928		20	3.07	-3.2	11.87	8.28	559	1200	165.57
0937		25	3.43	-4.6	12.20	8.32	549	1365	181.74
0944		30	3.43	-3.9	13.06	8.31	562	2742	198.73
0945	pump off, well dewatered, 30 gals removed								
10/7/17 1757	pump on	30.5	11.75	218.6	10.81	8.36	551	8.19	83.35
1803		35	11.25	222.2	10.82	8.21	549	11.34	108.15
1809		40	4.19	221.9	10.95	8.20	548	9.35	134.65
1815		45	11.16	216.9	10.86	8.22	552	10.35	155.27
1816 pump off									

Development Equipment: Redi-Flo 2

Comments: 0952 D.T.W: 184.55' TOC 0954 D.T.W 180.0' TOC
1000 D.T.W. 170.0' TOC 1040 D.T.W 117.42 1050 D.T.W 110.0' TOC
10/7/17 D.T.W: 77.92' TOC

Signature(s):

WELL DEVELOPMENT LOG

P. 1 of 2

Project Name: Atlas Site 4 RI Addendum
Project No.: E15-019-201
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Field Crew: RW / Katt w/ yellow jacket
Development Date 10/5/17
Weather: Sunny, ~52°F

Analytical Instruments: pH: YSI 556
Specific Conductivity: YSI 556
Temp: ↓
ORP: ↓
D.O: ↓
Turbidity: Hach 2100Q

Well ID: MW86-Shallow
Type of Well: Monitoring
Casing Stickup:
CASING VOLUME CALCULATION
Static Water Level: 9.95' T.O.C
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
Well Depth/Diameter: 58.53' / 2"

Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV)	Temp (°C)	pH	Sp. Cond. (mS/cm)	Turbidity (NTUs)	PWL (ft TOC)
1220		3.5	10.61	177.2	9.97	8.46	0.964	>1000	
1222		~~3.5~~ 6.5	11.10	172.4	10.01	8.46	0.977	>1000	
1225		10.0	10.90	150.8	9.84	8.75	0.954	>1000	
1229		13.0	9.34	47.9	9.63	8.51	0.636	>1000	
1229	well dewatered								
1342		16.5	10.06	-69.7	10.18	8.21	0.631	>1000	
1345		20.0	10.53	-66.4	10.13	8.07	0.603	>1000	
1347		23.5	10.35	-59.7	9.61	8.02	0.558	>1000	
1350		26.5	10.16	-56.2	9.58	8.01	0.578	>1000	
1350	well dewatered								
1415		30.0	10.52	3.7	9.75	7.95	0.450	>1000	
1417		33.5	10.78	-1.2	9.66	7.91	0.471	>1000	
1420		36.5	10.90	-4.8	9.48	7.93	0.502	>1000	
1423		40.0	10.76	-48.4	9.35	8.08	0.559	>1000	
1425		41.0	12.16	-61.6	9.72	7.97	0.589	>1000	

Development Equipment: SS Bailer / DW Rig

Comments: Water is very foamy, Surge block for 20 minutes (1315-1335)

Signature(s): RW

WELL DEVELOPMENT LOG

Project Name: Atlas Site 4 RI Addendum
Project No.: E15-019-201
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Field Crew: JM, TM
Development Date: 11/6/17
Weather: ~~Rltg Cloudy, 55°F, windy~~ Sunny, 40°

Analytical Instruments: pH: 451 556
Specific Conductivity: 451 556
Temp: "
ORP:
D.O: "
Turbidity: LAMOTTE 2011

Well ID: MW86 - SHALLOW
Type of Well: MONITORING

Casing Stickup:
CASING VOLUME CALCULATION
Static Water Level: 6.24' TOC
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
Well Depth/Diameter: 58.5'/2"

Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV)	Temp (°C)	pH	Sp. Cond. (mS/cm)	Turbidity (NTUs)	PWL (ft TOC)
11/6/17 0915 SWL = 6.30' TOC									
0924 Pump ON									
0928		42	7.84	-31.3	8.56	8.52	0.960	679	13.5
0932		46	3.14	-64.4	8.79	8.06	6.800	46.49	26.0
0936		51	2.99	-60.9	9.24	7.75	0.568	31.26	44.5
0940		56	2.88	-68.3	9.30	7.57	0.585	1723	50.5
0943 Pump OFF		59	DEWATERED TO PUMP		0955 WL = 35.0' TOC, 1005 WL = 20.0' TOC				
1015 WL = 12.0' TOC									
1019 Pump ON									
1023		64	7.60	-64.3	8.88	7.57	0.463	42.49	30.5
1027		69	4.85	-58.0	9.20	7.42	0.500	65.64	44.0
1034		74	4.67	-57.8	9.34	7.28	0.677	1300	52.0
1036 - PUMP OFF - DEWATERED TO PUMP 76 GALLONS. 1050 WL = 35.0' TOC,									
1102 WL = 20.0' TOC, 1111 WL = 12.0' TOC									
1112 Pump ON									
1117		81	4.57	-63.3	9.05	7.57	0.434	14.51	29.5
1122		86	4.99	-52.2	9.38	7.41	0.459	19.18	41.5
1123	Pump OFF								
1348	Pump ON								
1353		91	5.92	104.7	8.82	7.72	0.432	9.43	25.0
1358		96	5.79	46.8	9.20	7.53	0.437	9.68	37.0
1359 Pump OFF DEVELOPMENT COMPLETE									

Development Equipment: REDIFLO 2

Comments:

Signature(s):

WELL DEVELOPMENT LOG

Project Name: Atlas Site 4 RI Addendum
Project No.: E15-019-201
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Field Crew: RW / Kathw / Yellow Jacket
Development Date 10/5/17
Weather: Sunny, ~52°F

Analytical Instruments: pH: YSI 556
Specific Conductivity: YSI 556
Temp: ↓
ORP: ↓
D.O: ↓
Turbidity: Hach 2100 Q

Well ID: MW86- middle
Type of Well: Monitoring
Casing Stickup:
CASING VOLUME CALCULATION
Static Water Level: 12.35' T.O.C.
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
Well Depth/Diameter: 200.60' / 2"
=34 gal

Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV)	Temp (°C)	pH	Sp. Cond. (µS/cm) m	Turbidity (NTUs)	PWL (ft TOC)
10/5/17									
1024		3.5	9.08	202.0	10.13	8.71	0.721	>1000	
1030		7.0	9.31	197.7	10.21	8.59	0.729	>1000	
1126		10.5	9.18	211.3	11.08	8.56	0.661	>1000	
1139		14.0	9.99	204.3	10.78	8.54	0.676	>1000	
1143		17.5	10.25	199.7	10.61	8.27	0.696	>1000	
1146		21.0	10.33	199.6	10.61	8.66	0.712	>1000	
1150		24.5	10.25	197.0	10.59	8.75	0.707	>1000	
1156		28.0	10.31	193.1	10.56	8.55	0.643	>1000	
1201		31.5	10.10	193.8	10.53	8.71	0.659	>1000	
1205		35.0	10.43	192.9	10.52	8.76	0.704	>1000	
1207		36.5	10.56	190.6	10.63	8.51	0.621	>1000	
11/4 1330	– SWL = 12.20' TOC								
1415	Pump On								
1418		39	3.43	-73.8	9.60	8.47	0.588	>1000	24.8
1421		42	2.19	-132.1	9.63	8.16	0.511	>1000	38.0
1425		47	1.44	-147.0	9.83	7.97	0.498	~~57.86~~ NA	69.5
1429		52	1.15	-147.9	10.03	7.91	0.491	57.86	94.0
1433		57	1.05	-146.1	10.43	7.86	0.485	35.44	122.0
1438		62	0.97	-140.2	10.80	7.79	0.477	21.57	148.0
1441		67	0.98	-135.7	11.18	7.79	0.473	34.52	170.0

Development Equipment: SS Bailer / DW Rig

Comments: Initial bailer water is very silty and foamy. Surge block for 30 minutes (1042-1112)

Signature(s): RW

WELL DEVELOPMENT LOG

Project Name: Atlas Site 4 RI Addendum
Project No.: E15-019-201
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Field Crew: TM/JM
Development Date: 11/4/17
Weather: Partly Sunny, 55°, Wind

Analytical Instruments: pH: YSI 556
Specific Conductivity: YSI 556
Temp: "
ORP:
D.O: "
Turbidity: LaMotte 2011

Well ID: MW86 Middle
Type of Well: Monitoring
Casing Stickup:
CASING VOLUME CALCULATION
Static Water Level: 10.20' TOC
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
Well Depth/Diameter: 200.60' TOC/2"

	Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV)	Temp (°C)	pH	Sp. Cond. (µS/cm)	Turbidity (NTUs)	PWL (ft TOC)
11/4	1445			1.02	-130.8	12.07	7.81	0.458	52.40	190.0
	1446	Pump OFF - Dewatered to top of screen								
	1454	WL = 170.0' TOC								
	1503	WL = 150.0' TOC								
	1508	WL = 140.0' TOC		1513 WL = 130.0' TOC				1520 WL = 120.0' TOC		
	1527	WL = 110.0' TOC		1542 WL = 90.0'				1604 WL = 70.0' TOC		
	1631	WL = 52.1' TOC								
	1632	Pump ON								
	1638		72	1.50	-53.0	10.10	7.83	0.360	9.48	79.5
	1643		77	1.47	-46.8	10.45	7.66	0.364	10.45	102.0
	1647		82	1.44	-45.8	10.83	7.61	0.367	9.23	128.5
	1653		87	1.40	-49.8	11.36	7.62	0.372	23.42	151.5
	1657		92	1.41	-58.3	11.95	7.62	0.384	38.51	176.0
	1701		97	1.43	-67.1	12.02	7.68	0.380	57.73	191.5
	1702	Pump OFF Dewatered to top of screen								
11/5	0840	SWL = 10.66' TOC								
	0851	Pump ON								
	0855		102	4.15	184.2	9.31	7.73	0.378	12.70	41.5
	0900		107	3.10	166.6	9.53	7.67	0.375	3.99	68.0
	0904		112	2.76	145.1	10.04	7.66	0.378	2.26	103.0

Development Equipment: Redi Flow 2

Comments:

Signature(s):

WELL DEVELOPMENT LOG

Project Name: Atlas Site 4 RI Addendum
Project No.: E15-019-201
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Field Crew: JM / JM
Development Date 11/5/17
Weather: Partly Cloudy, 32°

Analytical Instruments: pH: YSI 556
Specific Conductivity: YSI 556
Temp: "
ORP: "
D.O: "
Turbidity: LaMotte 2011

Well ID: MW86 MIDDLE
Type of Well: Monitoring
Casing Stickup:
CASING VOLUME CALCULATION
Static Water Level: 10.66' TOC
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
Well Depth/Diameter: 200.60 TOC/2"

11/5/17

Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV)	Temp (°C)	pH	Sp. Cond. (µS/cm)	Turbidity (NTUs)	PWL (ft TOC)
0908	~~1008 mL~~	117	2.63	130.2	10.07	7.75	0.378	2.22	120.2
0914	~~1014 mL~~	122	2.39	101.2	10.68	7.80	0.384	1.68	136.0
0918	~~1018 mL~~	127	2.42	80.6	10.78	7.84	0.381	1.56	158.0
0922		132	2.31	63.4	11.44	7.88	0.384	2.43	177.5
0923	Pump OFF 133 Development complete								

Development Equipment: REDI FLO 2

Comments:

Signature(s):

WELL DEVELOPMENT LOG

Project Name: Atlas Site 4 RI Addendum
Project No.: E15-019-201
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Field Crew: RW / Tetra w/ yellow jacket
Development Date: 10/4/17 & 10/5/17
Weather: partly cloudy, ~48°F

Analytical Instruments: pH: YSI 556
Specific Conductivity: YSI 556
Temp: ↓
ORP: ↓
D.O: ↓
Turbidity: Hach 2100Q

Well ID: MW86-Deep
Type of Well: Monitoring
Casing Stickup:
CASING VOLUME CALCULATION
Static Water Level: 11.25' T.O.C
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
Well Depth/Diameter: 257.77' / 2"

	Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV)	Temp (°C)	pH	Sp. Cond. (mS/cm)	Turbidity (NTUs)	PWL (ft TOC)
10/4/17	1723		3.5	5.49	195.9	~~7.65~~ 11.34	7.56	0.380	>1000	
	1725		6.5	6.43	197.7	11.29	7.86	0.367	>1000	
10/5/17	0817		10.0	6.00	211.5	11.01	8.33	0.349	>1000	
	0826		12.5	5.75	208.4	11.00	8.32	0.345	>1000	
	0940		16.0	6.19	217.7	11.90	8.23	0.346	>1000	
	0947		19.5	5.64	219.7	11.77	8.15	0.347	>1000	
*	0955		23.0	5.72	217.9	11.24	8.18	0.352	277	
	1002		26.5	5.40	219.3	11.52	8.14	0.347	—	
	1011		30.0	5.81	212.5	11.51	8.08	0.336	>1000	
11/5/17	0938	SWL 11.22' TOC								
	1031	Pump On								
	1033		32	0.95	35.0	9.10	7.68	0.377	2.32	14.6
	1037		35	0.50	-62.6	9.70	7.79	0.377	3.06	30.0
	1042		40	0.34	-112.8	10.15	8.01	0.378	3.28	52.0
	1047		45	0.32	-126.9	10.08	8.04	0.378	2.91	68.5
	1053		50	0.32	-134.3	10.28	8.03	0.379	3.25	83.5
	1059		55	0.29	-146.1	10.68	8.04	0.387	7.14	98.5
	1104		60	0.26	-192.4	10.97	7.96	0.373	~~Out of range~~	114.0
	1109		65	0.31	-171.1	11.25	7.93	0.371	NA	130.0
	1114		70	0.48	-152.9	11.55	7.90	0.365	17.7	143.0

Development Equipment: SS Bailer / Dev Rig, 11/5/17 Redi Flo 2 (TM/JM)

Comments: ~~Surge block for 30 min (0840-0910)~~ Surge block for 30 min. (0840-0910)
* 0955 readings taken from top of water column

Signature(s): RW

WELL DEVELOPMENT LOG

Project Name: Atlas Site 4 RI Addendum
Project No.: E15-019-201
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Field Crew: TM / JM
Development Date: 11/5/17
Weather: SUNNY, 46° LIGHT WIND

Analytical Instruments: pH: 451556
Specific Conductivity: 451556
Temp: "
ORP:
D.O: "
Turbidity: LAMOTTE 20911

Well ID: MW86 DEEP
Type of Well: MONITORING
Casing Stickup:
CASING VOLUME CALCULATION
Static Water Level: 11.22' TOC
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
Well Depth/Diameter: 357.77' TOC / 2"

Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV)	Temp (°C)	pH	Sp. Cond. (mS/cm)	Turbidity (NTUs)	PWL (ft TOC)
1119		75	0.52	-146.6	11.82	7.92	0.368	16.48	~~147.0~~ 153.0
1125		80	0.73	-136.2	11.92	7.94	0.362	15.51	167.5
1129		85	0.74	-140.9	12.26	7.91	0.354	6.01	179.0
1134		90	1.16	-129.1	12.71	7.93	0.353	33.77	190.0
1139		95	1.07	-123.5	12.75	7.93	0.356	24.07	200.0
1144		100	1.13	-138.6	13.07	7.91	0.351	7.13	209.5
1148		105	1.11	-124.7	13.12	7.98	0.357	14.78	217.6
1154		110	1.13	-114.3	13.51	7.87	0.367	13.04	NA
1158		115	1.05	-129.9	13.54	7.88	0.365	9.11	233.0
1202		120	1.29	-114.4	13.96	7.90	0.362	5.5	247.5
1204	Pump OFF - Pump At Maximum Rams 1209 WL 220.0' TOC, 1214 WL 200.0 TOC,								
1220 - WL = 180.0' TOC, 1228 WL = 160.0' TOC, 1237 WL = 140.0' TOC, 1247 WL 120.0 TOC,									
1303 - WL = 100.0' TOC, 1319 - WL = 80.0' TOC, 1348 - WL = 60.0' TOC									
1353	Pump On							4.96	~~80.0~~
1357		125	3.83	-52.6	10.40	7.77	0.361	4.96	80.0
1403		130	3.04	-59.2	10.40	7.92	0.361	2.85	103.0
1408		135	2.70	-60.2	11.34	7.93	0.363	3.10	125.0
1413		140	2.53	-59.0	11.61	7.92	0.362	2.96	144.5
1418		145	2.37	-58.9	12.01	7.95	0.361	2.67	162.0
1422		150	2.25	-57.4	12.43	7.94	0.360	2.83	181.0

Pump OFF - DEVELOPMENT COMPLETE

Development Equipment: REDI-FLO 2

Comments:

Signature(s):

WELL DEVELOPMENT LOG

Project Name: Atlas Site 4 RI Addendum
Project No.: E15-019-201
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Field Crew: TM/MARK CULLUM - COLOG
Development Date 10/11/17
Weather: PARTLY CLOUDY, BREEZY, 45°

Analytical Instruments: pH: YSI 556
Temp: "
D.O: "
Specific Conductivity: YSI 556
ORP: "
Turbidity: HACH 2100Q

Well ID: MW 95 ~~DEEP~~ MIDDLE
Type of Well: MONITORING
Casing Stickup: PVC 30"
Static Water Level: 95.26' TOC (PVC)
Well Depth/Diameter: ~~210.3' TOC (PVC)~~ / 2"
208.3' TOC (PVC)

CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)

	Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV)	Temp (°C)	pH	Sp. Cond. (µS/cm)	Turbidity (NTUs)	PWL (ft TOC)
	1514		2	6.45*	152.8*	10.97	8.99	0.397	>1000	
	1543		4	7.36	110.0	11.37	9.04	0.389	>1000	
	1611		6	7.49	89.1	11.58	9.04	0.379	>1000	
11/17	0758	WL = 99.41' TOC								
11/19	0853	WL = ~~99~~.65' TOC								
	1110	PUMP ON								
	1112		7	3.82	35.2	10.42	7.30	0.406	166	109.0
	1115		11	1.99	-32.1	11.31	7.72	0.342	OUT OF RANGE	124.0
	1119		16	1.43	-105.0	12.01	7.94	0.367	"	134.5
	1123		21	1.69	-94.0	12.13	7.41	0.338	"	141.0
	1127		26	2.05	-86.8	12.07	7.84	0.331	779	145.8
	1131		31	2.50	-75.7	12.11	7.82	0.317	431	147.8
	1134		36	2.93	-64.5	12.10	7.78	0.310	260	150.0
	1138		41	3.09	-58.6	12.14	7.76	0.308	170	151.8
	1141		46	3.39	-50.5	12.16	7.76	0.301	109	152.6
	1145		51	3.64	-42.3	12.17	7.73	0.299	82.3	152.9
	1149		56	3.84	-34.4	12.19	7.72	0.296	76.5	152.9
	1152		61	4.01	-28.4	12.24	7.70	0.296	55.3	152.9
	1156		66	4.13	-22.4	12.27	7.66	0.296	43.1	152.9
	1200		71	4.26	-17.1	12.31	7.67	0.297	31.7	152.85

Development Equipment: BAILER 11/19 TM/JM RAD FLO 2

Comments: PROTECTIVE CASING 36" INITIAL PURGE H2O GRAY (DRILLING FLUID?)/SILTY. ORP+DO WERE RECORDED 30 SECONDS AFTER PROBE PUT IN SAMPLE - STABILIZATIONS NOT ABLE TO BE ACHIEVED. FINAL PURGE H2O STILL NOT REASONABLE FOR TURBIDITY BUT VISUALLY A LIGHTER GRAY WATER COMING OUT OF BAILER. DOESN'T FEEL SILTY/SANDY. 2/16" SILT IN BOTTOM OF 5 GALLON BUCKET ON LAST 2 GALLONS PURGED.

Signature(s): [signature]

WELL DEVELOPMENT LOG

Project Name: Atlas Site 4 RI Addendum
Project No.: E15-019-201
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Field Crew: TM/JM
Development Date 11/19/17
Weather: Sunny, 45° Windy

Analytical Instruments: pH: 451 556
Specific Conductivity: 451 556
Temp: "
ORP:
D.O: "
Turbidity: HACH 2100 Q

Well ID: MW95 Middle
Type of Well: Monitoring
Casing Stickup: 3.04'
CASING VOLUME CALCULATION
Static Water Level:
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
Well Depth/Diameter:

Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV)	Temp (°C)	pH	Sp. Cond. (µS/cm)	Turbidity (NTUs)	PWL (ft TOC)
1204		76	4.36	-13.0	12.31	7.67	0.296	26.8	152.7
1207		81	4.44	-9.3	12.24	7.61	0.300	24.6	153.7
1211		86	4.51	-5.6	12.26	7.57	0.299	16.8	153.6
1212	Pump OFF	87	DEVELOPMENT	COMPLETE					

Development Equipment: ROI FLO 2

Comments:

Signature(s):

WELL DEVELOPMENT LOG

Project Name: Atlas Site 4 RI Addendum
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Development Date 10/10/17, 10/11/17

Project No.: E15-019-201
Field Crew: TM / GREG BAUER COLOG 10/10/17
Weather: SUNNY, WINDY, 45° MARK CULLUM COLOG 10/11/17

Analytical Instruments: pH: YSI 556
Temp: "
D.O: "

Specific Conductivity: YSI 556
ORP: "
Turbidity: HACH 2100 Q

Well ID: MW95 DEEP
Casing Stickup: 32"
Static Water Level: 87.87' TOC (PVC)
Well Depth/Diameter: 228.2' " / 2"

Type of Well: MONITORING
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)

	Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV)	Temp (°C)	pH	Sp. Cond. (µS/cm)	Turbidity (NTUs)	PWL (ft TOC)
10/10/17	1643		1.5	3.68*	149.3*	10.18	8.23	0.739	>1000	
	1723		3.0	6.30	124.2	9.51	8.29	0.553	>1000	
	1803		4.5	5.52	12.1	9.11	8.34	0.511	>1000	
10/11/17	0939		6.5	8.98	160.0	10.75	8.19	0.423	>1000	
	1020		8.5	6.05	148.3	10.93	8.44	0.415	>1000	
	1107		10.5	6.61	144.1	11.32	8.38	0.403	>1000	
	1155		12.5	6.13	120.7	12.17	8.48	0.395	>1000	
	1241		14.5	6.28	105.2	11.78	8.52	0.392	>1000	
11/17	0802	WL = 94.96' TOC								
11/19	0849	WL = 95.26' TOC								
	0930	PUMP ON								
	0933		16.5	4.60	14.3	10.74	7.93	0.288	OVER RANGE	96.8
	0934		19.5	5.27	25.5	11.26	7.83	0.284	"	96.6
	0938		24.5	4.70	37.1	11.65	7.75	0.294	148	96.5
	0941		29.5	4.14	41.6	11.67	7.69	0.295	344	96.55
	0944		34.5	3.89	45.4	11.73	7.59	0.296	93.5	96.55
	0947		39.5	3.77	46.6	11.76	7.56	0.297	40.9	96.55
	0950		44.5	3.67	47.7	11.77	7.52	0.298	25.1	96.55
	0953		49.5	3.68	48.4	11.79	7.49	0.299	18.4	96.55
	0956		54.5	3.66	49.1	11.80	7.46	0.300	16.4	96.55

0957 PUMP OFF. DEVELOPMENT COMPLETE

Development Equipment: BAILER 11/9/17 TM/JM REDIFLOW 2

Comments: 10/10/17 PROTECTIVE CASING 36" AGS. INITIAL PURGE H_2O DK BROWN/VERY SILTY
* D.O. & ORP WERE RECORDED 30 SECONDS AFTER PUMP PUT IN SAMPLE - STABILIZATION NOT ABLE TO BE ACHIEVED. 10/11/17 INITIAL PURGE H_2O BROWN/SILTY, FINAL PURGE H_2O STILL NOT READABLE FOR TURB. SILTY BUT SLIGHTLY VISUALLY ~~LESS~~ LIGHTER BROWN. WATER COLUMN DUE OF BAILER DOESN'T FEEL SILTY/SANDY. 4"/6" SILT IN BOTTOM OF 5 GALLON BUCKET ON LAST 2 GALLONS PURGED.

Signature(s): TM

WELL DEVELOPMENT LOG

Project Name: Atlas Site 4 RI Addendum
Project No.: E15-019-201
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Field Crew: TH / Mark Cullum Comp
Development Date 10/11/17, 11/9/17,
Weather: Partly Cloudy, Light Breeze, 55°

Analytical Instruments: pH: 451 556
Specific Conductivity: 451 556
Temp: "
ORP:
D.O: "
Turbidity: HACH 2100Q

Well ID: MW95 Shallow
Type of Well: Monitoring
Casing Stickup: 30" PVC
CASING VOLUME CALCULATION
Static Water Level: 99.69' TOC (PVC)
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
Well Depth/Diameter: 170.3' TOC (PVC)/2"

	Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV)	Temp (°C)	pH	Sp. Cond. (µS/cm)	Turbidity (NTUs)	PWL (ft TOC)
10/11	1320		2	5.58*	164.8*	11.30	8.69	0.430	>1000	
-BAIL	1349		4	7.19	147.3	10.95	8.93	0.412	>1000	
	1414		6	7.67	153.0	11.03	8.83	0.401	>1000	
	1437		8	7.42	152.5	11.06	8.86	0.385	>1000	
11/9	1504	SWL = 103.05' TOC								
	1512	Begin pumping								
-PUMP	1514		9.0	2.49	-23.7	10.0	8.63	0.306	>1000	113.5
	1518		14	1.35	-85.4	11.8	8.54	0.301	>1000	126.6
	1522		19	1.88	-90.5	12.4	8.45	0.295	>1000	132.5
	1527		24	2.65	-82.6	12.5	8.35	0.296	763	133.3
	1531		29	3.33	-73.8	12.6	8.29	0.314	458	134.1
	1536		34	3.52	-66.2	12.6	8.28	0.307	213	134.3
	1540		39	3.91	-59.1	12.6	8.24	0.304	194	134.5
	1545		44	3.99	-51.9	12.6	8.22	0.300	148	134.5
	1549		49	4.08	-46.7	12.6	8.21	0.297	210	134.6
11/10/17	1554	WL = 103.78' TOC								
	1557	Resume pumping								
	1600		54	3.98	69.6	12.1	8.1	0.277	755	121.7
	1606		59	3.49	50.2	12.4	8.12	0.277	51.9	130.1
	1610		64	3.34	45.7	12.6	8.08	0.278	82.6	133.2

Development Equipment: Bailer, 2" Submersible pump

Comments: Protective Casing 36". Initial Purge H_2O Gray (Drilling?)/Silty ORP + DO were recorded 30 seconds after probe put in sample. Stabilizations not able to be achieved after 6 gallons called change from ~~Gray~~ OK Gray → ~~Brown~~ Lt. Gray. Final Purge H_2O Still Not Readable for Turbidity But Visually Lighter Gray Water Coming Out of Bailer Doesn't Feel Silty/Sandy. 2 1/2" Silt in Bottom of 5 Gallon Bucket on Last 2 Gallons Purged.

Signature(s): TH Mgl

WELL DEVELOPMENT LOG

Project Name: Atlas Site 4 RI Addendum
Project No.: E15-019-201
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Field Crew: JM
Development Date: 11/10/17
Weather: Overcast, 50°F, calm

Analytical Instruments: pH: YSI 556
Specific Conductivity: YSI 556
Temp: "
ORP: "
D.O: "
Turbidity: HACH 2100 Q

Well ID: MW95-SHALLOW
Type of Well:
Casing Stickup:
CASING VOLUME CALCULATION
Static Water Level:
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
Well Depth/Diameter: 169.96' TOC / 2"
Post Development

	Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV)	Temp (°C)	pH	Sp. Cond. ~~mS~~ µS/cm)	Turbidity (NTUs)	PWL (ft TOC)
11/10	1615		69	3.39	39.5	12.6	8.01	0.285	90.3	134.0
	1620		74	3.50	35.4	12.7	7.99	0.286	56.0	134.3
	1625		79	3.60	31.5	12.7	7.98	0.287	59.6	134.2
	1627	Pump off								
11/17	0755	WL = 103.47' TOC								
	0823	Pump On								
	0826		80	12.47	201.8	10.22	8.01	0.271	221	109.7
	0830		84	7.22	185.0	12.01	7.56	0.267	45.3	116.8
	0836		89	6.64	171.9	11.98	7.33	0.265	39.8	124.5
	0840		94	6.01	159.9	12.06	7.27	0.268	34.7	130.6
	0845		99	5.52	151.6	12.27	7.26	0.270	70.1	133.9
	0849		104	5.32	144.7	12.18	7.25	0.270	64.5	137.9
	0854		109	5.06	131.9	12.34	7.29	0.274	59.8	137.5
	0858		114	4.79	127.5	12.31	7.28	0.277	53.8	137.85
	0903		119	4.63	121.0	12.28	7.30	0.278	40.2	138.3
	0908		124	4.59	117.6	12.29	7.31	0.278	40.0	138.6
	0913		129	4.56	110.8	12.35	7.31	0.277	33.6	138.4
	0914		130	Pump OFF Development complete						

Development Equipment: 2" Submersible pump. 11/17 TM/JM

Comments:

Signature(s):

WELL DEVELOPMENT LOG

Project Name: Atlas Site 4 RI Addendum
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Development Date 10/10/17

Project No.: E15-019-201
Field Crew: TM/JM/GREG BAUER. CLIENT
Weather: SUNNY, SLIGHT BREEZE, 37°

Analytical Instruments: pH: YSI 556
Temp: "
D.O: "

Specific Conductivity: YSI 556
ORP:
Turbidity: HACH 2100 Q

Well ID: MW97 ~~DEEP~~ MIDDLE
Casing Stickup: PVC 30"
Static Water Level: 90.12' TOC (PVC)
Well Depth/Diameter: 271.80' / 2"

Type of Well: MONITORING

CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)

	Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV)	Temp (°C)	pH	Sp. Cond. (µS/cm)	Turbidity (NTUs)	PWL (ft TOC)
10/10	1204	Bailing	~~21.5~~	7.82	147.6	10.03	8.24	0.335	659	
	1255		3.5	7.15	151.4	9.74	8.44	0.333	582	
	1333		5.5	7.80	152.9	9.84	8.52	0.335	>1000	
	1515		7.5	9.88	148.4	9.92	8.35	0.337	>1000	
11/16	1440	W.L = 231.05' TOC								
11/18	1315	W.L = 231.86 TOC								
	1341	Pump On								
	1346		8.5	4.21	-37.3	10.45	9.62	0.427	COLOR CHANGE	258.0
	1349	Pump OFF	10	Continued Maxed		1405 WL =	250.0' TOC,	1434	WL = 242.5' TOC	
		1450 WL = 240.0 TOC								
11/19	0734	WL = 230.89' TOC								
	0742	Pump On								
	0746		11	6.27	187.1	10.17	8.14	0.342	45.6	245.0
	0748		13	3.57	161.4	11.80	7.79	0.629	COLOR CHANGE	NA
	0752		15	2.11	132.5	13.36	7.74	0.546	124	NA
	0751	Pump OFF - DEWATERED		0802 WL =	252.4' TOC					
	1508	WL = 232.25' TOC								
	1528	Pump On								
	1530		16	3.61	37.7	11.02	7.73	0.537	62.6	
	1533		18	2.08	26.8	13.36	7.58	0.520	82.0	
	1534	19 - Dewatered & pump off								

Development Equipment: BAILER, 11/18 TM/JM REDI FLOW 2

Comments: PROTECTIVE CASING 36". INITIAL PURGE H_2O BROWN/SILTY FINAL PURGE WATER BROWN/SILTY

Signature(s):

WELL DEVELOPMENT LOG

Project Name: Atlas Site 4 RI Addendum
Project No.: E15-019-201
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Field Crew: JM
Development Date: 11/20/17
Weather: Ptly cloudy, 50°F, high winds

Analytical Instruments: pH: YSI 556
Specific Conductivity: YSI 556
Temp: "
ORP:
D.O: "
Turbidity: HACH 2100Q

Well ID: MW 97 - MIDDLE
Type of Well:
Casing Stickup:
CASING VOLUME CALCULATION
Static Water Level:
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
Well Depth/Diameter:

Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV)	Temp (°C)	pH	Sp. Cond. (µS/cm)	Turbidity (NTUs)	PWL (ft TOC)
11/20 1014	- SWL = 231.51' TOC								
1021	Resume Pumping								
1023		+2	04.17	105.7	10.8	7.80	417	25.1	
1026		+3.5	2.40	85.6	12.8	7.60	427	52.7	
1027		+5.0	1.86	76.6	13.6	7.54	424	21.0	
1028	Pump off - dewatered to pump.								

Development Equipment:

Comments:

Signature(s): Joseph Martinucci

WELL DEVELOPMENT LOG

Project Name: Atlas Site 4 RI Addendum
Project No.: E15-019-201
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Field Crew: JM, TM
Development Date 11/18/17
Weather: SUNNY, 45°F, windy

Analytical Instruments: pH: _____
Specific Conductivity: _____
Temp: _____
ORP: _____
D.O: _____
Turbidity: _____

Well ID: MW97 - Deep
Type of Well: _____
Casing Stickup: _____
CASING VOLUME CALCULATION
Static Water Level: _____
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
Well Depth/Diameter: 334.1' TOC / 2"

Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV)	Temp (°C)	pH	Sp. Cond. (µS/cm)	Turbidity (NTUs)	PWL (ft TOC)
11/18	- Added 5 gal of distilled water to dry well (1400)								
11/19	1500 hrs - well is dry								

Development Equipment: _____

Comments: DTW = 333.9' TOC at 0800 11/19/17
TD = 334.1' TOC

Signature(s): _____

WELL DEVELOPMENT LOG

Project Name: Atlas Site 4 RI Addendum
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Development Date: 10/2/17 & 10/3/17

Project No.: E15-019-201
Field Crew: RW / Katt from Yellow Jacket
Weather: Snow, 31°F

Analytical Instruments: pH:
Temp:
D.O:

Specific Conductivity: YSI-556
ORP:
Turbidity: Hach 2100 Q

Well ID: MW101-Shallow
Casing Stickup:
Static Water Level: 99.83' T.O.C 2"
Well Depth/Diameter: 110.89' 2"

Type of Well: monitoring
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)

Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV)	Temp (°C)	pH	Sp. Cond. (mS/cm)	Turbidity (NTUs)	PWL (ft TOC)
10/2/17 1526		1.0	9.01	-134.6	6.37	8.05	0.527	71,000	
10/3/17 0918		4.0	8.56	1134.4	6.65	4.96	0.537	>1000	
0933		7.5	8.69	954.6	~~6.58~~ 6.93	6.52	0.544	>1000	
0923	well dewatered	~~8.20~~	463.8	~~7.98~~	~~8.60~~	0.563 RW	>1000		
1011		11.0	8.30	463.8	7.98	8.00	0.563	~~>1000~~	>1000
1017		14.0	8.20	488.1	8.12	8.13	0.556	>1000	
1026		17.0	7.81	701.6	7.92	8.04	0.542	>1000	
	well dewatered								
1114		20.0	9.18	1200.3	7.83	7.99	0.483	>1000	
1120		23.5	9.22	1132.1	8.00	7.92	0.454	>1000	

Development Equipment: SS Bailer / DPU Rig

Comments: Initial bailer is very silty, surge block for 30 min on 10/3/17 (0830-0900)

Signature(s): RW

WELL DEVELOPMENT LOG

Project Name: Atlas Site 4 RI Addendum
Project No.: E15-019-201
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Field Crew: JVH, TM
Development Date 10/4/17
Weather: cloudy, 40°f, windy

Analytical Instruments: pH: YSI 556
Temp:
D.O:
Specific Conductivity: YSI 556
ORP:
Turbidity: Lamotte 2020 we

Well ID: FEW4-MW101-Shallow
Type of Well: Nested monitoring
Casing Stickup:
CASING VOLUME CALCULATION
Static Water Level: 100.35' TOC (PVC, 2"
(TD(ft) – DTW(ft)) x 0.17 gal/ft = 1 casing volume (gals)
Well Depth/Diameter: Predevelopment: 110.95' 12" 12"
17 gals

Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV)	Temp (°C)	pH	Sp. Cond. (µS/cm)	Turbidity (NTUs)	PWL (ft TOC)
1441 begin developing		0.5	6.46	9.4	9.47	8.41	397	1295	~~100~~ 101.20
1446		5	6.19	11.2	9.60	8.21	409	306	106.60
1448 pump off, dewatered to pump. 6 gals removed. Pump around 105' TOC									~~101.77~~
1551 pump on		6.5	4.91	-24.7	10.29	8.31	414	overrange	101.44
1557		11	5.90	-38.4	10.19	8.18	420	102	105.31
1603 pump off, dewatered to pump. ~15 gallons removed									
10/5/17 0757 pump on		15.5	5.91	62.8	9.45	8.49	403	52.49	102.43
0803		20	4.25	58.0	9.47	8.19	400	56.92	105.07
0811		25	4.21	41.2	10.52	8.03	390	1011	107.39
0812 pump off, well dewatered to pump, 25 gallons removed								~~1876~~	~~101.65~~
1106 pump on		25.5	6.51	83.4	9.50	9.51	406	1876	101.65
1113		30	5.90	64.5	9.66	8.63	403	55.81	105.35
1116 pump off, 33 gals removed									
10/7/17 1710 pump on		33.5	5.95	63.9	9.47	8.13	403	38.2	107.42
1713		35	5.93	64.2	9.60	8.15	403	30.1	104.75
1720		40	5.91	64.4	9.71	8.16	402	30.0	106.65
1722		41	5.90	64.5	10.11	8.17	401	25.5	107.01
1723 pump off									

Development Equipment: Redi-Flo 2

Comments: 1450 D.T.W 106' TOC ~~1456~~ 1454 D.T.W 105' TOC
1459 D.T.W 104' TOC 1505 D.T.W 103' TOC 1542 D.T.W 100.85' TOC
10/5/17 D.T.W: 100.33' TOC 10/5/17 1103 D.T.W: 100.4' TOC
10/7/17 1707 D.T.W 100.33' TOC

Signature(s):

WELL DEVELOPMENT LOG

Project Name: Atlas Site 4 RI Addendum
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Development Date: 10/2/17

Project No.: E15-019-201
Field Crew: RW/ Latt from yellow Jacket
Weather: Heavy snow, 30° F

Analytical Instruments: pH: YSI 556
Temp:
D.O:

Specific Conductivity: YSI 556
ORP:
Turbidity: HACH 2100Q

Well ID: MW01 middle
Casing Stickup:
Static Water Level: 100.88' T.O.C
Well Depth/Diameter: 142.82' 2"

Type of Well: Monitoring

CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ___ gal/ft = 1 casing volume (gals)

Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV)	Temp (°C)	pH	Sp. Cond. (µS/cm)	Turbidity (NTUs)	PWL (ft TOC)
1132		3.0	9.30	-10.6	7.40	8.20	0.488	>1000	
1135		6.5	10.07	-11.5	7.76	8.39	0.495	>1000	
1138		9.5	9.65	-10.6	7.74	8.40	0.492	>1000	
1141		10.5	8.20	94.7	7.27	8.30	0.486	>1000	
1140	well is	dewatered							
1305	start	surge blocking							
1335	Finish	surge blocking							
1345		14.0	9.76	-151.5	7.70	8.21	0.547	>1000	
1353		17.5	10.11	-150.4	7.83	8.33	0.554	>1000	
1356		21.0	9.96	-150.0	7.58	8.33	0.552	>1000	
1358	well	dewatered							
1359		23.5	9.58	-147.5	7.61	8.28	0.556	>1000	
1402		27.0	10.24	-143.8	7.77	8.34	0.569	>1000	
1404		30.5	9.98	-131.3	7.09	8.17	0.600	>1000	
1409		33.5	9.68	-134.3	7.72	8.10	0.553	>1000	
1451		35.5	9.33	-132.5	7.69	8.08	0.596	>1000	
1454		37.5	9.13	-128.5	7.97	8.04	0.672	>1000	
1456		39.5	9.41	-127.5	8.16	8.08	0.646	>1000	
1459		41.5	8.67	-123.7	8.02	8.39	0.621	>1000	
1506		44.5	8.44	-126.4	7.91	8.02	0.668		

Development Equipment: SS bailer/ DevRig

Comments:

Signature(s): RW

WELL DEVELOPMENT LOG

Project Name: Atlas Site 4 RI Addendum
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Development Date 10/2/17

Project No.: E15-019-201
Field Crew: RW / Katt w/ yellow jacket
Weather: SNW 31°F

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556 ↓
ORP: ↓
Turbidity: Hach 2100 Q

Well ID: MW 101-middle
Type of Well: monitoring

Casing Stickup:
Static Water Level: 100.88 T.O.C.
Well Depth/Diameter: 142.82' 2"

CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)

Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV)	Temp (°C)	pH	Sp. Cond. (µS/cm)	Turbidity (NTUs)	PWL (ft TOC)
10/2/17 1511		47	8.94	-134.4	7.74	8.01	0.661	71000	

Development Equipment: SS Bailer / Dev Rig

Comments:

Signature(s):

WELL DEVELOPMENT LOG

Project Name: Atlas Site 4 RI Addendum
Project No.: E15-019-201
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Field Crew: JWH, JM
Development Date 10/4/17
Weather: Cloudy, 40°f, windy

Analytical Instruments: pH: YSI 556
Specific Conductivity: YSI 556
Temp:
ORP:
D.O:
Turbidity: LaMotte 2020we

Well ID: FEW4-mw101- middle
Type of Well: Nested monitoring
Casing Stickup:
CASING VOLUME CALCULATION
Static Water Level: 101.15' TOC (2" PVC)
(TD(ft) – DTW(ft)) x 0.17 gal/ft = 1 casing volume (gals)
Well Depth/Diameter: 142.90' TOC (2" PVC)
7.1 gals

Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV)	Temp (°C)	pH	Sp. Cond. (µS/cm)	Turbidity (NTUs)	PWL (ft TOC)
1348 begin developing		0.5	7.56	40.0	9.28	7.93	551	637	108.24
1353		5	7.74	35.1	9.85	7.95	589	724	121.10
1400		10	6.75	27.2	10.69	8.12	602	1232	130.33
1407		15	4.99	21.5	11.11	8.22	573	1888	134.58
1414		20	4.29	15.1	11.08	8.20	517	2370	136.71
1416 pump off. well dewatered to pump					21 gallons removed			3124	
1510 cont. developing		28.5	4.20	-19.5	9.92	8.05	477	~~105.25~~	105.25
1517		26	3.60	-21.9	10.03	8.07	472	420	118.80
1524		31	3.52	-32.7	11.32	8.26	477	47.36	128.15
1533		36	3.58	-31.0	11.48	8.25	468	35.57	134.55
1541		41	3.62	-30.5	11.23	8.21	461	48.9	135.79
1542 pump off									

Development Equipment: Redi-Flo2

Comments: 1425 D.T.W 125.35' TOC 1433 D.T.W 117.95' TOC
1508 D.T.W 103.03' TOC

Signature(s):

WELL DEVELOPMENT LOG

Project Name: Atlas Site 4 RI Addendum
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Development Date 10/2/17

Project No.: E15-019-201
Field Crew: RW / Scott Brom / Tim Talbot
Weather: snowy, 30°F

Analytical Instruments: pH: YSI-556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI-556
ORP: ↓
Turbidity: HACH 2100 Q

Well ID: MW104-Deep
Type of Well: Monitoring
Casing Stickup:
Static Water Level: 100.80' T.O.C.
Well Depth/Diameter: 242.87' T.O.C. 2"

CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)

Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV)	Temp (°C)	pH	Sp. Cond. (µS/cm)	Turbidity (NTUs)	PWL (ft TOC)
10/2/17 0824		2.0	9.79	49.6	7.33	8.76	0.304	~~[illegible]~~	
0832		5.5	10.50	25.3	7.92	8.10	0.318	87.0	
0945		9.0	7.53	77.0	7.66	8.11	0.323	>1000	
0950		12.0	7.48	54.2	8.25	8.15	0.323	>1000	
0953		15.5	7.80	22.1	8.55	8.07	0.323	866	
1035		19.0	7.90	-15.3	7.33	8.05	0.457	>1000	
1039		22.5	7.79	-18.6	8.30	8.05	0.423	—	
1044		26.0	7.67	-42.3	8.07	8.10	0.381	437	
1048		29.5	7.99	-36.8	8.34	8.05	0.362	674	
1052		33.0	7.50	-43.2	8.33	8.16	0.384	928	

Development Equipment: SS Bailer / DW Rig

Comments: Initial bailing water is clear and free of silt. Begin surge blocking after 5.5 gallons bailed (0900-0932)

Signature(s): RW

WELL DEVELOPMENT LOG

Project Name: Atlas Site 4 RI Addendum
Site Name: Atlas D Missile Site 4 – Cheyenne, WY
Development Date 10/4/17

Project No.: E15-019-201
Field Crew: JNH, TM
Weather: Cloudy, 40°F, Windy

Analytical Instruments: pH: YSI 556
Temp:
D.O:

Specific Conductivity: YSI 556
ORP:
Turbidity: LaMotte 2020 we

Well ID: FEW4-MW 101 - Deep
Casing Stickup:
Static Water Level: 101.10' TOC 2" PVC
Well Depth/Diameter: predevelopment: 242.98' / 2" / 2"

Type of Well: Nested Monitoring

CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x 0.17 gal/ft = 1 casing volume (gals)
24 gals

Time	Casing Volumes	Gallons Removed	Diss. Oxygen (mg/l)	ORP (mV)	Temp (°C)	pH	Sp. Cond. (µS/cm)	Turbidity (NTUs)	PWL (ft TOC)
1047 begin developing		0.5	4.61	163.1	8.65	8.18	450	muddy	107.90
1055		5	4.58	114.4	9.14	8.18	481	15.55	128.95
1101		10	2.63	73.9	10.10	8.19	456	38.44	153.30
1110		15	1.81	47.7	10.52	8.18	49	35.31	172.01
1117		20	1.81	15.2	11.26	8.20	464	31.32	193.92
1123		25	2.15	-7.5	11.68	8.23	4210	45.70	214.41
1132		30	2.50	-11.4	11.95	8.27	433	627	225.74
1135 well developed to pump, pump off. 33 gallons removed									
1310 pump on		33.5	2.91	96.9	9.43	8.22	420	629	128.36
1314		38	2.70	93.7	9.62	8.16	422	9.88	148.65
1318		43	2.68	23.5	10.45	8.11	418	20.68	167.81
1324		48	2.69	22.9	10.65	8.09	421	37.44	188.74
1330		53	2.65	23.1	11.61	8.16	426	38.02	209.22
1331 pump off									

Development Equipment: Rect-flo 2

Comments: 1140 D.T.W: 220.0' TOC 1150 196.95' TOC
1255 D.T.W: 124.65 1307 D.T.W 118.55 TOC

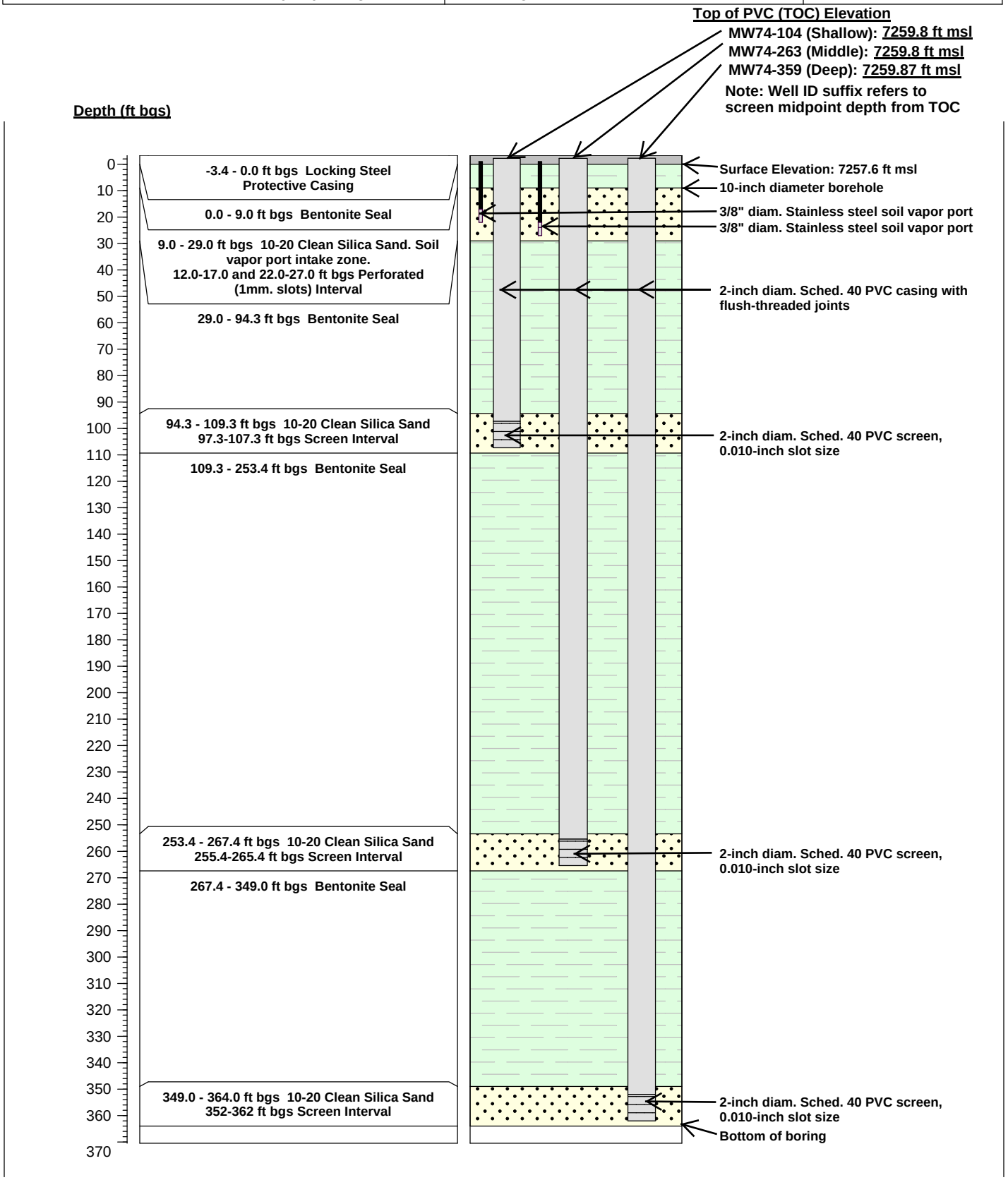
Signature(s):

A-3 Well Construction Diagrams

WELL CONSTRUCTION DETAILS

WELL NO. **MW74**

COMPANY NAME **RMC Consultants, Inc**	DRILLING SUBCONTRACTOR **Yellow Jacket Drilling Services, Inc.**	SHEET 1 OF 1 SHEETS
PROJECT: **Atlas D Missile Site 4 Focused Area RI Addendum**	DRILLING METHOD **Sonic Coring/Casing Advance**	
LOCATION **Atlas D Missile Site 4 - Laramie County, Wyoming**	FIELD GEOLOGIST **Todd Margulies**	DATE COMPLETED **8/27/2017**



DEVELOPMENT METHOD: **Surging w/ swab followed by bailing; pumping w/ Redi-Flo2 for final development**

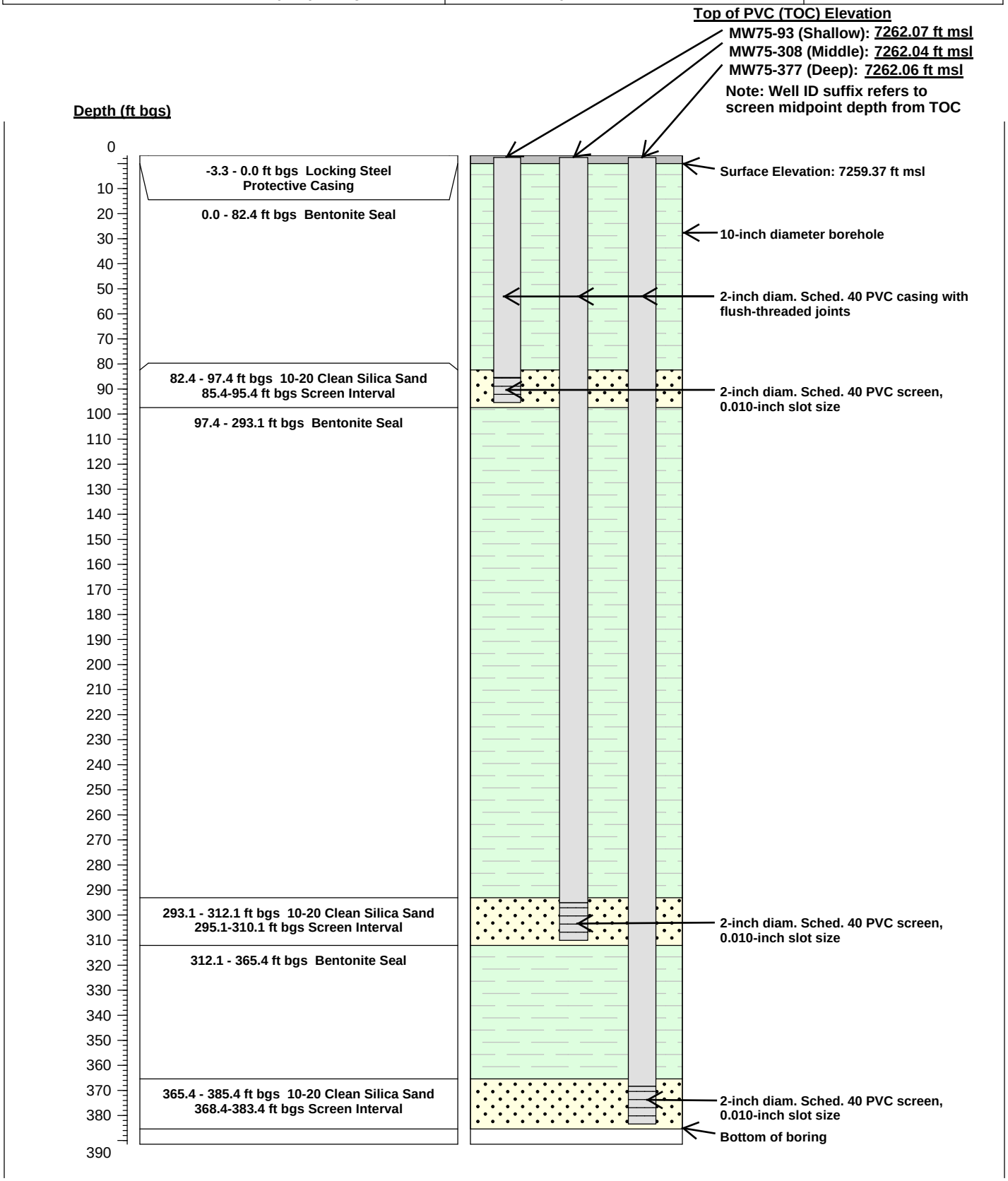
DEPTH TO WATER AFTER COMPLETION: **SWLs: Shallow MW: 47.58' bgs - Middle MW: 46.60' bgs - Deep MW: 58.70' bgs**

SIGNATURE OF PREPARER:

WELL CONSTRUCTION DETAILS

WELL NO. **MW75**

COMPANY NAME **RMC Consultants, Inc**	DRILLING SUBCONTRACTOR **Yellow Jacket Drilling Services, Inc.**	SHEET 1 OF 1 SHEETS
PROJECT: **Atlas D Missle Site 4 Focused Area RI Addendum**	DRILLING METHOD **Sonic Coring/Casing Advance**	
LOCATION **Atlas D Missle Site 4 - Laramie County, Wyoming**	FIELD GEOLOGIST **Jennifer Hussey**	DATE COMPLETED **8/21/2017**



DEVELOPMENT METHOD: **Surging w/ swab followed by bailing; pumping w/ Redi-Flo2 for final development**

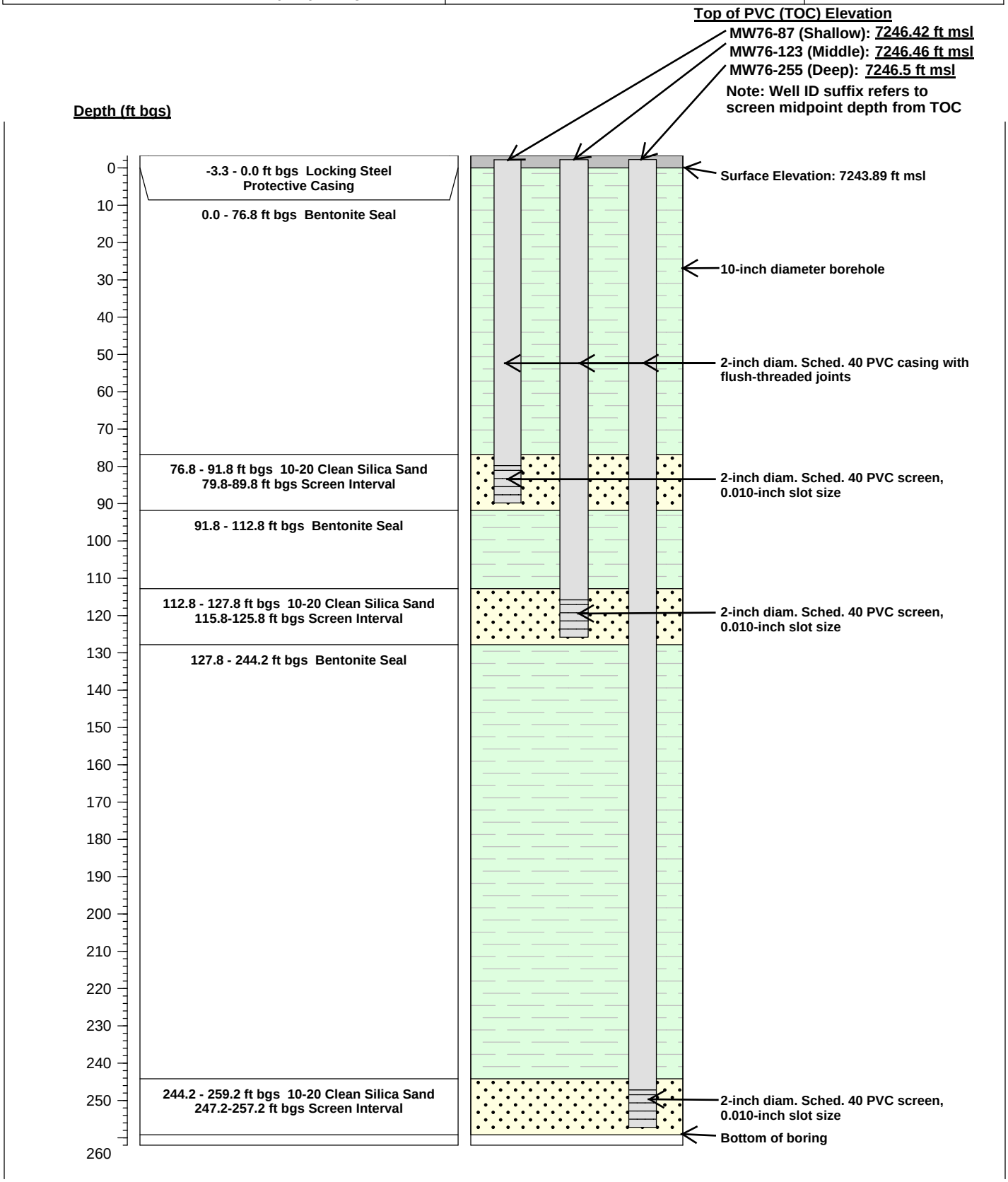
DEPTH TO WATER AFTER COMPLETION: **SWLs: Shallow MW: 75.45' bgs - Middle MW: 65.12' bgs - Deep MW: 132.90' bgs**

SIGNATURE OF PREPARER:

WELL CONSTRUCTION DETAILS

WELL NO. **MW76**

COMPANY NAME **RMC Consultants, Inc**	DRILLING SUBCONTRACTOR **Yellow Jacket Drilling Services, Inc.**	SHEET 1 OF 1 SHEETS
PROJECT: **Atlas D Missle Site 4 Focused Area RI Addendum**	DRILLING METHOD **Sonic Coring/Casing Advance**	
LOCATION **Atlas D Missle Site 4 - Laramie County, Wyoming**	FIELD GEOLOGIST **John Heil**	DATE COMPLETED **9/9/2017**



DEVELOPMENT METHOD: **Surging w/ swab followed by bailing; pumping w/ Redi-Flo2 for final development**

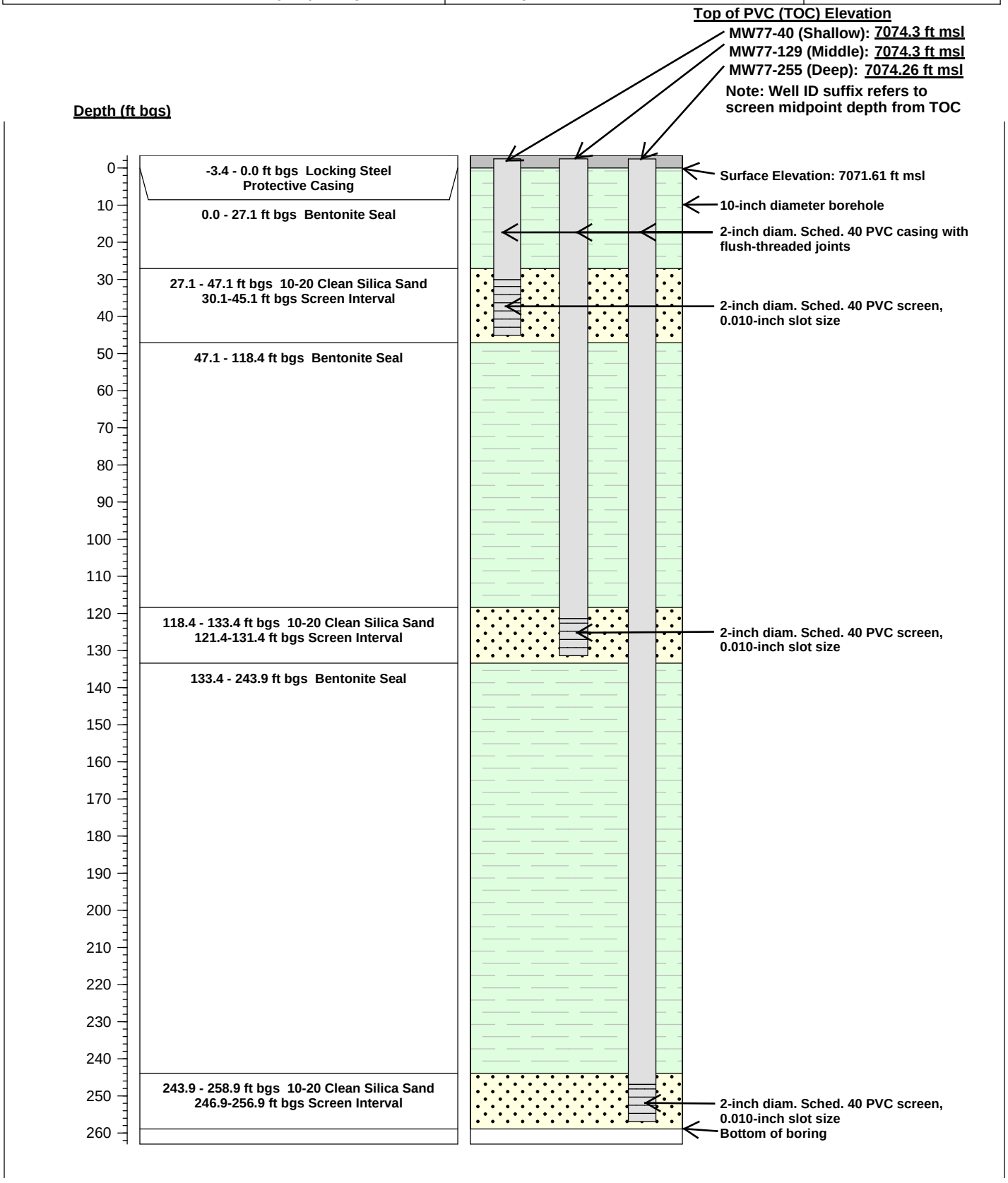
DEPTH TO WATER AFTER COMPLETION: **SWLs: Shallow MW: 78.89' bgs - Middle MW: 93.63' bgs - Deep MW: 273.13' bgs**

SIGNATURE OF PREPARER:

WELL CONSTRUCTION DETAILS

WELL NO. **MW77**

COMPANY NAME **RMC Consultants, Inc**	DRILLING SUBCONTRACTOR **Yellow Jacket Drilling Services, Inc.**	SHEET 1 OF 1 SHEETS
PROJECT: **Atlas D Missle Site 4 Focused Area RI Addendum**	DRILLING METHOD **Sonic Coring/Casing Advance**	
LOCATION **Atlas D Missle Site 4 - Laramie County, Wyoming**	FIELD GEOLOGIST **Todd Margulies**	DATE COMPLETED **8/23/2017**



DEVELOPMENT METHOD: **Surging w/ swab followed by bailing; pumping w/ Redi-Flo2 for final development**

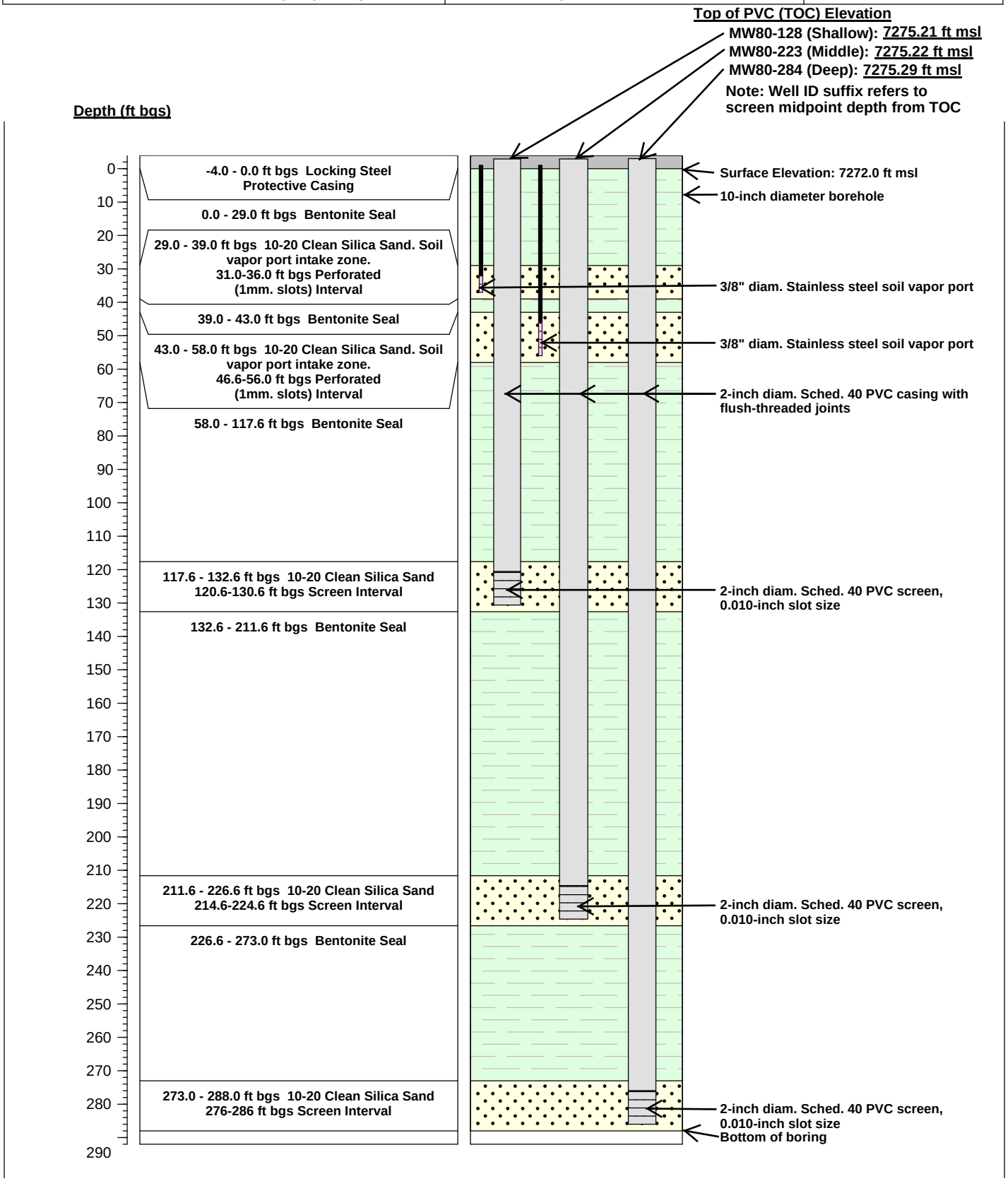
DEPTH TO WATER AFTER COMPLETION: **SWLs: Shallow MW: 25.42' bgs - Middle MW: 26.24' bgs - Deep MW: 18.49' bgs**

SIGNATURE OF PREPARER:

WELL CONSTRUCTION DETAILS

WELL NO. **MW80**

COMPANY NAME	DRILLING SUBCONTRACTOR	SHEET
RMC Consultants, Inc	**Yellow Jacket Drilling Services, Inc.**	1 OF 1 SHEETS
PROJECT: **Atlas D Missile Site 4 Focused Area RI Addendum**	DRILLING METHOD **Sonic Coring/Casing Advance**	
LOCATION **Atlas D Missile Site 4 - Laramie County, Wyoming**	FIELD GEOLOGIST **Jennifer Hussey**	DATE COMPLETED **8/17/2017**



DEVELOPMENT METHOD: **Surging w/ swab followed by bailing; pumping w/ Redi-Flo2 for final development**

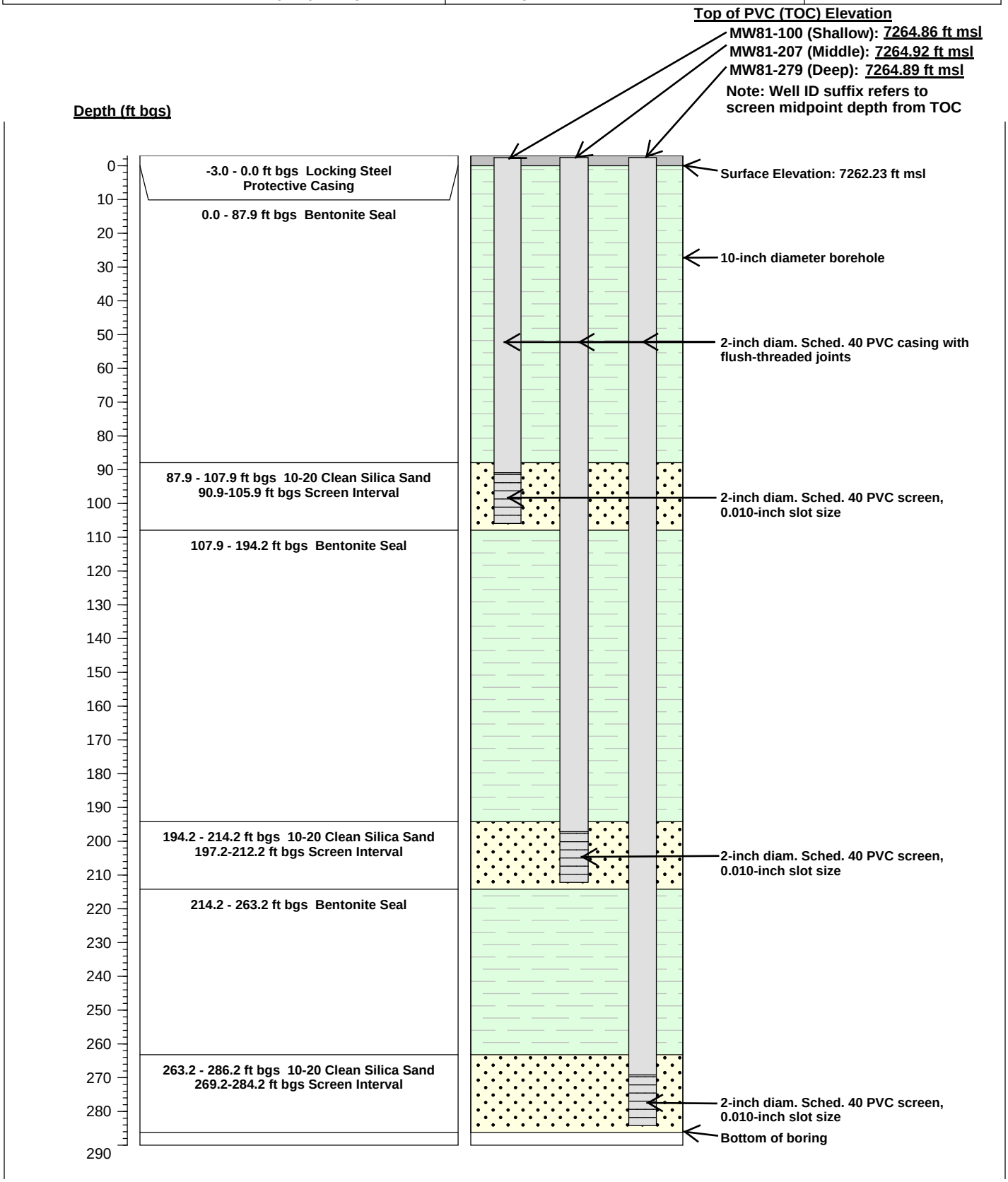
DEPTH TO WATER AFTER COMPLETION: **SWLs: Shallow MW: 68.54' bgs - Middle MW: 69.50' bgs - Deep MW: 63.67' bgs**

SIGNATURE OF PREPARER:

WELL CONSTRUCTION DETAILS

WELL NO. **MW81**

COMPANY NAME **RMC Consultants, Inc**	DRILLING SUBCONTRACTOR **Yellow Jacket Drilling Services, Inc.**	SHEET 1 OF 1 SHEETS
PROJECT: **Atlas D Missle Site 4 Focused Area RI Addendum**	DRILLING METHOD **Sonic Coring/Casing Advance**	
LOCATION **Atlas D Missle Site 4 - Laramie County, Wyoming**	FIELD GEOLOGIST **Todd Margulies**	DATE COMPLETED **7/24/2017**



DEVELOPMENT METHOD: **Surging w/ swab followed by bailing; pumping w/ Redi-Flo2 for final development**

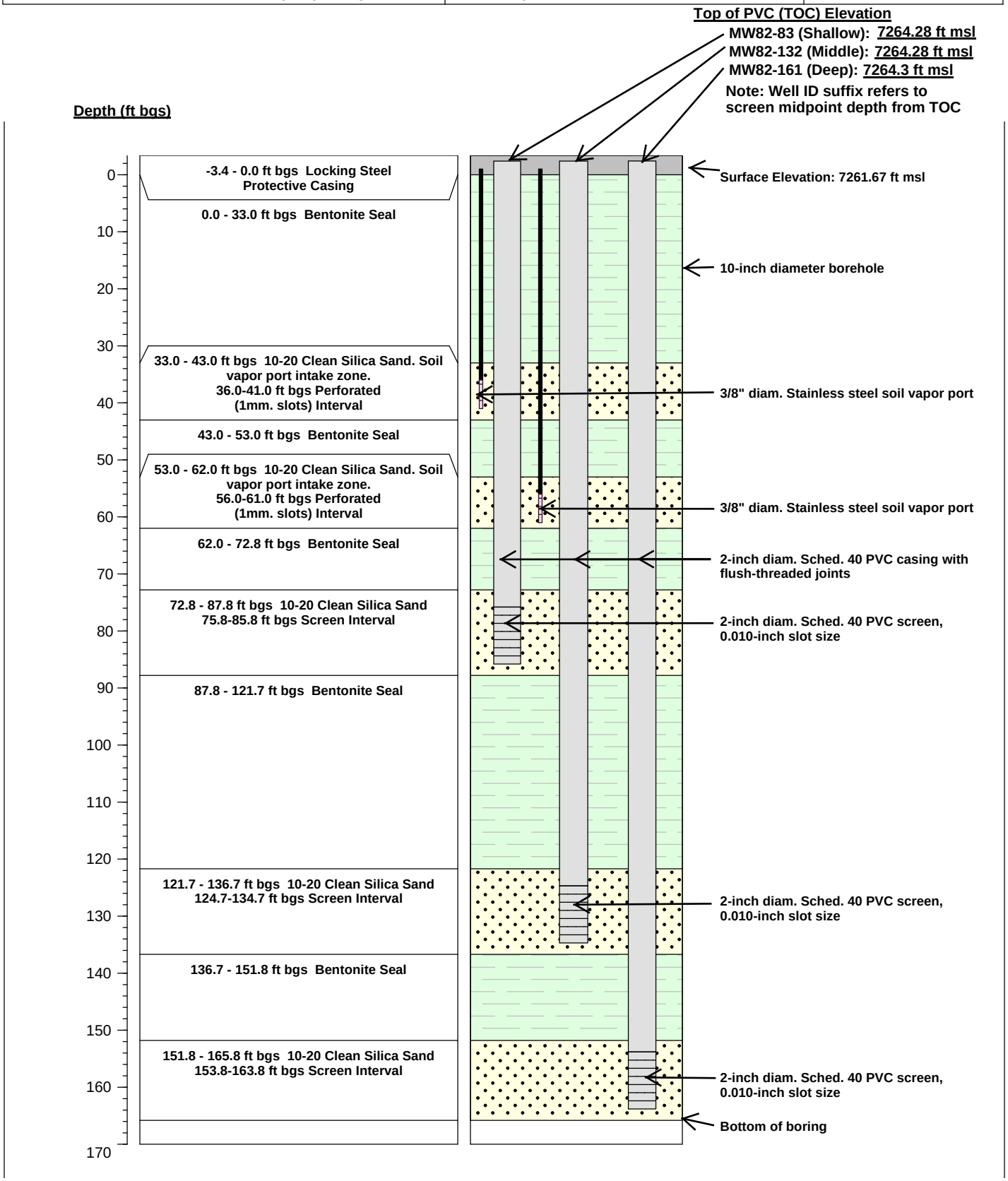
DEPTH TO WATER AFTER COMPLETION: **SWLs: Shallow MW: 63.49' bgs - Middle MW: 61.38' bgs - Deep MW: 53.88' bgs**

SIGNATURE OF PREPARER:

WELL CONSTRUCTION DETAILS

WELL NO. **MW82**

COMPANY NAME	DRILLING SUBCONTRACTOR	SHEET
RMC Consultants, Inc	**Yellow Jacket Drilling Services, Inc.**	1 OF 1 SHEETS
PROJECT: **Atlas D Missile Site 4 Focused Area RI Addendum**	DRILLING METHOD **Sonic Coring/Casing Advance**	
LOCATION **Atlas D Missile Site 4 - Laramie County, Wyoming**	FIELD GEOLOGIST **Todd Margulies**	DATE COMPLETED **8/21/2017**



DEVELOPMENT METHOD: **Surging w/ swab followed by bailing; pumping w/ Redi-Flo2 for final development**

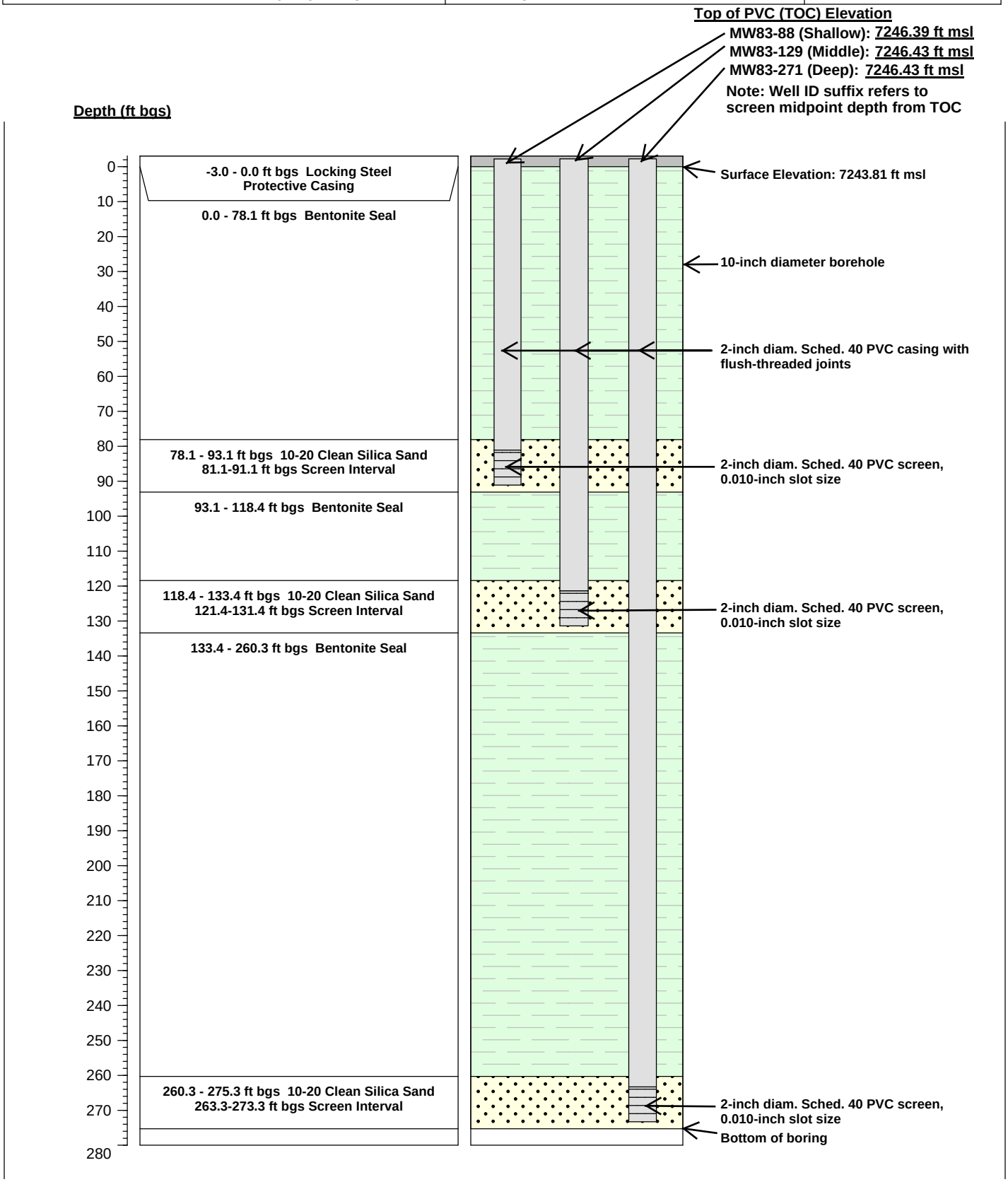
DEPTH TO WATER AFTER COMPLETION: **SWLs: Shallow MW: 64.13' bgs - Middle MW: 64.01' bgs - Deep MW: 64.23' bgs**

SIGNATURE OF PREPARER:

WELL CONSTRUCTION DETAILS

WELL NO. **MW83**

COMPANY NAME **RMC Consultants, Inc**	DRILLING SUBCONTRACTOR **Yellow Jacket Drilling Services, Inc.**	SHEET 1 OF 1 SHEETS
PROJECT: **Atlas D Missle Site 4 Focused Area RI Addendum**	DRILLING METHOD **Sonic Coring/Casing Advance**	
LOCATION **Atlas D Missle Site 4 - Laramie County, Wyoming**	FIELD GEOLOGIST **Todd Margulies**	DATE COMPLETED **8/17/2017**



DEVELOPMENT METHOD: **Surging w/ swab followed by bailing; pumping w/ Redi-Flo2 for final development**

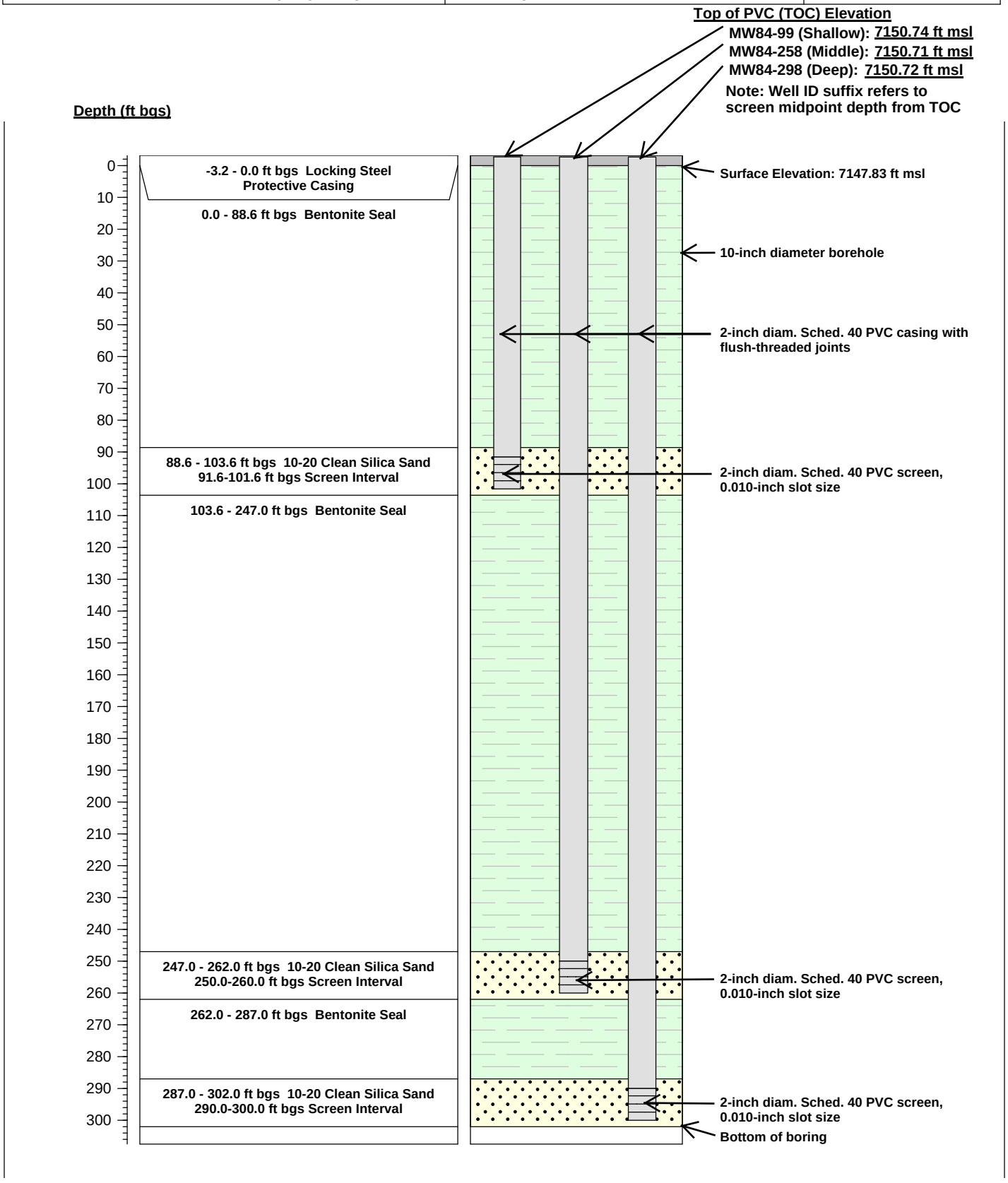
DEPTH TO WATER AFTER COMPLETION: **SWLs: Shallow MW: 74.78' bgs - Middle MW: 87.78' bgs - Deep MW: 49.53' bgs**

SIGNATURE OF PREPARER:

WELL CONSTRUCTION DETAILS

WELL NO. **MW84**

COMPANY NAME **RMC Consultants, Inc**	DRILLING SUBCONTRACTOR **Yellow Jacket Drilling Services, Inc.**	SHEET 1 OF 1 SHEETS
PROJECT: **Atlas D Missle Site 4 Focused Area RI Addendum**	DRILLING METHOD **Sonic Coring/Casing Advance**	
LOCATION **Atlas D Missle Site 4 - Laramie County, Wyoming**	FIELD GEOLOGIST **Todd Margulies**	DATE COMPLETED **9/7/2017**



DEVELOPMENT METHOD: **Surging w/ swab followed by bailing; pumping w/ Redi-Flo2 for final development**

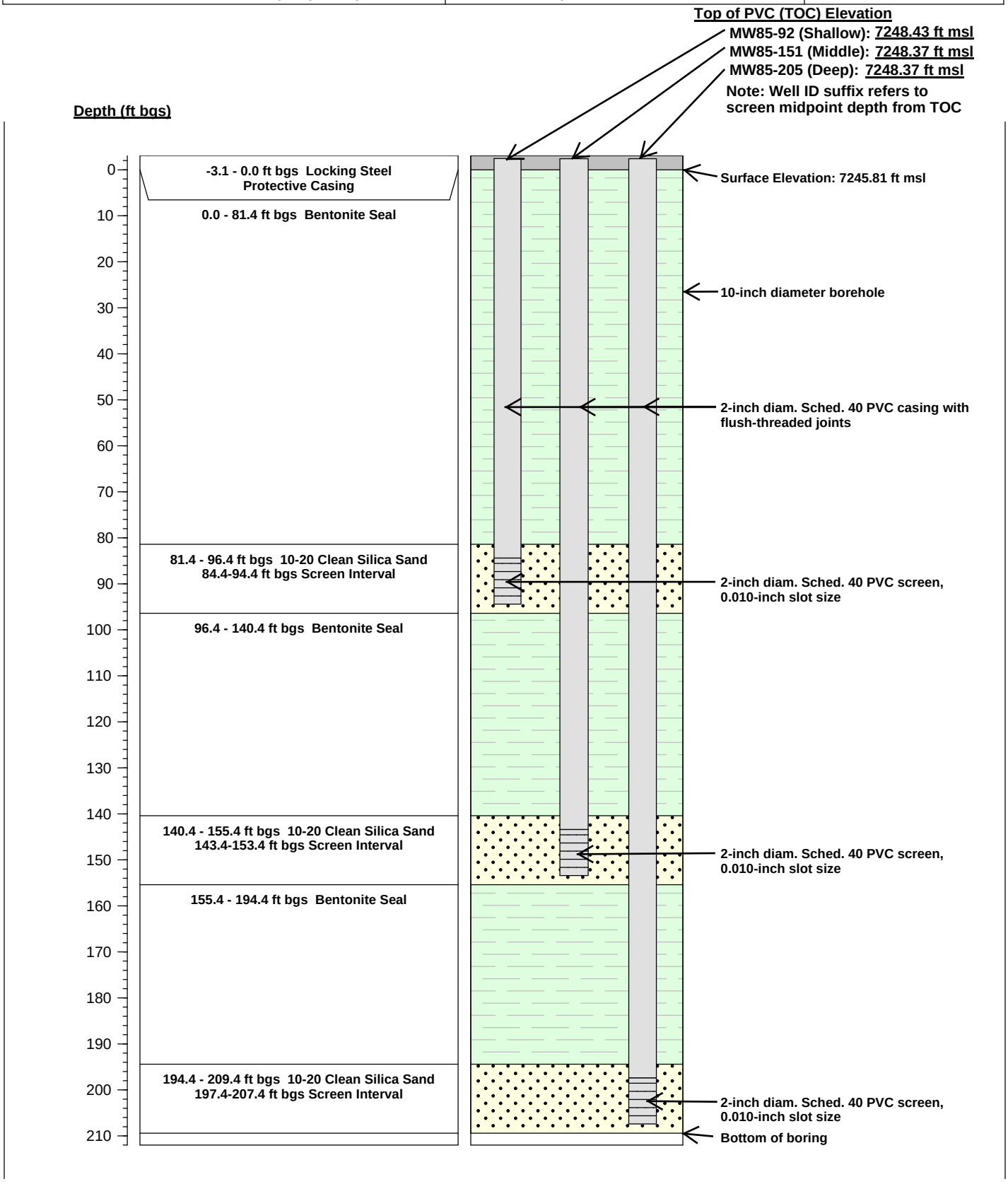
DEPTH TO WATER AFTER COMPLETION: **SWLs: Shallow MW: 94.79' bgs - Middle MW: 79.42' bgs - Deep MW: 97.73' bgs**

SIGNATURE OF PREPARER:

WELL CONSTRUCTION DETAILS

WELL NO. **MW85**

COMPANY NAME **RMC Consultants, Inc**	DRILLING SUBCONTRACTOR **Yellow Jacket Drilling Services, Inc.**	SHEET 1 OF 1 SHEETS
PROJECT: **Atlas D Missle Site 4 Focused Area RI Addendum**	DRILLING METHOD **Sonic Coring/Casing Advance**	
LOCATION **Atlas D Missle Site 4 - Laramie County, Wyoming**	FIELD GEOLOGIST **Jennifer Hussey**	DATE COMPLETED **9/27/2017**



DEVELOPMENT METHOD: **Surging w/ swab followed by bailing; pumping w/ Redi-Flo2 for final development**

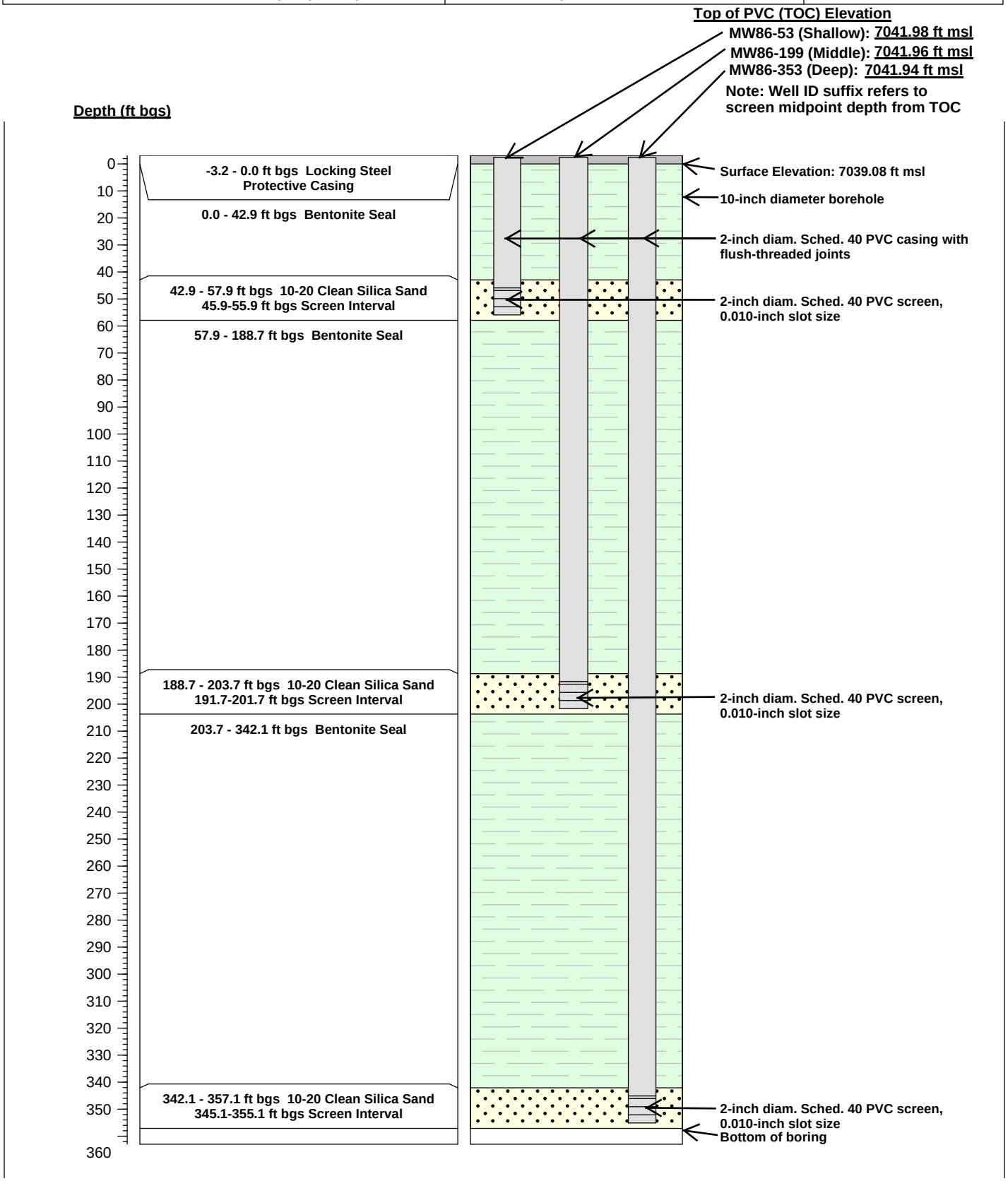
DEPTH TO WATER AFTER COMPLETION: **SWLs: Shallow MW: 84.86' bgs - Middle MW: 83.02' bgs - Deep MW: 75.86' bgs**

SIGNATURE OF PREPARER:

WELL CONSTRUCTION DETAILS

WELL NO. **MW86**

COMPANY NAME **RMC Consultants, Inc**	DRILLING SUBCONTRACTOR **Yellow Jacket Drilling Services, Inc.**	SHEET 1 OF 1 SHEETS
PROJECT: **Atlas D Missle Site 4 Focused Area RI Addendum**	DRILLING METHOD **Sonic Coring/Casing Advance**	
LOCATION **Atlas D Missle Site 4 - Laramie County, Wyoming**	FIELD GEOLOGIST **Jennifer Hussey**	DATE COMPLETED **8/10/2017**



DEVELOPMENT METHOD: **Surging w/ swab followed by bailing; pumping w/ Redi-Flo2 for final development**

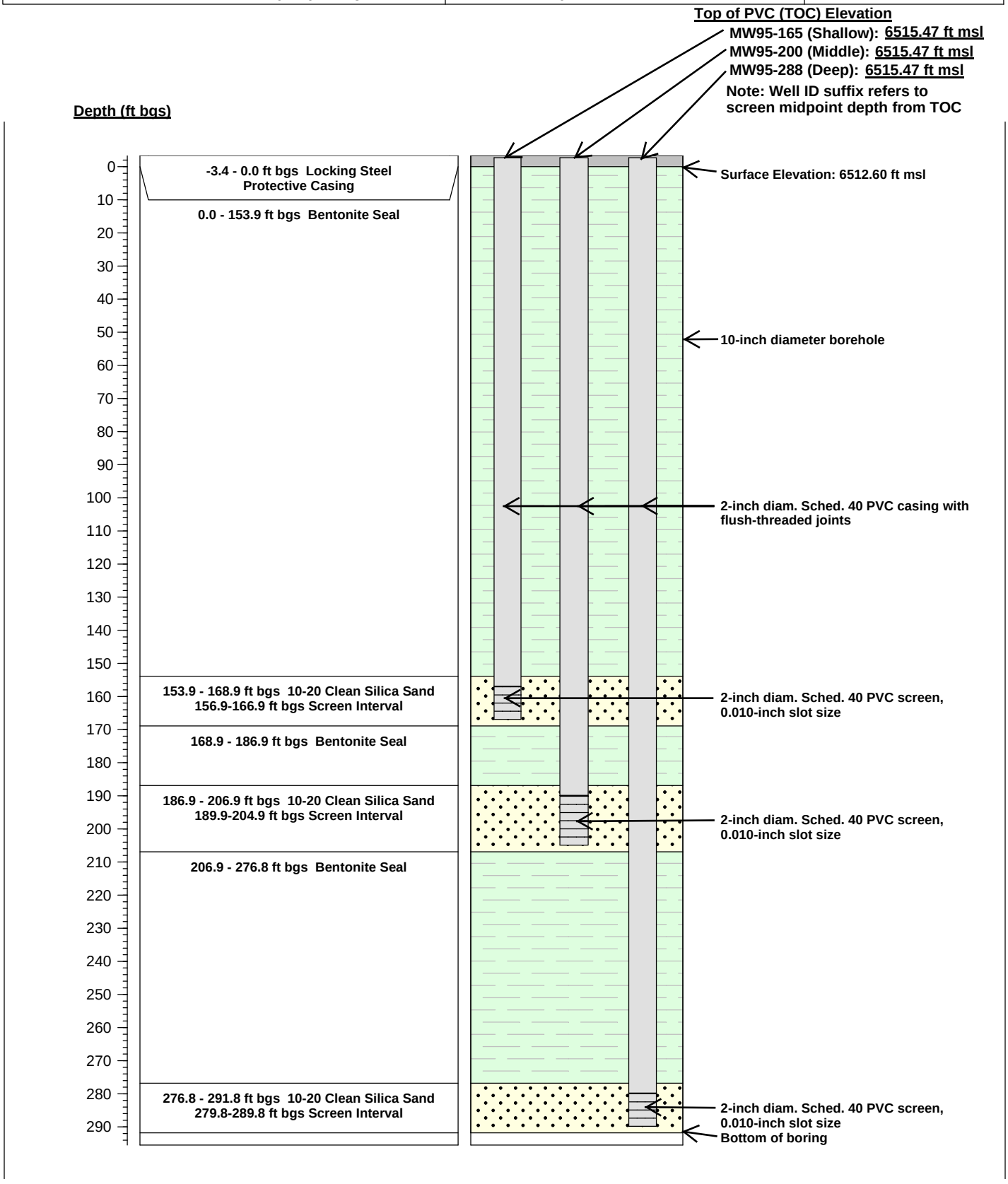
DEPTH TO WATER AFTER COMPLETION: **SWLs: Shallow MW: 3.83' bgs - Middle MW: 7.97' bgs - Deep MW: 8.76' bgs**

SIGNATURE OF PREPARER:

WELL CONSTRUCTION DETAILS

WELL NO. **MW95**

COMPANY NAME **RMC Consultants, Inc**	DRILLING SUBCONTRACTOR **Yellow Jacket Drilling Services, Inc.**	SHEET 1 OF 1 SHEETS
PROJECT: **Atlas D Missle Site 4 Focused Area RI Addendum**	DRILLING METHOD **Sonic Coring/Casing Advance**	
LOCATION **Atlas D Missle Site 4 - Laramie County, Wyoming**	FIELD GEOLOGIST **Jennifer Hussey**	DATE COMPLETED **9/17/2017**



DEVELOPMENT METHOD: **Surging w/ swab followed by bailing; pumping w/ Redi-Flo2 for final development**

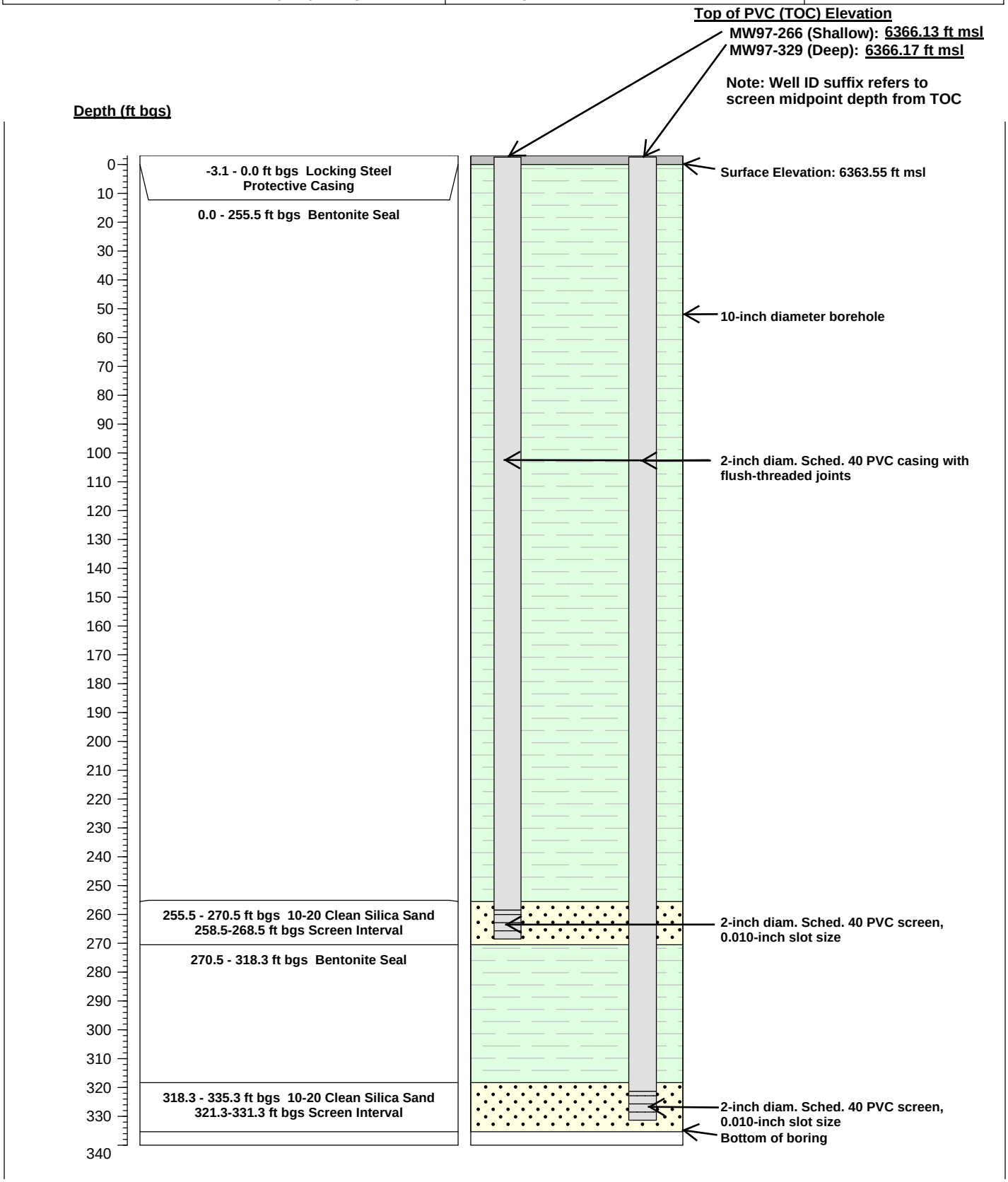
DEPTH TO WATER AFTER COMPLETION: **SWLs: Shallow MW: 96.60' bgs - Middle MW: 92.73' bgs - Deep MW: 86.14' bgs**

SIGNATURE OF PREPARER:

WELL CONSTRUCTION DETAILS

WELL NO. **MW97**

COMPANY NAME **RMC Consultants, Inc**	DRILLING SUBCONTRACTOR **Yellow Jacket Drilling Services, Inc.**	SHEET 1 OF 1 SHEETS
PROJECT: **Atlas D Missle Site 4 Focused Area RI Addendum**	DRILLING METHOD **Sonic Coring/Casing Advance**	
LOCATION **Atlas D Missle Site 4 - Laramie County, Wyoming**	FIELD GEOLOGIST **Todd Margulies**	DATE COMPLETED **9/19/2017**



DEVELOPMENT METHOD: **Surging w/ swab followed by bailing; pumping w/ Redi-Flo2 for final development**

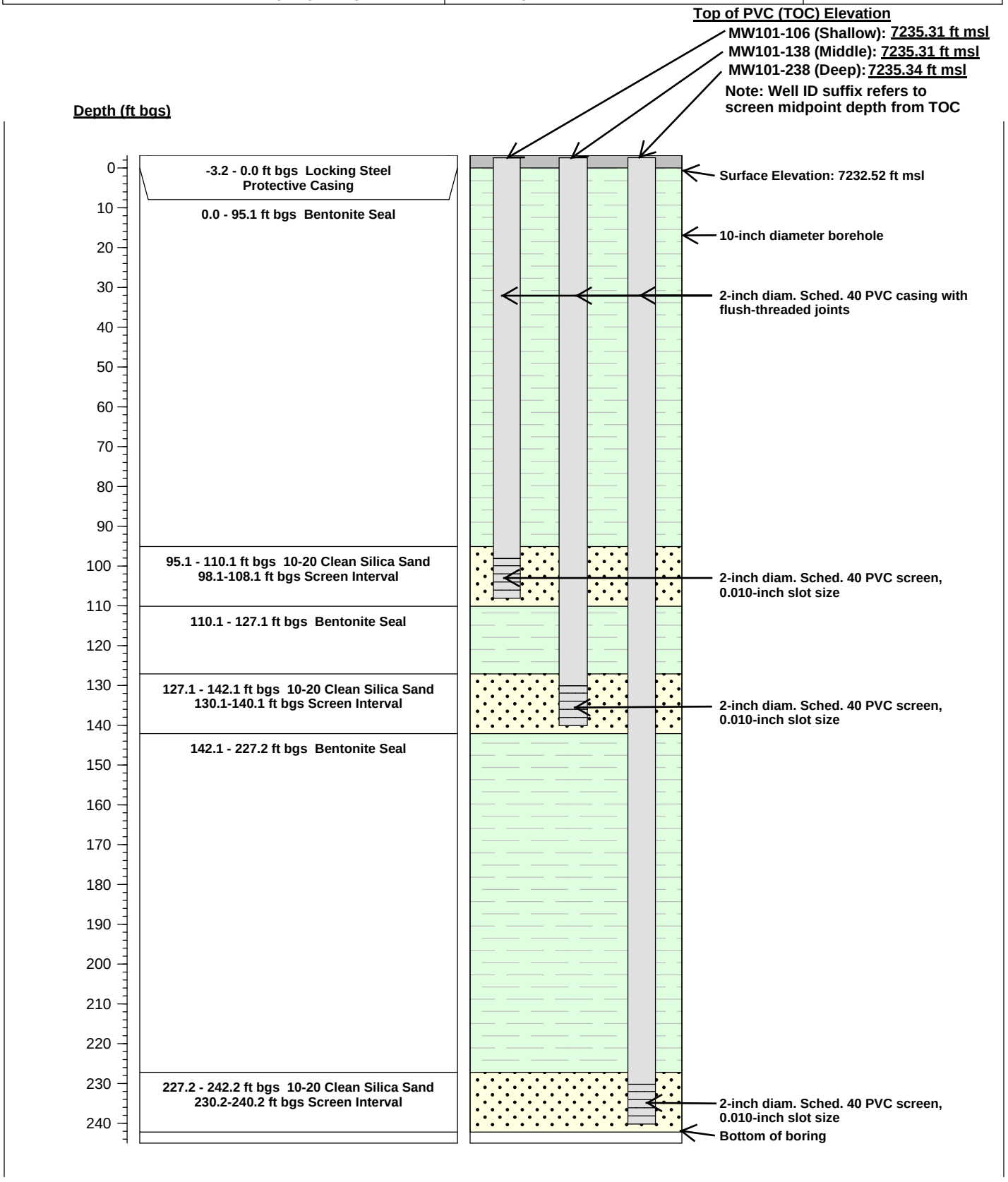
DEPTH TO WATER AFTER COMPLETION: **SWLs: Shallow MW: 23.22' bgs - Deep MW: 324.55' bgs**

SIGNATURE OF PREPARER:

WELL CONSTRUCTION DETAILS

WELL NO. **MW101**

COMPANY NAME	DRILLING SUBCONTRACTOR	SHEET 1 OF 1 SHEETS
RMC Consultants, Inc	**Yellow Jacket Drilling Services, Inc.**	
PROJECT: **Atlas D Missle Site 4 Focused Area RI Addendum**	DRILLING METHOD **Sonic Coring/Casing Advance**	
LOCATION **Atlas D Missle Site 4 - Laramie County, Wyoming**	FIELD GEOLOGIST **Todd Margulies**	DATE COMPLETED **9/10/2017**



DEVELOPMENT METHOD: **Surging w/ swab followed by bailing; pumping w/ Redi-Flo2 for final development**

DEPTH TO WATER AFTER COMPLETION: **SWLs: Shallow MW: 97.83' bgs - Middle MW: 98.60' bgs - Deep MW: 98.83' bgs**

SIGNATURE OF PREPARER:

A-4 Groundwater Sample Collection Logs

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/27/17

Project No.:
Field Crew: SB/RW
Weather: Cloudy, windy 50s

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: LaMotte 2020

Well ID: FEW4-MW03
Type of Well: Monitoring
Casing Stickup: 2.41
Static Water Level: 64.78
Well Depth/Diameter: 149.81 TOC / 2"

Purging Equipment: geosub
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
(149.81 – 64.78) x 0.17 = 14.5 gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1355		0.5	24.03	171.1	8.72	8.03	~~105.9~~ SB	NM 4.30	72.61	1.2 gal/min
1359		5	18.66	170.1	8.50	8.65	~~170.2~~ SB 275	4.25	83.61	1.2 gal/min
1402		10	16.42	169.1	8.52	7.53	~~104.1~~ 276	3.51	89.54	1.3 gal/min
1406	1	15	16.24	164.4	8.51	7.11	276	3.25	93.63	1.2 gal/min
1410		20	15.76	162.3	8.51	7.06	275	2.34	95.64	1.2 gal/min
1413		25	15.69	158.8	8.53	7.15	276	2.93	99.11	1.3 gal/min
1416	2	30	15.94	157.4	8.55	7.16	276	2.43	101.21	1.3 gal/min
1419	Sample	FEW4-MW03 collected								

Depth to water after purging/before sampling ____ ft TOC____
Sampling Equipment: geosub pump, discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
____ Preservative ____
____ Preservative ____

COMMENTS: Turbidity <5

Sampler Signature(s)

Na Ali'i

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/2/17

Project No.:
Field Crew: SB/RW
Weather: cloudy, breezy, 30s

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: LaMotte 2020

Well ID: FEW4-MW04
Type of Well: monitoring
Casing Stickup: 2.55
Static Water Level: 83.58' TOC
Well Depth/Diameter: 137.95 'TOC/2"

Purging Equipment: geo sub
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
(137.95 - 83.58) x 0.17 = 9.2 gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1130		0.5	0.52	97.4	8.51	8.87	275	4.46	90.27	1.2 gal/min
1134		5	0.46	107.3	8.68	9.13	276	3.62	105.61	1.2 gal/min
1137	(	10	0.46	107.6	8.78	8.72	278	3.13	114.10	1.3 gal/min
1140		14	0.44	100.0	8.84	8.58	279	3.96	119.28	1.3 gal/min
~~1147~~		~~15.5~~	~~0.43~~	Dewatered to pump. Will let recharge					~~8~~	
1157		15.5	0.40	105.1	8.84	8.82	279	3.60	87.47	1.3 gal/min
1200		20	0.45	104.5	8.67	8.75	279	2.29	105.21	1.3 gal/min
1204		25	0.42	114.1	8.76	8.71	279	1.55	113.55	1.2 gal/min
1208		30	0.43	114.0	8.80	8.46	279	1.82	119.32	1.2 gal/min
1208	Dewatered	to pump.	will	let recharge	before	sampling				
1227		31	0.46	112.5	8.78	8.45	279	1.56	86.94	
1229	sample	FEW4-MW04	collected							

Depth to water after purging/before sampling ____ ft TOC ____
Sampling Equipment: geo sub pump, discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
____ Preservative ____
____ Preservative ____

COMMENTS: GW @ 84.82 @ 1155
GW @ 84.28 @ 1225

Sampler Signature(s)

NA ALI'I

BD 1 OF 2

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/9/17

Project No.:
Field Crew: SB/RW
Weather: Sunny, windy, 20s

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: HACH 2100Q

Well ID: FEW4-MW05
Type of Well: monitoring
Casing Stickup: 2.69'
Static Water Level: 57.04
Well Depth/Diameter: 268.09' TOC /2"

Purging Equipment: redi flo 2
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
(268.09 – 57.04) x 0.17 = 35.9 gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
0907		0.2	12.82	160.4	7.15	7.96	293	2.60	55.43	1gal/min
0911		5	10.05	164.1	8.52	7.52	292	39.30	70.83	1gal/min
0919		10	9.62	161.5	8.89	7.56	293	8.68	75.80	0.7gal/min
0928		15	9.45	161.2	9.20	7.57	291	4.84	78.71	0.6gal/min
0935		20	9.23	159.6	9.29	7.56	292	6.73	81.90	0.7gal/min
0942		25	9.26	157.5	9.37	7.54	292	4.90	84.58	0.7gal/min
0949		30	9.12	156.2	9.55	7.54	292	3.35	85.10	0.7gal/min
0956		35	8.96	156.1	9.60	7.54	291	3.23	85.25	0.7gal/min
1004		40	8.43	155.0	9.70	7.54	291	2.95	87.30	0.7gal/min
1010		45	8.98	155.3	9.73	7.56	292	3.64	87.84	0.7gal/min
1018		50	9.00	154.2	9.76	7.54	292	2.78	88.03	0.7gal/min
1025		55	8.97	154.2	9.82	7.58	293	3.27	88.23	0.7gal/min
1033		60	8.93	153.5	9.78	7.60	293	2.60	88.33	0.7gal/min
1039		45	8.81	151.7	9.75	7.61	293	2.90	88.54	0.7gal/min

Depth to water after purging/before sampling _____ ft TOC_____
Sampling Equipment: redi flo 2 pump, discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: _____

Sampler Signature(s) _____

NA ALI'I

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/7/17

Project No.: _____
Field Crew: SB/RW
Weather: Sunny, windy, 20s

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: HACH 2100?

Well ID: FEW4-MW05
Type of Well: monitoring
Casing Stickup: 2.69'
Static Water Level: 57.04'
Well Depth/Diameter: 268.09' TOC/2"

Purging Equipment: redi flo 2
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1047		70	3.84	152.5	9.32	7.54	292	2.55	88.24	0.7gal/min
1054	2	79	0.81	151.4	9.35	7.60	293	4.23	88.27	0.7gal/min
1057	Sample	FEW4-	MW05	collected						

Depth to water after purging/before sampling _____ ft TOC _____
Sampling Equipment: redi flo 2 pump discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: Turbidity <5

Sampler Signature(s) [signature]

ONA ALI'I

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/21/17

Project No.:
Field Crew: SB/RW
Weather: Cloudy, Breezy, 30s

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556 ↓
ORP: ↓
Turbidity: LaMotte 2020

Well ID: FEW4-MW06
Type of Well: monitoring
Casing Stickup:
Static Water Level: 81.91' TOC
Well Depth/Diameter: 133.04' TOC /2"

Purging Equipment: Geosub
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
(133.04 – 81.91) x 0.17 = 8.7 gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond: (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
0809		0.5	0.55	158.2	7.75	8.12	330	24.0	90.28	1.3gal/min
0812		5	0.65	137.0	8.70	7.58	329	16.5	106.93	1.3gal/min
0815	1	10	0.43	135.7	8.78	7.38	329	22.1	116.20	1.3gal/min
0817		12.5	0.42	135.2	8.87	7.36	329	37.5	119.94	1.3gal/min
0817	Dewatered	to pump.	will let	recharge						
0918		13	0.58	109.3	7.39	8.56	325	31.7	85.24	1gal/min
0920		15	0.42	119.2	7.62	8.19	328	4.95	95.11	1gal/min
0922		17.5	0.40	122.8	8.75	8.11	329	6.54	103.39	1gal/min
0924		20	0.40	123.9	8.80	8.10	329	6.53	108.47	1.2gal/min
0926		22.5	0.40	124.3	8.85	8.09	329	6.55	111.91	1.2gal/min
0930		27.5	0.40	125.1	8.90	8.08	328	7.08	118.32	1.2gal/min
0931	Dewatered	to pump,	will let	recover	before	sampling				
1007		28	0.45	95.0	8.17	8.42	328	5.44	86.52	
1009	Sample	FEW4-MW06	collected							

Depth to water after purging/before sampling _____ ft TOC_____
Sampling Equipment: Geosub pump, discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: GW @ 82.19 @ 0914
GW @ 82.43 @ 1004

Sampler Signature(s)

ONA ALI'I

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/21/17

Project No.:
Field Crew: SG/RW
Weather: cloudy, breezy, 30s

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: LaMotte 2020

Well ID: FGW4-MW07
Type of Well: monitoring
Casing Stickup: 2.47'
Static Water Level: 60.45
Well Depth/Diameter: 112.87' TOC / 2"

Purging Equipment: geosub
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
(112.87 - 60.45) x 0.17 = 8.9 gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
0848		0.5	0.71	117.6	7.22	7.98	278	9.73	65.79	1.3gal/min
0851		5	0.43	110.6	8.56	8.12	274	8.06	83.51	1.3gal/min
0853		7.5	37.92	101.8	8.61	8.14	274	9.00	89.05	1gal/min
0856		10	0.76	101.5	8.63	8.12	274	11.9	94.74	1gal/min
0857		12.5	0.47	97.7	8.71	8.10	274	13.3	97.38	1gal/min
0859		15	0.44	95.6	8.74	8.09	274	8.73	100.11	1gal/min
0859	Dewatered	to pump, will let recover								
0943		15.2	0.57	92.7	8.31	8.55	274	8.31	68.29	1.2gal/min
0947		20	0.41	81.2	8.72	8.38	274	5.28	82.61	1.2gal/min
0951		25	0.43	59.2	8.91	8.31	274	7.27	89.42	1.2gal/min
0955		30	0.42	43.0	9.00	8.31	274	5.64	93.28	1.2gal/min
0956	Dewatered	to pump, will let recharge			before Sampling					
1034		31	0.56	91.1	8.20	8.77	274	5.23	67.38	
1034	Sample	FGW4-MW07 Collected								

Depth to water after purging/before sampling _____ ft TOC _____
Sampling Equipment: geo sub pump, discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 6 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: GW @ 59.30 @ 0940
GW @ 59.35 @ 1030
Blind duplicate sample FGW4-MW145 collected at 1130

Sampler Signature(s)

NA ALTI

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 10/25/18

Project No.: _____
Field Crew: SB/RS
Weather: Sunny, windy, 60s

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: HACH 2100P

Well ID: FEW4-MW10
Type of Well: monitoring
Casing Stickup: _____
Static Water Level: 9.22
Well Depth/Diameter: 34.16' TOC/2"

Purging Equipment: red: Flo 2
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
(34.16 – 9.22) x 0.17 = 4.2 gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1648		1	10.50	136.0	9.02	8.25	325	71.3	9.90	1gal/min
1650		2.5	8.75	143.6	8.66	7.70	327	22.6	10:00	1gal/min
1652	1	5	8.23	142.2	8.68	7.48	327	58.8	10.03	1gal/min
1654		7.5	8.23	144.4	8.63	7.39	329	15.0	10.05	1gal/min
1657	2	10	8.21	145.2	8.67	7.33	329	10.7	10.10	1gal/min
1658		12.5	8.10	145.3	8.66	7.31	328	6.09	10.09	1gal/min
1700	3	15	8.05	144.7	8.63	7.31	328	5.53	10.11	1gal/min
1702		17.5	7.99	144.1	8.62	7.29	329	4.24	10.15	1gal/min
1705	Sample	FEW4-MW10 collected								

Depth to water after purging/before sampling _____ ft TOC _____
Sampling Equipment: red: Flo 2 pump, discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: Turbidity <5

Sampler Signature(s) [signature]

Na Ali'i

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 10/20/17

Project No.: E15.0114.201
Field Crew: JNH, SB
Weather: sunny, cool, windy

Analytical Instruments: pH: YSI 556
Temp:
D.O:

Specific Conductivity: YSI 556
ORP:
Turbidity: HACH 2100 Q

Well ID: FEW4-MW12R
Type of Well: monitoring
Casing Stickup: 3.53
Static Water Level: 153.55
Well Depth/Diameter: 164.78

Purging Equipment: Disposable bailer
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x 0.17 gal/ft = 1 casing volume (gals)

(164.78) - 153.55) 0.17 = 1.9 gals

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1109		0.25	12.05	202.6	10.62	7.78	276	43.5	-NA-	
1113		0.75	10.37	208.7	10.14	7.57	251	185		
1116		1.25	10.26	209.9	10.06	7.50	265	365		
1120		1.75	9.76	205.4	9.90	7.54	274	388		
1124	1	2.25	9.35	203.1	10.03	7.59	280	393		
1128		2.75	9.55	201.3	10.04	7.61	279	555		
1132		3.25	9.48	199.5	10.07	7.63	279	875		

Depth to water after purging/before sampling _____ ft TOC _____
Sampling Equipment: disposable bailer

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: _____

Sampler Signature(s) _____

Na Ali'i

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/2/17

Project No.: _____
Field Crew: SB/RW
Weather: WINDY, cloudy, 50s

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: _____

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: HACH 2100?

Well ID: FEW4-MW13
Type of Well: monitoring
Casing Stickup: 2.33'
Static Water Level: 164.89
Well Depth/Diameter: 218.03' TOC / 2"

Purging Equipment: ~~[illegible]~~ SS Geosub/ redi flo2
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
(218.03 – 164.89) x 0.17 = 9.0 gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1000		0.5	16.16	200.2	7.61	6.95	247	5.92	169.18	—
1513		0.5	14.26	149.5	9.00	7.00	245	11.4	178.12	0.2gal/min
1520		5	10.14	155.3	12.22	7.31	248	190	179.48	0.2gal/min
1527	1	10	9.73	148.3	12.24	7.42	247	120	183.00	0.2gal/min
1535		15	9.57	154.3	12.27	7.33	248	70.3	183.40	0.6gal/min
1543	2	20	9.44	159.5	12.22	7.27	248	38.7	183.32	0.4gal/min
1550		25	9.40	160.7	12.32	7.27	247	25.3	183.35	0.2gal/min
1612	3	30	9.30	170.1	11.38	7.24	247	17.5	186.70	0.25gal/min
1618		35	9.30	166.2	11.89	7.28	248	22.2	188.53	0.25gal/min
1624		40	9.32	165.4	11.93	7.24	248	35.4	188.61	0.25gal/min
1630		45	9.39	168.2	11.89	7.26	247	25.2	189.19	0.25gal/min
1636		50	9.34	170.4	11.87	7.25	247	24.6	189.34	0.25gal/min
1643		55	9.34	171.4	11.90	7.23	248	25.7	189.30	
1646	Sample	FEW4-MW13 collected								

Depth to water after purging/before sampling _____ ft TOC _____
Sampling Equipment: redi flo 2 pump, discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: well too deep for SS Geosub, return w/ redi flo pump
1555 - generator runs out of gas, 1610 resume purging

Sampler Signature(s) [signature]

NA ALI'I

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/5/17

Project No.:
Field Crew: SS/RW
Weather: sunny, breezy, 40s

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: HACH 2100p

Well ID: FEW4 - MW15
Type of Well: monitoring
Casing Stickup: 2.46'
Static Water Level: 93.38
Well Depth/Diameter: 143.49' TOC / 2"

Purging Equipment: red: flo 2
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
(143.49 - 93.38) x 0.17 = 9.4 gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1200		0.1	11.17	123.0	9.36	8.60	270	20.8	101.87	0.4gal/min
1204		2.5	8.77	120.2	9.81	8.06	268	10.9	106.99	0.5gal/min
1209		5	8.37	122.2	10.76	7.81	268	4.33	110.64	0.5gal/min
1214		7.5	8.45	119.6	10.91	7.81	268	3.87	111.91	0.5gal/min
1220	1	10	8.72	114.7	10.62	7.87	268	2.27	112.58	0.5gal/min
1225		12.5	8.74	113.4	10.78	7.80	269	2.21	112.59	0.5gal/min
1229		15	8.86	113.4	10.63	7.77	270	1.85	112.73	0.5gal/min
1235		17.5	8.94	121.1	10.77	7.76	272	1.80	112.95	0.5gal/min
1240	2	20	9.09	122.4	10.68	7.74	273	1.46	112.97	0.5gal/min
1242	Sample	FEW4-MW15 collected, Samples FEW4-MW15 MS and FEW4-MW15MSD also collected								

Depth to water after purging/before sampling _____ ft TOC _____
Sampling Equipment: red: flo 2 pump discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
3 Preservative HCl
3 Preservative HCl

COMMENTS: turbidity <5
MS/MSD collected

Sampler Signature(s)

Na Alii

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/5/17

Project No.: _____
Field Crew: SB, RW
Weather: _____

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556 ↓
ORP: _____
Turbidity: HACH 2100Q

Well ID: FEW4-MW19
Type of Well: Monitoring
Casing Stickup: 2.55'
Static Water Level: 78.66
Well Depth/Diameter: 127.85' TOC / 2"

Purging Equipment: red. Flo 2
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)

(127.85 − 78.66) x 0.17 = 8.4 gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1420		0.2	9.10	102.8	8.49	8.59	301	4.90	80.00	0.5gal/min
1423		2.5	6.22	104.4	4.53	8.04	302	5.51	95.21	0.5gal/min
1427		5	6.42	106.6	10.31	7.89	302	5.03	103.11	0.5gal/min
1432		7.5	7.05	105.3	10.69	7.89	303	7.51	112.16	0.5gal/min
1433	Dewatered to pump will let ~~1.5 ch~~ recharge									
1502		8	12.61	124.0	8.24	7.94	300	1.96	91.21	0.5gal/min
1505		10	10.60	117.9	9.49	7.87	301	1.20	100.01	0.5gal/min
1507		11	10.15	116.6	10.43	7.88	301	2.02	103.22	0.5gal/min
1509		12	9.73	116.6	10.89	7.86	301	2.58	107.22	0.5gal/min
1511		13	9.53	116.8	10.86	7.86	301	3.27	110.20	
1512	Dewatered no pump will let recharge									
1551		13.2	11.20	117.4	8.75	8.22	302	0.63	89.40	0.5gal/min
1553		14	11.21	111.8	9.03	8.10	303	0.67	92.62	0.5gal/min
1555		15	10.69	110.0	9.47	8.07	303	1.23	95.69	0.5gal/min

Depth to water after purging/before sampling _____ ft TOC _____
Sampling Equipment: red. Flo 2 pump, discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
3 Preservative HCl
_____ Preservative _____

COMMENTS: 1500 GW @ 83.90, will re purge
1543 GW @ 79.60
Turbidity < 5
Duplicate sample FEW4-MW37 collected @ "1552"
Sample FEW4-MW19 collected at 1558

Sampler Signature(s) _____

NA ALI'I

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 10/25/17

Project No.: 615.019.201
Field Crew: JMH, KZ
Weather: Sunny, 52°F, windy

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: HACH 2100Q

Well ID: FEW4-MW20
Type of Well: monitoring
Casing Stickup: 2.7'
Static Water Level: 149.18' TOC
Well Depth/Diameter: 267' TOC / 2"

Purging Equipment: Redi-Flo 2 submersible pump
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x 0.17 gal/ft = 1 casing volume (gals)
(267 - 149.18) 0.17 = 20.0 gals

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1034 pump	on	0	3.01	-345.7	11.02	7.81	250	60.5	164.11	—
1042		5	2.67	-242.7	11.99	7.71	245	72.1	180.68	0.8
1050		10	4.90	-326.0	12.77	7.66	208	45.4	195.25	0.6
1058		15	5.34	-318.6	12.87	7.93	238	34.9	198.74	0.6
1106		20	5.42	-308.6	13.35	7.77	255	35.6	202.51	0.6
1115		25	5.54	-297.1	13.16	7.84	241	17.6	211.71	0.55
1124		30	5.39	-293.7	13.77	7.90	241	18.5	218.61	0.8
1129		35	5.79	-293.1	13.69	7.86	241	18.4	220.70	0.55
1133 collect FEW4-MW20 3 blind dup				~~MW30~~ MW32	@ 1232					

Depth to water after purging/before sampling 220.70 ft TOC 217.67
Sampling Equipment: collect from discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3+3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: _____

Sampler Signature(s) _____

NA ALI'I

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 6/24/17

Project No.:
Field Crew: SB/RS
Weather: Sunny, Windy, 50s

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556 ↓
ORP: ↓
Turbidity: HACH 2100P

Well ID: FEW4-MW21
Type of Well: monitoring
Casing Stickup: 2.20'
Static Water Level: 21.10
Well Depth/Diameter: 49.9' TOC / 2"

Purging Equipment: Redi-Flo 2
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
(49.90 – 21.10) x 0.17 = 4.9 gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1551		1	9.48	173.0	9.37	7.90	254	89.3	21.75	1gal/min
1554		2.5	9.46	187.5	9.14	7.32	3.06	58.5	21.74	1gal/min
1556	1	5	9.42	187.2	9.15	7.29	306	18.3	21.81	1gal/min
1559		7.5	9.40	185.0	9.15	7.24	261	7.38	21.82	1gal/min
1600	2	10	9.32	183.7	9.15	7.24	264	4.19	21.84	1gal/min
1602		12.5	9.30	182.9	9.13	7.23	266	3.07	21.84	1gal/min
1604	3	15	9.30	182.4	9.14	7.22	268	2.36	21.85	1gal/min
1607		17.5	9.28	182.7	9.13	7.19	273	1.67	21.88	1gal/min
1609	4	20	9.24	178.9	9.13	7.25	261	1.37	21.90	1gal/min
1611		22.5	9.28	178.1	9.14	7.24	261	0.87	21.90	1gal/min
1614	5	25	9.23	176.4	9.17	7.26	261		21.91	1gal/min
1616	Sample	FEW4-MW21 collected								

Depth to water after purging/before sampling _____ ft TOC _____
Sampling Equipment: Redi-Flo 2 pump, discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: Turbidity <5

Sampler Signature(s)

ONA ALTI

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 10/24/17

Project No.:
Field Crew: SB/RS
Weather: Sunny, Breezy, 50s

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: HACH 2100H

Well ID: FGW4-MW22
Type of Well: monitoring
Casing Stickup: 2.38'
Static Water Level: 13.92
Well Depth/Diameter: 22.38' TOC / 2"

Purging Equipment: ~~red. flo~~ SB Bailer
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
(22.38 - 13.92) x 0.17 = 1.4 gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1450		0.5	8.30	116.0	11.73	6.39	349	168		0.3gal/min
1453	1	1.5	6.24	134.9	11.40	7.42	399	201		0.3gal/min
1456		2.5	6.02	137.6	11.53	7.16	417	335	14.02	0.3gal/min
1459	2	3.5	5.87	140.4	11.35	7.04	419	812		0.3gal/min
1503	3	4.5	5.77	142.0	11.34	6.99	419	646	14.03	0.3gal/min
1506		5	5.56	143.3	11.43	6.92	418	502		"
1508	4	6	5.79	144.3	11.26	6.92	412	314		"
1511		7	5.76	145.6	11.22	6.89	367	403	14.02	"
1515		8	5.80	147.6	11.24	6.85	370	401		"
1518		9	5.70	147.8	11.23	6.86	371	315		"
1520		10	5.67	148.6	11.32	6.85	374	297		"
1522		10.5	5.58	148.8	11.35	6.84	373	277		"
1525	Sample	FGW4-MW22 collected							13.99	

Depth to water after purging/before sampling 13.99 ft TOC
Sampling Equipment: Bailer

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
Preservative
Preservative

COMMENTS:

Sampler Signature(s)

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/16/17

Project No.: 415.019.201
Field Crew: JM, KZ
Weather: Sunny, 57°F, windy

Analytical Instruments: pH: YSI 556
Temp:
D.O:

Specific Conductivity: YSI 556
ORP:
Turbidity: Hach 2100 Q

Well ID: FEW4-MW24
Type of Well: monitoring
Casing Stickup: 1.27
Static Water Level: 65.52' TOC
Well Depth/Diameter: 138.94' TOC / 2"

Purging Equipment: Red-Flo 2 submersible pump
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x 0.17 gal/ft = 1 casing volume (gals)

(138.94 - 65.52) 0.17 = 12.4 gals

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1141 pump	on	0.1	7.85	-211.0	10.06	7.59	331	7.17	73.60	gpm
1151		5	5.62	-226.1	10.47	7.57	337	3.91	95.65	0.5
1204		10	5.88	-231.8	11.84	7.61	339	3.27	114.72	~~0.38~~ 0.38
1219		15	6.01	-226.7	12.41	7.51	339	4.60	123.08	0.33
1234		20	6.27	-231.6	12.80	7.60	337	4.20	127.32	0.83
1235	collect FEW4-MW24 3 bottles dup MW141 @ 1235									

Depth to water after purging/before sampling 127.32 ft TOC 127.83
Sampling Equipment: collect from discharge tubing

COMMENTS:

Analysis to be performed and Number of Containers:
VOCs 3+3 Preservative HCl
Preservative
Preservative

Sampler Signature(s)

Na Ali'i

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/4/17

Project No.:
Field Crew: SB/FW
Weather: cloudy, windy, 40s

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: HACH 2100 P

Well ID: FEW4 - MW25
Type of Well: nested monitoring
Casing Stickup: 2.61
Static Water Level: 85.25
Well Depth/Diameter: 163.46 'TOC 12"

Purging Equipment: redi Flo 2
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
(163.46 - 85.25) x 0.17 = 13.3 gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1015		0.2	11.20	96.7	8.38	7.35	315	33.2	94.90	0.5gal/min
1624		5	9.57	100.4	9.91	7.59	315	627	98.74	0.5gal/min
1033		10	9.00	99.2	9.93	7.80	316	>1000	101.16	0.5gal/min
1041	1	15	8.46	103.1	9.96	7.70	319	936	103.41	0.6gal/min
1050		20	8.63	103.5	9.97	7.63	319	286	103.94	0.5gal/min
1100		25	8.67	110.9	9.93	7.62	316	178	104.27	0.5gal/min
1106	2	30	8.79	120.3	9.92	7.47	316	68.6	104.37	0.6gal/min
1117		35	8.84	125.4	9.92	7.46	316	46.4	104.50	0.5gal/min
1124	3	40	8.92	129.4	10.03	7.43	316	42.5	104.10	0.5gal/min
1135		45	8.95	133.9	10.03	7.39	316	41.3	104.26	0.5gal/min
1139	Sample	FEW4 - MW25		Collected						

Depth to water after purging/before sampling 104.26 ft TOC
Sampling Equipment: redi Flo 2 pump discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
____ Preservative ____
____ Preservative ____

COMMENTS:

Sampler Signature(s)

NAAUI

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/2/17

Project No.: E15.019201
Field Crew: JNH, KZ
Weather: foggy, 37°F, windy

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: HACH 2100 Q

Well ID: FEW4-MW26
Type of Well: monitoring
Casing Stickup: 2.75'
Static Water Level: 97.30' TOC
Well Depth/Diameter: 227.85' TOC/2"

Purging Equipment: Redi-Flo2 Submersible pump
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x 0.17 gal/ft = 1 casing volume (gals)

(227.85 - 97.30) 0.17 = 22.2 gals

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1051 pump on		0.1	4.91	-272.6	8.11	7.89	345	23.7	99.47	—
1100		5	8- 4.42	-270.9	8.86	7.58	337	27.7	126.54	0.55
1110		10	4.24	-272.1	9.80	7.61	337	44.1	144.36	0.5
1119		15	3.96	-273.0	10.34	7.62	339	37.2	158.95	0.55
1129		20	4.20	-272.7	11.15	7.63	340	38.7	170.80	0.5
1139		25	4.21	-271.0	11.18	7.59	340	36.2	183.60	0.55
1140	collect FEW4-MW26									

Depth to water after purging/before sampling 183.60 ft TOC 185.50
Sampling Equipment: collect from discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
____ Preservative ____
____ Preservative ____

COMMENTS: ____

Sampler Signature(s) [signature]

NA ALI'I

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/2/17

Project No.: E15.019.201
Field Crew: JVH, KZ
Weather: Partly cloudy, 37°F, breezy

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: HACH 2100Q

Well ID: FEW4-MW27
Type of Well: Monitoring
Casing Stickup: 2.53'
Static Water Level: 71.24'
Well Depth/Diameter: 133.63' TOC / 2"

Purging Equipment: Redi-flo 2 Submersible pump
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x 0.17 gal/ft = 1 casing volume (gals)
(133.63 - 71.24) 0.17 = 10.6 gals

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1240 pump on		0.1	8.57	-250.4	8.97	7.50	336	8.67	75.35	90m
1244		3	8.45	-251.6	9.34	7.36	338	19.7	81.0	0.75
1250		6	8.45	-258.1	9.50	7.45	336	12.6	81.47	0.5
1255		9	8.48	-260.0	9.53	7.50	335	7.26	82.11	0.6
1259		12	8.44	-260.1	9.43	7.50	334	5.54	84.70	0.75
1303		15	8.53	-259.5	9.44	7.48	332	4.75	85.09	0.75
1305	collect FEW4-MW27									

Depth to water after purging/before sampling 85.09 ft TOC 84.05
Sampling Equipment: water from discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
____ Preservative ____
____ Preservative ____

COMMENTS: ____

Sampler Signature(s) [signature]

NA ALI'I

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/30/17

Project No.:
Field Crew: SB/RW
Weather: Sunny, 40s

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: La Motte 2020

Well ID: FEW4-MW28
Type of Well: Monitoring
Casing Stickup: 2.82'
Static Water Level: 92.13'
Well Depth/Diameter: 133.07' TOC / 2"

Purging Equipment: geosub
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
(133.07 – 92.13) x 0.17 = 7.0 gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1102		0.2	0.47	102.4	9.07	7.66	271	14.4	93.68	1 gal/min
1104		2.5	0.38	104.3	9.21	8.20	272	37.2	93.68	1 gal/min
1107		5	0.36	118.7	9.28	8.01	272	18.9	93.73	1 gal/min
1110	1	7.5	0.36	123.3	9.27	7.83	273	6.46	93.78	1 gal/min
1113		10	0.37	124.9	9.29	7.75	273	3.41	93.82	1 gal/min
1116		12.5	0.36	127.7	9.29	7.77	273	2.06	93.88	1 gal/min
1118	2	15	0.36	128.3	9.32	7.80	273	1.76	93.88	1 gal/min
1120	Sample	FEW4-MW28 collected								

Depth to water after purging/before sampling _____ ft TOC_____
Sampling Equipment: geosub pump, discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: Turbidity <5

Sampler Signature(s) [signature]

Na Ali'i

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/17/17

Project No.:
Field Crew: SB / RW
Weather: Windy, Cloudy, 40s

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: Lamotte 2020

Well ID: FEW4-MW29
Type of Well: monitoring
Casing Stickup: 2.52
Static Water Level: 58.64
Well Depth/Diameter: 112.12 ' TOC / 2"

Purging Equipment: geosub
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
(112.12 – 58.64) x 0.17 = 9.1 gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
0944		0.2	0.59	135.1	8.70	8.09	353	48.6	64.92	1.2gal/min
0945		2.5	0.44	143.6	8.85	7.84	352	8.55	71.23	1.2gal/min
0947		5	0.44	150.7	8.90	7.65	352	11.9	74.45	1.2gal/min
0949		7.5	0.44	154.8	8.94	7.59	352	9.13	77.51	1.2gal/min
0950	1	10	0.43	156.0	8.95	7.56	351	11.8	79.44	1.2gal/min
0952		12.5	0.44	154.9	8.92	7.56	350	17.5	81.30	1.2gal/min
0954		15	0.44	154.7	8.94	7.56	349	19.4	82.01	1.2gal/min
0956		17.5	0.43	154.4	8.96	7.55	347	20.3	82.80	1.2gal/min
0957	2	20	0.43	154.6	8.97	7.57	347	21.2	83.71	1.2gal/min
0959	Sample	FEW4-MW29 collected								

Depth to water after purging/before sampling _____ ft TOC _____
Sampling Equipment: geo sub pump, discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS:

Sampler Signature(s)

ONA ALI'I

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/19/17

Project No.: E15.019.201
Field Crew: JNH, KZ
Weather: cloudy, 39°F, breezy

Analytical Instruments: pH: YSI 556
Temp:
D.O:

Specific Conductivity: YSI 556
ORP:
Turbidity: HACH 2100Q

Well ID: FEW4-MW30
Type of Well: monitoring
Casing Stickup: 2.95'
Static Water Level: 78.25' TOC
Well Depth/Diameter: 118.55' TOC / 2"

Purging Equipment: Redi-flo2 Submersible pump
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x 0.17 gal/ft = 1 casing volume (gals)
(118.55 - 78.25) 0.17 = 6.9 gals

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1420 Pump on		0.1	6.23	-259.6	8.93	7.59	347	8.92	85.55	—
1427	1	5	5.71	-279.9	10.00	7.55	341	—	—	0.71
1428 pump off, well discharge										
1505		D.T.W 85.0' TOC, pump on								
1509 ~~1505~~		6	5.18	-279.6		7.32	340	4.68	—	—
1513 pump off, well discharged				10 gals removed						
1600 ~~1400~~ D.T.W 85.0' pump on 7			6.05	-275.8	8.45	7.24 ~~7.05~~	337	4.52	87.91	
1605 ~~1405~~ collect FEW4-MW30 & blind dup MW143 @ 1505										

Depth to water after purging/before sampling 87.91' ft TOC 91.50'
Sampling Equipment: collect from discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3+3 Preservative HCl
Preservative
Preservative

COMMENTS:

Sampler Signature(s)

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 10/23/17

Project No.: B15-019.224
Field Crew: SMH, KE
Weather: Sunny, 50's windy

Analytical Instruments: pH: YSI 556
Temp: ✓
D.O: ✓

Specific Conductivity: YSI 556 ✓
ORP:
Turbidity: HACH 2100Q

Well ID: FEW4-MW31
Type of Well: monitoring
Casing Stickup: 2.66
Static Water Level: 176.34
Well Depth/Diameter: ~~214~~ 213.76 / 2"

Purging Equipment: Redi-Flo2 submersible pump
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ~~0.2~~ 213.76 gal/ft = 1 casing volume (gals)
(214.1 – 176.34) 0.17 = ~~5.9~~ 6.4 gals

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate gpm
1209 pump on		0.1	10.08	-334.5	12.55	7.91	306	27.9	174.39	
1215		5	10.18	-331.2	12.09	7.83	305	4.97	174.44	0.8
1221		10	10.19	-330.6	12.06	7.79	304	4.93	174.44	0.8
1226		15	10.21	-329.2	12.10	7.77	304	4.02	174.44	0.8
1230 collect FEW4-MW31 @ FEW4-MW31					130 C	1330, blind dup				

Depth to water after purging/before sampling 174.44 ft TOC 174.0
Sampling Equipment: collect from discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3x 3 Preservative HCl
Preservative
Preservative

COMMENTS:

Sampler Signature(s)

Na Ali'i

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 10/24/17

Project No.: 615.0019.201
Field Crew: JMH, KZ
Weather: Sunny, 68, windy

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: HACH 2100Q

Well ID: FEW4-MW33
Type of Well: Monitoring
Casing Stickup: 2.44
Static Water Level: 169.04
Well Depth/Diameter: 201.49 ; TOC/2"

Purging Equipment: Redi-flo2 Submersible pump
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x 0.17 gal/ft = 1 casing volume (gals)

(201.49 - 169.04) 0.17 = 5.5 gals

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1621 pump on		0.1	9.31	-324.5	9.50	8.09	784	302	169.71	gpm
1625		3	9.26	-312.6	10.85	7.74	283	123	169.73	0.75
1629		6	9.35	-305.6	11.01	7.58	283	744	169.73	~~0.75~~ 1
1632		9	9.38	-307.1	11.00	7.62	284	34.0	169.73	0.75
1635		12	9.39	-307.6	10.94	7.66	283	20.2	169.73	1
1638		15	9.34	-307.8	10.95	7.68	284	4.65	169.73	1
1640 collect FEW4-MW33										

Depth to water after purging/before sampling 109.73 ft TOC 169.65
Sampling Equipment: collect from discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: _____

Sampler Signature(s) _____

ONA ALI'I

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 10/20/17

Project No.: E15.014.201
Field Crew: JM, SB
Weather: Sunny, 65

Analytical Instruments: pH: YSI 556
Temp:
D.O:

Specific Conductivity: YSI 556
ORP:
Turbidity: HACH 2100Q

Well ID: FEW4-MW34
Type of Well: Monitoring
Casing Stickup:
Static Water Level: ~~230.04'TOC~~ 230.12'TOC
Well Depth/Diameter: 241.96'/4

Purging Equipment: Bailer, disposable
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x 0.17 gal/ft = 1 casing volume (gals)
(241.96 - 230.12) 0.17 = 2.0 gals

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
0938			7.71	178.6	11.12	7.76	278	NM	NA	1
0943		~~0.5~~ 0.75	4.68	199.2	10.40	7.22	276	48.9		
0950		1.25	4.30	205.0	10.32	7.16	277	152		
0957		1.75	3.81	203.8	10.35	7.25	278	238		
1005	1	2.25	3.49	200.7	10.27	7.40	280	338		
1011		2.75	3.67	202.7	10.27	7.41	265	474		
1035		3.0	3.52	195.4	10.37	7.45	278	454		
1040 collect FEW4-MW34										

Depth to water after purging/before sampling _____ ft TOC_____
Sampling Equipment: collect from bailer

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: 10:13 - well dewatered, will wait to recover before sampling

Sampler Signature(s)

ONA ALI'I

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 10/22/17

Project No.: E15.019.201
Field Crew: JWH, KZ
Weather: Partly Cloudy, 50°F windy

Analytical Instruments: pH: YSI 556
Temp:
D.O:

Specific Conductivity: YSI 556
ORP:
Turbidity: HACH 2100Q

Well ID: FEW4-MW36
Type of Well: monitoring
Casing Stickup:
Static Water Level: 31.1' TOC
Well Depth/Diameter: 45' / 2"

Purging Equipment: ~~Redi-Flo 2~~ SS Geosub submersible pump
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x 0.17 gal/ft = 1 casing volume (gals)
(45 - 31.1) 0.17 = 2.4 gals

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1343 Qtum	on	0.1	6.14	-342.4	10.02	7.77	402	130	31.18	N/A
1345		1	6.11	~~-326.7~~ -329.7	9.03	7.44	406	67.6	31.23	1/2 gal/min
1347		2	6.13	-328.7	8.96	7.44	405	35.2	31.23	1/2 gal/min
1352 ~~1350~~		~~5~~ 3	6.15	-329.1	8.91	7.40	405	25.2	31.21	0.6 gal/min
1356		4	6.10	-329.0	8.92	7.38	405	12.5	31.21	1/2 gal/min
1400 collect FEW4-MW36		3 Min	36 mg/mgD							

Depth to water after purging/before sampling 31.21 ft TOC 31.18
Sampling Equipment: collect from discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
Preservative
Preservative

COMMENTS: 3 consecutive stable reading w/ turbidity ≤ 5

Sampler Signature(s)

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 7/22/17

Project No.: E15.619.201
Field Crew: JMH, KZ
Weather: windy, 55°F, partly cloudy

Analytical Instruments: pH: YSI 556
Temp:
D.O:

Specific Conductivity: YSI 556
ORP:
Turbidity: HACH 2100Q

Well ID: FEW4-MW37
Type of Well: monitoring
Casing Stickup:
Static Water Level: 28.79 TOC
Well Depth/Diameter: 45' / 2.11

Purging Equipment: GS Geo Sub submersible pump
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x 0.17 gal/ft = 1 casing volume (gals)
(45 - 28.79) 0.17 = ~~2.75~~ 2.8 gals

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1443 pump on		0.1	8.25	-356.4	8.86	7.74	353	25.6	28.86	
1446		2	8.12	-332.7	8.74	7.32	352	11.7	28.93	1gal/min
1448		4	7.97	-332.2	8.69	7.22	353	6.52	28.92	1gal/min
1450		6	7.63	-333.0	8.69	7.27	352	4.20	28.90	~~1 gal/min~~ 1gal/m
1453		8	7.52	-333.0	8.73	7.34	354	2.62	28.90	0.8gal/min
1455 collect FEW4-MW37										

Depth to water after purging/before sampling 28.90 ft TOC 28.89
Sampling Equipment: collect from discharge tubing

COMMENTS: 3 consecutive stable readings w/ turbidity <5

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
Preservative
Preservative

Sampler Signature(s)

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/13/17

Project No.:
Field Crew: SB/RW
Weather: Cloudy, 30s, Breezy

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSi 556
ORP: ↓
Turbidity: LaMotte 2020

Well ID: FEW4-MW39
Type of Well: monitoring
Casing Stickup:
Static Water Level: ~~93.82~~ 73.95
Well Depth/Diameter: 118.12' TOC / 2"

Purging Equipment: geosub
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ___ gal/ft = 1 casing volume (gals) 7.5
(118.12 – ~~93.82~~ 73.95) x 0.17 = ~~4~~ 7.5 gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1524		0.5	0.53	100.3	8.28	8.23	393	76.9	81.91	1gal/min
1531		2.5	0.44	99.5	8.64	8.02	393	27.1	87.28	1gal/min
1532		5	0.56	100.1	8.71	7.93	383	14.2	88.81	2gal/min
1534	1	7.5	0.43	103.4	8.73	7.89	378	13.2	88.78	1.5gal/min
1535		10	0.40	104.7	8.76	7.83	383	11.2	88.84	2gal/min
1537		12.5	0.41	105.7	8.77	7.85	388	17.2	89.54	1.5gal/min
1538	2	15	0.41	106.2	8.78	7.81	391	22.0	90.54	1.5gal/min
1540		17.5	0.40	107.2	8.79	7.79	393	43.0	91.35	1.5gal/min
1541		20	0.40	108.0	8.79	7.81	393	29.3	91.89	1.5gal/min
1544		25	0.40	109.0	8.80	7.75	390	18.9	93.04	1.2gal/min
1548		30	0.41	108.9	8.80	7.81	387	20.7	93.68	1.3gal/min
1550		32.5	0.41	109.7	8.81	7.81	388	21.4	94.31	1.5gal/min
1552	Sample	FEW4-MW39 collected								

Depth to water after purging/before sampling ___ ft TOC ___
Sampling Equipment: geosub pump, discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
___ Preservative ___
___ Preservative ___

COMMENTS:

Sampler Signature(s)

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/2/17

Project No.:
Field Crew: SS TRW
Weather: cloudy, 40s

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: HACH 2100P

Well ID: FEW4-MW 40
Type of Well: monitoring
Casing Stickup: 2.3'
Static Water Level: 64.83'
Well Depth/Diameter: 99.0' TOC / 2"

Purging Equipment: SS Geosub
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)

(99.0 - 64.83) x 0.17 = 5.8 gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1121		0.5	14.29	193.4	8.06	8.02	282	74.2	73.14	0.75gal/min
1124		2	9.75	197.1	8.39	8.53	292	41.2	78.95	0.5gal/min
1126		3	9.84	198.1	8.53	8.81	241	60.1	82.90	0.5gal/min
1128		4	9.40	197.0	8.89	8.71	284	73.5	87.48	0.5gal/min
1131		6	10.04	191.2	8.84	8.60	NM	NM	NM	0.75gal/min
1137	Dewatered to pump, shut OFF pump, will let recharge									
1153		7	12.50	172.1	8.36	8.25	284	120	77.65	0.5gal/min
1155		8	12.37	176.8	8.66	8.03	284	145	82.20	0.5gal/min
1158		9	11.78	184.5	9.05	7.72	284	135	86.65	0.5gal/min
1159	Dewatered to pump, shut OFF pump, will collect sample post-recharge									
1214		9.5	13.94	178.3	8.57	8.05	284	44.0	77.74	0.5gal/min
1220		10.5	13.31	177.6	8.66	7.91	284	71.0	81.10	0.5gal/min
1222	Sample FEW4-MW40 collected									

Depth to water after purging/before sampling _____ ft TOC _____
Sampling Equipment: Geosub pump, discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: Duplicate sample FEW4-MW134 collected

Sampler Signature(s)

NA ALI'I

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 10/19/17

Project No.: _____
Field Crew: JH, RW
Weather: P.Cloudy, breezy, 60°F

Analytical Instruments: pH: YSI-556
Temp: "
D.O: "

Specific Conductivity: YSI-556
ORP: "
Turbidity: Hach 2100P

Well ID: MW43R-242
Type of Well: _____
Casing Stickup: _____
Static Water Level: 109.57 'TOC
Well Depth/Diameter: 250.10 'TOC/2"

Purging Equipment: Grundfos Redi-Flo2 pump
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
141.03' x .17 = 24 gal = 1 casing vol

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1630	Begin purging		6.96	77.7	10.09	7.94	315	>1000	110.77	1.6
1633	0.2	5	7.24	117.0	10.95	7.69	316	304	110.81	1.6
1636	0.4	10	7.31	124.2	11.14	7.76	315	146	110.82	1.66
1639	0.6	15	7.31	99.5	11.16	7.79	315	99.2	110.84	1.7
1642	0.8	20	7.33	102.0	11.15	7.79	315	51.8	110.84	1.7
1646	1.0	25	7.34	106.0	11.15	7.79	315	28.9	110.87	1.25
1649		30	7.33	103.4	11.16	7.80	315	20.4	110.85	1.7
1652	1.5	35	7.34	100.0	11.20	7.80	316	13.3	110.86	1.7
1655		40	7.35	110.1	11.18	7.80	316	9.46	110.86	1.7
1659	1.9	45	7.36	109.4	11.17	7.80	316	5.92	110.86	1.25
1702	2.1	50	7.36	108.9	11.18	7.81	316	4.94	110.86	1.7
1705	2.3	55	7.36	108.5	11.19	7.81	316	3.28	110.86	1.7
1708	2.5	60	7.62	108.0	11.17	7.81	316	3.08	110.86	1.7
1711	2.7	65	7.36	107.7	11.18	7.81	316	2.03	110.86	1.7

1713 Reduce pump rate

Depth to water after purging/before sampling 109.86' ft TOC _____
Sampling Equipment: Redi-Flo2 pump

COMMENTS: Initial H_2O purged is silty-gray/tan-brown
1714 Collect Sample FEW4-MW43R-242 for VOCs

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCL
_____ Preservative _____
_____ Preservative _____

Sampler Signature(s) _____

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 10/19/17

Project No.:
Field Crew: RW JH
Weather: P.cloudy, sl. Breezy, 68°F

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI-554
ORP: "
Turbidity: Hach 2100P

Well ID: MW43R-262
Type of Well: Nested monitoring
Casing Stickup: 2.68'
Static Water Level: 111.98' TOC
Well Depth/Diameter: 271.2' TOC / 2"

Purging Equipment: Grundfos Redi-Flo 2 SS pump
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x .17 gal/ft = 1 casing volume (gals)
159.22 x .17 = 27 gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1430	Begin	purging	5.58	-363.4	11.77	7.81	324	737	116.02	1.25
* 1434	0.2	5	6.41	-372.1	11.03	7.68	312	18.7	112.27	1.25
1442	0.5	13	7.38	47.9	11.32	7.69	313	10.0	118.12	1.0
1448	0.7	20	6.96	38.7	11.31	7.51	310	2.80	118.29	1.2
1453	0.93	25	6.92	65.6	11.32	7.57	310	1.91	118.53	1.0
1458	1.1	30	6.90	103.5	11.37	7.64	309	1.93	118.71	1.0
1503	1.3	35	6.97	113.3	11.50	7.65	309	1.21	118.84	1.0
1508	1.5	40	6.89	112.5	11.50	7.68	309	1.07	119.01	1.0
1514	1.7	45	6.91	108.9	11.53	7.70	309	1.06	119.06	0.8
1519	1.9	50	6.91	112.0	11.54	7.71	309	1.09	119.17	1.0
1524	2.0	55	6.92	106.2	11.55	7.71	309	0.94	119.29	1.0
1526	Collect	sample	FEW4-MW43R-262							

Depth to water after purging/before sampling 119.29 ft TOC
Sampling Equipment: Redi-Flo 2 pump

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCL
Preservative
Preservative

COMMENTS: * Re-calibrate ORP sensor at 1435 to 240 mV
Note: Reduce flow immediately prior to sample collection

Sampler Signature(s)

NA ALI'I

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 10/20/17

Project No.:
Field Crew: JH, CW
Weather: Sunny, windy, 68°F

Analytical Instruments: pH: YSI-556
Temp:
D.O:

Specific Conductivity: YSI 556
ORP:
Turbidity: HACH 2100P

Well ID: MW44R-207
Type of Well: nested monitoring
Casing Stickup: 2.38'
Static Water Level: 189.95' TOC
Well Depth/Diameter: 214.58' TOC / 2"

Purging Equipment: Redi-Flo 2 pump
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
24.63' x .17 = 4.2 gal = 1 casing vol

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1346	Begin purging	~~4~~	8.31	-260.4	11.14	7.73	327	109	191.28	1.0
1350	1		7.72	-276.6	12.05	7.53	323	65.4	191.12	~~0.7~~ 1.0
1353	1.4	6	9.87	-289.9	12.43	7.72	323	18.3	191.11	~~1.0~~ 0.7
~~1355~~		8	10.01	-300.0	12.48	7.79	324	9.72	191.10	1.0
1357		10	9.96	-301.6	12.51	7.75	323	5.42	191.12	1.0
1359	2.9	12	9.96	-309.6	12.54	7.77	324	3.57	191.12	1.0
1401		14	10.00	-318.4	12.42	7.77	324	2.47	191.12	1.0
1403		16	10.01	-314.2	12.47	7.75	324	2.14	191.15	1.0
1404	4.3	18	10.04	-317.6	12.43	7.75	323	1.63	191.15	0.7
1408	Reduce pump rate									
1410	Collect sample FEW4-MW44R-207									

Depth to water after purging/before sampling 191.5 ft TOC
Sampling Equipment: Grundfos Redi-Flo 2 pump

COMMENTS: steady pumping Rate achieved

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
Preservative
Preservative

Sampler Signature(s)

Na Ali'i

A

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 10/20/17

Project No.: _____
Field Crew: JH, RW
Weather: Clear, Sunny, Windy ~ 70°F

Analytical Instruments: pH: YSI-556
Temp: "
D.O: "

Specific Conductivity: YSI 556
ORP: "
Turbidity: Hach 2100P

Well ID: MW44R-242
Type of Well: Vesta monitoring
Casing Stickup: 2.44'
Static Water Level: 189.75' TOC
Well Depth/Diameter: 249.77' TOC / 2"

Purging Equipment: Grundfos Redi-Flo2 pump
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ___ gal/ft = 1 casing volume (gals)
60.02 x 0.17 = 10.2 gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1145	Begin purging	5	8.58	-108.1	11.36	7.30	348	279	192.22	1.6
1148			8.41	-17.7	11.81	7.05	313	>1000	191.56	1.6
1153		10	8.29	-48.5	12.26	7.24	313	223	191.53	1.0
1158	1.5	15	8.53	-95.6	12.49	7.50	312	—	191.55	1.0
1204		20	8.44	-126.0	12.69	7.59	312	8.18	191.53	1.2
1210		25	8.50	-112.7	12.65	7.63	312	4.45	191.56	1.2
1213	2.9	30	8.56	-110.3	12.67	7.64	312	2.60	191.55	1.6
1216		35	8.59	-119.7	12.68	7.64	312	1.74	191.56	1.0
1223		40	8.64	-122.8	12.62	7.65	312	1.17	191.54	1.0
1225	4.4	45	8.67	-122.8	12.58	7.65	312	1.23	191.52	1.0
1230	Collect Samples	FFW4-MW44R-242 + MS/MSD								

Depth to water after purging/before sampling 191.50 ft TOC _____
Sampling Equipment: Grundfos Redi-Flo 2 pump

COMMENTS: Reduced pump rate prior to sample collection

Analysis to be performed and Number of Containers:
VOCs 9 Preservative HCl
_____ Preservative _____
_____ Preservative _____

Sampler Signature(s) _____

Na Alii

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 10/20/17

Project No.:
Field Crew: JH, RW
Weather:

Analytical Instruments: pH: YSI-556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI-556
ORP: "
Turbidity: HACH 2100P

Well ID: MW44R-308
Type of Well: Nested monitoring
Casing Stickup: 2.43'
Static Water Level: 192.69
Well Depth/Diameter: 316.23' TOC / 2"

Purging Equipment: Grundfos RediFlo 2 pump
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
123.54' x .17 = 21 gal = 1 casing vol

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
~~1052~~ 0916	Begin purging		0.58	-135.6	10.15	7.39	440	5.54	230.27	1.7
* 0919	0.2	5	0.39	-73.9	11.28	7.31	443	6.58	236.99	1.7
0927	0.5	10	0.25	-73.5	12.49	7.37	431	4.49	248.98	0.6
* 0935	0.7	15	0.25	-113.2	13.32	7.45	434	5.25	261.02	0.63
0942	1.0	20	0.32	-146.3	13.57	7.56	434	10.9	272.27	0.7
0949	1.2	25	0.38	-243.4	13.79	7.51	428	11.9	273.69	0.7
1000	1.4	30	0.35	-262.3	14.28	7.59	421	3.41	272.96	0.5
1008	1.6	35	0.47	-274.6	14.49	7.61	439	10.09	276.51	0.42
1017	1.9	40	0.56	-276.2	14.41	7.64	451	8.06	277.35	0.6
1028	2.1	45	0.57	-280.4	14.58	7.68	458	3.49	277.46	0.5
1035	2.4	50	0.66	-285.2	14.60	7.69	458	4.11	278.51	0.7
1043	2.6	55	0.73	-288.6	14.57	7.70	456	4.11	278.65	
1045	Reduce pump Rate									
1047	Collect sample FEW4-MW44R-308									

Depth to water after purging/before sampling 278.65 ft TOC
Sampling Equipment: RediFlo 2 pump

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
Preservative
Preservative

COMMENTS: * Adjusted pump rate; unable to achieve static ~~con~~ pumping water level.

Sampler Signature(s) JH

Na Ali'i

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 10/21/17

Project No.:
Field Crew: JH, KZ
Weather: P.Cloudy, windy, 41°F

Analytical Instruments: pH: YSI-556
Temp:
D.O:

Specific Conductivity: YSI-556
ORP:
Turbidity: HACH 2100

Well ID: MW45R-252
Type of Well: Western monitoring
Casing Stickup:
Static Water Level: 135.98
Well Depth/Diameter: 260.22' TOC/2"

Purging Equipment: Grundfos Redi-Flo 2 pump
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)

124.24 x .17 = 21.1 gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1322	Begin purging	5	8.64	-292.2	10.16	7.43	380	1640	138.30	1.7
1325	0.2	5	7.18	-182.6	11.18	7.16	365	57.5	138.39	1.7
1329	0.5	10	7.36	-143.2	11.33	7.23	363	27.8	137.47	1.25
1334	0.7	15	7.41	-171.6	11.48	7.34	344	12.6	137.49	1.0
1339	0.9	20	7.44	-201.1	11.49	7.36	366	6.76	137.50	1.0
1344	1.2	25	7.54	-230.2	11.49	7.40	360	3.69	137.53	1.0
1349	1.4	30	7.61	-254.7	11.52	7.43	359	2.31	137.52	1.0
1355	1.6	35	7.67	-283.7	11.53	7.45	354	1.71	137.53	1.2
1359	1.9	40	7.74	-321.1	11.53	7.56	354	1.61	137.54	0.8
1404	2.1	45	7.85	*	11.54	7.	354	1.69	137.54	1.0
1409	2.4	50	7.88	-236.6	11.57	7.13	354	1.51	137.54	1.0
1414	2.6	55	7.94	-270.7	11.56	7.53	355	1.69	137.55	1.0
1418	2.8	60	7.97	-297.3	11.61	7.58	356	1.52	137.55	1.25
1423	3.1	65	7.95	-298.3	11.63	7.56	355	1.39	137.58	1.0
1428	3.3	70	7.97	-299.8	11.67	7.58	357	1.34	137.56	1.0

Depth to water after purging/before sampling 137.54 ft TOC
Sampling Equipment: Redi-Flo 2 pump

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
Preservative
Preservative

COMMENTS:
1403 - check ORP calibration
1410 - check pH w/cal solution
1429 Reduce Flow Rate
1430 Collect sample FEW4-MW45R-242

Sampler Signature(s)

ONA ALI'I

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 10/21/17

Project No.: E17.014-215
Field Crew: JM/KZ/TM
Weather: SUNNY, VERY WINDY, 44°

Analytical Instruments: pH: 451 556
Temp: "
D.O: "

Specific Conductivity: 451 556
ORP: "
Turbidity: HACH 2100Q

Well ID: FEW4-MW45R-299
Type of Well: MONITORING
Casing Stickup: 2.53'
Static Water Level: 135.04' TOC
Well Depth/Diameter: 308.23 TOC / 2"

Purging Equipment: REDI FLO2
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x 0.17 gal/ft = 1 casing volume (gals)
(308.23-135.04) x 0.17 = 29.4464

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate gpm
1543		1	4.55	-352.3	10.01	7.78	345	5.30	135.93	—
1548		5	7.36	-328.4	11.14	7.87	343	20.6	136.01	0.8
1552		10	7.23	-311.6	11.30	7.84	344	11.3	136.03	1.25
1557		15	7.20	-309.3	11.41	7.86	343	6.94	136.07	1.0
1601		20	7.23	-314.1	11.48	7.88	343	5.43	136.08	1.25
1606		25	7.28	-326.8	11.52	7.86	344	3.65	136.08	1.0
1611		30	7.32	-325.2	11.58	7.87	344	3.17	136.08	1.0
1616	1.2	35	7.35	-329.9	11.60	7.87	343	2.54	136.08	1.0
1620	Collect FEW4-MW45R-299									
1628		38	7.33	-330.0	11.50	7.93	343	2.74	135.92	0.25

Depth to water after purging/before sampling 136.08 ft TOC
Sampling Equipment: COLLECT FROM DISCHARGE TUBING

COMMENTS: 1537 Pump On, 1619 REDUCE FLOW RATE
COLLECTED DUPLICATE SAMPLE FEW4-MW45R-365 @ 1720

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCL
3 Preservative HCL Dup
___ Preservative ___

Sampler Signature(s)

NA ALI'I

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 10/22/17

Project No.: E17-014-215
Field Crew: JM/TM/KZ
Weather: Sunny, Very Windy, 35°

Analytical Instruments: pH: YSI 556
Temp: "
D.O: "

Specific Conductivity: YSI 556
ORP: "
Turbidity: HACH 2100Q

Well ID: FEW4 - MW45R-331
Type of Well: Western Monitoring
Casing Stickup: 2.60'
Static Water Level: 153.66' TOC
Well Depth/Diameter: 340.9 TOC 12"

Purging Equipment: Redi Flo 2
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x 0.17 gal/ft = 1 casing volume (gals)
(340.9 – 153.66) x 0.17 = 31.8 GAL

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate 9pm
10/22 0937		1	7.39	-235.1	10.21	7.37	523	9.73	162.41	—
0943		5	0.70	-196.4	11.78	7.48	520	12.31	189.0	0.67
0950		10	0.49	-192.8	12.49	7.62	519	3.95	223.5	0.71
0959		15	0.77	-240.8	13.63	7.63	513	5.46	256.5	0.56
1007		20	0.66	-268.3	14.47	7.61	515	8.61	NA	0.63
WELL DEWATERED TO PUMP @ 281', 1020 WL RECOVERED TO 274.7' TOC										
10/23 1037 PUMP ON		20.1	5.34	-368.5	10.31	7.43	445	8.88	149.84	—
1043		25	1.43	-345.5	11.09	7.75	439	4.95	185.25	0.8
1051		30	1.05	-337.5	12.21	7.77	444	3.98	215.89	0.6
1059		35	1.01	-338.9	13.27	7.73	444	3.14	247.15	0.6
1110		40	1.07	-340.2	14.19	7.70	443	~~3.73~~ 3.72	267.73	
1111 collect FEW4-MW-45R-331										

Depth to water after purging/before sampling 267.13 ft TOC 271.0
Sampling Equipment: Collect Samples From Discharge Tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
Preservative
Preservative

COMMENTS: 0930 Pump On 10/23/17 1030 ~~1445~~ D.T.W: 148.40' TOC
temperature not stable, b/c well was being de-watered. 3 consecutive reading (stable) with turbidity < 5

Sampler Signature(s)

Na Alii

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 10/24/17

Project No.: _____
Field Crew: SB/ RJ
Weather: Sunny, Breezy, 50s

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: HACH 2100P

Well ID: FEW4 - MW46-300
Type of Well: Nested monitoring
Casing Stickup: 2.48'
Static Water Level: 215.69
Well Depth/Diameter: 304.98' TOC / 2"

Purging Equipment: redi Flo 2
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
(304.98 - 215.69) x 0.17 = 15.2

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1238		1	9.48	154.6	10.91	7.09	279	91.1	218.10	1.5gal/min
1242		5	8.95	153.2	12.11	7.41	281	9.23	218.12	1.5gal/min
1245		10	9.00	154.1	11.83	7.34	251	5.13	218.04	1.5gal/min
1248	1	15	8.87	156.1	12.02	7.30	253	0.90	218.06	1.5gal/min
1253		20	8.82	155.2	12.24	7.31	253	0.44	217.47	1gal/min
1258		25	8.79	151.8	12.33	7.41	255	0.42	217.45	1gal/min
1303	2	30	8.76	150.7	12.33	7.39	255	0.53	217.45	1gal/min
1305	Sample	FEW4-MW46-300		Collected						

Depth to water after purging/before sampling 217.45 ft TOC _____
Sampling Equipment: redi Flo 2 - pump, discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: Turbidity <5

Sampler Signature(s) _____

NA ALTI

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 10/24/17

Project No.:
Field Crew: SG BS
Weather: Sunny, breezy, 50s

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556 ↓
ORP: ↓
Turbidity: Hach 2100P

Well ID: FEW4-MW46-334
Type of Well: Nested monitoring
Casing Stickup: 2.54'
Static Water Level: 214.57
Well Depth/Diameter: 344.74' TOC / 2"

Purging Equipment: redi flo 2
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ___ gal/ft = 1 casing volume (gals)
(344.74 - 214.57) x 0.17 = 22.1 gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1118		1	11.40	153.2	10.20	7.81	760	2.99	215.12	1.25gal/min
1122		5	9.33	146.6	11.58	7.21	258	0.84	215.12	1.25gal/min
1127		10	9.12	158.3	12.16	7.35	259	0.52	215.12	1gal/min
1132		15	8.99	154.7	12.29	7.38	258	1.75	215.12	1gal/min
1137		20	8.93	153.1	12.40	7.37	258	0.76	215.12	1gal/min
1142	1	25	8.87	152.4	12.48	7.40	258	0.57	215.12	1gal/min
1147		30	8.84	150.3	12.53	7.42	258	0.33	215.12	1gal/min
1153		35	8.87	151.9	12.53	7.40	258	0.16	215.12	0.75gal/min
1158		40	8.80	151.4	12.59	7.40	258	0.28	215.10	1gal/min
1203	2	45	8.82	152.2	12.60	7.42	258	0.30	215.11	1gal/min
1205	Sample	FEW4-MW46-334 collected								

Depth to water after purging/before sampling 215.11 ft TOC ___
Sampling Equipment: redi Flo 2, discharge tubing

COMMENTS: Turbidity <5

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
___ Preservative ___
___ Preservative ___

Sampler Signature(s)

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/15/17

Project No.: EP5.019.201
Field Crew: JNH, KZ
Weather: Sunny, 27°F, breezy

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: HACH 2100Q

Well ID: FEW4-MW46-389
Type of Well: Nested monitoring
Casing Stickup: 2.16'
Static Water Level: 384 - 218.92' TOC
Well Depth/Diameter: 399.16' TOC / 2"

Purging Equipment: HACH 2100Q 3' Bladder pump w/ one 2" packer
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x 0.17 gal/ft = 1 casing volume (gals)
(399.16 - 384) = 10.16 · 0.17 = 1.73 gals

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate gpm
0840 pump on		0.1	1.12	-211.3	6.95	7.68	206	8.21	—	—
0900		1	1.07	-249.8	8.71	7.58	354	7.81	—	0.05
0916		2	0.70	-255.6	8.93	7.59	362	8.67	—	0.06
0930		3	0.55	-262.5	8.98	7.68	361	6.81	—	0.07
0946		4	0.44	-254.3	8.69	7.69	361	4.98	—	0.06
0950	collect FEW4-MW46-389									

Depth to water after purging/before sampling — ft TOC —
Sampling Equipment: collect from discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
Preservative
Preservative

COMMENTS: Refil: 20.0 Discharge: 70.0
Controller Box: 1490 Packers: 1100 PSI

Sampler Signature(s)

NA ALI'I

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 10/19/17

Project No.: E15.019.201
Field Crew: JNH, SB
Weather: Sunny, 65°F

Analytical Instruments: pH: YSI 556
Temp:
D.O:

Specific Conductivity: YSI 556
ORP:
Turbidity: HACH 2100Q

Well ID: FISW4-MW47-239
Type of Well: Regional monitoring
Casing Stickup: 2.63'
Static Water Level: 164.61' TOC
Well Depth/Diameter: 244.63' TOC 12"

Purging Equipment: Redi-flo2 Submersible pump
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x 0.17 gal/ft = 1 casing volume (gals)

(244.63 - 164.61) 0.17 = 13.6 gals

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1305		0.1	7.76	133.1	11.97	8.43	283	34.6	171.80	N.A.
1312		5	9.46	148.9	12.66	7.56	278	36.7	174.90	0.8 gal/min
1318		10	9.61	155.5	12.50	7.54	276	32.1	176.65	0.9 gal/min
1322	1	15	9.36	160.9	12.22	7.51	277	49.4	180.40	1.1 gal/min
1327		20	9.71	166.7	12.28	7.50	276	8.57	178.35	1 gal/min
1332		25	9.70	170.5	12.25	7.52	275	5.10	178.42	1 gal/min
1337	2	30	9.77	174.6	12.23	7.53	275	6.13	178.53	1 gal/min
1342		35	9.78	177.1	12.23	7.54	274	5.59	178.55	1 gal/min
1347	3	40	9.83	179.3	12.15	7.57	274	5.88	178.59	1 gal/min

Depth to water after purging/before sampling 178.59 ft TOC 177.90
Sampling Equipment: collect from discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
Preservative
Preservative

COMMENTS:

Sampler Signature(s)

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 10/11/17

Project No.: E15.019.20
Field Crew: JM, SB
Weather: Sunny, 65°F. breezy

Analytical Instruments: pH: YSI 556
Temp:
D.O:

Specific Conductivity: YSI 556
ORP:
Turbidity: HACH2100Q

Well ID: FEW4-MW47-259
Type of Well: Nested, monitoring
Casing Stickup: 2.5'
Static Water Level: 166.95 MOC
Well Depth/Diameter: 269.16' TOC / 2"

Purging Equipment: Redi-flo2 submersible pump
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x 0.17 gal/ft = 1 casing volume (gals)
(269.16 - 166.95) 0.17 = 17.4 gals

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1115 ~~###~~ pump on		0.1	8.93	162.3	11.59	8.27	278	overrange	164.45	N/A
1120		5	4.67	142.0	12.33	7.34	275	361	164.45	1 gal/min
1125		10	9.79	168.0	12.04	7.33	274	158	164.45	1 gal/min
1129		15	9.76	173.6	12.06	7.34	274	99.1	164.44	1 gal/min
1134	1	20	9.69	182.3	12.12	7.36	274	51.5	164.42	1 gal/min
1139		25	9.78	191.0	12.13	7.34	274	25.5	164.40	1 gal/min
1144		30	9.70	189.7	12.15	7.33	274	18.3	164.43	1 gal/min
1149	2	35	9.69	201.2	12.18	7.37	274	10.9	164.41	1 gal/min
1154		40	9.72	205.7	12.25	7.40	274	8.66	164.41	1 gal/min
1159		45	9.87	208.5	12.23	7.43	275	6.23	164.41	1 gal/min
1204	3	52	9.75	211.17	12.25	7.46	274	4.69	164.42	1 gal/min
1205 collect FEW4-MW47-259 & dup FEW4-MW47-260 @ 1305										

Depth to water after purging/before sampling 164.42 ft TOC 164.25
Sampling Equipment: collect from discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3+3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: Turbidity continued to drop as well became more developed

Sampler Signature(s)

NA ALI'I

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 10/19/17

Project No.: E15.019201
Field Crew: SM, SB
Weather: sunny, 60°F, breezy

Analytical Instruments: pH: YSI 556
Temp:
D.O:

Specific Conductivity: YSI 556
ORP:
Turbidity: HACH 2100Q

Well ID: FEW4-MW47-290
Type of Well: Nested Monitoring
Casing Stickup:
Static Water Level: 166.95' TOC
Well Depth/Diameter: 294.75' TOC / 2"

Purging Equipment: Redi-Flo 2 submersible pump
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x 0.17 gal/ft = 1 casing volume (gals)
128.3' x .17 = 22 gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
0952 pump on		0.1	12.82	205.4	10.67	7.83	271	16.7	167.60	N.A
0958		5	9.87	206.1	11.77	7.32	271	83.6	167.60	~~1.25 gals/min~~ .77 gals/min
1003		10	9.90	201.8	12.01	7.29	270	7.06	168.02	1 gal/min
1007		15	9.43	205.6	11.85	7.33	272	3.60	168.05	1.25 gals/min
1011		20	9.33	209.0	11.90	7.30	272	1.94	168.08	1.25 gal/min
1016	1	25	9.32	211.2	11.93	7.37	272	1.96	168.08	1.25 gal/min
1021		30	9.18	211.3	11.93	7.41	272	1.85	168.09	1.25 gal/min
1026		36	9.18	212.1	11.97	7.44	272	1.43	168.08	1.25 gal/min
1031		41	9.17	213.5	11.99	7.46	272	1.37	167.08	1.25 gal/min
1036	2	47	9.16	217.0	12.00	7.48	272	1.41	168.11	1.25 gal/min
1040 collect FEW4-MW47-290 for VOCs										

Depth to water after purging/before sampling 168.11 ft TOC 167.70
Sampling Equipment: Collect from discharge tubing

COMMENTS: turbidity < 5, all other parameters stable

Analysis to be performed and Number of Containers:
VOCs 3+3 Preservative HCl
Preservative
Preservative

Sampler Signature(s)

Na Ali'i

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 10/21/17

Project No.: _____
Field Crew: SB/CJ
Weather: Sunny, windy, 30s

Analytical Instruments: pH: YSI-556
Temp: _____
D.O: _____

Specific Conductivity: YSI-556
ORP: _____
Turbidity: HACH 2100P

Well ID: FEW4-MW48-225
Type of Well: Nested monitoring
Casing Stickup: _____
Static Water Level: 184.20' / TOC
Well Depth/Diameter: 229.94' / 2" TOC

Purging Equipment: Grundfos Red. - Flo2 Pump
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
((229.94) - (184.2)) x 0.17 = 7.8 gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1217		0.25	11.26	188.1	10.63	7.34	337	382	191.99	1.5gal/min
1221		5	11.42	178.4	11.32	7.04	336	97.4	190.95	1.5gal/min
1225	1	10	11.28	178.4	11.60	7.03	333	8.81	190.00	1gal/min
1230		15	11.27	174.8	11.60	7.14	316	4.29	190.10	1gal/min
1235	2	20	11.25	174.0	11.57	7.22	323	3.23	190.11	1gal/min
1239		25	11.25	173.7	11.61	7.23	338	2.34	190.11	1gal/min
1244	3	30	11.24	170.9	11.50	7.38	339	1.98	190.15	1gal/min
1249		35	11.17	172.8	11.62	7.39	317	1.64	190.15	1gal/min
1253		40	11.16	172.4	11.69	7.42	336	1.45	190.16	1gal/min
1258		45	11.23	172.1	11.73	7.45	338	1.12	190.21	1gal/min
1302		50	11.34	167.3	11.43	7.53	339	1.39	190.14	1gal/min
1307		55	11.33	171.4	11.61	7.48	338	1.37	190.18	1gal/min
1309	Sample	FEW4-MW48-225		collected						

Depth to water after purging/before sampling _____ ft TOC _____
Sampling Equipment: Collect

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: _____

Sampler Signature(s) _____

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 10/19/17

Project No.: E15.019.201
Field Crew: JMH, SB
Weather: Cloudy, 55°F

Analytical Instruments: pH: YSI556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: HACH 2100 Q

Well ID: FEW4-MW48-254
Type of Well: Nested monitoring
Casing Stickup: 2.6'
Static Water Level: 167.23' TOC
Well Depth/Diameter: 264.7' TOC 2"

Purging Equipment: Redi-flo 2 Submersible pump
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x 0.17 gal/ft = 1 casing volume (gals)

(264.7 − 167.23) 0.17 = 16.6 gals

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1546 pump on		0.1	8.05	219.2	11.89	7.91	281	11.6	168.82	N/A
1551		5	9.61	225.1	11.82	7.47	275	353	168.80	1gal/min
1556		10	9.81	225.6	12.04	7.43	275	20.7	168.87	1gal/min
1601	1	15	9.85	223.6	12.05	7.47	275	6.34	168.90	1gal/min
1606		20	9.83	221.9	12.04	7.48	274	3.56	168.90	1gal/min
1611		25	9.86	220.7	12.01	7.50	274	2.77	168.90	1gal/min
1616		30	9.83	220.0	12.02	7.51	274	2.81	168.91	1gal/min
1621	2	35	9.89	219.7	12.01	7.52	274	2.27	168.90	1gal/min
1623	collect FEW4-MW48-254									

Depth to water after purging/before sampling 168.90 ft TOC 168.40
Sampling Equipment: collect from discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: turbidity <5 for 4 consecutive readings w/ turbidity <5 & other parameters stable

Sampler Signature(s) [signature]

ONA ALI'I

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 10/19/17

Project No.: 615.01920/
Field Crew: JNT, SB
Weather: Cloudy, 60°F

Analytical Instruments: pH: YSI 556
Temp:
D.O:

Specific Conductivity: YSI 556
ORP:
Turbidity: HACH 2100Q

Well ID: FEW4-MW48-284
Type of Well: Nested monitoring
Casing Stickup: 2.5'
Static Water Level: 167.67' TOC
Well Depth/Diameter: 289.9' TOC / 2"

Purging Equipment: Redi-Flo2 Submersible Pump
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x 0.17 gal/ft = 1 casing volume (gals)

(289.9 - 167.67) 0.17 = 20.8 gals

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1436 Pump on		0.1	8.11	146.2	10.50	8.39	277	8.74	171.18	N.A.
1441		5	9.98	213.8	11.62	7.56	275	133	171.32	1gal/min
1446		10	9.92	216.6	11.81	7.43	275	9.73	171.35	1gal/min
1451		15	9.85	217.3	11.82	7.40	274	5.23	171.39	1gal/min
1456	1	20	9.85	217.9	11.85	7.41	274	3.18	171.34	1gal/min
1500		25	9.80	217.9	11.88	7.44	274	2.66	171.38	1gal/min
1505		30	9.82	213.0	11.90	7.45	274	2.45	171.39	1gal/min
1510		35	9.80	213.2	11.92	7.47	275	2.09	171.38	1gal/min
1515	1.9	40	9.78	217.8	11.95	7.50	275	1.85	171.38	1gal/min
1517	collect FEW4-MW48-284									

Depth to water after purging/before sampling 171.38 ft TOC 169.60
Sampling Equipment: collect from discharge tubing

COMMENTS: Turbidity <5 for 5 straight readings, all other parameters stable

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
Preservative
Preservative

Sampler Signature(s)

ONA ALI'I

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 10/22/2017

Project No.:
Field Crew: SG/RS
Weather: Sunny, Windy, 50s

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: HACH 2100P

Well ID: FEW4-MW49-286
Type of Well: nested monitoring
Casing Stickup: 1.99
Static Water Level: 236.91
Well Depth/Diameter: 291.19' TOC /2"

Purging Equipment: Red. -Flo2
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
(291.19 - 236.91) x 0.17 = 9.2 gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
0922		0.2	12.26	190.0	9.91	8.39	336	16.6	238.25	
0930		5	10.77	191.1	13.28	7.21	323	8.13	234.20	1.25gal/min
0934	1	10	11.03	180.1	12.86	7.25	324	1.77	239.23	1.25gal/min
0937		15	11.05	183.1	12.51	7.19	344	13.3	239.25	1.25gal/min
0941	2	20	10.83	186.3	12.42	7.15	360	7.17	239.29	1.25gal/min
0944		25	10.83	185.10	12.36	7.15	364	4.34	239.31	1.3gal/min
0947	3	30	10.73	184.0	12.33	7.18	369	3.08	239.32	1.3gal/min
0950		35	10.68	182.9	12.32	7.19	353	1.94	239.32	1.3gal/min
0953	4	40	10.64	181.7	12.31	7.22	356	1.69	239.32	1.3gal/min
0956		45	10.63	179.9	12.31	7.23	359	1.83	239.32	
0958	Sample	FEW4-MW49-286	Collected							

Depth to water after purging/before sampling _____ ft TOC_____
Sampling Equipment: _____

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: _____

Sampler Signature(s) _____

NA ALTI

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 10/23/17

Project No.:
Field Crew: JB/EJ
Weather: Sunny, windy, 40s

Analytical Instruments: pH: YSI 556
Temp:
D.O:

Specific Conductivity: YSI 556
ORP:
Turbidity: HACH 2100P

Well ID: FEW4-MW49-311
Type of Well: nested monitoring
Casing Stickup: 1.32'
Static Water Level: 238.08' /TOC
Well Depth/Diameter: 316.02' /TOC /2"

Purging Equipment: Grundfos Red: Flo2 pump
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
(316.02 - 238.08) x 0.17 = 13.2 gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1406		1	12.51	174.1	10.45	7.96	315	8.87	236.61	1.25gal/min
1410		5	10.62	183.1	12.77	7.25	312	15.2	236.62	1.25gal/min
1414		10	10.59	180.0	12.49	7.22	311	1.85	236.63	1.25gal/min
1418	1	15	10.59	178.6	12.38	7.26	311	1.05	236.62	1.25gal/min
1423		20	10.52	179.0	12.86	7.28	309	1.04	236.62	1 gal/min
1427		25	10.48	180.1	12.93	7.27	307	0.55	236.62	1.25gal/min
1431	2	30	10.49	180.6	12.89	7.31	308	0.61	236.62	1.25gal/min
1432	Sample FEW4-MW49-311 collected									
	Blind duplicate sample FEW4-MW49-312 also collected, collection time noted @ 1531								1532	

Depth to water after purging/before sampling _____ ft TOC_____
Sampling Equipment: Red: Flo2 pump, discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: Turbidity <5

Sampler Signature(s)

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: _____

Project No.: _____
Field Crew: SJB/RJS
Weather: Sunny, Windy, 40s

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556 ↓
ORP: _____
Turbidity: HACH 2100P

Well ID: ~~SB MW4~~ FEW4 - MW49 - 333
Type of Well: nested monitoring
Casing Stickup: _____
Static Water Level: ~~_____~~ 235.97' TOC
Well Depth/Diameter: 338.0' TOC / 2"

Purging Equipment: Red; Flo2
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
(338.0 - 235.97) x 0.17 = 17.3 gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1421		0.1	17.41	134.5	10.02	8.32	275	2.44	238.91	1gal/min
1426		5	10.32	145.5	12.11	7.85	276	1.17	239.53	1gal/min
1430		10	9.45	139.9	12.34	7.91	275	9.42	239.60	1gal/min
1435		15	9.30	144.0	12.41	7.86	275	3.04	239.60	1gal/min
1440	/	20	9.15	144.9	12.42	7.88	276	2.08	239.61	1gal/min
1445		25	9.06	147.5	12.43	7.85	276	1.29	239.65	1gal/min
1448	Collected	Sample	FEW4 - MW49 - 333							

Depth to water after purging/before sampling _____ ft TOC_____
Sampling Equipment: Bailer

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: Turbidity <5 for 3 consecutive readings, all other parameters stable

Sampler Signature(s) _____

Na Ali'i

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 10/23/17

Project No.: _____
Field Crew: SB/RJ
Weather: Windy, Sunny, 50s

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556 ↓
ORP: _____
Turbidity: HACH 2100P

Well ID: FEW4-MW50-250
Type of Well: nested monitoring
Casing Stickup: _____
Static Water Level: 211.75
Well Depth/Diameter: 260.71 TOC / 2"

Purging Equipment: red. flo 2
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
(260.7 − 211.75) x 0.17 = 8.3 gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1624		1	13.73	170.4	10.16	8.10	270	673	212.32	1.5 gal/min
1627		5	11.42	176.8	12.09	7.23	269	166	212.32	1.5 gal/min
1631	1	10	11.11	179.1	12.35	7.18	268	21.1	212.31	1.25 gal/min
1635		15	10.97	179.9	12.38	7.15	268	6.62	212.31	1 gal/min
1639	2	20	10.90	179.8	12.33	7.23	314	3.79	212.30	1.25 gal/min
1643		25	10.85	178.5	12.38	7.22	317	2.45	212.30	1.25 gal/min
1647	3	30	10.83	177.2	12.44	7.27	319	1.99	212.30	1.25 gal/min
1651		35	10.84	177.4	12.39	7.31	317	1.23	212.30	1.25 gal/min
1653	Sample	FEW4-MW50-250 collected								

Depth to water after purging/before sampling _____ ft TOC _____
Sampling Equipment: red. flo 2 pump, discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: Turbidity <5

Sampler Signature(s) [signature]

Na Ali'i

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 10/24/17

Project No.:
Field Crew: SB/RS
Weather: Sunny, Breezy, 50s

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556 ↓
ORP:
Turbidity: HACH 2100P

Well ID: FEW4-MW50-290
Type of Well: nested monitoring
Casing Stickup: 2.62'
Static Water Level:
Well Depth/Diameter: 295.42'/2" TOC

Purging Equipment: Red; Flo 2
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ___ gal/ft = 1 casing volume (gals)
(295.42 – 208.33) x 0.17 = 14.8 gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
0932		1	10.68	187.1	10.09	7.48	284	48.9	209.04	1.25 gal/min
0936		5	10.69	186.5	12.02	6.65	285	58.8	209.09	1.25 gal/min
0939		10	10.35	180.0	12.39	6.65	284	31.7	209.10	1.3 gal/min
0943	1	15	10.11	174.5	12.39	6.72	284	15.7	209.01	1.25 gal/min
0947		20	9.95	169.7	12.60	6.87	288	11.6	209.01	1.25 gal/min
0951		25	9.87	166.8	12.65	6.95	287	8.93	209.01	1.25 gal/min
0955	2	30	9.84	164.3	12.73	7.04	308	7.52	209.01	1.25 gal/min
0959		35	9.80	161.5	12.73	7.10	307	5.13	209.01	1.25 gal/min
1004		40	9.76	160.3	12.74	7.16	304	4.31	209.01	1 gal/min
1008	3	45	9.69	159.7	12.83	7.17	305	1.69	209.01	1.25 gal/min
1010	Sample	FEW4-MW50-290	collected							

Depth to water after purging/before sampling 209.01 ft TOC
Sampling Equipment: Red; Flo 2 pump, discharge tubing

COMMENTS: Turbidity <5

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
___ Preservative ___
___ Preservative ___

Sampler Signature(s)

NA ALI'I

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/15/17

Project No.: F15.019.201
Field Crew: JNH, KE
Weather: sunny, 27°F, windy

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: HACH 2100Q

Well ID: FEW4-MW50-318
Type of Well: Nested monitoring
Casing Stickup: 2.44
Static Water Level: 208.40' TOC
Well Depth/Diameter: 323.44' TOC/2"

Purging Equipment: 3' Bladder pump w/ one 2" packer
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x 0.17 gal/ft = 1 casing volume (gals)

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1210 pump on		0.1	3.84	-43.4	9.52	7.81	361	5.88	—	—
1228		1	0.77	-87.7	10.19	7.82	350	0.29	—	0.06
1247		2	0.50	-126.3	10.40	7.87	349	1.23	—	0.05
1307		3	0.41	-165.5	10.32	7.92	349	0.51	—	0.05
1325		4	0.36	-191.6	10.37	7.92	349	0.73	—	0.06
1350		5	0.31	-221.9	10.24	7.95	352	0.15	—	0.04
1410		6	0.30	-238.4	10.17	7.95	350	0.44	—	0.05
1415	collect FEW4-MW50-318 & MW50-318 ms/msD									

Depth to water after purging/before sampling — ft TOC —
Sampling Equipment: collect from discharge tubing

COMMENTS: Refill 30.0 Discharge: 51.0
Controller Box: 150 PSI Packers: 90 PSI
Well pumped for 2 hrs 1210–1410

Analysis to be performed and Number of Containers:
VOCs 3+3+3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

Sampler Signature(s) _____

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/16/17

Project No.: _____
Field Crew: SB/RW
Weather: Sunny, 40s, Breezy

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: LaMotte 2020

Well ID: FEW4-MW51-80
Type of Well: nested monitoring
Casing Stickup: 2.4'
Static Water Level: 66.19' TOC
Well Depth/Diameter: 88.0' TOC / 2"

Purging Equipment: geo Sub
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
(88.0 - 66.19) x 0.17 = 3.7 gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
0943		0.1	10.45	70.6	9.97	7.74	351	311	72.74	1gal/min
0944		1	3.53	68.6	9.31	7.78	343	35.6	75.21	1gal/min
0945		1.5	2.57	69.9	9.16	7.68	341	21.6	77.00	0.5gal/min
0945	Dewatered	to pump, will let recharge								
1052		1.7	7.02	83.7	13.46	7.53	350	142	68.91	1gal/min
1053		2.5	4.27	71.1	9.02	7.82	345	31.6	72.74	1gal/min
1054		3.0	3.25	73.7	9.15	7.74	350	14.7	75.54	0.5gal/min
1055	Dewatered to pump, will let recharge before sampling									
1211		3.1	0.76	91.0	13.17	7.67	356	13.5	70.77	
1211	Sample	FEW4-MW 51-80 collected								

Depth to water after purging/before sampling _____ ft TOC_____
Sampling Equipment: geosub pump, discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: GW @ 1050 - 66.20, will dewater
GW @ 1204 - 66.12

Sampler Signature(s) _____

NA ALI'I

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/14/17

Project No.:
Field Crew: SB/RW
Weather: Sunny, 40s, Breezy

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: J
Turbidity: Lamotte 2020

Well ID: FEW4-MW51-110
Type of Well: nested monitoring
Casing Stickup: 2.44'
Static Water Level: 66.19'
Well Depth/Diameter: 117.54' TOC/2"

Purging Equipment: geo sub
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
(117.54 – 66.19) x 0.17 = 8.7 gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
0903		0.2	6.38	47.4	8.60	7.44	402	1012	75.41	0.7gal/min
0906		2	2.71	48.9	8.84	7.22	374	95.7	84.01	0.7gal/min
0909		4	2.34	53.1	9.08	7.03	382	29.0	93.64	0.7gal/min
0912		5	2.34	52.7	9.23	7.01	383	33.4	96.71	0.3gal/min
0914		6	2.35	51.9	9.32	6.97	399	59.1	102.23	0.5gal/min
0915	Dewatered	to pump,	will let	recharge						
1039		6.1	1.03	100.6	10.27	8.40	416	1057	85.10	0.5gal/min
1042		8	0.45	97.5	9.31	7.58	413	91.9	9382	0.5gal/min
1044	/	9	0.43	91.3	9.43	7.48	419	41.7	98.99	0.5gal/min
1047		10	0.41	82.0	9.74	7.43	415	31.6	103.55	0.3gal/min
1047	Dewatered	to pump,	will let	recharge	before	sampling				
1156		10.1	0.61	100.7	10.42	8.18	401	73.9	87.92	0.5gal/min
1158		11	0.45	99.8	9.36	7.90	375	39.2	91.36	0.5gal/min
1200	Sample	FEW4-MW51-110		collected						

Depth to water after purging/before sampling _____ ft TOC _____
Sampling Equipment: peristaltic pump, discharge tubing

COMMENTS: GW @ 78.22 @ 1037, will re-dewater

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

Sampler Signature(s) _____

NA ALI'I

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/17/17

Project No.:
Field Crew: SBirch
Weather:

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: Lamotte 2020

Well ID: FEW4-MW51-210
Type of Well: nested monitoring
Casing Stickup:
Static Water Level: 64.98
Well Depth/Diameter: 217.78' TOC /2"

Purging Equipment: rediFlo2
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
(217.78 - 64.98) x 0.17 = 26.0 gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
11/17										
0820		0.2	17.64	149.9	7.51	7.70	534	1.95	78.64	0.7gal/min
0828		5	0.95	89.4	9.37	7.21	525	1.65	105.75	0.7gal/min
0837		10	0.35	53.0	10.14	7.18	537	1.41	135.09	0.6gal/min
0845		15	0.32	39.0	11.20	7.16	544	2.06	163.06	0.7gal/min
0853		20	0.31	33.7	11.90	7.16	536	5.47	190.92	0.7gal/min
0856		22	0.31	34.1	12.07	7.16	532	3.30	199.65	0.6gal/min
0856	Dewatered to pump will ser recharge									
11/17 1250		22.25	0.41	110.6	8.95	8.09	486	3.58		
1257	Sample FEW4-MW51-210 Collected									

Depth to water after purging/before sampling _____ ft TOC _____
Sampling Equipment: Bailer

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: GW @ 98.99 on 11/17 @ 1300, not 80% recharge

Sampler Signature(s)

Na Ali'i

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 10/26/17

Project No.:
Field Crew: SB / RJ
Weather: Snowing, Cloudy, Windy, 30s

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: HACH 2100s

Well ID: FEW4-MW52-25
Type of Well: nested monitoring
Casing Stickup:
Static Water Level: 9.76
Well Depth/Diameter: 32.67' TOC 12"

Purging Equipment:
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)

(32.67 – 9.76) x 0.17 = 3.9 gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
0947		0	9.73	208.8	8.35	7.55	408	392	12.95	1gal/min
0950		2.5	5.16	200.9	8.65	7.05	408	71000	14.82	1gal/min
0954	1	5	4.20	192.5	8.49	6.96	401	145	15.10	0.75gal/min
0956		7.5	3.90	184.4	8.46	7.02	397	40.3	15.40	1gal/min
0959	2	10	3.79	180.4	8.53	7.01	392	13.2	15.38	1gal/min
1002	3	12.5	3.56	179.1	8.50	7.00	390	8.39	15.82	1gal/min
1005		15	3.44	175.3	8.51	7.06	387	8.01	16.03	1gal/min
1008		17.5	3.40	175.6	8.53	7.05	389	7.74	16.29	1gal/min
1010		20	3.54	173.4	8.55	7.06	390	6.04	16.21	1gal/min
1013		22.5	3.36	170.7	8.51	7.12	389	4.57	16.34	1gal/min
1014	Sample	FEW4-MW52-25		Collected						

Depth to water after purging/before sampling _____ ft TOC_____
Sampling Equipment: Grundfos pump, discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: turbidity <5

Sampler Signature(s)

Na Ali'i

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 10/26/17

Project No.:
Field Crew: SB/RJ
Weather: Cloudy, snowing, 30's, windy

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556 ↓
ORP:
Turbidity: HACH 2100P

Well ID: FEW4-MW52-[redacted]59
Type of Well: nested monitoring
Casing Stickup:
Static Water Level: 1.75
Well Depth/Diameter: [redacted] TOC/2"
67.79

Purging Equipment: redi flo 2
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
[redacted] (67.79 – 1.75) x 0.17 = 11.2 gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1052		0.5	15.74	150.4	8.08	7.49	341	296	2.88	1.5 gal/min
1053		5	10.53	151.5	8.27	7.48	334	NM	2.70	1.5 gal/min
1059		10	9.11	148.7	8.34	7.62	342	NM	2.68	1 gal/min
1102		15	8.75	148.0	8.31	7.59	344	NM	2.70	1.5 gal/min
1106		20	8.59	148.3	8.29	7.61	347	3.06 NM	2.69	1.25 gal/min
1109		25	8.51	149.3	8.31	7.58	347	2.05	2.69	.25 gal/min
1112	Sample	FEW4-MW52-59		Collected						

Depth to water after purging/before sampling _____ ft TOC _____
Sampling Equipment: redi flo 2 pump, discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: Turbidity meter batteries died mid-sample
Turbidity <5

Sampler Signature(s)

NA ALI'I

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/5/17

Project No.:
Field Crew: SS/RW
Weather: ~~sunny~~ cloudy, Breezy, 40s

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556 ↓
ORP:
Turbidity: Hach 2100P

Well ID: FEW4-MW52-140
Type of Well: nested monitoring
Casing Stickup:
Static Water Level: 8.00' TOC
Well Depth/Diameter: 147.34' TOC 12"

Purging Equipment: red: Flo 2
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ___ gal/ft = 1 casing volume (gals)
(147.34 – 8.00) x 0.17 = 23.7 gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
11/4 0901		0.2	26.80	198.0	8.44	7.65	304	10.3	16.91	0.5gal/min
0912		5	3.51	95.7	9.32	6.95	297	22.7	48.43	0.5gal/min
0921		10	2.07	43.8	10.07	7.16	297	22.0	74.18	0.5gal/min
0933		15	2.25	23.9	10.74	7.39	299	23.0	103.25	0.4gal/min
0942		20	1.71	15.5	11.51	7.48	298	20.5	126.40	0.6gal/min
0945		22	1.67	10.8	11.77	7.49	297	17.0	134.30	0.5gal/min
0946	Dewatered to pump, shut pump off for recharge									
1455		22.5	6.39	147.1	8.87	8.28	296	5.84	33.04	0.5gal/min
1504		27	2.43	127.2	9.64	7.70	293	3.97	61.64	0.5gal/min
1514		32	1.92	96.5	10.13	7.62	293	3.98	90.45	0.5gal/min
1521		37	1.85	75.3	10.72	7.64	293	4.29	117.66	0.7gal/min
1529		39.5	1.79	64.5	11.23	7.67	293	5.66	131.14	0.5gal/min
1526	Dewatered to pump, shut off pump, will let recharge overnight									

Depth to water after purging/before sampling _____ ft TOC _____
Sampling Equipment: _____

Analysis to be performed and Number of Containers:
VOCs _____ Preservative _____
_____ Preservative _____
_____ Preservative _____

COMMENTS: 11/4 @ 1450 GW @ 26.65', will dewater to pump again

Sampler Signature(s) _____

NA ALTI

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/5/17

Project No.:
Field Crew: SS/RW
Weather: cloudy, Breezy, 40s

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: HACH 2100P

Well ID: FEW4-MW52-140
Type of Well: nested monitoring
Casing Stickup:
Static Water Level: 8.00' TOC
Well Depth/Diameter: 197.34' TOC / 2"

Purging Equipment: redi flo 2
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)

23 7gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
11/5/17 0752		40	9.12	175.3	7.66	7.59	269	1.63	14.99	0.5 gal/min
0757		42.5	4.71	170.3	8.48	7.42	271	2.38	27.72	0.5 gal/min
0803		45	3.57	164.4	8.59	7.50	271	1.65	41.35	0.5 gal/min
0810	2	47.5	3.00	160.3	9.19	7.57	272	1.42	56.91	0.4 gal/min
0816		50	2.80	157.1	9.41	7.62	272	1.14	71.21	0.4 gal/min
0822		52.5	2.63	155.2	9.96	7.65	273	1.27	87.49	0.4 gal/min
0825	Sample	FEW4-MW52-140		collected						

Depth to water after purging/before sampling _____ ft TOC _____
Sampling Equipment: redi flo 2 pump, discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: 11/5 @ 0745 GW @ 8.51

Sampler Signature(s)

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 10/24/17

Project No.: E15 019 20
Field Crew: JMH, KZ
Weather: Sunny, 46°, windy

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: HACH 2100Q

Well ID: FEW4-MW53-95
Type of Well: Nested, monitoring
Casing Stickup: 2.03'
Static Water Level: 32.38' TOC
Well Depth/Diameter: 102.03' TOC / 2"

Purging Equipment: Redi-flo 2 submersible pump
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x 0.17 gal/ft = 1 casing volume (gals)

(102.03 – 32.38) 0.17 = 11.8 gals

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate gpm
1235 pump on	on	0.1	0.85	-325.0	8.64	7.91	339	121	37.19	
1245		4	0.40	-332.9	9.80	7.70	356	79.6	55.66	0.4
1251		8	1.11	-332.2	9.58	7.63	360	82.6	74.68	0.8
1259		12	1.20	-336.0	10.03	7.63	357	25.1	—	0.6
1300 pump off, well dewatered to pump										
1353 pump on		12.1	3.00	-338.8	8.35	7.64	348	41.4	45.33'	
1358		16	2.87	-331.0	9.22	7.60	356	15.6	~~45.57~~ 55.62	0.8
1407		20	2.74	-353.0	9.86	7.66	361	18.7	82.39	0.55
1410 pump off, well dewatered, 22 gallons removed, allow to recharge										
1501 pump on		22.1	3.71	-330.2	8.26	7.68	374	20.9	45.56	—
1505 collect FEW4 MW53-95				MW53-95 MS/MSD						

Depth to water after purging/before sampling 45.56 ft TOC 58.57
Sampling Equipment: collect from discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3+3+3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: 1350 D.T.W 43.70' TOC 1450 D.T.W 45.7
1455 D.T.W 43.0'

Sampler Signature(s) _____

NA ALI'I

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 10/23-24/17

Project No.: F15.019.201
Field Crew: JM, KT
Weather: Sunny, 50°F, windy

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: HACH 2100Q

Well ID: FEW4-mw 53-145
Type of Well: Nested monitoring
Casing Stickup: 2.06'
Static Water Level: ~~2.06~~ ~ 32.12' TOC
Well Depth/Diameter: 152.96'/2"

Purging Equipment: Redi-flo2 submersible pump
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ~~0.17~~ gal/ft = 1 casing volume (gals)

(152.96 - 32.12) 0.17 = 20.5 gals

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1430 pump on		0.1	1.87	-359.4	8.04	7.79	624	overrange	39.67	—
1435		5	0.69	-358.8	8.34	7.74	601	187	69.21	1
1443		10	0.48	-366.5	8.96	7.65	591	57.5	96.11	0.6
1452		15	0.53	-370.3	9.80	7.53	610	595	118.72	0.55
1501 ~~Bot~~	1	20	0.52	-372.6	10.39	7.53	598	—	~~136~~.34	0.55
1502 well dewatered to pump, allow to recover										
10/24 0834 pump on		20.1	2.11	322.8	7.68	7.87	547	30.2	42.84	—
0845		25	1.14	-357.4	8.54	7.52	523	32.3	69.06	0.55
0853		30	0.91	-341.6	9.26	7.50	525	31.7	93.23	0.6
0902		35	0.86	-344.9	9.66	7.47	524	overrange	113.74	0.55
0911		40	0.84	-348.3	10.84	7.49	543	overrange	132.42	
0912 well dewatered to pump, allow to recover										
1202 pump on		40.1	2.79	-342.5	8.25	7.51	503	994	58.27	—
1205 collect FEW4-mw 53-145										

Depth to water after purging/before sampling 58.27 ft TOC 67.75
Sampling Equipment: collect from discharge tubing

COMMENTS: 1524 D.T.W 115.0' TOC
1600 D.T.W 88.5' 10/24/17 0830 DTW 33.28'
1200 D.T.W 45.75'

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

Sampler Signature(s) _____

Na Ali'i

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 10/23/17

Project No.: E15.019.201
Field Crew: JMH, KZ
Weather: partly cloudy, windy, 55°F

Analytical Instruments: pH: YSI 556
Temp:
D.O.:

Specific Conductivity: YSI 556
ORP:
Turbidity: HACH 2100Q

Well ID: FEW4-MW53-182
Type of Well: Nested monitoring
Casing Stickup: 2.04
Static Water Level: 32.40 TOC
Well Depth/Diameter: 182 / 2"
184.2

Purging Equipment: 3S Geosub
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x 0.17 gal/ft = 1 casing volume (gals)

(184.2 - 32.40) 0.17 = 25.8 gals

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
10/22 1603	pump on	0.1	2.16	-357.0	8.47	7.80	419	overrange	50.3	N.A
1606		5	1.20	-346.1	9.56	7.43	419	31.2	8-7.70	0.8 gal/m
1614		10	1.16	-358.7	9.11	7.65	419	21.3	99.97	0.6 gal/min
1624		15	1.35	-362.2	9.56	7.70	420	17.9	126.72	½ gal/min
1625	pump off, not enough water for fifth volume					water @ 130'				
10/23 1321		15.1	4.15	-346.1	8.20	7.87	350	70.6	41.34	—
1325		20	4.09	-338.7	8.32	7.72	347	15.6	64.49	1.25
1331		25	3.42	-344.5	8.80	7.71	349	14.6	91.41	0.6
1338		30	3.06	-349.2	9.25	7.73	350	14.0	121.89	0.7
1344		35	3.01	-350.0	9.72	7.70	351	13.9	~~144.27~~	0.8
1345 collect FEW4-MW53-182									144.27	

Depth to water after purging/before sampling 144.27 ft TOC 152.43
Sampling Equipment: collect from discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
Preservative
Preservative

COMMENTS: 10/23/17 0830 D.T.W 38.98' TOC

Sampler Signature(s)

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 10/26/17

Project No.: E15.019.201
Field Crew: JAH, SB
Weather: Sunny, 65°F, windy

Analytical Instruments: pH: YSI 556
Temp:
D.O:

Specific Conductivity: YSI 556
ORP:
Turbidity: HACH 2100Q

Well ID: FEW4-MW54-222
Type of Well: Vertical monitoring
Casing Stickup:
Static Water Level: 88.01
Well Depth/Diameter: 229.21 / 2"

Purging Equipment: Redi-Flo2 Submersible pump
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x 0.17 gal/ft = 1 casing volume (gals)

(224.21-88.01) 0.17 = 23.15

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1346 begin purging		0.1	3.12	180.1	10.96	8.15	321	7.01	89.65	N.A
1350		5	4.27	193.7	10.68	7.55	315	193	89.70	1.25gal/min
1355		10	4.43	196.0	10.71	7.42	315	96.8	89.72	1 gal/min
1359		15	5.08	194.7	10.67	7.41	313	38.3	89.73	1.25 gal/min
1403		20	5.31	194.4	10.63	7.40	311	16.5	89.74	1.25 gal/min
1408	1	25	5.38	193.9	10.68	7.41	312	9.48	89.74	1.25 gal/min
1412		30	5.56	192.5	10.60	7.44	312	5.99	89.73	1.25 gal/min
1416		35	5.63	192.2	10.67	7.45	306	3.25	89.73	1.25 gal/min
1421		40	5.74	192.2	10.57	7.48	313	2.46	89.70	1.25 gal/min
1425		45	3.81	191.4	10.56	7.50	301	2.70	89.74	1.25 gal/min
1430	2	50	5.87	191.3	10.58	7.52	308	2.28	89.74	1.25 gal/min
1434		55	5.93	191.3	10.57	7.53	311	2.43	89.74	1.25 gal/min
1438		60	5.97	190.8	10.59	7.54	310	2.02	89.75	
1442	Collect	FEW4-MW54-222								

Depth to water after purging/before sampling _____ ft TOC_____
Sampling Equipment: Bailer

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: Turbidity <5 For 6 straight readings. All other parameters stable

Sampler Signature(s)

Na Ali'i

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 10/20/17

Project No.: E15.019.201
Field Crew: JNH, SB
Weather: Sunny, 65°f, windy

Analytical Instruments: pH: YSI 556
Temp: /
D.O: /

Specific Conductivity: YSI 556
ORP: /
Turbidity: HACH 2100Q

Well ID: FEW4-MW54-245
Type of Well: Nested monitoring
Casing Stickup:
Static Water Level: ~~86.45~~ ~~FBG~~ 86.61' TOC
Well Depth/Diameter: 253' / 2"

Purging Equipment: Redi-flo 2 Submersible pump
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x 0.17 gal/ft = 1 casing volume (gals)
(253 - 86.61) 0.17 = 28.3 gals

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1241		0.1	9.39	181.8	9.85	7.05	270	333	88.3	N/A
1247		10	6.93	192.4	10.40	7.34	270	70.6	88.95	2gal/min
1253		20	6.82	191.0	10.47	7.35	270	3.88	88.96	2gal/min
1259	1	30	6.94	190.9	10.51	7.39	270	2.72	88.96	2gal/min
1304		40	7.00	189.5	10.44	7.44	270	2.37	88.96	2gal/min
1305	collect FEW4-MW54-245									

Depth to water after purging/before sampling 88.96 ft TOC 87.71
Sampling Equipment: Collect from discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
Preservative
Preservative

COMMENTS:

Sampler Signature(s)

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 10/20/17 - 10/21/17
Analytical Instruments: pH: YSI-556
Temp:
D.O:

Project No.:
Field Crew: VH, SB
Weather:
Specific Conductivity: 451 - 556
ORP: "
Turbidity: Hach 2100P

Purging Equipment: Geotech Redi-Flo2 pump
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ___ gal/ft = 1 casing volume (gals)
138.08 x .17 = 23.4 gal = 1 casing vol

Well ID: MW54-284
Type of Well: Nested monitoring
Casing Stickup: 153.85' TOC
Static Water Level: 291.93' TOC/2"
Well Depth/Diameter:

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
10/20/17 1602	1.5 equiv	purging	5.33	181.7	12.16	8.32	277	41.1	182.25	—
1610	0.12	4	4.71	185.6	11.28	7.46	271	16.4	199.01	0.5
1617	0.34	8	3.66	175.6	12.24	7.31	271	16.3	225.81	0.6
1624		12	3.04	168.5	12.78	7.44	273	14.6	241.08	
1630		16	3.27	163.1	14.25	7.34	273	34.0	251.3	
1636		19 - Downtarget to pump intake; lt. turbidity								
10/21/17 0918	Measure	DTW = 154.47' TOC								
0957	Continue	purging	11.47	-336.6	9.22	7.40	299	15.6	175.45	
1000		22	8.73	-344.7	9.67	7.35	298	8.08	—	
1007		25	6.76	-278	11.43	7.48	299	8.94	211.7	
1011		29	6.22	-225.8	11.78	7.65	299	10.3	231.9	
1015		32	5.54	-315.4	12.37	7.62	299	10.8	257.1	
1019		35	5.27	-293.2	12.93	7.66	299	13.0	268.85	
1023		38.5	Downtarget to pump intake							

Depth to water after purging/before sampling _____ ft TOC _____
Sampling Equipment: _____

Analysis to be performed and Number of Containers:
VOCs _____ Preservative _____
_____ Preservative _____
_____ Preservative _____

COMMENTS:
10/20/17 1610 – controller at 332 Hz, continously increasing controller as water draws down. unable to achieve steady pumping level
10/21/17 1002 – check ORP w/ calibration solution ~~250~~ 240 mV. re-cal to 240 mV.

Sampler Signature(s) _____

18790

NA ALI'I

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 10/21/17

Project No.:
Field Crew: SB/RJ
Weather: Windy, 40s

Analytical Instruments: pH: YSI -556
Temp: ↓
D.O.: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: HACH 2100P

Well ID: MW54-284
Type of Well: nested monitoring
Casing Stickup:
Static Water Level: 153.85' TOC
Well Depth/Diameter: 291.93' / TOC / 2"

Purging Equipment: Grundfos Redi-Flo 2 Pump
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)

1 casing = 23.4 gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
									187.90	
1624		2	11.43	130.3	10.21	8.10	~~330~~ 302	7.70	217.95	1.25gal/min
1628		5	7.75	129.1	11.18	8.00	270	6.28	239.10	1.25gal/min
1630		7	7.01	122.9	11.99	8.06	270	8.74	246.65	1.25gal/min
1633	Sample	FEMW-MW54-284	collected							

Depth to water after purging/before sampling _____ ft TOC_____
Sampling Equipment: correct

Analysis to be performed and Number of Containers:
VOCs _____ Preservative _____
_____ Preservative _____
_____ Preservative _____

COMMENTS: Due to adverse weather conditions, well was purged to pump and sample collected.

Sampler Signature(s) _____

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/1/17

Project No.: E15.019.201
Field Crew: JM, KE
Weather: sunny, 60°f, windy

Analytical Instruments: pH: YSI 556
Temp: ✓
D.O: ✓

Specific Conductivity: YSI 556
ORP: ✓
Turbidity: HACH2100Q

Well ID: FEW4-MW55-250
Type of Well: Vistal monitoring
Casing Stickup: 2.74
Static Water Level: 135.81'
Well Depth/Diameter: 258.94' / 2"

Purging Equipment: Redi-flo 2 Submersible pump
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ~~0.17 gal/ft~~ = 1 casing volume (gals)

(258.94 - 135.81) 0.17 = 20.9 gals

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
~~1124~~ pump on		0.1	6.09	-295.3	10.81	7.42	291	71.2	139.41'	
1251		5	7.87	-303.4	11.76	7.38	293	57.9	140.32	1.25
1254		10	8.18	-315.0	11.95	7.53	294	28.3	144.10	1.66
1258		15	8.01	-318.3	11.96	7.58	293	16.8	140.50	1.25
1302		20	8.08	-318.5	12.00	7.61	296	9.54	140.33	1.25
1306		25	8.18	-310.2	12.06	7.60	~~3~~290	8.26	140.50	1.25
1310		30	8.20	-300.9	12.12	7.63	290	5.14	140.60	1.25
1314		35	8.26	-295.4	12.14	7.62	291	4.37	140.55	1.25
1318		40	8.27	-292.6	12.14	7.63	291	3.70	140.57	1.25
1320 collect FEW4-mw55-250										

Depth to water after purging/before sampling 140.57 ft TOC 138.95
Sampling Equipment: collect from discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: _____

Sampler Signature(s) _____

ONA ALI'I

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 10/26/17

Project No.: 415.014.201
Field Crew: JM, KZ
Weather: Sunny, 32°F, windy

Analytical Instruments: pH: YSI 556
Temp:
D.O:

Specific Conductivity: YSI 556
ORP:
Turbidity: HACH 2100Q

Well ID: FEW4-MW55-280
Type of Well: Vertical Monitoring
Casing Stickup: 2.68
Static Water Level: 139.49 TOC
Well Depth/Diameter: 288.98 TOC / 2"

Purging Equipment: Redi-Flo 2 Submersible pump
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x 0.17 gal/ft = 1 casing volume (gals)

(288.98 - 139.49) 0.17 = 25.4 gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1120 pump on		0.1	6.92	-202.1	9.85	7.80	254	27.4	141.35	30m
1132		5	8.01	-201.3	11.15	7.80	253	199	143.95	1.25
1137		10	7.88	-239.1	11.34	7.97	260	106	144.08	1
1140		15	7.83	-234.7	11.38	7.93	258	21.3	144.10	1.67
1145		20	7.81	-234.0	11.44	7.92	256	7.01	144.14	1
1148	1	25	7.79	-237.1	11.50	7.93	257	5.77	144.16	1.67
1153		30	7.81	-237.9	11.50	7.92	255	5.12	144.18	1
1157		35	7.82	-237.5	11.50	7.92	256	4.59	144.17	1.25
1200	collect FEW4-MW55-280									

Depth to water after purging/before sampling 144.17 ft TOC 142.30
Sampling Equipment: collect from discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
____ Preservative ____
____ Preservative ____

COMMENTS:

Sampler Signature(s)

ONA ALI'I

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/14/17 ~~11/13/17~~
Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Project No.: 615.019.201
Field Crew: SMTKE
Weather: Sunny, 27°F
Specific Conductivity: YSI 556 ↓
ORP: ↓
Turbidity: HACH 2100Q

Well ID: FEW4-MW55-320
Type of Well: Nested Monitoring
Casing Stickup: 2.66'
Static Water Level: 150.90' TOC PVC
Well Depth/Diameter: 329.36' TOC / 2"

Purging Equipment: 3' bladder pump w/ one 2" packer
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x 0.17 gal/ft = 1 casing volume (gals)
(329.36 − 319.36) 0.17 = 1.7 gals

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1020 pump on		0.1	3.06	-132.2	7.69	7.90	290	15.25	—	
1045 pump off, water line leaking. pull pump & evaluate										
1130 pump on		0.75	5.46	-256.4	8.35	8.28	289	20.2	—	—
1146		1	2.74	-276.0	8.63	8.48	286			
1205 pump off, no water produced by pump										
11/14 1320 pump on		0.1	1.71	-268.3	11.02	7.61	246	7.07	—	—
1334		1	0.86	-282.9	10.72	7.71	290	5.62	—	0.07
1345		2	1.20	-279.5	10.85	7.82	290	8.05	—	0.09
1357		3	0.92	-275.4	10.47	7.89	289	7.59	—	0.08
1412		4	0.87	-277.5	11.01	7.91	289	8.01	—	
1415 collect FEW4-MW55-320 & blind dup MW 1410 @							1515			

Depth to water after purging/before sampling — ft TOC —
Sampling Equipment: collect from discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3+3 Preservative HCl
Preservative
Preservative

COMMENTS: Refil: 22.0 Discharge: 55.0
controller box: 100.0 PSI packers 100 PSI

Sampler Signature(s)

NA ALÍ'I

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 10/26/17

Project No.: E15.019.201
Field Crew: JMW, KZ
Weather: Sunny, 65°F, windy

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: HACH 2100Q

Well ID: FEW4-MW56-203
Type of Well: Nested Monitoring
Casing Stickup: 2.83
Static Water Level: 80.35' TOC
Well Depth/Diameter: 210.83' 1/2"

Purging Equipment: Redi-Flo 2 submersible pump
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x 0.17 gal/ft = 1 casing volume (gals)

(210.83 - 80.35) 0.17 = 22.2gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate gpm
0835		0.1	8.02	-164.3	10.78	7.00	355	53.9	90.60	—
0941		5	7.47	-163.3	10.80	6.97	358	[illegible]	92.21	0.8
0849		10	8.17	-151.6	11.06	7.72	250	49.0	92.78	0.7
0856		15	8.30	-152.4	11.11	7.36	253	41.7	92.85	0.6
0905		20	8.29	-171.0	11.16	7.44	250	70.2	92.65	0.55
0913		25	8.20	-185.6	11.14	7.57	250	32.6	92.75	0.6
0921		30	8.17	-194.7	11.14	7.66	251	19.1	92.70	0.6
0929		35	8.04	-205.8	11.40	7.71	251	9.67	92.85	0.6
0938		40	8.17	-216.5	11.41	7.76	251	8.80	92.85	0.55
0946		45	8.15	-220.6	11.39	7.77	251	8.05	92.90	0.6
0953		50	8.16	-224.2	11.32	7.79	252	8.14	92.90	0.7
0955	collect FEW4-MW56-230									

Depth to water after purging/before sampling 92.90 ft TOC 91.25
Sampling Equipment: collect from discrete tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: _____

Sampler Signature(s) JMW

ONA ALI'I

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 10/25/17

Project No.: E15.019.201
Field Crew: JM, KE
Weather: Sunny, 77, windy

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: HACH 2100Q

Well ID: FEW4-MW56-250
Type of Well: Nested monitoring
Casing Stickup: 2.83 ~~FT~~
Static Water Level: 77.89 TOC
Well Depth/Diameter: 259.03 TOC / 2"

Purging Equipment: Redi-Flo 2 Submersible pump
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x 0.17 gal/ft = 1 casing volume (gals)

(259.03 - 77.89) 0.17 = 30.8 gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1603	pump on	0.1	8.76	-235.3	10.86	8.00	260	276	82.46	gpm
1608		10	8.52	-234.0	11.35	7.59	260	32.8	82.65	2
1613		20	8.63	-231.9	11.39	7.67	259	9.37	82.65	2
1618		30	8.61	-232.0	11.42	7.76	259	5.39	82.68	2
1623		40	8.61	-233.0	11.43	7.79	260	5.11	82.64	2
1628		50	8.61	-230.6	11.44	7.77	260	3.74	82.64	2
1630	collect FEW4-MW56-250			B MW56-250 MS/MSD						

Depth to water after purging/before sampling 82.64 ft TOC 80.98
Sampling Equipment: collect from discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3x 3+3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: _____

Sampler Signature(s): _____

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/8/17

Project No.: E15.019.201
Field Crew: JNH, KZ
Weather: Sunny, 39°, breezy

Analytical Instruments: pH: YSI 556
Temp:
D.O.: 56

Specific Conductivity: YSI 556
ORP:
Turbidity: HACH2100Q

Well ID: FEW4- MW56-290
Type of Well: Nested monitoring
Casing Stickup: 3.9
Static Water Level: 90.75 TOC
Well Depth/Diameter: 299.7' TOC/2"

Purging Equipment: 3" Submersible bladder pump w/ one 2" packer

CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x 0.17 gal/ft = 1 casing volume (gals)

(299.7 - 280) 0.17 = 3.3 gals

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1140 pump on		0.1	2.04	-276.4	9.78	7.94	495	20.3	—	40m
1142 pump off, water being pulled down well, pull pump & Waterra										
1224 1x pumping		0.5	9.05	-313.7	9.88	8.24	499	17.5	—	—
1245		2	1.05	-322.0	9.92	8.07	486	7.38	—	0.9
1254		3	0.70	-325.0	9.99	8.00	499	6.65	—	0.11
1303		4	0.75	-323.7	10.08	7.96	488	5.25	—	0.11
1313 ~~1345~~		5	1.87	-321.6	10.17	7.92	462	4.37	—	0.1
1347		6	1.53	-318.4	10.11	7.84	~~500~~ 461	4.55	—	0.03
1404		7	1.62	-320.1	10.12	7.85	462	4.20	—	0.07
1405	collect FEW4- MW56-290 @			MW56-290 MS/MSD						

Depth to water after purging/before sampling — ft TOC —
Sampling Equipment: collect from discharge tubing

COMMENTS: 1255 Refil: 20 discharge 52 Controller Box: 12/0.45F packers: 100
1348 Refil: 40 Discharge 40

Analysis to be performed and Number of Containers:
VOCs 3+3+3 Preservative HCl
Preservative
Preservative

Sampler Signature(s)

ONA ALI'I

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 10/23/17

Project No.:
Field Crew: SB/RS
Weather: Cloudy, windy, 40's

Analytical Instruments: pH: YSI 556
Temp: "
D.O: "

Specific Conductivity: YSI 556
ORP: "
Turbidity: HACH 2100P

Well ID: FEW4-MW57-211
Type of Well: Nested monitoring
Casing Stickup: 2.19'
Static Water Level: 156.75
Well Depth/Diameter: 216.19' (TOC) / 2"

Purging Equipment: Geo Flo 2
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
(216.19 - 156.75) x 0.17 = 10.1 gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1104		1	10.26	209.8	10.46	7.94	298	24.6	157.21	1.25gal/min
1113		5	10.07	216.7	11.53	7.47	296	13.4	157.22	1.25gal/min
1117	1	10	10.41	216.3	11.73	7.30	298	12.4	157.20	1.25gal/min
1122		15	9.70	208.1	11.86	7.23	298	5.83	157.21	1gal/min
1126	2	20	10.00	196.6	11.98	7.40	298	3.88	157.21	1.25gal/min
1131		25	9.88	198.7	12.02	7.36	298	2.49	157.19	1gal/min
1135	3	30	10.00	188.2	12.01	7.60	298	2.10	157.19	1.25gal/min
1140		35	9.87	184.9	12.14	7.50	299	1.49	157.20	1gal/min
1145	4	40	9.86	186.4	12.17	7.48	298	0.62	157.20	1gal/min
1150		45	9.81	186.0	12.13	7.47	299		157.20	1gal/min
1152	Sample	FEW4-MW57-211 collected								

Depth to water after purging/before sampling _____ ft TOC_____
Sampling Equipment: Geo Flo 2 pump, discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: Turbidity <5

Sampler Signature(s)

Na Ali'i

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 10/23/17

Project No.: _____
Field Crew: SG/RS
Weather: Sunny, breezy, 50's

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: HACH 2100P

Well ID: FEW4-MW57-240
Type of Well: nested monitoring
Casing Stickup: 1.92'
Static Water Level: 154.92
Well Depth/Diameter: 250.72' / 2"

Purging Equipment: Red; Flo 2 pump
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)

(250.72 – 154.92) x0.17 = 16.2 gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1214		1	9.52	232.2	10.71	7.09	296	475	157.58	1.5gal/min
1217		5	9.69	222.9	11.53	7.64	295	81.3	157.31	1.5gal/min
1222		10	9.64	219.8	12.02	7.45	295	28.2	156.75	1gal/min
1226		15	9.69	212.6	12.06	7.47	297	17.3	156.78	1.25gal/min
1231	1	20	9.66	208.7	12.12	7.47	296	8.51	156.78	1gal/min
1235		25	9.65	206.3	12.18	7.47	297	6.23	156.78	1.25gal/min
1240		30	9.63	198.5	12.21	7.52	295	4.42	156.71	1gal/min
1245	2	35	9.63	196.9	12.32	7.59	298	3.73	156.75	1gal/min
1250		40	9.61	196.8	12.29	7.56	298	3.26	156.71	1gal/min
1252	Sample	FEW4-MW57-240		collected						

Depth to water after purging/before sampling _____ ft TOC_____
Sampling Equipment: Red: Flo 2 pump, Discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: Turbidity <5

Sampler Signature(s) _____

NA ALTI

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 10/23/17

Project No.:
Field Crew: SB/RS
Weather: Sunny, Windy, 50's

Analytical Instruments: pH: YSI 556
Temp:
D.O:

Specific Conductivity: YSI 556
ORP:
Turbidity: HACH 2100P

Well ID: FEW4-MW57-276
Type of Well: nested monitoring
Casing Stickup: 1.72'
Static Water Level: 153.97
Well Depth/Diameter: 281.72' / 2"

Purging Equipment: Red:-Flo 2
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
(281.72 - 153.97) x 0.17 = 21.7 gal

	Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
10/22	1416		1	5.54	50.7	10.84	8.26	362	8.58	173.25	1gal/min
	1451		5	1.96	55.9	11.77	7.94	318	6.30	197.61	1gal/min
	1455		10	1.54	61.3	12.61	7.73	313	5.96	224.58	1gal/min
	1458		13	1.61	56.5	13.50	7.88	316	NM	235.1	
		-Pump kicked off. Dewatered to top of pump									
10/22	1621		14	5.06	104.7	10.88	8.04	367	12.4	194.61	1.25gal/min
	1625		19	5.77	97.9	12.07	7.84	360	10.6	221.28	1.25gal/min
	1631		24	4.25	90.0	14.44	7.78	363	NM	244.35	0.75gal/min
		-Pump kicked off. Dewatered to top of pump									
10/23	1015		25	8.34	206.5	10.32	6.96	311	8.51	165.95	1gal/min
	1017		27.5	8.06	203.3	10.71	6.98	302	10.3	178.68	1gal/min
	1021		29	7.93	200.1	11.49	7.02	299	6.04	189.15	1.25gal/min
	1023	Sample	FEW4-MW57-276		collected						

Depth to water after purging/before sampling _____ ft TOC _____
Sampling Equipment: red:Flo 2 pump, discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: Pump kicked off after ~13 gal, will let recharge and check tomorrow (10/23/17)
10/22/17 - Pump kicked off 2nd time after ~24 gal
10/23/17 - Well sampled after purging ~25 gal

Sampler Signature(s)

Na Ali'i

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 10/25/17

Project No.:
Field Crew: SB / RS
Weather: Sunny, Windy, 70s

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: HACH 2100P

Well ID: FEW4-MW58-124
Type of Well: nested monitoring
Casing Stickup: 2.44'
Static Water Level: 117.48
Well Depth/Diameter: 129.34' TOC 12"

Purging Equipment: redi Flo 2
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
(129.34 - 117.48) X 0.17 = 2.0 gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1553		1	11.76	140.2	10:41	8.09	751	322	117.91	1gal/min
1555	1	2.5	10.38	139.7	10.63	7.58	774	192	117.85	1gal/min
1556	2	4	10.09	133.4	10.80	7.39	781	97.3	117.75	1gal/min
1558	3	7	9.89	138.3	11.03	7.22	782	38.4	117.64	1gal/min
1600	4	9	9.80	133.8	11.41	7.12	782	11.4	117.72	1gal/min
1602	5	11	9.83	138.9	11.20	7.10	781	5.53	117.72	1gal/min
1606	7	15	9.77	140.5	11.20	7.05	780	2.73	117.72	1gal/min
1609	Sample	FEW4-MW58-124	Collected							

Depth to water after purging/before sampling _____ ft TOC _____
Sampling Equipment: redi flo2 pump, discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: Turbidity <5

Sampler Signature(s)

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/5/17

Project No.:
Field Crew: SB/RW
Weather: cloudy, windy, 50s

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O.: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: HACH 2100p

Well ID: FEW4-MW58-169
Type of Well: nested monitor
Casing Stickup: 2.29'
Static Water Level: 142.00
Well Depth/Diameter: 179.19' TOC /2"

Purging Equipment: rd: Flo 2
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)

(179.19 - 142.00) x 0.17 = 6.3 gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1407		0.2	6.20	140.2	10.46	8.40	374	97.1	150.34	0.5gal/min
1409		1	5.31	137.5	10.46	8.21	373	46.0	152.98	0.5 gal/min
1411		2	4.93	142.9	10.42	7.92	371	23.5	155.73	0.5 gal/min
1413		3	5.01	147.4	12.02	7.74	371	12.2	159.25	0.5gal/min
1415		4	4.74	147.2	13.63	7.65	371	8.65	159.73	0.5gal/min
1417		5	4.84	143.0	12.86	7.78	374	11.8	160.92	0.5gal/min
1418	/	6	4.80	140.0	13.07	7.80	376	51.8	162.20	0.5gal/min
1419	Dewatered	down to	pump	will let	recharge					
11/4 0730		6.25	8.46	196.8	8.09	7.15	373	17.3	159.45	—
0734	Sample	FEW4-MW58-169	collected							

Depth to water after purging/before sampling _____ ft TOC_____
Sampling Equipment: Bailer

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: 11/5 @ 0725 @ 159.45

Sampler Signature(s)

ONA ALI'I

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/3/17

Project No.:
Field Crew: SB/RJW
Weather: WINDY, Sunny, 50s

Analytical Instruments: pH: YSI 556
Temp:
D.O:

Specific Conductivity: YSI 556
ORP:
Turbidity: HACH 2100?

Well ID: FEW4-MW58-213
Type of Well: Nested monitoring
Casing Stickup: 2.16'
Static Water Level: 154.38
Well Depth/Diameter: 218.86'ea /2"

Purging Equipment: Sed: Flo 2
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
(218.86 - 154.88) x 0.17 = 10.9 gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
11/1 1408		1	6.61	209.1	10.43	7.10	1539	NM	168.61	1gal/min
1410		2.5	5.17	203.5	10.22	6.62	1455	4.50	181.40	1gal/min
1412		5	4.33	201.2	11.32	6.55	1377	2.31	189.41	1gal/min
1417		7.5	4.08	198.3	12.24	6.57	1259	5.01	204.36	0.5gal/min
1419		10.0	4.69	195?	12.92	6.62	1248	5.31	209.18	1gal/min
1422	Pump shut off after purging ~11 gal									
11/3 1607	Sample	FEW4-MW58-213 collected							199.89	
1608		10.25	6.14	159.5	10.25	7.83	1783	33.8		

Depth to water after purging/before sampling _____ ft TOC_____
Sampling Equipment: bailer

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: 11/2 - well had recharged <1 foot, pull pump
11/3 @ 1555 GW at 199.39 - will use bailer for grab sample

Sampler Signature(s)

ONA ALI'I

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 12/2/17

Project No.:
Field Crew: SB/RV
Weather: Sunny, 40s

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556 ↓
ORP: ↓
Turbidity: LaMotte 2020

Well ID: FEW4-MW59-74
Type of Well: monitoring
Casing Stickup:
Static Water Level: 50.67' TOC
Well Depth/Diameter: 79.21' TOC/2"

Purging Equipment: geosub
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
(79.21 - 50.67) x 0.17 = 4.9 Gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
0947		0.2	16.78	184.4	7.50	7.85	345	882	50.22	1.4gal/min
0950	1	5	9.38	179.9	7.30	7.74	351	39.6	65.34	1.4gal/min
0950	Dewatered to pump, will let recharge									
1011		5.2	14.18	158.6	7.54	7.85	347	36.6	52.33	1 gal/min
1013		7.5	9.15	161.1	7.73	7.82	335	61.0	58.25	1 gal/min
1016	2	10	8.88	160.0	7.76	7.82	340	59.0	62.51	1 gal/min
1018		12.5	7.50	158.0	7.80	7.84	340	97.7	64.97	1 gal/min
1019	Dewatered to pump, will let recharge before Sampling									
1035		13	9.93	184.4	7.81	7.92	340	9	53.13	
1037	Sample FEW4-MW59-74 collected									

Depth to water after purging/before sampling _____ ft TOC _____
Sampling Equipment: geosub pump, discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: GW @ 50.82 @ 1009
GW @ 51.52 @ 1033

Sampler Signature(s)

Na Alti

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 12/1/17

Project No.: _____
Field Crew: SG/RW
Weather: Sunny, 40s

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: LaMotte 2020

Well ID: FEW4-mw59-125
Type of Well: nested monitoring
Casing Stickup: _____
Static Water Level: 52.90' TOC
Well Depth/Diameter: 133.05 'TOC 12"

Purging Equipment: geosub
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
(133.05 – 52.90) x 0.17 = 13.6 gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
0820		0.2	0.45	198.2	6.90	10.74	294	31.5	52.48	1.2 gal/min
0824		5	0.33	182.2	7.91	7.90	293	30.0	76.22	1.2 gal/min
0829		10	0.31	173.7	8.10	7.47	291	49.7	80.14	1 gal/min
0835	1	15	0.33	167.9	8.29	7.56	288	13.9	81.22	0.8 gal/min
0840		20	0.33	164.5	8.38	7.43	288	4.89	82.64	1 gal/min
0846		25	0.33	162.1	8.40	7.43	288	2.92	83.98	0.8 gal/min
0851	2	30	0.34	159.9	8.42	7.46	287	3.74	84.61	0.8 gal/min
0853	Sample	FEW4-mw59-125 collected								

Depth to water after purging/before sampling _____ ft TOC _____
Sampling Equipment: geosub pump, discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: Turbidity LS

Sampler Signature(s) _____

NA ALI'I

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 12/1/17

Project No.:
Field Crew: SB/RW
Weather: Sunny, 40s

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: LaMotte 2020

Well ID: PEW4-MW59-183
Type of Well: nested monitoring
Casing Stickup:
Static Water Level: 55.06' TOC
Well Depth/Diameter: 190.4' TOC / 2"

Purging Equipment: red: flo
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
(190.4 – 55.06) x0.17 = 23gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1455		0.5	0.51	111.4	7.65	8.40	320	15.4	62.31	2gal/min
1457		5	0.44	121.4	8.33	11.92	325	46.9	75.14	2gal/min
1500		10	0.40	123.4	8.58	12.21	278	80	82.18	1.7gal/min
1502		15	0.39	124.1	8.63	12.17	271	77.5	84.38	1.8gal/min
1505		20	0.38	122.7	8.68	12.17	268	41.5	83.91	1.9gal/min
1508	1	25	0.38	120.4	8.70	12.16	277	1280 AU	83.92	1.4gal/min
1511		30	0.37	118.7	8.75	12.17	305	1428 AU	84.68	1.4gal/min
1514		35	0.35	116.2	8.78	12.14	342	>1000	85.54	1.4gal/min
1517		40	0.30	115.5	8.80	12.21	417	>1000	84.11	1.3gal/min
1521		45	0.29	115.0	8.78	12.22	438	>1000	83.22	1.3gal/min
1524		50	0.29	114.2	8.79	12.24	427	3315 AU	83.14	1.3gal/min
1528		55	0.30	113.7	8.82	12.21	406	3046 AU	83.01	1.3gal/min
1531		60	0.32	113.0	8.81	12.20	376	2923 AU	83.18	1.3gal/min
1534		65	0.33	112.9	8.80	12.19	349	2763 AU	83.22	1.3gal/min

Depth to water after purging/before sampling _____ ft TOC _____
Sampling Equipment: redi flo pump, discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS:

Sampler Signature(s)

NA ALI'I

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 12/1/17

Project No.:
Field Crew: SB/RW
Weather: sunny, 40s

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: LaMotte 2020

Well ID: FEW4-MW59-183
Type of Well: nested monitoring
Casing Stickup:
Static Water Level: 55.06' TOC
Well Depth/Diameter: 190.41' TOC /2"

Purging Equipment: red; FIO
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)

	Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
11/30	1537		70	0.34	112.6	8.80	12.18	329	2523 AU	83.21	1.3gal/min
	1541		75	0.35	113.1	8.81	12.15	318	2241 AU	83.22	1.3gal/min
	1544		80	0.35	114.7	8.83	12.12	312	1932 AU	83.23	1.3gal/min
	1548		85	0.36	115.1	8.84	12.06	302	1830 AU	83.12	1.3gal/min
	1551		90	0.36	115.4	8.84	12.03	299	1746 AU	83.13	1.3gal/min
	1551	stop purging, will resume purge in the morning									
12/1	0928		90.2	0.46	131.0	7.53	11.93	303	1351 AU	60.04	2gal/min
	0930		95	0.35	134.2	8.44	11.11	307	1363 AU	75.94	2gal/min
	0933		100	0.34	128.4	8.57	9.61	295	1695 AU	78.12	1.5gal/min
	0937		105	0.35	126.7	8.63	9.18	293	1419 AU	76.72	1.2gal/min
	0941		110	0.34	126.7	8.67	8.96	292	1718 AU	76.42	1.2gal/min
	0945		115	0.35	127.3	8.69	8.86	292	1306 AU	76.68	1.2gal/min
	0949		120	0.34	127.8	8.70	8.81	298	1610 AU	76.92	1.2gal/min
	0954		125	0.33	128.4	8.71	8.78	319	2471 AU	76.96	1.2gal/min

Depth to water after purging/before sampling _____ ft TOC _____
Sampling Equipment: Red: FIO pump, discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: GW @ 51.32 12/1 @ 0758

Sampler Signature(s)

ONA ALI'I

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 12/11/17

Project No.:
Field Crew: SG/RW
Weather: Sunny, 40s

Analytical Instruments: pH: YSI 550
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 550
ORP: ↓
Turbidity: LaMotte 2020

Well ID: FEW4- MW59-183
Type of Well: Nested monitoring
Casing Stickup:
Static Water Level: 55.06' TOC
Well Depth/Diameter: 190.4' TOC / 2"

Purging Equipment: red. Flo
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
0958		130	0.33	127.5	8.73	8.78	319	2336 AU	77.01	1.2gal/min
1002		135	0.34	127.8	8.76	8.78	309	1686 AU	76.98	1.2gal/min
1006		140	0.34	127.6	8.83	8.78	300	1190 AU	76.81	1.2gal/min
1010		145	0.34	127.6	8.84	8.76	294	917 AU	76.86	1.2gal/min
1015		150	0.35	127.9	8.86	8.77	290	836 AU	76.86	1 gal/min
1019		155	0.34	128.4	8.86	8.68	283	740 AU	78.14	1.2gal/min
1023		160	0.34	128.9	8.88	8.63	285	36	78.39	1.2gal/min
1027		165	0.35	129.3	8.87	8.59	283	3104	78.39	1.2gal/min
1028	Sample	FEW4-MW59-183		collected						

Depth to water after purging/before sampling ____ ft TOC____
Sampling Equipment: red. Flo 2 pump, discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
____ Preservative ____
____ Preservative ____

COMMENTS: well pumped for 2 hours

Sampler Signature(s)

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/30/17

Project No.: E15.019.201
Field Crew: JWH, KZ
Weather: Sunny, 52°F

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: HACH 2100Q

Well ID: FEW4-MW60-90
Type of Well: Nested monitoring
Casing Stickup: 2.75'
Static Water Level: 62.50
Well Depth/Diameter: 97.75' TOC/2"

Purging Equipment: Redi-flo 2 Submersible pump
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x 0.17 gal/ft = 1 casing volume (gals)
(97.75 - 62.50) 0.17 = 6 gals

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1311 pump	on	0.1	0.98	-97.0	9.25	8.21	440	550	66.96	1 pump
1314		2	0.74	-96.5	9.25	7.78	431	133	71.22	0.67
1317		4	0.63	-104.6	9.81	7.85	438	91.3	76.08	0.67
1321		6	0.66	-115.1	10.19	7.96	441	128	78.42	0.5
1325		8	0.87	-119.3	10.48	7.97	438	127	79.04	0.5
1328		10	1.00	-120.4	10.24	7.95	439	125	79.44	0.67
1330	collect FEW4-MW60-90									

Depth to water after purging/before sampling 79.44 ft TOC 78.15
Sampling Equipment: collect from discharge tubing

COMMENTS: ~11 gals contaminerized

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
Preservative
Preservative

Sampler Signature(s)

NA ALI'I

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/30/17

Project No.: E15.019.201
Field Crew: JNH, KE
Weather: Sunny, 42°F

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 5570
ORP: ↓
Turbidity: HACH 2100Q

Well ID: FEW4-MW60-146
Type of Well: Nested Monitoring
Casing Stickup: 2.69'
Static Water Level: 62.46' TOC
Well Depth/Diameter: 150.98' TOC / 2"

Purging Equipment: Redi-Flo 2 submersible pump
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)

(150.98 - 62.46) 0.17 = 15.05 gals

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1147 pump	on	0.1	0.82	-53.3	R.71	8.23	431	56.5	70.33	gpm
1151		5	0.68	-54.1	8.42	8.18	424	48.8	96.57	1.25
1156		10	0.51	-66.2	9.40	8.24	419	80.1	110.36	1
1202		15	0.69	-78.4	9.66	8.26	419	796	122.84	0.83
1208		20	1.22	-76.4	10.37	8.22	411	overrange	121.52	0.83
1216		25	2.01	-78.4	10.25	8.16	420	overrange	122.08	0.63
1224		30	2.60	-82.3	10.25	8.22	417	271	121.85	0.63
1232		35	2.99	-89.2	10.25	8.26	418	263	121.55	0.63
1240		40	3.05	-89.3	10.25	8.27	419	257	121.56	0.63
1242	collect FEW4-MW60-146 & blind dup MW146 @ 1342									

Depth to water after purging/before sampling 121.56 ft TOC 118.55
Sampling Equipment: collect from discharge tubing

COMMENTS: ~41 gals containers 2nd

Analysis to be performed and Number of Containers:
VOCs 3x3 Preservative ____
____ Preservative ____
____ Preservative ____

Sampler Signature(s) [signature]

NA ALI'I

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/30/17

Project No.: E15.019.201
Field Crew: SNH, KZ
Weather: Sunny, 35°, breezy

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: HACH 2100Q

Well ID: FEW4-MW60-233
Type of Well: Nested monitoring
Casing Stickup: 2.55'
Static Water Level: 60.64' TOC
Well Depth/Diameter: 237.95' TOC / 2"

Purging Equipment: Redi-Flo 2 Submersible pump
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x 0.17 gal/ft = 1 casing volume (gals)

(237.95 - 60.64) 0.17 = 30.14 gals

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1022 pump on		0.1	0.95	13.2	8.73	9.18	321	46.9	59.99	gpm
1027		5	0.89	12.1	8.73	9.16	321	18.5	84.45	1
1034		10	0.62	6.6	9.07	9.18	329	20.5	90.90	0.71
1041		15	0.52	-5.5	9.30	9.29	327	67.0	99.45	0.71
1047		20	0.46	-13.3	9.43	9.33	331	48.8	105.48	0.43
1053		25	0.42	-18.0	9.58	9.34	331	44.8	110.32	1
1100		30	0.40	-22.5	9.63	9.35	332	32.2	114.84	0.71
1107		35	0.41	-27.9	9.74	9.33	331	24.9	116.70	0.71
1114		40	0.42	-29.0	9.78	9.29	331	4.38	117.69	0.71
1115 collect FEW4-MW60-233 & MW60-233 MS/MSD										

Depth to water after purging/before sampling 117.69 ft TOC 116.85
Sampling Equipment: collect from discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3+3+3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: _____

Sampler Signature(s) _____

NA ALTI

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/30/17

Project No.:
Field Crew: SB/RW
Weather: Sunny, 30s

Analytical Instruments: pH: YSI 556
Temp: "
D.O: "

Specific Conductivity: YSI 556
ORP:
Turbidity: La Motte 2020

Well ID: FEW4 MW61-80
Type of Well: nested monitoring
Casing Stickup: 2.6'
Static Water Level: 78.13' TOC
Well Depth/Diameter: 88.3' TOC /2"

Purging Equipment: geosub
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)

(88.3 – 78.13) x 0.17 = 1.7gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
0754		0.2	0.50	202.2	7.53	7.49	269	>1000	78.58	1gal/min
0756		2.0	0.25	185.0	8.87	11.82	270	76.8	79.18	1gal/min
0758		3.4	0.27	182.3	9.45	11.83	269	54.0	79.56	1gal/min
0800		4	0.32	180.8	8.98	11.73	268	60.1	79.82	1gal/min
0802		8	0.31	179.5	9.00	11.75	268	43.3	80.05	1gal/min
0804		10	0.35	177.5	8.99	11.75	266	35.5	80.19	1gal/min
0806		12	0.41	175.5	8.99	11.79	267	23.1	80.22	1gal/min
0807		13	0.34	174.9	8.99	11.76	267	20.9	80.24	1gal/min
0808		14	0.35	174.2	9.00	11.76	267	19.3	80.26	1gal/min
0811	Sample	FEW4 MW61-80	collected							

Depth to water after purging/before sampling _____ ft TOC _____
Sampling Equipment: geosub pump, discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS:

Sampler Signature(s)

Na Ali'i

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/30/17

Project No.:
Field Crew: SB/RW
Weather: sunny, 40s

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556 ↓
ORP:
Turbidity: LaMotte 2020

Well ID: FEW4 - mw01-107
Type of Well: nested monitoring
Casing Stickup: 2.11'
Static Water Level: 79.42' TOC
Well Depth/Diameter: 112.41' TOC / 2"

Purging Equipment: redi-flo
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
(112.41 - 79.42) x 0.17 = 5.6 gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
0829		0.2	0.53	132.2	8.06	12.24	299	72.6	88.92	1 gal/min
0831		2.5	0.36	140.9	8.93	11.87	301	14.6	97.73	1 gal/min
0832		4	0.35	143.6	9.13	11.81	304	21.5	NM	1 gal/min
0832	Dewatered to pump, will let recharge									
0856		4.5	0.43	144.3	7.73	11.95	305	24.5	82.62	1 gal/min
0858		6	0.35	147.5	4.10	11.75	318	22.3	94.82	1 gal/min
0859		7.5	0.34	146.4	9.48	11.69	318	20.5	100.22	1 gal/min
0859	Dewatered	to pump, will let recharge			before	sampling				
0924		8	0.42	130.4	8.07	7.06	318	17.6	83.63	
0927	Sample	FEW4-mw01-107 collected								

Depth to water after purging/before sampling _____ ft TOC_____
Sampling Equipment: redi-flo pump, discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: GW @ 80.50 @ 0855
GW @ 80.41 @ 0923

Sampler Signature(s)

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/30/17

Project No.: E14.019.29
Field Crew: JNM, KZ
Weather: sunny, 55°f, breezy

Analytical Instruments: pH: YSI556
Temp:
D.O: ↓

Specific Conductivity: YSI556
ORP: ↓
Turbidity: HACH 2100Q

Well ID: FEW4-MW01-221
Type of Well: Nested Monitoring
Casing Stickup: 2.35'
Static Water Level: 77.69' TOC
Well Depth/Diameter: 231.35' TOC / 2"

Purging Equipment: Redi-Flo2 Submersible pump
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x 0.17 gal/ft = 1 casing volume (gals)

(231.35 - 77.69) 0.17 = 26.12 gals

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1425 pump in		0.1	4.15	-111.9	8.72	7.73	339	28.3	92.39	4lpm
1431		5	4.58	-127.1	9.29	7.69	340	8.81	96.03	0.83
1435		10	4.46	-137.7	9.35	7.78	337	5.64	93.67	1.25
1440		15	5.29	-144.9	9.40	7.81	338	3.94	95.18	1
1444		20	5.50	-148.1	9.44	7.81	339	3.22	95.78	1.25
1449		25	5.52	-150.7	9.46	7.81	338	3.31	96.08	↓
1453		30	5.57	-153.4	9.48	7.82	339	2.83	96.25	
1455	collect FEW4-MW01-221									

Depth to water after purging/before sampling 96.25 ft TOC 93.45
Sampling Equipment: collect from discharge tubing

COMMENTS: ~31 gals containerized

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
Preservative
Preservative

Sampler Signature(s)

ONA ALTI

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/8/17

Project No.:
Field Crew: SB/RW
Weather: Sunny, Breezy, 40s

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556 ↓
ORP:
Turbidity: HACH 2100P

Well ID: FEW4-mw62-84
Type of Well: nested monitoring
Casing Stickup:
Static Water Level: 83.59
Well Depth/Diameter: 92.3 TOC / 2"

Purging Equipment: Redi-Flo 2
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)

(92.3 - 83.59) x 0.17 = 1.5 gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
0957		0.1	15.51	178.6	9.12	8.24	337	147	86.28	0.5 gal/min
0958		0.5	7.77	161.6	7.70	8.22	348	94.8	86.62	0.5 gal/min
0959		1	6.58	163.4	8.01	7.94	346	141	87.21	0.5 gal/min
1000		1.5	5.72	165.3	8.38	7.85	345	90.2	88.21	0.5 gal/min
1001	Dewatered	to pump. Will	allow for	recharge						
1303		1.7	14.49	130.5	8.47	8.12	372	NM	88.72	
1305		2	8.21	128.0	8.53	8.17	346	NM	89.10	
1454	Sample	FEW4-mw62-84	collected							
1456		2.25	10.10	103.2	5.70	8.17	382	NM		

Depth to water after purging/before sampling _____ ft TOC_____
Sampling Equipment: Bailer

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: GW @ 1300 = 84.45
1305 - Dewatered to pump for second time, will let recharge before sampling

Sampler Signature(s)

ONA ALI'I

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/9/17

Project No.:
Field Crew: SB/RW
Weather: Sunny, Windy, 20s

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: Hach 2100q

Well ID: FGW4-MW62-158
Type of Well: nested monitoring
Casing Stickup:
Static Water Level: 82.97' TOC
Well Depth/Diameter: 163.3' TOC / 2"

Purging Equipment: red: Flo 2
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
(163.3 – 82.97) x 0.17 = 13.7 gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1141		0.2	5.77	148.8	8.05	7.13	297	5.20	100.98	0.5 gal/min
1152		5	1.07	143.5	10.39	7.83	295	13.26	124.31	0.5 gal/min
1156		7.5	1.64	144.7	10.08	7.73	296	5.67	137.10	0.5 gal/min
1159		10	1.77	144.3	10.28	7.69	293	5.20	142.38	0.5 gal/min
1204		12.5	1.80	141.8	10.56	7.71	291	18.40	145.21	0.5 gal/min
1208	1	15	2.37	141.7	10.67	7.70	301	25.36	146.68	0.5 gal/min
1214		17.5	3.01	142.6	10.74	7.70	311	69.34	146.97	0.4 gal/min
1218		20	3.42	142.7	10.76	7.72	313	62.57	147.43	0.5 gal/min
1224		22.5	3.98	142.3	10.70	7.75	310	40.56	147.64	0.4 gal/min
1228		25	4.28	142.2	10.64	7.73	309	32.52	149.78	0.5 gal/min
1232	2	27.5	4.47	142.4	10.87	7.72	307	24.61	150.62	0.5 gal/min
1233	Sample	FGW4-MW62-158 collected								

Depth to water after purging/before sampling _____ ft TOC _____
Sampling Equipment: red: Flo 2 pump, discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS:

Sampler Signature(s)

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/15/17

Project No.:
Field Crew: SG/RW
Weather: Sunny, 20s, Breezy

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: HACH 2100P

Well ID: FEW4-MW62-252
Type of Well: nested monitoring
Casing Stickup: 2.73
Static Water Level: 126.09
Well Depth/Diameter: 257.53' TOC /2"

Purging Equipment: red: flo 2
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ___ gal/ft = 1 casing volume (gals)
(257.53 – 126.09) x 0.17 = 22.3 gal

	Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
11/14	1428		0.2	4.05	158.2	9.12	7.84	437	41	141.90	0.8gal/min
	1431		2.5	2.33	157.4	8.81	7.56	432	100	152.48	0.8gal/min
	1436		5	2.04	157.0	9.16	7.56	434	12	163.57	0.8gal/min
	1442		10	1.52	145.0	10.92	7.61	439	765	195.22	0.7gal/min
	1447		12.5	Dewatered to pump well for recharge							
11/15	1334		10.5	6.31	145.3	8.12	7.94	484	26	197.00	
	Sample	FEW4-MW62-252		collected		at 1336 on 11/15					

Depth to water after purging/before sampling _____ ft TOC_____
Sampling Equipment: Bailer

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS:

Sampler Signature(s)

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/15/17

Project No.: _____
Field Crew: SB/RW
Weather: 20s, partly cloudy breezy

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: Lamotte 2020

Well ID: FEW4-MW63-79
Type of Well: nested monitoring
Casing Stickup: 2.43'
Static Water Level: 64.15
Well Depth/Diameter: 87.23' TOC/2"

Purging Equipment: Geo Sub
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
(87.23 - 64.15) x 0.17 = 3.9 gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1516		0.2	1.10	104.5	7.93	8.43	366	44.5	67.38	0.8 gal/min
1519		2.5	5.61	104.2	8.80	7.98	368	53.9	67.38	0.8 gal/min
1522	1	5	5.42	106.0	9.02	7.77	367	69.0	67.74	0.8 gal/min
1527		7.5	5.67	104.4	9.05	7.70	369	77	69.11	0.5 gal/min
1531	2	10	6.06	103.8	9.11	7.66	371	44.6	69.71	0.6 gal/min
1535		12.5	6.07	105.1	9.13	7.61	371	25.2	70.28	0.6 gal/min
1539		15	5.73	107.8	9.10	7.55	372	17.8	70.74	0.6 gal/min
1541		16	5.62	109.4	9.16	7.53	372	26.2	70.95	0.6 gal/min
1544	Sample	FEW4-MW63-79		collected						

Depth to water after purging/before sampling _____ ft TOC _____
Sampling Equipment: Geo Sub pump, discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: _____

Sampler Signature(s) _____

ONA ALI'I

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/16/17

Project No.:
Field Crew: SS/RW
Weather: Sunny, 30s, Windy

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: Lamotte 2020

Well ID: FEW4-mw63-143
Type of Well: nested monitoring
Casing Stickup: 2.35'
Static Water Level: 63.66' TOC
Well Depth/Diameter: 148.05' TOC / 2"

Purging Equipment: geosub
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)

(148.05 − 63.66) x 0.17 = 14.3 gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1310		0.2	1.83	110.8	10.56	8.28	360	4.53	71.81	1gal/min
1315		5	1.15	114.1	9.28	7.48	352	11.8	88.29	1gal/min
1324		10	2.43	103.0	9.64	7.40	350	13.9	98.00	0.5gal/min
1333	1	15	0.47	95.9	9.63	7.39	348	11.6	103.79	0.5gal/min
1339		20	0.45	92.3	9.41	7.42	349	11.7	114.71	0.9gal/min
1344		25	0.83	89.1	9.44	7.44	346	13.7	123.14	1gal/min
1349	2	28.5	0.48	88.9	9.57	7.41	348	12.2	125.28	
1351	Sample	FEW4-mw63-143 collected								

Depth to water after purging/before sampling _____ ft TOC_____
Sampling Equipment: geosub pump, discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: _____

Sampler Signature(s) _____

NA ALI'I

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/16/17

Project No.:
Field Crew: SB/RW
Weather: Sunny, 30s, windy

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: LaMotte 2020

Well ID: FEW4-MW63-223
Type of Well: nested monitoring
Casing Stickup: 2.33'
Static Water Level: 59.18'
Well Depth/Diameter: 228.13' TOC / 2"

Purging Equipment: redi flo2
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)

(228.13 – 59.18) x 0.17 = 28.7 gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1410		0.2	10.80	95.1	9.51	7.78	368	6.24	46.28	1.3gal/min
1413		5	1.90	107.2	9.35	7.65	374	9.87	78.44	1.3gal/min
1427		10	3.48	103.4	9.47	7.67	348	5.18	74.88	1.2gal/min
1430		15	4.05	108.4	9.68	7.58	354	4.31	88.65	1.2gal/min
1433		20	5.10	106.3	9.74	7.57	349	3.07	88.66	1.2gal/min
1437		25	5.99	103.7	9.75	7.61	345	1.84	83.81	1.1gal/min
1441	1	30	5.92	103.8	9.79	7.60	344	2.13	85.11	1.1gal/min
1445		35	5.67	103.5	9.83	7.70	347	2.15	88.38	1.1gal/min
1449		40	6.09	102.6	9.86	7.67	345	2.00	88.91	1.1gal/min
1453		45	5.85	102.1	9.89	7.68	344	1.73	90.41	1.1gal/min
1456		50	6.03	102.5	9.91	7.62	342	1.61	91.59	1.1gal/min
1500		55	5.90	102.5	9.92	7.63	341	1.91	92.05	1.1gal/min
1504	2	60	5.98	102.9	9.92	7.64	344	1.78	92.22	1.1gal/min
1506	Sample	FEW4-MW63-223	collected							

Depth to water after purging/before sampling _____ ft TOC _____
Sampling Equipment: redi flo2 pump, discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: 1415 - alarm on controller, pump shut off
Turbidity <5

Sampler Signature(s)

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/3/17

Project No.:
Field Crew: SB/RW
Weather: Sunny, 40s, Breezy

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: HACH 2100P

Well ID: FEW4-MW64-68
Type of Well: nested monitoring
Casing Stickup: 2.35
Static Water Level: 66.48
Well Depth/Diameter: 76.35 TOC / 2"

Purging Equipment: Geosub
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
(76.35 - 66.48) x 0.17 = 1.7 gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1303		0.1	7.31	156.2	8.25	8.08	327	833	67.40	0.5gal/min
1305		1	5.37	156.3	8.52	7.86	326	293	63.23	0.5gal/min
1307	1	1.2	4.39	162.8	8.59	7.60	325	111	68.90	0.5gal/min
1315		3	2.78	171.3	9.27	7.32	318	71.8	70.78	0.13gal/min
1318		3.25	2.79	160.3	9.30	7.34	318	98.9	71.20	
1320	Dewatered	to top	of pump	. Shut	pump off	for	recharge			
1343		3.5	- Dewatered	again						
									~~8.94~~	
1712		4.5	5.21	160.4	8.08	7.55	319	165	68.94	0.2gal/min
1717		5.5	5.87	165.2	8.83	7.89	315	73.8	70.56	0.2gal/min
1721	Dewatered	to top	of pump,	shut	pump off	for	recharge			
11/3 0821	Sample	FEW4-MW64-68	collected							

Depth to water after purging/before sampling 66.55 ft TOC
Sampling Equipment: Geosub pump, discharge tubing

COMMENTS: @1340, GW @ 69.70
@0816 11/3/17 GW @ 66.55, well grab sample

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
Preservative
Preservative

Sampler Signature(s)

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/4/17

Project No.:
Field Crew: SG/RW
Weather: Cloudy, Breezy, 40s

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: HACH 2100P

Well ID: FEW4-MW64-122
Type of Well: nested monitoring
Casing Stickup: 2.27'
Static Water Level: 65.35
Well Depth/Diameter: 127.27' TOC /2"

Purging Equipment: 900sub
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)

(127.27 - 65.35) x 0.17 = 10.5 gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
11/3 0854		0.1	10.60	211.0	8.14	7.45	337	20.4	72.01	0.4gal/min
0859		2	3.38	205.5	8.54	6.89	377	24.2	80.78	0.4gal/min
0905		3	2.72	201.6	9.03	6.88	369	21.8	89.64	0.2gal/min
0909		4	2.43	198.6	9.16	6.92	374	26.7	95.25	0.25gal/min
0912		5	2.40	196.2	9.32	6.96	374	30.4	99.82	0.3gal/min
0915		6	2.40	193.7	9.45	6.98	370	30.8	104.09	0.3gal/min
0917	Dewatered	down to pump shut pump off for recharge								
1634		6.1	4.90	112.8	8.66	8.49	338	22.3	95.01	0.5gal/min
1636		7	3.72	118.7	8.69	8.20	332	21.4	97.88	0.5gal/min
1639		8	2.91	122.3	9.05	7.92	338	20.3	103.48	0.3gal/min
1640	Dewatered	down to pump, shut pump off for recharge								
11/4 0826	Sample	FEW4 MW64-122 collected								

Depth to water after purging/before sampling: 73.78 ft TOC
Sampling Equipment: 900sub pump, discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
____ Preservative ____
____ Preservative ____

COMMENTS: 11/3 @ 1625 GW @ 85.81
11/4 @ 0815 GW @ 73.78

Sampler Signature(s)

85.81

NA ALTI

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/8/17

Project No.:
Field Crew: SG/RW
Weather:

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: HACH 2100q

Well ID: FEW4-MW65-88
Type of Well: nested monitoring
Casing Stickup: 2.49'
Static Water Level: 70.43'
Well Depth/Diameter: 92.94' TOC / 2"

Purging Equipment: QED Sub
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
(92.94 - 70.43) x 0.17 = 3.8 gal

	Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
11/7	1300		0.1	12.02	135.0	7.10	8.61	359	140	76.15	0.5 gal/min
	1302		↓	5.19	129.6	7.77	8.37	365	69.5	77.64	0.5 gal/min
	1304		1.5	3.45	137.1	7.49	8.05	368	43.3	80.24	0.25 gal/min
	1305	Dewatered to pump, will let recharge									
11/8	0752		1.6	21.43	181.0	7.40	8.00	334	33.1	70.53	1 gal/min
	0753		2.5	9.30	176.0	7.74	7.63	335	27.5	78.78	0.5 gal/min
	0754		3	8.05	184.1	7.84	7.31	NM	NM	79.82	0.5 gal/min
	0755	Dewatered to pump, will let recharge									
	1058	Sample FEW4-MW65-88 collected									
	1100		3.25	6.94	141.3	9.22	8.33	339			

Depth to water after purging/before sampling _____ ft TOC _____
Sampling Equipment: Bailer

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: GW on 11/8 @ 750 @ 70.56
GW on 11/8 @ 1020 @ 72.20

Sampler Signature(s)

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/6/17

Project No.:
Field Crew: SB | RW
Weather: Cloudy, Breezy, 30s

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: HACH 2100P

Well ID: PEW4-MW65-142
Type of Well: nested monitoring
Casing Stickup: 2.38'
Static Water Level: 73.87
Well Depth/Diameter: 153.18' TOC / 2"

Purging Equipment: redi flo 2
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
(153.18 – 73.87) x 0.17 = 13.5 gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1449		0.2	7.91	101.7	8.13	8.21	306	31.7	83.71	0.8gal/min
1455		5	2.32	112.7	9.00	7.61	305	154	92.39	0.8gal/min
1504		10	1.61	104.7	9.66	7.62	307	68.7	98.13	0.5gal/min
1512	1	15	1.56	106.2	9.38	7.49	304	98.7	102.94	0.7gal/min
1519		20	1.89	104.6	9.37	7.64	304	29.9	106.74	0.7gal/min
1529		25	2.19	105.9	10.32	7.56	302	5.77	102.94	0.5gal/min
1539	2	30	2.56	106.0	10.54	7.62	303	4.12	106.12	0.5gal/min
1542		31	2.59	106.1	10.58	7.61	302	2.14	106.42	
1544	Sample	PEW4-MW65-142		collected						

Depth to water after purging/before sampling _____ ft TOC _____
Sampling Equipment: redi flo 2 pump, discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: Turbidity <5

Sampler Signature(s)

Na Ali'i

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/4/17

Project No.:
Field Crew: SSI RW
Weather: sunny, windy, 20s

Analytical Instruments: pH: YSI 556
Temp:
D.O:

Specific Conductivity: YSI 556
ORP:
Turbidity: HACH 2100P

Well ID: FEW4-MW65-208
Type of Well: nested monitoring
Casing Stickup: 2.34'
Static Water Level: 66.39'
Well Depth/Diameter: 213.34' TOC /2"

Purging Equipment: redi flo 2
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)

(213.34 – 66.39) X0.17 = 25.0 gal

	Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
11/7	1321		0.1	9.10	160.0	7.64	8.38	651	8.32	75.64	0.9 gal/min
	1327		5	2.33	101.0	8.38	7.73	665	8.44	89.38	0.9 gal/min
	1336		10	1.49	53.7	9.04	7.67	670	8.43	130.62	0.5 gal/min
	1345		15	1.18	21.1	9.86	7.76	507*	7.77	159.12	0.5 gal/min
	1354		20	1.08	5.0	10.94	7.60	638**	14.8	186.68	0.5 gal/min
	1358		22.5	1.06	1.5	11.39	7.60	635	17.9	197.11	0.5 gal/min
	1359	Dewatered to pump, will let recharge									
11/8	1432		22.5	0.41	128.3	8.44	8.18	606		135.31	0.5 gal/min
	1434		24	0.28	113.4	8.71	7.97	626		191.45	0.5 gal/min
	1437		25	0.27	102.4	8.76	7.86	618		196.58	0.3 gal/min
	1438	Dewatered to pump, will let recharge before Sampling									
11/9	0814	Sample FEW4-MW65-208 collected									
	0816		28.25	0.52	185.9	8.26	7.60	602	13.41		

Depth to water after purging/before sampling _____ ft TOC _____
Sampling Equipment: Bailer

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: *Conductivity varying greatly, will re-calibrate after purging to pump
**conductivity behaving normal again
GW @ 172.36 11/8 @ 800
GW @ 169.72 11/8 @ 1429
GW @ 175.23 11/9 @ 0740
Sampler Signature(s)

NA ALI'I

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/17/17

Project No.:
Field Crew: SB/RV
Weather: cloudy, windy, 40s

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: LaMotte 2020

Well ID: FEW4-MW66-94
Type of Well: vessel monitoring
Casing Stickup: 2.49'
Static Water Level: 82.32'
Well Depth/Diameter: 102.59' TOC 12"

Purging Equipment: geo sub
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
(102.59 − 82.32) x 0.17 = 3.4 gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
0850		0.2	0.59	151.0	8.13	7.63	344	77.8	88.62	1gal/min
0852		2	0.48	149.1	8.57	7.50	345	32.0	90.50	1gal/min
0853		3	0.46	150.2	8.64	7.41	346	32.7	92.90	1gal/min
0853	Dewatered to pump will let recharge									
1043		3.1	9.84	147.9	9.01	8.11	337	14.8	88.20	1.3gal/min
1044		5	7.97	142.4	8.73	8.07	344	7.04	89.78	1.3gal/min
1045		6	8.23	142.7	8.83	7.95	344	13.3	91.28	1gal/min
1046	Dewatered to pump, will let recharge before sampling									
1104		6.1	12.66	122.0	9.01	8.15	342	22.1		
1105	Sample FEW4-MW66-94 collected for VOCs									

Depth to water after purging/before sampling _____ ft TOC _____
Sampling Equipment: geo sub pump, discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: GW @ 82.42 @ 1041
GW @ 82.35 @ 1100

Sampler Signature(s)

NA ALI'I

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/18/17

Project No.:
Field Crew: SB/MW
Weather: Sunny 30s, Breezy

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: LaMotte 2020

Well ID: FEW4-MW66-158
Type of Well: nested monitoring
Casing Stickup: 2.34'
Static Water Level: 87.44
Well Depth/Diameter: 163.28 'TOC / 2"

Purging Equipment: red; Flo 2
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
(163.28 – 87.44) x 0.17 = 12.9 gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
11/18										
1448		0.5	0.73	92.9	7.03	8.07	365	61.9	100.33	2gal/min
1449		2.5	0.55	40.4	8.59	7.88	344	12.6	110.48	2gal/min
1451		5	0.48	87.1	8.98	7.84	344	12.0	122.21	1gal/min
1453		7.5	0.45	83.6	9.65	7.82	347	16.3	133.03	1gal/min
1455		10	0.46	90.7	9.59	7.82	350	16.8	141.62	1gal/min
1457		12.5	0.41	81.1	10.04	7.77	355	30.0	143.68	1gal/min
1500		15	0.40	80.8	10.49	7.67	347	52.2	145.16	1gal/min
1504		20	0.41	74.7	10.23	7.66	407	72	149.52	1gal/min
1506	Dewatered	to pump,	will let	recharge						
11/19										
0733		20.5	3.86	196.0	7.98	7.57	367	36.4	101.24	0.2 1.3gal/min
0736		25	24.48	172.3	9.02	7.07	361	12.3	124.95	1.3gal/min
0739		30	12.49	168.2	9.61	6.95	360	13.9	142.05	1.3gal/min
0742		35	12.42	162.2	10.23	6.99	362	34	149.00	1.3gal/min
0742	Dewatered	to pump,	will let	recharge	before	sampling				
0920		30	8.77	147.9	8.78	7.60	366	13.8	113.58	

Depth to water after purging/before sampling _____ ft TOC _____
Sampling Equipment: red; Flo 2 pump, discharge tubing

COMMENTS: GW @ 87.80 on 11/19/17 @ 0730
GW @ 98.16 @ 0915
0922 Sample FEW4-MW66-158 collected
Samples FEW4-MW66-158MS and FEW4-MW66-158MSD also collected

Analysis to be performed and Number of Containers:
VOCs 9 Preservative HCl
_____ Preservative _____
_____ Preservative _____

Sampler Signature(s) _____

NA ALI'I

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 1/11/17

Project No.:
Field Crew: SB/RW
Weather: rainy, 40s, windy

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: LaMotte 2020

Well ID: FEW4-mw66-205
Type of Well: nested monitoring
Casing Stickup: 2.34
Static Water Level: 78.27
Well Depth/Diameter: 213.64' TOC / 2"

Purging Equipment: redi flo 2
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
(213.64 - 78.27) x 0.17 = 21.39 gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
0817		0.5	20.25	174.4	8.45	7.43	344	37.4	104.72	1.2gal/min
0821		5	3.87	178.1	9.18	7.12	343	22.6	125.74	1.2gal/min
0825		10	2.60	176.3	10.07	7.10	343	21.3	148.64	1.2gal/min
0830		15	2.15	169.2	10.64	7.21	343	27.9	169.97	1.2gal/min
0834		20	2.21	164.8	10.96	7.26	344	46.7	189.38	1.2gal/min
0836	1	22.5	Dewatered	to pump.	will let	recharge				
1025		22.0	9.04	136.0	8.85	7.28	351	100.1	113.05	1.3gal/min
1028		27.5	5.25	147.4	9.60	8.01	350	45.7	136.58	1.3gal/min
1032		32.5	4.50	148.4	10.27	7.91	351	44.4	162.21	1.2gal/min
1035		37.5	0.48	144.0	10.54	7.92	347	28.8	185.09	1.3gal/min
1036		40	0.41	142.4	10.87	7.91	346	30.6	194.20	1.3gal/min
1036	Dewatered to pump, will let recover before sampling									
1151		40.5	1.13	117.8	8.27	8.19	341	7.34	121.35	
1153		45	0.42	130.8	9.34	7.97	346	9.21	148.21	

1155 Sample FEW4-mw66-205 collected

Depth to water after purging/before sampling _____ ft TOC _____
Sampling Equipment: redi flo 2 pump, discharge tubing

COMMENTS: GW @ 98.58 @ 1020
GW @ 109.49 @ 1147

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

Sampler Signature(s)

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/6/17

Project No.:
Field Crew: SB/RW
Weather:

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556 ↓
ORP:
Turbidity: HACH 2100Q

Well ID: FEW4 MW70-100
Type of Well: nested monitoring
Casing Stickup:
Static Water Level: 97.62
Well Depth/Diameter: 107.97' TOC / 2"

Purging Equipment: Geo Sub
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
(107.97 - 97.62) x 0.17 = 1.8 gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
0856		0.2	11.08	154.4	7.48	8.12	308	450	99.81	0.5 gal/min
0911		1	8.46	148.2	8.72	7.81	294	211	100.41	0.5 gal/min
0943	1	2	7.30	157.4	9.39	7.51	292	52.0	100.94	0.5 gal/min
0946		3	8.87	157.4	9.66	7.43	284	53.3	NM	0.5 gal/min
0946	Dewatered	to top	of pump,	will let	recharge					
1006		3.1	9.02	116.2	8.42	7.99	276	36.1	98.22	0.4 gal/min
1011		4	8.27	115.0	8.73	7.79	287	32.4	99.35	0.4 gal/min
1013		5	8.20	118.0	9.28	7.64	287	39.4	100.18	0.5 gal/min
1017		6	8.30	117.7	9.93	7.64	288	21.4	100.73	0.3 gal/min
1020		7	8.47	118.9	10.13	7.66	287	NM	NM	
1026	Dewatered	to pump,	will let	recharge						
1130		7.4	10.61	114.4	9.01	8.25	286	27.4	99.31	
1132		8	9.35	125.0	9.38	8.02	287	12.5	100.18	
1134	Sample	FEW4-MW70-100		collected						

Depth to water after purging/before sampling _____ ft TOC _____
Sampling Equipment: geo sub pump discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: 1002 GW @ 97.70
1124 GW @ 97.73

Sampler Signature(s)

NA ALI'I

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/5/17

Project No.:
Field Crew: SB/RW
Weather: Cloudy, Breezy, 30s

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O:

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: HACH 2100 P

Well ID: FEW4-MW70-142
Type of Well: nested monitoring
Casing Stickup: 2.46'
Static Water Level: 97.63
Well Depth/Diameter: 147.66' TOC / 2"

Purging Equipment: geo sub
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
(147.66 - 97.63) x 0.17 = 8.5gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1108		0.7	7.64	121.4	9.01	8.27	371	26.8	108.55	0.5gal/min
1117		2.5	2.73	120.3	9.37	7.88	365	18.5	118.01	0.5gal/min
1118		5	2.03	118.3	10.14	7.70	397	38.1	126.35	0.4gal/min
1120		6	1.96	114.2	10.19	7.70	399	158	129.21	0.5gal/min
1121	Dewatered	to pump, shut pump off			to let recharge					
1312		6.1	7.34	125.3	8.55	8.12	376	214	109.44	0.5gal/min
1316		8	4.30	123.1	9.07	8.02	381	102	117.62	0.5gal/min
1318	1	9	3.44	120.0	9.57	8.03	381	36.4	122.44	0.5gal/min
1320		10	3.15	118.3	9.68	8.02	383	95.0	124.25	0.5gal/min
1323		11.5	2.96	115.8	10.02	8.01	370	65.0	129.16	0.5gal/min
1324	Dewatered	to pump, shut	pump	off, let	recharge					
1524		12	9.60	135.8	8.40	7.93	346	34.5	106.76	0.5gal/min
1528		14	4.46	136.6	~~7.88~~ 9.07	7.78	352	23.8	116.35	0.5gal/min
1530		15	4.12	135.7	9.51	7.76	354	22.9	121.54	0.5gal/min

Depth to water after purging/before sampling _____ ft TOC _____
Sampling Equipment: red. tbg = pump, discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: GW @ 1305 = 98.34, will ~~recharge~~ SB dewater again
GW @ 1520 = 98.20 will sample
1532 Sample FEW4-MW70-142 collected

Sampler Signature(s)

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/8/17

Project No.:
Field Crew: SB/RW
Weather:

Analytical Instruments: pH: YSI 556
Temp:
D.O.:

Specific Conductivity: YSI 556
ORP:
Turbidity: HACH 2100P

Well ID: FEW4-MW70-244
Type of Well: nested monitoring
Casing Stickup: 2.46'
Static Water Level: 97.61
Well Depth/Diameter: 248.96' Tot / 2"

Purging Equipment: Redi Flo 2
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
(248.96 - 97.61) x 0.17 = 25.7 gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
11/4 0912		0.2	12.20	143.2	7.68	7.88	315	7.28	107.74	0.4 gal/min
0924		5	2.00	151.9	9.84	7.57	316	22.9	136.21	0.7 gal/min
0933		10	1.48	143.2	10.71	7.58	316	18.7	160.52	0.5 gal/min
0943		15	1.24	132.1	11.55	7.55	319	18.4	185.61	0.5 gal/min
0951		20	1.12	111.4	13.49	7.57	322	21.3	207.41	0.6 gal/min
0958		25	1.09	100.5	13.31	7.51	330	NM	NM	
0958	- Dewatered to pump shut off pump, allow for recharge									
11/7 0925		25.1	9.43	138.1	8.19	7.93	344	4.56	118.21	0.7 gal/min
0933	/	30	4.37	183.0	9.07	6.92	342	5.06	141.95	0.7 gal/min
0942		35	3.21	168.0	10.27	7.11	346	5.02	167.51	0.6 gal/min
0950		40	2.52	160.7	11.57	7.22	349	5.29	188.66	0.7 gal/min
0958		45	2.07	154.0	12.44	7.32	352	4.18	210.11	0.7 gal/min
1002		47.5	2.11	153.4	13.05	7.34	354	5.09	220.00	0.7 gal/min
1004		50	1.90	153.0	13.06	7.34	357	3.96	227.36	0.7 gal/min
1006	Dewatered to pump, will let recharge									

Depth to water after purging/before sampling _____ ft TOC _____
Sampling Equipment: _____

COMMENTS: 11/7 @ 922, GW @ 103.71, will re dewater

Analysis to be performed and Number of Containers:
VOCs _____ Preservative _____
_____ Preservative _____
_____ Preservative _____

Sampler Signature(s) _____

11/7/17

NA ALI'I

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/8/17

Project No.:
Field Crew: SB, RW
Weather: Sunny, windy, 30s

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: HACH 2100q

Well ID: FEW4-MW70-244
Type of Well: nested monitoring
Casing Stickup: 2.46'
Static Water Level: 97.61'
Well Depth/Diameter: 243.96' TOC / 2"

Purging Equipment: Red: Flo2
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
0850	sample	FEW4-MW70-244 collected								
0855		50.25	9.15	164.6	8.27	7.87	310	15.6		

Depth to water after purging/before sampling _____ ft TOC_____
Sampling Equipment: Bailer

COMMENTS: 1118 @ 0813, FEW @ 104.98

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

Sampler Signature(s)

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/6/17

Project No.: _____
Field Crew: SB, RW
Weather: Sunny, Breezy, 40's

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: HACH 2100P

Well ID: FEW4 - MW71-96
Type of Well: nested monitoring
Casing Stickup: 2.38
Static Water Level: 86.15
Well Depth/Diameter: 102.88 TOC / 2"

Purging Equipment: red; Flo2
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
(102.88 - 86.15) x 0.17 = 2.8 gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1050		0.2	12.65	113.2	8.90	8.28	157	>1000	NM	0.3gal/min
1053		2	10.32	123.5	9.65	7.86	288	>1000	86.48	0.3gal/min
1055	1	3	9.83	123.8	10.27	7.73	288	439	86.48	0.5gal/min
1057		5	9.88	124.7	10.27	7.68	288	80.4	86.45	1gal/min
1059	2	7	9.65	124.4	10.13	7.69	287	31.6	86.48	1gal/min
1102		10	9.53	121.1	10.05	7.74	287	10.0	86.43	1gal/min
1105		12.5	9.41	125.3	10.14	7.66	287	5.42	86.42	1gal/min
1108		15	9.77	120.2	10.06	7.75	287	3.42	86.43	1gal/min
1111	Sample	FEW4-MW71-96		collected						

Depth to water after purging/before sampling _____ ft TOC _____
Sampling Equipment: red; Flo 2 pump discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: Turbidity <5

Sampler Signature(s) _____

Na Ali'i

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/7/17

Project No.:
Field Crew: SB/GW
Weather: Cloudy, 30s, windy, flurries

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556 ↓
ORP:
Turbidity: HACH 2100P

Well ID: FEW4-MW71-128
Type of Well: nested monitoring
Casing Stickup: 2.5'
Static Water Level: 84.54' TOC
Well Depth/Diameter: 133.1' TOC/2"

Purging Equipment: geo sub
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
(133.1 − 84.54) x 0.17 = 8.3 gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
11/6										
1343		0.2	7.41	45.6	8.03	7.80	295	240	94.18	0.5 gal/min
1348		2.5	2.00	101.5	9.17	7.44	297	13.7	105.73	0.5 gal/min
1351		4	1.85	100.8	9.31	7.41	297	21.9	112.66	0.5 gal/min
1353		5	1.97	99.9	9.45	7.42	297	34.3	115.52	0.5 gal/min
1355	Dewatered	to pump, will		let recharge						
11/7										
1030		5.1	6.49	156.0	7.95	7.93	317	27.1	97.58	1 gal/min
1032		7	3.33	153.7	8.47	7.72	316	19.3	105.91	1 gal/min
1033		8	2.98	158.8	8.34	7.53	317	19.9	111.52	1 gal/min
1035		9	2.63	161.0	8.16	7.43	317	16.3	116.96	0.5 gal/min
1037		10	2.54	161.7	8.06	7.39	317	16.4	118.91	0.5 gal/min
1038	Dewatered	to pump, will		let recharge						
1124		10.1	17.24	141.2	6.70	8.07	308	2.78	103.45	
1125		11	4.61	142.0	8.39	7.95	316	3.29	108.58	
1127	Sample	FEW4-MW	71-128	collected						

Depth to water after purging/before sampling _____ ft TOC _____
Sampling Equipment: geo sub pump, discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: 11/7 @ 1015 GW @ 84.56
~~11/7~~ 11/7 @ 1122 GW @ 93.17, will sample

Sampler Signature(s)

Na Ali'i

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/7/17

Project No.:
Field Crew: SB/RW
Weather: cloudy windy, 30s, flurries

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: Hach 2100 P

Well ID: FEW4-MW71-205
Type of Well: Nested monitoring
Casing Stickup: 2.55'
Static Water Level: 89.67
Well Depth/Diameter: 210.25' TOC / 2"

Purging Equipment: redi flo 2
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
(210.25 - 89.67) X 0.17 = 20.5gal

	Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
11/6	1252		0.2	3.73	121.8	9.07	8.50	275	36.0	96.37	0.6gal/min
	1300		5	1.56	39.0	10.00	7.47	277	50.0	119.51	0.6gal/min
	1309		10	1.27	82.3	10.56	7.53	278	41.6	141.43	0.5gal/min
	1317		15	1.10	81.5	11.75	7.52	280	45.3	159.12	0.6gal/min
	1325	/	20	1.22	76.7	12.01	7.57	281	37.5	176.84	0.6gal/min
	1330	Dewatered	down to pump. will let recharge								
	1607		23.5		34.7	8.74	8.50	277	11.6	186.51	0.8gal/min
	1614		28	2.87	105.5	10.00	7.32	271	4.55	140.55	0.3gal/min
	1621		33	2.32	100.3	11.15	7.37	273	9.29	143.92	0.8gal/min
	1627		38	2.25	100.3	11.51	7.35	273	9.33	180.41	0.9gal/min
	1634		43	2.31	101.0	11.84	7.34	272	9.29	192.64	
11/7	1635	Dewatered to pump. will let recharge									
	1048		93.1	3.70	150.4	8.20	7.34	284	1.64	96.65	0.8gal/min
	1055		98	4.49	159.6	8.32	7.46	279	1.37	118.68	0.8gal/min
	1058	sample FEW4-MW71-205 collected									

Depth to water after purging/before sampling ____ ft TOC ____
Sampling Equipment: redi flo 2 pump, discharge tubing

COMMENTS: 1600 GW @ 106.20 will recharge
11/7 @ 1045 GW at 89.93

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
____ Preservative ____
____ Preservative ____

Sampler Signature(s)

NA ALI'I

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/4/17

Project No.:
Field Crew: SBiPW
Weather: Cloudy, Windy 40s

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O.:

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: HACH 2100Q

Well ID: FEW4-MW72-130
Type of Well: Nested monitoring
Casing Stickup: 2.4'
Static Water Level: 131.94
Well Depth/Diameter: 138.2' TOC / 2"

Purging Equipment: Bailer
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ___ gal/ft = 1 casing volume (gals)

(138.2 - 131.94) x 0.17 = 1.1 gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1635		0.25	14.66	64.6	8.31	8.19	349	1.65		
1638		0.5	11.02	75.8	8.05	7.95	348	110		
1641		0.75	10.47	80.1	8.07	7.98	347	118		
1644		1	10.29	79.7	8.00	7.90	347	88.1		
1647	1	1.25	10.27	80.8	8.06	7.93	347	103		
1650		1.5	10.12	80.6	8.11	7.99	348	117		
1652		1.75	10.00	82.1	8.01	7.86	348	111		
1655		2	10.02	83.9	8.04	7.84	347	75.7		
1659	2	2.25		83.5	8.05	7.77	347	94.8		
1704	Sample	FEW4-MW72-130 collected								

Depth to water after purging/before sampling _____ ft TOC _____
Sampling Equipment: Bailer

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: _____

Sampler Signature(s) _____

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/5/17

Project No.:
Field Crew: SB | KW
Weather: cloudy, breezy, 40s

Analytical Instruments: pH: YSI 556
Temp:
D.O:

Specific Conductivity: YSI 556
ORP:
Turbidity: HACH 2100Q

Well ID: FEW4-MW72-158
Type of Well: nested monitoring
Casing Stickup:
Static Water Level: 134.64
Well Depth/Diameter: 162.98' TOC | 2"

Purging Equipment: redi flo 2
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
(162.98 - 134.64) x 0.17 = 4.82 gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1405		0.1	4.72	113.5	9.07	7.90	613	56.8	142.68	0.5gal/min
1407		1	3.29	91.3	9.17	7.71	617	9.40	144.96	0.5gal/min
1409		1.5	2.58	83.3	9.26	7.57	616	7.64	146.74	0.25gal/min
1411	well dewatered to pump. will fit recharge overnight									
0914	Sample	FEW4-MW72-153		collected						
0915		1.75	6.93	129.7	8.26	7.87	549	14.0	146.18	

Depth to water after purging/before sampling _____ ft TOC_____
Sampling Equipment: Bailer

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: 11/5 @ 0908 GW at 146.18

Sampler Signature(s)

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/6/17

Project No.:
Field Crew: SBiRw
Weather: cloudy, Breezy, 40s

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: HACH 2100p

Well ID: FEW4-MW72-205
Type of Well: nested monitoring
Casing Stickup: 2.34'
Static Water Level: 175.85
Well Depth/Diameter: 213.24' TOC /2"

Purging Equipment: Rd. F10 2
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)

(213.24-175.85) x 0.17 = 6.3 gal

	Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
11/5	1010		0.2	7.52	124.6	8.40	8.35	516	123	174.49	0.5gal/min
	1012		1	5.02	120.6	8.81	8.24	486	18.2	176.09	0.5gal/min
	1014		2	3.78	111.0	9.06	8.04	482	10.9	178.61	0.5gal/min
	1016		3	3.04	101.0	9.43	7.94	480	9.57	181.83	0.5gal/min
	1018		4	2.57	94.5	11.38	7.87	478	7.30	183.44	0.5gal/min
	1020		5	2.35	92.4	12.24	7.87	481	7.75	185.22	0.5gal/min
	1022		6	2.19	87.2	12.51	7.93	479	7.74	188.24	0.5gal/min
	1024	1	7	1.96	86.3	13.45	7.87	484	8.12	189.03	0.5gal/min
	1026		8	1.81	84.4	13.33	7.84	483	8.01	189.51	0.5gal/min
	1027	Dewatered	down to	pump. Pump shut	off. will	allow for recharge					
11/6	0800	Sample	FEW4-MW	72-205	collected						
	0801		8.25	7.54	104.8	8.37	7.47	505	25.9	189.18	

Depth to water after purging/before sampling _____ ft TOC_____
Sampling Equipment: Bailer

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: 11/6 @ 0740 GW @ 189.18

Sampler Signature(s)

NA ALI'I

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/3/17

Project No.: SGLRW
Field Crew: SGL RW
Weather: Sunny, Breezy, 150s

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: Hach 2100P

Well ID: FEW4-MW73-137
Type of Well: nested monitoring
Casing Stickup: 2.31'
Static Water Level: 98.78
Well Depth/Diameter: 145.21' TOC / 12"

Purging Equipment: reds Flo2
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)

(145.21 − 98.78) x 0.17 = 7.9 gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1451		0.2	10.35	149.1	9.30	7.00	402	77.9	103.38	1.25gal/min
1455		5	10.29	158.0	10.06	7.46	399	23.3	103.25	1.25gal/min
1501	1	10	10.30	163.4	10.25	7.33	401	4.48	103.54	0.8gal/min
1508		15	10.31	161.9	10.23	7.40	399	2.57	103.65	0.8gal/min
1511	2	17.5	10.32	161.6	10.22	7.37	401	1.71	103.61	0.8gal/min
1513	Sample	FEW4-MW73-137		collected						

Depth to water after purging/before sampling _____ ft TOC_____
Sampling Equipment: red; Flo2 pump, discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: Turbidity <5

Sampler Signature(s) [signature]

ONA ALI'I

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/3/17

Project No.: _____
Field Crew: SB | RW
Weather: cloudy, breezy, 40s

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: HACH 2100 Q

Well ID: FEW4-MW73-21B
Type of Well: nested monitoring
Casing Stickup: 2.34'
Static Water Level: 125.02'
Well Depth/Diameter: 222.14' TOC / 2"

Purging Equipment: redi Flo 2
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
(222.14 – 125.02) x 0.17 = 16.5 gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1307		0.1	3.64	162.5	9.43	7.87	394	44.6	141.09	0.5 gal/min
1316		5	1.53	167.7	10.41	7.41	399	42.5	150.38	0.5 gal/min
1326		10	1.66	153.8	12.00	7.56	394	43.4	160.98	0.5 gal/min
1336		15	2.32	155.6	12.22	7.50	392	9.82	163.44	0.5 gal/min
1345		20	2.39	154.3	12.23	7.51	396	4.13	168.38	0.5 gal/min
1355		25	2.82	154.1	12.60	7.51	396	3.07	169.10	0.5 gal/min
1404		30	2.85	155.4	12.57	7.49	395	3.31	172.91	0.5 gal/min
1408		33	2.83	154.9	12.46	7.49	396	3.69	175.31	0.5 gal/min
1410	Sample	FEW4-MW73-21B collected								

Depth to water after purging/before sampling _____ ft TOC _____
Sampling Equipment: redi Flo 2 pump, discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: Turbidity < 5

Sampler Signature(s) _____

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/3/17

Project No.: _____
Field Crew: SB/RW
Weather: Cloudy, Breezy, 40s

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: HACH 2100Q

Well ID: FEW4-MW73-243
Type of Well: nested monitoring
Casing Stickup: 2.3'
Static Water Level: 128.62'
Well Depth/Diameter: 248.3' TOC / 2"

Purging Equipment: Red: Flo 2
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
(248.3 - 128.62) x 0.17 = 20.3 gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1022		0.1	15.62	178.3	8.84	7.45	339	4.76	136.75	0.5gal/min
1031		5	2.27	182.0	9.91	7.48	357	5.69	155.66	0.6gal/min
1041		10	1.88	173.0	11.27	7.51	339	31.9	175.09	0.5gal/min
1051		15	1.82	175.7	12.30	7.35	336	16.4	186.61	0.6gal/min
1101	1	20	1.83	168.7	13.25	7.41	401	9.87	197.11	0.5gal/min
1112		25	2.00	167.0	13.32	7.40	407	10.8	204.62	0.5gal/min
1126		30	2.76	162.3	14.03	7.45	398	13.1	209.23	0.4gal/min
1134		35	2.73	164.4	13.93	7.41	403	37.4	215.34	0.6gal/min
1148	2	40	4.39	173.5	12.19	7.30	416	107	211.25	0.5gal/min
1157		45	3.97	156.6	13.97	7.56	411	67.5	218.74	0.5gal/min
1208		50	4.54	160.0	14.02	7.47	402	61.4	219.76	0.5gal/min
1218		55	4.70	158.1	14.28	7.47	394	54.2	222.73	0.5gal/min
1222	Sample FEW4-MW73-243 collected									

Depth to water after purging/before sampling _____ ft TOC _____
Sampling Equipment: Red-Flo 2 pump, discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: 1140 - Generator ran out of gas
Purged well for 2 hours

Sampler Signature(s) [signature]

Na Alti

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 12/2/17

Project No.:
Field Crew: SS/RW
Weather: Sunny, 40s

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: LaMotte 2020

Well ID: FEW4- MW 74-104
Type of Well: nested monitoring
Casing Stickup:
Static Water Level: 51.70'
Well Depth/Diameter: 109.92' TOC/2"

Purging Equipment: ~~Geosub~~ red: flo
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
(109.92 – 51.70) x 0.17 = 9.9 gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1051		0.2	8.65	25.5	7.68	7.98	382	3489 AU	57.10	—
1127		0.2	9.70	-8.4	7.84	8.27	380	47.3	57.25	2gal/min
1129		5	4.90	-48.6	8.31	8.06	380	65.6	76.48	2gal/min
1132		10	3.46	-83.3	8.73	7.94	384	1538 AU	86.78	1.4gal/min
1135		15	2.93	-95.9	8.73	7.91	386	1087 AU	95.85	1.4gal/min
1135	Dewatered	to pump.	will let	recharge						
1154		17	5.50	-110.7	8.04	7.91	388	1240 AU	58.61	1.5gal/min
1156		20	3.87	-118.7	8.27	7.87	388	-13 NTU?	72.92	1.5gal/min
1159		25	2.81	-120.1	8.71	7.85	386	-6 NTU	85.54	1.5gal/min
1203		30	2.35	-119.3	8.87	7.84	383	70.2	91.71	1.5gal/min
1204	Dewatered	to pump.	will let	recharge	before	sampling				
1225		31	5.05	-124.2	8.44	7.92	383	46.7	56.21	
1227	Sample	FEW4-MW	74-104	collected						

Depth to water after purging/before sampling _____ ft TOC_____
Sampling Equipment: red: flo pump, discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: Geosub not pumping well, replaced w/ red: flo
Gw @ 53.90 @ 1153
Turbidity reading negative #s
Gw @ 52.70' @ 1223

Sampler Signature(s)

Na Alʻi

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 12/4/17

Project No.: E15.014.201
Field Crew: JNH, SB, RW
Weather: Sunny, 32°F, windy

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: HACH 2100Q

Well ID: FEW1-MW74-263
Type of Well: Nested Monitoring
Casing Stickup: 2.06'
Static Water Level: 48.60 TOC
Well Depth/Diameter: 267.80

Purging Equipment: Redi-Flo 2 Submersible Pump
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x 0.17 gal/ft = 1 casing volume (gals)

37.2 gals

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
12/3 1140 pump on	0	0.1	0.59	33.5	8.59	8.03	1533	10.8	54.78	—
1149		10	0.57	335.5	8.60	8.03	1531	613	108.42	1.11
1154		20	0.45	73.2	9.48	8.12	1546	635	160.64	1
1210		30	0.42	66.8	10.07	8.05	1603	675	208.12	0.81
1214 pump off, 35 gals removed, well decanted										1.25
12/4 1043 pump on		35.1	0.91	-248.2	7.33	7.45	1481	overrange	68.75	—
1054		45	0.90	-244.2	8.61	7.91	1482	overrange	138.03	1.11
1105		56	0.73	-254.8	9.75	7.91	1582	overrange	174.35	0.91
1115		63	0.61	-263.9	10.71	7.89	1646	"	195.85	0.8
1123 pump off, 70 gals removed, decanted to pump										0.88
1520 pump on		71	5.21	9.4	7.53	7.74	1647	overrange	94.51	—
1522		72.5	3.38	3.7	8.05	7.96	1085	" "	106.74	0.75
1523		75	4.72	-1.2	8.34	8.16	1085	" "	117.32	2.5
1525 collect FEW4-MW74-263										—

Depth to water after purging/before sampling 117.32 ft TOC 122.57
Sampling Equipment: collect from discharge tubing

COMMENTS: 12/3 1415 D.T.W: 126.34' TOC
12/4 1035 D.T.W 54.90' TOC
1514 D.T.W 88.78' TOC

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
Preservative
Preservative

Sampler Signature(s)

Na Alti

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 12/2/17

Project No.: E15.019.201
Field Crew: JNH, KZ
Weather: Sunny, 55°F, windy

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: HACH 2100Q

Well ID: FEW4-MW74-359
Type of Well: Nested monitoring
Casing Stickup: 2.04'
Static Water Level: 60.87' TOC
Well Depth/Diameter: 364.5' TOC / 2"

Purging Equipment: Submersible bladder pump w/ packer
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x 0.17 gal/ft = 1 casing volume (gals)
364.5 – 60.87
(~~364.5 – 354.5~~) 0.17 = ~~1.7 gals~~ = 51.2 gals

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
12/2 1443	pump on	0.1	8.83	-158.8	7.61	7.92	1717	10.75	106.74	
1452		10	0.84	-141.5	8.85	7.85	2988	24.5	165.48	
1503		20	0.53	-205.6	10.06	7.29	2964	11.80	216.09	
1506	pump kicked off,		high temp/	reading	failure,	224.79'				
12/3 0911	pump on	20	1.07	75.4	10.43	~~10.67~~	2999	42.4	207.35	
0925	pump off,	max	power	25 cycles	removed,	D.T.W	261.01			
12/4 1134	pump on	25.1	2.19	-264.1	7.50	7.77	1903	32.8	234.45	
1140		30	0.41	-262.3	9.16	7.54	2900	15.3	249.15	
1143	well dewatered			262.35'	; 33 gals	removed				
12/6 0945	collect FEW4-MW74-359									

Depth to water after purging/before sampling _____ ft TOC _____
Sampling Equipment: collect from bailer

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: 12/3/17 0800 D.T.W: 203.67' TOC
12/4/17 1045 D.T.W 249.79' TOC

Sampler Signature(s) [signature]

Na Alti

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/20/17

Project No.: E15.019.201
Field Crew: JMH, AH
Weather: Sunny, 45°F, Windy

Analytical Instruments: pH: YSI 556
Temp:
D.O:

Specific Conductivity: ~~Sunny~~ YSI 556
ORP:
Turbidity: HACH 2100Q

Well ID: FEW4-MW75-93
Type of Well: Nested Monitoring
Casing Stickup: ~~2.33~~ 2.33'
Static Water Level: 77.89'
Well Depth/Diameter: 98.05' TOC/2"

Purging Equipment: Redi-Flo 2 Submersible Pump
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)

(98.05 - 77.89) 0.17 = 3.429 gals

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1231 Pump on	on	0.1	5.78	-280.3	9.17	7.91	371	110	~~80.56~~	
1233		1	5.66	-280.9	9.32	7.80	374	21.9	83.56	
1235		2	4.81	-286.3	9.92	7.83	380	21.9	84.20	
1237		3	4.75	-287.3	10.20	7.82	381	15.5	84.48	
1238		4	4.77	-287.6	10.44	7.79	384	13.2	84.61	
1239		5	4.83	-287.5	10.53	7.76	384	12.5	84.75	
1240		6	4.86	-287.1	10.59	7.74	384	4:20	84.73	
1242	collect	FEW4-MW75-93 3		blind dup	MW144 @ 1342					

Depth to water after purging/before sampling 84.73' ft TOC 84.73
Sampling Equipment: collect from discharge tubing

COMMENTS: Containerized w 7 gals

Analysis to be performed and Number of Containers:
VOCs 3+3 Preservative HCl
____ Preservative ____
____ Preservative ____

Sampler Signature(s) JMH AH

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/20/17

Project No.: E15.019.20
Field Crew: JNH, JH
Weather: Sunny, 45°F, windy

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: HACH 2100Q

Well ID: FEW4-MW75-308
Type of Well: NC Std, monitoring
Casing Stickup: 2.33'
Static Water Level: 67.53' TOC
Well Depth/Diameter: ~~386.06'~~ 312.25' TOC / 2"

Purging Equipment: Redi-flo2 Submersible pump
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ~~0.17~~ gal/ft = 1 casing volume (gals)
(~~386.06~~ 312.25 – 67.53) 0.17 = 41.6 gals

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1047 pump on		0.1	1.33	-244.3	9.17	7.58	473	7.47	73.55	ppm
1057		1.0	2.29	-254.7	9.24	7.63	451	2.65	74.48	1
1105		2.0	3.39	-263.4	9.39	7.72	420	1.92	75.36	1.25
1114		3.0	4.03	-270.3	9.37	7.89	421	1.19	76.25	1.11
1123		4.0	4.44	-274.6	9.40	7.81	409	0.95	76.53	1.11
1132		5.0	4.84	-277.4	9.45	7.85	400	2.39	76.85	1.11
1142		6.0	5.11	-279.8	9.43	7.87	396	2.26	77.13	1.11
1151		7.0	5.35	-281.6	9.47	7.91	394	3.72	77.31	1.11
1200		8.0	5.56	-283.3	9.54	7.94	395	2.57	77.50	1.11
1202 collect FEW4-MW75-308										

Depth to water after purging/before sampling _____ ft TOC 75.25
Sampling Equipment: collect from discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: _____

Sampler Signature(s) _____

Na Ali'i

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/7/17

Project No.: F15.019.201
Field Crew: JNH, TM, JM
Weather: Sunny, 25°F

Analytical Instruments: pH: YSI 556
Temp:
D.O.: ✓

Specific Conductivity: YSI 556
ORP:
Turbidity: HACH 2100Q

Well ID: FEW4-MW)75-377
Type of Well: Nested, monitoring
Casing Stickup: 2.33'
Static Water Level: 135.33 'TOC PVC
Well Depth/Diameter: 386.06 'TOC PVC/ 2"

Purging Equipment: 3' submersible bladder pump w/ one 2" packer
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x 0.17 gal/ft = 1 casing volume (gals)
(386.06 - 370.0) 0.17 = 2.7 gals

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1220 pump on		0.1	4.20	-289.0	7.75	8.70	366	76.2	—	0.09
1231		1	4.07	-284.5	7.76	8.65	366	64.8	—	0.09
1242		2	3.92	-283.2	7.95	8.57	364	35.3	—	0.09
1253		3	3.87	-279.6	8.03	8.35	362	21.7	—	0.09
1304		4	4.37	-271.7	8.31	8.31	365	7.69	—	0.09
1315		5	4.21	-269.3	8.25	8.24	365	6.85	—	0.09
1326		6	4.32	-265.2	8.02	8.18	364	5.03	—	0.09
1337		7	4.15	-261.9	7.94	8.14	366	4.21	—	0.09
1340 collect FEW4-MW75-377										

Depth to water after purging/before sampling — ft TOC —
Sampling Equipment: Collect from discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
Preservative
Preservative

COMMENTS: Refil: 20 sec. Discharge: 60.0
controller box: 180 PSI packers: 100 PSI

Sampler Signature(s) JNM

NA ALI'I

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/29/17

Project No.:
Field Crew: SB/RW
Weather: Sunny, windy, 40s

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556 ↓
ORP:
Turbidity: LaMotte 2020

Well ID: FEW4-MW76-87
Type of Well: nested monitoring
Casing Stickup:
Static Water Level: 81.26 TOC
Well Depth/Diameter: 91.74 TOC / 2"

Purging Equipment: geosub
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
(91.74 - 81.26) x 0.17 = 1.8gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1358		0.5	0.54	67.9	8.61	8.46	312	>1000	82.24	1gal/min
1400		1	0.36	64.4	8.81	8.22	289	756 AU	82.94	1gal/min
1401	1	2.5	0.33	72.4	8.87	8.02	296	731 AU	83.53	1.3gal/min
1403	2	5	0.32	74.8	8.88	7.92	308	28	84.31	1.2gal/min
1405		7.5	0.31	83.0	8.89	7.88	315	44	84.88	1.2gal/min
1404		10	0.32	84.6	8.89	7.86	320	104.2	85.24	1.2gal/min
1408		12.5	0.39	74.9	8.84	7.88	318	33	85.56	1.2gal/min
1410		15	9.88	84.0	8.90	7.87	313	100.3	85.89	1.2gal/min
1413		17.5	9.07	84.1	8.90	7.87	309	80.9	86.15	1.2gal/min
1413	Dewatered to pump, will let recharge									
1430		18	10.35	93.5	8.82	7.89	307	72.0	82.65	1.3gal/min
1433		22.5	8.28	93.1	8.85	7.74	305	57	84.41	1.3gal/min
1436		27.5	7.72	93.7	8.85	7.83	303	826 AU	85.98	1.3gal/min
1436	Dewatered to pump, will let recharge before Sampling									

Depth to water after purging/before sampling _____ ft TOC_____
Sampling Equipment: geosub pump, discharge tubing

COMMENTS: GW @ 81.53 @ 1427

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

Sampler Signature(s)

NA ALI'I

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/29/17

Project No.:
Field Crew: SB/MW
Weather: Sunny, windy, 40s.

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: Lamotte 2020

Well ID: FEW4-MW76-87
Type of Well: nested monitoring
Casing Stickup:
Static Water Level: 81.26' TOC
Well Depth/Diameter: 91.74' TOC/2"

Purging Equipment: geosub
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1454		29	9.98	96.6	7.82	7.82	301	55	82.46	
1456	Sample	FEW4-MW76-87	collected							

Depth to water after purging/before sampling _____ ft TOC_____
Sampling Equipment: geosub pump, discharge tubing

COMMENTS: GW @ 81.57 @ 1452

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

Sampler Signature(s)

Na Ali'i

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/30/17

Project No.:
Field Crew: SB/RW
Weather: Sunny, 40s

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: LaMotte 2020

Well ID: FEW4-MW76-123
Type of Well: nested monitoring
Casing Stickup:
Static Water Level: 91.47 'TOC
Well Depth/Diameter: 127.20 'TOC / 2"

Purging Equipment: Geosub
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
(127.20 – 91.47) x 0.17 = 6.1 gal

	Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
11/29	1346		0.5	7.55	34.6	8.31	8.12	581	1,630	99.81	1 gal/min
	1347		1	7.12	32.4	7.81	8.16	583	34.3	104.64	1 gal/min
	1348		2	5.05	34.2	9.43	8.18	583	15.3	108.80	1 gal/min
	1349		3	4.27	36.2	9.03	8.16	583	15.1	112.65	1 gal/min
	1349	Dewatered TD pump will let recharge									
11/30	1005	Sample FEW4-MW76-123			Collected						
	1007		3.25	11.84	148.8	8.55	8.31	520	12.1	109.97	

Depth to water after purging/before sampling _____ ft TOC_____
Sampling Equipment: bailer

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: GW @ 109.97, well not recharged, will sample w/ bailer

Sampler Signature(s): SB RB

Na Ali'i

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/30/17

Project No.:
Field Crew: SS/RW
Weather: Sunny, 40s

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: LaMotte 2020

Well ID: FEW4-MW76-255
Type of Well: nested monitoring
Casing Stickup:
Static Water Level: 235.73' TOC
Well Depth/Diameter: 260.35' TOC / 2"

Purging Equipment: Bailer
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
(260.35 - 235.73) x 0.17 = 4.2 gal

	Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
11/28	1413		0.25	7.55	75.3	8.34	12.38	341	27.3	NM	
	1424		1	3.51	89.8	8.55	11.52	350	27.1	NM	
	1440		2	0.70	92.5	8.65	11.41	347	46	245.44	
	1456		3	5.07	96.4	8.28	9.24	360	>1000	NM	
	1511		4		89.7	8.58	8.98	367	>1000	248.65	
	1533	1	5	3.10	95.1	8.03	10.08	357	>1000	NM	
11/29	1122		6	5.44	107.6	9.07	8.26	331	>1000	NM	
	1142		7	3.02	117.6	9.12	7.99	324	>1000	251.75	
	1158		8	0.45	[illegible] 112.6	9.04	7.83	324	>1000	NM	
	1706	2	8.5	0.64	104.3	9.12	7.90	322	>1000	NM	
	1213		9	0.85	104.5	8.80	7.80	321	>1000	253.90	
	1234		10	8.48	92.3	9.02	7.76	318	>1000	254.45	
	1254		11	0.85	88.5	9.02	7.71	314	>1000	255.20	
	1313		11.05							255.55	
11/30	0953		11.25	10.49	135.2	9.04	8.25	333	>1000	NM	

Depth to water after purging/before sampling _____ ft TOC _____
Sampling Equipment: bailer

COMMENTS: After bailing 5.5 gal, WL @ 150.55
GW @ 250.21 11/29 @ 1105
~~After~~ After 11 gallons, consistently pulling up < 1/3 bailer full of water
GW @ 254.99 @ 940 11/30
11/30 0950 Sample FEW4-MW76-255 collected

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

Sampler Signature(s)

Deep

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/19/17

Project No.: E15.019.201
Field Crew: JNH, KZ
Weather: Cloudy, 36°F, windy

Analytical Instruments: pH: YSI 556
Temp:
D.O.:

Specific Conductivity: YSI 556
ORP:
Turbidity: HACH 2100Q

Well ID: FEW4-mw77-40
Type of Well: Nested monitoring
Casing Stickup: 2.17'
Static Water Level: 28.99' TOC PVC
Well Depth/Diameter: 47.80' TOC 2"

Purging Equipment: Redi-Flo2 Submersible pump
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x 0.17 gal/ft = 1 casing volume (gals)

(47.80 - 28.99) 0.17 = 3.2 gals

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1207 pump on		0.1	8.14	-272.6 ~~-9.9~~	7.99	8.00	355	overrange	31.85'	gpm
1210		1	5.10	-272.8	8.55	7.76	346	overrange	32.85	0.33
1212		2	4.48	-282.9	8.80	7.84	349	53.5	33.85	0.5
1213		3	3.32	-287.8	8.94	7.84	352	44.7	34.55	0.5
1215		4	2.60	-289.9	9.07	7.77	350	43.2	35.2	0.5
1218		5	2.80	-289.8	9.26	7.74	349	43.8	35.67	0.33
1221		6	3.05	-290.4	9.47	7.71	348	41.25	36.23	0.33
1222	collect FEW4-mw77-40		3 blind	dup	Mid 14/2	@ 1222				

Depth to water after purging/before sampling 36.23 ft TOC 36.25
Sampling Equipment: collect from discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
Preservative
Preservative

COMMENTS:

Sampler Signature(s)

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: ~~11/16/17~~ 11/20/17

Project No.: 515.019.201
Field Crew: BWH
Weather: Sunny, 20's, WNW 5 D Y

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556 ↓
ORP:
Turbidity: HACH 2100Q

Well ID: FEW4-MW77-129
Type of Well: Nested monitoring
Casing Stickup: 2.17'
Static Water Level: ~~33.39' TOC~~ 28.72' TOC
Well Depth/Diameter: 134.16' TOC

Purging Equipment: Redi-flo 2 Submersible pump
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x 0.17 gal/ft = 1 casing volume (gals)

(134.16 - 28.72) 0.17 = 18 gals

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
11/18 1000 pump on	0.1	0.1	3.38	-245.0	9.74	8.75	584	overrange	33.39	gpm
1038		5	1.31	-261.7	7.96	8.50	560	overrange	61.80	0.63
1046		10	6.74	-265.9	8.93	8.23	562	overrange	85.70	~~0.83~~ 0.63
1052		15	0.56	-268.0	8.97	8.06	562	975	111.25	0.83
1058		20	0.58	-269.5	10.32	8.01	547	925	—	0.83
1059 pump off, well dewatered to pump		20.01	4.20	-17.6	8.33	6.93	509	247	42.0	—
11/19 0810 pump on		2.5	4.42	-68.2	8.54	7.02	509	~~0.5~~ 3.36	63.45	0.5
0820		30	3.69	-177.3	9.68	7.23	515	361	86.75	0.42
0832		35	3.44	-165.2	10.24	7.26	515	324	111.75	0.7
0845		40	3.56	-190.3	10.52	7.35	522	4.23	—	0.5
0855										
0856 pump off, well dewatered to pump		40 gals removed								
11/20 0815 pump on		41	3.45	-145.2	9.75	7.31	523	77.5	42.0	—
0819 collect FEW4-MW77-129 & MW77-129 MS/MSD										

Depth to water after purging/before sampling 42.0' ft TOC ~~48.8'~~
Sampling Equipment: collect from discharge tubing

Analysis to be performed and Number of Containers:
VOCs ~~3+3+3=5~~ Preservative HCl
Preservative
Preservative

COMMENTS: 1200 D.T.W 116.5' TOC 11/19/17 D.T.W 32.0' TOC
1105 D.T.W 100.75' TOC 1245 D.T.W: 85.25' TOC
11/20/17 0910 D.T.W 31.71' TOC
Containerized ~42 gals

Sampler Signature(s)

Na Ali'i

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/19/17

Project No.: E15.019.201
Field Crew: SNH, KZ
Weather: partly cloudy, 36°F, windy

Analytical Instruments: pH: YSI556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI556
ORP: ↓
Turbidity: HACH2100Q

Well ID: FEW4-MW77-255
Type of Well: Nested Monitoring
Casing Stickup: 2.15'
Static Water Level: 2103' TOC PVC
Well Depth/Diameter: 2595 5" dia/2.11

Purging Equipment: Redi-Flo 2 Submersible pump
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x 0.17 gal/ft = 1 casing volume (gals)
40.5 gals

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
0940	pump on	0.1	3.31	-241.8	8.08	7.66	644	8.38	32.35	—
0952		10	0.57	-274.2	9.71	7.70	648	overrange	31.15	0.93
1003		20	0.64	-276.7	9.93	7.70	645	97.8	31.09	0.9
1015		30	0.77	-279.6	9.98	7.73	537	24.4	36.35	0.93
1028		40	0.92	-282.5	10.08	7.76	539	7.62	37.85	0.9
1040		50	1.09	-284.3	10.31	7.75	538	7.64	39.51	0.83
1052		60	1.26	-286.2	10.34	7.80	537	4.44	40.35	0.83
1055	collect FEW4-MW77-255									

Depth to water after purging/before sampling 40.35 ft TOC 39.53
Sampling Equipment: collect from discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: _____

Sampler Signature(s) _____

Na Alí'i

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/30/17

Project No.:
Field Crew: SB / KW
Weather: sunny, 40s

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: LaMotte 2020

Well ID: FEW4- MW30 - 128
Type of Well: nested monitoring
Casing Stickup:
Static Water Level: 73.74' TOC
Well Depth/Diameter: 133.8' TOC / 2"

Purging Equipment: geo sub
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)

(133.8 - 73.74) x 0.17 = 10.2 gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1233		0.2	0.53	112.8	9.20	8.31	305	8.35	79.01	1 gal/min
1237		5	0.36	120.8	9.03	12.06	309	60	102.95	1 gal/min
1240		7.5	0.36	129.9	9.15	13.15	308	619	109.58	1 gal/min
1242		10	0.35	134.5	9.28	13.32	313	774 AU	114.58	1 gal/min
1243	Dewatered	to pump,	will let	recharge						
1321	/	10.11	0.28	121.8	11.28	10.49	360	697 AU	76.98	1 gal/min
1323		12.5	0.35	119.8	9.04	10.92	331	115	83.04	1 gal/min
1325		15	0.34	122.6	9.03	11.33	333	57.8	95.19	1 gal/min
1327		17.5	0.33	128.4	9.07	10.54	332	71.3	103.85	1 gal/min
1329		20	0.33	129.5	9.21	10.29	332	59.6	111.61	1 gal/min
1332		22.5	0.33	129.6	9.31	12.48	331	49.5	116.14	1 gal/min
1334			0.33	128.3	9.38	13.11	333	51.1	120.25	1 gal/min
1335	Dewatered	to pump	will let	recharge	before	Sampling				
1415		23.5	0.32	114.5	10.19	8.18	335	54.9	77.66	

1417 Sample FEW4- MW30 -128 collected

Depth to water after purging/before sampling _____ ft TOC _____
Sampling Equipment: geo sub pump, discharge tubing

COMMENTS: GW @ 75.38 @ 1319
GW @ 75.39 @ 1413

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

Sampler Signature(s)

NA ALÍ

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 12/2/17

Project No.: E15.019.2.01
Field Crew: JM, KZ
Weather: Sunny, 37°F, breezy

Analytical Instruments: pH: YSI 556
Temp:
D.O.:

Specific Conductivity: YSI 556
ORP:
Turbidity: HACH 2100Q

Well ID: FEW4-MW80-223
Type of Well: Nested monitoring
Casing Stickup: 2.87
Static Water Level: 72.42 ' TOC
Well Depth/Diameter: 227.77

Purging Equipment: Redi-Flo 2 Submersible pump
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x 0.17 gal/ft = 1 casing volume (gals)

(227.77 - 72.42) 0.17 = 26.4 gals

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1019 pump on		0.1	1.52	-44.7	8.79	7.38	521	5.94	75.43	—
1024		5	0.75	-31.5	9.20	7.13	524	10.7	77.07	1
1030		10	4.48	-22.4	9.30	7.19	398	3.21	77.45	0.83
1036		15	5.58	-20.7	9.33	7.16	380	1.58	78.14	0.83
1042		20	6.09	-21.4	9.32	7.25	394	1.04	77.16	0.83
1047		25	6.45	-28.0	9.24	7.22	447	1.06	77.51	1
1053		30	6.65	-32.6	9.25	7.20	446	0.60	77.56	0.83
1058		35	6.77	-35.3	9.22	7.25	449	0.57	77.61	1
1100	collect FEW4-MW80-223									

Depth to water after purging/before sampling 77.61 ft TOC 77.02
Sampling Equipment: collect from discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
Preservative
Preservative

COMMENTS:

Sampler Signature(s) JM Kz

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 12/2/17

Project No.: EI5.014.20
Field Crew: JW, KZ
Weather: Sunny, 35°F, windy

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556 ↓
ORP: ↓
Turbidity: HACH 2100 Q

Well ID: FEW4-MW80-289
Type of Well: Nested monitoring
Casing Stickup: 2.92
Static Water Level: 66.66' TOC
Well Depth/Diameter: 289.09 : 2"

Purging Equipment: Redi-Flo 2 Submersible pump
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x 0.17 gal/ft = 1 casing volume (gals)

(289.09 - 66.66) 0.17 = 37.8 gals

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
0833 Pump on		0.1	4.89	39.0	8.63	7.20	363	15.8	67.04	gpm
0840		5	4.90	44.8	8.65	7.20	363	7.75	67.23	0.71
0846		10	5.29	70.3	8.90	7.36	363	39.2	67.45	0.83
0854		15	5.25	72.9	8.90	7.46	365	11.6	67.60	0.63
0901		20	5.26	66.2	9.03	7.51	368	3.77	67.67	0.71
0907		25	5.29	58.5	9.06	7.52	366	1.21	67.76	0.83
0913		30	5.34	62.8	9.07	7.51	365	3.25	67.85	0.83
0920		35	5.35	55.4	9.12	7.55	365	1.02	67.93	0.71
0926		40	5.39	50.4	9.14	7.57	365	0.85	68.00	0.83
0933		45	5.46	42.7	9.15	7.58	365	0.85	68.05	0.71
0939		50	5.57	41.3	9.19	7.56	364	0.84	68.10	0.83
0940 collect FEW4-MW80-289										

Depth to water after purging/before sampling 68.10 ft TOC 67.89
Sampling Equipment: collect from discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: _____

Sampler Signature(s) _____

ONA ALI'I

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/20/17

Project No.:
Field Crew: SB MW
Weather: WINDY, 40s, sunny

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: LaMotte 2020

Well ID: FEW4-MW81-100
Type of Well: nested monitoring
Casing Stickup:
Static Water Level: 66.66' TOC
Well Depth/Diameter: 107.52' TOC; 2"

Purging Equipment: geosub
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
(107.52 – 66.66) x 0.17 = 6.9 gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1241		0.5	0.42	91.2	9.19	8.75	427	359	73.41	0.3gal/min
1256		2.5	0.35	92.8	10.48	8.15	411	36	72.88	1gal/min
1258		5	0.37	90.7	9.15	8.10	410	57	78.65	1gal/min
1300		7.5	0.34	97.8	9.28	7.97	412	105	86.82	1gal/min
1302		10	0.35	99.9	9.44	7.87	413	94	88.91	1gal/min
1304		12 Dewatered	to pump,	will let	recharge					
1324		12.1	0.35	73.8	10.15	8.07	417	89	64.49	1gal/min
1331		14.5	0.36	75.2	8.96	8.03	503	97	78.05	1gal/min
1334		17	0.35	77.0	9.10	7.86	482	30	84.91	0.3gal/min
1336		19.5	0.35	76.4	9.17	7.83	479	95.3	90.48	1gal/min
1336	Dewatered	to pump,	will let	recharge	before	sampling				
1404		20	0.35	61.1	9.63	7.99	481	79	72.29	
1406	Sample	FEW4-MW81-100		collected						

Depth to water after purging/before sampling _____ ft TOC _____
Sampling Equipment: geosub pump, discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: 1245 - pump barely working, pull pump to recheck GW @ 68.75 @ 1325
GW @ 67.89 @ 1402

Sampler Signature(s)

NA ALI'I

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/29/17

Project No.:
Field Crew: SB / RW
Weather: Sunny, windy, 40s

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556 ↓
ORP:
Turbidity: LaMotte 2020

Well ID: FEW4-MW81-207
Type of Well: Nested monitoring
Casing Stickup:
Static Water Level: 65.62
Well Depth/Diameter: 212.56' TOC / 2"

Purging Equipment: redi Flo
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
(212.56 – 65.62) x 0.17 = 25 gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
0953		0.5	0.67	98.3	8.31	8.28	266	8.37	72.51	2.2gal/min
0955		5	0.41	114.1	8.82	7.89	263	1139 AU	81.62	2.2gal/min
1002		10	0.34	120.8	9.26	7.69	262	1214 AU	80.44	1gal/min
1007		15	0.40	116.8	9.30	7.69	262	69.2	82.95	1.3gal/min
1007		20	0.33	115.2	9.29	7.71	261	20.9	83.83	1.2gal/min
1011	1	25	0.38	114.9	9.32	7.72	262	14.7	84.24	1.2gal/min
1015		30	0.39	115.3	9.37	7.73	262	6.50	84.52	1.2gal/min
1019		35	0.38	115.9	9.40	7.73	262	8.31	84.71	1.2gal/min
1023		40	0.36	116.5	9.43	7.73	261	5.41	84.69	1.2gal/min
1027		45	0.38	117.4	9.48	7.72	262	4.02	84.76	1.2gal/min
1030	2	50	0.37	117.1	9.54	7.71	261	4.20	84.95	
1033	Sample	FEW4-MW81-207	collected							

Depth to water after purging/before sampling _____ ft TOC _____
Sampling Equipment: redi Flo pump, discharge tubing

Analysis to be performed and Number of Containers:
VOCs 6 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: Duplicate Sample "FEW4-MW146" collected @ "1133"
Turbidity 25

Sampler Signature(s)

NA ALI'I

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/29/17

Project No.: E15.019.201
Field Crew: JWH, KZ
Weather: partly cloudy, 46°F, windy

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: HACH2100Q

Well ID: FEW4-mw81-279
Type of Well: Nested monitoring
Casing Stickup: 2.5'
Static Water Level: ~~78.25'~~ ~~TOC~~ 56.36' TOC
Well Depth/Diameter: 286.85' TOC

Purging Equipment: Redi-flo 2 Submersible pump
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x 0.17 gal/ft = 1 casing volume (gals)
(286.85 – 56.36) 0.17 = 39 gals

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1502 pump on		0.1	3.70	-209.9	8.35	7.92	363	10.4	57.22	60 mL
1512		10	5.29	-237.9	8.81	7.64	393	overrange	57.89	1
1521		20	6.35	-251.2	8.91	7.76	369	91.4	58.29	1.11
1530		30	6.65	-256.6	8.94	7.77	355	23.8	58.59	1.11
1538		40	6.83	-257.0	8.92	7.75	352	7.88	58.89	1.25
1547		50	6.93	-257.5	8.92	7.76	353	3.75	59.09	1.11
1550 collect FEW4-mw81-279										

Depth to water after purging/before sampling 59.09 ft TOC 58.95
Sampling Equipment: collect from discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: _____

Sampler Signature(s) _____

Na Alti

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/28/17

Project No.:
Field Crew: SS/RW
Weather: Sunny, 40s

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O.:

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: LaMotte 2020

Well ID: FEW4-MW82-83
Type of Well: nested monitoring
Casing Stickup:
Static Water Level: 66.82
Well Depth/Diameter: 88.85 TOC/2"

Purging Equipment: geosub
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
(88.85 − 66.82) × 0.17 = 3.7 gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1309		0.7	0.57	81.4	8.04	9.02	312	1183	69.81	1.4 gal/min
1312	1	5	0.44	75.4	8.57	7.87	294	71.4	69.99	1.4 gal/min
1315	2	10	0.45	75.5	8.55	8.87	293	21.5	70.54	1.3 gal/min
1320		15	0.43	82.8	8.56	8.84	287	7.33	70.48	1 gal/min
1323		20	0.45	76.3	8.58	8.84	284	4.43	70.46	1.3 gal/min
1326		25	0.44	88.8	8.60	8.84	287	2.84	70.28	1.3 gal/min
1329	Sample	FEW4-MW82-83 collected								

Depth to water after purging/before sampling _____ ft TOC_____
Sampling Equipment: geoSub pump, discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: Turbidity LS

Sampler Signature(s)

Na Ali'i

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/28/17

Project No.:
Field Crew: SG/RW
Weather: Sunny, 40s

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: LaMotte 2020

Well ID: FEW4-MW82-132
Type of Well: nested monitoring
Casing Stickup:
Static Water Level: 67.51' TOC
Well Depth/Diameter: 137.42' TOC / 2"

Purging Equipment: geosub
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
(137.42 - 67.51) x 0.17 = 11.9 gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1028		0.5	10.08	91.9	7.36	9.39	288	32.2	73.10	1.4gal/min
1031		5	11.58	91.4	8.30	8.96	271	1451	86.45	1.9gal/min
1036		10	11.00	95.4	8.42	8.87	272	1167	98.22	1gal/min
1040	1	15	11.11	97.1	8.50	8.84	276	1263	104.74	1.25gal/min
1044		20	10.98	98.3	8.57	8.81	281	857	109.51	1.25gal/min
1049	2	25	10.00	99.4	8.63	8.77	288	104	112.83	1gal/min
1053		30	8.57	100.3	8.66	8.77	294	50	115.15	1.2gal/min
1056		35	8.40	100.8	8.66	8.77	296	63	119.28	1.3gal/min
1100		40	8.19	101.0	8.71	8.75	302	916	121.08	1.2gal/min
1103		45	8.61	101.3	8.74	8.75	305	17	121.58	1.3gal/min
1108		56	8.21	97.5	8.75	8.76	303	15	118.72	2gal/min
1111	Sample	FEW4-MW82-132		collected						

Depth to water after purging/before sampling _____ ft TOC _____
Sampling Equipment: geosub pump, discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS:

Sampler Signature(s)

Na Ali'i

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/29/17

Project No.:
Field Crew: SB / RW
Weather: sunny, breezy, 40s

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: LaMotte 2020

Well ID: FEW4-MW82-161
Type of Well: nested monitoring
Casing Stickup:
Static Water Level: 66.88
Well Depth/Diameter: 166.45

Purging Equipment: rel. flo
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
(166.45 − 66.88) × 0.17 = 16.9 gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
0818		0.5	69.37	193.4	8.06	7.74	339	5.02	76.91	2.5gal/min
0820		5	43.09	185.3	8.72	8.56	371	2335 AU	91.28	2.5gal/min
0823		10	23.28	169.7	9.13	7.50	378	1826 AU	93.51	1.5gal/min
0826		15	15.90	155.6	9.12	7.28	342	47	93.98	1.5gal/min
0829	1	20	12.08	151.1	9.16	7.23	336	24.8	94.32	1.5gal/min
0832		25	11.01	148.2	9.15	7.26	331	8.20	97.72	1.5gal/min
0835		30	12.13	145.0	9.27	7.27	326	24.4	97.49	1.5gal/min
0838	2	35	12.17	142.6	9.29	7.30	325	20	97.34	1.5gal/min
0841		40	9.30	139.8	9.31	7.32	326	>1000	97.34	1.5gal/min
0844		45	9.46	136.3	9.24	7.34	315	26.4	97.44	1.5gal/min
0847		50	0.47	136.1	9.30	7.36	314	4.98	97.53	1.5gal/min
0850		55	0.35	135.1	9.34	7.38	314	3.42	97.44	1.5gal/min
0853		60	0.37	134.4	9.32	7.40	312	2.99	97.46	
0856	Sample	FEW4-MW82-161 collected								

Depth to water after purging/before sampling _____ ft TOC _____
Sampling Equipment: rel. flo pump, discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: Turbidity <5
Bursts of silt and greatly changing D.O. readings during first ~45 gallons

Sampler Signature(s)

NA ALI'I

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/19/17

Project No.: _____
Field Crew: JB/RW
Weather: cloudy, Breezy windy

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: LaMotte 2020

Well ID: FEW4-MW83-88
Type of Well: nested monitoring
Casing Stickup: _____
Static Water Level: 77.12 TOC
Well Depth/Diameter: 94.90 TOC /2"

Purging Equipment: geosub
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
(94.90 – 77.12) x 0.17 = 3 gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1220		0.5	0.52	117.8	8.66	8.42	369	>1000	83.18	1 gal/min
1229		1	0.50	113.5	8.43	8.39	356	>1000	84.36	1 gal/min
1229	Dewatered	to pump,	will	let recharge						
1335		1.25	8.58	111.1	8.25	8.01	349	~~52~~ 52		
1338		2.25	10.56	108.3	7.80	8.06	349	111		
1342 ~~1342~~ 2nd		3.25	7.71	113.7	7.84	8.07	352	612	82.72	
1348		4.25	8.23	114.9	7.81	7.92	352	891		
1355		5.25	8.14	115.3	7.83	7.91	352	71000		
1402		6.25	8.16	109.4	7.82	7.92	351	71000		
1405		7.25	8.18	111.3	7.82	7.92	351	71000	84.91	
1406	Sample	FEW4-MW83-88		collected						

Depth to water after purging/before sampling _____ ft TOC_____
Sampling Equipment: Bailer

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: Pull pump, not enough water and very silty
GW @ 1327, will hand bail
collect Sample FEW4-MW83-88 @ 1406

Sampler Signature(s) _____

Na Ali'i

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/19/17

Project No.:
Field Crew: SB/RW
Weather: Cloudy, Breezy, 30's

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: LaMotte 2020

Well ID: FEW4-MW83-129
Type of Well: nested monitoring
Casing Stickup:
Static Water Level: 90.06' TOC
Well Depth/Diameter: 132.44' TOC / 2"

Purging Equipment: geosub
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
(132.44 - 90.06) x 0.17 = 7.2 gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1211		0.5	0.63	91.0	8.19	8.55	340	8.40	99.31	0.8gal/min
1214		2.5	0.47	100.9	8.44	8.17	340	83.9	107.21	0.8gal/min
1215		5	0.46	116.0	9.03	7.93	341	91.7	114.93	1.5gal/min
1216		7	0.47	118.0	9.04	7.92	334	29	118.78	1.5gal/min
1217	Dewatered to pump, will let recharge									
1301		7.5	0.53	107.7	8.38	8.19	335	5	98.49	1gal/min
1303		9.5	0.46	115.8	9.02	8.02	335	96.8	107.98	1gal/min
1305		12	0.45	118.1	9.03	7.96	336	19	112.98	1gal/min
1307		14	0.45	118.0	9.11	7.92	336	4	116.42	1gal/min
1307	Dewatered	to pump, will let recharge			before	Sampling				
1322		14.5	0.53	118.3	8.24	8.11	338	86.2	99.62	
1324	Sample	FEW4-MW83-129		collected						

Depth to water after purging/before sampling _____ ft TOC _____
Sampling Equipment: geosub pump, discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: GW @ 90.21 @ 1254
GW @ 92.20 @ 1320

Sampler Signature(s)

ONA ALI'I

PD 1 OF 2

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/19/17

Project No.:
Field Crew: SB/RW
Weather: Sunny, Breezy, 30s

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: Lamotte 2020

Well ID: FEW4-MW83-271
Type of Well: nested monitoring
Casing Stickup:
Static Water Level: 51.25
Well Depth/Diameter: 271.83' TOC / 2"

Purging Equipment: Redi Flo 2
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
(271.83 - 51.25) x 0.17 = 37.5 gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1044		0.5	0.59	151.2	9.55	8.44	365	7.24	55.39	2gal/min
1046		5	0.44	144.9	9.34	8.04	363	>1000	55.45	2gal/min
1048		10	0.44	138.6	9.32	7.77	344	>1000	55.25	2gal/min
1052		15	0.44	130.3	9.37	7.68	355	>1000	55.48	1.2gal/min
1055		20	0.43	127.7	9.40	7.72	348	>1000	55.72	1.2gal/min
1059		25	0.44	125.0	9.40	7.71	365	72	56.31	1.2gal/min
1102		30	0.43	125.6	9.43	7.73	364	44.2	56.66	1.3gal/min
1105		35	0.44	121.8	9.41	7.78	364	35.0	57.43	1.2gal/min
1108	1	40	0.43	123.1	9.44	7.80	364	9.91	57.81	1.2gal/min
1110		45	0.44	124.2	9.45	7.79	364	13.9	58.17	1.5gal/min
1113		50	0.43	124.7	9.48	7.80	364	31.7	58.61	1.5gal/min
1115		55	0.43	126.7	9.47	7.69	362	39.6	58.85	1.5gal/min
1118		60	0.44	125.9	9.48	7.74	363	28.9	59.15	1.5gal/min
1121		65	0.43	126.3	9.50	7.79	361	13.5	59.41	1.5gal/min

Depth to water after purging/before sampling _____ ft TOC_____
Sampling Equipment: _____

Analysis to be performed and Number of Containers:
VOCs _____ Preservative _____
_____ Preservative _____
_____ Preservative _____

COMMENTS: _____

Sampler Signature(s) _____

NA ALTI

pg 2 of 2

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/17/17

Project No.:
Field Crew: SS BW
Weather: Sunny, Breezy, 30s

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: LaMotte 2020

Well ID: FEW4-MW83-271
Type of Well: Nested monitoring
Casing Stickup:
Static Water Level: 51.25
Well Depth/Diameter: 271.83' TOC / 2"

Purging Equipment: redi flo 2
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1123		70	0.43	128.0	9.52	7.79	364	4.4	59.62	
1126	2	75	0.43	127.6	9.52	7.74	362	4.76	59.83	
1128	Sample	FEW4-MW83-271		Collected						

Depth to water after purging/before sampling _____ ft TOC_____
Sampling Equipment: redi flo 2 pump, discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: Turbidity <5

Sampler Signature(s)

Na Alii

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 12/5/17

Project No.: EIS.019.201
Field Crew: JNTI, R.D. SB
Weather: sunny, 35°F, windy

Analytical Instruments: pH: YSI556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: N
Turbidity: HACH 2100Q

Well ID: FEW4-MW04-~~00~~99
Type of Well: Metal MONITORING
Casing Stickup: 2.45
Static Water Level: 97.50' TOC
Well Depth/Diameter: 104.55' TOC 12"

Purging Equipment: 3', 1L bailer
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x 0.17 gal/ft = 1 casing volume (gals)

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
12/3 1237		0.25	2.85	4.8	8.90	8.13	2133	OR	—	—
12/4 1250		~~2.75~~ 0.75	2.73	2.5	8.95	8.15	2138	OR	—	—
1255		1.5	2.01	-1.9	8.75	8.08	2213	OR	—	—
12/5 0936		1.75	3.75	-236.3	8.51	7.78	2194	OR	85.91	—

Depth to water after purging/before sampling _____ ft TOC _____
Sampling Equipment: collect from bailer

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: 1259 well dewatered 1.75L
12/4/1245 D.T.W 97.50' TOC 1300 well dewatered, ~~2.75~~ 1.75 gals removed
1215 0935 Sample FEW4-MW04-99 collected

Sampler Signature(s) [signature]

NA ALI'I

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/29/17

Project No.: E15.019.201
Field Crew: JNH, KZ
Weather: Cloudy, 43°F, windy

Analytical Instruments: pH: 30 YSI556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: HACH 2100Q

Well ID: FEW4-MW84-258
Type of Well: Nested Monitoring
Casing Stickup: 2.5'
Static Water Level: 82.09' TOC
Well Depth/Diameter: 269.95' TOC/2"

Purging Equipment: Redi-Flo 2 Submersible pump
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x 0.17 gal/ft = 1 casing volume (gals)

(269.95 – 82.09') 0.17 = 31.9 gals

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
0901 pump on		0.1	1.15	-93.5	9.35	7.43	8:50 ~~674~~	~~67.1 96.02~~	96.02	—
0905		5	1.13	-92.7	9.40	7.41	847	overrange	118.56	1.75
0911		10	~~0.78~~	-110.9	9.59	7.52	884	overrange	144.58	0.83
0918		15	0.63	-126.0	10.53	7.61	972	overrange	170.42	0.71
0920 pump turned off										
1022 pump on		18	0.75	-214.7	8.62	7.67	1188	overrange	162.14	—
1004		20	0.68	-215.5	8.65	7.67	1185	overrange	168.39	~~0.75~~ 0.75
1011		25	0.62	-230.8	11.64	7.68	994	overrange	190.07	0.83
1019		30	0.53	-235.3	12.42	7.79	993	overrange	214.09	0.63
1628		35	0.63	-243.4	13.28	7.78	1065	overrange	235.05	
1031 well dewatered to pump, ~37 gals removed										
11/30/17 0746 pump on		35	1.09	-31.3	9.09	7.04	1326	20.2	102.12	—
0753		40	0.85	24.5	9.56	7.11	1626	overrange	134.07	0.71
0757		45	0.69	24.7	10.13	7.17	1571	overrange	169.64	1.25

Depth to water after purging/before sampling _____ ft TOC _____
Sampling Equipment: Collect from discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: 1045 D.T.W 220.0' TOC 1110 D.T.W: 200.0'
1140 D.T.W: 180.0' TOC 1218 D.T.W 160.0' TOC
1352 D.T.W 132.52 11/30/17 0730 D.T.W:
99.63' TOC

Sampler Signature(s) [signature]

ONA ALTI

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/30/17

Project No.: EIS-019-201
Field Crew: SM, KZ
Weather: Sunny, 30°F, breezy

Analytical Instruments: pH: _____
Temp: _____
D.O: _____

Specific Conductivity: _____
ORP: _____
Turbidity: _____

Well ID: FEW4-MW04-258
Type of Well: _____
Casing Stickup: _____
Static Water Level: _____
Well Depth/Diameter: _____

Purging Equipment: _____
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
0803		50	0.65	21.1	10.31	7.21	1557	overrange	189.21	0.83
0810		55	0.56	14.4	10.82	7.27	1547	overrange	212.04	0.71
0817		60	0.64	7.0	12.55	7.34	1436	overrange	235.1	0.71
0824 pump off, well dewatered to pump, 62 gals removed										—
1520 pump on		61	0.65	6.9	9.58	7.76	1373	298	131.85	—
1523 collect FEW4-MW04-258										

Depth to water after purging/before sampling 131.85 ft TOC 132.47
Sampling Equipment: collect from discharge tubing

COMMENTS: 11/30/17 1515 D.T.W: 119.35'

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

Sampler Signature(s) _____

NA ALI'I

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/29/17

Project No.: E15.019.20
Field Crew: JH, KZ
Weather: Cloudy, 43°F, windy

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP:
Turbidity: HACH 2100Q

Well ID: FEW4, MW84-798
Type of Well: Vestal monitoring
Casing Stickup: 2.58'
Static Water Level: 100.41' TOC
Well Depth/Diameter: ~~286.85'~~ 302.88' TOC / 2"

Purging Equipment: Redi-Flo 2 Submersible pump
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x 0.17 gal/ft = 1 casing volume (gals)
~~(286.85 – 100.41') 0.17 = 31.7 gals~~
(302.88 – 100.41') 0.17 = 51.5 gals

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1236 pump on		0.1	5.25	-252.6	9.57	7.46	340	67.1	17.72	gpm
1243		10	5.32	-252.5	9.71	7.54	336	153.5	48.53	1.43
1253		20	5.51	-254.3	9.95	7.75	337	437	56.81	1
1305 ~~1259~~		30	5.50	-252.9	9.99	7.77	337	233	79.78	0.83
1320		40	5.61	-249.5	10.39	7.80	337	15.3	88.33	0.67
1332		50	5.43	-254.2	10.74	7.82	336	9.70	105.36	~~0.71~~ 0.83
1346		60	5.81	-248.0	10.79	7.83	337	421	112.12	0.71
1348 collect FEW4-MW84-798										

Depth to water after purging/before sampling 112.12' ft TOC 111.81'
Sampling Equipment: collect from discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
Preservative
Preservative

COMMENTS:

Sampler Signature(s)

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/20/17

Project No.:
Field Crew: SS/RW
Weather: windy, 40s, Sunny

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: LaMotte 2020

Well ID: FGW4-MW8S-92
Type of Well: nested monitoring
Casing Stickup:
Static Water Level: 87.38
Well Depth/Diameter: 97.12' TOC /2"

Purging Equipment: geosub
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
(97.12 - 87.38) x 0.17 = 1.7 gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
0830		1	0.57	81.4	8.38	8.00	351	3169 *	88.84	1gal/min
0831		2.5	0.34	72.1	9.09	7.75	348	1565 *	89.61	1gal/min
0833		5	0.37	71.2	9.14	7.71	347	1090 *	90.05	1gal/min
0834		7.5	0.37	65.3	9.17	7.77	347	1182 *	90.35	1gal/min
0836		10	0.37	64.7	9.18	7.78	346	741 *	90.53	1gal/min
0839		15	0.35	67.6	9.20	7.73	346	36	90.92	1.3gal/min
0842		20	0.39	67.7	9.20	7.74	346	15	91.14	1.3gal/min
0846		25	0.38	77.5	9.18	7.64	346	17	91.35	1.2gal/min
0849		30	0.39	82.9	9.18	7.64	346	57.7	91.48	1.3gal/min
0851		35	0.39	87.3	9.16	7.62	346	83.9	91.62	1.5gal/min
0854		40	0.39	90.5	9.17	7.62	346	45.0	—	1.3gal/min
0854	Dewatered	to pump,	will lift	recovery						
1014		41	0.45	71.0	8.99	8.43	354	46.7	89.04	
1017		49	0.36	81.1	9.24	7.90	346	98	90.01	1gal/min

Depth to water after purging/before sampling _____ ft TOC _____
Sampling Equipment: geosub pump, discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: * Turbidity measured in "AU"s
GW @ 87.44 @ 0933

Sampler Signature(s) _____

Na Ali'i

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/20/17

Project No.: _____
Field Crew: SB/RW
Weather: WINDY, 40s, Sunny

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: LaMotte 2020

Well ID: FEW4-MW85-92
Type of Well: Nested monitoring
Casing Stickup: _____
Static Water Level: 87.38'
Well Depth/Diameter: 97.12' TOC /2"

Purging Equipment: geosub
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1020		50	0.35	87.7	9.14	7.75	346	745	90.92	1.3 gal/min
1022		55	0.37	89.3	9.20	7.70	345	93.8	91.35	2gal/min
1025		60	0.35	91.2	9.20	7.64	345	99.4	91.38	1.3gal/min
1028		65	0.34	42.6	9.20	7.64	345	93.4	91.55	1.3gal/min
1029	Dewatered	to pump,	will	let	recharge	before	Sampling			
1055		65.2	0.49	81.2	9.15	8.24	345	72.5	88.62	
1057	Sample	FEW4-MW85-92		collected						

Depth to water after purging/before sampling _____ ft TOC_____
Sampling Equipment: geosub pump, discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: GW @ 87.45 @ 1050

Sampler Signature(s) [signature]

ONA ALTI

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/20/17

Project No.:
Field Crew: SS/RW
Weather: WINDY, 40s. Sunny

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: LaMotte 2020

Well ID: FEW4 - MW85 - 151
Type of Well: nested monitoring
Casing Stickup:
Static Water Level: 85.78
Well Depth/Diameter: 156.95 - TOC 12"

Purging Equipment: geo Sub
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)

(156.95 - 85.78) x0.17 = 12.1 gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
0756		0.5	0.22	198.6	8.53	7.23	845	>1000	95.72	1gal/min
0758		2.5	0.32	151.9	9.16	7.03	575	18.9	110.26	1gal/min
0759		5	0.24	134.5	9.23	6.89	826	145	121.91	1.5gal/min
0801		7.5	0.19	128.4	9.24	6.87	1073	18.2	129.41	1gal/min
0803		10	0.15	121.9	9.32	6.86	1321	36.3	138.02	1gal/min
0805	1	12	0.07	117.8	9.44	6.87	1486	36.0	142.71	1gal/min
0806	Dewatered to pump, will let recharge									
0946		12.2	0.10	150.3	8.87	7.56	1572	49.9	97.33	1gal/min
0948		14.5	0.01	145.0	9.20	7.50	2294	45.1	102.68	1gal/min
0450		17	0.01	136.9	9.39	7.55	2347	34.2	117.98	1gal/min
0954		19.5	0.04	125.8	9.61	7.53	2343	18.3	133.25	0.6gal/min
0956		22	0.01	119.6	9.71	7.56	2255	23.8	137.04	1gal/min
0958		24	0.00	114.4	9.80	7.50	2161	NM	142.25	1gal/min
0958	Dewatered to pump, will let recharge before sampling									

Depth to water after purging/before sampling _____ ft TOC _____
Sampling Equipment: geo sub pump, discharge tubing

COMMENTS: GW @ 95.09 @ 0931

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

Sampler Signature(s) _____

Na Ali'i

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/20/17

Project No.:
Field Crew: SS/RW
Weather: WINDY, 40s, Sunny

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: Lamotte 2020

Well ID: FGW4-MW85-151
Type of Well: nested monitoring
Casing Stickup:
Static Water Level: 85.78'
Well Depth/Diameter: 156.95' TOC /2"

Purging Equipment: geosub
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1114		25	5.24	130.0	9.20	7.86	2107	25.3	101.85	
1116	Sample	FGW4-MW85-151		collected						

Depth to water after purging/before sampling _____ ft TOC _____
Sampling Equipment: geosub pump, discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: GW @ 98.20 @ 1111
highly effervescent, had trouble getting bubble-free VOAs filled

Sampler Signature(s)

NA ALI'I

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/28/17

Analytical Instruments: pH: YSI 556
Temp:
D.O.:

Project No.: ES.019.201
Field Crew: JWH, KZ
Weather: ~~11~~ / cloudy, 32°f, breezy

Specific Conductivity: YSI 556
ORP:
Turbidity: HACH 2100Q

Well ID: FEW4-MW85-205
Type of Well: NESHAP monitoring
Casing Stickup: 2.31
Static Water Level: 78.25' TOC
Well Depth/Diameter: 214.24' TOC / 2"

Purging Equipment: Redi-Flo 2 submersible pump
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x 0.17 gal/ft = 1 casing volume (gals)
(214.24 - 78.25) 0.17 = 23.12 gals

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1121 pump on		0.1	1.10	-304.0	9.73	7.21	562	5.15	86.96	—
1129		5	1.07	-312.9	9.79	7.27	568	103.10 ⟷ 78.89		0.63
1139		10	0.70	-336.2	10.41	7.51	567	128.78 ⟷ 69.3		0.5
1145		15	0.60	-327.1	10.97	7.51	564	overrange	150.40	0.83
1153		20	0.64	-309.8	11.60	7.54	570	overrange	172.15	0.63
1202		25	0.69	-336.5	12.27	7.59	556	270	—	0.71
1201 pump off, well dewated to pump										
1422 pump on		25.01	2.92	-349.5	9.67	7.79	420	168	104.75	—
1430		30	2.47	-349.0	9.99	7.62	419	~~595~~ 585	130.02	0.63
1440		35	2.61	-349.6	10.75	7.85	421	998	149.67	0.5
1450		40	2.45	-349.4	10.95	7.82	420	993	163.66	0.5
1452	collect	FEW4-MW85-205								—

Depth to water after purging/before sampling 163.66 ft TOC 169.47
Sampling Equipment: collect from discharge tubing

Analysis to be performed and Number of Containers:
VOCs ~~3~~ 3 Preservative HCl
Preservative
Preservative

COMMENTS: 1222 D.T.W: 170.0' TOC 1245 D.T.W 150.0' TOC
1318 D.T.W 130.0' TOC 1420 D.T.W 104.15' TOC
~44 gals containerized

Sampler Signature(s)

NA ALTI

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/22/17

Project No.:
Field Crew: SB/RW
Weather: Sunny, 40s

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: LaMotte 2020

Well ID: FEW4-MW86-53
Type of Well: nested monitoring
Casing Stickup:
Static Water Level: 6.63'
Well Depth/Diameter: 58.6' TOC / 2"

Purging Equipment: geoSub
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
(58.6 - 6.63) x 0.17 = 8.8 gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
0744		0.5	0.36	172.5	8.15	9.27	545	4054 NM	15.45	1.3gal/min
0747		5	0.31	166.3	8.24	8.61	569	10	29.34	1.3gal/min
0749		7.5	0.34	157.2	8.25	8.80	540	31	36.51	1.2gal/min
0751	1	10	0.37	150.8	8.23	8.64	460	6	42.08	1.2gal/min
0753		12.5	0.38	146.4	8.27	8.55	427	2	46.71	1.2gal/min
0753	Dewatered	to pump,	will let	recharge						
0814		13	14.92	94.4	7.90	11.84	332	1	10.45	1.5gal/min
0817		15	11.54	95.7	8.32	11.61	324	42.5	21.06	1.5gal/min
0819		17.5	6.34	100.4	8.38	11.64	332	51.1	30.94	1.5gal/min
0850		20	0.50	103.8	8.50	11.62	342	60.8	37.75	1.5gal/min
0852		22.5	0.45	104.6	8.50	11.54	358	67.6	44.28	1.5gal/min
0854		25	0.43	105.4	8.44	4.60	384	NM	NM	1.5gal/min
0854	Dewatered	to pump	will let	recharge	before	sampling				
1209		26	0.62	40.2	7.77	10.38	407	34.8	9.21	

1211 Sample FEW4-MW86-53 collected

Depth to water after purging/before sampling _____ ft TOC _____
Sampling Equipment: geo Sub pump, discharge tubing

COMMENTS: GW @ 6.60' @ 0844
GW @ 6.38' @ 1205

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

Sampler Signature(s)

Na Ali'i

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/28/17

Project No.:
Field Crew: SB/RW
Weather: Sunny, 40s

Analytical Instruments: pH: YSI 556
Temp: "
D.O: "

Specific Conductivity: YSI 556
ORP: "
Turbidity: LaMotte 2020

Well ID: FEW4-MW86-199
Type of Well: nested monitoring
Casing Stickup:
Static Water Level: 10.40'
Well Depth/Diameter: 204.3' TOC /2"

Purging Equipment: red: FIO
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
(204.3 - 10.40) x 0.17 = 33.0 gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
0822		0.5	14.75	131.7	8.51	12.57	308	129	24.45	2gal/min
0824		5	5.96	125.6	9.21	10.71	300	5.05	42.15	2gal/min
0827		10	4.07	111.6	9.34	9.51	310	8.32	73.34	1.4gal/min
0830		15	3.69	105.7	9.63	9.18	319	7.73	93.10	1.4gal/min
0833		20	3.27	103.1	9.88	8.94	318	8.83	119.31	1.4gal/min
0835		25	2.86	100.0	10.16	8.89	323	58.6	141.55	1.4gal/min
0838		30	2.85	95.5	10.60	8.77	322	53.1	164.74	1.4gal/min
0841	1	35	2.74	91.3	11.19	8.70	327	42.1	187.50	1.4gal/min
0841	Dewatered	to pump	will	not	recharge					
1138		35.5	0.76	83.2	8.24	9.11	322	57.9	33.65	1.2gal/min
1142		40	0.47	94.1	9.49	8.86	289	3.88	60.28	1.2gal/min
1146		45	0.40	98.5	9.78	8.74	293	2.27	84.75	1.2gal/min
1150		50	0.38	98.0	10.10	8.75	293	6.42	111.24	1.2gal/min
1154		55	0.36	96.7	10.56	8.75	297	6.75	133.58	1.2gal/min

Depth to water after purging/before sampling ____ ft TOC____
Sampling Equipment: red: FIO pump, discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
____ Preservative ____
____ Preservative ____

COMMENTS: GW @ 27.52 @ 1135

Sampler Signature(s)

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/28/17

Project No.:
Field Crew: SS/RW
Weather: Sunny, 40s

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: LaMotte 2020

Well ID: FEW4-MW 86-199
Type of Well: nested monitoring
Casing Stickup:
Static Water Level: 10.40' TOC
Well Depth/Diameter: 204.3' TOC / 2"

Purging Equipment: redi flo
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1158		60	0.35	95.5	10.92	8.74	305	7.48	156.52	1.2gal/min
1202		65	0.34	94.4	11.29	8.73	307	20.2	179.42	1.2gal/min
1203	Dewatered	to pump, will let recharge before Sampling								
1558		65	0.78	76.3	8.34	9.49	304	31.8	26.42	
1601		70	5.22	72.4	9.42	9.27	284	3.67	50.01	
1603	Sample	FEW4-MW 86-199		collected						

Depth to water after purging/before sampling _____ ft TOC_____
Sampling Equipment: redi flo pump, discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: GW @ 19.58 @ 1355

Sampler Signature(s)

NA ALI'I

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 12/1/17

Project No.: E15.0179.201
Field Crew: JWH / EZ
Weather: cloudy, 48°F, windy

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: HACH 2100Q

Well ID: FEW4-MW86-353
Type of Well: Vertical monitoring
Casing Stickup: 2.29
Static Water Level: 11.15'
Well Depth/Diameter: 357.75' TOC/2"

Purging Equipment: 3" submersible bladder pump w/ 2" packer
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x 0.17 gal/ft = 1 casing volume (gals)
(357.75 - 340.0)0.17 = 3 gals

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1439		0.1	2.46	-112.7	8.25	7.34	358	2.52	—	—
1446 pump on		1	1.61	-140.8	8.25	7.38	351	3.75	—	0.14
1455		2	0.91	-171.1	8.29	7.54	350	1.25	—	0.1
1503		3	0.82	-180.4	8.24	7.60	353	4.20	—	0.13
1511		4	0.75	-183.3	8.24	7.61	373	3.24	—	0.13
1518		5	0.71	-190.8	8.25	7.62	370	3.25	—	0.14
1525		6	0.72	-190.3	8.24	7.61	371	2.75	—	0.14
1526	collect FEW4-MW86-353									

Depth to water after purging/before sampling _____ ft TOC _____
Sampling Equipment: collect from discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: unable to get pump lower than 340.0' b/c of large water column
Refill: 10:0 Discharge: 44.0 Controller box: 170 PSI
Packer: 160.0 PSI

Sampler Signature(s) [signature]

Na Ali'i

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 12/3/17

Project No.:
Field Crew: SS/RW
Weather: Sunny, 40s

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: LaMotte 2020

Well ID: FEW4-MW95-288
Type of Well: Nested monitoring
Casing Stickup:
Static Water Level: 96.02 TOC
Well Depth/Diameter: 292.80 TOC/2"

Purging Equipment: Redi flo
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ___ gal/ft = 1 casing volume (gals)
(292.80 - 96.02) x0.17 = 33.5 gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
0908		0.2	10.15	226.5	10.07	8.41	249	14.8	97.60	1.5gal/min
0911		5	7.72	215.2	11.37	8.22	263	2286 AU	97.72	1.5gal/min
0913		10	7.44	208.5	11.61	8.12	286	-16	97.58	2gal/min
0916		15	6.88	200.7	11.60	8.17	290	35.9	97.39	1.5gal/min
0918		20	6.43	195.4	11.63	8.21	292	19.3	97.39	2gal/min
0921		25	6.16	193.0	11.68	8.20	293	16.2	97.40	1.7gal/min
0924		30	5.90	191.9	11.78	8.18	292	13.5	97.64	1.7gal/min
0926	1	35	5.80	189.9	11.81	8.19	293	10.62	97.64	1.8gal/min
0928		40	5.72	186.5	11.83	8.19	294	9.11	97.64	1.8gal/min
0931		45	5.70	187.5	11.83	8.18	292	9.14	97.64	1.8gal/min
0933		50	5.64	186.5	11.86	8.18	293	6.70	97.66	1.8gal/min
0936		55	5.66	185.4	11.86	8.18	295	6.22	97.68	1.8gal/min
0938		60	5.57	184.6	11.89	8.18	294	4.80	97.68	1.8gal/min
0940		65	5.58	182.8	11.92	8.18	294	5.41	97.68	1.8gal/min
0943	2	70	5.57	182.3	11.93	8.17	295	4.35	97.66	1.8gal/min

Depth to water after purging/before sampling ____ ft TOC____
Sampling Equipment: Redi Flo pump, discharge tubing

COMMENTS:
0945 Sample FEW4-MW95-288 collected

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
____ Preservative ____
____ Preservative ____

Sampler Signature(s)

Na Alti

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 12/5/17

Project No.: E15.019.201
Field Crew: JWH, JM
Weather: Sunny, 32°F, windy

Analytical Instruments: pH: YSI 556
Temp:
D.O:

Specific Conductivity: YSI 556
ORP:
Turbidity: HACH 2100Q

Well ID: FEW4-MW97-266
Type of Well: Nested monitoring
Casing Stickup: ~~235.45 - 235.81 +~~ 10C / PVC
Static Water Level:
Well Depth/Diameter: 271.3 / 10C / 2"

Purging Equipment: 3' submersible bladder pump w/ 2" packer
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x 0.17 gal/ft = 1 casing volume (gals)
(261.3 - 271.3) 0.17 = 1.7 gals

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1027 pump on		0.1	4.36	30.6	8.54	7.20	639	overrange	—	—
1034		0.5	3.31	-24.4	8.85	7.42	649	overrange	—	0.07
1040		1	2.15	-51.6	9.10	7.66	628	" "	—	
1047		1.5	1.55	-60.5	9.16	7.87	594	" "	—	
1054		2	1.31	-62.4	9.36	8.01	550	" "	—	
1102		2.5	1.13	-63.8	9.36	8.15	501	" "	—	
1108		3	1.06	-61.4	9.42	8.18	473	" "	—	
1116		3.5	0.47	-57.8	9.46	8.12	470	" "	—	
1123		4.0	0.93	-56.7	9.40	8.16	471	" "	—	
1125 collect FEW4-MW97-266										

Depth to water after purging/before sampling _____ ft TOC _____
Sampling Equipment: collect from discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: Refill: 39.0 Discharge: 30.0
Control box: 190 PSI packer 1100 PSI

Sampler Signature(s) Jason Hess

Na Alti

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/19/17

Project No.: _____
Field Crew: SB/RW
Weather: Sunny, 30s, breezy

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: LaMotte 2020

Well ID: FEW4-MW101-106
Type of Well: nested monitoring
Casing Stickup: _____
Static Water Level: 100.56' TOC
Well Depth/Diameter: 110.95' TOC 12"

Purging Equipment: Geosub
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
(110.95 - 100.56) x 0.17 = 1.8 gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
0804		0 2	1.00	132.0	6.55	7.50	324	NM	102.58	1gal/min
0805		1	0.54	134.4	7.91	7.43	325	62.7	103.24	1gal/min
0806	1	2	0.45	143.3	8.42	7.34	338	48.1	104.10	1gal/min
0807		3	0.45	143.3	7.60	7.32	326	68.4	104.97	1gal/min
0808	2	4	0.71	143.0	8.64	7.24	330	97.8	105.80	1gal/min
0808	Dewatered	to pump	will	let recharge						
0835		4.5	0.64	147.3	8.04	7.43	334	70	102.74	1gal/min
0836		6	0.48	146.6	8.70	7.32	342	24.1	104.05	1gal/min
0837		7	0.45	145.8	8.77	7.34	330	53.7	105.38	1gal/min
0837	Dewatered	to pump,	will let	recharge	before	sampling				
0900		7.2	0.53	143.0	6.90	7.54	332	43.8	102.84	
0902	Sample	FEW4-MW101-106		collected						

Depth to water after purging/before sampling _____ ft TOC _____
Sampling Equipment: geosub pump, discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: GW @ 101.75 @ 0833
GW @ 102.12 @ 0858

Sampler Signature(s) _____

NA ALTI

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/18/17

Project No.: _____
Field Crew: SB/RW
Weather: _____

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: LaMotte 2020

Well ID: ~~FEW4~~ FEW4-mw101-138
Type of Well: nested monitoring
Casing Stickup: _____
Static Water Level: 101.30
Well Depth/Diameter: 142.90' TOC / 2"

Purging Equipment: geosub
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
(142.90 - 101.30) x 0.17 = 7.1 gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1018		0.2	0.58	62.3	7.18	8.04	343	25.1	112.41	½gpm/min
1020		2.5	0.51	52.2	8.22	8.02	334	10.09	120.02	½gpm/min
1021		4	0.49	49.1	8.21	8.01	340	15.4	124.41	½gpm/min
1022		5	0.48	48.4	8.20	8.02	344	14.9	127.20	½gpm/min
1023	Dewatered to pump. Will let recharge									
1235		5.5	10.10	60.1	8.54	7.89	349	25.2	NM	½gpm/min
1236		6	0.83	71.6	9.18	7.80	353	10.42	NM	1gal/min
1237		8	0.74	65.1	8.89	7.89	352	8.40	128.50	1-3gpm/min
1237	Dewatered to pump, will let recharge before sampling									
1353		9	11.18	80.7	8.04	8.28	350		104.41	
1355	Sample	FEW4-mw101-138	Collected							

Depth to water after purging/before sampling _____ ft TOC _____
Sampling Equipment: geosub pump, discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: GW @ 101.52 @ 1208
~~GW @ 113.73 @ 1323~~
GW @ 101.65 @ 1318

Sampler Signature(s) _____

NA ALI'I

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/13/19

Project No.:
Field Crew: SG/RW
Weather: Sunny, windy, 20s

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O.: ↓

Specific Conductivity: YSI 556 ↓
ORP:
Turbidity: LaMotte 2020

Well ID: FEW4-MW101-238
Type of Well: nested monitoring
Casing Stickup:
Static Water Level: 101.58
Well Depth/Diameter: 242.87' TOC / 2"

Purging Equipment: red: Flo 2
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)
(242.87 - 101.58) x 0.17 = 24.0 gal

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
0910		0.5	0.46	133.3	7.10	8.41	400	13.2	121.75	2gal/min
0920		5	0.50	110.3	8.43	7.66	374	13.4	138.25	2gal/min
0924		10	0.45	96.4	9.41	7.54	376	51.2	163.64	1.2gal/min
0927		15	0.45	73.3	9.35	7.52	391	78.8	183.85	1.2gal/min
0931		20	0.42	59.1	9.40	7.52	397	NM	207.71	1.2gal/min
0936		25	0.38	43.5	10.45	7.53	405	56.2	226.80	1.2gal/min
0936	Dewatered to pump, will let recharge									
1153		25.2	11.02	79.8	8.08	8.23	478	77.6	128.19	1.3gal/min
1156		30	3.99	76.2	9.44	8.01	483	38.8	152.41	1.3gal/min
1159		35	2.97	67.0	10.12	7.96	467	29.0	176.41	1.3gal/min
1202		40	2.58	60.1	10.34	7.84	462	26.9	197.25	1.3gal/min
1205		45	2.51	54.5	10.87	7.84	454	26.3	220.81	1.3gal/min
1206	Dewatered to pump, will let recharge before sampling									
1337		46	0.53	86.7	8.74	7.97	444	1.55	142.64	

1339 Sample FEW4-MW101-238 collected

Depth to water after purging/before sampling _____ ft TOC _____
Sampling Equipment: red: Flo 2 pump, discharge tubing

COMMENTS: 0932 - pump shut off momentarily
GW @ 113.24 @ 1150
GW @ 132.22 @ 1333

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

Sampler Signature(s)

Na Ali'i

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 10/26/17

Project No.:
Field Crew: SB/RJ
Weather: Snowy, Cloudy, Windy, 30s

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: Hach 2100P

Well ID: FEW4- Kennedy #1
Type of Well:
Casing Stickup:
Static Water Level:
Well Depth/Diameter:

Purging Equipment:
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1158		0.5	11.51	143.1	12.11	7.78	292	0.71		
1201		2	9.31	137.4	12.23	8.01	293	0.62		
1203		3	8.91	137.4	12.21	8.02	293	2.32		
1205		4.5	8.69	138.7	12.19	8.00	293	0.59		
1206	Sample	FEW4-Kennedy #1								

Depth to water after purging/before sampling _____ ft TOC_____
Sampling Equipment: discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: well flowing 30 GPM

Sampler Signature(s)

Na Ali'i

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 10/25/17

Project No.: E15-019-20
Field Crew: JMH, KZ
Weather: sunny, 75°F, windy

Analytical Instruments: pH: YSI 556
Temp:
D.O:

Specific Conductivity: YSI 556
ORP:
Turbidity: HACH 2100 Q

Well ID: FEW4- Johnson NO. 1
Type of Well: Stock
Casing Stickup: —
Static Water Level: —
Well Depth/Diameter: —

Purging Equipment: permanent submersible pump
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x — gal/ft = 1 casing volume (gals)

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1512	pump on	—	9.81	-227.5	11.00	8.30	254	8.31	—	—
1515			9.20	-223.4	10.65	8.17	256	5.05	—	—
1518			8.76	-218.5	10.65	8.12	255	5.09	—	—
1521			8.76	-215.2	10.72	8.08	257	5.08	—	—
1524	collect	FEW4- Johnson NO. 1								

Depth to water after purging/before sampling — ft TOC —
Sampling Equipment:

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
Preservative
Preservative

COMMENTS: Initial flow meter: 08028279
Final 08039491

Sampler Signature(s)

Na Ali'i

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/1/17

Project No.: E15.04.20
Field Crew: JWH, KE
Weather: Sunny, 60°F, windy

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI, 556
ORP: ↓
Turbidity: HACH2100Q

Well ID: FEW4 - King No. 3
Type of Well: Stock
Casing Stickup: —
Static Water Level: —
Well Depth/Diameter: —

Purging Equipment: Permanent submersible pump
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x — gal/ft = 1 casing volume (gals)

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1358			8.83	-330.6	11.48	7.95	359	4.10	—	—
1401			8.91	-329.2	11.32	7.91	358	3.00	—	—
1404			8.79	-327.5	11.11	7.93	358	4.75	—	—
1407			8.75	-326.2	11.15	7.92	357	4.58		
1410 collect FEW4-King No.3										

Depth to water after purging/before sampling — ft TOC —
Sampling Equipment: collect from outlet

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: Not able to use flow cell w/ YSI

Sampler Signature(s) [signature]

ONA ALI'I

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/17/17

Project No.: F15.019.201
Field Crew: JM, KZ
Weather: _____

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓ NO. 4

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: HACH 2100Q

Well ID: FEW4- Soler #1 W
Type of Well: Stock
Casing Stickup: _____
Static Water Level: Assume ~150' bgs
Well Depth/Diameter: _____

Purging Equipment: dedicated pump
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ___ gal/ft = 1 casing volume (gals)

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C) 11.34	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate 9 gpm
1105	—	0.1	8.57	-229.5	~~9.38~~	8.38	~~297~~	15.2	—	2
1107		5	8.21	-228.8	11.20	8.35	287	4.73	—	2.5
1109		10	8.19	-227.3	11.31	8.31	287	4.24	—	2.5
1111		15	8.18	-226.5	11.15	8.32	287	3.15	—	2.5
1113		20	8.21	-226.3	11.28	8.33	286	0.12	—	2.5
1115	collect	FEW4-	Soler	NO. 4						

Depth to water after purging/before sampling — ft TOC —
Sampling Equipment: collect from piping

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: _____

Sampler Signature(s) _____

NA ALI'I

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 12/6/17

Project No.:
Field Crew: RW/JM
Weather: Sunny, high winds, 30° F

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O:

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: Hach 2100 Q

Well ID: Rees Bros. #7
Type of Well: Stock
Casing Stickup:
Static Water Level: 5.35'
Well Depth/Diameter:

Purging Equipment:
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1437			2.00	-194.9	9.56	8.18	154	69.2		
collected	sample	FEW4 - Rees Bros. #7 @ 1435								

Depth to water after purging/before sampling _____ ft TOC_____
Sampling Equipment:

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCL
_____ Preservative _____
_____ Preservative _____

COMMENTS: No Purging performed
This is an inactive stock well, no pump present

Sampler Signature(s)

Na Alti

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/2/17

Project No.: E15.014.201
Field Crew: JNH, KZ
Weather: foggy, 34°F

Analytical Instruments: pH: YSI 556
Temp:
D.O:

Specific Conductivity: YSI 556
ORP:
Turbidity: HACH 2100Q

Well ID: FEW4- Belvoir NO.1
Type of Well: Stock
Casing Stickup: —
Static Water Level: —
Well Depth/Diameter: —

Purging Equipment: ~~Bl~~ Dedicated Submersible pump
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x —gal/ft = 1 casing volume (gals)

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate 30m
0855 pump on		—	9.28	-52.3	10.55	7.68	291	overrange	—	1007
0858			9.15	-68.9	10.84	7.86	295	917	—	828
0901			9.02	-79.3	10.95	7.85	294	7.56	—	900
0904			8.91	-75.4	11.00	7.84	295	6.07	—	787
0907			8.71	-73.2	11.02	7.84	293		—	792
0910 collect FEW4-Belvoir NO 1					~~B~~ Belvoir NO 1		ms/cm SO			
0911 pump off										

Depth to water after purging/before sampling — ft TOC —
Sampling Equipment: collect from well output

Analysis to be performed and Number of Containers:
VOCs 3+3+3 Preservative HCl
Preservative
Preservative

COMMENTS: flow meter reading: Initial: 1667776 x100
final 1687911 x100

Sampler Signature(s)

NA ALI'I

1350

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 12/1/17

Project No.:
Field Crew: SB / RW / JH
Weather: Cloudy, windy, 40s

Analytical Instruments: pH: YSI 556
Temp:
D.O.:

Specific Conductivity: YSI 556
ORP:
Turbidity: LaMotte 2020

Well ID: Belvior - Borie No. 1
Type of Well:
Casing Stickup:
Static Water Level:
Well Depth/Diameter:

Purging Equipment: —
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1339			19.32	105.9	10.08	10.96	149	2.86		
1342			14.98	104.7	10.03	9.77	223	2.44		
1344			16.76	105.3	9.97	9.05	227	3.18		
1349	Sample	FEW4- Belvior - Borie		NO-1	Collected					

Depth to water after purging/before sampling _____ ft TOC_____
Sampling Equipment: Sample Port

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: inaccurate D.O. due to wrong size tubing into freeze

Sampler Signature(s) [signature]

ONA ALI'I

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/1/17

Project No.: E15.019.201
Field Crew: DWH, KZ
Weather: Cloudy, 60°F, windy

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: HACH2100Q

Well ID: FEW4- Belvoir NO. 2
Type of Well: Stock
Casing Stickup: —
Static Water Level: —
Well Depth/Diameter: —

Purging Equipment: Permanent Submersible pump
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x 0.17 gal/ft = 1 casing volume (gals)

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1455	pump on		8.06	-347.3	10.67	8.01	304	1.41	—	~15 gpm
1458			6.71	-355.0	12.41	7.93	301	10.4	—	" "
1501			6.72	-351.4	12.61	7.91	303	5.94	—	" "
1504			6.70	350.2	12.70	7.45	302	4.25	—	" "
1505	collect FEW4- Belvoir NO.2									

Depth to water after purging/before sampling _____ ft TOC _____
Sampling Equipment: collect from output

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: Note: Flow meter is broken, no initial or final reading. Unable to use flow cell for readings

Sampler Signature(s) [signature]

Na Aliʻi

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/1/17

Project No.: FIS.019.201
Field Crew: JNH, KZ
Weather: Sunny, 60 ot, windy

Analytical Instruments: pH: YSI 556
Temp:
D.O:

Specific Conductivity: YSI 556
ORP:
Turbidity: HACH2100Q

Well ID: FEW4 - Belvoir NO. 3
Type of Well: Stock
Casing Stickup: —
Static Water Level: —
Well Depth/Diameter: —

Purging Equipment:
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x — gal/ft = 1 casing volume (gals)

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1637	—	—	10.13	-289.6	9.23	8.20	284	2.34	—	—
1640	—	—	10.71	-294.7	9.21	8.09	283	2.14	—	—
1643	—	—	10.13	-293.4	9.20	8.08	281	1.27	—	—
1646	—	—	10.01	-297.0	9.23	8.07	283	2.14	—	—
1649	—	—	10.00	-295.4	9.22	8.07	282	1.72	—	—
1650	collect FEW4 - Belvoir NO. 3									

Depth to water after purging/before sampling — ft TOC —
Sampling Equipment: collect from water flowing out of well

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
Preservative
Preservative

COMMENTS: Well flowing artesian out of the top of the well

Sampler Signature(s)

ONA ALI'I

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 12/2/17

Project No.: E15.019.201
Field Crew: JW/TT
Weather: sunny, 55°F, breezy

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556 ↓
ORP: ↓
Turbidity: HACH 100Q

Well ID: FEW4 - King NO.20
Type of Well: Stock
Casing Stickup: —
Static Water Level: —
Well Depth/Diameter: —

Purging Equipment: Dedicated submersible pump
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x — gal/ft = 1 casing volume (gals)

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1244	pump on	0.1	6.73	-178.7	10.06	7.31	258	10.1	—	gpm
1249		50	6.90	-182.0	10.35	7.93	267	6.94	—	PD
1252		80	7.64	-185.0	10.45	7.91	276	5.73	—	" "
1255		110	7.78	-185.4	10.48	7.92	274	4.25	—	" "
1258		140	7.79	-185.2	10.53	7.89	275	4.32	—	" ½
1300	collect	FEW4 - King NO.20			King NO.20 ms/msD					½

Depth to water after purging/before sampling — ft TOC —
Sampling Equipment: collect from

Analysis to be performed and Number of Containers:
VOCs 3+3+3 Preservative HCl
Preservative
Preservative

COMMENTS: turn down spicket to ~ ½ gal/min to collect sample

Sampler Signature(s)

ONA ALLI

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 10/25/17

Project No.: EIS.019.201
Field Crew: JM, KZ
Weather: Sunny, 73, windy

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: HACH 2100Q

Well ID: FEW4- low camp #1
Type of Well: Stock
Casing Stickup: —
Static Water Level: —
Well Depth/Diameter: — / 6"

Purging Equipment: permanent pump
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x — gal/ft = 1 casing volume (gals)

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1412	pump on		8.10	-257.8	10.60	8.29	265	6.75	—	—
1416			8.04	-257.5	10.63	7.98	264	4.64	—	—
1418			8.27	-252.3	10.59	7.92	264	3.20	—	—
1421			8.36	-248.4	10.52	7.90	264	2.40	—	—
1424	collect FEW4- low camp #1									

Depth to water after purging/before sampling — ft TOC —
Sampling Equipment: collect from port on side of meter

COMMENTS: 1355 Initial Flow meter reading: 19615421
Final:

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
Preservative
Preservative

Sampler Signature(s) JM

ONA ALI'I

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 12/1/17

Project No.: E15.019.201
Field Crew: SNH, KZ
Weather: sunny, 52°, breezy

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: HACH 2100Q

Well ID: FBW4-TH2
Type of Well: Test hole
Casing Stickup: 2.05'
Static Water Level: 262.20
Well Depth/Diameter: 289.05

Purging Equipment: Redi-flo 2 submersible pump
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ~~0.17~~ 0.65 gal/ft = 1 casing volume (gals)
(289.05 - 262.20) 0.65 = 17.5 gals

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1058 pump on		0.1	9.42	-171.8	10.37	7.52	307	9.82	261.59	gpm
1103		5	9.12	-161.7	12.87	7.47	308	9.35	261.60	1
1107		10	4.39	-153.5	13.12	7.50	308	6.37	261.59	1.25
1114		15	9.36	-159.4	13.36	7.50	308	5.90	261.59	0.71
1121		20	9.33	-167.2	13.36	7.51	309	3.87	261.59	0.71
1128		25	9.26	-173.1	13.58	7.55	308	4.02	261.59	0.71
1135		30	9.31	-172.2	13.42	7.56	308	3.75	261.59	0.71
1137	collect FBW4-TH2									

Depth to water after purging/before sampling 261.59 ft TOC
Sampling Equipment: collect from discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
Preservative
Preservative

COMMENTS: Pump @ ~10' off bottom of well

Sampler Signature(s)

NA ALI'I

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/4/17

Project No.: E15.019.201
Field Crew: JWH KZ
Weather: partly cloudy, 55°F, WNW 6-9

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: HACH 2100Q

Well ID: FEW4-THS-97
Type of Well: test hole
Casing Stickup: 2.09
Static Water Level: 46.25' TOC
Well Depth/Diameter: 279.09' TOC / 4"

Purging Equipment: submersible bladder pump w/ 2 packers
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x 0.65 gal/ft = 1 casing volume (gals)
(0.65 · 10) = 6.5 gals

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1423 pump on		0.1	7.37	-254.4	11.51	7.56	292	15.2	—	—
1430		1	6.27	-253.2	10.32	7.47	282	9.14	—	0.14
1435		2	6.76	-253.2	10.30	7.46	282	9.83	—	0.20
1441		3	6.56	-254.8	10.28	7.51	282	4.52	—	0.17
1447		4	6.26	-254.0	10.28	7.49	282	6.61	—	0.17
1453		5	6.59	-254.2	10.27	7.51	282	4.48	—	0.17
1458		6	6.46	-253.3	10.27	7.51	282	4.20	—	0.2
1504		7	6.47	-251.9	10.25	7.52	282	3.95	—	0.17
1510		8	6.43	-251.7	10.23	7.52	282	2.25	—	0.17
1515		9	6.47	-252.2	10.21	7.53	282	1.69	—	0.2
1521		10	6.39	-252.0	10.21	7.53	282	1.88	—	0.17
1527		11	6.42	-251.2	10.24	7.52	282	1.71	—	0.17
1534 ~~1533~~		13	6.41	-250.2	10.22	7.52	282	1.52	—	0.17
1540	collect FEW4-THS-97									

Depth to water after purging/before sampling — ft TOC —
Sampling Equipment: collect from discharge tubing

COMMENTS: Refil: 30.0 Discharge 29.0
controller 30x: 80psi packers: 90psi

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
Preservative
Preservative

Sampler Signature(s)

ONA ALI'I

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/4/17

Project No.: 515.019.201
Field Crew: SAH, KZ
Weather: Cloudy, 55°F, windy

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: HACH 2100 Q

Well ID: FEW4-THS-205
Type of Well: Test Hole
Casing Stickup: 2.09'
Static Water Level: 46.25'
Well Depth/Diameter: 279.09' TOC / 4"

Purging Equipment: Submersible bladder pump w/ 2 packers
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x 0.65 gal/ft = 1 casing volume (gals)
(0.65 * 10) = 6.5 gals

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1230 Pump on		0.1	7.75	-277.6	10.23	7.60	285	6.95	—	0m —
1237		1	7.74	-282.2	10.43	7.40	295	1.24	—	0.14
1243		2	7.39	-280.8	10.43	7.43	295	1.26	—	0.20
1249		3	7.33	-275.5	10.40	7.45	295	1.34	—	0.17
1255		4	7.27	-271.9	10.39	7.45	295	1.00	—	0.17
1301		5	7.17	268.6	10.37	7.45	295	1.26	—	0.17
1308		6	7.24	-266.3	10.37	7.45	295	1.21	—	0.14
1314		7	7.24	-264.0	10.38	7.46	295	1.09	—	0.17
1321		8	7.18	-261.8	10.39	7.46	295	1.15	—	0.17
1327		9	7.17	-260.0	10.42	7.46	295	1.22	—	0.17
1333		10	7.14	-258.9	10.36	7.48	295	1.06	—	0.17
1339		11	7.13	-256.3	10.35	7.47	295	1.25	—	0.17
1351		13	7.15	-256.7	10.33	7.48	295	1.02	—	0.17
1353	collect FEW4-THS-205									

Depth to water after purging/before sampling — ft TOC —
Sampling Equipment: collect from discharge tubing

COMMENTS: Refl: 25.0 Dischage 24.0
~~Box~~ controller pressure 120 PSI packers: 110 PSI

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
Preservative
Preservative

Sampler Signature(s)

ONA ALI'I

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/6/17

Project No.: E15.019.201
Field Crew: JNH, KZ
Weather: Sunny, 32°F, breezy

Analytical Instruments: pH: YSI 556
Temp:
D.O:

Specific Conductivity: YSI 556
ORP:
Turbidity: HACH 2100Q

Well ID: FEW4-TH6-197
Type of Well: test hole
Casing Stickup: 2.35
Static Water Level: 160.65' TOC
Well Depth/Diameter: 342.35' TOC / 4"

Purging Equipment: Submersible bladder pump w/ 2 packers
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x 0.65 gal/ft = 1 casing volume (gals)

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1420 pump on		0.1	4.07	-238.1	9.82	6.83	285	556	—	0.1
1438		2	3.63	-239.0	10.89	7.67	282	525	—	0.1
1456		4	3.89	-235.5	9.90	7.76	284	94.9	—	0.1
1514		6	3.92	-239.7	10.05	7.83	282	93.2	—	0.1
1532		8	3.15	-241.0	10.09	7.88	283	516		0.1
1550		10	3.27	-233.0	10.21	7.86	282	28.6		0.1
1608		12	3.52	-234.1	10.17	7.87	283	27.9		0.1
1617		13	3.57	-230.3	9.85	7.90	282	28.1		0.1
1620 collect FEW4-TH6-197										0.4

Depth to water after purging/before sampling — ft TOC —
Sampling Equipment: collect from discharge tubing

COMMENTS: Refill: 41.0 Discharge: 40.0 controller Box: 110 PSI
Packers: 70 PSI

Analysis to be performed and Number of Containers:
VOCs 3+3 Preservative HCl
Preservative
Preservative

Sampler Signature(s)

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/6/17

Project No.: E15.019.201
Field Crew: JM, KZ
Weather: partly cloudy, 32°f, breezy

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: HACH 2100Q

Well ID: FEW4-TH6-~~13~~234
Type of Well: test hole
Casing Stickup: 3.35'
Static Water Level: 160.65' TOC
Well Depth/Diameter: 342.35' TOC / 4"

Purging Equipment: submersible bladder pump w/ 2 packers
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ~~0.65~~ gal/ft = 1 casing volume (gals)

0.65 · 10 = 6.5 gals

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate gpm
1235	pump on	0.1	3.58	-260.4	11.05	7.98	284	420	—	0.1
1254		2	6.24	-243.1	10.55	7.84	283	5.52	—	0.11
1210		4	6.43	-239.9	10.55	7.90	283	4.18	—	0.13
1226		6	6.42	-237.9	10.70	7.90	283	4.52	—	0.13
1241		8	6.44	-237.0	10.65	7.91	283	5.34	—	0.13
1257		10	6.51	-234.4	10.57	7.89	283	4.98	—	0.13
1313		12	6.49	-235.2	10.60	7.88	283	4.21	—	0.13
1320		13	6.46	-237.3	10.61	7.89	283	3.95	—	0.13
1325	collect FEW4-TH6		-234	& blank dup	MW138	@ 1423				

Depth to water after purging/before sampling — ft TOC —
Sampling Equipment: collect from discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3+3 Preservative HCl
Preservative
Preservative

COMMENTS: Refill: 36 sec Discharge 39 ~~BOX~~
controller box: 120 psi packers 105 psi

Sampler Signature(s)

Na Ali'i

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/6/17

Project No.: E15-019.201
Field Crew: JWH, KZ
Weather: Sunny, 32°F

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: HACH 2100 Q

Well ID: FEW4-TH6-287
Type of Well: Test hole
Casing Stickup: 2.35'
Static Water Level: 160.65' TOC
Well Depth/Diameter: 342.35' TOC / 4"

Purging Equipment: Bladder pump w/ 2 packers Submersible
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x 0.65 gal/ft = 1 casing volume (gals)
0.65 · 10 = 6.5 gals

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
0845 pump on		0.1	7.91	-147.8	10.18	7.69	286	13.5	—	1gpm
0909 ~~1004~~		2	6.68	-228.3	10.51	7.84	286	12.3	—	0.08
0925 ~~1025~~		4	6.63	-237.2	10.56	7.85	285	9.23	—	0.13
0943 ~~1043~~		6	6.69	-240.6	10.54	7.87	284	7.94	—	0.11
0959 ~~1058~~		8	6.64	-242.7	10.89	7.86	285	4.20	—	0.13
1012		10	6.50	-239.0	10.55	7.83	284	3.21	—	0.1
1026		12	6.40	-241.6	11.15	7.86	284	2.15	—	0.14
1033		13	6.42	-241.3	11.07	7.87	285	1.09	—	0.14
1035 collect FEW4-TH6-287 & TH6-287 ms/msD										

Depth to water after purging/before sampling _____ ft TOC_____
Sampling Equipment: collect from discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3+3+3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: Refill: 35 discharge: 38 controller box 140 PSI packers 115 PSI

Sampler Signature(s) [signature]

ONA ALI'I

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/4/17

Project No.: EIS.019.201
Field Crew: JMH, KZ
Weather: partly cloudy, 45°F, breezy

Analytical Instruments: pH: YSI 556
Temp:
D.O:

Specific Conductivity: YSI 556
ORP: N/A
Turbidity: HACH 2100Q

Well ID: FEW4-TH9-12.5
Type of Well: 1st hole
Casing Stickup: 1.4' TOC PVC
Static Water Level: 1.96' TOC
Well Depth/Diameter: 54.4' / 4"

Purging Equipment: Submersible, 3' bladder pump w/ 2 packers
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x 0.65 gal/ft = 1 casing volume (gals)

10 · 0.65 = 6.5 gals

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate gpm
0902 pump on		0	8.37	-284.9	10.60	7.25	243	103.2	—	—
0912		1	8.57	-285.0	10.56	7.31	243	77.5	—	0.1
0917		2	8.27	-280.4	10.59	7.37	243	65.3	—	0.14
0917		3	8.13	-270.7	10.62	7.39	243	46.3	—	0.1
0934		4	8.09	-264.0	10.65	7.39	242	20.2	—	0.1
0942		5	8.05	-258.4	10.62	7.39	242	15.2	—	0.13
0944		6	7.98	-256.4	10.67	7.42	242	9.62	—	0.14
0946		7	7.84	-254.7	11.12	7.40	242	9.22		0.14
0953		8	7.90	-244.4	10.65	7.39	242	9.27	—	0.14
1000		9	7.86	-249.4	10.74	7.42	242	5.54	—	0.14
1007		10	7.88	-245.3	10.73	7.40	242	5.02	—	0.14
1014		11	7.90	-249.6	10.76	7.46	242	4.85	—	0.14
1024		13 12	7.89	-250.2	11.01	7.44	242	4.45	—	0.2
1025	1025 collect FEW4-TH9-12.5 3			MW 136 @		1125				

Depth to water after purging/before sampling — ft TOC —
Sampling Equipment: collect from discharge tubing

COMMENTS: 0935 Refil: 31.0 Discharge: 27.0
Packers: 110 Box: 40psi

Analysis to be performed and Number of Containers:
VOCs 3x3 Preservative HCl
Preservative
Preservative

Sampler Signature(s)

Na Ali'i

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/5/17

Project No.: E15.019201
Field Crew: JMH, KZ
Weather: Cloudy, 35°F, Windy

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: ↓

Well ID: FEW4-TH10-135
Type of Well: Test hole
Casing Stickup: 2.9
Static Water Level: 114.09' TOC
Well Depth/Diameter: 394.9' TOC / 4"

Purging Equipment: Submersible bladder pump w/ 2 packers
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x 0.65 gal/ft = 1 casing volume (gals)

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1255 pump on		0.1	4.20	-261.9	9.43	8.10	266	19.8	—	—
1315		2	4.21	-263.6	9.53	8.12	266	17.9	—	0.1
1330		4	4.20	-261.1	9.50	8.15	267	16.5	—	0.13
1343		6	4.30	-260.0	9.24	8.10	267	9.70	—	0.15
1348		8	4.29	-258.4	9.25	8.13	267	7.85	—	0.13
1411		10	4.31	-257.3	9.20	8.15	268	8.70	—	0.09
1428		12	4.38	-254.6	9.74	8.19	266	5.79	—	0.12
1436		~13	4.37	-256.5	9.79	8.13	266	4.85	—	
1440 collect FEW4-TH10-135										

Depth to water after purging/before sampling _____ ft TOC _____
Sampling Equipment: collect from discharge tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: _____

Sampler Signature(s) _____

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/5/17

Project No.: 615.014.201
Field Crew: SH, K 2
Weather: cloudy, 36°F, windy

Analytical Instruments: pH: YSI 556
Temp:
D.O:

Specific Conductivity: YSI 556
ORP:
Turbidity: HACH 2100 Q

Well ID: FEW4-TH10-175
Type of Well: Test hole
Casing Stickup: 2.4'
Static Water Level: 114.09' TOC
Well Depth/Diameter: 344.9' TOC / 4"

Purging Equipment: Submersible bladder pump w/ 2 packers
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x 0.65 gal/ft = 1 casing volume (gals)

~~0.65~~ 0.65 · 10 = 6.5 gals

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1045 pump on		0.1	7.52	-250.2	10.66	7.94	267	11.5	—	—
1105		2	4.55	261.0	11.42	8.01	266	9.85	—	0.1
1124		4	4.85	-258.3	11.07	8.02	267	7.52	—	0.11
1143		6	5.66	-260.3	11.49	8.10	266	4.25	—	0.11
1158		8	5.77	-260.5	11.79	8.07	265	4.20	—	0.13
1215		10	6.01	-260.2	11.52	8.08	265	3.25	—	0.12
1235		12	5.77	-254.4	11.25	8.08	266	4.95	—	0.1
1245		13	5.69	-254.7	11.23	8.09	267	4.18	—	0.1
1250 collect FEW4-TH10-175										

Depth to water after purging/before sampling — ft TOC —
Sampling Equipment: collect from discharge tubing

COMMENTS:

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
Preservative
Preservative

Sampler Signature(s):

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/5/17

Project No.: EIS.0194.201
Field Crew: JW H, KZ
Weather: cloudy, 36°F, breezy

Analytical Instruments: pH: YSI556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556 ↓
ORP:
Turbidity: HACH 2100Q

Well ID: FEW4-TH10-245
Type of Well: Test hole
Casing Stickup: 2.9'
Static Water Level: 119.09' TOC
Well Depth/Diameter: 394.9' TOC / 6"

Purging Equipment: Submersible bladder pump w/ 2 packers
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x 0.65 gal/ft = 1 casing volume (gals)

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
0900	pump on	0.1	7.76	-233.1	10.64	7.56	269	14.1	—	—
0910		2	4.68	-257.7	10.98	7.90	266	2.19	—	0.2
0920		4	7.00	-254.2	11.03	7.90	266	1.69	—	0.2
0930		6	7.09	-254.7	11.13	7.92	266	1.72	—	0.2
0940		8	7.09	-254.4	11.13	7.93	266	1.50	—	0.2
0950		10	7.05	-254.3	11.16	7.95	266	1.32	—	0.2
1000		12	7.04	-254.1	11.18	7.98	266	1.04	—	0.2
1005		13	7.09	-254.5	11.17	7.97	265	1.24	—	0.2
1007	collect FEW4-TH10-245									

Depth to water after purging/before sampling — ft TOC —
Sampling Equipment: collect from discharge tubing

COMMENTS: Refil: 26.0 Discharge 40.0
Controller Box: 130 PSI Packers 100 PSI

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
Preservative
Preservative

Sampler Signature(s)

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 4/17/17

Project No.: 615.019-2.01
Field Crew: SNH, KZ
Weather: _____

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓ Borrie

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: HACH 2100Q

Well ID: FEW4- Weber ~~Borrie~~ NO.1
Type of Well: Municipal
Casing Stickup: _____
Static Water Level: _____
Well Depth/Diameter: _____

Purging Equipment: dedicated Submersible pump
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ___ gal/ft = 1 casing volume (gals)

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1010	—	—	8.22	-194.3	10.93	8.11	360	1.12	—	2.97
1013			8.13	-192.7	10.96	8.07	361	1.09	—	284
1016			7.99	-193.6	10.97	7.99	360	0.53	—	277
1019			8.01	-194.1	10.97	7.98	360	0.22	—	275
1020	collect FEW4- Borrie NO.1									

Depth to water after purging/before sampling — ft TOC —
Sampling Equipment: pump line faucet

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: _____

Sampler Signature(s) _____

NA ALI'I

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/17/17

Project No.: EIS.019.201
Field Crew: SNH, KZ
Weather: _____

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: HACH 2100Q

Well ID: FEW4- Finnerty NO.2
Type of Well: municipal
Casing Stickup: _____
Static Water Level: _____
Well Depth/Diameter: _____

Purging Equipment: dedicated submersible pump
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x — gal/ft = 1 casing volume (gals)

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
0943	—	—	9.48	-147.2	10.64	7.91	313	0.82	—	271
0946	—	—	7.94	-155.9	10.66	7.94	312	0.72	—	274
0949	—	—	7.93	-160.8	10.70	7.93	312	0.61	—	279
0952	—	—	8.07	-162.7	10.80	7.94	310	0.75	—	278
0955	collect	FEW4-	Finnerty	NO.2						

Depth to water after purging/before sampling — ft TOC _____
Sampling Equipment: In-line Tubing

Analysis to be performed and Number of Containers:
VOCs 3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: _____

Sampler Signature(s) _____

NA ALI'I

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 11/17/17

Project No.: EIS.019.201
Field Crew: SNH, ISZ
Weather: _____

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: _____
Turbidity: HACH 2100Q

Well ID: FEW4 - Elkar NO. 7
Type of Well: municipal
Casing Stickup: _____
Static Water Level: _____
Well Depth/Diameter: _____

Purging Equipment: dedicated submersible pump
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ___ gal/ft = 1 casing volume (gals)

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
0903	—	—	8.97	-44.0	10.51	7.51	308	0.34	—	395
0906	—	—	8.77	-63.0	10.46	7.46	~~307~~ 310	0.25	—	400
0909	—	—	8.39	-65.0	10.47	7.53	306	0.13	—	403
0912	—	—	8.29	-67.5	10.47	7.55	305	0.17	—	401
0915	collect FEW4 - Elkar NO.7 @ Elkar NO.7 ms/msd									

Depth to water after purging/before sampling — ft TOC —
Sampling Equipment: In-line faucet

Analysis to be performed and Number of Containers:
VOCs 3+3+3 Preservative HCl
_____ Preservative _____
_____ Preservative _____

COMMENTS: _____

Sampler Signature(s) _____

NA ALU

Surface Water Sample Collection Form

Sample Identification No. FEW4 - Lone Tree - SW #1
FEW4 - Lone Tree - SED #1

Project Number:
Site Name: Atlas 4
Contractor: _____ **Sample Tech.:** SB / RW / SH

Location ID No: Lone Tree

Sample Collection Information

Date and Time of Sample Collection: 12/1/17 1139 SW #1
12/1/17 1150 SED #1

Field Water Quality Parameters:

Time	1138	1202	1212
Volume (gallons)			
pH (SI units)	12.89*	12.87	12.59
Temperature (°C)	4.58	5.00	5.10
SC (mS/cm)	226	234	235
DO (mg/l)	0.65	0.59	17.48
Turbidity (NTU)	2.74	3.50	3.45
Color	clear	clear	clear
Flow			

Sampling Method/Device:

Containers	Number	Preservatives	Analyses
VOAs	3	HCl	VOCs
VOAs	2	Blank water	VOCs
VOA	1	methanol	VOCs

Associated QA/QC Samples:

SAMPLE QA SPLIT: YES (NO) SPLIT SAMPLE NO. _____
SAMPLE QC DUPLICATE: YES (NO) DUPLICATE SAMPLE NO. _____
MS/MSD REQUESTED: YES (NO)

Comments/Observations

PH readings seem off, recalibrate YSI @ 1140, PH still reading high
Total Width of stream @ Sample Point: 3.5'
Depth westbank→east 0-6": 5", 6"-1': 6", 1'-1.5': 6", 1.5'-2': 6"
Velocity 0-6": 0.36 ft/s, 6'-1': 0.63 ft/s, 1'-1.5': 1.06 ft/s, 1.5'-2': 0.76 ft/s
Depth 2'-2.5': 5.5", 2.5'-3': 5"
Velocity 2'-2.5': 0.76 ft/s, 2.5'-3': 0.89 ft/s

Surface Water Sample Collection Form

Sample Identification No. FEW4- Otto Spring - SW#1
FEW4- Otto Spring- SED#1

Project Number:
Site Name: Atlas 4
Contractor: _____ **Sample Tech.:** SB/RW/JH

Location ID No: Otto Spring

Sample Collection Information

Date and Time of Sample Collection: 12/1/17 @ 1250 SW#1
12/1/17 @ 1300 SED#1

Field Water Quality Parameters:

Time	1252	1255	1258
Volume (gallons)			
pH (SI units)	11.65	9.69	8.97
Temperature (°C)	8.18	8.18	8.19
SC (mS/cm)	225	225	225
DO (mg/l)	10.36	10.04	9.77
Turbidity (NTU)	0.90	1.35	2.40
Color	clear	Clear	Clear
Flow			

Sampling Method/Device:

Containers	Number	Preservatives	Analyses
VOAs	3	HCl	VOCs
VOAs	2	Blank water	VOCs
VOAs	1	Methanol	VOCs

Associated QA/QC Samples:

SAMPLE QA SPLIT: YES (NO) SPLIT SAMPLE NO. _____
SAMPLE QC DUPLICATE: YES (NO) DUPLICATE SAMPLE NO. _____
MS/MSD REQUESTED: YES (NO)

Comments/Observations

Sediment consists of Sand (Fine - coarse)
Spring has narrow flow of discharge through vegetation, can only get one flow Sample (see pics)
Depth: 4.5", Velocity: 0.11 ft/s.

Surface Water Sample Collection Form

Sample Identification No. FEW4-Belvior-Borie NO.1 - SW #1
FEW4-Belvior-Borie NO.1 - SED #1

Project Number:
Site Name: Atlas 4
Contractor: _____ **Sample Tech.:** SB/RW/JH

Location ID No: Belvior - Borie NO.1

Sample Collection Information

Date and Time of Sample Collection: 12/1/17 1350 SW#1
12/1/17 1355 SED#1

Field Water Quality Parameters:

Time	1412	1413	1414
Volume (gallons)			
pH (SI units)	8.42	8.34	8.26
Temperature (°C)	9.72	9.73	9.72
SC (mS/cm)	231	231	230
DO (mg/l)	0.88	0.45	0.40
Turbidity (NTU)	2.88	2.94	2.65
Color	Clear	Clear	Clear
Flow			

Sampling Method/Device:

Containers	Number	Preservatives	Analyses
VOAs	3	HCl	VOCs
VOAs	2	Blank Water	VOCs
VOAs	1	Methenol	VOCs

Associated QA/QC Samples:

SAMPLE QA SPLIT: YES (NO) SPLIT SAMPLE NO. _____
SAMPLE QC DUPLICATE: YES (NO) DUPLICATE SAMPLE NO. _____
MS/MSD REQUESTED: (YES) NO

Comments/Observations

MS/MSD Samples collected For SW and SED

Surface Water Sample Collection Form

Sample Identification No. FEW4 Belvoir-Borie No.1 - SW #2
FEW4 - Belvoir - Borie No 1 - SED #2

Project Number:
Site Name: Atlas 4
Contractor: **Sample Tech.:** SB/RW

Location ID No: Belvoir-Borie No. 1

Sample Collection Information

Date and Time of Sample Collection: 12/2/17 755 SW#2
12/2/17 0815 SED #2

Field Water Quality Parameters:

Time	0747	811	813
Volume (gallons)			
pH (SI units)	12.79 *	9.04	8.90
Temperature (°C)	1.70	1.89	1.92
SC (mS/cm)	215	406	347
DO (mg/l)	0.69	16.39	15.68
Turbidity (NTU)	540	5.66	5.34
Color	Clear	clear	Clear
Flow			

Sampling Method/Device:

Containers	Number	Preservatives	Analyses
VOAs	3	HCl	VOCs
VOAs	2	Blank water	VOCs
VOA	1	methanol	VOCs

Associated QA/QC Samples:

SAMPLE QA SPLIT: YES (NO) SPLIT SAMPLE NO.

SAMPLE QC DUPLICATE: (YES) NO DUPLICATE SAMPLE NO. FEW4- ~~Belvoir- Borie NO1-SW#3~~

MS/MSD REQUESTED: YES (NO) FEW4- ~~SED #3~~ Belvoir- Borie NO 1- SED#3

Comments/Observations

* pH reading high, used different YSI for future readings (calibrated in Field)
Duplicate samples SW#3 and SED #3 collected at "0855" and "0915", respectively.

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 12/6/17

Project No.:
Field Crew: RW / JM
Weather: Sunny, high winds, 30° F

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O:

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: Hach 2100 Q

Well ID: Dyno Nobel #8
Type of Well: Industrial
Casing Stickup:
Static Water Level:
Well Depth/Diameter:

Purging Equipment:
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1234			8.61	-69.7	10.91	7.39	253	2.73		
1236			8.55	-77.4	10.99	7.51	281	2.55		
1235			8.56	-80.2	11.03	7.52	252	5.19		
Collected sample FEW4-DynoNobel#8 @ 1240										

Depth to water after purging/before sampling _____ ft TOC_____
Sampling Equipment: _____

Analysis to be performed and Number of Containers:
VOCs _____ Preservative _____
_____ Preservative _____
_____ Preservative _____

COMMENTS: well is running @ 40 gpm
well has been running for 24 hrs

Sampler Signature(s) RW JM

NA ALTI

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 12/6/17

Project No.:
Field Crew: RW/JM
Weather: Sunny, high winds, 30°F

Analytical Instruments: pH: YSI -556
Temp: ↓
D.O.: ↓

Specific Conductivity: YSI - 556
ORP: ↓
Turbidity: Hach 2100 Q

Well ID: Dyno Nobel #16
Type of Well: Industrial
Casing Stickup:
Static Water Level:
Well Depth/Diameter:

Purging Equipment:
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1126			9.63	72.9	11.55	6.97	256	35.0		
1129			9.62	35.7	11.64	7.34	253	3.40		
1130			9.54	25.9	11.62	7.36	253	3.60		
FEW4 - Dyno Nobel - #16 Collected @ 1132										

Depth to water after purging/before sampling _____ ft TOC_____
Sampling Equipment: _____

Analysis to be performed and Number of Containers:
VOCs _____ Preservative _____
_____ Preservative _____
_____ Preservative _____

COMMENTS: Well is running @ 130 g.p.m
Well has been running for 24 hrs
Dyno Nobel #16 sample collected @ 1132

Sampler Signature(s) RJ W

NA ALI'I

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 12/6/17

Project No.: _____
Field Crew: RW / JM
Weather: Sunny, high winds, ~ 30 F

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O: ↓

Specific Conductivity: YSI 556
ORP: ↓
Turbidity: Hach 2100 Q

Well ID: Dyno Nobel #22
Type of Well: Industrial
Casing Stickup: _____
Static Water Level: _____
Well Depth/Diameter: _____

Purging Equipment: _____
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1153			8.03	-11.8	11.28	7.24	284	5.56		
1155			8.58	-16.5	11.40	7.33	284	3.62		
1158			8.44	-25.1	11.51	7.42	284	2.90		
1200			8.36	-28.0	11.56	7.42	284	3.72		
FEW4 - Dyno Nobel #22 collected at 1205 a/s. MS/MSD collected										

Depth to water after purging/before sampling _____ ft TOC _____
Sampling Equipment: _____

Analysis to be performed and Number of Containers:
VOCs _____ Preservative _____
_____ Preservative _____
_____ Preservative _____

COMMENTS: well is running @ 170 g.p.m
well has been running for 24 hrs

Sampler Signature(s) RJ [illegible]

NA ALTI

GROUNDWATER SAMPLING LOG (revised 8/17.2017)

Project Name: Atlas Site 4 LTMP
Site Name: Former Atlas D Missile Site 4
Sampling Date: 12/6/17

Project No.:
Field Crew: RW/JM
Weather: sunny, high winds, 30°F

Analytical Instruments: pH: YSI 556
Temp: ↓
D.O.:

Specific Conductivity: YSI 556 ↓
ORP:
Turbidity: Hach 2100 Q

Well ID: Dyno Nobel #26
Type of Well: Industrial
Casing Stickup:
Static Water Level: ✓
Well Depth/Diameter:

Purging Equipment:
CASING VOLUME CALCULATION
(TD(ft) – DTW(ft)) x ____ gal/ft = 1 casing volume (gals)

Time	Casing Volumes	Gallons Removed	D.O. (±0.5 mg/l)	ORP (±10 mV)	Temp (±1°C)	pH (±0.1)	Sp. Cond. (±3 µS)	Turbidity (± 10% NTUs)	PWL (ft TOC)	Purge Rate
1346			7.94	-154.4	11.42	7.55	281	2.55		
1348			7.88	-159.6	11.27	7.67	279	1.83		
1350			7.85	-159.6	11.21	7.61	280	2.38		
Collect Sample FEW4- Dyno Nobel #26 @ 1351										

Depth to water after purging/before sampling _____ ft TOC_____
Sampling Equipment: _____

Analysis to be performed and Number of Containers:
VOCs _____ Preservative _____
_____ Preservative _____
_____ Preservative _____

COMMENTS: well is pumping 101 gpm. well has been running for 24 hrs.
collected Dup sample MW150 @ 1451

Sampler Signature(s) RJ/WH

NA ALTI

A-5 Vapor Sample Collection Logs

Vapor Sampling Form

Project Name: Former Atlas D Missile Site 4 Long-Term Monitoring Program

Date: 12/3/2017
Crew: JM, RW, KZ
Weather: Sunny, 50 deg. F, windy

Location ID: MW59
Vapor Port Interval (ft bgs): 37-42
VP Sandpack Length (ft): 10
Borehole Diam. (in.): 10
Vaport Port Tube diam. (in.): 0.25
Vaport Port Tube length (ft): 45
Sandpack Porosity: 0.35

Barometric Pressure: 29.67 in. (altimeter)
1001.7 mb (sea level)

Borehole Vol. per ft = 0.5451 cubic ft
= **15.4383** liters per ft
Borehole Vol.: **154.3833 liters**

St. Steel Tubing Volume per ft: 0.000341 cubic ft
= 0.009649 liters per ft
St. Steel Tubing Volume : **0.434203 liters**

2-in PVC casing actual diam.: 2.31 inches
2-in PVC casing volume per ft: 0.02909 cubic ft
No. of 2-in. well casings: 1
Total 2-in PVC casing volume per ft: 0.02909 cubic ft
= **0.82380** liters per ft
2-in PVC casing volume: **8.23805 liters**

Sandpack Volume (Borehole Vol. minus PVC Vol. minus tubing vol.): 145.7111 liters
Sandpack Air Volume @ 35% porosity: 50.9989 liters

Sandpack Air Volume + Tubing Vol.: 51.4331 liters

Begin Purge Time: 1415 hrs
Average Flow Rate: 4.87 liters/min.

End Purge Time: 1441
Total Minutes Purge Time: 26
Total Volume Purged 126.62 liters

Purge Time	PID Reading (ppm)	Avg. Flow (l/min.)
1419	49.9	4.89
1425	44.4	4.87
1430	41.6	4.85
1435	39.8	4.85
1440	38.5	4.89

Sample ID: FEW4-MW59-(37-42)
Summa Canister No: 5483
Summa Canister Volume: 6 liters
Flow controller # NA
Un-connected Gauge Reading (pre-sample): -0.4 in. Hg
Initial Summa Vacuum: -24 in. Hg
Sample Collection Start Time: 1442 hrs
Sample Collection End Time: 1442 hrs
Post-Collection Summa Vaccum: -2 in. Hg

Comments:

Sampler Signature:

Vapor Sampling Form

Project Name: Former Atlas D Missile Site 4 Long-Term Monitoring Program

Date: 12/3/2017
Crew: JM, RW, KZ
Weather: Sunny, 50 deg. F, windy

Location ID: MW59
Vapor Port Interval (ft bgs): 17-22
VP Sandpack Length (ft): 10
Borehole Diam. (in.): 10
Vaport Port Tube diam. (in.): 0.25
Vaport Port Tube length (ft): 25
Sandpack Porosity: 0.35

Barometric Pressure: 29.67 in. (altimeter)
1001.7 mb (sea level)

Borehole Vol. per ft = 0.5451 cubic ft
= **15.4383** liters per ft
Borehole Vol.: **154.3833 liters**

St. Steel Tubing Volume per ft: 0.000341 cubic ft
= 0.009649 liters per ft
St. Steel Tubing Volume : **0.241224 liters**

2-in PVC casing actual diam.: 2.31 inches
2-in PVC casing volume per ft: 0.02909 cubic ft
No. of 2-in. well casings: 1
Total 2-in PVC casing volume per ft: 0.02909 cubic ft
= **0.82380** liters per ft
2-in PVC casing volume: **8.23805 liters**

Sandpack Volume (Borehole Vol. minus PVC Vol. minus tubing vol.):
145.9041 liters
Sandpack Air Volume @ 35% porosity: 51.0664 liters

Sandpack Air Volume + Tubing Vol.: 51.3076 liters

Begin Purge Time: 1450 hrs
Average Flow Rate: 4.913333333 liters/min.

End Purge Time: 1516
Total Minutes Purge Time: 26
Total Volume Purged 127.7466667 liters

Purge Time	PID Reading (ppm)	Avg. Flow (l/min.)
1452	8.1	4.97
1457	3.7	4.91
1500	2.8	4.88
1505	2.7	4.88
1510	2.6	4.87
1515	2.4	4.97

Sample ID: FEW4-MW59-(17-22)
Summa Canister No: 1393
Summa Canister Volume: 6 liters
Flow controller # NA
Un-connected Gauge Reading
(pre-sample): 0 in. Hg
Initial Summa Vacuum: -24.0 in. Hg
Sample Collection Start Time: 1517 hrs
Sample Collection End Time: 1517 hrs
Post-Collection Summa Vaccum: -1.5 in. Hg

Comments:

Sampler Signature:

Vapor Sampling Form

Project Name: Former Atlas D Missile Site 4 Long-Term Monitoring Program

Date: 11/29/2017
Crew: JM,
Weather: Sunny, 42 deg. F, breezy

Location ID: MW60
Vapor Port Interval (ft bgs): 55-60
VP Sandpack Length (ft): 10
Borehole Diam. (in.): 10
Vaport Port Tube diam. (in.): 0.25
Vaport Port Tube length (ft): 65
Sandpack Porosity: 0.35

Barometric Pressure: 30.08 in. (altimeter)
1017.2 mb (sea level)

Borehole Vol. per ft = 0.5451 cubic ft
= **15.4383** liters per ft
Borehole Vol.: **154.3833 liters**

St. Steel Tubing Volume per ft: 0.000341 cubic ft
= 0.009649 liters per ft
St. Steel Tubing Volume : **0.627182 liters**

2-in PVC casing actual diam.: 2.31 inches
2-in PVC casing volume per ft: 0.02909 cubic ft
No. of 2-in. well casings: 3
Total 2-in PVC casing volume per ft: 0.08727 cubic ft
= **2.47141** liters per ft
2-in PVC casing volume: **24.714 liters**

Sandpack Volume (Borehole Vol. minus PVC Vol. minus tubing vol.): 129.04 liters
Sandpack Air Volume @ 35% porosity: 45.16 liters
Sandpack Air Volume + Tubing Vol.: 45.79 liters

Begin Purge Time: 1530 hrs
Average Flow Rate: 4.22 liters/min.

End Purge Time: 1557
Total Minutes Purge Time: 27
Total Volume Purged 113.94 liters

Purge Time	PID Reading (ppm)	Avg. Flow (l/min.)
1531	0	4.29
1534	0	4.18
1538	0	4.17
1544	0	4.17
1550	0	4.23
1556	0	4.28

Sample ID: FEW4-MW60-(55-60)
Summa Canister No: 1427
Summa Canister Volume: 6 liters
Flow controller # NA
Un-connected Gauge Reading
(pre-sample): -1.1 in. Hg
Initial Summa Vacuum: -24.0 in. Hg
Sample Collection Start Time: 1559 hrs
Sample Collection End Time: 1559 hrs
Post-Collection Summa Vaccum: -3.8 in. Hg

Comments:

Sampler Signature:

Vapor Sampling Form

Project Name: Former Atlas D Missile Site 4 Long-Term Monitoring Program

Date: 11/29/2017
Crew: JM
Weather: Partly cloudy, 41 deg. F, breezy

Location ID: MW60
Vapor Port Interval (ft bgs): 25-30
VP Sandpack Length (ft): 10
Borehole Diam. (in.): 10
Vaport Port Tube diam. (in.): 0.25
Vaport Port Tube length (ft): 35
Sandpack Porosity: 0.35

Barometric Pressure: 30.08 in. (altimeter)
1017.2 mb (sea level)

Borehole Vol. per ft = 0.5451 cubic ft
= **15.4383** liters per ft
Borehole Vol.: **154.3833 liters**

St. Steel Tubing Volume per ft: 0.000341 cubic ft
= 0.009649 liters per ft
St. Steel Tubing Volume : **0.337714 liters**

2-in PVC casing actual diam.: 2.31 inches
2-in PVC casing volume per ft: 0.02909 cubic ft
No. of 2-in. well casings: 3
Total 2-in PVC casing volume per ft: 0.08727 cubic ft
= **2.47141** liters per ft
2-in PVC casing volume: **24.714 liters**

Sandpack Volume (Borehole Vol. minus PVC Vol. minus tubing vol.):
129.33 liters
Sandpack Air Volume @ 35% porosity: 45.27 liters

Sandpack Air Volume + Tubing Vol.: 45.60 liters

Begin Purge Time: 1449 hrs
Average Flow Rate: 4.24 liters/min.

End Purge Time: 1518
Total Minutes Purge Time: 29
Total Volume Purged 123.00833 liters

Purge Time	PID Reading (ppm)	Avg. Flow (l/min.)
1453	0	4.25
1458	0	4.26
1302	0	4.23
1306	0	4.26
1310	0	4.24
1316	0	4.21

Sample ID: FEW4-MW60-(25-30)
Summa Canister No: 3182
Summa Canister Volume: 6 liters
Flow controller # NA
Un-connected Gauge Reading (pre-sample): -1.2 in. Hg
Initial Summa Vacuum: -23.2 in. Hg
Sample Collection Start Time: 1520 hrs
Sample Collection End Time: 1520 hrs
Post-Collection Summa Vaccum: -2.6 in. Hg

Sample ID: FEW4-MW60-(85-90)
Summa Canister No: 3547
Summa Canister Volume: 6 liters
Flow controller # NA
Un-connected Gauge Reading (pre-sample): -1.2 in. Hg
Initial Summa Vacuum: -24.0 in. Hg
Sample Collection Start Time: 1620 hrs
Sample Collection End Time: 1620 hrs
st-Collection Summa Vaccum: -3 in. Hg

Comments:

Sampler Signature:

Vapor Sampling Form

Project Name: Former Atlas D Missile Site 4 Long-Term Monitoring Program

Date: 11/28/2017
Crew: JM,
Weather: Sunny, 35 deg. F, breeze

Location ID: MW61
Vapor Port Interval (ft bgs): 58-63
VP Sandpack Length (ft): 10
Borehole Diam. (in.): 10
Vaport Port Tube diam. (in.): 0.25
Vaport Port Tube length (ft): 66
Sandpack Porosity: 0.35

Barometric Pressure: 30.22 in. (altimeter)
1024.0 mb (sea level) mb

Borehole Vol. per ft = 0.5451 cubic ft
= **15.4383** liters per ft
Borehole Vol.: **154.3833 liters**

St. Steel Tubing Volume per ft: 0.000341 cubic ft
= 0.009649 liters per ft
St. Steel Tubing Volume : **0.636831 liters**

2-in PVC casing actual diam.: 2.31 inches
2-in PVC casing volume per ft: 0.02909 cubic ft
No. of 2-in. well casings: 3
Total 2-in PVC casing volume per ft: 0.08727 cubic ft
= **2.47141** liters per ft
2-in PVC casing volume: **24.71415 liters**

Sandpack Volume (Borehole Vol. minus PVC Vol. minus tubing vol.):
129.0324 liters
Sandpack Air Volume @ 35% porosity: 45.1613 liters

Sandpack Air Volume + Tubing Vol.: 45.7982 liters

Begin Purge Time: 1330 hrs
Average Flow Rate: 1.913333333 liters/min.

End Purge Time: 1421
Total Minutes Purge Time: 51
Total Volume Purged 97.58 liters

Purge Time	PID Reading (ppm)	Avg. Flow (l/min.)
1331	0	4.55
1332	0	3.7
1335	0	2.03
1344	0.1	1.93
1352	0.1	1.9
1400	0.2	1.89
1408	0.3	1.86
1419	0.4	1.87

Sample ID: FEW4-MW61-(58-63)
Summa Canister No: 1168
Summa Canister Volume: 6 liters
Flow controller #
Un-connected Gauge Reading
(pre-sample): -1.0 in. Hg
Initial Summa Vacuum: -23.5 in. Hg
Sample Collection Start Time: 1422 hrs
Sample Collection End Time: 1422 hrs
Post-Collection Summa Vaccum: -4.9 in. Hg

Comments: This port is apparently in a tight formation; 5 l/min pump is unable to maintain flow due to a vacum developing in the vapor port during purging, causing a flow fault. Purging was accomplshed in incremental pumping stapes of approx. one minute each.

Sampler Signature: _____

Vapor Sampling Form

Project Name: Former Atlas D Missile Site 4 Long-Term Monitoring Program

ostly Sunny,

Date: 11/28/2017

Crew: JM

Weather: Mostly Sunny, 36 deg. F, slight breeze

Location ID: MW61

Vapor Port Interval (ft bgs): 30-40

VP Sandpack Length (ft): 15

Borehole Diam. (in.): 10

Vaport Port Tube diam. (in.): 0.25

Vaport Port Tube length (ft): 43

Sandpack Porosity: 0.35

Barometric Pressure: 30.24 in. (altimeter)

1024.8 mb (sea level)

Borehole Vol. per ft = 0.5451 cubic ft

= **15.4383** liters per ft

Borehole Vol.: **231.5750 liters**

St. Steel Tubing Volume per ft: 0.000341 cubic ft

= 0.009649 liters per ft

St. Steel Tubing Volume : **0.414905 liters**

2-in PVC casing actual diam.: 2.31 inches

2-in PVC casing volume per ft: 0.02909 cubic ft

No. of 2-in. well casings: 3

Total 2-in PVC casing volume per ft: 0.08727 cubic ft

= **2.47141** liters per ft

2-in PVC casing volume: **37.07122 liters**

Sandpack Volume (Borehole Vol. minus PVC Vol. minus tubing vol.): 194.0889 liters

Sandpack Air Volume @ 35% porosity: 67.9311 liters

Sandpack Air Volume + Tubing Vol.: 68.3460 liters

Begin Purge Time: 1243 hrs

Average Flow Rate: 4.57 liters/min.

End Purge Time: 1316

Total Minutes Purge Time: 33

Total Volume Purged 150.81 liters

Purge Time	PID Reading (ppm)	Avg. Flow (l/min.)
1244	0	4.56
1247	0	4.63
1250	0	4.59
1255	0	4.57
1259	0	4.56
1302	0	4.54
1308	0	4.55
1311	0	4.56
1315	0	4.57

Sample ID: FEW4-MW61-(30-40)

Summa Canister No: 1368

Summa Canister Volume: 6 liters

Flow controller # NA

Un-connected Gauge Reading

(pre-sample): -0.8 in. Hg

Initial Summa Vacuum: -24.0 in. Hg

Sample Collection Start Time: 1320 hrs

Sample Collection End Time: 1320 hrs

Post-Collection Summa Vaccum: -2.8 in. Hg

Comments:

Sampler Signature:

Vapor Sampling Form

Project Name: Former Atlas D Missile Site 4 Long-Term Monitoring Program

Date: 11/30/2017
Crew: JM, JH
Weather: Sunny, 45 deg. F, slight breeze

Location ID: MW62
Vapor Port Interval (ft bgs): 50-55
VP Sandpack Length (ft): 10
Borehole Diam. (in.): 10
Vaport Port Tube diam. (in.): 0.25
Vaport Port Tube length (ft): 58
Sandpack Porosity: 0.35

Barometric Pressure: 30.16 in. (altimeter)
1020.7 mb (sea level)

Borehole Vol. per ft = 0.5451 cubic ft
= **15.4383** liters per ft
Borehole Vol.: **154.3833 liters**

St. Steel Tubing Volume per ft: 0.000341 cubic ft
= 0.009649 liters per ft
St. Steel Tubing Volume : **0.559640 liters**

2-in PVC casing actual diam.: 2.31 inches
2-in PVC casing volume per ft: 0.02909 cubic ft
No. of 2-in. well casings: 3
Total 2-in PVC casing volume per ft: 0.08727 cubic ft
= **2.47141** liters per ft
2-in PVC casing volume: **24.71415 liters**

Sandpack Volume (Borehole Vol. minus PVC Vol. minus tubing vol.): 129.1095 liters
Sandpack Air Volume @ 35% porosity: 45.1883 liters

Sandpack Air Volume + Tubing Vol.: 45.7480 liters

Begin Purge Time: 1117 hrs
Average Flow Rate: 3.32714 liters/min.

End Purge Time: 1155
Total Minutes Purge Time: 38
Total Volume Purged 126.4314286 liters

Purge Time	PID Reading (ppm)	Avg. Flow (l/min.)
1118	0	3.22
1123	0	3.36
1128	0	3.36
1133	0	3.34
1139	0	3.32
1144	0	3.34
1154	0	3.35

Sample ID: FEW4-MW62-(50-55)
Summa Canister No: 5848
Summa Canister Volume: 6 liters
Flow controller # NA
Un-connected Gauge Reading
(pre-sample): -1.3 in. Hg
Initial Summa Vacuum: -24.0 in. Hg
Sample Collection Start Time: 1156 hrs
Sample Collection End Time: 1156 hrs
Post-Collection Summa Vaccum: -4.1 in. Hg

Comments:

Sampler Signature:

Vapor Sampling Form

Project Name: Former Atlas D Missile Site 4 Long-Term Monitoring Program

Date: 11/30/2017
Crew: JM, JH
Weather: Sunny, 45 deg. F, breeze

Location ID: MW62
Vapor Port Interval (ft bgs): 20-25
VP Sandpack Length (ft): 10
Borehole Diam. (in.): 10
Vaport Port Tube diam. (in.): 0.25
Vaport Port Tube length (ft): 28
Sandpack Porosity: 0.35

Barometric Pressure: 30.19 in. (altimeter)
1022.9 mb (sea level)

Borehole Vol. per ft = 0.5451 cubic ft
= **15.4383** liters per ft
Borehole Vol.: **154.3833 liters**

St. Steel Tubing Volume per ft: 0.000341 cubic ft
= 0.009649 liters per ft
St. Steel Tubing Volume : **0.270171 liters**

2-in PVC casing actual diam.: 2.31 inches
2-in PVC casing volume per ft: 0.02909 cubic ft
No. of 2-in. well casings: 3
Total 2-in PVC casing volume per ft: 0.08727 cubic ft
= **2.47141** liters per ft
2-in PVC casing volume: **24.71415 liters**

Sandpack Volume (Borehole Vol. minus PVC Vol. minus tubing vol.): 129.3990 liters
Sandpack Air Volume @ 35% porosity: 45.2897 liters

Sandpack Air Volume + Tubing Vol.: 45.5598 liters

Begin Purge Time: 1039 hrs
Average Flow Rate: 4.68600 liters/min.

End Purge Time: 1105
Total Minutes Purge Time: 26
Total Volume Purged 121.836 liters

Purge Time	PID Reading (ppm)	Avg. Flow (l/min.)
1041	0	4.71
1044	0	4.70
1052	0	4.69
1100	0	4.68
1105	0	4.65

Sample ID: FEW4-MW62-(20-25)
Summa Canister No: 2007
Summa Canister Volume: 6 liters
Flow controller # NA
Un-connected Gauge Reading
(pre-sample): -1.5 in. Hg
Initial Summa Vacuum: -24.1 in. Hg
Sample Collection Start Time: 1107 hrs
Sample Collection End Time: 1107 hrs
Post-Collection Summa Vaccum: -1.9 in. Hg

Comments:

Sampler Signature:

Vapor Sampling Form

Project Name: Former Atlas D Missile Site 4 Long-Term Monitoring Program

Date: 11/29/2017
Crew: JM, JH
Weather: Mostly Cloudy, 43 deg., breezy

Location ID: MW63
Vapor Port Interval (ft bgs): 45-50
VP Sandpack Length (ft): 10
Borehole Diam. (in.): 10
Vaport Port Tube diam. (in.): 0.25
Vaport Port Tube length (ft): 53
Sandpack Porosity: 0.35

Barometric Pressure: 30.02 in. (altimeter)
1017.9 mb (sea level)

Borehole Vol. per ft = 0.5451 cubic ft
= **15.4383** liters per ft
Borehole Vol.: **154.3833 liters**

St. Steel Tubing Volume per ft: 0.000341 cubic ft
= 0.009649 liters per ft
St. Steel Tubing Volume : **0.511395 liters**

2-in PVC casing actual diam.: 2.31 inches
2-in PVC casing volume per ft: 0.02909 cubic ft
No. of 2-in. well casings: 3
Total 2-in PVC casing volume per ft: 0.08727 cubic ft
= **2.47141** liters per ft
2-in PVC casing volume: **24.71415 liters**

Sandpack Volume (Borehole Vol. minus PVC Vol. minus tubing vol.): 129.1578 liters
Sandpack Air Volume @ 35% porosity: 45.2052 liters
Sandpack Air Volume + Tubing Vol.: 45.7166 liters

Begin Purge Time: 1007 hrs
Average Flow Rate: 2.992857143 liters/min.

End Purge Time: 1049
Total Minutes Purge Time: 42
Total Volume Purged 125.7 liters

Purge Time	PID Reading (ppm)	Avg. Flow (l/min.)
1009	0	3.2
1014	0	3.03
1020	0	2.91
1027	0	2.95
1034	0	3
1040	0	2.94
1048	0	2.92

Sample ID: FEW4-MW63 (45-50)
Summa Canister No: 3135
Summa Canister Volume: 6 liters
Flow controller # NA
Un-connected Gauge Reading
(pre-sample): -1.2 in. Hg
Initial Summa Vacuum: -24.0 in. Hg
Sample Collection Start Time: 1050 hrs
Sample Collection End Time: 1050 hrs
Post-Collection Summa Vaccum: -2.7 in. Hg

Comments:

Sampler Signature:

Vapor Sampling Form

Project Name: Former Atlas D Missile Site 4 Long-Term Monitoring Program

Date: 11/28/2017
Crew: JM, JH
Weather: Sunny, 32 deg. F, breeze

Location ID: FEW4-MW63 (25-35)
Vapor Port Interval (ft bgs): 25-35
VP Sandpack Length (ft): 15
Borehole Diam. (in.): 10
Vaport Port Tube diam. (in.): 0.25
Vaport Port Tube length (ft): 38
Sandpack Porosity: 0.35

Barometric Pressure: 30.21 in. (altimeter)
1023.8 mb (sea level)

Borehole Vol. per ft = 0.5451 cubic ft
= **15.4383** liters per ft
Borehole Vol.: **231.5750 liters**

St. Steel Tubing Volume per ft: 0.000341 cubic ft
= 0.009649 liters per ft
St. Steel Tubing Volume : **0.366660 liters**

2-in PVC casing actual diam.: 2.31 inches
2-in PVC casing volume per ft: 0.02909 cubic ft
No. of 2-in. well casings: 1
Total 2-in PVC casing volume per ft: 0.02909 cubic ft
= **0.82380** liters per ft
2-in PVC casing volume: **12.35707 liters**

Sandpack Volume (Borehole Vol. minus PVC Vol. minus tubing vol.):
218.8513 liters
Sandpack Air Volume @ 35% porosity: 76.5979 liters

Sandpack Air Volume + Tubing Vol.: 76.9646 liters

Begin Purge Time: 1455 hrs
Average Flow Rate: 2.647142857 liters/min.

End Purge Time: 1557
Total Minutes Purge Time: 61
Total Volume Purged 161.4757143 liters

Purge Time	PID Reading (ppm)	Avg. Flow (l/min.)
1456	0	2.62
1506	0	2.62
1516	0	2.61
1526	0	2.67
1536	0	2.65
1546	0	2.67
1556	0	2.69

Sample ID: FEW4-MW63 (25-35)
Summa Canister No: 1422
Summa Canister Volume: 6 liters
Flow controller #
Un-connected Gauge Reading
(pre-sample): -1.0 in. Hg
Initial Summa Vacuum: -23.6 in. Hg
Sample Collection Start Time: 1559 hrs
Sample Collection End Time: 1559 hrs
Post-Collection Summa Vaccum: -3.2 in. Hg

Comments:

Sampler Signature:

Vapor Sampling Form

Project Name: Former Atlas D Missile Site 4 Long-Term Monitoring Program

Date: 11/29/2017
Crew: JM
Weather: Mostly sunny, 48 deg. F, breezy

Location ID: MW64
Vapor Port Interval (ft bgs): 45-50
VP Sandpack Length (ft): 10
Borehole Diam. (in.): 10
Vaport Port Tube diam. (in.): 0.25
Vaport Port Tube length (ft): 53
Sandpack Porosity: 0.35

Barometric Pressure: 30.04 in. (altimeter)
1015.5 mb (sea level)

Borehole Vol. per ft = 0.5451 cubic ft
= **15.4383** liters per ft
Borehole Vol.: **154.3833 liters**

St. Steel Tubing Volume per ft: 0.000341 cubic ft
= 0.009649 liters per ft
St. Steel Tubing Volume : **0.511395 liters**

2-in PVC casing actual diam.: 2.31 inches
2-in PVC casing volume per ft: 0.02909 cubic ft
No. of 2-in. well casings: 2
Total 2-in PVC casing volume per ft: 0.05818 cubic ft
= **1.64761** liters per ft
2-in PVC casing volume: **16.47610 liters**

Sandpack Volume (Borehole Vol. minus PVC Vol. minus tubing vol.): 137.3958 liters
Sandpack Air Volume @ 35% porosity: 48.0885 liters

Sandpack Air Volume + Tubing Vol.: 48.5999 liters

Begin Purge Time: 1303 hrs
Average Flow Rate: 1.6875 liters/min.

End Purge Time: 1410
Total Minutes Purge Time: 64
Total Volume Purged 108 liters

Purge Time	PID Reading (ppm)	Avg. Flow (l/min.)
1304	0	3.23
1306	0	2.34
1310	0	1.66
1316	0	1.64
1325	0	1.59
1335	0	1.56
1345	0	1.58
1355	0	1.58
1405	0	1.55

Sample ID: FEW4-MW64-(45-50)
Summa Canister No: 3735
Summa Canister Volume: 6 liters
Flow controller # NA
Un-connected Gauge Reading (pre-sample): -1.0 in. Hg
Initial Summa Vacuum: -24.0 in. Hg
Sample Collection Start Time: 1412 hrs
Sample Collection End Time: 1412 hrs
Post-Collection Summa Vaccum: -5.1 in. Hg

Comments: Flow rate greater than ~1.7 L/min causes fault on GilAir5 pump

Sampler Signature:

Vapor Sampling Form

Project Name: Former Atlas D Missile Site 4 Long-Term Monitoring Program

Date: 11/29/2017
Crew: JM, JH
Weather: Mostly sunny, 48 deg. F, breezy

Location ID: MW64
Vapor Port Interval (ft bgs): 15-25
VP Sandpack Length (ft): 10
Borehole Diam. (in.): 10
Vaport Port Tube diam. (in.): 0.25
Vaport Port Tube length (ft): 28
Sandpack Porosity: 0.35

Barometric Pressure: 30.04 in. (altimeter)
1015.1 mb (sea level)

Borehole Vol. per ft = 0.5451 cubic ft
= **15.4383** liters per ft
Borehole Vol.: **154.3833 liters**

St. Steel Tubing Volume per ft: 0.000341 cubic ft
= 0.009649 liters per ft
St. Steel Tubing Volume : **0.270171 liters**

2-in PVC casing actual diam.: 2.31 inches
2-in PVC casing volume per ft: 0.02909 cubic ft
No. of 2-in. well casings: 2
Total 2-in PVC casing volume per ft: 0.05818 cubic ft
= **1.64761** liters per ft
2-in PVC casing volume: **16.47610 liters**

Sandpack Volume (Borehole Vol. minus PVC Vol. minus tubing vol.):
137.6371 liters
Sandpack Air Volume @ 35% porosity: 48.1730 liters

Sandpack Air Volume + Tubing Vol.: 48.4431 liters

Begin Purge Time: 1223 hrs
Average Flow Rate: 4.967 liters/min.

End Purge Time: 1245
Total Minutes Purge Time: 22
Total Volume Purged 109.2666667 liters

Purge Time	PID Reading (ppm)	Avg. Flow (l/min.)
1224	0	5.02
1228	0	4.94
1232	0	4.95
1236	0	4.92
1240	0	4.95
1244	0	5.02

Sample ID: FEW4-MW64-(15-25)
Summa Canister No: 1461
Summa Canister Volume: 6 liters
Flow controller # NA
Un-connected Gauge Reading
(pre-sample): -1.2 in. Hg
Initial Summa Vacuum: -24.0 in. Hg
Sample Collection Start Time: 1248 hrs
Sample Collection End Time: 1248 hrs
Post-Collection Summa Vaccum: -1.9 in. Hg

Comments:

Sampler Signature:

Vapor Sampling Form

Project Name: Former Atlas D Missile Site 4 Long-Term Monitoring Program

Date: 11/30/2017
Crew: JM
Weather: Sunny, 49 deg. F. breezy

Location ID: MW65
Vapor Port Interval (ft bgs): 20-30
VP Sandpack Length (ft): 15
Borehole Diam. (in.): 10
Vaport Port Tube diam. (in.): 0.25
Vaport Port Tube length (ft): 35
Sandpack Porosity: 0.35

Barometric Pressure: 30.06 in. (altimeter)
1016.5 mb (sea level)

Borehole Vol. per ft = 0.5451 cubic ft
= **15.4383** liters per ft
Borehole Vol.: **231.5750 liters**

St. Steel Tubing Volume per ft: 0.000341 cubic ft
= 0.009649 liters per ft
St. Steel Tubing Volume : **0.337714 liters**

2-in PVC casing actual diam.: 2.31 inches
2-in PVC casing volume per ft: 0.02909 cubic ft
No. of 2-in. well casings: 3
Total 2-in PVC casing volume per ft: 0.08727 cubic ft
= **2.47141** liters per ft
2-in PVC casing volume: **37.07122 liters**

Sandpack Volume (Borehole Vol. minus PVC Vol. minus tubing vol.): 194.1661 liters
Sandpack Air Volume @ 35% porosity: 67.9581 liters

Sandpack Air Volume + Tubing Vol.: 68.2958 liters

Begin Purge Time: 1448 hrs
Average Flow Rate: 3.766 liters/min.

End Purge Time: 1530
Total Minutes Purge Time: 42
Total Volume Purged 158.1533333 liters

Purge Time	PID Reading (ppm)	Avg. Flow (l/min.)
1450	0	3.75
1455	0	3.83
1500	0	3.77
1506	0	3.76
1510	0	3.74
1515	0	3.76
1520	0	3.77
1525	0	3.76
1530	0	3.75

Sample ID: FEW4-MW65-(20-30)
Summa Canister No: 5419
Summa Canister Volume: 6 liters
Flow controller # NA
Un-connected Gauge Reading
(pre-sample): -1.0 in. Hg
Initial Summa Vacuum: -24.0 in. Hg
Sample Collection Start Time: 1531 hrs
Sample Collection End Time: 1531 hrs
Post-Collection Summa Vaccum: -2.8 in. Hg

Comments:

Sampler Signature:

Vapor Sampling Form

Project Name: Former Atlas D Missile Site 4 Long-Term Monitoring Program

Date: 11/30/2017
Crew: JM
Weather: Sunny, 51 deg. F, breezy

Location ID: MW66_Deep
Vapor Port Interval (ft bgs): 55-65
VP Sandpack Length (ft): 15
Borehole Diam. (in.): 10
Vaport Port Tube diam. (in.): 0.25
Vaport Port Tube length (ft): 68
Sandpack Porosity: 0.35

Barometric Pressure: 30.09 in. (altimeter)
1016.6 mb (sea level)

Borehole Vol. per ft = 0.5451 cubic ft
= **15.4383** liters per ft
Borehole Vol.: **231.5750 liters**

St. Steel Tubing Volume per ft: 0.000341 cubic ft
= 0.009649 liters per ft
St. Steel Tubing Volume : **0.656129 liters**

2-in PVC casing actual diam.: 2.31 inches
2-in PVC casing volume per ft: 0.02909 cubic ft
No. of 2-in. well casings: 3
Total 2-in PVC casing volume per ft: 0.08727 cubic ft
= **2.47141** liters per ft
2-in PVC casing volume: **37.07122 liters**

Sandpack Volume (Borehole Vol. minus PVC Vol. minus tubing vol.): 193.8477 liters
Sandpack Air Volume @ 35% porosity: 67.8467 liters

Sandpack Air Volume + Tubing Vol.: 68.5028 liters

Begin Purge Time: 1336 hrs
Average Flow Rate: 3.9038 liters/min.

End Purge Time: 1415
Total Minutes Purge Time: 39
Total Volume Purged 152.24625 liters

Purge Time	PID Reading (ppm)	Avg. Flow (l/min.)
1337	0	5.14
1340	0	4.59
1345	0	4.21
1349	0	3.87
1355	0	3.88
1400	0	3.73
1405	0	3.71
1410	0	3.59
1415	0	3.65

Sample ID: FEW4-MW66 (55-65)
Summa Canister No: 1474
Summa Canister Volume: 6 liters
Flow controller # NA
Un-connected Gauge Reading
(pre-sample): -1.2 in. Hg
Initial Summa Vacuum: -24.0 in. Hg
Sample Collection Start Time: 1417 hrs
Sample Collection End Time: 1417 hrs
Post-Collection Summa Vaccum: -3.8 in. Hg

Comments:

Sampler Signature:

Vapor Sampling Form

Project Name: Former Atlas D Missile Site 4 Long-Term Monitoring Program

Date: 11/30/2017
Crew: JM
Weather: Sunny, 50 deg. F, breeze

Location ID: MW66
Vapor Port Interval (ft bgs): 18-28
VP Sandpack Length (ft): 15
Borehole Diam. (in.): 10
Vaport Port Tube diam. (in.): 0.25
Vaport Port Tube length (ft): 31
Sandpack Porosity: 0.35

Barometric Pressure: 30.12 in. (altimeter)
1018.6 mb (sea level)

Borehole Vol. per ft = 0.5451 cubic ft
= **15.4383** liters per ft
Borehole Vol.: **231.5750 liters**

St. Steel Tubing Volume per ft: 0.000341 cubic ft
= 0.009649 liters per ft
St. Steel Tubing Volume : **0.299118 liters**

2-in PVC casing actual diam.: 2.31 inches
2-in PVC casing volume per ft: 0.02909 cubic ft
No. of 2-in. well casings: 3
Total 2-in PVC casing volume per ft: 0.08727 cubic ft
= **2.47141** liters per ft
2-in PVC casing volume: **37.07122 liters**

Sandpack Volume (Borehole Vol. minus PVC Vol. minus tubing vol.):
194.2047 liters
Sandpack Air Volume @ 35% porosity: 67.9716 liters

Sandpack Air Volume + Tubing Vol.: 68.2707 liters

Begin Purge Time: 1241 hrs
Average Flow Rate: 5.077 liters/min.

End Purge Time: 1316
Total Minutes Purge Time: 35
Total Volume Purged 177.6833 liters

Purge Time	PID Reading (ppm)	Avg. Flow (l/min.)
1243	0	5.11
1249	0	5.27
1255	0	5.01
1302	0	5.02
1310	0	5.02
1315	0	5.03

Sample ID: FEW4-MW66 (18-28)
Summa Canister No: 1466
Summa Canister Volume: 6 liters
Flow controller # NA
Un-connected Gauge Reading
(pre-sample): -1.2 in. Hg
Initial Summa Vacuum: -23.8 in. Hg
Sample Collection Start Time: 1317 hrs
Sample Collection End Time: 1317 hrs
Post-Collection Summa Vaccum: -2.8 in. Hg

Comments:

Sampler Signature:

Vapor Sampling Form

Project Name: Former Atlas D Missile Site 4 Long-Term Monitoring Program

Date: 12/1/2017
Crew: JM,
Weather: Sunny, 45 deg. F, windy

Location ID: MW67
Vapor Port Interval (ft bgs): 47-52
VP Sandpack Length (ft): 10
Borehole Diam. (in.): 10
Vaport Port Tube diam. (in.): 0.25
Vaport Port Tube length (ft): 55
Sandpack Porosity: 0.35

Barometric Pressure: 30.01 in. (altimeter)
1014.2 mb (sea level)

Borehole Vol. per ft = 0.5451 cubic ft
= **15.4383** liters per ft
Borehole Vol.: **154.3833 liters**

St. Steel Tubing Volume per ft: 0.000341 cubic ft
= 0.009649 liters per ft
St. Steel Tubing Volume : **0.530693 liters**

2-in PVC casing actual diam.: 2.31 inches
2-in PVC casing volume per ft: 0.02909 cubic ft
No. of 2-in. well casings: 3
Total 2-in PVC casing volume per ft: 0.08727 cubic ft
= **2.47141** liters per ft
2-in PVC casing volume: **24.71415 liters**

Sandpack Volume (Borehole Vol. minus PVC Vol. minus tubing vol.):
129.1385 liters
Sandpack Air Volume @ 35% porosity: 45.1985 liters

Sandpack Air Volume + Tubing Vol.: 45.7292 liters

Begin Purge Time: 1230 hrs
Average Flow Rate: 2.440 liters/min.

End Purge Time:
Total Minutes Purge Time: 52
Total Volume Purged 126.88 liters

Purge Time	PID Reading (ppm)	Avg. Flow (l/min.)
1231	0.0	2.7
1235	0.0	2.4
1240	0.0	2.4
1247	0.0	2.4
1254	0.0	2.4
1300	0.0	2.4
1306	0.0	2.4
1312	0.0	2.5
1315	0.0	2.4
1321	0.0	2.4

Sample ID: FEW4-MW67-(47-52)
Summa Canister No: 5417
Summa Canister Volume: 6 liters
Flow controller # NA
Un-connected Gauge Reading
(pre-sample): -1.0 in. Hg
Initial Summa Vacuum: -24.0 in. Hg
Sample Collection Start Time: 1323 hrs
Sample Collection End Time: 1323 hrs
Post-Collection Summa Vaccum: -1.9 in. Hg

Comments:

Sampler Signature:

Vapor Sampling Form

Project Name: Former Atlas D Missile Site 4 Long-Term Monitoring Program

Date: 12/1/2017
Crew: JM, JH
Weather: Sunny, 48 deg. F, windy

Location ID: MW67
Vapor Port Interval (ft bgs): 20-25
VP Sandpack Length (ft): 10
Borehole Diam. (in.): 10
Vaport Port Tube diam. (in.): 0.25
Vaport Port Tube length (ft): 28
Sandpack Porosity: 0.35

Barometric Pressure: 30.03 in. (altimeter)
1015.6 mb (sea level)

Borehole Vol. per ft = 0.5451 cubic ft
= **15.4383** liters per ft
Borehole Vol.: **154.3833 liters**

St. Steel Tubing Volume per ft: 0.000341 cubic ft
= 0.009649 liters per ft
St. Steel Tubing Volume : **0.270171 liters**

2-in PVC casing actual diam.: 2.31 inches
2-in PVC casing volume per ft: 0.02909 cubic ft
No. of 2-in. well casings: 3
Total 2-in PVC casing volume per ft: 0.08727 cubic ft
= **2.47141** liters per ft
2-in PVC casing volume: **24.71415 liters**

Sandpack Volume (Borehole Vol. minus PVC Vol. minus tubing vol.): 129.3990 liters
Sandpack Air Volume @ 35% porosity: 45.2897 liters

Sandpack Air Volume + Tubing Vol.: 45.5598 liters

Begin Purge Time: 1134 hrs
Average Flow Rate: 2.9 liters/min.

End Purge Time: 1220
Total Minutes Purge Time: 46
Total Volume Purged 133.40 liters

Purge Time	PID Reading (ppm)	Avg. Flow (l/min.)
1135	0.0	2.5
1136	0.0	3.0
1142	0.0	3.0
1147	0.0	3.0
1153	0.0	3.0
1159	0.0	3.0
1204	0.0	2.9
1210	0.0	2.9
1214	0.0	2.8
1219	0.0	2.9

Sample ID: FEW4-MW67-(20-25)
Summa Canister No: 5476
Summa Canister Volume: 6 liters
Flow controller # NA
Un-connected Gauge Reading
(pre-sample): -1.1 in. Hg
Initial Summa Vacuum: -24.0 in. Hg
Sample Collection Start Time: 1221 hrs
Sample Collection End Time: 1221 hrs
Post-Collection Summa Vaccum: -3.8 in. Hg

Comments:

Sampler Signature:

Vapor Sampling Form

Project Name: Former Atlas D Missile Site 4 Long-Term Monitoring Program

Date: 12/2/2017
Crew: JM,
Weather: Sunny, 49 deg, F, slight breeze

Location ID: MW70
Vapor Port Interval (ft bgs): 70-80
VP Sandpack Length (ft): 15
Borehole Diam. (in.): 10
Vaport Port Tube diam. (in.): 0.25
Vaport Port Tube length (ft): 83
Sandpack Porosity: 0.35

Barometric Pressure: 30.1 in. (altimeter)
1018.1 mb (sea level)

Borehole Vol. per ft = 0.5451 cubic ft
= **15.4383** liters per ft
Borehole Vol.: **231.5750 liters**

St. Steel Tubing Volume per ft: 0.000341 cubic ft
= 0.009649 liters per ft
St. Steel Tubing Volume : **0.800864 liters**

2-in PVC casing actual diam.: 2.31 inches
2-in PVC casing volume per ft: 0.02909 cubic ft
No. of 2-in. well casings: 3
Total 2-in PVC casing volume per ft: 0.08727 cubic ft
= **2.47141** liters per ft
2-in PVC casing volume: **37.07122 liters**

Sandpack Volume (Borehole Vol. minus PVC Vol. minus tubing vol.): 193.7029 liters
Sandpack Air Volume @ 35% porosity: 67.7960 liters
Sandpack Air Volume + Tubing Vol.: 68.5969 liters

Begin Purge Time: 1012 hrs
Average Flow Rate: 4.513 liters/min.

End Purge Time: 1052
Total Minutes Purge Time: 40
Total Volume Purged 180.514 liters

Purge Time	PID Reading (ppm)	Avg. Flow (l/min.)
1014	0	4.61
1022	0	4.60
1030	0	4.61
1035	0	4.53
1040	0	4.50
1045	0	4.46
1050	0	4.28

Sample ID: FEW4-MW70-(70-80)
Summa Canister No: 3592
Summa Canister Volume: 6 liters
Flow controller # NA
Un-connected Gauge Reading
(pre-sample): -1.1 in. Hg
Initial Summa Vacuum: -24.2 in. Hg
Sample Collection Start Time: 1053 hrs
Sample Collection End Time: 1053 hrs
Post-Collection Summa Vaccum: -2.2 in. Hg

Comments:

Sampler Signature:

Vapor Sampling Form

Project Name: Former Atlas D Missile Site 4 Long-Term Monitoring Program

Date: 12/2/2017
Crew: JM
Weather: Sunny, 49 deg, F, slight breeze

Location ID: MW70
Vapor Port Interval (ft bgs): 30-40
VP Sandpack Length (ft): 15
Borehole Diam. (in.): 10
Vaport Port Tube diam. (in.): 0.25
Vaport Port Tube length (ft): 43
Sandpack Porosity: 0.35

Barometric Pressure: 30.1 in. (altimeter)
1018.1 mb (sea level)

Borehole Vol. per ft = 0.5451 cubic ft
= **15.4383** liters per ft
Borehole Vol.: **231.5750 liters**

St. Steel Tubing Volume per ft: 0.000341 cubic ft
= 0.009649 liters per ft
St. Steel Tubing Volume : **0.414905 liters**

2-in PVC casing actual diam.: 2.31 inches
2-in PVC casing volume per ft: 0.02909 cubic ft
No. of 2-in. well casings: 3
Total 2-in PVC casing volume per ft: 0.08727 cubic ft
= **2.47141** liters per ft
2-in PVC casing volume: **37.07122 liters**

Sandpack Volume (Borehole Vol. minus PVC Vol. minus tubing vol.): 194.0889 liters
Sandpack Air Volume @ 35% porosity: 67.9311 liters

Sandpack Air Volume + Tubing Vol.: 68.3460 liters

Begin Purge Time: 0921 hrs
Average Flow Rate: 4.594 liters/min.

End Purge Time: 1000
Total Minutes Purge Time: 41
Total Volume Purged 188.354 liters

Purge Time	PID Reading (ppm)	Avg. Flow (l/min.)
0922	0	4.7
0927	0	4.56
0932	0	4.59
0937	0	4.55
0958	0	4.57

Sample ID: FEW4-MW70-(30-40)
Summa Canister No: 1418
Summa Canister Volume: 6 liters
Flow controller # NA
Un-connected Gauge Reading
(pre-sample): -1.0 in. Hg
Initial Summa Vacuum: -24.0 in. Hg
Sample Collection Start Time: 1001 hrs
Sample Collection End Time: 1001 hrs
Post-Collection Summa Vaccum: -2.8 in. Hg

Comments:

Sampler Signature:

Vapor Sampling Form

Project Name: Former Atlas D Missile Site 4 Long-Term Monitoring Program

Date: 12/3/2017
Crew: JM, RW, SB
Weather: Sunny, 51 deg. F, breezy

Location ID: MW74
Vapor Port Interval (ft bgs): 22-27
VP Sandpack Length (ft): 10
Borehole Diam. (in.): 10
Vaport Port Tube diam. (in.): 0.25
Vaport Port Tube length (ft): 27
Sandpack Porosity: 0.35

Barometric Pressure: 29.67 in. (altimeter)
1001.7 mb (sea level)

Borehole Vol. per ft = 0.5451 cubic ft
= **15.4383** liters per ft
Borehole Vol.: **154.3833 liters**

St. Steel Tubing Volume per ft: 0.000341 cubic ft
= 0.009649 liters per ft
St. Steel Tubing Volume : **0.260522 liters**

2-in PVC casing actual diam.: 2.31 inches
2-in PVC casing volume per ft: 0.02909 cubic ft
No. of 2-in. well casings: 3
Total 2-in PVC casing volume per ft: 0.08727 cubic ft
= **2.47141** liters per ft
2-in PVC casing volume: **24.714 liters**

Sandpack Volume (Borehole Vol. minus PVC Vol. minus tubing vol.): 129.41 liters
Sandpack Air Volume @ 35% porosity: 45.29 liters
Sandpack Air Volume + Tubing Vol.: 45.55 liters

Begin Purge Time: 1502 hrs
Average Flow Rate: 4.21 liters/min.

End Purge Time: 1527
Total Minutes Purge Time: 25
Total Volume Purged 105.2 liters

Purge Time	PID Reading (ppm)	Avg. Flow (l/min.)
1503	0	4.92
1505	0	4.02
1510	0.0	4.25
1515	0.1	4.24
1520	0.0	4.27
1525	0.1	4.26

Sample ID: FEW4-MW74-(22-27)
Summa Canister No: 3546
Summa Canister Volume: 6 liters
Flow controller # NA
Un-connected Gauge Reading
(pre-sample): -1.5 in. Hg
Initial Summa Vacuum: -23.8 in. Hg
Sample Collection Start Time: 1527 hrs
Sample Collection End Time: 1527 hrs
Post-Collection Summa Vaccum: -5.1 in. Hg

Comments:

Sampler Signature:

Vapor Sampling Form

Project Name: Former Atlas D Missile Site 4 Long-Term Monitoring Program

Date: 12/3/2017
Crew: JM, JNH, SB
Weather: Sunny, 51 deg. F, breezy

Location ID: MW74
Vapor Port Interval (ft bgs): 12-17
VP Sandpack Length (ft): 10
Borehole Diam. (in.): 10
Vaport Port Tube diam. (in.): 0.25
Vaport Port Tube length (ft): 17
Sandpack Porosity: 0.35

Barometric Pressure: 29.67 in. (altimeter)
1001.7 mb (sea level)

Borehole Vol. per ft = 0.5451 cubic ft
= **15.4383** liters per ft
Borehole Vol.: **154.3833 liters**

St. Steel Tubing Volume per ft: 0.000341 cubic ft
= 0.009649 liters per ft
St. Steel Tubing Volume : **0.164032 liters**

2-in PVC casing actual diam.: 2.31 inches
2-in PVC casing volume per ft: 0.02909 cubic ft
No. of 2-in. well casings: 3
Total 2-in PVC casing volume per ft: 0.08727 cubic ft
= **2.47141** liters per ft
2-in PVC casing volume: **24.714 liters**

Sandpack Volume (Borehole Vol. minus PVC Vol. minus tubing vol.): 129.51 liters
Sandpack Air Volume @ 35% porosity: 45.33 liters

Sandpack Air Volume + Tubing Vol.: 45.49 liters

Begin Purge Time: 1426 hrs
Average Flow Rate: 5.00 liters/min.

End Purge Time: 1453
Total Minutes Purge Time: 27
Total Volume Purged 135.09 liters

Purge Time	PID Reading (ppm)	Avg. Flow (l/min.)
1427	0.7	4.96
1432	1.2	4.99
1437	1.0	5.02
1442	0.7	5.01
1447	0.3	5.03
1452	0.3	5.01

Sample ID: FEW4-MW74-(12-17)
Summa Canister No: 1415
Summa Canister Volume: 6 liters
Flow controller # NA
Un-connected Gauge Reading
(pre-sample): -1.3 in. Hg
Initial Summa Vacuum: -24.0 in. Hg
Sample Collection Start Time: 1454 hrs
Sample Collection End Time: 1454 hrs
Post-Collection Summa Vaccum: -2.0 in. Hg

Comments:

Sampler Signature:

Vapor Sampling Form

Project Name: Former Atlas D Missile Site 4 Long-Term Monitoring Program

Date: 12/4/2017
Crew: JM, JNH, SB
Weather: Sunny, 25 deg. F, windy

Location ID: MW80
Vapor Port Interval (ft bgs): 46-56
VP Sandpack Length (ft): 15
Borehole Diam. (in.): 10
Vaport Port Tube diam. (in.): 0.25
Vaport Port Tube length (ft): 56
Sandpack Porosity: 0.35

Barometric Pressure: 29.94 in. (altimeter)
1015.2 mb (sea level)

Borehole Vol. per ft = 0.5451 cubic ft
= **15.4383** liters per ft
Borehole Vol.: **231.5750 liters**

St. Steel Tubing Volume per ft: 0.000341 cubic ft
= 0.009649 liters per ft
St. Steel Tubing Volume : **0.540342 liters**

2-in PVC casing actual diam.: 2.31 inches
2-in PVC casing volume per ft: 0.02909 cubic ft
No. of 2-in. well casings: 3
Total 2-in PVC casing volume per ft: 0.08727 cubic ft
= **2.47141** liters per ft
2-in PVC casing volume: **37.071 liters**

Sandpack Volume (Borehole Vol. minus PVC Vol. minus tubing vol.):
193.96 liters
Sandpack Air Volume @ 35% porosity: 67.89 liters

Sandpack Air Volume + Tubing Vol.: 68.43 liters

Begin Purge Time: 1058 hrs
Average Flow Rate: 4.75 liters/min.

End Purge Time: 1130
Total Minutes Purge Time: 32
Total Volume Purged 151.86286 liters

Purge Time	PID Reading (ppm)	Avg. Flow (l/min.)
1100	0.3	4.80
1105	0.3	4.76
1110	0.4	4.78
1115	0.4	4.75
1120	0.3	4.68
1125	0.4	4.80
1130	0.3	4.65

Sample ID: FEW4-MW80-(46-56)
Summa Canister No: 1432
Summa Canister Volume: 6 liters
Flow controller # NA
Un-connected Gauge Reading (pre-sample): -1.3 in. Hg
Initial Summa Vacuum: -23.9 in. Hg
Sample Collection Start Time: 1131 hrs
Sample Collection End Time: 1131 hrs
Post-Collection Summa Vaccum: -2.9 in. Hg

Comments: Dup Sample Collected: Summa Canister No: 3558 Initial Summa Vacuum: -23.9 in. Hg
Un-connected Gauge Reading: -1.3
Dup Sample ID: FEW4-MW80-(82-87) Sample collected @ 1134 Post-Collection Summa Vaccum: -2.8 in. Hg

Sampler Signature: _____

Vapor Sampling Form

Project Name: Former Atlas D Missile Site 4 Long-Term Monitoring Program

Date: 12/4/2017
Crew: JM
Weather: Partly Sunny, 27 deg. F, breezy

Location ID: MW80
Vapor Port Interval (ft bgs): 32-37
VP Sandpack Length (ft): 10
Borehole Diam. (in.): 10
Vaport Port Tube diam. (in.): 0.25
Vaport Port Tube length (ft): 37
Sandpack Porosity: 0.35

Barometric Pressure: 29.99 in. (altimeter)
1018.4 mb (sea level)

Borehole Vol. per ft = 0.5451 cubic ft
= **15.4383** liters per ft
Borehole Vol.: **154.3833 liters**

St. Steel Tubing Volume per ft: 0.000341 cubic ft
= 0.009649 liters per ft
St. Steel Tubing Volume : **0.357011 liters**

2-in PVC casing actual diam.: 2.31 inches
2-in PVC casing volume per ft: 0.02909 cubic ft
No. of 2-in. well casings: 3
Total 2-in PVC casing volume per ft: 0.08727 cubic ft
= **2.47141** liters per ft
2-in PVC casing volume: **24.714 liters**

Sandpack Volume (Borehole Vol. minus PVC Vol. minus tubing vol.): 129.31 liters
Sandpack Air Volume @ 35% porosity: 45.26 liters

Sandpack Air Volume + Tubing Vol.: 45.62 liters

Begin Purge Time: 1303 hrs
Average Flow Rate: 4.67 liters/min.

End Purge Time: 1328
Total Minutes Purge Time: 25
Total Volume Purged 116.70833 liters

Purge Time	PID Reading (ppm)	Avg. Flow (l/min.)
1305	0	4.70
1308	0	4.64
1313	0	4.65
1318	0	4.73
1323	0	4.65
1327	0	4.64

Sample ID: FEW4-MW80-(32-37)
Summa Canister No: 2404
Summa Canister Volume: 6 liters
Flow controller # NA
Un-connected Gauge Reading
(pre-sample): -1.2 in. Hg
Initial Summa Vacuum: -23.8 in. Hg
Sample Collection Start Time: 1329 hrs
Sample Collection End Time: 1329 hrs
Post-Collection Summa Vaccum: -2.8 in. Hg

Comments:

Sampler Signature:

Vapor Sampling Form

Project Name: Former Atlas D Missile Site 4 Long-Term Monitoring Program

Date: 12/2/2017
Crew: RW,SB
Weather: Sunny, 49 deg. F, Breezy

Location ID: MW82
Vapor Port Interval (ft bgs): 56-61
VP Sandpack Length (ft): 10
Borehole Diam. (in.): 10
Vaport Port Tube diam. (in.): 0.25
Vaport Port Tube length (ft): 61
Sandpack Porosity: 0.35

Barometric Pressure: 30.06 in. (altimeter)
1014.9 mb (sea level)

Borehole Vol. per ft = 0.5451 cubic ft
= **15.4383** liters per ft
Borehole Vol.: **154.3833 liters**

St. Steel Tubing Volume per ft: 0.000341 cubic ft
= 0.009649 liters per ft
St. Steel Tubing Volume : **0.588586 liters**

2-in PVC casing actual diam.: 2.31 inches
2-in PVC casing volume per ft: 0.02909 cubic ft
No. of 2-in. well casings: 3
Total 2-in PVC casing volume per ft: 0.08727 cubic ft
= **2.47141** liters per ft
2-in PVC casing volume: **24.714 liters**

Sandpack Volume (Borehole Vol. minus PVC Vol. minus tubing vol.): 129.08 liters
Sandpack Air Volume @ 35% porosity: 45.18 liters

Sandpack Air Volume + Tubing Vol.: 45.77 liters

Begin Purge Time: 1426 hrs
Average Flow Rate: 4.00 liters/min.

End Purge Time: 1456
Total Minutes Purge Time: 30
Total Volume Purged 119.95714 liters

Purge Time	PID Reading (ppm)	Avg. Flow (l/min.)
1426	0.0	4.46
1433	0.0	4.42
1438	0.0	4.08
1443	0.1	3.71
1448	0.2	3.76
1453	0.1	3.79
1456	0.0	3.77

Sample ID: FEW4-MW82-(56-61)
Summa Canister No: 3545
Summa Canister Volume: 6 liters
Flow controller # NA
Un-connected Gauge Reading (pre-sample): -1.3 in. Hg
Initial Summa Vacuum: -24 in. Hg
Sample Collection Start Time: 1457 hrs
Sample Collection End Time: 1457 hrs
Post-Collection Summa Vaccum: -4.2 in. Hg

Duplicate Sample ID: FEW4-MW82-(96-101)
Summa Canister No: 1428
Summa Canister Volume: 6 liters
Flow controller # NA
Un-connected Gauge Reading (pre-sample): -1.3 in. Hg
Initial Summa Vacuum: -24 in. Hg
Sample Collection Start Time: 1459 hrs
Sample Collection End Time: 1459 hrs
Post-Collection Summa Vaccum: -3.5 in. Hg

Comments:

Sampler Signature:

Vapor Sampling Form

Project Name: Former Atlas D Missile Site 4 Long-Term Monitoring Program

Date: 12/2/2017
Crew: JM, RW, SB
Weather: Sunny, 51 deg. F, breezy

Location ID: MW82
Vapor Port Interval (ft bgs): 36-41
VP Sandpack Length (ft): 10
Borehole Diam. (in.): 10
Vaport Port Tube diam. (in.): 0.25
Vaport Port Tube length (ft): 41
Sandpack Porosity: 0.35

Barometric Pressure: 30.06 in. (altimeter)
1014.9 mb (sea level)

Borehole Vol. per ft = 0.5451 cubic ft
= **15.4383** liters per ft
Borehole Vol.: **154.3833 liters**

St. Steel Tubing Volume per ft: 0.000341 cubic ft
= 0.009649 liters per ft
St. Steel Tubing Volume : **0.395607 liters**

2-in PVC casing actual diam.: 2.31 inches
2-in PVC casing volume per ft: 0.02909 cubic ft
No. of 2-in. well casings: 3
Total 2-in PVC casing volume per ft: 0.08727 cubic ft
= **2.47141** liters per ft
2-in PVC casing volume: **24.714 liters**

Sandpack Volume (Borehole Vol. minus PVC Vol. minus tubing vol.): 129.27 liters
Sandpack Air Volume @ 35% porosity: 45.25 liters

Sandpack Air Volume + Tubing Vol.: 45.64 liters

Begin Purge Time: 1347 hrs
Average Flow Rate: 4.29 liters/min.

End Purge Time: 1416
Total Minutes Purge Time: 25
Total Volume Purged 107.25 liters

Purge Time	PID Reading (ppm)	Avg. Flow (l/min.)
1350	5.8	4.09
1356	3.8	4.25
1401	1.7	4.32
1408	1.1	4.44
1415	0.5	4.35

Sample ID: FEW4-MW82-(36-41)
Summa Canister No: 3720
Summa Canister Volume: 6 liters
Flow controller # NA
Un-connected Gauge Reading
(pre-sample): -1.5 in. Hg
Initial Summa Vacuum: -24 in. Hg
Sample Collection Start Time: 1417 hrs
Sample Collection End Time: 1417 hrs
Post-Collection Summa Vaccum: -4.0 in. Hg

Comments:

Sampler Signature:

A-6 Photograph Logs

RMC SoundEarth Limited Liability Corporation

Photographic Log

CLIENT NAME:	SITE LOCATION:	PROJECT NUMBER:
U.S. Army Corps of Engineers	Atlas D Missile Site 4 Remedial Investigation	E15.019.201

Photo No: 1	Date: 8/24/2017

Description: MW74 core from 22–24 feet. Ogallala Formation, gravelly sand with a large cobble at 22.5 feet bgs.

Photo No: 2	Date: 8/24/2017

Description: MW74 core from 36–40 feet. Ogallala and the Brule Member of the WRF contact at 36 feet. Compositional change from gravelly silt to high plasticity clay.

CLIENT NAME:	SITE LOCATION:	PROJECT NUMBER:
U.S. Army Corps of Engineers	Atlas D Missile Site 4 Remedial Investigation	E15.019.201

Photo No: 3	Date: 8/24/2017

Description: MW74 core from 89–93 feet. Brule Member of the WRF, interbedded clayey silt and silty clay, claystone clasts and 2- to 3-inch layers.

Photo No: 4	Date: 8/25/2017

Description: MW 74 core from 156–162 feet. Brule Member of the WRF; hard to very hard, claystone. Vertical fracture with major manganese oxide present.

CLIENT NAME:	SITE LOCATION:	PROJECT NUMBER:
U.S. Army Corps of Engineers	Atlas D Missile Site 4 Remedial Investigation	E15.019.201

Photo No: 5	Date: 8/26/2017

Description: MW74 core from 260.5-265 feet. Brule Member of the White River Formation, massive, moderately hard silty claystone. Sub-vertical fracture from 261-262.5 feet, ~3mm thick clay infill observed in fracture.

Photo No: 6	Date: 8/27/2017

Description: MW74 core from 330.8 to 335 feet. Contact between the Brule and Chadron Members of the WRF at ~333 feet. Change from a silty clay to a light olive-brown gravelly clay.

CLIENT NAME:	SITE LOCATION:	PROJECT NUMBER:
U.S. Army Corps of Engineers	Atlas D Missile Site 4 Remedial Investigation	E15.019.201

Photo No: 7	Date: 8/27/2017

Description: MW74 core from 352 to 356.5 feet. Chadron Member of the WRF, gravelly silt with cobbles and clay. Matrix is clayey silt.

Photo No: 8	Date: 8/27/2017

Description: MW74 core from 354–363 feet. Contact between the Chadron Member of WRF and Goose Egg Formation at 358 feet. Composition and color change from brown to grayish-brown gravelly silt with cobbles and clay to reddish-brown, massive claystone.

CLIENT NAME:	SITE LOCATION:	PROJECT NUMBER:
U.S. Army Corps of Engineers	Atlas D Missile Site 4 Remedial Investigation	E15.019.201

Photo No: 9	Date: 8/18/2017

Description: MW75 core from 39–45 feet. Ogallala Formation; silt, clay, sand with gravel.

Photo No: 10	Date: 7/28/2017

Description: MW75 core form 82–85 feet. Contact between Ogallala and the Brule Member of WRF at 84 feet. Compositional change from clay and silt with sand and gravel to silty clay/clayey silt.

CLIENT NAME:	SITE LOCATION:	PROJECT NUMBER:
U.S. Army Corps of Engineers	Atlas D Missile Site 4 Remedial Investigation	E15.019.201

Photo No: 11	Date: 8/20/2017

Description: MW74 core from 213–224 feet. Brule Member of WRF, variegated cobbles and a well cemented conglomerate with cobbles.

Photo No: 12	Date: 8/20/2017

Description: MW75 core form 288–290 feet. Brule Member of WRF; claystone with gravel and silt.

CLIENT NAME:	SITE LOCATION:	PROJECT NUMBER:
U.S. Army Corps of Engineers	Atlas D Missile Site 4 Remedial Investigation	E15.019.201

Photo No: 13	Date: 8/21/2017

Description: MW75 core from ~369–378 feet. Contact between the Brule and Chadron Members of WRF at 369 feet. Compositional change from clay to claystone with variegated gravel and sand.

Photo No: 14	Date: 8/21/2017

Description: MW75 core from 380.5–387 feet. Chadron Member of WRF, variegated gravelly sand with clay and hard, smooth silt/claystone.

CLIENT NAME:	SITE LOCATION:	PROJECT NUMBER:
U.S. Army Corps of Engineers	Atlas D Missile Site 4 Remedial Investigation	E15.019.201

Photo No: 15	Date: 9/9/2017

Description: MW76 core from 25–28 feet. Ogallala Formation, gravelly sand silt.

Photo No: 16	Date: 9/10/2017

Description: MW76 core from 76–82 feet. Contact between Ogallala and Brule Member of WRF at 89 feet. Compositional change from gravelly silt with sand to alternating layers of silty clay and clayey silt.

CLIENT NAME:	SITE LOCATION:	PROJECT NUMBER:
U.S. Army Corps of Engineers	Atlas D Missile Site 4 Remedial Investigation	E15.019.201

Photo No: 17	Date: /10/2017
Description: MW76 core from 160–167 feet. Brule Member of WRF, clayey siltstone. Possible fracture zone from 160–162.5 feet and 164–167 feet. Possible tight fractures at 160–161 feet and 164–165 feet.	

Photo No: 18	Date: 9/11/2017
Description: MW76 core from 205–214 feet. Brule Member of WRF; clayey siltstone. Possible tight, vertical fracture at 210 feet.	

CLIENT NAME: U.S. Army Corps of Engineers

SITE LOCATION: Atlas D Missile Site 4 Remedial Investigation

PROJECT NUMBER: E15.019.201

Photo No: 19	**Date: 7/30/2017**
Description: MW77 core form 6–12 feet. Contact between Ogallala and Brule Member of WRF at 6 feet. Compositional change from silt with gravel to clay.	

Photo No: 20	**Date: 7/6/17**
Description: MW77 core from 116–126 feet. Brule Member of WRF; dense, hard, uniform claystone. Sub-vertical fracture from 117–118 feet and 125.5–126 feet.	

CLIENT NAME:	SITE LOCATION:	PROJECT NUMBER:
U.S. Army Corps of Engineers	Atlas D Missile Site 4 Remedial Investigation	E15.019.201

Photo No: 21	Date: 7/29/2017

Description: MW77 core from 168–170 feet. Brule Member of WRF; dense, massive, very hard claystone. Oblique 45° fracture at 169 feet, slickensides present.

Photo No: 22	Date: 8/10/2017

Description: MW77 core from 192–196 feet. Brule Member of WRF; silty claystone. Oblique, 45° fracture at 194 feet, slickensides present.

CLIENT NAME:	SITE LOCATION:	PROJECT NUMBER:
U.S. Army Corps of Engineers	Atlas D Missile Site 4 Remedial Investigation	E15.019.201

Photo No: 23	Date: 7/29/2017

Description: MW77 core from 198–210 feet. Brule Member of WRF; silty claystone with trace sand. Tight, near vertical fracture with slickensides at 200 feet.

Photo No: 24	Date: 7/29/2017

Description: MW77 core from 219 to 224 feet. Brule Member of WRF; very hard, dense, massive silty claystone. Large, vertical, semi-tight fracture with slickensides and mineralization of the fracture surface from 220–224 feet.

CLIENT NAME:	SITE LOCATION:	PROJECT NUMBER:
U.S. Army Corps of Engineers	Atlas D Missile Site 4 Remedial Investigation	E15.019.201

Photo No: 25	Date: 8/12/2017

Description: MW80 Core from 8–16 feet. Ogallala Formation, silty sand with gravel, 7-inch cobble at 15 feet.

Photo No: 26	Date: 8/13/2017

Description: MW80 core from 62–69 feet. Contact between Ogallala and Brule Member of WRF at 66 feet. Compositional change from clayey silt with sand and gravel to clay.

CLIENT NAME:	SITE LOCATION:	PROJECT NUMBER:
U.S. Army Corps of Engineers	Atlas D Missile Site 4 Remedial Investigation	E15.019.201

Photo No: 27	Date: 8/13/2017

Description: MW80 core from 113 to 120 feet. Brule Member of WRF; siltstone. Possible vertical fracture with slickensides at 114 feet, vugs with manganese oxide from 114-120 feet.

Photo No: 28	Date: 8/14/2017

Description: MW80 core from 154–156 feet. Brule Member of WRF; hard, dense, massive siltstone. Possible fracture zone from 154–156 feet.

CLIENT NAME:	SITE LOCATION:	PROJECT NUMBER:
U.S. Army Corps of Engineers	Atlas D Missile Site 4 Remedial Investigation	E15.019.201

Photo No: 29	Date: 8/15/2017

Description: MW80 core from 216–223. Brule Member of WRF; variegated, well-cemented, very hard conglomerate with loose gravel/cobbles

Photo No: 30	Date: 8/15/2017

Description: MW80 core from 254–260 feet. Brule Member of WRF; hard, dense siltstone with minor sand. Vugs with high amounts of manganese from 258–260 feet. Possible fracture with slickensides at 257 feet.

CLIENT NAME:	SITE LOCATION:	PROJECT NUMBER:
U.S. Army Corps of Engineers	Atlas D Missile Site 4 Remedial Investigation	E15.019.201

Photo No: 31	Date: 8/15/2017

Description: MW80 core from 279–285 feet. Brule Member of WRF; variegated gravels and cobbles with sand. Sand washed out from 279–283 feet.

Photo No: 32	Date: 7/21/2017

Description: MW81 core from 36–42 feet. Ogallala Formation; sand with gravel.

CLIENT NAME:	SITE LOCATION:	PROJECT NUMBER:
U.S. Army Corps of Engineers	Atlas D Missile Site 4 Remedial Investigation	E15.019.201

Photo No: 33	Date: 7/22/2017

Description: MW81 core from ~60–66 feet. Contact between Ogallala and the Brule Member of WRF at 61 feet. Compositional change from clayey sand with gravel and cobbles to clay.

Photo No: 34	Date: 7/22/2017

Description: MW81 core from 104–112 feet. Brule Member of WRF; interbedded silty clay and clayey silt with large, hard clasts

CLIENT NAME: U.S. Army Corps of Engineers

SITE LOCATION: Atlas D Missile Site 4 Remedial Investigation

PROJECT NUMBER: E15.019.201

Photo No: 35	**Date: 7/22/2017**
Description: MW81 core from 200–206 feet. Brule Member of WRF; silty clay with trace sand and gravelly sand with cobbles.	

Photo No: 36	**Date: 7/23/2017**
Description: MW81 core from 251–253 feet. Brule Member of WRF; very hard claystone with trace medium sand. Oblique, tight 45° fracture at 252 feet, slickensides present.	

CLIENT NAME:	SITE LOCATION:	PROJECT NUMBER:
U.S. Army Corps of Engineers	Atlas D Missile Site 4 Remedial Investigation	E15.019.201

Photo No: 37	Date: 7/27/2017

Description: MW81 core from 280–286 feet. Brule Member of WRF; siltstone with 5% medium sand and a gravel zone with cobbles. Fines washed out by drilling fluids.

Photo No: 38	Date: 7/24/2017

Description: MW81 core from 288–294 feet. Brule Member of WRF; very hard conglomerate composed of gravel, cobbles, coarse sand and trace silt.

CLIENT NAME:
U.S. Army Corps of Engineers

SITE LOCATION:
Atlas D Missile Site 4
Remedial Investigation

PROJECT NUMBER:
E15.019.201

Photo No: 39	**Date: 10/20/2017**

Description: MW82 core from 22–28 feet. Ogallala Formation; clayey silt and silty clay with variegated gravel and a few medium cobbles.

Photo No: 40	**Date: 10/20/2017**

Description: MW82 core from 58–66 feet. Contact between Ogallala and the Brule Member of WRF at 63 feet. Compositional change from gravelly clay with sand to medium to high plasticity clay.

CLIENT NAME:
U.S. Army Corps of Engineers

SITE LOCATION:
Atlas D Missile Site 4
Remedial Investigation

PROJECT NUMBER:
E15.019.201

Photo No: 41	**Date: 10/20/2017**

Description: MW82 core from 78–84 feet. Brule Member of WRF; sand with fine gravel and clay and a few cobbles. Wet to saturated.

Photo No: 42	**Date: 10/20/2017**

Description: MW82 core from 98-–106 feet. Brule Member of WRF; silty sand with little gravel and 2 to 4 inches silt/claystone layers.

CLIENT NAME:
U.S. Army Corps of Engineers

SITE LOCATION:
Atlas D Missile Site 4
Remedial Investigation

PROJECT NUMBER:
E15.019.201

Photo No: 43	Date: 10/20/2017

Description: MW82 core at 155 feet. Brule Member of WRF; sand with silt and clay. Very moist to wet.

Photo No: 44	Date: 10/20/2017

Description: MW82 core from 244–252 feet. Brule Member of WRF; very hard, dense, massive siltstone with a little fine gravel present.

CLIENT NAME:
U.S. Army Corps of Engineers

SITE LOCATION:
Atlas D Missile Site 4
Remedial Investigation

PROJECT NUMBER:
E15.019.201

Photo No: 45	**Date: 10/20/2017**

Description: MW82 core from 292–300 feet. Brule Member of WRF, very hard, dense, massive siltstone.

Photo No: 46	**Date: 7/26/2017**

Description: MW83 core from 48–54 feet. Ogallala Formation, gravelly, silty sand with a few cobbles.

CLIENT NAME:
U.S. Army Corps of Engineers

SITE LOCATION:
Atlas D Missile Site 4
Remedial Investigation

PROJECT NUMBER:
E15.019.201

Photo No: 47	**Date:** 7/26/2017

Description: MW83 core from 80–86 feet. Contact between Ogallala and the Brule Member of WRF at 82.5 feet. Compositional change from gravelly silt to clay.

Photo No: 48	**Date:** 7/28/2017

Description: MW83 core from 106–112 feet. Brule Member of WRF, interbedded clay and silty clay. Small to medium (5 to 6 inch) clasts present.

CLIENT NAME:
U.S. Army Corps of Engineers

SITE LOCATION:
Atlas D Missile Site 4
Remedial Investigation

PROJECT NUMBER:
E15.019.201

Photo No: 49	**Date:** 7/28/2017

Description: MW83 core from 238–240 feet. Brule Member of WRF; dense, very hard claystone. Oblique, 45° fracture at 239.5 feet.

Photo No: 50	**Date:** 7/28/2017

Description: MW83 core from 242–246 feet. Brule Member of WRF; claystone and gravelly, cobbly sand with clay and silt.

CLIENT NAME:
U.S. Army Corps of Engineers

SITE LOCATION:
Atlas D Missile Site 4
Remedial Investigation

PROJECT NUMBER:
E15.019.201

Photo No: 51	Date: 7/28/2017

Description: MW83 core from 252–260 feet. Brule Member of WRF; soft, dense, high plasticity clay and gravelly clay with silt.

Photo No: 52	Date: 7/30/2017

Description: MW84 core from 36–46 feet. Ogallala Formation; gravel silt with clay and cobbles (36–43 feet) clayey silt (42–43 feet), gravelly silt with clay (43–46 feet).

CLIENT NAME:
U.S. Army Corps of Engineers

SITE LOCATION:
Atlas D Missile Site 4
Remedial Investigation

PROJECT NUMBER:
E15.019.201

Photo No: 53	Date: 7/30/2017

Description: MW84 core from 54–62 feet. Ogallala Formation, gravelly silt with a few cobbles.

Photo No: 54	Date: 7/30/2017

Description: MW84 core from 76–86 feet. Contact between Ogallala and the Brule Member of WRF at 84 feet. Compositional change from gravelly/cobbly clay to silty clay.

CLIENT NAME:
U.S. Army Corps of Engineers

SITE LOCATION:
Atlas D Missile Site 4
Remedial Investigation

PROJECT NUMBER:
E15.019.201

Photo No: 55	**Date: 7/31/2017**

Description: MW84 core from 102–103 feet. Brule Member of WRF; moist silty gravelly clay with caliche present.

Photo No: 56	**Date: 8/2/2017**

Description: MW84 core at 232 feet. Brule Member of WRF; dense, hard claystone. Fracture at 232 feet, slickensides and elongated minerals present (biotite).

CLIENT NAME:
U.S. Army Corps of Engineers

SITE LOCATION:
Atlas D Missile Site 4
Remedial Investigation

PROJECT NUMBER:
E15.019.201

Photo No: 57	**Date: 8/2/2017**

Description: MW84 core at 256 feet. Brule Member of WRF; very hard, dense, dry siltstone/claystone. Fracture at 256 feet, slickensides present.

Photo No: 58	**Date: 8/2/17**

Description: MW84 core from 296–302 feet. Brule Member of WRF; gravelly sand (296–300 feet) and dry, very hard siltstone (300–302 feet).

CLIENT NAME:
U.S. Army Corps of Engineers

SITE LOCATION:
Atlas D Missile Site 4
Remedial Investigation

PROJECT NUMBER:
E15.019.201

Photo No: 59	**Date: 8/10/2017**

Description: MW84 core from 346–350 feet. Contact between the Brule and Chadron Members of WRF at 349 feet. Compositional change from medium hard siltstone to gravelly sand with trace silt and clay

Photo No: 60	**Date: 8/10/2017**

Description: MW84 core at 399 feet. Chadron Member of the WRF; very hard, dense, massive silt/mudstone. Fracture with slickensides at 399 feet.

CLIENT NAME:
U.S. Army Corps of Engineers

SITE LOCATION:
Atlas D Missile Site 4
Remedial Investigation

PROJECT NUMBER:
E15.019.201

Photo No: 61	**Date: 8/8/2017**

Description: MW86 core from 0–6 feet. Ogallala Formation; loose, dry to slightly moist silt with sand and gravel.

Photo No: 62	**Date: 8/8/2017**

Description: MW86 core from 6–12 feet. Contact between Ogallala and the Brule Member of WRF at 6 feet. Compositional change from gravelly/cobbly clay to silty clay.

CLIENT NAME:
U.S. Army Corps of Engineers

SITE LOCATION:
Atlas D Missile Site 4
Remedial Investigation

PROJECT NUMBER:
E15.019.201

Photo No: 63	**Date: 8/8/2017**

Description: MW86 core from 111–123 feet. Brule Member of WRF; claystone with medium-grained sand. Vertical, tight fracture from 114–115 feet.

Photo No: 64	**Date: 8/9/2017**

Description: MW86 core at 194 feet. Brule Member of WRF; medium to coarse-grained sand in cemented clay matrix.

CLIENT NAME:
U.S. Army Corps of Engineers

SITE LOCATION:
Atlas D Missile Site 4
Remedial Investigation

PROJECT NUMBER:
E15.019.201

Photo No: 65	**Date: 8/9/2017**

Description: MW86 core from 231–236 feet. Brule Member of WRF; solid cores of hard claystone.

Photo No: 66	**Date: 8/10/2017**

Description: MW86 core from 373–384 feet. Contact between Brule Member of WRF and Cloverly Formation at 380 feet. Compositional change from claystone with a cobble zone (373–380 feet) to mottled coloring, claystone/siltstone with iron staining.

CLIENT NAME:
U.S. Army Corps of Engineers

SITE LOCATION:
Atlas D Missile Site 4
Remedial Investigation

PROJECT NUMBER:
E15.019.201

Photo No: 67	**Date: 8/10/2017**

Description: MW86 core from 380–388 feet. Cloverly Formation; low plasticity clay. Rip-up claystone pieces, streaks of iron staining and white chalky areas.

Photo No: 68	**Date: 9/14/2017**

Description: MW95 core from 6–9 feet. Ogallala Formation; slightly moist clayey silt with sand and gravel.

CLIENT NAME:
U.S. Army Corps of Engineers

SITE LOCATION:
Atlas D Missile Site 4
Remedial Investigation

PROJECT NUMBER:
E15.019.201

Photo No: 69	**Date: 9/14/2017**

Description: MW95 core from 50–53 feet. Ogallala Formation; lens of low plasticity clay.

Photo No: 70	**Date: 9/15/2017**

Description: MW95 core from 107–109 feet. Ogallala Formation; very hard sandstone composed of a very fine-grained sandy matrix and medium to coarse-grained clasts.

CLIENT NAME:
U.S. Army Corps of Engineers

SITE LOCATION:
Atlas D Missile Site 4
Remedial Investigation

PROJECT NUMBER:
E15.019.201

Photo No: 71	**Date: 9/16/2017**

Description: MW95 core from 221–227 feet. Ogallala Formation; very hard, cemented conglomerate (223–225) and interbedded layers of very hard cemented coarse sand and fine gravel.

Photo No: 72	**Date: 9/16/2017**

Description: MW95 core from 276–281 feet. Contact between Ogallala and the Brule Member of WRF at 279 feet. Compositional change from gravel with cobbles and sand (washed out) to cohesive, stiff clay.

CLIENT NAME:
U.S. Army Corps of Engineers

SITE LOCATION:
Atlas D Missile Site 4
Remedial Investigation

PROJECT NUMBER:
E15.019.201

Photo No: 73	**Date: 9/18/2017**

Description: MW95 core from 295–307 feet. Brule Member of WRF; silty clay (295–299 feet) and very stiff to hard, uniform claystone (299–307 feet).

Photo No: 74	**Date: 9/18/2017**

Description: MW95 core from 349–358 feet. Brule Member of WRF; stiff to medium stiff clay. Some rip-up claystone pieces within the clay.

CLIENT NAME:
U.S. Army Corps of Engineers

SITE LOCATION:
Atlas D Missile Site 4
Remedial Investigation

PROJECT NUMBER:
E15.019.201

Photo No: 75	**Date: 7/20/2017**

Description: MW97 core from 26–34 feet. Ogallala Formation; very wet gravelly sand and sandy gravel (26–30 feet) and moist, soft to medium soft silty clay with sand (30–34 feet)

Photo No: 76	**Date: 7/20/2017**

Description: MW97 core from 11-–24 feet.
Ogallala Formation; medium plasticity, gravelly sandy clay (116–122) and variegated gravelly, clayey sand with cobbles.

CLIENT NAME:
U.S. Army Corps of Engineers

SITE LOCATION:
Atlas D Missile Site 4
Remedial Investigation

PROJECT NUMBER:
E15.019.201

Photo No: 77	**Date: 7/20/2017**

Description: MW97 core from 182–186 feet. Contact between Ogallala and the Brule Member of WRF at 185 feet. Compositional change from variegated gravel to stiff/hard silty clay.

Photo No: 78	**Date: 7/20/2017**

Description: MW97 core from 264–273 feet. Brule Member of WRF; medium plasticity, sandy gravelly clay (264–266 feet) and hard to very hard siltstone with a 6-inch conglomerate layer (269–269.5 feet)

CLIENT NAME:
U.S. Army Corps of Engineers

SITE LOCATION:
Atlas D Missile Site 4
Remedial Investigation

PROJECT NUMBER:
E15.019.201

Photo No: 79	**Date: 7/20/2017**

Description: MW97 core from 354.5–366 feet. Brule Member of WRF; silt with variegated gravel (354.5–358 feet), 1- to 6-inch pieces of gravelly, sandy siltstone (358–362.5 feet) and clayey silt/silty clay (362.5–366 feet).

Photo No: 80	**Date: 7/20/2017**

Description: MW97 core from 370.5–380 feet. Brule Member of WRF; clayey silt interbedded with silty clay and layers of hard siltstone. Possible vertical fracture from 373–376 feet.

CLIENT NAME:
U.S. Army Corps of Engineers

SITE LOCATION:
Atlas D Missile Site 4
Remedial Investigation

PROJECT NUMBER:
E15.019.201

Photo No: 81	**Date: 7/20/2017**

Description: MW97 core from 418–426 feet. Brule Member of WRF; interbedded clayey silt/silty clay. Portions of core are blocky and there are some clasts present in the cores.

Photo No: 82	**Date: 9/9/2017**

Description: MW101 core from 16–22 feet. Ogallala Formation; variegated gravelly sand, dry.

CLIENT NAME:
U.S. Army Corps of Engineers

SITE LOCATION:
Atlas D Missile Site 4
Remedial Investigation

PROJECT NUMBER:
E15.019.201

Photo No: 83	**Date: 9/9/2017**

Description: MW101 core from 94–100 feet. Contact between Ogallala and the Brule Member of WRF at 98 feet. Compositional change from clayey silt/silty clay with fine-gravel to silty clay with a small amount of gravel.

Photo No: 84	**Date: 9/9/2017**

Description: MW101 core from 116–122 feet. Brule Member of WRF; interbedded clayey silt/silty clay. Low to medium plasticity, moist to very moist and small to medium sized clasts.

CLIENT NAME:
U.S. Army Corps of Engineers

SITE LOCATION:
Atlas D Missile Site 4
Remedial Investigation

PROJECT NUMBER:
E15.019.201

Photo No: 85	**Date: 9/10/2017**

Description: MW101 core at 220 feet. Brule Member of WRF; well cemented, very hard claystone. Possible vertical fracture at 220 feet, manganese oxide in abundance on possible fracture surface.

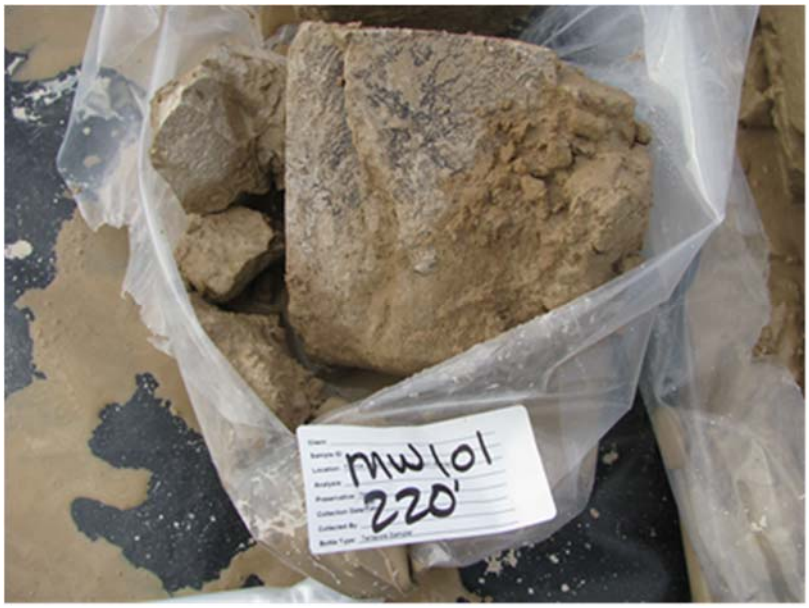


Photo No: 86	**Date: 9/10/2017**

Description: MW101 core from 265–273 feet. Brule Member of WRF; well cemented, hard to very hard, dry claystone/siltstone.

CLIENT NAME:
U.S. Army Corps of Engineers

SITE LOCATION:
Atlas D Missile Site 4
Remedial Investigation

PROJECT NUMBER:
E15.019.201

Photo No: 87	**Date:** 9/10/2017

Description: MW101 core from 302–306 feet. Brule Member of WRF; variegated, gravelly, sandy silt with clay.

Appendix B. Onsite Laboratory Screening Sample Analytical Reports

ChemSolutions

7388 S. Revere Parkway, Suite 805
Centennial, CO 80112
303.771.5570

CASE NARRATIVE

ChemSolutions Project ID: RMC008
RMC Project ID: E15.019.201
September 12, 2017

This report contains the analytical results for the samples collected on 8/24-8/27/17. The samples were analyzed onsite in our mobile laboratory in accordance with Standard Operating Procedure Atlas D Missile Site 4 On-Site Laboratory unless noted otherwise in this Case Narrative.

All sample aliquots were received on ice, in the proper containers, with the appropriate preservatives, and within method specified holding times. All samples were analyzed within the established holding times. All Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results.

The data contained in the following report have been reviewed and approved by:

John Graves
Laboratory Director
ChemSolutions LLC

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW74-(0.5)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/24/17
Date Received: 8/24/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/24/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/24/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/24/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/24/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	109	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW74-(2.5)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/24/17
Date Received: 8/24/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/24/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/24/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/24/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/24/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	104	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW74-(9.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/24/17
Date Received: 8/24/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/24/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/24/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/24/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/24/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	105	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW74-(56.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/24/17
Date Received: 8/24/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	50	ug/Kg	50	8/24/2017	8260C	
cis-1,2-Dichloroethene	ND	50	ug/Kg	50	8/24/2017	8260C	
Trichloroethene	1000	50	ug/Kg	50	8/24/2017	8260C	
Tetrachloroethene	ND	50	ug/Kg	50	8/24/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	105	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW74-(57.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/24/17
Date Received: 8/24/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	50	ug/Kg	50	8/24/2017	8260C	
cis-1,2-Dichloroethene	ND	50	ug/Kg	50	8/24/2017	8260C	
Trichloroethene	500	50	ug/Kg	50	8/24/2017	8260C	
Tetrachloroethene	ND	50	ug/Kg	50	8/24/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	103	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW74-(65.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/24/17
Date Received: 8/24/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	50	ug/Kg	50	8/24/2017	8260C	
cis-1,2-Dichloroethene	ND	50	ug/Kg	50	8/24/2017	8260C	
Trichloroethene	130	50	ug/Kg	50	8/24/2017	8260C	
Tetrachloroethene	ND	50	ug/Kg	50	8/24/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW74-(75.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/24/17
Date Received: 8/24/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	50	ug/Kg	50	8/24/2017	8260C	
cis-1,2-Dichloroethene	ND	50	ug/Kg	50	8/24/2017	8260C	
Trichloroethene	76	50	ug/Kg	50	8/24/2017	8260C	
Tetrachloroethene	ND	50	ug/Kg	50	8/24/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	103	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW74-(85.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/24/17
Date Received: 8/24/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	
Trichloroethene	36	1	ug/Kg	1	8/25/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	103	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW74-(94.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/24/17
Date Received: 8/24/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	50	ug/Kg	50	8/24/2017	8260C	
cis-1,2-Dichloroethene	ND	50	ug/Kg	50	8/24/2017	8260C	
Trichloroethene	680	50	ug/Kg	50	8/24/2017	8260C	
Tetrachloroethene	ND	50	ug/Kg	50	8/24/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	104	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW74-(104.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/25/17
Date Received: 8/25/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	50	ug/Kg	50	8/25/2017	8260C	
cis-1,2-Dichloroethene	ND	50	ug/Kg	50	8/25/2017	8260C	
Trichloroethene	280	50	ug/Kg	50	8/25/2017	8260C	
Tetrachloroethene	ND	50	ug/Kg	50	8/25/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	103	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW74-(105.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/25/17
Date Received: 8/25/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	50	ug/Kg	50	8/25/2017	8260C	
cis-1,2-Dichloroethene	ND	50	ug/Kg	50	8/25/2017	8260C	
Trichloroethene	360	50	ug/Kg	50	8/25/2017	8260C	
Tetrachloroethene	ND	50	ug/Kg	50	8/25/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	105	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW74-(114.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/25/17
Date Received: 8/25/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	
cis-1,2-Dichloroethene	3.4	1	ug/Kg	1	8/25/2017	8260C	
Trichloroethene	210	1	ug/Kg	1	8/25/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	102	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW74-(125.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/25/17
Date Received: 8/25/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	
cis-1,2-Dichloroethene	1.8	1	ug/Kg	1	8/25/2017	8260C	
Trichloroethene	140	1	ug/Kg	1	8/25/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	97.6	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW74-(134.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/25/17
Date Received: 8/25/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	
Trichloroethene	37	1	ug/Kg	1	8/25/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	105	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW74-(144.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/25/17
Date Received: 8/25/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	
Trichloroethene	1.9	1	ug/Kg	1	8/25/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	100	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW74-(154.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/25/17
Date Received: 8/25/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	103	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW74-(157.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/25/17
Date Received: 8/25/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	103	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW74-(167.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/25/17
Date Received: 8/25/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	100	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW74-(177.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/25/17
Date Received: 8/25/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	104	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW74-(187.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/25/17
Date Received: 8/25/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	102	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW74-(197.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/25/17
Date Received: 8/25/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	103	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW74-(202.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/26/17
Date Received: 8/26/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/26/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/26/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/26/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/26/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	102	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW74-(212.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/26/17
Date Received: 8/26/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/26/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/26/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/26/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/26/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	104	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW74-(213.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/26/17
Date Received: 8/26/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/26/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/26/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/26/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/26/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	103	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW74-(222.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/26/17
Date Received: 8/26/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/26/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/26/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/26/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/26/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW74-(232.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/26/17
Date Received: 8/26/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/26/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/26/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/26/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/26/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	103	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW74-(242.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/26/17
Date Received: 8/26/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/26/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/26/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/26/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/26/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	104	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW74-(256.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/26/17
Date Received: 8/26/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/26/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/26/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/26/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/26/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	102	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW74-(262.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/26/17
Date Received: 8/26/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/26/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/26/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/26/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/26/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	102	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW74-(276.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/26/17
Date Received: 8/26/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/26/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/26/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/26/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/26/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	103	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW74-(289.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/27/17
Date Received: 8/27/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/27/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/27/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/27/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/27/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	103	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW74-(296.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/27/17
Date Received: 8/27/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/27/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/27/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/27/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/27/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	102	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW74-(310.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/27/17
Date Received: 8/27/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/27/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/27/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/27/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/27/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	103	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW74-(317.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/27/17
Date Received: 8/27/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/27/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/27/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/27/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/27/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	99.4	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW74-(318.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/27/17
Date Received: 8/27/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/27/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/27/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/27/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/27/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	103	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW74-(327.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/27/17
Date Received: 8/27/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/27/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/27/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/27/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/27/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW74-(334.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/27/17
Date Received: 8/27/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/27/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/27/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/27/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/27/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	103	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW74-(348.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/27/17
Date Received: 8/27/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/27/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/27/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/27/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/27/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW74-(354.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/27/17
Date Received: 8/27/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/27/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/27/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/27/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/27/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	102	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW74-(362.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/27/17
Date Received: 8/27/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/27/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/27/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/27/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/27/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	103	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW74-65
Client Project ID: E15.019.201
Sample Matrix: Water

Date Sampled: 8/24/17
Date Received: 8/24/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	20	ug/L	20	8/24/2017	8260C	
cis-1,2-Dichloroethene	ND	20	ug/L	20	8/24/2017	8260C	
Trichloroethene	2000	20	ug/L	20	8/24/2017	8260C	
Tetrachloroethene	ND	20	ug/L	20	8/24/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	102	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: Refrigerator Blank
Client Project ID: E15.019.201
Sample Matrix: Water

Date Sampled: 8/24/17
Date Received: 8/24/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/L	1	8/24/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/L	1	8/24/2017	8260C	
Trichloroethene	ND	1	ug/L	1	8/24/2017	8260C	
Tetrachloroethene	ND	1	ug/L	1	8/24/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	102	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: Refrigerator Blank
Client Project ID: E15.019.201
Sample Matrix: Water

Date Sampled: 8/25/17
Date Received: 8/25/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/L	1	8/25/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/L	1	8/25/2017	8260C	
Trichloroethene	ND	1	ug/L	1	8/25/2017	8260C	
Tetrachloroethene	ND	1	ug/L	1	8/25/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	100	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: Refrigerator Blank
Client Project ID: E15.019.201
Sample Matrix: Water

Date Sampled: 8/26/17
Date Received: 8/26/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/L	1	8/26/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/L	1	8/26/2017	8260C	
Trichloroethene	ND	1	ug/L	1	8/26/2017	8260C	
Tetrachloroethene	ND	1	ug/L	1	8/26/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	104	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: Refrigerator Blank
Client Project ID: E15.019.201
Sample Matrix: Water

Date Sampled: 8/27/17
Date Received: 8/27/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/L	1	8/27/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/L	1	8/27/2017	8260C	
Trichloroethene	ND	1	ug/L	1	8/27/2017	8260C	
Tetrachloroethene	ND	1	ug/L	1	8/27/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	103	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-IDW-INF
Client Project ID: E15.019.201
Sample Matrix: Water

Date Sampled: 8/27/17
Date Received: 8/27/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/L	1	8/27/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/L	1	8/27/2017	8260C	
Trichloroethene	16	1	ug/L	1	8/27/2017	8260C	
Tetrachloroethene	ND	1	ug/L	1	8/27/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-IDW-EFF
Client Project ID: E15.019.201
Sample Matrix: Water

Date Sampled: 8/27/17
Date Received: 8/27/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/L	1	8/27/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/L	1	8/27/2017	8260C	
Trichloroethene	ND	1	ug/L	1	8/27/2017	8260C	
Tetrachloroethene	ND	1	ug/L	1	8/27/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	103	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Soil Blank Results
Project ID: RMC008

Sample ID: Blank
Client Project ID: E15.019.201
Sample Matrix: Soil

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/24/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/24/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/24/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/24/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	104	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Soil Blank Results
Project ID: RMC008

Sample ID: Blank
Client Project ID: E15.019.201
Sample Matrix: Soil

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	103	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Soil Blank Results
Project ID: RMC008

Sample ID: Blank
Client Project ID: E15.019.201
Sample Matrix: Soil

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/26/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/26/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/26/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/26/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	103	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Soil Blank Results
Project ID: RMC008

Sample ID: Blank
Client Project ID: E15.019.201
Sample Matrix: Soil

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/27/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/27/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/27/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/27/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	102	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Laboratory Control Sample Results
Project ID: RMC008

Sample ID: LCS
Client Project ID: E15.019.201
Sample Matrix: Soil

EPA Method 8260C Date Analyzed: 8/24/17

ANALYTE	LCS SPIKE	% RECOVERY	UNITS	QC Limits	Qualifier
trans-1,2-Dichloroethene	46.6	93	ug/Kg	70-130	
cis-1,2-Dichloroethene	46.7	93.4	ug/Kg	70-130	
Trichloroethene	47.7	95.4	ug/Kg	70-130	
Tetrachloroethene	49.0	98.0	ug/Kg	70-130	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	103	8260C	70-130

ChemSolutions LLC
Laboratory Control Sample Results
Project ID: RMC008

Sample ID: LCS
Client Project ID: E15.019.201
Sample Matrix: Soil

EPA Method 8260C Date Analyzed: 8/25/17

ANALYTE	LCS SPIKE	% RECOVERY	UNITS	QC Limits	Qualifier
trans-1,2-Dichloroethene	43.6	87	ug/Kg	70-130	
cis-1,2-Dichloroethene	42.8	85.6	ug/Kg	70-130	
Trichloroethene	42.8	85.6	ug/Kg	70-130	
Tetrachloroethene	41.8	83.6	ug/Kg	70-130	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	102	8260C	70-130

ChemSolutions LLC
Laboratory Control Sample Results
Project ID: RMC008

Sample ID: LCS
Client Project ID: E15.019.201
Sample Matrix: Soil

EPA Method 8260C Date Analyzed: 8/26/17

ANALYTE	LCS SPIKE	% RECOVERY	UNITS	QC Limits	Qualifier
trans-1,2-Dichloroethene	51.2	102	ug/Kg	70-130	
cis-1,2-Dichloroethene	46.0	92.0	ug/Kg	70-130	
Trichloroethene	48.0	96.0	ug/Kg	70-130	
Tetrachloroethene	48.0	96.0	ug/Kg	70-130	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	102	8260C	70-130

ChemSolutions LLC
Laboratory Control Sample Results
Project ID: RMC008

Sample ID: LCS
Client Project ID: E15.019.201
Sample Matrix: Soil

EPA Method 8260C Date Analyzed: 8/27/17

ANALYTE	LCS SPIKE	% RECOVERY	UNITS	QC Limits	Qualifier
trans-1,2-Dichloroethene	53.2	106	ug/Kg	70-130	
cis-1,2-Dichloroethene	47.3	94.6	ug/Kg	70-130	
Trichloroethene	49.1	98.2	ug/Kg	70-130	
Tetrachloroethene	48.8	97.6	ug/Kg	70-130	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	98.7	8260C	70-130

ChemSolutions LLC
Matrix Spike Results
Project ID: RMC008

Client Sample ID: FEW4-MW74-(9.0)
Client Project ID: E15.019.201
Sample Matrix: Soil

EPA Method 8260C Date Analyzed: 8/24/17

ANALYTE	MATRIX SPIKE	% RECOVERY	UNITS	QC Limits	Qualifier
trans-1,2-Dichloroethene	49.2	98.4	ug/Kg	70-130	
cis-1,2-Dichloroethene	43.7	87.4	ug/Kg	70-130	
Trichloroethene	45.4	90.8	ug/Kg	70-130	
Tetrachloroethene	45.5	91.0	ug/Kg	70-130	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	107	8260C	70-130

EPA Method 8260C MATRIX SPIKE

ANALYTE	DUPLICATE	% RECOVERY	UNITS	RPD	QC Limits	RPD Limit	Qualifier
trans-1,2-Dichloroethene	47.8	95.6	ug/Kg	2.9	70-130	30	
cis-1,2-Dichloroethene	44.5	89.0	ug/Kg	1.8	70-130	30	
Trichloroethene	43.6	87.2	ug/Kg	4.0	70-130	30	
Tetrachloroethene	43.1	86.2	ug/Kg	5.4	70-130	30	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ChemSolutions LLC
Matrix Spike Results
Project ID: RMC008

Client Sample ID: FEW4-MW85-(208.0)
Client Project ID: E15.019.201
Sample Matrix: Soil

EPA Method 8260C Date Analyzed: 8/25/17

ANALYTE	MATRIX SPIKE	% RECOVERY	UNITS	QC Limits	Qualifier
trans-1,2-Dichloroethene	54.9	109.8	ug/Kg	70-130	
cis-1,2-Dichloroethene	48.8	97.6	ug/Kg	70-130	
Trichloroethene	49.0	98.0	ug/Kg	70-130	
Tetrachloroethene	48.6	97.2	ug/Kg	70-130	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	102	8260C	70-130

EPA Method 8260C MATRIX SPIKE

ANALYTE	DUPLICATE	% RECOVERY	UNITS	RPD	QC Limits	RPD Limit	Qualifier
trans-1,2-Dichloroethene	50.5	101	ug/Kg	8.3	70-130	30	
cis-1,2-Dichloroethene	46.6	93.2	ug/Kg	4.6	70-130	30	
Trichloroethene	46.9	93.8	ug/Kg	4.4	70-130	30	
Tetrachloroethene	48.1	96.2	ug/Kg	1.0	70-130	30	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	103	8260C	70-130

ChemSolutions LLC
Matrix Spike Results
Project ID: RMC008

Client Sample ID: FEW4-MW85-(202.0)
Client Project ID: E15.019.201
Sample Matrix: Soil

EPA Method 8260C Date Analyzed: 8/26/17

ANALYTE	MATRIX SPIKE	% RECOVERY	UNITS	QC Limits	Qualifier
trans-1,2-Dichloroethene	42.9	85.8	ug/Kg	70-130	
cis-1,2-Dichloroethene	43.6	87.2	ug/Kg	70-130	
Trichloroethene	42.9	85.8	ug/Kg	70-130	
Tetrachloroethene	43.5	87.0	ug/Kg	70-130	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	102	8260C	70-130

EPA Method 8260C MATRIX SPIKE

ANALYTE	DUPLICATE	% RECOVERY	UNITS	RPD	QC Limits	RPD Limit	Qualifier
trans-1,2-Dichloroethene	45.9	92	ug/Kg	6.8	70-130	30	
cis-1,2-Dichloroethene	43.2	86.4	ug/Kg	0.9	70-130	30	
Trichloroethene	42.9	85.8	ug/Kg	0.0	70-130	30	
Tetrachloroethene	43.0	86.0	ug/Kg	1.2	70-130	30	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	99.8	8260C	70-130

ChemSolutions LLC
Matrix Spike Results
Project ID: RMC008

Client Sample ID: FEW4-MW85-(289.0)
Client Project ID: E15.019.201
Sample Matrix: Soil

EPA Method 8260C Date Analyzed: 8/27/17

ANALYTE	MATRIX SPIKE	% RECOVERY	UNITS	QC Limits	Qualifier
trans-1,2-Dichloroethene	41.8	83.6	ug/Kg	70-130	
cis-1,2-Dichloroethene	39.4	78.8	ug/Kg	70-130	
Trichloroethene	41.6	83.2	ug/Kg	70-130	
Tetrachloroethene	40.9	81.8	ug/Kg	70-130	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	105	8260C	70-130

EPA Method 8260C MATRIX SPIKE

ANALYTE	DUPLICATE	% RECOVERY	UNITS	RPD	QC Limits	RPD Limit	Qualifier
trans-1,2-Dichloroethene	35.2	70.4	ug/Kg	17.1	70-130	30	
cis-1,2-Dichloroethene	34.8	69.6	ug/Kg	12.4	70-130	30	
Trichloroethene	37.6	75.2	ug/Kg	10.1	70-130	30	
Tetrachloroethene	35.5	71.0	ug/Kg	14.1	70-130	30	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ChemSolutions

7388 S. Revere Parkway, Suite 805
Centennial, CO 80112
303.771.5570

CASE NARRATIVE

ChemSolutions Project ID: RMC008
RMC Project ID: E15.019.201
August 24, 2017

This report contains the analytical results for the samples collected on 8/18-8/21/17. The samples were analyzed onsite in our mobile laboratory in accordance with Standard Operating Procedure Atlas D Missile Site 4 On-Site Laboratory unless noted otherwise in this Case Narrative.

All sample aliquots were received on ice, in the proper containers, with the appropriate preservatives, and within method specified holding times. All samples were analyzed within the established holding times. All Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results.

The data contained in the following report have been reviewed and approved by:

John Graves
Laboratory Director
ChemSolutions LLC

ChemSolutions

7388 S. Revere Parkway, Suite 805
Centennial, CO 80112
303.771.5570

CASE NARRATIVE

ChemSolutions Project ID: RMC007
RMC Project ID: E15.019.201
July 30, 2017

This report contains the analytical results for the samples collected on 7/28-7/29/17. The samples were analyzed in our on-site laboratory in accordance with Standard Operating Procedure Atlas D Missile Site 4 On-Site Laboratory unless noted otherwise in this Case Narrative.

All sample aliquots were received on ice, in the proper containers, with the appropriate preservatives, and within method specified holding times. All samples were analyzed within the established holding times. All Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results.

The data contained in the following report have been reviewed and approved by:

John Graves
Laboratory Director
ChemSolutions LLC

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW77-(28.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/28/17
Date Received: 7/28/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/28/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/28/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/28/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/28/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW77-(35.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/28/17
Date Received: 7/28/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/28/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/28/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/28/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/28/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	99.0	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW77-(45.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/28/17
Date Received: 7/28/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/28/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/28/2017	8260C	
Trichloroethene	1.5	1	ug/Kg	1	7/28/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/28/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	102	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW77-(55.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/28/17
Date Received: 7/28/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/28/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/28/2017	8260C	
Trichloroethene	3.2	1	ug/Kg	1	7/28/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/28/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	99.0	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW77-(65.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/28/17
Date Received: 7/28/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/28/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/28/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/28/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/28/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW77-(73.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/28/17
Date Received: 7/28/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/28/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/28/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/28/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/28/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	100	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW77-(74.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/28/17
Date Received: 7/28/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/28/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/28/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/28/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/28/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	99.1	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW77-(85.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/28/17
Date Received: 7/28/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/28/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/28/2017	8260C	
Trichloroethene	4.0	1	ug/Kg	1	7/28/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/28/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	99.2	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW77-(96.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/28/17
Date Received: 7/28/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/28/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/28/2017	8260C	
Trichloroethene	1.4	1	ug/Kg	1	7/28/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/28/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW77-(105.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/28/17
Date Received: 7/28/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/28/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/28/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/28/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/28/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	98.6	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW77-(115.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/28/17
Date Received: 7/29/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/29/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/29/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/29/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/29/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW77-(126.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/29/17
Date Received: 7/29/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/29/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/29/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/29/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/29/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	99.6	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW77-(134.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/29/17
Date Received: 7/29/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/29/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/29/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/29/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/29/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	102	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW77-(139.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/29/17
Date Received: 7/29/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/29/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/29/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/29/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/29/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	99.8	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW77-(145.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/29/17
Date Received: 7/29/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/29/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/29/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/29/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/29/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	100	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW77-(155.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/29/17
Date Received: 7/29/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/29/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/29/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/29/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/29/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	99.9	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW77-(169.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/29/17
Date Received: 7/29/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/29/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/29/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/29/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/29/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	99.7	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW77-(177.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/29/17
Date Received: 7/29/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/29/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/29/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/29/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/29/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	99.1	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW77-(182.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/29/17
Date Received: 7/29/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/29/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/29/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/29/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/29/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW77-(195.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/29/17
Date Received: 7/29/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/29/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/29/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/29/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/29/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW77-(200.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/29/17
Date Received: 7/29/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/29/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/29/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/29/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/29/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	99.4	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW77-(215.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/29/17
Date Received: 7/29/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/29/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/29/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/29/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/29/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	100	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW77-(216.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/29/17
Date Received: 7/29/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/29/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/29/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/29/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/29/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	98.1	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW77-(224.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/29/17
Date Received: 7/29/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/29/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/29/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/29/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/29/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	98.4	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW77-(235.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/29/17
Date Received: 7/29/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/29/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/29/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/29/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/29/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	97.6	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW77-(246.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/29/17
Date Received: 7/30/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/30/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/30/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/30/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/30/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	99.2	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW77-(254.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/29/17
Date Received: 7/30/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/30/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/30/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/30/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/30/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW77-41
Client Project ID: E15.019.201
Sample Matrix: Water

Date Sampled: 7/28/17
Date Received: 7/28/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/L	1	7/28/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/L	1	7/28/2017	8260C	
Trichloroethene	52	1	ug/L	1	7/28/2017	8260C	
Tetrachloroethene	ND	1	ug/L	1	7/28/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: Refrigerator Blank
Client Project ID: E15.019.201
Sample Matrix: Water

Date Sampled: 7/29/17
Date Received: 7/29/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/L	1	7/29/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/L	1	7/29/2017	8260C	
Trichloroethene	ND	1	ug/L	1	7/29/2017	8260C	
Tetrachloroethene	ND	1	ug/L	1	7/29/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	98.4	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Soil Blank Results
Project ID: RMC007

Sample ID: Blank
Client Project ID: E15.019.201
Sample Matrix: Soil

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/28/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/28/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/28/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/28/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Soil Blank Results
Project ID: RMC007

Sample ID: Blank
Client Project ID: E15.019.201
Sample Matrix: Soil

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/29/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/29/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/29/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/29/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	99.1	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Soil Blank Results
Project ID: RMC007

Sample ID: Blank
Client Project ID: E15.019.201
Sample Matrix: Soil

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/30/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/30/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/30/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/30/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	104	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Laboratory Control Sample Results
Project ID: RMC007

Sample ID: LCS
Client Project ID: E15.019.201
Sample Matrix: Soil

EPA Method 8260C Date Analyzed:7/28/17

ANALYTE	LCS SPIKE	% RECOVERY	UNITS	QC Limits	Qualifier
trans-1,2-Dichloroethene	56.9	114	ug/Kg	70-130	
cis-1,2-Dichloroethene	47.0	94.0	ug/Kg	70-130	
Trichloroethene	46.4	92.8	ug/Kg	70-130	
Tetrachloroethene	46.9	93.8	ug/Kg	70-130	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	98.8	8260C	70-130

ChemSolutions LLC
Laboratory Control Sample Results
Project ID: RMC007

Sample ID: LCS
Client Project ID: E15.019.201
Sample Matrix: Soil

EPA Method 8260C Date Analyzed:7/29/17

ANALYTE	LCS SPIKE	% RECOVERY	UNITS	QC Limits	Qualifier
trans-1,2-Dichloroethene	54.1	108.2	ug/Kg	70-130	
cis-1,2-Dichloroethene	48.5	97.0	ug/Kg	70-130	
Trichloroethene	51.7	103.4	ug/Kg	70-130	
Tetrachloroethene	54.3	108.6	ug/Kg	70-130	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	96.1	8260C	70-130

ChemSolutions LLC
Matrix Spike Results
Project ID: RMC007

Client Sample ID: FEW4-MW77-(55.0)
Client Project ID: E15.019.201
Sample Matrix: Soil

EPA Method 8260C Date Analyzed: 7/28/17

ANALYTE	MATRIX SPIKE	% RECOVERY	UNITS	QC Limits	Qualifier
trans-1,2-Dichloroethene	49.2	98.4	ug/Kg	70-130	
cis-1,2-Dichloroethene	48.0	96.0	ug/Kg	70-130	
Trichloroethene	47.5	88.6	ug/Kg	70-130	
Tetrachloroethene	50.1	100	ug/Kg	70-130	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	99.4	8260C	70-130

EPA Method 8260C MATRIX SPIKE

ANALYTE	DUPLICATE	% RECOVERY	UNITS	RPD	QC Limits	RPD Limit	Qualifier
trans-1,2-Dichloroethene	58.1	116	ug/Kg	3.0	70-130	30	
cis-1,2-Dichloroethene	50.7	101	ug/Kg	6.1	70-130	30	
Trichloroethene	51.0	95.6	ug/Kg	7.1	70-130	30	
Tetrachloroethene	49.9	100	ug/Kg	0.4	70-130	30	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	95.8	8260C	70-130

ChemSolutions LLC
Matrix Spike Results
Project ID: RMC007

Client Sample ID: FEW4-MW77-(177.0)
Client Project ID: E15.019.201
Sample Matrix: Soil

EPA Method 8260C Date Analyzed: 7/29/17

ANALYTE	MATRIX SPIKE	% RECOVERY	UNITS	QC Limits	Qualifier
trans-1,2-Dichloroethene	44.8	89.6	ug/Kg	70-130	
cis-1,2-Dichloroethene	47.8	95.6	ug/Kg	70-130	
Trichloroethene	45.8	85.2	ug/Kg	70-130	
Tetrachloroethene	46.3	93	ug/Kg	70-130	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	98.9	8260C	70-130

EPA Method 8260C MATRIX SPIKE

ANALYTE	DUPLICATE	% RECOVERY	UNITS	RPD	QC Limits	RPD Limit	Qualifier
trans-1,2-Dichloroethene	44.6	89	ug/Kg	0.4	70-130	30	
cis-1,2-Dichloroethene	44.6	89	ug/Kg	12.9	70-130	30	
Trichloroethene	42.0	77.6	ug/Kg	8.7	70-130	30	
Tetrachloroethene	43.4	87	ug/Kg	6.5	70-130	30	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	98.9	8260C	70-130

ChemSolutions

7388 S. Revere Parkway, Suite 805
Centennial, CO 80112
303.771.5570

CASE NARRATIVE

ChemSolutions Project ID: RMC008
RMC Project ID: E15.019.201
August 16, 2017

This report contains the analytical results for the samples collected on 8/12-8/15/17. The samples were analyzed in our base laboratory in accordance with Standard Operating Procedure Atlas D Missile Site 4 On-Site Laboratory unless noted otherwise in this Case Narrative.

All sample aliquots were received on ice, in the proper containers, with the appropriate preservatives, and within method specified holding times. All samples were analyzed within the established holding times. All Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results.

The data contained in the following report have been reviewed and approved by:

John Graves
Laboratory Director
ChemSolutions LLC

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW80-(0.5)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/12/17
Date Received: 8/12/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/12/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/12/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/12/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/12/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	102	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW80-(2.5)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/12/17
Date Received: 8/12/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/12/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/12/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/12/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/12/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	103	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW80-(9.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/12/17
Date Received: 8/12/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/12/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/12/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/12/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/12/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	102	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW80-(65.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/12/17
Date Received: 8/13/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/13/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/13/2017	8260C	
Trichloroethene	1.4	1	ug/Kg	1	8/13/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/13/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW80-(74.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/13/17
Date Received: 8/13/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/13/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/13/2017	8260C	
Trichloroethene	7.1	1	ug/Kg	1	8/13/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/13/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW80-(85.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/13/17
Date Received: 8/13/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/13/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/13/2017	8260C	
Trichloroethene	31	1	ug/Kg	1	8/13/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/13/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	100	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW80-(86.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/13/17
Date Received: 8/13/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/13/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/13/2017	8260C	
Trichloroethene	29	1	ug/Kg	1	8/13/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/13/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	103	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW80-(95.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/13/17
Date Received: 8/13/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	50	ug/Kg	50	8/13/2017	8260C	
cis-1,2-Dichloroethene	ND	50	ug/Kg	50	8/13/2017	8260C	
Trichloroethene	1600	50	ug/Kg	50	8/13/2017	8260C	
Tetrachloroethene	ND	50	ug/Kg	50	8/13/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	106	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW80-(105.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/13/17
Date Received: 8/13/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/13/2017	8260C	
cis-1,2-Dichloroethene	1.7	1	ug/Kg	1	8/13/2017	8260C	
Trichloroethene	990	25	ug/Kg	1	8/13/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/13/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits	
Toluene-d8	98.3	8260C	70-130	1X Dilution
Toluene-d8	108	8260C	70-130	25X Dilution

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW80-(113.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/13/17
Date Received: 8/13/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	25	ug/Kg	25	8/13/2017	8260C	
cis-1,2-Dichloroethene	ND	25	ug/Kg	25	8/13/2017	8260C	
Trichloroethene	1100	25	ug/Kg	25	8/13/2017	8260C	
Tetrachloroethene	ND	25	ug/Kg	25	8/13/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	106	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW80-(125.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/13/17
Date Received: 8/13/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	25	ug/Kg	25	8/13/2017	8260C	
cis-1,2-Dichloroethene	ND	25	ug/Kg	25	8/13/2017	8260C	
Trichloroethene	8300	100	ug/Kg	100	8/13/2017	8260C	
Tetrachloroethene	ND	25	ug/Kg	25	8/13/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits	
Toluene-d8	104	8260C	70-130	25X Dilution
Toluene-d8	104	8260C	70-130	100X Dilution

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW80-(135.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/14/17
Date Received: 8/14/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	50	ug/Kg	50	8/14/2017	8260C	
cis-1,2-Dichloroethene	ND	50	ug/Kg	50	8/14/2017	8260C	
Trichloroethene	2700	50	ug/Kg	50	8/14/2017	8260C	
Tetrachloroethene	ND	50	ug/Kg	50	8/14/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	106	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW80-(145.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/14/17
Date Received: 8/14/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	50	ug/Kg	50	8/14/2017	8260C	
cis-1,2-Dichloroethene	ND	50	ug/Kg	50	8/14/2017	8260C	
Trichloroethene	2700	50	ug/Kg	50	8/14/2017	8260C	
Tetrachloroethene	ND	50	ug/Kg	50	8/14/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	106	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW80-(146.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/14/17
Date Received: 8/14/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	50	ug/Kg	50	8/14/2017	8260C	
cis-1,2-Dichloroethene	ND	50	ug/Kg	50	8/14/2017	8260C	
Trichloroethene	3000	50	ug/Kg	50	8/14/2017	8260C	
Tetrachloroethene	ND	50	ug/Kg	50	8/14/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	104	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW80-(155.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/14/17
Date Received: 8/14/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	50	ug/Kg	50	8/14/2017	8260C	
cis-1,2-Dichloroethene	ND	50	ug/Kg	50	8/14/2017	8260C	
Trichloroethene	1100	50	ug/Kg	50	8/14/2017	8260C	
Tetrachloroethene	ND	50	ug/Kg	50	8/14/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	104	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW80-(165.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/14/17
Date Received: 8/14/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	50	ug/Kg	50	8/14/2017	8260C	
cis-1,2-Dichloroethene	ND	50	ug/Kg	50	8/14/2017	8260C	
Trichloroethene	2200	50	ug/Kg	50	8/14/2017	8260C	
Tetrachloroethene	ND	50	ug/Kg	50	8/14/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	105	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW80-(175.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/14/17
Date Received: 8/14/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	50	ug/Kg	50	8/14/2017	8260C	
cis-1,2-Dichloroethene	ND	50	ug/Kg	50	8/14/2017	8260C	
Trichloroethene	2100	50	ug/Kg	50	8/14/2017	8260C	
Tetrachloroethene	ND	50	ug/Kg	50	8/14/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	104	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW80-(185.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/14/17
Date Received: 8/14/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	50	ug/Kg	50	8/14/2017	8260C	
cis-1,2-Dichloroethene	ND	50	ug/Kg	50	8/14/2017	8260C	
Trichloroethene	2600	50	ug/Kg	50	8/14/2017	8260C	
Tetrachloroethene	ND	50	ug/Kg	50	8/14/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	105	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW80-(197.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/14/17
Date Received: 8/14/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	50	ug/Kg	50	8/14/2017	8260C	
cis-1,2-Dichloroethene	ND	50	ug/Kg	50	8/14/2017	8260C	
Trichloroethene	230	50	ug/Kg	50	8/14/2017	8260C	
Tetrachloroethene	ND	50	ug/Kg	50	8/14/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	106	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW80-(205.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/14/17
Date Received: 8/14/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	100	ug/Kg	100	8/14/2017	8260C	
cis-1,2-Dichloroethene	ND	100	ug/Kg	100	8/14/2017	8260C	
Trichloroethene	520	100	ug/Kg	100	8/14/2017	8260C	
Tetrachloroethene	ND	100	ug/Kg	100	8/14/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	104	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW80-(215.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/14/17
Date Received: 8/14/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	50	ug/Kg	50	8/14/2017	8260C	
cis-1,2-Dichloroethene	ND	50	ug/Kg	50	8/14/2017	8260C	
Trichloroethene	280	50	ug/Kg	50	8/14/2017	8260C	
Tetrachloroethene	ND	50	ug/Kg	50	8/14/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	105	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW80-(225.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/15/17
Date Received: 8/15/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/15/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/15/2017	8260C	
Trichloroethene	6.7	1	ug/Kg	1	8/15/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/15/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW80-(233.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/15/17
Date Received: 8/15/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/15/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/15/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/15/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/15/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	103	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW80-(234.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/15/17
Date Received: 8/15/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/15/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/15/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/15/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/15/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	102	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW80-(245.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/15/17
Date Received: 8/15/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/15/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/15/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/15/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/15/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	105	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW80-(254.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/15/17
Date Received: 8/15/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/15/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/15/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/15/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/15/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	103	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW80-(257.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/15/17
Date Received: 8/15/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/15/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/15/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/15/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/15/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW80-(269.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/15/17
Date Received: 8/15/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/15/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/15/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/15/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/15/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW80-(273.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/15/17
Date Received: 8/15/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/15/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/15/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/15/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/15/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	103	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW80-(284.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/15/17
Date Received: 8/15/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/15/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/15/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/15/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/15/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	102	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW80-(294.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/15/17
Date Received: 8/15/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/15/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/15/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/15/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/15/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	103	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW80-(301.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/15/17
Date Received: 8/15/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/15/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/15/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/15/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/15/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	100	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: Refrigerator Blank
Client Project ID: E15.019.201
Sample Matrix: Water

Date Sampled: 8/12/17
Date Received: 8/12/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/L	1	8/12/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/L	1	8/12/2017	8260C	
Trichloroethene	ND	1	ug/L	1	8/12/2017	8260C	
Tetrachloroethene	ND	1	ug/L	1	8/12/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	102	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-IDW-INF
Client Project ID: E15.019.201
Sample Matrix: Water

Date Sampled: 8/12/17
Date Received: 8/12/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/L	1	8/12/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/L	1	8/12/2017	8260C	
Trichloroethene	ND	1	ug/L	1	8/12/2017	8260C	
Tetrachloroethene	ND	1	ug/L	1	8/12/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-IDW-EFF
Client Project ID: E15.019.201
Sample Matrix: Water

Date Sampled: 8/12/17
Date Received: 8/12/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/L	1	8/12/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/L	1	8/12/2017	8260C	
Trichloroethene	ND	1	ug/L	1	8/12/2017	8260C	
Tetrachloroethene	ND	1	ug/L	1	8/12/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW80-85
Client Project ID: E15.019.201
Sample Matrix: Water

Date Sampled: 8/13/17
Date Received: 8/13/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/L	1	8/13/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/L	1	8/13/2017	8260C	
Trichloroethene	100	1	ug/L	1	8/13/2017	8260C	
Tetrachloroethene	ND	1	ug/L	1	8/13/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	100	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: Refrigerator Blank
Client Project ID: E15.019.201
Sample Matrix: Water

Date Sampled: 8/13/17
Date Received: 8/13/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/L	1	8/13/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/L	1	8/13/2017	8260C	
Trichloroethene	ND	1	ug/L	1	8/13/2017	8260C	
Tetrachloroethene	ND	1	ug/L	1	8/13/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: Refrigerator Blank
Client Project ID: E15.019.201
Sample Matrix: Water

Date Sampled: 8/14/17
Date Received: 8/14/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/L	1	8/14/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/L	1	8/14/2017	8260C	
Trichloroethene	ND	1	ug/L	1	8/14/2017	8260C	
Tetrachloroethene	ND	1	ug/L	1	8/14/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: Refrigerator Blank
Client Project ID: E15.019.201
Sample Matrix: Water

Date Sampled: 8/15/17
Date Received: 8/15/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/L	1	8/15/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/L	1	8/15/2017	8260C	
Trichloroethene	ND	1	ug/L	1	8/15/2017	8260C	
Tetrachloroethene	ND	1	ug/L	1	8/15/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Soil Blank Results
Project ID: RMC008

Sample ID: Blank
Client Project ID: E15.019.201
Sample Matrix: Soil

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/12/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/12/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/12/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/12/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	100	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Soil Blank Results
Project ID: RMC008

Sample ID: Blank
Client Project ID: E15.019.201
Sample Matrix: Soil

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/13/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/13/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/13/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/13/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	103	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Soil Blank Results
Project ID: RMC008

Sample ID: Blank
Client Project ID: E15.019.201
Sample Matrix: Soil

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/14/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/14/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/14/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/14/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	103	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Soil Blank Results
Project ID: RMC008

Sample ID: Blank
Client Project ID: E15.019.201
Sample Matrix: Soil

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/15/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/15/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/15/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/15/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	103	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Laboratory Control Sample Results
Project ID: RMC008

Sample ID: LCS
Client Project ID: E15.019.201
Sample Matrix: Soil

EPA Method 8260C Date Analyzed: 8/12/17

ANALYTE	LCS SPIKE	% RECOVERY	UNITS	QC Limits	Qualifier
trans-1,2-Dichloroethene	48.4	96.8	ug/Kg	70-130	
cis-1,2-Dichloroethene	45.1	90.2	ug/Kg	70-130	
Trichloroethene	44.3	88.6	ug/Kg	70-130	
Tetrachloroethene	45.5	91.0	ug/Kg	70-130	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ChemSolutions LLC
Laboratory Control Sample Results
Project ID: RMC008

Sample ID: LCS
Client Project ID: E15.019.201
Sample Matrix: Soil

EPA Method 8260C Date Analyzed: 8/13/17

ANALYTE	LCS SPIKE	% RECOVERY	UNITS	QC Limits	Qualifier
trans-1,2-Dichloroethene	52.4	105	ug/Kg	70-130	
cis-1,2-Dichloroethene	44.4	88.8	ug/Kg	70-130	
Trichloroethene	43.1	86.2	ug/Kg	70-130	
Tetrachloroethene	43.4	86.8	ug/Kg	70-130	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	102	8260C	70-130

ChemSolutions LLC
Laboratory Control Sample Results
Project ID: RMC008

Sample ID: LCS
Client Project ID: E15.019.201
Sample Matrix: Soil

EPA Method 8260C Date Analyzed: 8/14/17

ANALYTE	LCS SPIKE	% RECOVERY	UNITS	QC Limits	Qualifier
trans-1,2-Dichloroethene	53.4	107	ug/Kg	70-130	
cis-1,2-Dichloroethene	46.6	93.2	ug/Kg	70-130	
Trichloroethene	45.3	90.6	ug/Kg	70-130	
Tetrachloroethene	45.8	91.6	ug/Kg	70-130	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	104	8260C	70-130

ChemSolutions LLC
Laboratory Control Sample Results
Project ID: RMC008

Sample ID: LCS
Client Project ID: E15.019.201
Sample Matrix: Soil

EPA Method 8260C Date Analyzed: 8/15/17

ANALYTE	LCS SPIKE	% RECOVERY	UNITS	QC Limits	Qualifier
trans-1,2-Dichloroethene	55.1	110	ug/Kg	70-130	
cis-1,2-Dichloroethene	50.8	102	ug/Kg	70-130	
Trichloroethene	50.6	101	ug/Kg	70-130	
Tetrachloroethene	50.4	101	ug/Kg	70-130	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	104	8260C	70-130

ChemSolutions LLC
Matrix Spike Results
Project ID: RMC008

Client Sample ID: FEW4-MW80-(9.0)
Client Project ID: E15.019.201
Sample Matrix: Soil

EPA Method 8260C Date Analyzed: 8/12/17

ANALYTE	MATRIX SPIKE	% RECOVERY	UNITS	QC Limits	Qualifier
trans-1,2-Dichloroethene	58.2	116	ug/Kg	70-130	
cis-1,2-Dichloroethene	51.0	102	ug/Kg	70-130	
Trichloroethene	47.3	94.6	ug/Kg	70-130	
Tetrachloroethene	49.4	98.8	ug/Kg	70-130	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

EPA Method 8260C MATRIX SPIKE

ANALYTE	DUPLICATE	% RECOVERY	UNITS	RPD	QC Limits	RPD Limit	Qualifier
trans-1,2-Dichloroethene	52.5	105	ug/Kg	10.3	70-130	30	
cis-1,2-Dichloroethene	49.6	99.2	ug/Kg	2.8	70-130	30	
Trichloroethene	47.5	95.0	ug/Kg	0.4	70-130	30	
Tetrachloroethene	45.9	91.8	ug/Kg	7.3	70-130	30	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	104	8260C	70-130

ChemSolutions LLC
Matrix Spike Results
Project ID: RMC008

Client Sample ID: FEW4-MW80-(74.0)
Client Project ID: E15.019.201
Sample Matrix: Soil

EPA Method 8260C Date Analyzed: 8/13/17

ANALYTE	MATRIX SPIKE	% RECOVERY	UNITS	QC Limits	Qualifier
trans-1,2-Dichloroethene	53.0	106	ug/Kg	70-130	
cis-1,2-Dichloroethene	45.3	90.6	ug/Kg	70-130	
Trichloroethene	52.4	90.6	ug/Kg	70-130	
Tetrachloroethene	44.2	88.4	ug/Kg	70-130	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	104	8260C	70-130

EPA Method 8260C MATRIX SPIKE

ANALYTE	DUPLICATE	% RECOVERY	UNITS	RPD	QC Limits	RPD Limit	Qualifier
trans-1,2-Dichloroethene	52.8	106	ug/Kg	0.4	70-130	30	
cis-1,2-Dichloroethene	44.4	88.8	ug/Kg	2.0	70-130	30	
Trichloroethene	54.3	94.4	ug/Kg	3.6	70-130	30	
Tetrachloroethene	44.1	88.2	ug/Kg	0.2	70-130	30	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	100	8260C	70-130

ChemSolutions LLC
Matrix Spike Results
Project ID: RMC008

Client Sample ID: FEW4-MW80-(165.0)
Client Project ID: E15.019.201
Sample Matrix: Soil

EPA Method 8260C Date Analyzed: 8/14/17

ANALYTE	MATRIX SPIKE	% RECOVERY	UNITS	QC Limits	Qualifier
trans-1,2-Dichloroethene	3060	122	ug/Kg	70-130	
cis-1,2-Dichloroethene	2760	110	ug/Kg	70-130	
Trichloroethene	5480	131	ug/Kg	70-130	J6
Tetrachloroethene	3000	120	ug/Kg	70-130	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	106	8260C	70-130

EPA Method 8260C MATRIX SPIKE

ANALYTE	DUPLICATE	% RECOVERY	UNITS	RPD	QC Limits	RPD Limit	Qualifier
trans-1,2-Dichloroethene	3340	134	ug/Kg	8.8	70-130	30	J6
cis-1,2-Dichloroethene	2750	110	ug/Kg	0.4	70-130	30	
Trichloroethene	5630	137	ug/Kg	2.7	70-130	30	J6
Tetrachloroethene	3000	120	ug/Kg	0.0	70-130	30	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	104	8260C	70-130

J6 = Spike recovery outside QC limits. Batch accepted based on LCS.

ChemSolutions LLC
Matrix Spike Results
Project ID: RMC008

Client Sample ID: FEW4-MW80-(225.0)
Client Project ID: E15.019.201
Sample Matrix: Soil

EPA Method 8260C Date Analyzed: 8/15/17

ANALYTE	MATRIX SPIKE	% RECOVERY	UNITS	QC Limits	Qualifier
trans-1,2-Dichloroethene	55.5	111	ug/Kg	70-130	
cis-1,2-Dichloroethene	49.0	98.0	ug/Kg	70-130	
Trichloroethene	50.0	86.6	ug/Kg	70-130	
Tetrachloroethene	47.0	94.0	ug/Kg	70-130	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	104	8260C	70-130

EPA Method 8260C MATRIX SPIKE

ANALYTE	DUPLICATE	% RECOVERY	UNITS	RPD	QC Limits	RPD Limit	Qualifier
trans-1,2-Dichloroethene	47.2	94.4	ug/Kg	16.2	70-130	30	
cis-1,2-Dichloroethene	48.7	97.4	ug/Kg	0.6	70-130	30	
Trichloroethene	57.1	101	ug/Kg	13.3	70-130	30	
Tetrachloroethene	48.6	97.2	ug/Kg	3.3	70-130	30	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ChemSolutions

7388 S. Revere Parkway, Suite 805
Centennial, CO 80112
303.771.5570

CASE NARRATIVE

ChemSolutions Project ID: RMC007
RMC Project ID: E15.019.201
July 29, 2017

This report contains the analytical results for the samples collected on 7/20-7/24/17. The samples were analyzed in our base laboratory in accordance with Standard Operating Procedure Atlas D Missile Site 4 On-Site Laboratory unless noted otherwise in this Case Narrative.

All sample aliquots were received on ice, in the proper containers, with the appropriate preservatives, and within method specified holding times. All samples were analyzed within the established holding times. All Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results.

The data contained in the following report have been reviewed and approved by:

John Graves
Laboratory Director
ChemSolutions LLC

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW81-(0.5)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/20/17
Date Received: 7/20/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/20/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/20/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/20/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/20/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	103	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW81-(2.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/20/17
Date Received: 7/20/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/20/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/20/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/20/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/20/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	99.2	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW81-(9.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/20/17
Date Received: 7/20/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/20/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/20/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/20/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/20/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	102	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW81-(20.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/20/17
Date Received: 7/20/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/20/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/20/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/20/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/20/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	99.7	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW81-(30.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/20/17
Date Received: 7/20/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/20/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/20/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/20/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/20/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	102	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW81-(40.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/21/17
Date Received: 7/21/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/21/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/21/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/21/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/21/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW81-(50.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/21/17
Date Received: 7/21/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/21/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/21/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/21/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/21/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	103	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW81-(60.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/21/17
Date Received: 7/21/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/21/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/21/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/21/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/21/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	102	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW81-(70.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/21/17
Date Received: 7/21/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/21/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/21/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/21/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/21/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	102	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW81-(80.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/21/17
Date Received: 7/21/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/21/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/21/2017	8260C	
Trichloroethene	1.5	1	ug/Kg	1	7/21/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/21/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	102	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW81-(90.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/21/17
Date Received: 7/21/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/21/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/21/2017	8260C	
Trichloroethene	0.68	1	ug/Kg	1	7/21/2017	8260C	J
Tetrachloroethene	ND	1	ug/Kg	1	7/21/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ND = Not detected at or above the reporting limit.
J=The compound was detected and verified by its' mass spectrum at a concentration less than the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW81-(91.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/21/17
Date Received: 7/21/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/21/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/21/2017	8260C	
Trichloroethene	1.1	1	ug/Kg	1	7/21/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/21/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW81-(100.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/21/17
Date Received: 7/21/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/21/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/21/2017	8260C	
Trichloroethene	32	1	ug/Kg	1	7/21/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/21/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	102	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW81-(110.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/21/17
Date Received: 7/22/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/22/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/22/2017	8260C	
Trichloroethene	16	1	ug/Kg	1	7/22/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/22/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	103	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW81-(120.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/21/17
Date Received: 7/22/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/22/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/22/2017	8260C	
Trichloroethene	25	1	ug/Kg	1	7/22/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/22/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	103	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW81-(130.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/21/17
Date Received: 7/22/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/22/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/22/2017	8260C	
Trichloroethene	14	1	ug/Kg	1	7/22/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/22/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	102	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW81-(140.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/22/17
Date Received: 7/22/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/22/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/22/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/22/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/22/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	99.6	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW81-(150.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/22/17
Date Received: 7/22/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/22/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/22/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/22/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/22/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW81-(160.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/22/17
Date Received: 7/22/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/22/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/22/2017	8260C	
Trichloroethene	0.85	1	ug/Kg	1	7/22/2017	8260C	J
Tetrachloroethene	ND	1	ug/Kg	1	7/22/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	102	8260C	70-130

ND = Not detected at or above the reporting limit.
J=The compound was detected and verified by its' mass spectrum at a concentration less than the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW81-(161.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/22/17
Date Received: 7/22/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/22/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/22/2017	8260C	
Trichloroethene	1.2	1	ug/Kg	1	7/22/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/22/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	102	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW81-(170.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/22/17
Date Received: 7/22/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/22/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/22/2017	8260C	
Trichloroethene	8.5	1	ug/Kg	1	7/22/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/22/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	105	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW81-(180.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/22/17
Date Received: 7/22/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/22/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/22/2017	8260C	
Trichloroethene	36	1	ug/Kg	1	7/22/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/22/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW81-(190.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/22/17
Date Received: 7/22/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/22/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/22/2017	8260C	
Trichloroethene	82	1	ug/Kg	1	7/22/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/22/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	104	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW81-(200.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/22/17
Date Received: 7/22/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/22/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/22/2017	8260C	
Trichloroethene	110	1	ug/Kg	1	7/22/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/22/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	103	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW81-(210.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/22/17
Date Received: 7/22/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/22/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/22/2017	8260C	
Trichloroethene	6.4	1	ug/Kg	1	7/22/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/22/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW81-(220.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/22/17
Date Received: 7/22/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/22/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/22/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/22/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/22/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	99.5	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW81-(232.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/23/17
Date Received: 7/23/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/23/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/23/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/23/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/23/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW81-(240.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/23/17
Date Received: 7/23/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/23/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/23/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/23/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/23/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	100	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW81-(250.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/23/17
Date Received: 7/23/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/23/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/23/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/23/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/23/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	102	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW81-(252.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/23/17
Date Received: 7/23/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/23/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/23/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/23/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/23/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	98.5	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW81-(260.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/23/17
Date Received: 7/23/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/23/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/23/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/23/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/23/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	102	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW81-(269.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/23/17
Date Received: 7/24/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/24/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/24/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/24/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/24/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	100	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW81-(300.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/24/17
Date Received: 7/24/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/24/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/24/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/24/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/24/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW81-(68)
Client Project ID: E15.019.201
Sample Matrix: Water

Date Sampled: 7/21/17
Date Received: 7/21/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/L	1	7/21/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/L	1	7/21/2017	8260C	
Trichloroethene	2.0	1	ug/L	1	7/21/2017	8260C	
Tetrachloroethene	ND	1	ug/L	1	7/21/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	102	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: Refrigerator Blank
Client Project ID: E15.019.201
Sample Matrix: Water

Date Sampled: 7/21/17
Date Received: 7/21/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/L	1	7/21/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/L	1	7/21/2017	8260C	
Trichloroethene	ND	1	ug/L	1	7/21/2017	8260C	
Tetrachloroethene	ND	1	ug/L	1	7/21/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	104	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: Refrigerator Blank
Client Project ID: E15.019.201
Sample Matrix: Water

Date Sampled: 7/22/17
Date Received: 7/22/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/L	1	7/22/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/L	1	7/22/2017	8260C	
Trichloroethene	ND	1	ug/L	1	7/22/2017	8260C	
Tetrachloroethene	ND	1	ug/L	1	7/22/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: Refrigerator Blank
Client Project ID: E15.019.201
Sample Matrix: Water

Date Sampled: 7/23/17
Date Received: 7/23/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/L	1	7/23/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/L	1	7/23/2017	8260C	
Trichloroethene	ND	1	ug/L	1	7/23/2017	8260C	
Tetrachloroethene	ND	1	ug/L	1	7/23/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: Refrigerator Blank
Client Project ID: E15.019.201
Sample Matrix: Water

Date Sampled: 7/24/17
Date Received: 7/24/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/L	1	7/24/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/L	1	7/24/2017	8260C	
Trichloroethene	ND	1	ug/L	1	7/24/2017	8260C	
Tetrachloroethene	ND	1	ug/L	1	7/24/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	102	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Soil Blank Results
Project ID: RMC007

Sample ID: Blank
Client Project ID: E15.019.201
Sample Matrix: Soil

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/20/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/20/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/20/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/20/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	103	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Soil Blank Results
Project ID: RMC007

Sample ID: Blank
Client Project ID: E15.019.201
Sample Matrix: Soil

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/21/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/21/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/21/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/21/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	98.9	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Soil Blank Results
Project ID: RMC007

Sample ID: Blank
Client Project ID: E15.019.201
Sample Matrix: Soil

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/22/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/22/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/22/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/22/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	102	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Soil Blank Results
Project ID: RMC007

Sample ID: Blank
Client Project ID: E15.019.201
Sample Matrix: Soil

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/23/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/23/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/23/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/23/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Soil Blank Results
Project ID: RMC007

Sample ID: Blank
Client Project ID: E15.019.201
Sample Matrix: Soil

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/24/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/24/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/24/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/24/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	102	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Laboratory Control Sample Results
Project ID: RMC007

Sample ID: LCS
Client Project ID: E15.019.201
Sample Matrix: Soil

EPA Method 8260C Date Analyzed:7/20/17

ANALYTE	LCS SPIKE	% RECOVERY	UNITS	QC Limits	Qualifier
trans-1,2-Dichloroethene	38.1	76.2	ug/Kg	70-130	
cis-1,2-Dichloroethene	36.6	73.2	ug/Kg	70-130	
Trichloroethene	37.8	75.6	ug/Kg	70-130	
Tetrachloroethene	37.3	74.6	ug/Kg	70-130	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ChemSolutions LLC
Laboratory Control Sample Results
Project ID: RMC007

Sample ID: LCS
Client Project ID: E15.019.201
Sample Matrix: Soil

EPA Method 8260C Date Analyzed:7/21/17

ANALYTE	LCS SPIKE	% RECOVERY	UNITS	QC Limits	Qualifier
trans-1,2-Dichloroethene	58.5	117.0	ug/Kg	70-130	
cis-1,2-Dichloroethene	46.1	92.2	ug/Kg	70-130	
Trichloroethene	49.4	98.8	ug/Kg	70-130	
Tetrachloroethene	48.6	97.2	ug/Kg	70-130	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	102	8260C	70-130

ChemSolutions LLC
Laboratory Control Sample Results
Project ID: RMC007

Sample ID: LCS
Client Project ID: E15.019.201
Sample Matrix: Soil

EPA Method 8260C Date Analyzed:7/22/17

ANALYTE	LCS SPIKE	% RECOVERY	UNITS	QC Limits	Qualifier
trans-1,2-Dichloroethene	40.3	80.6	ug/Kg	70-130	
cis-1,2-Dichloroethene	41.1	82.2	ug/Kg	70-130	
Trichloroethene	42.0	84.0	ug/Kg	70-130	
Tetrachloroethene	43.0	86.0	ug/Kg	70-130	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ChemSolutions LLC
Laboratory Control Sample Results
Project ID: RMC007

Sample ID: LCS
Client Project ID: E15.019.201
Sample Matrix: Soil

EPA Method 8260C Date Analyzed:7/23/17

ANALYTE	LCS SPIKE	% RECOVERY	UNITS	QC Limits	Qualifier
trans-1,2-Dichloroethene	55.0	110.0	ug/Kg	70-130	
cis-1,2-Dichloroethene	41.2	82.4	ug/Kg	70-130	
Trichloroethene	41.1	82.2	ug/Kg	70-130	
Tetrachloroethene	38.4	76.8	ug/Kg	70-130	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	102	8260C	70-130

ChemSolutions LLC
Laboratory Control Sample Results
Project ID: RMC007

Sample ID: LCS
Client Project ID: E15.019.201
Sample Matrix: Soil

EPA Method 8260C Date Analyzed:7/24/17

ANALYTE	LCS SPIKE	% RECOVERY	UNITS	QC Limits	Qualifier
trans-1,2-Dichloroethene	56.8	113.6	ug/Kg	70-130	
cis-1,2-Dichloroethene	43.8	87.6	ug/Kg	70-130	
Trichloroethene	47.2	94.4	ug/Kg	70-130	
Tetrachloroethene	45.3	90.6	ug/Kg	70-130	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	100	8260C	70-130

ChemSolutions LLC
Matrix Spike Results
Project ID: RMC007

Client Sample ID: FEW4-MW81-(30.0)
Client Project ID: E15.019.201
Sample Matrix: Soil

EPA Method 8260C Date Analyzed: 7/20/17

ANALYTE	MATRIX SPIKE	% RECOVERY	UNITS	QC Limits	Qualifier
trans-1,2-Dichloroethene	43.3	86.6	ug/Kg	70-130	
cis-1,2-Dichloroethene	44.6	89.2	ug/Kg	70-130	
Trichloroethene	43.0	86.0	ug/Kg	70-130	
Tetrachloroethene	40.7	81.4	ug/Kg	70-130	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	104	8260C	70-130

EPA Method 8260C MATRIX SPIKE

ANALYTE	DUPLICATE	% RECOVERY	UNITS	RPD	QC Limits	RPD Limit	Qualifier
trans-1,2-Dichloroethene	39.5	79.0	ug/Kg	9.2	70-130	30	
cis-1,2-Dichloroethene	40.6	81.2	ug/Kg	9.4	70-130	30	
Trichloroethene	40.6	81.2	ug/Kg	5.7	70-130	30	
Tetrachloroethene	36.1	72.2	ug/Kg	12.0	70-130	30	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ChemSolutions LLC
Matrix Spike Results
Project ID: RMC007

Client Sample ID: FEW4-MW81-(70.0)
Client Project ID: E15.019.201
Sample Matrix: Soil

EPA Method 8260C Date Analyzed: 7/21/17

ANALYTE	MATRIX SPIKE	% RECOVERY	UNITS	QC Limits	Qualifier
trans-1,2-Dichloroethene	45.0	90.0	ug/Kg	70-130	
cis-1,2-Dichloroethene	43.2	86.4	ug/Kg	70-130	
Trichloroethene	42.7	85.4	ug/Kg	70-130	
Tetrachloroethene	40.0	80.0	ug/Kg	70-130	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	103	8260C	70-130

EPA Method 8260C MATRIX SPIKE

ANALYTE	DUPLICATE	% RECOVERY	UNITS	RPD	QC Limits	RPD Limit	Qualifier
trans-1,2-Dichloroethene	46.8	93.6	ug/Kg	3.9	70-130	30	
cis-1,2-Dichloroethene	43.7	87.4	ug/Kg	1.2	70-130	30	
Trichloroethene	44.1	88.2	ug/Kg	3.2	70-130	30	
Tetrachloroethene	41.4	82.8	ug/Kg	3.4	70-130	30	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	102	8260C	70-130

ChemSolutions LLC
Matrix Spike Results
Project ID: RMC007

Client Sample ID: FEW4-MW81-(140.0)
Client Project ID: E15.019.201
Sample Matrix: Soil

EPA Method 8260C Date Analyzed: 7/22/17

ANALYTE	MATRIX SPIKE	% RECOVERY	UNITS	QC Limits	Qualifier
trans-1,2-Dichloroethene	38.2	76.4	ug/Kg	70-130	
cis-1,2-Dichloroethene	36.2	72.4	ug/Kg	70-130	
Trichloroethene	38.7	77.4	ug/Kg	70-130	
Tetrachloroethene	39.0	78.0	ug/Kg	70-130	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	100	8260C	70-130

EPA Method 8260C MATRIX SPIKE

ANALYTE	DUPLICATE	% RECOVERY	UNITS	RPD	QC Limits	RPD Limit	Qualifier
trans-1,2-Dichloroethene	55.2	110	ug/Kg	36.4	70-130	30	J3
cis-1,2-Dichloroethene	48.0	96.0	ug/Kg	28.0	70-130	30	
Trichloroethene	51.5	103	ug/Kg	28.4	70-130	30	
Tetrachloroethene	50.7	101	ug/Kg	26.1	70-130	30	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	102	8260C	70-130

J3=Exceeds QC range for precision.

ChemSolutions LLC
Matrix Spike Results
Project ID: RMC007

Client Sample ID: FEW4-MW81-(300.0)
Client Project ID: E15.019.201
Sample Matrix: Soil

EPA Method 8260C Date Analyzed: 7/24/17

ANALYTE	MATRIX SPIKE	% RECOVERY	UNITS	QC Limits	Qualifier
trans-1,2-Dichloroethene	64.2	128	ug/Kg	70-130	
cis-1,2-Dichloroethene	53.4	107	ug/Kg	70-130	
Trichloroethene	56.0	112	ug/Kg	70-130	
Tetrachloroethene	51.5	103	ug/Kg	70-130	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	104	8260C	70-130

EPA Method 8260C MATRIX SPIKE

ANALYTE	DUPLICATE	% RECOVERY	UNITS	RPD	QC Limits	RPD Limit	Qualifier
trans-1,2-Dichloroethene	67.6	135	ug/Kg	5.2	70-130	30	J2
cis-1,2-Dichloroethene	56.7	113	ug/Kg	6.0	70-130	30	
Trichloroethene	61.2	122	ug/Kg	8.9	70-130	30	
Tetrachloroethene	55.6	111	ug/Kg	7.7	70-130	30	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	93.6	8260C	70-130

J2=Exceeds QC limits for accuracy.

ChemSolutions

7388 S. Revere Parkway, Suite 805
Centennial, CO 80112
303.771.5570

CASE NARRATIVE

ChemSolutions Project ID: RMC008
RMC Project ID: E15.019.201
August 20, 2017

This report contains the analytical results for the samples collected on 8/17-8/19/17. The samples were analyzed in our base laboratory in accordance with Standard Operating Procedure Atlas D Missile Site 4 On-Site Laboratory unless noted otherwise in this Case Narrative.

All sample aliquots were received on ice, in the proper containers, with the appropriate preservatives, and within method specified holding times. All samples were analyzed within the established holding times. All Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results.

The data contained in the following report have been reviewed and approved by:

John Graves
Laboratory Director
ChemSolutions LLC

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW82-(0.5)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/17/17
Date Received: 8/17/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/17/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/17/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/17/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/17/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	99.7	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW82-(2.5)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/17/17
Date Received: 8/17/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/17/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/17/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/17/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/17/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	100	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW82-(9.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/17/17
Date Received: 8/17/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/17/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/17/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/17/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/17/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	98.5	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW82-(75.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/17/17
Date Received: 8/17/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/18/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/18/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/18/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/18/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	100	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW82-(76.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/17/17
Date Received: 8/17/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/18/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/18/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/18/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/18/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	97.8	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW82-(83.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/17/17
Date Received: 8/17/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/18/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/18/2017	8260C	
Trichloroethene	23	1	ug/Kg	1	8/18/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/18/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	102	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW82-(95.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/18/17
Date Received: 8/18/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/18/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/18/2017	8260C	
Trichloroethene	30	1	ug/Kg	1	8/18/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/18/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	98.8	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW82-(105.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/18/17
Date Received: 8/18/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/18/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/18/2017	8260C	
Trichloroethene	28	1	ug/Kg	1	8/18/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/18/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	98.5	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW82-(115.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/18/17
Date Received: 8/18/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/18/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/18/2017	8260C	
Trichloroethene	77	1	ug/Kg	1	8/18/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/18/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	99.0	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW82-(125.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/18/17
Date Received: 8/18/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/18/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/18/2017	8260C	
Trichloroethene	70	1	ug/Kg	1	8/18/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/18/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	98.9	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW82-(126.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/18/17
Date Received: 8/18/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/18/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/18/2017	8260C	
Trichloroethene	66	1	ug/Kg	1	8/18/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/18/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	103	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW82-(135.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/18/17
Date Received: 8/18/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/18/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/18/2017	8260C	
Trichloroethene	82	1	ug/Kg	1	8/18/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/18/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	99.4	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW82-(145.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/18/17
Date Received: 8/18/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/18/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/18/2017	8260C	
Trichloroethene	4.9	1	ug/Kg	1	8/18/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/18/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	99.5	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW82-(154.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/18/17
Date Received: 8/18/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/18/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/18/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/18/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/18/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	98.2	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW82-(164.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/18/17
Date Received: 8/18/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/18/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/18/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/18/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/18/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW82-(175.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/18/17
Date Received: 8/18/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/18/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/18/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/18/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/18/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW82-(185.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/18/17
Date Received: 8/18/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/18/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/18/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/18/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/18/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	99.7	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW82-(195.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/18/17
Date Received: 8/18/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/18/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/18/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/18/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/18/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	99.4	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW82-(206.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/18/17
Date Received: 8/18/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/18/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/18/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/18/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/18/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	100	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW82-(215.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/18/17
Date Received: 8/18/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/18/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/18/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/18/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/18/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	99.7	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW82-(216.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/18/17
Date Received: 8/18/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/18/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/18/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/18/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/18/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW82-(224.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/18/17
Date Received: 8/18/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/18/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/18/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/18/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/18/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	99.4	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW82-(235.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/18/17
Date Received: 8/18/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/18/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/18/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/18/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/18/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW82-(244.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/19/17
Date Received: 8/19/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/19/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/19/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/19/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/19/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	98.1	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW82-(252.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/19/17
Date Received: 8/19/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/19/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/19/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/19/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/19/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW82-(264.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/19/17
Date Received: 8/19/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/19/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/19/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/19/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/19/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	100	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW82-(275.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/19/17
Date Received: 8/19/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/19/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/19/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/19/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/19/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	100	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW82-(285.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/19/17
Date Received: 8/19/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/19/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/19/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/19/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/19/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	102	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW82-(299.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/19/17
Date Received: 8/19/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/19/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/19/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/19/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/19/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	102	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW82-(306.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/19/17
Date Received: 8/19/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/19/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/19/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/19/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/19/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	99.5	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: Refrigerator Blank
Client Project ID: E15.019.201
Sample Matrix: Water

Date Sampled: 8/17/17
Date Received: 8/17/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/L	1	8/17/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/L	1	8/17/2017	8260C	
Trichloroethene	ND	1	ug/L	1	8/17/2017	8260C	
Tetrachloroethene	ND	1	ug/L	1	8/17/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: Refrigerator Blank
Client Project ID: E15.019.201
Sample Matrix: Water

Date Sampled: 8/18/17
Date Received: 8/18/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/L	1	8/18/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/L	1	8/18/2017	8260C	
Trichloroethene	ND	1	ug/L	1	8/18/2017	8260C	
Tetrachloroethene	ND	1	ug/L	1	8/18/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	99.4	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW82-74
Client Project ID: E15.019.201
Sample Matrix: Water

Date Sampled: 8/18/17
Date Received: 8/18/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/L	1	8/18/2017	8260C	
cis-1,2-Dichloroethene	5.3	1	ug/L	1	8/18/2017	8260C	
Trichloroethene	540	5	ug/L	5	8/18/2017	8260C	
Tetrachloroethene	ND	1	ug/L	1	8/18/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits	
Toluene-d8	98.6	8260C	70-130	1X Dilution
Toluene-d8	97.5	8260C	70-130	5X Dilution

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: MW82 Recirculating Fluid
Client Project ID: E15.019.201
Sample Matrix: Water

Date Sampled: 8/18/17
Date Received: 8/18/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/L	1	8/18/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/L	1	8/18/2017	8260C	
Trichloroethene	ND	1	ug/L	1	8/18/2017	8260C	
Tetrachloroethene	ND	1	ug/L	1	8/18/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	106	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: Refrigerator Blank
Client Project ID: E15.019.201
Sample Matrix: Water

Date Sampled: 8/19/17
Date Received: 8/19/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/L	1	8/19/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/L	1	8/19/2017	8260C	
Trichloroethene	ND	1	ug/L	1	8/19/2017	8260C	
Tetrachloroethene	ND	1	ug/L	1	8/19/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	100	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Soil Blank Results
Project ID: RMC008

Sample ID: Blank
Client Project ID: E15.019.201
Sample Matrix: Soil

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/17/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/17/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/17/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/17/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	99.2	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Soil Blank Results
Project ID: RMC008

Sample ID: Blank
Client Project ID: E15.019.201
Sample Matrix: Soil

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/18/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/18/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/18/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/18/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	99.4	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Soil Blank Results
Project ID: RMC008

Sample ID: Blank
Client Project ID: E15.019.201
Sample Matrix: Soil

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/19/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/19/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/19/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/19/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	100	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Laboratory Control Sample Results
Project ID: RMC008

Sample ID: LCS
Client Project ID: E15.019.201
Sample Matrix: Soil

EPA Method 8260C Date Analyzed: 8/17/17

ANALYTE	LCS SPIKE	% RECOVERY	UNITS	QC Limits	Qualifier
trans-1,2-Dichloroethene	39.4	78.8	ug/Kg	70-130	
cis-1,2-Dichloroethene	40.6	81.2	ug/Kg	70-130	
Trichloroethene	39.3	78.6	ug/Kg	70-130	
Tetrachloroethene	41.3	82.6	ug/Kg	70-130	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	98.8	8260C	70-130

ChemSolutions LLC
Laboratory Control Sample Results
Project ID: RMC008

Sample ID: LCS
Client Project ID: E15.019.201
Sample Matrix: Soil

EPA Method 8260C Date Analyzed: 8/18/17

ANALYTE	LCS SPIKE	% RECOVERY	UNITS	QC Limits	Qualifier
trans-1,2-Dichloroethene	45.3	91	ug/Kg	70-130	
cis-1,2-Dichloroethene	46.1	92.2	ug/Kg	70-130	
Trichloroethene	46.7	93.4	ug/Kg	70-130	
Tetrachloroethene	47.7	95.4	ug/Kg	70-130	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ChemSolutions LLC
Laboratory Control Sample Results
Project ID: RMC008

Sample ID: LCS
Client Project ID: E15.019.201
Sample Matrix: Soil

EPA Method 8260C Date Analyzed: 8/19/17

ANALYTE	LCS SPIKE	% RECOVERY	UNITS	QC Limits	Qualifier
trans-1,2-Dichloroethene	51.9	104	ug/Kg	70-130	
cis-1,2-Dichloroethene	48.7	97.4	ug/Kg	70-130	
Trichloroethene	49.4	98.8	ug/Kg	70-130	
Tetrachloroethene	49.4	98.8	ug/Kg	70-130	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	98.7	8260C	70-130

ChemSolutions LLC
Matrix Spike Results
Project ID: RMC008

Client Sample ID: FEW4-MW82-(9.0)
Client Project ID: E15.019.201
Sample Matrix: Soil

EPA Method 8260C Date Analyzed: 8/17/17

ANALYTE	MATRIX SPIKE	% RECOVERY	UNITS	QC Limits	Qualifier
trans-1,2-Dichloroethene	60.1	120	ug/Kg	70-130	
cis-1,2-Dichloroethene	51.2	102	ug/Kg	70-130	
Trichloroethene	53.6	107	ug/Kg	70-130	
Tetrachloroethene	53.9	108	ug/Kg	70-130	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	97.4	8260C	70-130

EPA Method 8260C MATRIX SPIKE

ANALYTE	DUPLICATE	% RECOVERY	UNITS	RPD	QC Limits	RPD Limit	Qualifier
trans-1,2-Dichloroethene	46.6	93.2	ug/Kg	25.3	70-130	30	
cis-1,2-Dichloroethene	43.6	87.2	ug/Kg	16.0	70-130	30	
Trichloroethene	43.3	86.6	ug/Kg	21.3	70-130	30	
Tetrachloroethene	42.5	85.0	ug/Kg	23.7	70-130	30	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	98.6	8260C	70-130

ChemSolutions LLC
Matrix Spike Results
Project ID: RMC008

Client Sample ID: FEW4-MW82-(95.0)
Client Project ID: E15.019.201
Sample Matrix: Soil

EPA Method 8260C Date Analyzed: 8/18/17

ANALYTE	MATRIX SPIKE	% RECOVERY	UNITS	QC Limits	Qualifier
trans-1,2-Dichloroethene	53.5	107	ug/Kg	70-130	
cis-1,2-Dichloroethene	47.5	95.0	ug/Kg	70-130	
Trichloroethene	73.1	86.2	ug/Kg	70-130	
Tetrachloroethene	47.5	95.0	ug/Kg	70-130	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	98.2	8260C	70-130

EPA Method 8260C MATRIX SPIKE

ANALYTE	DUPLICATE	% RECOVERY	UNITS	RPD	QC Limits	RPD Limit	Qualifier
trans-1,2-Dichloroethene	56.0	112	ug/Kg	4.6	70-130	30	
cis-1,2-Dichloroethene	51.0	102	ug/Kg	7.1	70-130	30	
Trichloroethene	71.3	82.6	ug/Kg	2.5	70-130	30	
Tetrachloroethene	50.9	102	ug/Kg	6.9	70-130	30	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	98.4	8260C	70-130

ChemSolutions LLC
Matrix Spike Results
Project ID: RMC008

Client Sample ID: FEW4-MW82-(252.0)
Client Project ID: E15.019.201
Sample Matrix: Soil

EPA Method 8260C Date Analyzed: 8/19/17

ANALYTE	MATRIX SPIKE	% RECOVERY	UNITS	QC Limits	Qualifier
trans-1,2-Dichloroethene	47.1	94.2	ug/Kg	70-130	
cis-1,2-Dichloroethene	40.5	81.0	ug/Kg	70-130	
Trichloroethene	41.7	83.4	ug/Kg	70-130	
Tetrachloroethene	40.6	81.2	ug/Kg	70-130	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	100	8260C	70-130

EPA Method 8260C MATRIX SPIKE

ANALYTE	DUPLICATE	% RECOVERY	UNITS	RPD	QC Limits	RPD Limit	Qualifier
trans-1,2-Dichloroethene	52.5	105.0	ug/Kg	10.8	70-130	30	
cis-1,2-Dichloroethene	48.1	96.2	ug/Kg	17.2	70-130	30	
Trichloroethene	49.0	98.0	ug/Kg	16.1	70-130	30	
Tetrachloroethene	47.4	94.8	ug/Kg	15.5	70-130	30	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ChemSolutions

7388 S. Revere Parkway, Suite 805
Centennial, CO 80112
303.771.5570

CASE NARRATIVE

ChemSolutions Project ID: RMC007
RMC Project ID: E15.019.201
July 29, 2017

This report contains the analytical results for the samples collected on 7/25-7/28/17. The samples were analyzed in our base laboratory in accordance with Standard Operating Procedure Atlas D Missile Site 4 On-Site Laboratory unless noted otherwise in this Case Narrative.

All sample aliquots were received on ice, in the proper containers, with the appropriate preservatives, and within method specified holding times. All samples were analyzed within the established holding times. All Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results.

The data contained in the following report have been reviewed and approved by:

John Graves
Laboratory Director
ChemSolutions LLC

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW83-(0.5)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/25/17
Date Received: 7/25/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/25/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/25/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/25/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/25/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	99.5	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW83-(2.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/25/17
Date Received: 7/25/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/25/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/25/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/25/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/25/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	99.2	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW83-(9.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/25/17
Date Received: 7/25/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/25/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/25/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/25/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/25/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	97.6	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW83-(75.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/26/17
Date Received: 7/26/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/26/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/26/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/26/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/26/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	98.2	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW83-(85.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/26/17
Date Received: 7/26/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/26/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/26/2017	8260C	
Trichloroethene	7.3	1	ug/Kg	1	7/26/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/26/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	97.5	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW83-(95.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/26/17
Date Received: 7/26/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/26/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/26/2017	8260C	
Trichloroethene	53	1	ug/Kg	1	7/26/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/26/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	98.4	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW83-(105.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/26/17
Date Received: 7/26/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/26/2017	8260C	
cis-1,2-Dichloroethene	1.7	1	ug/Kg	1	7/26/2017	8260C	
Trichloroethene	470	20	ug/Kg	20	7/26/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/26/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits	
Toluene-d8	98.5	8260C	70-130	1X Dilution
Toluene-d8	105	8260C	70-130	20X Dilution

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW83-(106.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/26/17
Date Received: 7/26/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/26/2017	8260C	
cis-1,2-Dichloroethene	1.5	1	ug/Kg	1	7/26/2017	8260C	
Trichloroethene	350	20	ug/Kg	20	7/27/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/26/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits	
Toluene-d8	95.9	8260C	70-130	1X Dilution
Toluene-d8	103	8260C	70-130	20X Dilution

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW83-(115.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/26/17
Date Received: 7/26/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	20	ug/Kg	20	7/26/2017	8260C	
cis-1,2-Dichloroethene	ND	20	ug/Kg	20	7/26/2017	8260C	
Trichloroethene	550	20	ug/Kg	20	7/26/2017	8260C	
Tetrachloroethene	ND	20	ug/Kg	20	7/26/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	103	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW83-(124.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/26/17
Date Received: 7/26/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	25	ug/Kg	25	7/26/2017	8260C	
cis-1,2-Dichloroethene	ND	25	ug/Kg	25	7/26/2017	8260C	
Trichloroethene	400	25	ug/Kg	25	7/26/2017	8260C	
Tetrachloroethene	ND	25	ug/Kg	25	7/26/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	102	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW83-(133.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/26/17
Date Received: 7/27/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	100	ug/Kg	100	7/27/2017	8260C	
cis-1,2-Dichloroethene	ND	100	ug/Kg	100	7/27/2017	8260C	
Trichloroethene	330	100	ug/Kg	100	7/27/2017	8260C	
Tetrachloroethene	ND	100	ug/Kg	100	7/27/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	100	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW83-(145.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/26/17
Date Received: 7/27/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	100	ug/Kg	100	7/27/2017	8260C	
cis-1,2-Dichloroethene	ND	100	ug/Kg	100	7/27/2017	8260C	
Trichloroethene	180	100	ug/Kg	100	7/27/2017	8260C	
Tetrachloroethene	ND	100	ug/Kg	100	7/27/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	102	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW83-(149.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/27/17
Date Received: 7/27/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	25	ug/Kg	25	7/27/2017	8260C	
cis-1,2-Dichloroethene	ND	25	ug/Kg	25	7/27/2017	8260C	
Trichloroethene	280	25	ug/Kg	25	7/27/2017	8260C	
Tetrachloroethene	ND	25	ug/Kg	25	7/27/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	103	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW83-(157.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/27/17
Date Received: 7/27/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/27/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/27/2017	8260C	
Trichloroethene	17	1	ug/Kg	1	7/27/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/27/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	99.0	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW83-(169.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/27/17
Date Received: 7/27/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/27/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/27/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/27/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/27/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	99.3	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW83-(178.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/27/17
Date Received: 7/27/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/27/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/27/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/27/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/27/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	97.1	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW83-(185.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/27/17
Date Received: 7/27/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/27/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/27/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/27/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/27/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	98.0	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW83-(193.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/27/17
Date Received: 7/27/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/27/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/27/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/27/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/27/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	99.6	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW83-(204.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/27/17
Date Received: 7/27/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/27/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/27/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/27/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/27/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	99.4	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW83-(212.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/27/17
Date Received: 7/27/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/27/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/27/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/27/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/27/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	98.3	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW83-(213.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/27/17
Date Received: 7/27/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/27/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/27/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/27/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/27/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	98.3	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW83-(225.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/27/17
Date Received: 7/27/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/27/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/27/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/27/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/27/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	100	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW83-(239.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/27/17
Date Received: 7/27/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/27/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/27/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/27/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/27/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	99.7	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW83-(244.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/27/17
Date Received: 7/27/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/28/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/28/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/28/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/28/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	98.6	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW83-(255.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/27/17
Date Received: 7/27/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/28/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/28/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/28/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/28/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	100	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW83-(265.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/28/17
Date Received: 7/28/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/28/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/28/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/28/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/28/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	102	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW83-(272.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/28/17
Date Received: 7/29/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/29/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/29/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/29/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/29/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	100	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW83-79
Client Project ID: E15.019.201
Sample Matrix: Water

Date Sampled: 7/26/17
Date Received: 7/26/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/L	1	7/26/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/L	1	7/26/2017	8260C	
Trichloroethene	30	1	ug/L	1	7/26/2017	8260C	
Tetrachloroethene	ND	1	ug/L	1	7/26/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	99.5	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: Refrigerator Blank
Client Project ID: E15.019.201
Sample Matrix: Water

Date Sampled: 7/25/17
Date Received: 7/25/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/L	1	7/25/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/L	1	7/25/2017	8260C	
Trichloroethene	ND	1	ug/L	1	7/25/2017	8260C	
Tetrachloroethene	ND	1	ug/L	1	7/25/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	100	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: Refrigerator Blank
Client Project ID: E15.019.201
Sample Matrix: Water

Date Sampled: 7/26/17
Date Received: 7/26/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/L	1	7/26/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/L	1	7/26/2017	8260C	
Trichloroethene	ND	1	ug/L	1	7/26/2017	8260C	
Tetrachloroethene	ND	1	ug/L	1	7/26/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: Refrigerator Blank
Client Project ID: E15.019.201
Sample Matrix: Water

Date Sampled: 7/27/17
Date Received: 7/27/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/L	1	7/27/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/L	1	7/27/2017	8260C	
Trichloroethene	ND	1	ug/L	1	7/27/2017	8260C	
Tetrachloroethene	ND	1	ug/L	1	7/27/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	98.6	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: Refrigerator Blank
Client Project ID: E15.019.201
Sample Matrix: Water

Date Sampled: 7/28/17
Date Received: 7/28/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/L	1	7/28/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/L	1	7/28/2017	8260C	
Trichloroethene	ND	1	ug/L	1	7/28/2017	8260C	
Tetrachloroethene	ND	1	ug/L	1	7/28/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	98.2	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Soil Blank Results
Project ID: RMC007

Sample ID: Blank
Client Project ID: E15.019.201
Sample Matrix: Soil

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/25/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/25/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/25/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/25/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	99.8	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Soil Blank Results
Project ID: RMC007

Sample ID: Blank
Client Project ID: E15.019.201
Sample Matrix: Soil

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/26/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/26/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/26/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/26/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	98.9	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Soil Blank Results
Project ID: RMC007

Sample ID: Blank
Client Project ID: E15.019.201
Sample Matrix: Soil

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/27/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/27/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/27/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/27/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	98.2	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Soil Blank Results
Project ID: RMC007

Sample ID: Blank
Client Project ID: E15.019.201
Sample Matrix: Soil

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/28/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/28/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/28/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/28/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Laboratory Control Sample Results
Project ID: RMC007

Sample ID: LCS
Client Project ID: E15.019.201
Sample Matrix: Soil

EPA Method 8260C Date Analyzed:7/25/17

ANALYTE	LCS SPIKE	% RECOVERY	UNITS	QC Limits	Qualifier
trans-1,2-Dichloroethene	46.7	93.4	ug/Kg	70-130	
cis-1,2-Dichloroethene	48.1	96.2	ug/Kg	70-130	
Trichloroethene	46.7	93.4	ug/Kg	70-130	
Tetrachloroethene	47.8	95.6	ug/Kg	70-130	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ChemSolutions LLC
Laboratory Control Sample Results
Project ID: RMC007

Sample ID: LCS
Client Project ID: E15.019.201
Sample Matrix: Soil

EPA Method 8260C Date Analyzed:7/26/17

ANALYTE	LCS SPIKE	% RECOVERY	UNITS	QC Limits	Qualifier
trans-1,2-Dichloroethene	42.6	85.2	ug/Kg	70-130	
cis-1,2-Dichloroethene	46.2	92.4	ug/Kg	70-130	
Trichloroethene	44.6	89.2	ug/Kg	70-130	
Tetrachloroethene	47.7	95.4	ug/Kg	70-130	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ChemSolutions LLC
Laboratory Control Sample Results
Project ID: RMC007

Sample ID: LCS
Client Project ID: E15.019.201
Sample Matrix: Soil

EPA Method 8260C Date Analyzed:7/27/17

ANALYTE	LCS SPIKE	% RECOVERY	UNITS	QC Limits	Qualifier
trans-1,2-Dichloroethene	53.9	107.8	ug/Kg	70-130	
cis-1,2-Dichloroethene	48.5	97.0	ug/Kg	70-130	
Trichloroethene	47.2	94.4	ug/Kg	70-130	
Tetrachloroethene	47.5	95.0	ug/Kg	70-130	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	99.2	8260C	70-130

ChemSolutions LLC
Laboratory Control Sample Results
Project ID: RMC007

Sample ID: LCS
Client Project ID: E15.019.201
Sample Matrix: Soil

EPA Method 8260C Date Analyzed:7/28/17

ANALYTE	LCS SPIKE	% RECOVERY	UNITS	QC Limits	Qualifier
trans-1,2-Dichloroethene	56.9	113.8	ug/Kg	70-130	
cis-1,2-Dichloroethene	47.0	94.0	ug/Kg	70-130	
Trichloroethene	46.4	92.8	ug/Kg	70-130	
Tetrachloroethene	46.9	93.8	ug/Kg	70-130	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	98.8	8260C	70-130

ChemSolutions LLC
Matrix Spike Results
Project ID: RMC007

Client Sample ID: FEW4-MW83-(9.0)
Client Project ID: E15.019.201
Sample Matrix: Soil

EPA Method 8260C Date Analyzed: 7/25/17

ANALYTE	MATRIX SPIKE	% RECOVERY	UNITS	QC Limits	Qualifier
trans-1,2-Dichloroethene	36.0	72.0	ug/Kg	70-130	
cis-1,2-Dichloroethene	33.2	66.5	ug/Kg	70-130	J2
Trichloroethene	36.8	73.6	ug/Kg	70-130	
Tetrachloroethene	32.6	65.2	ug/Kg	70-130	J2

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	99.2	8260C	70-130

EPA Method 8260C MATRIX SPIKE

ANALYTE	DUPLICATE	% RECOVERY	UNITS	RPD	QC Limits	RPD Limit	Qualifier
trans-1,2-Dichloroethene	53.1	106.2	ug/Kg	38.4	70-130	30	J3
cis-1,2-Dichloroethene	54.5	109.0	ug/Kg	48.5	70-130	30	J3
Trichloroethene	53.8	107.6	ug/Kg	37.5	70-130	30	J3
Tetrachloroethene	53.4	106.8	ug/Kg	48.4	70-130	30	J3

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	104	8260C	70-130

J2=Exceeds QC limits for accuracy.
J3=Exceeds QC ;imits for precision.

ChemSolutions LLC
Matrix Spike Results
Project ID: RMC007

Client Sample ID: FEW4-MW83-(106.0)
Client Project ID: E15.019.201
Sample Matrix: Soil

EPA Method 8260C Date Analyzed: 7/26/17

ANALYTE	MATRIX SPIKE	% RECOVERY	UNITS	QC Limits	Qualifier
trans-1,2-Dichloroethene	1050	105	ug/Kg	70-130	
cis-1,2-Dichloroethene	943	94.2	ug/Kg	70-130	
Trichloroethene	1230	72.0	ug/Kg	70-130	
Tetrachloroethene	1120	112	ug/Kg	70-130	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	103	8260C	70-130

EPA Method 8260C MATRIX SPIKE

ANALYTE	DUPLICATE	% RECOVERY	UNITS	RPD	QC Limits	RPD Limit	Qualifier
trans-1,2-Dichloroethene	867	86.7	ug/Kg	19.1	70-130	30	
cis-1,2-Dichloroethene	932	93.1	ug/Kg	1.2	70-130	30	
Trichloroethene	1210	70.0	ug/Kg	1.6	70-130	30	
Tetrachloroethene	1110	111	ug/Kg	0.9	70-130	30	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	103	8260C	70-130

ChemSolutions LLC
Matrix Spike Results
Project ID: RMC007

Client Sample ID: FEW4-MW83-(157.0)
Client Project ID: E15.019.201
Sample Matrix: Soil

EPA Method 8260C Date Analyzed: 7/27/17

ANALYTE	MATRIX SPIKE	% RECOVERY	UNITS	QC Limits	Qualifier
trans-1,2-Dichloroethene	1510	121	ug/Kg	70-130	
cis-1,2-Dichloroethene	1200	96.0	ug/Kg	70-130	
Trichloroethene	1250	98.6	ug/Kg	70-130	
Tetrachloroethene	1320	106	ug/Kg	70-130	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	103	8260C	70-130

EPA Method 8260C MATRIX SPIKE

ANALYTE	DUPLICATE	% RECOVERY	UNITS	RPD	QC Limits	RPD Limit	Qualifier
trans-1,2-Dichloroethene	1500	99.2	ug/Kg	19.6	70-130	30	
cis-1,2-Dichloroethene	1240	99.2	ug/Kg	5.7	70-130	30	
Trichloroethene	1270	100	ug/Kg	1.6	70-130	30	
Tetrachloroethene	1330	106	ug/Kg	0.8	70-130	30	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	104	8260C	70-130

ChemSolutions LLC
Matrix Spike Results
Project ID: RMC007

Client Sample ID: FEW4-MW77-(55.0)
Client Project ID: E15.019.201
Sample Matrix: Soil

EPA Method 8260C Date Analyzed: 7/28/17

ANALYTE	MATRIX SPIKE	% RECOVERY	UNITS	QC Limits	Qualifier
trans-1,2-Dichloroethene	49.2	98.4	ug/Kg	70-130	
cis-1,2-Dichloroethene	48.0	96.0	ug/Kg	70-130	
Trichloroethene	47.5	88.6	ug/Kg	70-130	
Tetrachloroethene	50.1	100	ug/Kg	70-130	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	99.4	8260C	70-130

EPA Method 8260C MATRIX SPIKE

ANALYTE	DUPLICATE	% RECOVERY	UNITS	RPD	QC Limits	RPD Limit	Qualifier
trans-1,2-Dichloroethene	58.1	116	ug/Kg	3.0	70-130	30	
cis-1,2-Dichloroethene	50.7	101	ug/Kg	6.1	70-130	30	
Trichloroethene	51.0	95.6	ug/Kg	7.1	70-130	30	
Tetrachloroethene	49.9	100	ug/Kg	0.4	70-130	30	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	95.8	8260C	70-130

ChemSolutions

7388 S. Revere Parkway, Suite 805
Centennial, CO 80112
303.771.5570

CASE NARRATIVE

ChemSolutions Project ID: RMC007/008
RMC Project ID: E15.019.201
August 11, 2017

This report contains the analytical results for the samples collected on 7/31-8/9/17. The samples were analyzed in our base laboratory in accordance with Standard Operating Procedure Atlas D Missile Site 4 On-Site Laboratory unless noted otherwise in this Case Narrative.

All sample aliquots were received on ice, in the proper containers, with the appropriate preservatives, and within method specified holding times. All samples were analyzed within the established holding times. All Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results.

The data contained in the following report have been reviewed and approved by:

John Graves
Laboratory Director
ChemSolutions LLC

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW84-(91.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/30/17
Date Received: 7/31/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/31/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/31/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/31/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/31/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW84-(101.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/31/17
Date Received: 7/31/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/31/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/31/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/31/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/31/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	100	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW84-(113.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/31/17
Date Received: 7/31/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/31/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/31/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/31/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/31/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW84-(114.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/31/17
Date Received: 7/31/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/31/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/31/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/31/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/31/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	105	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW84-(125.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/31/17
Date Received: 7/31/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/31/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/31/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/31/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/31/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	100	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW84-(135.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/31/17
Date Received: 7/31/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/31/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/31/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/31/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/31/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	103	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW84-(145.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/31/17
Date Received: 7/31/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/31/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/31/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/31/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/31/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	99.6	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW84-(155.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/31/17
Date Received: 7/31/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/31/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/31/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/31/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/31/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW84-(162.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/31/17
Date Received: 7/31/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/31/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/31/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/31/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/31/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	103	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW84-(175.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/31/17
Date Received: 7/31/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/31/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/31/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/31/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/31/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	99.0	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW84-(185.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/31/17
Date Received: 7/31/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	100	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW84-(195.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/31/17
Date Received: 7/31/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	98.9	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW84-(200.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/31/17
Date Received: 7/31/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	99.9	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW84-(212.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/31/17
Date Received: 7/31/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	103	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW84-(225.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/31/17
Date Received: 8/01/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	98.4	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW84-(232.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/1/17
Date Received: 8/1/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	102	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW84-(245.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/1/17
Date Received: 8/1/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	103	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW84-(256.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/1/17
Date Received: 8/1/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	99.1	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW84-(265.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/1/17
Date Received: 8/1/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW84-(266.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/1/17
Date Received: 8/1/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	99.0	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW84-(275.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/1/17
Date Received: 8/1/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	102	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW84-(286.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/1/17
Date Received: 8/1/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW84-(297.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/1/17
Date Received: 8/1/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	102	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW84-(307.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/1/17
Date Received: 8/1/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW84-(311.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/8/17
Date Received: 8/8/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/8/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/8/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/8/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/8/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	99.1	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW84-(324.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/8/17
Date Received: 8/8/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/8/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/8/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/8/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/8/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW84-(325.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/8/17
Date Received: 8/9/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW84-(336.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/8/17
Date Received: 8/9/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	98.4	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW84-(349.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/8/17
Date Received: 8/9/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW84-(359.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/9/17
Date Received: 8/9/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	102	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW84-(367.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/9/17
Date Received: 8/9/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	104	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW84-(374.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/9/17
Date Received: 8/9/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	99.3	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW84-(384.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/9/17
Date Received: 8/9/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	102	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW84-(399.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/9/17
Date Received: 8/9/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	97.6	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW84-(400.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/9/17
Date Received: 8/9/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW84-87
Client Project ID: E15.019.201
Sample Matrix: Water

Date Sampled: 7/31/17
Date Received: 7/31/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/L	1	7/31/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/L	1	7/31/2017	8260C	
Trichloroethene	15	1	ug/L	1	7/31/2017	8260C	
Tetrachloroethene	ND	1	ug/L	1	7/31/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	100	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: Refrigerator Blank
Client Project ID: E15.019.201
Sample Matrix: Water

Date Sampled: 7/31/17
Date Received: 7/31/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/L	1	7/31/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/L	1	7/31/2017	8260C	
Trichloroethene	ND	1	ug/L	1	7/31/2017	8260C	
Tetrachloroethene	ND	1	ug/L	1	7/31/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	98.8	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: Refrigerator Blank
Client Project ID: E15.019.201
Sample Matrix: Water

Date Sampled: 8/1/17
Date Received: 8/1/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/L	1	8/1/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/L	1	8/1/2017	8260C	
Trichloroethene	ND	1	ug/L	1	8/1/2017	8260C	
Tetrachloroethene	ND	1	ug/L	1	8/1/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: IDW-EFF
Client Project ID: E15.019.201
Sample Matrix: Water

Date Sampled: 8/1/17
Date Received: 8/1/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/L	1	8/1/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/L	1	8/1/2017	8260C	
Trichloroethene	ND	1	ug/L	1	8/1/2017	8260C	
Tetrachloroethene	ND	1	ug/L	1	8/1/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	100	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: IDW-INF
Client Project ID: E15.019.201
Sample Matrix: Water

Date Sampled: 8/1/17
Date Received: 8/1/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/L	1	8/1/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/L	1	8/1/2017	8260C	
Trichloroethene	ND	1	ug/L	1	8/1/2017	8260C	
Tetrachloroethene	ND	1	ug/L	1	8/1/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	100	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Soil Blank Results
Project ID: RMC007

Sample ID: Blank
Client Project ID: E15.019.201
Sample Matrix: Soil

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/31/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/31/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/31/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/31/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	100	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Soil Blank Results
Project ID: RMC007

Sample ID: Blank
Client Project ID: E15.019.201
Sample Matrix: Soil

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	102	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Soil Blank Results
Project ID: RMC008

Sample ID: Blank
Client Project ID: E15.019.201
Sample Matrix: Soil

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/8/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/8/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/8/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/8/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	102	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Soil Blank Results
Project ID: RMC008

Sample ID: Blank
Client Project ID: E15.019.201
Sample Matrix: Soil

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	99.7	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Laboratory Control Sample Results
Project ID: RMC007

Sample ID: LCS
Client Project ID: E15.019.201
Sample Matrix: Soil

EPA Method 8260C Date Analyzed: 7/31/17

ANALYTE	LCS SPIKE	% RECOVERY	UNITS	QC Limits	Qualifier
trans-1,2-Dichloroethene	56.0	112	ug/Kg	70-130	
cis-1,2-Dichloroethene	48.1	96.2	ug/Kg	70-130	
Trichloroethene	47.8	95.6	ug/Kg	70-130	
Tetrachloroethene	47.4	94.8	ug/Kg	70-130	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ChemSolutions LLC
Laboratory Control Sample Results
Project ID: RMC007

Sample ID: LCS
Client Project ID: E15.019.201
Sample Matrix: Soil

EPA Method 8260C Date Analyzed: 8/1/17

ANALYTE	LCS SPIKE	% RECOVERY	UNITS	QC Limits	Qualifier
trans-1,2-Dichloroethene	51.8	104	ug/Kg	70-130	
cis-1,2-Dichloroethene	45.5	91.0	ug/Kg	70-130	
Trichloroethene	45.3	90.6	ug/Kg	70-130	
Tetrachloroethene	45.5	91.0	ug/Kg	70-130	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ChemSolutions LLC
Laboratory Control Sample Results
Project ID: RMC008

Sample ID: LCS
Client Project ID: E15.019.201
Sample Matrix: Soil

EPA Method 8260C Date Analyzed: 8/8/17

ANALYTE	LCS SPIKE	% RECOVERY	UNITS	QC Limits	Qualifier
trans-1,2-Dichloroethene	42.6	85.2	ug/Kg	70-130	
cis-1,2-Dichloroethene	43.2	86.4	ug/Kg	70-130	
Trichloroethene	43.5	87.0	ug/Kg	70-130	
Tetrachloroethene	44.3	88.6	ug/Kg	70-130	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	99.8	8260C	70-130

ChemSolutions LLC
Laboratory Control Sample Results
Project ID: RMC008

Sample ID: LCS
Client Project ID: E15.019.201
Sample Matrix: Soil

EPA Method 8260C Date Analyzed: 8/9/17

ANALYTE	LCS SPIKE	% RECOVERY	UNITS	QC Limits	Qualifier
trans-1,2-Dichloroethene	63.6	127	ug/Kg	70-130	
cis-1,2-Dichloroethene	53.2	106	ug/Kg	70-130	
Trichloroethene	53.0	106	ug/Kg	70-130	
Tetrachloroethene	54.0	108	ug/Kg	70-130	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	102	8260C	70-130

ChemSolutions LLC
Matrix Spike Results
Project ID: RMC007

Client Sample ID: FEW4-MW84-(101.0)
Client Project ID: E15.019.201
Sample Matrix: Soil

EPA Method 8260C Date Analyzed: 7/31/17

ANALYTE	MATRIX SPIKE	% RECOVERY	UNITS	QC Limits	Qualifier
trans-1,2-Dichloroethene	51.9	104	ug/Kg	70-130	
cis-1,2-Dichloroethene	48.7	97.4	ug/Kg	70-130	
Trichloroethene	45.9	91.8	ug/Kg	70-130	
Tetrachloroethene	46.2	92.4	ug/Kg	70-130	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

EPA Method 8260C MATRIX SPIKE

ANALYTE	DUPLICATE	% RECOVERY	UNITS	RPD	QC Limits	RPD Limit	Qualifier
trans-1,2-Dichloroethene	57.0	114	ug/Kg	6.1	70-130	30	
cis-1,2-Dichloroethene	48.6	97.2	ug/Kg	4.3	70-130	30	
Trichloroethene	46.6	93.2	ug/Kg	1.5	70-130	30	
Tetrachloroethene	46.9	93.8	ug/Kg	1.5	70-130	30	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ChemSolutions LLC
Matrix Spike Results
Project ID: RMC007

Client Sample ID: FEW4-MW84-(245.0)
Client Project ID: E15.019.201
Sample Matrix: Soil

EPA Method 8260C Date Analyzed: 8/1/17

ANALYTE	MATRIX SPIKE	% RECOVERY	UNITS	QC Limits	Qualifier
trans-1,2-Dichloroethene	56.7	113	ug/Kg	70-130	
cis-1,2-Dichloroethene	47.3	94.6	ug/Kg	70-130	
Trichloroethene	46.6	93.2	ug/Kg	70-130	
Tetrachloroethene	46.7	93.4	ug/Kg	70-130	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	99.1	8260C	70-130

EPA Method 8260C MATRIX SPIKE

ANALYTE	DUPLICATE	% RECOVERY	UNITS	RPD	QC Limits	RPD Limit	Qualifier
trans-1,2-Dichloroethene	62.9	126	ug/Kg	10.4	70-130	30	
cis-1,2-Dichloroethene	50.7	101	ug/Kg	6.9	70-130	30	
Trichloroethene	50.7	101	ug/Kg	1.5	70-130	30	
Tetrachloroethene	51.9	104	ug/Kg	1.5	70-130	30	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	100	8260C	70-130

ChemSolutions LLC
Matrix Spike Results
Project ID: RMC008

Client Sample ID: FEW4-MW86-(269.0)
Client Project ID: E15.019.201
Sample Matrix: Soil

EPA Method 8260C Date Analyzed: 8/8/17

ANALYTE	MATRIX SPIKE	% RECOVERY	UNITS	QC Limits	Qualifier
trans-1,2-Dichloroethene	47.3	94.6	ug/Kg	70-130	
cis-1,2-Dichloroethene	45.1	90.2	ug/Kg	70-130	
Trichloroethene	41.7	83.4	ug/Kg	70-130	
Tetrachloroethene	43.1	86.2	ug/Kg	70-130	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

EPA Method 8260C MATRIX SPIKE

ANALYTE	DUPLICATE	% RECOVERY	UNITS	RPD	QC Limits	RPD Limit	Qualifier
trans-1,2-Dichloroethene	56.7	113	ug/Kg	18.1	70-130	30	
cis-1,2-Dichloroethene	50.4	101	ug/Kg	11.1	70-130	30	
Trichloroethene	49.2	98.4	ug/Kg	1.5	70-130	30	
Tetrachloroethene	49.3	98.6	ug/Kg	1.5	70-130	30	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	104	8260C	70-130

ChemSolutions LLC
Matrix Spike Results
Project ID: RMC008

Client Sample ID: FEW4-MW86-(275.0)
Client Project ID: E15.019.201
Sample Matrix: Soil

EPA Method 8260C Date Analyzed: 8/9/17

ANALYTE	MATRIX SPIKE	% RECOVERY	UNITS	QC Limits	Qualifier
trans-1,2-Dichloroethene	63.7	127	ug/Kg	70-130	
cis-1,2-Dichloroethene	52.9	106	ug/Kg	70-130	
Trichloroethene	52.7	105	ug/Kg	70-130	
Tetrachloroethene	50.3	101	ug/Kg	70-130	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	102	8260C	70-130

EPA Method 8260C MATRIX SPIKE

ANALYTE	DUPLICATE	% RECOVERY	UNITS	RPD	QC Limits	RPD Limit	Qualifier
trans-1,2-Dichloroethene	62.8	126	ug/Kg	1.4	70-130	30	
cis-1,2-Dichloroethene	54.1	108	ug/Kg	2.2	70-130	30	
Trichloroethene	56.1	112	ug/Kg	1.5	70-130	30	
Tetrachloroethene	55.9	112	ug/Kg	1.5	70-130	30	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	100	8260C	70-130

ChemSolutions

7388 S. Revere Parkway, Suite 805
Centennial, CO 80112
303.771.5570

CASE NARRATIVE

ChemSolutions Project ID: RMC008
RMC Project ID: E15.019.201
August 31, 2017

This report contains the analytical results for the samples collected on 8/24-8/25/17. The samples were analyzed onsite in our mobile laboratory in accordance with Standard Operating Procedure Atlas D Missile Site 4 On-Site Laboratory unless noted otherwise in this Case Narrative.

All sample aliquots were received on ice, in the proper containers, with the appropriate preservatives, and within method specified holding times. All samples were analyzed within the established holding times. All Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results.

The data contained in the following report have been reviewed and approved by:

John Graves
Laboratory Director
ChemSolutions LLC

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW85-(86.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/24/17
Date Received: 8/24/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/24/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/24/2017	8260C	
Trichloroethene	5.5	1	ug/Kg	1	8/24/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/24/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW85-(96.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/24/17
Date Received: 8/25/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	
Trichloroethene	11	1	ug/Kg	1	8/25/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	99.8	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW85-(105.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/24/17
Date Received: 8/25/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	
Trichloroethene	9.1	1	ug/Kg	1	8/25/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW85-(109.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/24/17
Date Received: 8/25/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	
Trichloroethene	3.2	1	ug/Kg	1	8/25/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	99.5	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW85-(118.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/24/17
Date Received: 8/25/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	
Trichloroethene	4.6	1	ug/Kg	1	8/25/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW85-(128.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/24/17
Date Received: 8/25/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	
Trichloroethene	42	1	ug/Kg	1	8/25/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW85-(138.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/25/17
Date Received: 8/25/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	
Trichloroethene	30	1	ug/Kg	1	8/25/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	102	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW85-(148.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/25/17
Date Received: 8/25/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	
Trichloroethene	41	1	ug/Kg	1	8/25/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	99.4	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW85-(149.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/25/17
Date Received: 8/25/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	
Trichloroethene	30	1	ug/Kg	1	8/25/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	104	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW85-(158.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/25/17
Date Received: 8/25/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	102	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW85-(168.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/25/17
Date Received: 8/25/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	107	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW85-(178.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/25/17
Date Received: 8/25/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	103	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW85-(188.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/25/17
Date Received: 8/25/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	103	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW85-(199.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/25/17
Date Received: 8/25/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW85-(208.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/25/17
Date Received: 8/25/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	96.3	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW85-(218.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/25/17
Date Received: 8/25/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	104	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW85-(228.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/25/17
Date Received: 8/25/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	102	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC008

Client Sample ID: FEW4-MW85-90
Client Project ID: E15.019.201
Sample Matrix: Water

Date Sampled: 8/24/17
Date Received: 8/24/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	10	ug/L	10	8/24/2017	8260C	
cis-1,2-Dichloroethene	ND	10	ug/L	10	8/24/2017	8260C	
Trichloroethene	1400	10	ug/L	10	8/24/2017	8260C	
Tetrachloroethene	ND	10	ug/L	10	8/24/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	100	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Soil Blank Results
Project ID: RMC008

Sample ID: Blank
Client Project ID: E15.019.201
Sample Matrix: Soil

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/24/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/24/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/24/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/24/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	104	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Soil Blank Results
Project ID: RMC008

Sample ID: Blank
Client Project ID: E15.019.201
Sample Matrix: Soil

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/25/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	103	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Laboratory Control Sample Results
Project ID: RMC008

Sample ID: LCS
Client Project ID: E15.019.201
Sample Matrix: Soil

EPA Method 8260C Date Analyzed: 8/24/17

ANALYTE	LCS SPIKE	% RECOVERY	UNITS	QC Limits	Qualifier
trans-1,2-Dichloroethene	46.6	93	ug/Kg	70-130	
cis-1,2-Dichloroethene	46.7	93.4	ug/Kg	70-130	
Trichloroethene	47.7	95.4	ug/Kg	70-130	
Tetrachloroethene	49.0	98.0	ug/Kg	70-130	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	103	8260C	70-130

ChemSolutions LLC
Laboratory Control Sample Results
Project ID: RMC008

Sample ID: LCS
Client Project ID: E15.019.201
Sample Matrix: Soil

EPA Method 8260C Date Analyzed: 8/25/17

ANALYTE	LCS SPIKE	% RECOVERY	UNITS	QC Limits	Qualifier
trans-1,2-Dichloroethene	43.6	87	ug/Kg	70-130	
cis-1,2-Dichloroethene	42.8	85.6	ug/Kg	70-130	
Trichloroethene	42.8	85.6	ug/Kg	70-130	
Tetrachloroethene	41.8	83.6	ug/Kg	70-130	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	102	8260C	70-130

ChemSolutions LLC
Matrix Spike Results
Project ID: RMC008

Client Sample ID: FEW4-MW74-(9.0)
Client Project ID: E15.019.201
Sample Matrix: Soil

EPA Method 8260C Date Analyzed: 8/24/17

ANALYTE	MATRIX SPIKE	% RECOVERY	UNITS	QC Limits	Qualifier
trans-1,2-Dichloroethene	49.2	98.4	ug/Kg	70-130	
cis-1,2-Dichloroethene	43.7	87.4	ug/Kg	70-130	
Trichloroethene	45.4	90.8	ug/Kg	70-130	
Tetrachloroethene	45.5	91.0	ug/Kg	70-130	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	107	8260C	70-130

EPA Method 8260C MATRIX SPIKE

ANALYTE	DUPLICATE	% RECOVERY	UNITS	RPD	QC Limits	RPD Limit	Qualifier
trans-1,2-Dichloroethene	47.8	95.6	ug/Kg	2.9	70-130	30	
cis-1,2-Dichloroethene	44.5	89.0	ug/Kg	1.8	70-130	30	
Trichloroethene	43.6	87.2	ug/Kg	4.0	70-130	30	
Tetrachloroethene	43.1	86.2	ug/Kg	5.4	70-130	30	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ChemSolutions LLC
Matrix Spike Results
Project ID: RMC008

Client Sample ID: FEW4-MW85-(208.0)
Client Project ID: E15.019.201
Sample Matrix: Soil

EPA Method 8260C Date Analyzed: 8/25/17

ANALYTE	MATRIX SPIKE	% RECOVERY	UNITS	QC Limits	Qualifier
trans-1,2-Dichloroethene	54.9	109.8	ug/Kg	70-130	
cis-1,2-Dichloroethene	48.8	97.6	ug/Kg	70-130	
Trichloroethene	49.0	98.0	ug/Kg	70-130	
Tetrachloroethene	48.6	97.2	ug/Kg	70-130	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	102	8260C	70-130

EPA Method 8260C MATRIX SPIKE

ANALYTE	DUPLICATE	% RECOVERY	UNITS	RPD	QC Limits	RPD Limit	Qualifier
trans-1,2-Dichloroethene	50.5	101	ug/Kg	8.3	70-130	30	
cis-1,2-Dichloroethene	46.6	93.2	ug/Kg	4.6	70-130	30	
Trichloroethene	46.9	93.8	ug/Kg	4.4	70-130	30	
Tetrachloroethene	48.1	96.2	ug/Kg	1.0	70-130	30	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	103	8260C	70-130

ChemSolutions

7388 S. Revere Parkway, Suite 805
Centennial, CO 80112
303.771.5570

CASE NARRATIVE

ChemSolutions Project ID: RMC007
RMC Project ID: E15.019.201
August 15, 2017

This report contains the analytical results for the samples collected on 7/31-8/10/17. The samples were analyzed in our base laboratory in accordance with Standard Operating Procedure Atlas D Missile Site 4 On-Site Laboratory unless noted otherwise in this Case Narrative.

All sample aliquots were received on ice, in the proper containers, with the appropriate preservatives, and within method specified holding times. All samples were analyzed within the established holding times. All Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results.

The data contained in the following report have been reviewed and approved by:

John Graves
Laboratory Director
ChemSolutions LLC

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW86-(15.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/31/17
Date Received: 7/31/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/31/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/31/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/31/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/31/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW86-(25.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/31/17
Date Received: 7/31/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/31/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/31/2017	8260C	
Trichloroethene	2.9	1	ug/Kg	1	7/31/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/31/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW86-(28.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/31/17
Date Received: 7/31/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/31/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/31/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/31/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/31/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	104	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW86-(40.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/31/17
Date Received: 7/31/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/31/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/31/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/31/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/31/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	100	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW86-(52.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/31/17
Date Received: 7/31/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/31/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/31/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/31/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/31/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	103	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW86-(62.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/31/17
Date Received: 7/31/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/31/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/31/2017	8260C	
Trichloroethene	3.7	1	ug/Kg	1	7/31/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/31/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW86-(72.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/31/17
Date Received: 7/31/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/31/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/31/2017	8260C	
Trichloroethene	4.4	1	ug/Kg	1	7/31/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/31/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW85-(82.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/31/17
Date Received: 7/31/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/31/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/31/2017	8260C	
Trichloroethene	2.9	1	ug/Kg	1	7/31/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/31/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	100	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW86-(92.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/31/17
Date Received: 7/31/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
Trichloroethene	7.3	1	ug/Kg	1	8/1/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	100	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW86-(102.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/31/17
Date Received: 7/31/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
Trichloroethene	4.2	1	ug/Kg	1	8/1/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	98.5	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW86-(103.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/31/17
Date Received: 7/31/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
Trichloroethene	4.3	1	ug/Kg	1	8/1/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	99.0	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW86-(112.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/31/17
Date Received: 7/31/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
Trichloroethene	5.3	1	ug/Kg	1	8/1/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	102	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW86-(118.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/31/17
Date Received: 7/31/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
Trichloroethene	4.0	1	ug/Kg	1	8/1/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	99.7	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW86-(128.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/31/17
Date Received: 7/31/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
Trichloroethene	3.2	1	ug/Kg	1	8/1/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	102	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW86-(136.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/31/17
Date Received: 7/31/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
Trichloroethene	4.1	1	ug/Kg	1	8/1/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW86-(146.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 7/31/17
Date Received: 7/31/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	99.9	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW86-(156.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/1/17
Date Received: 8/1/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW86-(166.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/1/17
Date Received: 8/1/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW86-(176.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/1/17
Date Received: 8/1/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	104	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW86-(189.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/1/17
Date Received: 8/1/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	100	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW86-(199.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/1/17
Date Received: 8/1/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	103	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW86-(209.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/1/17
Date Received: 8/1/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	103	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW86-(210.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/1/17
Date Received: 8/1/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	102	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW86-(216.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/1/17
Date Received: 8/1/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	103	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW86-(226.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/1/17
Date Received: 8/1/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW86-(238.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/8/17
Date Received: 8/8/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/8/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/8/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/8/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/8/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	99.4	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW86-(248.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/8/17
Date Received: 8/8/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/8/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/8/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/8/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/8/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	99.3	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW86-(259.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/8/17
Date Received: 8/8/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/8/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/8/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/8/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/8/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	99.3	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW86-(269.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/8/17
Date Received: 8/8/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/8/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/8/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/8/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/8/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	99.2	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW86-(275.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/9/17
Date Received: 8/9/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	100	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW86-(287.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/9/17
Date Received: 8/9/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	102	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW86-(295.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/9/17
Date Received: 8/9/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	98.8	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW86-(305.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/9/17
Date Received: 8/9/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	102	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW86-(306.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/9/17
Date Received: 8/9/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	99.6	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW86-(313.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/9/17
Date Received: 8/9/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	103	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW86-(325.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/9/17
Date Received: 8/9/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	102	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW86-(334.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/9/17
Date Received: 8/9/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	105	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW86-(341.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/9/17
Date Received: 8/9/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW86-(353.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/9/17
Date Received: 8/9/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	
Trichloroethene	0.78	1	ug/Kg	1	8/9/2017	8260C	J
Tetrachloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	102	8260C	70-130

J=The compound was detected and verified by its mass spectrum at a concentration less than the reporting limit.
ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW86-(353.0) Duplicate
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/9/17
Date Received: 8/9/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/10/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/10/2017	8260C	
Trichloroethene	1.1	1	ug/Kg	1	8/10/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/10/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	100	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW86-(362.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/9/17
Date Received: 8/9/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	103	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW86-(372.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/9/17
Date Received: 8/9/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	102	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW86-(382.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 8/10/17
Date Received: 8/10/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/10/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/10/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/10/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/10/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: FEW4-MW86-16
Client Project ID: E15.019.201
Sample Matrix: Water

Date Sampled: 7/31/17
Date Received: 7/31/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/L	1	7/31/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/L	1	7/31/2017	8260C	
Trichloroethene	13	1	ug/L	1	7/31/2017	8260C	
Tetrachloroethene	ND	1	ug/L	1	7/31/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	100	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: Refrigerator Blank
Client Project ID: E15.019.201
Sample Matrix: Water

Date Sampled: 8/08/17
Date Received: 8/08/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/L	1	8/8/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/L	1	8/8/2017	8260C	
Trichloroethene	ND	1	ug/L	1	8/8/2017	8260C	
Tetrachloroethene	ND	1	ug/L	1	8/8/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	97.8	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: Refrigerator Blank
Client Project ID: E15.019.201
Sample Matrix: Water

Date Sampled: 8/09/17
Date Received: 8/09/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/L	1	8/9/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/L	1	8/9/2017	8260C	
Trichloroethene	ND	1	ug/L	1	8/9/2017	8260C	
Tetrachloroethene	ND	1	ug/L	1	8/9/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	99.2	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: Recirculating Fluid
Client Project ID: E15.019.201
Sample Matrix: Water

Date Sampled: 8/09/17
Date Received: 8/09/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/L	1	8/9/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/L	1	8/9/2017	8260C	
Trichloroethene	ND	1	ug/L	1	8/9/2017	8260C	
Tetrachloroethene	ND	1	ug/L	1	8/9/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	100	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC007

Client Sample ID: Refrigerator Blank
Client Project ID: E15.019.201
Sample Matrix: Water

Date Sampled: 8/10/17
Date Received: 8/10/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/L	1	8/10/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/L	1	8/10/2017	8260C	
Trichloroethene	ND	1	ug/L	1	8/10/2017	8260C	
Tetrachloroethene	ND	1	ug/L	1	8/10/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Soil Blank Results
Project ID: RMC007

Sample ID: Blank
Client Project ID: E15.019.201
Sample Matrix: Soil

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	7/31/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	7/31/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	7/31/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	7/31/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	100	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Soil Blank Results
Project ID: RMC007

Sample ID: Blank
Client Project ID: E15.019.201
Sample Matrix: Soil

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/1/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	102	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Soil Blank Results
Project ID: RMC007

Sample ID: Blank
Client Project ID: E15.019.201
Sample Matrix: Soil

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/8/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/8/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/8/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/8/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	102	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Soil Blank Results
Project ID: RMC007

Sample ID: Blank
Client Project ID: E15.019.201
Sample Matrix: Soil

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/9/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	99.7	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Soil Blank Results
Project ID: RMC007

Sample ID: Blank
Client Project ID: E15.019.201
Sample Matrix: Soil

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	8/10/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	8/10/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	8/10/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	8/10/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	100	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Laboratory Control Sample Results
Project ID: RMC007

Sample ID: LCS
Client Project ID: E15.019.201
Sample Matrix: Soil

EPA Method 8260C Date Analyzed: 7/31/17

ANALYTE	LCS SPIKE	% RECOVERY	UNITS	QC Limits	Qualifier
trans-1,2-Dichloroethene	56.0	112	ug/Kg	70-130	
cis-1,2-Dichloroethene	48.1	96.2	ug/Kg	70-130	
Trichloroethene	47.8	95.6	ug/Kg	70-130	
Tetrachloroethene	47.4	94.8	ug/Kg	70-130	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ChemSolutions LLC
Laboratory Control Sample Results
Project ID: RMC007

Sample ID: LCS
Client Project ID: E15.019.201
Sample Matrix: Soil

EPA Method 8260C Date Analyzed: 8/1/17

ANALYTE	LCS SPIKE	% RECOVERY	UNITS	QC Limits	Qualifier
trans-1,2-Dichloroethene	51.8	104	ug/Kg	70-130	
cis-1,2-Dichloroethene	45.5	91.0	ug/Kg	70-130	
Trichloroethene	45.3	90.6	ug/Kg	70-130	
Tetrachloroethene	45.5	91.0	ug/Kg	70-130	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ChemSolutions LLC
Laboratory Control Sample Results
Project ID: RMC007

Sample ID: LCS
Client Project ID: E15.019.201
Sample Matrix: Soil

EPA Method 8260C Date Analyzed: 8/8/17

ANALYTE	LCS SPIKE	% RECOVERY	UNITS	QC Limits	Qualifier
trans-1,2-Dichloroethene	42.6	85.2	ug/Kg	70-130	
cis-1,2-Dichloroethene	43.2	86.4	ug/Kg	70-130	
Trichloroethene	43.5	87.0	ug/Kg	70-130	
Tetrachloroethene	44.3	88.6	ug/Kg	70-130	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	99.8	8260C	70-130

ChemSolutions LLC
Laboratory Control Sample Results
Project ID: RMC007

Sample ID: LCS
Client Project ID: E15.019.201
Sample Matrix: Soil

EPA Method 8260C Date Analyzed: 8/9/17

ANALYTE	LCS SPIKE	% RECOVERY	UNITS	QC Limits	Qualifier
trans-1,2-Dichloroethene	63.6	127	ug/Kg	70-130	
cis-1,2-Dichloroethene	53.2	106	ug/Kg	70-130	
Trichloroethene	53.0	106	ug/Kg	70-130	
Tetrachloroethene	54.0	108	ug/Kg	70-130	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	102	8260C	70-130

ChemSolutions LLC
Laboratory Control Sample Results
Project ID: RMC007

Sample ID: LCS
Client Project ID: E15.019.201
Sample Matrix: Soil

EPA Method 8260C Date Analyzed: 8/10/17

ANALYTE	LCS SPIKE	% RECOVERY	UNITS	QC Limits	Qualifier
trans-1,2-Dichloroethene	60.4	121	ug/Kg	70-130	
cis-1,2-Dichloroethene	50.6	101	ug/Kg	70-130	
Trichloroethene	49.6	99.2	ug/Kg	70-130	
Tetrachloroethene	50.4	101	ug/Kg	70-130	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ChemSolutions LLC
Matrix Spike Results
Project ID: RMC007

Client Sample ID: FEW4-MW84-(101.0)
Client Project ID: E15.019.201
Sample Matrix: Soil

EPA Method 8260C Date Analyzed: 7/31/17

ANALYTE	MATRIX SPIKE	% RECOVERY	UNITS	QC Limits	Qualifier
trans-1,2-Dichloroethene	51.9	104	ug/Kg	70-130	
cis-1,2-Dichloroethene	48.7	97.4	ug/Kg	70-130	
Trichloroethene	45.9	91.8	ug/Kg	70-130	
Tetrachloroethene	46.2	92.4	ug/Kg	70-130	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

EPA Method 8260C MATRIX SPIKE

ANALYTE	DUPLICATE	% RECOVERY	UNITS	RPD	QC Limits	RPD Limit	Qualifier
trans-1,2-Dichloroethene	57.0	114	ug/Kg	6.6	70-130	30	
cis-1,2-Dichloroethene	48.6	97.2	ug/Kg	4.4	70-130	30	
Trichloroethene	46.6	93.2	ug/Kg	1.5	70-130	30	
Tetrachloroethene	46.9	93.8	ug/Kg	1.5	70-130	30	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ChemSolutions LLC
Matrix Spike Results
Project ID: RMC007

Client Sample ID: FEW4-MW84-(245.0)
Client Project ID: E15.019.201
Sample Matrix: Soil

EPA Method 8260C Date Analyzed: 8/1/17

ANALYTE	MATRIX SPIKE	% RECOVERY	UNITS	QC Limits	Qualifier
trans-1,2-Dichloroethene	56.7	113	ug/Kg	70-130	
cis-1,2-Dichloroethene	47.3	94.6	ug/Kg	70-130	
Trichloroethene	46.6	93.2	ug/Kg	70-130	
Tetrachloroethene	46.7	93.4	ug/Kg	70-130	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	99.1	8260C	70-130

EPA Method 8260C MATRIX SPIKE

ANALYTE	DUPLICATE	% RECOVERY	UNITS	RPD	QC Limits	RPD Limit	Qualifier
trans-1,2-Dichloroethene	62.9	126	ug/Kg	11.2	70-130	30	
cis-1,2-Dichloroethene	50.7	101	ug/Kg	6.9	70-130	30	
Trichloroethene	50.7	101	ug/Kg	8.4	70-130	30	
Tetrachloroethene	51.9	104	ug/Kg	10.5	70-130	30	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	100	8260C	70-130

ChemSolutions LLC
Matrix Spike Results
Project ID: RMC007

Client Sample ID: FEW4-MW86-(269.0)
Client Project ID: E15.019.201
Sample Matrix: Soil

EPA Method 8260C Date Analyzed: 8/8/17

ANALYTE	MATRIX SPIKE	% RECOVERY	UNITS	QC Limits	Qualifier
trans-1,2-Dichloroethene	47.3	94.6	ug/Kg	70-130	
cis-1,2-Dichloroethene	45.1	90.2	ug/Kg	70-130	
Trichloroethene	41.7	83.4	ug/Kg	70-130	
Tetrachloroethene	43.1	86.2	ug/Kg	70-130	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

EPA Method 8260C MATRIX SPIKE

ANALYTE	DUPLICATE	% RECOVERY	UNITS	RPD	QC Limits	RPD Limit	Qualifier
trans-1,2-Dichloroethene	56.7	113	ug/Kg	6.3	70-130	30	
cis-1,2-Dichloroethene	50.4	101	ug/Kg	8.7	70-130	30	
Trichloroethene	49.2	98.4	ug/Kg	16.5	70-130	30	
Tetrachloroethene	49.3	98.6	ug/Kg	13.4	70-130	30	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	104	8260C	70-130

ChemSolutions LLC
Matrix Spike Results
Project ID: RMC007

Client Sample ID: FEW4-MW86-(275.0)
Client Project ID: E15.019.201
Sample Matrix: Soil

EPA Method 8260C Date Analyzed: 8/9/17

ANALYTE	MATRIX SPIKE	% RECOVERY	UNITS	QC Limits	Qualifier
trans-1,2-Dichloroethene	63.7	127	ug/Kg	70-130	
cis-1,2-Dichloroethene	52.9	106	ug/Kg	70-130	
Trichloroethene	52.7	105	ug/Kg	70-130	
Tetrachloroethene	50.3	101	ug/Kg	70-130	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	102	8260C	70-130

EPA Method 8260C MATRIX SPIKE

ANALYTE	DUPLICATE	% RECOVERY	UNITS	RPD	QC Limits	RPD Limit	Qualifier
trans-1,2-Dichloroethene	62.8	126	ug/Kg	16.3	70-130	30	
cis-1,2-Dichloroethene	54.1	108	ug/Kg	5.9	70-130	30	
Trichloroethene	56.1	112	ug/Kg	6.3	70-130	30	
Tetrachloroethene	55.9	112	ug/Kg	10.5	70-130	30	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	100	8260C	70-130

ChemSolutions LLC
Matrix Spike Results
Project ID: RMC007

Client Sample ID: FEW4-MW86-(382.0)
Client Project ID: E15.019.201
Sample Matrix: Soil

EPA Method 8260C Date Analyzed: 8/10/17

ANALYTE	MATRIX SPIKE	% RECOVERY	UNITS	QC Limits	Qualifier
trans-1,2-Dichloroethene	49.5	99.0	ug/Kg	70-130	
cis-1,2-Dichloroethene	48.9	97.8	ug/Kg	70-130	
Trichloroethene	48.7	97.4	ug/Kg	70-130	
Tetrachloroethene	48.2	96.4	ug/Kg	70-130	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	102	8260C	70-130

EPA Method 8260C MATRIX SPIKE

ANALYTE	DUPLICATE	% RECOVERY	UNITS	RPD	QC Limits	RPD Limit	Qualifier
trans-1,2-Dichloroethene	51.9	104	ug/Kg	2.4	70-130	30	
cis-1,2-Dichloroethene	50.7	101	ug/Kg	3.4	70-130	30	
Trichloroethene	50.6	101	ug/Kg	3.8	70-130	30	
Tetrachloroethene	51.7	103	ug/Kg	7.0	70-130	30	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	99.4	8260C	70-130

ChemSolutions

7388 S. Revere Parkway, Suite 805
Centennial, CO 80112
303.771.5570

CASE NARRATIVE

ChemSolutions Project ID: RMC010
RMC Project ID: E15.019.201
September 20, 2017

This report contains the analytical results for the samples collected on 9/13-9/15/17. The samples were analyzed in our base laboratory in accordance with Standard Operating Procedure Atlas D Missile Site 4 On-Site Laboratory unless noted otherwise in this Case Narrative.

All sample aliquots were received on ice, in the proper containers, with the appropriate preservatives, and within method specified holding times. All samples were analyzed within the established holding times. All Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results.

The data contained in the following report have been reviewed and approved by:

John Graves
Laboratory Director
ChemSolutions LLC

ChemSolutions LLC
Sample Results
Project ID: RMC010

Client Sample ID: FEW4-MW95-117
Client Project ID: E15.019.201
Sample Matrix: Water

Date Sampled: 9/15/17
Date Received: 9/15/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/L	1	9/16/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/L	1	9/16/2017	8260C	
Trichloroethene	ND	1	ug/L	1	9/16/2017	8260C	
Tetrachloroethene	ND	1	ug/L	1	9/16/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	107	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC010

Client Sample ID: FEW4-MW97-12
Client Project ID: E15.019.201
Sample Matrix: Water

Date Sampled: 9/13/17
Date Received: 9/15/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/L	1	9/16/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/L	1	9/16/2017	8260C	
Trichloroethene	ND	1	ug/L	1	9/16/2017	8260C	
Tetrachloroethene	ND	1	ug/L	1	9/16/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	107	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC010

Client Sample ID: FEW4-MW97-150
Client Project ID: E15.019.201
Sample Matrix: Water

Date Sampled: 9/14/17
Date Received: 9/15/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/L	1	9/16/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/L	1	9/16/2017	8260C	
Trichloroethene	ND	1	ug/L	1	9/16/2017	8260C	
Tetrachloroethene	ND	1	ug/L	1	9/16/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	127	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Water Blank Results
Project ID: RMC010

Sample ID: Blank
Client Project ID: E15.019.201
Sample Matrix: Water

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/L	1	9/16/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/L	1	9/16/2017	8260C	
Trichloroethene	ND	1	ug/L	1	9/16/2017	8260C	
Tetrachloroethene	ND	1	ug/L	1	9/16/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	106	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Laboratory Control Sample Results
Project ID: RMC010

Sample ID: LCS
Client Project ID: E15.019.201
Sample Matrix: Water

EPA Method 8260C Date Analyzed: 9/16/17

ANALYTE	LCS SPIKE	% RECOVERY	UNITS	QC Limits	Qualifier
trans-1,2-Dichloroethene	43.1	86.2	ug/L	70-130	
cis-1,2-Dichloroethene	40.1	80.2	ug/L	70-130	
Trichloroethene	58.1	116	ug/L	70-130	
Tetrachloroethene	59.4	119	ug/L	70-130	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	104	8260C	70-130

ChemSolutions LLC
Matrix Spike Results
Project ID: RMC010

Client Sample ID: FEW4-MW97-12
Client Project ID: E15.019.201
Sample Matrix: Water

EPA Method 8260C Date Analyzed: 9/16/17

ANALYTE	MATRIX SPIKE	% RECOVERY	UNITS	QC Limits	Qualifier
trans-1,2-Dichloroethene	44.4	88.8	ug/Kg	70-130	
cis-1,2-Dichloroethene	42.1	84.2	ug/Kg	70-130	
Trichloroethene	57.7	115	ug/Kg	70-130	
Tetrachloroethene	58.2	116	ug/Kg	70-130	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	106	8260C	70-130

EPA Method 8260C MATRIX SPIKE

ANALYTE	DUPLICATE	% RECOVERY	UNITS	RPD	QC Limits	RPD Limit	Qualifier
trans-1,2-Dichloroethene	43.3	86.6	ug/Kg	2.5	70-130	30	
cis-1,2-Dichloroethene	41.6	83.2	ug/Kg	1.2	70-130	30	
Trichloroethene	57.1	114	ug/Kg	1.0	70-130	30	
Tetrachloroethene	61.4	123	ug/Kg	5.4	70-130	30	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	106	8260C	70-130

ChemSolutions

7388 S. Revere Parkway, Suite 805
Centennial, CO 80112
303.771.5570

CASE NARRATIVE

ChemSolutions Project ID: RMC009
RMC Project ID: E15.019.201
September 13, 2017

This report contains the analytical results for the samples collected on 9/9-9/10/17. The samples were analyzed our base laboratory in accordance with Standard Operating Procedure Atlas D Missile Site 4 On-Site Laboratory unless noted otherwise in this Case Narrative.

All sample aliquots were received on ice, in the proper containers, with the appropriate preservatives, and within method specified holding times. All samples were analyzed within the established holding times. All Quality Control are within established criteria except where addressed in this case narrative, a non-conformance form or properly qualified within the sample results.

The data contained in the following report have been reviewed and approved by:

John Graves
Laboratory Director
ChemSolutions LLC

ChemSolutions LLC
Sample Results
Project ID: RMC009

Client Sample ID: FEW4-MW101-(92.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 9/9/17
Date Received: 9/11/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	
Trichloroethene	0.85	1	ug/Kg	1	9/11/2017	8260C	J
Tetrachloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	105	8260C	70-130

ND = Not detected at or above the reporting limit.
J= The compound was detected and verified by its mass spectrum at a concentration less than the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC009

Client Sample ID: FEW4-MW101-(93.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 9/9/17
Date Received: 9/11/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	
Trichloroethene	2.4	1	ug/Kg	1	9/11/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	103	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC009

Client Sample ID: FEW4-MW101-(101.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 9/9/17
Date Received: 9/11/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	
Trichloroethene	12	1	ug/Kg	1	9/11/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	103	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC009

Client Sample ID: FEW4-MW101-(110.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 9/9/17
Date Received: 9/11/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	
Trichloroethene	50	1	ug/Kg	1	9/11/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	104	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC009

Client Sample ID: FEW4-MW101-(120.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 9/9/17
Date Received: 9/11/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	
Trichloroethene	69	1	ug/Kg	1	9/11/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	103	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC009

Client Sample ID: FEW4-MW101-(130.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 9/9/17
Date Received: 9/11/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	
Trichloroethene	120	1	ug/Kg	1	9/11/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	104	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC009

Client Sample ID: FEW4-MW101-(140.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 9/9/17
Date Received: 9/11/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	
Trichloroethene	95	1	ug/Kg	1	9/11/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	102	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC009

Client Sample ID: FEW4-MW101-(150.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 9/9/17
Date Received: 9/11/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	
Trichloroethene	17	1	ug/Kg	1	9/11/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	103	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC009

Client Sample ID: FEW4-MW101-(160.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 9/9/17
Date Received: 9/11/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC009

Client Sample ID: FEW4-MW101-(170.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 9/9/17
Date Received: 9/11/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	
Trichloroethene	16	1	ug/Kg	1	9/11/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	102	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC009

Client Sample ID: FEW4-MW101-(180.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 9/9/17
Date Received: 9/11/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	
Trichloroethene	3.6	1	ug/Kg	1	9/11/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC009

Client Sample ID: FEW4-MW101-(190.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 9/9/17
Date Received: 9/11/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	99.8	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC009

Client Sample ID: FEW4-MW101-(200.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 9/9/17
Date Received: 9/11/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	9/12/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	9/12/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	9/12/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	9/12/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	102	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC009

Client Sample ID: FEW4-MW101-(210.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 9/9/17
Date Received: 9/11/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	102	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC009

Client Sample ID: FEW4-MW101-(220.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 9/10/17
Date Received: 9/11/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	102	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC009

Client Sample ID: FEW4-MW101-(230.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 9/10/17
Date Received: 9/11/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	103	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC009

Client Sample ID: FEW4-MW101-(240.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 9/10/17
Date Received: 9/11/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	104	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC009

Client Sample ID: FEW4-MW101-(250.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 9/10/17
Date Received: 9/11/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	102	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC009

Client Sample ID: FEW4-MW101-(251.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 9/10/17
Date Received: 9/11/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	103	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC009

Client Sample ID: FEW4-MW101-(260.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 9/10/17
Date Received: 9/11/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	103	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC009

Client Sample ID: FEW4-MW101-(270.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 9/10/17
Date Received: 9/11/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	101	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC009

Client Sample ID: FEW4-MW101-(280.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 9/10/17
Date Received: 9/11/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	104	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC009

Client Sample ID: FEW4-MW101-(290.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 9/10/17
Date Received: 9/11/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	103	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC009

Client Sample ID: FEW4-MW101-(300.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 9/10/17
Date Received: 9/11/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	103	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC009

Client Sample ID: FEW4-MW101-(306.0)
Client Project ID: E15.019.201
Sample Matrix: Soil
Wet Weight Basis

Date Sampled: 9/10/17
Date Received: 9/11/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	103	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC009

Client Sample ID: FEW4-MW101-107
Client Project ID: E15.019.201
Sample Matrix: Water

Date Sampled: 9/9/17
Date Received: 9/11/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	10	ug/L	10	9/11/2017	8260C	
cis-1,2-Dichloroethene	ND	10	ug/L	10	9/11/2017	8260C	
Trichloroethene	140	10	ug/L	10	9/11/2017	8260C	
Tetrachloroethene	ND	10	ug/L	10	9/11/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	104	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC009

Client Sample ID: FEW4-IDW-INF
Client Project ID: E15.019.201
Sample Matrix: Water

Date Sampled: 9/9/17
Date Received: 9/11/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/L	1	9/11/2017	8260C	
cis-1,2-Dichloroethene	2.2	1	ug/L	1	9/11/2017	8260C	
Trichloroethene	580	10	ug/L	10	9/12/2017	8260C	
Tetrachloroethene	ND	1	ug/L	1	9/11/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits	
Toluene-d8	100	8260C	70-130	1X Dilution
Toluene-d8	103	8260C	70-130	10X Dilution

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Sample Results
Project ID: RMC009

Client Sample ID: FEW4-IDW-EFF
Client Project ID: E15.019.201
Sample Matrix: Water

Date Sampled: 9/9/17
Date Received: 9/11/17

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/L	1	9/11/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/L	1	9/11/2017	8260C	
Trichloroethene	ND	1	ug/L	1	9/11/2017	8260C	
Tetrachloroethene	ND	1	ug/L	1	9/11/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	103	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Soil Blank Results
Project ID: RMC009

Sample ID: Blank
Client Project ID: E15.019.201
Sample Matrix: Soil

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	9/11/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	106	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Soil Blank Results
Project ID: RMC009

Sample ID: Blank
Client Project ID: E15.019.201
Sample Matrix: Soil

ANALYTE	Concentration	Reporting Limit	Units	Dilution Factor	Date Analyzed	EPA Method	Qualifier
trans-1,2-Dichloroethene	ND	1	ug/Kg	1	9/12/2017	8260C	
cis-1,2-Dichloroethene	ND	1	ug/Kg	1	9/12/2017	8260C	
Trichloroethene	ND	1	ug/Kg	1	9/12/2017	8260C	
Tetrachloroethene	ND	1	ug/Kg	1	9/12/2017	8260C	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	102	8260C	70-130

ND = Not detected at or above the reporting limit.

ChemSolutions LLC
Laboratory Control Sample Results
Project ID: RMC009

Sample ID: LCS
Client Project ID: E15.019.201
Sample Matrix: Soil

EPA Method 8260C Date Analyzed: 9/11/17

ANALYTE	LCS SPIKE	% RECOVERY	UNITS	QC Limits	Qualifier
trans-1,2-Dichloroethene	52.7	105	ug/Kg	70-130	
cis-1,2-Dichloroethene	48.7	97.4	ug/Kg	70-130	
Trichloroethene	49.8	99.6	ug/Kg	70-130	
Tetrachloroethene	53.0	106	ug/Kg	70-130	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	104	8260C	70-130

ChemSolutions LLC
Laboratory Control Sample Results
Project ID: RMC009

Sample ID: LCS
Client Project ID: E15.019.201
Sample Matrix: Soil

EPA Method 8260C Date Analyzed: 9/12/17

ANALYTE	LCS SPIKE	% RECOVERY	UNITS	QC Limits	Qualifier
trans-1,2-Dichloroethene	51.4	103	ug/Kg	70-130	
cis-1,2-Dichloroethene	48.7	97.4	ug/Kg	70-130	
Trichloroethene	47.4	94.8	ug/Kg	70-130	
Tetrachloroethene	46.8	93.6	ug/Kg	70-130	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	104	8260C	70-130

ChemSolutions LLC
Matrix Spike Results
Project ID: RMC009

Client Sample ID: FEW4-MW101-(120.0)
Client Project ID: E15.019.201
Sample Matrix: Soil

EPA Method 8260C Date Analyzed: 9/11/17

ANALYTE	MATRIX SPIKE	% RECOVERY	UNITS	QC Limits	Qualifier
trans-1,2-Dichloroethene	59.8	120	ug/Kg	70-130	
cis-1,2-Dichloroethene	59.4	119	ug/Kg	70-130	
Trichloroethene	128	118	ug/Kg	70-130	
Tetrachloroethene	64.2	128	ug/Kg	70-130	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	103	8260C	70-130

EPA Method 8260C MATRIX SPIKE

ANALYTE	DUPLICATE	% RECOVERY	UNITS	RPD	QC Limits	RPD Limit	Qualifier
trans-1,2-Dichloroethene	61.5	123	ug/Kg	2.8	70-130	30	
cis-1,2-Dichloroethene	55.2	110	ug/Kg	7.3	70-130	30	
Trichloroethene	129	120	ug/Kg	0.8	70-130	30	
Tetrachloroethene	58.4	117	ug/Kg	9.5	70-130	30	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	99.2	8260C	70-130

ChemSolutions LLC
Matrix Spike Results
Project ID: RMC009

Client Sample ID: FEW4-MW101-(260.0)
Client Project ID: E15.019.201
Sample Matrix: Soil

EPA Method 8260C Date Analyzed: 9/11/17

ANALYTE	MATRIX SPIKE	% RECOVERY	UNITS	QC Limits	Qualifier
trans-1,2-Dichloroethene	61.6	123	ug/Kg	70-130	
cis-1,2-Dichloroethene	57.6	115	ug/Kg	70-130	
Trichloroethene	58.3	117	ug/Kg	70-130	
Tetrachloroethene	60.1	120	ug/Kg	70-130	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	102	8260C	70-130

EPA Method 8260C MATRIX SPIKE

ANALYTE	DUPLICATE	% RECOVERY	UNITS	RPD	QC Limits	RPD Limit	Qualifier
trans-1,2-Dichloroethene	61.1	122	ug/Kg	0.8	70-130	30	
cis-1,2-Dichloroethene	55.1	110	ug/Kg	4.4	70-130	30	
Trichloroethene	56.8	114	ug/Kg	2.6	70-130	30	
Tetrachloroethene	59.8	120	ug/Kg	0.5	70-130	30	

Surrogate	% Recovery		Surrogate QC Limits
Toluene-d8	103	8260C	70-130

Appendix C. Offsite Laboratory Definitive Soil Sample Analytical Reports (provided separately)

Appendix D. Data Verification Reports

PROJECT: **Atlas D Missile Site 4 Focused Source Area RI Addendum, Fall 2017**
CLIENT: **Army Corps of Engineers – Omaha District**
LABORATORY: **TestAmerica-Denver**
DATA REVIEWER: **Gary Torf**

DATA REVIEW AND USABILITY REPORT

INTRODUCTION

Data review is the process by which data are examined and evaluated to ensure that data: 1) are of known and documented quality, and 2) meet measurement and project-specific quality objectives. The process involves three related assessments to ensure that project data quality needs are met:

- **Verification** – Confirming data completeness and ensuring that specific data sets conform and comply with procedural, documentation, and contract requirements
- **Validation** – Substantiating that method-specific requirements have been met and that data qualifiers have been applied appropriately and consistently
- **Usability** – Evaluating the adequacy of the project-specific data for the decisions being made, based on the results of the verification and validation review steps

This data review was performed in accordance with the *Final Uniform Federal Policy-Quality Assurance Project Plan for the Remedial Investigation Addendum 2017-2018 Tasks, Atlas "D" Missile Site 4, Laramie County, Wyoming* (RMC, 2017). The collection of Site 4 soil and groundwater samples occurred between July 20 and October 1, 2017. All soil samples were split upon collection and provided to both an on site mobile laboratory and an off-site fixed-based laboratory. The purpose of the on-site soil sample analyses was to collect near real time screening level data for selected borings located in the source area and areas immediately downgradient, to quickly assess the vertical extent of volatile organic compounds (VOCs) in soil and groundwater and to inform field decisions regarding drilling depths and well installation. The purpose of the off-site soil sample analyses was to collect definitive level soil VOC data to characterize the vertical contaminant profile at each location.

The on-site samples submitted for analysis included normal 349 soil and eight investigative derived waste (IDW) water samples. The off-site samples submitted for analysis included 393 normal soil samples and 12 normal groundwater samples; 36 double-blind field duplicate soil samples; 29 matrix spike/matrix spike duplicate soil sample pairs and 1 matrix spike/matrix spike duplicate groundwater sample pair; and 11 IDW soil samples. The screening samples were submitted to ChemSolutions LLC (Centennial, Colorado) for on-site analysis of 4 volatile organic analytes as received (wet weight basis); the definitive samples were delivered off-site to Test America Laboratories (Arvada, Colorado) in 30 sample delivery groups for analysis of 66 volatile organic analytes in soil on a dry-weight basis, and 52 volatile organic analytes in water.

DATA VERIFICATION

Data verification is a sample-specific assessment performed to evaluate sample data completeness, correctness, consistency, and compliance with the quality objectives of the project

plan and contract requirements.

Sample-specific data verification was performed for the definitive level soil and groundwater data on laboratory files uploaded to the United States Army Corps of Engineers (USACE) Formerly Used Defense Sites Chemistry Database (FUDSChem) in a Staged Electronic Data Deliverable (SEDD) 2A format using SEDD Specification and Data Element Dictionary version 5.2. The level of automated data review (ADR) was consistent with USEPA Stage 2A Data Verification and Validation checks, labeled S2AVEM [Stage 2A Validation Electronic and Manual] (EPA, 2009). The electronic data were verified against analytical method criteria and requirements contained in the *Department of Defense (DoD) Quality Systems Manual (QSM) Version (V) 5.1*. (DoD, 2017).

Project data verification has been documented in an Automated Data Review (ADR) Detail Report for each sample delivery group (SDG) using a standard reporting output generated by the FUDSChem database. The 'Batch Report' indicates what samples were batched together when the lab conducted its analysis, the 'QC Outlier Report' indicates the quality control outliers found by the automated data flagging system (and may be superseded by manual data validation), and the 'Qualified Results' listing indicates the results qualified by the ADR or manually by the data validator.

DATA VALIDATION

Data validation is a sample and analyte-specific assessment that substantiates whether analytical requirements have been met, and whether data qualifiers have been applied appropriately and consistently.

Data validation was performed on 100% of the definitive level soil and groundwater sample data according to the analytical method requirements and the criteria listed in the Quality Assurance Project Plan (QAPP) and DoD QSM V5.0 Appendix B Table 4, and technical judgment. The level of data validation was consistent with United States Environmental Protection Agency (EPA) Stage 3 Data Verification and Validation checks, labeled S3VEM [Stage 3 Validation Electronic and Manual] (EPA, 2009).

Project data validation has been documented in a Data Validation Report for each SDG using a standard reporting output generated by the FUDSChem database. The 'Table of All Qualified Results' indicates the results qualified for reasons other than being trace values, the 'Table of All Trace Results' indicates the analytes detected at concentrations less than the limit of quantitation (LOQ), the 'Table of Results with Modified Qualifiers' lists the results qualified manually by the data validator, and the FUDSChem 'Review Questions' checklist provides a record of the data validation according to the assigned data review quality control level.

DATA QUALIFIER DEFINITION

The following definitions provide a brief explanation of the data qualifier flags used during the data validation process:

U The analyte was not detected and is reported as less than the Limit of Detection.

UJ The analyte was not detected and is reported as an estimated value less than the Limit of Detection.

J The result is an estimated value (e.g., QC criteria failure, possible matrix interferences, or the analyte was detected at a concentration outside the quantitation range).

B The result is associated with a contaminated blank.

R The result is rejected due to analytical deficiencies, matrix interferences, and/or other circumstances and may not be used to support critical decisions.

DATA USABILITY SUMMARY

Data Levels

Sample results generated by the on-site laboratory were considered screening level data and usable to guide intermediate and preliminary project decisions. Sample results generated by the off-site laboratory were considered definitive level data and usable for final decisions.

Data Quality Indicators

The data quality indicators of precision, accuracy, representativeness, comparability, completeness, and sensitivity were used to determine the overall acceptability and usability of the analytical results. The data qualifiers presented in this Data Review and Usability Report are considered the final determination of data quality for the definitive sample results.

Sample results that have not been qualified indicate the data meet all acceptance criteria, and all results are considered usable unless specifically qualified “R”.

Precision

Total data precision is evaluated by measuring the variability associated with the entire sampling and analysis process as determined by the collection and analysis of field duplicate (FD) samples and matrix spike (MS) duplicate (MSD) samples; analytical data precision may be evaluated by measuring the variability associated with the analysis of laboratory sample replicates and

laboratory control sample (LCS) duplicates (LCSD).

Most of the soil sample analytes with detected values greater than the associated LOQ in both field sample duplicates met the precision performance criteria of 20% relative percent difference (RPD). The exception was trichloroethene with a 31% RPD for sample FEW4-MW75-(110.0), 66% RPD for sample FEW4-MW76-(140.0), a 38% RPD for sample FEW4-MW80-(145.0), and a 48% RPD for sample FEW4-MW80-(85.0). The only instance of an analyte detected in one sample greater than the LOQ and not detected in the associated duplicate was acetone at 45 µg/kg in soil sample FEW4-MW80-(233).

All groundwater sample analytes met the precision performance criteria of 20% RPD for the one MS/MSD water sample pair.

2 of 25 MS/MSD soil sample pairs had one or more analytes exceed the on-site laboratory precision performance criteria of 30% RPD, indicating relatively good analytical data precision of the method on the sample matrix.

21 of 29 MS/MSD soil sample pairs had one or more analyte exceed the off-site laboratory precision performance criteria of 20% RPD, indicating relatively poor analytical data precision of the method on the sample matrix. Analytes detected in the parent sample of the MS/MSD that exceeded the precision criteria had their results qualified as estimated values (J).

Laboratory sample duplicates, laboratory sample replicates, and LCSD were not required for the soil or groundwater sample analyses.

Based on the FD and the MS/MSD sample precision results the associated field sample data were determined to be usable.

Accuracy

Analytical data accuracy was evaluated by measuring the percent recovery of analytes added to LCS, and the percent recovery of surrogate standards added to individual field and laboratory quality control (QC) samples. At least one LCS was analyzed within each of the analytical batches for the on-site and off-site laboratory analyses.

All the on-site laboratory LCS analyte results met the accuracy performance criteria of 70% to 130% recovery.

Most of the off-site laboratory LCS analyte results met the designated accuracy performance criteria. No LCS analytes were recovered less than the lower control limit. LCS analytes recovered above the upper control limit included: benzene, bromobenzene, bromomethane, 4-chlorotoluene, 1,1 dichloropropene, 1,2-dichloropropane, hexachlorobutadiene, 4-methyl-2-

pentanone, n-butylbenzene, sec-butylbenzene, toluene, 1,2,4-trimethylbenzene, and vinyl chloride. These LCS analytes were not detected in any associated samples.

All the on-site laboratory surrogate analyte results were within the accuracy performance criteria of 70%-130% recovery.

Most of the off-site surrogate analytes were within the designated accuracy performance criteria for each normal and FD sample. 76 out of 1,944 total surrogate analytes (4%) were outside the control limits, with 71 above recovery limits and 5 below recovery limits.

Based on the LCS and surrogate standard accuracy results, the associated field sample data were determined to be usable.

Bias

Sample matrix bias was evaluated by measuring the percent recovery of target analytes added to a soil or water sample (known as a matrix spike) and taking into account the concentration of analytes(s) determined to be present in a non-spiked aliquot of the same sample.

All 52 analytes spiked in the 1 groundwater MS/MSD pair met the performance criteria.

3 of 25 MS/MSD soil sample pairs had one or more of the four spiked analytes exceed the on-site laboratory bias criteria of 70%-130% recovery.

The majority of the 66 analytes spiked in the soil MS/MSD pairs met the matrix bias performance criteria. 264 of the 3,828 analyte spike recovery results (6.9%) were recovered outside the criteria, indicating a matrix bias for one or more analytes on the analytical method for the affected samples. These soil samples were: FEW4-MW75-(205.0), FEW4-MW75-(323.0), FEW4-MW80-(225.0), FEW4-MW81-(70.0), FEW4-MW82-(9.0), FEW4-MW82-(235.0), FEW4-MW83-(95.0), FEW4-MW84-(101.0), FEW4-MW85-(86.0), FEW4-MW86-(269.0), FEW4-MW95-(224.0), FEW4-MW95-(300.0), FEW4-MW97-(11.0), FEW4-MW97-(221.0), FEW4-MW97-(391.0), and FEW4-MW101-(260.0).

Laboratory method blanks were also used to assess bias. No field sample results were qualified based on association with method blank sample analyte concentrations greater than the limit of quantitation (LOQ). At least one method blank was analyzed within each of the analytical batches for the on-site and off-site laboratory analyses. No target analytes were detected in any of the method blanks at concentrations greater than ½ the associated LOQ, and no common lab contaminants (e.g., acetone and methylene chloride) were detected in any of the method blanks at concentrations greater than the LOQ.

Based on the MS/MSD and laboratory method blank bias results, the associated field sample data

were determined to be usable.

Representativeness

The analytical data associated with the field samples are considered representative of the site condition for the following reasons specified in the QAPP: the work plan was followed; proper sampling techniques and sample handling procedures were used; the samples were prepared and analyzed in the same respective SDG; and appropriate documentation was prepared establishing sample identification and integrity.

Comparability

The screening level data and definitive level data were generated using similar analytical methods and associated with similar detection limits. Principal differences included: screening analyses were generally performed within 24 hours on soil samples chilled to less than 4°C, and results reported on a wet-weight basis; definitive analyses were generally performed within 14 days on soil samples frozen within 48 hours of collection, and results reported on a dry weight basis. Comparability criteria between the data levels was not specifically established because the definitive data were not intended to "confirm" the screening data. However, comparison charts of the screening and definitive analytical results indicate agreement well within an order of magnitude.

Completeness

Definitive data completeness was evaluated based on the total number of field samples collected and analyzed and calculated as a percentage of the number of valid (i.e., not rejected due to quality considerations) results compared to the total number of expected results. 10% FD samples were expected to be collected; 36 duplicate soil samples (9.2%) were collected. 5% MS/MSD sample pairs were expected to be collected; 29 soil (7.4%) and 1 groundwater (8.3%) MS/MSD sample pairs were collected. All samples were analyzed for the project specified 66 volatile analytes in soil and 52 volatile analytes in groundwater.

The completeness goal of less than 10% rejected data was met for the soil and groundwater analyses. No analyte results were rejected due to non-compliant quality control criteria.

Sensitivity

Analytical sensitivity, the ability to detect all project specified volatile analytes was evaluated and considered acceptable for the screening and definitive analyses. All sample analyte limit of detection (LOD) values were less than the associated sample LOQ values, and all sample analytes detected between the detection limit (DL) and the LOQ were reported and qualified as estimated values.

REFERENCES

RMC Consultants, Inc. (RMC). 2017. *Final Uniform Federal Policy-Quality Assurance Project Plan for the Remedial Investigation Addendum 2017-2018 Tasks, Atlas "D" Missile Site 4, Laramie County, Wyoming.* October.

Department of Defense (DoD). 2017. *Department of Defense Quality Systems Manual for Environmental Laboratories (QSM), Version 5.1*. January.

United States Environmental Protection Agency (EPA). 2009. *Guidance for Labeling Externally Validated Laboratory Analytical Data for Superfund Use. EPA-540-R-08-1*. January.

US Army Corps of Engineers ®

Batch Report

Test Method: SW8260B Analysis Batch: 280-385049

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
LABQC	SQ	LCS 280-385059/1-A	LCS 280-385059/1-A		1/1	8/21/2017 17:40	8/21/2017 17:40	8/21/2017 20:27	280-385049/	BS
LABQC	SQ	MB 280-385059/2-A	MB 280-385059/2-A		1/1	8/21/2017 17:40	8/21/2017 17:40	8/21/2017 20:48	280-385049/	LB
FEW4-MW86	SO	FEW4-MW86-(238.0)	280-100086-1		1/1	8/8/2017 16:10	8/8/2017 16:10	8/21/2017 22:53	280-385049/	N
FEW4-MW86	SO	FEW4-MW86-(248.0)	280-100086-2		1/1	8/8/2017 16:20	8/8/2017 16:20	8/21/2017 23:14	280-385049/	N
FEW4-MW86	SO	FEW4-MW86-(259.0)	280-100086-3		1/1	8/8/2017 17:20	8/8/2017 17:20	8/21/2017 23:34	280-385049/	N
FEW4-MW86	SO	FEW4-MW86-(269.0)	280-100086-4		1/1	8/8/2017 17:25	8/8/2017 17:25	8/21/2017 23:55	280-385049/	N
FEW4-MW86	SO	FEW4-MW86-(269.0)	280-100086-4MS		1/1	8/8/2017 17:25	8/8/2017 17:25	8/22/2017 00:15	280-385049/	MS
FEW4-MW86	SO	FEW4-MW86-(269.0)	280-100086-4MSD		1/1	8/8/2017 17:25	8/8/2017 17:25	8/22/2017 00:35	280-385049/	SD
FEW4-MW86	SO	FEW4-MW86-(287.0)	280-100086-6		1/1	8/9/2017 09:35	8/9/2017 09:35	8/22/2017 00:55	280-385049/	N
FEW4-MW86	SO	FEW4-MW86-(295.0)	280-100086-7		1/1	8/9/2017 11:00	8/9/2017 11:00	8/22/2017 01:16	280-385049/	N
FEW4-MW86	SO	FEW4-MW86-(305.0)	280-100086-8		1/1	8/9/2017 11:11	8/9/2017 11:11	8/22/2017 01:36	280-385049/	N
FEW4-MW86	SO	FEW4-MW86-(306.0)	280-100086-9		1/1	8/9/2017 12:11	8/9/2017 12:11	8/22/2017 01:56	280-385049/	FD
FEW4-MW86	SO	FEW4-MW86-(313.0)	280-100086-10		1/1	8/9/2017 12:50	8/9/2017 12:50	8/22/2017 02:16	280-385049/	N
FEW4-MW86	SO	FEW4-MW86-(325.0)	280-100086-11		1/1	8/9/2017 13:00	8/9/2017 13:00	8/22/2017 02:37	280-385049/	N
FEW4-MW84	SO	FEW4-MW84-(311.0)	280-100086-12		1/1	8/8/2017 16:55	8/8/2017 16:55	8/22/2017 02:57	280-385049/	N
FEW4-MW84	SO	FEW4-MW84-(324.0)	280-100086-13		1/1	8/8/2017 17:05	8/8/2017 17:05	8/22/2017 03:17	280-385049/	N
FEW4-MW84	SO	FEW4-MW84-(349.0)	280-100086-16		1/1	8/8/2017 18:35	8/8/2017 18:35	8/22/2017 04:17	280-385049/	N

Test Method: SW8260B Analysis Batch: 280-385200

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
LABQC	SQ	LCS 280-385208/1-A	LCS 280-385208/1-A		1/1	8/22/2017 16:00	8/22/2017 16:00	8/22/2017 19:53	280-385200/	BS
LABQC	SQ	LCSD 280-385208/2-A	LCSD 280-385208/2-A		1/1	8/22/2017 16:00	8/22/2017 16:00	8/22/2017 20:14	280-385200/	BD
LABQC	SQ	MB 280-385208/3-A	MB 280-385208/3-A		1/1	8/22/2017 16:00	8/22/2017 16:00	8/22/2017 20:54	280-385200/	LB
FEW4-MW84	SO	FEW4-MW84-(325.0)	280-100086-14		1/1	8/8/2017 18:05	8/8/2017 18:05	8/22/2017 22:16	280-385200/	FD

US Army Corps of Engineers ®

Batch Report

Test Method: SW8260B Analysis Batch: 280-385200

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
FEW4-MW84	SO	FEW4-MW84-(336.0)	280-100086-15		1/1	8/8/2017 18:30	8/8/2017 18:30	8/22/2017 22:36	280-385200/	N

Test Method: SW8260B Analysis Batch: 280-385204

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
LABQC	SQ	LCSD 280-385219/2-A	LCSD 280-385219/2-A		1/1	8/22/2017 16:00	8/22/2017 16:00	8/22/2017 21:42	280-385204/	BD
LABQC	SQ	MB 280-385219/3-A	MB 280-385219/3-A		1/1	8/22/2017 16:00	8/22/2017 16:00	8/22/2017 22:23	280-385204/	LB
LABQC	SQ	LCS 280-385219/1-A	LCS 280-385219/1-A		1/1	8/22/2017 16:00	8/22/2017 16:00	8/22/2017 22:43	280-385204/	BS
FEW4-MW86	SO	FEW4-MW86-(275.0)	280-100086-5		1/1	8/9/2017 09:30	8/9/2017 09:30	8/23/2017 00:47	280-385204/	N
FEW4-MW84	SO	FEW4-MW84-(367.0)	280-100086-18		1/1	8/9/2017 10:35	8/9/2017 10:35	8/23/2017 01:28	280-385204/	N
FEW4-MW84	SO	FEW4-MW84-(374.0)	280-100086-19		1/1	8/9/2017 12:55	8/9/2017 12:55	8/23/2017 01:49	280-385204/	N
FEW4-MW84	SO	FEW4-MW84-(384.0)	280-100086-20		1/1	8/9/2017 13:05	8/9/2017 13:05	8/23/2017 02:10	280-385204/	N

Test Method: SW8260B Analysis Batch: 280-385348

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
LABQC	SQ	LCS 280-385372/1-A	LCS 280-385372/1-A		1/1	8/23/2017 16:00	8/23/2017 16:00	8/23/2017 20:08	280-385348/	BS
LABQC	SQ	LCSD 280-385372/2-A	LCSD 280-385372/2-A		1/1	8/23/2017 16:00	8/23/2017 16:00	8/23/2017 20:29	280-385348/	BD
LABQC	SQ	MB 280-385372/3-A	MB 280-385372/3-A		1/1	8/23/2017 16:00	8/23/2017 16:00	8/23/2017 21:10	280-385348/	LB

US Army Corps of Engineers ®

Batch Report

Test Method: SW8260B Analysis Batch: 280-385348

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
FEW4-MW84	SO	FEW4-MW84-(359.0)	280-100086-17		1/1	8/9/2017 10:25	8/9/2017 10:25	8/23/2017 21:32	280-385348/	N

US Army Corps of Engineers ®

Field Batch Report

--No Records Found--

MS Mismatch Report

--No Records Found--

Section to identify Matrix Spike mismatches where parent sample differs from MS by dilution.

US Army Corps of Engineers ®

QC Outlier Report

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

QC Element	Sample ID/ Lab Sample ID	Run#/ Dil'n	Analyte	Result (Units)	Qualifier	Warning Limits	Control Limits	Reason	Comment	Rule	Action Level
MS Recovery	FEW4-MW86-(269.0) (SD) / 280-100086-4MSD	1 / 1.00	1,2,4-Trichlorobenzene	66.09 (percent)	J/UJ	67 - 129	67 - 129	M			
MS Recovery	FEW4-MW86-(269.0) (SD) / 280-100086-4MSD	1 / 1.00	1,2,4-Trimethylbenzene	68.77 (percent)	J/UJ	75 - 123	75 - 123	M			
MS Recovery	FEW4-MW86-(269.0) (SD) / 280-100086-4MSD	1 / 1.00	1,2-Dichlorobenzene	72.40 (percent)	J/UJ	78 - 121	78 - 121	M			
MS Recovery	FEW4-MW86-(269.0) (SD) / 280-100086-4MSD	1 / 1.00	1,3,5-Trimethylbenzene	71.14 (percent)	J/UJ	73 - 124	73 - 124	M			
MS Recovery	FEW4-MW86-(269.0) (SD) / 280-100086-4MSD	1 / 1.00	1,3-Dichlorobenzene	68.14 (percent)	J/UJ	77 - 121	77 - 121	M			
MS Recovery	FEW4-MW86-(269.0) (SD) / 280-100086-4MSD	1 / 1.00	1,4-Dichlorobenzene	67.67 (percent)	J/UJ	75 - 120	75 - 120	M			
MS Recovery	FEW4-MW86-(269.0) (SD) / 280-100086-4MSD	1 / 1.00	2-Chlorotoluene	71.77 (percent)	J/UJ	75 - 122	75 - 122	M			
MS Recovery	FEW4-MW86-(269.0) (SD) / 280-100086-4MSD	1 / 1.00	4-Chlorotoluene	70.35 (percent)	J/UJ	72 - 124	72 - 124	M			
MS Recovery	FEW4-MW86-(269.0) (SD) / 280-100086-4MSD	1 / 1.00	Bromobenzene	75.08 (percent)	J/UJ	78 - 121	78 - 121	M			
MS Recovery	FEW4-MW86-(269.0) (SD) / 280-100086-4MSD	1 / 1.00	Chlorobenzene	75.55 (percent)	J/UJ	79 - 120	79 - 120	M			
MS Recovery	FEW4-MW86-(269.0) (SD) / 280-100086-4MSD	1 / 1.00	Ethylbenzene	75.24 (percent)	J/UJ	76 - 122	76 - 122	M			
MS Recovery	FEW4-MW86-(269.0) (SD) / 280-100086-4MSD	1 / 1.00	Hexachlorobutadiene	54.57 (percent)	J/UJ	61 - 135	61 - 135	M			
MS Recovery	FEW4-MW86-(269.0) (SD) / 280-100086-4MSD	1 / 1.00	m,p-Xylene	74.92 (percent)	J/UJ	77 - 124	77 - 124	M			
MS Recovery	FEW4-MW86-(269.0) (SD) / 280-100086-4MSD	1 / 1.00	n-Butylbenzene	61.51 (percent)	J/UJ	70 - 128	70 - 128	M			
MS Recovery	FEW4-MW86-(269.0) (SD) / 280-100086-4MSD	1 / 1.00	n-Propylbenzene	70.66 (percent)	J/UJ	73 - 125	73 - 125	M			
MS Recovery	FEW4-MW86-(269.0) (SD) / 280-100086-4MSD	1 / 1.00	o-Xylene	76.66 (percent)	J/UJ	77 - 123	77 - 123	M			
MS Recovery	FEW4-MW86-(269.0) (SD) / 280-100086-4MSD	1 / 1.00	p-Cymene (p-Isopropyltoluene)	65.62 (percent)	J/UJ	73 - 127	73 - 127	M			
MS Recovery	FEW4-MW86-(269.0) (SD) / 280-100086-4MSD	1 / 1.00	sec-Butylbenzene	67.19 (percent)	J/UJ	73 - 126	73 - 126	M			

US Army Corps of Engineers ®

QC Outlier Report

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

QC Element	Sample ID/ Lab Sample ID	Run#/ Dil'n	Analyte	Result (Units)	Qualifier	Warning Limits	Control Limits	Reason	Comment	Rule	Action Level
MS Recovery	FEW4-MW86-(269.0) (SD) / 280-100086-4MSD	1 / 1.00	tert-Butylbenzene	69.72 (percent)	J/UJ	73 - 125	73 - 125	M			
MS RPD	280-100086-4MSD (SD) / 280-100086-4MSD	1 / 1.00	Hexachlorobutadiene	29.14 (rpd)	J/None	< 20	< 20	D			
Test Hold Time	FEW4-MW84-(325.0) (FD) / 280-100086-14	1 / 1.00	All in Run	14.17 (days)	J/UJ	< 14	< 14	H1	Test Exceeds UCL		
Test Hold Time	FEW4-MW84-(336.0) (N) / 280-100086-15	1 / 1.00	All in Run	14.17 (days)	J/UJ	< 14	< 14	H1	Test Exceeds UCL		
Test Hold Time	FEW4-MW84-(359.0) (N) / 280-100086-17	1 / 1.00	All in Run	14.46 (days)	J/UJ	< 14	< 14	H1	Test Exceeds UCL		

Rule is the multiplier used when blank contamination occurs to determine action level.

US Army Corps of Engineers ®

Qualified Results

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW84-(311.0)	280-100086-12	SO	N	Acetone	23	18 J	18 J		ug/kg	TR
FEW4-MW84-(349.0)	280-100086-16	SO	N	Acetone	19	7.9 J	7.9 J		ug/kg	TR
FEW4-MW84-(359.0)	280-100086-17	SO	N	Toluene	6.1	1.0 J	1.0 J		ug/kg	TR
FEW4-MW84-(367.0)	280-100086-18	SO	N	Acetone	22	18 J	18 J		ug/kg	TR
FEW4-MW84-(374.0)	280-100086-19	SO	N	Acetone	28	19 J	19 J		ug/kg	TR
FEW4-MW84-(384.0)	280-100086-20	SO	N	Acetone	25	8.5 J	8.5 J		ug/kg	TR
FEW4-MW86-(238.0)	280-100086-1	SO	N	Acetone	35	9.6 J	9.6 J		ug/kg	TR
FEW4-MW86-(269.0)	280-100086-4	SO	N	1,2,4-Trichlorobenzene	6.8	2.2 U J	2.2 UJ	-	ug/kg	M
FEW4-MW86-(269.0)	280-100086-4	SO	N	1,2,4-Trimethylbenzene	6.8	2.2 U J	2.2 UJ	-	ug/kg	M
FEW4-MW86-(269.0)	280-100086-4	SO	N	1,2-Dichlorobenzene	6.8	2.2 U J	2.2 UJ	-	ug/kg	M
FEW4-MW86-(269.0)	280-100086-4	SO	N	1,3,5-Trimethylbenzene	6.8	2.2 U J	2.2 UJ	-	ug/kg	M
FEW4-MW86-(269.0)	280-100086-4	SO	N	1,3-Dichlorobenzene	6.8	2.2 U J	2.2 UJ	-	ug/kg	M
FEW4-MW86-(269.0)	280-100086-4	SO	N	1,4-Dichlorobenzene	6.8	2.2 U J	2.2 UJ	-	ug/kg	M
FEW4-MW86-(269.0)	280-100086-4	SO	N	2-Chlorotoluene	6.8	2.2 U J	2.2 UJ	-	ug/kg	M
FEW4-MW86-(269.0)	280-100086-4	SO	N	4-Chlorotoluene	6.8	2.2 U J	2.2 UJ	-	ug/kg	M
FEW4-MW86-(269.0)	280-100086-4	SO	N	Bromobenzene	6.8	2.2 U J	2.2 UJ	-	ug/kg	M
FEW4-MW86-(269.0)	280-100086-4	SO	N	Chlorobenzene	6.8	2.2 U J	2.2 UJ	-	ug/kg	M
FEW4-MW86-(269.0)	280-100086-4	SO	N	Ethylbenzene	6.8	2.2 U J	2.2 UJ	-	ug/kg	M
FEW4-MW86-(269.0)	280-100086-4	SO	N	Hexachlorobutadiene	6.8	2.2 U J	2.2 UJ	-	ug/kg	M
FEW4-MW86-(269.0)	280-100086-4	SO	N	m,p-Xylene	4.3	4.3 U J	4.3 UJ	-	ug/kg	M
FEW4-MW86-(269.0)	280-100086-4	SO	N	n-Butylbenzene	6.8	2.2 U J	2.2 UJ	-	ug/kg	M
FEW4-MW86-(269.0)	280-100086-4	SO	N	n-Propylbenzene	6.8	2.2 U J	2.2 UJ	-	ug/kg	M
FEW4-MW86-(269.0)	280-100086-4	SO	N	o-Xylene	6.8	2.2 U	2.2 UJ	-	ug/kg	M
FEW4-MW86-(269.0)	280-100086-4	SO	N	p-Cymene (p-Isopropyltoluene)	6.8	2.2 U J	2.2 UJ	-	ug/kg	M
FEW4-MW86-(269.0)	280-100086-4	SO	N	sec-Butylbenzene	6.8	2.2 U J	2.2 UJ	-	ug/kg	M
FEW4-MW86-(269.0)	280-100086-4	SO	N	tert-Butylbenzene	6.8	2.2 U J	2.2 UJ	-	ug/kg	M
FEW4-MW86-(275.0)	280-100086-5	SO	N	Acetone	36	24 J	24 J		ug/kg	TR

US Army Corps of Engineers ®

Qualified Results

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW86-(295.0)	280-100086-7	SO	N	Acetone	21	9.6 J	9.6 J		ug/kg	TR
FEW4-MW86-(313.0)	280-100086-10	SO	N	Acetone	47	23 J	23 J		ug/kg	TR
FEW4-MW86-(325.0)	280-100086-11	SO	N	Acetone	30	20 J	20 J		ug/kg	TR

Qualified analytes in samples are reported as estimated, not detected (UJ) at the Limit of Detection (LOD).

Detected Results

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Dilution	Analyte	LOQ	Lab Result	Qualified Result	Units	Reason
FEW4-MW84-(311.0)	280-100086-12	SO	N	1	Acetone	23	18 J	18 J	ug/kg	TR
FEW4-MW84-(324.0)	280-100086-13	SO	N	1	Acetone	22	35	35	ug/kg	
FEW4-MW84-(325.0)	280-100086-14	SO	FD	1	Acetone	24	42	42	ug/kg	
FEW4-MW84-(336.0)	280-100086-15	SO	N	1	Acetone	33	73	73	ug/kg	
FEW4-MW84-(349.0)	280-100086-16	SO	N	1	Acetone	19	7.9 J	7.9 J	ug/kg	TR
FEW4-MW84-(359.0)	280-100086-17	SO	N	1	Acetone	24	41	41	ug/kg	
FEW4-MW84-(359.0)	280-100086-17	SO	N	1	Toluene	6.1	1.0 J	1.0 J	ug/kg	TR
FEW4-MW84-(367.0)	280-100086-18	SO	N	1	Acetone	22	18 J	18 J	ug/kg	TR
FEW4-MW84-(374.0)	280-100086-19	SO	N	1	Acetone	28	19 J	19 J	ug/kg	TR
FEW4-MW84-(384.0)	280-100086-20	SO	N	1	Acetone	25	8.5 J	8.5 J	ug/kg	TR
FEW4-MW86-(238.0)	280-100086-1	SO	N	1	Acetone	35	9.6 J	9.6 J	ug/kg	TR
FEW4-MW86-(248.0)	280-100086-2	SO	N	1	Acetone	26	66	66	ug/kg	
FEW4-MW86-(259.0)	280-100086-3	SO	N	1	Acetone	17	17	17	ug/kg	
FEW4-MW86-(275.0)	280-100086-5	SO	N	1	Acetone	36	24 J	24 J	ug/kg	TR
FEW4-MW86-(287.0)	280-100086-6	SO	N	1	Acetone	27	30	30	ug/kg	
FEW4-MW86-(295.0)	280-100086-7	SO	N	1	Acetone	21	9.6 J	9.6 J	ug/kg	TR
FEW4-MW86-(305.0)	280-100086-8	SO	N	1	Acetone	26	74	74	ug/kg	
FEW4-MW86-(306.0)	280-100086-9	SO	FD	1	Acetone	24	25	25	ug/kg	
FEW4-MW86-(313.0)	280-100086-10	SO	N	1	Acetone	47	23 J	23 J	ug/kg	TR
FEW4-MW86-(325.0)	280-100086-11	SO	N	1	Acetone	30	20 J	20 J	ug/kg	TR

US Army Corps of Engineers ®

Rejected Results

--No Records Found--

US Army Corps of Engineers ®

Facility:	B08WY0467-02, F.E. Warren AFB, Site 4
Event:	2017-2018 RI Addendum Tasks
SDG:	280-100086-1_52_2a_FUDSChem
Guidance Document:	Draft-Final Uniform Federal Policy-Quality Assurance Project Plan for the Remedial Investigation Addendum 2017-2018 Tasks Atlas "D" Missile Site 4 —Laramie County, Wyoming, July 2017
Prime Contractor:	RMC Consultants, Inc., LAKEWOOD, CO
Project Manager:	David Groy
Contract Laboratory:	TestAmerica Laboratories, Inc., Arvada, CO
Data Review Contractor:	RMC Consultants
Data Review Level:	Stage 3VEM
Primary Data Reviewer:	Gary Torf, Contractor Project Chemist
Second Reviewer:	, Senior Scientist
Date Submitted:	

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	SW8260B
FEW4-MW84-(311.0)	280-100086-12	Solid	Field Sample/N	X
FEW4-MW84-(324.0)	280-100086-13	Solid	Field Sample/N	X
FEW4-MW84-(325.0)	280-100086-14	Solid	Field Duplicate/FD	X
FEW4-MW84-(336.0)	280-100086-15	Solid	Field Sample/N	X
FEW4-MW84-(349.0)	280-100086-16	Solid	Field Sample/N	X
FEW4-MW84-(359.0)	280-100086-17	Solid	Field Sample/N	X
FEW4-MW84-(367.0)	280-100086-18	Solid	Field Sample/N	X
FEW4-MW84-(374.0)	280-100086-19	Solid	Field Sample/N	X
FEW4-MW84-(384.0)	280-100086-20	Solid	Field Sample/N	X
FEW4-MW86-(238.0)	280-100086-1	Solid	Field Sample/N	X
FEW4-MW86-(248.0)	280-100086-2	Solid	Field Sample/N	X
FEW4-MW86-(259.0)	280-100086-3	Solid	Field Sample/N	X
FEW4-MW86-(269.0)	280-100086-4	Solid	Field Sample/N	X
FEW4-MW86-(275.0)	280-100086-5	Solid	Field Sample/N	X
FEW4-MW86-(287.0)	280-100086-6	Solid	Field Sample/N	X
FEW4-MW86-(295.0)	280-100086-7	Solid	Field Sample/N	X
FEW4-MW86-(305.0)	280-100086-8	Solid	Field Sample/N	X
FEW4-MW86-(306.0)	280-100086-9	Solid	Field Duplicate/FD	X
FEW4-MW86-(313.0)	280-100086-10	Solid	Field Sample/N	X

US Army Corps of Engineers ®

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	SW8260B
FEW4-MW86-(325.0)	280-100086-11	Solid	Field Sample/N	X

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the Draft-Final Uniform Federal Policy-Quality Assurance Project Plan for the Remedial Investigation Addendum 2017-2018 Tasks Atlas “D” Missile Site 4 —Laramie County, Wyoming, July 2017 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by RMC Consultants, Inc., LAKEWOOD, CO; analyses were performed by TestAmerica Laboratories, Inc., Arvada, CO and were reported under sample delivery group (SDG) 280-100086-1_52_2a_FUDSChem. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

- Blank
- Blank - Negative
- Field Duplicate RPD
- LCS Recovery
- LCS RPD
- MS Recovery
- MS RPD
- Prep Hold Time
- Surrogate
- Test Hold Time

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 19 results (1.44%) out of the 1320 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected. Trace values, defined as results that are qualified as estimated because they fall between the limit of detection and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

Narrative Comments

Analytical Method	Data Reviewer Comment
SW8260B	No additional comments; see Checklist for detail.

October 31, 2017

Reviewed by Gary Torf, Contractor Project Chemist, RMC Consultants

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of a minimum of 10% of the reported sample results and method quality control data between the two deliverables.

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

Quality Control Outliers for test method SW8260B, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
FEW4-MW86-(269.0) (SD)/ 280-100086-4MSD	Hexachlorobutadiene	54.57	61 - 135	61 - 135	percent	J/UJ	M	
FEW4-MW86-(269.0) (SD)/ 280-100086-4MSD	n-Butylbenzene	61.51	70 - 128	70 - 128	percent	J/UJ	M	
FEW4-MW86-(269.0) (SD)/ 280-100086-4MSD	p-Cymene (p-Isopropyltoluene)	65.62	73 - 127	73 - 127	percent	J/UJ	M	
FEW4-MW86-(269.0) (SD)/ 280-100086-4MSD	1,2,4-Trichlorobenzene	66.09	67 - 129	67 - 129	percent	J/UJ	M	
FEW4-MW86-(269.0) (SD)/ 280-100086-4MSD	sec-Butylbenzene	67.19	73 - 126	73 - 126	percent	J/UJ	M	
FEW4-MW86-(269.0) (SD)/ 280-100086-4MSD	1,4-Dichlorobenzene	67.67	75 - 120	75 - 120	percent	J/UJ	M	
FEW4-MW86-(269.0) (SD)/ 280-100086-4MSD	1,3-Dichlorobenzene	68.14	77 - 121	77 - 121	percent	J/UJ	M	
FEW4-MW86-(269.0) (SD)/ 280-100086-4MSD	1,2,4-Trimethylbenzene	68.77	75 - 123	75 - 123	percent	J/UJ	M	
FEW4-MW86-(269.0) (SD)/ 280-100086-4MSD	tert-Butylbenzene	69.72	73 - 125	73 - 125	percent	J/UJ	M	
FEW4-MW86-(269.0) (SD)/ 280-100086-4MSD	4-Chlorotoluene	70.35	72 - 124	72 - 124	percent	J/UJ	M	
FEW4-MW86-(269.0) (SD)/ 280-100086-4MSD	n-Propylbenzene	70.66	73 - 125	73 - 125	percent	J/UJ	M	
FEW4-MW86-(269.0) (SD)/ 280-100086-4MSD	1,3,5-Trimethylbenzene	71.14	73 - 124	73 - 124	percent	J/UJ	M	
FEW4-MW86-(269.0) (SD)/ 280-100086-4MSD	2-Chlorotoluene	71.77	75 - 122	75 - 122	percent	J/UJ	M	
FEW4-MW86-(269.0) (SD)/ 280-100086-4MSD	1,2-Dichlorobenzene	72.40	78 - 121	78 - 121	percent	J/UJ	M	
FEW4-MW86-(269.0) (SD)/ 280-100086-4MSD	m,p-Xylene	74.92	77 - 124	77 - 124	percent	J/UJ	M	
FEW4-MW86-(269.0) (SD)/ 280-100086-4MSD	Bromobenzene	75.08	78 - 121	78 - 121	percent	J/UJ	M	
FEW4-MW86-(269.0) (SD)/ 280-100086-4MSD	Ethylbenzene	75.24	76 - 122	76 - 122	percent	J/UJ	M	
FEW4-MW86-(269.0) (SD)/ 280-100086-4MSD	Chlorobenzene	75.55	79 - 120	79 - 120	percent	J/UJ	M	
FEW4-MW86-(269.0) (SD)/ 280-100086-4MSD	o-Xylene	76.66	77 - 123	77 - 123	percent	J/UJ	M	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the MS Recovery for SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW86-(269.0)	N	1,2,4-Trichlorobenzene	6.8	2.2 U J	2.2 UJ	-	ug/kg	M

Qualified Results associated with the MS Recovery for SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW86-(269.0)	N	1,2,4-Trimethylbenzene	6.8	2.2 U J	2.2 UJ	-	ug/kg	M
FEW4-MW86-(269.0)	N	1,2-Dichlorobenzene	6.8	2.2 U J	2.2 UJ	-	ug/kg	M
FEW4-MW86-(269.0)	N	1,3,5-Trimethylbenzene	6.8	2.2 U J	2.2 UJ	-	ug/kg	M
FEW4-MW86-(269.0)	N	1,3-Dichlorobenzene	6.8	2.2 U J	2.2 UJ	-	ug/kg	M
FEW4-MW86-(269.0)	N	1,4-Dichlorobenzene	6.8	2.2 U J	2.2 UJ	-	ug/kg	M
FEW4-MW86-(269.0)	N	2-Chlorotoluene	6.8	2.2 U J	2.2 UJ	-	ug/kg	M
FEW4-MW86-(269.0)	N	4-Chlorotoluene	6.8	2.2 U J	2.2 UJ	-	ug/kg	M
FEW4-MW86-(269.0)	N	Bromobenzene	6.8	2.2 U J	2.2 UJ	-	ug/kg	M
FEW4-MW86-(269.0)	N	Chlorobenzene	6.8	2.2 U J	2.2 UJ	-	ug/kg	M
FEW4-MW86-(269.0)	N	Ethylbenzene	6.8	2.2 U J	2.2 UJ	-	ug/kg	M
FEW4-MW86-(269.0)	N	Hexachlorobutadiene	6.8	2.2 U J	2.2 UJ	-	ug/kg	M
FEW4-MW86-(269.0)	N	m,p-Xylene	4.3	4.3 U J	4.3 UJ	-	ug/kg	M
FEW4-MW86-(269.0)	N	n-Butylbenzene	6.8	2.2 U J	2.2 UJ	-	ug/kg	M
FEW4-MW86-(269.0)	N	n-Propylbenzene	6.8	2.2 U J	2.2 UJ	-	ug/kg	M
FEW4-MW86-(269.0)	N	o-Xylene	6.8	2.2 U	2.2 UJ	-	ug/kg	M
FEW4-MW86-(269.0)	N	p-Cymene (p-Isopropyltoluene)	6.8	2.2 U J	2.2 UJ	-	ug/kg	M
FEW4-MW86-(269.0)	N	sec-Butylbenzene	6.8	2.2 U J	2.2 UJ	-	ug/kg	M
FEW4-MW86-(269.0)	N	tert-Butylbenzene	6.8	2.2 U J	2.2 UJ	-	ug/kg	M

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

Quality Control Outliers for test method SW8260B, MS RPD

The objective of matrix spikes/matrix spike duplicates (MS/MSD) RPD analysis is to demonstrate acceptable method precision by the laboratory at the time of analysis. MS/MSD analyses are also performed to generate data that determines the long-term precision of the analytical method on various matrices. Non-homogenous samples can impact the apparent method precision. Summary forms were evaluated and compared to electronic data deliverables. Matrix spikes/matrix spike duplicates results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
280-100086-4MSD (SD)/ 280-100086-4MSD	Hexachlorobutadiene	29.14	< 20	< 20	rpd	J/None	D	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

Quality Control Outliers for test method SW8260B, Test Hold Time

Hold times are ascertained based on project requirements. Holding times were determined by comparing the chain of custody records with the dates of analysis found in the electronic data deliverable and laboratory summary forms. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
FEW4-MW84-(325.0) (FD)/ 280-100086-14		14.17	< 14	< 14	days	J/UJ	H1	Test Exceeds UCL
FEW4-MW84-(336.0) (N)/ 280-100086-15		14.17	< 14	< 14	days	J/UJ	H1	Test Exceeds UCL
FEW4-MW84-(359.0) (N)/ 280-100086-17		14.46	< 14	< 14	days	J/UJ	H1	Test Exceeds UCL

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

Table of All Qualified Results

Test Method: SW8260B	Extraction Method: SW5035A							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW86-(269.0)	N	1,2,4-Trichlorobenzene	6.8	2.2 U J	2.2 UJ	-	ug/kg	M
FEW4-MW86-(269.0)	N	1,2,4-Trimethylbenzene	6.8	2.2 U J	2.2 UJ	-	ug/kg	M
FEW4-MW86-(269.0)	N	1,2-Dichlorobenzene	6.8	2.2 U J	2.2 UJ	-	ug/kg	M
FEW4-MW86-(269.0)	N	1,3,5-Trimethylbenzene	6.8	2.2 U J	2.2 UJ	-	ug/kg	M
FEW4-MW86-(269.0)	N	1,3-Dichlorobenzene	6.8	2.2 U J	2.2 UJ	-	ug/kg	M
FEW4-MW86-(269.0)	N	1,4-Dichlorobenzene	6.8	2.2 U J	2.2 UJ	-	ug/kg	M
FEW4-MW86-(269.0)	N	2-Chlorotoluene	6.8	2.2 U J	2.2 UJ	-	ug/kg	M
FEW4-MW86-(269.0)	N	4-Chlorotoluene	6.8	2.2 U J	2.2 UJ	-	ug/kg	M
FEW4-MW86-(269.0)	N	Bromobenzene	6.8	2.2 U J	2.2 UJ	-	ug/kg	M
FEW4-MW86-(269.0)	N	Chlorobenzene	6.8	2.2 U J	2.2 UJ	-	ug/kg	M
FEW4-MW86-(269.0)	N	Ethylbenzene	6.8	2.2 U J	2.2 UJ	-	ug/kg	M
FEW4-MW86-(269.0)	N	Hexachlorobutadiene	6.8	2.2 U J	2.2 UJ	-	ug/kg	M
FEW4-MW86-(269.0)	N	m,p-Xylene	4.3	4.3 U J	4.3 UJ	-	ug/kg	M
FEW4-MW86-(269.0)	N	n-Butylbenzene	6.8	2.2 U J	2.2 UJ	-	ug/kg	M
FEW4-MW86-(269.0)	N	n-Propylbenzene	6.8	2.2 U J	2.2 UJ	-	ug/kg	M
FEW4-MW86-(269.0)	N	o-Xylene	6.8	2.2 U	2.2 UJ	-	ug/kg	M
FEW4-MW86-(269.0)	N	p-Cymene (p-Isopropyltoluene)	6.8	2.2 U J	2.2 UJ	-	ug/kg	M
FEW4-MW86-(269.0)	N	sec-Butylbenzene	6.8	2.2 U J	2.2 UJ	-	ug/kg	M
FEW4-MW86-(269.0)	N	tert-Butylbenzene	6.8	2.2 U J	2.2 UJ	-	ug/kg	M

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
Trace values are not included in the qualified results table unless additional reason codes are associated.

Table of All Trace Results

Test Method: SW8260B	Extraction Method: SW5035A							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW84-(311.0)	N	Acetone	23.0	18.0 J	18.0 J		ug/kg	TR
FEW4-MW84-(349.0)	N	Acetone	19.0	7.90 J	7.90 J		ug/kg	TR
FEW4-MW84-(359.0)	N	Toluene	6.10	1.00 J	1.00 J		ug/kg	TR
FEW4-MW84-(367.0)	N	Acetone	22.0	18.0 J	18.0 J		ug/kg	TR
FEW4-MW84-(374.0)	N	Acetone	28.0	19.0 J	19.0 J		ug/kg	TR
FEW4-MW84-(384.0)	N	Acetone	25.0	8.50 J	8.50 J		ug/kg	TR
FEW4-MW86-(238.0)	N	Acetone	35.0	9.60 J	9.60 J		ug/kg	TR
FEW4-MW86-(275.0)	N	Acetone	36.0	24.0 J	24.0 J		ug/kg	TR
FEW4-MW86-(295.0)	N	Acetone	21.0	9.60 J	9.60 J		ug/kg	TR
FEW4-MW86-(313.0)	N	Acetone	47.0	23.0 J	23.0 J		ug/kg	TR
FEW4-MW86-(325.0)	N	Acetone	30.0	20.0 J	20.0 J		ug/kg	TR

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW84-(325.0)	FD	1,1,1,2-Tetrachloroethane	6.0	1.9 U	1.9 UJ	1.9 U	
FEW4-MW84-(325.0)	FD	1,1,1-Trichloroethane	6.0	1.9 U Q	1.9 UJ	1.9 U	
FEW4-MW84-(325.0)	FD	1,1,2,2-Tetrachloroethane	6.0	1.9 U	1.9 UJ	1.9 U	
FEW4-MW84-(325.0)	FD	1,1,2-Trichloroethane	6.0	3.8 U	3.8 UJ	3.8 U	
FEW4-MW84-(325.0)	FD	1,1-Dichloroethane	6.0	0.96 U	0.96 UJ	0.96 U	
FEW4-MW84-(325.0)	FD	1,1-Dichloroethene	6.0	1.9 U	1.9 UJ	1.9 U	
FEW4-MW84-(325.0)	FD	1,1-Dichloropropene	6.0	1.9 U	1.9 UJ	1.9 U	
FEW4-MW84-(325.0)	FD	1,2,3-Trichlorobenzene	6.0	1.9 U	1.9 UJ	1.9 U	
FEW4-MW84-(325.0)	FD	1,2,3-Trichloropropane	6.0	3.8 U	3.8 UJ	3.8 U	
FEW4-MW84-(325.0)	FD	1,2,4-Trichlorobenzene	6.0	1.9 U	1.9 UJ	1.9 U	
FEW4-MW84-(325.0)	FD	1,2,4-Trimethylbenzene	6.0	1.9 U	1.9 UJ	1.9 U	
FEW4-MW84-(325.0)	FD	1,2-Dibromo-3-chloropropane	12	1.9 U	1.9 UJ	1.9 U	
FEW4-MW84-(325.0)	FD	1,2-Dibromoethane (EDB)	6.0	1.9 U	1.9 UJ	1.9 U	
FEW4-MW84-(325.0)	FD	1,2-Dichlorobenzene	6.0	1.9 U	1.9 UJ	1.9 U	
FEW4-MW84-(325.0)	FD	1,2-Dichloroethane	6.0	1.9 U	1.9 UJ	1.9 U	
FEW4-MW84-(325.0)	FD	1,2-Dichloroethene	6.0	1.9 U	1.9 UJ	1.9 U	
FEW4-MW84-(325.0)	FD	1,2-Dichloropropane	6.0	1.9 U	1.9 UJ	1.9 U	
FEW4-MW84-(325.0)	FD	1,3,5-Trimethylbenzene	6.0	1.9 U	1.9 UJ	1.9 U	
FEW4-MW84-(325.0)	FD	1,3-Dichlorobenzene	6.0	1.9 U	1.9 UJ	1.9 U	
FEW4-MW84-(325.0)	FD	1,3-Dichloropropane	6.0	1.9 U	1.9 UJ	1.9 U	
FEW4-MW84-(325.0)	FD	1,4-Dichlorobenzene	6.0	1.9 U	1.9 UJ	1.9 U	
FEW4-MW84-(325.0)	FD	2,2-Dichloropropane	6.0	1.9 U Q	1.9 UJ	1.9 U	
FEW4-MW84-(325.0)	FD	2-Butanone (MEK)	24	7.7 U	7.7 UJ	7.7 U	
FEW4-MW84-(325.0)	FD	2-Chlorotoluene	6.0	1.9 U	1.9 UJ	1.9 U	
FEW4-MW84-(325.0)	FD	2-Hexanone	24	15 U	15 UJ	15 U	
FEW4-MW84-(325.0)	FD	4-Chlorotoluene	6.0	1.9 U	1.9 UJ	1.9 U	
FEW4-MW84-(325.0)	FD	4-Methyl-2-pentanone (MIBK)	24	15 U	15 UJ	15 U	
FEW4-MW84-(325.0)	FD	Acetone	24	42	42 J	42	
FEW4-MW84-(325.0)	FD	Benzene	6.0	1.9 U	1.9 UJ	1.9 U	
FEW4-MW84-(325.0)	FD	Bromobenzene	6.0	1.9 U	1.9 UJ	1.9 U	
FEW4-MW84-(325.0)	FD	Bromochloromethane	6.0	0.96 U Q	0.96 UJ	0.96 U	
FEW4-MW84-(325.0)	FD	Bromodichloromethane	6.0	0.96 U	0.96 UJ	0.96 U	
FEW4-MW84-(325.0)	FD	Bromoform	6.0	0.96 U	0.96 UJ	0.96 U	
FEW4-MW84-(325.0)	FD	Bromomethane	12	1.9 U	1.9 UJ	1.9 U	
FEW4-MW84-(325.0)	FD	Carbon disulfide	6.0	1.9 U	1.9 UJ	1.9 U	
FEW4-MW84-(325.0)	FD	Carbon tetrachloride	6.0	1.9 U Q	1.9 UJ	1.9 U	
FEW4-MW84-(325.0)	FD	Chlorobenzene	6.0	1.9 U	1.9 UJ	1.9 U	
FEW4-MW84-(325.0)	FD	Chloroethane	12	3.8 U	3.8 UJ	3.8 U	
FEW4-MW84-(325.0)	FD	Chloroform	12	0.96 U	0.96 UJ	0.96 U	
FEW4-MW84-(325.0)	FD	Chloromethane	12	1.9 U	1.9 UJ	1.9 U	
FEW4-MW84-(325.0)	FD	cis-1,2-Dichloroethene	6.0	1.9 U	1.9 UJ	1.9 U	

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW84-(325.0)	FD	cis-1,3-Dichloropropene	6.0	3.8 U	3.8 UJ	3.8 U	
FEW4-MW84-(325.0)	FD	Dibromochloromethane	6.0	1.9 U	1.9 UJ	1.9 U	
FEW4-MW84-(325.0)	FD	Dibromomethane	6.0	3.8 U	3.8 UJ	3.8 U	
FEW4-MW84-(325.0)	FD	Dichlorodifluoromethane	12	1.9 U Q	1.9 UJ	1.9 U	
FEW4-MW84-(325.0)	FD	Ethylbenzene	6.0	1.9 U	1.9 UJ	1.9 U	
FEW4-MW84-(325.0)	FD	Hexachlorobutadiene	6.0	1.9 U	1.9 UJ	1.9 U	
FEW4-MW84-(325.0)	FD	Isopropylbenzene (Cumene)	6.0	1.9 U	1.9 UJ	1.9 U	
FEW4-MW84-(325.0)	FD	m,p-Xylene	3.8	3.8 U	3.8 UJ	3.8 U	
FEW4-MW84-(325.0)	FD	Methyl tert-butyl ether (MTBE)	24	0.96 U	0.96 UJ	0.96 U	
FEW4-MW84-(325.0)	FD	Methylene chloride	6.0	3.8 U	3.8 UJ	3.8 U	
FEW4-MW84-(325.0)	FD	Naphthalene	6.0	1.9 U	1.9 UJ	1.9 U	
FEW4-MW84-(325.0)	FD	n-Butylbenzene	6.0	1.9 U	1.9 UJ	1.9 U	
FEW4-MW84-(325.0)	FD	n-Propylbenzene	6.0	1.9 U	1.9 UJ	1.9 U	
FEW4-MW84-(325.0)	FD	o-Xylene	6.0	1.9 U	1.9 UJ	1.9 U	
FEW4-MW84-(325.0)	FD	p-Cymene (p-Isopropyltoluene)	6.0	1.9 U	1.9 UJ	1.9 U	
FEW4-MW84-(325.0)	FD	sec-Butylbenzene	6.0	1.9 U	1.9 UJ	1.9 U	
FEW4-MW84-(325.0)	FD	Styrene	6.0	1.9 U	1.9 UJ	1.9 U	
FEW4-MW84-(325.0)	FD	tert-Butylbenzene	6.0	1.9 U	1.9 UJ	1.9 U	
FEW4-MW84-(325.0)	FD	Tetrachloroethene (PCE)	6.0	1.9 U	1.9 UJ	1.9 U	
FEW4-MW84-(325.0)	FD	Toluene	6.0	1.9 U	1.9 UJ	1.9 U	
FEW4-MW84-(325.0)	FD	trans-1,2-Dichloroethene	6.0	0.96 U	0.96 UJ	0.96 U	
FEW4-MW84-(325.0)	FD	trans-1,3-Dichloropropene	6.0	1.9 U Q	1.9 UJ	1.9 U	
FEW4-MW84-(325.0)	FD	Trichloroethene (TCE)	6.0	0.96 U	0.96 UJ	0.96 U	
FEW4-MW84-(325.0)	FD	Trichlorofluoromethane	12	3.8 U Q	3.8 UJ	3.8 U	
FEW4-MW84-(325.0)	FD	Vinyl chloride	6.0	3.8 U	3.8 UJ	3.8 U	
FEW4-MW84-(336.0)	N	1,1,1,2-Tetrachloroethane	8.2	2.6 U	2.6 UJ	2.6 U	
FEW4-MW84-(336.0)	N	1,1,1-Trichloroethane	8.2	2.6 U Q	2.6 UJ	2.6 U	
FEW4-MW84-(336.0)	N	1,1,2,2-Tetrachloroethane	8.2	2.6 U	2.6 UJ	2.6 U	
FEW4-MW84-(336.0)	N	1,1,2-Trichloroethane	8.2	5.2 U	5.2 UJ	5.2 U	
FEW4-MW84-(336.0)	N	1,1-Dichloroethane	8.2	1.3 U	1.3 UJ	1.3 U	
FEW4-MW84-(336.0)	N	1,1-Dichloroethene	8.2	2.6 U	2.6 UJ	2.6 U	
FEW4-MW84-(336.0)	N	1,1-Dichloropropene	8.2	2.6 U	2.6 UJ	2.6 U	
FEW4-MW84-(336.0)	N	1,2,3-Trichlorobenzene	8.2	2.6 U	2.6 UJ	2.6 U	
FEW4-MW84-(336.0)	N	1,2,3-Trichloropropane	8.2	5.2 U	5.2 UJ	5.2 U	
FEW4-MW84-(336.0)	N	1,2,4-Trichlorobenzene	8.2	2.6 U	2.6 UJ	2.6 U	
FEW4-MW84-(336.0)	N	1,2,4-Trimethylbenzene	8.2	2.6 U	2.6 UJ	2.6 U	
FEW4-MW84-(336.0)	N	1,2-Dibromo-3-chloropropane	16	2.6 U	2.6 UJ	2.6 U	
FEW4-MW84-(336.0)	N	1,2-Dibromoethane (EDB)	8.2	2.6 U	2.6 UJ	2.6 U	
FEW4-MW84-(336.0)	N	1,2-Dichlorobenzene	8.2	2.6 U	2.6 UJ	2.6 U	
FEW4-MW84-(336.0)	N	1,2-Dichloroethane	8.2	2.6 U	2.6 UJ	2.6 U	

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW84-(336.0)	N	1,2-Dichloroethene	8.2	2.6 U	2.6 UJ	2.6 U	
FEW4-MW84-(336.0)	N	1,2-Dichloropropane	8.2	2.6 U	2.6 UJ	2.6 U	
FEW4-MW84-(336.0)	N	1,3,5-Trimethylbenzene	8.2	2.6 U	2.6 UJ	2.6 U	
FEW4-MW84-(336.0)	N	1,3-Dichlorobenzene	8.2	2.6 U	2.6 UJ	2.6 U	
FEW4-MW84-(336.0)	N	1,3-Dichloropropane	8.2	2.6 U	2.6 UJ	2.6 U	
FEW4-MW84-(336.0)	N	1,4-Dichlorobenzene	8.2	2.6 U	2.6 UJ	2.6 U	
FEW4-MW84-(336.0)	N	2,2-Dichloropropane	8.2	2.6 U Q	2.6 UJ	2.6 U	
FEW4-MW84-(336.0)	N	2-Butanone (MEK)	33	10 U	10 UJ	10 U	
FEW4-MW84-(336.0)	N	2-Chlorotoluene	8.2	2.6 U	2.6 UJ	2.6 U	
FEW4-MW84-(336.0)	N	2-Hexanone	33	21 U	21 UJ	21 U	
FEW4-MW84-(336.0)	N	4-Chlorotoluene	8.2	2.6 U	2.6 UJ	2.6 U	
FEW4-MW84-(336.0)	N	4-Methyl-2-pentanone (MIBK)	33	21 U	21 UJ	21 U	
FEW4-MW84-(336.0)	N	Acetone	33	73	73 J	73	
FEW4-MW84-(336.0)	N	Benzene	8.2	2.6 U	2.6 UJ	2.6 U	
FEW4-MW84-(336.0)	N	Bromobenzene	8.2	2.6 U	2.6 UJ	2.6 U	
FEW4-MW84-(336.0)	N	Bromochloromethane	8.2	1.3 U Q	1.3 UJ	1.3 U	
FEW4-MW84-(336.0)	N	Bromodichloromethane	8.2	1.3 U	1.3 UJ	1.3 U	
FEW4-MW84-(336.0)	N	Bromoform	8.2	1.3 U	1.3 UJ	1.3 U	
FEW4-MW84-(336.0)	N	Bromomethane	16	2.6 U	2.6 UJ	2.6 U	
FEW4-MW84-(336.0)	N	Carbon disulfide	8.2	2.6 U	2.6 UJ	2.6 U	
FEW4-MW84-(336.0)	N	Carbon tetrachloride	8.2	2.6 U Q	2.6 UJ	2.6 U	
FEW4-MW84-(336.0)	N	Chlorobenzene	8.2	2.6 U	2.6 UJ	2.6 U	
FEW4-MW84-(336.0)	N	Chloroethane	16	5.2 U	5.2 UJ	5.2 U	
FEW4-MW84-(336.0)	N	Chloroform	16	1.3 U	1.3 UJ	1.3 U	
FEW4-MW84-(336.0)	N	Chloromethane	16	2.6 U	2.6 UJ	2.6 U	
FEW4-MW84-(336.0)	N	cis-1,2-Dichloroethene	8.2	2.6 U	2.6 UJ	2.6 U	
FEW4-MW84-(336.0)	N	cis-1,3-Dichloropropene	8.2	5.2 U	5.2 UJ	5.2 U	
FEW4-MW84-(336.0)	N	Dibromochloromethane	8.2	2.6 U	2.6 UJ	2.6 U	
FEW4-MW84-(336.0)	N	Dibromomethane	8.2	5.2 U	5.2 UJ	5.2 U	
FEW4-MW84-(336.0)	N	Dichlorodifluoromethane	16	2.6 U Q	2.6 UJ	2.6 U	
FEW4-MW84-(336.0)	N	Ethylbenzene	8.2	2.6 U	2.6 UJ	2.6 U	
FEW4-MW84-(336.0)	N	Hexachlorobutadiene	8.2	2.6 U	2.6 UJ	2.6 U	
FEW4-MW84-(336.0)	N	Isopropylbenzene (Cumene)	8.2	2.6 U	2.6 UJ	2.6 U	
FEW4-MW84-(336.0)	N	m,p-Xylene	5.2	5.2 U	5.2 UJ	5.2 U	
FEW4-MW84-(336.0)	N	Methyl tert-butyl ether (MTBE)	33	1.3 U	1.3 UJ	1.3 U	
FEW4-MW84-(336.0)	N	Methylene chloride	8.2	5.2 U	5.2 UJ	5.2 U	
FEW4-MW84-(336.0)	N	Naphthalene	8.2	2.6 U	2.6 UJ	2.6 U	
FEW4-MW84-(336.0)	N	n-Butylbenzene	8.2	2.6 U	2.6 UJ	2.6 U	
FEW4-MW84-(336.0)	N	n-Propylbenzene	8.2	2.6 U	2.6 UJ	2.6 U	
FEW4-MW84-(336.0)	N	o-Xylene	8.2	2.6 U	2.6 UJ	2.6 U	

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW84-(336.0)	N	p-Cymene (p-Isopropyltoluene)	8.2	2.6 U	2.6 UJ	2.6 U	
FEW4-MW84-(336.0)	N	sec-Butylbenzene	8.2	2.6 U	2.6 UJ	2.6 U	
FEW4-MW84-(336.0)	N	Styrene	8.2	2.6 U	2.6 UJ	2.6 U	
FEW4-MW84-(336.0)	N	tert-Butylbenzene	8.2	2.6 U	2.6 UJ	2.6 U	
FEW4-MW84-(336.0)	N	Tetrachloroethene (PCE)	8.2	2.6 U	2.6 UJ	2.6 U	
FEW4-MW84-(336.0)	N	Toluene	8.2	2.6 U	2.6 UJ	2.6 U	
FEW4-MW84-(336.0)	N	trans-1,2-Dichloroethene	8.2	1.3 U	1.3 UJ	1.3 U	
FEW4-MW84-(336.0)	N	trans-1,3-Dichloropropene	8.2	2.6 U Q	2.6 UJ	2.6 U	
FEW4-MW84-(336.0)	N	Trichloroethene (TCE)	8.2	1.3 U	1.3 UJ	1.3 U	
FEW4-MW84-(336.0)	N	Trichlorofluoromethane	16	5.2 U Q	5.2 UJ	5.2 U	
FEW4-MW84-(336.0)	N	Vinyl chloride	8.2	5.2 U	5.2 UJ	5.2 U	
FEW4-MW84-(359.0)	N	1,1,1,2-Tetrachloroethane	6.1	1.9 U	1.9 UJ	1.9 U	
FEW4-MW84-(359.0)	N	1,1,1-Trichloroethane	6.1	1.9 U	1.9 UJ	1.9 U	
FEW4-MW84-(359.0)	N	1,1,2,2-Tetrachloroethane	6.1	1.9 U	1.9 UJ	1.9 U	
FEW4-MW84-(359.0)	N	1,1,2-Trichloroethane	6.1	3.9 U	3.9 UJ	3.9 U	
FEW4-MW84-(359.0)	N	1,1-Dichloroethane	6.1	0.97 U	0.97 UJ	0.97 U	
FEW4-MW84-(359.0)	N	1,1-Dichloroethene	6.1	1.9 U	1.9 UJ	1.9 U	
FEW4-MW84-(359.0)	N	1,1-Dichloropropene	6.1	1.9 U	1.9 UJ	1.9 U	
FEW4-MW84-(359.0)	N	1,2,3-Trichlorobenzene	6.1	1.9 U	1.9 UJ	1.9 U	
FEW4-MW84-(359.0)	N	1,2,3-Trichloropropane	6.1	3.9 U	3.9 UJ	3.9 U	
FEW4-MW84-(359.0)	N	1,2,4-Trichlorobenzene	6.1	1.9 U	1.9 UJ	1.9 U	
FEW4-MW84-(359.0)	N	1,2,4-Trimethylbenzene	6.1	1.9 U	1.9 UJ	1.9 U	
FEW4-MW84-(359.0)	N	1,2-Dibromo-3-chloropropane	12	1.9 U	1.9 UJ	1.9 U	
FEW4-MW84-(359.0)	N	1,2-Dibromoethane (EDB)	6.1	1.9 U	1.9 UJ	1.9 U	
FEW4-MW84-(359.0)	N	1,2-Dichlorobenzene	6.1	1.9 U	1.9 UJ	1.9 U	
FEW4-MW84-(359.0)	N	1,2-Dichloroethane	6.1	1.9 U	1.9 UJ	1.9 U	
FEW4-MW84-(359.0)	N	1,2-Dichloroethene	6.1	1.9 U	1.9 UJ	1.9 U	
FEW4-MW84-(359.0)	N	1,2-Dichloropropane	6.1	1.9 U	1.9 UJ	1.9 U	
FEW4-MW84-(359.0)	N	1,3,5-Trimethylbenzene	6.1	1.9 U	1.9 UJ	1.9 U	
FEW4-MW84-(359.0)	N	1,3-Dichlorobenzene	6.1	1.9 U	1.9 UJ	1.9 U	
FEW4-MW84-(359.0)	N	1,3-Dichloropropane	6.1	1.9 U	1.9 UJ	1.9 U	
FEW4-MW84-(359.0)	N	1,4-Dichlorobenzene	6.1	1.9 U	1.9 UJ	1.9 U	
FEW4-MW84-(359.0)	N	2,2-Dichloropropane	6.1	1.9 U	1.9 UJ	1.9 U	
FEW4-MW84-(359.0)	N	2-Butanone (MEK)	24	7.8 U	7.8 UJ	7.8 U	
FEW4-MW84-(359.0)	N	2-Chlorotoluene	6.1	1.9 U	1.9 UJ	1.9 U	
FEW4-MW84-(359.0)	N	2-Hexanone	24	16 U	16 UJ	16 U	
FEW4-MW84-(359.0)	N	4-Chlorotoluene	6.1	1.9 U	1.9 UJ	1.9 U	
FEW4-MW84-(359.0)	N	4-Methyl-2-pentanone (MIBK)	24	16 U	16 UJ	16 U	
FEW4-MW84-(359.0)	N	Acetone	24	41	41 J	41	
FEW4-MW84-(359.0)	N	Benzene	6.1	1.9 U	1.9 UJ	1.9 U	
FEW4-MW84-(359.0)	N	Bromobenzene	6.1	1.9 U	1.9 UJ	1.9 U	

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW84-(359.0)	N	Bromochloromethane	6.1	0.97 U	0.97 UJ	0.97 U	
FEW4-MW84-(359.0)	N	Bromodichloromethane	6.1	0.97 U	0.97 UJ	0.97 U	
FEW4-MW84-(359.0)	N	Bromoform	6.1	0.97 U	0.97 UJ	0.97 U	
FEW4-MW84-(359.0)	N	Bromomethane	12	1.9 U Q	1.9 UJ	1.9 U	
FEW4-MW84-(359.0)	N	Carbon disulfide	6.1	1.9 U	1.9 UJ	1.9 U	
FEW4-MW84-(359.0)	N	Carbon tetrachloride	6.1	1.9 U	1.9 UJ	1.9 U	
FEW4-MW84-(359.0)	N	Chlorobenzene	6.1	1.9 U	1.9 UJ	1.9 U	
FEW4-MW84-(359.0)	N	Chloroethane	12	3.9 U	3.9 UJ	3.9 U	
FEW4-MW84-(359.0)	N	Chloroform	12	0.97 U	0.97 UJ	0.97 U	
FEW4-MW84-(359.0)	N	Chloromethane	12	1.9 U	1.9 UJ	1.9 U	
FEW4-MW84-(359.0)	N	cis-1,2-Dichloroethene	6.1	1.9 U	1.9 UJ	1.9 U	
FEW4-MW84-(359.0)	N	cis-1,3-Dichloropropene	6.1	3.9 U	3.9 UJ	3.9 U	
FEW4-MW84-(359.0)	N	Dibromochloromethane	6.1	1.9 U	1.9 UJ	1.9 U	
FEW4-MW84-(359.0)	N	Dibromomethane	6.1	3.9 U	3.9 UJ	3.9 U	
FEW4-MW84-(359.0)	N	Dichlorodifluoromethane	12	1.9 U Q	1.9 UJ	1.9 U	
FEW4-MW84-(359.0)	N	Ethylbenzene	6.1	1.9 U	1.9 UJ	1.9 U	
FEW4-MW84-(359.0)	N	Hexachlorobutadiene	6.1	1.9 U	1.9 UJ	1.9 U	
FEW4-MW84-(359.0)	N	Isopropylbenzene (Cumene)	6.1	1.9 U	1.9 UJ	1.9 U	
FEW4-MW84-(359.0)	N	m,p-Xylene	3.9	3.9 U	3.9 UJ	3.9 U	
FEW4-MW84-(359.0)	N	Methyl tert-butyl ether (MTBE)	24	0.97 U	0.97 UJ	0.97 U	
FEW4-MW84-(359.0)	N	Methylene chloride	6.1	3.9 U	3.9 UJ	3.9 U	
FEW4-MW84-(359.0)	N	Naphthalene	6.1	1.9 U	1.9 UJ	1.9 U	
FEW4-MW84-(359.0)	N	n-Butylbenzene	6.1	1.9 U	1.9 UJ	1.9 U	
FEW4-MW84-(359.0)	N	n-Propylbenzene	6.1	1.9 U	1.9 UJ	1.9 U	
FEW4-MW84-(359.0)	N	o-Xylene	6.1	1.9 U	1.9 UJ	1.9 U	
FEW4-MW84-(359.0)	N	p-Cymene (p-Isopropyltoluene)	6.1	1.9 U	1.9 UJ	1.9 U	
FEW4-MW84-(359.0)	N	sec-Butylbenzene	6.1	1.9 U	1.9 UJ	1.9 U	
FEW4-MW84-(359.0)	N	Styrene	6.1	1.9 U	1.9 UJ	1.9 U	
FEW4-MW84-(359.0)	N	tert-Butylbenzene	6.1	1.9 U	1.9 UJ	1.9 U	
FEW4-MW84-(359.0)	N	Tetrachloroethene (PCE)	6.1	1.9 U	1.9 UJ	1.9 U	
FEW4-MW84-(359.0)	N	Toluene	6.1	1.0 J	1.0 J	1.0 J	TR
FEW4-MW84-(359.0)	N	trans-1,2-Dichloroethene	6.1	0.97 U	0.97 UJ	0.97 U	
FEW4-MW84-(359.0)	N	trans-1,3-Dichloropropene	6.1	1.9 U	1.9 UJ	1.9 U	
FEW4-MW84-(359.0)	N	Trichloroethene (TCE)	6.1	0.97 U	0.97 UJ	0.97 U	
FEW4-MW84-(359.0)	N	Trichlorofluoromethane	12	3.9 U	3.9 UJ	3.9 U	
FEW4-MW84-(359.0)	N	Vinyl chloride	6.1	3.9 U	3.9 UJ	3.9 U	

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
Trace values are not included in the qualified results table unless additional reason codes are associated.

Reason Code Definitions

Code	Definition
D	MS RPD
H1	Test Hold Time
M	MS Recovery
TR	Trace Level Detect

Flag Code and Definitions

Flag	Definition
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
J	Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
R	The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making.
B	Blank contamination: The analyte was found in an associated blank above one half the RL, as well as in the sample.
UB	The analyte was also detected in an associated laboratory or field blank at a concentration comparable to the concentration in the sample. The reported result has been requalified as not detected.

Review Questions

Method: SW8260B (Volatile Organic Compounds by Capillary GC/MS)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			ADR noted that the following samples exceeded the 14 day analysis holding time on the 14th day between 0000 and 2359 hours: FEW4-MW84-(325.0) 4 hours, FEW4-MW84-(336.0) 4 hours, FEW4-MW84-(359.0)11 hours. According to DoD ELAP QSM 5.1 FAQ – Holding Time - Days: "the holding time shall be tracked by the day." "...an exceedance of holding time for a sample with a 14-day holding time will occur when the 15th day is reached (at 12am)." Therefore, no holding time exceedance is considered to have occurred for the noted samples.
Were sample reciept temperatures met?	•			Sample receipt temperatures were 1.4ºC and 1.7ºC.
Were QAPP specified PQLs achieved?	•			
Were all QAPP-specified target analytes reported?	•			
Was the GC/MS system properly tuned based on method criteria?	•			
Was the criteria met during each 12 hour shift (prior to ICAL and Cal Ver.)?	•			
Does the initial calibration curve consist of 5 concentration levels, with the low standard near but > MDL?	•			
Did the Calibration Check Compounds (CCCs) have a relative standard deviation within QAPP acceptance limits?	•			
Were the average response factors (RFs) for the System Performance Check Compounds (SPCCs) within QAPP acceptance limits?	•			
Were the ICAL %RSDs for the target compounds within method criteria?	•			
If a quadratic equation curve was used, was the coefficient of determination (COD) within criteria?	•			
If a linear regression curve was used, was the correlation coefficient within criteria?	•			
Check and recalculate the response factors and average response factors for a least one target compound.	•			VMS_G 8/16/17 TCE AVG RF = 0.3273
Check and recalculate the %RSD for one of more target compounds and DMCs. Verify that the recalculated values agree with the laboratory reported values.	•			ICAL VMS-G 8/16/17 TCE %RSD = 4.3% 1,2-DCA-d4 %RSD = 5.0
Was a second source verification analyzed after the ICAL and all analytes within criteria?		•		The ICV percent difference was above the uppercontrol limit for bromomethane at 36.6%D anddichlorofluoromethane at -22.7%. All associated sample results were nondetec tfor these analytes, therefore no data qualification is warranted.
Was a CCV run at the beginning of the analytical sequence and every 12 hours?	•			
Was the CCV a mid-level standard from the initial calibration curve?	•			
Did the CCCs have a %Difference within QAPP acceptance limits?	•			

Review Questions

Method: SW8260B (Volatile Organic Compounds by Capillary GC/MS)

Review Questions	Yes	No	NA	Comment
Were the average RFs for the SPCCs within QAPP acceptance limits?	•			
Was the %D (difference or drift) for all target analytes within QAPP acceptance limits?		•		The CCV percent difference was above the control limit for carbon tetrachloride at 31.9%, chlorobromomethane at 20.3%, dichlorodifluoromethane at 23.2%, 2,2-dichloropropane at 23.4%, trans-1,3-dichloropropene at 24.6% , 1,1,1-trichloroethane24.8%, and trichlorofluoromethane at 24.6%. All associated sample results were non-detect for these analytes, therefore no data qualification is warranted.
Check and recalculate the CCV relative response factor for at least one target compound.	•			VMS-G 8/24/17 CCVC 280-385348/30 Trichloroethene RF = 0.3496
Were the internal standards added to every standard, blank, matrix spike, matrix spike duplicate, and sample?	•			
Were the retention times for all IS compounds within QAPP acceptance limits?	•			
Are the area counts of all IS compounds within QAPP acceptance limits?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes detected in the method blank above the MDL?	•			Acetone and 1,2,3-trichlorobenzene were detected in a method blank at concentrations less than 1/2 the LOQ.
Were target analytes reported in the field blank analyses above the MDL?			•	
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?	•			FEW4-MW86-(306.0) is a blind duplicate of FEW4-MW86-(305.0).
Was an LCS/LCSD pair prepared and analyzed with each batch?		•		An LCS/LCSD was prepared with batch 280-385208.
Were the LCS/LCSD recoveries within QAPP acceptance limits?	•			
Were the LCS/LCSD RPDs within QAPP acceptance limits?	•			
Was the duplicate RPD within QAPP acceptance limits?			•	
Was a MS/MSD pair prepared with each batch?	•			
Is the MS/MSD parent sample the one designated by the sampling team?	•			FEW4-MW86-(269.0) was designated for MS/MSD analysis.
Were MS/MSD recoveries and RPD within QAPP acceptance limits?		•		Several analytes were recovered less than the lower control limit in the MSD. The precision of hexachlorobutadiene exceeded the 20% RPD control limit at 29%.
Were surrogate recoveries within QAPP acceptance limits?	•			
Were reported sample concentrations within calibration range?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were instrument run logs present and filled out appropriately?	•			
Were sample prepration sheets present and filled out appropriately?	•			

Review Questions

Method: SW8260B (Volatile Organic Compounds by Capillary GC/MS)

Review Questions	Yes	No	NA	Comment
Check and recalculate the %D for one target compound. Verify that the recalculated values agree with the laboratory-reported values.			•	
Examine raw data to verify correct calculation of sample results reported by the laboratory. Compare quantitation lists and chromatograms to the reported detect and non-detect sample results.	•			FEW4-MW84-(359.0) Acetone = 41 ug/kg
Verify that the reporting limits and sample results have been adjusted to reflect all sample dilutions and Percent Moisture factors (non-aqueous samples).	•			

US Army Corps of Engineers ®

Batch Report

Test Method: SW8260B Analysis Batch: 280-385200

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
LABQC	SQ	LCS 280-385208/1-A	LCS 280-385208/1-A		1/1	8/22/2017 16:00	8/22/2017 16:00	8/22/2017 19:53	280-385200/	BS
LABQC	SQ	LCSD 280-385208/2-A	LCSD 280-385208/2-A		1/1	8/22/2017 16:00	8/22/2017 16:00	8/22/2017 20:14	280-385200/	BD
LABQC	SQ	MB 280-385208/3-A	MB 280-385208/3-A		1/1	8/22/2017 16:00	8/22/2017 16:00	8/22/2017 20:54	280-385200/	LB
FEW4-MW86	SO	FEW4-MW86-(334.0)	280-100142-1		1/1	8/9/2017 15:50	8/9/2017 15:50	8/22/2017 22:58	280-385200/	N
FEW4-MW84	SO	FEW4-MW84-(400.0)	280-100142-2		1/1	8/9/2017 19:20	8/9/2017 19:20	8/22/2017 23:19	280-385200/	N
FEW4-MW86	SO	FEW4-MW86-(353.0)	280-100142-3		1/1	8/9/2017 15:35	8/9/2017 15:35	8/22/2017 23:39	280-385200/	N
FEW4-MW84	SO	FEW4-MW84-(399.0)	280-100142-5		1/1	8/9/2017 18:20	8/9/2017 18:20	8/23/2017 00:19	280-385200/	N

Test Method: SW8260B Analysis Batch: 280-385348

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
LABQC	SQ	LCS 280-385372/1-A	LCS 280-385372/1-A		1/1	8/23/2017 16:00	8/23/2017 16:00	8/23/2017 20:08	280-385348/	BS
LABQC	SQ	LCSD 280-385372/2-A	LCSD 280-385372/2-A		1/1	8/23/2017 16:00	8/23/2017 16:00	8/23/2017 20:29	280-385348/	BD
LABQC	SQ	MB 280-385372/3-A	MB 280-385372/3-A		1/1	8/23/2017 16:00	8/23/2017 16:00	8/23/2017 21:10	280-385348/	LB
FEW4-MW86	SO	FEW4-MW86-(362.0)	280-100142-4		1/1	8/9/2017 17:25	8/9/2017 17:25	8/23/2017 22:34	280-385348/	N
FEW4-MW86	SO	FEW4-MW86-(382.0)	280-100142-6		1/1	8/10/2017 11:11	8/10/2017 11:11	8/23/2017 22:54	280-385348/	N
FEW4-MW86	SO	FEW4-MW86-(341.0)	280-100142-7		1/1	8/9/2017 15:20	8/9/2017 15:20	8/23/2017 23:15	280-385348/	N
FEW4-MW86	SO	FEW4-MW86-(372.0)	280-100142-8		1/1	8/9/2017 17:35	8/9/2017 17:35	8/23/2017 23:35	280-385348/	N

US Army Corps of Engineers ®

Field Batch Report

--No Records Found--

MS Mismatch Report

--No Records Found--

Section to identify Matrix Spike mismatches where parent sample differs from MS by dilution.

US Army Corps of Engineers ®

QC Outlier Report

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

QC Element	Sample ID/ Lab Sample ID	Run#/ Dil'n	Analyte	Result (Units)	Qualifier	Warning Limits	Control Limits	Reason	Comment	Rule	Action Level
Surrogate	FEW4-MW84-(400.0) (N) / 280-100142-2	1 / 1.00	Dibromofluoromethane	120.0 (percent)	J/None	78 - 119	78 - 119	I			
Test Hold Time	FEW4-MW86-(341.0) (N) / 280-100142-7	1 / 1.00	All in Run	14.33 (days)	J/UJ	< 14	< 14	H1	Test Exceeds UCL		
Test Hold Time	FEW4-MW86-(362.0) (N) / 280-100142-4	1 / 1.00	All in Run	14.21 (days)	J/UJ	< 14	< 14	H1	Test Exceeds UCL		
Test Hold Time	FEW4-MW86-(372.0) (N) / 280-100142-8	1 / 1.00	All in Run	14.25 (days)	J/UJ	< 14	< 14	H1	Test Exceeds UCL		

Rule is the multiplier used when blank contamination occurs to determine action level.

US Army Corps of Engineers ®

Qualified Results

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW84-(399.0)	280-100142-5	SO	N	Toluene	4.8	0.70 J	0.70 J		ug/kg	TR
FEW4-MW84-(400.0)	280-100142-2	SO	N	Acetone	45	67	67 J	+	ug/kg	I
FEW4-MW84-(400.0)	280-100142-2	SO	N	Toluene	11	1.7 J	1.7 J	+	ug/kg	I/TR
FEW4-MW86-(334.0)	280-100142-1	SO	N	Acetone	26	19 J	19 J		ug/kg	TR
FEW4-MW86-(353.0)	280-100142-3	SO	N	Acetone	18	8.8 J	8.8 J		ug/kg	TR
FEW4-MW86-(353.0)	280-100142-3	SO	N	Trichloroethene (TCE)	4.6	1.5 J	1.5 J		ug/kg	TR

Qualified analytes in samples are reported as estimated, not detected (UJ) at the Limit of Detection (LOD).

US Army Corps of Engineers ®

Detected Results

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Dilution	Analyte	LOQ	Lab Result	Qualified Result	Units	Reason
FEW4-MW84-(399.0)	280-100142-5	SO	N	1	Acetone	19	36	36	ug/kg	
FEW4-MW84-(399.0)	280-100142-5	SO	N	1	Toluene	4.8	0.70 J	0.70 J	ug/kg	TR
FEW4-MW84-(400.0)	280-100142-2	SO	N	1	Acetone	45	67	67 J	ug/kg	I
FEW4-MW84-(400.0)	280-100142-2	SO	N	1	Toluene	11	1.7 J	1.7 J	ug/kg	I/TR
FEW4-MW86-(334.0)	280-100142-1	SO	N	1	Acetone	26	19 J	19 J	ug/kg	TR
FEW4-MW86-(341.0)	280-100142-7	SO	N	1	Acetone	17	65	65	ug/kg	
FEW4-MW86-(353.0)	280-100142-3	SO	N	1	Acetone	18	8.8 J	8.8 J	ug/kg	TR
FEW4-MW86-(353.0)	280-100142-3	SO	N	1	Trichloroethene (TCE)	4.6	1.5 J	1.5 J	ug/kg	TR
FEW4-MW86-(362.0)	280-100142-4	SO	N	1	Acetone	23	42	42	ug/kg	
FEW4-MW86-(382.0)	280-100142-6	SO	N	1	Acetone	22	49	49	ug/kg	

US Army Corps of Engineers ®

Rejected Results

--No Records Found--

US Army Corps of Engineers ®

Facility:	B08WY0467-02, F.E. Warren AFB, Site 4
Event:	2017-2018 RI Addendum Tasks
SDG:	280-100142-1_52_2a_FUDSChem
Guidance Document:	Draft-Final Uniform Federal Policy-Quality Assurance Project Plan for the Remedial Investigation Addendum 2017-2018 Tasks Atlas “D” Missile Site 4 —Laramie County, Wyoming, July 2017
Prime Contractor:	RMC Consultants, Inc., LAKEWOOD, CO
Project Manager:	David Groy
Contract Laboratory:	TestAmerica Laboratories, Inc., Arvada, CO
Data Review Contractor:	RMC Consultants
Data Review Level:	Stage 3VEM
Primary Data Reviewer:	Gary Torf, Contractor Project Chemist
Second Reviewer:	, Senior Scientist
Date Submitted:	

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	SW8260B
FEW4-MW84-(399.0)	280-100142-5	Solid	Field Sample/N	X
FEW4-MW84-(400.0)	280-100142-2	Solid	Field Sample/N	X
FEW4-MW86-(334.0)	280-100142-1	Solid	Field Sample/N	X
FEW4-MW86-(341.0)	280-100142-7	Solid	Field Sample/N	X
FEW4-MW86-(353.0)	280-100142-3	Solid	Field Sample/N	X
FEW4-MW86-(362.0)	280-100142-4	Solid	Field Sample/N	X
FEW4-MW86-(372.0)	280-100142-8	Solid	Field Sample/N	X
FEW4-MW86-(382.0)	280-100142-6	Solid	Field Sample/N	X

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the Draft-Final Uniform Federal Policy-Quality Assurance Project Plan for the Remedial Investigation Addendum 2017-2018 Tasks Atlas “D” Missile Site 4 —Laramie County, Wyoming, July 2017 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by RMC Consultants, Inc., LAKEWOOD, CO; analyses were performed by TestAmerica Laboratories, Inc., Arvada, CO and were reported under sample delivery group (SDG) 280-100142-1_52_2a_FUDSChem. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

- Blank
- Blank - Negative
- LCS Recovery
- LCS RPD
- Prep Hold Time
- Surrogate
- Test Hold Time

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 2 results (0.38%) out of the 528 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected. Trace values, defined as results that are qualified as estimated because they fall between the limit of detection and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

Narrative Comments

Analytical Method	Data Reviewer Comment
SW8260B	No additional comments; see Checklist for detail.

October 30, 2017

Reviewed by Gary Torf, Contractor Project Chemist, RMC Consultants

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of a minimum of 10% of the reported sample results and method quality control data between the two deliverables.

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

Quality Control Outliers for test method SW8260B, Surrogate

Method performance for individual samples is demonstrated through spiking activities. All samples are spiked with surrogate compounds prior to sample preparation. The sample itself may produce effects due to such factors as interferences and high concentrations of analytes. Summary forms were evaluated and compared to electronic data deliverables. Surrogate results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
FEW4-MW84-(400.0) (N)/ 280-100142-2	Dibromofluoromethane	120.0	78 - 119	78 - 119	percent	J/None	I	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the Surrogate for SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW84-(400.0)	N	Acetone	45	67	67 J	+	ug/kg	I
FEW4-MW84-(400.0)	N	Toluene	11	1.7 J	1.7 J	+	ug/kg	I/TR

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

Quality Control Outliers for test method SW8260B, Test Hold Time

Hold times are ascertained based on project requirements. Holding times were determined by comparing the chain of custody records with the dates of analysis found in the electronic data deliverable and laboratory summary forms. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
FEW4-MW86-(341.0) (N)/ 280-100142-7		14.33	< 14	< 14	days	J/UJ	H1	Test Exceeds UCL
FEW4-MW86-(362.0) (N)/ 280-100142-4		14.21	< 14	< 14	days	J/UJ	H1	Test Exceeds UCL
FEW4-MW86-(372.0) (N)/ 280-100142-8		14.25	< 14	< 14	days	J/UJ	H1	Test Exceeds UCL

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

Table of All Qualified Results

Test Method: SW8260B	Extraction Method: SW5035A							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW84-(400.0)	N	Acetone	45	67	67 J	+	ug/kg	I
FEW4-MW84-(400.0)	N	Toluene	11	1.7 J	1.7 J	+	ug/kg	I/TR

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
Trace values are not included in the qualified results table unless additional reason codes are associated.

Table of All Trace Results

Test Method: SW8260B	Extraction Method: SW5035A							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW84-(399.0)	N	Toluene	4.80	0.700 J	0.700 J		ug/kg	TR
FEW4-MW84-(400.0)	N	Toluene	11.0	1.70 J	1.70 J	+	ug/kg	I/TR
FEW4-MW86-(334.0)	N	Acetone	26.0	19.0 J	19.0 J		ug/kg	TR
FEW4-MW86-(353.0)	N	Acetone	18.0	8.80 J	8.80 J		ug/kg	TR
FEW4-MW86-(353.0)	N	Trichloroethene (TCE)	4.60	1.50 J	1.50 J		ug/kg	TR

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW86-(341.0)	N	1,1,1,2-Tetrachloroethane	4.3	1.4 U	1.4 UJ	1.4 U	
FEW4-MW86-(341.0)	N	1,1,1-Trichloroethane	4.3	1.4 U	1.4 UJ	1.4 U	
FEW4-MW86-(341.0)	N	1,1,2,2-Tetrachloroethane	4.3	1.4 U	1.4 UJ	1.4 U	
FEW4-MW86-(341.0)	N	1,1,2-Trichloroethane	4.3	2.8 U	2.8 UJ	2.8 U	
FEW4-MW86-(341.0)	N	1,1-Dichloroethane	4.3	0.69 U	0.69 UJ	0.69 U	
FEW4-MW86-(341.0)	N	1,1-Dichloroethene	4.3	1.4 U	1.4 UJ	1.4 U	
FEW4-MW86-(341.0)	N	1,1-Dichloropropene	4.3	1.4 U	1.4 UJ	1.4 U	
FEW4-MW86-(341.0)	N	1,2,3-Trichlorobenzene	4.3	1.4 U	1.4 UJ	1.4 U	
FEW4-MW86-(341.0)	N	1,2,3-Trichloropropane	4.3	2.8 U	2.8 UJ	2.8 U	
FEW4-MW86-(341.0)	N	1,2,4-Trichlorobenzene	4.3	1.4 U	1.4 UJ	1.4 U	
FEW4-MW86-(341.0)	N	1,2,4-Trimethylbenzene	4.3	1.4 U	1.4 UJ	1.4 U	
FEW4-MW86-(341.0)	N	1,2-Dibromo-3-chloropropane	8.6	1.4 U	1.4 UJ	1.4 U	
FEW4-MW86-(341.0)	N	1,2-Dibromoethane (EDB)	4.3	1.4 U	1.4 UJ	1.4 U	
FEW4-MW86-(341.0)	N	1,2-Dichlorobenzene	4.3	1.4 U	1.4 UJ	1.4 U	
FEW4-MW86-(341.0)	N	1,2-Dichloroethane	4.3	1.4 U	1.4 UJ	1.4 U	
FEW4-MW86-(341.0)	N	1,2-Dichloroethene	4.3	1.4 U	1.4 UJ	1.4 U	
FEW4-MW86-(341.0)	N	1,2-Dichloropropane	4.3	1.4 U	1.4 UJ	1.4 U	
FEW4-MW86-(341.0)	N	1,3,5-Trimethylbenzene	4.3	1.4 U	1.4 UJ	1.4 U	
FEW4-MW86-(341.0)	N	1,3-Dichlorobenzene	4.3	1.4 U	1.4 UJ	1.4 U	
FEW4-MW86-(341.0)	N	1,3-Dichloropropane	4.3	1.4 U	1.4 UJ	1.4 U	
FEW4-MW86-(341.0)	N	1,4-Dichlorobenzene	4.3	1.4 U	1.4 UJ	1.4 U	
FEW4-MW86-(341.0)	N	2,2-Dichloropropane	4.3	1.4 U	1.4 UJ	1.4 U	
FEW4-MW86-(341.0)	N	2-Butanone (MEK)	17	5.5 U	5.5 UJ	5.5 U	
FEW4-MW86-(341.0)	N	2-Chlorotoluene	4.3	1.4 U	1.4 UJ	1.4 U	
FEW4-MW86-(341.0)	N	2-Hexanone	17	11 U	11 UJ	11 U	
FEW4-MW86-(341.0)	N	4-Chlorotoluene	4.3	1.4 U	1.4 UJ	1.4 U	
FEW4-MW86-(341.0)	N	4-Methyl-2-pentanone (MIBK)	17	11 U	11 UJ	11 U	
FEW4-MW86-(341.0)	N	Acetone	17	65	65 J	65	
FEW4-MW86-(341.0)	N	Benzene	4.3	1.4 U	1.4 UJ	1.4 U	
FEW4-MW86-(341.0)	N	Bromobenzene	4.3	1.4 U	1.4 UJ	1.4 U	
FEW4-MW86-(341.0)	N	Bromochloromethane	4.3	0.69 U	0.69 UJ	0.69 U	
FEW4-MW86-(341.0)	N	Bromodichloromethane	4.3	0.69 U	0.69 UJ	0.69 U	
FEW4-MW86-(341.0)	N	Bromoform	4.3	0.69 U	0.69 UJ	0.69 U	
FEW4-MW86-(341.0)	N	Bromomethane	8.6	1.4 U Q	1.4 UJ	1.4 U	
FEW4-MW86-(341.0)	N	Carbon disulfide	4.3	1.4 U	1.4 UJ	1.4 U	
FEW4-MW86-(341.0)	N	Carbon tetrachloride	4.3	1.4 U	1.4 UJ	1.4 U	
FEW4-MW86-(341.0)	N	Chlorobenzene	4.3	1.4 U	1.4 UJ	1.4 U	
FEW4-MW86-(341.0)	N	Chloroethane	8.6	2.8 U	2.8 UJ	2.8 U	
FEW4-MW86-(341.0)	N	Chloroform	8.6	0.69 U	0.69 UJ	0.69 U	
FEW4-MW86-(341.0)	N	Chloromethane	8.6	1.4 U	1.4 UJ	1.4 U	
FEW4-MW86-(341.0)	N	cis-1,2-Dichloroethene	4.3	1.4 U	1.4 UJ	1.4 U	

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW86-(341.0)	N	cis-1,3-Dichloropropene	4.3	2.8 U	2.8 UJ	2.8 U	
FEW4-MW86-(341.0)	N	Dibromochloromethane	4.3	1.4 U	1.4 UJ	1.4 U	
FEW4-MW86-(341.0)	N	Dibromomethane	4.3	2.8 U	2.8 UJ	2.8 U	
FEW4-MW86-(341.0)	N	Dichlorodifluoromethane	8.6	1.4 U Q	1.4 UJ	1.4 U	
FEW4-MW86-(341.0)	N	Ethylbenzene	4.3	1.4 U	1.4 UJ	1.4 U	
FEW4-MW86-(341.0)	N	Hexachlorobutadiene	4.3	1.4 U	1.4 UJ	1.4 U	
FEW4-MW86-(341.0)	N	Isopropylbenzene (Cumene)	4.3	1.4 U	1.4 UJ	1.4 U	
FEW4-MW86-(341.0)	N	m,p-Xylene	2.8	2.8 U	2.8 UJ	2.8 U	
FEW4-MW86-(341.0)	N	Methyl tert-butyl ether (MTBE)	17	0.69 U	0.69 UJ	0.69 U	
FEW4-MW86-(341.0)	N	Methylene chloride	4.3	2.8 U	2.8 UJ	2.8 U	
FEW4-MW86-(341.0)	N	Naphthalene	4.3	1.4 U	1.4 UJ	1.4 U	
FEW4-MW86-(341.0)	N	n-Butylbenzene	4.3	1.4 U	1.4 UJ	1.4 U	
FEW4-MW86-(341.0)	N	n-Propylbenzene	4.3	1.4 U	1.4 UJ	1.4 U	
FEW4-MW86-(341.0)	N	o-Xylene	4.3	1.4 U	1.4 UJ	1.4 U	
FEW4-MW86-(341.0)	N	p-Cymene (p-Isopropyltoluene)	4.3	1.4 U	1.4 UJ	1.4 U	
FEW4-MW86-(341.0)	N	sec-Butylbenzene	4.3	1.4 U	1.4 UJ	1.4 U	
FEW4-MW86-(341.0)	N	Styrene	4.3	1.4 U	1.4 UJ	1.4 U	
FEW4-MW86-(341.0)	N	tert-Butylbenzene	4.3	1.4 U	1.4 UJ	1.4 U	
FEW4-MW86-(341.0)	N	Tetrachloroethene (PCE)	4.3	1.4 U	1.4 UJ	1.4 U	
FEW4-MW86-(341.0)	N	Toluene	4.3	1.4 U	1.4 UJ	1.4 U	
FEW4-MW86-(341.0)	N	trans-1,2-Dichloroethene	4.3	0.69 U	0.69 UJ	0.69 U	
FEW4-MW86-(341.0)	N	trans-1,3-Dichloropropene	4.3	1.4 U	1.4 UJ	1.4 U	
FEW4-MW86-(341.0)	N	Trichloroethene (TCE)	4.3	0.69 U	0.69 UJ	0.69 U	
FEW4-MW86-(341.0)	N	Trichlorofluoromethane	8.6	2.8 U	2.8 UJ	2.8 U	
FEW4-MW86-(341.0)	N	Vinyl chloride	4.3	2.8 U	2.8 UJ	2.8 U	
FEW4-MW86-(362.0)	N	1,1,1,2-Tetrachloroethane	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(362.0)	N	1,1,1-Trichloroethane	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(362.0)	N	1,1,2,2-Tetrachloroethane	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(362.0)	N	1,1,2-Trichloroethane	5.7	3.6 U	3.6 UJ	3.6 U	
FEW4-MW86-(362.0)	N	1,1-Dichloroethane	5.7	0.91 U	0.91 UJ	0.91 U	
FEW4-MW86-(362.0)	N	1,1-Dichloroethene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(362.0)	N	1,1-Dichloropropene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(362.0)	N	1,2,3-Trichlorobenzene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(362.0)	N	1,2,3-Trichloropropane	5.7	3.6 U	3.6 UJ	3.6 U	
FEW4-MW86-(362.0)	N	1,2,4-Trichlorobenzene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(362.0)	N	1,2,4-Trimethylbenzene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(362.0)	N	1,2-Dibromo-3-chloropropane	11	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(362.0)	N	1,2-Dibromoethane (EDB)	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(362.0)	N	1,2-Dichlorobenzene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(362.0)	N	1,2-Dichloroethane	5.7	1.8 U	1.8 UJ	1.8 U	

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW86-(362.0)	N	1,2-Dichloroethene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(362.0)	N	1,2-Dichloropropane	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(362.0)	N	1,3,5-Trimethylbenzene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(362.0)	N	1,3-Dichlorobenzene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(362.0)	N	1,3-Dichloropropane	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(362.0)	N	1,4-Dichlorobenzene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(362.0)	N	2,2-Dichloropropane	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(362.0)	N	2-Butanone (MEK)	23	7.3 U	7.3 UJ	7.3 U	
FEW4-MW86-(362.0)	N	2-Chlorotoluene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(362.0)	N	2-Hexanone	23	15 U	15 UJ	15 U	
FEW4-MW86-(362.0)	N	4-Chlorotoluene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(362.0)	N	4-Methyl-2-pentanone (MIBK)	23	15 U	15 UJ	15 U	
FEW4-MW86-(362.0)	N	Acetone	23	42	42 J	42	
FEW4-MW86-(362.0)	N	Benzene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(362.0)	N	Bromobenzene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(362.0)	N	Bromochloromethane	5.7	0.91 U	0.91 UJ	0.91 U	
FEW4-MW86-(362.0)	N	Bromodichloromethane	5.7	0.91 U	0.91 UJ	0.91 U	
FEW4-MW86-(362.0)	N	Bromoform	5.7	0.91 U	0.91 UJ	0.91 U	
FEW4-MW86-(362.0)	N	Bromomethane	11	1.8 U Q	1.8 UJ	1.8 U	
FEW4-MW86-(362.0)	N	Carbon disulfide	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(362.0)	N	Carbon tetrachloride	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(362.0)	N	Chlorobenzene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(362.0)	N	Chloroethane	11	3.6 U	3.6 UJ	3.6 U	
FEW4-MW86-(362.0)	N	Chloroform	11	0.91 U	0.91 UJ	0.91 U	
FEW4-MW86-(362.0)	N	Chloromethane	11	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(362.0)	N	cis-1,2-Dichloroethene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(362.0)	N	cis-1,3-Dichloropropene	5.7	3.6 U	3.6 UJ	3.6 U	
FEW4-MW86-(362.0)	N	Dibromochloromethane	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(362.0)	N	Dibromomethane	5.7	3.6 U	3.6 UJ	3.6 U	
FEW4-MW86-(362.0)	N	Dichlorodifluoromethane	11	1.8 U Q	1.8 UJ	1.8 U	
FEW4-MW86-(362.0)	N	Ethylbenzene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(362.0)	N	Hexachlorobutadiene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(362.0)	N	Isopropylbenzene (Cumene)	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(362.0)	N	m,p-Xylene	3.6	3.6 U	3.6 UJ	3.6 U	
FEW4-MW86-(362.0)	N	Methyl tert-butyl ether (MTBE)	23	0.91 U	0.91 UJ	0.91 U	
FEW4-MW86-(362.0)	N	Methylene chloride	5.7	3.6 U	3.6 UJ	3.6 U	
FEW4-MW86-(362.0)	N	Naphthalene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(362.0)	N	n-Butylbenzene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(362.0)	N	n-Propylbenzene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(362.0)	N	o-Xylene	5.7	1.8 U	1.8 UJ	1.8 U	

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW86-(362.0)	N	p-Cymene (p-Isopropyltoluene)	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(362.0)	N	sec-Butylbenzene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(362.0)	N	Styrene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(362.0)	N	tert-Butylbenzene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(362.0)	N	Tetrachloroethene (PCE)	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(362.0)	N	Toluene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(362.0)	N	trans-1,2-Dichloroethene	5.7	0.91 U	0.91 UJ	0.91 U	
FEW4-MW86-(362.0)	N	trans-1,3-Dichloropropene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(362.0)	N	Trichloroethene (TCE)	5.7	0.91 U	0.91 UJ	0.91 U	
FEW4-MW86-(362.0)	N	Trichlorofluoromethane	11	3.6 U	3.6 UJ	3.6 U	
FEW4-MW86-(362.0)	N	Vinyl chloride	5.7	3.6 U	3.6 UJ	3.6 U	
FEW4-MW86-(372.0)	N	1,1,1,2-Tetrachloroethane	5.8	1.9 U	1.9 UJ	1.9 U	
FEW4-MW86-(372.0)	N	1,1,1-Trichloroethane	5.8	1.9 U	1.9 UJ	1.9 U	
FEW4-MW86-(372.0)	N	1,1,2,2-Tetrachloroethane	5.8	1.9 U	1.9 UJ	1.9 U	
FEW4-MW86-(372.0)	N	1,1,2-Trichloroethane	5.8	3.7 U	3.7 UJ	3.7 U	
FEW4-MW86-(372.0)	N	1,1-Dichloroethane	5.8	0.93 U	0.93 UJ	0.93 U	
FEW4-MW86-(372.0)	N	1,1-Dichloroethene	5.8	1.9 U	1.9 UJ	1.9 U	
FEW4-MW86-(372.0)	N	1,1-Dichloropropene	5.8	1.9 U	1.9 UJ	1.9 U	
FEW4-MW86-(372.0)	N	1,2,3-Trichlorobenzene	5.8	1.9 U	1.9 UJ	1.9 U	
FEW4-MW86-(372.0)	N	1,2,3-Trichloropropane	5.8	3.7 U	3.7 UJ	3.7 U	
FEW4-MW86-(372.0)	N	1,2,4-Trichlorobenzene	5.8	1.9 U	1.9 UJ	1.9 U	
FEW4-MW86-(372.0)	N	1,2,4-Trimethylbenzene	5.8	1.9 U	1.9 UJ	1.9 U	
FEW4-MW86-(372.0)	N	1,2-Dibromo-3-chloropropane	12	1.9 U	1.9 UJ	1.9 U	
FEW4-MW86-(372.0)	N	1,2-Dibromoethane (EDB)	5.8	1.9 U	1.9 UJ	1.9 U	
FEW4-MW86-(372.0)	N	1,2-Dichlorobenzene	5.8	1.9 U	1.9 UJ	1.9 U	
FEW4-MW86-(372.0)	N	1,2-Dichloroethane	5.8	1.9 U	1.9 UJ	1.9 U	
FEW4-MW86-(372.0)	N	1,2-Dichloroethene	5.8	1.9 U	1.9 UJ	1.9 U	
FEW4-MW86-(372.0)	N	1,2-Dichloropropane	5.8	1.9 U	1.9 UJ	1.9 U	
FEW4-MW86-(372.0)	N	1,3,5-Trimethylbenzene	5.8	1.9 U	1.9 UJ	1.9 U	
FEW4-MW86-(372.0)	N	1,3-Dichlorobenzene	5.8	1.9 U	1.9 UJ	1.9 U	
FEW4-MW86-(372.0)	N	1,3-Dichloropropane	5.8	1.9 U	1.9 UJ	1.9 U	
FEW4-MW86-(372.0)	N	1,4-Dichlorobenzene	5.8	1.9 U	1.9 UJ	1.9 U	
FEW4-MW86-(372.0)	N	2,2-Dichloropropane	5.8	1.9 U	1.9 UJ	1.9 U	
FEW4-MW86-(372.0)	N	2-Butanone (MEK)	23	7.4 U	7.4 UJ	7.4 U	
FEW4-MW86-(372.0)	N	2-Chlorotoluene	5.8	1.9 U	1.9 UJ	1.9 U	
FEW4-MW86-(372.0)	N	2-Hexanone	23	15 U	15 UJ	15 U	
FEW4-MW86-(372.0)	N	4-Chlorotoluene	5.8	1.9 U	1.9 UJ	1.9 U	
FEW4-MW86-(372.0)	N	4-Methyl-2-pentanone (MIBK)	23	15 U	15 UJ	15 U	
FEW4-MW86-(372.0)	N	Acetone	23	15 U	15 UJ	15 U	
FEW4-MW86-(372.0)	N	Benzene	5.8	1.9 U	1.9 UJ	1.9 U	
FEW4-MW86-(372.0)	N	Bromobenzene	5.8	1.9 U	1.9 UJ	1.9 U	

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW86-(372.0)	N	Bromochloromethane	5.8	0.93 U	0.93 UJ	0.93 U	
FEW4-MW86-(372.0)	N	Bromodichloromethane	5.8	0.93 U	0.93 UJ	0.93 U	
FEW4-MW86-(372.0)	N	Bromoform	5.8	0.93 U	0.93 UJ	0.93 U	
FEW4-MW86-(372.0)	N	Bromomethane	12	1.9 U Q	1.9 UJ	1.9 U	
FEW4-MW86-(372.0)	N	Carbon disulfide	5.8	1.9 U	1.9 UJ	1.9 U	
FEW4-MW86-(372.0)	N	Carbon tetrachloride	5.8	1.9 U	1.9 UJ	1.9 U	
FEW4-MW86-(372.0)	N	Chlorobenzene	5.8	1.9 U	1.9 UJ	1.9 U	
FEW4-MW86-(372.0)	N	Chloroethane	12	3.7 U	3.7 UJ	3.7 U	
FEW4-MW86-(372.0)	N	Chloroform	12	0.93 U	0.93 UJ	0.93 U	
FEW4-MW86-(372.0)	N	Chloromethane	12	1.9 U	1.9 UJ	1.9 U	
FEW4-MW86-(372.0)	N	cis-1,2-Dichloroethene	5.8	1.9 U	1.9 UJ	1.9 U	
FEW4-MW86-(372.0)	N	cis-1,3-Dichloropropene	5.8	3.7 U	3.7 UJ	3.7 U	
FEW4-MW86-(372.0)	N	Dibromochloromethane	5.8	1.9 U	1.9 UJ	1.9 U	
FEW4-MW86-(372.0)	N	Dibromomethane	5.8	3.7 U	3.7 UJ	3.7 U	
FEW4-MW86-(372.0)	N	Dichlorodifluoromethane	12	1.9 U Q	1.9 UJ	1.9 U	
FEW4-MW86-(372.0)	N	Ethylbenzene	5.8	1.9 U	1.9 UJ	1.9 U	
FEW4-MW86-(372.0)	N	Hexachlorobutadiene	5.8	1.9 U	1.9 UJ	1.9 U	
FEW4-MW86-(372.0)	N	Isopropylbenzene (Cumene)	5.8	1.9 U	1.9 UJ	1.9 U	
FEW4-MW86-(372.0)	N	m,p-Xylene	3.7	3.7 U	3.7 UJ	3.7 U	
FEW4-MW86-(372.0)	N	Methyl tert-butyl ether (MTBE)	23	0.93 U	0.93 UJ	0.93 U	
FEW4-MW86-(372.0)	N	Methylene chloride	5.8	3.7 U	3.7 UJ	3.7 U	
FEW4-MW86-(372.0)	N	Naphthalene	5.8	1.9 U	1.9 UJ	1.9 U	
FEW4-MW86-(372.0)	N	n-Butylbenzene	5.8	1.9 U	1.9 UJ	1.9 U	
FEW4-MW86-(372.0)	N	n-Propylbenzene	5.8	1.9 U	1.9 UJ	1.9 U	
FEW4-MW86-(372.0)	N	o-Xylene	5.8	1.9 U	1.9 UJ	1.9 U	
FEW4-MW86-(372.0)	N	p-Cymene (p-Isopropyltoluene)	5.8	1.9 U	1.9 UJ	1.9 U	
FEW4-MW86-(372.0)	N	sec-Butylbenzene	5.8	1.9 U	1.9 UJ	1.9 U	
FEW4-MW86-(372.0)	N	Styrene	5.8	1.9 U	1.9 UJ	1.9 U	
FEW4-MW86-(372.0)	N	tert-Butylbenzene	5.8	1.9 U	1.9 UJ	1.9 U	
FEW4-MW86-(372.0)	N	Tetrachloroethene (PCE)	5.8	1.9 U	1.9 UJ	1.9 U	
FEW4-MW86-(372.0)	N	Toluene	5.8	1.9 U	1.9 UJ	1.9 U	
FEW4-MW86-(372.0)	N	trans-1,2-Dichloroethene	5.8	0.93 U	0.93 UJ	0.93 U	
FEW4-MW86-(372.0)	N	trans-1,3-Dichloropropene	5.8	1.9 U	1.9 UJ	1.9 U	
FEW4-MW86-(372.0)	N	Trichloroethene (TCE)	5.8	0.93 U	0.93 UJ	0.93 U	
FEW4-MW86-(372.0)	N	Trichlorofluoromethane	12	3.7 U	3.7 UJ	3.7 U	
FEW4-MW86-(372.0)	N	Vinyl chloride	5.8	3.7 U	3.7 UJ	3.7 U	

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
Trace values are not included in the qualified results table unless additional reason codes are associated.

Reason Code Definitions

Code	Definition
H1	Test Hold Time
I	Surrogate recovery outside project limits.
TR	Trace Level Detect

Flag Code and Definitions

Flag	Definition
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
J	Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
R	The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making.
B	Blank contamination: The analyte was found in an associated blank above one half the RL, as well as in the sample.
UB	The analyte was also detected in an associated laboratory or field blank at a concentration comparable to the concentration in the sample. The reported result has been requalified as not detected.

Review Questions

Method: SW8260B (Volatile Organic Compounds by Capillary GC/MS)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?				
Were holding times met?	•			ADR noted that the following samples exceeded the 14 day analysis holding time on the 14th day between 0000 and 2359 hours: FEW4-MW86-(362.0) 5 hours, FEW4-MW86-(341.0) 8 hours, and FEW4-MW86-(372.0) 6 hours. According to DoD ELAP QSM 5.1 FAQ – Holding Time - Days: "the holding time shall be tracked by the day." "...an exceedance of holding time for a sample with a 14-day holding time will occur when the 15th day is reached (at 12am)." Therefore, no holding time exceedance is considered to have occurred for the noted samples.
Were sample reciept temperatures met?	•			Sample receipt temperature was 4.9ºC.
Were QAPP specified PQLs achieved?	•			
Were all QAPP-specified target analytes reported?	•			
Was the GC/MS system properly tuned based on method criteria?	•			
Was the criteria met during each 12 hour shift (prior to ICAL and Cal Ver.)?	•			
Does the initial calibration curve consist of 5 concentration levels, with the low standard near but > MDL?	•			
Did the Calibration Check Compounds (CCCs) have a relative standard deviation within QAPP acceptance limits?	•			
Were the average response factors (RFs) for the System Performance Check Compounds (SPCCs) within QAPP acceptance limits?	•			
Were the ICAL %RSDs for the target compounds within method criteria?	•			
If a quadratic equation curve was used, was the coefficient of determination (COD) within criteria?	•			
If a linear regression curve was used, was the correlation coefficient within criteria?	•			
Check and recalculate the response factors and average response factors for a least one target compound.	•			ICAL VMS-G 8/16/17 TCE AVG RF = 0.3273
Check and recalculate the %RSD for one of more target compounds and DMCs. Verify that the recalculated values agree with the laboratory reported values.	•			ICAL VMS-G 8/16/17 TCE %RSD = 4.3% 1,2-DCA-d4 %RSD = 5.0
Was a second source verification analyzed after the ICAL and all analytes within criteria?		•		The ICV percent difference was above the upper control limit for bromomethane at 36.6%D and dichlorofluoromethane at -22.7%. All associated sample results were nondetect for these analytes, therefore no data qualification is warranted.
Was a CCV run at the beginning of the analytical sequence and every 12 hours?	•			
Was the CCV a mid-level standard from the initial calibration curve?	•			
Did the CCCs have a %Difference within QAPP acceptance limits?	•			
Were the average RFs for the SPCCs within QAPP acceptance limits?	•			

Review Questions

Method: SW8260B (Volatile Organic Compounds by Capillary GC/MS)

Review Questions	Yes	No	NA	Comment
Was the %D (difference or drift) for all target analytes within QAPP acceptance limits?		•		The CCV percent difference was above the control limit for carbon tetrachloride at 31.9%, chlorobromomethane at 20.3%, dichlorodifluoromethane at 23.2%, 2,2-dichloropropane at 23.4%, trans-1,3-dichloropropene at 24.6% , 1,1,1-trichloroethane 24.8%, and trichlorofluoromethane at 24.6%. All associated sample results were non-detect for these analytes, therefore no data qualification is warranted.
Check and recalculate the CCV relative response factor for at least one target compound.	•			VMS-G 8/24/17 CCVC 280-385348/30 Trichloroethene RF = 0.3496
Were the internal standards added to every standard, blank, matrix spike, matrix spike duplicate, and sample?	•			
Were the retention times for all IS compounds within QAPP acceptance limits?	•			
Are the area counts of all IS compounds within QAPP acceptance limits?		•		The Internal standard response for TBA-d9 for the following samples was outside acceptance criteria: FEW4-MW84-(400.0) and FEW4-MW86-(353.0). This internal standard does not correspond to any target compounds.
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes detected in the method blank above the MDL?	•			Acetone and 1,2,3-trichlorobenzene were detected in a method blank at concentrations less than 1/2 the LOQ.
Were target analytes reported in the field blank analyses above the MDL?			•	
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?			•	A field duplicate was not collected with this SDG.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were the LCS/LCSD recoveries within QAPP acceptance limits?	•			
Were the LCS/LCSD RPDs within QAPP acceptance limits?	•			
Was the duplicate RPD within QAPP acceptance limits?			•	
Was a MS/MSD pair prepared with each batch?		•		MS/MSD samples were not designated for analysis with this SDG.
Is the MS/MSD parent sample the one designated by the sampling team?			•	
Were MS/MSD recoveries and RPD within QAPP acceptance limits?			•	
Were surrogate recoveries within QAPP acceptance limits?	•			
Were reported sample concentrations within calibration range?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were instrument run logs present and filled out appropriately?	•			
Were sample prepration sheets present and filled out appropriately?	•			
Check and recalculate the %D for one target compound. Verify that the recalculated values agree with the laboratory-reported values.	•			

Review Questions

Method: SW8260B (Volatile Organic Compounds by Capillary GC/MS)

Review Questions	Yes	No	NA	Comment
Examine raw data to verify correct calculation of sample results reported by the laboratory. Compare quantitation lists and chromatograms to the reported detect and non-detect sample results.	•			
Verify that the reporting limits and sample results have been adjusted to reflect all sample dilutions and Percent Moisture factors (non-aqueous samples).	•			

US Army Corps of Engineers ®

Batch Report

Test Method: SW8260B Analysis Batch: 280-385617

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
LABQC	SQ	LCS 280-385465/2-A	LCS 280-385465/2-A		1/1	8/24/2017 11:43	8/24/2017 11:43	8/25/2017 11:53	280-385617/	BS
FEW4-MW80	SO	FEW4-MW80-(95.0)	280-100211-9		2/1	8/13/2017 12:11	8/14/2017 11:11	8/25/2017 13:11	280-385617/	N
FEW4-MW80	SO	FEW4-MW80-(105.0)	280-100211-10		2/1	8/13/2017 12:15	8/14/2017 12:15	8/25/2017 13:30	280-385617/	N
FEW4-MW80	SO	FEW4-MW80-(113.0)	280-100211-11		2/1	8/13/2017 12:22	8/13/2017 12:22	8/25/2017 13:50	280-385617/	N
LABQC	SQ	MB 280-385465/1-A	MB 280-385465/1-A		1/1	8/24/2017 11:43	8/24/2017 11:43	8/25/2017 18:40	280-385617/	LB

Test Method: SW8260B Analysis Batch: 280-385692

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
LABQC	SQ	LCS 280-385690/1-A	LCS 280-385690/1-A		1/1	8/25/2017 16:00	8/25/2017 16:00	8/25/2017 20:55	280-385692/	BS
LABQC	SQ	MB 280-385690/2-A	MB 280-385690/2-A		1/1	8/25/2017 16:00	8/25/2017 16:00	8/25/2017 21:36	280-385692/	LB
FEW4-MW80	SO	FEW4-MW80-(0.5)	280-100211-1		1/1	8/12/2017 15:25	8/12/2017 15:25	8/26/2017 00:23	280-385692/	N
FEW4-MW80	SO	FEW4-MW80-(2.5)	280-100211-2		1/1	8/12/2017 15:35	8/12/2017 15:35	8/26/2017 00:43	280-385692/	N
FEW4-MW80	SO	FEW4-MW80-(9.0)	280-100211-3		1/1	8/12/2017 15:40	8/12/2017 15:40	8/26/2017 01:04	280-385692/	N
FEW4-MW80	SO	FEW4-MW80-(65.0)	280-100211-4		1/1	8/12/2017 18:20	8/12/2017 18:20	8/26/2017 01:24	280-385692/	N
FEW4-MW80	SO	FEW4-MW80-(74.0)	280-100211-5		1/1	8/13/2017 08:15	8/13/2017 08:15	8/26/2017 01:45	280-385692/	N
FEW4-MW80	SO	FEW4-MW80-(85.0)	280-100211-6		1/1	8/13/2017 09:00	8/13/2017 09:00	8/26/2017 02:06	280-385692/	N
FEW4-MW80	SO	FEW4-MW80-(86.0)	280-100211-7		1/1	8/13/2017 10:00	8/13/2017 10:00	8/26/2017 02:27	280-385692/	FD
FEW4-MW80	SO	FEW4-MW80-(95.0)	280-100211-9		1/1	8/13/2017 12:11	8/13/2017 12:11	8/26/2017 02:47	280-385692/	N
FEW4-MW80	SO	FEW4-MW80-(105.0)	280-100211-10		1/1	8/13/2017 12:15	8/13/2017 12:15	8/26/2017 03:08	280-385692/	N
FEW4-MW80	SO	FEW4-MW80-(113.0)	280-100211-11		1/1	8/13/2017 12:22	8/13/2017 12:22	8/26/2017 03:29	280-385692/	N

US Army Corps of Engineers ®

Batch Report

Test Method: SW8260B Analysis Batch: 280-385702

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
LABQC	WQ	LCS 280-385702/4	LCS 280-385702/4		1/1	8/26/2017 09:12	8/26/2017 09:12	8/26/2017 09:12	280-385702/	BS
LABQC	WQ	MB 280-385702/6	MB 280-385702/6		1/1	8/26/2017 09:32	8/26/2017 09:32	8/26/2017 09:32	280-385702/	LB
FEW4-MW80	WG	FEW4-MW80-(85)	280-100211-8		1/1	8/13/2017 09:35	8/26/2017 09:54	8/26/2017 09:54	280-385702/	N
FEW4-MW80	WG	FEW4-MW80-(85)	280-100211-8		2/4	8/13/2017 09:35	8/26/2017 10:35	8/26/2017 10:35	280-385702/	N

US Army Corps of Engineers ®

Field Batch Report

--No Records Found--

MS Mismatch Report

--No Records Found--

Section to identify Matrix Spike mismatches where parent sample differs from MS by dilution.

US Army Corps of Engineers ®

QC Outlier Report

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

QC Element	Sample ID/ Lab Sample ID	Run#/ Dil'n	Analyte	Result (Units)	Qualifier	Warning Limits	Control Limits	Reason	Comment	Rule	Action Level
Surrogate	FEW4-MW80-(105.0) (N) / 280-100211-10	2 / 1.00	1-Bromo-4-fluorobenzene (4-Bromofluorobenzene)	121.6 (percent)	J/None	79 - 119	79 - 119	I			
Surrogate	FEW4-MW80-(74.0) (N) / 280-100211-5	1 / 1.00	Dibromofluoromethane	119.2 (percent)	J/None	78 - 119	78 - 119	I			
Surrogate	FEW4-MW80-(9.0) (N) / 280-100211-3	1 / 1.00	Dibromofluoromethane	124.6 (percent)	J/None	78 - 119	78 - 119	I			
Surrogate	FEW4-MW80-(9.0) (N) / 280-100211-3	1 / 1.00	Toluene-d8	116.1 (percent)	J/None	85 - 116	85 - 116	I			
Surrogate	FEW4-MW80-(95.0) (N) / 280-100211-9	2 / 1.00	1-Bromo-4-fluorobenzene (4-Bromofluorobenzene)	125.0 (percent)	J/None	79 - 119	79 - 119	I			

Rule is the multiplier used when blank contamination occurs to determine action level.

US Army Corps of Engineers ®

Qualified Results

Test Method: SW8260B Extraction Method: SW5030B Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW80-(85)	280-100211-8	WG	N	Benzene	1.00	0.520 J	0.520 J		ug/L	TR
FEW4-MW80-(85)	280-100211-8	WG	N	Chloromethane	2.00	0.370 J	0.370 J		ug/L	TR
FEW4-MW80-(85)	280-100211-8	WG	N	Toluene	1.00	0.490 J	0.490 J		ug/L	TR

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW80-(0.5)	280-100211-1	SO	N	Acetone	19.0	24.0 Q	24.0 J		ug/kg	V2
FEW4-MW80-(105.0)	280-100211-10	SO	N	1,2-Dichloroethene	6.90	3.60 J	3.60 J		ug/kg	TR
FEW4-MW80-(105.0)	280-100211-10	SO	N	Acetone	28.0	18.0 U Q	28.0 U		ug/kg	V2
FEW4-MW80-(105.0)	280-100211-10	SO	N	Chloroform	14.0	0.490 J	0.490 J		ug/kg	TR
FEW4-MW80-(105.0)	280-100211-10	SO	N	cis-1,2-Dichloroethene	6.90	3.60 J	3.60 J		ug/kg	TR
FEW4-MW80-(105.0)	280-100211-10	SO	N	Trichloroethene (TCE)	500	2700	2700 J	+	ug/kg	I
FEW4-MW80-(113.0)	280-100211-11	SO	N	1,2-Dichloroethene	7.80	2.30 J	2.30 J		ug/kg	TR
FEW4-MW80-(113.0)	280-100211-11	SO	N	Acetone	31.0	20.0 J Q	20.0 J		ug/kg	TR/V2
FEW4-MW80-(113.0)	280-100211-11	SO	N	cis-1,2-Dichloroethene	7.80	2.30 J	2.30 J		ug/kg	TR
FEW4-MW80-(2.5)	280-100211-2	SO	N	Acetone	22.0	15.0 J Q	15.0 J		ug/kg	TR/V2
FEW4-MW80-(65.0)	280-100211-4	SO	N	Acetone	18.0	40.0 Q	40.0 J		ug/kg	V2
FEW4-MW80-(65.0)	280-100211-4	SO	N	Trichloroethene (TCE)	4.50	2.20 J	2.20 J		ug/kg	TR
FEW4-MW80-(74.0)	280-100211-5	SO	N	Acetone	27.0	26.0 J Q	26.0 J	+	ug/kg	I/TR/V2
FEW4-MW80-(74.0)	280-100211-5	SO	N	Trichloroethene (TCE)	6.80	13.0	13.0 J	+	ug/kg	I
FEW4-MW80-(85.0)	280-100211-6	SO	N	Acetone	27.0	42.0 Q	42.0 J		ug/kg	V2
FEW4-MW80-(85.0)	280-100211-6	SO	N	Trichloroethene (TCE)	6.70	49.0	49.0 J		ug/kg	D3
FEW4-MW80-(86.0)	280-100211-7	SO	FD	Acetone	30.0	23.0 J Q	23.0 J		ug/kg	TR/V2
FEW4-MW80-(86.0)	280-100211-7	SO	FD	Trichloroethene (TCE)	7.50	30.0	30.0 J		ug/kg	D3
FEW4-MW80-(9.0)	280-100211-3	SO	N	2-Butanone (MEK)	17.0	4.80 J Q	4.80 J	+	ug/kg	I/TR
FEW4-MW80-(9.0)	280-100211-3	SO	N	Acetone	17.0	25.0 Q	25.0 J	+	ug/kg	I/V2

US Army Corps of Engineers ®

Qualified Results

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW80-(95.0)	280-100211-9	SO	N	1,2-Dichloroethene	7.90	1.70 J	1.70 J		ug/kg	TR
FEW4-MW80-(95.0)	280-100211-9	SO	N	Acetone	32.0	84.0 Q	84.0 J		ug/kg	V2
FEW4-MW80-(95.0)	280-100211-9	SO	N	cis-1,2-Dichloroethene	7.90	1.70 J	1.70 J		ug/kg	TR
FEW4-MW80-(95.0)	280-100211-9	SO	N	Trichloroethene (TCE)	400	1000	1000 J	+	ug/kg	I

Qualified analytes in samples are reported as estimated, not detected (UJ) at the Limit of Detection (LOD).

US Army Corps of Engineers ®

Detected Results

Test Method: SW8260B Extraction Method: SW5030B Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Dilution	Analyte	LOQ	Lab Result	Qualified Result	Units	Reason
FEW4-MW80-(85)	280-100211-8	WG	N	1	Acetone	10.0	11.0	11.0	ug/L	
FEW4-MW80-(85)	280-100211-8	WG	N	1	Benzene	1.00	0.520 J	0.520 J	ug/L	TR
FEW4-MW80-(85)	280-100211-8	WG	N	1	Chloromethane	2.00	0.370 J	0.370 J	ug/L	TR
FEW4-MW80-(85)	280-100211-8	WG	N	1	Toluene	1.00	0.490 J	0.490 J	ug/L	TR
FEW4-MW80-(85)	280-100211-8	WG	N	4	Trichloroethene (TCE)	4.00	110 D	110	ug/L	

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Dilution	Analyte	LOQ	Lab Result	Qualified Result	Units	Reason
FEW4-MW80-(0.5)	280-100211-1	SO	N	1	Acetone	19.0	24.0 Q	24.0 J	ug/kg	V2
FEW4-MW80-(105.0)	280-100211-10	SO	N	1	1,2-Dichloroethene	6.90	3.60 J	3.60 J	ug/kg	TR
FEW4-MW80-(105.0)	280-100211-10	SO	N	1	Chloroform	14.0	0.490 J	0.490 J	ug/kg	TR
FEW4-MW80-(105.0)	280-100211-10	SO	N	1	cis-1,2-Dichloroethene	6.90	3.60 J	3.60 J	ug/kg	TR
FEW4-MW80-(105.0)	280-100211-10	SO	N	1	Trichloroethene (TCE)	500	2700	2700 J	ug/kg	I
FEW4-MW80-(113.0)	280-100211-11	SO	N	1	1,2-Dichloroethene	7.80	2.30 J	2.30 J	ug/kg	TR
FEW4-MW80-(113.0)	280-100211-11	SO	N	1	Acetone	31.0	20.0 J Q	20.0 J	ug/kg	TR/V2
FEW4-MW80-(113.0)	280-100211-11	SO	N	1	cis-1,2-Dichloroethene	7.80	2.30 J	2.30 J	ug/kg	TR
FEW4-MW80-(113.0)	280-100211-11	SO	N	1	Trichloroethene (TCE)	580	1800	1800	ug/kg	
FEW4-MW80-(2.5)	280-100211-2	SO	N	1	Acetone	22.0	15.0 J Q	15.0 J	ug/kg	TR/V2
FEW4-MW80-(65.0)	280-100211-4	SO	N	1	Acetone	18.0	40.0 Q	40.0 J	ug/kg	V2
FEW4-MW80-(65.0)	280-100211-4	SO	N	1	Trichloroethene (TCE)	4.50	2.20 J	2.20 J	ug/kg	TR
FEW4-MW80-(74.0)	280-100211-5	SO	N	1	Acetone	27.0	26.0 J Q	26.0 J	ug/kg	I/TR/V2
FEW4-MW80-(74.0)	280-100211-5	SO	N	1	Trichloroethene (TCE)	6.80	13.0	13.0 J	ug/kg	I
FEW4-MW80-(85.0)	280-100211-6	SO	N	1	Acetone	27.0	42.0 Q	42.0 J	ug/kg	V2
FEW4-MW80-(85.0)	280-100211-6	SO	N	1	Trichloroethene (TCE)	6.70	49.0	49.0 J	ug/kg	D3
FEW4-MW80-(86.0)	280-100211-7	SO	FD	1	Acetone	30.0	23.0 J Q	23.0 J	ug/kg	TR/V2

US Army Corps of Engineers ®

Detected Results

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Dilution	Analyte	LOQ	Lab Result	Qualified Result	Units	Reason
FEW4-MW80-(86.0)	280-100211-7	SO	FD	1	Trichloroethene (TCE)	7.50	30.0	30.0 J	ug/kg	D3
FEW4-MW80-(9.0)	280-100211-3	SO	N	1	2-Butanone (MEK)	17.0	4.80 J Q	4.80 J	ug/kg	I/TR
FEW4-MW80-(9.0)	280-100211-3	SO	N	1	Acetone	17.0	25.0 Q	25.0 J	ug/kg	I/V2
FEW4-MW80-(95.0)	280-100211-9	SO	N	1	1,2-Dichloroethene	7.90	1.70 J	1.70 J	ug/kg	TR
FEW4-MW80-(95.0)	280-100211-9	SO	N	1	Acetone	32.0	84.0 Q	84.0 J	ug/kg	V2
FEW4-MW80-(95.0)	280-100211-9	SO	N	1	cis-1,2-Dichloroethene	7.90	1.70 J	1.70 J	ug/kg	TR
FEW4-MW80-(95.0)	280-100211-9	SO	N	1	Trichloroethene (TCE)	400	1000	1000 J	ug/kg	I

US Army Corps of Engineers ®

Rejected Results

--No Records Found--

Facility:	B08WY0467-02, F.E. Warren AFB, Site 4
Event:	2017-2018 RI Addendum Tasks
SDG:	280-100211-1_52_2a_FUDSChem
Guidance Document:	Draft-Final Uniform Federal Policy-Quality Assurance Project Plan for the Remedial Investigation Addendum 2017-2018 Tasks Atlas “D” Missile Site 4 —Laramie County, Wyoming, July 2017
Prime Contractor:	RMC Consultants, Inc., LAKEWOOD, CO
Project Manager:	David Groy
Contract Laboratory:	TestAmerica Laboratories, Inc., Arvada, CO
Data Review Contractor:	RMC Consultants
Data Review Level:	Stage 3VEM
Primary Data Reviewer:	Gary Torf, Contractor Project Chemist
Second Reviewer:	, Senior Scientist
Date Submitted:	

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	SW8260B
FEW4-MW80-(86.0)	280-100211-7	Solid	Field Duplicate/FD	X
FEW4-MW80-(0.5)	280-100211-1	Solid	Field Sample/N	X
FEW4-MW80-(105.0)	280-100211-10	Solid	Field Sample/N	X
FEW4-MW80-(113.0)	280-100211-11	Solid	Field Sample/N	X
FEW4-MW80-(2.5)	280-100211-2	Solid	Field Sample/N	X
FEW4-MW80-(65.0)	280-100211-4	Solid	Field Sample/N	X
FEW4-MW80-(74.0)	280-100211-5	Solid	Field Sample/N	X
FEW4-MW80-(85)	280-100211-8	Water	Field Sample/N	X
FEW4-MW80-(85.0)	280-100211-6	Solid	Field Sample/N	X
FEW4-MW80-(9.0)	280-100211-3	Solid	Field Sample/N	X
FEW4-MW80-(95.0)	280-100211-9	Solid	Field Sample/N	X

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the Draft-Final Uniform Federal Policy-Quality Assurance Project Plan for the Remedial Investigation Addendum 2017-2018 Tasks Atlas “D” Missile Site 4 —Laramie County, Wyoming, July 2017 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by RMC Consultants, Inc., LAKEWOOD, CO; analyses were performed by TestAmerica Laboratories, Inc., Arvada, CO and were reported under sample delivery group (SDG) 280-100211-1_52_2a_FUDSChem. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

- Blank
- Blank - Negative
- Field Duplicate RPD
- LCS Recovery
- Prep Hold Time
- Surrogate
- Test Hold Time

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 16 results (2.25%) out of the 712 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected. Trace values, defined as results that are qualified as estimated because they fall between the limit of detection and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

Narrative Comments

Analytical Method	Data Reviewer Comment
SW8260B	No additional comments; see Checklist for detail.

October 31, 2017

Reviewed by Gary Torf, Contractor Project Chemist, RMC Consultants

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of a minimum of 10% of the reported sample results and method quality control data between the two deliverables.

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

Quality Control Outliers for test method SW8260B, Surrogate

Method performance for individual samples is demonstrated through spiking activities. All samples are spiked with surrogate compounds prior to sample preparation. The sample itself may produce effects due to such factors as interferences and high concentrations of analytes. Summary forms were evaluated and compared to electronic data deliverables. Surrogate results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
FEW4-MW80-(105.0) (N)/ 280-100211-10	1-Bromo-4-fluorobenzene (4-Bromofluorobenzene)	121.6	79 - 119	79 - 119	percent	J/None	I	
FEW4-MW80-(74.0) (N)/ 280-100211-5	Dibromofluoromethane	119.2	78 - 119	78 - 119	percent	J/None	I	
FEW4-MW80-(9.0) (N)/ 280-100211-3	Toluene-d8	116.1	85 - 116	85 - 116	percent	J/None	I	
FEW4-MW80-(9.0) (N)/ 280-100211-3	Dibromofluoromethane	124.6	78 - 119	78 - 119	percent	J/None	I	
FEW4-MW80-(95.0) (N)/ 280-100211-9	1-Bromo-4-fluorobenzene (4-Bromofluorobenzene)	125.0	79 - 119	79 - 119	percent	J/None	I	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the Surrogate for SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW80-(105.0)	N	Trichloroethene (TCE)	500	2700	2700 J	+	ug/kg	I
FEW4-MW80-(74.0)	N	Acetone	27.0	26.0 J Q	26.0 J	+	ug/kg	I/TR/V2
FEW4-MW80-(74.0)	N	Trichloroethene (TCE)	6.80	13.0	13.0 J	+	ug/kg	I
FEW4-MW80-(9.0)	N	2-Butanone (MEK)	17.0	4.80 J Q	4.80 J	+	ug/kg	I/TR
FEW4-MW80-(9.0)	N	Acetone	17.0	25.0 Q	25.0 J	+	ug/kg	I/V2
FEW4-MW80-(95.0)	N	Trichloroethene (TCE)	400	1000	1000 J	+	ug/kg	I

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

Table of All Qualified Results

Test Method: SW8260B	**Extraction Method: SW5035A**							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW80-(105.0)	N	Trichloroethene (TCE)	500	2700	2700 J	+	ug/kg	I
FEW4-MW80-(74.0)	N	Acetone	27.0	26.0 J Q	26.0 J	+	ug/kg	I/TR/V2
FEW4-MW80-(74.0)	N	Trichloroethene (TCE)	6.80	13.0	13.0 J	+	ug/kg	I
FEW4-MW80-(9.0)	N	2-Butanone (MEK)	17.0	4.80 J Q	4.80 J	+	ug/kg	I/TR
FEW4-MW80-(9.0)	N	Acetone	17.0	25.0 Q	25.0 J	+	ug/kg	I/V2
FEW4-MW80-(95.0)	N	Trichloroethene (TCE)	400	1000	1000 J	+	ug/kg	I

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
Trace values are not included in the qualified results table unless additional reason codes are associated.

Table of All Trace Results

Test Method: SW8260B	Extraction Method: SW5030B							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW80-(85)	N	Benzene	1.00	0.520 J	0.520 J		ug/L	TR
FEW4-MW80-(85)	N	Chloromethane	2.00	0.370 J	0.370 J		ug/L	TR
FEW4-MW80-(85)	N	Toluene	1.00	0.490 J	0.490 J		ug/L	TR

Test Method: SW8260B	Extraction Method: SW5035A							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW80-(105.0)	N	1,2-Dichloroethene	6.90	3.60 J	3.60 J		ug/kg	TR
FEW4-MW80-(105.0)	N	Chloroform	14.0	0.490 J	0.490 J		ug/kg	TR
FEW4-MW80-(105.0)	N	cis-1,2-Dichloroethene	6.90	3.60 J	3.60 J		ug/kg	TR
FEW4-MW80-(113.0)	N	1,2-Dichloroethene	7.80	2.30 J	2.30 J		ug/kg	TR
FEW4-MW80-(113.0)	N	Acetone	31.0	20.0 J Q	20.0 J		ug/kg	TR/V2
FEW4-MW80-(113.0)	N	cis-1,2-Dichloroethene	7.80	2.30 J	2.30 J		ug/kg	TR
FEW4-MW80-(2.5)	N	Acetone	22.0	15.0 J Q	15.0 J		ug/kg	TR/V2
FEW4-MW80-(65.0)	N	Trichloroethene (TCE)	4.50	2.20 J	2.20 J		ug/kg	TR
FEW4-MW80-(74.0)	N	Acetone	27.0	26.0 J Q	26.0 J	+	ug/kg	I/TR/V2
FEW4-MW80-(86.0)	FD	Acetone	30.0	23.0 J Q	23.0 J		ug/kg	TR/V2
FEW4-MW80-(9.0)	N	2-Butanone (MEK)	17.0	4.80 J Q	4.80 J	+	ug/kg	I/TR
FEW4-MW80-(95.0)	N	1,2-Dichloroethene	7.90	1.70 J	1.70 J		ug/kg	TR
FEW4-MW80-(95.0)	N	cis-1,2-Dichloroethene	7.90	1.70 J	1.70 J		ug/kg	TR

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW80-(0.5)	N	Acetone	19.0	24.0 Q	24.0	24.0 J	V2
FEW4-MW80-(65.0)	N	Acetone	18.0	40.0 Q	40.0	40.0 J	V2
FEW4-MW80-(85.0)	N	Acetone	27.0	42.0 Q	42.0	42.0 J	V2
FEW4-MW80-(85.0)	N	Trichloroethene (TCE)	6.70	49.0	49.0	49.0 J	D3
FEW4-MW80-(86.0)	FD	Trichloroethene (TCE)	7.50	30.0	30.0	30.0 J	D3
FEW4-MW80-(95.0)	N	Acetone	32.0	84.0 Q	84.0	84.0 J	V2

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
Trace values are not included in the qualified results table unless additional reason codes are associated.

Reason Code Definitions

Code	Definition
D3	Field Duplicate RPD
I	Surrogate recovery outside project limits.
TR	Trace Level Detect
V2	CCV

Flag Code and Definitions

Flag	Definition
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
J	Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
R	The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making.
B	Blank contamination: The analyte was found in an associated blank above one half the RL, as well as in the sample.
UB	The analyte was also detected in an associated laboratory or field blank at a concentration comparable to the concentration in the sample. The reported result has been requalified as not detected.

Review Questions

Method: SW8260B (Volatile Organic Compounds by Capillary GC/MS)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?		•		All terracore sample vials were frozen prior to submittal to the laboratory. The samples were removed from a freezer and sent by courier to the laboratory. A sample temperature taken upon lab receipt was 7.1 degrees C. All samples were subsequently frozen again upon receipt at the laboratory within 48 hours of collection.
Were holding times met?	•			
Were sample reciept temperatures met?		•		A temperature blank was not submitted to the lab with the samples. A sample temperature taken upon receipt at the laboratory was 7.1 degrees C. See Item #2 above. The samples are considered to have been acceptable chilled and no data qualification has been applied.
Were QAPP specified PQLs achieved?	•			
Were all QAPP-specified target analytes reported?	•			
Was the GC/MS system properly tuned based on method criteria?	•			
Was the criteria met during each 12 hour shift (prior to ICAL and Cal Ver.)?	•			
Does the initial calibration curve consist of 5 concentration levels, with the low standard near but > MDL?	•			
Did the Calibration Check Compounds (CCCs) have a relative standard deviation within QAPP acceptance limits?	•			
Were the average response factors (RFs) for the System Performance Check Compounds (SPCCs) within QAPP acceptance limits?	•			
Were the ICAL %RSDs for the target compounds within method criteria?	•			
If a quadratic equation curve was used, was the coefficient of determination (COD) within criteria?	•			
If a linear regression curve was used, was the correlation coefficient within criteria?	•			
Check and recalculate the response factors and average response factors for a least one target compound.	•			ICAL VMS-G 8/16/17 TCE AVG RF = 0.3273
Check and recalculate the %RSD for one of more target compounds and DMCs. Verify that the recalculated values agree with the laboratory reported values.	•			TCE %RSD = 4.3% 1,2-DCA-d4 %RSD = 5.0
Was a second source verification analyzed after the ICAL and all analytes within criteria?		•		The ICV percent difference associated with batch 280-385692 was above the upper control limit for bromomethane at 36.6%D and dichlorofluoromethane at -22.7%. All associated sample results were nondetect for these analytes, therefore no data qualification is warranted.
Was a CCV run at the beginning of the analytical sequence and every 12 hours?	•			
Was the CCV a mid-level standard from the initial calibration curve?	•			
Did the CCCs have a %Difference within QAPP acceptance limits?	•			
Were the average RFs for the SPCCs within QAPP acceptance limits?	•			

Review Questions

Method: SW8260B (Volatile Organic Compounds by Capillary GC/MS)

Review Questions	Yes	No	NA	Comment
Was the %D (difference or drift) for all target analytes within QAPP acceptance limits?		•		CCV 280-385692/2 percent difference was above the 20% control limit for acetone at 22.7%; associated samples with detections for acetone have been qualified and included FEW4-MW80-(0.5), FEW4-MW80-(2.5), FEW4-MW80-(9.0), FEW4-MW80-(65.0), FEW4-MW80-(74.0), FEW4-MW80-(85.0),FEW4-MW80-(86.0), FEW4-MW80-(95.0), FEW4-MW80-(105.0), and FEW4-MW80-(113.0). CCV 280-385702 was above the 20% control limit for bromoform at 20.2%, bromomethane at 23.1%, and dichlorodifluoromethane at 37.1%. These analytes were not detected in any associated samples, therefore data qualification was not warranted.
Check and recalculate the CCV relative response factor for at least one target compound.	•			VMS-G 8/25/17 CCVC 280-385692/2 Trichloroethene RF = 0.3331
Were the internal standards added to every standard, blank, matrix spike, matrix spike duplicate, and sample?	•			
Were the retention times for all IS compounds within QAPP acceptance limits?	•			
Are the area counts of all IS compounds within QAPP acceptance limits?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes detected in the method blank above the MDL?		•		
Were target analytes reported in the field blank analyses above the MDL?			•	
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?		•		FEW4-MW80-(86.0) was a blind duplicatge of FEW4-MW80-(85.0). The relative percent difference for TCE was 48%.
Was an LCS/LCSD pair prepared and analyzed with each batch?		•		NO LCSD were analyzed.
Were the LCS/LCSD recoveries within QAPP acceptance limits?			•	
Were the LCS/LCSD RPDs within QAPP acceptance limits?			•	
Was the duplicate RPD within QAPP acceptance limits?			•	
Was a MS/MSD pair prepared with each batch?			•	No MS/MSD were desigated for this SDG.
Is the MS/MSD parent sample the one designated by the sampling team?			•	
Were MS/MSD recoveries and RPD within QAPP acceptance limits?			•	
Were surrogate recoveries within QAPP acceptance limits?		•		Bromofluorobenzene was above the upper control limit of 119% at 124% in FEW4-MW80-(95.0) and at 123% in FEW4-MW80-(105.0). Dibromofluoromethane was above the upper control limit of 119% in FEW4-MW80-(9.0) at 124% and in FEW4-MW80-(74.0) at 120%.
Were reported sample concentrations within calibration range?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were instrument run logs present and filled out appropriately?	•			

Review Questions

Method: SW8260B (Volatile Organic Compounds by Capillary GC/MS)

Review Questions	Yes	No	NA	Comment
Were sample prepration sheets present and filled out appropriately?	•			
Check and recalculate the %D for one target compound. Verify that the recalculated values agree with the laboratory-reported values.			•	
Examine raw data to verify correct calculation of sample results reported by the laboratory. Compare quantitation lists and chromatograms to the reported detect and non-detect sample results.	•			FEW4-MW80-(86.0) TCE = 30 ug/kg
Verify that the reporting limits and sample results have been adjusted to reflect all sample dilutions and Percent Moisture factors (non-aqueous samples).	•			

US Army Corps of Engineers ®

Batch Report

Test Method: SW8260B Analysis Batch: 280-385348

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
LABQC	SQ	LCS 280-385372/1-A	LCS 280-385372/1-A		1/1	8/23/2017 16:00	8/23/2017 16:00	8/23/2017 20:08	280-385348/	BS
LABQC	SQ	LCSD 280-385372/2-A	LCSD 280-385372/2-A		1/1	8/23/2017 16:00	8/23/2017 16:00	8/23/2017 20:29	280-385348/	BD
LABQC	SQ	MB 280-385372/3-A	MB 280-385372/3-A		1/1	8/23/2017 16:00	8/23/2017 16:00	8/23/2017 21:10	280-385348/	LB
FEW4-MW80	SO	FEW4-MW80-(165.0)	280-100222-6		1/1	8/14/2017 10:30	8/14/2017 10:30	8/23/2017 23:56	280-385348/	N
FEW4-MW80	SO	FEW4-MW80-(165.0)	280-100222-6MS		1/1	8/14/2017 10:30	8/14/2017 10:30	8/24/2017 00:16	280-385348/	MS
FEW4-MW80	SO	FEW4-MW80-(165.0)	280-100222-6MSD		1/1	8/14/2017 10:30	8/14/2017 10:30	8/24/2017 00:37	280-385348/	SD
FEW4-MW80	SO	FEW4-MW80-(125.0)	280-100222-1		1/1	8/13/2017 14:00	8/13/2017 14:00	8/24/2017 01:18	280-385348/	N
FEW4-MW80	SO	FEW4-MW80-(135.0)	280-100222-2		1/1	8/14/2017 09:00	8/14/2017 09:00	8/24/2017 01:39	280-385348/	N
FEW4-MW80	SO	FEW4-MW80-(145.0)	280-100222-3		1/1	8/14/2017 09:09	8/14/2017 09:09	8/24/2017 01:59	280-385348/	N
FEW4-MW80	SO	FEW4-MW80-(146.0)	280-100222-4		1/1	8/14/2017 10:09	8/14/2017 10:09	8/24/2017 02:20	280-385348/	FD
FEW4-MW80	SO	FEW4-MW80-(155.0)	280-100222-5		1/1	8/14/2017 10:20	8/14/2017 10:20	8/24/2017 02:41	280-385348/	N
FEW4-MW80	SO	FEW4-MW80-(175.0)	280-100222-7		1/1	8/14/2017 11:30	8/14/2017 11:30	8/24/2017 03:01	280-385348/	N
FEW4-MW80	SO	FEW4-MW80-(185.0)	280-100222-8		1/1	8/14/2017 11:40	8/14/2017 11:40	8/24/2017 03:22	280-385348/	N
FEW4-MW80	SO	FEW4-MW80-(197.0)	280-100222-9		1/1	8/14/2017 13:00	8/14/2017 13:00	8/24/2017 03:43	280-385348/	N
FEW4-MW80	SO	FEW4-MW80-(205.0)	280-100222-10		1/1	8/14/2017 13:03	8/14/2017 13:03	8/24/2017 04:03	280-385348/	N
FEW4-MW80	SO	FEW4-MW80-(215.0)	280-100222-11		1/1	8/14/2017 13:13	8/14/2017 13:13	8/24/2017 04:24	280-385348/	N

Test Method: SW8260B Analysis Batch: 280-385617

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
LABQC	SQ	LCS 280-385465/2-A	LCS 280-385465/2-A		1/1	8/24/2017 11:43	8/24/2017 11:43	8/25/2017 11:53	280-385617/	BS
FEW4-MW80	SO	FEW4-MW80-(135.0)	280-100222-2		2/1	8/14/2017 09:00	8/14/2017 09:00	8/25/2017 14:28	280-385617/	N
FEW4-MW80	SO	FEW4-MW80-(145.0)	280-100222-3		2/1	8/14/2017 09:09	8/14/2017 09:09	8/25/2017 14:48	280-385617/	N
FEW4-MW80	SO	FEW4-MW80-(146.0)	280-100222-4		2/1	8/14/2017 10:09	8/14/2017 10:09	8/25/2017 15:07	280-385617/	FD
FEW4-MW80	SO	FEW4-MW80-(155.0)	280-100222-5		2/1	8/14/2017 10:20	8/14/2017 10:20	8/25/2017 15:26	280-385617/	N

US Army Corps of Engineers ®

Batch Report

Test Method: SW8260B Analysis Batch: 280-385617

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
FEW4-MW80	SO	FEW4-MW80-(165.0)	280-100222-6		2/1	8/14/2017 10:30	8/14/2017 10:30	8/25/2017 15:46	280-385617/	N
FEW4-MW80	SO	FEW4-MW80-(165.0)	280-100222-6MS		2/1	8/14/2017 10:30	8/14/2017 10:30	8/25/2017 16:05	280-385617/	MS
FEW4-MW80	SO	FEW4-MW80-(165.0)	280-100222-6MSD		2/1	8/14/2017 10:30	8/14/2017 10:30	8/25/2017 16:24	280-385617/	SD
FEW4-MW80	SO	FEW4-MW80-(175.0)	280-100222-7		2/1	8/14/2017 11:30	8/14/2017 11:30	8/25/2017 16:44	280-385617/	N
FEW4-MW80	SO	FEW4-MW80-(185.0)	280-100222-8		2/1	8/14/2017 11:40	8/14/2017 11:40	8/25/2017 17:03	280-385617/	N
FEW4-MW80	SO	FEW4-MW80-(197.0)	280-100222-9		2/1	8/14/2017 13:00	8/14/2017 13:00	8/25/2017 17:23	280-385617/	N
FEW4-MW80	SO	FEW4-MW80-(205.0)	280-100222-10		2/1	8/14/2017 13:03	8/14/2017 13:03	8/25/2017 17:42	280-385617/	N
FEW4-MW80	SO	FEW4-MW80-(125.0)	280-100222-1		2/1	8/13/2017 14:00	8/13/2017 14:00	8/25/2017 18:21	280-385617/	N
LABQC	SQ	MB 280-385465/1-A	MB 280-385465/1-A		1/1	8/24/2017 11:43	8/24/2017 11:43	8/25/2017 18:40	280-385617/	LB

US Army Corps of Engineers ®

Field Batch Report

--No Records Found--

MS Mismatch Report

--No Records Found--

Section to identify Matrix Spike mismatches where parent sample differs from MS by dilution.

QC Outliers Report

--No Records Found--

Qualified Results

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW80-(125.0)	280-100222-1	SO	N	1,1,2-Trichloroethane	6.20	3.00 J	3.00 J		ug/kg	TR

US Army Corps of Engineers ®

Qualified Results

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW80-(125.0)	280-100222-1	SO	N	Chloroform	12.0	2.20 J	2.20 J		ug/kg	TR
FEW4-MW80-(125.0)	280-100222-1	SO	N	Trichloroethene (TCE)	260	8500	8500 J	+	ug/kg	I
FEW4-MW80-(135.0)	280-100222-2	SO	N	1,2-Dichloroethene	18.0	3.50 J	3.50 J		ug/kg	TR
FEW4-MW80-(135.0)	280-100222-2	SO	N	Acetone	72.0	32.0 J	32.0 J		ug/kg	TR
FEW4-MW80-(135.0)	280-100222-2	SO	N	cis-1,2-Dichloroethene	18.0	3.50 J	3.50 J		ug/kg	TR
FEW4-MW80-(135.0)	280-100222-2	SO	N	Toluene	18.0	3.00 J	3.00 J		ug/kg	TR
FEW4-MW80-(135.0)	280-100222-2	SO	N	Trichloroethene (TCE)	680	9000	9000 J	+	ug/kg	I
FEW4-MW80-(145.0)	280-100222-3	SO	N	1,1,2-Trichloroethane	6.40	1.70 J	1.70 J		ug/kg	TR
FEW4-MW80-(145.0)	280-100222-3	SO	N	Acetone	25.0	17.0 J	17.0 J		ug/kg	TR
FEW4-MW80-(145.0)	280-100222-3	SO	N	Chloroform	13.0	1.40 J	1.40 J		ug/kg	TR
FEW4-MW80-(145.0)	280-100222-3	SO	N	Trichloroethene (TCE)	450	6300	6300 J	+	ug/kg	I/D3
FEW4-MW80-(146.0)	280-100222-4	SO	FD	1,1,2-Trichloroethane	6.30	1.30 J	1.30 J		ug/kg	TR
FEW4-MW80-(146.0)	280-100222-4	SO	FD	1,2-Dichloroethene	6.30	4.40 J	4.40 J		ug/kg	TR
FEW4-MW80-(146.0)	280-100222-4	SO	FD	Acetone	25.0	17.0 J	17.0 J		ug/kg	TR
FEW4-MW80-(146.0)	280-100222-4	SO	FD	Chloroform	13.0	0.970 J	0.970 J		ug/kg	TR
FEW4-MW80-(146.0)	280-100222-4	SO	FD	cis-1,2-Dichloroethene	6.30	4.40 J	4.40 J		ug/kg	TR
FEW4-MW80-(146.0)	280-100222-4	SO	FD	Trichloroethene (TCE)	330	4300	4300 J		ug/kg	D3
FEW4-MW80-(155.0)	280-100222-5	SO	N	1,2-Dichloroethene	13.0	4.20 J	4.20 J		ug/kg	TR
FEW4-MW80-(155.0)	280-100222-5	SO	N	Acetone	53.0	37.0 J	37.0 J		ug/kg	TR
FEW4-MW80-(155.0)	280-100222-5	SO	N	cis-1,2-Dichloroethene	13.0	4.20 J	4.20 J		ug/kg	TR
FEW4-MW80-(155.0)	280-100222-5	SO	N	Toluene	13.0	2.40 J	2.40 J		ug/kg	TR
FEW4-MW80-(165.0)	280-100222-6	SO	N	1,2-Dichloroethene	6.60	4.10 J	4.10 J		ug/kg	TR
FEW4-MW80-(165.0)	280-100222-6	SO	N	Chloroform	13.0	0.740 J	0.740 J		ug/kg	TR
FEW4-MW80-(165.0)	280-100222-6	SO	N	cis-1,2-Dichloroethene	6.60	4.10 J	4.10 J		ug/kg	TR
FEW4-MW80-(165.0)	280-100222-6	SO	N	Trichloroethene (TCE)	300	1600	1600 J	+	ug/kg	I
FEW4-MW80-(175.0)	280-100222-7	SO	N	1,2-Dichloroethene	6.80	4.00 J	4.00 J		ug/kg	TR
FEW4-MW80-(175.0)	280-100222-7	SO	N	Chloroform	14.0	0.790 J	0.790 J		ug/kg	TR
FEW4-MW80-(175.0)	280-100222-7	SO	N	cis-1,2-Dichloroethene	6.80	4.00 J	4.00 J		ug/kg	TR

US Army Corps of Engineers ®

Qualified Results

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW80-(175.0)	280-100222-7	SO	N	Toluene	6.80	1.30 J	1.30 J		ug/kg	TR
FEW4-MW80-(185.0)	280-100222-8	SO	N	1,1,2-Trichloroethane	7.30	1.30 J	1.30 J		ug/kg	TR
FEW4-MW80-(185.0)	280-100222-8	SO	N	1,2-Dichloroethene	7.30	6.10 J	6.10 J		ug/kg	TR
FEW4-MW80-(185.0)	280-100222-8	SO	N	Acetone	29.0	8.40 J	8.40 J		ug/kg	TR
FEW4-MW80-(185.0)	280-100222-8	SO	N	Chloroform	15.0	1.10 J	1.10 J		ug/kg	TR
FEW4-MW80-(185.0)	280-100222-8	SO	N	cis-1,2-Dichloroethene	7.30	6.10 J	6.10 J		ug/kg	TR
FEW4-MW80-(197.0)	280-100222-9	SO	N	1,2-Dichloroethene	6.40	0.730 J	0.730 J		ug/kg	TR
FEW4-MW80-(197.0)	280-100222-9	SO	N	Acetone	25.0	9.00 J	9.00 J		ug/kg	TR
FEW4-MW80-(197.0)	280-100222-9	SO	N	cis-1,2-Dichloroethene	6.40	0.730 J	0.730 J		ug/kg	TR
FEW4-MW80-(197.0)	280-100222-9	SO	N	Toluene	6.40	0.930 J	0.930 J		ug/kg	TR
FEW4-MW80-(205.0)	280-100222-10	SO	N	1,2-Dichloroethene	4.50	0.530 J	0.530 J		ug/kg	TR
FEW4-MW80-(205.0)	280-100222-10	SO	N	Acetone	18.0	17.0 J	17.0 J		ug/kg	TR
FEW4-MW80-(205.0)	280-100222-10	SO	N	Chloroform	9.00	0.860 J	0.860 J		ug/kg	TR
FEW4-MW80-(205.0)	280-100222-10	SO	N	cis-1,2-Dichloroethene	4.50	0.530 J	0.530 J		ug/kg	TR

Qualified analytes in samples are reported as estimated, not detected (UJ) at the Limit of Detection (LOD).

US Army Corps of Engineers ®

Detected Results

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Dilution	Analyte	LOQ	Lab Result	Qualified Result	Units	Reason
FEW4-MW80-(125.0)	280-100222-1	SO	N	1	1,1,2-Trichloroethane	6.20	3.00 J	3.00 J	ug/kg	TR
FEW4-MW80-(125.0)	280-100222-1	SO	N	1	1,2-Dichloroethene	6.20	11.0	11.0	ug/kg	
FEW4-MW80-(125.0)	280-100222-1	SO	N	1	Acetone	25.0	45.0	45.0	ug/kg	
FEW4-MW80-(125.0)	280-100222-1	SO	N	1	Chloroform	12.0	2.20 J	2.20 J	ug/kg	TR
FEW4-MW80-(125.0)	280-100222-1	SO	N	1	cis-1,2-Dichloroethene	6.20	11.0	11.0	ug/kg	
FEW4-MW80-(125.0)	280-100222-1	SO	N	1	Trichloroethene (TCE)	260	8500	8500 J	ug/kg	I
FEW4-MW80-(135.0)	280-100222-2	SO	N	1	1,2-Dichloroethene	18.0	3.50 J	3.50 J	ug/kg	TR
FEW4-MW80-(135.0)	280-100222-2	SO	N	1	Acetone	72.0	32.0 J	32.0 J	ug/kg	TR
FEW4-MW80-(135.0)	280-100222-2	SO	N	1	cis-1,2-Dichloroethene	18.0	3.50 J	3.50 J	ug/kg	TR
FEW4-MW80-(135.0)	280-100222-2	SO	N	1	Toluene	18.0	3.00 J	3.00 J	ug/kg	TR
FEW4-MW80-(135.0)	280-100222-2	SO	N	1	Trichloroethene (TCE)	680	9000	9000 J	ug/kg	I
FEW4-MW80-(145.0)	280-100222-3	SO	N	1	1,1,2-Trichloroethane	6.40	1.70 J	1.70 J	ug/kg	TR
FEW4-MW80-(145.0)	280-100222-3	SO	N	1	1,2-Dichloroethene	6.40	6.80	6.80	ug/kg	
FEW4-MW80-(145.0)	280-100222-3	SO	N	1	Acetone	25.0	17.0 J	17.0 J	ug/kg	TR
FEW4-MW80-(145.0)	280-100222-3	SO	N	1	Chloroform	13.0	1.40 J	1.40 J	ug/kg	TR
FEW4-MW80-(145.0)	280-100222-3	SO	N	1	cis-1,2-Dichloroethene	6.40	6.80	6.80	ug/kg	
FEW4-MW80-(145.0)	280-100222-3	SO	N	1	Trichloroethene (TCE)	450	6300	6300 J	ug/kg	I/D3
FEW4-MW80-(146.0)	280-100222-4	SO	FD	1	1,1,2-Trichloroethane	6.30	1.30 J	1.30 J	ug/kg	TR
FEW4-MW80-(146.0)	280-100222-4	SO	FD	1	1,2-Dichloroethene	6.30	4.40 J	4.40 J	ug/kg	TR
FEW4-MW80-(146.0)	280-100222-4	SO	FD	1	Acetone	25.0	17.0 J	17.0 J	ug/kg	TR
FEW4-MW80-(146.0)	280-100222-4	SO	FD	1	Chloroform	13.0	0.970 J	0.970 J	ug/kg	TR
FEW4-MW80-(146.0)	280-100222-4	SO	FD	1	cis-1,2-Dichloroethene	6.30	4.40 J	4.40 J	ug/kg	TR
FEW4-MW80-(146.0)	280-100222-4	SO	FD	1	Trichloroethene (TCE)	330	4300	4300 J	ug/kg	D3
FEW4-MW80-(155.0)	280-100222-5	SO	N	1	1,2-Dichloroethene	13.0	4.20 J	4.20 J	ug/kg	TR
FEW4-MW80-(155.0)	280-100222-5	SO	N	1	Acetone	53.0	37.0 J	37.0 J	ug/kg	TR
FEW4-MW80-(155.0)	280-100222-5	SO	N	1	cis-1,2-Dichloroethene	13.0	4.20 J	4.20 J	ug/kg	TR
FEW4-MW80-(155.0)	280-100222-5	SO	N	1	Toluene	13.0	2.40 J	2.40 J	ug/kg	TR

Detected Results

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Dilution	Analyte	LOQ	Lab Result	Qualified Result	Units	Reason
FEW4-MW80-(155.0)	280-100222-5	SO	N	1	Trichloroethene (TCE)	470	5300	5300	ug/kg	
FEW4-MW80-(165.0)	280-100222-6	SO	N	1	1,2-Dichloroethene	6.60	4.10 J	4.10 J	ug/kg	TR
FEW4-MW80-(165.0)	280-100222-6	SO	N	1	Acetone	26.0	50.0	50.0	ug/kg	
FEW4-MW80-(165.0)	280-100222-6	SO	N	1	Chloroform	13.0	0.740 J	0.740 J	ug/kg	TR
FEW4-MW80-(165.0)	280-100222-6	SO	N	1	cis-1,2-Dichloroethene	6.60	4.10 J	4.10 J	ug/kg	TR
FEW4-MW80-(165.0)	280-100222-6	SO	N	1	Trichloroethene (TCE)	300	1600	1600 J	ug/kg	I
FEW4-MW80-(175.0)	280-100222-7	SO	N	1	1,2-Dichloroethene	6.80	4.00 J	4.00 J	ug/kg	TR
FEW4-MW80-(175.0)	280-100222-7	SO	N	1	Acetone	27.0	28.0	28.0	ug/kg	
FEW4-MW80-(175.0)	280-100222-7	SO	N	1	Chloroform	14.0	0.790 J	0.790 J	ug/kg	TR
FEW4-MW80-(175.0)	280-100222-7	SO	N	1	cis-1,2-Dichloroethene	6.80	4.00 J	4.00 J	ug/kg	TR
FEW4-MW80-(175.0)	280-100222-7	SO	N	1	Toluene	6.80	1.30 J	1.30 J	ug/kg	TR
FEW4-MW80-(175.0)	280-100222-7	SO	N	1	Trichloroethene (TCE)	380	4900	4900	ug/kg	
FEW4-MW80-(185.0)	280-100222-8	SO	N	1	1,1,2-Trichloroethane	7.30	1.30 J	1.30 J	ug/kg	TR
FEW4-MW80-(185.0)	280-100222-8	SO	N	1	1,2-Dichloroethene	7.30	6.10 J	6.10 J	ug/kg	TR
FEW4-MW80-(185.0)	280-100222-8	SO	N	1	Acetone	29.0	8.40 J	8.40 J	ug/kg	TR
FEW4-MW80-(185.0)	280-100222-8	SO	N	1	Chloroform	15.0	1.10 J	1.10 J	ug/kg	TR
FEW4-MW80-(185.0)	280-100222-8	SO	N	1	cis-1,2-Dichloroethene	7.30	6.10 J	6.10 J	ug/kg	TR
FEW4-MW80-(185.0)	280-100222-8	SO	N	1	Trichloroethene (TCE)	360	3200	3200	ug/kg	
FEW4-MW80-(197.0)	280-100222-9	SO	N	1	1,2-Dichloroethene	6.40	0.730 J	0.730 J	ug/kg	TR
FEW4-MW80-(197.0)	280-100222-9	SO	N	1	Acetone	25.0	9.00 J	9.00 J	ug/kg	TR
FEW4-MW80-(197.0)	280-100222-9	SO	N	1	cis-1,2-Dichloroethene	6.40	0.730 J	0.730 J	ug/kg	TR
FEW4-MW80-(197.0)	280-100222-9	SO	N	1	Toluene	6.40	0.930 J	0.930 J	ug/kg	TR
FEW4-MW80-(197.0)	280-100222-9	SO	N	1	Trichloroethene (TCE)	270	1400	1400	ug/kg	
FEW4-MW80-(205.0)	280-100222-10	SO	N	1	1,2-Dichloroethene	4.50	0.530 J	0.530 J	ug/kg	TR
FEW4-MW80-(205.0)	280-100222-10	SO	N	1	Acetone	18.0	17.0 J	17.0 J	ug/kg	TR
FEW4-MW80-(205.0)	280-100222-10	SO	N	1	Chloroform	9.00	0.860 J	0.860 J	ug/kg	TR
FEW4-MW80-(205.0)	280-100222-10	SO	N	1	cis-1,2-Dichloroethene	4.50	0.530 J	0.530 J	ug/kg	TR
FEW4-MW80-(205.0)	280-100222-10	SO	N	1	Trichloroethene (TCE)	230	450	450	ug/kg	

US Army Corps of Engineers ®

Detected Results

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Dilution	Analyte	LOQ	Lab Result	Qualified Result	Units	Reason
FEW4-MW80-(215.0)	280-100222-11	SO	N	1	Acetone	24.0	59.0	59.0	ug/kg	
FEW4-MW80-(215.0)	280-100222-11	SO	N	1	Trichloroethene (TCE)	5.90	180	180	ug/kg	

US Army Corps of Engineers ®

Rejected Results

--No Records Found--

Facility:	B08WY0467-02, F.E. Warren AFB, Site 4
Event:	2017-2018 RI Addendum Tasks
SDG:	280-100222-1_52_2a_FUDSChem
Guidance Document:	Draft-Final Uniform Federal Policy-Quality Assurance Project Plan for the Remedial Investigation Addendum 2017-2018 Tasks Atlas “D” Missile Site 4 —Laramie County, Wyoming, July 2017
Prime Contractor:	RMC Consultants, Inc., LAKEWOOD, CO
Project Manager:	David Groy
Contract Laboratory:	TestAmerica Laboratories, Inc., Arvada, CO
Data Review Contractor:	RMC Consultants
Data Review Level:	Stage 3VEM
Primary Data Reviewer:	Gary Torf, Contractor Project Chemist
Second Reviewer:	, Senior Scientist
Date Submitted:	

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	SW8260B
FEW4-MW80-(146.0)	280-100222-4	Solid	Field Duplicate/FD	X
FEW4-MW80-(125.0)	280-100222-1	Solid	Field Sample/N	X
FEW4-MW80-(135.0)	280-100222-2	Solid	Field Sample/N	X
FEW4-MW80-(145.0)	280-100222-3	Solid	Field Sample/N	X
FEW4-MW80-(155.0)	280-100222-5	Solid	Field Sample/N	X
FEW4-MW80-(165.0)	280-100222-6	Solid	Field Sample/N	X
FEW4-MW80-(175.0)	280-100222-7	Solid	Field Sample/N	X
FEW4-MW80-(185.0)	280-100222-8	Solid	Field Sample/N	X
FEW4-MW80-(197.0)	280-100222-9	Solid	Field Sample/N	X
FEW4-MW80-(205.0)	280-100222-10	Solid	Field Sample/N	X
FEW4-MW80-(215.0)	280-100222-11	Solid	Field Sample/N	X

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the Draft-Final Uniform Federal Policy-Quality Assurance Project Plan for the Remedial Investigation Addendum 2017-2018 Tasks Atlas “D” Missile Site 4 —Laramie County, Wyoming, July 2017 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by RMC Consultants, Inc., LAKEWOOD, CO; analyses were performed by TestAmerica Laboratories, Inc., Arvada, CO and were reported under sample delivery group (SDG) 280-100222-1_52_2a_FUDSChem. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

- Blank
- Blank - Negative
- Field Duplicate RPD
- LCS Recovery
- LCS RPD
- MS Recovery
- MS RPD
- Prep Hold Time
- Surrogate
- Test Hold Time

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 5 results (0.69%) out of the 726 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected. Trace values, defined as results that are qualified as estimated because they fall between the limit of detection and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

Narrative Comments

Analytical Method	Data Reviewer Comment
SW8260B	No additional comments; see Checklist for detail.

November 08, 2017

Reviewed by Gary Torf, Contractor Project Chemist, RMC Consultants

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of a minimum of 10% of the reported sample results and method quality control data between the two deliverables.

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

Quality Control Outliers for test method SW8260B, MS RPD

The objective of matrix spikes/matrix spike duplicates (MS/MSD) RPD analysis is to demonstrate acceptable method precision by the laboratory at the time of analysis. MS/MSD analyses are also performed to generate data that determines the long-term precision of the analytical method on various matrices. Non-homogenous samples can impact the apparent method precision. Summary forms were evaluated and compared to electronic data deliverables. Matrix spikes/matrix spike duplicates results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
280-100222-6MSD (SD)/ 280-100222-6MSD	m,p-Xylene	20.44	< 20	< 20	rpd	J/None	D	
280-100222-6MSD (SD)/ 280-100222-6MSD	Bromomethane	22.22	< 20	< 20	rpd	J/None	D	
280-100222-6MSD (SD)/ 280-100222-6MSD	Isopropylbenzene (Cumene)	24.12	< 20	< 20	rpd	J/None	D	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

Quality Control Outliers for test method SW8260B, Surrogate

Method performance for individual samples is demonstrated through spiking activities. All samples are spiked with surrogate compounds prior to sample preparation. The sample itself may produce effects due to such factors as interferences and high concentrations of analytes. Summary forms were evaluated and compared to electronic data deliverables. Surrogate results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
FEW4-MW80-(125.0) (N)/ 280-100222-1	1-Bromo-4-fluorobenzene (4-Bromofluorobenzene)	123.2	79 - 119	79 - 119	percent	J/None	I	
FEW4-MW80-(135.0) (N)/ 280-100222-2	1-Bromo-4-fluorobenzene (4-Bromofluorobenzene)	120.9	79 - 119	79 - 119	percent	J/None	I	
FEW4-MW80-(145.0) (N)/ 280-100222-3	1-Bromo-4-fluorobenzene (4-Bromofluorobenzene)	119.8	79 - 119	79 - 119	percent	J/None	I	
FEW4-MW80-(165.0) (N)/ 280-100222-6	1-Bromo-4-fluorobenzene (4-Bromofluorobenzene)	121.8	79 - 119	79 - 119	percent	J/None	I	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the Surrogate for SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW80-(125.0)	N	Trichloroethene (TCE)	260	8500	8500 J	+	ug/kg	I
FEW4-MW80-(135.0)	N	Trichloroethene (TCE)	680	9000	9000 J	+	ug/kg	I
FEW4-MW80-(145.0)	N	Trichloroethene (TCE)	450	6300	6300 J	+	ug/kg	I/D3
FEW4-MW80-(165.0)	N	Trichloroethene (TCE)	300	1600	1600 J	+	ug/kg	I

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

Table of All Qualified Results

Test Method: SW8260B	**Extraction Method: SW5035A**							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW80-(125.0)	N	Trichloroethene (TCE)	260	8500	8500 J	+	ug/kg	I
FEW4-MW80-(135.0)	N	Trichloroethene (TCE)	680	9000	9000 J	+	ug/kg	I
FEW4-MW80-(145.0)	N	Trichloroethene (TCE)	450	6300	6300 J	+	ug/kg	I/D3
FEW4-MW80-(165.0)	N	Trichloroethene (TCE)	300	1600	1600 J	+	ug/kg	I

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
Trace values are not included in the qualified results table unless additional reason codes are associated.

Table of All Trace Results

Test Method: SW8260B Extraction Method: SW5035A

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW80-(125.0)	N	1,1,2-Trichloroethane	6.20	3.00 J	3.00 J		ug/kg	TR
FEW4-MW80-(125.0)	N	Chloroform	12.0	2.20 J	2.20 J		ug/kg	TR
FEW4-MW80-(135.0)	N	1,2-Dichloroethene	18.0	3.50 J	3.50 J		ug/kg	TR
FEW4-MW80-(135.0)	N	Acetone	72.0	32.0 J	32.0 J		ug/kg	TR
FEW4-MW80-(135.0)	N	cis-1,2-Dichloroethene	18.0	3.50 J	3.50 J		ug/kg	TR
FEW4-MW80-(135.0)	N	Toluene	18.0	3.00 J	3.00 J		ug/kg	TR
FEW4-MW80-(145.0)	N	1,1,2-Trichloroethane	6.40	1.70 J	1.70 J		ug/kg	TR
FEW4-MW80-(145.0)	N	Acetone	25.0	17.0 J	17.0 J		ug/kg	TR
FEW4-MW80-(145.0)	N	Chloroform	13.0	1.40 J	1.40 J		ug/kg	TR
FEW4-MW80-(146.0)	FD	1,1,2-Trichloroethane	6.30	1.30 J	1.30 J		ug/kg	TR
FEW4-MW80-(146.0)	FD	1,2-Dichloroethene	6.30	4.40 J	4.40 J		ug/kg	TR
FEW4-MW80-(146.0)	FD	Acetone	25.0	17.0 J	17.0 J		ug/kg	TR
FEW4-MW80-(146.0)	FD	Chloroform	13.0	0.970 J	0.970 J		ug/kg	TR
FEW4-MW80-(146.0)	FD	cis-1,2-Dichloroethene	6.30	4.40 J	4.40 J		ug/kg	TR
FEW4-MW80-(155.0)	N	1,2-Dichloroethene	13.0	4.20 J	4.20 J		ug/kg	TR
FEW4-MW80-(155.0)	N	Acetone	53.0	37.0 J	37.0 J		ug/kg	TR
FEW4-MW80-(155.0)	N	cis-1,2-Dichloroethene	13.0	4.20 J	4.20 J		ug/kg	TR
FEW4-MW80-(155.0)	N	Toluene	13.0	2.40 J	2.40 J		ug/kg	TR
FEW4-MW80-(165.0)	N	1,2-Dichloroethene	6.60	4.10 J	4.10 J		ug/kg	TR
FEW4-MW80-(165.0)	N	Chloroform	13.0	0.740 J	0.740 J		ug/kg	TR
FEW4-MW80-(165.0)	N	cis-1,2-Dichloroethene	6.60	4.10 J	4.10 J		ug/kg	TR
FEW4-MW80-(175.0)	N	1,2-Dichloroethene	6.80	4.00 J	4.00 J		ug/kg	TR
FEW4-MW80-(175.0)	N	Chloroform	14.0	0.790 J	0.790 J		ug/kg	TR
FEW4-MW80-(175.0)	N	cis-1,2-Dichloroethene	6.80	4.00 J	4.00 J		ug/kg	TR
FEW4-MW80-(175.0)	N	Toluene	6.80	1.30 J	1.30 J		ug/kg	TR
FEW4-MW80-(185.0)	N	1,1,2-Trichloroethane	7.30	1.30 J	1.30 J		ug/kg	TR
FEW4-MW80-(185.0)	N	1,2-Dichloroethene	7.30	6.10 J	6.10 J		ug/kg	TR
FEW4-MW80-(185.0)	N	Acetone	29.0	8.40 J	8.40 J		ug/kg	TR
FEW4-MW80-(185.0)	N	Chloroform	15.0	1.10 J	1.10 J		ug/kg	TR
FEW4-MW80-(185.0)	N	cis-1,2-Dichloroethene	7.30	6.10 J	6.10 J		ug/kg	TR
FEW4-MW80-(197.0)	N	1,2-Dichloroethene	6.40	0.730 J	0.730 J		ug/kg	TR
FEW4-MW80-(197.0)	N	Acetone	25.0	9.00 J	9.00 J		ug/kg	TR
FEW4-MW80-(197.0)	N	cis-1,2-Dichloroethene	6.40	0.730 J	0.730 J		ug/kg	TR
FEW4-MW80-(197.0)	N	Toluene	6.40	0.930 J	0.930 J		ug/kg	TR
FEW4-MW80-(205.0)	N	1,2-Dichloroethene	4.50	0.530 J	0.530 J		ug/kg	TR
FEW4-MW80-(205.0)	N	Acetone	18.0	17.0 J	17.0 J		ug/kg	TR
FEW4-MW80-(205.0)	N	Chloroform	9.00	0.860 J	0.860 J		ug/kg	TR
FEW4-MW80-(205.0)	N	cis-1,2-Dichloroethene	4.50	0.530 J	0.530 J		ug/kg	TR

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B							
FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW80-(146.0)	FD	Trichloroethene (TCE)	330	4300	4300	4300 J	D3

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
Trace values are not included in the qualified results table unless additional reason codes are associated.

Reason Code Definitions

Code	Definition
D	MS RPD
D3	Field Duplicate RPD
I	Surrogate recovery outside project limits.
TR	Trace Level Detect

Flag Code and Definitions

Flag	Definition
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
J	Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
R	The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making.
B	Blank contamination: The analyte was found in an associated blank above one half the RL, as well as in the sample.
UB	The analyte was also detected in an associated laboratory or field blank at a concentration comparable to the concentration in the sample. The reported result has been requalified as not detected.

Review Questions

Method: SW8260B (Volatile Organic Compounds by Capillary GC/MS)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were sample reciept temperatures met?	•			Sample receipt temperature was 2.9ºC.
Were QAPP specified PQLs achieved?	•			
Were all QAPP-specified target analytes reported?	•			
Was the GC/MS system properly tuned based on method criteria?	•			
Was the criteria met during each 12 hour shift (prior to ICAL and Cal Ver.)?	•			
Does the initial calibration curve consist of 5 concentration levels, with the low standard near but > MDL?	•			
Did the Calibration Check Compounds (CCCs) have a relative standard deviation within QAPP acceptance limits?	•			
Were the average response factors (RFs) for the System Performance Check Compounds (SPCCs) within QAPP acceptance limits?	•			
Were the ICAL %RSDs for the target compounds within method criteria?	•			
If a quadratic equation curve was used, was the coefficient of determination (COD) within criteria?	•			
If a linear regression curve was used, was the correlation coefficient within criteria?	•			
Check and recalculate the response factors and average response factors for a least one target compound.	•			ICAL VMS-G 8/16/17 TCE AVG RF = 0.3273
Check and recalculate the %RSD for one of more target compounds and DMCs. Verify that the recalculated values agree with the laboratory reported values.	•			ICAL VMS-G 8/16/17 TCE %RSD = 4.3% 1,2-DCA-d4 %RSD = 5.0
Was a second source verification analyzed after the ICAL and all analytes within criteria?		•		The ICV percent difference was above the upper control limit for bromomethane at 36.6%D and dichlorofluoromethane at -22.7%. All associated sample results were nondetect for these analytes, therefore no data qualification is warranted.
Was a CCV run at the beginning of the analytical sequence and every 12 hours?	•			
Was the CCV a mid-level standard from the initial calibration curve?	•			
Did the CCCs have a %Difference within QAPP acceptance limits?	•			
Were the average RFs for the SPCCs within QAPP acceptance limits?	•			
Was the %D (difference or drift) for all target analytes within QAPP acceptance limits?	•			
Check and recalculate the CCV relative response factor for at least one target compound.	•			VMS-G 8/24/17 CCVC 280-385348/30 Trichloroethene RF = 0.3496
Were the internal standards added to every standard, blank, matrix spike, matrix spike duplicate, and sample?	•			
Were the retention times for all IS compounds within QAPP acceptance limits?	•			

Review Questions

Method: SW8260B (Volatile Organic Compounds by Capillary GC/MS)

Review Questions	Yes	No	NA	Comment
Are the area counts of all IS compounds within QAPP acceptance limits?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes detected in the method blank above the MDL?	•			Acetone and 1,2,3-trichlorobenzene were detected in a method blank at concentrations less than 1/2 the LOQ.
Were target analytes reported in the field blank analyses above the MDL?			•	
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?		•		FEW4-MW80-(146.0) was a blind field duplicate of FEW4-MW80-(145.0). The RPD of trichloroethene was greater than the 20% control limit at 38%. The TCE result has been qualified as an estimated value for the field duplicates.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were the LCS/LCSD recoveries within QAPP acceptance limits?	•			
Were the LCS/LCSD RPDs within QAPP acceptance limits?	•			
Was the duplicate RPD within QAPP acceptance limits?			•	
Was a MS/MSD pair prepared with each batch?	•			FEW4-MW80-(165.0) was designated for MS/MSD analyses.
Is the MS/MSD parent sample the one designated by the sampling team?	•			
Were MS/MSD recoveries and RPD within QAPP acceptance limits?		•		The RPD control limit of 20% was exceeded for bromomethane at 22% and isopropylbenzene at 24%.
Were surrogate recoveries within QAPP acceptance limits?		•		Bromofluorobenzene exceeded the upper control limit of 119% in FEW4-MW80-(125.0) at 121%, FEW4-MW80-(135.0) at 120%, FEW4-MW80-(145.0) at 120%, and FEW4-MW80-(165.0) at 122%.
Were reported sample concentrations within calibration range?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were instrument run logs present and filled out appropriately?	•			
Were sample prepration sheets present and filled out appropriately?	•			
Check and recalculate the %D for one target compound. Verify that the recalculated values agree with the laboratory-reported values.			•	
Examine raw data to verify correct calculation of sample results reported by the laboratory. Compare quantitation lists and chromatograms to the reported detect and non-detect sample results.	•			FEW4-MW80-(145.0) TCE = 6300 ug/kg
Verify that the reporting limits and sample results have been adjusted to reflect all sample dilutions and Percent Moisture factors (non-aqueous samples).	•			

Automated Data Review Detail Report for 280-100257-1_52_2a_FUDSChem
B08WY0467-02, F.E. Warren AFB, Site 4
Draft-Final Uniform Federal Policy-Quality Assurance Project Plan for the Remedial Investigation Addendum 2017-2018 Tasks
Atlas "D" Missile Site 4—Laramie County, Wyoming, July 2017

US Army Corps of Engineers ®

Batch Report

Test Method: SW8260B Analysis Batch: 280-385692

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
FEW4-MW80	SO	FEW4-MW80-(225.0)	280-100257-1		1/1	8/15/2017 08:30	8/15/2017 08:30	8/26/2017 06:13	280-385692/	N
FEW4-MW80	SO	FEW4-MW80-(225.0)	280-100257-1MS		1/1	8/15/2017 08:30	8/15/2017 08:30	8/26/2017 06:34	280-385692/	MS
FEW4-MW80	SO	FEW4-MW80-(225.0)	280-100257-1MSD		1/1	8/15/2017 08:30	8/15/2017 08:30	8/26/2017 06:54	280-385692/	SD

Test Method: SW8260B Analysis Batch: 280-385869

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
FEW4-MW80	SO	FEW4-MW80-(233.0)	280-100257-2		1/1	8/15/2017 08:40	8/15/2017 08:40	8/29/2017 02:38	280-385869/	N
FEW4-MW80	SO	FEW4-MW80-(234.0)	280-100257-3		1/1	8/15/2017 09:40	8/15/2017 09:40	8/29/2017 02:58	280-385869/	FD
FEW4-MW80	SO	FEW4-MW80-(245.0)	280-100257-4		1/1	8/15/2017 10:10	8/15/2017 10:10	8/29/2017 03:19	280-385869/	N
FEW4-MW80	SO	FEW4-MW80-(254.0)	280-100257-5		1/1	8/15/2017 10:20	8/15/2017 10:20	8/29/2017 03:40	280-385869/	N
FEW4-MW80	SO	FEW4-MW80-(257.0)	280-100257-6		1/1	8/15/2017 12:12	8/15/2017 12:12	8/29/2017 04:00	280-385869/	N
FEW4-MW80	SO	FEW4-MW80-(269.0)	280-100257-7		1/1	8/15/2017 12:20	8/15/2017 12:20	8/29/2017 04:21	280-385869/	N
FEW4-MW80	SO	FEW4-MW80-(273.0)	280-100257-8		1/1	8/15/2017 12:22	8/15/2017 12:22	8/29/2017 04:42	280-385869/	N
FEW4-MW80	SO	FEW4-MW80-(284.0)	280-100257-9		1/1	8/15/2017 13:33	8/15/2017 13:33	8/29/2017 05:02	280-385869/	N
FEW4-MW80	SO	FEW4-MW80-(294.0)	280-100257-10		1/1	8/15/2017 14:20	8/15/2017 14:20	8/29/2017 05:23	280-385869/	N
FEW4-MW80	SO	FEW4-MW80-(301.0)	280-100257-11		1/1	8/15/2017 14:25	8/15/2017 14:25	8/29/2017 05:44	280-385869/	N

US Army Corps of Engineers ®

Field Batch Report

--No Records Found--

MS Mismatch Report

--No Records Found--

Section to identify Matrix Spike mismatches where parent sample differs from MS by dilution.

US Army Corps of Engineers ®

QC Outlier Report

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

QC Element	Sample ID/ Lab Sample ID	Run#/ Dil'n	Analyte	Result (Units)	Qualifier	Warning Limits	Control Limits	Reason	Comment	Rule	Action Level
MS Recovery	FEW4-MW80-(225.0) (SD) / 280-100257-1MSD	1 / 1.00	1,2,4-Trichlorobenzene	61.65 (percent)	J/UJ	67 - 129	67 - 129	M			
MS Recovery	FEW4-MW80-(225.0) (SD) / 280-100257-1MSD	1 / 1.00	1,2,4-Trimethylbenzene	64.45 (percent)	J/UJ	75 - 123	75 - 123	M			
MS Recovery	FEW4-MW80-(225.0) (SD) / 280-100257-1MSD	1 / 1.00	1,2-Dichlorobenzene	72.57 (percent)	J/UJ	78 - 121	78 - 121	M			
MS Recovery	FEW4-MW80-(225.0) (SD) / 280-100257-1MSD	1 / 1.00	1,3,5-Trimethylbenzene	68.14 (percent)	J/UJ	73 - 124	73 - 124	M			
MS Recovery	FEW4-MW80-(225.0) (SD) / 280-100257-1MSD	1 / 1.00	1,3-Dichlorobenzene	68.14 (percent)	J/UJ	77 - 121	77 - 121	M			
MS Recovery	FEW4-MW80-(225.0) (SD) / 280-100257-1MSD	1 / 1.00	1,4-Dichlorobenzene	65.19 (percent)	J/UJ	75 - 120	75 - 120	M			
MS Recovery	FEW4-MW80-(225.0) (SD) / 280-100257-1MSD	1 / 1.00	2-Chlorotoluene	72.12 (percent)	J/UJ	75 - 122	75 - 122	M			
MS Recovery	FEW4-MW80-(225.0) (SD) / 280-100257-1MSD	1 / 1.00	4-Chlorotoluene	69.32 (percent)	J/UJ	72 - 124	72 - 124	M			
MS Recovery	FEW4-MW80-(225.0) (SD) / 280-100257-1MSD	1 / 1.00	Hexachlorobutadiene	47.79 (percent)	J/UJ	61 - 135	61 - 135	M			
MS Recovery	FEW4-MW80-(225.0) (SD) / 280-100257-1MSD	1 / 1.00	n-Butylbenzene	55.46 (percent)	J/UJ	70 - 128	70 - 128	M			
MS Recovery	FEW4-MW80-(225.0) (SD) / 280-100257-1MSD	1 / 1.00	n-Propylbenzene	65.78 (percent)	J/UJ	73 - 125	73 - 125	M			
MS Recovery	FEW4-MW80-(225.0) (SD) / 280-100257-1MSD	1 / 1.00	p-Cymene (p-Isopropyltoluene)	61.21 (percent)	J/UJ	73 - 127	73 - 127	M			
MS Recovery	FEW4-MW80-(225.0) (SD) / 280-100257-1MSD	1 / 1.00	sec-Butylbenzene	62.68 (percent)	J/UJ	73 - 126	73 - 126	M			
MS Recovery	FEW4-MW80-(225.0) (SD) / 280-100257-1MSD	1 / 1.00	tert-Butylbenzene	69.62 (percent)	J/UJ	73 - 125	73 - 125	M			
MS RPD	280-100257-1MSD (SD) / 280-100257-1MSD	1 / 1.00	1,1,1,2-Tetrachloroethane	20.70 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100257-1MSD (SD) / 280-100257-1MSD	1 / 1.00	1,1,1-Trichloroethane	28.44 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100257-1MSD (SD) / 280-100257-1MSD	1 / 1.00	1,1,2-Trichloroethane	22.76 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100257-1MSD (SD) / 280-100257-1MSD	1 / 1.00	1,1-Dichloroethane	20.77 (rpd)	J/None	< 20	< 20	D			

US Army Corps of Engineers ®

QC Outlier Report

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

QC Element	Sample ID/ Lab Sample ID	Run#/ Dil'n	Analyte	Result (Units)	Qualifier	Warning Limits	Control Limits	Reason	Comment	Rule	Action Level
MS RPD	280-100257-1MSD (SD) / 280-100257-1MSD	1 / 1.00	1,1-Dichloroethene	31.92 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100257-1MSD (SD) / 280-100257-1MSD	1 / 1.00	1,1-Dichloropropene	30.78 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100257-1MSD (SD) / 280-100257-1MSD	1 / 1.00	1,2,3-Trichloropropane	21.52 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100257-1MSD (SD) / 280-100257-1MSD	1 / 1.00	1,2-Dibromoethane (EDB)	21.05 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100257-1MSD (SD) / 280-100257-1MSD	1 / 1.00	1,2-Dichloroethane	25.31 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100257-1MSD (SD) / 280-100257-1MSD	1 / 1.00	1,2-Dichloroethene	26.36 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100257-1MSD (SD) / 280-100257-1MSD	1 / 1.00	1,2-Dichloropropane	24.56 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100257-1MSD (SD) / 280-100257-1MSD	1 / 1.00	1,3-Dichloropropane	23.08 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100257-1MSD (SD) / 280-100257-1MSD	1 / 1.00	2,2-Dichloropropane	28.38 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100257-1MSD (SD) / 280-100257-1MSD	1 / 1.00	2-Butanone (MEK)	23.09 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100257-1MSD (SD) / 280-100257-1MSD	1 / 1.00	2-Hexanone	21.55 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100257-1MSD (SD) / 280-100257-1MSD	1 / 1.00	4-Methyl-2-pentanone (MIBK)	21.48 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100257-1MSD (SD) / 280-100257-1MSD	1 / 1.00	Benzene	26.51 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100257-1MSD (SD) / 280-100257-1MSD	1 / 1.00	Bromochloromethane	23.93 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100257-1MSD (SD) / 280-100257-1MSD	1 / 1.00	Bromodichloromethane	25.46 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100257-1MSD (SD) / 280-100257-1MSD	1 / 1.00	Bromoform	22.71 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100257-1MSD (SD) / 280-100257-1MSD	1 / 1.00	Bromomethane	24.35 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100257-1MSD (SD) / 280-100257-1MSD	1 / 1.00	Carbon disulfide	27.24 (rpd)	J/None	< 20	< 20	D			

US Army Corps of Engineers ®

QC Outlier Report

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

QC Element	Sample ID/ Lab Sample ID	Run#/ Dil'n	Analyte	Result (Units)	Qualifier	Warning Limits	Control Limits	Reason	Comment	Rule	Action Level
MS RPD	280-100257-1MSD (SD) / 280-100257-1MSD	1 / 1.00	Carbon tetrachloride	28.30 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100257-1MSD (SD) / 280-100257-1MSD	1 / 1.00	Chloroethane	26.26 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100257-1MSD (SD) / 280-100257-1MSD	1 / 1.00	Chloroform	25.72 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100257-1MSD (SD) / 280-100257-1MSD	1 / 1.00	Chloromethane	24.75 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100257-1MSD (SD) / 280-100257-1MSD	1 / 1.00	cis-1,2-Dichloroethene	25.45 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100257-1MSD (SD) / 280-100257-1MSD	1 / 1.00	cis-1,3-Dichloropropene	20.76 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100257-1MSD (SD) / 280-100257-1MSD	1 / 1.00	Dibromochloromethane	23.53 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100257-1MSD (SD) / 280-100257-1MSD	1 / 1.00	Dibromomethane	23.03 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100257-1MSD (SD) / 280-100257-1MSD	1 / 1.00	Dichlorodifluoromethane	24.80 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100257-1MSD (SD) / 280-100257-1MSD	1 / 1.00	Hexachlorobutadiene	29.47 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100257-1MSD (SD) / 280-100257-1MSD	1 / 1.00	Methyl tert-butyl ether (MTBE)	26.45 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100257-1MSD (SD) / 280-100257-1MSD	1 / 1.00	Methylene chloride	22.32 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100257-1MSD (SD) / 280-100257-1MSD	1 / 1.00	Tetrachloroethene (PCE)	20.93 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100257-1MSD (SD) / 280-100257-1MSD	1 / 1.00	Toluene	23.31 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100257-1MSD (SD) / 280-100257-1MSD	1 / 1.00	trans-1,2-Dichloroethene	27.12 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100257-1MSD (SD) / 280-100257-1MSD	1 / 1.00	trans-1,3-Dichloropropene	20.27 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100257-1MSD (SD) / 280-100257-1MSD	1 / 1.00	Trichlorofluoromethane	26.63 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100257-1MSD (SD) / 280-100257-1MSD	1 / 1.00	Vinyl chloride	32.36 (rpd)	J/None	< 20	< 20	D			

US Army Corps of Engineers ®

QC Outlier Report

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

QC Element	Sample ID/ Lab Sample ID	Run#/ Dil'n	Analyte	Result (Units)	Qualifier	Warning Limits	Control Limits	Reason	Comment	Rule	Action Level
Surrogate	FEW4-MW80-(233.0) (N) / 280-100257-2	1 / 1.00	Dibromofluoromethane	125.2 (percent)	J/None	78 - 119	78 - 119	I			
Surrogate	FEW4-MW80-(233.0) (N) / 280-100257-2	1 / 1.00	Toluene-d8	121.4 (percent)	J/None	85 - 116	85 - 116	I			
Surrogate	FEW4-MW80-(257.0) (N) / 280-100257-6	1 / 1.00	Dibromofluoromethane	133.8 (percent)	J/None	78 - 119	78 - 119	I			
Surrogate	FEW4-MW80-(294.0) (N) / 280-100257-10	1 / 1.00	Dibromofluoromethane	132.0 (percent)	J/None	78 - 119	78 - 119	I			

Rule is the multiplier used when blank contamination occurs to determine action level.

Qualified Results

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW80-(225.0)	280-100257-1	SO	N	1,2,4-Trichlorobenzene	7.8	2.5 U J	2.5 UJ	-	ug/kg	M
FEW4-MW80-(225.0)	280-100257-1	SO	N	1,2,4-Trimethylbenzene	7.8	2.5 U J	2.5 UJ	-	ug/kg	M
FEW4-MW80-(225.0)	280-100257-1	SO	N	1,2-Dichlorobenzene	7.8	2.5 U J	2.5 UJ	-	ug/kg	M
FEW4-MW80-(225.0)	280-100257-1	SO	N	1,3,5-Trimethylbenzene	7.8	2.5 U J	2.5 UJ	-	ug/kg	M
FEW4-MW80-(225.0)	280-100257-1	SO	N	1,3-Dichlorobenzene	7.8	2.5 U J	2.5 UJ	-	ug/kg	M
FEW4-MW80-(225.0)	280-100257-1	SO	N	1,4-Dichlorobenzene	7.8	2.5 U J	2.5 UJ	-	ug/kg	M
FEW4-MW80-(225.0)	280-100257-1	SO	N	2-Chlorotoluene	7.8	2.5 U J	2.5 UJ	-	ug/kg	M
FEW4-MW80-(225.0)	280-100257-1	SO	N	4-Chlorotoluene	7.8	2.5 U J	2.5 UJ	-	ug/kg	M
FEW4-MW80-(225.0)	280-100257-1	SO	N	Acetone	31	28 J Q	28 J		ug/kg	TR/V2
FEW4-MW80-(225.0)	280-100257-1	SO	N	Benzene	7.8	1.4 J	1.4 J		ug/kg	D/TR
FEW4-MW80-(225.0)	280-100257-1	SO	N	Hexachlorobutadiene	7.8	2.5 U J	2.5 UJ	-	ug/kg	M
FEW4-MW80-(225.0)	280-100257-1	SO	N	n-Butylbenzene	7.8	2.5 U J	2.5 UJ	-	ug/kg	M
FEW4-MW80-(225.0)	280-100257-1	SO	N	n-Propylbenzene	7.8	2.5 U J	2.5 UJ	-	ug/kg	M
FEW4-MW80-(225.0)	280-100257-1	SO	N	p-Cymene (p-Isopropyltoluene)	7.8	2.5 U J	2.5 UJ	-	ug/kg	M
FEW4-MW80-(225.0)	280-100257-1	SO	N	sec-Butylbenzene	7.8	2.5 U J	2.5 UJ	-	ug/kg	M
FEW4-MW80-(225.0)	280-100257-1	SO	N	tert-Butylbenzene	7.8	2.5 U J	2.5 UJ	-	ug/kg	M
FEW4-MW80-(225.0)	280-100257-1	SO	N	Toluene	7.8	3.1 J	3.1 J		ug/kg	D/TR
FEW4-MW80-(225.0)	280-100257-1	SO	N	Trichloroethene (TCE)	7.8	7.0 J	7.0 J		ug/kg	TR
FEW4-MW80-(233.0)	280-100257-2	SO	N	Acetone	25	16 U Q	16 UJ		ug/kg	D3
FEW4-MW80-(234.0)	280-100257-3	SO	FD	Acetone	25	45 Q	45 J		ug/kg	D3
FEW4-MW80-(254.0)	280-100257-5	SO	N	Acetone	22	21 J Q	21 J		ug/kg	TR
FEW4-MW80-(257.0)	280-100257-6	SO	N	Acetone	34	45 Q	45 J	+	ug/kg	I
FEW4-MW80-(273.0)	280-100257-8	SO	N	Acetone	19	18 J Q	18 J		ug/kg	TR
FEW4-MW80-(284.0)	280-100257-9	SO	N	2-Butanone (MEK)	17	5.3 J Q	5.3 J		ug/kg	TR

US Army Corps of Engineers ®

Qualified Results

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW80-(294.0)	280-100257-10	SO	N	Acetone	16	15 J Q	15 J	+	ug/kg	I/TR

Qualified analytes in samples are reported as estimated, not detected (UJ) at the Limit of Detection (LOD).

US Army Corps of Engineers ®

Detected Results

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Dilution	Analyte	LOQ	Lab Result	Qualified Result	Units	Reason
FEW4-MW80-(225.0)	280-100257-1	SO	N	1	Acetone	31	28 J Q	28 J	ug/kg	TR/V2
FEW4-MW80-(225.0)	280-100257-1	SO	N	1	Benzene	7.8	1.4 J	1.4 J	ug/kg	D/TR
FEW4-MW80-(225.0)	280-100257-1	SO	N	1	Toluene	7.8	3.1 J	3.1 J	ug/kg	D/TR
FEW4-MW80-(225.0)	280-100257-1	SO	N	1	Trichloroethene (TCE)	7.8	7.0 J	7.0 J	ug/kg	TR
FEW4-MW80-(234.0)	280-100257-3	SO	FD	1	Acetone	25	45 Q	45 J	ug/kg	D3
FEW4-MW80-(245.0)	280-100257-4	SO	N	1	Acetone	24	27 Q	27	ug/kg	
FEW4-MW80-(254.0)	280-100257-5	SO	N	1	Acetone	22	21 J Q	21 J	ug/kg	TR
FEW4-MW80-(257.0)	280-100257-6	SO	N	1	Acetone	34	45 Q	45 J	ug/kg	I
FEW4-MW80-(269.0)	280-100257-7	SO	N	1	Acetone	20	27 Q	27	ug/kg	
FEW4-MW80-(273.0)	280-100257-8	SO	N	1	Acetone	19	18 J Q	18 J	ug/kg	TR
FEW4-MW80-(284.0)	280-100257-9	SO	N	1	2-Butanone (MEK)	17	5.3 J Q	5.3 J	ug/kg	TR
FEW4-MW80-(284.0)	280-100257-9	SO	N	1	Acetone	17	66 Q	66	ug/kg	
FEW4-MW80-(294.0)	280-100257-10	SO	N	1	Acetone	16	15 J Q	15 J	ug/kg	I/TR
FEW4-MW80-(301.0)	280-100257-11	SO	N	1	Acetone	22	68 Q	68	ug/kg	

US Army Corps of Engineers ®

Rejected Results

--No Records Found--

US Army Corps of Engineers ®

Facility:	B08WY0467-02, F.E. Warren AFB, Site 4
Event:	2017-2018 RI Addendum Tasks
SDG:	280-100257-1_52_2a_FUDSChem
Guidance Document:	Draft-Final Uniform Federal Policy-Quality Assurance Project Plan for the Remedial Investigation Addendum 2017-2018 Tasks Atlas “D” Missile Site 4 —Laramie County, Wyoming, July 2017
Prime Contractor:	RMC Consultants, Inc., LAKEWOOD, CO
Project Manager:	David Groy
Contract Laboratory:	TestAmerica Laboratories, Inc., Arvada, CO
Data Review Contractor:	RMC Consultants
Data Review Level:	Stage 3VEM
Primary Data Reviewer:	Gary Torf, Contractor Project Chemist
Second Reviewer:	, Senior Scientist
Date Submitted:	

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	SW8260B
FEW4-MW80-(234.0)	280-100257-3	Solid	Field Duplicate/FD	X
FEW4-MW80-(225.0)	280-100257-1	Solid	Field Sample/N	X
FEW4-MW80-(233.0)	280-100257-2	Solid	Field Sample/N	X
FEW4-MW80-(245.0)	280-100257-4	Solid	Field Sample/N	X
FEW4-MW80-(254.0)	280-100257-5	Solid	Field Sample/N	X
FEW4-MW80-(257.0)	280-100257-6	Solid	Field Sample/N	X
FEW4-MW80-(269.0)	280-100257-7	Solid	Field Sample/N	X
FEW4-MW80-(273.0)	280-100257-8	Solid	Field Sample/N	X
FEW4-MW80-(284.0)	280-100257-9	Solid	Field Sample/N	X
FEW4-MW80-(294.0)	280-100257-10	Solid	Field Sample/N	X
FEW4-MW80-(301.0)	280-100257-11	Solid	Field Sample/N	X

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the Draft-Final Uniform Federal Policy-Quality Assurance Project Plan for the Remedial Investigation Addendum 2017-2018 Tasks Atlas “D” Missile Site 4 —Laramie County, Wyoming, July 2017 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by RMC Consultants, Inc., LAKEWOOD, CO; analyses were performed by TestAmerica Laboratories, Inc., Arvada, CO and were reported under sample delivery group (SDG) 280-100257-1_52_2a_FUDSChem. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

- Blank
- Blank - Negative
- Field Duplicate RPD
- LCS Recovery
- LCS RPD
- MS Recovery
- MS RPD
- Prep Hold Time
- Surrogate
- Test Hold Time

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 21 results (2.89%) out of the 726 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected. Trace values, defined as results that are qualified as estimated because they fall between the limit of detection and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

Narrative Comments

Analytical Method	Data Reviewer Comment
SW8260B	No additional comments; see Checklist for detail.

November 08, 2017

Reviewed by Gary Torf, Contractor Project Chemist, RMC Consultants

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of a minimum of 10% of the reported sample results and method quality control data between the two deliverables.

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

Quality Control Outliers for test method SW8260B, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
FEW4-MW80-(225.0) (SD)/ 280-100257-1MSD	Hexachlorobutadiene	47.79	61 - 135	61 - 135	percent	J/UJ	M	
FEW4-MW80-(225.0) (SD)/ 280-100257-1MSD	n-Butylbenzene	55.46	70 - 128	70 - 128	percent	J/UJ	M	
FEW4-MW80-(225.0) (SD)/ 280-100257-1MSD	p-Cymene (p-Isopropyltoluene)	61.21	73 - 127	73 - 127	percent	J/UJ	M	
FEW4-MW80-(225.0) (SD)/ 280-100257-1MSD	1,2,4-Trichlorobenzene	61.65	67 - 129	67 - 129	percent	J/UJ	M	
FEW4-MW80-(225.0) (SD)/ 280-100257-1MSD	sec-Butylbenzene	62.68	73 - 126	73 - 126	percent	J/UJ	M	
FEW4-MW80-(225.0) (SD)/ 280-100257-1MSD	1,2,4-Trimethylbenzene	64.45	75 - 123	75 - 123	percent	J/UJ	M	
FEW4-MW80-(225.0) (SD)/ 280-100257-1MSD	1,4-Dichlorobenzene	65.19	75 - 120	75 - 120	percent	J/UJ	M	
FEW4-MW80-(225.0) (SD)/ 280-100257-1MSD	n-Propylbenzene	65.78	73 - 125	73 - 125	percent	J/UJ	M	
FEW4-MW80-(225.0) (SD)/ 280-100257-1MSD	1,3,5-Trimethylbenzene	68.14	73 - 124	73 - 124	percent	J/UJ	M	
FEW4-MW80-(225.0) (SD)/ 280-100257-1MSD	1,3-Dichlorobenzene	68.14	77 - 121	77 - 121	percent	J/UJ	M	
FEW4-MW80-(225.0) (SD)/ 280-100257-1MSD	4-Chlorotoluene	69.32	72 - 124	72 - 124	percent	J/UJ	M	
FEW4-MW80-(225.0) (SD)/ 280-100257-1MSD	tert-Butylbenzene	69.62	73 - 125	73 - 125	percent	J/UJ	M	
FEW4-MW80-(225.0) (SD)/ 280-100257-1MSD	2-Chlorotoluene	72.12	75 - 122	75 - 122	percent	J/UJ	M	
FEW4-MW80-(225.0) (SD)/ 280-100257-1MSD	1,2-Dichlorobenzene	72.57	78 - 121	78 - 121	percent	J/UJ	M	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the MS Recovery for SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW80-(225.0)	N	1,2,4-Trichlorobenzene	7.80	2.50 U J	2.50 UJ	-	ug/kg	M
FEW4-MW80-(225.0)	N	1,2,4-Trimethylbenzene	7.80	2.50 U J	2.50 UJ	-	ug/kg	M
FEW4-MW80-(225.0)	N	1,2-Dichlorobenzene	7.80	2.50 U J	2.50 UJ	-	ug/kg	M
FEW4-MW80-(225.0)	N	1,3,5-Trimethylbenzene	7.80	2.50 U J	2.50 UJ	-	ug/kg	M
FEW4-MW80-(225.0)	N	1,3-Dichlorobenzene	7.80	2.50 U J	2.50 UJ	-	ug/kg	M
FEW4-MW80-(225.0)	N	1,4-Dichlorobenzene	7.80	2.50 U J	2.50 UJ	-	ug/kg	M
FEW4-MW80-(225.0)	N	2-Chlorotoluene	7.80	2.50 U J	2.50 UJ	-	ug/kg	M
FEW4-MW80-(225.0)	N	4-Chlorotoluene	7.80	2.50 U J	2.50 UJ	-	ug/kg	M
FEW4-MW80-(225.0)	N	Hexachlorobutadiene	7.80	2.50 U J	2.50 UJ	-	ug/kg	M

Qualified Results associated with the MS Recovery for SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW80-(225.0)	N	n-Butylbenzene	7.80	2.50 U J	2.50 UJ	-	ug/kg	M
FEW4-MW80-(225.0)	N	n-Propylbenzene	7.80	2.50 U J	2.50 UJ	-	ug/kg	M
FEW4-MW80-(225.0)	N	p-Cymene (p-Isopropyltoluene)	7.80	2.50 U J	2.50 UJ	-	ug/kg	M
FEW4-MW80-(225.0)	N	sec-Butylbenzene	7.80	2.50 U J	2.50 UJ	-	ug/kg	M
FEW4-MW80-(225.0)	N	tert-Butylbenzene	7.80	2.50 U J	2.50 UJ	-	ug/kg	M

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

Quality Control Outliers for test method SW8260B, MS RPD

The objective of matrix spikes/matrix spike duplicates (MS/MSD) RPD analysis is to demonstrate acceptable method precision by the laboratory at the time of analysis. MS/MSD analyses are also performed to generate data that determines the long-term precision of the analytical method on various matrices. Non-homogenous samples can impact the apparent method precision. Summary forms were evaluated and compared to electronic data deliverables. Matrix spikes/matrix spike duplicates results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
280-100257-1MSD (SD)/ 280-100257-1MSD	trans-1,3-Dichloropropene	20.27	< 20	< 20	rpd	J/None	D	
280-100257-1MSD (SD)/ 280-100257-1MSD	1,1,1,2-Tetrachloroethane	20.70	< 20	< 20	rpd	J/None	D	
280-100257-1MSD (SD)/ 280-100257-1MSD	cis-1,3-Dichloropropene	20.76	< 20	< 20	rpd	J/None	D	
280-100257-1MSD (SD)/ 280-100257-1MSD	1,1-Dichloroethane	20.77	< 20	< 20	rpd	J/None	D	
280-100257-1MSD (SD)/ 280-100257-1MSD	Tetrachloroethene (PCE)	20.93	< 20	< 20	rpd	J/None	D	
280-100257-1MSD (SD)/ 280-100257-1MSD	1,2-Dibromoethane (EDB)	21.05	< 20	< 20	rpd	J/None	D	
280-100257-1MSD (SD)/ 280-100257-1MSD	4-Methyl-2-pentanone (MIBK)	21.48	< 20	< 20	rpd	J/None	D	
280-100257-1MSD (SD)/ 280-100257-1MSD	1,2,3-Trichloropropane	21.52	< 20	< 20	rpd	J/None	D	
280-100257-1MSD (SD)/ 280-100257-1MSD	2-Hexanone	21.55	< 20	< 20	rpd	J/None	D	
280-100257-1MSD (SD)/ 280-100257-1MSD	Methylene chloride	22.32	< 20	< 20	rpd	J/None	D	
280-100257-1MSD (SD)/ 280-100257-1MSD	Bromoform	22.71	< 20	< 20	rpd	J/None	D	
280-100257-1MSD (SD)/ 280-100257-1MSD	1,1,2-Trichloroethane	22.76	< 20	< 20	rpd	J/None	D	
280-100257-1MSD (SD)/ 280-100257-1MSD	Dibromomethane	23.03	< 20	< 20	rpd	J/None	D	
280-100257-1MSD (SD)/ 280-100257-1MSD	1,3-Dichloropropane	23.08	< 20	< 20	rpd	J/None	D	
280-100257-1MSD (SD)/ 280-100257-1MSD	2-Butanone (MEK)	23.09	< 20	< 20	rpd	J/None	D	
280-100257-1MSD (SD)/ 280-100257-1MSD	Dibromochloromethane	23.53	< 20	< 20	rpd	J/None	D	
280-100257-1MSD (SD)/ 280-100257-1MSD	Bromochloromethane	23.93	< 20	< 20	rpd	J/None	D	
280-100257-1MSD (SD)/ 280-100257-1MSD	Bromomethane	24.35	< 20	< 20	rpd	J/None	D	
280-100257-1MSD (SD)/ 280-100257-1MSD	1,2-Dichloropropane	24.56	< 20	< 20	rpd	J/None	D	

Quality Control Outliers for test method SW8260B, MS RPD

The objective of matrix spikes/matrix spike duplicates (MS/MSD) RPD analysis is to demonstrate acceptable method precision by the laboratory at the time of analysis. MS/MSD analyses are also performed to generate data that determines the long-term precision of the analytical method on various matrices. Non-homogenous samples can impact the apparent method precision. Summary forms were evaluated and compared to electronic data deliverables. Matrix spikes/matrix spike duplicates results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
280-100257-1MSD (SD)/ 280-100257-1MSD	Chloromethane	24.75	< 20	< 20	rpd	J/None	D	
280-100257-1MSD (SD)/ 280-100257-1MSD	Dichlorodifluoromethane	24.80	< 20	< 20	rpd	J/None	D	
280-100257-1MSD (SD)/ 280-100257-1MSD	1,2-Dichloroethane	25.31	< 20	< 20	rpd	J/None	D	
280-100257-1MSD (SD)/ 280-100257-1MSD	cis-1,2-Dichloroethene	25.45	< 20	< 20	rpd	J/None	D	
280-100257-1MSD (SD)/ 280-100257-1MSD	Bromodichloromethane	25.46	< 20	< 20	rpd	J/None	D	
280-100257-1MSD (SD)/ 280-100257-1MSD	Chloroform	25.72	< 20	< 20	rpd	J/None	D	
280-100257-1MSD (SD)/ 280-100257-1MSD	Chloroethane	26.26	< 20	< 20	rpd	J/None	D	
280-100257-1MSD (SD)/ 280-100257-1MSD	1,2-Dichloroethene	26.36	< 20	< 20	rpd	J/None	D	
280-100257-1MSD (SD)/ 280-100257-1MSD	Methyl tert-butyl ether (MTBE)	26.45	< 20	< 20	rpd	J/None	D	
280-100257-1MSD (SD)/ 280-100257-1MSD	Trichlorofluoromethane	26.63	< 20	< 20	rpd	J/None	D	
280-100257-1MSD (SD)/ 280-100257-1MSD	trans-1,2-Dichloroethene	27.12	< 20	< 20	rpd	J/None	D	
280-100257-1MSD (SD)/ 280-100257-1MSD	Carbon disulfide	27.24	< 20	< 20	rpd	J/None	D	
280-100257-1MSD (SD)/ 280-100257-1MSD	Carbon tetrachloride	28.30	< 20	< 20	rpd	J/None	D	
280-100257-1MSD (SD)/ 280-100257-1MSD	2,2-Dichloropropane	28.38	< 20	< 20	rpd	J/None	D	
280-100257-1MSD (SD)/ 280-100257-1MSD	1,1,1-Trichloroethane	28.44	< 20	< 20	rpd	J/None	D	
280-100257-1MSD (SD)/ 280-100257-1MSD	Hexachlorobutadiene	29.47	< 20	< 20	rpd	J/None	D	
280-100257-1MSD (SD)/ 280-100257-1MSD	1,1-Dichloropropene	30.78	< 20	< 20	rpd	J/None	D	
280-100257-1MSD (SD)/ 280-100257-1MSD	1,1-Dichloroethene	31.92	< 20	< 20	rpd	J/None	D	
280-100257-1MSD (SD)/ 280-100257-1MSD	Vinyl chloride	32.36	< 20	< 20	rpd	J/None	D	
280-100257-1MSD (SD)/ 280-100257-1MSD	Toluene	23.31	< 20	< 20	rpd	J/None	D	
280-100257-1MSD (SD)/ 280-100257-1MSD	Benzene	26.51	< 20	< 20	rpd	J/None	D	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the MS RPD for SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW80-(225.0)	N	Benzene	7.80	1.40 J	1.40 J		ug/kg	D/TR
FEW4-MW80-(225.0)	N	Toluene	7.80	3.10 J	3.10 J		ug/kg	D/TR

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

Quality Control Outliers for test method SW8260B, Surrogate

Method performance for individual samples is demonstrated through spiking activities. All samples are spiked with surrogate compounds prior to sample preparation. The sample itself may produce effects due to such factors as interferences and high concentrations of analytes. Summary forms were evaluated and compared to electronic data deliverables. Surrogate results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
FEW4-MW80-(233.0) (N)/ 280-100257-2	Toluene-d8	121.4	85 - 116	85 - 116	percent	J/None	I	
FEW4-MW80-(233.0) (N)/ 280-100257-2	Dibromofluoromethane	125.2	78 - 119	78 - 119	percent	J/None	I	
FEW4-MW80-(257.0) (N)/ 280-100257-6	Dibromofluoromethane	133.8	78 - 119	78 - 119	percent	J/None	I	
FEW4-MW80-(294.0) (N)/ 280-100257-10	Dibromofluoromethane	132.0	78 - 119	78 - 119	percent	J/None	I	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the Surrogate for SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW80-(257.0)	N	Acetone	34.0	45.0 Q	45.0 J	+	ug/kg	I
FEW4-MW80-(294.0)	N	Acetone	16.0	15.0 J Q	15.0 J	+	ug/kg	I/TR

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

Table of All Qualified Results

Test Method: SW8260B	Extraction Method: SW5035A							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW80-(225.0)	N	1,2,4-Trichlorobenzene	7.80	2.50 U J	2.50 UJ	-	ug/kg	M
FEW4-MW80-(225.0)	N	1,2,4-Trimethylbenzene	7.80	2.50 U J	2.50 UJ	-	ug/kg	M
FEW4-MW80-(225.0)	N	1,2-Dichlorobenzene	7.80	2.50 U J	2.50 UJ	-	ug/kg	M
FEW4-MW80-(225.0)	N	1,3,5-Trimethylbenzene	7.80	2.50 U J	2.50 UJ	-	ug/kg	M
FEW4-MW80-(225.0)	N	1,3-Dichlorobenzene	7.80	2.50 U J	2.50 UJ	-	ug/kg	M
FEW4-MW80-(225.0)	N	1,4-Dichlorobenzene	7.80	2.50 U J	2.50 UJ	-	ug/kg	M
FEW4-MW80-(225.0)	N	2-Chlorotoluene	7.80	2.50 U J	2.50 UJ	-	ug/kg	M
FEW4-MW80-(225.0)	N	4-Chlorotoluene	7.80	2.50 U J	2.50 UJ	-	ug/kg	M
FEW4-MW80-(225.0)	N	Benzene	7.80	1.40 J	1.40 J		ug/kg	D/TR
FEW4-MW80-(225.0)	N	Hexachlorobutadiene	7.80	2.50 U J	2.50 UJ	-	ug/kg	M
FEW4-MW80-(225.0)	N	n-Butylbenzene	7.80	2.50 U J	2.50 UJ	-	ug/kg	M
FEW4-MW80-(225.0)	N	n-Propylbenzene	7.80	2.50 U J	2.50 UJ	-	ug/kg	M
FEW4-MW80-(225.0)	N	p-Cymene (p-Isopropyltoluene)	7.80	2.50 U J	2.50 UJ	-	ug/kg	M
FEW4-MW80-(225.0)	N	sec-Butylbenzene	7.80	2.50 U J	2.50 UJ	-	ug/kg	M
FEW4-MW80-(225.0)	N	tert-Butylbenzene	7.80	2.50 U J	2.50 UJ	-	ug/kg	M
FEW4-MW80-(225.0)	N	Toluene	7.80	3.10 J	3.10 J		ug/kg	D/TR
FEW4-MW80-(257.0)	N	Acetone	34.0	45.0 Q	45.0 J	+	ug/kg	I
FEW4-MW80-(294.0)	N	Acetone	16.0	15.0 J Q	15.0 J	+	ug/kg	I/TR

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
Trace values are not included in the qualified results table unless additional reason codes are associated.

Table of All Trace Results

Test Method: SW8260B	Extraction Method: SW5035A							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW80-(225.0)	N	Acetone	31.0	28.0 J Q	28.0 J		ug/kg	TR/V2
FEW4-MW80-(225.0)	N	Benzene	7.80	1.40 J	1.40 J		ug/kg	D/TR
FEW4-MW80-(225.0)	N	Toluene	7.80	3.10 J	3.10 J		ug/kg	D/TR
FEW4-MW80-(225.0)	N	Trichloroethene (TCE)	7.80	7.00 J	7.00 J		ug/kg	TR
FEW4-MW80-(254.0)	N	Acetone	22.0	21.0 J Q	21.0 J		ug/kg	TR
FEW4-MW80-(273.0)	N	Acetone	19.0	18.0 J Q	18.0 J		ug/kg	TR
FEW4-MW80-(284.0)	N	2-Butanone (MEK)	17.0	5.30 J Q	5.30 J		ug/kg	TR
FEW4-MW80-(294.0)	N	Acetone	16.0	15.0 J Q	15.0 J	+	ug/kg	I/TR

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW80-(233.0)	N	Acetone	25.0	16.0 U Q	16.0 U	16.0 UJ	D3
FEW4-MW80-(234.0)	FD	Acetone	25.0	45.0 Q	45.0	45.0 J	D3

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
Trace values are not included in the qualified results table unless additional reason codes are associated.

Reason Code Definitions

Code	Definition
D	MS RPD
D3	Field Duplicate RPD
I	Surrogate recovery outside project limits.
M	MS Recovery
TR	Trace Level Detect
V2	CCV

Flag Code and Definitions

Flag	Definition
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
J	Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
R	The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making.
B	Blank contamination: The analyte was found in an associated blank above one half the RL, as well as in the sample.
UB	The analyte was also detected in an associated laboratory or field blank at a concentration comparable to the concentration in the sample. The reported result has been requalified as not detected.

Review Questions

Method: SW8260B (Volatile Organic Compounds by Capillary GC/MS)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were sample reciept temperatures met?	•			Sample receipt temperature was 4.5ºC.
Were QAPP specified PQLs achieved?	•			
Were all QAPP-specified target analytes reported?	•			
Was the GC/MS system properly tuned based on method criteria?	•			
Was the criteria met during each 12 hour shift (prior to ICAL and Cal Ver.)?				
Does the initial calibration curve consist of 5 concentration levels, with the low standard near but > MDL?	•			
Did the Calibration Check Compounds (CCCs) have a relative standard deviation within QAPP acceptance limits?	•			
Were the average response factors (RFs) for the System Performance Check Compounds (SPCCs) within QAPP acceptance limits?	•			
Were the ICAL %RSDs for the target compounds within method criteria?	•			
If a quadratic equation curve was used, was the coefficient of determination (COD) within criteria?	•			
If a linear regression curve was used, was the correlation coefficient within criteria?	•			
Check and recalculate the response factors and average response factors for a least one target compound.	•			ICAL VMS-G 8/16/17 TCE AVG RF = 0.3273
Check and recalculate the %RSD for one of more target compounds and DMCs. Verify that the recalculated values agree with the laboratory reported values.	•			ICAL VMS-G 8/16/17 TCE %RSD = 4.3% 1,2-DCA-d4 %RSD = 5.0
Was a second source verification analyzed after the ICAL and all analytes within criteria?		•		The ICV percent difference was above the upper control limit for bromomethane at 36.6%D and dichlorofluoromethane at -22.7%. All associated sample results were nondetect for these analytes, therefore no data qualification is warranted.
Was a CCV run at the beginning of the analytical sequence and every 12 hours?	•			
Was the CCV a mid-level standard from the initial calibration curve?	•			
Did the CCCs have a %Difference within QAPP acceptance limits?	•			
Were the average RFs for the SPCCs within QAPP acceptance limits?	•			

Review Questions

Method: SW8260B (Volatile Organic Compounds by Capillary GC/MS)

Review Questions	Yes	No	NA	Comment
Was the %D (difference or drift) for all target analytes within QAPP acceptance limits?		•		The acetone %D of 22.7% was greater than the control limit of 20%D in CCV 280-385692. Acetone was detected in associated sample FEW4-MW80-(225.0) and the result has been qualified as an estimated value. The % difference of acetone at 24.3%, 2-butanone at 20.3%, and 4-methyl-2-pentanone at 28.1% was greater than the control limit of 20% in CCV 280-385869/2. Acetone was detected in associated samples FEW4-MW80-(233.0), FEW4-MW80-(234.0), FEW4-MW80-(245.0), FEW4-MW80-(254.0), FEW4-MW80-(257.0), FEW4-MW80-(269.0), FEW4-MW80-(273.0), FEW4-MW80-(284.0), FEW4-MW80-(294.0), and FEW4-MW80-(301.0); these acetone results have been qualified as estimated values.
Check and recalculate the CCV relative response factor for at least one target compound.		•		VMS-G 8/28/17 CCV 280-385869/2 Trichloroethene RF = 0.34134
Were the internal standards added to every standard, blank, matrix spike, matrix spike duplicate, and sample?	•			
Were the retention times for all IS compounds within QAPP acceptance limits?	•			
Are the area counts of all IS compounds within QAPP acceptance limits?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes detected in the method blank above the MDL?		•		
Were target analytes reported in the field blank analyses above the MDL?			•	
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?		•		FEW4-MW80-(234.0) was a blind field duplicate of FEW4-MW80-(233.0). Acetone was detected greater than the LOQ in FEW4-MW80-(234.0) but not FEW4-MW80-(233.0). The acetone results have been qualified as estimated values for the duplicate samples.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were the LCS/LCSD recoveries within QAPP acceptance limits?		•		A bromomethane recovery of 156% was greater than the upper control limit of 143%; this analyte was not detected in the associated sample and has therefore not been qualified. Benzene was recovered greater than the upper control limit of 121% at 123%; 1,2-dichloropropane was recovered greater than the upper control limit of 123% at 127%; and 4-methyl-2-pentanone was recovered greater than the upper control limit of 135% at 136% for analytical batch 280-385869. These analytes were not detected in any associated samples and have therefore not been qualified.
Were the LCS/LCSD RPDs within QAPP acceptance limits?	•			
Was the duplicate RPD within QAPP acceptance limits?			•	
Was a MS/MSD pair prepared with each batch?	•			

Review Questions

Method: SW8260B (Volatile Organic Compounds by Capillary GC/MS)				
Review Questions	Yes	No	NA	Comment
Is the MS/MSD parent sample the one designated by the sampling team?	•			FEW4-MW80-(225.0) was designated for MS/MSD analyses.
Were MS/MSD recoveries and RPD within QAPP acceptance limits?		•		Several analytes were recovered less than the lower control limit in the MSD, though all the MS recoveries were within control limits. The RPD of several analytes were above the 20% control limit. These analytes have been qualified for the parent sample.
Were surrogate recoveries within QAPP acceptance limits?		•		The 125% dibromofluoromethane recovery was greater than the upper control limit of 119% and the 122% toluene recovery was greater than the upper control limit of 116% in FEW4-MW80-(233.0). The 134% and 131% recovery of dibromofluoromethane was greater than the upper control limit of 119% in FEW4-MW80-(257.0) and FEW4-MW80-(294.0) respectively.
Were reported sample concentrations within calibration range?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were instrument run logs present and filled out appropriately?	•			
Were sample prepration sheets present and filled out appropriately?	•			
Check and recalculate the %D for one target compound. Verify that the recalculated values agree with the laboratory-reported values.			•	
Examine raw data to verify correct calculation of sample results reported by the laboratory. Compare quantitation lists and chromatograms to the reported detect and non-detect sample results.	•			FEW4-MW80-(301.0) Acetone = 68
Verify that the reporting limits and sample results have been adjusted to reflect all sample dilutions and Percent Moisture factors (non-aqueous samples).	•			

Automated Data Review Detail Report for 280-100442-1_52_2a_FUDSChem
B08WY0467-02, F.E. Warren AFB, Site 4
Draft-Final Uniform Federal Policy-Quality Assurance Project Plan for the Remedial Investigation Addendum 2017-2018 Tasks
Atlas "D" Missile Site 4—Laramie County, Wyoming, July 2017

US Army Corps of Engineers ®

Batch Report

Test Method: SW8260B Analysis Batch: 280-386215

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
FEW4-MW82	SO	FEW4-MW82-(0.5)	280-100442-1		1/1	8/17/2017 15:20	8/17/2017 15:20	8/31/2017 03:00	280-386215/	N
FEW4-MW82	SO	FEW4-MW82-(2.5)	280-100442-2		1/1	8/17/2017 15:25	8/17/2017 15:25	8/31/2017 03:21	280-386215/	N
FEW4-MW82	SO	FEW4-MW82-(9.0)	280-100442-3		1/1	8/17/2017 15:30	8/17/2017 15:30	8/31/2017 03:41	280-386215/	N
FEW4-MW82	SO	FEW4-MW82-(9.0)	280-100442-3MS		1/1	8/17/2017 15:30	8/17/2017 15:30	8/31/2017 04:02	280-386215/	MS
FEW4-MW82	SO	FEW4-MW82-(9.0)	280-100442-3MSD		1/1	8/17/2017 15:30	8/17/2017 15:30	8/31/2017 04:23	280-386215/	SD
FEW4-MW82	SO	FEW4-MW82-(75.0)	280-100442-4		1/1	8/17/2017 18:00	8/17/2017 18:00	8/31/2017 05:04	280-386215/	N
FEW4-MW82	SO	FEW4-MW82-(76.0)	280-100442-5		1/1	8/17/2017 19:00	8/17/2017 19:00	8/31/2017 05:24	280-386215/	FD
FEW4-MW82	SO	FEW4-MW82-(83.0)	280-100442-6		1/1	8/17/2017 18:08	8/17/2017 18:08	8/31/2017 05:45	280-386215/	N
FEW4-MW82	SO	FEW4-MW82-(95.0)	280-100442-8		1/1	8/18/2017 10:10	8/18/2017 10:10	8/31/2017 06:06	280-386215/	N
FEW4-MW82	SO	FEW4-MW82-(105.0)	280-100442-9		1/1	8/18/2017 10:40	8/18/2017 10:40	8/31/2017 06:26	280-386215/	N
FEW4-MW82	SO	FEW4-MW82-(115.0)	280-100442-10		1/1	8/18/2017 10:50	8/18/2017 10:50	8/31/2017 06:47	280-386215/	N

Test Method: SW8260B Analysis Batch: 280-386359

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
FEW4-MW82	SO	FEW4-MW82-(125.0)	280-100442-11		1/1	8/18/2017 11:00	8/18/2017 11:00	9/1/2017 00:56	280-386359/	N
FEW4-MW82	SO	FEW4-MW82-(126.0)	280-100442-12		1/1	8/18/2017 12:00	8/18/2017 12:00	9/1/2017 01:17	280-386359/	FD
FEW4-MW82	SO	FEW4-MW82-(135.0)	280-100442-13		1/1	8/18/2017 11:30	8/18/2017 11:30	9/1/2017 01:38	280-386359/	N
FEW4-MW82	SO	FEW4-MW82-(145.0)	280-100442-14		1/1	8/18/2017 11:40	8/18/2017 11:40	9/1/2017 01:58	280-386359/	N
FEW4-MW82	SO	FEW4-MW82-(154.0)	280-100442-15		1/1	8/18/2017 11:54	8/18/2017 11:54	9/1/2017 02:19	280-386359/	N
FEW4-MW82	SO	FEW4-MW82-(164.0)	280-100442-16		1/1	8/18/2017 12:20	8/18/2017 12:20	9/1/2017 02:39	280-386359/	N
FEW4-MW82	SO	FEW4-MW82-(175.0)	280-100442-17		1/1	8/18/2017 12:22	8/18/2017 12:22	9/1/2017 03:00	280-386359/	N
FEW4-MW82	SO	FEW4-MW82-(185.0)	280-100442-18		1/1	8/18/2017 13:40	8/18/2017 13:40	9/1/2017 03:21	280-386359/	N

US Army Corps of Engineers®

Batch Report

Test Method: SW8260B Analysis Batch: 280-386391

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
FEW4-MW82	WG	FEW4-MW82-74	280-100442-7		1/1	8/18/2017 09:00	9/1/2017 11:34	9/1/2017 11:34	280-386391/	N
FEW4-MW82	WG	FEW4-MW82-74	280-100442-7		2/20	8/18/2017 09:00	9/1/2017 12:34	9/1/2017 12:34	280-386391/	N
FEW4-MW75	WG	FEW4-MW75-80	280-100442-26		1/2	8/18/2017 15:15	9/1/2017 12:58	9/1/2017 12:58	280-386391/	N
FEW4-MW75	WG	FEW4-MW75-80	280-100442-26		2/20	8/18/2017 15:15	9/1/2017 13:20	9/1/2017 13:20	280-386391/	N

Test Method: SW8260B Analysis Batch: 280-386459

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
FEW4-MW82	SO	FEW4-MW82-(195.0)	280-100442-19		1/1	8/18/2017 14:20	8/18/2017 14:20	9/1/2017 16:25	280-386459/	N
FEW4-MW82	SO	FEW4-MW82-(206.0)	280-100442-20		1/1	8/18/2017 15:54	8/18/2017 15:54	9/1/2017 16:45	280-386459/	N
FEW4-MW82	SO	FEW4-MW82-(215.0)	280-100442-21		1/1	8/18/2017 16:00	8/18/2017 16:00	9/1/2017 17:06	280-386459/	N
FEW4-MW82	SO	FEW4-MW82-(216.0)	280-100442-22		1/1	8/18/2017 17:00	8/18/2017 17:00	9/1/2017 17:27	280-386459/	FD
FEW4-MW82	SO	FEW4-MW82-(224.0)	280-100442-23		1/1	8/18/2017 16:50	8/18/2017 16:50	9/1/2017 17:48	280-386459/	N
FEW4-MW82	SO	FEW4-MW82-(235.0)	280-100442-24		1/1	8/18/2017 17:08	8/18/2017 17:08	9/1/2017 18:08	280-386459/	N
FEW4-MW82	SO	FEW4-MW82-(235.0)	280-100442-24MS		1/1	8/18/2017 17:08	8/18/2017 17:08	9/1/2017 18:29	280-386459/	MS
FEW4-MW82	SO	FEW4-MW82-(235.0)	280-100442-24MSD		1/1	8/18/2017 17:08	8/18/2017 17:08	9/1/2017 18:50	280-386459/	SD
FEW4-MW75	SO	FEW4-MW75-(80.0)	280-100442-25		1/1	8/18/2017 14:26	8/18/2017 14:26	9/1/2017 19:31	280-386459/	N
FEW4-MW75	SO	FEW4-MW75-(90.0)	280-100442-27		1/1	8/18/2017 16:05	8/18/2017 16:05	9/1/2017 19:52	280-386459/	N
FEW4-MW75	SO	FEW4-MW75-(100.0)	280-100442-28		1/1	8/18/2017 16:30	8/18/2017 16:30	9/1/2017 20:13	280-386459/	N
FEW4-MW75	SO	FEW4-MW75-(110.0)	280-100442-29		1/1	8/18/2017 17:50	8/18/2017 17:50	9/1/2017 20:34	280-386459/	N
FEW4-MW75	SO	FEW4-MW75-(111.0)	280-100442-30		1/1	8/18/2017 18:50	8/18/2017 18:50	9/1/2017 20:54	280-386459/	FD

US Army Corps of Engineers®

Batch Report

Test Method: SW8260B Analysis Batch: 280-386486

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
FEW4-MW82	WG	FEW4-MW82-74	280-100442-7		2/1	8/18/2017 09:00	9/2/2017 14:32	9/2/2017 14:32	280-386486/	N
FEW4-MW75	WG	FEW4-MW75-80	280-100442-26		2/1	8/18/2017 15:15	9/2/2017 14:53	9/2/2017 14:53	280-386486/	N

Test Method: SW8260B Analysis Batch: 280-386520

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
FEW4-MW75	SO	FEW4-MW75-(90.0)	280-100442-27		2/1	8/18/2017 16:05	9/4/2017 16:06	9/4/2017 21:07	280-386520/	N
FEW4-MW75	SO	FEW4-MW75-(110.0)	280-100442-29		2/1	8/18/2017 17:50	9/4/2017 16:06	9/4/2017 21:45	280-386520/	N
FEW4-MW75	SO	FEW4-MW75-(111.0)	280-100442-30		2/1	8/18/2017 18:50	9/4/2017 16:06	9/4/2017 22:05	280-386520/	FD
FEW4-MW75	SO	FEW4-MW75-(100.0)	280-100442-28		2/10	8/18/2017 16:30	9/4/2017 16:06	9/7/2017 11:35	280-386520/	N

Field Batch Report

--No Records Found--

MS Mismatch Report

--No Records Found--

Section to identify Matrix Spike mismatches where parent sample differs from MS by dilution.

US Army Corps of Engineers®

QC Outlier Report

Test Method: SW8260B Extraction Method: SW5030B Leach Method: NONE

QC Element	Sample ID/ Lab Sample ID	Run#/ Dil'n	Analyte	Result (Units)	Qualifier	Warning Limits	Control Limits	Reason	Comment	Rule	Action Level
Surrogate	FEW4-MW82-74 (N) / 280-100442-7	2 / 20.00	Toluene-d8	88.89 (percent)	J/UJ	89 - 112	89 - 112	I			
Test Hold Time	FEW4-MW75-80 (N) / 280-100442-26	2 / 1.00	All in Run	14.98 (days)	J/UJ	< 14	< 14	H1	Test Exceeds UCL		
Test Hold Time	FEW4-MW82-74 (N) / 280-100442-7	1 / 1.00	All in Run	14.11 (days)	J/UJ	< 14	< 14	H1	Test Exceeds UCL		
Test Hold Time	FEW4-MW82-74 (N) / 280-100442-7	2 / 20.00	All in Run	14.15 (days)	J/UJ	< 14	< 14	H1	Test Exceeds UCL		
Test Hold Time	FEW4-MW82-74 (N) / 280-100442-7	2 / 1.00	All in Run	15.23 (days)	J/UJ	< 14	< 14	H1	Test Exceeds UCL		

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

QC Element	Sample ID/ Lab Sample ID	Run#/ Dil'n	Analyte	Result (Units)	Qualifier	Warning Limits	Control Limits	Reason	Comment	Rule	Action Level
MS Recovery	FEW4-MW82-(235.0) (MS) / 280-100442-24MS	1 / 1.00	1,2,4-Trimethylbenzene	69.44 (percent)	J/UJ	75 - 123	75 - 123	M			
MS Recovery	FEW4-MW82-(235.0) (MS) / 280-100442-24MS	1 / 1.00	1,3-Dichlorobenzene	76.51 (percent)	J/UJ	77 - 121	77 - 121	M			
MS Recovery	FEW4-MW82-(235.0) (MS) / 280-100442-24MS	1 / 1.00	n-Propylbenzene	72.35 (percent)	J/UJ	73 - 125	73 - 125	M			
MS Recovery	FEW4-MW82-(235.0) (MS) / 280-100442-24MS	1 / 1.00	sec-Butylbenzene	69.44 (percent)	J/UJ	73 - 126	73 - 126	M			
MS Recovery	FEW4-MW82-(9.0) (MS) / 280-100442-3MS	1 / 1.00	1,2,3-Trichlorobenzene	60.61 (percent)	J/UJ	66 - 130	66 - 130	M			
MS Recovery	FEW4-MW82-(9.0) (MS) / 280-100442-3MS	1 / 1.00	1,2,4-Trichlorobenzene	55.31 (percent)	J/UJ	67 - 129	67 - 129	M			
MS Recovery	FEW4-MW82-(9.0) (MS) / 280-100442-3MS	1 / 1.00	1,2,4-Trimethylbenzene	60.41 (percent)	J/UJ	75 - 123	75 - 123	M			
MS Recovery	FEW4-MW82-(9.0) (MS) / 280-100442-3MS	1 / 1.00	1,2-Dichlorobenzene	66.33 (percent)	J/UJ	78 - 121	78 - 121	M			

US Army Corps of Engineers®

QC Outlier Report

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

QC Element	Sample ID/ Lab Sample ID	Run#/ Dil'n	Analyte	Result (Units)	Qualifier	Warning Limits	Control Limits	Reason	Comment	Rule	Action Level
MS Recovery	FEW4-MW82-(9.0) (MS) / 280-100442-3MS	1 / 1.00	1,3,5-Trimethylbenzene	63.88 (percent)	J/UJ	73 - 124	73 - 124	M			
MS Recovery	FEW4-MW82-(9.0) (MS) / 280-100442-3MS	1 / 1.00	1,3-Dichlorobenzene	60.00 (percent)	J/UJ	77 - 121	77 - 121	M			
MS Recovery	FEW4-MW82-(9.0) (MS) / 280-100442-3MS	1 / 1.00	1,4-Dichlorobenzene	60.41 (percent)	J/UJ	75 - 120	75 - 120	M			
MS Recovery	FEW4-MW82-(9.0) (MS) / 280-100442-3MS	1 / 1.00	2-Chlorotoluene	64.49 (percent)	J/UJ	75 - 122	75 - 122	M			
MS Recovery	FEW4-MW82-(9.0) (MS) / 280-100442-3MS	1 / 1.00	4-Chlorotoluene	62.04 (percent)	J/UJ	72 - 124	72 - 124	M			
MS Recovery	FEW4-MW82-(9.0) (MS) / 280-100442-3MS	1 / 1.00	Bromobenzene	70.61 (percent)	J/UJ	78 - 121	78 - 121	M			
MS Recovery	FEW4-MW82-(9.0) (MS) / 280-100442-3MS	1 / 1.00	Chlorobenzene	70.82 (percent)	J/UJ	79 - 120	79 - 120	M			
MS Recovery	FEW4-MW82-(9.0) (MS) / 280-100442-3MS	1 / 1.00	Ethylbenzene	69.59 (percent)	J/UJ	76 - 122	76 - 122	M			
MS Recovery	FEW4-MW82-(9.0) (MS) / 280-100442-3MS	1 / 1.00	Hexachlorobutadiene	46.73 (percent)	J/UJ	61 - 135	61 - 135	M			
MS Recovery	FEW4-MW82-(9.0) (MS) / 280-100442-3MS	1 / 1.00	Isopropylbenzene (Cumene)	67.76 (percent)	J/UJ	68 - 134	68 - 134	M			
MS Recovery	FEW4-MW82-(9.0) (MS) / 280-100442-3MS	1 / 1.00	m,p-Xylene	66.33 (percent)	J/UJ	77 - 124	77 - 124	M			
MS Recovery	FEW4-MW82-(9.0) (MS) / 280-100442-3MS	1 / 1.00	n-Butylbenzene	52.45 (percent)	J/UJ	70 - 128	70 - 128	M			
MS Recovery	FEW4-MW82-(9.0) (MS) / 280-100442-3MS	1 / 1.00	n-Propylbenzene	64.29 (percent)	J/UJ	73 - 125	73 - 125	M			
MS Recovery	FEW4-MW82-(9.0) (MS) / 280-100442-3MS	1 / 1.00	o-Xylene	68.78 (percent)	J/UJ	77 - 123	77 - 123	M			
MS Recovery	FEW4-MW82-(9.0) (MS) / 280-100442-3MS	1 / 1.00	p-Cymene (p-Isopropyltoluene)	57.76 (percent)	J/UJ	73 - 127	73 - 127	M			
MS Recovery	FEW4-MW82-(9.0) (MS) / 280-100442-3MS	1 / 1.00	sec-Butylbenzene	60.82 (percent)	J/UJ	73 - 126	73 - 126	M			
MS Recovery	FEW4-MW82-(9.0) (MS) / 280-100442-3MS	1 / 1.00	Styrene	71.84 (percent)	J/UJ	76 - 124	76 - 124	M			
MS Recovery	FEW4-MW82-(9.0) (MS) / 280-100442-3MS	1 / 1.00	tert-Butylbenzene	63.27 (percent)	J/UJ	73 - 125	73 - 125	M			

US Army Corps of Engineers®

QC Outlier Report

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

QC Element	Sample ID/ Lab Sample ID	Run#/ Dil'n	Analyte	Result (Units)	Qualifier	Warning Limits	Control Limits	Reason	Comment	Rule	Action Level
MS Recovery	FEW4-MW82-(9.0) (MS) / 280-100442-3MS	1 / 1.00	Tetrachloroethene (PCE)	72.65 (percent)	J/UJ	73 - 128	73 - 128	M			
MS Recovery	FEW4-MW82-(9.0) (MS) / 280-100442-3MS	1 / 1.00	Toluene	73.47 (percent)	J/UJ	77 - 121	77 - 121	M			
MS Recovery	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	1,1,1,2-Tetrachloroethane	68.92 (percent)	J/UJ	78 - 125	78 - 125	M			
MS Recovery	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	1,1,1-Trichloroethane	71.25 (percent)	J/UJ	73 - 130	73 - 130	M			
MS Recovery	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	1,1,2,2-Tetrachloroethane	64.69 (percent)	J/UJ	70 - 124	70 - 124	M			
MS Recovery	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	1,1,2-Trichloroethane	64.90 (percent)	J/UJ	78 - 121	78 - 121	M			
MS Recovery	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	1,1-Dichloroethane	68.08 (percent)	J/UJ	76 - 125	76 - 125	M			
MS Recovery	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	1,1-Dichloroethene	67.44 (percent)	J/UJ	70 - 131	70 - 131	M			
MS Recovery	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	1,1-Dichloropropene	70.82 (percent)	J/UJ	76 - 125	76 - 125	M			
MS Recovery	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	1,2,3-Trichlorobenzene	49.68 (percent)	J/UJ	66 - 130	66 - 130	M			
MS Recovery	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	1,2,3-Trichloropropane	71.46 (percent)	J/UJ	73 - 125	73 - 125	M			
MS Recovery	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	1,2,4-Trichlorobenzene	43.76 (percent)	J/UJ	67 - 129	67 - 129	M			
MS Recovery	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	1,2,4-Trimethylbenzene	45.03 (percent)	J/UJ	75 - 123	75 - 123	M			
MS Recovery	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	1,2-Dibromo-3-chloropropane	59.20 (percent)	J/UJ	61 - 132	61 - 132	M			
MS Recovery	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	1,2-Dibromoethane (EDB)	69.34 (percent)	J/UJ	78 - 122	78 - 122	M			
MS Recovery	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	1,2-Dichlorobenzene	53.49 (percent)	J/UJ	78 - 121	78 - 121	M			
MS Recovery	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	1,2-Dichloroethane	71.88 (percent)	J/UJ	73 - 128	73 - 128	M			
MS Recovery	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	1,2-Dichloroethene	66.07 (percent)	J/UJ	78 - 122	78 - 122	M			

US Army Corps of Engineers®

QC Outlier Report

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

QC Element	Sample ID/ Lab Sample ID	Run#/ Dil'n	Analyte	Result (Units)	Qualifier	Warning Limits	Control Limits	Reason	Comment	Rule	Action Level
MS Recovery	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	1,2-Dichloropropane	70.19 (percent)	J/UJ	76 - 123	76 - 123	M			
MS Recovery	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	1,3,5-Trimethylbenzene	50.95 (percent)	J/UJ	73 - 124	73 - 124	M			
MS Recovery	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	1,3-Dichlorobenzene	48.63 (percent)	J/UJ	77 - 121	77 - 121	M			
MS Recovery	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	1,3-Dichloropropane	70.82 (percent)	J/UJ	77 - 121	77 - 121	M			
MS Recovery	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	1,4-Dichlorobenzene	48.84 (percent)	J/UJ	75 - 120	75 - 120	M			
MS Recovery	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	2-Chlorotoluene	51.80 (percent)	J/UJ	75 - 122	75 - 122	M			
MS Recovery	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	4-Chlorotoluene	51.16 (percent)	J/UJ	72 - 124	72 - 124	M			
MS Recovery	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	Benzene	63.64 (percent)	J/UJ	77 - 121	77 - 121	M			
MS Recovery	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	Bromobenzene	56.03 (percent)	J/UJ	78 - 121	78 - 121	M			
MS Recovery	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	Bromochloromethane	67.23 (percent)	J/UJ	78 - 125	78 - 125	M			
MS Recovery	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	Bromodichloromethane	69.77 (percent)	J/UJ	75 - 127	75 - 127	M			
MS Recovery	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	Carbon disulfide	61.52 (percent)	J/UJ	63 - 132	63 - 132	M			
MS Recovery	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	Chlorobenzene	58.35 (percent)	J/UJ	79 - 120	79 - 120	M			
MS Recovery	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	Chloroform	67.86 (percent)	J/UJ	78 - 123	78 - 123	M			
MS Recovery	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	cis-1,2-Dichloroethene	66.17 (percent)	J/UJ	77 - 123	77 - 123	M			
MS Recovery	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	cis-1,3-Dichloropropene	66.60 (percent)	J/UJ	74 - 126	74 - 126	M			
MS Recovery	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	Dibromochloromethane	67.86 (percent)	J/UJ	74 - 126	74 - 126	M			
MS Recovery	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	Dibromomethane	64.06 (percent)	J/UJ	78 - 125	78 - 125	M			

US Army Corps of Engineers®

QC Outlier Report

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

QC Element	Sample ID/ Lab Sample ID	Run#/ Dil'n	Analyte	Result (Units)	Qualifier	Warning Limits	Control Limits	Reason	Comment	Rule	Action Level
MS Recovery	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	Ethylbenzene	56.87 (percent)	J/UJ	76 - 122	76 - 122	M			
MS Recovery	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	Hexachlorobutadiene	36.79 (percent)	J/UJ	61 - 135	61 - 135	M			
MS Recovery	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	Isopropylbenzene (Cumene)	54.12 (percent)	J/UJ	68 - 134	68 - 134	M			
MS Recovery	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	m,p-Xylene	56.03 (percent)	J/UJ	77 - 124	77 - 124	M			
MS Recovery	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	Methyl tert-butyl ether (MTBE)	70.19 (percent)	J/UJ	73 - 125	73 - 125	M			
MS Recovery	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	Methylene chloride	64.69 (percent)	J/UJ	70 - 128	70 - 128	M			
MS Recovery	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	Naphthalene	54.12 (percent)	J/UJ	62 - 129	62 - 129	M			
MS Recovery	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	n-Butylbenzene	41.86 (percent)	J/UJ	70 - 128	70 - 128	M			
MS Recovery	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	n-Propylbenzene	50.11 (percent)	J/UJ	73 - 125	73 - 125	M			
MS Recovery	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	o-Xylene	58.56 (percent)	J/UJ	77 - 123	77 - 123	M			
MS Recovery	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	p-Cymene (p-Isopropyltoluene)	45.67 (percent)	J/UJ	73 - 127	73 - 127	M			
MS Recovery	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	sec-Butylbenzene	48.63 (percent)	J/UJ	73 - 126	73 - 126	M			
MS Recovery	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	Styrene	59.41 (percent)	J/UJ	76 - 124	76 - 124	M			
MS Recovery	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	tert-Butylbenzene	48.20 (percent)	J/UJ	73 - 125	73 - 125	M			
MS Recovery	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	Tetrachloroethene (PCE)	60.89 (percent)	J/UJ	73 - 128	73 - 128	M			
MS Recovery	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	Toluene	58.35 (percent)	J/UJ	77 - 121	77 - 121	M			
MS Recovery	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	trans-1,2-Dichloroethene	65.96 (percent)	J/UJ	74 - 125	74 - 125	M			
MS Recovery	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	trans-1,3-Dichloropropene	64.48 (percent)	J/UJ	71 - 130	71 - 130	M			

US Army Corps of Engineers®

QC Outlier Report

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

QC Element	Sample ID/ Lab Sample ID	Run#/ Dil'n	Analyte	Result (Units)	Qualifier	Warning Limits	Control Limits	Reason	Comment	Rule	Action Level
MS Recovery	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	Trichloroethene (TCE)	65.33 (percent)	J/UJ	77 - 123	77 - 123	M			
MS RPD	FEW4-MW82-(235.0) (SD) / 280-100442-24MSD	1 / 1.00	1,2,4-Trimethylbenzene	24.67 (rpd)	J/None	< 20	< 20	D			
MS RPD	FEW4-MW82-(235.0) (SD) / 280-100442-24MSD	1 / 1.00	n-Butylbenzene	20.57 (rpd)	J/None	< 20	< 20	D			
MS RPD	FEW4-MW82-(235.0) (SD) / 280-100442-24MSD	1 / 1.00	n-Propylbenzene	20.85 (rpd)	J/None	< 20	< 20	D			
MS RPD	FEW4-MW82-(235.0) (SD) / 280-100442-24MSD	1 / 1.00	sec-Butylbenzene	22.34 (rpd)	J/None	< 20	< 20	D			
MS RPD	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	1,1,1,2-Tetrachloroethane	23.31 (rpd)	J/None	< 20	< 20	D			
MS RPD	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	1,1,1-Trichloroethane	24.71 (rpd)	J/None	< 20	< 20	D			
MS RPD	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	1,1,2-Trichloroethane	26.55 (rpd)	J/None	< 20	< 20	D			
MS RPD	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	1,1-Dichloroethane	26.65 (rpd)	J/None	< 20	< 20	D			
MS RPD	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	1,1-Dichloroethene	22.28 (rpd)	J/None	< 20	< 20	D			
MS RPD	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	1,1-Dichloropropene	20.38 (rpd)	J/None	< 20	< 20	D			
MS RPD	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	1,2,3-Trichlorobenzene	23.31 (rpd)	J/None	< 20	< 20	D			
MS RPD	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	1,2,3-Trichloropropane	23.96 (rpd)	J/None	< 20	< 20	D			
MS RPD	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	1,2,4-Trichlorobenzene	26.78 (rpd)	J/None	< 20	< 20	D			
MS RPD	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	1,2,4-Trimethylbenzene	32.61 (rpd)	J/None	< 20	< 20	D			
MS RPD	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	1,2-Dibromo-3-chloropropane	25.55 (rpd)	J/None	< 20	< 20	D			
MS RPD	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	1,2-Dichlorobenzene	24.91 (rpd)	J/None	< 20	< 20	D			
MS RPD	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	1,2-Dichloroethane	26.97 (rpd)	J/None	< 20	< 20	D			

US Army Corps of Engineers®

QC Outlier Report

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

QC Element	Sample ID/ Lab Sample ID	Run#/ Dil'n	Analyte	Result (Units)	Qualifier	Warning Limits	Control Limits	Reason	Comment	Rule	Action Level
MS RPD	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	1,2-Dichloroethene	23.82 (rpd)	J/None	< 20	< 20	D			
MS RPD	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	1,2-Dichloropropane	21.27 (rpd)	J/None	< 20	< 20	D			
MS RPD	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	1,3,5-Trimethylbenzene	25.99 (rpd)	J/None	< 20	< 20	D			
MS RPD	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	1,3-Dichlorobenzene	24.43 (rpd)	J/None	< 20	< 20	D			
MS RPD	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	1,3-Dichloropropane	21.81 (rpd)	J/None	< 20	< 20	D			
MS RPD	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	1,4-Dichlorobenzene	24.67 (rpd)	J/None	< 20	< 20	D			
MS RPD	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	2,2-Dichloropropane	21.35 (rpd)	J/None	< 20	< 20	D			
MS RPD	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	2-Butanone (MEK)	45.59 (rpd)	J/None	< 20	< 20	D			
MS RPD	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	2-Chlorotoluene	25.31 (rpd)	J/None	< 20	< 20	D			
MS RPD	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	2-Hexanone	23.14 (rpd)	J/None	< 20	< 20	D			
MS RPD	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	4-Chlorotoluene	22.71 (rpd)	J/None	< 20	< 20	D			
MS RPD	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	4-Methyl-2-pentanone (MIBK)	28.42 (rpd)	J/None	< 20	< 20	D			
MS RPD	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	Acetone	30.84 (rpd)	J/None	< 20	< 20	D			
MS RPD	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	Benzene	26.76 (rpd)	J/None	< 20	< 20	D			
MS RPD	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	Bromobenzene	26.51 (rpd)	J/None	< 20	< 20	D			
MS RPD	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	Bromochloromethane	21.10 (rpd)	J/None	< 20	< 20	D			
MS RPD	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	Bromodichloromethane	23.29 (rpd)	J/None	< 20	< 20	D			
MS RPD	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	Bromoform	22.99 (rpd)	J/None	< 20	< 20	D			

US Army Corps of Engineers ®

QC Outlier Report

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

QC Element	Sample ID/ Lab Sample ID	Run#/ Dil'n	Analyte	Result (Units)	Qualifier	Warning Limits	Control Limits	Reason	Comment	Rule	Action Level
MS RPD	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	Bromomethane	27.02 (rpd)	J/None	< 20	< 20	D			
MS RPD	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	Carbon disulfide	27.30 (rpd)	J/None	< 20	< 20	D			
MS RPD	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	Carbon tetrachloride	21.36 (rpd)	J/None	< 20	< 20	D			
MS RPD	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	Chlorobenzene	22.79 (rpd)	J/None	< 20	< 20	D			
MS RPD	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	Chloroethane	20.61 (rpd)	J/None	< 20	< 20	D			
MS RPD	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	Chloroform	23.14 (rpd)	J/None	< 20	< 20	D			
MS RPD	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	Chloromethane	20.18 (rpd)	J/None	< 20	< 20	D			
MS RPD	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	cis-1,2-Dichloroethene	23.66 (rpd)	J/None	< 20	< 20	D			
MS RPD	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	cis-1,3-Dichloropropene	21.28 (rpd)	J/None	< 20	< 20	D			
MS RPD	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	Dibromochloromethane	22.90 (rpd)	J/None	< 20	< 20	D			
MS RPD	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	Dibromomethane	27.84 (rpd)	J/None	< 20	< 20	D			
MS RPD	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	Dichlorodifluoromethane	26.53 (rpd)	J/None	< 20	< 20	D			
MS RPD	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	Ethylbenzene	23.61 (rpd)	J/None	< 20	< 20	D			
MS RPD	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	Hexachlorobutadiene	27.30 (rpd)	J/None	< 20	< 20	D			
MS RPD	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	Isopropylbenzene (Cumene)	25.85 (rpd)	J/None	< 20	< 20	D			
MS RPD	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	m,p-Xylene	20.34 (rpd)	J/None	< 20	< 20	D			
MS RPD	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	Methyl tert-butyl ether (MTBE)	21.74 (rpd)	J/None	< 20	< 20	D			
MS RPD	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	Methylene chloride	27.61 (rpd)	J/None	< 20	< 20	D			

US Army Corps of Engineers®

QC Outlier Report

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

QC Element	Sample ID/ Lab Sample ID	Run#/ Dil'n	Analyte	Result (Units)	Qualifier	Warning Limits	Control Limits	Reason	Comment	Rule	Action Level
MS RPD	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	Naphthalene	22.22 (rpd)	J/None	< 20	< 20	D			
MS RPD	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	n-Butylbenzene	25.93 (rpd)	J/None	< 20	< 20	D			
MS RPD	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	n-Propylbenzene	28.26 (rpd)	J/None	< 20	< 20	D			
MS RPD	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	p-Cymene (p-Isopropyltoluene)	26.85 (rpd)	J/None	< 20	< 20	D			
MS RPD	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	sec-Butylbenzene	25.76 (rpd)	J/None	< 20	< 20	D			
MS RPD	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	Styrene	22.43 (rpd)	J/None	< 20	< 20	D			
MS RPD	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	tert-Butylbenzene	30.48 (rpd)	J/None	< 20	< 20	D			
MS RPD	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	Tetrachloroethene (PCE)	21.12 (rpd)	J/None	< 20	< 20	D			
MS RPD	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	Toluene	26.42 (rpd)	J/None	< 20	< 20	D			
MS RPD	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	trans-1,2-Dichloroethene	23.98 (rpd)	J/None	< 20	< 20	D			
MS RPD	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	trans-1,3-Dichloropropene	22.93 (rpd)	J/None	< 20	< 20	D			
MS RPD	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	Trichloroethene (TCE)	21.13 (rpd)	J/None	< 20	< 20	D			
MS RPD	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	Trichlorofluoromethane	22.78 (rpd)	J/None	< 20	< 20	D			
MS RPD	FEW4-MW82-(9.0) (SD) / 280-100442-3MSD	1 / 1.00	Vinyl chloride	24.26 (rpd)	J/None	< 20	< 20	D			
Test Hold Time	FEW4-MW75-(100.0) (N) / 280-100442-28	1 / 1.00	All in Run	14.16 (days)	J/UJ	< 14		H1	Test Exceeds UWL		
Test Hold Time	FEW4-MW75-(100.0) (N) / 280-100442-28	2 / 10.00	All in Run	19.80 (days)	J/UJ	< 14		H1	Test Exceeds UWL		
Test Hold Time	FEW4-MW75-(110.0) (N) / 280-100442-29	1 / 1.00	All in Run	14.11 (days)	J/UJ	< 14		H1	Test Exceeds UWL		

US Army Corps of Engineers ®

QC Outlier Report

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

QC Element	Sample ID/ Lab Sample ID	Run#/ Dil'n	Analyte	Result (Units)	Qualifier	Warning Limits	Control Limits	Reason	Comment	Rule	Action Level
Test Hold Time	FEW4-MW75-(110.0) (N) / 280-100442-29	2 / 1.00	All in Run	17.16 (days)	J/UJ	< 14		H1	Test Exceeds UWL		
Test Hold Time	FEW4-MW75-(111.0) (FD) / 280-100442-30	1 / 1.00	All in Run	14.09 (days)	J/UJ	< 14		H1	Test Exceeds UWL		
Test Hold Time	FEW4-MW75-(111.0) (FD) / 280-100442-30	2 / 1.00	All in Run	17.14 (days)	J/UJ	< 14		H1	Test Exceeds UWL		
Test Hold Time	FEW4-MW75-(80.0) (N) / 280-100442-25	1 / 1.00	All in Run	14.21 (days)	J/UJ	< 14		H1	Test Exceeds UWL		
Test Hold Time	FEW4-MW75-(90.0) (N) / 280-100442-27	1 / 1.00	All in Run	14.16 (days)	J/UJ	< 14		H1	Test Exceeds UWL		
Test Hold Time	FEW4-MW75-(90.0) (N) / 280-100442-27	2 / 1.00	All in Run	17.21 (days)	J/UJ	< 14		H1	Test Exceeds UWL		
Test Hold Time	FEW4-MW82-(195.0) (N) / 280-100442-19	1 / 1.00	All in Run	14.09 (days)	J/UJ	< 14		H1	Test Exceeds UWL		
Test Hold Time	FEW4-MW82-(206.0) (N) / 280-100442-20	1 / 1.00	All in Run	14.04 (days)	J/UJ	< 14		H1	Test Exceeds UWL		
Test Hold Time	FEW4-MW82-(215.0) (N) / 280-100442-21	1 / 1.00	All in Run	14.05 (days)	J/UJ	< 14		H1	Test Exceeds UWL		
Test Hold Time	FEW4-MW82-(216.0) (FD) / 280-100442-22	1 / 1.00	All in Run	14.02 (days)	J/UJ	< 14		H1	Test Exceeds UWL		
Test Hold Time	FEW4-MW82-(224.0) (N) / 280-100442-23	1 / 1.00	All in Run	14.04 (days)	J/UJ	< 14		H1	Test Exceeds UWL		
Test Hold Time	FEW4-MW82-(235.0) (N) / 280-100442-24	1 / 1.00	All in Run	14.04 (days)	J/UJ	< 14		H1	Test Exceeds UWL		

US Army Corps of Engineers ®

QC Outlier Report

Rule is the multiplier used when blank contamination occurs to determine action level.

US Army Corps of Engineers®

Qualified Results

Test Method: SW8260B Extraction Method: SW5030B Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW75-80	280-100442-26	WG	N	1,4-Dioxane (p-Dioxane)	220	160 U H	220 U		ug/L	H1
FEW4-MW82-74	280-100442-7	WG	N	1,4-Dioxane (p-Dioxane)	220	160 U H	220 U	-	ug/L	H1

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW75-(100.0)	280-100442-28	SO	N	1,2-Dichloroethene	5.7	0.84 J	0.84 J		ug/kg	TR
FEW4-MW75-(100.0)	280-100442-28	SO	N	Acetone	23	22 J Q	22 J		ug/kg	TR/V2
FEW4-MW75-(100.0)	280-100442-28	SO	N	cis-1,2-Dichloroethene	5.7	0.84 J	0.84 J		ug/kg	TR
FEW4-MW75-(100.0)	280-100442-28	SO	N	Trichloroethene (TCE)	2700	1200 J H D	1200 J	-	ug/kg	TR/H1
FEW4-MW75-(110.0)	280-100442-29	SO	N	1,2-Dichloroethene	7.0	0.98 J	0.98 J		ug/kg	TR
FEW4-MW75-(110.0)	280-100442-29	SO	N	Acetone	28	15 J Q	15 J		ug/kg	TR/V2
FEW4-MW75-(110.0)	280-100442-29	SO	N	Chloroform	14	0.54 J	0.54 J		ug/kg	TR
FEW4-MW75-(110.0)	280-100442-29	SO	N	cis-1,2-Dichloroethene	7.0	0.98 J	0.98 J		ug/kg	TR
FEW4-MW75-(110.0)	280-100442-29	SO	N	Trichloroethene (TCE)	350	1500 H	1500 J	-	ug/kg	H1/D3
FEW4-MW75-(111.0)	280-100442-30	SO	FD	1,2-Dichloroethene	8.9	1.4 J	1.4 J		ug/kg	TR
FEW4-MW75-(111.0)	280-100442-30	SO	FD	Acetone	36	50 Q	50 J		ug/kg	V2
FEW4-MW75-(111.0)	280-100442-30	SO	FD	Chloroform	18	0.65 J	0.65 J		ug/kg	TR
FEW4-MW75-(111.0)	280-100442-30	SO	FD	cis-1,2-Dichloroethene	8.9	1.4 J	1.4 J		ug/kg	TR
FEW4-MW75-(111.0)	280-100442-30	SO	FD	Trichloroethene (TCE)	310	1100 H	1100 J	-	ug/kg	H1/D3
FEW4-MW75-(80.0)	280-100442-25	SO	N	Acetone	20	29 Q	29 J		ug/kg	V2
FEW4-MW75-(80.0)	280-100442-25	SO	N	Trichloroethene (TCE)	5.1	2.2 J	2.2 J		ug/kg	TR
FEW4-MW75-(90.0)	280-100442-27	SO	N	1,2-Dichloroethene	7.2	4.7 J	4.7 J		ug/kg	TR
FEW4-MW75-(90.0)	280-100442-27	SO	N	Acetone	29	21 J Q	21 J		ug/kg	TR/V2
FEW4-MW75-(90.0)	280-100442-27	SO	N	Chloroform	14	0.43 J	0.43 J		ug/kg	TR
FEW4-MW75-(90.0)	280-100442-27	SO	N	cis-1,2-Dichloroethene	7.2	4.7 J	4.7 J		ug/kg	TR
FEW4-MW75-(90.0)	280-100442-27	SO	N	Trichloroethene (TCE)	310	1600 H	1600 J	-	ug/kg	H1

US Army Corps of Engineers®

Qualified Results

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW82-(115.0)	280-100442-10	SO	N	1,2-Dichloroethene	5.3	1.1 J	1.1 J		ug/kg	TR
FEW4-MW82-(115.0)	280-100442-10	SO	N	cis-1,2-Dichloroethene	5.3	1.1 J	1.1 J		ug/kg	TR
FEW4-MW82-(145.0)	280-100442-14	SO	N	Trichloroethene (TCE)	5.7	5.0 J	5.0 J		ug/kg	TR
FEW4-MW82-(154.0)	280-100442-15	SO	N	Trichloroethene (TCE)	4.7	0.30 J	0.30 J		ug/kg	TR
FEW4-MW82-(195.0)	280-100442-19	SO	N	Acetone	25	31 Q	31 J		ug/kg	V2
FEW4-MW82-(206.0)	280-100442-20	SO	N	Acetone	31	56 Q	56 J		ug/kg	V2
FEW4-MW82-(215.0)	280-100442-21	SO	N	Acetone	19	14 J Q	14 J		ug/kg	TR/V2
FEW4-MW82-(216.0)	280-100442-22	SO	FD	Acetone	26	30 Q	30 J		ug/kg	V2
FEW4-MW82-(224.0)	280-100442-23	SO	N	Acetone	21	14 U Q	14 UJ		ug/kg	V2
FEW4-MW82-(235.0)	280-100442-24	SO	N	1,2,4-Trimethylbenzene	4.7	1.5 U J	1.5 UJ		ug/kg	M
FEW4-MW82-(235.0)	280-100442-24	SO	N	1,3-Dichlorobenzene	4.7	1.5 U	1.5 UJ		ug/kg	M
FEW4-MW82-(235.0)	280-100442-24	SO	N	Acetone	19	11 J Q	11 J		ug/kg	TR/V2
FEW4-MW82-(235.0)	280-100442-24	SO	N	n-Propylbenzene	4.7	1.5 U J	1.5 UJ		ug/kg	M
FEW4-MW82-(235.0)	280-100442-24	SO	N	sec-Butylbenzene	4.7	1.5 U J	1.5 UJ		ug/kg	M
FEW4-MW82-(75.0)	280-100442-4	SO	N	Acetone	19	17 J	17 J		ug/kg	TR
FEW4-MW82-(9.0)	280-100442-3	SO	N	1,1,1,2-Tetrachloroethane	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	280-100442-3	SO	N	1,1,1-Trichloroethane	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	280-100442-3	SO	N	1,1,2,2-Tetrachloroethane	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	280-100442-3	SO	N	1,1,2-Trichloroethane	4.5	2.9 U J	2.9 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	280-100442-3	SO	N	1,1-Dichloroethane	4.5	0.72 U J	0.72 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	280-100442-3	SO	N	1,1-Dichloroethene	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	280-100442-3	SO	N	1,1-Dichloropropene	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	280-100442-3	SO	N	1,2,3-Trichlorobenzene	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	280-100442-3	SO	N	1,2,3-Trichloropropane	4.5	2.9 U J	2.9 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	280-100442-3	SO	N	1,2,4-Trichlorobenzene	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	280-100442-3	SO	N	1,2,4-Trimethylbenzene	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	280-100442-3	SO	N	1,2-Dibromo-3-chloropropane	9.0	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	280-100442-3	SO	N	1,2-Dibromoethane (EDB)	4.5	1.4 U J	1.4 UJ	-	ug/kg	M

US Army Corps of Engineers®

Qualified Results

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW82-(9.0)	280-100442-3	SO	N	1,2-Dichlorobenzene	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	280-100442-3	SO	N	1,2-Dichloroethane	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	280-100442-3	SO	N	1,2-Dichloroethene	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	280-100442-3	SO	N	1,2-Dichloropropane	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	280-100442-3	SO	N	1,3,5-Trimethylbenzene	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	280-100442-3	SO	N	1,3-Dichlorobenzene	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	280-100442-3	SO	N	1,3-Dichloropropane	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	280-100442-3	SO	N	1,4-Dichlorobenzene	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	280-100442-3	SO	N	2-Chlorotoluene	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	280-100442-3	SO	N	4-Chlorotoluene	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	280-100442-3	SO	N	Acetone	18	29 J	29 J		ug/kg	D
FEW4-MW82-(9.0)	280-100442-3	SO	N	Benzene	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	280-100442-3	SO	N	Bromobenzene	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	280-100442-3	SO	N	Bromochloromethane	4.5	0.72 U J	0.72 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	280-100442-3	SO	N	Bromodichloromethane	4.5	0.72 U J	0.72 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	280-100442-3	SO	N	Carbon disulfide	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	280-100442-3	SO	N	Chlorobenzene	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	280-100442-3	SO	N	Chloroform	9.0	0.72 U J	0.72 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	280-100442-3	SO	N	cis-1,2-Dichloroethene	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	280-100442-3	SO	N	cis-1,3-Dichloropropene	4.5	2.9 U J	2.9 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	280-100442-3	SO	N	Dibromochloromethane	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	280-100442-3	SO	N	Dibromomethane	4.5	2.9 U J	2.9 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	280-100442-3	SO	N	Ethylbenzene	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	280-100442-3	SO	N	Hexachlorobutadiene	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	280-100442-3	SO	N	Isopropylbenzene (Cumene)	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	280-100442-3	SO	N	m,p-Xylene	2.9	2.9 U J	2.9 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	280-100442-3	SO	N	Methyl tert-butyl ether (MTBE)	18	0.72 U J	0.72 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	280-100442-3	SO	N	Methylene chloride	4.5	2.9 U J	2.9 UJ	-	ug/kg	M

US Army Corps of Engineers®

Qualified Results

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW82-(9.0)	280-100442-3	SO	N	Naphthalene	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	280-100442-3	SO	N	n-Butylbenzene	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	280-100442-3	SO	N	n-Propylbenzene	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	280-100442-3	SO	N	o-Xylene	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	280-100442-3	SO	N	p-Cymene (p-Isopropyltoluene)	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	280-100442-3	SO	N	sec-Butylbenzene	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	280-100442-3	SO	N	Styrene	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	280-100442-3	SO	N	tert-Butylbenzene	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	280-100442-3	SO	N	Tetrachloroethene (PCE)	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	280-100442-3	SO	N	Toluene	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	280-100442-3	SO	N	trans-1,2-Dichloroethene	4.5	0.72 U J	0.72 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	280-100442-3	SO	N	trans-1,3-Dichloropropene	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	280-100442-3	SO	N	Trichloroethene (TCE)	4.5	0.72 U J	0.72 UJ	-	ug/kg	M
FEW4-MW82-(95.0)	280-100442-8	SO	N	1,2-Dichloroethene	5.6	0.69 J	0.69 J		ug/kg	TR
FEW4-MW82-(95.0)	280-100442-8	SO	N	cis-1,2-Dichloroethene	5.6	0.69 J	0.69 J		ug/kg	TR

Qualified analytes in samples are reported as estimated, not detected (UJ) at the Limit of Detection (LOD).

US Army Corps of Engineers ®

Detected Results

Test Method: SW8260B Extraction Method: SW5030B Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Dilution	Analyte	LOQ	Lab Result	Qualified Result	Units	Reason
FEW4-MW75-80	280-100442-26	WG	N	2	cis-1,2-Dichloroethene	2.0	3.4 D	3.4	ug/L	
FEW4-MW75-80	280-100442-26	WG	N	20	Trichloroethene (TCE)	20	730 D	730	ug/L	
FEW4-MW82-74	280-100442-7	WG	N	1	cis-1,2-Dichloroethene	1.0	2.5	2.5	ug/L	
FEW4-MW82-74	280-100442-7	WG	N	20	Trichloroethene (TCE)	20	510 D	510	ug/L	

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Dilution	Analyte	LOQ	Lab Result	Qualified Result	Units	Reason
FEW4-MW75-(100.0)	280-100442-28	SO	N	1	1,2-Dichloroethene	5.7	0.84 J	0.84 J	ug/kg	TR
FEW4-MW75-(100.0)	280-100442-28	SO	N	1	Acetone	23	22 J Q	22 J	ug/kg	TR/V2
FEW4-MW75-(100.0)	280-100442-28	SO	N	1	cis-1,2-Dichloroethene	5.7	0.84 J	0.84 J	ug/kg	TR
FEW4-MW75-(100.0)	280-100442-28	SO	N	10	Trichloroethene (TCE)	2700	1200 J H D	1200 J	ug/kg	TR/H1
FEW4-MW75-(110.0)	280-100442-29	SO	N	1	1,2-Dichloroethene	7.0	0.98 J	0.98 J	ug/kg	TR
FEW4-MW75-(110.0)	280-100442-29	SO	N	1	Acetone	28	15 J Q	15 J	ug/kg	TR/V2
FEW4-MW75-(110.0)	280-100442-29	SO	N	1	Chloroform	14	0.54 J	0.54 J	ug/kg	TR
FEW4-MW75-(110.0)	280-100442-29	SO	N	1	cis-1,2-Dichloroethene	7.0	0.98 J	0.98 J	ug/kg	TR
FEW4-MW75-(110.0)	280-100442-29	SO	N	1	Trichloroethene (TCE)	350	1500 H	1500 J	ug/kg	H1/D3
FEW4-MW75-(111.0)	280-100442-30	SO	FD	1	1,2-Dichloroethene	8.9	1.4 J	1.4 J	ug/kg	TR
FEW4-MW75-(111.0)	280-100442-30	SO	FD	1	Acetone	36	50 Q	50 J	ug/kg	V2
FEW4-MW75-(111.0)	280-100442-30	SO	FD	1	Chloroform	18	0.65 J	0.65 J	ug/kg	TR
FEW4-MW75-(111.0)	280-100442-30	SO	FD	1	cis-1,2-Dichloroethene	8.9	1.4 J	1.4 J	ug/kg	TR
FEW4-MW75-(111.0)	280-100442-30	SO	FD	1	Trichloroethene (TCE)	310	1100 H	1100 J	ug/kg	H1/D3
FEW4-MW75-(80.0)	280-100442-25	SO	N	1	Acetone	20	29 Q	29 J	ug/kg	V2
FEW4-MW75-(80.0)	280-100442-25	SO	N	1	Trichloroethene (TCE)	5.1	2.2 J	2.2 J	ug/kg	TR
FEW4-MW75-(90.0)	280-100442-27	SO	N	1	1,2-Dichloroethene	7.2	4.7 J	4.7 J	ug/kg	TR
FEW4-MW75-(90.0)	280-100442-27	SO	N	1	Acetone	29	21 J Q	21 J	ug/kg	TR/V2

US Army Corps of Engineers®

Detected Results

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Dilution	Analyte	LOQ	Lab Result	Qualified Result	Units	Reason
FEW4-MW75-(90.0)	280-100442-27	SO	N	1	Chloroform	14	0.43 J	0.43 J	ug/kg	TR
FEW4-MW75-(90.0)	280-100442-27	SO	N	1	cis-1,2-Dichloroethene	7.2	4.7 J	4.7 J	ug/kg	TR
FEW4-MW75-(90.0)	280-100442-27	SO	N	1	Trichloroethene (TCE)	310	1600 H	1600 J	ug/kg	H1
FEW4-MW82-(105.0)	280-100442-9	SO	N	1	Acetone	28	52	52	ug/kg	
FEW4-MW82-(105.0)	280-100442-9	SO	N	1	Trichloroethene (TCE)	7.1	27	27	ug/kg	
FEW4-MW82-(115.0)	280-100442-10	SO	N	1	1,2-Dichloroethene	5.3	1.1 J	1.1 J	ug/kg	TR
FEW4-MW82-(115.0)	280-100442-10	SO	N	1	cis-1,2-Dichloroethene	5.3	1.1 J	1.1 J	ug/kg	TR
FEW4-MW82-(115.0)	280-100442-10	SO	N	1	Trichloroethene (TCE)	5.3	110	110	ug/kg	
FEW4-MW82-(125.0)	280-100442-11	SO	N	1	Trichloroethene (TCE)	6.5	39	39	ug/kg	
FEW4-MW82-(126.0)	280-100442-12	SO	FD	1	Acetone	28	92	92	ug/kg	
FEW4-MW82-(126.0)	280-100442-12	SO	FD	1	Trichloroethene (TCE)	6.9	37	37	ug/kg	
FEW4-MW82-(135.0)	280-100442-13	SO	N	1	Trichloroethene (TCE)	6.5	66	66	ug/kg	
FEW4-MW82-(145.0)	280-100442-14	SO	N	1	Trichloroethene (TCE)	5.7	5.0 J	5.0 J	ug/kg	TR
FEW4-MW82-(154.0)	280-100442-15	SO	N	1	Acetone	19	32	32	ug/kg	
FEW4-MW82-(154.0)	280-100442-15	SO	N	1	Trichloroethene (TCE)	4.7	0.30 J	0.30 J	ug/kg	TR
FEW4-MW82-(195.0)	280-100442-19	SO	N	1	Acetone	25	31 Q	31 J	ug/kg	V2
FEW4-MW82-(206.0)	280-100442-20	SO	N	1	Acetone	31	56 Q	56 J	ug/kg	V2
FEW4-MW82-(215.0)	280-100442-21	SO	N	1	Acetone	19	14 J Q	14 J	ug/kg	TR/V2
FEW4-MW82-(216.0)	280-100442-22	SO	FD	1	Acetone	26	30 Q	30 J	ug/kg	V2
FEW4-MW82-(235.0)	280-100442-24	SO	N	1	Acetone	19	11 J Q	11 J	ug/kg	TR/V2
FEW4-MW82-(75.0)	280-100442-4	SO	N	1	Acetone	19	17 J	17 J	ug/kg	TR
FEW4-MW82-(76.0)	280-100442-5	SO	FD	1	Acetone	28	41	41	ug/kg	
FEW4-MW82-(83.0)	280-100442-6	SO	N	1	Trichloroethene (TCE)	4.2	29	29	ug/kg	
FEW4-MW82-(9.0)	280-100442-3	SO	N	1	Acetone	18	29 J	29 J	ug/kg	D
FEW4-MW82-(95.0)	280-100442-8	SO	N	1	1,2-Dichloroethene	5.6	0.69 J	0.69 J	ug/kg	TR
FEW4-MW82-(95.0)	280-100442-8	SO	N	1	cis-1,2-Dichloroethene	5.6	0.69 J	0.69 J	ug/kg	TR

US Army Corps of Engineers ®

Detected Results

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Dilution	Analyte	LOQ	Lab Result	Qualified Result	Units	Reason
FEW4-MW82-(95.0)	280-100442-8	SO	N	1	Trichloroethene (TCE)	5.6	54	54	ug/kg	

Rejected Results

--No Records Found--

US Army Corps of Engineers ®

Facility:	B08WY0467-02, F.E. Warren AFB, Site 4
Event:	2017-2018 RI Addendum Tasks
SDG:	280-100442-1_52_2a_FUDSChem
Guidance Document:	Draft-Final Uniform Federal Policy-Quality Assurance Project Plan for the Remedial Investigation Addendum 2017-2018 Tasks Atlas "D" Missile Site 4 —Laramie County, Wyoming, July 2017
Prime Contractor:	RMC Consultants, Inc., LAKEWOOD, CO
Project Manager:	David Groy
Contract Laboratory:	TestAmerica Laboratories, Inc., Arvada, CO
Data Review Contractor:	RMC Consultants
Data Review Level:	Stage 3VEM
Primary Data Reviewer:	Gary Torf, Contractor Project Chemist
Second Reviewer:	, Senior Scientist
Date Submitted:	

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	SW8260B
FEW4-MW75-(100.0)	280-100442-28	Solid	Field Sample/N	X
FEW4-MW75-(110.0)	280-100442-29	Solid	Field Sample/N	X
FEW4-MW75-(111.0)	280-100442-30	Solid	Field Duplicate/FD	X
FEW4-MW75-(80.0)	280-100442-25	Solid	Field Sample/N	X
FEW4-MW75-(90.0)	280-100442-27	Solid	Field Sample/N	X
FEW4-MW82-(0.5)	280-100442-1	Solid	Field Sample/N	X
FEW4-MW82-(105.0)	280-100442-9	Solid	Field Sample/N	X
FEW4-MW82-(115.0)	280-100442-10	Solid	Field Sample/N	X
FEW4-MW82-(125.0)	280-100442-11	Solid	Field Sample/N	X
FEW4-MW82-(126.0)	280-100442-12	Solid	Field Duplicate/FD	X
FEW4-MW82-(135.0)	280-100442-13	Solid	Field Sample/N	X
FEW4-MW82-(145.0)	280-100442-14	Solid	Field Sample/N	X
FEW4-MW82-(154.0)	280-100442-15	Solid	Field Sample/N	X
FEW4-MW82-(164.0)	280-100442-16	Solid	Field Sample/N	X
FEW4-MW82-(175.0)	280-100442-17	Solid	Field Sample/N	X
FEW4-MW82-(185.0)	280-100442-18	Solid	Field Sample/N	X
FEW4-MW82-(195.0)	280-100442-19	Solid	Field Sample/N	X
FEW4-MW82-(2.5)	280-100442-2	Solid	Field Sample/N	X
FEW4-MW82-(206.0)	280-100442-20	Solid	Field Sample/N	X

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	SW8260B
FEW4-MW82-(215.0)	280-100442-21	Solid	Field Sample/N	X
FEW4-MW82-(216.0)	280-100442-22	Solid	Field Duplicate/FD	X
FEW4-MW82-(224.0)	280-100442-23	Solid	Field Sample/N	X
FEW4-MW82-(235.0)	280-100442-24	Solid	Field Sample/N	X
FEW4-MW82-(75.0)	280-100442-4	Solid	Field Sample/N	X
FEW4-MW82-(76.0)	280-100442-5	Solid	Field Duplicate/FD	X
FEW4-MW82-(83.0)	280-100442-6	Solid	Field Sample/N	X
FEW4-MW82-(9.0)	280-100442-3	Solid	Field Sample/N	X
FEW4-MW82-(95.0)	280-100442-8	Solid	Field Sample/N	X
FEW4-MW75-80	280-100442-26	Water	Field Sample/N	X
FEW4-MW82-74	280-100442-7	Water	Field Sample/N	X

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the Draft-Final Uniform Federal Policy-Quality Assurance Project Plan for the Remedial Investigation Addendum 2017-2018 Tasks Atlas “D” Missile Site 4 —Laramie County, Wyoming, July 2017 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by RMC Consultants, Inc., LAKEWOOD, CO; analyses were performed by TestAmerica Laboratories, Inc., Arvada, CO and were reported under sample delivery group (SDG) 280-100442-1_52_2a_FUDSChem. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

- Blank
- Blank - Negative
- Field Duplicate RPD
- LCS Recovery
- LCS RPD
- MS Recovery
- MS RPD
- Prep Hold Time
- Surrogate
- Test Hold Time

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 75 results (3.84%) out of the 1952 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected. Trace values, defined as results that are qualified as estimated because they fall between the limit of detection and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

Narrative Comments

Analytical Method	Data Reviewer Comment
SW8260B	No additional comments; see Checklist for detail.

November 16, 2017

Reviewed by Gary Torf, Contractor Project Chemist, RMC Consultants

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of a minimum of 10% of the reported sample results and method quality control data between the two deliverables.

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

Quality Control Outliers for test method SW8260B, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
FEW4-MW82-(235.0) (MS)/ 280-100442-24MS	sec-Butylbenzene	69.44	73 - 126	73 - 126	percent	J/UJ	M	
FEW4-MW82-(235.0) (MS)/ 280-100442-24MS	1,2,4-Trimethylbenzene	69.44	75 - 123	75 - 123	percent	J/UJ	M	
FEW4-MW82-(235.0) (MS)/ 280-100442-24MS	n-Propylbenzene	72.35	73 - 125	73 - 125	percent	J/UJ	M	
FEW4-MW82-(235.0) (MS)/ 280-100442-24MS	1,3-Dichlorobenzene	76.51	77 - 121	77 - 121	percent	J/UJ	M	
FEW4-MW82-(9.0) (MS)/ 280-100442-3MS	Hexachlorobutadiene	46.73	61 - 135	61 - 135	percent	J/UJ	M	
FEW4-MW82-(9.0) (MS)/ 280-100442-3MS	n-Butylbenzene	52.45	70 - 128	70 - 128	percent	J/UJ	M	
FEW4-MW82-(9.0) (MS)/ 280-100442-3MS	1,2,4-Trichlorobenzene	55.31	67 - 129	67 - 129	percent	J/UJ	M	
FEW4-MW82-(9.0) (MS)/ 280-100442-3MS	p-Cymene (p-Isopropyltoluene)	57.76	73 - 127	73 - 127	percent	J/UJ	M	
FEW4-MW82-(9.0) (MS)/ 280-100442-3MS	1,3-Dichlorobenzene	60.00	77 - 121	77 - 121	percent	J/UJ	M	
FEW4-MW82-(9.0) (MS)/ 280-100442-3MS	1,4-Dichlorobenzene	60.41	75 - 120	75 - 120	percent	J/UJ	M	
FEW4-MW82-(9.0) (MS)/ 280-100442-3MS	1,2,4-Trimethylbenzene	60.41	75 - 123	75 - 123	percent	J/UJ	M	
FEW4-MW82-(9.0) (MS)/ 280-100442-3MS	1,2,3-Trichlorobenzene	60.61	66 - 130	66 - 130	percent	J/UJ	M	
FEW4-MW82-(9.0) (MS)/ 280-100442-3MS	sec-Butylbenzene	60.82	73 - 126	73 - 126	percent	J/UJ	M	
FEW4-MW82-(9.0) (MS)/ 280-100442-3MS	4-Chlorotoluene	62.04	72 - 124	72 - 124	percent	J/UJ	M	
FEW4-MW82-(9.0) (MS)/ 280-100442-3MS	tert-Butylbenzene	63.27	73 - 125	73 - 125	percent	J/UJ	M	
FEW4-MW82-(9.0) (MS)/ 280-100442-3MS	1,3,5-Trimethylbenzene	63.88	73 - 124	73 - 124	percent	J/UJ	M	
FEW4-MW82-(9.0) (MS)/ 280-100442-3MS	n-Propylbenzene	64.29	73 - 125	73 - 125	percent	J/UJ	M	
FEW4-MW82-(9.0) (MS)/ 280-100442-3MS	2-Chlorotoluene	64.49	75 - 122	75 - 122	percent	J/UJ	M	
FEW4-MW82-(9.0) (MS)/ 280-100442-3MS	m,p-Xylene	66.33	77 - 124	77 - 124	percent	J/UJ	M	
FEW4-MW82-(9.0) (MS)/ 280-100442-3MS	1,2-Dichlorobenzene	66.33	78 - 121	78 - 121	percent	J/UJ	M	
FEW4-MW82-(9.0) (MS)/ 280-100442-3MS	Isopropylbenzene (Cumene)	67.76	68 - 134	68 - 134	percent	J/UJ	M	
FEW4-MW82-(9.0) (MS)/ 280-100442-3MS	o-Xylene	68.78	77 - 123	77 - 123	percent	J/UJ	M	
FEW4-MW82-(9.0) (MS)/ 280-100442-3MS	Ethylbenzene	69.59	76 - 122	76 - 122	percent	J/UJ	M	
FEW4-MW82-(9.0) (MS)/ 280-100442-3MS	Bromobenzene	70.61	78 - 121	78 - 121	percent	J/UJ	M	

Quality Control Outliers for test method SW8260B, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
FEW4-MW82-(9.0) (MS)/ 280-100442-3MS	Chlorobenzene	70.82	79 - 120	79 - 120	percent	J/UJ	M	
FEW4-MW82-(9.0) (MS)/ 280-100442-3MS	Styrene	71.84	76 - 124	76 - 124	percent	J/UJ	M	
FEW4-MW82-(9.0) (MS)/ 280-100442-3MS	Tetrachloroethene (PCE)	72.65	73 - 128	73 - 128	percent	J/UJ	M	
FEW4-MW82-(9.0) (MS)/ 280-100442-3MS	Toluene	73.47	77 - 121	77 - 121	percent	J/UJ	M	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	Trichloroethene (TCE)	65.33	77 - 123	77 - 123	percent	J/UJ	M	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	1,2-Dichloroethene	66.07	78 - 122	78 - 122	percent	J/UJ	M	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	cis-1,2-Dichloroethene	66.17	77 - 123	77 - 123	percent	J/UJ	M	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	Chloroform	67.86	78 - 123	78 - 123	percent	J/UJ	M	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	Hexachlorobutadiene	36.79	61 - 135	61 - 135	percent	J/UJ	M	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	n-Butylbenzene	41.86	70 - 128	70 - 128	percent	J/UJ	M	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	1,2,4-Trichlorobenzene	43.76	67 - 129	67 - 129	percent	J/UJ	M	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	1,2,4-Trimethylbenzene	45.03	75 - 123	75 - 123	percent	J/UJ	M	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	p-Cymene (p-Isopropyltoluene)	45.67	73 - 127	73 - 127	percent	J/UJ	M	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	tert-Butylbenzene	48.20	73 - 125	73 - 125	percent	J/UJ	M	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	sec-Butylbenzene	48.63	73 - 126	73 - 126	percent	J/UJ	M	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	1,3-Dichlorobenzene	48.63	77 - 121	77 - 121	percent	J/UJ	M	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	1,4-Dichlorobenzene	48.84	75 - 120	75 - 120	percent	J/UJ	M	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	1,2,3-Trichlorobenzene	49.68	66 - 130	66 - 130	percent	J/UJ	M	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	n-Propylbenzene	50.11	73 - 125	73 - 125	percent	J/UJ	M	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	1,3,5-Trimethylbenzene	50.95	73 - 124	73 - 124	percent	J/UJ	M	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	4-Chlorotoluene	51.16	72 - 124	72 - 124	percent	J/UJ	M	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	2-Chlorotoluene	51.80	75 - 122	75 - 122	percent	J/UJ	M	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	1,2-Dichlorobenzene	53.49	78 - 121	78 - 121	percent	J/UJ	M	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	Naphthalene	54.12	62 - 129	62 - 129	percent	J/UJ	M	

Quality Control Outliers for test method SW8260B, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	Isopropylbenzene (Cumene)	54.12	68 - 134	68 - 134	percent	J/UJ	M	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	m,p-Xylene	56.03	77 - 124	77 - 124	percent	J/UJ	M	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	Bromobenzene	56.03	78 - 121	78 - 121	percent	J/UJ	M	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	Ethylbenzene	56.87	76 - 122	76 - 122	percent	J/UJ	M	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	Toluene	58.35	77 - 121	77 - 121	percent	J/UJ	M	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	Chlorobenzene	58.35	79 - 120	79 - 120	percent	J/UJ	M	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	o-Xylene	58.56	77 - 123	77 - 123	percent	J/UJ	M	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	1,2-Dibromo-3-chloropropane	59.20	61 - 132	61 - 132	percent	J/UJ	M	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	Styrene	59.41	76 - 124	76 - 124	percent	J/UJ	M	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	Tetrachloroethene (PCE)	60.89	73 - 128	73 - 128	percent	J/UJ	M	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	Carbon disulfide	61.52	63 - 132	63 - 132	percent	J/UJ	M	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	Benzene	63.64	77 - 121	77 - 121	percent	J/UJ	M	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	Dibromomethane	64.06	78 - 125	78 - 125	percent	J/UJ	M	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	trans-1,3-Dichloropropene	64.48	71 - 130	71 - 130	percent	J/UJ	M	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	1,1,2,2-Tetrachloroethane	64.69	70 - 124	70 - 124	percent	J/UJ	M	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	Methylene chloride	64.69	70 - 128	70 - 128	percent	J/UJ	M	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	1,1,2-Trichloroethane	64.90	78 - 121	78 - 121	percent	J/UJ	M	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	trans-1,2-Dichloroethene	65.96	74 - 125	74 - 125	percent	J/UJ	M	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	cis-1,3-Dichloropropene	66.60	74 - 126	74 - 126	percent	J/UJ	M	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	Bromochloromethane	67.23	78 - 125	78 - 125	percent	J/UJ	M	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	1,1-Dichloroethene	67.44	70 - 131	70 - 131	percent	J/UJ	M	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	Dibromochloromethane	67.86	74 - 126	74 - 126	percent	J/UJ	M	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	1,1-Dichloroethane	68.08	76 - 125	76 - 125	percent	J/UJ	M	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	1,1,1,2-Tetrachloroethane	68.92	78 - 125	78 - 125	percent	J/UJ	M	

Quality Control Outliers for test method SW8260B, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	1,2-Dibromoethane (EDB)	69.34	78 - 122	78 - 122	percent	J/UJ	M	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	Bromodichloromethane	69.77	75 - 127	75 - 127	percent	J/UJ	M	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	Methyl tert-butyl ether (MTBE)	70.19	73 - 125	73 - 125	percent	J/UJ	M	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	1,2-Dichloropropane	70.19	76 - 123	76 - 123	percent	J/UJ	M	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	1,1-Dichloropropene	70.82	76 - 125	76 - 125	percent	J/UJ	M	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	1,3-Dichloropropane	70.82	77 - 121	77 - 121	percent	J/UJ	M	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	1,1,1-Trichloroethane	71.25	73 - 130	73 - 130	percent	J/UJ	M	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	1,2,3-Trichloropropane	71.46	73 - 125	73 - 125	percent	J/UJ	M	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	1,2-Dichloroethane	71.88	73 - 128	73 - 128	percent	J/UJ	M	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the MS Recovery for SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW82-(235.0)	N	1,2,4-Trimethylbenzene	4.7	1.5 U J	1.5 UJ		ug/kg	M
FEW4-MW82-(235.0)	N	1,3-Dichlorobenzene	4.7	1.5 U	1.5 UJ		ug/kg	M
FEW4-MW82-(235.0)	N	n-Propylbenzene	4.7	1.5 U J	1.5 UJ		ug/kg	M
FEW4-MW82-(235.0)	N	sec-Butylbenzene	4.7	1.5 U J	1.5 UJ		ug/kg	M
FEW4-MW82-(9.0)	N	1,1,1,2-Tetrachloroethane	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	1,1,1-Trichloroethane	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	1,1,2,2-Tetrachloroethane	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	1,1,2-Trichloroethane	4.5	2.9 U J	2.9 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	1,1-Dichloroethane	4.5	0.72 U J	0.72 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	1,1-Dichloroethene	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	1,1-Dichloropropene	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	1,2,3-Trichlorobenzene	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	1,2,3-Trichloropropane	4.5	2.9 U J	2.9 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	1,2,4-Trichlorobenzene	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	1,2,4-Trimethylbenzene	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	1,2-Dibromo-3-chloropropane	9.0	1.4 U J	1.4 UJ	-	ug/kg	M

Qualified Results associated with the MS Recovery for SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW82-(9.0)	N	1,2-Dibromoethane (EDB)	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	1,2-Dichlorobenzene	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	1,2-Dichloroethane	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	1,2-Dichloroethene	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	1,2-Dichloropropane	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	1,3,5-Trimethylbenzene	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	1,3-Dichlorobenzene	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	1,3-Dichloropropane	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	1,4-Dichlorobenzene	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	2-Chlorotoluene	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	4-Chlorotoluene	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	Benzene	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	Bromobenzene	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	Bromochloromethane	4.5	0.72 U J	0.72 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	Bromodichloromethane	4.5	0.72 U J	0.72 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	Carbon disulfide	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	Chlorobenzene	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	Chloroform	9.0	0.72 U J	0.72 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	cis-1,2-Dichloroethene	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	cis-1,3-Dichloropropene	4.5	2.9 U J	2.9 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	Dibromochloromethane	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	Dibromomethane	4.5	2.9 U J	2.9 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	Ethylbenzene	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	Hexachlorobutadiene	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	Isopropylbenzene (Cumene)	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	m,p-Xylene	2.9	2.9 U J	2.9 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	Methyl tert-butyl ether (MTBE)	18	0.72 U J	0.72 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	Methylene chloride	4.5	2.9 U J	2.9 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	Naphthalene	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	n-Butylbenzene	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	n-Propylbenzene	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	o-Xylene	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	p-Cymene (p-Isopropyltoluene)	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	sec-Butylbenzene	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	Styrene	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	tert-Butylbenzene	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	Tetrachloroethene (PCE)	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	Toluene	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	trans-1,2-Dichloroethene	4.5	0.72 U J	0.72 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	trans-1,3-Dichloropropene	4.5	1.4 U J	1.4 UJ	-	ug/kg	M

Qualified Results associated with the MS Recovery for SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW82-(9.0)	N	Trichloroethene (TCE)	4.5	0.72 U J	0.72 UJ	-	ug/kg	M

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

Quality Control Outliers for test method SW8260B, MS RPD

The objective of matrix spikes/matrix spike duplicates (MS/MSD) RPD analysis is to demonstrate acceptable method precision by the laboratory at the time of analysis. MS/MSD analyses are also performed to generate data that determines the long-term precision of the analytical method on various matrices. Non-homogenous samples can impact the apparent method precision. Summary forms were evaluated and compared to electronic data deliverables. Matrix spikes/matrix spike duplicates results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
FEW4-MW82-(235.0) (SD)/ 280-100442-24MSD	n-Butylbenzene	20.57	< 20	< 20	rpd	J/None	D	
FEW4-MW82-(235.0) (SD)/ 280-100442-24MSD	n-Propylbenzene	20.85	< 20	< 20	rpd	J/None	D	
FEW4-MW82-(235.0) (SD)/ 280-100442-24MSD	sec-Butylbenzene	22.34	< 20	< 20	rpd	J/None	D	
FEW4-MW82-(235.0) (SD)/ 280-100442-24MSD	1,2,4-Trimethylbenzene	24.67	< 20	< 20	rpd	J/None	D	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	Chloromethane	20.18	< 20	< 20	rpd	J/None	D	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	m,p-Xylene	20.34	< 20	< 20	rpd	J/None	D	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	1,1-Dichloropropene	20.38	< 20	< 20	rpd	J/None	D	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	Chloroethane	20.61	< 20	< 20	rpd	J/None	D	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	Bromochloromethane	21.10	< 20	< 20	rpd	J/None	D	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	Tetrachloroethene (PCE)	21.12	< 20	< 20	rpd	J/None	D	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	Trichloroethene (TCE)	21.13	< 20	< 20	rpd	J/None	D	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	1,2-Dichloropropane	21.27	< 20	< 20	rpd	J/None	D	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	cis-1,3-Dichloropropene	21.28	< 20	< 20	rpd	J/None	D	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	2,2-Dichloropropane	21.35	< 20	< 20	rpd	J/None	D	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	Carbon tetrachloride	21.36	< 20	< 20	rpd	J/None	D	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	Methyl tert-butyl ether (MTBE)	21.74	< 20	< 20	rpd	J/None	D	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	1,3-Dichloropropane	21.81	< 20	< 20	rpd	J/None	D	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	Naphthalene	22.22	< 20	< 20	rpd	J/None	D	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	1,1-Dichloroethene	22.28	< 20	< 20	rpd	J/None	D	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	Styrene	22.43	< 20	< 20	rpd	J/None	D	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	4-Chlorotoluene	22.71	< 20	< 20	rpd	J/None	D	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	Trichlorofluoromethane	22.78	< 20	< 20	rpd	J/None	D	

Quality Control Outliers for test method SW8260B, MS RPD

The objective of matrix spikes/matrix spike duplicates (MS/MSD) RPD analysis is to demonstrate acceptable method precision by the laboratory at the time of analysis. MS/MSD analyses are also performed to generate data that determines the long-term precision of the analytical method on various matrices. Non-homogenous samples can impact the apparent method precision. Summary forms were evaluated and compared to electronic data deliverables. Matrix spikes/matrix spike duplicates results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	Chlorobenzene	22.79	< 20	< 20	rpd	J/None	D	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	Dibromochloromethane	22.90	< 20	< 20	rpd	J/None	D	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	trans-1,3-Dichloropropene	22.93	< 20	< 20	rpd	J/None	D	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	Bromoform	22.99	< 20	< 20	rpd	J/None	D	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	2-Hexanone	23.14	< 20	< 20	rpd	J/None	D	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	Chloroform	23.14	< 20	< 20	rpd	J/None	D	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	Bromodichloromethane	23.29	< 20	< 20	rpd	J/None	D	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	1,1,1,2-Tetrachloroethane	23.31	< 20	< 20	rpd	J/None	D	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	1,2,3-Trichlorobenzene	23.31	< 20	< 20	rpd	J/None	D	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	Ethylbenzene	23.61	< 20	< 20	rpd	J/None	D	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	cis-1,2-Dichloroethene	23.66	< 20	< 20	rpd	J/None	D	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	1,2-Dichloroethene	23.82	< 20	< 20	rpd	J/None	D	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	1,2,3-Trichloropropane	23.96	< 20	< 20	rpd	J/None	D	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	trans-1,2-Dichloroethene	23.98	< 20	< 20	rpd	J/None	D	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	Vinyl chloride	24.26	< 20	< 20	rpd	J/None	D	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	1,3-Dichlorobenzene	24.43	< 20	< 20	rpd	J/None	D	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	1,4-Dichlorobenzene	24.67	< 20	< 20	rpd	J/None	D	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	1,1,1-Trichloroethane	24.71	< 20	< 20	rpd	J/None	D	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	1,2-Dichlorobenzene	24.91	< 20	< 20	rpd	J/None	D	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	2-Chlorotoluene	25.31	< 20	< 20	rpd	J/None	D	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	1,2-Dibromo-3-chloropropane	25.55	< 20	< 20	rpd	J/None	D	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	sec-Butylbenzene	25.76	< 20	< 20	rpd	J/None	D	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	Isopropylbenzene (Cumene)	25.85	< 20	< 20	rpd	J/None	D	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	n-Butylbenzene	25.93	< 20	< 20	rpd	J/None	D	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	1,3,5-Trimethylbenzene	25.99	< 20	< 20	rpd	J/None	D	

Quality Control Outliers for test method SW8260B, MS RPD

The objective of matrix spikes/matrix spike duplicates (MS/MSD) RPD analysis is to demonstrate acceptable method precision by the laboratory at the time of analysis. MS/MSD analyses are also performed to generate data that determines the long-term precision of the analytical method on various matrices. Non-homogenous samples can impact the apparent method precision. Summary forms were evaluated and compared to electronic data deliverables. Matrix spikes/matrix spike duplicates results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	Toluene	26.42	< 20	< 20	rpd	J/None	D	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	Bromobenzene	26.51	< 20	< 20	rpd	J/None	D	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	Dichlorodifluoromethane	26.53	< 20	< 20	rpd	J/None	D	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	1,1,2-Trichloroethane	26.55	< 20	< 20	rpd	J/None	D	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	1,1-Dichloroethane	26.65	< 20	< 20	rpd	J/None	D	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	Benzene	26.76	< 20	< 20	rpd	J/None	D	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	1,2,4-Trichlorobenzene	26.78	< 20	< 20	rpd	J/None	D	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	p-Cymene (p-Isopropyltoluene)	26.85	< 20	< 20	rpd	J/None	D	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	1,2-Dichloroethane	26.97	< 20	< 20	rpd	J/None	D	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	Bromomethane	27.02	< 20	< 20	rpd	J/None	D	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	Carbon disulfide	27.30	< 20	< 20	rpd	J/None	D	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	Hexachlorobutadiene	27.30	< 20	< 20	rpd	J/None	D	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	Methylene chloride	27.61	< 20	< 20	rpd	J/None	D	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	Dibromomethane	27.84	< 20	< 20	rpd	J/None	D	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	n-Propylbenzene	28.26	< 20	< 20	rpd	J/None	D	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	4-Methyl-2-pentanone (MIBK)	28.42	< 20	< 20	rpd	J/None	D	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	tert-Butylbenzene	30.48	< 20	< 20	rpd	J/None	D	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	Acetone	30.84	< 20	< 20	rpd	J/None	D	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	1,2,4-Trimethylbenzene	32.61	< 20	< 20	rpd	J/None	D	
FEW4-MW82-(9.0) (SD)/ 280-100442-3MSD	2-Butanone (MEK)	45.59	< 20	< 20	rpd	J/None	D	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the MS RPD for SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW82-(9.0)	N	Acetone	18	29 J	29 J		ug/kg	D

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

Quality Control Outliers for test method SW8260B, Surrogate

Method performance for individual samples is demonstrated through spiking activities. All samples are spiked with surrogate compounds prior to sample preparation. The sample itself may produce effects due to such factors as interferences and high concentrations of analytes. Summary forms were evaluated and compared to electronic data deliverables. Surrogate results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
FEW4-MW82-74 (N)/ 280-100442-7	Toluene-d8	88.89	89 - 112	89 - 112	percent	J/UJ	I	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

Quality Control Outliers for test method SW8260B, Test Hold Time

Hold times are ascertained based on project requirements. Holding times were determined by comparing the chain of custody records with the dates of analysis found in the electronic data deliverable and laboratory summary forms. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
FEW4-MW75-80 (N)/ 280-100442-26		14.98	< 14	< 14	days	J/UJ	H1	Test Exceeds UCL
FEW4-MW82-74 (N)/ 280-100442-7		14.11	< 14	< 14	days	J/UJ	H1	Test Exceeds UCL
FEW4-MW82-74 (N)/ 280-100442-7		14.15	< 14	< 14	days	J/UJ	H1	Test Exceeds UCL

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the Test Hold Time for SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW75-80	N	1,4-Dioxane (p-Dioxane)	220	160 U H	220 U		ug/l	H1
FEW4-MW82-74	N	1,4-Dioxane (p-Dioxane)	220	160 U H	220 U	-	ug/l	H1

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

Quality Control Outliers for test method SW8260B, Test Hold Time

Hold times are ascertained based on project requirements. Holding times were determined by comparing the chain of custody records with the dates of analysis found in the electronic data deliverable and laboratory summary forms. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
FEW4-MW75-(100.0) (N)/ 280-100442-28		14.16	< 14		days	J/UJ	H1	Test Exceeds UWL
FEW4-MW75-(100.0) (N)/ 280-100442-28		19.80	< 14		days	J/UJ	H1	Test Exceeds UWL
FEW4-MW75-(110.0) (N)/ 280-100442-29		14.11	< 14		days	J/UJ	H1	Test Exceeds UWL
FEW4-MW75-(110.0) (N)/ 280-100442-29		17.16	< 14		days	J/UJ	H1	Test Exceeds UWL
FEW4-MW75-(111.0) (FD)/ 280-100442-30		14.09	< 14		days	J/UJ	H1	Test Exceeds UWL
FEW4-MW75-(111.0) (FD)/ 280-100442-30		17.14	< 14		days	J/UJ	H1	Test Exceeds UWL
FEW4-MW75-(80.0) (N)/ 280-100442-25		14.21	< 14		days	J/UJ	H1	Test Exceeds UWL
FEW4-MW75-(90.0) (N)/ 280-100442-27		14.16	< 14		days	J/UJ	H1	Test Exceeds UWL
FEW4-MW75-(90.0) (N)/ 280-100442-27		17.21	< 14		days	J/UJ	H1	Test Exceeds UWL
FEW4-MW82-(195.0) (N)/ 280-100442-19		14.09	< 14		days	J/UJ	H1	Test Exceeds UWL
FEW4-MW82-(206.0) (N)/ 280-100442-20		14.04	< 14		days	J/UJ	H1	Test Exceeds UWL
FEW4-MW82-(215.0) (N)/ 280-100442-21		14.05	< 14		days	J/UJ	H1	Test Exceeds UWL
FEW4-MW82-(216.0) (FD)/ 280-100442-22		14.02	< 14		days	J/UJ	H1	Test Exceeds UWL
FEW4-MW82-(224.0) (N)/ 280-100442-23		14.04	< 14		days	J/UJ	H1	Test Exceeds UWL
FEW4-MW82-(235.0) (N)/ 280-100442-24		14.04	< 14		days	J/UJ	H1	Test Exceeds UWL

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the Test Hold Time for SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW75-(100.0)	N	Trichloroethene (TCE)	2700	1200 J H D	1200 J	-	ug/kg	TR/H1
FEW4-MW75-(110.0)	N	Trichloroethene (TCE)	350	1500 H	1500 J	-	ug/kg	H1/D3
FEW4-MW75-(111.0)	FD	Trichloroethene (TCE)	310	1100 H	1100 J	-	ug/kg	H1/D3
FEW4-MW75-(90.0)	N	Trichloroethene (TCE)	310	1600 H	1600 J	-	ug/kg	H1

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

Table of All Qualified Results

Test Method: SW8260B	Extraction Method: SW5030B							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW75-80	N	1,4-Dioxane (p-Dioxane)	220	160 U H	220 U		ug/l	H1
FEW4-MW82-74	N	1,4-Dioxane (p-Dioxane)	220	160 U H	220 U	-	ug/l	H1

Test Method: SW8260B	Extraction Method: SW5035A							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW75-(100.0)	N	Trichloroethene (TCE)	2700	1200 J H D	1200 J	-	ug/kg	TR/H1
FEW4-MW75-(110.0)	N	Trichloroethene (TCE)	350	1500 H	1500 J	-	ug/kg	H1/D3
FEW4-MW75-(111.0)	FD	Trichloroethene (TCE)	310	1100 H	1100 J	-	ug/kg	H1/D3
FEW4-MW75-(90.0)	N	Trichloroethene (TCE)	310	1600 H	1600 J	-	ug/kg	H1
FEW4-MW82-(235.0)	N	1,2,4-Trimethylbenzene	4.7	1.5 U J	1.5 UJ		ug/kg	M
FEW4-MW82-(235.0)	N	1,3-Dichlorobenzene	4.7	1.5 U	1.5 UJ		ug/kg	M
FEW4-MW82-(235.0)	N	n-Propylbenzene	4.7	1.5 U J	1.5 UJ		ug/kg	M
FEW4-MW82-(235.0)	N	sec-Butylbenzene	4.7	1.5 U J	1.5 UJ		ug/kg	M
FEW4-MW82-(9.0)	N	1,1,1,2-Tetrachloroethane	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	1,1,1-Trichloroethane	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	1,1,2,2-Tetrachloroethane	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	1,1,2-Trichloroethane	4.5	2.9 U J	2.9 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	1,1-Dichloroethane	4.5	0.72 U J	0.72 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	1,1-Dichloroethene	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	1,1-Dichloropropene	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	1,2,3-Trichlorobenzene	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	1,2,3-Trichloropropane	4.5	2.9 U J	2.9 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	1,2,4-Trichlorobenzene	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	1,2,4-Trimethylbenzene	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	1,2-Dibromo-3-chloropropane	9.0	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	1,2-Dibromoethane (EDB)	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	1,2-Dichlorobenzene	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	1,2-Dichloroethane	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	1,2-Dichloroethene	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	1,2-Dichloropropane	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	1,3,5-Trimethylbenzene	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	1,3-Dichlorobenzene	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	1,3-Dichloropropane	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	1,4-Dichlorobenzene	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	2-Chlorotoluene	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	4-Chlorotoluene	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	Acetone	18	29 J	29 J		ug/kg	D
FEW4-MW82-(9.0)	N	Benzene	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	Bromobenzene	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	Bromochloromethane	4.5	0.72 U J	0.72 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	Bromodichloromethane	4.5	0.72 U J	0.72 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	Carbon disulfide	4.5	1.4 U J	1.4 UJ	-	ug/kg	M

Table of All Qualified Results

Test Method: SW8260B	Extraction Method: SW5035A							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW82-(9.0)	N	Chlorobenzene	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	Chloroform	9.0	0.72 U J	0.72 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	cis-1,2-Dichloroethene	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	cis-1,3-Dichloropropene	4.5	2.9 U J	2.9 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	Dibromochloromethane	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	Dibromomethane	4.5	2.9 U J	2.9 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	Ethylbenzene	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	Hexachlorobutadiene	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	Isopropylbenzene (Cumene)	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	m,p-Xylene	2.9	2.9 U J	2.9 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	Methyl tert-butyl ether (MTBE)	18	0.72 U J	0.72 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	Methylene chloride	4.5	2.9 U J	2.9 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	Naphthalene	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	n-Butylbenzene	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	n-Propylbenzene	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	o-Xylene	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	p-Cymene (p-Isopropyltoluene)	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	sec-Butylbenzene	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	Styrene	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	tert-Butylbenzene	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	Tetrachloroethene (PCE)	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	Toluene	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	trans-1,2-Dichloroethene	4.5	0.72 U J	0.72 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	trans-1,3-Dichloropropene	4.5	1.4 U J	1.4 UJ	-	ug/kg	M
FEW4-MW82-(9.0)	N	Trichloroethene (TCE)	4.5	0.72 U J	0.72 UJ	-	ug/kg	M

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
Trace values are not included in the qualified results table unless additional reason codes are associated.

Table of All Trace Results

Test Method: SW8260B Extraction Method: SW5035A

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW75-(100.0)	N	1,2-Dichloroethane-d4	2700	2200 D	2200 J		ug/kg	TR
FEW4-MW75-(100.0)	N	1,2-Dichloroethene	5.70	0.840 J	0.840 J		ug/kg	TR
FEW4-MW75-(100.0)	N	1-Bromo-4-fluorobenzene (4-Bromofluorobenzene)	2700	2300 D	2300 J		ug/kg	TR
FEW4-MW75-(100.0)	N	Acetone	23.0	22.0 J Q	22.0 J		ug/kg	TR/V2
FEW4-MW75-(100.0)	N	cis-1,2-Dichloroethene	5.70	0.840 J	0.840 J		ug/kg	TR
FEW4-MW75-(100.0)	N	Dibromofluoromethane	2700	2300 D	2300 J		ug/kg	TR
FEW4-MW75-(100.0)	N	Toluene-d8	2700	2100 D	2100 J		ug/kg	TR
FEW4-MW75-(100.0)	N	Trichloroethene (TCE)	2700	1200 J H D	1200 J	-	ug/kg	TR/H1
FEW4-MW75-(110.0)	N	1,2-Dichloroethene	7.00	0.980 J	0.980 J		ug/kg	TR
FEW4-MW75-(110.0)	N	Acetone	28.0	15.0 J Q	15.0 J		ug/kg	TR/V2
FEW4-MW75-(110.0)	N	Chloroform	14.0	0.540 J	0.540 J		ug/kg	TR
FEW4-MW75-(110.0)	N	cis-1,2-Dichloroethene	7.00	0.980 J	0.980 J		ug/kg	TR
FEW4-MW75-(111.0)	FD	1,2-Dichloroethene	8.90	1.40 J	1.40 J		ug/kg	TR
FEW4-MW75-(111.0)	FD	Chloroform	18.0	0.650 J	0.650 J		ug/kg	TR
FEW4-MW75-(111.0)	FD	cis-1,2-Dichloroethene	8.90	1.40 J	1.40 J		ug/kg	TR
FEW4-MW75-(80.0)	N	Trichloroethene (TCE)	5.10	2.20 J	2.20 J		ug/kg	TR
FEW4-MW75-(90.0)	N	1,2-Dichloroethene	7.20	4.70 J	4.70 J		ug/kg	TR
FEW4-MW75-(90.0)	N	Acetone	29.0	21.0 J Q	21.0 J		ug/kg	TR/V2
FEW4-MW75-(90.0)	N	Chloroform	14.0	0.430 J	0.430 J		ug/kg	TR
FEW4-MW75-(90.0)	N	cis-1,2-Dichloroethene	7.20	4.70 J	4.70 J		ug/kg	TR
FEW4-MW82-(115.0)	N	1,2-Dichloroethene	5.30	1.10 J	1.10 J		ug/kg	TR
FEW4-MW82-(115.0)	N	cis-1,2-Dichloroethene	5.30	1.10 J	1.10 J		ug/kg	TR
FEW4-MW82-(145.0)	N	Trichloroethene (TCE)	5.70	5.00 J	5.00 J		ug/kg	TR
FEW4-MW82-(154.0)	N	Trichloroethene (TCE)	4.70	0.300 J	0.300 J		ug/kg	TR
FEW4-MW82-(215.0)	N	Acetone	19.0	14.0 J Q	14.0 J		ug/kg	TR/V2
FEW4-MW82-(235.0)	N	Acetone	19.0	11.0 J Q	11.0 J		ug/kg	TR/V2
FEW4-MW82-(75.0)	N	Acetone	19.0	17.0 J	17.0 J		ug/kg	TR
FEW4-MW82-(95.0)	N	1,2-Dichloroethene	5.60	0.690 J	0.690 J		ug/kg	TR
FEW4-MW82-(95.0)	N	cis-1,2-Dichloroethene	5.60	0.690 J	0.690 J		ug/kg	TR

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW75-80	N	1,4-Dioxane (p-Dioxane)	220	160 U H	220 UJ	220 U	H1
FEW4-MW75-80	N	Trichloroethene (TCE)	20	730 D	730 J	730	
FEW4-MW82-74	N	1,1,1-Trichloroethane	1.0	0.40 U	0.40 UJ	0.40 U	
FEW4-MW82-74	N	1,1,2,2-Tetrachloroethane	1.0	0.80 U	0.80 UJ	0.80 U	
FEW4-MW82-74	N	1,1,2-Trichloro-1,2,2-trifluoroethane	3.0	1.6 U	1.6 UJ	1.6 U	
FEW4-MW82-74	N	1,1,2-Trichloroethane	1.0	0.80 U	0.80 UJ	0.80 U	
FEW4-MW82-74	N	1,1-Dichloroethane	1.0	0.80 U	0.80 UJ	0.80 U	
FEW4-MW82-74	N	1,1-Dichloroethene	1.0	0.80 U	0.80 UJ	0.80 U	
FEW4-MW82-74	N	1,2,3-Trichlorobenzene	1.0	0.80 U	0.80 UJ	0.80 U	
FEW4-MW82-74	N	1,2,4-Trichlorobenzene	1.0	0.80 U	0.80 UJ	0.80 U	
FEW4-MW82-74	N	1,2-Dibromo-3-chloropropane	5.0	1.6 U	1.6 UJ	1.6 U	
FEW4-MW82-74	N	1,2-Dibromoethane (EDB)	1.0	0.40 U	0.40 UJ	0.40 U	
FEW4-MW82-74	N	1,2-Dichlorobenzene	1.0	0.40 U	0.40 UJ	0.40 U	
FEW4-MW82-74	N	1,2-Dichloroethane	1.0	0.40 U	0.40 UJ	0.40 U	
FEW4-MW82-74	N	1,2-Dichloropropane	1.0	0.40 U	0.40 UJ	0.40 U	
FEW4-MW82-74	N	1,3-Dichlorobenzene	1.0	0.40 U	0.40 UJ	0.40 U	
FEW4-MW82-74	N	1,4-Dichlorobenzene	1.0	0.40 U	0.40 UJ	0.40 U	
FEW4-MW82-74	N	1,4-Dioxane (p-Dioxane)	220	160 U H	220 UJ	220 U	H1
FEW4-MW82-74	N	2-Butanone (MEK)	6.0	4.0 U	4.0 UJ	4.0 U	
FEW4-MW82-74	N	2-Hexanone	5.0	4.0 U	4.0 UJ	4.0 U	
FEW4-MW82-74	N	4-Methyl-2-pentanone (MIBK)	5.0	3.2 U	3.2 UJ	3.2 U	
FEW4-MW82-74	N	Acetone	10	6.4 U	6.4 UJ	6.4 U	
FEW4-MW82-74	N	Benzene	1.0	0.40 U	0.40 UJ	0.40 U	
FEW4-MW82-74	N	Bromochloromethane	1.0	0.20 U	0.20 UJ	0.20 U	
FEW4-MW82-74	N	Bromodichloromethane	1.0	0.40 U	0.40 UJ	0.40 U	
FEW4-MW82-74	N	Bromoform	1.0	0.40 U	0.40 UJ	0.40 U	
FEW4-MW82-74	N	Bromomethane	2.0	0.80 U	0.80 UJ	0.80 U	
FEW4-MW82-74	N	Carbon disulfide	2.0	1.6 U	1.6 UJ	1.6 U	
FEW4-MW82-74	N	Carbon tetrachloride	2.0	0.40 U	0.40 UJ	0.40 U	
FEW4-MW82-74	N	Chlorobenzene	1.0	0.40 U	0.40 UJ	0.40 U	
FEW4-MW82-74	N	Chloroethane	2.0	1.6 U	1.6 UJ	1.6 U	
FEW4-MW82-74	N	Chloroform	1.0	0.40 U	0.40 UJ	0.40 U	
FEW4-MW82-74	N	Chloromethane	2.0	0.80 U	0.80 UJ	0.80 U	
FEW4-MW82-74	N	cis-1,2-Dichloroethene	1.0	2.5	2.5 J	2.5	
FEW4-MW82-74	N	cis-1,3-Dichloropropene	1.0	0.40 U	0.40 UJ	0.40 U	
FEW4-MW82-74	N	Cyclohexane	2.0	0.80 U	0.80 UJ	0.80 U	
FEW4-MW82-74	N	Dibromochloromethane	1.0	0.40 U	0.40 UJ	0.40 U	
FEW4-MW82-74	N	Dichlorodifluoromethane	2.0	0.80 U	0.80 UJ	0.80 U	
FEW4-MW82-74	N	Ethylbenzene	1.0	0.40 U	0.40 UJ	0.40 U	
FEW4-MW82-74	N	Isopropylbenzene (Cumene)	1.0	0.40 U	0.40 UJ	0.40 U	

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW82-74	N	m,p-Xylene	2.0	0.80 U	0.80 UJ	0.80 U	
FEW4-MW82-74	N	Methyl acetate	5.0	4.0 U	4.0 UJ	4.0 U	
FEW4-MW82-74	N	Methyl tert-butyl ether (MTBE)	5.0	0.80 U	0.80 UJ	0.80 U	
FEW4-MW82-74	N	Methylcyclohexane	2.0	0.80 U	0.80 UJ	0.80 U	
FEW4-MW82-74	N	Methylene chloride	5.0	0.80 U	0.80 UJ	0.80 U	
FEW4-MW82-74	N	o-Xylene	1.0	0.40 U	0.40 UJ	0.40 U	
FEW4-MW82-74	N	Styrene	1.0	0.40 U	0.40 UJ	0.40 U	
FEW4-MW82-74	N	Tetrachloroethene (PCE)	1.0	0.40 U	0.40 UJ	0.40 U	
FEW4-MW82-74	N	Toluene	1.0	0.40 U	0.40 UJ	0.40 U	
FEW4-MW82-74	N	trans-1,2-Dichloroethene	1.0	0.40 U	0.40 UJ	0.40 U	
FEW4-MW82-74	N	trans-1,3-Dichloropropene	1.0	0.40 U	0.40 UJ	0.40 U	
FEW4-MW82-74	N	Trichloroethene (TCE)	20	510 D	510 J	510	
FEW4-MW82-74	N	Trichlorofluoromethane	2.0	0.80 U	0.80 UJ	0.80 U	
FEW4-MW82-74	N	Vinyl chloride	1.5	0.20 U	0.20 UJ	0.20 U	

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW75-(100.0)	N	1,1,1,2-Tetrachloroethane	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(100.0)	N	1,1,1-Trichloroethane	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(100.0)	N	1,1,2,2-Tetrachloroethane	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(100.0)	N	1,1,2-Trichloroethane	5.7	3.7 U	3.7 UJ	3.7 U	
FEW4-MW75-(100.0)	N	1,1-Dichloroethane	5.7	0.91 U	0.91 UJ	0.91 U	
FEW4-MW75-(100.0)	N	1,1-Dichloroethene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(100.0)	N	1,1-Dichloropropene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(100.0)	N	1,2,3-Trichlorobenzene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(100.0)	N	1,2,3-Trichloropropane	5.7	3.7 U	3.7 UJ	3.7 U	
FEW4-MW75-(100.0)	N	1,2,4-Trichlorobenzene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(100.0)	N	1,2,4-Trimethylbenzene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(100.0)	N	1,2-Dibromo-3-chloropropane	11	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(100.0)	N	1,2-Dibromoethane (EDB)	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(100.0)	N	1,2-Dichlorobenzene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(100.0)	N	1,2-Dichloroethane	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(100.0)	N	1,2-Dichloroethene	5.7	0.84 J	0.84 J	0.84 J	TR
FEW4-MW75-(100.0)	N	1,2-Dichloropropane	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(100.0)	N	1,3,5-Trimethylbenzene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(100.0)	N	1,3-Dichlorobenzene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(100.0)	N	1,3-Dichloropropane	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(100.0)	N	1,4-Dichlorobenzene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(100.0)	N	2,2-Dichloropropane	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(100.0)	N	2-Butanone (MEK)	23	7.3 U Q	7.3 UJ	7.3 U	
FEW4-MW75-(100.0)	N	2-Chlorotoluene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(100.0)	N	2-Hexanone	23	15 U Q	15 UJ	15 U	

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW75-(100.0)	N	4-Chlorotoluene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(100.0)	N	4-Methyl-2-pentanone (MIBK)	23	15 U	15 UJ	15 U	
FEW4-MW75-(100.0)	N	Acetone	23	22 J Q	22 J	22 J	TR/V2
FEW4-MW75-(100.0)	N	Benzene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(100.0)	N	Bromobenzene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(100.0)	N	Bromochloromethane	5.7	0.91 U	0.91 UJ	0.91 U	
FEW4-MW75-(100.0)	N	Bromodichloromethane	5.7	0.91 U	0.91 UJ	0.91 U	
FEW4-MW75-(100.0)	N	Bromoform	5.7	0.91 U	0.91 UJ	0.91 U	
FEW4-MW75-(100.0)	N	Bromomethane	11	1.8 U Q	1.8 UJ	1.8 U	
FEW4-MW75-(100.0)	N	Carbon disulfide	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(100.0)	N	Carbon tetrachloride	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(100.0)	N	Chlorobenzene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(100.0)	N	Chloroethane	11	3.7 U	3.7 UJ	3.7 U	
FEW4-MW75-(100.0)	N	Chloroform	11	0.91 U	0.91 UJ	0.91 U	
FEW4-MW75-(100.0)	N	Chloromethane	11	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(100.0)	N	cis-1,2-Dichloroethene	5.7	0.84 J	0.84 J	0.84 J	TR
FEW4-MW75-(100.0)	N	cis-1,3-Dichloropropene	5.7	3.7 U	3.7 UJ	3.7 U	
FEW4-MW75-(100.0)	N	Dibromochloromethane	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(100.0)	N	Dibromomethane	5.7	3.7 U	3.7 UJ	3.7 U	
FEW4-MW75-(100.0)	N	Dichlorodifluoromethane	11	1.8 U Q	1.8 UJ	1.8 U	
FEW4-MW75-(100.0)	N	Ethylbenzene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(100.0)	N	Hexachlorobutadiene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(100.0)	N	Isopropylbenzene (Cumene)	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(100.0)	N	m,p-Xylene	3.7	3.7 U	3.7 UJ	3.7 U	
FEW4-MW75-(100.0)	N	Methyl tert-butyl ether (MTBE)	23	0.91 U	0.91 UJ	0.91 U	
FEW4-MW75-(100.0)	N	Methylene chloride	5.7	3.7 U	3.7 UJ	3.7 U	
FEW4-MW75-(100.0)	N	Naphthalene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(100.0)	N	n-Butylbenzene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(100.0)	N	n-Propylbenzene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(100.0)	N	o-Xylene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(100.0)	N	p-Cymene (p-Isopropyltoluene)	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(100.0)	N	sec-Butylbenzene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(100.0)	N	Styrene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(100.0)	N	tert-Butylbenzene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(100.0)	N	Tetrachloroethene (PCE)	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(100.0)	N	Toluene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(100.0)	N	trans-1,2-Dichloroethene	5.7	0.91 U	0.91 UJ	0.91 U	
FEW4-MW75-(100.0)	N	trans-1,3-Dichloropropene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(100.0)	N	Trichloroethene (TCE)	2700	1200 J H D	1200 J	1200 J	TR/H1
FEW4-MW75-(100.0)	N	Trichlorofluoromethane	11	3.7 U	3.7 UJ	3.7 U	

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW75-(100.0)	N	Vinyl chloride	5.7	3.7 U	3.7 UJ	3.7 U	
FEW4-MW75-(110.0)	N	1,1,1,2-Tetrachloroethane	7.0	2.2 U	2.2 UJ	2.2 U	
FEW4-MW75-(110.0)	N	1,1,1-Trichloroethane	7.0	2.2 U	2.2 UJ	2.2 U	
FEW4-MW75-(110.0)	N	1,1,2,2-Tetrachloroethane	7.0	2.2 U	2.2 UJ	2.2 U	
FEW4-MW75-(110.0)	N	1,1,2-Trichloroethane	7.0	4.5 U	4.5 UJ	4.5 U	
FEW4-MW75-(110.0)	N	1,1-Dichloroethane	7.0	1.1 U	1.1 UJ	1.1 U	
FEW4-MW75-(110.0)	N	1,1-Dichloroethene	7.0	2.2 U	2.2 UJ	2.2 U	
FEW4-MW75-(110.0)	N	1,1-Dichloropropene	7.0	2.2 U	2.2 UJ	2.2 U	
FEW4-MW75-(110.0)	N	1,2,3-Trichlorobenzene	7.0	2.2 U	2.2 UJ	2.2 U	
FEW4-MW75-(110.0)	N	1,2,3-Trichloropropane	7.0	4.5 U	4.5 UJ	4.5 U	
FEW4-MW75-(110.0)	N	1,2,4-Trichlorobenzene	7.0	2.2 U	2.2 UJ	2.2 U	
FEW4-MW75-(110.0)	N	1,2,4-Trimethylbenzene	7.0	2.2 U	2.2 UJ	2.2 U	
FEW4-MW75-(110.0)	N	1,2-Dibromo-3-chloropropane	14	2.2 U	2.2 UJ	2.2 U	
FEW4-MW75-(110.0)	N	1,2-Dibromoethane (EDB)	7.0	2.2 U	2.2 UJ	2.2 U	
FEW4-MW75-(110.0)	N	1,2-Dichlorobenzene	7.0	2.2 U	2.2 UJ	2.2 U	
FEW4-MW75-(110.0)	N	1,2-Dichloroethane	7.0	2.2 U	2.2 UJ	2.2 U	
FEW4-MW75-(110.0)	N	1,2-Dichloroethene	7.0	0.98 J	0.98 J	0.98 J	TR
FEW4-MW75-(110.0)	N	1,2-Dichloropropane	7.0	2.2 U	2.2 UJ	2.2 U	
FEW4-MW75-(110.0)	N	1,3,5-Trimethylbenzene	7.0	2.2 U	2.2 UJ	2.2 U	
FEW4-MW75-(110.0)	N	1,3-Dichlorobenzene	7.0	2.2 U	2.2 UJ	2.2 U	
FEW4-MW75-(110.0)	N	1,3-Dichloropropane	7.0	2.2 U	2.2 UJ	2.2 U	
FEW4-MW75-(110.0)	N	1,4-Dichlorobenzene	7.0	2.2 U	2.2 UJ	2.2 U	
FEW4-MW75-(110.0)	N	2,2-Dichloropropane	7.0	2.2 U	2.2 UJ	2.2 U	
FEW4-MW75-(110.0)	N	2-Butanone (MEK)	28	8.9 U Q	8.9 UJ	8.9 U	
FEW4-MW75-(110.0)	N	2-Chlorotoluene	7.0	2.2 U	2.2 UJ	2.2 U	
FEW4-MW75-(110.0)	N	2-Hexanone	28	18 U Q	18 UJ	18 U	
FEW4-MW75-(110.0)	N	4-Chlorotoluene	7.0	2.2 U	2.2 UJ	2.2 U	
FEW4-MW75-(110.0)	N	4-Methyl-2-pentanone (MIBK)	28	18 U	18 UJ	18 U	
FEW4-MW75-(110.0)	N	Acetone	28	15 J Q	15 J	15 J	TR/V2
FEW4-MW75-(110.0)	N	Benzene	7.0	2.2 U	2.2 UJ	2.2 U	
FEW4-MW75-(110.0)	N	Bromobenzene	7.0	2.2 U	2.2 UJ	2.2 U	
FEW4-MW75-(110.0)	N	Bromochloromethane	7.0	1.1 U	1.1 UJ	1.1 U	
FEW4-MW75-(110.0)	N	Bromodichloromethane	7.0	1.1 U	1.1 UJ	1.1 U	
FEW4-MW75-(110.0)	N	Bromoform	7.0	1.1 U	1.1 UJ	1.1 U	
FEW4-MW75-(110.0)	N	Bromomethane	14	2.2 U Q	2.2 UJ	2.2 U	
FEW4-MW75-(110.0)	N	Carbon disulfide	7.0	2.2 U	2.2 UJ	2.2 U	
FEW4-MW75-(110.0)	N	Carbon tetrachloride	7.0	2.2 U	2.2 UJ	2.2 U	
FEW4-MW75-(110.0)	N	Chlorobenzene	7.0	2.2 U	2.2 UJ	2.2 U	
FEW4-MW75-(110.0)	N	Chloroethane	14	4.5 U	4.5 UJ	4.5 U	
FEW4-MW75-(110.0)	N	Chloroform	14	0.54 J	0.54 J	0.54 J	TR
FEW4-MW75-(110.0)	N	Chloromethane	14	2.2 U	2.2 UJ	2.2 U	

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW75-(110.0)	N	cis-1,2-Dichloroethene	7.0	0.98 J	0.98 J	0.98 J	TR
FEW4-MW75-(110.0)	N	cis-1,3-Dichloropropene	7.0	4.5 U	4.5 UJ	4.5 U	
FEW4-MW75-(110.0)	N	Dibromochloromethane	7.0	2.2 U	2.2 UJ	2.2 U	
FEW4-MW75-(110.0)	N	Dibromomethane	7.0	4.5 U	4.5 UJ	4.5 U	
FEW4-MW75-(110.0)	N	Dichlorodifluoromethane	14	2.2 U Q	2.2 UJ	2.2 U	
FEW4-MW75-(110.0)	N	Ethylbenzene	7.0	2.2 U	2.2 UJ	2.2 U	
FEW4-MW75-(110.0)	N	Hexachlorobutadiene	7.0	2.2 U	2.2 UJ	2.2 U	
FEW4-MW75-(110.0)	N	Isopropylbenzene (Cumene)	7.0	2.2 U	2.2 UJ	2.2 U	
FEW4-MW75-(110.0)	N	m,p-Xylene	4.5	4.5 U	4.5 UJ	4.5 U	
FEW4-MW75-(110.0)	N	Methyl tert-butyl ether (MTBE)	28	1.1 U	1.1 UJ	1.1 U	
FEW4-MW75-(110.0)	N	Methylene chloride	7.0	4.5 U	4.5 UJ	4.5 U	
FEW4-MW75-(110.0)	N	Naphthalene	7.0	2.2 U	2.2 UJ	2.2 U	
FEW4-MW75-(110.0)	N	n-Butylbenzene	7.0	2.2 U	2.2 UJ	2.2 U	
FEW4-MW75-(110.0)	N	n-Propylbenzene	7.0	2.2 U	2.2 UJ	2.2 U	
FEW4-MW75-(110.0)	N	o-Xylene	7.0	2.2 U	2.2 UJ	2.2 U	
FEW4-MW75-(110.0)	N	p-Cymene (p-Isopropyltoluene)	7.0	2.2 U	2.2 UJ	2.2 U	
FEW4-MW75-(110.0)	N	sec-Butylbenzene	7.0	2.2 U	2.2 UJ	2.2 U	
FEW4-MW75-(110.0)	N	Styrene	7.0	2.2 U	2.2 UJ	2.2 U	
FEW4-MW75-(110.0)	N	tert-Butylbenzene	7.0	2.2 U	2.2 UJ	2.2 U	
FEW4-MW75-(110.0)	N	Tetrachloroethene (PCE)	7.0	2.2 U	2.2 UJ	2.2 U	
FEW4-MW75-(110.0)	N	Toluene	7.0	2.2 U	2.2 UJ	2.2 U	
FEW4-MW75-(110.0)	N	trans-1,2-Dichloroethene	7.0	1.1 U	1.1 UJ	1.1 U	
FEW4-MW75-(110.0)	N	trans-1,3-Dichloropropene	7.0	2.2 U	2.2 UJ	2.2 U	
FEW4-MW75-(110.0)	N	Trichloroethene (TCE)	350	1500 H	1500 J	1500 J	H1/D3
FEW4-MW75-(110.0)	N	Trichlorofluoromethane	14	4.5 U	4.5 UJ	4.5 U	
FEW4-MW75-(110.0)	N	Vinyl chloride	7.0	4.5 U	4.5 UJ	4.5 U	
FEW4-MW75-(111.0)	FD	1,1,1,2-Tetrachloroethane	8.9	2.9 U	2.9 UJ	2.9 U	
FEW4-MW75-(111.0)	FD	1,1,1-Trichloroethane	8.9	2.9 U	2.9 UJ	2.9 U	
FEW4-MW75-(111.0)	FD	1,1,2,2-Tetrachloroethane	8.9	2.9 U	2.9 UJ	2.9 U	
FEW4-MW75-(111.0)	FD	1,1,2-Trichloroethane	8.9	5.7 U	5.7 UJ	5.7 U	
FEW4-MW75-(111.0)	FD	1,1-Dichloroethane	8.9	1.4 U	1.4 UJ	1.4 U	
FEW4-MW75-(111.0)	FD	1,1-Dichloroethene	8.9	2.9 U	2.9 UJ	2.9 U	
FEW4-MW75-(111.0)	FD	1,1-Dichloropropene	8.9	2.9 U	2.9 UJ	2.9 U	
FEW4-MW75-(111.0)	FD	1,2,3-Trichlorobenzene	8.9	2.9 U	2.9 UJ	2.9 U	
FEW4-MW75-(111.0)	FD	1,2,3-Trichloropropane	8.9	5.7 U	5.7 UJ	5.7 U	
FEW4-MW75-(111.0)	FD	1,2,4-Trichlorobenzene	8.9	2.9 U	2.9 UJ	2.9 U	
FEW4-MW75-(111.0)	FD	1,2,4-Trimethylbenzene	8.9	2.9 U	2.9 UJ	2.9 U	
FEW4-MW75-(111.0)	FD	1,2-Dibromo-3-chloropropane	18	2.9 U	2.9 UJ	2.9 U	
FEW4-MW75-(111.0)	FD	1,2-Dibromoethane (EDB)	8.9	2.9 U	2.9 UJ	2.9 U	
FEW4-MW75-(111.0)	FD	1,2-Dichlorobenzene	8.9	2.9 U	2.9 UJ	2.9 U	

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW75-(111.0)	FD	1,2-Dichloroethane	8.9	2.9 U	2.9 UJ	2.9 U	
FEW4-MW75-(111.0)	FD	1,2-Dichloroethene	8.9	1.4 J	1.4 J	1.4 J	TR
FEW4-MW75-(111.0)	FD	1,2-Dichloropropane	8.9	2.9 U	2.9 UJ	2.9 U	
FEW4-MW75-(111.0)	FD	1,3,5-Trimethylbenzene	8.9	2.9 U	2.9 UJ	2.9 U	
FEW4-MW75-(111.0)	FD	1,3-Dichlorobenzene	8.9	2.9 U	2.9 UJ	2.9 U	
FEW4-MW75-(111.0)	FD	1,3-Dichloropropane	8.9	2.9 U	2.9 UJ	2.9 U	
FEW4-MW75-(111.0)	FD	1,4-Dichlorobenzene	8.9	2.9 U	2.9 UJ	2.9 U	
FEW4-MW75-(111.0)	FD	2,2-Dichloropropane	8.9	2.9 U	2.9 UJ	2.9 U	
FEW4-MW75-(111.0)	FD	2-Butanone (MEK)	36	11 U Q	11 UJ	11 U	
FEW4-MW75-(111.0)	FD	2-Chlorotoluene	8.9	2.9 U	2.9 UJ	2.9 U	
FEW4-MW75-(111.0)	FD	2-Hexanone	36	23 U Q	23 UJ	23 U	
FEW4-MW75-(111.0)	FD	4-Chlorotoluene	8.9	2.9 U	2.9 UJ	2.9 U	
FEW4-MW75-(111.0)	FD	4-Methyl-2-pentanone (MIBK)	36	23 U	23 UJ	23 U	
FEW4-MW75-(111.0)	FD	Acetone	36	50 Q	50 J	50 J	V2
FEW4-MW75-(111.0)	FD	Benzene	8.9	2.9 U	2.9 UJ	2.9 U	
FEW4-MW75-(111.0)	FD	Bromobenzene	8.9	2.9 U	2.9 UJ	2.9 U	
FEW4-MW75-(111.0)	FD	Bromochloromethane	8.9	1.4 U	1.4 UJ	1.4 U	
FEW4-MW75-(111.0)	FD	Bromodichloromethane	8.9	1.4 U	1.4 UJ	1.4 U	
FEW4-MW75-(111.0)	FD	Bromoform	8.9	1.4 U	1.4 UJ	1.4 U	
FEW4-MW75-(111.0)	FD	Bromomethane	18	2.9 U Q	2.9 UJ	2.9 U	
FEW4-MW75-(111.0)	FD	Carbon disulfide	8.9	2.9 U	2.9 UJ	2.9 U	
FEW4-MW75-(111.0)	FD	Carbon tetrachloride	8.9	2.9 U	2.9 UJ	2.9 U	
FEW4-MW75-(111.0)	FD	Chlorobenzene	8.9	2.9 U	2.9 UJ	2.9 U	
FEW4-MW75-(111.0)	FD	Chloroethane	18	5.7 U	5.7 UJ	5.7 U	
FEW4-MW75-(111.0)	FD	Chloroform	18	0.65 J	0.65 J	0.65 J	TR
FEW4-MW75-(111.0)	FD	Chloromethane	18	2.9 U	2.9 UJ	2.9 U	
FEW4-MW75-(111.0)	FD	cis-1,2-Dichloroethene	8.9	1.4 J	1.4 J	1.4 J	TR
FEW4-MW75-(111.0)	FD	cis-1,3-Dichloropropene	8.9	5.7 U	5.7 UJ	5.7 U	
FEW4-MW75-(111.0)	FD	Dibromochloromethane	8.9	2.9 U	2.9 UJ	2.9 U	
FEW4-MW75-(111.0)	FD	Dibromomethane	8.9	5.7 U	5.7 UJ	5.7 U	
FEW4-MW75-(111.0)	FD	Dichlorodifluoromethane	18	2.9 U Q	2.9 UJ	2.9 U	
FEW4-MW75-(111.0)	FD	Ethylbenzene	8.9	2.9 U	2.9 UJ	2.9 U	
FEW4-MW75-(111.0)	FD	Hexachlorobutadiene	8.9	2.9 U	2.9 UJ	2.9 U	
FEW4-MW75-(111.0)	FD	Isopropylbenzene (Cumene)	8.9	2.9 U	2.9 UJ	2.9 U	
FEW4-MW75-(111.0)	FD	m,p-Xylene	5.7	5.7 U	5.7 UJ	5.7 U	
FEW4-MW75-(111.0)	FD	Methyl tert-butyl ether (MTBE)	36	1.4 U	1.4 UJ	1.4 U	
FEW4-MW75-(111.0)	FD	Methylene chloride	8.9	5.7 U	5.7 UJ	5.7 U	
FEW4-MW75-(111.0)	FD	Naphthalene	8.9	2.9 U	2.9 UJ	2.9 U	
FEW4-MW75-(111.0)	FD	n-Butylbenzene	8.9	2.9 U	2.9 UJ	2.9 U	
FEW4-MW75-(111.0)	FD	n-Propylbenzene	8.9	2.9 U	2.9 UJ	2.9 U	
FEW4-MW75-(111.0)	FD	o-Xylene	8.9	2.9 U	2.9 UJ	2.9 U	

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW75-(111.0)	FD	p-Cymene (p-Isopropyltoluene)	8.9	2.9 U	2.9 UJ	2.9 U	
FEW4-MW75-(111.0)	FD	sec-Butylbenzene	8.9	2.9 U	2.9 UJ	2.9 U	
FEW4-MW75-(111.0)	FD	Styrene	8.9	2.9 U	2.9 UJ	2.9 U	
FEW4-MW75-(111.0)	FD	tert-Butylbenzene	8.9	2.9 U	2.9 UJ	2.9 U	
FEW4-MW75-(111.0)	FD	Tetrachloroethene (PCE)	8.9	2.9 U	2.9 UJ	2.9 U	
FEW4-MW75-(111.0)	FD	Toluene	8.9	2.9 U	2.9 UJ	2.9 U	
FEW4-MW75-(111.0)	FD	trans-1,2-Dichloroethene	8.9	1.4 U	1.4 UJ	1.4 U	
FEW4-MW75-(111.0)	FD	trans-1,3-Dichloropropene	8.9	2.9 U	2.9 UJ	2.9 U	
FEW4-MW75-(111.0)	FD	Trichloroethene (TCE)	310	1100 H	1100 J	1100 J	H1/D3
FEW4-MW75-(111.0)	FD	Trichlorofluoromethane	18	5.7 U	5.7 UJ	5.7 U	
FEW4-MW75-(111.0)	FD	Vinyl chloride	8.9	5.7 U	5.7 UJ	5.7 U	
FEW4-MW75-(80.0)	N	1,1,1,2-Tetrachloroethane	5.1	1.6 U	1.6 UJ	1.6 U	
FEW4-MW75-(80.0)	N	1,1,1-Trichloroethane	5.1	1.6 U	1.6 UJ	1.6 U	
FEW4-MW75-(80.0)	N	1,1,2,2-Tetrachloroethane	5.1	1.6 U	1.6 UJ	1.6 U	
FEW4-MW75-(80.0)	N	1,1,2-Trichloroethane	5.1	3.2 U	3.2 UJ	3.2 U	
FEW4-MW75-(80.0)	N	1,1-Dichloroethane	5.1	0.81 U	0.81 UJ	0.81 U	
FEW4-MW75-(80.0)	N	1,1-Dichloroethene	5.1	1.6 U	1.6 UJ	1.6 U	
FEW4-MW75-(80.0)	N	1,1-Dichloropropene	5.1	1.6 U	1.6 UJ	1.6 U	
FEW4-MW75-(80.0)	N	1,2,3-Trichlorobenzene	5.1	1.6 U	1.6 UJ	1.6 U	
FEW4-MW75-(80.0)	N	1,2,3-Trichloropropane	5.1	3.2 U	3.2 UJ	3.2 U	
FEW4-MW75-(80.0)	N	1,2,4-Trichlorobenzene	5.1	1.6 U	1.6 UJ	1.6 U	
FEW4-MW75-(80.0)	N	1,2,4-Trimethylbenzene	5.1	1.6 U	1.6 UJ	1.6 U	
FEW4-MW75-(80.0)	N	1,2-Dibromo-3-chloropropane	10	1.6 U	1.6 UJ	1.6 U	
FEW4-MW75-(80.0)	N	1,2-Dibromoethane (EDB)	5.1	1.6 U	1.6 UJ	1.6 U	
FEW4-MW75-(80.0)	N	1,2-Dichlorobenzene	5.1	1.6 U	1.6 UJ	1.6 U	
FEW4-MW75-(80.0)	N	1,2-Dichloroethane	5.1	1.6 U	1.6 UJ	1.6 U	
FEW4-MW75-(80.0)	N	1,2-Dichloroethene	5.1	1.6 U	1.6 UJ	1.6 U	
FEW4-MW75-(80.0)	N	1,2-Dichloropropane	5.1	1.6 U	1.6 UJ	1.6 U	
FEW4-MW75-(80.0)	N	1,3,5-Trimethylbenzene	5.1	1.6 U	1.6 UJ	1.6 U	
FEW4-MW75-(80.0)	N	1,3-Dichlorobenzene	5.1	1.6 U	1.6 UJ	1.6 U	
FEW4-MW75-(80.0)	N	1,3-Dichloropropane	5.1	1.6 U	1.6 UJ	1.6 U	
FEW4-MW75-(80.0)	N	1,4-Dichlorobenzene	5.1	1.6 U	1.6 UJ	1.6 U	
FEW4-MW75-(80.0)	N	2,2-Dichloropropane	5.1	1.6 U	1.6 UJ	1.6 U	
FEW4-MW75-(80.0)	N	2-Butanone (MEK)	20	6.5 U Q	6.5 UJ	6.5 U	
FEW4-MW75-(80.0)	N	2-Chlorotoluene	5.1	1.6 U	1.6 UJ	1.6 U	
FEW4-MW75-(80.0)	N	2-Hexanone	20	13 U Q	13 UJ	13 U	
FEW4-MW75-(80.0)	N	4-Chlorotoluene	5.1	1.6 U	1.6 UJ	1.6 U	
FEW4-MW75-(80.0)	N	4-Methyl-2-pentanone (MIBK)	20	13 U	13 UJ	13 U	
FEW4-MW75-(80.0)	N	Acetone	20	29 Q	29 J	29 J	V2
FEW4-MW75-(80.0)	N	Benzene	5.1	1.6 U	1.6 UJ	1.6 U	
FEW4-MW75-(80.0)	N	Bromobenzene	5.1	1.6 U	1.6 UJ	1.6 U	

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW75-(80.0)	N	Bromochloromethane	5.1	0.81 U	0.81 UJ	0.81 U	
FEW4-MW75-(80.0)	N	Bromodichloromethane	5.1	0.81 U	0.81 UJ	0.81 U	
FEW4-MW75-(80.0)	N	Bromoform	5.1	0.81 U	0.81 UJ	0.81 U	
FEW4-MW75-(80.0)	N	Bromomethane	10	1.6 U Q	1.6 UJ	1.6 U	
FEW4-MW75-(80.0)	N	Carbon disulfide	5.1	1.6 U	1.6 UJ	1.6 U	
FEW4-MW75-(80.0)	N	Carbon tetrachloride	5.1	1.6 U	1.6 UJ	1.6 U	
FEW4-MW75-(80.0)	N	Chlorobenzene	5.1	1.6 U	1.6 UJ	1.6 U	
FEW4-MW75-(80.0)	N	Chloroethane	10	3.2 U	3.2 UJ	3.2 U	
FEW4-MW75-(80.0)	N	Chloroform	10	0.81 U	0.81 UJ	0.81 U	
FEW4-MW75-(80.0)	N	Chloromethane	10	1.6 U	1.6 UJ	1.6 U	
FEW4-MW75-(80.0)	N	cis-1,2-Dichloroethene	5.1	1.6 U	1.6 UJ	1.6 U	
FEW4-MW75-(80.0)	N	cis-1,3-Dichloropropene	5.1	3.2 U	3.2 UJ	3.2 U	
FEW4-MW75-(80.0)	N	Dibromochloromethane	5.1	1.6 U	1.6 UJ	1.6 U	
FEW4-MW75-(80.0)	N	Dibromomethane	5.1	3.2 U	3.2 UJ	3.2 U	
FEW4-MW75-(80.0)	N	Dichlorodifluoromethane	10	1.6 U Q	1.6 UJ	1.6 U	
FEW4-MW75-(80.0)	N	Ethylbenzene	5.1	1.6 U	1.6 UJ	1.6 U	
FEW4-MW75-(80.0)	N	Hexachlorobutadiene	5.1	1.6 U	1.6 UJ	1.6 U	
FEW4-MW75-(80.0)	N	Isopropylbenzene (Cumene)	5.1	1.6 U	1.6 UJ	1.6 U	
FEW4-MW75-(80.0)	N	m,p-Xylene	3.2	3.2 U	3.2 UJ	3.2 U	
FEW4-MW75-(80.0)	N	Methyl tert-butyl ether (MTBE)	20	0.81 U	0.81 UJ	0.81 U	
FEW4-MW75-(80.0)	N	Methylene chloride	5.1	3.2 U	3.2 UJ	3.2 U	
FEW4-MW75-(80.0)	N	Naphthalene	5.1	1.6 U	1.6 UJ	1.6 U	
FEW4-MW75-(80.0)	N	n-Butylbenzene	5.1	1.6 U	1.6 UJ	1.6 U	
FEW4-MW75-(80.0)	N	n-Propylbenzene	5.1	1.6 U	1.6 UJ	1.6 U	
FEW4-MW75-(80.0)	N	o-Xylene	5.1	1.6 U	1.6 UJ	1.6 U	
FEW4-MW75-(80.0)	N	p-Cymene (p-Isopropyltoluene)	5.1	1.6 U	1.6 UJ	1.6 U	
FEW4-MW75-(80.0)	N	sec-Butylbenzene	5.1	1.6 U	1.6 UJ	1.6 U	
FEW4-MW75-(80.0)	N	Styrene	5.1	1.6 U	1.6 UJ	1.6 U	
FEW4-MW75-(80.0)	N	tert-Butylbenzene	5.1	1.6 U	1.6 UJ	1.6 U	
FEW4-MW75-(80.0)	N	Tetrachloroethene (PCE)	5.1	1.6 U	1.6 UJ	1.6 U	
FEW4-MW75-(80.0)	N	Toluene	5.1	1.6 U	1.6 UJ	1.6 U	
FEW4-MW75-(80.0)	N	trans-1,2-Dichloroethene	5.1	0.81 U	0.81 UJ	0.81 U	
FEW4-MW75-(80.0)	N	trans-1,3-Dichloropropene	5.1	1.6 U	1.6 UJ	1.6 U	
FEW4-MW75-(80.0)	N	Trichloroethene (TCE)	5.1	2.2 J	2.2 J	2.2 J	TR
FEW4-MW75-(80.0)	N	Trichlorofluoromethane	10	3.2 U	3.2 UJ	3.2 U	
FEW4-MW75-(80.0)	N	Vinyl chloride	5.1	3.2 U	3.2 UJ	3.2 U	
FEW4-MW75-(90.0)	N	1,1,1,2-Tetrachloroethane	7.2	2.3 U	2.3 UJ	2.3 U	
FEW4-MW75-(90.0)	N	1,1,1-Trichloroethane	7.2	2.3 U	2.3 UJ	2.3 U	
FEW4-MW75-(90.0)	N	1,1,2,2-Tetrachloroethane	7.2	2.3 U	2.3 UJ	2.3 U	
FEW4-MW75-(90.0)	N	1,1,2-Trichloroethane	7.2	4.6 U	4.6 UJ	4.6 U	
FEW4-MW75-(90.0)	N	1,1-Dichloroethane	7.2	1.1 U	1.1 UJ	1.1 U	

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW75-(90.0)	N	1,1-Dichloroethene	7.2	2.3 U	2.3 UJ	2.3 U	
FEW4-MW75-(90.0)	N	1,1-Dichloropropene	7.2	2.3 U	2.3 UJ	2.3 U	
FEW4-MW75-(90.0)	N	1,2,3-Trichlorobenzene	7.2	2.3 U	2.3 UJ	2.3 U	
FEW4-MW75-(90.0)	N	1,2,3-Trichloropropane	7.2	4.6 U	4.6 UJ	4.6 U	
FEW4-MW75-(90.0)	N	1,2,4-Trichlorobenzene	7.2	2.3 U	2.3 UJ	2.3 U	
FEW4-MW75-(90.0)	N	1,2,4-Trimethylbenzene	7.2	2.3 U	2.3 UJ	2.3 U	
FEW4-MW75-(90.0)	N	1,2-Dibromo-3-chloropropane	14	2.3 U	2.3 UJ	2.3 U	
FEW4-MW75-(90.0)	N	1,2-Dibromoethane (EDB)	7.2	2.3 U	2.3 UJ	2.3 U	
FEW4-MW75-(90.0)	N	1,2-Dichlorobenzene	7.2	2.3 U	2.3 UJ	2.3 U	
FEW4-MW75-(90.0)	N	1,2-Dichloroethane	7.2	2.3 U	2.3 UJ	2.3 U	
FEW4-MW75-(90.0)	N	1,2-Dichloroethene	7.2	4.7 J	4.7 J	4.7 J	TR
FEW4-MW75-(90.0)	N	1,2-Dichloropropane	7.2	2.3 U	2.3 UJ	2.3 U	
FEW4-MW75-(90.0)	N	1,3,5-Trimethylbenzene	7.2	2.3 U	2.3 UJ	2.3 U	
FEW4-MW75-(90.0)	N	1,3-Dichlorobenzene	7.2	2.3 U	2.3 UJ	2.3 U	
FEW4-MW75-(90.0)	N	1,3-Dichloropropane	7.2	2.3 U	2.3 UJ	2.3 U	
FEW4-MW75-(90.0)	N	1,4-Dichlorobenzene	7.2	2.3 U	2.3 UJ	2.3 U	
FEW4-MW75-(90.0)	N	2,2-Dichloropropane	7.2	2.3 U	2.3 UJ	2.3 U	
FEW4-MW75-(90.0)	N	2-Butanone (MEK)	29	9.2 U Q	9.2 UJ	9.2 U	
FEW4-MW75-(90.0)	N	2-Chlorotoluene	7.2	2.3 U	2.3 UJ	2.3 U	
FEW4-MW75-(90.0)	N	2-Hexanone	29	18 U Q	18 UJ	18 U	
FEW4-MW75-(90.0)	N	4-Chlorotoluene	7.2	2.3 U	2.3 UJ	2.3 U	
FEW4-MW75-(90.0)	N	4-Methyl-2-pentanone (MIBK)	29	18 U	18 UJ	18 U	
FEW4-MW75-(90.0)	N	Acetone	29	21 J Q	21 J	21 J	TR/V2
FEW4-MW75-(90.0)	N	Benzene	7.2	2.3 U	2.3 UJ	2.3 U	
FEW4-MW75-(90.0)	N	Bromobenzene	7.2	2.3 U	2.3 UJ	2.3 U	
FEW4-MW75-(90.0)	N	Bromochloromethane	7.2	1.1 U	1.1 UJ	1.1 U	
FEW4-MW75-(90.0)	N	Bromodichloromethane	7.2	1.1 U	1.1 UJ	1.1 U	
FEW4-MW75-(90.0)	N	Bromoform	7.2	1.1 U	1.1 UJ	1.1 U	
FEW4-MW75-(90.0)	N	Bromomethane	14	2.3 U Q	2.3 UJ	2.3 U	
FEW4-MW75-(90.0)	N	Carbon disulfide	7.2	2.3 U	2.3 UJ	2.3 U	
FEW4-MW75-(90.0)	N	Carbon tetrachloride	7.2	2.3 U	2.3 UJ	2.3 U	
FEW4-MW75-(90.0)	N	Chlorobenzene	7.2	2.3 U	2.3 UJ	2.3 U	
FEW4-MW75-(90.0)	N	Chloroethane	14	4.6 U	4.6 UJ	4.6 U	
FEW4-MW75-(90.0)	N	Chloroform	14	0.43 J	0.43 J	0.43 J	TR
FEW4-MW75-(90.0)	N	Chloromethane	14	2.3 U	2.3 UJ	2.3 U	
FEW4-MW75-(90.0)	N	cis-1,2-Dichloroethene	7.2	4.7 J	4.7 J	4.7 J	TR
FEW4-MW75-(90.0)	N	cis-1,3-Dichloropropene	7.2	4.6 U	4.6 UJ	4.6 U	
FEW4-MW75-(90.0)	N	Dibromochloromethane	7.2	2.3 U	2.3 UJ	2.3 U	
FEW4-MW75-(90.0)	N	Dibromomethane	7.2	4.6 U	4.6 UJ	4.6 U	
FEW4-MW75-(90.0)	N	Dichlorodifluoromethane	14	2.3 U Q	2.3 UJ	2.3 U	
FEW4-MW75-(90.0)	N	Ethylbenzene	7.2	2.3 U	2.3 UJ	2.3 U	

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW75-(90.0)	N	Hexachlorobutadiene	7.2	2.3 U	2.3 UJ	2.3 U	
FEW4-MW75-(90.0)	N	Isopropylbenzene (Cumene)	7.2	2.3 U	2.3 UJ	2.3 U	
FEW4-MW75-(90.0)	N	m,p-Xylene	4.6	4.6 U	4.6 UJ	4.6 U	
FEW4-MW75-(90.0)	N	Methyl tert-butyl ether (MTBE)	29	1.1 U	1.1 UJ	1.1 U	
FEW4-MW75-(90.0)	N	Methylene chloride	7.2	4.6 U	4.6 UJ	4.6 U	
FEW4-MW75-(90.0)	N	Naphthalene	7.2	2.3 U	2.3 UJ	2.3 U	
FEW4-MW75-(90.0)	N	n-Butylbenzene	7.2	2.3 U	2.3 UJ	2.3 U	
FEW4-MW75-(90.0)	N	n-Propylbenzene	7.2	2.3 U	2.3 UJ	2.3 U	
FEW4-MW75-(90.0)	N	o-Xylene	7.2	2.3 U	2.3 UJ	2.3 U	
FEW4-MW75-(90.0)	N	p-Cymene (p-Isopropyltoluene)	7.2	2.3 U	2.3 UJ	2.3 U	
FEW4-MW75-(90.0)	N	sec-Butylbenzene	7.2	2.3 U	2.3 UJ	2.3 U	
FEW4-MW75-(90.0)	N	Styrene	7.2	2.3 U	2.3 UJ	2.3 U	
FEW4-MW75-(90.0)	N	tert-Butylbenzene	7.2	2.3 U	2.3 UJ	2.3 U	
FEW4-MW75-(90.0)	N	Tetrachloroethene (PCE)	7.2	2.3 U	2.3 UJ	2.3 U	
FEW4-MW75-(90.0)	N	Toluene	7.2	2.3 U	2.3 UJ	2.3 U	
FEW4-MW75-(90.0)	N	trans-1,2-Dichloroethene	7.2	1.1 U	1.1 UJ	1.1 U	
FEW4-MW75-(90.0)	N	trans-1,3-Dichloropropene	7.2	2.3 U	2.3 UJ	2.3 U	
FEW4-MW75-(90.0)	N	Trichlorofluoromethane	14	4.6 U	4.6 UJ	4.6 U	
FEW4-MW75-(90.0)	N	Vinyl chloride	7.2	4.6 U	4.6 UJ	4.6 U	
FEW4-MW82-(195.0)	N	1,1,1,2-Tetrachloroethane	6.4	2.0 U	2.0 UJ	2.0 U	
FEW4-MW82-(195.0)	N	1,1,1-Trichloroethane	6.4	2.0 U	2.0 UJ	2.0 U	
FEW4-MW82-(195.0)	N	1,1,2,2-Tetrachloroethane	6.4	2.0 U	2.0 UJ	2.0 U	
FEW4-MW82-(195.0)	N	1,1,2-Trichloroethane	6.4	4.1 U	4.1 UJ	4.1 U	
FEW4-MW82-(195.0)	N	1,1-Dichloroethane	6.4	1.0 U	1.0 UJ	1.0 U	
FEW4-MW82-(195.0)	N	1,1-Dichloroethene	6.4	2.0 U	2.0 UJ	2.0 U	
FEW4-MW82-(195.0)	N	1,1-Dichloropropene	6.4	2.0 U	2.0 UJ	2.0 U	
FEW4-MW82-(195.0)	N	1,2,3-Trichlorobenzene	6.4	2.0 U	2.0 UJ	2.0 U	
FEW4-MW82-(195.0)	N	1,2,3-Trichloropropane	6.4	4.1 U	4.1 UJ	4.1 U	
FEW4-MW82-(195.0)	N	1,2,4-Trichlorobenzene	6.4	2.0 U	2.0 UJ	2.0 U	
FEW4-MW82-(195.0)	N	1,2,4-Trimethylbenzene	6.4	2.0 U	2.0 UJ	2.0 U	
FEW4-MW82-(195.0)	N	1,2-Dibromo-3-chloropropane	13	2.0 U	2.0 UJ	2.0 U	
FEW4-MW82-(195.0)	N	1,2-Dibromoethane (EDB)	6.4	2.0 U	2.0 UJ	2.0 U	
FEW4-MW82-(195.0)	N	1,2-Dichlorobenzene	6.4	2.0 U	2.0 UJ	2.0 U	
FEW4-MW82-(195.0)	N	1,2-Dichloroethane	6.4	2.0 U	2.0 UJ	2.0 U	
FEW4-MW82-(195.0)	N	1,2-Dichloroethene	6.4	2.0 U	2.0 UJ	2.0 U	
FEW4-MW82-(195.0)	N	1,2-Dichloropropane	6.4	2.0 U	2.0 UJ	2.0 U	
FEW4-MW82-(195.0)	N	1,3,5-Trimethylbenzene	6.4	2.0 U	2.0 UJ	2.0 U	
FEW4-MW82-(195.0)	N	1,3-Dichlorobenzene	6.4	2.0 U	2.0 UJ	2.0 U	
FEW4-MW82-(195.0)	N	1,3-Dichloropropane	6.4	2.0 U	2.0 UJ	2.0 U	
FEW4-MW82-(195.0)	N	1,4-Dichlorobenzene	6.4	2.0 U	2.0 UJ	2.0 U	

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW82-(195.0)	N	2,2-Dichloropropane	6.4	2.0 U	2.0 UJ	2.0 U	
FEW4-MW82-(195.0)	N	2-Butanone (MEK)	25	8.1 U Q	8.1 UJ	8.1 U	
FEW4-MW82-(195.0)	N	2-Chlorotoluene	6.4	2.0 U	2.0 UJ	2.0 U	
FEW4-MW82-(195.0)	N	2-Hexanone	25	16 U Q	16 UJ	16 U	
FEW4-MW82-(195.0)	N	4-Chlorotoluene	6.4	2.0 U	2.0 UJ	2.0 U	
FEW4-MW82-(195.0)	N	4-Methyl-2-pentanone (MIBK)	25	16 U	16 UJ	16 U	
FEW4-MW82-(195.0)	N	Acetone	25	31 Q	31 J	31 J	V2
FEW4-MW82-(195.0)	N	Benzene	6.4	2.0 U	2.0 UJ	2.0 U	
FEW4-MW82-(195.0)	N	Bromobenzene	6.4	2.0 U	2.0 UJ	2.0 U	
FEW4-MW82-(195.0)	N	Bromochloromethane	6.4	1.0 U	1.0 UJ	1.0 U	
FEW4-MW82-(195.0)	N	Bromodichloromethane	6.4	1.0 U	1.0 UJ	1.0 U	
FEW4-MW82-(195.0)	N	Bromoform	6.4	1.0 U	1.0 UJ	1.0 U	
FEW4-MW82-(195.0)	N	Bromomethane	13	2.0 U Q	2.0 UJ	2.0 U	
FEW4-MW82-(195.0)	N	Carbon disulfide	6.4	2.0 U	2.0 UJ	2.0 U	
FEW4-MW82-(195.0)	N	Carbon tetrachloride	6.4	2.0 U	2.0 UJ	2.0 U	
FEW4-MW82-(195.0)	N	Chlorobenzene	6.4	2.0 U	2.0 UJ	2.0 U	
FEW4-MW82-(195.0)	N	Chloroethane	13	4.1 U	4.1 UJ	4.1 U	
FEW4-MW82-(195.0)	N	Chloroform	13	1.0 U	1.0 UJ	1.0 U	
FEW4-MW82-(195.0)	N	Chloromethane	13	2.0 U	2.0 UJ	2.0 U	
FEW4-MW82-(195.0)	N	cis-1,2-Dichloroethene	6.4	2.0 U	2.0 UJ	2.0 U	
FEW4-MW82-(195.0)	N	cis-1,3-Dichloropropene	6.4	4.1 U	4.1 UJ	4.1 U	
FEW4-MW82-(195.0)	N	Dibromochloromethane	6.4	2.0 U	2.0 UJ	2.0 U	
FEW4-MW82-(195.0)	N	Dibromomethane	6.4	4.1 U	4.1 UJ	4.1 U	
FEW4-MW82-(195.0)	N	Dichlorodifluoromethane	13	2.0 U Q	2.0 UJ	2.0 U	
FEW4-MW82-(195.0)	N	Ethylbenzene	6.4	2.0 U	2.0 UJ	2.0 U	
FEW4-MW82-(195.0)	N	Hexachlorobutadiene	6.4	2.0 U	2.0 UJ	2.0 U	
FEW4-MW82-(195.0)	N	Isopropylbenzene (Cumene)	6.4	2.0 U	2.0 UJ	2.0 U	
FEW4-MW82-(195.0)	N	m,p-Xylene	4.1	4.1 U	4.1 UJ	4.1 U	
FEW4-MW82-(195.0)	N	Methyl tert-butyl ether (MTBE)	25	1.0 U	1.0 UJ	1.0 U	
FEW4-MW82-(195.0)	N	Methylene chloride	6.4	4.1 U	4.1 UJ	4.1 U	
FEW4-MW82-(195.0)	N	Naphthalene	6.4	2.0 U	2.0 UJ	2.0 U	
FEW4-MW82-(195.0)	N	n-Butylbenzene	6.4	2.0 U	2.0 UJ	2.0 U	
FEW4-MW82-(195.0)	N	n-Propylbenzene	6.4	2.0 U	2.0 UJ	2.0 U	
FEW4-MW82-(195.0)	N	o-Xylene	6.4	2.0 U	2.0 UJ	2.0 U	
FEW4-MW82-(195.0)	N	p-Cymene (p-Isopropyltoluene)	6.4	2.0 U	2.0 UJ	2.0 U	
FEW4-MW82-(195.0)	N	sec-Butylbenzene	6.4	2.0 U	2.0 UJ	2.0 U	
FEW4-MW82-(195.0)	N	Styrene	6.4	2.0 U	2.0 UJ	2.0 U	
FEW4-MW82-(195.0)	N	tert-Butylbenzene	6.4	2.0 U	2.0 UJ	2.0 U	
FEW4-MW82-(195.0)	N	Tetrachloroethene (PCE)	6.4	2.0 U	2.0 UJ	2.0 U	
FEW4-MW82-(195.0)	N	Toluene	6.4	2.0 U	2.0 UJ	2.0 U	

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW82-(195.0)	N	trans-1,2-Dichloroethene	6.4	1.0 U	1.0 UJ	1.0 U	
FEW4-MW82-(195.0)	N	trans-1,3-Dichloropropene	6.4	2.0 U	2.0 UJ	2.0 U	
FEW4-MW82-(195.0)	N	Trichloroethene (TCE)	6.4	1.0 U	1.0 UJ	1.0 U	
FEW4-MW82-(195.0)	N	Trichlorofluoromethane	13	4.1 U	4.1 UJ	4.1 U	
FEW4-MW82-(195.0)	N	Vinyl chloride	6.4	4.1 U	4.1 UJ	4.1 U	
FEW4-MW82-(206.0)	N	1,1,1,2-Tetrachloroethane	7.6	2.4 U	2.4 UJ	2.4 U	
FEW4-MW82-(206.0)	N	1,1,1-Trichloroethane	7.6	2.4 U	2.4 UJ	2.4 U	
FEW4-MW82-(206.0)	N	1,1,2,2-Tetrachloroethane	7.6	2.4 U	2.4 UJ	2.4 U	
FEW4-MW82-(206.0)	N	1,1,2-Trichloroethane	7.6	4.9 U	4.9 UJ	4.9 U	
FEW4-MW82-(206.0)	N	1,1-Dichloroethane	7.6	1.2 U	1.2 UJ	1.2 U	
FEW4-MW82-(206.0)	N	1,1-Dichloroethene	7.6	2.4 U	2.4 UJ	2.4 U	
FEW4-MW82-(206.0)	N	1,1-Dichloropropene	7.6	2.4 U	2.4 UJ	2.4 U	
FEW4-MW82-(206.0)	N	1,2,3-Trichlorobenzene	7.6	2.4 U	2.4 UJ	2.4 U	
FEW4-MW82-(206.0)	N	1,2,3-Trichloropropane	7.6	4.9 U	4.9 UJ	4.9 U	
FEW4-MW82-(206.0)	N	1,2,4-Trichlorobenzene	7.6	2.4 U	2.4 UJ	2.4 U	
FEW4-MW82-(206.0)	N	1,2,4-Trimethylbenzene	7.6	2.4 U	2.4 UJ	2.4 U	
FEW4-MW82-(206.0)	N	1,2-Dibromo-3-chloropropane	15	2.4 U	2.4 UJ	2.4 U	
FEW4-MW82-(206.0)	N	1,2-Dibromoethane (EDB)	7.6	2.4 U	2.4 UJ	2.4 U	
FEW4-MW82-(206.0)	N	1,2-Dichlorobenzene	7.6	2.4 U	2.4 UJ	2.4 U	
FEW4-MW82-(206.0)	N	1,2-Dichloroethane	7.6	2.4 U	2.4 UJ	2.4 U	
FEW4-MW82-(206.0)	N	1,2-Dichloroethene	7.6	2.4 U	2.4 UJ	2.4 U	
FEW4-MW82-(206.0)	N	1,2-Dichloropropane	7.6	2.4 U	2.4 UJ	2.4 U	
FEW4-MW82-(206.0)	N	1,3,5-Trimethylbenzene	7.6	2.4 U	2.4 UJ	2.4 U	
FEW4-MW82-(206.0)	N	1,3-Dichlorobenzene	7.6	2.4 U	2.4 UJ	2.4 U	
FEW4-MW82-(206.0)	N	1,3-Dichloropropane	7.6	2.4 U	2.4 UJ	2.4 U	
FEW4-MW82-(206.0)	N	1,4-Dichlorobenzene	7.6	2.4 U	2.4 UJ	2.4 U	
FEW4-MW82-(206.0)	N	2,2-Dichloropropane	7.6	2.4 U	2.4 UJ	2.4 U	
FEW4-MW82-(206.0)	N	2-Butanone (MEK)	31	9.8 U Q	9.8 UJ	9.8 U	
FEW4-MW82-(206.0)	N	2-Chlorotoluene	7.6	2.4 U	2.4 UJ	2.4 U	
FEW4-MW82-(206.0)	N	2-Hexanone	31	20 U Q	20 UJ	20 U	
FEW4-MW82-(206.0)	N	4-Chlorotoluene	7.6	2.4 U	2.4 UJ	2.4 U	
FEW4-MW82-(206.0)	N	4-Methyl-2-pentanone (MIBK)	31	20 U	20 UJ	20 U	
FEW4-MW82-(206.0)	N	Acetone	31	56 Q	56 J	56 J	V2
FEW4-MW82-(206.0)	N	Benzene	7.6	2.4 U	2.4 UJ	2.4 U	
FEW4-MW82-(206.0)	N	Bromobenzene	7.6	2.4 U	2.4 UJ	2.4 U	
FEW4-MW82-(206.0)	N	Bromochloromethane	7.6	1.2 U	1.2 UJ	1.2 U	
FEW4-MW82-(206.0)	N	Bromodichloromethane	7.6	1.2 U	1.2 UJ	1.2 U	
FEW4-MW82-(206.0)	N	Bromoform	7.6	1.2 U	1.2 UJ	1.2 U	
FEW4-MW82-(206.0)	N	Bromomethane	15	2.4 U Q	2.4 UJ	2.4 U	
FEW4-MW82-(206.0)	N	Carbon disulfide	7.6	2.4 U	2.4 UJ	2.4 U	
FEW4-MW82-(206.0)	N	Carbon tetrachloride	7.6	2.4 U	2.4 UJ	2.4 U	

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW82-(206.0)	N	Chlorobenzene	7.6	2.4 U	2.4 UJ	2.4 U	
FEW4-MW82-(206.0)	N	Chloroethane	15	4.9 U	4.9 UJ	4.9 U	
FEW4-MW82-(206.0)	N	Chloroform	15	1.2 U	1.2 UJ	1.2 U	
FEW4-MW82-(206.0)	N	Chloromethane	15	2.4 U	2.4 UJ	2.4 U	
FEW4-MW82-(206.0)	N	cis-1,2-Dichloroethene	7.6	2.4 U	2.4 UJ	2.4 U	
FEW4-MW82-(206.0)	N	cis-1,3-Dichloropropene	7.6	4.9 U	4.9 UJ	4.9 U	
FEW4-MW82-(206.0)	N	Dibromochloromethane	7.6	2.4 U	2.4 UJ	2.4 U	
FEW4-MW82-(206.0)	N	Dibromomethane	7.6	4.9 U	4.9 UJ	4.9 U	
FEW4-MW82-(206.0)	N	Dichlorodifluoromethane	15	2.4 U Q	2.4 UJ	2.4 U	
FEW4-MW82-(206.0)	N	Ethylbenzene	7.6	2.4 U	2.4 UJ	2.4 U	
FEW4-MW82-(206.0)	N	Hexachlorobutadiene	7.6	2.4 U	2.4 UJ	2.4 U	
FEW4-MW82-(206.0)	N	Isopropylbenzene (Cumene)	7.6	2.4 U	2.4 UJ	2.4 U	
FEW4-MW82-(206.0)	N	m,p-Xylene	4.9	4.9 U	4.9 UJ	4.9 U	
FEW4-MW82-(206.0)	N	Methyl tert-butyl ether (MTBE)	31	1.2 U	1.2 UJ	1.2 U	
FEW4-MW82-(206.0)	N	Methylene chloride	7.6	4.9 U	4.9 UJ	4.9 U	
FEW4-MW82-(206.0)	N	Naphthalene	7.6	2.4 U	2.4 UJ	2.4 U	
FEW4-MW82-(206.0)	N	n-Butylbenzene	7.6	2.4 U	2.4 UJ	2.4 U	
FEW4-MW82-(206.0)	N	n-Propylbenzene	7.6	2.4 U	2.4 UJ	2.4 U	
FEW4-MW82-(206.0)	N	o-Xylene	7.6	2.4 U	2.4 UJ	2.4 U	
FEW4-MW82-(206.0)	N	p-Cymene (p-Isopropyltoluene)	7.6	2.4 U	2.4 UJ	2.4 U	
FEW4-MW82-(206.0)	N	sec-Butylbenzene	7.6	2.4 U	2.4 UJ	2.4 U	
FEW4-MW82-(206.0)	N	Styrene	7.6	2.4 U	2.4 UJ	2.4 U	
FEW4-MW82-(206.0)	N	tert-Butylbenzene	7.6	2.4 U	2.4 UJ	2.4 U	
FEW4-MW82-(206.0)	N	Tetrachloroethene (PCE)	7.6	2.4 U	2.4 UJ	2.4 U	
FEW4-MW82-(206.0)	N	Toluene	7.6	2.4 U	2.4 UJ	2.4 U	
FEW4-MW82-(206.0)	N	trans-1,2-Dichloroethene	7.6	1.2 U	1.2 UJ	1.2 U	
FEW4-MW82-(206.0)	N	trans-1,3-Dichloropropene	7.6	2.4 U	2.4 UJ	2.4 U	
FEW4-MW82-(206.0)	N	Trichloroethene (TCE)	7.6	1.2 U	1.2 UJ	1.2 U	
FEW4-MW82-(206.0)	N	Trichlorofluoromethane	15	4.9 U	4.9 UJ	4.9 U	
FEW4-MW82-(206.0)	N	Vinyl chloride	7.6	4.9 U	4.9 UJ	4.9 U	
FEW4-MW82-(215.0)	N	1,1,1,2-Tetrachloroethane	4.8	1.6 U	1.6 UJ	1.6 U	
FEW4-MW82-(215.0)	N	1,1,1-Trichloroethane	4.8	1.6 U	1.6 UJ	1.6 U	
FEW4-MW82-(215.0)	N	1,1,2,2-Tetrachloroethane	4.8	1.6 U	1.6 UJ	1.6 U	
FEW4-MW82-(215.0)	N	1,1,2-Trichloroethane	4.8	3.1 U	3.1 UJ	3.1 U	
FEW4-MW82-(215.0)	N	1,1-Dichloroethane	4.8	0.78 U	0.78 UJ	0.78 U	
FEW4-MW82-(215.0)	N	1,1-Dichloroethene	4.8	1.6 U	1.6 UJ	1.6 U	
FEW4-MW82-(215.0)	N	1,1-Dichloropropene	4.8	1.6 U	1.6 UJ	1.6 U	
FEW4-MW82-(215.0)	N	1,2,3-Trichlorobenzene	4.8	1.6 U	1.6 UJ	1.6 U	
FEW4-MW82-(215.0)	N	1,2,3-Trichloropropane	4.8	3.1 U	3.1 UJ	3.1 U	
FEW4-MW82-(215.0)	N	1,2,4-Trichlorobenzene	4.8	1.6 U	1.6 UJ	1.6 U	
FEW4-MW82-(215.0)	N	1,2,4-Trimethylbenzene	4.8	1.6 U	1.6 UJ	1.6 U	

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW82-(215.0)	N	1,2-Dibromo-3-chloropropane	9.7	1.6 U	1.6 UJ	1.6 U	
FEW4-MW82-(215.0)	N	1,2-Dibromoethane (EDB)	4.8	1.6 U	1.6 UJ	1.6 U	
FEW4-MW82-(215.0)	N	1,2-Dichlorobenzene	4.8	1.6 U	1.6 UJ	1.6 U	
FEW4-MW82-(215.0)	N	1,2-Dichloroethane	4.8	1.6 U	1.6 UJ	1.6 U	
FEW4-MW82-(215.0)	N	1,2-Dichloroethene	4.8	1.6 U	1.6 UJ	1.6 U	
FEW4-MW82-(215.0)	N	1,2-Dichloropropane	4.8	1.6 U	1.6 UJ	1.6 U	
FEW4-MW82-(215.0)	N	1,3,5-Trimethylbenzene	4.8	1.6 U	1.6 UJ	1.6 U	
FEW4-MW82-(215.0)	N	1,3-Dichlorobenzene	4.8	1.6 U	1.6 UJ	1.6 U	
FEW4-MW82-(215.0)	N	1,3-Dichloropropane	4.8	1.6 U	1.6 UJ	1.6 U	
FEW4-MW82-(215.0)	N	1,4-Dichlorobenzene	4.8	1.6 U	1.6 UJ	1.6 U	
FEW4-MW82-(215.0)	N	2,2-Dichloropropane	4.8	1.6 U	1.6 UJ	1.6 U	
FEW4-MW82-(215.0)	N	2-Butanone (MEK)	19	6.2 U Q	6.2 UJ	6.2 U	
FEW4-MW82-(215.0)	N	2-Chlorotoluene	4.8	1.6 U	1.6 UJ	1.6 U	
FEW4-MW82-(215.0)	N	2-Hexanone	19	12 U Q	12 UJ	12 U	
FEW4-MW82-(215.0)	N	4-Chlorotoluene	4.8	1.6 U	1.6 UJ	1.6 U	
FEW4-MW82-(215.0)	N	4-Methyl-2-pentanone (MIBK)	19	12 U	12 UJ	12 U	
FEW4-MW82-(215.0)	N	Acetone	19	14 J Q	14 J	14 J	TR/V2
FEW4-MW82-(215.0)	N	Benzene	4.8	1.6 U	1.6 UJ	1.6 U	
FEW4-MW82-(215.0)	N	Bromobenzene	4.8	1.6 U	1.6 UJ	1.6 U	
FEW4-MW82-(215.0)	N	Bromochloromethane	4.8	0.78 U	0.78 UJ	0.78 U	
FEW4-MW82-(215.0)	N	Bromodichloromethane	4.8	0.78 U	0.78 UJ	0.78 U	
FEW4-MW82-(215.0)	N	Bromoform	4.8	0.78 U	0.78 UJ	0.78 U	
FEW4-MW82-(215.0)	N	Bromomethane	9.7	1.6 U Q	1.6 UJ	1.6 U	
FEW4-MW82-(215.0)	N	Carbon disulfide	4.8	1.6 U	1.6 UJ	1.6 U	
FEW4-MW82-(215.0)	N	Carbon tetrachloride	4.8	1.6 U	1.6 UJ	1.6 U	
FEW4-MW82-(215.0)	N	Chlorobenzene	4.8	1.6 U	1.6 UJ	1.6 U	
FEW4-MW82-(215.0)	N	Chloroethane	9.7	3.1 U	3.1 UJ	3.1 U	
FEW4-MW82-(215.0)	N	Chloroform	9.7	0.78 U	0.78 UJ	0.78 U	
FEW4-MW82-(215.0)	N	Chloromethane	9.7	1.6 U	1.6 UJ	1.6 U	
FEW4-MW82-(215.0)	N	cis-1,2-Dichloroethene	4.8	1.6 U	1.6 UJ	1.6 U	
FEW4-MW82-(215.0)	N	cis-1,3-Dichloropropene	4.8	3.1 U	3.1 UJ	3.1 U	
FEW4-MW82-(215.0)	N	Dibromochloromethane	4.8	1.6 U	1.6 UJ	1.6 U	
FEW4-MW82-(215.0)	N	Dibromomethane	4.8	3.1 U	3.1 UJ	3.1 U	
FEW4-MW82-(215.0)	N	Dichlorodifluoromethane	9.7	1.6 U Q	1.6 UJ	1.6 U	
FEW4-MW82-(215.0)	N	Ethylbenzene	4.8	1.6 U	1.6 UJ	1.6 U	
FEW4-MW82-(215.0)	N	Hexachlorobutadiene	4.8	1.6 U	1.6 UJ	1.6 U	
FEW4-MW82-(215.0)	N	Isopropylbenzene (Cumene)	4.8	1.6 U	1.6 UJ	1.6 U	
FEW4-MW82-(215.0)	N	m,p-Xylene	3.1	3.1 U	3.1 UJ	3.1 U	
FEW4-MW82-(215.0)	N	Methyl tert-butyl ether (MTBE)	19	0.78 U	0.78 UJ	0.78 U	
FEW4-MW82-(215.0)	N	Methylene chloride	4.8	3.1 U	3.1 UJ	3.1 U	

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW82-(215.0)	N	Naphthalene	4.8	1.6 U	1.6 UJ	1.6 U	
FEW4-MW82-(215.0)	N	n-Butylbenzene	4.8	1.6 U	1.6 UJ	1.6 U	
FEW4-MW82-(215.0)	N	n-Propylbenzene	4.8	1.6 U	1.6 UJ	1.6 U	
FEW4-MW82-(215.0)	N	o-Xylene	4.8	1.6 U	1.6 UJ	1.6 U	
FEW4-MW82-(215.0)	N	p-Cymene (p-Isopropyltoluene)	4.8	1.6 U	1.6 UJ	1.6 U	
FEW4-MW82-(215.0)	N	sec-Butylbenzene	4.8	1.6 U	1.6 UJ	1.6 U	
FEW4-MW82-(215.0)	N	Styrene	4.8	1.6 U	1.6 UJ	1.6 U	
FEW4-MW82-(215.0)	N	tert-Butylbenzene	4.8	1.6 U	1.6 UJ	1.6 U	
FEW4-MW82-(215.0)	N	Tetrachloroethene (PCE)	4.8	1.6 U	1.6 UJ	1.6 U	
FEW4-MW82-(215.0)	N	Toluene	4.8	1.6 U	1.6 UJ	1.6 U	
FEW4-MW82-(215.0)	N	trans-1,2-Dichloroethene	4.8	0.78 U	0.78 UJ	0.78 U	
FEW4-MW82-(215.0)	N	trans-1,3-Dichloropropene	4.8	1.6 U	1.6 UJ	1.6 U	
FEW4-MW82-(215.0)	N	Trichloroethene (TCE)	4.8	0.78 U	0.78 UJ	0.78 U	
FEW4-MW82-(215.0)	N	Trichlorofluoromethane	9.7	3.1 U	3.1 UJ	3.1 U	
FEW4-MW82-(215.0)	N	Vinyl chloride	4.8	3.1 U	3.1 UJ	3.1 U	
FEW4-MW82-(216.0)	FD	1,1,1,2-Tetrachloroethane	6.5	2.1 U	2.1 UJ	2.1 U	
FEW4-MW82-(216.0)	FD	1,1,1-Trichloroethane	6.5	2.1 U	2.1 UJ	2.1 U	
FEW4-MW82-(216.0)	FD	1,1,2,2-Tetrachloroethane	6.5	2.1 U	2.1 UJ	2.1 U	
FEW4-MW82-(216.0)	FD	1,1,2-Trichloroethane	6.5	4.2 U	4.2 UJ	4.2 U	
FEW4-MW82-(216.0)	FD	1,1-Dichloroethane	6.5	1.0 U	1.0 UJ	1.0 U	
FEW4-MW82-(216.0)	FD	1,1-Dichloroethene	6.5	2.1 U	2.1 UJ	2.1 U	
FEW4-MW82-(216.0)	FD	1,1-Dichloropropene	6.5	2.1 U	2.1 UJ	2.1 U	
FEW4-MW82-(216.0)	FD	1,2,3-Trichlorobenzene	6.5	2.1 U	2.1 UJ	2.1 U	
FEW4-MW82-(216.0)	FD	1,2,3-Trichloropropane	6.5	4.2 U	4.2 UJ	4.2 U	
FEW4-MW82-(216.0)	FD	1,2,4-Trichlorobenzene	6.5	2.1 U	2.1 UJ	2.1 U	
FEW4-MW82-(216.0)	FD	1,2,4-Trimethylbenzene	6.5	2.1 U	2.1 UJ	2.1 U	
FEW4-MW82-(216.0)	FD	1,2-Dibromo-3-chloropropane	13	2.1 U	2.1 UJ	2.1 U	
FEW4-MW82-(216.0)	FD	1,2-Dibromoethane (EDB)	6.5	2.1 U	2.1 UJ	2.1 U	
FEW4-MW82-(216.0)	FD	1,2-Dichlorobenzene	6.5	2.1 U	2.1 UJ	2.1 U	
FEW4-MW82-(216.0)	FD	1,2-Dichloroethane	6.5	2.1 U	2.1 UJ	2.1 U	
FEW4-MW82-(216.0)	FD	1,2-Dichloroethene	6.5	2.1 U	2.1 UJ	2.1 U	
FEW4-MW82-(216.0)	FD	1,2-Dichloropropane	6.5	2.1 U	2.1 UJ	2.1 U	
FEW4-MW82-(216.0)	FD	1,3,5-Trimethylbenzene	6.5	2.1 U	2.1 UJ	2.1 U	
FEW4-MW82-(216.0)	FD	1,3-Dichlorobenzene	6.5	2.1 U	2.1 UJ	2.1 U	
FEW4-MW82-(216.0)	FD	1,3-Dichloropropane	6.5	2.1 U	2.1 UJ	2.1 U	
FEW4-MW82-(216.0)	FD	1,4-Dichlorobenzene	6.5	2.1 U	2.1 UJ	2.1 U	
FEW4-MW82-(216.0)	FD	2,2-Dichloropropane	6.5	2.1 U	2.1 UJ	2.1 U	
FEW4-MW82-(216.0)	FD	2-Butanone (MEK)	26	8.3 U Q	8.3 UJ	8.3 U	
FEW4-MW82-(216.0)	FD	2-Chlorotoluene	6.5	2.1 U	2.1 UJ	2.1 U	
FEW4-MW82-(216.0)	FD	2-Hexanone	26	17 U Q	17 UJ	17 U	
FEW4-MW82-(216.0)	FD	4-Chlorotoluene	6.5	2.1 U	2.1 UJ	2.1 U	

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW82-(216.0)	FD	4-Methyl-2-pentanone (MIBK)	26	17 U	17 UJ	17 U	
FEW4-MW82-(216.0)	FD	Acetone	26	30 Q	30 J	30 J	V2
FEW4-MW82-(216.0)	FD	Benzene	6.5	2.1 U	2.1 UJ	2.1 U	
FEW4-MW82-(216.0)	FD	Bromobenzene	6.5	2.1 U	2.1 UJ	2.1 U	
FEW4-MW82-(216.0)	FD	Bromochloromethane	6.5	1.0 U	1.0 UJ	1.0 U	
FEW4-MW82-(216.0)	FD	Bromodichloromethane	6.5	1.0 U	1.0 UJ	1.0 U	
FEW4-MW82-(216.0)	FD	Bromoform	6.5	1.0 U	1.0 UJ	1.0 U	
FEW4-MW82-(216.0)	FD	Bromomethane	13	2.1 U Q	2.1 UJ	2.1 U	
FEW4-MW82-(216.0)	FD	Carbon disulfide	6.5	2.1 U	2.1 UJ	2.1 U	
FEW4-MW82-(216.0)	FD	Carbon tetrachloride	6.5	2.1 U	2.1 UJ	2.1 U	
FEW4-MW82-(216.0)	FD	Chlorobenzene	6.5	2.1 U	2.1 UJ	2.1 U	
FEW4-MW82-(216.0)	FD	Chloroethane	13	4.2 U	4.2 UJ	4.2 U	
FEW4-MW82-(216.0)	FD	Chloroform	13	1.0 U	1.0 UJ	1.0 U	
FEW4-MW82-(216.0)	FD	Chloromethane	13	2.1 U	2.1 UJ	2.1 U	
FEW4-MW82-(216.0)	FD	cis-1,2-Dichloroethene	6.5	2.1 U	2.1 UJ	2.1 U	
FEW4-MW82-(216.0)	FD	cis-1,3-Dichloropropene	6.5	4.2 U	4.2 UJ	4.2 U	
FEW4-MW82-(216.0)	FD	Dibromochloromethane	6.5	2.1 U	2.1 UJ	2.1 U	
FEW4-MW82-(216.0)	FD	Dibromomethane	6.5	4.2 U	4.2 UJ	4.2 U	
FEW4-MW82-(216.0)	FD	Dichlorodifluoromethane	13	2.1 U Q	2.1 UJ	2.1 U	
FEW4-MW82-(216.0)	FD	Ethylbenzene	6.5	2.1 U	2.1 UJ	2.1 U	
FEW4-MW82-(216.0)	FD	Hexachlorobutadiene	6.5	2.1 U	2.1 UJ	2.1 U	
FEW4-MW82-(216.0)	FD	Isopropylbenzene (Cumene)	6.5	2.1 U	2.1 UJ	2.1 U	
FEW4-MW82-(216.0)	FD	m,p-Xylene	4.2	4.2 U	4.2 UJ	4.2 U	
FEW4-MW82-(216.0)	FD	Methyl tert-butyl ether (MTBE)	26	1.0 U	1.0 UJ	1.0 U	
FEW4-MW82-(216.0)	FD	Methylene chloride	6.5	4.2 U	4.2 UJ	4.2 U	
FEW4-MW82-(216.0)	FD	Naphthalene	6.5	2.1 U	2.1 UJ	2.1 U	
FEW4-MW82-(216.0)	FD	n-Butylbenzene	6.5	2.1 U	2.1 UJ	2.1 U	
FEW4-MW82-(216.0)	FD	n-Propylbenzene	6.5	2.1 U	2.1 UJ	2.1 U	
FEW4-MW82-(216.0)	FD	o-Xylene	6.5	2.1 U	2.1 UJ	2.1 U	
FEW4-MW82-(216.0)	FD	p-Cymene (p-Isopropyltoluene)	6.5	2.1 U	2.1 UJ	2.1 U	
FEW4-MW82-(216.0)	FD	sec-Butylbenzene	6.5	2.1 U	2.1 UJ	2.1 U	
FEW4-MW82-(216.0)	FD	Styrene	6.5	2.1 U	2.1 UJ	2.1 U	
FEW4-MW82-(216.0)	FD	tert-Butylbenzene	6.5	2.1 U	2.1 UJ	2.1 U	
FEW4-MW82-(216.0)	FD	Tetrachloroethene (PCE)	6.5	2.1 U	2.1 UJ	2.1 U	
FEW4-MW82-(216.0)	FD	Toluene	6.5	2.1 U	2.1 UJ	2.1 U	
FEW4-MW82-(216.0)	FD	trans-1,2-Dichloroethene	6.5	1.0 U	1.0 UJ	1.0 U	
FEW4-MW82-(216.0)	FD	trans-1,3-Dichloropropene	6.5	2.1 U	2.1 UJ	2.1 U	
FEW4-MW82-(216.0)	FD	Trichloroethene (TCE)	6.5	1.0 U	1.0 UJ	1.0 U	
FEW4-MW82-(216.0)	FD	Trichlorofluoromethane	13	4.2 U	4.2 UJ	4.2 U	
FEW4-MW82-(216.0)	FD	Vinyl chloride	6.5	4.2 U	4.2 UJ	4.2 U	

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW82-(224.0)	N	1,1,1,2-Tetrachloroethane	5.3	1.7 U	1.7 UJ	1.7 U	
FEW4-MW82-(224.0)	N	1,1,1-Trichloroethane	5.3	1.7 U	1.7 UJ	1.7 U	
FEW4-MW82-(224.0)	N	1,1,2,2-Tetrachloroethane	5.3	1.7 U	1.7 UJ	1.7 U	
FEW4-MW82-(224.0)	N	1,1,2-Trichloroethane	5.3	3.4 U	3.4 UJ	3.4 U	
FEW4-MW82-(224.0)	N	1,1-Dichloroethane	5.3	0.85 U	0.85 UJ	0.85 U	
FEW4-MW82-(224.0)	N	1,1-Dichloroethene	5.3	1.7 U	1.7 UJ	1.7 U	
FEW4-MW82-(224.0)	N	1,1-Dichloropropene	5.3	1.7 U	1.7 UJ	1.7 U	
FEW4-MW82-(224.0)	N	1,2,3-Trichlorobenzene	5.3	1.7 U	1.7 UJ	1.7 U	
FEW4-MW82-(224.0)	N	1,2,3-Trichloropropane	5.3	3.4 U	3.4 UJ	3.4 U	
FEW4-MW82-(224.0)	N	1,2,4-Trichlorobenzene	5.3	1.7 U	1.7 UJ	1.7 U	
FEW4-MW82-(224.0)	N	1,2,4-Trimethylbenzene	5.3	1.7 U	1.7 UJ	1.7 U	
FEW4-MW82-(224.0)	N	1,2-Dibromo-3-chloropropane	11	1.7 U	1.7 UJ	1.7 U	
FEW4-MW82-(224.0)	N	1,2-Dibromoethane (EDB)	5.3	1.7 U	1.7 UJ	1.7 U	
FEW4-MW82-(224.0)	N	1,2-Dichlorobenzene	5.3	1.7 U	1.7 UJ	1.7 U	
FEW4-MW82-(224.0)	N	1,2-Dichloroethane	5.3	1.7 U	1.7 UJ	1.7 U	
FEW4-MW82-(224.0)	N	1,2-Dichloroethene	5.3	1.7 U	1.7 UJ	1.7 U	
FEW4-MW82-(224.0)	N	1,2-Dichloropropane	5.3	1.7 U	1.7 UJ	1.7 U	
FEW4-MW82-(224.0)	N	1,3,5-Trimethylbenzene	5.3	1.7 U	1.7 UJ	1.7 U	
FEW4-MW82-(224.0)	N	1,3-Dichlorobenzene	5.3	1.7 U	1.7 UJ	1.7 U	
FEW4-MW82-(224.0)	N	1,3-Dichloropropane	5.3	1.7 U	1.7 UJ	1.7 U	
FEW4-MW82-(224.0)	N	1,4-Dichlorobenzene	5.3	1.7 U	1.7 UJ	1.7 U	
FEW4-MW82-(224.0)	N	2,2-Dichloropropane	5.3	1.7 U	1.7 UJ	1.7 U	
FEW4-MW82-(224.0)	N	2-Butanone (MEK)	21	6.8 U Q	6.8 UJ	6.8 U	
FEW4-MW82-(224.0)	N	2-Chlorotoluene	5.3	1.7 U	1.7 UJ	1.7 U	
FEW4-MW82-(224.0)	N	2-Hexanone	21	14 U Q	14 UJ	14 U	
FEW4-MW82-(224.0)	N	4-Chlorotoluene	5.3	1.7 U	1.7 UJ	1.7 U	
FEW4-MW82-(224.0)	N	4-Methyl-2-pentanone (MIBK)	21	14 U	14 UJ	14 U	
FEW4-MW82-(224.0)	N	Acetone	21	14 U Q	14 UJ	14 UJ	V2
FEW4-MW82-(224.0)	N	Benzene	5.3	1.7 U	1.7 UJ	1.7 U	
FEW4-MW82-(224.0)	N	Bromobenzene	5.3	1.7 U	1.7 UJ	1.7 U	
FEW4-MW82-(224.0)	N	Bromochloromethane	5.3	0.85 U	0.85 UJ	0.85 U	
FEW4-MW82-(224.0)	N	Bromodichloromethane	5.3	0.85 U	0.85 UJ	0.85 U	
FEW4-MW82-(224.0)	N	Bromoform	5.3	0.85 U	0.85 UJ	0.85 U	
FEW4-MW82-(224.0)	N	Bromomethane	11	1.7 U Q	1.7 UJ	1.7 U	
FEW4-MW82-(224.0)	N	Carbon disulfide	5.3	1.7 U	1.7 UJ	1.7 U	
FEW4-MW82-(224.0)	N	Carbon tetrachloride	5.3	1.7 U	1.7 UJ	1.7 U	
FEW4-MW82-(224.0)	N	Chlorobenzene	5.3	1.7 U	1.7 UJ	1.7 U	
FEW4-MW82-(224.0)	N	Chloroethane	11	3.4 U	3.4 UJ	3.4 U	
FEW4-MW82-(224.0)	N	Chloroform	11	0.85 U	0.85 UJ	0.85 U	
FEW4-MW82-(224.0)	N	Chloromethane	11	1.7 U	1.7 UJ	1.7 U	
FEW4-MW82-(224.0)	N	cis-1,2-Dichloroethene	5.3	1.7 U	1.7 UJ	1.7 U	

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW82-(224.0)	N	cis-1,3-Dichloropropene	5.3	3.4 U	3.4 UJ	3.4 U	
FEW4-MW82-(224.0)	N	Dibromochloromethane	5.3	1.7 U	1.7 UJ	1.7 U	
FEW4-MW82-(224.0)	N	Dibromomethane	5.3	3.4 U	3.4 UJ	3.4 U	
FEW4-MW82-(224.0)	N	Dichlorodifluoromethane	11	1.7 U Q	1.7 UJ	1.7 U	
FEW4-MW82-(224.0)	N	Ethylbenzene	5.3	1.7 U	1.7 UJ	1.7 U	
FEW4-MW82-(224.0)	N	Hexachlorobutadiene	5.3	1.7 U	1.7 UJ	1.7 U	
FEW4-MW82-(224.0)	N	Isopropylbenzene (Cumene)	5.3	1.7 U	1.7 UJ	1.7 U	
FEW4-MW82-(224.0)	N	m,p-Xylene	3.4	3.4 U	3.4 UJ	3.4 U	
FEW4-MW82-(224.0)	N	Methyl tert-butyl ether (MTBE)	21	0.85 U	0.85 UJ	0.85 U	
FEW4-MW82-(224.0)	N	Methylene chloride	5.3	3.4 U	3.4 UJ	3.4 U	
FEW4-MW82-(224.0)	N	Naphthalene	5.3	1.7 U	1.7 UJ	1.7 U	
FEW4-MW82-(224.0)	N	n-Butylbenzene	5.3	1.7 U	1.7 UJ	1.7 U	
FEW4-MW82-(224.0)	N	n-Propylbenzene	5.3	1.7 U	1.7 UJ	1.7 U	
FEW4-MW82-(224.0)	N	o-Xylene	5.3	1.7 U	1.7 UJ	1.7 U	
FEW4-MW82-(224.0)	N	p-Cymene (p-Isopropyltoluene)	5.3	1.7 U	1.7 UJ	1.7 U	
FEW4-MW82-(224.0)	N	sec-Butylbenzene	5.3	1.7 U	1.7 UJ	1.7 U	
FEW4-MW82-(224.0)	N	Styrene	5.3	1.7 U	1.7 UJ	1.7 U	
FEW4-MW82-(224.0)	N	tert-Butylbenzene	5.3	1.7 U	1.7 UJ	1.7 U	
FEW4-MW82-(224.0)	N	Tetrachloroethene (PCE)	5.3	1.7 U	1.7 UJ	1.7 U	
FEW4-MW82-(224.0)	N	Toluene	5.3	1.7 U	1.7 UJ	1.7 U	
FEW4-MW82-(224.0)	N	trans-1,2-Dichloroethene	5.3	0.85 U	0.85 UJ	0.85 U	
FEW4-MW82-(224.0)	N	trans-1,3-Dichloropropene	5.3	1.7 U	1.7 UJ	1.7 U	
FEW4-MW82-(224.0)	N	Trichloroethene (TCE)	5.3	0.85 U	0.85 UJ	0.85 U	
FEW4-MW82-(224.0)	N	Trichlorofluoromethane	11	3.4 U	3.4 UJ	3.4 U	
FEW4-MW82-(224.0)	N	Vinyl chloride	5.3	3.4 U	3.4 UJ	3.4 U	
FEW4-MW82-(235.0)	N	1,1,1,2-Tetrachloroethane	4.7	1.5 U	1.5 UJ	1.5 U	
FEW4-MW82-(235.0)	N	1,1,1-Trichloroethane	4.7	1.5 U	1.5 UJ	1.5 U	
FEW4-MW82-(235.0)	N	1,1,2,2-Tetrachloroethane	4.7	1.5 U	1.5 UJ	1.5 U	
FEW4-MW82-(235.0)	N	1,1,2-Trichloroethane	4.7	3.0 U	3.0 UJ	3.0 U	
FEW4-MW82-(235.0)	N	1,1-Dichloroethane	4.7	0.76 U	0.76 UJ	0.76 U	
FEW4-MW82-(235.0)	N	1,1-Dichloroethene	4.7	1.5 U	1.5 UJ	1.5 U	
FEW4-MW82-(235.0)	N	1,1-Dichloropropene	4.7	1.5 U	1.5 UJ	1.5 U	
FEW4-MW82-(235.0)	N	1,2,3-Trichlorobenzene	4.7	1.5 U	1.5 UJ	1.5 U	
FEW4-MW82-(235.0)	N	1,2,3-Trichloropropane	4.7	3.0 U	3.0 UJ	3.0 U	
FEW4-MW82-(235.0)	N	1,2,4-Trichlorobenzene	4.7	1.5 U	1.5 UJ	1.5 U	
FEW4-MW82-(235.0)	N	1,2,4-Trimethylbenzene	4.7	1.5 U J	1.5 UJ	1.5 UJ	M
FEW4-MW82-(235.0)	N	1,2-Dibromo-3-chloropropane	9.5	1.5 U	1.5 UJ	1.5 U	
FEW4-MW82-(235.0)	N	1,2-Dibromoethane (EDB)	4.7	1.5 U	1.5 UJ	1.5 U	
FEW4-MW82-(235.0)	N	1,2-Dichlorobenzene	4.7	1.5 U	1.5 UJ	1.5 U	
FEW4-MW82-(235.0)	N	1,2-Dichloroethane	4.7	1.5 U	1.5 UJ	1.5 U	

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW82-(235.0)	N	1,2-Dichloroethene	4.7	1.5 U	1.5 UJ	1.5 U	
FEW4-MW82-(235.0)	N	1,2-Dichloropropane	4.7	1.5 U	1.5 UJ	1.5 U	
FEW4-MW82-(235.0)	N	1,3,5-Trimethylbenzene	4.7	1.5 U	1.5 UJ	1.5 U	
FEW4-MW82-(235.0)	N	1,3-Dichlorobenzene	4.7	1.5 U	1.5 UJ	1.5 UJ	M
FEW4-MW82-(235.0)	N	1,3-Dichloropropane	4.7	1.5 U	1.5 UJ	1.5 U	
FEW4-MW82-(235.0)	N	1,4-Dichlorobenzene	4.7	1.5 U	1.5 UJ	1.5 U	
FEW4-MW82-(235.0)	N	2,2-Dichloropropane	4.7	1.5 U	1.5 UJ	1.5 U	
FEW4-MW82-(235.0)	N	2-Butanone (MEK)	19	6.0 U Q	6.0 UJ	6.0 U	
FEW4-MW82-(235.0)	N	2-Chlorotoluene	4.7	1.5 U	1.5 UJ	1.5 U	
FEW4-MW82-(235.0)	N	2-Hexanone	19	12 U Q	12 UJ	12 U	
FEW4-MW82-(235.0)	N	4-Chlorotoluene	4.7	1.5 U	1.5 UJ	1.5 U	
FEW4-MW82-(235.0)	N	4-Methyl-2-pentanone (MIBK)	19	12 U	12 UJ	12 U	
FEW4-MW82-(235.0)	N	Acetone	19	11 J Q	11 J	11 J	TR/V2
FEW4-MW82-(235.0)	N	Benzene	4.7	1.5 U	1.5 UJ	1.5 U	
FEW4-MW82-(235.0)	N	Bromobenzene	4.7	1.5 U	1.5 UJ	1.5 U	
FEW4-MW82-(235.0)	N	Bromochloromethane	4.7	0.76 U	0.76 UJ	0.76 U	
FEW4-MW82-(235.0)	N	Bromodichloromethane	4.7	0.76 U	0.76 UJ	0.76 U	
FEW4-MW82-(235.0)	N	Bromoform	4.7	0.76 U	0.76 UJ	0.76 U	
FEW4-MW82-(235.0)	N	Bromomethane	9.5	1.5 U Q	1.5 UJ	1.5 U	
FEW4-MW82-(235.0)	N	Carbon disulfide	4.7	1.5 U	1.5 UJ	1.5 U	
FEW4-MW82-(235.0)	N	Carbon tetrachloride	4.7	1.5 U	1.5 UJ	1.5 U	
FEW4-MW82-(235.0)	N	Chlorobenzene	4.7	1.5 U	1.5 UJ	1.5 U	
FEW4-MW82-(235.0)	N	Chloroethane	9.5	3.0 U	3.0 UJ	3.0 U	
FEW4-MW82-(235.0)	N	Chloroform	9.5	0.76 U	0.76 UJ	0.76 U	
FEW4-MW82-(235.0)	N	Chloromethane	9.5	1.5 U	1.5 UJ	1.5 U	
FEW4-MW82-(235.0)	N	cis-1,2-Dichloroethene	4.7	1.5 U	1.5 UJ	1.5 U	
FEW4-MW82-(235.0)	N	cis-1,3-Dichloropropene	4.7	3.0 U	3.0 UJ	3.0 U	
FEW4-MW82-(235.0)	N	Dibromochloromethane	4.7	1.5 U	1.5 UJ	1.5 U	
FEW4-MW82-(235.0)	N	Dibromomethane	4.7	3.0 U	3.0 UJ	3.0 U	
FEW4-MW82-(235.0)	N	Dichlorodifluoromethane	9.5	1.5 U Q	1.5 UJ	1.5 U	
FEW4-MW82-(235.0)	N	Ethylbenzene	4.7	1.5 U	1.5 UJ	1.5 U	
FEW4-MW82-(235.0)	N	Hexachlorobutadiene	4.7	1.5 U	1.5 UJ	1.5 U	
FEW4-MW82-(235.0)	N	Isopropylbenzene (Cumene)	4.7	1.5 U	1.5 UJ	1.5 U	
FEW4-MW82-(235.0)	N	m,p-Xylene	3.0	3.0 U	3.0 UJ	3.0 U	
FEW4-MW82-(235.0)	N	Methyl tert-butyl ether (MTBE)	19	0.76 U	0.76 UJ	0.76 U	
FEW4-MW82-(235.0)	N	Methylene chloride	4.7	3.0 U	3.0 UJ	3.0 U	
FEW4-MW82-(235.0)	N	Naphthalene	4.7	1.5 U	1.5 UJ	1.5 U	
FEW4-MW82-(235.0)	N	n-Butylbenzene	4.7	1.5 U J	1.5 UJ	1.5 U	
FEW4-MW82-(235.0)	N	n-Propylbenzene	4.7	1.5 U J	1.5 UJ	1.5 UJ	M
FEW4-MW82-(235.0)	N	o-Xylene	4.7	1.5 U	1.5 UJ	1.5 U	

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW82-(235.0)	N	p-Cymene (p-Isopropyltoluene)	4.7	1.5 U	1.5 UJ	1.5 U	
FEW4-MW82-(235.0)	N	sec-Butylbenzene	4.7	1.5 U J	1.5 UJ	1.5 UJ	M
FEW4-MW82-(235.0)	N	Styrene	4.7	1.5 U	1.5 UJ	1.5 U	
FEW4-MW82-(235.0)	N	tert-Butylbenzene	4.7	1.5 U	1.5 UJ	1.5 U	
FEW4-MW82-(235.0)	N	Tetrachloroethene (PCE)	4.7	1.5 U	1.5 UJ	1.5 U	
FEW4-MW82-(235.0)	N	Toluene	4.7	1.5 U	1.5 UJ	1.5 U	
FEW4-MW82-(235.0)	N	trans-1,2-Dichloroethene	4.7	0.76 U	0.76 UJ	0.76 U	
FEW4-MW82-(235.0)	N	trans-1,3-Dichloropropene	4.7	1.5 U	1.5 UJ	1.5 U	
FEW4-MW82-(235.0)	N	Trichloroethene (TCE)	4.7	0.76 U	0.76 UJ	0.76 U	
FEW4-MW82-(235.0)	N	Trichlorofluoromethane	9.5	3.0 U	3.0 UJ	3.0 U	
FEW4-MW82-(235.0)	N	Vinyl chloride	4.7	3.0 U	3.0 UJ	3.0 U	

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
Trace values are not included in the qualified results table unless additional reason codes are associated.

Reason Code Definitions

Code	Definition
D	MS RPD
D3	Field Duplicate RPD
H1	Test Hold Time
I	Surrogate recovery outside project limits.
M	MS Recovery
TR	Trace Level Detect
V2	CCV

Flag Code and Definitions

Flag	Definition
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
J	Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
R	The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making.
B	Blank contamination: The analyte was found in an associated blank above one half the RL, as well as in the sample.
UB	The analyte was also detected in an associated laboratory or field blank at a concentration comparable to the concentration in the sample. The reported result has been requalified as not detected.

Review Questions

Method: SW8260B (Volatile Organic Compounds by Capillary GC/MS)

Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?		•		ADR noted that the following samples exceeded the 14 day analysis holding time on the 14th day between 0000 and 2359 hours: FEW4-MW75-(80.0) 5 hours, FEW4-MW75-(90.0) 3.8 hours, FEW4-MW75-(100.0) 3.8 hours, FEW4-MW75-(110.0) 2.6 hours, FEW4-MW75-(111.0) 2.2 hours, FW4-MW82-74 2.6 hours, FEW4-MW82-(195.0) 2.2 hours, FEW4-MW82-(206.0) 0.96 hours, FEW4-MW82-(215.0) 1.2 hours, FEW4-MW82-(216.0) 0.5 hours, FEW4-MW82-(224.0) 0.96 hours, FEW4-MW82-(235.0) 0.96 hours, and TCE dilution analysis in FEW4-MW75-80 23.5 hours; according to DoD ELAP QSM 5.1 FAQ – Holding Time - Days: "the holding time shall be tracked by the day." "...an exceedance of holding time for a sample with a 14-day holding time will occur when the 15th day is reached (at 12am)." Therefore, no holding time exceedance is considered to have occurred for the noted samples. Analyses were performed beyond the holding time discussed above for TCE dilution analysis of samples FEW4-MW75-(90.0) at 3 days, FEW4-MW75-(100.0) at 5.8 days, FEW4-MW75-(110.0) at 3.2 days, and FEW4-MW75-(111.0) at 3.1 days. Analysis was performed beyond the holding time discussed above for 1,4-dioxane in FEW4-MW82-74 at 1 day and the dilution analysis of 1,4-dioxane in FEW4-MW75-80 at 1 day.
Were sample reciept temperatures met?	•			Sample receipt temperatures were 1.7ºC and 2.7ºC.
Were QAPP specified PQLs achieved?	•			
Were all QAPP-specified target analytes reported?	•			
Was the GC/MS system properly tuned based on method criteria?	•			
Was the criteria met during each 12 hour shift (prior to ICAL and Cal Ver.)?	•			
Does the initial calibration curve consist of 5 concentration levels, with the low standard near but > MDL?	•			
Did the Calibration Check Compounds (CCCs) have a relative standard deviation within QAPP acceptance limits?	•			
Were the average response factors (RFs) for the System Performance Check Compounds (SPCCs) within QAPP acceptance limits?	•			
Were the ICAL %RSDs for the target compounds within method criteria?	•			
If a quadratic equation curve was used, was the coefficient of determination (COD) within criteria?	•			
If a linear regression curve was used, was the correlation coefficient within criteria?	•			
Check and recalculate the response factors and average response factors for a least one target compound.	•			ICAL VMS-G 8/16/17TCE AVG RF = 0.3273

Review Questions

Method: SW8260B (Volatile Organic Compounds by Capillary GC/MS)

Review Questions	Yes	No	NA	Comment
Check and recalculate the %RSD for one of more target compounds and DMCs. Verify that the recalculated values agree with the laboratory reported values.	•			ICAL VMS-G 8/16/17 TCE %RSD = 4.3% 1,2-DCA-d4 %RSD = 5.0
Was a second source verification analyzed after the ICAL and all analytes within criteria?		•		The ICV percent difference was above the upper control limit for bromomethane at 36.6%D and dichlorofluoromethane at -22.7%D. All associated sample results were nondetect for these analytes, therefore no data qualification is warranted.
Was a CCV run at the beginning of the analytical sequence and every 12 hours?	•			
Was the CCV a mid-level standard from the initial calibration curve?	•			
Did the CCCs have a %Difference within QAPP acceptance limits?	•			
Were the average RFs for the SPCCs within QAPP acceptance limits?	•			
Was the %D (difference or drift) for all target analytes within QAPP acceptance limits?		•		CCV 280-386199/2: 2-Hexanone had a percent difference greater than the 20% control limit at 20.7%. The analyte was not detected in any associated samples and has therefore not been qualified. CCV 280-386366/2: 2-Hexanone (29.2%), chloromethane (-21.5%), and dichlorodifluoromethane (-27.0%) were outside the 20% control limit. These analytes were not detected in any associated samples and have therefore not been qualified. CCV 280-386437/2: 2-Hexanone (27.8%), and bromomethane (-22.5%) were outside the 20% control limit. These analytes were not detected in any associated samples and have therefore not been qualified. Acetone (20.7%) was outside the control limit and detected in several samples; these samples were qualified as estimated values where applicable.
Check and recalculate the CCV relative response factor for at least one target compound.	•			VMS-G 8/28/17 CCV 280-385869/2 Trichloroethene RF = 0.34134
Were the internal standards added to every standard, blank, matrix spike, matrix spike duplicate, and sample?	•			
Were the retention times for all IS compounds within QAPP acceptance limits?	•			
Are the area counts of all IS compounds within QAPP acceptance limits?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes detected in the method blank above the MDL?	•			Acetone was detected in one of several method blanks at a concentration less than the LOQ.
Were target analytes reported in the field blank analyses above the MDL?			•	

Review Questions

Method: SW8260B (Volatile Organic Compounds by Capillary GC/MS)

Review Questions	Yes	No	NA	Comment
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?		•		FEW4-MW82-(76.0) is a blind field duplicate of FEW4-MW82-(75.0); FEW4-MW82-(126.0) is a blind field duplicate of FEW4-MW82-(125.0); FEW4-MW82-(216.0) is a blind field duplicate of FEW4-MW82-(215.0); FEW4-MW75-(111.0) is a blind field duplicate of FEW4-MW75-(110.0).The TCE RPD was greater than the control limit for duplicate samples FEW4-MW75-(110.0)/(111.0) at 31%.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were the LCS/LCSD recoveries within QAPP acceptance limits?		•		LCSD 280-386215/2-A: Bromomethane recovery of 155% was greater than the upper control limit of 143%. 280-386359/1-A: Bromomethane recovery of 145% was greater than the upper control limit of 143%.
Were the LCS/LCSD RPDs within QAPP acceptance limits?			•	
Was the duplicate RPD within QAPP acceptance limits?			•	
Was a MS/MSD pair prepared with each batch?	•			
Is the MS/MSD parent sample the one designated by the sampling team?	•			FEW4-MW82-(9.0) and FEW4-MW82-(235.0) were designated for matrix spike analysis.
Were MS/MSD recoveries and RPD within QAPP acceptance limits?		•		Spike recoveries and RPD values were outside the acceptance limits for several analytes.
Were surrogate recoveries within QAPP acceptance limits?	•			
Were reported sample concentrations within calibration range?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were instrument run logs present and filled out appropriately?	•			
Were sample prepration sheets present and filled out appropriately?	•			
Check and recalculate the %D for one target compound. Verify that the recalculated values agree with the laboratory-reported values.			•	
Examine raw data to verify correct calculation of sample results reported by the laboratory. Compare quantitation lists and chromatograms to the reported detect and non-detect sample results.	•			FEW4-MW82-74 DL TCE = 510 ug/L
Verify that the reporting limits and sample results have been adjusted to reflect all sample dilutions and Percent Moisture factors (non-aqueous samples).	•			

US Army Corps of Engineers®

Batch Report

Test Method: SW8260B Analysis Batch: 280-386435

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
LABQC	SQ	MB 280-386460/2-A	MB 280-386460/2-A		1/1	9/1/2017 15:00	9/1/2017 15:00	9/1/2017 17:39	280-386435/	LB
FEW4-MW75	SO	FEW4-MW75-(205.0)	280-100459-20		1/1	8/19/2017 18:20	8/19/2017 18:20	9/1/2017 18:00	280-386435/	N
FEW4-MW75	SO	FEW4-MW75-(205.0)	280-100459-20MS		1/1	8/19/2017 18:20	8/19/2017 18:20	9/1/2017 18:20	280-386435/	MS
FEW4-MW75	SO	FEW4-MW75-(205.0)	280-100459-20MSD		1/1	8/19/2017 18:20	8/19/2017 18:20	9/1/2017 18:41	280-386435/	SD
FEW4-MW82	SO	FEW4-MW82-(244.0)	280-100459-21		1/1	8/19/2017 11:44	8/19/2017 11:44	9/1/2017 19:22	280-386435/	N
LABQC	SQ	LCS 280-386460/1-A	LCS 280-386460/1-A		1/1	9/1/2017 15:00	9/1/2017 15:00	9/1/2017 19:43	280-386435/	BS
FEW4-MW82	SO	FEW4-MW82-(252.0)	280-100459-22		1/1	8/19/2017 11:52	8/19/2017 11:52	9/1/2017 20:24	280-386435/	N
FEW4-MW82	SO	FEW4-MW82-(264.0)	280-100459-23		1/1	8/19/2017 12:44	8/19/2017 12:44	9/1/2017 20:44	280-386435/	N
FEW4-MW82	SO	FEW4-MW82-(275.0)	280-100459-24		1/1	8/19/2017 12:50	8/19/2017 12:50	9/1/2017 21:05	280-386435/	N
FEW4-MW82	SO	FEW4-MW82-(285.0)	280-100459-25		1/1	8/19/2017 15:10	8/19/2017 15:10	9/1/2017 21:25	280-386435/	N
FEW4-MW82	SO	FEW4-MW82-(299.0)	280-100459-26		1/1	8/19/2017 15:15	8/19/2017 15:15	9/1/2017 21:45	280-386435/	N
FEW4-MW82	SO	FEW4-MW82-(306.0)	280-100459-27		1/1	8/19/2017 15:20	8/19/2017 15:20	9/1/2017 22:06	280-386435/	N

Test Method: SW8260B Analysis Batch: 280-386437

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
LABQC	SQ	LCS 280-386459/1-A	LCS 280-386459/1-A		1/1	9/1/2017 12:00	9/1/2017 12:00	9/1/2017 15:02	280-386437/	BS
LABQC	SQ	LCSD 280-386459/2-A	LCSD 280-386459/2-A		1/1	9/1/2017 12:00	9/1/2017 12:00	9/1/2017 15:22	280-386437/	BD
LABQC	SQ	MB 280-386459/3-A	MB 280-386459/3-A		1/1	9/1/2017 12:00	9/1/2017 12:00	9/1/2017 16:04	280-386437/	LB
FEW4-MW75	SO	FEW4-MW75-(123.0)	280-100459-12		1/1	8/19/2017 13:15	8/19/2017 13:15	9/1/2017 21:15	280-386437/	N
FEW4-MW75	SO	FEW4-MW75-(133.0)	280-100459-13		1/1	8/19/2017 13:30	8/19/2017 13:30	9/1/2017 21:36	280-386437/	N
FEW4-MW75	SO	FEW4-MW75-(141.0)	280-100459-14		1/1	8/19/2017 14:05	8/19/2017 14:05	9/1/2017 21:57	280-386437/	N
FEW4-MW75	SO	FEW4-MW75-(151.0)	280-100459-15		1/1	8/19/2017 14:30	8/19/2017 14:30	9/1/2017 22:17	280-386437/	N
FEW4-MW75	SO	FEW4-MW75-(161.0)	280-100459-16		1/1	8/19/2017 16:45	8/19/2017 16:45	9/1/2017 22:38	280-386437/	N
FEW4-MW75	SO	FEW4-MW75-(171.0)	280-100459-17		1/1	8/19/2017 16:55	8/19/2017 16:55	9/1/2017 22:58	280-386437/	N

US Army Corps of Engineers®

Batch Report

Test Method: SW8260B Analysis Batch: 280-386437

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
FEW4-MW75	SO	FEW4-MW75-(181.0)	280-100459-18		1/1	8/19/2017 17:10	8/19/2017 17:10	9/1/2017 23:19	280-386437/	N
FEW4-MW75	SO	FEW4-MW75-(191.0)	280-100459-19		1/1	8/19/2017 18:15	8/19/2017 18:15	9/1/2017 23:40	280-386437/	N

Test Method: SW8260B Analysis Batch: 280-386513

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
LABQC	SQ	LCS 280-386520/1-A	LCS 280-386520/1-A		1/1	9/4/2017 16:06	9/4/2017 16:06	9/4/2017 16:20	280-386513/	BS
LABQC	SQ	LCSD 280-386520/2-A	LCSD 280-386520/2-A		1/1	9/4/2017 16:06	9/4/2017 16:06	9/4/2017 16:40	280-386513/	BD
LABQC	SQ	MB 280-386520/3-A	MB 280-386520/3-A		1/1	9/4/2017 16:06	9/4/2017 16:06	9/4/2017 16:59	280-386513/	LB
FEW4-MW75	SO	FEW4-MW75-(123.0)	280-100459-12		2/1	8/19/2017 13:15	9/4/2017 16:06	9/4/2017 22:24	280-386513/	N

Test Method: SW8260B Analysis Batch: 280-386514

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
LABQC	SQ	LCS 280-386502/1-A	LCS 280-386502/1-A		1/1	9/3/2017 14:16	9/3/2017 14:16	9/3/2017 14:40	280-386514/	BS
LABQC	SQ	MB 280-386502/2-A	MB 280-386502/2-A		1/1	9/3/2017 14:16	9/3/2017 14:16	9/3/2017 15:00	280-386514/	LB
FEW4-MW75	SO	FEW4-MW75-(225.0)	280-100459-1		1/1	8/20/2017 10:10	8/20/2017 10:10	9/3/2017 15:41	280-386514/	N
FEW4-MW75	SO	FEW4-MW75-(226.0)	280-100459-2		1/1	8/20/2017 11:10	8/20/2017 11:10	9/3/2017 16:02	280-386514/	FD
FEW4-MW75	SO	FEW4-MW75-(235.0)	280-100459-4		1/1	8/20/2017 11:50	8/20/2017 11:50	9/3/2017 16:43	280-386514/	N
FEW4-MW75	SO	FEW4-MW75-(245.0)	280-100459-5		1/1	8/20/2017 12:00	8/20/2017 12:00	9/3/2017 17:04	280-386514/	N
FEW4-MW75	SO	FEW4-MW75-(255.0)	280-100459-6		1/1	8/20/2017 13:45	8/20/2017 13:45	9/3/2017 17:25	280-386514/	N
FEW4-MW75	SO	FEW4-MW75-(265.0)	280-100459-7		1/1	8/20/2017 13:55	8/20/2017 13:55	9/3/2017 17:45	280-386514/	N
FEW4-MW75	SO	FEW4-MW75-(275.0)	280-100459-8		1/1	8/20/2017 16:15	8/20/2017 16:15	9/3/2017 18:06	280-386514/	N
FEW4-MW75	SO	FEW4-MW75-(285.0)	280-100459-9		1/1	8/20/2017 16:30	8/20/2017 16:30	9/3/2017 18:27	280-386514/	N

US Army Corps of Engineers®

Batch Report

Test Method: SW8260B Analysis Batch: 280-386514

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
FEW4-MW75	SO	FEW4-MW75-(293.0)	280-100459-10		1/1	8/20/2017 17:23	8/20/2017 17:23	9/3/2017 18:47	280-386514/	N
FEW4-MW75	SO	FEW4-MW75-(304.0)	280-100459-11		1/1	8/20/2017 17:30	8/20/2017 17:30	9/3/2017 19:08	280-386514/	N

Test Method: SW8260B Analysis Batch: 280-386515

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
LABQC	SQ	LCS 280-386503/1-A	LCS 280-386503/1-A		1/1	9/3/2017 08:00	9/3/2017 08:00	9/3/2017 14:40	280-386515/	BS
LABQC	SQ	MB 280-386503/2-A	MB 280-386503/2-A		1/1	9/3/2017 08:00	9/3/2017 08:00	9/3/2017 15:00	280-386515/	LB
LABQC	SQ	LCSD 280-386503/6-A	LCSD 280-386503/6-A		1/1	9/3/2017 08:00	9/3/2017 08:00	9/3/2017 15:21	280-386515/	BD
FEW4-MW75	SO	FEW4-MW75-(213.0)	280-100459-3		1/1	8/20/2017 10:05	9/3/2017 08:00	9/3/2017 16:23	280-386515/	N

Field Batch Report

--No Records Found--

MS Mismatch Report

--No Records Found--

Section to identify Matrix Spike mismatches where parent sample differs from MS by dilution.

US Army Corps of Engineers®

QC Outlier Report

Test Method: SW8260B Extraction Method: SW5030A Leach Method: NONE

QC Element	Sample ID/ Lab Sample ID	Run#/ Dil'n	Analyte	Result (Units)	Qualifier	Warning Limits	Control Limits	Reason	Comment	Rule	Action Level
Test Hold Time	FEW4-MW75-(213.0) (N) / 280-100459-3	1 / 1.00	All in Run	14.26 (days)	J/UJ	< 14	< 14	H1	Test Exceeds UCL		

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

QC Element	Sample ID/ Lab Sample ID	Run#/ Dil'n	Analyte	Result (Units)	Qualifier	Warning Limits	Control Limits	Reason	Comment	Rule	Action Level
MS Recovery	FEW4-MW75-(205.0) (SD) / 280-100459-20MSD	1 / 1.00	n-Butylbenzene	69.37 (percent)	J/UJ	70 - 128	70 - 128	M			
MS RPD	280-100459-20MSD (SD) / 280-100459-20MSD	1 / 1.00	Chloroethane	37.40 (rpd)	J/None	< 20	< 20	D			
Surrogate	FEW4-MW75-(123.0) (N) / 280-100459-12	2 / 1.00	1-Bromo-4-fluorobenzene (4-Bromofluorobenzene)	137.6 (percent)	J/None	79 - 119	79 - 119	I			
Surrogate	FEW4-MW75-(123.0) (N) / 280-100459-12	2 / 1.00	Dibromofluoromethane	119.3 (percent)	J/None	78 - 119	78 - 119	I			
Surrogate	FEW4-MW75-(123.0) (N) / 280-100459-12	2 / 1.00	Toluene-d8	128.4 (percent)	J/None	85 - 116	85 - 116	I			
Test Hold Time	FEW4-MW75-(123.0) (N) / 280-100459-12	2 / 1.00	All in Run	16.38 (days)	J/UJ	< 14	< 14	H1	Test Exceeds UCL		
Test Hold Time	FEW4-MW75-(225.0) (N) / 280-100459-1	1 / 1.00	All in Run	14.23 (days)	J/UJ	< 14	< 14	H1	Test Exceeds UCL		
Test Hold Time	FEW4-MW75-(226.0) (FD) / 280-100459-2	1 / 1.00	All in Run	14.20 (days)	J/UJ	< 14	< 14	H1	Test Exceeds UCL		
Test Hold Time	FEW4-MW75-(235.0) (N) / 280-100459-4	1 / 1.00	All in Run	14.20 (days)	J/UJ	< 14	< 14	H1	Test Exceeds UCL		
Test Hold Time	FEW4-MW75-(245.0) (N) / 280-100459-5	1 / 1.00	All in Run	14.21 (days)	J/UJ	< 14	< 14	H1	Test Exceeds UCL		
Test Hold Time	FEW4-MW75-(255.0) (N) / 280-100459-6	1 / 1.00	All in Run	14.15 (days)	J/UJ	< 14	< 14	H1	Test Exceeds UCL		

US Army Corps of Engineers ®

QC Outlier Report

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

QC Element	Sample ID/ Lab Sample ID	Run#/ Dil'n	Analyte	Result (Units)	Qualifier	Warning Limits	Control Limits	Reason	Comment	Rule	Action Level
Test Hold Time	FEW4-MW75-(265.0) (N) / 280-100459-7	1 / 1.00	All in Run	14.16 (days)	J/UJ	< 14	< 14	H1	Test Exceeds UCL		
Test Hold Time	FEW4-MW75-(275.0) (N) / 280-100459-8	1 / 1.00	All in Run	14.08 (days)	J/UJ	< 14	< 14	H1	Test Exceeds UCL		
Test Hold Time	FEW4-MW75-(285.0) (N) / 280-100459-9	1 / 1.00	All in Run	14.08 (days)	J/UJ	< 14	< 14	H1	Test Exceeds UCL		
Test Hold Time	FEW4-MW75-(293.0) (N) / 280-100459-10	1 / 1.00	All in Run	14.06 (days)	J/UJ	< 14	< 14	H1	Test Exceeds UCL		
Test Hold Time	FEW4-MW75-(304.0) (N) / 280-100459-11	1 / 1.00	All in Run	14.07 (days)	J/UJ	< 14	< 14	H1	Test Exceeds UCL		

Rule is the multiplier used when blank contamination occurs to determine action level.

US Army Corps of Engineers®

Qualified Results

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW75-(123.0)	280-100459-12	SO	N	1,1,1,2-Tetrachloroethane	4.2	1.3 U	1.3 UJ		ug/kg	P
FEW4-MW75-(123.0)	280-100459-12	SO	N	1,1,1-Trichloroethane	4.2	1.3 U	1.3 UJ		ug/kg	P
FEW4-MW75-(123.0)	280-100459-12	SO	N	1,1,2,2-Tetrachloroethane	4.2	1.3 U	1.3 UJ		ug/kg	P
FEW4-MW75-(123.0)	280-100459-12	SO	N	1,1,2-Trichloroethane	4.2	2.7 U	2.7 UJ		ug/kg	P
FEW4-MW75-(123.0)	280-100459-12	SO	N	1,1-Dichloroethane	4.2	0.67 U	0.67 UJ		ug/kg	P
FEW4-MW75-(123.0)	280-100459-12	SO	N	1,1-Dichloroethene	4.2	1.3 U	1.3 UJ		ug/kg	P
FEW4-MW75-(123.0)	280-100459-12	SO	N	1,1-Dichloropropene	4.2	1.3 U	1.3 UJ		ug/kg	P
FEW4-MW75-(123.0)	280-100459-12	SO	N	1,2,3-Trichlorobenzene	4.2	1.3 U	1.3 UJ		ug/kg	P
FEW4-MW75-(123.0)	280-100459-12	SO	N	1,2,3-Trichloropropane	4.2	2.7 U	2.7 UJ		ug/kg	P
FEW4-MW75-(123.0)	280-100459-12	SO	N	1,2,4-Trichlorobenzene	4.2	1.3 U	1.3 UJ		ug/kg	P
FEW4-MW75-(123.0)	280-100459-12	SO	N	1,2,4-Trimethylbenzene	4.2	1.3 U	1.3 UJ		ug/kg	P
FEW4-MW75-(123.0)	280-100459-12	SO	N	1,2-Dibromo-3-chloropropane	8.4	1.3 U	1.3 UJ		ug/kg	P
FEW4-MW75-(123.0)	280-100459-12	SO	N	1,2-Dibromoethane (EDB)	4.2	1.3 U	1.3 UJ		ug/kg	P
FEW4-MW75-(123.0)	280-100459-12	SO	N	1,2-Dichlorobenzene	4.2	1.3 U	1.3 UJ		ug/kg	P
FEW4-MW75-(123.0)	280-100459-12	SO	N	1,2-Dichloroethane	4.2	1.3 U	1.3 UJ		ug/kg	P
FEW4-MW75-(123.0)	280-100459-12	SO	N	1,2-Dichloroethene	4.2	0.54 J	0.54 J		ug/kg	TR/P
FEW4-MW75-(123.0)	280-100459-12	SO	N	1,2-Dichloropropane	4.2	1.3 U	1.3 UJ		ug/kg	P
FEW4-MW75-(123.0)	280-100459-12	SO	N	1,3,5-Trimethylbenzene	4.2	1.3 U	1.3 UJ		ug/kg	P
FEW4-MW75-(123.0)	280-100459-12	SO	N	1,3-Dichlorobenzene	4.2	1.3 U	1.3 UJ		ug/kg	P
FEW4-MW75-(123.0)	280-100459-12	SO	N	1,3-Dichloropropane	4.2	1.3 U	1.3 UJ		ug/kg	P
FEW4-MW75-(123.0)	280-100459-12	SO	N	1,4-Dichlorobenzene	4.2	1.3 U	1.3 UJ		ug/kg	P
FEW4-MW75-(123.0)	280-100459-12	SO	N	2,2-Dichloropropane	4.2	1.3 U	1.3 UJ		ug/kg	P
FEW4-MW75-(123.0)	280-100459-12	SO	N	2-Butanone (MEK)	17	5.4 U Q	5.4 UJ		ug/kg	P
FEW4-MW75-(123.0)	280-100459-12	SO	N	2-Chlorotoluene	4.2	1.3 U	1.3 UJ		ug/kg	P
FEW4-MW75-(123.0)	280-100459-12	SO	N	2-Hexanone	17	11 U Q	11 UJ		ug/kg	P
FEW4-MW75-(123.0)	280-100459-12	SO	N	4-Chlorotoluene	4.2	1.3 U	1.3 UJ		ug/kg	P
FEW4-MW75-(123.0)	280-100459-12	SO	N	4-Methyl-2-pentanone (MIBK)	17	11 U	11 UJ		ug/kg	P

US Army Corps of Engineers®

Qualified Results

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW75-(123.0)	280-100459-12	SO	N	Acetone	17	27 Q	27 J		ug/kg	P/V2
FEW4-MW75-(123.0)	280-100459-12	SO	N	Benzene	4.2	1.3 U	1.3 UJ		ug/kg	P
FEW4-MW75-(123.0)	280-100459-12	SO	N	Bromobenzene	4.2	1.3 U	1.3 UJ		ug/kg	P
FEW4-MW75-(123.0)	280-100459-12	SO	N	Bromochloromethane	4.2	0.67 U	0.67 UJ		ug/kg	P
FEW4-MW75-(123.0)	280-100459-12	SO	N	Bromodichloromethane	4.2	0.67 U	0.67 UJ		ug/kg	P
FEW4-MW75-(123.0)	280-100459-12	SO	N	Bromoform	4.2	0.67 U	0.67 UJ		ug/kg	P
FEW4-MW75-(123.0)	280-100459-12	SO	N	Bromomethane	8.4	1.3 U Q	1.3 UJ		ug/kg	P
FEW4-MW75-(123.0)	280-100459-12	SO	N	Carbon disulfide	4.2	1.3 U	1.3 UJ		ug/kg	P
FEW4-MW75-(123.0)	280-100459-12	SO	N	Carbon tetrachloride	4.2	1.3 U	1.3 UJ		ug/kg	P
FEW4-MW75-(123.0)	280-100459-12	SO	N	Chlorobenzene	4.2	1.3 U	1.3 UJ		ug/kg	P
FEW4-MW75-(123.0)	280-100459-12	SO	N	Chloroethane	8.4	2.7 U	2.7 UJ		ug/kg	P
FEW4-MW75-(123.0)	280-100459-12	SO	N	Chloroform	8.4	0.48 J	0.48 J		ug/kg	TR/P
FEW4-MW75-(123.0)	280-100459-12	SO	N	Chloromethane	8.4	1.3 U	1.3 UJ		ug/kg	P
FEW4-MW75-(123.0)	280-100459-12	SO	N	cis-1,2-Dichloroethene	4.2	0.54 J	0.54 J		ug/kg	TR/P
FEW4-MW75-(123.0)	280-100459-12	SO	N	cis-1,3-Dichloropropene	4.2	2.7 U	2.7 UJ		ug/kg	P
FEW4-MW75-(123.0)	280-100459-12	SO	N	Dibromochloromethane	4.2	1.3 U	1.3 UJ		ug/kg	P
FEW4-MW75-(123.0)	280-100459-12	SO	N	Dibromomethane	4.2	2.7 U	2.7 UJ		ug/kg	P
FEW4-MW75-(123.0)	280-100459-12	SO	N	Dichlorodifluoromethane	8.4	1.3 U Q	1.3 UJ		ug/kg	P
FEW4-MW75-(123.0)	280-100459-12	SO	N	Ethylbenzene	4.2	1.3 U	1.3 UJ		ug/kg	P
FEW4-MW75-(123.0)	280-100459-12	SO	N	Hexachlorobutadiene	4.2	1.3 U	1.3 UJ		ug/kg	P
FEW4-MW75-(123.0)	280-100459-12	SO	N	Isopropylbenzene (Cumene)	4.2	1.3 U	1.3 UJ		ug/kg	P
FEW4-MW75-(123.0)	280-100459-12	SO	N	m,p-Xylene	2.7	2.7 U	2.7 UJ		ug/kg	P
FEW4-MW75-(123.0)	280-100459-12	SO	N	Methyl tert-butyl ether (MTBE)	17	0.67 U	0.67 UJ		ug/kg	P
FEW4-MW75-(123.0)	280-100459-12	SO	N	Methylene chloride	4.2	2.7 U	2.7 UJ		ug/kg	P
FEW4-MW75-(123.0)	280-100459-12	SO	N	Naphthalene	4.2	1.3 U	1.3 UJ		ug/kg	P
FEW4-MW75-(123.0)	280-100459-12	SO	N	n-Butylbenzene	4.2	1.3 U	1.3 UJ		ug/kg	P
FEW4-MW75-(123.0)	280-100459-12	SO	N	n-Propylbenzene	4.2	1.3 U	1.3 UJ		ug/kg	P
FEW4-MW75-(123.0)	280-100459-12	SO	N	o-Xylene	4.2	1.3 U	1.3 UJ		ug/kg	P

US Army Corps of Engineers®

Qualified Results

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW75-(123.0)	280-100459-12	SO	N	p-Cymene (p-Isopropyltoluene)	4.2	1.3 U	1.3 UJ		ug/kg	P
FEW4-MW75-(123.0)	280-100459-12	SO	N	sec-Butylbenzene	4.2	1.3 U	1.3 UJ		ug/kg	P
FEW4-MW75-(123.0)	280-100459-12	SO	N	Styrene	4.2	1.3 U	1.3 UJ		ug/kg	P
FEW4-MW75-(123.0)	280-100459-12	SO	N	tert-Butylbenzene	4.2	1.3 U	1.3 UJ		ug/kg	P
FEW4-MW75-(123.0)	280-100459-12	SO	N	Tetrachloroethene (PCE)	4.2	1.3 U	1.3 UJ		ug/kg	P
FEW4-MW75-(123.0)	280-100459-12	SO	N	Toluene	4.2	1.3 U	1.3 UJ		ug/kg	P
FEW4-MW75-(123.0)	280-100459-12	SO	N	trans-1,2-Dichloroethene	4.2	0.67 U	0.67 UJ		ug/kg	P
FEW4-MW75-(123.0)	280-100459-12	SO	N	trans-1,3-Dichloropropene	4.2	1.3 U	1.3 UJ		ug/kg	P
FEW4-MW75-(123.0)	280-100459-12	SO	N	Trichloroethene (TCE)	1400	2800 H	2800 J		ug/kg	H1/I/P
FEW4-MW75-(123.0)	280-100459-12	SO	N	Trichlorofluoromethane	8.4	2.7 U	2.7 UJ		ug/kg	P
FEW4-MW75-(123.0)	280-100459-12	SO	N	Vinyl chloride	4.2	2.7 U	2.7 UJ		ug/kg	P
FEW4-MW75-(133.0)	280-100459-13	SO	N	Acetone	25	21 J Q	21 J		ug/kg	TR/V2
FEW4-MW75-(141.0)	280-100459-14	SO	N	Acetone	21	31 Q	31 J		ug/kg	V2
FEW4-MW75-(151.0)	280-100459-15	SO	N	Acetone	24	18 J Q	18 J		ug/kg	TR/V2
FEW4-MW75-(161.0)	280-100459-16	SO	N	Acetone	25	22 J Q	22 J		ug/kg	TR/V2
FEW4-MW75-(161.0)	280-100459-16	SO	N	Trichloroethene (TCE)	6.3	0.69 J	0.69 J		ug/kg	TR
FEW4-MW75-(171.0)	280-100459-17	SO	N	Acetone	26	17 J Q	17 J		ug/kg	TR/V2
FEW4-MW75-(181.0)	280-100459-18	SO	N	Acetone	29	36 Q	36 J		ug/kg	V2
FEW4-MW75-(191.0)	280-100459-19	SO	N	Acetone	34	39 Q	39 J		ug/kg	V2
FEW4-MW75-(191.0)	280-100459-19	SO	N	Trichloroethene (TCE)	8.5	0.67 J	0.67 J		ug/kg	TR
FEW4-MW75-(205.0)	280-100459-20	SO	N	n-Butylbenzene	7.6	2.4 U J	2.4 UJ	-	ug/kg	M
FEW4-MW82-(244.0)	280-100459-21	SO	N	Acetone	27	16 J	16 J		ug/kg	TR
FEW4-MW82-(252.0)	280-100459-22	SO	N	Acetone	24	8.3 J	8.3 J		ug/kg	TR
FEW4-MW82-(264.0)	280-100459-23	SO	N	Acetone	38	35 J	35 J		ug/kg	TR
FEW4-MW82-(275.0)	280-100459-24	SO	N	Acetone	23	7.6 J	7.6 J		ug/kg	TR
FEW4-MW82-(285.0)	280-100459-25	SO	N	Acetone	43	30 J	30 J		ug/kg	TR
FEW4-MW82-(299.0)	280-100459-26	SO	N	Acetone	23	19 J	19 J		ug/kg	TR

US Army Corps of Engineers ®

Qualified Results

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW82-(306.0)	280-100459-27	SO	N	Acetone	22	13 J	13 J		ug/kg	TR

Qualified analytes in samples are reported as estimated, not detected (UJ) at the Limit of Detection (LOD).

US Army Corps of Engineers®

Detected Results

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Dilution	Analyte	LOQ	Lab Result	Qualified Result	Units	Reason
FEW4-MW75-(123.0)	280-100459-12	SO	N	1	1,2-Dichloroethene	4.2	0.54 J	0.54 J	ug/kg	TR/P
FEW4-MW75-(123.0)	280-100459-12	SO	N	1	Acetone	17	27 Q	27 J	ug/kg	P/V2
FEW4-MW75-(123.0)	280-100459-12	SO	N	1	Chloroform	8.4	0.48 J	0.48 J	ug/kg	TR/P
FEW4-MW75-(123.0)	280-100459-12	SO	N	1	cis-1,2-Dichloroethene	4.2	0.54 J	0.54 J	ug/kg	TR/P
FEW4-MW75-(123.0)	280-100459-12	SO	N	1	Trichloroethene (TCE)	1400	2800 H	2800 J	ug/kg	H1/I/P
FEW4-MW75-(133.0)	280-100459-13	SO	N	1	Acetone	25	21 J Q	21 J	ug/kg	TR/V2
FEW4-MW75-(133.0)	280-100459-13	SO	N	1	Trichloroethene (TCE)	6.3	18	18	ug/kg	
FEW4-MW75-(141.0)	280-100459-14	SO	N	1	Acetone	21	31 Q	31 J	ug/kg	V2
FEW4-MW75-(141.0)	280-100459-14	SO	N	1	Trichloroethene (TCE)	5.1	14	14	ug/kg	
FEW4-MW75-(151.0)	280-100459-15	SO	N	1	Acetone	24	18 J Q	18 J	ug/kg	TR/V2
FEW4-MW75-(151.0)	280-100459-15	SO	N	1	Trichloroethene (TCE)	5.9	96	96	ug/kg	
FEW4-MW75-(161.0)	280-100459-16	SO	N	1	Acetone	25	22 J Q	22 J	ug/kg	TR/V2
FEW4-MW75-(161.0)	280-100459-16	SO	N	1	Trichloroethene (TCE)	6.3	0.69 J	0.69 J	ug/kg	TR
FEW4-MW75-(171.0)	280-100459-17	SO	N	1	Acetone	26	17 J Q	17 J	ug/kg	TR/V2
FEW4-MW75-(181.0)	280-100459-18	SO	N	1	Acetone	29	36 Q	36 J	ug/kg	V2
FEW4-MW75-(191.0)	280-100459-19	SO	N	1	Acetone	34	39 Q	39 J	ug/kg	V2
FEW4-MW75-(191.0)	280-100459-19	SO	N	1	Trichloroethene (TCE)	8.5	0.67 J	0.67 J	ug/kg	TR
FEW4-MW75-(225.0)	280-100459-1	SO	N	1	Acetone	15	13 J	13	ug/kg	
FEW4-MW75-(225.0)	280-100459-1	SO	N	1	Trichloroethene (TCE)	3.8	2.1 J	2.1	ug/kg	
FEW4-MW75-(226.0)	280-100459-2	SO	FD	1	Acetone	15	9.6 J	9.6	ug/kg	
FEW4-MW75-(226.0)	280-100459-2	SO	FD	1	Trichloroethene (TCE)	3.8	1.8 J	1.8	ug/kg	
FEW4-MW75-(235.0)	280-100459-4	SO	N	1	Acetone	23	11 J	11	ug/kg	
FEW4-MW75-(255.0)	280-100459-6	SO	N	1	Acetone	25	32	32	ug/kg	
FEW4-MW75-(265.0)	280-100459-7	SO	N	1	Acetone	29	24 J	24	ug/kg	
FEW4-MW75-(275.0)	280-100459-8	SO	N	1	Acetone	30	27 J	27	ug/kg	
FEW4-MW82-(244.0)	280-100459-21	SO	N	1	Acetone	27	16 J	16 J	ug/kg	TR
FEW4-MW82-(252.0)	280-100459-22	SO	N	1	Acetone	24	8.3 J	8.3 J	ug/kg	TR

US Army Corps of Engineers ®

Detected Results

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Dilution	Analyte	LOQ	Lab Result	Qualified Result	Units	Reason
FEW4-MW82-(264.0)	280-100459-23	SO	N	1	Acetone	38	35 J	35 J	ug/kg	TR
FEW4-MW82-(275.0)	280-100459-24	SO	N	1	Acetone	23	7.6 J	7.6 J	ug/kg	TR
FEW4-MW82-(285.0)	280-100459-25	SO	N	1	Acetone	43	30 J	30 J	ug/kg	TR
FEW4-MW82-(299.0)	280-100459-26	SO	N	1	Acetone	23	19 J	19 J	ug/kg	TR
FEW4-MW82-(306.0)	280-100459-27	SO	N	1	Acetone	22	13 J	13 J	ug/kg	TR

Rejected Results

--No Records Found--

US Army Corps of Engineers ®

Facility:	B08WY0467-02, F.E. Warren AFB, Site 4
Event:	2017-2018 RI Addendum Tasks
SDG:	280-100459-1_52-2a_FUDSChem
Guidance Document:	Draft-Final Uniform Federal Policy-Quality Assurance Project Plan for the Remedial Investigation Addendum 2017-2018 Tasks Atlas "D" Missile Site 4 —Laramie County, Wyoming, July 2017
Prime Contractor:	RMC Consultants, Inc., LAKEWOOD, CO
Project Manager:	David Groy
Contract Laboratory:	TestAmerica Laboratories, Inc., Arvada, CO
Data Review Contractor:	RMC Consultants
Data Review Level:	Stage 3VEM
Primary Data Reviewer:	Gary Torf, Contractor Project Chemist
Second Reviewer:	, Senior Scientist
Date Submitted:	

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	SW8260B
FEW4-MW75-(123.0)	280-100459-12	Solid	Field Sample/N	X
FEW4-MW75-(133.0)	280-100459-13	Solid	Field Sample/N	X
FEW4-MW75-(141.0)	280-100459-14	Solid	Field Sample/N	X
FEW4-MW75-(151.0)	280-100459-15	Solid	Field Sample/N	X
FEW4-MW75-(161.0)	280-100459-16	Solid	Field Sample/N	X
FEW4-MW75-(171.0)	280-100459-17	Solid	Field Sample/N	X
FEW4-MW75-(181.0)	280-100459-18	Solid	Field Sample/N	X
FEW4-MW75-(191.0)	280-100459-19	Solid	Field Sample/N	X
FEW4-MW75-(205.0)	280-100459-20	Solid	Field Sample/N	X
FEW4-MW75-(213.0)	280-100459-3	Solid	Field Sample/N	X
FEW4-MW75-(225.0)	280-100459-1	Solid	Field Sample/N	X
FEW4-MW75-(226.0)	280-100459-2	Solid	Field Duplicate/FD	X
FEW4-MW75-(235.0)	280-100459-4	Solid	Field Sample/N	X
FEW4-MW75-(245.0)	280-100459-5	Solid	Field Sample/N	X
FEW4-MW75-(255.0)	280-100459-6	Solid	Field Sample/N	X
FEW4-MW75-(265.0)	280-100459-7	Solid	Field Sample/N	X
FEW4-MW75-(275.0)	280-100459-8	Solid	Field Sample/N	X
FEW4-MW75-(285.0)	280-100459-9	Solid	Field Sample/N	X
FEW4-MW75-(293.0)	280-100459-10	Solid	Field Sample/N	X

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	SW8260B
FEW4-MW75-(304.0)	280-100459-11	Solid	Field Sample/N	X
FEW4-MW82-(244.0)	280-100459-21	Solid	Field Sample/N	X
FEW4-MW82-(252.0)	280-100459-22	Solid	Field Sample/N	X
FEW4-MW82-(264.0)	280-100459-23	Solid	Field Sample/N	X
FEW4-MW82-(275.0)	280-100459-24	Solid	Field Sample/N	X
FEW4-MW82-(285.0)	280-100459-25	Solid	Field Sample/N	X
FEW4-MW82-(299.0)	280-100459-26	Solid	Field Sample/N	X
FEW4-MW82-(306.0)	280-100459-27	Solid	Field Sample/N	X

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the Draft-Final Uniform Federal Policy-Quality Assurance Project Plan for the Remedial Investigation Addendum 2017-2018 Tasks Atlas “D” Missile Site 4 —Laramie County, Wyoming, July 2017 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by RMC Consultants, Inc., LAKEWOOD, CO; analyses were performed by TestAmerica Laboratories, Inc., Arvada, CO and were reported under sample delivery group (SDG) 280-100459-1_52-2a_FUDSChem. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

- Blank
- Blank - Negative
- Field Duplicate RPD
- LCS Recovery
- LCS RPD
- MS Recovery
- MS RPD
- Prep Hold Time
- Surrogate
- Test Hold Time

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 74 results (4.15%) out of the 1782 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected. Trace values, defined as results that are qualified as estimated because they fall between the limit of detection and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

Narrative Comments

Analytical Method	Data Reviewer Comment
SW8260B	No additional comments; see Checklist for detail.

November 30, 2017

Reviewed by Gary Torf, Contractor Project Chemist, RMC Consultants

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of a minimum of 10% of the reported sample results and method quality control data between the two deliverables.

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

Quality Control Outliers for test method SW8260B, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
FEW4-MW75-(205.0) (SD)/ 280-100459-20MSD	n-Butylbenzene	69.37	70 - 128	70 - 128	percent	J/UJ	M	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the MS Recovery for SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW75-(205.0)	N	n-Butylbenzene	7.6	2.4 U J	2.4 UJ	-	ug/kg	M

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

Quality Control Outliers for test method SW8260B, MS RPD

The objective of matrix spikes/matrix spike duplicates (MS/MSD) RPD analysis is to demonstrate acceptable method precision by the laboratory at the time of analysis. MS/MSD analyses are also performed to generate data that determines the long-term precision of the analytical method on various matrices. Non-homogenous samples can impact the apparent method precision. Summary forms were evaluated and compared to electronic data deliverables. Matrix spikes/matrix spike duplicates results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
280-100459-20MSD (SD)/ 280-100459-20MSD	Chloroethane	37.40	< 20	< 20	rpd	J/None	D	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

Quality Control Outliers for test method SW8260B, Surrogate

Method performance for individual samples is demonstrated through spiking activities. All samples are spiked with surrogate compounds prior to sample preparation. The sample itself may produce effects due to such factors as interferences and high concentrations of analytes. Summary forms were evaluated and compared to electronic data deliverables. Surrogate results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
FEW4-MW75-(123.0) (N)/ 280-100459-12	Dibromofluoromethane	119.3	78 - 119	78 - 119	percent	J/None	I	
FEW4-MW75-(123.0) (N)/ 280-100459-12	Toluene-d8	128.4	85 - 116	85 - 116	percent	J/None	I	
FEW4-MW75-(123.0) (N)/ 280-100459-12	1-Bromo-4-fluorobenzene (4-Bromofluorobenzene)	137.6	79 - 119	79 - 119	percent	J/None	I	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the Surrogate for SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW75-(123.0)	N	Trichloroethene (TCE)	1400	2800 H	2800 J		ug/kg	H1/I/P

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

Quality Control Outliers for test method SW8260B, Test Hold Time

Hold times are ascertained based on project requirements. Holding times were determined by comparing the chain of custody records with the dates of analysis found in the electronic data deliverable and laboratory summary forms. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
FEW4-MW75-(213.0) (N)/ 280-100459-3		14.26	< 14	< 14	days	J/UJ	H1	Test Exceeds UCL

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

Quality Control Outliers for test method SW8260B, Test Hold Time

Hold times are ascertained based on project requirements. Holding times were determined by comparing the chain of custody records with the dates of analysis found in the electronic data deliverable and laboratory summary forms. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
FEW4-MW75-(123.0) (N)/ 280-100459-12		16.38	< 14	< 14	days	J/UJ	H1	Test Exceeds UCL
FEW4-MW75-(225.0) (N)/ 280-100459-1		14.23	< 14	< 14	days	J/UJ	H1	Test Exceeds UCL
FEW4-MW75-(226.0) (FD)/ 280-100459-2		14.20	< 14	< 14	days	J/UJ	H1	Test Exceeds UCL
FEW4-MW75-(235.0) (N)/ 280-100459-4		14.20	< 14	< 14	days	J/UJ	H1	Test Exceeds UCL
FEW4-MW75-(245.0) (N)/ 280-100459-5		14.21	< 14	< 14	days	J/UJ	H1	Test Exceeds UCL
FEW4-MW75-(255.0) (N)/ 280-100459-6		14.15	< 14	< 14	days	J/UJ	H1	Test Exceeds UCL
FEW4-MW75-(265.0) (N)/ 280-100459-7		14.16	< 14	< 14	days	J/UJ	H1	Test Exceeds UCL
FEW4-MW75-(275.0) (N)/ 280-100459-8		14.08	< 14	< 14	days	J/UJ	H1	Test Exceeds UCL
FEW4-MW75-(285.0) (N)/ 280-100459-9		14.08	< 14	< 14	days	J/UJ	H1	Test Exceeds UCL
FEW4-MW75-(293.0) (N)/ 280-100459-10		14.06	< 14	< 14	days	J/UJ	H1	Test Exceeds UCL
FEW4-MW75-(304.0) (N)/ 280-100459-11		14.07	< 14	< 14	days	J/UJ	H1	Test Exceeds UCL

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the Test Hold Time for SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW75-(123.0)	N	Trichloroethene (TCE)	1400	2800 H	2800 J		ug/kg	H1/I/P

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

Table of All Qualified Results

Test Method: SW8260B	Extraction Method: SW5035A							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW75-(123.0)	N	Trichloroethene (TCE)	1400	2800 H	2800 J		ug/kg	H1/I/P
FEW4-MW75-(205.0)	N	n-Butylbenzene	7.6	2.4 U J	2.4 UJ	-	ug/kg	M

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
Trace values are not included in the qualified results table unless additional reason codes are associated.

Table of All Trace Results

Test Method: SW8260B	Extraction Method: SW5035A							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW75-(123.0)	N	1,2-Dichloroethene	4.20	0.540 J	0.540 J		ug/kg	TR/P
FEW4-MW75-(123.0)	N	Chloroform	8.40	0.480 J	0.480 J		ug/kg	TR/P
FEW4-MW75-(123.0)	N	cis-1,2-Dichloroethene	4.20	0.540 J	0.540 J		ug/kg	TR/P
FEW4-MW75-(133.0)	N	Acetone	25.0	21.0 J Q	21.0 J		ug/kg	TR/V2
FEW4-MW75-(151.0)	N	Acetone	24.0	18.0 J Q	18.0 J		ug/kg	TR/V2
FEW4-MW75-(161.0)	N	Acetone	25.0	22.0 J Q	22.0 J		ug/kg	TR/V2
FEW4-MW75-(161.0)	N	Trichloroethene (TCE)	6.30	0.690 J	0.690 J		ug/kg	TR
FEW4-MW75-(171.0)	N	Acetone	26.0	17.0 J Q	17.0 J		ug/kg	TR/V2
FEW4-MW75-(191.0)	N	Trichloroethene (TCE)	8.50	0.670 J	0.670 J		ug/kg	TR
FEW4-MW82-(244.0)	N	Acetone	27.0	16.0 J	16.0 J		ug/kg	TR
FEW4-MW82-(252.0)	N	Acetone	24.0	8.30 J	8.30 J		ug/kg	TR
FEW4-MW82-(264.0)	N	Acetone	38.0	35.0 J	35.0 J		ug/kg	TR
FEW4-MW82-(275.0)	N	Acetone	23.0	7.60 J	7.60 J		ug/kg	TR
FEW4-MW82-(285.0)	N	Acetone	43.0	30.0 J	30.0 J		ug/kg	TR
FEW4-MW82-(299.0)	N	Acetone	23.0	19.0 J	19.0 J		ug/kg	TR
FEW4-MW82-(306.0)	N	Acetone	22.0	13.0 J	13.0 J		ug/kg	TR

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW75-(213.0)	N	1,1,1,2-Tetrachloroethane	6.8	2.2 U	2.2 UJ	2.2 U	
FEW4-MW75-(213.0)	N	1,1,1-Trichloroethane	6.8	2.2 U	2.2 UJ	2.2 U	
FEW4-MW75-(213.0)	N	1,1,2,2-Tetrachloroethane	6.8	2.2 U	2.2 UJ	2.2 U	
FEW4-MW75-(213.0)	N	1,1,2-Trichloroethane	6.8	4.3 U	4.3 UJ	4.3 U	
FEW4-MW75-(213.0)	N	1,1-Dichloroethane	6.8	1.1 U	1.1 UJ	1.1 U	
FEW4-MW75-(213.0)	N	1,1-Dichloroethene	6.8	2.2 U	2.2 UJ	2.2 U	
FEW4-MW75-(213.0)	N	1,1-Dichloropropene	6.8	2.2 U	2.2 UJ	2.2 U	
FEW4-MW75-(213.0)	N	1,2,3-Trichlorobenzene	6.8	2.2 U	2.2 UJ	2.2 U	
FEW4-MW75-(213.0)	N	1,2,3-Trichloropropane	6.8	4.3 U	4.3 UJ	4.3 U	
FEW4-MW75-(213.0)	N	1,2,4-Trichlorobenzene	6.8	2.2 U	2.2 UJ	2.2 U	
FEW4-MW75-(213.0)	N	1,2,4-Trimethylbenzene	6.8	2.2 U	2.2 UJ	2.2 U	
FEW4-MW75-(213.0)	N	1,2-Dibromo-3-chloropropane	14	2.2 U	2.2 UJ	2.2 U	
FEW4-MW75-(213.0)	N	1,2-Dibromoethane (EDB)	6.8	2.2 U	2.2 UJ	2.2 U	
FEW4-MW75-(213.0)	N	1,2-Dichlorobenzene	6.8	2.2 U	2.2 UJ	2.2 U	
FEW4-MW75-(213.0)	N	1,2-Dichloroethane	6.8	2.2 U	2.2 UJ	2.2 U	
FEW4-MW75-(213.0)	N	1,2-Dichloroethene	6.8	2.2 U	2.2 UJ	2.2 U	
FEW4-MW75-(213.0)	N	1,2-Dichloropropane	6.8	2.2 U	2.2 UJ	2.2 U	
FEW4-MW75-(213.0)	N	1,3,5-Trimethylbenzene	6.8	2.2 U	2.2 UJ	2.2 U	
FEW4-MW75-(213.0)	N	1,3-Dichlorobenzene	6.8	2.2 U	2.2 UJ	2.2 U	
FEW4-MW75-(213.0)	N	1,3-Dichloropropane	6.8	2.2 U	2.2 UJ	2.2 U	
FEW4-MW75-(213.0)	N	1,4-Dichlorobenzene	6.8	2.2 U	2.2 UJ	2.2 U	
FEW4-MW75-(213.0)	N	2,2-Dichloropropane	6.8	2.2 U	2.2 UJ	2.2 U	
FEW4-MW75-(213.0)	N	2-Butanone (MEK)	27	8.7 U	8.7 UJ	8.7 U	
FEW4-MW75-(213.0)	N	2-Chlorotoluene	6.8	2.2 U	2.2 UJ	2.2 U	
FEW4-MW75-(213.0)	N	2-Hexanone	27	17 U	17 UJ	17 U	
FEW4-MW75-(213.0)	N	4-Chlorotoluene	6.8	2.2 U	2.2 UJ	2.2 U	
FEW4-MW75-(213.0)	N	4-Methyl-2-pentanone (MIBK)	27	17 U	17 UJ	17 U	
FEW4-MW75-(213.0)	N	Acetone	27	17 U	17 UJ	17 U	
FEW4-MW75-(213.0)	N	Benzene	6.8	2.2 U	2.2 UJ	2.2 U	
FEW4-MW75-(213.0)	N	Bromobenzene	6.8	2.2 U	2.2 UJ	2.2 U	
FEW4-MW75-(213.0)	N	Bromochloromethane	6.8	1.1 U	1.1 UJ	1.1 U	
FEW4-MW75-(213.0)	N	Bromodichloromethane	6.8	1.1 U	1.1 UJ	1.1 U	
FEW4-MW75-(213.0)	N	Bromoform	6.8	1.1 U	1.1 UJ	1.1 U	
FEW4-MW75-(213.0)	N	Bromomethane	14	2.2 U Q	2.2 UJ	2.2 U	
FEW4-MW75-(213.0)	N	Carbon disulfide	6.8	2.2 U	2.2 UJ	2.2 U	
FEW4-MW75-(213.0)	N	Carbon tetrachloride	6.8	2.2 U	2.2 UJ	2.2 U	
FEW4-MW75-(213.0)	N	Chlorobenzene	6.8	2.2 U	2.2 UJ	2.2 U	
FEW4-MW75-(213.0)	N	Chloroethane	14	4.3 U Q	4.3 UJ	4.3 U	
FEW4-MW75-(213.0)	N	Chloroform	14	1.1 U	1.1 UJ	1.1 U	
FEW4-MW75-(213.0)	N	Chloromethane	14	2.2 U	2.2 UJ	2.2 U	
FEW4-MW75-(213.0)	N	cis-1,2-Dichloroethene	6.8	2.2 U	2.2 UJ	2.2 U	

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW75-(213.0)	N	cis-1,3-Dichloropropene	6.8	4.3 U	4.3 UJ	4.3 U	
FEW4-MW75-(213.0)	N	Dibromochloromethane	6.8	2.2 U	2.2 UJ	2.2 U	
FEW4-MW75-(213.0)	N	Dibromomethane	6.8	4.3 U	4.3 UJ	4.3 U	
FEW4-MW75-(213.0)	N	Dichlorodifluoromethane	14	2.2 U	2.2 UJ	2.2 U	
FEW4-MW75-(213.0)	N	Ethylbenzene	6.8	2.2 U	2.2 UJ	2.2 U	
FEW4-MW75-(213.0)	N	Hexachlorobutadiene	6.8	2.2 U	2.2 UJ	2.2 U	
FEW4-MW75-(213.0)	N	Isopropylbenzene (Cumene)	6.8	2.2 U	2.2 UJ	2.2 U	
FEW4-MW75-(213.0)	N	m,p-Xylene	4.3	4.3 U	4.3 UJ	4.3 U	
FEW4-MW75-(213.0)	N	Methyl tert-butyl ether (MTBE)	27	1.1 U	1.1 UJ	1.1 U	
FEW4-MW75-(213.0)	N	Methylene chloride	6.8	4.3 U	4.3 UJ	4.3 U	
FEW4-MW75-(213.0)	N	Naphthalene	6.8	2.2 U	2.2 UJ	2.2 U	
FEW4-MW75-(213.0)	N	n-Butylbenzene	6.8	2.2 U	2.2 UJ	2.2 U	
FEW4-MW75-(213.0)	N	n-Propylbenzene	6.8	2.2 U	2.2 UJ	2.2 U	
FEW4-MW75-(213.0)	N	o-Xylene	6.8	2.2 U	2.2 UJ	2.2 U	
FEW4-MW75-(213.0)	N	p-Cymene (p-Isopropyltoluene)	6.8	2.2 U	2.2 UJ	2.2 U	
FEW4-MW75-(213.0)	N	sec-Butylbenzene	6.8	2.2 U	2.2 UJ	2.2 U	
FEW4-MW75-(213.0)	N	Styrene	6.8	2.2 U	2.2 UJ	2.2 U	
FEW4-MW75-(213.0)	N	tert-Butylbenzene	6.8	2.2 U	2.2 UJ	2.2 U	
FEW4-MW75-(213.0)	N	Tetrachloroethene (PCE)	6.8	2.2 U	2.2 UJ	2.2 U	
FEW4-MW75-(213.0)	N	Toluene	6.8	2.2 U	2.2 UJ	2.2 U	
FEW4-MW75-(213.0)	N	trans-1,2-Dichloroethene	6.8	1.1 U	1.1 UJ	1.1 U	
FEW4-MW75-(213.0)	N	trans-1,3-Dichloropropene	6.8	2.2 U	2.2 UJ	2.2 U	
FEW4-MW75-(213.0)	N	Trichloroethene (TCE)	6.8	1.1 U	1.1 UJ	1.1 U	
FEW4-MW75-(213.0)	N	Trichlorofluoromethane	14	4.3 U	4.3 UJ	4.3 U	
FEW4-MW75-(213.0)	N	Vinyl chloride	6.8	4.3 U	4.3 UJ	4.3 U	

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW75-(123.0)	N	1,1,1,2-Tetrachloroethane	4.2	1.3 U	1.3 U	1.3 UJ	P
FEW4-MW75-(123.0)	N	1,1,1-Trichloroethane	4.2	1.3 U	1.3 U	1.3 UJ	P
FEW4-MW75-(123.0)	N	1,1,2,2-Tetrachloroethane	4.2	1.3 U	1.3 U	1.3 UJ	P
FEW4-MW75-(123.0)	N	1,1,2-Trichloroethane	4.2	2.7 U	2.7 U	2.7 UJ	P
FEW4-MW75-(123.0)	N	1,1-Dichloroethane	4.2	0.67 U	0.67 U	0.67 UJ	P
FEW4-MW75-(123.0)	N	1,1-Dichloroethene	4.2	1.3 U	1.3 U	1.3 UJ	P
FEW4-MW75-(123.0)	N	1,1-Dichloropropene	4.2	1.3 U	1.3 U	1.3 UJ	P
FEW4-MW75-(123.0)	N	1,2,3-Trichlorobenzene	4.2	1.3 U	1.3 U	1.3 UJ	P
FEW4-MW75-(123.0)	N	1,2,3-Trichloropropane	4.2	2.7 U	2.7 U	2.7 UJ	P
FEW4-MW75-(123.0)	N	1,2,4-Trichlorobenzene	4.2	1.3 U	1.3 U	1.3 UJ	P
FEW4-MW75-(123.0)	N	1,2,4-Trimethylbenzene	4.2	1.3 U	1.3 U	1.3 UJ	P
FEW4-MW75-(123.0)	N	1,2-Dibromo-3-chloropropane	8.4	1.3 U	1.3 U	1.3 UJ	P
FEW4-MW75-(123.0)	N	1,2-Dibromoethane (EDB)	4.2	1.3 U	1.3 U	1.3 UJ	P

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW75-(123.0)	N	1,2-Dichlorobenzene	4.2	1.3 U	1.3 U	1.3 UJ	P
FEW4-MW75-(123.0)	N	1,2-Dichloroethane	4.2	1.3 U	1.3 U	1.3 UJ	P
FEW4-MW75-(123.0)	N	1,2-Dichloroethene	4.2	0.54 J	0.54 J	0.54 J	TR/P
FEW4-MW75-(123.0)	N	1,2-Dichloropropane	4.2	1.3 U	1.3 U	1.3 UJ	P
FEW4-MW75-(123.0)	N	1,3,5-Trimethylbenzene	4.2	1.3 U	1.3 U	1.3 UJ	P
FEW4-MW75-(123.0)	N	1,3-Dichlorobenzene	4.2	1.3 U	1.3 U	1.3 UJ	P
FEW4-MW75-(123.0)	N	1,3-Dichloropropane	4.2	1.3 U	1.3 U	1.3 UJ	P
FEW4-MW75-(123.0)	N	1,4-Dichlorobenzene	4.2	1.3 U	1.3 U	1.3 UJ	P
FEW4-MW75-(123.0)	N	2,2-Dichloropropane	4.2	1.3 U	1.3 U	1.3 UJ	P
FEW4-MW75-(123.0)	N	2-Butanone (MEK)	17	5.4 U Q	5.4 U	5.4 UJ	P
FEW4-MW75-(123.0)	N	2-Chlorotoluene	4.2	1.3 U	1.3 U	1.3 UJ	P
FEW4-MW75-(123.0)	N	2-Hexanone	17	11 U Q	11 U	11 UJ	P
FEW4-MW75-(123.0)	N	4-Chlorotoluene	4.2	1.3 U	1.3 U	1.3 UJ	P
FEW4-MW75-(123.0)	N	4-Methyl-2-pentanone (MIBK)	17	11 U	11 U	11 UJ	P
FEW4-MW75-(123.0)	N	Acetone	17	27 Q	27	27 J	P/V2
FEW4-MW75-(123.0)	N	Benzene	4.2	1.3 U	1.3 U	1.3 UJ	P
FEW4-MW75-(123.0)	N	Bromobenzene	4.2	1.3 U	1.3 U	1.3 UJ	P
FEW4-MW75-(123.0)	N	Bromochloromethane	4.2	0.67 U	0.67 U	0.67 UJ	P
FEW4-MW75-(123.0)	N	Bromodichloromethane	4.2	0.67 U	0.67 U	0.67 UJ	P
FEW4-MW75-(123.0)	N	Bromoform	4.2	0.67 U	0.67 U	0.67 UJ	P
FEW4-MW75-(123.0)	N	Bromomethane	8.4	1.3 U Q	1.3 U	1.3 UJ	P
FEW4-MW75-(123.0)	N	Carbon disulfide	4.2	1.3 U	1.3 U	1.3 UJ	P
FEW4-MW75-(123.0)	N	Carbon tetrachloride	4.2	1.3 U	1.3 U	1.3 UJ	P
FEW4-MW75-(123.0)	N	Chlorobenzene	4.2	1.3 U	1.3 U	1.3 UJ	P
FEW4-MW75-(123.0)	N	Chloroethane	8.4	2.7 U	2.7 U	2.7 UJ	P
FEW4-MW75-(123.0)	N	Chloroform	8.4	0.48 J	0.48 J	0.48 J	TR/P
FEW4-MW75-(123.0)	N	Chloromethane	8.4	1.3 U	1.3 U	1.3 UJ	P
FEW4-MW75-(123.0)	N	cis-1,2-Dichloroethene	4.2	0.54 J	0.54 J	0.54 J	TR/P
FEW4-MW75-(123.0)	N	cis-1,3-Dichloropropene	4.2	2.7 U	2.7 U	2.7 UJ	P
FEW4-MW75-(123.0)	N	Dibromochloromethane	4.2	1.3 U	1.3 U	1.3 UJ	P
FEW4-MW75-(123.0)	N	Dibromomethane	4.2	2.7 U	2.7 U	2.7 UJ	P
FEW4-MW75-(123.0)	N	Dichlorodifluoromethane	8.4	1.3 U Q	1.3 U	1.3 UJ	P
FEW4-MW75-(123.0)	N	Ethylbenzene	4.2	1.3 U	1.3 U	1.3 UJ	P
FEW4-MW75-(123.0)	N	Hexachlorobutadiene	4.2	1.3 U	1.3 U	1.3 UJ	P
FEW4-MW75-(123.0)	N	Isopropylbenzene (Cumene)	4.2	1.3 U	1.3 U	1.3 UJ	P
FEW4-MW75-(123.0)	N	m,p-Xylene	2.7	2.7 U	2.7 U	2.7 UJ	P
FEW4-MW75-(123.0)	N	Methyl tert-butyl ether (MTBE)	17	0.67 U	0.67 U	0.67 UJ	P
FEW4-MW75-(123.0)	N	Methylene chloride	4.2	2.7 U	2.7 U	2.7 UJ	P
FEW4-MW75-(123.0)	N	Naphthalene	4.2	1.3 U	1.3 U	1.3 UJ	P
FEW4-MW75-(123.0)	N	n-Butylbenzene	4.2	1.3 U	1.3 U	1.3 UJ	P
FEW4-MW75-(123.0)	N	n-Propylbenzene	4.2	1.3 U	1.3 U	1.3 UJ	P

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW75-(123.0)	N	o-Xylene	4.2	1.3 U	1.3 U	1.3 UJ	P
FEW4-MW75-(123.0)	N	p-Cymene (p-Isopropyltoluene)	4.2	1.3 U	1.3 U	1.3 UJ	P
FEW4-MW75-(123.0)	N	sec-Butylbenzene	4.2	1.3 U	1.3 U	1.3 UJ	P
FEW4-MW75-(123.0)	N	Styrene	4.2	1.3 U	1.3 U	1.3 UJ	P
FEW4-MW75-(123.0)	N	tert-Butylbenzene	4.2	1.3 U	1.3 U	1.3 UJ	P
FEW4-MW75-(123.0)	N	Tetrachloroethene (PCE)	4.2	1.3 U	1.3 U	1.3 UJ	P
FEW4-MW75-(123.0)	N	Toluene	4.2	1.3 U	1.3 U	1.3 UJ	P
FEW4-MW75-(123.0)	N	trans-1,2-Dichloroethene	4.2	0.67 U	0.67 U	0.67 UJ	P
FEW4-MW75-(123.0)	N	trans-1,3-Dichloropropene	4.2	1.3 U	1.3 U	1.3 UJ	P
FEW4-MW75-(123.0)	N	Trichloroethene (TCE)	1400	2800 H	2800 J	2800 J	H1/I/P
FEW4-MW75-(123.0)	N	Trichlorofluoromethane	8.4	2.7 U	2.7 U	2.7 UJ	P
FEW4-MW75-(123.0)	N	Vinyl chloride	4.2	2.7 U	2.7 U	2.7 UJ	P
FEW4-MW75-(133.0)	N	Acetone	25	21 J Q	21 J	21 J	TR/V2
FEW4-MW75-(141.0)	N	Acetone	21	31 Q	31	31 J	V2
FEW4-MW75-(151.0)	N	Acetone	24	18 J Q	18 J	18 J	TR/V2
FEW4-MW75-(161.0)	N	Acetone	25	22 J Q	22 J	22 J	TR/V2
FEW4-MW75-(171.0)	N	Acetone	26	17 J Q	17 J	17 J	TR/V2
FEW4-MW75-(181.0)	N	Acetone	29	36 Q	36	36 J	V2
FEW4-MW75-(191.0)	N	Acetone	34	39 Q	39	39 J	V2
FEW4-MW75-(225.0)	N	1,1,1,2-Tetrachloroethane	3.8	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(225.0)	N	1,1,1-Trichloroethane	3.8	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(225.0)	N	1,1,2,2-Tetrachloroethane	3.8	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(225.0)	N	1,1,2-Trichloroethane	3.8	2.4 U	2.4 UJ	2.4 U	
FEW4-MW75-(225.0)	N	1,1-Dichloroethane	3.8	0.61 U	0.61 UJ	0.61 U	
FEW4-MW75-(225.0)	N	1,1-Dichloroethene	3.8	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(225.0)	N	1,1-Dichloropropene	3.8	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(225.0)	N	1,2,3-Trichlorobenzene	3.8	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(225.0)	N	1,2,3-Trichloropropane	3.8	2.4 U	2.4 UJ	2.4 U	
FEW4-MW75-(225.0)	N	1,2,4-Trichlorobenzene	3.8	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(225.0)	N	1,2,4-Trimethylbenzene	3.8	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(225.0)	N	1,2-Dibromo-3-chloropropane	7.6	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(225.0)	N	1,2-Dibromoethane (EDB)	3.8	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(225.0)	N	1,2-Dichlorobenzene	3.8	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(225.0)	N	1,2-Dichloroethane	3.8	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(225.0)	N	1,2-Dichloroethene	3.8	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(225.0)	N	1,2-Dichloropropane	3.8	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(225.0)	N	1,3,5-Trimethylbenzene	3.8	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(225.0)	N	1,3-Dichlorobenzene	3.8	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(225.0)	N	1,3-Dichloropropane	3.8	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(225.0)	N	1,4-Dichlorobenzene	3.8	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(225.0)	N	2,2-Dichloropropane	3.8	1.2 U	1.2 UJ	1.2 U	

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW75-(225.0)	N	2-Butanone (MEK)	15	4.9 U	4.9 UJ	4.9 U	
FEW4-MW75-(225.0)	N	2-Chlorotoluene	3.8	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(225.0)	N	2-Hexanone	15	9.8 U	9.8 UJ	9.8 U	
FEW4-MW75-(225.0)	N	4-Chlorotoluene	3.8	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(225.0)	N	4-Methyl-2-pentanone (MIBK)	15	9.8 U	9.8 UJ	9.8 U	
FEW4-MW75-(225.0)	N	Acetone	15	13 J	13 J	13	
FEW4-MW75-(225.0)	N	Benzene	3.8	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(225.0)	N	Bromobenzene	3.8	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(225.0)	N	Bromochloromethane	3.8	0.61 U	0.61 UJ	0.61 U	
FEW4-MW75-(225.0)	N	Bromodichloromethane	3.8	0.61 U	0.61 UJ	0.61 U	
FEW4-MW75-(225.0)	N	Bromoform	3.8	0.61 U	0.61 UJ	0.61 U	
FEW4-MW75-(225.0)	N	Bromomethane	7.6	1.2 U Q	1.2 UJ	1.2 U	
FEW4-MW75-(225.0)	N	Carbon disulfide	3.8	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(225.0)	N	Carbon tetrachloride	3.8	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(225.0)	N	Chlorobenzene	3.8	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(225.0)	N	Chloroethane	7.6	2.4 U Q	2.4 UJ	2.4 U	
FEW4-MW75-(225.0)	N	Chloroform	7.6	0.61 U	0.61 UJ	0.61 U	
FEW4-MW75-(225.0)	N	Chloromethane	7.6	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(225.0)	N	cis-1,2-Dichloroethene	3.8	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(225.0)	N	cis-1,3-Dichloropropene	3.8	2.4 U	2.4 UJ	2.4 U	
FEW4-MW75-(225.0)	N	Dibromochloromethane	3.8	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(225.0)	N	Dibromomethane	3.8	2.4 U	2.4 UJ	2.4 U	
FEW4-MW75-(225.0)	N	Dichlorodifluoromethane	7.6	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(225.0)	N	Ethylbenzene	3.8	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(225.0)	N	Hexachlorobutadiene	3.8	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(225.0)	N	Isopropylbenzene (Cumene)	3.8	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(225.0)	N	m,p-Xylene	2.4	2.4 U	2.4 UJ	2.4 U	
FEW4-MW75-(225.0)	N	Methyl tert-butyl ether (MTBE)	15	0.61 U	0.61 UJ	0.61 U	
FEW4-MW75-(225.0)	N	Methylene chloride	3.8	2.4 U	2.4 UJ	2.4 U	
FEW4-MW75-(225.0)	N	Naphthalene	3.8	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(225.0)	N	n-Butylbenzene	3.8	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(225.0)	N	n-Propylbenzene	3.8	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(225.0)	N	o-Xylene	3.8	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(225.0)	N	p-Cymene (p-Isopropyltoluene)	3.8	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(225.0)	N	sec-Butylbenzene	3.8	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(225.0)	N	Styrene	3.8	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(225.0)	N	tert-Butylbenzene	3.8	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(225.0)	N	Tetrachloroethene (PCE)	3.8	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(225.0)	N	Toluene	3.8	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(225.0)	N	trans-1,2-Dichloroethene	3.8	0.61 U	0.61 UJ	0.61 U	

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW75-(225.0)	N	trans-1,3-Dichloropropene	3.8	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(225.0)	N	Trichloroethene (TCE)	3.8	2.1 J	2.1 J	2.1	
FEW4-MW75-(225.0)	N	Trichlorofluoromethane	7.6	2.4 U	2.4 UJ	2.4 U	
FEW4-MW75-(225.0)	N	Vinyl chloride	3.8	2.4 U	2.4 UJ	2.4 U	
FEW4-MW75-(226.0)	FD	1,1,1,2-Tetrachloroethane	3.8	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(226.0)	FD	1,1,1-Trichloroethane	3.8	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(226.0)	FD	1,1,2,2-Tetrachloroethane	3.8	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(226.0)	FD	1,1,2-Trichloroethane	3.8	2.4 U	2.4 UJ	2.4 U	
FEW4-MW75-(226.0)	FD	1,1-Dichloroethane	3.8	0.60 U	0.60 UJ	0.60 U	
FEW4-MW75-(226.0)	FD	1,1-Dichloroethene	3.8	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(226.0)	FD	1,1-Dichloropropene	3.8	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(226.0)	FD	1,2,3-Trichlorobenzene	3.8	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(226.0)	FD	1,2,3-Trichloropropane	3.8	2.4 U	2.4 UJ	2.4 U	
FEW4-MW75-(226.0)	FD	1,2,4-Trichlorobenzene	3.8	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(226.0)	FD	1,2,4-Trimethylbenzene	3.8	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(226.0)	FD	1,2-Dibromo-3-chloropropane	7.5	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(226.0)	FD	1,2-Dibromoethane (EDB)	3.8	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(226.0)	FD	1,2-Dichlorobenzene	3.8	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(226.0)	FD	1,2-Dichloroethane	3.8	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(226.0)	FD	1,2-Dichloroethene	3.8	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(226.0)	FD	1,2-Dichloropropane	3.8	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(226.0)	FD	1,3,5-Trimethylbenzene	3.8	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(226.0)	FD	1,3-Dichlorobenzene	3.8	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(226.0)	FD	1,3-Dichloropropane	3.8	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(226.0)	FD	1,4-Dichlorobenzene	3.8	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(226.0)	FD	2,2-Dichloropropane	3.8	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(226.0)	FD	2-Butanone (MEK)	15	4.8 U	4.8 UJ	4.8 U	
FEW4-MW75-(226.0)	FD	2-Chlorotoluene	3.8	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(226.0)	FD	2-Hexanone	15	9.6 U	9.6 UJ	9.6 U	
FEW4-MW75-(226.0)	FD	4-Chlorotoluene	3.8	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(226.0)	FD	4-Methyl-2-pentanone (MIBK)	15	9.6 U	9.6 UJ	9.6 U	
FEW4-MW75-(226.0)	FD	Acetone	15	9.6 J	9.6 J	9.6	
FEW4-MW75-(226.0)	FD	Benzene	3.8	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(226.0)	FD	Bromobenzene	3.8	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(226.0)	FD	Bromochloromethane	3.8	0.60 U	0.60 UJ	0.60 U	
FEW4-MW75-(226.0)	FD	Bromodichloromethane	3.8	0.60 U	0.60 UJ	0.60 U	
FEW4-MW75-(226.0)	FD	Bromoform	3.8	0.60 U	0.60 UJ	0.60 U	
FEW4-MW75-(226.0)	FD	Bromomethane	7.5	1.2 U Q	1.2 UJ	1.2 U	
FEW4-MW75-(226.0)	FD	Carbon disulfide	3.8	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(226.0)	FD	Carbon tetrachloride	3.8	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(226.0)	FD	Chlorobenzene	3.8	1.2 U	1.2 UJ	1.2 U	

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW75-(226.0)	FD	Chloroethane	7.5	2.4 U Q	2.4 UJ	2.4 U	
FEW4-MW75-(226.0)	FD	Chloroform	7.5	0.60 U	0.60 UJ	0.60 U	
FEW4-MW75-(226.0)	FD	Chloromethane	7.5	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(226.0)	FD	cis-1,2-Dichloroethene	3.8	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(226.0)	FD	cis-1,3-Dichloropropene	3.8	2.4 U	2.4 UJ	2.4 U	
FEW4-MW75-(226.0)	FD	Dibromochloromethane	3.8	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(226.0)	FD	Dibromomethane	3.8	2.4 U	2.4 UJ	2.4 U	
FEW4-MW75-(226.0)	FD	Dichlorodifluoromethane	7.5	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(226.0)	FD	Ethylbenzene	3.8	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(226.0)	FD	Hexachlorobutadiene	3.8	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(226.0)	FD	Isopropylbenzene (Cumene)	3.8	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(226.0)	FD	m,p-Xylene	2.4	2.4 U	2.4 UJ	2.4 U	
FEW4-MW75-(226.0)	FD	Methyl tert-butyl ether (MTBE)	15	0.60 U	0.60 UJ	0.60 U	
FEW4-MW75-(226.0)	FD	Methylene chloride	3.8	2.4 U	2.4 UJ	2.4 U	
FEW4-MW75-(226.0)	FD	Naphthalene	3.8	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(226.0)	FD	n-Butylbenzene	3.8	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(226.0)	FD	n-Propylbenzene	3.8	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(226.0)	FD	o-Xylene	3.8	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(226.0)	FD	p-Cymene (p-Isopropyltoluene)	3.8	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(226.0)	FD	sec-Butylbenzene	3.8	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(226.0)	FD	Styrene	3.8	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(226.0)	FD	tert-Butylbenzene	3.8	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(226.0)	FD	Tetrachloroethene (PCE)	3.8	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(226.0)	FD	Toluene	3.8	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(226.0)	FD	trans-1,2-Dichloroethene	3.8	0.60 U	0.60 UJ	0.60 U	
FEW4-MW75-(226.0)	FD	trans-1,3-Dichloropropene	3.8	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(226.0)	FD	Trichloroethene (TCE)	3.8	1.8 J	1.8 J	1.8	
FEW4-MW75-(226.0)	FD	Trichlorofluoromethane	7.5	2.4 U	2.4 UJ	2.4 U	
FEW4-MW75-(226.0)	FD	Vinyl chloride	3.8	2.4 U	2.4 UJ	2.4 U	
FEW4-MW75-(235.0)	N	1,1,1,2-Tetrachloroethane	5.8	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(235.0)	N	1,1,1-Trichloroethane	5.8	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(235.0)	N	1,1,2,2-Tetrachloroethane	5.8	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(235.0)	N	1,1,2-Trichloroethane	5.8	3.7 U	3.7 UJ	3.7 U	
FEW4-MW75-(235.0)	N	1,1-Dichloroethane	5.8	0.92 U	0.92 UJ	0.92 U	
FEW4-MW75-(235.0)	N	1,1-Dichloroethene	5.8	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(235.0)	N	1,1-Dichloropropene	5.8	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(235.0)	N	1,2,3-Trichlorobenzene	5.8	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(235.0)	N	1,2,3-Trichloropropane	5.8	3.7 U	3.7 UJ	3.7 U	
FEW4-MW75-(235.0)	N	1,2,4-Trichlorobenzene	5.8	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(235.0)	N	1,2,4-Trimethylbenzene	5.8	1.8 U	1.8 UJ	1.8 U	

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW75-(235.0)	N	1,2-Dibromo-3-chloropropane	12	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(235.0)	N	1,2-Dibromoethane (EDB)	5.8	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(235.0)	N	1,2-Dichlorobenzene	5.8	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(235.0)	N	1,2-Dichloroethane	5.8	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(235.0)	N	1,2-Dichloroethene	5.8	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(235.0)	N	1,2-Dichloropropane	5.8	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(235.0)	N	1,3,5-Trimethylbenzene	5.8	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(235.0)	N	1,3-Dichlorobenzene	5.8	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(235.0)	N	1,3-Dichloropropane	5.8	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(235.0)	N	1,4-Dichlorobenzene	5.8	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(235.0)	N	2,2-Dichloropropane	5.8	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(235.0)	N	2-Butanone (MEK)	23	7.4 U	7.4 UJ	7.4 U	
FEW4-MW75-(235.0)	N	2-Chlorotoluene	5.8	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(235.0)	N	2-Hexanone	23	15 U	15 UJ	15 U	
FEW4-MW75-(235.0)	N	4-Chlorotoluene	5.8	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(235.0)	N	4-Methyl-2-pentanone (MIBK)	23	15 U	15 UJ	15 U	
FEW4-MW75-(235.0)	N	Acetone	23	11 J	11 J	11	
FEW4-MW75-(235.0)	N	Benzene	5.8	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(235.0)	N	Bromobenzene	5.8	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(235.0)	N	Bromochloromethane	5.8	0.92 U	0.92 UJ	0.92 U	
FEW4-MW75-(235.0)	N	Bromodichloromethane	5.8	0.92 U	0.92 UJ	0.92 U	
FEW4-MW75-(235.0)	N	Bromoform	5.8	0.92 U	0.92 UJ	0.92 U	
FEW4-MW75-(235.0)	N	Bromomethane	12	1.8 U Q	1.8 UJ	1.8 U	
FEW4-MW75-(235.0)	N	Carbon disulfide	5.8	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(235.0)	N	Carbon tetrachloride	5.8	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(235.0)	N	Chlorobenzene	5.8	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(235.0)	N	Chloroethane	12	3.7 U Q	3.7 UJ	3.7 U	
FEW4-MW75-(235.0)	N	Chloroform	12	0.92 U	0.92 UJ	0.92 U	
FEW4-MW75-(235.0)	N	Chloromethane	12	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(235.0)	N	cis-1,2-Dichloroethene	5.8	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(235.0)	N	cis-1,3-Dichloropropene	5.8	3.7 U	3.7 UJ	3.7 U	
FEW4-MW75-(235.0)	N	Dibromochloromethane	5.8	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(235.0)	N	Dibromomethane	5.8	3.7 U	3.7 UJ	3.7 U	
FEW4-MW75-(235.0)	N	Dichlorodifluoromethane	12	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(235.0)	N	Ethylbenzene	5.8	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(235.0)	N	Hexachlorobutadiene	5.8	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(235.0)	N	Isopropylbenzene (Cumene)	5.8	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(235.0)	N	m,p-Xylene	3.7	3.7 U	3.7 UJ	3.7 U	
FEW4-MW75-(235.0)	N	Methyl tert-butyl ether (MTBE)	23	0.92 U	0.92 UJ	0.92 U	
FEW4-MW75-(235.0)	N	Methylene chloride	5.8	3.7 U	3.7 UJ	3.7 U	

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW75-(235.0)	N	Naphthalene	5.8	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(235.0)	N	n-Butylbenzene	5.8	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(235.0)	N	n-Propylbenzene	5.8	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(235.0)	N	o-Xylene	5.8	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(235.0)	N	p-Cymene (p-Isopropyltoluene)	5.8	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(235.0)	N	sec-Butylbenzene	5.8	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(235.0)	N	Styrene	5.8	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(235.0)	N	tert-Butylbenzene	5.8	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(235.0)	N	Tetrachloroethene (PCE)	5.8	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(235.0)	N	Toluene	5.8	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(235.0)	N	trans-1,2-Dichloroethene	5.8	0.92 U	0.92 UJ	0.92 U	
FEW4-MW75-(235.0)	N	trans-1,3-Dichloropropene	5.8	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(235.0)	N	Trichloroethene (TCE)	5.8	0.92 U	0.92 UJ	0.92 U	
FEW4-MW75-(235.0)	N	Trichlorofluoromethane	12	3.7 U	3.7 UJ	3.7 U	
FEW4-MW75-(235.0)	N	Vinyl chloride	5.8	3.7 U	3.7 UJ	3.7 U	
FEW4-MW75-(245.0)	N	1,1,1,2-Tetrachloroethane	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(245.0)	N	1,1,1-Trichloroethane	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(245.0)	N	1,1,2,2-Tetrachloroethane	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(245.0)	N	1,1,2-Trichloroethane	5.7	3.7 U	3.7 UJ	3.7 U	
FEW4-MW75-(245.0)	N	1,1-Dichloroethane	5.7	0.91 U	0.91 UJ	0.91 U	
FEW4-MW75-(245.0)	N	1,1-Dichloroethene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(245.0)	N	1,1-Dichloropropene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(245.0)	N	1,2,3-Trichlorobenzene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(245.0)	N	1,2,3-Trichloropropane	5.7	3.7 U	3.7 UJ	3.7 U	
FEW4-MW75-(245.0)	N	1,2,4-Trichlorobenzene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(245.0)	N	1,2,4-Trimethylbenzene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(245.0)	N	1,2-Dibromo-3-chloropropane	11	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(245.0)	N	1,2-Dibromoethane (EDB)	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(245.0)	N	1,2-Dichlorobenzene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(245.0)	N	1,2-Dichloroethane	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(245.0)	N	1,2-Dichloroethene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(245.0)	N	1,2-Dichloropropane	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(245.0)	N	1,3,5-Trimethylbenzene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(245.0)	N	1,3-Dichlorobenzene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(245.0)	N	1,3-Dichloropropane	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(245.0)	N	1,4-Dichlorobenzene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(245.0)	N	2,2-Dichloropropane	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(245.0)	N	2-Butanone (MEK)	23	7.3 U	7.3 UJ	7.3 U	
FEW4-MW75-(245.0)	N	2-Chlorotoluene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(245.0)	N	2-Hexanone	23	15 U	15 UJ	15 U	
FEW4-MW75-(245.0)	N	4-Chlorotoluene	5.7	1.8 U	1.8 UJ	1.8 U	

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW75-(245.0)	N	4-Methyl-2-pentanone (MIBK)	23	15 U	15 UJ	15 U	
FEW4-MW75-(245.0)	N	Acetone	23	15 U	15 UJ	15 U	
FEW4-MW75-(245.0)	N	Benzene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(245.0)	N	Bromobenzene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(245.0)	N	Bromochloromethane	5.7	0.91 U	0.91 UJ	0.91 U	
FEW4-MW75-(245.0)	N	Bromodichloromethane	5.7	0.91 U	0.91 UJ	0.91 U	
FEW4-MW75-(245.0)	N	Bromoform	5.7	0.91 U	0.91 UJ	0.91 U	
FEW4-MW75-(245.0)	N	Bromomethane	11	1.8 U Q	1.8 UJ	1.8 U	
FEW4-MW75-(245.0)	N	Carbon disulfide	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(245.0)	N	Carbon tetrachloride	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(245.0)	N	Chlorobenzene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(245.0)	N	Chloroethane	11	3.7 U Q	3.7 UJ	3.7 U	
FEW4-MW75-(245.0)	N	Chloroform	11	0.91 U	0.91 UJ	0.91 U	
FEW4-MW75-(245.0)	N	Chloromethane	11	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(245.0)	N	cis-1,2-Dichloroethene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(245.0)	N	cis-1,3-Dichloropropene	5.7	3.7 U	3.7 UJ	3.7 U	
FEW4-MW75-(245.0)	N	Dibromochloromethane	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(245.0)	N	Dibromomethane	5.7	3.7 U	3.7 UJ	3.7 U	
FEW4-MW75-(245.0)	N	Dichlorodifluoromethane	11	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(245.0)	N	Ethylbenzene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(245.0)	N	Hexachlorobutadiene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(245.0)	N	Isopropylbenzene (Cumene)	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(245.0)	N	m,p-Xylene	3.7	3.7 U	3.7 UJ	3.7 U	
FEW4-MW75-(245.0)	N	Methyl tert-butyl ether (MTBE)	23	0.91 U	0.91 UJ	0.91 U	
FEW4-MW75-(245.0)	N	Methylene chloride	5.7	3.7 U	3.7 UJ	3.7 U	
FEW4-MW75-(245.0)	N	Naphthalene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(245.0)	N	n-Butylbenzene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(245.0)	N	n-Propylbenzene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(245.0)	N	o-Xylene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(245.0)	N	p-Cymene (p-Isopropyltoluene)	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(245.0)	N	sec-Butylbenzene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(245.0)	N	Styrene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(245.0)	N	tert-Butylbenzene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(245.0)	N	Tetrachloroethene (PCE)	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(245.0)	N	Toluene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(245.0)	N	trans-1,2-Dichloroethene	5.7	0.91 U	0.91 UJ	0.91 U	
FEW4-MW75-(245.0)	N	trans-1,3-Dichloropropene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW75-(245.0)	N	Trichloroethene (TCE)	5.7	0.91 U	0.91 UJ	0.91 U	
FEW4-MW75-(245.0)	N	Trichlorofluoromethane	11	3.7 U	3.7 UJ	3.7 U	
FEW4-MW75-(245.0)	N	Vinyl chloride	5.7	3.7 U	3.7 UJ	3.7 U	

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW75-(255.0)	N	1,1,1,2-Tetrachloroethane	6.3	2.0 U	2.0 UJ	2.0 U	
FEW4-MW75-(255.0)	N	1,1,1-Trichloroethane	6.3	2.0 U	2.0 UJ	2.0 U	
FEW4-MW75-(255.0)	N	1,1,2,2-Tetrachloroethane	6.3	2.0 U	2.0 UJ	2.0 U	
FEW4-MW75-(255.0)	N	1,1,2-Trichloroethane	6.3	4.0 U	4.0 UJ	4.0 U	
FEW4-MW75-(255.0)	N	1,1-Dichloroethane	6.3	1.0 U	1.0 UJ	1.0 U	
FEW4-MW75-(255.0)	N	1,1-Dichloroethene	6.3	2.0 U	2.0 UJ	2.0 U	
FEW4-MW75-(255.0)	N	1,1-Dichloropropene	6.3	2.0 U	2.0 UJ	2.0 U	
FEW4-MW75-(255.0)	N	1,2,3-Trichlorobenzene	6.3	2.0 U	2.0 UJ	2.0 U	
FEW4-MW75-(255.0)	N	1,2,3-Trichloropropane	6.3	4.0 U	4.0 UJ	4.0 U	
FEW4-MW75-(255.0)	N	1,2,4-Trichlorobenzene	6.3	2.0 U	2.0 UJ	2.0 U	
FEW4-MW75-(255.0)	N	1,2,4-Trimethylbenzene	6.3	2.0 U	2.0 UJ	2.0 U	
FEW4-MW75-(255.0)	N	1,2-Dibromo-3-chloropropane	13	2.0 U	2.0 UJ	2.0 U	
FEW4-MW75-(255.0)	N	1,2-Dibromoethane (EDB)	6.3	2.0 U	2.0 UJ	2.0 U	
FEW4-MW75-(255.0)	N	1,2-Dichlorobenzene	6.3	2.0 U	2.0 UJ	2.0 U	
FEW4-MW75-(255.0)	N	1,2-Dichloroethane	6.3	2.0 U	2.0 UJ	2.0 U	
FEW4-MW75-(255.0)	N	1,2-Dichloroethene	6.3	2.0 U	2.0 UJ	2.0 U	
FEW4-MW75-(255.0)	N	1,2-Dichloropropane	6.3	2.0 U	2.0 UJ	2.0 U	
FEW4-MW75-(255.0)	N	1,3,5-Trimethylbenzene	6.3	2.0 U	2.0 UJ	2.0 U	
FEW4-MW75-(255.0)	N	1,3-Dichlorobenzene	6.3	2.0 U	2.0 UJ	2.0 U	
FEW4-MW75-(255.0)	N	1,3-Dichloropropane	6.3	2.0 U	2.0 UJ	2.0 U	
FEW4-MW75-(255.0)	N	1,4-Dichlorobenzene	6.3	2.0 U	2.0 UJ	2.0 U	
FEW4-MW75-(255.0)	N	2,2-Dichloropropane	6.3	2.0 U	2.0 UJ	2.0 U	
FEW4-MW75-(255.0)	N	2-Butanone (MEK)	25	8.1 U	8.1 UJ	8.1 U	
FEW4-MW75-(255.0)	N	2-Chlorotoluene	6.3	2.0 U	2.0 UJ	2.0 U	
FEW4-MW75-(255.0)	N	2-Hexanone	25	16 U	16 UJ	16 U	
FEW4-MW75-(255.0)	N	4-Chlorotoluene	6.3	2.0 U	2.0 UJ	2.0 U	
FEW4-MW75-(255.0)	N	4-Methyl-2-pentanone (MIBK)	25	16 U	16 UJ	16 U	
FEW4-MW75-(255.0)	N	Acetone	25	32	32 J	32	
FEW4-MW75-(255.0)	N	Benzene	6.3	2.0 U	2.0 UJ	2.0 U	
FEW4-MW75-(255.0)	N	Bromobenzene	6.3	2.0 U	2.0 UJ	2.0 U	
FEW4-MW75-(255.0)	N	Bromochloromethane	6.3	1.0 U	1.0 UJ	1.0 U	
FEW4-MW75-(255.0)	N	Bromodichloromethane	6.3	1.0 U	1.0 UJ	1.0 U	
FEW4-MW75-(255.0)	N	Bromoform	6.3	1.0 U	1.0 UJ	1.0 U	
FEW4-MW75-(255.0)	N	Bromomethane	13	2.0 U Q	2.0 UJ	2.0 U	
FEW4-MW75-(255.0)	N	Carbon disulfide	6.3	2.0 U	2.0 UJ	2.0 U	
FEW4-MW75-(255.0)	N	Carbon tetrachloride	6.3	2.0 U	2.0 UJ	2.0 U	
FEW4-MW75-(255.0)	N	Chlorobenzene	6.3	2.0 U	2.0 UJ	2.0 U	
FEW4-MW75-(255.0)	N	Chloroethane	13	4.0 U Q	4.0 UJ	4.0 U	
FEW4-MW75-(255.0)	N	Chloroform	13	1.0 U	1.0 UJ	1.0 U	
FEW4-MW75-(255.0)	N	Chloromethane	13	2.0 U	2.0 UJ	2.0 U	
FEW4-MW75-(255.0)	N	cis-1,2-Dichloroethene	6.3	2.0 U	2.0 UJ	2.0 U	

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW75-(255.0)	N	cis-1,3-Dichloropropene	6.3	4.0 U	4.0 UJ	4.0 U	
FEW4-MW75-(255.0)	N	Dibromochloromethane	6.3	2.0 U	2.0 UJ	2.0 U	
FEW4-MW75-(255.0)	N	Dibromomethane	6.3	4.0 U	4.0 UJ	4.0 U	
FEW4-MW75-(255.0)	N	Dichlorodifluoromethane	13	2.0 U	2.0 UJ	2.0 U	
FEW4-MW75-(255.0)	N	Ethylbenzene	6.3	2.0 U	2.0 UJ	2.0 U	
FEW4-MW75-(255.0)	N	Hexachlorobutadiene	6.3	2.0 U	2.0 UJ	2.0 U	
FEW4-MW75-(255.0)	N	Isopropylbenzene (Cumene)	6.3	2.0 U	2.0 UJ	2.0 U	
FEW4-MW75-(255.0)	N	m,p-Xylene	4.0	4.0 U	4.0 UJ	4.0 U	
FEW4-MW75-(255.0)	N	Methyl tert-butyl ether (MTBE)	25	1.0 U	1.0 UJ	1.0 U	
FEW4-MW75-(255.0)	N	Methylene chloride	6.3	4.0 U	4.0 UJ	4.0 U	
FEW4-MW75-(255.0)	N	Naphthalene	6.3	2.0 U	2.0 UJ	2.0 U	
FEW4-MW75-(255.0)	N	n-Butylbenzene	6.3	2.0 U	2.0 UJ	2.0 U	
FEW4-MW75-(255.0)	N	n-Propylbenzene	6.3	2.0 U	2.0 UJ	2.0 U	
FEW4-MW75-(255.0)	N	o-Xylene	6.3	2.0 U	2.0 UJ	2.0 U	
FEW4-MW75-(255.0)	N	p-Cymene (p-Isopropyltoluene)	6.3	2.0 U	2.0 UJ	2.0 U	
FEW4-MW75-(255.0)	N	sec-Butylbenzene	6.3	2.0 U	2.0 UJ	2.0 U	
FEW4-MW75-(255.0)	N	Styrene	6.3	2.0 U	2.0 UJ	2.0 U	
FEW4-MW75-(255.0)	N	tert-Butylbenzene	6.3	2.0 U	2.0 UJ	2.0 U	
FEW4-MW75-(255.0)	N	Tetrachloroethene (PCE)	6.3	2.0 U	2.0 UJ	2.0 U	
FEW4-MW75-(255.0)	N	Toluene	6.3	2.0 U	2.0 UJ	2.0 U	
FEW4-MW75-(255.0)	N	trans-1,2-Dichloroethene	6.3	1.0 U	1.0 UJ	1.0 U	
FEW4-MW75-(255.0)	N	trans-1,3-Dichloropropene	6.3	2.0 U	2.0 UJ	2.0 U	
FEW4-MW75-(255.0)	N	Trichloroethene (TCE)	6.3	1.0 U	1.0 UJ	1.0 U	
FEW4-MW75-(255.0)	N	Trichlorofluoromethane	13	4.0 U	4.0 UJ	4.0 U	
FEW4-MW75-(255.0)	N	Vinyl chloride	6.3	4.0 U	4.0 UJ	4.0 U	
FEW4-MW75-(265.0)	N	1,1,1,2-Tetrachloroethane	7.2	2.3 U	2.3 UJ	2.3 U	
FEW4-MW75-(265.0)	N	1,1,1-Trichloroethane	7.2	2.3 U	2.3 UJ	2.3 U	
FEW4-MW75-(265.0)	N	1,1,2,2-Tetrachloroethane	7.2	2.3 U	2.3 UJ	2.3 U	
FEW4-MW75-(265.0)	N	1,1,2-Trichloroethane	7.2	4.6 U	4.6 UJ	4.6 U	
FEW4-MW75-(265.0)	N	1,1-Dichloroethane	7.2	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(265.0)	N	1,1-Dichloroethene	7.2	2.3 U	2.3 UJ	2.3 U	
FEW4-MW75-(265.0)	N	1,1-Dichloropropene	7.2	2.3 U	2.3 UJ	2.3 U	
FEW4-MW75-(265.0)	N	1,2,3-Trichlorobenzene	7.2	2.3 U	2.3 UJ	2.3 U	
FEW4-MW75-(265.0)	N	1,2,3-Trichloropropane	7.2	4.6 U	4.6 UJ	4.6 U	
FEW4-MW75-(265.0)	N	1,2,4-Trichlorobenzene	7.2	2.3 U	2.3 UJ	2.3 U	
FEW4-MW75-(265.0)	N	1,2,4-Trimethylbenzene	7.2	2.3 U	2.3 UJ	2.3 U	
FEW4-MW75-(265.0)	N	1,2-Dibromo-3-chloropropane	14	2.3 U	2.3 UJ	2.3 U	
FEW4-MW75-(265.0)	N	1,2-Dibromoethane (EDB)	7.2	2.3 U	2.3 UJ	2.3 U	
FEW4-MW75-(265.0)	N	1,2-Dichlorobenzene	7.2	2.3 U	2.3 UJ	2.3 U	
FEW4-MW75-(265.0)	N	1,2-Dichloroethane	7.2	2.3 U	2.3 UJ	2.3 U	

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW75-(265.0)	N	1,2-Dichloroethene	7.2	2.3 U	2.3 UJ	2.3 U	
FEW4-MW75-(265.0)	N	1,2-Dichloropropane	7.2	2.3 U	2.3 UJ	2.3 U	
FEW4-MW75-(265.0)	N	1,3,5-Trimethylbenzene	7.2	2.3 U	2.3 UJ	2.3 U	
FEW4-MW75-(265.0)	N	1,3-Dichlorobenzene	7.2	2.3 U	2.3 UJ	2.3 U	
FEW4-MW75-(265.0)	N	1,3-Dichloropropane	7.2	2.3 U	2.3 UJ	2.3 U	
FEW4-MW75-(265.0)	N	1,4-Dichlorobenzene	7.2	2.3 U	2.3 UJ	2.3 U	
FEW4-MW75-(265.0)	N	2,2-Dichloropropane	7.2	2.3 U	2.3 UJ	2.3 U	
FEW4-MW75-(265.0)	N	2-Butanone (MEK)	29	9.3 U	9.3 UJ	9.3 U	
FEW4-MW75-(265.0)	N	2-Chlorotoluene	7.2	2.3 U	2.3 UJ	2.3 U	
FEW4-MW75-(265.0)	N	2-Hexanone	29	19 U	19 UJ	19 U	
FEW4-MW75-(265.0)	N	4-Chlorotoluene	7.2	2.3 U	2.3 UJ	2.3 U	
FEW4-MW75-(265.0)	N	4-Methyl-2-pentanone (MIBK)	29	19 U	19 UJ	19 U	
FEW4-MW75-(265.0)	N	Acetone	29	24 J	24 J	24	
FEW4-MW75-(265.0)	N	Benzene	7.2	2.3 U	2.3 UJ	2.3 U	
FEW4-MW75-(265.0)	N	Bromobenzene	7.2	2.3 U	2.3 UJ	2.3 U	
FEW4-MW75-(265.0)	N	Bromochloromethane	7.2	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(265.0)	N	Bromodichloromethane	7.2	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(265.0)	N	Bromoform	7.2	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(265.0)	N	Bromomethane	14	2.3 U Q	2.3 UJ	2.3 U	
FEW4-MW75-(265.0)	N	Carbon disulfide	7.2	2.3 U	2.3 UJ	2.3 U	
FEW4-MW75-(265.0)	N	Carbon tetrachloride	7.2	2.3 U	2.3 UJ	2.3 U	
FEW4-MW75-(265.0)	N	Chlorobenzene	7.2	2.3 U	2.3 UJ	2.3 U	
FEW4-MW75-(265.0)	N	Chloroethane	14	4.6 U Q	4.6 UJ	4.6 U	
FEW4-MW75-(265.0)	N	Chloroform	14	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(265.0)	N	Chloromethane	14	2.3 U	2.3 UJ	2.3 U	
FEW4-MW75-(265.0)	N	cis-1,2-Dichloroethene	7.2	2.3 U	2.3 UJ	2.3 U	
FEW4-MW75-(265.0)	N	cis-1,3-Dichloropropene	7.2	4.6 U	4.6 UJ	4.6 U	
FEW4-MW75-(265.0)	N	Dibromochloromethane	7.2	2.3 U	2.3 UJ	2.3 U	
FEW4-MW75-(265.0)	N	Dibromomethane	7.2	4.6 U	4.6 UJ	4.6 U	
FEW4-MW75-(265.0)	N	Dichlorodifluoromethane	14	2.3 U	2.3 UJ	2.3 U	
FEW4-MW75-(265.0)	N	Ethylbenzene	7.2	2.3 U	2.3 UJ	2.3 U	
FEW4-MW75-(265.0)	N	Hexachlorobutadiene	7.2	2.3 U	2.3 UJ	2.3 U	
FEW4-MW75-(265.0)	N	Isopropylbenzene (Cumene)	7.2	2.3 U	2.3 UJ	2.3 U	
FEW4-MW75-(265.0)	N	m,p-Xylene	4.6	4.6 U	4.6 UJ	4.6 U	
FEW4-MW75-(265.0)	N	Methyl tert-butyl ether (MTBE)	29	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(265.0)	N	Methylene chloride	7.2	4.6 U	4.6 UJ	4.6 U	
FEW4-MW75-(265.0)	N	Naphthalene	7.2	2.3 U	2.3 UJ	2.3 U	
FEW4-MW75-(265.0)	N	n-Butylbenzene	7.2	2.3 U	2.3 UJ	2.3 U	
FEW4-MW75-(265.0)	N	n-Propylbenzene	7.2	2.3 U	2.3 UJ	2.3 U	
FEW4-MW75-(265.0)	N	o-Xylene	7.2	2.3 U	2.3 UJ	2.3 U	

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW75-(265.0)	N	p-Cymene (p-Isopropyltoluene)	7.2	2.3 U	2.3 UJ	2.3 U	
FEW4-MW75-(265.0)	N	sec-Butylbenzene	7.2	2.3 U	2.3 UJ	2.3 U	
FEW4-MW75-(265.0)	N	Styrene	7.2	2.3 U	2.3 UJ	2.3 U	
FEW4-MW75-(265.0)	N	tert-Butylbenzene	7.2	2.3 U	2.3 UJ	2.3 U	
FEW4-MW75-(265.0)	N	Tetrachloroethene (PCE)	7.2	2.3 U	2.3 UJ	2.3 U	
FEW4-MW75-(265.0)	N	Toluene	7.2	2.3 U	2.3 UJ	2.3 U	
FEW4-MW75-(265.0)	N	trans-1,2-Dichloroethene	7.2	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(265.0)	N	trans-1,3-Dichloropropene	7.2	2.3 U	2.3 UJ	2.3 U	
FEW4-MW75-(265.0)	N	Trichloroethene (TCE)	7.2	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(265.0)	N	Trichlorofluoromethane	14	4.6 U	4.6 UJ	4.6 U	
FEW4-MW75-(265.0)	N	Vinyl chloride	7.2	4.6 U	4.6 UJ	4.6 U	
FEW4-MW75-(275.0)	N	1,1,1,2-Tetrachloroethane	7.4	2.4 U	2.4 UJ	2.4 U	
FEW4-MW75-(275.0)	N	1,1,1-Trichloroethane	7.4	2.4 U	2.4 UJ	2.4 U	
FEW4-MW75-(275.0)	N	1,1,2,2-Tetrachloroethane	7.4	2.4 U	2.4 UJ	2.4 U	
FEW4-MW75-(275.0)	N	1,1,2-Trichloroethane	7.4	4.7 U	4.7 UJ	4.7 U	
FEW4-MW75-(275.0)	N	1,1-Dichloroethane	7.4	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(275.0)	N	1,1-Dichloroethene	7.4	2.4 U	2.4 UJ	2.4 U	
FEW4-MW75-(275.0)	N	1,1-Dichloropropene	7.4	2.4 U	2.4 UJ	2.4 U	
FEW4-MW75-(275.0)	N	1,2,3-Trichlorobenzene	7.4	2.4 U	2.4 UJ	2.4 U	
FEW4-MW75-(275.0)	N	1,2,3-Trichloropropane	7.4	4.7 U	4.7 UJ	4.7 U	
FEW4-MW75-(275.0)	N	1,2,4-Trichlorobenzene	7.4	2.4 U	2.4 UJ	2.4 U	
FEW4-MW75-(275.0)	N	1,2,4-Trimethylbenzene	7.4	2.4 U	2.4 UJ	2.4 U	
FEW4-MW75-(275.0)	N	1,2-Dibromo-3-chloropropane	15	2.4 U	2.4 UJ	2.4 U	
FEW4-MW75-(275.0)	N	1,2-Dibromoethane (EDB)	7.4	2.4 U	2.4 UJ	2.4 U	
FEW4-MW75-(275.0)	N	1,2-Dichlorobenzene	7.4	2.4 U	2.4 UJ	2.4 U	
FEW4-MW75-(275.0)	N	1,2-Dichloroethane	7.4	2.4 U	2.4 UJ	2.4 U	
FEW4-MW75-(275.0)	N	1,2-Dichloroethene	7.4	2.4 U	2.4 UJ	2.4 U	
FEW4-MW75-(275.0)	N	1,2-Dichloropropane	7.4	2.4 U	2.4 UJ	2.4 U	
FEW4-MW75-(275.0)	N	1,3,5-Trimethylbenzene	7.4	2.4 U	2.4 UJ	2.4 U	
FEW4-MW75-(275.0)	N	1,3-Dichlorobenzene	7.4	2.4 U	2.4 UJ	2.4 U	
FEW4-MW75-(275.0)	N	1,3-Dichloropropane	7.4	2.4 U	2.4 UJ	2.4 U	
FEW4-MW75-(275.0)	N	1,4-Dichlorobenzene	7.4	2.4 U	2.4 UJ	2.4 U	
FEW4-MW75-(275.0)	N	2,2-Dichloropropane	7.4	2.4 U	2.4 UJ	2.4 U	
FEW4-MW75-(275.0)	N	2-Butanone (MEK)	30	9.5 U	9.5 UJ	9.5 U	
FEW4-MW75-(275.0)	N	2-Chlorotoluene	7.4	2.4 U	2.4 UJ	2.4 U	
FEW4-MW75-(275.0)	N	2-Hexanone	30	19 U	19 UJ	19 U	
FEW4-MW75-(275.0)	N	4-Chlorotoluene	7.4	2.4 U	2.4 UJ	2.4 U	
FEW4-MW75-(275.0)	N	4-Methyl-2-pentanone (MIBK)	30	19 U	19 UJ	19 U	
FEW4-MW75-(275.0)	N	Acetone	30	27 J	27 J	27	
FEW4-MW75-(275.0)	N	Benzene	7.4	2.4 U	2.4 UJ	2.4 U	
FEW4-MW75-(275.0)	N	Bromobenzene	7.4	2.4 U	2.4 UJ	2.4 U	

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW75-(275.0)	N	Bromochloromethane	7.4	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(275.0)	N	Bromodichloromethane	7.4	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(275.0)	N	Bromoform	7.4	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(275.0)	N	Bromomethane	15	2.4 U Q	2.4 UJ	2.4 U	
FEW4-MW75-(275.0)	N	Carbon disulfide	7.4	2.4 U	2.4 UJ	2.4 U	
FEW4-MW75-(275.0)	N	Carbon tetrachloride	7.4	2.4 U	2.4 UJ	2.4 U	
FEW4-MW75-(275.0)	N	Chlorobenzene	7.4	2.4 U	2.4 UJ	2.4 U	
FEW4-MW75-(275.0)	N	Chloroethane	15	4.7 U Q	4.7 UJ	4.7 U	
FEW4-MW75-(275.0)	N	Chloroform	15	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(275.0)	N	Chloromethane	15	2.4 U	2.4 UJ	2.4 U	
FEW4-MW75-(275.0)	N	cis-1,2-Dichloroethene	7.4	2.4 U	2.4 UJ	2.4 U	
FEW4-MW75-(275.0)	N	cis-1,3-Dichloropropene	7.4	4.7 U	4.7 UJ	4.7 U	
FEW4-MW75-(275.0)	N	Dibromochloromethane	7.4	2.4 U	2.4 UJ	2.4 U	
FEW4-MW75-(275.0)	N	Dibromomethane	7.4	4.7 U	4.7 UJ	4.7 U	
FEW4-MW75-(275.0)	N	Dichlorodifluoromethane	15	2.4 U	2.4 UJ	2.4 U	
FEW4-MW75-(275.0)	N	Ethylbenzene	7.4	2.4 U	2.4 UJ	2.4 U	
FEW4-MW75-(275.0)	N	Hexachlorobutadiene	7.4	2.4 U	2.4 UJ	2.4 U	
FEW4-MW75-(275.0)	N	Isopropylbenzene (Cumene)	7.4	2.4 U	2.4 UJ	2.4 U	
FEW4-MW75-(275.0)	N	m,p-Xylene	4.7	4.7 U	4.7 UJ	4.7 U	
FEW4-MW75-(275.0)	N	Methyl tert-butyl ether (MTBE)	30	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(275.0)	N	Methylene chloride	7.4	4.7 U	4.7 UJ	4.7 U	
FEW4-MW75-(275.0)	N	Naphthalene	7.4	2.4 U	2.4 UJ	2.4 U	
FEW4-MW75-(275.0)	N	n-Butylbenzene	7.4	2.4 U	2.4 UJ	2.4 U	
FEW4-MW75-(275.0)	N	n-Propylbenzene	7.4	2.4 U	2.4 UJ	2.4 U	
FEW4-MW75-(275.0)	N	o-Xylene	7.4	2.4 U	2.4 UJ	2.4 U	
FEW4-MW75-(275.0)	N	p-Cymene (p-Isopropyltoluene)	7.4	2.4 U	2.4 UJ	2.4 U	
FEW4-MW75-(275.0)	N	sec-Butylbenzene	7.4	2.4 U	2.4 UJ	2.4 U	
FEW4-MW75-(275.0)	N	Styrene	7.4	2.4 U	2.4 UJ	2.4 U	
FEW4-MW75-(275.0)	N	tert-Butylbenzene	7.4	2.4 U	2.4 UJ	2.4 U	
FEW4-MW75-(275.0)	N	Tetrachloroethene (PCE)	7.4	2.4 U	2.4 UJ	2.4 U	
FEW4-MW75-(275.0)	N	Toluene	7.4	2.4 U	2.4 UJ	2.4 U	
FEW4-MW75-(275.0)	N	trans-1,2-Dichloroethene	7.4	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(275.0)	N	trans-1,3-Dichloropropene	7.4	2.4 U	2.4 UJ	2.4 U	
FEW4-MW75-(275.0)	N	Trichloroethene (TCE)	7.4	1.2 U	1.2 UJ	1.2 U	
FEW4-MW75-(275.0)	N	Trichlorofluoromethane	15	4.7 U	4.7 UJ	4.7 U	
FEW4-MW75-(275.0)	N	Vinyl chloride	7.4	4.7 U	4.7 UJ	4.7 U	
FEW4-MW75-(285.0)	N	1,1,1,2-Tetrachloroethane	5.4	1.7 U	1.7 UJ	1.7 U	
FEW4-MW75-(285.0)	N	1,1,1-Trichloroethane	5.4	1.7 U	1.7 UJ	1.7 U	
FEW4-MW75-(285.0)	N	1,1,2,2-Tetrachloroethane	5.4	1.7 U	1.7 UJ	1.7 U	
FEW4-MW75-(285.0)	N	1,1,2-Trichloroethane	5.4	3.5 U	3.5 UJ	3.5 U	
FEW4-MW75-(285.0)	N	1,1-Dichloroethane	5.4	0.86 U	0.86 UJ	0.86 U	

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW75-(285.0)	N	1,1-Dichloroethene	5.4	1.7 U	1.7 UJ	1.7 U	
FEW4-MW75-(285.0)	N	1,1-Dichloropropene	5.4	1.7 U	1.7 UJ	1.7 U	
FEW4-MW75-(285.0)	N	1,2,3-Trichlorobenzene	5.4	1.7 U	1.7 UJ	1.7 U	
FEW4-MW75-(285.0)	N	1,2,3-Trichloropropane	5.4	3.5 U	3.5 UJ	3.5 U	
FEW4-MW75-(285.0)	N	1,2,4-Trichlorobenzene	5.4	1.7 U	1.7 UJ	1.7 U	
FEW4-MW75-(285.0)	N	1,2,4-Trimethylbenzene	5.4	1.7 U	1.7 UJ	1.7 U	
FEW4-MW75-(285.0)	N	1,2-Dibromo-3-chloropropane	11	1.7 U	1.7 UJ	1.7 U	
FEW4-MW75-(285.0)	N	1,2-Dibromoethane (EDB)	5.4	1.7 U	1.7 UJ	1.7 U	
FEW4-MW75-(285.0)	N	1,2-Dichlorobenzene	5.4	1.7 U	1.7 UJ	1.7 U	
FEW4-MW75-(285.0)	N	1,2-Dichloroethane	5.4	1.7 U	1.7 UJ	1.7 U	
FEW4-MW75-(285.0)	N	1,2-Dichloroethene	5.4	1.7 U	1.7 UJ	1.7 U	
FEW4-MW75-(285.0)	N	1,2-Dichloropropane	5.4	1.7 U	1.7 UJ	1.7 U	
FEW4-MW75-(285.0)	N	1,3,5-Trimethylbenzene	5.4	1.7 U	1.7 UJ	1.7 U	
FEW4-MW75-(285.0)	N	1,3-Dichlorobenzene	5.4	1.7 U	1.7 UJ	1.7 U	
FEW4-MW75-(285.0)	N	1,3-Dichloropropane	5.4	1.7 U	1.7 UJ	1.7 U	
FEW4-MW75-(285.0)	N	1,4-Dichlorobenzene	5.4	1.7 U	1.7 UJ	1.7 U	
FEW4-MW75-(285.0)	N	2,2-Dichloropropane	5.4	1.7 U	1.7 UJ	1.7 U	
FEW4-MW75-(285.0)	N	2-Butanone (MEK)	22	6.9 U	6.9 UJ	6.9 U	
FEW4-MW75-(285.0)	N	2-Chlorotoluene	5.4	1.7 U	1.7 UJ	1.7 U	
FEW4-MW75-(285.0)	N	2-Hexanone	22	14 U	14 UJ	14 U	
FEW4-MW75-(285.0)	N	4-Chlorotoluene	5.4	1.7 U	1.7 UJ	1.7 U	
FEW4-MW75-(285.0)	N	4-Methyl-2-pentanone (MIBK)	22	14 U	14 UJ	14 U	
FEW4-MW75-(285.0)	N	Acetone	22	14 U	14 UJ	14 U	
FEW4-MW75-(285.0)	N	Benzene	5.4	1.7 U	1.7 UJ	1.7 U	
FEW4-MW75-(285.0)	N	Bromobenzene	5.4	1.7 U	1.7 UJ	1.7 U	
FEW4-MW75-(285.0)	N	Bromochloromethane	5.4	0.86 U	0.86 UJ	0.86 U	
FEW4-MW75-(285.0)	N	Bromodichloromethane	5.4	0.86 U	0.86 UJ	0.86 U	
FEW4-MW75-(285.0)	N	Bromoform	5.4	0.86 U	0.86 UJ	0.86 U	
FEW4-MW75-(285.0)	N	Bromomethane	11	1.7 U Q	1.7 UJ	1.7 U	
FEW4-MW75-(285.0)	N	Carbon disulfide	5.4	1.7 U	1.7 UJ	1.7 U	
FEW4-MW75-(285.0)	N	Carbon tetrachloride	5.4	1.7 U	1.7 UJ	1.7 U	
FEW4-MW75-(285.0)	N	Chlorobenzene	5.4	1.7 U	1.7 UJ	1.7 U	
FEW4-MW75-(285.0)	N	Chloroethane	11	3.5 U Q	3.5 UJ	3.5 U	
FEW4-MW75-(285.0)	N	Chloroform	11	0.86 U	0.86 UJ	0.86 U	
FEW4-MW75-(285.0)	N	Chloromethane	11	1.7 U	1.7 UJ	1.7 U	
FEW4-MW75-(285.0)	N	cis-1,2-Dichloroethene	5.4	1.7 U	1.7 UJ	1.7 U	
FEW4-MW75-(285.0)	N	cis-1,3-Dichloropropene	5.4	3.5 U	3.5 UJ	3.5 U	
FEW4-MW75-(285.0)	N	Dibromochloromethane	5.4	1.7 U	1.7 UJ	1.7 U	
FEW4-MW75-(285.0)	N	Dibromomethane	5.4	3.5 U	3.5 UJ	3.5 U	
FEW4-MW75-(285.0)	N	Dichlorodifluoromethane	11	1.7 U	1.7 UJ	1.7 U	
FEW4-MW75-(285.0)	N	Ethylbenzene	5.4	1.7 U	1.7 UJ	1.7 U	

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW75-(285.0)	N	Hexachlorobutadiene	5.4	1.7 U	1.7 UJ	1.7 U	
FEW4-MW75-(285.0)	N	Isopropylbenzene (Cumene)	5.4	1.7 U	1.7 UJ	1.7 U	
FEW4-MW75-(285.0)	N	m,p-Xylene	3.5	3.5 U	3.5 UJ	3.5 U	
FEW4-MW75-(285.0)	N	Methyl tert-butyl ether (MTBE)	22	0.86 U	0.86 UJ	0.86 U	
FEW4-MW75-(285.0)	N	Methylene chloride	5.4	3.5 U	3.5 UJ	3.5 U	
FEW4-MW75-(285.0)	N	Naphthalene	5.4	1.7 U	1.7 UJ	1.7 U	
FEW4-MW75-(285.0)	N	n-Butylbenzene	5.4	1.7 U	1.7 UJ	1.7 U	
FEW4-MW75-(285.0)	N	n-Propylbenzene	5.4	1.7 U	1.7 UJ	1.7 U	
FEW4-MW75-(285.0)	N	o-Xylene	5.4	1.7 U	1.7 UJ	1.7 U	
FEW4-MW75-(285.0)	N	p-Cymene (p-Isopropyltoluene)	5.4	1.7 U	1.7 UJ	1.7 U	
FEW4-MW75-(285.0)	N	sec-Butylbenzene	5.4	1.7 U	1.7 UJ	1.7 U	
FEW4-MW75-(285.0)	N	Styrene	5.4	1.7 U	1.7 UJ	1.7 U	
FEW4-MW75-(285.0)	N	tert-Butylbenzene	5.4	1.7 U	1.7 UJ	1.7 U	
FEW4-MW75-(285.0)	N	Tetrachloroethene (PCE)	5.4	1.7 U	1.7 UJ	1.7 U	
FEW4-MW75-(285.0)	N	Toluene	5.4	1.7 U	1.7 UJ	1.7 U	
FEW4-MW75-(285.0)	N	trans-1,2-Dichloroethene	5.4	0.86 U	0.86 UJ	0.86 U	
FEW4-MW75-(285.0)	N	trans-1,3-Dichloropropene	5.4	1.7 U	1.7 UJ	1.7 U	
FEW4-MW75-(285.0)	N	Trichloroethene (TCE)	5.4	0.86 U	0.86 UJ	0.86 U	
FEW4-MW75-(285.0)	N	Trichlorofluoromethane	11	3.5 U	3.5 UJ	3.5 U	
FEW4-MW75-(285.0)	N	Vinyl chloride	5.4	3.5 U	3.5 UJ	3.5 U	
FEW4-MW75-(293.0)	N	1,1,1,2-Tetrachloroethane	4.7	1.5 U	1.5 UJ	1.5 U	
FEW4-MW75-(293.0)	N	1,1,1-Trichloroethane	4.7	1.5 U	1.5 UJ	1.5 U	
FEW4-MW75-(293.0)	N	1,1,2,2-Tetrachloroethane	4.7	1.5 U	1.5 UJ	1.5 U	
FEW4-MW75-(293.0)	N	1,1,2-Trichloroethane	4.7	3.0 U	3.0 UJ	3.0 U	
FEW4-MW75-(293.0)	N	1,1-Dichloroethane	4.7	0.75 U	0.75 UJ	0.75 U	
FEW4-MW75-(293.0)	N	1,1-Dichloroethene	4.7	1.5 U	1.5 UJ	1.5 U	
FEW4-MW75-(293.0)	N	1,1-Dichloropropene	4.7	1.5 U	1.5 UJ	1.5 U	
FEW4-MW75-(293.0)	N	1,2,3-Trichlorobenzene	4.7	1.5 U	1.5 UJ	1.5 U	
FEW4-MW75-(293.0)	N	1,2,3-Trichloropropane	4.7	3.0 U	3.0 UJ	3.0 U	
FEW4-MW75-(293.0)	N	1,2,4-Trichlorobenzene	4.7	1.5 U	1.5 UJ	1.5 U	
FEW4-MW75-(293.0)	N	1,2,4-Trimethylbenzene	4.7	1.5 U	1.5 UJ	1.5 U	
FEW4-MW75-(293.0)	N	1,2-Dibromo-3-chloropropane	9.3	1.5 U	1.5 UJ	1.5 U	
FEW4-MW75-(293.0)	N	1,2-Dibromoethane (EDB)	4.7	1.5 U	1.5 UJ	1.5 U	
FEW4-MW75-(293.0)	N	1,2-Dichlorobenzene	4.7	1.5 U	1.5 UJ	1.5 U	
FEW4-MW75-(293.0)	N	1,2-Dichloroethane	4.7	1.5 U	1.5 UJ	1.5 U	
FEW4-MW75-(293.0)	N	1,2-Dichloroethene	4.7	1.5 U	1.5 UJ	1.5 U	
FEW4-MW75-(293.0)	N	1,2-Dichloropropane	4.7	1.5 U	1.5 UJ	1.5 U	
FEW4-MW75-(293.0)	N	1,3,5-Trimethylbenzene	4.7	1.5 U	1.5 UJ	1.5 U	
FEW4-MW75-(293.0)	N	1,3-Dichlorobenzene	4.7	1.5 U	1.5 UJ	1.5 U	
FEW4-MW75-(293.0)	N	1,3-Dichloropropane	4.7	1.5 U	1.5 UJ	1.5 U	

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW75-(293.0)	N	1,4-Dichlorobenzene	4.7	1.5 U	1.5 UJ	1.5 U	
FEW4-MW75-(293.0)	N	2,2-Dichloropropane	4.7	1.5 U	1.5 UJ	1.5 U	
FEW4-MW75-(293.0)	N	2-Butanone (MEK)	19	6.0 U	6.0 UJ	6.0 U	
FEW4-MW75-(293.0)	N	2-Chlorotoluene	4.7	1.5 U	1.5 UJ	1.5 U	
FEW4-MW75-(293.0)	N	2-Hexanone	19	12 U	12 UJ	12 U	
FEW4-MW75-(293.0)	N	4-Chlorotoluene	4.7	1.5 U	1.5 UJ	1.5 U	
FEW4-MW75-(293.0)	N	4-Methyl-2-pentanone (MIBK)	19	12 U	12 UJ	12 U	
FEW4-MW75-(293.0)	N	Acetone	19	12 U	12 UJ	12 U	
FEW4-MW75-(293.0)	N	Benzene	4.7	1.5 U	1.5 UJ	1.5 U	
FEW4-MW75-(293.0)	N	Bromobenzene	4.7	1.5 U	1.5 UJ	1.5 U	
FEW4-MW75-(293.0)	N	Bromochloromethane	4.7	0.75 U	0.75 UJ	0.75 U	
FEW4-MW75-(293.0)	N	Bromodichloromethane	4.7	0.75 U	0.75 UJ	0.75 U	
FEW4-MW75-(293.0)	N	Bromoform	4.7	0.75 U	0.75 UJ	0.75 U	
FEW4-MW75-(293.0)	N	Bromomethane	9.3	1.5 U Q	1.5 UJ	1.5 U	
FEW4-MW75-(293.0)	N	Carbon disulfide	4.7	1.5 U	1.5 UJ	1.5 U	
FEW4-MW75-(293.0)	N	Carbon tetrachloride	4.7	1.5 U	1.5 UJ	1.5 U	
FEW4-MW75-(293.0)	N	Chlorobenzene	4.7	1.5 U	1.5 UJ	1.5 U	
FEW4-MW75-(293.0)	N	Chloroethane	9.3	3.0 U Q	3.0 UJ	3.0 U	
FEW4-MW75-(293.0)	N	Chloroform	9.3	0.75 U	0.75 UJ	0.75 U	
FEW4-MW75-(293.0)	N	Chloromethane	9.3	1.5 U	1.5 UJ	1.5 U	
FEW4-MW75-(293.0)	N	cis-1,2-Dichloroethene	4.7	1.5 U	1.5 UJ	1.5 U	
FEW4-MW75-(293.0)	N	cis-1,3-Dichloropropene	4.7	3.0 U	3.0 UJ	3.0 U	
FEW4-MW75-(293.0)	N	Dibromochloromethane	4.7	1.5 U	1.5 UJ	1.5 U	
FEW4-MW75-(293.0)	N	Dibromomethane	4.7	3.0 U	3.0 UJ	3.0 U	
FEW4-MW75-(293.0)	N	Dichlorodifluoromethane	9.3	1.5 U	1.5 UJ	1.5 U	
FEW4-MW75-(293.0)	N	Ethylbenzene	4.7	1.5 U	1.5 UJ	1.5 U	
FEW4-MW75-(293.0)	N	Hexachlorobutadiene	4.7	1.5 U	1.5 UJ	1.5 U	
FEW4-MW75-(293.0)	N	Isopropylbenzene (Cumene)	4.7	1.5 U	1.5 UJ	1.5 U	
FEW4-MW75-(293.0)	N	m,p-Xylene	3.0	3.0 U	3.0 UJ	3.0 U	
FEW4-MW75-(293.0)	N	Methyl tert-butyl ether (MTBE)	19	0.75 U	0.75 UJ	0.75 U	
FEW4-MW75-(293.0)	N	Methylene chloride	4.7	3.0 U	3.0 UJ	3.0 U	
FEW4-MW75-(293.0)	N	Naphthalene	4.7	1.5 U	1.5 UJ	1.5 U	
FEW4-MW75-(293.0)	N	n-Butylbenzene	4.7	1.5 U	1.5 UJ	1.5 U	
FEW4-MW75-(293.0)	N	n-Propylbenzene	4.7	1.5 U	1.5 UJ	1.5 U	
FEW4-MW75-(293.0)	N	o-Xylene	4.7	1.5 U	1.5 UJ	1.5 U	
FEW4-MW75-(293.0)	N	p-Cymene (p-Isopropyltoluene)	4.7	1.5 U	1.5 UJ	1.5 U	
FEW4-MW75-(293.0)	N	sec-Butylbenzene	4.7	1.5 U	1.5 UJ	1.5 U	
FEW4-MW75-(293.0)	N	Styrene	4.7	1.5 U	1.5 UJ	1.5 U	
FEW4-MW75-(293.0)	N	tert-Butylbenzene	4.7	1.5 U	1.5 UJ	1.5 U	
FEW4-MW75-(293.0)	N	Tetrachloroethene (PCE)	4.7	1.5 U	1.5 UJ	1.5 U	

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW75-(293.0)	N	Toluene	4.7	1.5 U	1.5 UJ	1.5 U	
FEW4-MW75-(293.0)	N	trans-1,2-Dichloroethene	4.7	0.75 U	0.75 UJ	0.75 U	
FEW4-MW75-(293.0)	N	trans-1,3-Dichloropropene	4.7	1.5 U	1.5 UJ	1.5 U	
FEW4-MW75-(293.0)	N	Trichloroethene (TCE)	4.7	0.75 U	0.75 UJ	0.75 U	
FEW4-MW75-(293.0)	N	Trichlorofluoromethane	9.3	3.0 U	3.0 UJ	3.0 U	
FEW4-MW75-(293.0)	N	Vinyl chloride	4.7	3.0 U	3.0 UJ	3.0 U	
FEW4-MW75-(304.0)	N	1,1,1,2-Tetrachloroethane	4.8	1.5 U	1.5 UJ	1.5 U	
FEW4-MW75-(304.0)	N	1,1,1-Trichloroethane	4.8	1.5 U	1.5 UJ	1.5 U	
FEW4-MW75-(304.0)	N	1,1,2,2-Tetrachloroethane	4.8	1.5 U	1.5 UJ	1.5 U	
FEW4-MW75-(304.0)	N	1,1,2-Trichloroethane	4.8	3.1 U	3.1 UJ	3.1 U	
FEW4-MW75-(304.0)	N	1,1-Dichloroethane	4.8	0.77 U	0.77 UJ	0.77 U	
FEW4-MW75-(304.0)	N	1,1-Dichloroethene	4.8	1.5 U	1.5 UJ	1.5 U	
FEW4-MW75-(304.0)	N	1,1-Dichloropropene	4.8	1.5 U	1.5 UJ	1.5 U	
FEW4-MW75-(304.0)	N	1,2,3-Trichlorobenzene	4.8	1.5 U	1.5 UJ	1.5 U	
FEW4-MW75-(304.0)	N	1,2,3-Trichloropropane	4.8	3.1 U	3.1 UJ	3.1 U	
FEW4-MW75-(304.0)	N	1,2,4-Trichlorobenzene	4.8	1.5 U	1.5 UJ	1.5 U	
FEW4-MW75-(304.0)	N	1,2,4-Trimethylbenzene	4.8	1.5 U	1.5 UJ	1.5 U	
FEW4-MW75-(304.0)	N	1,2-Dibromo-3-chloropropane	9.7	1.5 U	1.5 UJ	1.5 U	
FEW4-MW75-(304.0)	N	1,2-Dibromoethane (EDB)	4.8	1.5 U	1.5 UJ	1.5 U	
FEW4-MW75-(304.0)	N	1,2-Dichlorobenzene	4.8	1.5 U	1.5 UJ	1.5 U	
FEW4-MW75-(304.0)	N	1,2-Dichloroethane	4.8	1.5 U	1.5 UJ	1.5 U	
FEW4-MW75-(304.0)	N	1,2-Dichloroethene	4.8	1.5 U	1.5 UJ	1.5 U	
FEW4-MW75-(304.0)	N	1,2-Dichloropropane	4.8	1.5 U	1.5 UJ	1.5 U	
FEW4-MW75-(304.0)	N	1,3,5-Trimethylbenzene	4.8	1.5 U	1.5 UJ	1.5 U	
FEW4-MW75-(304.0)	N	1,3-Dichlorobenzene	4.8	1.5 U	1.5 UJ	1.5 U	
FEW4-MW75-(304.0)	N	1,3-Dichloropropane	4.8	1.5 U	1.5 UJ	1.5 U	
FEW4-MW75-(304.0)	N	1,4-Dichlorobenzene	4.8	1.5 U	1.5 UJ	1.5 U	
FEW4-MW75-(304.0)	N	2,2-Dichloropropane	4.8	1.5 U	1.5 UJ	1.5 U	
FEW4-MW75-(304.0)	N	2-Butanone (MEK)	19	6.2 U	6.2 UJ	6.2 U	
FEW4-MW75-(304.0)	N	2-Chlorotoluene	4.8	1.5 U	1.5 UJ	1.5 U	
FEW4-MW75-(304.0)	N	2-Hexanone	19	12 U	12 UJ	12 U	
FEW4-MW75-(304.0)	N	4-Chlorotoluene	4.8	1.5 U	1.5 UJ	1.5 U	
FEW4-MW75-(304.0)	N	4-Methyl-2-pentanone (MIBK)	19	12 U	12 UJ	12 U	
FEW4-MW75-(304.0)	N	Acetone	19	12 U	12 UJ	12 U	
FEW4-MW75-(304.0)	N	Benzene	4.8	1.5 U	1.5 UJ	1.5 U	
FEW4-MW75-(304.0)	N	Bromobenzene	4.8	1.5 U	1.5 UJ	1.5 U	
FEW4-MW75-(304.0)	N	Bromochloromethane	4.8	0.77 U	0.77 UJ	0.77 U	
FEW4-MW75-(304.0)	N	Bromodichloromethane	4.8	0.77 U	0.77 UJ	0.77 U	
FEW4-MW75-(304.0)	N	Bromoform	4.8	0.77 U	0.77 UJ	0.77 U	
FEW4-MW75-(304.0)	N	Bromomethane	9.7	1.5 U Q	1.5 UJ	1.5 U	
FEW4-MW75-(304.0)	N	Carbon disulfide	4.8	1.5 U	1.5 UJ	1.5 U	

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW75-(304.0)	N	Carbon tetrachloride	4.8	1.5 U	1.5 UJ	1.5 U	
FEW4-MW75-(304.0)	N	Chlorobenzene	4.8	1.5 U	1.5 UJ	1.5 U	
FEW4-MW75-(304.0)	N	Chloroethane	9.7	3.1 U Q	3.1 UJ	3.1 U	
FEW4-MW75-(304.0)	N	Chloroform	9.7	0.77 U	0.77 UJ	0.77 U	
FEW4-MW75-(304.0)	N	Chloromethane	9.7	1.5 U	1.5 UJ	1.5 U	
FEW4-MW75-(304.0)	N	cis-1,2-Dichloroethene	4.8	1.5 U	1.5 UJ	1.5 U	
FEW4-MW75-(304.0)	N	cis-1,3-Dichloropropene	4.8	3.1 U	3.1 UJ	3.1 U	
FEW4-MW75-(304.0)	N	Dibromochloromethane	4.8	1.5 U	1.5 UJ	1.5 U	
FEW4-MW75-(304.0)	N	Dibromomethane	4.8	3.1 U	3.1 UJ	3.1 U	
FEW4-MW75-(304.0)	N	Dichlorodifluoromethane	9.7	1.5 U	1.5 UJ	1.5 U	
FEW4-MW75-(304.0)	N	Ethylbenzene	4.8	1.5 U	1.5 UJ	1.5 U	
FEW4-MW75-(304.0)	N	Hexachlorobutadiene	4.8	1.5 U	1.5 UJ	1.5 U	
FEW4-MW75-(304.0)	N	Isopropylbenzene (Cumene)	4.8	1.5 U	1.5 UJ	1.5 U	
FEW4-MW75-(304.0)	N	m,p-Xylene	3.1	3.1 U	3.1 UJ	3.1 U	
FEW4-MW75-(304.0)	N	Methyl tert-butyl ether (MTBE)	19	0.77 U	0.77 UJ	0.77 U	
FEW4-MW75-(304.0)	N	Methylene chloride	4.8	3.1 U	3.1 UJ	3.1 U	
FEW4-MW75-(304.0)	N	Naphthalene	4.8	1.5 U	1.5 UJ	1.5 U	
FEW4-MW75-(304.0)	N	n-Butylbenzene	4.8	1.5 U	1.5 UJ	1.5 U	
FEW4-MW75-(304.0)	N	n-Propylbenzene	4.8	1.5 U	1.5 UJ	1.5 U	
FEW4-MW75-(304.0)	N	o-Xylene	4.8	1.5 U	1.5 UJ	1.5 U	
FEW4-MW75-(304.0)	N	p-Cymene (p-Isopropyltoluene)	4.8	1.5 U	1.5 UJ	1.5 U	
FEW4-MW75-(304.0)	N	sec-Butylbenzene	4.8	1.5 U	1.5 UJ	1.5 U	
FEW4-MW75-(304.0)	N	Styrene	4.8	1.5 U	1.5 UJ	1.5 U	
FEW4-MW75-(304.0)	N	tert-Butylbenzene	4.8	1.5 U	1.5 UJ	1.5 U	
FEW4-MW75-(304.0)	N	Tetrachloroethene (PCE)	4.8	1.5 U	1.5 UJ	1.5 U	
FEW4-MW75-(304.0)	N	Toluene	4.8	1.5 U	1.5 UJ	1.5 U	
FEW4-MW75-(304.0)	N	trans-1,2-Dichloroethene	4.8	0.77 U	0.77 UJ	0.77 U	
FEW4-MW75-(304.0)	N	trans-1,3-Dichloropropene	4.8	1.5 U	1.5 UJ	1.5 U	
FEW4-MW75-(304.0)	N	Trichloroethene (TCE)	4.8	0.77 U	0.77 UJ	0.77 U	
FEW4-MW75-(304.0)	N	Trichlorofluoromethane	9.7	3.1 U	3.1 UJ	3.1 U	
FEW4-MW75-(304.0)	N	Vinyl chloride	4.8	3.1 U	3.1 UJ	3.1 U	

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
Trace values are not included in the qualified results table unless additional reason codes are associated.

Reason Code Definitions

Code	Definition
D	MS RPD
H1	Test Hold Time
I	Surrogate recovery outside project limits.
M	MS Recovery
P	Sample preservation/collection requirement not met.
TR	Trace Level Detect
V2	CCV

Flag Code and Definitions

Flag	Definition
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
J	Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
R	The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making.
B	Blank contamination: The analyte was found in an associated blank above one half the RL, as well as in the sample.
UB	The analyte was also detected in an associated laboratory or field blank at a concentration comparable to the concentration in the sample. The reported result has been requalified as not detected.

Review Questions

Method: SW8260B (Volatile Organic Compounds by Capillary GC/MS)

Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?		•		Sample FEW4-MW75-(213.0) was analyzed from a 4oz soil jar as both terracore sample vials received were observed to be broken when thawed out for analyses. All analyte results have been qualified as UJ/J (undetected estimated/detected estimated) values.
Were holding times met?	•			ADR noted that the following samples exceeded the 14 day analysis holding time on the 14th day between 0000 and 2359 hours: FEW4-MW75-(213.0) 6 hours, FEW4-MW75-(225.0) 5.5 hours, FEW4-MW75-(226.0) 4.8 hours, FEW4-MW75-(235.0) 4.8 hours, FEW4-MW75-(245.0) 4.8 hours, FEW4-MW75-(255.0) 3.6 hours, FEW4-MW75-(265.0) 3.6 hours, FEW4-MW75-(275.0) 1.9 hours, FEW4-MW75-(285.0) 1.9 hours, FEW4-MW75-(293.0) 1.4 hours, and FEW4-MW75-(304.0) 1.7 hours; According to DoD ELAP QSM 5.1 FAQ – Holding Time - Days: "the holding time shall be tracked by the day." "...an exceedance of holding time for a sample with a 14-day holding time will occur when the 15th day is reached (at 12am)." Therefore, no holding time exceedance is considered to have occurred for the noted samples. FEW4-MW75-(123.0) (280-100459-12) was reanalyzed at a dilution for TCE 2.4 days past the 14 day holding time.
Were sample reciept temperatures met?	•			Sample receipt temperatures were 4.0ºC, 4.2ºC, and 5.2ºC.
Were QAPP specified PQLs achieved?	•			
Were all QAPP-specified target analytes reported?	•			
Was the GC/MS system properly tuned based on method criteria?	•			
Was the criteria met during each 12 hour shift (prior to ICAL and Cal Ver.)?	•			
Does the initial calibration curve consist of 5 concentration levels, with the low standard near but > MDL?	•			
Did the Calibration Check Compounds (CCCs) have a relative standard deviation within QAPP acceptance limits?	•			
Were the average response factors (RFs) for the System Performance Check Compounds (SPCCs) within QAPP acceptance limits?	•			
Were the ICAL %RSDs for the target compounds within method criteria?	•			
If a quadratic equation curve was used, was the coefficient of determination (COD) within criteria?	•			
If a linear regression curve was used, was the correlation coefficient within criteria?	•			
Check and recalculate the response factors and average response factors for a least one target compound.	•			ICAL VMS-G 8/16/17 TCE AVG RF = 0.3273
Check and recalculate the %RSD for one of more target compounds and DMCs. Verify that the recalculated values agree with the laboratory reported values.	•			ICAL VMS-G 8/16/17 TCE %RSD = 4.3% 1,2-DCA-d4 %RSD = 5.0

Review Questions

Method: SW8260B (Volatile Organic Compounds by Capillary GC/MS)

Review Questions	Yes	No	NA	Comment
Was a second source verification analyzed after the ICAL and all analytes within criteria?		•		The ICV percent difference was above the upper control limit for bromomethane at 36.6%D and dichlorofluoromethane at -22.7%D. All associated sample results were nondetect for these analytes, therefore no data qualification is warranted.
Was a CCV run at the beginning of the analytical sequence and every 12 hours?		•		CCVC 280-386514/32 was analyzed 9 hours past the 12 hour criteria. All target analytes met the +/- 50% recovery criteria.
Was the CCV a mid-level standard from the initial calibration curve?	•			
Did the CCCs have a %Difference within QAPP acceptance limits?	•			
Were the average RFs for the SPCCs within QAPP acceptance limits?	•			
Was the %D (difference or drift) for all target analytes within QAPP acceptance limits?		•		CCV 280-386437/2: 2-Hexanone (27.8%), and bromomethane (-22.5%) were outside the 20% control limit. These analytes were not detected in any associated samples and have therefore not been qualified. Acetone (20.7%) was outside the control limit and detected in several samples; these samples were qualified as estimated values where applicable. CCV 280-386514/2: Bromomethane (-24.1%D) and chloroethane (-31.2%D) were outside the 20% control limit. These analytes were not detected in any associated samples and have therefore not been qualified.
Check and recalculate the CCV relative response factor for at least one target compound.	•			VMS-G2 9/4/17 CCVC 280-386514/32 Trichloroethene RF = 0.2501
Were the internal standards added to every standard, blank, matrix spike, matrix spike duplicate, and sample?	•			
Were the retention times for all IS compounds within QAPP acceptance limits?	•			
Are the area counts of all IS compounds within QAPP acceptance limits?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes detected in the method blank above the MDL?	•			Acetone was detected at a concentration less than the LOQ in two method blanks.
Were target analytes reported in the field blank analyses above the MDL?			•	
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?	•			FEW4-MW75-(226.0) is a blind field duplicate of FEW4-MW75-(225.0)
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were the LCS/LCSD recoveries within QAPP acceptance limits?	•			
Were the LCS/LCSD RPDs within QAPP acceptance limits?			•	
Was the duplicate RPD within QAPP acceptance limits?			•	
Was a MS/MSD pair prepared with each batch?	•			
Is the MS/MSD parent sample the one designated by the sampling team?	•			FEW4-MW75-(205.0) was designated for matrix spike analyses.

Review Questions

Method: SW8260B (Volatile Organic Compounds by Capillary GC/MS)

Review Questions	Yes	No	NA	Comment
Were MS/MSD recoveries and RPD within QAPP acceptance limits?		•		n-Butylbenzene was recovered less than the lower control limit of 70% at 69%; chloroethane exceeded the 20% RPD limit at 37%.
Were surrogate recoveries within QAPP acceptance limits?		•		BFB (138%) and toluene-d8 (128%) were recovered greater than the respective upper control limits of 119% and 116% in sample FEW4-MW75-(123.0).
Were reported sample concentrations within calibration range?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were instrument run logs present and filled out appropriately?	•			
Were sample prepration sheets present and filled out appropriately?	•			
Check and recalculate the %D for one target compound. Verify that the recalculated values agree with the laboratory-reported values.			•	
Examine raw data to verify correct calculation of sample results reported by the laboratory. Compare quantitation lists and chromatograms to the reported detect and non-detect sample results.	•			FEW4-MW75-(151.0) TCE = 96 ug/kg
Verify that the reporting limits and sample results have been adjusted to reflect all sample dilutions and Percent Moisture factors (non-aqueous samples).	•			

Automated Data Review Detail Report for 280-100487-1_52_2a_FUDSChem
B08WY0467-02, F.E. Warren AFB, Site 4
Draft-Final Uniform Federal Policy-Quality Assurance Project Plan for the Remedial Investigation Addendum 2017-2018 Tasks
Atlas "D" Missile Site 4—Laramie County, Wyoming, July 2017

US Army Corps of Engineers ®

Batch Report

Test Method: SW8260B Analysis Batch: 280-386512

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
LABQC	SQ	LCS 280-386526/1-A	LCS 280-386526/1-A		1/1	9/4/2017 12:00	9/4/2017 12:00	9/4/2017 14:10	280-386512/	BS
LABQC	SQ	LCSD 280-386526/2-A	LCSD 280-386526/2-A		1/1	9/4/2017 12:00	9/4/2017 12:00	9/4/2017 14:31	280-386512/	BD
LABQC	SQ	MB 280-386526/3-A	MB 280-386526/3-A		1/1	9/4/2017 12:00	9/4/2017 12:00	9/4/2017 15:32	280-386512/	LB
FEW4-MW75	SO	FEW4-MW75-(387.0)	280-100487-9		1/1	8/21/2017 16:45	8/21/2017 16:45	9/4/2017 15:53	280-386512/	N

Test Method: SW8260B Analysis Batch: 280-386514

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
LABQC	SQ	LCS 280-386502/1-A	LCS 280-386502/1-A		1/1	9/3/2017 14:16	9/3/2017 14:16	9/3/2017 14:40	280-386514/	BS
LABQC	SQ	MB 280-386502/2-A	MB 280-386502/2-A		1/1	9/3/2017 14:16	9/3/2017 14:16	9/3/2017 15:00	280-386514/	LB
FEW4-MW75	SO	FEW4-MW75-(314.0)	280-100487-1		1/1	8/21/2017 11:05	8/21/2017 11:05	9/3/2017 19:29	280-386514/	N
FEW4-MW75	SO	FEW4-MW75-(323.0)	280-100487-2		1/1	8/21/2017 11:20	8/21/2017 11:20	9/3/2017 19:49	280-386514/	N
FEW4-MW75	SO	FEW4-MW75-(323.0)	280-100487-2MS		1/1	8/21/2017 11:20	8/21/2017 11:20	9/3/2017 20:10	280-386514/	MS
FEW4-MW75	SO	FEW4-MW75-(323.0)	280-100487-2MSD		1/1	8/21/2017 11:20	8/21/2017 11:20	9/3/2017 20:30	280-386514/	SD
FEW4-MW75	SO	FEW4-MW75-(333.0)	280-100487-3		1/1	8/21/2017 13:12	8/21/2017 13:12	9/3/2017 20:51	280-386514/	N
FEW4-MW75	SO	FEW4-MW75-(344.0)	280-100487-4		1/1	8/21/2017 13:17	8/21/2017 13:17	9/3/2017 21:11	280-386514/	N
FEW4-MW75	SO	FEW4-MW75-(345.0)	280-100487-5		1/1	8/21/2017 14:17	8/21/2017 14:17	9/3/2017 21:32	280-386514/	FD
FEW4-MW75	SO	FEW4-MW75-(355.0)	280-100487-6		1/1	8/21/2017 15:00	8/21/2017 15:00	9/3/2017 21:52	280-386514/	N
FEW4-MW75	SO	FEW4-MW75-(366.0)	280-100487-7		1/1	8/21/2017 15:05	8/21/2017 15:05	9/3/2017 22:12	280-386514/	N
FEW4-MW75	SO	FEW4-MW75-(380.0)	280-100487-8		1/1	8/21/2017 16:40	8/21/2017 16:40	9/3/2017 22:33	280-386514/	N

US Army Corps of Engineers ®

Field Batch Report

--No Records Found--

MS Mismatch Report

--No Records Found--

Section to identify Matrix Spike mismatches where parent sample differs from MS by dilution.

US Army Corps of Engineers ®

QC Outlier Report

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

QC Element	Sample ID/ Lab Sample ID	Run#/ Dil'n	Analyte	Result (Units)	Qualifier	Warning Limits	Control Limits	Reason	Comment	Rule	Action Level
MS Recovery	FEW4-MW75-(323.0) (MS) / 280-100487-2MS	1 / 1.00	1,2,4-Trimethylbenzene	74.87 (percent)	J/UJ	75 - 123	75 - 123	M			
MS Recovery	FEW4-MW75-(323.0) (MS) / 280-100487-2MS	1 / 1.00	1,3-Dichlorobenzene	75.30 (percent)	J/UJ	77 - 121	77 - 121	M			
MS Recovery	FEW4-MW75-(323.0) (MS) / 280-100487-2MS	1 / 1.00	n-Butylbenzene	69.65 (percent)	J/UJ	70 - 128	70 - 128	M			

Rule is the multiplier used when blank contamination occurs to determine action level.

US Army Corps of Engineers ®

Qualified Results

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW75-(314.0)	280-100487-1	SO	N	Acetone	34.0	32.0 J	32.0 J		ug/kg	TR
FEW4-MW75-(323.0)	280-100487-2	SO	N	1,2,4-Trimethylbenzene	13.0	4.00 U	4.00 UJ	-	ug/kg	M
FEW4-MW75-(323.0)	280-100487-2	SO	N	1,3-Dichlorobenzene	13.0	4.00 U J	4.00 UJ	-	ug/kg	M
FEW4-MW75-(323.0)	280-100487-2	SO	N	n-Butylbenzene	13.0	4.00 U	4.00 UJ	-	ug/kg	M
FEW4-MW75-(333.0)	280-100487-3	SO	N	Acetone	36.0	17.0 J	17.0 J		ug/kg	TR
FEW4-MW75-(344.0)	280-100487-4	SO	N	Acetone	23.0	10.0 J	10.0 J		ug/kg	TR
FEW4-MW75-(345.0)	280-100487-5	SO	FD	Acetone	21.0	13.0 J	13.0 J		ug/kg	TR
FEW4-MW75-(366.0)	280-100487-7	SO	N	Acetone	17.0	16.0 J	16.0 J		ug/kg	TR
FEW4-MW75-(380.0)	280-100487-8	SO	N	Acetone	13.0	10.0 J	10.0 J		ug/kg	TR
FEW4-MW75-(387.0)	280-100487-9	SO	N	Acetone	25.0	11.0 J	11.0 J		ug/kg	TR

Qualified analytes in samples are reported as estimated, not detected (UJ) at the Limit of Detection (LOD).

US Army Corps of Engineers ®

Detected Results

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Dilution	Analyte	LOQ	Lab Result	Qualified Result	Units	Reason
FEW4-MW75-(314.0)	280-100487-1	SO	N	1	Acetone	34.0	32.0 J	32.0 J	ug/kg	TR
FEW4-MW75-(333.0)	280-100487-3	SO	N	1	Acetone	36.0	17.0 J	17.0 J	ug/kg	TR
FEW4-MW75-(344.0)	280-100487-4	SO	N	1	Acetone	23.0	10.0 J	10.0 J	ug/kg	TR
FEW4-MW75-(345.0)	280-100487-5	SO	FD	1	Acetone	21.0	13.0 J	13.0 J	ug/kg	TR
FEW4-MW75-(355.0)	280-100487-6	SO	N	1	Acetone	30.0	57.0	57.0	ug/kg	
FEW4-MW75-(366.0)	280-100487-7	SO	N	1	Acetone	17.0	16.0 J	16.0 J	ug/kg	TR
FEW4-MW75-(380.0)	280-100487-8	SO	N	1	Acetone	13.0	10.0 J	10.0 J	ug/kg	TR
FEW4-MW75-(387.0)	280-100487-9	SO	N	1	Acetone	25.0	11.0 J	11.0 J	ug/kg	TR

US Army Corps of Engineers ®

Rejected Results

--No Records Found--

US Army Corps of Engineers ®

Facility:	B08WY0467-02, F.E. Warren AFB, Site 4
Event:	2017-2018 RI Addendum Tasks
SDG:	280-100487-1_52_2a_FUDSChem
Guidance Document:	Draft-Final Uniform Federal Policy-Quality Assurance Project Plan for the Remedial Investigation Addendum 2017-2018 Tasks Atlas “D” Missile Site 4 —Laramie County, Wyoming, July 2017
Prime Contractor:	RMC Consultants, Inc., LAKEWOOD, CO
Project Manager:	David Groy
Contract Laboratory:	TestAmerica Laboratories, Inc., Arvada, CO
Data Review Contractor:	RMC Consultants
Data Review Level:	Stage 3VEM
Primary Data Reviewer:	Gary Torf, Contractor Project Chemist
Second Reviewer:	, Senior Scientist
Date Submitted:	

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	SW8260B
FEW4-MW75-(345.0)	280-100487-5	Solid	Field Duplicate/FD	X
FEW4-MW75-(314.0)	280-100487-1	Solid	Field Sample/N	X
FEW4-MW75-(323.0)	280-100487-2	Solid	Field Sample/N	X
FEW4-MW75-(333.0)	280-100487-3	Solid	Field Sample/N	X
FEW4-MW75-(344.0)	280-100487-4	Solid	Field Sample/N	X
FEW4-MW75-(355.0)	280-100487-6	Solid	Field Sample/N	X
FEW4-MW75-(366.0)	280-100487-7	Solid	Field Sample/N	X
FEW4-MW75-(380.0)	280-100487-8	Solid	Field Sample/N	X
FEW4-MW75-(387.0)	280-100487-9	Solid	Field Sample/N	X

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the Draft-Final Uniform Federal Policy-Quality Assurance Project Plan for the Remedial Investigation Addendum 2017-2018 Tasks Atlas “D” Missile Site 4 —Laramie County, Wyoming, July 2017 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by RMC Consultants, Inc., LAKEWOOD, CO; analyses were performed by TestAmerica Laboratories, Inc., Arvada, CO and were reported under sample delivery group (SDG) 280-100487-1_52_2a_FUDSChem. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

- Blank
- Blank - Negative
- Field Duplicate RPD
- LCS Recovery
- LCS RPD
- MS Recovery
- MS RPD
- Prep Hold Time
- Surrogate
- Test Hold Time

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 3 results (0.51%) out of the 594 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected. Trace values, defined as results that are qualified as estimated because they fall between the limit of detection and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

Narrative Comments

Analytical Method	Data Reviewer Comment
SW8260B	No additional comments; see Checklist for detail.

December 19, 2017

Reviewed by Gary Torf, Contractor Project Chemist, RMC Consultants

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of a minimum of 10% of the reported sample results and method quality control data between the two deliverables.

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

Quality Control Outliers for test method SW8260B, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
FEW4-MW75-(323.0) (MS)/ 280-100487-2MS	n-Butylbenzene	69.65	70 - 128	70 - 128	percent	J/UJ	M	
FEW4-MW75-(323.0) (MS)/ 280-100487-2MS	1,2,4-Trimethylbenzene	74.87	75 - 123	75 - 123	percent	J/UJ	M	
FEW4-MW75-(323.0) (MS)/ 280-100487-2MS	1,3-Dichlorobenzene	75.30	77 - 121	77 - 121	percent	J/UJ	M	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the MS Recovery for SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW75-(323.0)	N	1,2,4-Trimethylbenzene	13.0	4.00 U	4.00 UJ	-	ug/kg	M
FEW4-MW75-(323.0)	N	1,3-Dichlorobenzene	13.0	4.00 U J	4.00 UJ	-	ug/kg	M
FEW4-MW75-(323.0)	N	n-Butylbenzene	13.0	4.00 U	4.00 UJ	-	ug/kg	M

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

Table of All Qualified Results

Test Method: SW8260B	**Extraction Method: SW5035A**							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW75-(323.0)	N	1,2,4-Trimethylbenzene	13.0	4.00 U	4.00 UJ	-	ug/kg	M
FEW4-MW75-(323.0)	N	1,3-Dichlorobenzene	13.0	4.00 U J	4.00 UJ	-	ug/kg	M
FEW4-MW75-(323.0)	N	n-Butylbenzene	13.0	4.00 U	4.00 UJ	-	ug/kg	M

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
Trace values are not included in the qualified results table unless additional reason codes are associated.

Table of All Trace Results

Test Method: SW8260B	Extraction Method: SW5035A							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW75-(314.0)	N	Acetone	34.0	32.0 J	32.0 J		ug/kg	TR
FEW4-MW75-(333.0)	N	Acetone	36.0	17.0 J	17.0 J		ug/kg	TR
FEW4-MW75-(344.0)	N	Acetone	23.0	10.0 J	10.0 J		ug/kg	TR
FEW4-MW75-(345.0)	FD	Acetone	21.0	13.0 J	13.0 J		ug/kg	TR
FEW4-MW75-(366.0)	N	Acetone	17.0	16.0 J	16.0 J		ug/kg	TR
FEW4-MW75-(380.0)	N	Acetone	13.0	10.0 J	10.0 J		ug/kg	TR
FEW4-MW75-(387.0)	N	Acetone	25.0	11.0 J	11.0 J		ug/kg	TR

Results with Modified Qualifiers

No qualifiers associated with this sample delivery group were modified manually.

Reason Code Definitions

Code	Definition
M	MS Recovery
TR	Trace Level Detect

Flag Code and Definitions

Flag	Definition
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
J	Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
R	The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making.
B	Blank contamination: The analyte was found in an associated blank above one half the RL, as well as in the sample.
UB	The analyte was also detected in an associated laboratory or field blank at a concentration comparable to the concentration in the sample. The reported result has been requalified as not detected.

Review Questions

Method: SW8260B (Volatile Organic Compounds by Capillary GC/MS)

Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were sample reciept temperatures met?	•			Sample receipt temperature was 5.8ºC.
Were QAPP specified PQLs achieved?	•			
Were all QAPP-specified target analytes reported?	•			
Was the GC/MS system properly tuned based on method criteria?	•			
Was the criteria met during each 12 hour shift (prior to ICAL and Cal Ver.)?	•			
Does the initial calibration curve consist of 5 concentration levels, with the low standard near but > MDL?	•			
Did the Calibration Check Compounds (CCCs) have a relative standard deviation within QAPP acceptance limits?	•			
Were the average response factors (RFs) for the System Performance Check Compounds (SPCCs) within QAPP acceptance limits?	•			
Were the ICAL %RSDs for the target compounds within method criteria?	•			
If a quadratic equation curve was used, was the coefficient of determination (COD) within criteria?	•			
If a linear regression curve was used, was the correlation coefficient within criteria?	•			
Check and recalculate the response factors and average response factors for a least one target compound.	•			ICAL VMS-G2 8/30/17 TCE AVG RF = 0.2896
Check and recalculate the %RSD for one of more target compounds and DMCs. Verify that the recalculated values agree with the laboratory reported values.	•			VMS_G2 8/30/17 TCE %RSD = 5.1% 1,2-DCA-d4 %RSD = 4.5%
Was a second source verification analyzed after the ICAL and all analytes within criteria?	•			
Was a CCV run at the beginning of the analytical sequence and every 12 hours?		•		CCVC 280-386514/32 was analyzed 9 hours past the 12 hour criteria. All target analytes met the +/- 50% recovery criteria.
Was the CCV a mid-level standard from the initial calibration curve?	•			
Did the CCCs have a %Difference within QAPP acceptance limits?	•			
Were the average RFs for the SPCCs within QAPP acceptance limits?	•			
Was the %D (difference or drift) for all target analytes within QAPP acceptance limits?		•		CCV 280-386514/2: Bromomethane (-24.1%D) and chloroethane (-31.2%D) were outside the 20% control limit. These analytes were not detected in any associated samples and have therefore not been qualified. CCV 280-386512: 1,1,1,2-Tetrachloroethane (-22.2%D), 1,2,3-trichloropropane (-20.5%D), and 1,2-dibromo3-chloropropane (-22.0%D) were outside the 20% control limit. These analytes were not detected in any associated samples and have therefore not been qualified.

Review Questions

Method: SW8260B (Volatile Organic Compounds by Capillary GC/MS)

Review Questions	Yes	No	NA	Comment
Check and recalculate the CCV relative response factor for at least one target compound.	•			VMS-G2 9/30/17 CCV 280-386514/2 Trichloroethene RF = 0.2939
Were the internal standards added to every standard, blank, matrix spike, matrix spike duplicate, and sample?	•			
Were the retention times for all IS compounds within QAPP acceptance limits?	•			
Are the area counts of all IS compounds within QAPP acceptance limits?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes detected in the method blank above the MDL?		•		
Were target analytes reported in the field blank analyses above the MDL?			•	
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?	•			FEW4-MW75-(345.0) is a blind field duplicate of FEW4-MW75-(344.0)
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were the LCS/LCSD recoveries within QAPP acceptance limits?	•			
Were the LCS/LCSD RPDs within QAPP acceptance limits?			•	
Was the duplicate RPD within QAPP acceptance limits?			•	
Was a MS/MSD pair prepared with each batch?	•			
Is the MS/MSD parent sample the one designated by the sampling team?	•			FEW4-MW75-(323.0) was designated for matrix spike analyses.
Were MS/MSD recoveries and RPD within QAPP acceptance limits?		•		1,2,4-Trimethylbenzene was recovered at 74.87% with a lower control limit of 75%; 1,3-dichlorobenzene was recovered at 75.3% with a lower control limit of 77%; n-butylbenzene was recovered at 69.65% with a lower control limit of 70%.
Were surrogate recoveries within QAPP acceptance limits?	•			
Were reported sample concentrations within calibration range?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were instrument run logs present and filled out appropriately?	•			
Were sample prepration sheets present and filled out appropriately?	•			
Check and recalculate the %D for one target compound. Verify that the recalculated values agree with the laboratory-reported values.			•	
Examine raw data to verify correct calculation of sample results reported by the laboratory. Compare quantitation lists and chromatograms to the reported detect and non-detect sample results.	•			FEW4-MW75-(314.0) TCE = Not detected
Verify that the reporting limits and sample results have been adjusted to reflect all sample dilutions and Percent Moisture factors (non-aqueous samples).	•			

US Army Corps of Engineers ®

Batch Report

Test Method: SW8260B Analysis Batch: 280-386519

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
LABQC	SQ	LCS 280-386519/1-A	LCS 280-386519/1-A		1/1	9/3/2017 12:00	9/3/2017 12:00	9/4/2017 14:10	280-386519/	BS
LABQC	SQ	LCSD 280-386519/2-A	LCSD 280-386519/2-A		1/1	9/3/2017 12:00	9/3/2017 12:00	9/4/2017 14:31	280-386519/	BD
LABQC	SQ	MB 280-386519/5-A	MB 280-386519/5-A		1/1	9/3/2017 12:00	9/3/2017 12:00	9/4/2017 15:32	280-386519/	LB
FEW4-MW74	SO	FEW4-MW74-(0.50)	280-100594-1		1/1	8/24/2017 11:15	8/24/2017 11:15	9/4/2017 16:18	280-386519/	N
FEW4-MW74	SO	FEW4-MW74-(2.50)	280-100594-2		1/1	8/24/2017 11:35	8/24/2017 11:35	9/4/2017 16:39	280-386519/	N
FEW4-MW74	SO	FEW4-MW74-(9.00)	280-100594-3		1/1	8/24/2017 11:40	8/24/2017 11:40	9/4/2017 16:59	280-386519/	N
FEW4-MW74	SO	FEW4-MW74-(9.00)	280-100594-3MS		1/1	8/24/2017 11:40	8/24/2017 11:40	9/4/2017 17:22	280-386519/	MS
FEW4-MW74	SO	FEW4-MW74-(9.00)	280-100594-3MSD		1/1	8/24/2017 11:40	8/24/2017 11:40	9/4/2017 17:43	280-386519/	SD
FEW4-MW74	SO	FEW4-MW74-(56.0)	280-100594-4		1/1	8/24/2017 13:40	8/24/2017 13:40	9/4/2017 18:03	280-386519/	N
FEW4-MW74	SO	FEW4-MW74-(57.0)	280-100594-5		1/1	8/24/2017 14:40	8/24/2017 14:40	9/4/2017 18:24	280-386519/	FD
FEW4-MW74	SO	FEW4-MW74-(75.0)	280-100594-7		1/1	8/24/2017 15:15	8/24/2017 15:15	9/4/2017 18:44	280-386519/	N
FEW4-MW85	SO	FEW4-MW85-(86.0)	280-100594-8		1/1	8/24/2017 15:45	8/24/2017 15:45	9/4/2017 19:05	280-386519/	N
FEW4-MW85	SO	FEW4-MW85-(86.0)	280-100594-8MS		1/1	8/24/2017 15:45	8/24/2017 15:45	9/4/2017 19:25	280-386519/	MS
FEW4-MW85	SO	FEW4-MW85-(86.0)	280-100594-8MSD		1/1	8/24/2017 15:45	8/24/2017 15:45	9/4/2017 19:46	280-386519/	SD
FEW4-MW74	SO	FEW4-MW74-(65.0)	280-100594-9		1/1	8/24/2017 14:00	8/24/2017 14:00	9/4/2017 20:06	280-386519/	N

Test Method: SW8260B Analysis Batch: 280-386761

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
LABQC	WQ	MB 280-386761/7	MB 280-386761/7		1/1	9/6/2017 19:56	9/6/2017 19:56	9/6/2017 19:56	280-386761/	LB
LABQC	WQ	LCS 280-386761/5	LCS 280-386761/5		1/1	9/6/2017 20:17	9/6/2017 20:17	9/6/2017 20:17	280-386761/	BS
LABQC	WQ	LCSD 280-386761/6	LCSD 280-386761/6		1/1	9/6/2017 20:38	9/6/2017 20:38	9/6/2017 20:38	280-386761/	BD
FEW4-MW74	WG	FEW4-MW74-65	280-100594-6		1/10	8/24/2017 14:23	9/7/2017 04:59	9/7/2017 04:59	280-386761/	N

US Army Corps of Engineers ®

Batch Report

Test Method: SW8260B Analysis Batch: 280-386761

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
FEW4-MW74	WG	FEW4-MW74-65	280-100594-6		2/100	8/24/2017 14:23	9/7/2017 05:20	9/7/2017 05:20	280-386761/	N

US Army Corps of Engineers ®

Field Batch Report

--No Records Found--

MS Mismatch Report

--No Records Found--

Section to identify Matrix Spike mismatches where parent sample differs from MS by dilution.

US Army Corps of Engineers ®

QC Outlier Report

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

QC Element	Sample ID/ Lab Sample ID	Run#/ Dil'n	Analyte	Result (Units)	Qualifier	Warning Limits	Control Limits	Reason	Comment	Rule	Action Level
MS Recovery	FEW4-MW85-(86.0) (MS) / 280-100594-8MS	1 / 1.00	1,2,4-Trimethylbenzene	71.43 (percent)	J/UJ	75 - 123	75 - 123	M			
MS Recovery	FEW4-MW85-(86.0) (MS) / 280-100594-8MS	1 / 1.00	1,2-Dichlorobenzene	75.14 (percent)	J/UJ	78 - 121	78 - 121	M			
MS Recovery	FEW4-MW85-(86.0) (MS) / 280-100594-8MS	1 / 1.00	1,3,5-Trimethylbenzene	70.86 (percent)	J/UJ	73 - 124	73 - 124	M			
MS Recovery	FEW4-MW85-(86.0) (MS) / 280-100594-8MS	1 / 1.00	1,3-Dichlorobenzene	72.00 (percent)	J/UJ	77 - 121	77 - 121	M			
MS Recovery	FEW4-MW85-(86.0) (MS) / 280-100594-8MS	1 / 1.00	1,4-Dichlorobenzene	74.00 (percent)	J/UJ	75 - 120	75 - 120	M			
MS Recovery	FEW4-MW85-(86.0) (MS) / 280-100594-8MS	1 / 1.00	2-Chlorotoluene	73.14 (percent)	J/UJ	75 - 122	75 - 122	M			
MS Recovery	FEW4-MW85-(86.0) (MS) / 280-100594-8MS	1 / 1.00	Bromobenzene	74.86 (percent)	J/UJ	78 - 121	78 - 121	M			
MS Recovery	FEW4-MW85-(86.0) (MS) / 280-100594-8MS	1 / 1.00	n-Propylbenzene	70.86 (percent)	J/UJ	73 - 125	73 - 125	M			
MS Recovery	FEW4-MW85-(86.0) (MS) / 280-100594-8MS	1 / 1.00	p-Cymene (p-Isopropyltoluene)	71.14 (percent)	J/UJ	73 - 127	73 - 127	M			
MS Recovery	FEW4-MW85-(86.0) (MS) / 280-100594-8MS	1 / 1.00	tert-Butylbenzene	72.00 (percent)	J/UJ	73 - 125	73 - 125	M			
MS RPD	280-100594-3MSD (SD) / 280-100594-3MSD	1 / 1.00	1,1,1,2-Tetrachloroethane	24.48 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100594-3MSD (SD) / 280-100594-3MSD	1 / 1.00	1,1,1-Trichloroethane	25.93 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100594-3MSD (SD) / 280-100594-3MSD	1 / 1.00	1,1,2,2-Tetrachloroethane	23.40 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100594-3MSD (SD) / 280-100594-3MSD	1 / 1.00	1,1,2-Trichloroethane	20.49 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100594-3MSD (SD) / 280-100594-3MSD	1 / 1.00	1,1-Dichloroethane	25.75 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100594-3MSD (SD) / 280-100594-3MSD	1 / 1.00	1,1-Dichloroethene	23.44 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100594-3MSD (SD) / 280-100594-3MSD	1 / 1.00	1,1-Dichloropropene	25.79 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100594-3MSD (SD) / 280-100594-3MSD	1 / 1.00	1,2,3-Trichloropropane	23.11 (rpd)	J/None	< 20	< 20	D			

US Army Corps of Engineers ®

QC Outlier Report

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

QC Element	Sample ID/ Lab Sample ID	Run#/ Dil'n	Analyte	Result (Units)	Qualifier	Warning Limits	Control Limits	Reason	Comment	Rule	Action Level
MS RPD	280-100594-3MSD (SD) / 280-100594-3MSD	1 / 1.00	1,2,4-Trichlorobenzene	21.59 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100594-3MSD (SD) / 280-100594-3MSD	1 / 1.00	1,2,4-Trimethylbenzene	27.90 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100594-3MSD (SD) / 280-100594-3MSD	1 / 1.00	1,2-Dibromoethane (EDB)	22.39 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100594-3MSD (SD) / 280-100594-3MSD	1 / 1.00	1,2-Dichlorobenzene	25.68 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100594-3MSD (SD) / 280-100594-3MSD	1 / 1.00	1,2-Dichloroethane	22.97 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100594-3MSD (SD) / 280-100594-3MSD	1 / 1.00	1,2-Dichloroethene	25.10 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100594-3MSD (SD) / 280-100594-3MSD	1 / 1.00	1,2-Dichloropropane	24.24 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100594-3MSD (SD) / 280-100594-3MSD	1 / 1.00	1,3,5-Trimethylbenzene	27.97 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100594-3MSD (SD) / 280-100594-3MSD	1 / 1.00	1,3-Dichlorobenzene	26.02 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100594-3MSD (SD) / 280-100594-3MSD	1 / 1.00	1,3-Dichloropropane	23.05 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100594-3MSD (SD) / 280-100594-3MSD	1 / 1.00	1,4-Dichlorobenzene	25.55 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100594-3MSD (SD) / 280-100594-3MSD	1 / 1.00	2,2-Dichloropropane	26.36 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100594-3MSD (SD) / 280-100594-3MSD	1 / 1.00	2-Chlorotoluene	28.21 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100594-3MSD (SD) / 280-100594-3MSD	1 / 1.00	4-Chlorotoluene	25.98 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100594-3MSD (SD) / 280-100594-3MSD	1 / 1.00	Benzene	24.00 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100594-3MSD (SD) / 280-100594-3MSD	1 / 1.00	Bromobenzene	25.77 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100594-3MSD (SD) / 280-100594-3MSD	1 / 1.00	Bromochloromethane	23.71 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100594-3MSD (SD) / 280-100594-3MSD	1 / 1.00	Bromodichloromethane	23.42 (rpd)	J/None	< 20	< 20	D			

US Army Corps of Engineers ®

QC Outlier Report

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

QC Element	Sample ID/ Lab Sample ID	Run#/ Dil'n	Analyte	Result (Units)	Qualifier	Warning Limits	Control Limits	Reason	Comment	Rule	Action Level
MS RPD	280-100594-3MSD (SD) / 280-100594-3MSD	1 / 1.00	Bromoform	20.08 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100594-3MSD (SD) / 280-100594-3MSD	1 / 1.00	Bromomethane	27.37 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100594-3MSD (SD) / 280-100594-3MSD	1 / 1.00	Carbon disulfide	27.75 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100594-3MSD (SD) / 280-100594-3MSD	1 / 1.00	Carbon tetrachloride	26.68 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100594-3MSD (SD) / 280-100594-3MSD	1 / 1.00	Chlorobenzene	24.66 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100594-3MSD (SD) / 280-100594-3MSD	1 / 1.00	Chloroethane	25.71 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100594-3MSD (SD) / 280-100594-3MSD	1 / 1.00	Chloroform	25.09 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100594-3MSD (SD) / 280-100594-3MSD	1 / 1.00	Chloromethane	29.65 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100594-3MSD (SD) / 280-100594-3MSD	1 / 1.00	cis-1,2-Dichloroethene	23.93 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100594-3MSD (SD) / 280-100594-3MSD	1 / 1.00	cis-1,3-Dichloropropene	24.90 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100594-3MSD (SD) / 280-100594-3MSD	1 / 1.00	Dibromochloromethane	24.06 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100594-3MSD (SD) / 280-100594-3MSD	1 / 1.00	Dibromomethane	22.27 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100594-3MSD (SD) / 280-100594-3MSD	1 / 1.00	Dichlorodifluoromethane	27.10 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100594-3MSD (SD) / 280-100594-3MSD	1 / 1.00	Ethylbenzene	26.19 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100594-3MSD (SD) / 280-100594-3MSD	1 / 1.00	Hexachlorobutadiene	25.10 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100594-3MSD (SD) / 280-100594-3MSD	1 / 1.00	Isopropylbenzene (Cumene)	28.05 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100594-3MSD (SD) / 280-100594-3MSD	1 / 1.00	m,p-Xylene	27.23 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100594-3MSD (SD) / 280-100594-3MSD	1 / 1.00	Methyl tert-butyl ether (MTBE)	21.66 (rpd)	J/None	< 20	< 20	D			

US Army Corps of Engineers ®

QC Outlier Report

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

QC Element	Sample ID/ Lab Sample ID	Run#/ Dil'n	Analyte	Result (Units)	Qualifier	Warning Limits	Control Limits	Reason	Comment	Rule	Action Level
MS RPD	280-100594-3MSD (SD) / 280-100594-3MSD	1 / 1.00	Methylene chloride	24.19 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100594-3MSD (SD) / 280-100594-3MSD	1 / 1.00	n-Butylbenzene	27.75 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100594-3MSD (SD) / 280-100594-3MSD	1 / 1.00	n-Propylbenzene	27.98 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100594-3MSD (SD) / 280-100594-3MSD	1 / 1.00	o-Xylene	25.09 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100594-3MSD (SD) / 280-100594-3MSD	1 / 1.00	p-Cymene (p-Isopropyltoluene)	27.17 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100594-3MSD (SD) / 280-100594-3MSD	1 / 1.00	sec-Butylbenzene	27.28 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100594-3MSD (SD) / 280-100594-3MSD	1 / 1.00	Styrene	24.97 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100594-3MSD (SD) / 280-100594-3MSD	1 / 1.00	tert-Butylbenzene	27.17 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100594-3MSD (SD) / 280-100594-3MSD	1 / 1.00	Tetrachloroethene (PCE)	26.36 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100594-3MSD (SD) / 280-100594-3MSD	1 / 1.00	Toluene	25.27 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100594-3MSD (SD) / 280-100594-3MSD	1 / 1.00	trans-1,2-Dichloroethene	26.20 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100594-3MSD (SD) / 280-100594-3MSD	1 / 1.00	trans-1,3-Dichloropropene	21.29 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100594-3MSD (SD) / 280-100594-3MSD	1 / 1.00	Trichloroethene (TCE)	25.35 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100594-3MSD (SD) / 280-100594-3MSD	1 / 1.00	Trichlorofluoromethane	25.52 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100594-3MSD (SD) / 280-100594-3MSD	1 / 1.00	Vinyl chloride	25.97 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100594-8MSD (SD) / 280-100594-8MSD	1 / 1.00	Bromomethane	23.08 (rpd)	J/None	< 20	< 20	D			

Rule is the multiplier used when blank contamination occurs to determine action level.

US Army Corps of Engineers ®

Qualified Results

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW74-(0.50)	280-100594-1	SO	N	p-Cymene (p-Isopropyltoluene)	4.90	1.00 J	1.00 J		ug/kg	TR
FEW4-MW74-(2.50)	280-100594-2	SO	N	Acetone	43.0	19.0 J	19.0 J		ug/kg	TR
FEW4-MW74-(56.0)	280-100594-4	SO	N	Acetone	29.0	19.0 J	19.0 J		ug/kg	TR
FEW4-MW74-(57.0)	280-100594-5	SO	FD	Tetrachloroethene (PCE)	6.90	1.00 J	1.00 J		ug/kg	TR
FEW4-MW74-(75.0)	280-100594-7	SO	N	Acetone	30.0	16.0 J	16.0 J		ug/kg	TR
FEW4-MW74-(9.00)	280-100594-3	SO	N	Acetone	20.0	13.0 J	13.0 J		ug/kg	TR
FEW4-MW85-(86.0)	280-100594-8	SO	N	1,2,4-Trimethylbenzene	3.90	1.30 U J	1.30 UJ	-	ug/kg	M
FEW4-MW85-(86.0)	280-100594-8	SO	N	1,2-Dichlorobenzene	3.90	1.30 U J	1.30 UJ	-	ug/kg	M
FEW4-MW85-(86.0)	280-100594-8	SO	N	1,3,5-Trimethylbenzene	3.90	1.30 U J	1.30 UJ	-	ug/kg	M
FEW4-MW85-(86.0)	280-100594-8	SO	N	1,3-Dichlorobenzene	3.90	1.30 U J	1.30 UJ	-	ug/kg	M
FEW4-MW85-(86.0)	280-100594-8	SO	N	1,4-Dichlorobenzene	3.90	1.30 U J	1.30 UJ	-	ug/kg	M
FEW4-MW85-(86.0)	280-100594-8	SO	N	2-Chlorotoluene	3.90	1.30 U J	1.30 UJ	-	ug/kg	M
FEW4-MW85-(86.0)	280-100594-8	SO	N	Bromobenzene	3.90	1.30 U J	1.30 UJ	-	ug/kg	M
FEW4-MW85-(86.0)	280-100594-8	SO	N	n-Propylbenzene	3.90	1.30 U J	1.30 UJ	-	ug/kg	M
FEW4-MW85-(86.0)	280-100594-8	SO	N	p-Cymene (p-Isopropyltoluene)	3.90	1.30 U J	1.30 UJ	-	ug/kg	M
FEW4-MW85-(86.0)	280-100594-8	SO	N	tert-Butylbenzene	3.90	1.30 U J	1.30 UJ	-	ug/kg	M
FEW4-MW85-(86.0)	280-100594-8	SO	N	Trichloroethene (TCE)	3.90	2.50 J	2.50 J		ug/kg	TR

Qualified analytes in samples are reported as estimated, not detected (UJ) at the Limit of Detection (LOD).

US Army Corps of Engineers ®

Detected Results

Test Method: SW8260B Extraction Method: SW5030B Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Dilution	Analyte	LOQ	Lab Result	Qualified Result	Units	Reason
FEW4-MW74-65	280-100594-6	WG	N	100	Trichloroethene (TCE)	100	2200 D	2200	ug/L	

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Dilution	Analyte	LOQ	Lab Result	Qualified Result	Units	Reason
FEW4-MW74-(0.50)	280-100594-1	SO	N	1	Naphthalene	4.90	5.30	5.30	ug/kg	
FEW4-MW74-(0.50)	280-100594-1	SO	N	1	p-Cymene (p-Isopropyltoluene)	4.90	1.00 J	1.00 J	ug/kg	TR
FEW4-MW74-(2.50)	280-100594-2	SO	N	1	Acetone	43.0	19.0 J	19.0 J	ug/kg	TR
FEW4-MW74-(56.0)	280-100594-4	SO	N	1	Acetone	29.0	19.0 J	19.0 J	ug/kg	TR
FEW4-MW74-(56.0)	280-100594-4	SO	N	1	Trichloroethene (TCE)	7.20	2200 J	2200	ug/kg	
FEW4-MW74-(57.0)	280-100594-5	SO	FD	1	Tetrachloroethene (PCE)	6.90	1.00 J	1.00 J	ug/kg	TR
FEW4-MW74-(57.0)	280-100594-5	SO	FD	1	Trichloroethene (TCE)	6.90	2700 J	2700	ug/kg	
FEW4-MW74-(65.0)	280-100594-9	SO	N	1	Trichloroethene (TCE)	9.80	530 J	530	ug/kg	
FEW4-MW74-(75.0)	280-100594-7	SO	N	1	Acetone	30.0	16.0 J	16.0 J	ug/kg	TR
FEW4-MW74-(75.0)	280-100594-7	SO	N	1	Trichloroethene (TCE)	7.40	130	130	ug/kg	
FEW4-MW74-(9.00)	280-100594-3	SO	N	1	Acetone	20.0	13.0 J	13.0 J	ug/kg	TR
FEW4-MW85-(86.0)	280-100594-8	SO	N	1	Trichloroethene (TCE)	3.90	2.50 J	2.50 J	ug/kg	TR

US Army Corps of Engineers ®

Rejected Results

--No Records Found--

US Army Corps of Engineers ®

Facility:	B08WY0467-02, F.E. Warren AFB, Site 4
Event:	2017-2018 RI Addendum Tasks
SDG:	280-100594-1_52_2a_FUDSChem
Guidance Document:	Draft-Final Uniform Federal Policy-Quality Assurance Project Plan for the Remedial Investigation Addendum 2017-2018 Tasks Atlas “D” Missile Site 4 —Laramie County, Wyoming, July 2017
Prime Contractor:	RMC Consultants, Inc., LAKEWOOD, CO
Project Manager:	David Groy
Contract Laboratory:	TestAmerica Laboratories, Inc., Arvada, CO
Data Review Contractor:	RMC Consultants
Data Review Level:	Stage 3VEM
Primary Data Reviewer:	Gary Torf, Contractor Project Chemist
Second Reviewer:	, Senior Scientist
Date Submitted:	

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	SW8260B
FEW4-MW74-(57.0)	280-100594-5	Solid	Field Duplicate/FD	X
FEW4-MW74-(0.50)	280-100594-1	Solid	Field Sample/N	X
FEW4-MW74-(2.50)	280-100594-2	Solid	Field Sample/N	X
FEW4-MW74-(56.0)	280-100594-4	Solid	Field Sample/N	X
FEW4-MW74-(65.0)	280-100594-9	Solid	Field Sample/N	X
FEW4-MW74-(75.0)	280-100594-7	Solid	Field Sample/N	X
FEW4-MW74-(9.00)	280-100594-3	Solid	Field Sample/N	X
FEW4-MW74-65	280-100594-6	Water	Field Sample/N	X
FEW4-MW85-(86.0)	280-100594-8	Solid	Field Sample/N	X

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the Draft-Final Uniform Federal Policy-Quality Assurance Project Plan for the Remedial Investigation Addendum 2017-2018 Tasks Atlas “D” Missile Site 4 —Laramie County, Wyoming, July 2017 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by RMC Consultants, Inc., LAKEWOOD, CO; analyses were performed by TestAmerica Laboratories, Inc., Arvada, CO and were reported under sample delivery group (SDG) 280-100594-1_52_2a_FUDSChem. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

- Blank
- Blank - Negative
- Field Duplicate RPD
- LCS Recovery
- LCS RPD
- MS Recovery
- MS RPD
- Prep Hold Time
- Surrogate
- Test Hold Time

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 10 results (1.72%) out of the 580 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected. Trace values, defined as results that are qualified as estimated because they fall between the limit of detection and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

Narrative Comments

Analytical Method	Data Reviewer Comment
SW8260B	No additional comments; see Checklist for detail.

Gary Torf

December 19, 2017

Reviewed by Gary Torf, Contractor Project Chemist, RMC Consultants

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of a minimum of 10% of the reported sample results and method quality control data between the two deliverables.

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

Quality Control Outliers for test method SW8260B, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
FEW4-MW85-(86.0) (MS)/ 280-100594-8MS	p-Cymene (p-Isopropyltoluene)	71.14	73 - 127	73 - 127	percent	J/UJ	M	
FEW4-MW85-(86.0) (MS)/ 280-100594-8MS	1,3,5-Trimethylbenzene	70.86	73 - 124	73 - 124	percent	J/UJ	M	
FEW4-MW85-(86.0) (MS)/ 280-100594-8MS	n-Propylbenzene	70.86	73 - 125	73 - 125	percent	J/UJ	M	
FEW4-MW85-(86.0) (MS)/ 280-100594-8MS	1,2,4-Trimethylbenzene	71.43	75 - 123	75 - 123	percent	J/UJ	M	
FEW4-MW85-(86.0) (MS)/ 280-100594-8MS	tert-Butylbenzene	72.00	73 - 125	73 - 125	percent	J/UJ	M	
FEW4-MW85-(86.0) (MS)/ 280-100594-8MS	1,3-Dichlorobenzene	72.00	77 - 121	77 - 121	percent	J/UJ	M	
FEW4-MW85-(86.0) (MS)/ 280-100594-8MS	2-Chlorotoluene	73.14	75 - 122	75 - 122	percent	J/UJ	M	
FEW4-MW85-(86.0) (MS)/ 280-100594-8MS	1,4-Dichlorobenzene	74.00	75 - 120	75 - 120	percent	J/UJ	M	
FEW4-MW85-(86.0) (MS)/ 280-100594-8MS	Bromobenzene	74.86	78 - 121	78 - 121	percent	J/UJ	M	
FEW4-MW85-(86.0) (MS)/ 280-100594-8MS	1,2-Dichlorobenzene	75.14	78 - 121	78 - 121	percent	J/UJ	M	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the MS Recovery for SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW85-(86.0)	N	1,2,4-Trimethylbenzene	3.90	1.30 U J	1.30 UJ	-	ug/kg	M
FEW4-MW85-(86.0)	N	1,2-Dichlorobenzene	3.90	1.30 U J	1.30 UJ	-	ug/kg	M
FEW4-MW85-(86.0)	N	1,3,5-Trimethylbenzene	3.90	1.30 U J	1.30 UJ	-	ug/kg	M
FEW4-MW85-(86.0)	N	1,3-Dichlorobenzene	3.90	1.30 U J	1.30 UJ	-	ug/kg	M
FEW4-MW85-(86.0)	N	1,4-Dichlorobenzene	3.90	1.30 U J	1.30 UJ	-	ug/kg	M
FEW4-MW85-(86.0)	N	2-Chlorotoluene	3.90	1.30 U J	1.30 UJ	-	ug/kg	M
FEW4-MW85-(86.0)	N	Bromobenzene	3.90	1.30 U J	1.30 UJ	-	ug/kg	M
FEW4-MW85-(86.0)	N	n-Propylbenzene	3.90	1.30 U J	1.30 UJ	-	ug/kg	M
FEW4-MW85-(86.0)	N	p-Cymene (p-Isopropyltoluene)	3.90	1.30 U J	1.30 UJ	-	ug/kg	M
FEW4-MW85-(86.0)	N	tert-Butylbenzene	3.90	1.30 U J	1.30 UJ	-	ug/kg	M

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

Quality Control Outliers for test method SW8260B, MS RPD

The objective of matrix spikes/matrix spike duplicates (MS/MSD) RPD analysis is to demonstrate acceptable method precision by the laboratory at the time of analysis. MS/MSD analyses are also performed to generate data that determines the long-term precision of the analytical method on various matrices. Non-homogenous samples can impact the apparent method precision. Summary forms were evaluated and compared to electronic data deliverables. Matrix spikes/matrix spike duplicates results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
280-100594-3MSD (SD)/ 280-100594-3MSD	Bromoform	20.08	< 20	< 20	rpd	J/None	D	
280-100594-3MSD (SD)/ 280-100594-3MSD	1,1,2-Trichloroethane	20.49	< 20	< 20	rpd	J/None	D	
280-100594-3MSD (SD)/ 280-100594-3MSD	trans-1,3-Dichloropropene	21.29	< 20	< 20	rpd	J/None	D	
280-100594-3MSD (SD)/ 280-100594-3MSD	1,2,4-Trichlorobenzene	21.59	< 20	< 20	rpd	J/None	D	
280-100594-3MSD (SD)/ 280-100594-3MSD	Methyl tert-butyl ether (MTBE)	21.66	< 20	< 20	rpd	J/None	D	
280-100594-3MSD (SD)/ 280-100594-3MSD	Dibromomethane	22.27	< 20	< 20	rpd	J/None	D	
280-100594-3MSD (SD)/ 280-100594-3MSD	1,2-Dibromoethane (EDB)	22.39	< 20	< 20	rpd	J/None	D	
280-100594-3MSD (SD)/ 280-100594-3MSD	1,2-Dichloroethane	22.97	< 20	< 20	rpd	J/None	D	
280-100594-3MSD (SD)/ 280-100594-3MSD	1,3-Dichloropropane	23.05	< 20	< 20	rpd	J/None	D	
280-100594-3MSD (SD)/ 280-100594-3MSD	1,2,3-Trichloropropane	23.11	< 20	< 20	rpd	J/None	D	
280-100594-3MSD (SD)/ 280-100594-3MSD	1,1,2,2-Tetrachloroethane	23.40	< 20	< 20	rpd	J/None	D	
280-100594-3MSD (SD)/ 280-100594-3MSD	Bromodichloromethane	23.42	< 20	< 20	rpd	J/None	D	
280-100594-3MSD (SD)/ 280-100594-3MSD	1,1-Dichloroethene	23.44	< 20	< 20	rpd	J/None	D	
280-100594-3MSD (SD)/ 280-100594-3MSD	Bromochloromethane	23.71	< 20	< 20	rpd	J/None	D	
280-100594-3MSD (SD)/ 280-100594-3MSD	cis-1,2-Dichloroethene	23.93	< 20	< 20	rpd	J/None	D	
280-100594-3MSD (SD)/ 280-100594-3MSD	Benzene	24.00	< 20	< 20	rpd	J/None	D	
280-100594-3MSD (SD)/ 280-100594-3MSD	Dibromochloromethane	24.06	< 20	< 20	rpd	J/None	D	
280-100594-3MSD (SD)/ 280-100594-3MSD	Methylene chloride	24.19	< 20	< 20	rpd	J/None	D	
280-100594-3MSD (SD)/ 280-100594-3MSD	1,2-Dichloropropane	24.24	< 20	< 20	rpd	J/None	D	
280-100594-3MSD (SD)/ 280-100594-3MSD	1,1,1,2-Tetrachloroethane	24.48	< 20	< 20	rpd	J/None	D	
280-100594-3MSD (SD)/ 280-100594-3MSD	Chlorobenzene	24.66	< 20	< 20	rpd	J/None	D	
280-100594-3MSD (SD)/ 280-100594-3MSD	cis-1,3-Dichloropropene	24.90	< 20	< 20	rpd	J/None	D	
280-100594-3MSD (SD)/ 280-100594-3MSD	Styrene	24.97	< 20	< 20	rpd	J/None	D	
280-100594-3MSD (SD)/ 280-100594-3MSD	Chloroform	25.09	< 20	< 20	rpd	J/None	D	
280-100594-3MSD (SD)/ 280-100594-3MSD	o-Xylene	25.09	< 20	< 20	rpd	J/None	D	

Quality Control Outliers for test method SW8260B, MS RPD

The objective of matrix spikes/matrix spike duplicates (MS/MSD) RPD analysis is to demonstrate acceptable method precision by the laboratory at the time of analysis. MS/MSD analyses are also performed to generate data that determines the long-term precision of the analytical method on various matrices. Non-homogenous samples can impact the apparent method precision. Summary forms were evaluated and compared to electronic data deliverables. Matrix spikes/matrix spike duplicates results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
280-100594-3MSD (SD)/ 280-100594-3MSD	1,2-Dichloroethene	25.10	< 20	< 20	rpd	J/None	D	
280-100594-3MSD (SD)/ 280-100594-3MSD	Hexachlorobutadiene	25.10	< 20	< 20	rpd	J/None	D	
280-100594-3MSD (SD)/ 280-100594-3MSD	Toluene	25.27	< 20	< 20	rpd	J/None	D	
280-100594-3MSD (SD)/ 280-100594-3MSD	Trichloroethene (TCE)	25.35	< 20	< 20	rpd	J/None	D	
280-100594-3MSD (SD)/ 280-100594-3MSD	Trichlorofluoromethane	25.52	< 20	< 20	rpd	J/None	D	
280-100594-3MSD (SD)/ 280-100594-3MSD	1,4-Dichlorobenzene	25.55	< 20	< 20	rpd	J/None	D	
280-100594-3MSD (SD)/ 280-100594-3MSD	1,2-Dichlorobenzene	25.68	< 20	< 20	rpd	J/None	D	
280-100594-3MSD (SD)/ 280-100594-3MSD	Chloroethane	25.71	< 20	< 20	rpd	J/None	D	
280-100594-3MSD (SD)/ 280-100594-3MSD	1,1-Dichloroethane	25.75	< 20	< 20	rpd	J/None	D	
280-100594-3MSD (SD)/ 280-100594-3MSD	Bromobenzene	25.77	< 20	< 20	rpd	J/None	D	
280-100594-3MSD (SD)/ 280-100594-3MSD	1,1-Dichloropropene	25.79	< 20	< 20	rpd	J/None	D	
280-100594-3MSD (SD)/ 280-100594-3MSD	1,1,1-Trichloroethane	25.93	< 20	< 20	rpd	J/None	D	
280-100594-3MSD (SD)/ 280-100594-3MSD	Vinyl chloride	25.97	< 20	< 20	rpd	J/None	D	
280-100594-3MSD (SD)/ 280-100594-3MSD	4-Chlorotoluene	25.98	< 20	< 20	rpd	J/None	D	
280-100594-3MSD (SD)/ 280-100594-3MSD	1,3-Dichlorobenzene	26.02	< 20	< 20	rpd	J/None	D	
280-100594-3MSD (SD)/ 280-100594-3MSD	Ethylbenzene	26.19	< 20	< 20	rpd	J/None	D	
280-100594-3MSD (SD)/ 280-100594-3MSD	trans-1,2-Dichloroethene	26.20	< 20	< 20	rpd	J/None	D	
280-100594-3MSD (SD)/ 280-100594-3MSD	2,2-Dichloropropane	26.36	< 20	< 20	rpd	J/None	D	
280-100594-3MSD (SD)/ 280-100594-3MSD	Tetrachloroethene (PCE)	26.36	< 20	< 20	rpd	J/None	D	
280-100594-3MSD (SD)/ 280-100594-3MSD	Carbon tetrachloride	26.68	< 20	< 20	rpd	J/None	D	
280-100594-3MSD (SD)/ 280-100594-3MSD	Dichlorodifluoromethane	27.10	< 20	< 20	rpd	J/None	D	
280-100594-3MSD (SD)/ 280-100594-3MSD	tert-Butylbenzene	27.17	< 20	< 20	rpd	J/None	D	
280-100594-3MSD (SD)/ 280-100594-3MSD	p-Cymene (p-Isopropyltoluene)	27.17	< 20	< 20	rpd	J/None	D	
280-100594-3MSD (SD)/ 280-100594-3MSD	m,p-Xylene	27.23	< 20	< 20	rpd	J/None	D	
280-100594-3MSD (SD)/ 280-100594-3MSD	sec-Butylbenzene	27.28	< 20	< 20	rpd	J/None	D	

Quality Control Outliers for test method SW8260B, MS RPD

The objective of matrix spikes/matrix spike duplicates (MS/MSD) RPD analysis is to demonstrate acceptable method precision by the laboratory at the time of analysis. MS/MSD analyses are also performed to generate data that determines the long-term precision of the analytical method on various matrices. Non-homogenous samples can impact the apparent method precision. Summary forms were evaluated and compared to electronic data deliverables. Matrix spikes/matrix spike duplicates results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
280-100594-3MSD (SD)/ 280-100594-3MSD	Bromomethane	27.37	< 20	< 20	rpd	J/None	D	
280-100594-3MSD (SD)/ 280-100594-3MSD	n-Butylbenzene	27.75	< 20	< 20	rpd	J/None	D	
280-100594-3MSD (SD)/ 280-100594-3MSD	Carbon disulfide	27.75	< 20	< 20	rpd	J/None	D	
280-100594-3MSD (SD)/ 280-100594-3MSD	1,2,4-Trimethylbenzene	27.90	< 20	< 20	rpd	J/None	D	
280-100594-3MSD (SD)/ 280-100594-3MSD	1,3,5-Trimethylbenzene	27.97	< 20	< 20	rpd	J/None	D	
280-100594-3MSD (SD)/ 280-100594-3MSD	n-Propylbenzene	27.98	< 20	< 20	rpd	J/None	D	
280-100594-3MSD (SD)/ 280-100594-3MSD	Isopropylbenzene (Cumene)	28.05	< 20	< 20	rpd	J/None	D	
280-100594-3MSD (SD)/ 280-100594-3MSD	2-Chlorotoluene	28.21	< 20	< 20	rpd	J/None	D	
280-100594-3MSD (SD)/ 280-100594-3MSD	Chloromethane	29.65	< 20	< 20	rpd	J/None	D	
280-100594-8MSD (SD)/ 280-100594-8MSD	Bromomethane	23.08	< 20	< 20	rpd	J/None	D	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

Table of All Qualified Results

Test Method: SW8260B	Extraction Method: SW5035A							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW85-(86.0)	N	1,2,4-Trimethylbenzene	3.90	1.30 U J	1.30 UJ	-	ug/kg	M
FEW4-MW85-(86.0)	N	1,2-Dichlorobenzene	3.90	1.30 U J	1.30 UJ	-	ug/kg	M
FEW4-MW85-(86.0)	N	1,3,5-Trimethylbenzene	3.90	1.30 U J	1.30 UJ	-	ug/kg	M
FEW4-MW85-(86.0)	N	1,3-Dichlorobenzene	3.90	1.30 U J	1.30 UJ	-	ug/kg	M
FEW4-MW85-(86.0)	N	1,4-Dichlorobenzene	3.90	1.30 U J	1.30 UJ	-	ug/kg	M
FEW4-MW85-(86.0)	N	2-Chlorotoluene	3.90	1.30 U J	1.30 UJ	-	ug/kg	M
FEW4-MW85-(86.0)	N	Bromobenzene	3.90	1.30 U J	1.30 UJ	-	ug/kg	M
FEW4-MW85-(86.0)	N	n-Propylbenzene	3.90	1.30 U J	1.30 UJ	-	ug/kg	M
FEW4-MW85-(86.0)	N	p-Cymene (p-Isopropyltoluene)	3.90	1.30 U J	1.30 UJ	-	ug/kg	M
FEW4-MW85-(86.0)	N	tert-Butylbenzene	3.90	1.30 U J	1.30 UJ	-	ug/kg	M

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
Trace values are not included in the qualified results table unless additional reason codes are associated.

Table of All Trace Results

Test Method: SW8260B Extraction Method: SW5035A

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW74-(0.50)	N	p-Cymene (p-Isopropyltoluene)	4.90	1.00 J	1.00 J		ug/kg	TR
FEW4-MW74-(2.50)	N	Acetone	43.0	19.0 J	19.0 J		ug/kg	TR
FEW4-MW74-(56.0)	N	Acetone	29.0	19.0 J	19.0 J		ug/kg	TR
FEW4-MW74-(57.0)	FD	Tetrachloroethene (PCE)	6.90	1.00 J	1.00 J		ug/kg	TR
FEW4-MW74-(75.0)	N	Acetone	30.0	16.0 J	16.0 J		ug/kg	TR
FEW4-MW74-(9.00)	N	Acetone	20.0	13.0 J	13.0 J		ug/kg	TR
FEW4-MW85-(86.0)	N	Trichloroethene (TCE)	3.90	2.50 J	2.50 J		ug/kg	TR

Results with Modified Qualifiers

No qualifiers associated with this sample delivery group were modified manually.

Reason Code Definitions

Code	Definition
D	MS RPD
M	MS Recovery
TR	Trace Level Detect

Flag Code and Definitions

Flag	Definition
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
J	Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
R	The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making.
B	Blank contamination: The analyte was found in an associated blank above one half the RL, as well as in the sample.
UB	The analyte was also detected in an associated laboratory or field blank at a concentration comparable to the concentration in the sample. The reported result has been requalified as not detected.

Review Questions

Method: SW8260B (Volatile Organic Compounds by Capillary GC/MS)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were sample reciept temperatures met?	•			Sample receipt temperature were 0.5ºC.
Were QAPP specified PQLs achieved?	•			
Were all QAPP-specified target analytes reported?	•			
Was the GC/MS system properly tuned based on method criteria?	•			
Was the criteria met during each 12 hour shift (prior to ICAL and Cal Ver.)?	•			
Does the initial calibration curve consist of 5 concentration levels, with the low standard near but > MDL?	•			
Did the Calibration Check Compounds (CCCs) have a relative standard deviation within QAPP acceptance limits?	•			
Were the average response factors (RFs) for the System Performance Check Compounds (SPCCs) within QAPP acceptance limits?	•			
Were the ICAL %RSDs for the target compounds within method criteria?	•			
If a quadratic equation curve was used, was the coefficient of determination (COD) within criteria?	•			
If a linear regression curve was used, was the correlation coefficient within criteria?	•			
Check and recalculate the response factors and average response factors for a least one target compound.	•			ICAL VMS-MS9 8/31/17 TCE AVG RF = 0.2774
Check and recalculate the %RSD for one of more target compounds and DMCs. Verify that the recalculated values agree with the laboratory reported values.	•			ICAL VMS-MS9 8/31/17 TCE %RSD = 8% Toluene-=d8 %RSD = 14.2%
Was a second source verification analyzed after the ICAL and all analytes within criteria?	•			
Was a CCV run at the beginning of the analytical sequence and every 12 hours?	•			
Was the CCV a mid-level standard from the initial calibration curve?	•			
Did the CCCs have a %Difference within QAPP acceptance limits?	•			
Were the average RFs for the SPCCs within QAPP acceptance limits?	•			
Was the %D (difference or drift) for all target analytes within QAPP acceptance limits?		•		CCV 280-386512/2: 1,1,2,2-Tetrachloroethane (-22.2%D) and 1,2-dibromo-3-chloropropane (-22.0%D) were outside the 20% control limit. These analytes were not detected in any associated samples and have therefore not been qualified.
Check and recalculate the CCV relative response factor for at least one target compound.	•			VMS-MS9 9/6/17 CCV 280-386761/2 Trichloroethene RF = 0.3075
Were the internal standards added to every standard, blank, matrix spike, matrix spike duplicate, and sample?	•			
Were the retention times for all IS compounds within QAPP acceptance limits?	•			

Review Questions

Method: SW8260B (Volatile Organic Compounds by Capillary GC/MS)

Review Questions	Yes	No	NA	Comment
Are the area counts of all IS compounds within QAPP acceptance limits?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes detected in the method blank above the MDL?		•		
Were target analytes reported in the field blank analyses above the MDL?			•	
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?				FEW4-MW74-(57.0) is a blind field duplicate of FEW4-MW74-(56.0)
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were the LCS/LCSD recoveries within QAPP acceptance limits?	•			
Were the LCS/LCSD RPDs within QAPP acceptance limits?			•	
Was the duplicate RPD within QAPP acceptance limits?			•	
Was a MS/MSD pair prepared with each batch?	•			
Is the MS/MSD parent sample the one designated by the sampling team?	•			FEW4-MW74-(9.00) and FEW4-MW85-(86.0) were designated for matrix spike analyses.
Were MS/MSD recoveries and RPD within QAPP acceptance limits?		•		Several analytes were recovered less than the lower control limit for the MS of sample FEW4-MW85-(86.0); the 20% RPD limit was also exceeded for several analytes.
Were surrogate recoveries within QAPP acceptance limits?	•			
Were reported sample concentrations within calibration range?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were instrument run logs present and filled out appropriately?	•			
Were sample prepration sheets present and filled out appropriately?	•			
Check and recalculate the %D for one target compound. Verify that the recalculated values agree with the laboratory-reported values.			•	
Examine raw data to verify correct calculation of sample results reported by the laboratory. Compare quantitation lists and chromatograms to the reported detect and non-detect sample results.	•			FEW4-MW74-65 DL TCE = 2200 ug/L
Verify that the reporting limits and sample results have been adjusted to reflect all sample dilutions and Percent Moisture factors (non-aqueous samples).	•			

US Army Corps of Engineers ®

Batch Report

Test Method: SW8260B Analysis Batch: 280-386761

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
LABQC	WQ	MB 280-386761/7	MB 280-386761/7		1/1	9/6/2017 19:56	9/6/2017 19:56	9/6/2017 19:56	280-386761/	LB
LABQC	WQ	LCS 280-386761/5	LCS 280-386761/5		1/1	9/6/2017 20:17	9/6/2017 20:17	9/6/2017 20:17	280-386761/	BS
LABQC	WQ	LCSD 280-386761/6	LCSD 280-386761/6		1/1	9/6/2017 20:38	9/6/2017 20:38	9/6/2017 20:38	280-386761/	BD
FEW4-MW85	WG	FEW4-MW85-90	280-100638-1		1/4	8/24/2017 16:05	9/7/2017 01:30	9/7/2017 01:30	280-386761/	N
FEW4-MW85	WG	FEW4-MW85-90	280-100638-1		2/40	8/24/2017 16:05	9/7/2017 01:51	9/7/2017 01:51	280-386761/	N

Test Method: SW8260B Analysis Batch: 280-386777

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
LABQC	SQ	LCS 280-386777/1-A	LCS 280-386777/1-A		1/1	9/6/2017 19:00	9/6/2017 19:00	9/6/2017 19:59	280-386777/	BS
LABQC	SQ	LCSD 280-386777/2-A	LCSD 280-386777/2-A		1/1	9/6/2017 19:00	9/6/2017 19:00	9/6/2017 20:19	280-386777/	BD
LABQC	SQ	MB 280-386777/3-A	MB 280-386777/3-A		1/1	9/6/2017 19:00	9/6/2017 19:00	9/6/2017 20:39	280-386777/	LB
FEW4-MW85	SO	FEW4-MW85-(96.0)	280-100638-2		1/1	8/24/2017 16:45	8/24/2017 16:45	9/6/2017 23:21	280-386777/	N
FEW4-MW85	SO	FEW4-MW85-(105.0)	280-100638-3		1/1	8/24/2017 16:55	8/24/2017 16:55	9/6/2017 23:41	280-386777/	N
FEW4-MW85	SO	FEW4-MW85-(109.0)	280-100638-4		1/1	8/24/2017 17:15	8/24/2017 17:15	9/7/2017 00:01	280-386777/	N
FEW4-MW85	SO	FEW4-MW85-(118.0)	280-100638-5		1/1	8/24/2017 17:49	8/24/2017 17:49	9/7/2017 00:21	280-386777/	N
FEW4-MW85	SO	FEW4-MW85-(128.0)	280-100638-6		1/1	8/24/2017 18:00	8/24/2017 18:00	9/7/2017 00:42	280-386777/	N
FEW4-MW85	SO	FEW4-MW85-(138.0)	280-100638-7		1/1	8/25/2017 08:25	8/25/2017 08:25	9/7/2017 01:02	280-386777/	N
FEW4-MW85	SO	FEW4-MW85-(148.0)	280-100638-8		1/1	8/25/2017 09:40	8/25/2017 09:40	9/7/2017 01:22	280-386777/	N
FEW4-MW85	SO	FEW4-MW85-(158.0)	280-100638-9		1/1	8/25/2017 09:40	8/25/2017 09:40	9/7/2017 01:42	280-386777/	N
FEW4-MW85	SO	FEW4-MW85-(168.0)	280-100638-10		1/1	8/25/2017 10:07	8/25/2017 10:07	9/7/2017 02:02	280-386777/	N
FEW4-MW85	SO	FEW4-MW85-(149.0)	280-100638-11		1/1	8/25/2017 10:40	8/25/2017 10:40	9/7/2017 02:22	280-386777/	FD
FEW4-MW74	SO	FEW4-MW74-(85.0)	280-100638-12		1/1	8/24/2017 16:33	8/24/2017 16:33	9/7/2017 02:42	280-386777/	N
FEW4-MW74	SO	FEW4-MW74-(94.0)	280-100638-13		1/1	8/24/2017 17:03	8/24/2017 17:03	9/7/2017 03:03	280-386777/	N
FEW4-MW74	SO	FEW4-MW74-(104.0)	280-100638-14		1/1	8/25/2017 09:15	8/25/2017 09:15	9/7/2017 03:23	280-386777/	N

US Army Corps of Engineers ®

Batch Report

Test Method: SW8260B Analysis Batch: 280-386777

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
FEW4-MW74	SO	FEW4-MW74-(105.0)	280-100638-15		1/1	8/25/2017 10:15	8/25/2017 10:15	9/7/2017 03:43	280-386777/	FD
FEW4-MW74	SO	FEW4-MW74-(114.0)	280-100638-16		1/1	8/25/2017 09:55	8/25/2017 09:55	9/7/2017 04:03	280-386777/	N

Test Method: SW8260B Analysis Batch: 280-386841

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
LABQC	SQ	MB 280-386841/1-A	MB 280-386841/1-A		1/1	9/7/2017 08:50	9/7/2017 08:50	9/7/2017 10:18	280-386841/	LB
LABQC	SQ	LCS 280-386841/2-A	LCS 280-386841/2-A		1/1	9/7/2017 08:50	9/7/2017 08:50	9/7/2017 10:37	280-386841/	BS
FEW4-MW74	SO	FEW4-MW74-(104.0)	280-100638-14		2/1	8/25/2017 09:15	9/7/2017 08:50	9/7/2017 13:51	280-386841/	N
FEW4-MW74	SO	FEW4-MW74-(105.0)	280-100638-15		2/1	8/25/2017 10:15	9/7/2017 08:50	9/7/2017 14:10	280-386841/	FD
FEW4-MW74	SO	FEW4-MW74-(114.0)	280-100638-16		2/1	8/25/2017 09:55	9/7/2017 08:50	9/7/2017 14:49	280-386841/	N
FEW4-MW74	SO	FEW4-MW74-(94.0)	280-100638-13		2/1	8/24/2017 17:03	9/7/2017 08:50	9/7/2017 16:26	280-386841/	N

Test Method: SW8260B Analysis Batch: 280-386916

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
LABQC	SQ	LCS 280-386916/1-A	LCS 280-386916/1-A		1/1	9/7/2017 18:38	9/7/2017 18:38	9/7/2017 21:27	280-386916/	BS
LABQC	SQ	LCSD 280-386916/2-A	LCSD 280-386916/2-A		1/1	9/7/2017 18:38	9/7/2017 18:38	9/7/2017 21:47	280-386916/	BD
LABQC	SQ	MB 280-386916/3-A	MB 280-386916/3-A		1/1	9/7/2017 18:38	9/7/2017 18:38	9/7/2017 22:07	280-386916/	LB
FEW4-MW74	SO	FEW4-MW74-(125.0)	280-100638-17		1/1	8/25/2017 10:00	8/28/2017 10:00	9/7/2017 22:27	280-386916/	N
FEW4-MW74	SO	FEW4-MW74-(134.0)	280-100638-18		1/1	8/25/2017 11:00	8/28/2017 11:00	9/7/2017 22:47	280-386916/	N
FEW4-MW74	SO	FEW4-MW74-(144.0)	280-100638-19		1/1	8/25/2017 12:35	8/28/2017 12:35	9/7/2017 23:07	280-386916/	N
FEW4-MW74	SO	FEW4-MW74-(154.0)	280-100638-20		1/1	8/25/2017 12:40	8/28/2017 12:40	9/7/2017 23:27	280-386916/	N
FEW4-MW85	SO	FEW4-MW85-(178.0)	280-100638-21		1/1	8/25/2017 10:55	8/28/2017 10:55	9/7/2017 23:48	280-386916/	N

US Army Corps of Engineers ®

Batch Report

Test Method: SW8260B Analysis Batch: 280-386916

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
FEW4-MW85	SO	FEW4-MW85-(188.0)	280-100638-22		1/1	8/25/2017 11:10	8/28/2017 11:10	9/8/2017 00:08	280-386916/	N
FEW4-MW85	SO	FEW4-MW85-(199.0)	280-100638-23		1/1	8/25/2017 13:15	8/28/2017 13:15	9/8/2017 00:28	280-386916/	N
FEW4-MW85	SO	FEW4-MW85-(208.0)	280-100638-24		1/1	8/25/2017 13:25	8/28/2017 13:25	9/8/2017 00:48	280-386916/	N

US Army Corps of Engineers ®

Field Batch Report

--No Records Found--

MS Mismatch Report

--No Records Found--

Section to identify Matrix Spike mismatches where parent sample differs from MS by dilution.

US Army Corps of Engineers ®

QC Outlier Report

Test Method: SW8260B Extraction Method: SW5030B Leach Method: NONE

QC Element	Sample ID/ Lab Sample ID	Run#/ Dil'n	Analyte	Result (Units)	Qualifier	Warning Limits	Control Limits	Reason	Comment	Rule	Action Level
Surrogate	FEW4-MW85-90 (N) / 280-100638-1	2 / 40.00	Toluene-d8	88.64 (percent)	J/UJ	89 - 112	89 - 112	I			

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

QC Element	Sample ID/ Lab Sample ID	Run#/ Dil'n	Analyte	Result (Units)	Qualifier	Warning Limits	Control Limits	Reason	Comment	Rule	Action Level
Surrogate	FEW4-MW74-(104.0) (N) / 280-100638-14	1 / 1.00	Dibromofluoromethane	125.9 (percent)	J/None	78 - 119	78 - 119	I			
Surrogate	FEW4-MW74-(114.0) (N) / 280-100638-16	1 / 1.00	Dibromofluoromethane	121.8 (percent)	J/None	78 - 119	78 - 119	I			
Surrogate	FEW4-MW74-(144.0) (N) / 280-100638-19	1 / 1.00	Dibromofluoromethane	121.2 (percent)	J/None	78 - 119	78 - 119	I			
Surrogate	FEW4-MW74-(94.0) (N) / 280-100638-13	1 / 1.00	Dibromofluoromethane	119.5 (percent)	J/None	78 - 119	78 - 119	I			
Surrogate	FEW4-MW85-(105.0) (N) / 280-100638-3	1 / 1.00	Dibromofluoromethane	119.2 (percent)	J/None	78 - 119	78 - 119	I			
Surrogate	FEW4-MW85-(118.0) (N) / 280-100638-5	1 / 1.00	Dibromofluoromethane	119.6 (percent)	J/None	78 - 119	78 - 119	I			
Surrogate	FEW4-MW85-(138.0) (N) / 280-100638-7	1 / 1.00	Dibromofluoromethane	126.7 (percent)	J/None	78 - 119	78 - 119	I			
Surrogate	FEW4-MW85-(148.0) (N) / 280-100638-8	1 / 1.00	Dibromofluoromethane	120.1 (percent)	J/None	78 - 119	78 - 119	I			
Surrogate	FEW4-MW85-(149.0) (FD) / 280-100638-11	1 / 1.00	Dibromofluoromethane	120.3 (percent)	J/None	78 - 119	78 - 119	I			
Surrogate	FEW4-MW85-(168.0) (N) / 280-100638-10	1 / 1.00	Dibromofluoromethane	120.7 (percent)	J/None	78 - 119	78 - 119	I			
Surrogate	FEW4-MW85-(199.0) (N) / 280-100638-23	1 / 1.00	Dibromofluoromethane	120.3 (percent)	J/None	78 - 119	78 - 119	I			

US Army Corps of Engineers ®

QC Outlier Report

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

QC Element	Sample ID/ Lab Sample ID	Run#/ Dil'n	Analyte	Result (Units)	Qualifier	Warning Limits	Control Limits	Reason	Comment	Rule	Action Level
Surrogate	FEW4-MW85-(208.0) (N) / 280-100638-24	1 / 1.00	Dibromofluoromethane	119.8 (percent)	J/None	78 - 119	78 - 119	I			

Rule is the multiplier used when blank contamination occurs to determine action level.

US Army Corps of Engineers ®

Qualified Results

Test Method: SW8260B Extraction Method: SW5030B Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW85-90	280-100638-1	WG	N	Trichloroethene (TCE)	40.0	1100 D	1100 J	-	ug/L	I

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW74-(104.0)	280-100638-14	SO	N	1,2-Dichloroethene	6.30	5.10 J	5.10 J	+	ug/kg	I/TR
FEW4-MW74-(104.0)	280-100638-14	SO	N	cis-1,2-Dichloroethene	6.30	5.10 J Q	5.10 J	+	ug/kg	I/TR
FEW4-MW74-(105.0)	280-100638-15	SO	FD	1,2-Dichloroethene	6.80	5.00 J	5.00 J		ug/kg	TR
FEW4-MW74-(105.0)	280-100638-15	SO	FD	Acetone	27.0	25.0 J	25.0 J		ug/kg	TR
FEW4-MW74-(105.0)	280-100638-15	SO	FD	cis-1,2-Dichloroethene	6.80	5.00 J	5.00 J		ug/kg	TR
FEW4-MW74-(114.0)	280-100638-16	SO	N	1,2-Dichloroethene	5.80	3.70 J	3.70 J	+	ug/kg	I/TR
FEW4-MW74-(114.0)	280-100638-16	SO	N	Acetone	23.0	24.0 Q	24.0 J	+	ug/kg	I
FEW4-MW74-(114.0)	280-100638-16	SO	N	cis-1,2-Dichloroethene	5.80	3.70 J Q	3.70 J	+	ug/kg	I/TR
FEW4-MW74-(114.0)	280-100638-16	SO	N	Trichloroethene (TCE)	290	270 J	270 J		ug/kg	TR
FEW4-MW74-(125.0)	280-100638-17	SO	N	1,2-Dichloroethene	6.80	2.30 J	2.30 J		ug/kg	TR
FEW4-MW74-(125.0)	280-100638-17	SO	N	Acetone	27.0	21.0 J	21.0 J		ug/kg	TR
FEW4-MW74-(125.0)	280-100638-17	SO	N	cis-1,2-Dichloroethene	6.80	2.30 J	2.30 J		ug/kg	TR
FEW4-MW74-(134.0)	280-100638-18	SO	N	1,2-Dichloroethene	6.90	1.50 J	1.50 J		ug/kg	TR
FEW4-MW74-(134.0)	280-100638-18	SO	N	cis-1,2-Dichloroethene	6.90	1.50 J	1.50 J		ug/kg	TR
FEW4-MW74-(144.0)	280-100638-19	SO	N	Acetone	29.0	32.0 Q	32.0 J	+	ug/kg	I
FEW4-MW74-(144.0)	280-100638-19	SO	N	Trichloroethene (TCE)	7.20	3.20 J	3.20 J	+	ug/kg	I/TR
FEW4-MW74-(85.0)	280-100638-12	SO	N	1,2-Dichloroethene	6.30	0.920 J	0.920 J		ug/kg	TR
FEW4-MW74-(85.0)	280-100638-12	SO	N	Acetone	25.0	16.0 J	16.0 J		ug/kg	TR
FEW4-MW74-(85.0)	280-100638-12	SO	N	cis-1,2-Dichloroethene	6.30	0.920 J	0.920 J		ug/kg	TR
FEW4-MW74-(94.0)	280-100638-13	SO	N	1,1,2-Trichloroethane	6.60	2.60 J	2.60 J	+	ug/kg	I/TR
FEW4-MW74-(94.0)	280-100638-13	SO	N	1,2-Dichloroethene	6.60	4.70 J	4.70 J	+	ug/kg	I/TR
FEW4-MW74-(94.0)	280-100638-13	SO	N	cis-1,2-Dichloroethene	6.60	4.70 J Q	4.70 J	+	ug/kg	I/TR

US Army Corps of Engineers ®

Qualified Results

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW85-(105.0)	280-100638-3	SO	N	Acetone	20.0	14.0 J	14.0 J	+	ug/kg	I/TR
FEW4-MW85-(105.0)	280-100638-3	SO	N	Trichloroethene (TCE)	5.00	15.0	15.0 J	+	ug/kg	I
FEW4-MW85-(118.0)	280-100638-5	SO	N	Acetone	26.0	12.0 J	12.0 J	+	ug/kg	I/TR
FEW4-MW85-(118.0)	280-100638-5	SO	N	Trichloroethene (TCE)	6.40	9.90	9.90 J	+	ug/kg	I
FEW4-MW85-(128.0)	280-100638-6	SO	N	Acetone	22.0	13.0 J	13.0 J		ug/kg	TR
FEW4-MW85-(138.0)	280-100638-7	SO	N	Trichloroethene (TCE)	5.10	56.0	56.0 J	+	ug/kg	I
FEW4-MW85-(148.0)	280-100638-8	SO	N	Acetone	34.0	23.0 J Q	23.0 J	+	ug/kg	I/TR
FEW4-MW85-(148.0)	280-100638-8	SO	N	Trichloroethene (TCE)	8.60	66.0	66.0 J	+	ug/kg	I
FEW4-MW85-(149.0)	280-100638-11	SO	FD	Trichloroethene (TCE)	8.30	71.0	71.0 J	+	ug/kg	I
FEW4-MW85-(158.0)	280-100638-9	SO	N	Acetone	28.0	19.0 J	19.0 J		ug/kg	TR
FEW4-MW85-(168.0)	280-100638-10	SO	N	Trichloroethene (TCE)	5.70	0.590 J	0.590 J	+	ug/kg	I/TR
FEW4-MW85-(188.0)	280-100638-22	SO	N	Acetone	25.0	14.0 J	14.0 J		ug/kg	TR
FEW4-MW85-(199.0)	280-100638-23	SO	N	Acetone	28.0	32.0 Q	32.0 J	+	ug/kg	I
FEW4-MW85-(208.0)	280-100638-24	SO	N	Acetone	17.0	14.0 J	14.0 J	+	ug/kg	I/TR
FEW4-MW85-(96.0)	280-100638-2	SO	N	Acetone	16.0	12.0 J	12.0 J		ug/kg	TR

Qualified analytes in samples are reported as estimated, not detected (UJ) at the Limit of Detection (LOD).

Detected Results

Test Method: SW8260B Extraction Method: SW5030B Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Dilution	Analyte	LOQ	Lab Result	Qualified Result	Units	Reason
FEW4-MW85-90	280-100638-1	WG	N	4	cis-1,2-Dichloroethene	4.00	4.10 D	4.10	ug/L	
FEW4-MW85-90	280-100638-1	WG	N	40	Trichloroethene (TCE)	40.0	1100 D	1100 J	ug/L	I

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Dilution	Analyte	LOQ	Lab Result	Qualified Result	Units	Reason
FEW4-MW74-(104.0)	280-100638-14	SO	N	1	1,2-Dichloroethene	6.30	5.10 J	5.10 J	ug/kg	I/TR
FEW4-MW74-(104.0)	280-100638-14	SO	N	1	cis-1,2-Dichloroethene	6.30	5.10 J Q	5.10 J	ug/kg	I/TR
FEW4-MW74-(104.0)	280-100638-14	SO	N	1	Trichloroethene (TCE)	320	350	350	ug/kg	
FEW4-MW74-(105.0)	280-100638-15	SO	FD	1	1,2-Dichloroethene	6.80	5.00 J	5.00 J	ug/kg	TR
FEW4-MW74-(105.0)	280-100638-15	SO	FD	1	Acetone	27.0	25.0 J	25.0 J	ug/kg	TR
FEW4-MW74-(105.0)	280-100638-15	SO	FD	1	cis-1,2-Dichloroethene	6.80	5.00 J	5.00 J	ug/kg	TR
FEW4-MW74-(105.0)	280-100638-15	SO	FD	1	Trichloroethene (TCE)	270	430	430	ug/kg	
FEW4-MW74-(114.0)	280-100638-16	SO	N	1	1,2-Dichloroethene	5.80	3.70 J	3.70 J	ug/kg	I/TR
FEW4-MW74-(114.0)	280-100638-16	SO	N	1	Acetone	23.0	24.0 Q	24.0 J	ug/kg	I
FEW4-MW74-(114.0)	280-100638-16	SO	N	1	cis-1,2-Dichloroethene	5.80	3.70 J Q	3.70 J	ug/kg	I/TR
FEW4-MW74-(114.0)	280-100638-16	SO	N	1	Trichloroethene (TCE)	290	270 J	270 J	ug/kg	TR
FEW4-MW74-(125.0)	280-100638-17	SO	N	1	1,2-Dichloroethene	6.80	2.30 J	2.30 J	ug/kg	TR
FEW4-MW74-(125.0)	280-100638-17	SO	N	1	Acetone	27.0	21.0 J	21.0 J	ug/kg	TR
FEW4-MW74-(125.0)	280-100638-17	SO	N	1	cis-1,2-Dichloroethene	6.80	2.30 J	2.30 J	ug/kg	TR
FEW4-MW74-(125.0)	280-100638-17	SO	N	1	Trichloroethene (TCE)	6.80	120	120	ug/kg	
FEW4-MW74-(134.0)	280-100638-18	SO	N	1	1,2-Dichloroethene	6.90	1.50 J	1.50 J	ug/kg	TR
FEW4-MW74-(134.0)	280-100638-18	SO	N	1	cis-1,2-Dichloroethene	6.90	1.50 J	1.50 J	ug/kg	TR
FEW4-MW74-(134.0)	280-100638-18	SO	N	1	Trichloroethene (TCE)	6.90	60.0	60.0	ug/kg	
FEW4-MW74-(144.0)	280-100638-19	SO	N	1	Acetone	29.0	32.0 Q	32.0 J	ug/kg	I
FEW4-MW74-(144.0)	280-100638-19	SO	N	1	Trichloroethene (TCE)	7.20	3.20 J	3.20 J	ug/kg	I/TR

US Army Corps of Engineers ®

Detected Results

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Dilution	Analyte	LOQ	Lab Result	Qualified Result	Units	Reason
FEW4-MW74-(154.0)	280-100638-20	SO	N	1	Acetone	23.0	27.0	27.0	ug/kg	
FEW4-MW74-(85.0)	280-100638-12	SO	N	1	1,2-Dichloroethene	6.30	0.920 J	0.920 J	ug/kg	TR
FEW4-MW74-(85.0)	280-100638-12	SO	N	1	Acetone	25.0	16.0 J	16.0 J	ug/kg	TR
FEW4-MW74-(85.0)	280-100638-12	SO	N	1	cis-1,2-Dichloroethene	6.30	0.920 J	0.920 J	ug/kg	TR
FEW4-MW74-(85.0)	280-100638-12	SO	N	1	Trichloroethene (TCE)	6.30	70.0	70.0	ug/kg	
FEW4-MW74-(94.0)	280-100638-13	SO	N	1	1,1,2-Trichloroethane	6.60	2.60 J	2.60 J	ug/kg	I/TR
FEW4-MW74-(94.0)	280-100638-13	SO	N	1	1,2-Dichloroethene	6.60	4.70 J	4.70 J	ug/kg	I/TR
FEW4-MW74-(94.0)	280-100638-13	SO	N	1	cis-1,2-Dichloroethene	6.60	4.70 J Q	4.70 J	ug/kg	I/TR
FEW4-MW74-(94.0)	280-100638-13	SO	N	1	Trichloroethene (TCE)	340	1400	1400	ug/kg	
FEW4-MW85-(105.0)	280-100638-3	SO	N	1	Acetone	20.0	14.0 J	14.0 J	ug/kg	I/TR
FEW4-MW85-(105.0)	280-100638-3	SO	N	1	Trichloroethene (TCE)	5.00	15.0	15.0 J	ug/kg	I
FEW4-MW85-(109.0)	280-100638-4	SO	N	1	Acetone	16.0	22.0	22.0	ug/kg	
FEW4-MW85-(109.0)	280-100638-4	SO	N	1	Trichloroethene (TCE)	4.00	4.30	4.30	ug/kg	
FEW4-MW85-(118.0)	280-100638-5	SO	N	1	Acetone	26.0	12.0 J	12.0 J	ug/kg	I/TR
FEW4-MW85-(118.0)	280-100638-5	SO	N	1	Trichloroethene (TCE)	6.40	9.90	9.90 J	ug/kg	I
FEW4-MW85-(128.0)	280-100638-6	SO	N	1	Acetone	22.0	13.0 J	13.0 J	ug/kg	TR
FEW4-MW85-(128.0)	280-100638-6	SO	N	1	Trichloroethene (TCE)	5.40	62.0	62.0	ug/kg	
FEW4-MW85-(138.0)	280-100638-7	SO	N	1	Trichloroethene (TCE)	5.10	56.0	56.0 J	ug/kg	I
FEW4-MW85-(148.0)	280-100638-8	SO	N	1	Acetone	34.0	23.0 J Q	23.0 J	ug/kg	I/TR
FEW4-MW85-(148.0)	280-100638-8	SO	N	1	Trichloroethene (TCE)	8.60	66.0	66.0 J	ug/kg	I
FEW4-MW85-(149.0)	280-100638-11	SO	FD	1	Trichloroethene (TCE)	8.30	71.0	71.0 J	ug/kg	I
FEW4-MW85-(158.0)	280-100638-9	SO	N	1	Acetone	28.0	19.0 J	19.0 J	ug/kg	TR
FEW4-MW85-(168.0)	280-100638-10	SO	N	1	Trichloroethene (TCE)	5.70	0.590 J	0.590 J	ug/kg	I/TR
FEW4-MW85-(188.0)	280-100638-22	SO	N	1	Acetone	25.0	14.0 J	14.0 J	ug/kg	TR
FEW4-MW85-(199.0)	280-100638-23	SO	N	1	Acetone	28.0	32.0 Q	32.0 J	ug/kg	I
FEW4-MW85-(208.0)	280-100638-24	SO	N	1	Acetone	17.0	14.0 J	14.0 J	ug/kg	I/TR
FEW4-MW85-(96.0)	280-100638-2	SO	N	1	Acetone	16.0	12.0 J	12.0 J	ug/kg	TR

US Army Corps of Engineers ®

Detected Results

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Dilution	Analyte	LOQ	Lab Result	Qualified Result	Units	Reason
FEW4-MW85-(96.0)	280-100638-2	SO	N	1	Trichloroethene (TCE)	4.00	7.10	7.10	ug/kg	

US Army Corps of Engineers ®

Rejected Results

--No Records Found--

Facility:	B08WY0467-02, F.E. Warren AFB, Site 4
Event:	2017-2018 RI Addendum Tasks
SDG:	280-100638-1_52_2a_FUDSChem
Guidance Document:	Draft-Final Uniform Federal Policy-Quality Assurance Project Plan for the Remedial Investigation Addendum 2017-2018 Tasks Atlas "D" Missile Site 4 —Laramie County, Wyoming, July 2017
Prime Contractor:	RMC Consultants, Inc., LAKEWOOD, CO
Project Manager:	David Groy
Contract Laboratory:	TestAmerica Laboratories, Inc., Arvada, CO
Data Review Contractor:	RMC Consultants Inc.
Data Review Level:	Stage 3VEM
Primary Data Reviewer:	Gary Torf, Contractor Project Chemist
Second Reviewer:	, Senior Scientist
Date Submitted:	

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	SW8260B
FEW4-MW74-(105.0)	280-100638-15	Solid	Field Duplicate/FD	X
FEW4-MW85-(149.0)	280-100638-11	Solid	Field Duplicate/FD	X
FEW4-MW74-(104.0)	280-100638-14	Solid	Field Sample/N	X
FEW4-MW74-(114.0)	280-100638-16	Solid	Field Sample/N	X
FEW4-MW74-(125.0)	280-100638-17	Solid	Field Sample/N	X
FEW4-MW74-(134.0)	280-100638-18	Solid	Field Sample/N	X
FEW4-MW74-(144.0)	280-100638-19	Solid	Field Sample/N	X
FEW4-MW74-(154.0)	280-100638-20	Solid	Field Sample/N	X
FEW4-MW74-(85.0)	280-100638-12	Solid	Field Sample/N	X
FEW4-MW74-(94.0)	280-100638-13	Solid	Field Sample/N	X
FEW4-MW85-(105.0)	280-100638-3	Solid	Field Sample/N	X
FEW4-MW85-(109.0)	280-100638-4	Solid	Field Sample/N	X
FEW4-MW85-(118.0)	280-100638-5	Solid	Field Sample/N	X
FEW4-MW85-(128.0)	280-100638-6	Solid	Field Sample/N	X
FEW4-MW85-(138.0)	280-100638-7	Solid	Field Sample/N	X
FEW4-MW85-(148.0)	280-100638-8	Solid	Field Sample/N	X
FEW4-MW85-(158.0)	280-100638-9	Solid	Field Sample/N	X
FEW4-MW85-(168.0)	280-100638-10	Solid	Field Sample/N	X
FEW4-MW85-(178.0)	280-100638-21	Solid	Field Sample/N	X

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	SW8260B
FEW4-MW85-(188.0)	280-100638-22	Solid	Field Sample/N	X
FEW4-MW85-(199.0)	280-100638-23	Solid	Field Sample/N	X
FEW4-MW85-(208.0)	280-100638-24	Solid	Field Sample/N	X
FEW4-MW85-(96.0)	280-100638-2	Solid	Field Sample/N	X
FEW4-MW85-90	280-100638-1	Water	Field Sample/N	X

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the Draft-Final Uniform Federal Policy-Quality Assurance Project Plan for the Remedial Investigation Addendum 2017-2018 Tasks Atlas “D” Missile Site 4 —Laramie County, Wyoming, July 2017 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by RMC Consultants, Inc., LAKEWOOD, CO; analyses were performed by TestAmerica Laboratories, Inc., Arvada, CO and were reported under sample delivery group (SDG) 280-100638-1_52_2a_FUDSChem. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

- Blank
- Blank - Negative
- Field Duplicate RPD
- LCS Recovery
- LCS RPD
- Prep Hold Time
- Surrogate
- Test Hold Time

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 22 results (1.40%) out of the 1570 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected. Trace values, defined as results that are qualified as estimated because they fall between the limit of detection and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

Narrative Comments

Analytical Method	Data Reviewer Comment
SW8260B	No additional comments; see Checklist for detail.

December 28, 2017

Reviewed by Gary Torf, Contractor Project Chemist, RMC Consultants Inc.

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of a minimum of 10% of the reported sample results and method quality control data between the two deliverables.

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

Quality Control Outliers for test method SW8260B, Surrogate

Method performance for individual samples is demonstrated through spiking activities. All samples are spiked with surrogate compounds prior to sample preparation. The sample itself may produce effects due to such factors as interferences and high concentrations of analytes. Summary forms were evaluated and compared to electronic data deliverables. Surrogate results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
FEW4-MW74-(104.0) (N)/ 280-100638-14	Dibromofluoromethane	125.9	78 - 119	78 - 119	percent	J/None	I	
FEW4-MW74-(114.0) (N)/ 280-100638-16	Dibromofluoromethane	121.8	78 - 119	78 - 119	percent	J/None	I	
FEW4-MW74-(144.0) (N)/ 280-100638-19	Dibromofluoromethane	121.2	78 - 119	78 - 119	percent	J/None	I	
FEW4-MW74-(94.0) (N)/ 280-100638-13	Dibromofluoromethane	119.5	78 - 119	78 - 119	percent	J/None	I	
FEW4-MW85-(105.0) (N)/ 280-100638-3	Dibromofluoromethane	119.2	78 - 119	78 - 119	percent	J/None	I	
FEW4-MW85-(118.0) (N)/ 280-100638-5	Dibromofluoromethane	119.6	78 - 119	78 - 119	percent	J/None	I	
FEW4-MW85-(138.0) (N)/ 280-100638-7	Dibromofluoromethane	126.7	78 - 119	78 - 119	percent	J/None	I	
FEW4-MW85-(148.0) (N)/ 280-100638-8	Dibromofluoromethane	120.1	78 - 119	78 - 119	percent	J/None	I	
FEW4-MW85-(149.0) (FD)/ 280-100638-11	Dibromofluoromethane	120.3	78 - 119	78 - 119	percent	J/None	I	
FEW4-MW85-(168.0) (N)/ 280-100638-10	Dibromofluoromethane	120.7	78 - 119	78 - 119	percent	J/None	I	
FEW4-MW85-(199.0) (N)/ 280-100638-23	Dibromofluoromethane	120.3	78 - 119	78 - 119	percent	J/None	I	
FEW4-MW85-(208.0) (N)/ 280-100638-24	Dibromofluoromethane	119.8	78 - 119	78 - 119	percent	J/None	I	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the Surrogate for SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW74-(104.0)	N	1,2-Dichloroethene	6.30	5.10 J	5.10 J	+	ug/kg	I/TR
FEW4-MW74-(104.0)	N	cis-1,2-Dichloroethene	6.30	5.10 J Q	5.10 J	+	ug/kg	I/TR
FEW4-MW74-(114.0)	N	1,2-Dichloroethene	5.80	3.70 J	3.70 J	+	ug/kg	I/TR
FEW4-MW74-(114.0)	N	Acetone	23.0	24.0 Q	24.0 J	+	ug/kg	I
FEW4-MW74-(114.0)	N	cis-1,2-Dichloroethene	5.80	3.70 J Q	3.70 J	+	ug/kg	I/TR
FEW4-MW74-(144.0)	N	Acetone	29.0	32.0 Q	32.0 J	+	ug/kg	I
FEW4-MW74-(144.0)	N	Trichloroethene (TCE)	7.20	3.20 J	3.20 J	+	ug/kg	I/TR
FEW4-MW74-(94.0)	N	1,1,2-Trichloroethane	6.60	2.60 J	2.60 J	+	ug/kg	I/TR
FEW4-MW74-(94.0)	N	1,2-Dichloroethene	6.60	4.70 J	4.70 J	+	ug/kg	I/TR
FEW4-MW74-(94.0)	N	cis-1,2-Dichloroethene	6.60	4.70 J Q	4.70 J	+	ug/kg	I/TR
FEW4-MW85-(105.0)	N	Acetone	20.0	14.0 J	14.0 J	+	ug/kg	I/TR
FEW4-MW85-(105.0)	N	Trichloroethene (TCE)	5.00	15.0	15.0 J	+	ug/kg	I
FEW4-MW85-(118.0)	N	Acetone	26.0	12.0 J	12.0 J	+	ug/kg	I/TR
FEW4-MW85-(118.0)	N	Trichloroethene (TCE)	6.40	9.90	9.90 J	+	ug/kg	I

Qualified Results associated with the Surrogate for SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW85-(138.0)	N	Trichloroethene (TCE)	5.10	56.0	56.0 J	+	ug/kg	I
FEW4-MW85-(148.0)	N	Acetone	34.0	23.0 J Q	23.0 J	+	ug/kg	I/TR
FEW4-MW85-(148.0)	N	Trichloroethene (TCE)	8.60	66.0	66.0 J	+	ug/kg	I
FEW4-MW85-(149.0)	FD	Trichloroethene (TCE)	8.30	71.0	71.0 J	+	ug/kg	I
FEW4-MW85-(168.0)	N	Trichloroethene (TCE)	5.70	0.590 J	0.590 J	+	ug/kg	I/TR
FEW4-MW85-(199.0)	N	Acetone	28.0	32.0 Q	32.0 J	+	ug/kg	I
FEW4-MW85-(208.0)	N	Acetone	17.0	14.0 J	14.0 J	+	ug/kg	I/TR

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

Quality Control Outliers for test method SW8260B, Surrogate

Method performance for individual samples is demonstrated through spiking activities. All samples are spiked with surrogate compounds prior to sample preparation. The sample itself may produce effects due to such factors as interferences and high concentrations of analytes. Summary forms were evaluated and compared to electronic data deliverables. Surrogate results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
FEW4-MW85-90 (N)/ 280-100638-1	Toluene-d8	88.64	89 - 112	89 - 112	percent	J/UJ	I	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the Surrogate for SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW85-90	N	Trichloroethene (TCE)	40.0	1100 D	1100 J	-	ug/l	I

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

Table of All Qualified Results

Test Method: SW8260B	Extraction Method: SW5030B							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW85-90	N	Trichloroethene (TCE)	40.0	1100 D	1100 J	-	ug/l	I

Test Method: SW8260B	Extraction Method: SW5035A							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW74-(104.0)	N	1,2-Dichloroethene	6.30	5.10 J	5.10 J	+	ug/kg	I/TR
FEW4-MW74-(104.0)	N	cis-1,2-Dichloroethene	6.30	5.10 J Q	5.10 J	+	ug/kg	I/TR
FEW4-MW74-(114.0)	N	1,2-Dichloroethene	5.80	3.70 J	3.70 J	+	ug/kg	I/TR
FEW4-MW74-(114.0)	N	Acetone	23.0	24.0 Q	24.0 J	+	ug/kg	I
FEW4-MW74-(114.0)	N	cis-1,2-Dichloroethene	5.80	3.70 J Q	3.70 J	+	ug/kg	I/TR
FEW4-MW74-(144.0)	N	Acetone	29.0	32.0 Q	32.0 J	+	ug/kg	I
FEW4-MW74-(144.0)	N	Trichloroethene (TCE)	7.20	3.20 J	3.20 J	+	ug/kg	I/TR
FEW4-MW74-(94.0)	N	1,1,2-Trichloroethane	6.60	2.60 J	2.60 J	+	ug/kg	I/TR
FEW4-MW74-(94.0)	N	1,2-Dichloroethene	6.60	4.70 J	4.70 J	+	ug/kg	I/TR
FEW4-MW74-(94.0)	N	cis-1,2-Dichloroethene	6.60	4.70 J Q	4.70 J	+	ug/kg	I/TR
FEW4-MW85-(105.0)	N	Acetone	20.0	14.0 J	14.0 J	+	ug/kg	I/TR
FEW4-MW85-(105.0)	N	Trichloroethene (TCE)	5.00	15.0	15.0 J	+	ug/kg	I
FEW4-MW85-(118.0)	N	Acetone	26.0	12.0 J	12.0 J	+	ug/kg	I/TR
FEW4-MW85-(118.0)	N	Trichloroethene (TCE)	6.40	9.90	9.90 J	+	ug/kg	I
FEW4-MW85-(138.0)	N	Trichloroethene (TCE)	5.10	56.0	56.0 J	+	ug/kg	I
FEW4-MW85-(148.0)	N	Acetone	34.0	23.0 J Q	23.0 J	+	ug/kg	I/TR
FEW4-MW85-(148.0)	N	Trichloroethene (TCE)	8.60	66.0	66.0 J	+	ug/kg	I
FEW4-MW85-(149.0)	FD	Trichloroethene (TCE)	8.30	71.0	71.0 J	+	ug/kg	I
FEW4-MW85-(168.0)	N	Trichloroethene (TCE)	5.70	0.590 J	0.590 J	+	ug/kg	I/TR
FEW4-MW85-(199.0)	N	Acetone	28.0	32.0 Q	32.0 J	+	ug/kg	I
FEW4-MW85-(208.0)	N	Acetone	17.0	14.0 J	14.0 J	+	ug/kg	I/TR

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
Trace values are not included in the qualified results table unless additional reason codes are associated.

Table of All Trace Results

Test Method: SW8260B Extraction Method: SW5035A

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW74-(104.0)	N	1,2-Dichloroethene	6.30	5.10 J	5.10 J	+	ug/kg	I/TR
FEW4-MW74-(104.0)	N	cis-1,2-Dichloroethene	6.30	5.10 J Q	5.10 J	+	ug/kg	I/TR
FEW4-MW74-(105.0)	FD	1,2-Dichloroethene	6.80	5.00 J	5.00 J		ug/kg	TR
FEW4-MW74-(105.0)	FD	Acetone	27.0	25.0 J	25.0 J		ug/kg	TR
FEW4-MW74-(105.0)	FD	cis-1,2-Dichloroethene	6.80	5.00 J	5.00 J		ug/kg	TR
FEW4-MW74-(114.0)	N	1,2-Dichloroethene	5.80	3.70 J	3.70 J	+	ug/kg	I/TR
FEW4-MW74-(114.0)	N	cis-1,2-Dichloroethene	5.80	3.70 J Q	3.70 J	+	ug/kg	I/TR
FEW4-MW74-(114.0)	N	Trichloroethene (TCE)	290	270 J	270 J		ug/kg	TR
FEW4-MW74-(125.0)	N	1,2-Dichloroethene	6.80	2.30 J	2.30 J		ug/kg	TR
FEW4-MW74-(125.0)	N	Acetone	27.0	21.0 J	21.0 J		ug/kg	TR
FEW4-MW74-(125.0)	N	cis-1,2-Dichloroethene	6.80	2.30 J	2.30 J		ug/kg	TR
FEW4-MW74-(134.0)	N	1,2-Dichloroethene	6.90	1.50 J	1.50 J		ug/kg	TR
FEW4-MW74-(134.0)	N	cis-1,2-Dichloroethene	6.90	1.50 J	1.50 J		ug/kg	TR
FEW4-MW74-(144.0)	N	Trichloroethene (TCE)	7.20	3.20 J	3.20 J	+	ug/kg	I/TR
FEW4-MW74-(85.0)	N	1,2-Dichloroethene	6.30	0.920 J	0.920 J		ug/kg	TR
FEW4-MW74-(85.0)	N	Acetone	25.0	16.0 J	16.0 J		ug/kg	TR
FEW4-MW74-(85.0)	N	cis-1,2-Dichloroethene	6.30	0.920 J	0.920 J		ug/kg	TR
FEW4-MW74-(94.0)	N	1,1,2-Trichloroethane	6.60	2.60 J	2.60 J	+	ug/kg	I/TR
FEW4-MW74-(94.0)	N	1,2-Dichloroethene	6.60	4.70 J	4.70 J	+	ug/kg	I/TR
FEW4-MW74-(94.0)	N	cis-1,2-Dichloroethene	6.60	4.70 J Q	4.70 J	+	ug/kg	I/TR
FEW4-MW85-(105.0)	N	Acetone	20.0	14.0 J	14.0 J	+	ug/kg	I/TR
FEW4-MW85-(118.0)	N	Acetone	26.0	12.0 J	12.0 J	+	ug/kg	I/TR
FEW4-MW85-(128.0)	N	Acetone	22.0	13.0 J	13.0 J		ug/kg	TR
FEW4-MW85-(148.0)	N	Acetone	34.0	23.0 J Q	23.0 J	+	ug/kg	I/TR
FEW4-MW85-(158.0)	N	Acetone	28.0	19.0 J	19.0 J		ug/kg	TR
FEW4-MW85-(168.0)	N	Trichloroethene (TCE)	5.70	0.590 J	0.590 J	+	ug/kg	I/TR
FEW4-MW85-(188.0)	N	Acetone	25.0	14.0 J	14.0 J		ug/kg	TR
FEW4-MW85-(208.0)	N	Acetone	17.0	14.0 J	14.0 J	+	ug/kg	I/TR
FEW4-MW85-(96.0)	N	Acetone	16.0	12.0 J	12.0 J		ug/kg	TR

Results with Modified Qualifiers

No qualifiers associated with this sample delivery group were modified manually.

Reason Code Definitions

Code	Definition
I	Surrogate recovery outside project limits.
TR	Trace Level Detect

Flag Code and Definitions

Flag	Definition
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
J	Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
R	The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making.
B	Blank contamination: The analyte was found in an associated blank above one half the RL, as well as in the sample.
UB	The analyte was also detected in an associated laboratory or field blank at a concentration comparable to the concentration in the sample. The reported result has been requalified as not detected.

Review Questions

Method: SW8260B (Volatile Organic Compounds by Capillary GC/MS)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were sample reciept temperatures met?	•			Sample receipt temperatures were 1.2ºC and 5.7ºC.
Were QAPP specified Project Quantitation Limit Goals achieved?	•			
Were all QAPP-specified target analytes reported?	•			
Was the GC/MS system properly tuned based on method criteria?	•			
Was the criteria met during each 12 hour shift (prior to ICAL and Cal Ver.)?	•			
Does the initial calibration curve consist of 5 concentration levels, with the low standard near but > MDL?	•			
Did the Calibration Check Compounds (CCCs) have a relative standard deviation within QAPP acceptance limits?	•			
Were the average response factors (RFs) for the System Performance Check Compounds (SPCCs) within QAPP acceptance limits?	•			
Were the ICAL %RSDs for the target compounds within method criteria?	•			
If a quadratic equation curve was used, was the coefficient of determination (COD) within criteria?	•			
If a linear regression curve was used, was the correlation coefficient within criteria?	•			
Check and recalculate the response factors and average response factors for a least one target compound.	•			ICAL VMS-G2 8/30/17 TCE AVG RF = 0.2896
Check and recalculate the %RSD for one of more target compounds and DMCs. Verify that the recalculated values agree with the laboratory reported values.	•			VMS_G2 8/30/17 TCE %RSD = 5.1% 1,2-DCA-d4 %RSD = 4.5%
Was a second source verification analyzed after the ICAL and all analytes within criteria?	•			
Was a CCV run at the beginning of the analytical sequence and every 12 hours?	•			
Was the CCV a mid-level standard from the initial calibration curve?	•			
Did the CCCs have a %Difference within QAPP acceptance limits?	•			
Were the average RFs for the SPCCs within QAPP acceptance limits?	•			
Was the %D (difference or drift) for all target analytes within QAPP acceptance limits?		•		CCV 280-386787/2: Carbon tetrachloride (20.7%), chloromethane (-26.2%), and chlorobromomethane (20.3%) were outside the 20% control limit. These analytes were not detected in any associated samples and have therefore not been qualified. CCV 280-386913/2: 1,2-dibromo-3-chloropropane (-20.1%) was outside the 20% control limit. The analyte was not detected in any associated samples and has therefore not been qualified.

Review Questions

Method: SW8260B (Volatile Organic Compounds by Capillary GC/MS)

Review Questions	Yes	No	NA	Comment
Check and recalculate the CCV relative response factor for at least one target compound.	•			VMS-G2 9/6/17 CCV 280-386787/2 Trichloroethene RF = 0.3144
Were the internal standards added to every standard, blank, matrix spike, matrix spike duplicate, and sample?	•			
Were the retention times for all IS compounds within QAPP acceptance limits?	•			
Are the area counts of all IS compounds within QAPP acceptance limits?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes detected in the method blank less than 1/2 LOQ and less than 1/10 the amount in any sample?	•			Acetone, methylene chloride, and n-butylbenzene were detected in a method blank less than 1/2 the LOQ.
Were target analytes reported in the field blank less than 1/2 LOQ and less than 1/10 the amount in any sample?			•	
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?	•			FEW4-MW85-(149.0) is a blind field duplicate of FEW4-MW85-(148.0), and FEW4-MW74-(105.0) is a blind field duplicate of FEW4-MW74-(104.0)
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were the LCS/LCSD recoveries within QAPP acceptance limits?		•		Vinyl chloride was recovered above the upper control limit of 135% in an LCS and LCSD at 145%. The analyte was not detected in any associated samples.
Were the LCS/LCSD RPDs within QAPP acceptance limits?	•			
Was the duplicate RPD within QAPP acceptance limits?			•	
Was a MS/MSD pair prepared with each batch?		•		
Is the MS/MSD parent sample the one designated by the sampling team?			•	MS/MSD samples were not designated for analysis with the associated samples.
Were MS/MSD recoveries and RPD within QAPP acceptance limits?			•	
Were surrogate recoveries within QAPP acceptance limits?		•		Dibromofluoromethane was recovered above the upper control limit of 119% in several samples; toluene-d8 was recovered less than the lower control limit of 89% at 88.64% in the dilution analysis for TCE in sample FEW4-MW85-90.
Were reported sample concentrations within calibration range?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were instrument run logs present and filled out appropriately?	•			
Were sample prepration sheets present and filled out appropriately?	•			
Check and recalculate the %D for one target compound. Verify that the recalculated values agree with the laboratory-reported values.			•	
Examine raw data to verify correct calculation of sample results reported by the laboratory. Compare quantitation lists and chromatograms to the reported detect and non-detect sample results.	•			FEW4-MW85-(109.0) TCE = 4.3 ug/kg
Verify that the reporting limits and sample results have been adjusted to reflect all sample dilutions and Percent Moisture factors (non-aqueous samples).	•			

US Army Corps of Engineers ®

Batch Report

Test Method: SW8260B Analysis Batch: 280-386916

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
LABQC	SQ	LCS 280-386916/1-A	LCS 280-386916/1-A		1/1	9/7/2017 18:38	9/7/2017 18:38	9/7/2017 21:27	280-386916/	BS
LABQC	SQ	LCSD 280-386916/2-A	LCSD 280-386916/2-A		1/1	9/7/2017 18:38	9/7/2017 18:38	9/7/2017 21:47	280-386916/	BD
LABQC	SQ	MB 280-386916/3-A	MB 280-386916/3-A		1/1	9/7/2017 18:38	9/7/2017 18:38	9/7/2017 22:07	280-386916/	LB
FEW4-MW74	SO	FEW4-MW74-(157.0)	280-100642-1		1/1	8/25/2017 16:30	8/25/2017 16:30	9/8/2017 02:49	280-386916/	N
FEW4-MW74	SO	FEW4-MW74-(177.0)	280-100642-3		1/1	8/25/2017 16:40	8/25/2017 16:40	9/8/2017 03:09	280-386916/	N
FEW4-MW74	SO	FEW4-MW74-(187.0)	280-100642-4		1/1	8/25/2017 17:50	8/25/2017 17:50	9/8/2017 03:29	280-386916/	N
FEW4-MW74	SO	FEW4-MW74-(197.0)	280-100642-5		1/1	8/25/2017 17:55	8/25/2017 17:55	9/8/2017 03:49	280-386916/	N
FEW4-MW85	SO	FEW4-MW85-(218.0)	280-100642-6		1/1	8/25/2017 17:15	8/25/2017 17:15	9/8/2017 04:09	280-386916/	N
FEW4-MW85	SO	FEW4-MW85-(228.0)	280-100642-7		1/1	8/25/2017 17:25	8/25/2017 17:25	9/8/2017 04:29	280-386916/	N

Test Method: SW8260B Analysis Batch: 280-386917

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
LABQC	SQ	LCS 280-386917/1-A	LCS 280-386917/1-A		1/1	9/7/2017 19:16	9/7/2017 19:16	9/7/2017 21:27	280-386917/	BS
LABQC	SQ	LCSD 280-386917/2-A	LCSD 280-386917/2-A		1/1	9/7/2017 19:16	9/7/2017 19:16	9/7/2017 21:47	280-386917/	BD
LABQC	SQ	MB 280-386917/3-A	MB 280-386917/3-A		1/1	9/7/2017 19:16	9/7/2017 19:16	9/7/2017 22:07	280-386917/	LB
FEW4-MW74	SO	FEW4-MW74-(167.0)	280-100642-2		1/1	8/25/2017 16:35	9/7/2017 19:16	9/8/2017 04:49	280-386917/	N

US Army Corps of Engineers ®

Field Batch Report

--No Records Found--

MS Mismatch Report

--No Records Found--

Section to identify Matrix Spike mismatches where parent sample differs from MS by dilution.

US Army Corps of Engineers ®

QC Outlier Report

Test Method: SW8260B Extraction Method: SW5030A Leach Method: NONE

QC Element	Sample ID/ Lab Sample ID	Run#/ Dil'n	Analyte	Result (Units)	Qualifier	Warning Limits	Control Limits	Reason	Comment	Rule	Action Level
Blank	MB 280-386917/3-A (LB) / MB 280-386917/3-A	1 / 1.00	Acetone	8.460 (ug/kg)	*U/None	< 5.4	< 20	L		2	16.9
LCS Recovery	LCS 280-386917/1-A (BS) / LCS 280-386917/1-A	1 / 1.00	Vinyl chloride	144.6 (percent)	J/None	56 - 135	56 - 135	C			
LCS Recovery	LCSD 280-386917/2-A (BD) / LCSD 280-386917/2-A	1 / 1.00	Vinyl chloride	144.6 (percent)	J/None	56 - 135	56 - 135	C			

Rule is the multiplier used when blank contamination occurs to determine action level.

*Blank qualification may apply a J flag when the sample result is greater than the reporting limit for NFG and when the sample result is between 5 and 20 times the blank result for EM200-1-10.

US Army Corps of Engineers ®

Qualified Results

Test Method: SW8260B Extraction Method: SW5030A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW74-(167.0)	280-100642-2	SO	N	1,1,1,2-Tetrachloroethane	6.00	1.90 U	1.90 UJ		ug/kg	P
FEW4-MW74-(167.0)	280-100642-2	SO	N	1,1,1-Trichloroethane	6.00	1.90 U	1.90 UJ		ug/kg	P
FEW4-MW74-(167.0)	280-100642-2	SO	N	1,1,2,2-Tetrachloroethane	6.00	1.90 U	1.90 UJ		ug/kg	P
FEW4-MW74-(167.0)	280-100642-2	SO	N	1,1,2-Trichloroethane	6.00	3.80 U	3.80 UJ		ug/kg	P
FEW4-MW74-(167.0)	280-100642-2	SO	N	1,1-Dichloroethane	6.00	0.960 U	0.960 UJ		ug/kg	P
FEW4-MW74-(167.0)	280-100642-2	SO	N	1,1-Dichloroethene	6.00	1.90 U	1.90 UJ		ug/kg	P
FEW4-MW74-(167.0)	280-100642-2	SO	N	1,1-Dichloropropene	6.00	1.90 U	1.90 UJ		ug/kg	P
FEW4-MW74-(167.0)	280-100642-2	SO	N	1,2,3-Trichlorobenzene	6.00	1.90 U	1.90 UJ		ug/kg	P
FEW4-MW74-(167.0)	280-100642-2	SO	N	1,2,3-Trichloropropane	6.00	3.80 U	3.80 UJ		ug/kg	P
FEW4-MW74-(167.0)	280-100642-2	SO	N	1,2,4-Trichlorobenzene	6.00	1.90 U	1.90 UJ		ug/kg	P
FEW4-MW74-(167.0)	280-100642-2	SO	N	1,2,4-Trimethylbenzene	6.00	1.90 U	1.90 UJ		ug/kg	P
FEW4-MW74-(167.0)	280-100642-2	SO	N	1,2-Dibromo-3-chloropropane	12.0	1.90 U Q	1.90 UJ		ug/kg	P
FEW4-MW74-(167.0)	280-100642-2	SO	N	1,2-Dibromoethane (EDB)	6.00	1.90 U	1.90 UJ		ug/kg	P
FEW4-MW74-(167.0)	280-100642-2	SO	N	1,2-Dichlorobenzene	6.00	1.90 U	1.90 UJ		ug/kg	P
FEW4-MW74-(167.0)	280-100642-2	SO	N	1,2-Dichloroethane	6.00	1.90 U	1.90 UJ		ug/kg	P
FEW4-MW74-(167.0)	280-100642-2	SO	N	1,2-Dichloroethene	6.00	1.90 U	1.90 UJ		ug/kg	P
FEW4-MW74-(167.0)	280-100642-2	SO	N	1,2-Dichloropropane	6.00	1.90 U	1.90 UJ		ug/kg	P
FEW4-MW74-(167.0)	280-100642-2	SO	N	1,3,5-Trimethylbenzene	6.00	1.90 U	1.90 UJ		ug/kg	P
FEW4-MW74-(167.0)	280-100642-2	SO	N	1,3-Dichlorobenzene	6.00	1.90 U	1.90 UJ		ug/kg	P
FEW4-MW74-(167.0)	280-100642-2	SO	N	1,3-Dichloropropane	6.00	1.90 U	1.90 UJ		ug/kg	P
FEW4-MW74-(167.0)	280-100642-2	SO	N	1,4-Dichlorobenzene	6.00	1.90 U	1.90 UJ		ug/kg	P
FEW4-MW74-(167.0)	280-100642-2	SO	N	2,2-Dichloropropane	6.00	1.90 U	1.90 UJ		ug/kg	P
FEW4-MW74-(167.0)	280-100642-2	SO	N	2-Butanone (MEK)	24.0	7.70 U	7.70 UJ		ug/kg	P
FEW4-MW74-(167.0)	280-100642-2	SO	N	2-Chlorotoluene	6.00	1.90 U	1.90 UJ		ug/kg	P
FEW4-MW74-(167.0)	280-100642-2	SO	N	2-Hexanone	24.0	15.0 U	15.0 UJ		ug/kg	P
FEW4-MW74-(167.0)	280-100642-2	SO	N	4-Chlorotoluene	6.00	1.90 U	1.90 UJ		ug/kg	P
FEW4-MW74-(167.0)	280-100642-2	SO	N	4-Methyl-2-pentanone (MIBK)	24.0	15.0 U	15.0 UJ		ug/kg	P

US Army Corps of Engineers ®

Qualified Results

Test Method: SW8260B Extraction Method: SW5030A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW74-(167.0)	280-100642-2	SO	N	Acetone	24.0	15.0 U	15.0 UJ		ug/kg	P
FEW4-MW74-(167.0)	280-100642-2	SO	N	Benzene	6.00	1.90 U	1.90 UJ		ug/kg	P
FEW4-MW74-(167.0)	280-100642-2	SO	N	Bromobenzene	6.00	1.90 U	1.90 UJ		ug/kg	P
FEW4-MW74-(167.0)	280-100642-2	SO	N	Bromochloromethane	6.00	0.960 U	0.960 UJ		ug/kg	P
FEW4-MW74-(167.0)	280-100642-2	SO	N	Bromodichloromethane	6.00	0.960 U	0.960 UJ		ug/kg	P
FEW4-MW74-(167.0)	280-100642-2	SO	N	Bromoform	6.00	0.960 U	0.960 UJ		ug/kg	P
FEW4-MW74-(167.0)	280-100642-2	SO	N	Bromomethane	12.0	1.90 U	1.90 UJ		ug/kg	P
FEW4-MW74-(167.0)	280-100642-2	SO	N	Carbon disulfide	6.00	1.90 U	1.90 UJ		ug/kg	P
FEW4-MW74-(167.0)	280-100642-2	SO	N	Carbon tetrachloride	6.00	1.90 U	1.90 UJ		ug/kg	P
FEW4-MW74-(167.0)	280-100642-2	SO	N	Chlorobenzene	6.00	1.90 U	1.90 UJ		ug/kg	P
FEW4-MW74-(167.0)	280-100642-2	SO	N	Chloroethane	12.0	3.80 U	3.80 UJ		ug/kg	P
FEW4-MW74-(167.0)	280-100642-2	SO	N	Chloroform	12.0	0.960 U	0.960 UJ		ug/kg	P
FEW4-MW74-(167.0)	280-100642-2	SO	N	Chloromethane	12.0	1.90 U	1.90 UJ		ug/kg	P
FEW4-MW74-(167.0)	280-100642-2	SO	N	cis-1,2-Dichloroethene	6.00	1.90 U	1.90 UJ		ug/kg	P
FEW4-MW74-(167.0)	280-100642-2	SO	N	cis-1,3-Dichloropropene	6.00	3.80 U	3.80 UJ		ug/kg	P
FEW4-MW74-(167.0)	280-100642-2	SO	N	Dibromochloromethane	6.00	1.90 U	1.90 UJ		ug/kg	P
FEW4-MW74-(167.0)	280-100642-2	SO	N	Dibromomethane	6.00	3.80 U	3.80 UJ		ug/kg	P
FEW4-MW74-(167.0)	280-100642-2	SO	N	Dichlorodifluoromethane	12.0	1.90 U	1.90 UJ		ug/kg	P
FEW4-MW74-(167.0)	280-100642-2	SO	N	Ethylbenzene	6.00	1.90 U	1.90 UJ		ug/kg	P
FEW4-MW74-(167.0)	280-100642-2	SO	N	Hexachlorobutadiene	6.00	1.90 U	1.90 UJ		ug/kg	P
FEW4-MW74-(167.0)	280-100642-2	SO	N	Isopropylbenzene (Cumene)	6.00	1.90 U	1.90 UJ		ug/kg	P
FEW4-MW74-(167.0)	280-100642-2	SO	N	m,p-Xylene	3.80	3.80 U	3.80 UJ		ug/kg	P
FEW4-MW74-(167.0)	280-100642-2	SO	N	Methyl tert-butyl ether (MTBE)	24.0	0.960 U	0.960 UJ		ug/kg	P
FEW4-MW74-(167.0)	280-100642-2	SO	N	Methylene chloride	6.00	3.80 U	3.80 UJ		ug/kg	P
FEW4-MW74-(167.0)	280-100642-2	SO	N	Naphthalene	6.00	1.90 U	1.90 UJ		ug/kg	P
FEW4-MW74-(167.0)	280-100642-2	SO	N	n-Butylbenzene	6.00	1.90 U	1.90 UJ		ug/kg	P
FEW4-MW74-(167.0)	280-100642-2	SO	N	n-Propylbenzene	6.00	1.90 U	1.90 UJ		ug/kg	P
FEW4-MW74-(167.0)	280-100642-2	SO	N	o-Xylene	6.00	1.90 U	1.90 UJ		ug/kg	P

US Army Corps of Engineers ®

Qualified Results

Test Method: SW8260B Extraction Method: SW5030A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW74-(167.0)	280-100642-2	SO	N	p-Cymene (p-Isopropyltoluene)	6.00	1.90 U	1.90 UJ		ug/kg	P
FEW4-MW74-(167.0)	280-100642-2	SO	N	sec-Butylbenzene	6.00	1.90 U	1.90 UJ		ug/kg	P
FEW4-MW74-(167.0)	280-100642-2	SO	N	Styrene	6.00	1.90 U	1.90 UJ		ug/kg	P
FEW4-MW74-(167.0)	280-100642-2	SO	N	tert-Butylbenzene	6.00	1.90 U	1.90 UJ		ug/kg	P
FEW4-MW74-(167.0)	280-100642-2	SO	N	Tetrachloroethene (PCE)	6.00	1.90 U	1.90 UJ		ug/kg	P
FEW4-MW74-(167.0)	280-100642-2	SO	N	Toluene	6.00	1.90 U	1.90 UJ		ug/kg	P
FEW4-MW74-(167.0)	280-100642-2	SO	N	trans-1,2-Dichloroethene	6.00	0.960 U	0.960 UJ		ug/kg	P
FEW4-MW74-(167.0)	280-100642-2	SO	N	trans-1,3-Dichloropropene	6.00	1.90 U	1.90 UJ		ug/kg	P
FEW4-MW74-(167.0)	280-100642-2	SO	N	Trichloroethene (TCE)	6.00	0.960 U	0.960 UJ		ug/kg	P
FEW4-MW74-(167.0)	280-100642-2	SO	N	Trichlorofluoromethane	12.0	3.80 U	3.80 UJ		ug/kg	P
FEW4-MW74-(167.0)	280-100642-2	SO	N	Vinyl chloride	6.00	3.80 U Q	3.80 UJ		ug/kg	P

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW74-(157.0)	280-100642-1	SO	N	Acetone	17.0	8.60 J	8.60 J		ug/kg	TR
FEW4-MW74-(177.0)	280-100642-3	SO	N	Acetone	26.0	17.0 J	17.0 J		ug/kg	TR
FEW4-MW74-(187.0)	280-100642-4	SO	N	Acetone	17.0	13.0 J	13.0 J		ug/kg	TR
FEW4-MW85-(218.0)	280-100642-6	SO	N	Acetone	26.0	13.0 J	13.0 J		ug/kg	TR

Qualified analytes in samples are reported as estimated, not detected (UJ) at the Limit of Detection (LOD).

US Army Corps of Engineers ®

Detected Results

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Dilution	Analyte	LOQ	Lab Result	Qualified Result	Units	Reason
FEW4-MW74-(157.0)	280-100642-1	SO	N	1	Acetone	17.0	8.60 J	8.60 J	ug/kg	TR
FEW4-MW74-(177.0)	280-100642-3	SO	N	1	Acetone	26.0	17.0 J	17.0 J	ug/kg	TR
FEW4-MW74-(187.0)	280-100642-4	SO	N	1	Acetone	17.0	13.0 J	13.0 J	ug/kg	TR
FEW4-MW85-(218.0)	280-100642-6	SO	N	1	Acetone	26.0	13.0 J	13.0 J	ug/kg	TR
FEW4-MW85-(228.0)	280-100642-7	SO	N	1	Acetone	28.0	37.0	37.0	ug/kg	

US Army Corps of Engineers ®

Rejected Results

--No Records Found--

US Army Corps of Engineers ®

Facility:	B08WY0467-02, F.E. Warren AFB, Site 4
Event:	2017-2018 RI Addendum Tasks
SDG:	280-100642-1_52_2a_FUDSChem
Guidance Document:	Draft-Final Uniform Federal Policy-Quality Assurance Project Plan for the Remedial Investigation Addendum 2017-2018 Tasks Atlas “D” Missile Site 4 —Laramie County, Wyoming, July 2017
Prime Contractor:	RMC Consultants, Inc., LAKEWOOD, CO
Project Manager:	David Groy
Contract Laboratory:	TestAmerica Laboratories, Inc., Arvada, CO
Data Review Contractor:	RMC Consultants
Data Review Level:	Stage 3VEM
Primary Data Reviewer:	Gary Torf, Contractor Project Chemist
Second Reviewer:	, Senior Scientist
Date Submitted:	

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	SW8260B
FEW4-MW74-(157.0)	280-100642-1	Solid	Field Sample/N	X
FEW4-MW74-(167.0)	280-100642-2	Solid	Field Sample/N	X
FEW4-MW74-(177.0)	280-100642-3	Solid	Field Sample/N	X
FEW4-MW74-(187.0)	280-100642-4	Solid	Field Sample/N	X
FEW4-MW74-(197.0)	280-100642-5	Solid	Field Sample/N	X
FEW4-MW85-(218.0)	280-100642-6	Solid	Field Sample/N	X
FEW4-MW85-(228.0)	280-100642-7	Solid	Field Sample/N	X

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the Draft-Final Uniform Federal Policy-Quality Assurance Project Plan for the Remedial Investigation Addendum 2017-2018 Tasks Atlas “D” Missile Site 4 —Laramie County, Wyoming, July 2017 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by RMC Consultants, Inc., LAKEWOOD, CO; analyses were performed by TestAmerica Laboratories, Inc., Arvada, CO and were reported under sample delivery group (SDG) 280-100642-1_52_2a_FUDSChem. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

- Blank
- Blank - Negative
- LCS Recovery
- LCS RPD
- Prep Hold Time
- Surrogate
- Test Hold Time

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 66 results (14.29%) out of the 462 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected. Trace values, defined as results that are qualified as estimated because they fall between the limit of detection and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

Narrative Comments

Analytical Method	Data Reviewer Comment
SW8260B	Sample FEW4-MW74-(167.0) was analyzed for volatile organic compounds (GC/MS) using the soil jar sent in for moisture analysis as the terracore vials were found to be broken when taken out of the lab freezer.

December 28, 2017

Reviewed by Gary Torf, Contractor Project Chemist, RMC Consultants

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of a minimum of 10% of the reported sample results and method quality control data between the two deliverables.

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

Quality Control Outliers for test method SW8260B, Blank

The purpose of laboratory blanks is to determine the existence and magnitude of cross-contamination problems resulting from laboratory activities. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in laboratory blanks are listed below along with any associated qualified results.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
MB 280-386917/3-A (LB)/ MB 280-386917/3-A	Acetone	8.460	< 5.4	< 20	ug/kg	U/None	L	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

Quality Control Outliers for test method SW8260B, LCS Recovery

The laboratory control sample/laboratory control sample duplicate (LCS/LCSD) serves as a monitor of the overall performance of each step during the analysis, including the sample preparation. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
LCS 280-386917/1-A (BS)/ LCS 280-386917/1-A	Vinyl chloride	144.6	56 - 135	56 - 135	percent	J/None	C	
LCSD 280-386917/2-A (BD)/ LCSD 280-386917/2-A	Vinyl chloride	144.6	56 - 135	56 - 135	percent	J/None	C	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

Qualified Results

No results associated with this sample delivery group required qualification.

Table of All Trace Results

Test Method: SW8260B Extraction Method: SW5035A

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW74-(157.0)	N	Acetone	17.0	8.60 J	8.60 J		ug/kg	TR
FEW4-MW74-(177.0)	N	Acetone	26.0	17.0 J	17.0 J		ug/kg	TR
FEW4-MW74-(187.0)	N	Acetone	17.0	13.0 J	13.0 J		ug/kg	TR
FEW4-MW85-(218.0)	N	Acetone	26.0	13.0 J	13.0 J		ug/kg	TR

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW74-(167.0)	N	1,1,1,2-Tetrachloroethane	6.00	1.90 U	1.90 U	1.90 UJ	P
FEW4-MW74-(167.0)	N	1,1,1-Trichloroethane	6.00	1.90 U	1.90 U	1.90 UJ	P
FEW4-MW74-(167.0)	N	1,1,2,2-Tetrachloroethane	6.00	1.90 U	1.90 U	1.90 UJ	P
FEW4-MW74-(167.0)	N	1,1,2-Trichloroethane	6.00	3.80 U	3.80 U	3.80 UJ	P
FEW4-MW74-(167.0)	N	1,1-Dichloroethane	6.00	0.960 U	0.960 U	0.960 UJ	P
FEW4-MW74-(167.0)	N	1,1-Dichloroethene	6.00	1.90 U	1.90 U	1.90 UJ	P
FEW4-MW74-(167.0)	N	1,1-Dichloropropene	6.00	1.90 U	1.90 U	1.90 UJ	P
FEW4-MW74-(167.0)	N	1,2,3-Trichlorobenzene	6.00	1.90 U	1.90 U	1.90 UJ	P
FEW4-MW74-(167.0)	N	1,2,3-Trichloropropane	6.00	3.80 U	3.80 U	3.80 UJ	P
FEW4-MW74-(167.0)	N	1,2,4-Trichlorobenzene	6.00	1.90 U	1.90 U	1.90 UJ	P
FEW4-MW74-(167.0)	N	1,2,4-Trimethylbenzene	6.00	1.90 U	1.90 U	1.90 UJ	P
FEW4-MW74-(167.0)	N	1,2-Dibromo-3-chloropropane	12.0	1.90 U Q	1.90 U	1.90 UJ	P
FEW4-MW74-(167.0)	N	1,2-Dibromoethane (EDB)	6.00	1.90 U	1.90 U	1.90 UJ	P
FEW4-MW74-(167.0)	N	1,2-Dichlorobenzene	6.00	1.90 U	1.90 U	1.90 UJ	P
FEW4-MW74-(167.0)	N	1,2-Dichloroethane	6.00	1.90 U	1.90 U	1.90 UJ	P
FEW4-MW74-(167.0)	N	1,2-Dichloroethene	6.00	1.90 U	1.90 U	1.90 UJ	P
FEW4-MW74-(167.0)	N	1,2-Dichloropropane	6.00	1.90 U	1.90 U	1.90 UJ	P
FEW4-MW74-(167.0)	N	1,3,5-Trimethylbenzene	6.00	1.90 U	1.90 U	1.90 UJ	P
FEW4-MW74-(167.0)	N	1,3-Dichlorobenzene	6.00	1.90 U	1.90 U	1.90 UJ	P
FEW4-MW74-(167.0)	N	1,3-Dichloropropane	6.00	1.90 U	1.90 U	1.90 UJ	P
FEW4-MW74-(167.0)	N	1,4-Dichlorobenzene	6.00	1.90 U	1.90 U	1.90 UJ	P
FEW4-MW74-(167.0)	N	2,2-Dichloropropane	6.00	1.90 U	1.90 U	1.90 UJ	P
FEW4-MW74-(167.0)	N	2-Butanone (MEK)	24.0	7.70 U	7.70 U	7.70 UJ	P
FEW4-MW74-(167.0)	N	2-Chlorotoluene	6.00	1.90 U	1.90 U	1.90 UJ	P
FEW4-MW74-(167.0)	N	2-Hexanone	24.0	15.0 U	15.0 U	15.0 UJ	P
FEW4-MW74-(167.0)	N	4-Chlorotoluene	6.00	1.90 U	1.90 U	1.90 UJ	P
FEW4-MW74-(167.0)	N	4-Methyl-2-pentanone (MIBK)	24.0	15.0 U	15.0 U	15.0 UJ	P
FEW4-MW74-(167.0)	N	Acetone	24.0	15.0 U	15.0 U	15.0 UJ	P
FEW4-MW74-(167.0)	N	Benzene	6.00	1.90 U	1.90 U	1.90 UJ	P
FEW4-MW74-(167.0)	N	Bromobenzene	6.00	1.90 U	1.90 U	1.90 UJ	P
FEW4-MW74-(167.0)	N	Bromochloromethane	6.00	0.960 U	0.960 U	0.960 UJ	P
FEW4-MW74-(167.0)	N	Bromodichloromethane	6.00	0.960 U	0.960 U	0.960 UJ	P
FEW4-MW74-(167.0)	N	Bromoform	6.00	0.960 U	0.960 U	0.960 UJ	P
FEW4-MW74-(167.0)	N	Bromomethane	12.0	1.90 U	1.90 U	1.90 UJ	P
FEW4-MW74-(167.0)	N	Carbon disulfide	6.00	1.90 U	1.90 U	1.90 UJ	P
FEW4-MW74-(167.0)	N	Carbon tetrachloride	6.00	1.90 U	1.90 U	1.90 UJ	P
FEW4-MW74-(167.0)	N	Chlorobenzene	6.00	1.90 U	1.90 U	1.90 UJ	P
FEW4-MW74-(167.0)	N	Chloroethane	12.0	3.80 U	3.80 U	3.80 UJ	P
FEW4-MW74-(167.0)	N	Chloroform	12.0	0.960 U	0.960 U	0.960 UJ	P
FEW4-MW74-(167.0)	N	Chloromethane	12.0	1.90 U	1.90 U	1.90 UJ	P
FEW4-MW74-(167.0)	N	cis-1,2-Dichloroethene	6.00	1.90 U	1.90 U	1.90 UJ	P

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW74-(167.0)	N	cis-1,3-Dichloropropene	6.00	3.80 U	3.80 U	3.80 UJ	P
FEW4-MW74-(167.0)	N	Dibromochloromethane	6.00	1.90 U	1.90 U	1.90 UJ	P
FEW4-MW74-(167.0)	N	Dibromomethane	6.00	3.80 U	3.80 U	3.80 UJ	P
FEW4-MW74-(167.0)	N	Dichlorodifluoromethane	12.0	1.90 U	1.90 U	1.90 UJ	P
FEW4-MW74-(167.0)	N	Ethylbenzene	6.00	1.90 U	1.90 U	1.90 UJ	P
FEW4-MW74-(167.0)	N	Hexachlorobutadiene	6.00	1.90 U	1.90 U	1.90 UJ	P
FEW4-MW74-(167.0)	N	Isopropylbenzene (Cumene)	6.00	1.90 U	1.90 U	1.90 UJ	P
FEW4-MW74-(167.0)	N	m,p-Xylene	3.80	3.80 U	3.80 U	3.80 UJ	P
FEW4-MW74-(167.0)	N	Methyl tert-butyl ether (MTBE)	24.0	0.960 U	0.960 U	0.960 UJ	P
FEW4-MW74-(167.0)	N	Methylene chloride	6.00	3.80 U	3.80 U	3.80 UJ	P
FEW4-MW74-(167.0)	N	Naphthalene	6.00	1.90 U	1.90 U	1.90 UJ	P
FEW4-MW74-(167.0)	N	n-Butylbenzene	6.00	1.90 U	1.90 U	1.90 UJ	P
FEW4-MW74-(167.0)	N	n-Propylbenzene	6.00	1.90 U	1.90 U	1.90 UJ	P
FEW4-MW74-(167.0)	N	o-Xylene	6.00	1.90 U	1.90 U	1.90 UJ	P
FEW4-MW74-(167.0)	N	p-Cymene (p-Isopropyltoluene)	6.00	1.90 U	1.90 U	1.90 UJ	P
FEW4-MW74-(167.0)	N	sec-Butylbenzene	6.00	1.90 U	1.90 U	1.90 UJ	P
FEW4-MW74-(167.0)	N	Styrene	6.00	1.90 U	1.90 U	1.90 UJ	P
FEW4-MW74-(167.0)	N	tert-Butylbenzene	6.00	1.90 U	1.90 U	1.90 UJ	P
FEW4-MW74-(167.0)	N	Tetrachloroethene (PCE)	6.00	1.90 U	1.90 U	1.90 UJ	P
FEW4-MW74-(167.0)	N	Toluene	6.00	1.90 U	1.90 U	1.90 UJ	P
FEW4-MW74-(167.0)	N	trans-1,2-Dichloroethene	6.00	0.960 U	0.960 U	0.960 UJ	P
FEW4-MW74-(167.0)	N	trans-1,3-Dichloropropene	6.00	1.90 U	1.90 U	1.90 UJ	P
FEW4-MW74-(167.0)	N	Trichloroethene (TCE)	6.00	0.960 U	0.960 U	0.960 UJ	P
FEW4-MW74-(167.0)	N	Trichlorofluoromethane	12.0	3.80 U	3.80 U	3.80 UJ	P
FEW4-MW74-(167.0)	N	Vinyl chloride	6.00	3.80 U Q	3.80 U	3.80 UJ	P

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
Trace values are not included in the qualified results table unless additional reason codes are associated.

Reason Code Definitions

Code	Definition
C	LCS Recovery
L	Lab Blank
P	Sample preservation/collection requirement not met.
TR	Trace Level Detect

Flag Code and Definitions

Flag	Definition
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
J	Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
R	The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making.
B	Blank contamination: The analyte was found in an associated blank above one half the RL, as well as in the sample.
UB	The analyte was also detected in an associated laboratory or field blank at a concentration comparable to the concentration in the sample. The reported result has been requalified as not detected.

Review Questions

Method: SW8260B (Volatile Organic Compounds by Capillary GC/MS)

Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?		•		Sample FEW4-MW74-(167.0) was analyzed for volatile organic compounds (GC/MS) using the soil jar sent in for moisture analysis as the terracore vials were found to be broken when taken out of the lab freezer. All values for this sample have been qualified as estimated results.
Were holding times met?	•			
Were sample reciept temperatures met?	•			Sample receipt temperatures were 0.4C.
Were QAPP specified Project Quantitation Limit Goals achieved?	•			
Were all QAPP-specified target analytes reported?	•			
Was the GC/MS system properly tuned based on method criteria?	•			
Was the criteria met during each 12 hour shift (prior to ICAL and Cal Ver.)?	•			
Does the initial calibration curve consist of 5 concentration levels, with the low standard near but > MDL?	•			
Did the Calibration Check Compounds (CCCs) have a relative standard deviation within QAPP acceptance limits?	•			
Were the average response factors (RFs) for the System Performance Check Compounds (SPCCs) within QAPP acceptance limits?	•			
Were the ICAL %RSDs for the target compounds within method criteria?	•			
If a quadratic equation curve was used, was the coefficient of determination (COD) within criteria?	•			
If a linear regression curve was used, was the correlation coefficient within criteria?	•			
Check and recalculate the response factors and average response factors for a least one target compound.	•			ICAL VMS-G2 8/30/17 TCE AVG RF = 0.2896
Check and recalculate the %RSD for one of more target compounds and DMCs. Verify that the recalculated values agree with the laboratory reported values.	•			VMS_G2 8/30/17 TCE %RSD = 5.1% 1,2-DCA-d4 %RSD = 4.5%
Was a second source verification analyzed after the ICAL and all analytes within criteria?	•			
Was a CCV run at the beginning of the analytical sequence and every 12 hours?	•			
Was the CCV a mid-level standard from the initial calibration curve?	•			
Did the CCCs have a %Difference within QAPP acceptance limits?	•			
Were the average RFs for the SPCCs within QAPP acceptance limits?	•			
Was the %D (difference or drift) for all target analytes within QAPP acceptance limits?		•		CCV 280-386913/2: 1,2-dibromo-3-chloropropane (-20.1%) was outside the 20% control limit. The analyte was not detected in any associated samples and has therefore not been qualified.
Check and recalculate the CCV relative response factor for at least one target compound.	•			VMS-G2 9/7/17 CCV 280-386913/2 Trichloroethene RF = 0.2995

Review Questions

Method: SW8260B (Volatile Organic Compounds by Capillary GC/MS)

Review Questions	Yes	No	NA	Comment
Were the internal standards added to every standard, blank, matrix spike, matrix spike duplicate, and sample?	•			
Were the retention times for all IS compounds within QAPP acceptance limits?	•			
Are the area counts of all IS compounds within QAPP acceptance limits?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes detected in the method blank less than 1/2 LOQ and less than 1/10 the amount in any sample?	•			Acetone was detected in a method blank at a concentration less than 1/2 the LOQ.
Were target analytes reported in the field blank less than 1/2 LOQ and less than 1/10 the amount in any sample?			•	
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?			•	A field duplicate was not analyzed with the associated samples.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were the LCS/LCSD recoveries within QAPP acceptance limits?		•		Vinyl chloride was recovered above the upper control limit of 135% in an LCS and LCSD at 145%. The analyte was not detected in any associated samples.
Were the LCS/LCSD RPDs within QAPP acceptance limits?			•	
Was the duplicate RPD within QAPP acceptance limits?			•	
Was a MS/MSD pair prepared with each batch?		•		
Is the MS/MSD parent sample the one designated by the sampling team?			•	
Were MS/MSD recoveries and RPD within QAPP acceptance limits?			•	
Were surrogate recoveries within QAPP acceptance limits?	•			
Were reported sample concentrations within calibration range?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were instrument run logs present and filled out appropriately?	•			
Were sample prepration sheets present and filled out appropriately?	•			
Check and recalculate the %D for one target compound. Verify that the recalculated values agree with the laboratory-reported values.			•	
Examine raw data to verify correct calculation of sample results reported by the laboratory. Compare quantitation lists and chromatograms to the reported detect and non-detect sample results.	•			
Verify that the reporting limits and sample results have been adjusted to reflect all sample dilutions and Percent Moisture factors (non-aqueous samples).	•			FEW4-MW74-(157.0) TCE = Not detected

US Army Corps of Engineers ®

Batch Report

Test Method: SW8260B Analysis Batch: 280-387103

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
LABQC	SQ	LCS 280-387103/1-A	LCS 280-387103/1-A		1/1	9/9/2017 09:28	9/9/2017 09:28	9/9/2017 09:49	280-387103/	BS
LABQC	SQ	MB 280-387103/2-A	MB 280-387103/2-A		1/1	9/9/2017 09:28	9/9/2017 09:28	9/9/2017 10:09	280-387103/	LB
FEW4-MW74	SO	FEW4-MW74-(202.0)	280-100661-1		1/1	8/26/2017 12:30	8/26/2017 12:30	9/9/2017 10:30	280-387103/	N
FEW4-MW74	SO	FEW4-MW74-(202.0)	280-100661-1MS		1/1	8/26/2017 12:30	8/26/2017 12:30	9/9/2017 10:50	280-387103/	MS
FEW4-MW74	SO	FEW4-MW74-(202.0)	280-100661-1MSD		1/1	8/26/2017 12:30	8/26/2017 12:30	9/9/2017 11:10	280-387103/	SD
FEW4-MW74	SO	FEW4-MW74-(212.0)	280-100661-2		1/1	8/26/2017 12:35	8/26/2017 12:35	9/9/2017 11:30	280-387103/	N
FEW4-MW74	SO	FEW4-MW74-(213.0)	280-100661-3		1/1	8/26/2017 13:35	8/26/2017 13:35	9/9/2017 11:50	280-387103/	FD
FEW4-MW74	SO	FEW4-MW74-(222.0)	280-100661-4		1/1	8/26/2017 14:25	8/26/2017 14:25	9/9/2017 12:10	280-387103/	N
FEW4-MW74	SO	FEW4-MW74-(232.0)	280-100661-5		1/1	8/26/2017 14:30	8/26/2017 14:30	9/9/2017 12:31	280-387103/	N
FEW4-MW74	SO	FEW4-MW74-(242.0)	280-100661-6		1/1	8/26/2017 16:00	8/26/2017 16:00	9/9/2017 12:51	280-387103/	N
FEW4-MW74	SO	FEW4-MW74-(256.0)	280-100661-7		1/1	8/26/2017 16:05	8/26/2017 16:05	9/9/2017 13:12	280-387103/	N
FEW4-MW74	SO	FEW4-MW74-(262.0)	280-100661-8		1/1	8/26/2017 17:30	8/26/2017 17:30	9/9/2017 13:32	280-387103/	N
FEW4-MW74	SO	FEW4-MW74-(276.0)	280-100661-9		1/1	8/26/2017 17:40	8/26/2017 17:40	9/9/2017 13:52	280-387103/	N
FEW4-MW74	SO	FEW4-MW74-(289.0)	280-100661-10		1/1	8/27/2017 09:50	8/27/2017 09:50	9/9/2017 14:13	280-387103/	N
FEW4-MW74	SO	FEW4-MW74-(289.0)	280-100661-10MS		1/1	8/27/2017 09:50	8/27/2017 09:50	9/9/2017 14:33	280-387103/	MS
FEW4-MW74	SO	FEW4-MW74-(289.0)	280-100661-10MSD		1/1	8/27/2017 09:50	8/27/2017 09:50	9/9/2017 14:53	280-387103/	SD
FEW4-MW74	SO	FEW4-MW74-(296.0)	280-100661-11		1/1	8/27/2017 10:00	8/27/2017 10:00	9/9/2017 15:14	280-387103/	N
FEW4-MW74	SO	FEW4-MW74-(310.0)	280-100661-12		1/1	8/27/2017 11:30	8/27/2017 11:30	9/9/2017 15:34	280-387103/	N
FEW4-MW74	SO	FEW4-MW74-(311.0)	280-100661-13		1/1	8/27/2017 12:30	8/27/2017 12:30	9/9/2017 15:55	280-387103/	FD
FEW4-MW74	SO	FEW4-MW74-(317.0)	280-100661-14		1/1	8/27/2017 11:35	8/27/2017 11:35	9/9/2017 16:15	280-387103/	N
FEW4-MW74	SO	FEW4-MW74-(327.0)	280-100661-15		1/1	8/27/2017 13:10	8/27/2017 13:10	9/9/2017 16:35	280-387103/	N
FEW4-MW74	SO	FEW4-MW74-(334.0)	280-100661-16		1/1	8/27/2017 13:15	8/27/2017 13:15	9/9/2017 16:56	280-387103/	N
FEW4-MW74	SO	FEW4-MW74-(348.0)	280-100661-17		1/1	8/27/2017 14:45	8/27/2017 14:45	9/9/2017 17:16	280-387103/	N
FEW4-MW74	SO	FEW4-MW74-(354.0)	280-100661-18		1/1	8/27/2017 14:50	8/27/2017 14:50	9/9/2017 17:36	280-387103/	N

US Army Corps of Engineers ®

Batch Report

Test Method: SW8260B Analysis Batch: 280-387103

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
FEW4-MW74	SO	FEW4-MW74-(362.0)	280-100661-19		1/1	8/27/2017 16:25	8/27/2017 16:25	9/9/2017 17:57	280-387103/	N

US Army Corps of Engineers ®

Field Batch Report

--No Records Found--

MS Mismatch Report

--No Records Found--

Section to identify Matrix Spike mismatches where parent sample differs from MS by dilution.

US Army Corps of Engineers ®

QC Outlier Report

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

QC Element	Sample ID/ Lab Sample ID	Run#/ Dil'n	Analyte	Result (Units)	Qualifier	Warning Limits	Control Limits	Reason	Comment	Rule	Action Level
MS Recovery	FEW4-MW74-(289.0) (MS) / 280-100661-10MS	1 / 1.00	Bromomethane	143.9 (percent)	J/None	53 - 143	53 - 143	M			
MS Recovery	FEW4-MW74-(289.0) (MS) / 280-100661-10MS	1 / 1.00	Chloroethane	148.1 (percent)	J/None	59 - 139	59 - 139	M			
MS RPD	280-100661-10MSD (SD) / 280-100661-10MSD	1 / 1.00	1,1,1-Trichloroethane	22.31 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100661-10MSD (SD) / 280-100661-10MSD	1 / 1.00	1,1-Dichloroethane	20.07 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100661-10MSD (SD) / 280-100661-10MSD	1 / 1.00	1,1-Dichloroethene	21.28 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100661-10MSD (SD) / 280-100661-10MSD	1 / 1.00	1,2-Dichloroethane	20.28 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100661-10MSD (SD) / 280-100661-10MSD	1 / 1.00	1,2-Dichloroethene	21.48 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100661-10MSD (SD) / 280-100661-10MSD	1 / 1.00	2-Butanone (MEK)	21.25 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100661-10MSD (SD) / 280-100661-10MSD	1 / 1.00	Bromomethane	26.08 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100661-10MSD (SD) / 280-100661-10MSD	1 / 1.00	Carbon disulfide	21.06 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100661-10MSD (SD) / 280-100661-10MSD	1 / 1.00	Carbon tetrachloride	20.80 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100661-10MSD (SD) / 280-100661-10MSD	1 / 1.00	Chloroethane	55.37 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100661-10MSD (SD) / 280-100661-10MSD	1 / 1.00	Chloroform	20.29 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100661-10MSD (SD) / 280-100661-10MSD	1 / 1.00	cis-1,2-Dichloroethene	21.45 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100661-10MSD (SD) / 280-100661-10MSD	1 / 1.00	trans-1,2-Dichloroethene	21.12 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100661-1MSD (SD) / 280-100661-1MSD	1 / 1.00	Bromomethane	32.07 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100661-1MSD (SD) / 280-100661-1MSD	1 / 1.00	Chloroethane	39.24 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100661-1MSD (SD) / 280-100661-1MSD	1 / 1.00	Chloromethane	22.69 (rpd)	J/None	< 20	< 20	D			

US Army Corps of Engineers ®

QC Outlier Report

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

QC Element	Sample ID/ Lab Sample ID	Run#/ Dil'n	Analyte	Result (Units)	Qualifier	Warning Limits	Control Limits	Reason	Comment	Rule	Action Level
MS RPD	280-100661-1MSD (SD) / 280-100661-1MSD	1 / 1.00	Trichlorofluoromethane	23.11 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-100661-1MSD (SD) / 280-100661-1MSD	1 / 1.00	Vinyl chloride	23.26 (rpd)	J/None	< 20	< 20	D			

Rule is the multiplier used when blank contamination occurs to determine action level.

US Army Corps of Engineers ®

Qualified Results

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW74-(242.0)	280-100661-6	SO	N	Acetone	18.0	6.60 J	6.60 J		ug/kg	TR
FEW4-MW74-(262.0)	280-100661-8	SO	N	Acetone	15.0	10.0 J	10.0 J		ug/kg	TR
FEW4-MW74-(289.0)	280-100661-10	SO	N	Acetone	29.0	13.0 J	13.0 J		ug/kg	TR
FEW4-MW74-(296.0)	280-100661-11	SO	N	Acetone	26.0	23.0 J	23.0 J		ug/kg	TR
FEW4-MW74-(311.0)	280-100661-13	SO	FD	Acetone	26.0	17.0 J	17.0 J		ug/kg	TR
FEW4-MW74-(317.0)	280-100661-14	SO	N	Acetone	24.0	17.0 J	17.0 J		ug/kg	TR

Qualified analytes in samples are reported as estimated, not detected (UJ) at the Limit of Detection (LOD).

Detected Results

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Dilution	Analyte	LOQ	Lab Result	Qualified Result	Units	Reason
FEW4-MW74-(202.0)	280-100661-1	SO	N	1	Acetone	27.0	36.0	36.0	ug/kg	
FEW4-MW74-(212.0)	280-100661-2	SO	N	1	Acetone	25.0	27.0	27.0	ug/kg	
FEW4-MW74-(213.0)	280-100661-3	SO	FD	1	Acetone	23.0	28.0	28.0	ug/kg	
FEW4-MW74-(222.0)	280-100661-4	SO	N	1	Acetone	28.0	35.0	35.0	ug/kg	
FEW4-MW74-(232.0)	280-100661-5	SO	N	1	Acetone	21.0	33.0	33.0	ug/kg	
FEW4-MW74-(242.0)	280-100661-6	SO	N	1	Acetone	18.0	6.60 J	6.60 J	ug/kg	TR
FEW4-MW74-(262.0)	280-100661-8	SO	N	1	Acetone	15.0	10.0 J	10.0 J	ug/kg	TR
FEW4-MW74-(276.0)	280-100661-9	SO	N	1	Acetone	24.0	35.0	35.0	ug/kg	
FEW4-MW74-(289.0)	280-100661-10	SO	N	1	Acetone	29.0	13.0 J	13.0 J	ug/kg	TR
FEW4-MW74-(296.0)	280-100661-11	SO	N	1	Acetone	26.0	23.0 J	23.0 J	ug/kg	TR
FEW4-MW74-(310.0)	280-100661-12	SO	N	1	Acetone	22.0	23.0	23.0	ug/kg	
FEW4-MW74-(311.0)	280-100661-13	SO	FD	1	Acetone	26.0	17.0 J	17.0 J	ug/kg	TR
FEW4-MW74-(317.0)	280-100661-14	SO	N	1	Acetone	24.0	17.0 J	17.0 J	ug/kg	TR
FEW4-MW74-(327.0)	280-100661-15	SO	N	1	Acetone	22.0	22.0	22.0	ug/kg	
FEW4-MW74-(334.0)	280-100661-16	SO	N	1	Acetone	21.0	24.0	24.0	ug/kg	
FEW4-MW74-(348.0)	280-100661-17	SO	N	1	Acetone	22.0	26.0	26.0	ug/kg	
FEW4-MW74-(354.0)	280-100661-18	SO	N	1	Acetone	25.0	31.0	31.0	ug/kg	
FEW4-MW74-(362.0)	280-100661-19	SO	N	1	Acetone	20.0	34.0	34.0	ug/kg	

US Army Corps of Engineers ®

Rejected Results

--No Records Found--

US Army Corps of Engineers ®

Review Questions

Method: SW8260B

Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?				
Were samples preserved properly and received in good condition?				
Were holding times met?				
Were sample reciept temperatures met?				
Were QAPP specified Project Quantitation Limit Goals achieved?				
Were all QAPP-specified target analytes reported?				
Was the GC/MS system properly tuned based on method criteria?				
Was the criteria met during each 12 hour shift (prior to ICAL and Cal Ver.)?				
Does the initial calibration curve consist of 5 concentration levels, with the low standard near but > MDL?				
Did the Calibration Check Compounds (CCCs) have a relative standard deviation within QAPP acceptance limits?				
Were the average response factors (RFs) for the System Performance Check Compounds (SPCCs) within QAPP acceptance limits?				
Were the ICAL %RSDs for the target compounds within method criteria?				
If a quadratic equation curve was used, was the coefficient of determination (COD) within criteria?				
If a linear regression curve was used, was the correlation coefficient within criteria?				
Check and recalculate the response factors and average response factors for a least one target compound.				
Check and recalculate the %RSD for one of more target compounds and DMCs. Verify that the recalculated values agree with the laboratory reported values.				
Was a second source verification analyzed after the ICAL and all analytes within criteria?				
Was a CCV run at the beginning of the analytical sequence and every 12 hours?				
Was the CCV a mid-level standard from the initial calibration curve?				
Did the CCCs have a %Difference within QAPP acceptance limits?				
Were the average RFs for the SPCCs within QAPP acceptance limits?				
Was the %D (difference or drift) for all target analytes within QAPP acceptance limits?				
Check and recalculate the CCV relative response factor for at least one target compound.				

US Army Corps of Engineers ®

Review Questions

Method: SW8260B

Review Questions	Yes	No	NA	Comment
Were the internal standards added to every standard, blank, matrix spike, matrix spike duplicate, and sample?				
Were the retention times for all IS compounds within QAPP acceptance limits?				
Are the area counts of all IS compounds within QAPP acceptance limits?				
Was a method blank prepared and analyzed with each batch?				
Were target analytes detected in the method blank less than 1/2 LOQ and less than 1/10 the amount in any sample?				
Were target analytes reported in the field blank less than 1/2 LOQ and less than 1/10 the amount in any sample?				
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?				
Was an LCS/LCSD pair prepared and analyzed with each batch?				
Were the LCS/LCSD recoveries within QAPP acceptance limits?				
Were the LCS/LCSD RPDs within QAPP acceptance limits?				
Was the duplicate RPD within QAPP acceptance limits?				
Was a MS/MSD pair prepared with each batch?				
Is the MS/MSD parent sample the one designated by the sampling team?				
Were MS/MSD recoveries and RPD within QAPP acceptance limits?				
Were surrogate recoveries within QAPP acceptance limits?				
Were reported sample concentrations within calibration range?				
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?				
Were instrument run logs present and filled out appropriately?				
Were sample prepration sheets present and filled out appropriately?				
Check and recalculate the %D for one target compound. Verify that the recalculated values agree with the laboratory-reported values.				
Examine raw data to verify correct calculation of sample results reported by the laboratory. Compare quantitation lists and chromatograms to the reported detect and non-detect sample results.				
Verify that the reporting limits and sample results have been adjusted to reflect all sample dilutions and Percent Moisture factors (non-aqueous samples).				

Facility:	B08WY0467-02, F.E. Warren AFB, Site 4
Event:	2017-2018 RI Addendum Tasks
SDG:	280-100661-1_52_2a_FUDSChem
Guidance Document:	Draft-Final Uniform Federal Policy-Quality Assurance Project Plan for the Remedial Investigation Addendum 2017-2018 Tasks Atlas "D" Missile Site 4 —Laramie County, Wyoming, July 2017
Prime Contractor:	RMC Consultants, Inc., LAKEWOOD, CO
Project Manager:	David Groy
Contract Laboratory:	TestAmerica Laboratories, Inc., Arvada, CO
Data Review Contractor:	RMC Consultants, Inc.
Data Review Level:	Stage 3VEM
Primary Data Reviewer:	Gary Torf, Contractor Project Chemist
Second Reviewer:	, Senior Scientist
Date Submitted:	

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	SW8260B
FEW4-MW74-(213.0)	280-100661-3	Solid	Field Duplicate/FD	X
FEW4-MW74-(311.0)	280-100661-13	Solid	Field Duplicate/FD	X
FEW4-MW74-(202.0)	280-100661-1	Solid	Field Sample/N	X
FEW4-MW74-(212.0)	280-100661-2	Solid	Field Sample/N	X
FEW4-MW74-(222.0)	280-100661-4	Solid	Field Sample/N	X
FEW4-MW74-(232.0)	280-100661-5	Solid	Field Sample/N	X
FEW4-MW74-(242.0)	280-100661-6	Solid	Field Sample/N	X
FEW4-MW74-(256.0)	280-100661-7	Solid	Field Sample/N	X
FEW4-MW74-(262.0)	280-100661-8	Solid	Field Sample/N	X
FEW4-MW74-(276.0)	280-100661-9	Solid	Field Sample/N	X
FEW4-MW74-(289.0)	280-100661-10	Solid	Field Sample/N	X
FEW4-MW74-(296.0)	280-100661-11	Solid	Field Sample/N	X
FEW4-MW74-(310.0)	280-100661-12	Solid	Field Sample/N	X
FEW4-MW74-(317.0)	280-100661-14	Solid	Field Sample/N	X
FEW4-MW74-(327.0)	280-100661-15	Solid	Field Sample/N	X
FEW4-MW74-(334.0)	280-100661-16	Solid	Field Sample/N	X
FEW4-MW74-(348.0)	280-100661-17	Solid	Field Sample/N	X
FEW4-MW74-(354.0)	280-100661-18	Solid	Field Sample/N	X
FEW4-MW74-(362.0)	280-100661-19	Solid	Field Sample/N	X

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the Draft-Final Uniform Federal Policy-Quality Assurance Project Plan for the Remedial Investigation Addendum 2017-2018 Tasks Atlas “D” Missile Site 4 —Laramie County, Wyoming, July 2017 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by RMC Consultants, Inc., LAKEWOOD, CO; analyses were performed by TestAmerica Laboratories, Inc., Arvada, CO and were reported under sample delivery group (SDG) 280-100661-1_52_2a_FUDSChem. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

- Blank
- Blank - Negative
- Field Duplicate RPD
- LCS Recovery
- MS Recovery
- MS RPD
- Prep Hold Time
- Surrogate
- Test Hold Time

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 0 results (0.00%) out of the 1254 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected. Trace values, defined as results that are qualified as estimated because they fall between the limit of detection and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

Narrative Comments

Analytical Method	Data Reviewer Comment
SW8260B	No additional comments; see Checklist for detail.

December 29, 2017

Reviewed by Gary Torf, Contractor Project Chemist, RMC Consultants, Inc.

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of a minimum of 10% of the reported sample results and method quality control data between the two deliverables.

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

Quality Control Outliers for test method SW8260B, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
FEW4-MW74-(289.0) (MS)/ 280-100661-10MS	Bromomethane	143.9	53 - 143	53 - 143	percent	J/None	M	
FEW4-MW74-(289.0) (MS)/ 280-100661-10MS	Chloroethane	148.1	59 - 139	59 - 139	percent	J/None	M	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

Quality Control Outliers for test method SW8260B, MS RPD

The objective of matrix spikes/matrix spike duplicates (MS/MSD) RPD analysis is to demonstrate acceptable method precision by the laboratory at the time of analysis. MS/MSD analyses are also performed to generate data that determines the long-term precision of the analytical method on various matrices. Non-homogenous samples can impact the apparent method precision. Summary forms were evaluated and compared to electronic data deliverables. Matrix spikes/matrix spike duplicates results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
280-100661-10MSD (SD)/ 280-100661-10MSD	1,1-Dichloroethane	20.07	< 20	< 20	rpd	J/None	D	
280-100661-10MSD (SD)/ 280-100661-10MSD	1,2-Dichloroethane	20.28	< 20	< 20	rpd	J/None	D	
280-100661-10MSD (SD)/ 280-100661-10MSD	Chloroform	20.29	< 20	< 20	rpd	J/None	D	
280-100661-10MSD (SD)/ 280-100661-10MSD	Carbon tetrachloride	20.80	< 20	< 20	rpd	J/None	D	
280-100661-10MSD (SD)/ 280-100661-10MSD	Carbon disulfide	21.06	< 20	< 20	rpd	J/None	D	
280-100661-10MSD (SD)/ 280-100661-10MSD	trans-1,2-Dichloroethene	21.12	< 20	< 20	rpd	J/None	D	
280-100661-10MSD (SD)/ 280-100661-10MSD	2-Butanone (MEK)	21.25	< 20	< 20	rpd	J/None	D	
280-100661-10MSD (SD)/ 280-100661-10MSD	1,1-Dichloroethene	21.28	< 20	< 20	rpd	J/None	D	
280-100661-10MSD (SD)/ 280-100661-10MSD	cis-1,2-Dichloroethene	21.45	< 20	< 20	rpd	J/None	D	
280-100661-10MSD (SD)/ 280-100661-10MSD	1,2-Dichloroethene	21.48	< 20	< 20	rpd	J/None	D	
280-100661-10MSD (SD)/ 280-100661-10MSD	1,1,1-Trichloroethane	22.31	< 20	< 20	rpd	J/None	D	
280-100661-10MSD (SD)/ 280-100661-10MSD	Bromomethane	26.08	< 20	< 20	rpd	J/None	D	
280-100661-10MSD (SD)/ 280-100661-10MSD	Chloroethane	55.37	< 20	< 20	rpd	J/None	D	
280-100661-1MSD (SD)/ 280-100661-1MSD	Chloromethane	22.69	< 20	< 20	rpd	J/None	D	
280-100661-1MSD (SD)/ 280-100661-1MSD	Trichlorofluoromethane	23.11	< 20	< 20	rpd	J/None	D	
280-100661-1MSD (SD)/ 280-100661-1MSD	Vinyl chloride	23.26	< 20	< 20	rpd	J/None	D	
280-100661-1MSD (SD)/ 280-100661-1MSD	Bromomethane	32.07	< 20	< 20	rpd	J/None	D	
280-100661-1MSD (SD)/ 280-100661-1MSD	Chloroethane	39.24	< 20	< 20	rpd	J/None	D	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

Qualified Results

No results associated with this sample delivery group required qualification.

Table of All Trace Results

Test Method: SW8260B Extraction Method: SW5035A

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW74-(242.0)	N	Acetone	18.0	6.60 J	6.60 J		ug/kg	TR
FEW4-MW74-(262.0)	N	Acetone	15.0	10.0 J	10.0 J		ug/kg	TR
FEW4-MW74-(289.0)	N	Acetone	29.0	13.0 J	13.0 J		ug/kg	TR
FEW4-MW74-(296.0)	N	Acetone	26.0	23.0 J	23.0 J		ug/kg	TR
FEW4-MW74-(311.0)	FD	Acetone	26.0	17.0 J	17.0 J		ug/kg	TR
FEW4-MW74-(317.0)	N	Acetone	24.0	17.0 J	17.0 J		ug/kg	TR

Results with Modified Qualifiers

No qualifiers associated with this sample delivery group were modified manually.

Reason Code Definitions

Code	Definition
D	MS RPD
M	MS Recovery
TR	Trace Level Detect

Flag Code and Definitions

Flag	Definition
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
J	Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
R	The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making.
B	Blank contamination: The analyte was found in an associated blank above one half the RL, as well as in the sample.
UB	The analyte was also detected in an associated laboratory or field blank at a concentration comparable to the concentration in the sample. The reported result has been requalified as not detected.

Review Questions

Method: SW8260B (Volatile Organic Compounds by Capillary GC/MS)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were sample reciept temperatures met?	•			Sample receipt temperatures were 2.4ºC and 2.6ºC.
Were QAPP specified Project Quantitation Limit Goals achieved?	•			
Were all QAPP-specified target analytes reported?	•			
Was the GC/MS system properly tuned based on method criteria?	•			
Was the criteria met during each 12 hour shift (prior to ICAL and Cal Ver.)?	•			
Does the initial calibration curve consist of 5 concentration levels, with the low standard near but > MDL?	•			
Did the Calibration Check Compounds (CCCs) have a relative standard deviation within QAPP acceptance limits?	•			
Were the average response factors (RFs) for the System Performance Check Compounds (SPCCs) within QAPP acceptance limits?	•			
Were the ICAL %RSDs for the target compounds within method criteria?	•			
If a quadratic equation curve was used, was the coefficient of determination (COD) within criteria?	•			
If a linear regression curve was used, was the correlation coefficient within criteria?	•			
Check and recalculate the response factors and average response factors for a least one target compound.	•			ICAL VMS-G2 9/9/17 TCE AVG RF = 0.2333
Check and recalculate the %RSD for one of more target compounds and DMCs. Verify that the recalculated values agree with the laboratory reported values.	•			VMS_G2 9/9/17 TCE %RSD = 6.0% 1,2-DCA-d4 %RSD = 5.0%
Was a second source verification analyzed after the ICAL and all analytes within criteria?		•		ICV 280-387087/18: Bromomethane (35.3%) exceeded the 20% difference control limit. The analyte was not detected in any associated samples.
Was a CCV run at the beginning of the analytical sequence and every 12 hours?	•			
Was the CCV a mid-level standard from the initial calibration curve?	•			
Did the CCCs have a %Difference within QAPP acceptance limits?	•			
Were the average RFs for the SPCCs within QAPP acceptance limits?	•			
Was the %D (difference or drift) for all target analytes within QAPP acceptance limits?		•		CCV 280-387102/2: 1,3,5-trimethylbenzene (21.5%),1,2,4-trimethylbenzene (21.4%), sec-butylbenzene (22.2%), n-propylbenzene (23.3%), o-Xylene (21.8%), 4-isopropyltoluene (23.0%), isopropylbenzene (23.5%), and tert-butylbenzene (23.3%) exceeded the 20% difference control limit. The analytes were not detected in any associated samples.
Check and recalculate the CCV relative response factor for at least one target compound.	•			VMS-G2 9/9/17 CCV 280-387102/2 TCE RRF = 0.2564

Review Questions

Method: SW8260B (Volatile Organic Compounds by Capillary GC/MS)

Review Questions	Yes	No	NA	Comment
Were the internal standards added to every standard, blank, matrix spike, matrix spike duplicate, and sample?	•			
Were the retention times for all IS compounds within QAPP acceptance limits?	•			
Are the area counts of all IS compounds within QAPP acceptance limits?		•		TBA-d9 was outside acceptance criteria for several samples. This internal standard is not associated with any target analytes.
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes detected in the method blank less than 1/2 LOQ and less than 1/10 the amount in any sample?	•			Acetone was detected at a concentration less than 1/2 the LOQ.
Were target analytes reported in the field blank less than 1/2 LOQ and less than 1/10 the amount in any sample?			•	
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?	•			FEW4-MW74-(213.0) is a blind duplicate of FEW4-MW74-(212.0); FEW4-MW74-(311.0) is a blind duplicate of FEW4-MW74-(310.0).
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were the LCS/LCSD recoveries within QAPP acceptance limits?		•		280-387103/1-A: 2-Chlorotoluene, bromomethane, dichlorodifluoromethane, o-Xylene and Vinyl chloride exceeded the upper control limit. These analytes were not detected in any associated samples.
Were the LCS/LCSD RPDs within QAPP acceptance limits?			•	
Was the duplicate RPD within QAPP acceptance limits?			•	
Was a MS/MSD pair prepared with each batch?	•			
Is the MS/MSD parent sample the one designated by the sampling team?	•			FEW4-MW74-(202.0) and FEW4-MW74-(289.0) were designated for matrix spike analysis.
Were MS/MSD recoveries and RPD within QAPP acceptance limits?		•		The MS recovery of bromomethane and chloroethane exceeded the upper control limit in FEW4-MW74-(289.0) (MS); the relative percent difference was exceeed for several analytes in 280-100661-10 MSD.
Were surrogate recoveries within QAPP acceptance limits?	•			
Were reported sample concentrations within calibration range?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were instrument run logs present and filled out appropriately?	•			
Were sample prepration sheets present and filled out appropriately?	•			
Check and recalculate the %D for one target compound. Verify that the recalculated values agree with the laboratory-reported values.			•	
Examine raw data to verify correct calculation of sample results reported by the laboratory. Compare quantitation lists and chromatograms to the reported detect and non-detect sample results.	•			FEW4-MW74-(202.0) TCE = Not detected
Verify that the reporting limits and sample results have been adjusted to reflect all sample dilutions and Percent Moisture factors (non-aqueous samples).	•			

US Army Corps of Engineers ®

Batch Report

Test Method: SW8260B Analysis Batch: 280-387912

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
LABQC	SQ	LCS 280-387912/1-A	LCS 280-387912/1-A		1/1	9/17/2017 10:00	9/17/2017 10:00	9/17/2017 10:27	280-387912/	BS
LABQC	SQ	MB 280-387912/2-A	MB 280-387912/2-A		1/1	9/17/2017 10:00	9/17/2017 10:00	9/17/2017 10:47	280-387912/	LB
FEW4-MW76	SO	FEW4-MW76-(90.0)	280-101025-1		1/1	9/9/2017 18:00	9/9/2017 18:00	9/17/2017 11:07	280-387912/	N
FEW4-MW76	SO	FEW4-MW76-(100.0)	280-101025-2		1/1	9/9/2017 18:05	9/9/2017 18:05	9/17/2017 11:28	280-387912/	N
FEW4-MW76	SO	FEW4-MW76-(100.0)	280-101025-2MS		1/1	9/9/2017 18:05	9/9/2017 18:05	9/17/2017 11:48	280-387912/	MS
FEW4-MW76	SO	FEW4-MW76-(100.0)	280-101025-2MSD		1/1	9/9/2017 18:05	9/9/2017 18:05	9/17/2017 12:08	280-387912/	SD
FEW4-MW76	SO	FEW4-MW76-(110.0)	280-101025-3		1/1	9/10/2017 10:25	9/10/2017 10:25	9/17/2017 12:28	280-387912/	N
FEW4-MW76	SO	FEW4-MW76-(120.0)	280-101025-4		1/1	9/10/2017 10:40	9/10/2017 10:40	9/17/2017 12:49	280-387912/	N
FEW4-MW76	SO	FEW4-MW76-(140.0)	280-101025-5		1/1	9/10/2017 12:00	9/10/2017 12:00	9/17/2017 13:09	280-387912/	N
FEW4-MW76	SO	FEW4-MW76-(141.0)	280-101025-6		1/1	9/10/2017 13:00	9/10/2017 13:00	9/17/2017 13:29	280-387912/	FD
FEW4-MW76	SO	FEW4-MW76-(160.0)	280-101025-8		1/1	9/10/2017 12:35	9/10/2017 12:35	9/17/2017 13:49	280-387912/	N
FEW4-MW76	SO	FEW4-MW76-(164.0)	280-101025-9		1/1	9/10/2017 16:00	9/10/2017 16:00	9/17/2017 14:09	280-387912/	N
FEW4-MW76	SO	FEW4-MW76-(170.0)	280-101025-10		1/1	9/10/2017 16:10	9/10/2017 16:10	9/17/2017 14:30	280-387912/	N
FEW4-MW76	SO	FEW4-MW76-(180.0)	280-101025-11		1/1	9/10/2017 16:20	9/10/2017 16:20	9/17/2017 14:50	280-387912/	N
FEW4-MW76	SO	FEW4-MW76-(130.0)	280-101025-12		1/1	9/10/2017 10:55	9/10/2017 10:55	9/17/2017 15:10	280-387912/	N
FEW4-MW76	SO	FEW4-MW76-(181.0)	280-101025-13		1/1	9/10/2017 17:20	9/10/2017 17:20	9/17/2017 15:30	280-387912/	FD
FEW4-MW101	SO	FEW4-MW101-(92.0)	280-101025-14		1/1	9/9/2017 11:15	9/9/2017 11:15	9/17/2017 15:50	280-387912/	N
FEW4-MW101	SO	FEW4-MW101-(93.0)	280-101025-15		1/1	9/9/2017 12:15	9/9/2017 12:15	9/17/2017 16:11	280-387912/	FD
FEW4-MW101	SO	FEW4-MW101-(101.0)	280-101025-16		1/1	9/9/2017 11:35	9/9/2017 11:35	9/17/2017 16:31	280-387912/	N
FEW4-MW101	SO	FEW4-MW101-(110.0)	280-101025-17		1/1	9/9/2017 12:25	9/9/2017 12:25	9/17/2017 16:51	280-387912/	N
FEW4-MW101	SO	FEW4-MW101-(120.0)	280-101025-19		1/1	9/9/2017 14:05	9/9/2017 14:05	9/17/2017 17:11	280-387912/	N
FEW4-MW101	SO	FEW4-MW101-(120.0)	280-101025-19MS		1/1	9/9/2017 14:05	9/9/2017 14:05	9/17/2017 17:31	280-387912/	MS
FEW4-MW101	SO	FEW4-MW101-(120.0)	280-101025-19MSD		1/1	9/9/2017 14:05	9/9/2017 14:05	9/17/2017 17:52	280-387912/	SD
FEW4-MW101	SO	FEW4-MW101-(130.0)	280-101025-20		1/1	9/9/2017 14:45	9/9/2017 14:45	9/17/2017 18:12	280-387912/	N

US Army Corps of Engineers®

Batch Report

Test Method: SW8260B Analysis Batch: 280-387912

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
FEW4-MW101	SO	FEW4-MW101-(140.0)	280-101025-21		1/1	9/9/2017 14:50	9/9/2017 14:50	9/17/2017 18:32	280-387912/	N

Test Method: SW8260B Analysis Batch: 280-387913

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
LABQC	SQ	LCS 280-387913/1-A	LCS 280-387913/1-A		1/1	9/17/2017 10:00	9/17/2017 10:00	9/17/2017 10:27	280-387913/	BS
LABQC	SQ	MB 280-387913/2-A	MB 280-387913/2-A		1/1	9/17/2017 10:00	9/17/2017 10:00	9/17/2017 10:47	280-387913/	LB
FEW4-MW76	SO	FEW4-MW76-(150.0)	280-101025-7		1/1	9/10/2017 12:20	9/17/2017 10:00	9/17/2017 18:52	280-387913/	N

Test Method: SW8260B Analysis Batch: 280-387916

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
LABQC	SQ	LCS 280-387916/1-A	LCS 280-387916/1-A		1/1	9/17/2017 10:00	9/17/2017 10:00	9/17/2017 13:18	280-387916/	BS
FEW4-MW101	SO	FEW4-MW101-(160.0)	280-101025-23		1/1	9/9/2017 15:40	9/9/2017 15:40	9/17/2017 17:41	280-387916/	N
FEW4-MW101	SO	FEW4-MW101-(170.0)	280-101025-24		1/1	9/9/2017 16:05	9/9/2017 16:05	9/17/2017 18:01	280-387916/	N
FEW4-MW101	SO	FEW4-MW101-(180.0)	280-101025-25		1/1	9/9/2017 16:10	9/9/2017 16:10	9/17/2017 18:21	280-387916/	N
FEW4-MW101	SO	FEW4-MW101-(190.0)	280-101025-26		1/1	9/9/2017 16:30	9/9/2017 16:30	9/17/2017 18:41	280-387916/	N
FEW4-MW101	SO	FEW4-MW101-(200.0)	280-101025-27		1/1	9/9/2017 16:35	9/9/2017 16:35	9/17/2017 19:01	280-387916/	N
FEW4-MW101	SO	FEW4-MW101-(210.0)	280-101025-28		1/1	9/9/2017 17:00	9/9/2017 17:00	9/17/2017 19:21	280-387916/	N
FEW4-MW101	SO	FEW4-MW101-(220.0)	280-101025-29		1/1	9/10/2017 09:15	9/10/2017 09:15	9/17/2017 19:41	280-387916/	N
FEW4-MW101	SO	FEW4-MW101-(230.0)	280-101025-30		1/1	9/10/2017 09:20	9/10/2017 09:20	9/17/2017 20:01	280-387916/	N
FEW4-MW101	SO	FEW4-MW101-(240.0)	280-101025-31		1/1	9/10/2017 09:25	9/10/2017 09:25	9/17/2017 20:21	280-387916/	N

US Army Corps of Engineers®

Batch Report

Test Method: SW8260B Analysis Batch: 280-387916

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
FEW4-MW101	SO	FEW4-MW101-(250.0)	280-101025-32		1/1	9/10/2017 10:40	9/10/2017 10:40	9/17/2017 20:41	280-387916/	N
FEW4-MW101	SO	FEW4-MW101-(251.0)	280-101025-33		1/1	9/10/2017 11:40	9/10/2017 11:40	9/17/2017 21:02	280-387916/	FD
FEW4-MW101	SO	FEW4-MW101-(260.0)	280-101025-34		1/1	9/10/2017 10:45	9/10/2017 10:45	9/17/2017 21:22	280-387916/	N
FEW4-MW101	SO	FEW4-MW101-(260.0)	280-101025-34MS		1/1	9/10/2017 10:45	9/10/2017 10:45	9/17/2017 21:42	280-387916/	MS
FEW4-MW101	SO	FEW4-MW101-(260.0)	280-101025-34MSD		1/1	9/10/2017 10:45	9/10/2017 10:45	9/17/2017 22:02	280-387916/	SD
FEW4-MW101	SO	FEW4-MW101-(270.0)	280-101025-35		1/1	9/10/2017 12:30	9/10/2017 12:30	9/17/2017 22:22	280-387916/	N
FEW4-MW101	SO	FEW4-MW101-(280.0)	280-101025-36		1/1	9/10/2017 12:35	9/10/2017 12:35	9/17/2017 22:42	280-387916/	N
LABQC	SQ	MB 280-387916/2-A	MB 280-387916/2-A		1/1	9/17/2017 10:00	9/17/2017 10:00	9/17/2017 23:02	280-387916/	LB

Test Method: SW8260B Analysis Batch: 280-387923

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
LABQC	SQ	LCS 280-387923/1-A	LCS 280-387923/1-A		1/1	9/17/2017 19:58	9/17/2017 19:58	9/17/2017 20:28	280-387923/	BS
LABQC	SQ	MB 280-387923/2-A	MB 280-387923/2-A		1/1	9/17/2017 19:58	9/17/2017 19:58	9/17/2017 21:09	280-387923/	LB
FEW4-MW101	SO	FEW4-MW101-(150.0)	280-101025-22		1/1	9/9/2017 15:10	9/9/2017 15:10	9/18/2017 02:10	280-387923/	N
FEW4-MW101	SO	FEW4-MW101-(300.0)	280-101025-38		1/1	9/10/2017 15:25	9/10/2017 15:25	9/18/2017 02:30	280-387923/	N
FEW4-MW101	SO	FEW4-MW101-(306.0)	280-101025-39		1/1	9/10/2017 15:30	9/10/2017 15:30	9/18/2017 02:50	280-387923/	N
FEW4-MW101	SO	FEW4-MW101-(290.0)	280-101025-37		1/1	9/10/2017 15:20	9/10/2017 15:20	9/18/2017 06:30	280-387923/	N

Test Method: SW8260B Analysis Batch: 280-388567

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
LABQC	SQ	MB 280-388567/1-A	MB 280-388567/1-A		1/1	9/22/2017 09:01	9/22/2017 09:01	9/22/2017 10:20	280-388567/	LB
LABQC	SQ	LCS 280-388567/2-A	LCS 280-388567/2-A		1/1	9/22/2017 09:01	9/22/2017 09:01	9/22/2017 10:39	280-388567/	BS

US Army Corps of Engineers®

Batch Report

Test Method: SW8260B Analysis Batch: 280-388567

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
FEW4-MW76	SO	FEW4-MW76-(140.0)	280-101025-5		2/1	9/10/2017 12:00	9/22/2017 09:01	9/22/2017 10:59	280-388567/	N
FEW4-MW76	SO	FEW4-MW76-(141.0)	280-101025-6		2/1	9/10/2017 13:00	9/22/2017 09:01	9/22/2017 11:18	280-388567/	FD
FEW4-MW76	SO	FEW4-MW76-(150.0)	280-101025-7		2/1	9/10/2017 12:20	9/22/2017 09:01	9/22/2017 11:38	280-388567/	N
FEW4-MW76	SO	FEW4-MW76-(160.0)	280-101025-8		2/1	9/10/2017 12:35	9/22/2017 09:01	9/22/2017 11:57	280-388567/	N
FEW4-MW76	SO	FEW4-MW76-(164.0)	280-101025-9		2/1	9/10/2017 16:00	9/22/2017 09:01	9/22/2017 12:16	280-388567/	N
FEW4-MW76	SO	FEW4-MW76-(170.0)	280-101025-10		2/1	9/10/2017 16:10	9/22/2017 09:01	9/22/2017 12:36	280-388567/	N
FEW4-MW76	SO	FEW4-MW76-(180.0)	280-101025-11		2/1	9/10/2017 16:20	9/22/2017 09:01	9/22/2017 12:55	280-388567/	N

Test Method: SW8260B Analysis Batch: 280-388618

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
LABQC	WQ	LCS 280-388618/4	LCS 280-388618/4		1/1	9/22/2017 14:20	9/22/2017 14:20	9/22/2017 14:20	280-388618/	BS
LABQC	WQ	LCSD 280-388618/5	LCSD 280-388618/5		1/1	9/22/2017 14:41	9/22/2017 14:41	9/22/2017 14:41	280-388618/	BD
LABQC	WQ	MB 280-388618/6	MB 280-388618/6		1/1	9/22/2017 15:01	9/22/2017 15:01	9/22/2017 15:01	280-388618/	LB
FEW4-MW101	WG	FEW4-MW101-107	280-101025-18		1/1	9/9/2017 12:40	9/22/2017 17:03	9/22/2017 17:03	280-388618/	N

Test Method: SW8260B Analysis Batch: 280-388654

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
LABQC	WQ	LCS 280-388654/4	LCS 280-388654/4		1/1	9/23/2017 09:30	9/23/2017 09:30	9/23/2017 09:30	280-388654/	BS
LABQC	WQ	LCSD 280-388654/5	LCSD 280-388654/5		1/1	9/23/2017 09:50	9/23/2017 09:50	9/23/2017 09:50	280-388654/	BD
LABQC	WQ	MB 280-388654/6	MB 280-388654/6		1/1	9/23/2017 10:11	9/23/2017 10:11	9/23/2017 10:11	280-388654/	LB

US Army Corps of Engineers®

Batch Report

Test Method: SW8260B Analysis Batch: 280-388654

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
FEW4-MW101	WG	FEW4-MW101-107	280-101025-18		2/4	9/9/2017 12:40	9/23/2017 11:31	9/23/2017 11:31	280-388654/	N

Field Batch Report

--No Records Found--

MS Mismatch Report

--No Records Found--

Section to identify Matrix Spike mismatches where parent sample differs from MS by dilution.

QC Outlier Report

Test Method: SW8260B Extraction Method: SW5030A Leach Method: NONE

QC Element	Sample ID/ Lab Sample ID	Run#/ Dil'n	Analyte	Result (Units)	Qualifier	Warning Limits	Control Limits	Reason	Comment	Rule	Action Level
Blank	MB 280-387913/2-A (LB) / MB 280-387913/2-A	1 / 1.00	1,2,3-Trichlorobenzene	1.280 (ug/kg)	*U/None	< 0.75	< 5	L		1	1.28
Blank	MB 280-387913/2-A (LB) / MB 280-387913/2-A	1 / 1.00	1,2,4-Trichlorobenzene	1.550 (ug/kg)	*U/None	< 0.73	< 5	L		1	1.55
Blank	MB 280-387913/2-A (LB) / MB 280-387913/2-A	1 / 1.00	Hexachlorobutadiene	0.7890 (ug/kg)	*U/None	< 0.55	< 5	L		1	0.789
Blank	MB 280-387913/2-A (LB) / MB 280-387913/2-A	1 / 1.00	n-Butylbenzene	0.8750 (ug/kg)	*U/None	< 0.56	< 5	L		1	0.875
LCS Recovery	LCS 280-387913/1-A (BS) / LCS 280-387913/1-A	1 / 1.00	Bromobenzene	123.4 (percent)	J/None	78 - 121	78 - 121	C			
LCS Recovery	LCS 280-387913/1-A (BS) / LCS 280-387913/1-A	1 / 1.00	Ethylbenzene	122.4 (percent)	J/None	76 - 122	76 - 122	C			
LCS Recovery	LCS 280-387913/1-A (BS) / LCS 280-387913/1-A	1 / 1.00	Toluene	121.8 (percent)	J/None	77 - 121	77 - 121	C			

Test Method: SW8260B Extraction Method: SW5030B Leach Method: NONE

QC Element	Sample ID/ Lab Sample ID	Run#/ Dil'n	Analyte	Result (Units)	Qualifier	Warning Limits	Control Limits	Reason	Comment	Rule	Action Level
Surrogate	FEW4-MW101-107 (N) / 280-101025-18	1 / 1.00	1,2-Dichloroethane-d4	120.0 (percent)	J/None	81 - 118	81 - 118	I			

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

QC Element	Sample ID/ Lab Sample ID	Run#/ Dil'n	Analyte	Result (Units)	Qualifier	Warning Limits	Control Limits	Reason	Comment	Rule	Action Level
MS Recovery	FEW4-MW101-(120.0) (MS) / 280-101025-19MS	1 / 1.00	Trichloroethene (TCE)	67.21 (percent)	J/UJ	77 - 123	77 - 123	M			
MS Recovery	FEW4-MW101-(260.0) (MS) / 280-101025-34MS	1 / 1.00	1,2,3-Trichlorobenzene	55.43 (percent)	J/UJ	66 - 130	66 - 130	M			
MS Recovery	FEW4-MW101-(260.0) (MS) / 280-101025-34MS	1 / 1.00	1,2,4-Trichlorobenzene	46.78 (percent)	J/UJ	67 - 129	67 - 129	M			

US Army Corps of Engineers®

QC Outlier Report

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

QC Element	Sample ID/ Lab Sample ID	Run#/ Dil'n	Analyte	Result (Units)	Qualifier	Warning Limits	Control Limits	Reason	Comment	Rule	Action Level
MS Recovery	FEW4-MW101-(260.0) (MS) / 280-101025-34MS	1 / 1.00	1,2,4-Trimethylbenzene	52.12 (percent)	J/UJ	75 - 123	75 - 123	M			
MS Recovery	FEW4-MW101-(260.0) (MS) / 280-101025-34MS	1 / 1.00	1,2-Dichlorobenzene	58.56 (percent)	J/UJ	78 - 121	78 - 121	M			
MS Recovery	FEW4-MW101-(260.0) (MS) / 280-101025-34MS	1 / 1.00	1,3,5-Trimethylbenzene	53.22 (percent)	J/UJ	73 - 124	73 - 124	M			
MS Recovery	FEW4-MW101-(260.0) (MS) / 280-101025-34MS	1 / 1.00	1,3-Dichlorobenzene	52.30 (percent)	J/UJ	77 - 121	77 - 121	M			
MS Recovery	FEW4-MW101-(260.0) (MS) / 280-101025-34MS	1 / 1.00	1,4-Dichlorobenzene	51.01 (percent)	J/UJ	75 - 120	75 - 120	M			
MS Recovery	FEW4-MW101-(260.0) (MS) / 280-101025-34MS	1 / 1.00	2-Chlorotoluene	54.51 (percent)	J/UJ	75 - 122	75 - 122	M			
MS Recovery	FEW4-MW101-(260.0) (MS) / 280-101025-34MS	1 / 1.00	4-Chlorotoluene	52.12 (percent)	J/UJ	72 - 124	72 - 124	M			
MS Recovery	FEW4-MW101-(260.0) (MS) / 280-101025-34MS	1 / 1.00	Bromobenzene	62.25 (percent)	J/UJ	78 - 121	78 - 121	M			
MS Recovery	FEW4-MW101-(260.0) (MS) / 280-101025-34MS	1 / 1.00	Chlorobenzene	69.43 (percent)	J/UJ	79 - 120	79 - 120	M			
MS Recovery	FEW4-MW101-(260.0) (MS) / 280-101025-34MS	1 / 1.00	Ethylbenzene	65.01 (percent)	J/UJ	76 - 122	76 - 122	M			
MS Recovery	FEW4-MW101-(260.0) (MS) / 280-101025-34MS	1 / 1.00	Hexachlorobutadiene	39.96 (percent)	J/UJ	61 - 135	61 - 135	M			
MS Recovery	FEW4-MW101-(260.0) (MS) / 280-101025-34MS	1 / 1.00	Isopropylbenzene (Cumene)	55.06 (percent)	J/UJ	68 - 134	68 - 134	M			
MS Recovery	FEW4-MW101-(260.0) (MS) / 280-101025-34MS	1 / 1.00	m,p-Xylene	61.88 (percent)	J/UJ	77 - 124	77 - 124	M			
MS Recovery	FEW4-MW101-(260.0) (MS) / 280-101025-34MS	1 / 1.00	n-Butylbenzene	39.78 (percent)	J/UJ	70 - 128	70 - 128	M			
MS Recovery	FEW4-MW101-(260.0) (MS) / 280-101025-34MS	1 / 1.00	n-Propylbenzene	49.54 (percent)	J/UJ	73 - 125	73 - 125	M			
MS Recovery	FEW4-MW101-(260.0) (MS) / 280-101025-34MS	1 / 1.00	o-Xylene	66.48 (percent)	J/UJ	77 - 123	77 - 123	M			
MS Recovery	FEW4-MW101-(260.0) (MS) / 280-101025-34MS	1 / 1.00	p-Cymene (p-Isopropyltoluene)	46.59 (percent)	J/UJ	73 - 127	73 - 127	M			
MS Recovery	FEW4-MW101-(260.0) (MS) / 280-101025-34MS	1 / 1.00	sec-Butylbenzene	48.62 (percent)	J/UJ	73 - 126	73 - 126	M			

US Army Corps of Engineers®

QC Outlier Report

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

QC Element	Sample ID/ Lab Sample ID	Run#/ Dil'n	Analyte	Result (Units)	Qualifier	Warning Limits	Control Limits	Reason	Comment	Rule	Action Level
MS Recovery	FEW4-MW101-(260.0) (MS) / 280-101025-34MS	1 / 1.00	Styrene	64.46 (percent)	J/UJ	76 - 124	76 - 124	M			
MS Recovery	FEW4-MW101-(260.0) (MS) / 280-101025-34MS	1 / 1.00	tert-Butylbenzene	53.22 (percent)	J/UJ	73 - 125	73 - 125	M			
MS Recovery	FEW4-MW101-(260.0) (MS) / 280-101025-34MS	1 / 1.00	Tetrachloroethene (PCE)	69.06 (percent)	J/UJ	73 - 128	73 - 128	M			
MS Recovery	FEW4-MW76-(100.0) (MS) / 280-101025-2MS	1 / 1.00	Trichloroethene (TCE)	55.56 (percent)	J/UJ	77 - 123	77 - 123	M			
MS Recovery	FEW4-MW76-(100.0) (SD) / 280-101025-2MSD	1 / 1.00	Trichloroethene (TCE)	71.43 (percent)	J/UJ	77 - 123	77 - 123	M			
MS RPD	280-101025-34MSD (SD) / 280-101025-34MSD	1 / 1.00	1,1,1,2-Tetrachloroethane	36.52 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101025-34MSD (SD) / 280-101025-34MSD	1 / 1.00	1,1,1-Trichloroethane	29.05 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101025-34MSD (SD) / 280-101025-34MSD	1 / 1.00	1,1,2,2-Tetrachloroethane	22.18 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101025-34MSD (SD) / 280-101025-34MSD	1 / 1.00	1,1,2-Trichloroethane	28.34 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101025-34MSD (SD) / 280-101025-34MSD	1 / 1.00	1,1-Dichloroethane	24.73 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101025-34MSD (SD) / 280-101025-34MSD	1 / 1.00	1,1-Dichloroethene	26.27 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101025-34MSD (SD) / 280-101025-34MSD	1 / 1.00	1,1-Dichloropropene	34.53 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101025-34MSD (SD) / 280-101025-34MSD	1 / 1.00	1,2,3-Trichlorobenzene	57.85 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101025-34MSD (SD) / 280-101025-34MSD	1 / 1.00	1,2,3-Trichloropropane	20.47 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101025-34MSD (SD) / 280-101025-34MSD	1 / 1.00	1,2,4-Trichlorobenzene	64.89 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101025-34MSD (SD) / 280-101025-34MSD	1 / 1.00	1,2,4-Trimethylbenzene	68.22 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101025-34MSD (SD) / 280-101025-34MSD	1 / 1.00	1,2-Dibromo-3-chloropropane	21.22 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101025-34MSD (SD) / 280-101025-34MSD	1 / 1.00	1,2-Dibromoethane (EDB)	26.45 (rpd)	J/None	< 20	< 20	D			

US Army Corps of Engineers®

QC Outlier Report

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

QC Element	Sample ID/ Lab Sample ID	Run#/ Dil'n	Analyte	Result (Units)	Qualifier	Warning Limits	Control Limits	Reason	Comment	Rule	Action Level
MS RPD	280-101025-34MSD (SD) / 280-101025-34MSD	1 / 1.00	1,2-Dichlorobenzene	56.76 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101025-34MSD (SD) / 280-101025-34MSD	1 / 1.00	1,2-Dichloroethane	24.88 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101025-34MSD (SD) / 280-101025-34MSD	1 / 1.00	1,2-Dichloroethene	30.40 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101025-34MSD (SD) / 280-101025-34MSD	1 / 1.00	1,2-Dichloropropane	30.39 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101025-34MSD (SD) / 280-101025-34MSD	1 / 1.00	1,3,5-Trimethylbenzene	68.04 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101025-34MSD (SD) / 280-101025-34MSD	1 / 1.00	1,3-Dichlorobenzene	63.46 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101025-34MSD (SD) / 280-101025-34MSD	1 / 1.00	1,3-Dichloropropane	26.00 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101025-34MSD (SD) / 280-101025-34MSD	1 / 1.00	1,4-Dichlorobenzene	63.04 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101025-34MSD (SD) / 280-101025-34MSD	1 / 1.00	2,2-Dichloropropane	25.67 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101025-34MSD (SD) / 280-101025-34MSD	1 / 1.00	2-Chlorotoluene	62.80 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101025-34MSD (SD) / 280-101025-34MSD	1 / 1.00	4-Chlorotoluene	68.07 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101025-34MSD (SD) / 280-101025-34MSD	1 / 1.00	Benzene	32.26 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101025-34MSD (SD) / 280-101025-34MSD	1 / 1.00	Bromobenzene	52.72 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101025-34MSD (SD) / 280-101025-34MSD	1 / 1.00	Bromochloromethane	24.26 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101025-34MSD (SD) / 280-101025-34MSD	1 / 1.00	Bromodichloromethane	31.56 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101025-34MSD (SD) / 280-101025-34MSD	1 / 1.00	Bromoform	27.30 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101025-34MSD (SD) / 280-101025-34MSD	1 / 1.00	Bromomethane	23.35 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101025-34MSD (SD) / 280-101025-34MSD	1 / 1.00	Carbon disulfide	30.54 (rpd)	J/None	< 20	< 20	D			

US Army Corps of Engineers®

QC Outlier Report

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

QC Element	Sample ID/ Lab Sample ID	Run#/ Dil'n	Analyte	Result (Units)	Qualifier	Warning Limits	Control Limits	Reason	Comment	Rule	Action Level
MS RPD	280-101025-34MSD (SD) / 280-101025-34MSD	1 / 1.00	Carbon tetrachloride	31.25 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101025-34MSD (SD) / 280-101025-34MSD	1 / 1.00	Chlorobenzene	46.75 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101025-34MSD (SD) / 280-101025-34MSD	1 / 1.00	Chloroethane	23.87 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101025-34MSD (SD) / 280-101025-34MSD	1 / 1.00	Chloroform	27.04 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101025-34MSD (SD) / 280-101025-34MSD	1 / 1.00	Chloromethane	25.76 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101025-34MSD (SD) / 280-101025-34MSD	1 / 1.00	cis-1,2-Dichloroethene	31.56 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101025-34MSD (SD) / 280-101025-34MSD	1 / 1.00	cis-1,3-Dichloropropene	32.46 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101025-34MSD (SD) / 280-101025-34MSD	1 / 1.00	Dibromochloromethane	28.24 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101025-34MSD (SD) / 280-101025-34MSD	1 / 1.00	Dibromomethane	25.95 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101025-34MSD (SD) / 280-101025-34MSD	1 / 1.00	Dichlorodifluoromethane	21.44 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101025-34MSD (SD) / 280-101025-34MSD	1 / 1.00	Ethylbenzene	53.07 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101025-34MSD (SD) / 280-101025-34MSD	1 / 1.00	Hexachlorobutadiene	86.39 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101025-34MSD (SD) / 280-101025-34MSD	1 / 1.00	Isopropylbenzene (Cumene)	64.55 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101025-34MSD (SD) / 280-101025-34MSD	1 / 1.00	m,p-Xylene	58.38 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101025-34MSD (SD) / 280-101025-34MSD	1 / 1.00	Methyl tert-butyl ether (MTBE)	22.83 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101025-34MSD (SD) / 280-101025-34MSD	1 / 1.00	Methylene chloride	26.24 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101025-34MSD (SD) / 280-101025-34MSD	1 / 1.00	Naphthalene	43.19 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101025-34MSD (SD) / 280-101025-34MSD	1 / 1.00	n-Butylbenzene	82.77 (rpd)	J/None	< 20	< 20	D			

US Army Corps of Engineers®

QC Outlier Report

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

QC Element	Sample ID/ Lab Sample ID	Run#/ Dil'n	Analyte	Result (Units)	Qualifier	Warning Limits	Control Limits	Reason	Comment	Rule	Action Level
MS RPD	280-101025-34MSD (SD) / 280-101025-34MSD	1 / 1.00	n-Propylbenzene	71.90 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101025-34MSD (SD) / 280-101025-34MSD	1 / 1.00	o-Xylene	55.60 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101025-34MSD (SD) / 280-101025-34MSD	1 / 1.00	p-Cymene (p-Isopropyltoluene)	76.89 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101025-34MSD (SD) / 280-101025-34MSD	1 / 1.00	sec-Butylbenzene	75.32 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101025-34MSD (SD) / 280-101025-34MSD	1 / 1.00	Styrene	53.25 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101025-34MSD (SD) / 280-101025-34MSD	1 / 1.00	tert-Butylbenzene	69.82 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101025-34MSD (SD) / 280-101025-34MSD	1 / 1.00	Tetrachloroethene (PCE)	46.15 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101025-34MSD (SD) / 280-101025-34MSD	1 / 1.00	Toluene	41.32 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101025-34MSD (SD) / 280-101025-34MSD	1 / 1.00	trans-1,2-Dichloroethene	29.85 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101025-34MSD (SD) / 280-101025-34MSD	1 / 1.00	trans-1,3-Dichloropropene	35.16 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101025-34MSD (SD) / 280-101025-34MSD	1 / 1.00	Trichloroethene (TCE)	37.49 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101025-34MSD (SD) / 280-101025-34MSD	1 / 1.00	Vinyl chloride	25.22 (rpd)	J/None	< 20	< 20	D			
Surrogate	FEW4-MW101-(290.0) (N) / 280-101025-37	1 / 1.00	Toluene-d8	116.8 (percent)	J/None	85 - 116	85 - 116	I			
Surrogate	FEW4-MW76-(141.0) (FD) / 280-101025-6	2 / 1.00	1,2-Dichloroethane-d4	170.4 (percent)	J/None	71 - 136	71 - 136	I			
Surrogate	FEW4-MW76-(141.0) (FD) / 280-101025-6	2 / 1.00	1-Bromo-4-fluorobenzene (4-Bromofluorobenzene)	182.7 (percent)	J/None	79 - 119	79 - 119	I			
Surrogate	FEW4-MW76-(141.0) (FD) / 280-101025-6	2 / 1.00	Dibromofluoromethane	172.8 (percent)	J/None	78 - 119	78 - 119	I			
Surrogate	FEW4-MW76-(141.0) (FD) / 280-101025-6	2 / 1.00	Toluene-d8	160.5 (percent)	J/None	85 - 116	85 - 116	I			
Surrogate	FEW4-MW76-(150.0) (N) / 280-101025-7	2 / 1.00	Dibromofluoromethane	122.3 (percent)	J/None	78 - 119	78 - 119	I			

US Army Corps of Engineers ®

QC Outlier Report

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

QC Element	Sample ID/ Lab Sample ID	Run#/ Dil'n	Analyte	Result (Units)	Qualifier	Warning Limits	Control Limits	Reason	Comment	Rule	Action Level
Surrogate	FEW4-MW76-(160.0) (N) / 280-101025-8	2 / 1.00	1,2-Dichloroethane-d4	144.7 (percent)	J/None	71 - 136	71 - 136	I			
Surrogate	FEW4-MW76-(160.0) (N) / 280-101025-8	2 / 1.00	1-Bromo-4-fluorobenzene (4-Bromofluorobenzene)	154.6 (percent)	J/None	79 - 119	79 - 119	I			
Surrogate	FEW4-MW76-(160.0) (N) / 280-101025-8	2 / 1.00	Dibromofluoromethane	148.0 (percent)	J/None	78 - 119	78 - 119	I			
Surrogate	FEW4-MW76-(160.0) (N) / 280-101025-8	2 / 1.00	Toluene-d8	138.2 (percent)	J/None	85 - 116	85 - 116	I			
Surrogate	FEW4-MW76-(164.0) (N) / 280-101025-9	2 / 1.00	1-Bromo-4-fluorobenzene (4-Bromofluorobenzene)	132.5 (percent)	J/None	79 - 119	79 - 119	I			
Surrogate	FEW4-MW76-(164.0) (N) / 280-101025-9	2 / 1.00	Dibromofluoromethane	132.5 (percent)	J/None	78 - 119	78 - 119	I			
Surrogate	FEW4-MW76-(164.0) (N) / 280-101025-9	2 / 1.00	Toluene-d8	123.0 (percent)	J/None	85 - 116	85 - 116	I			

Rule is the multiplier used when blank contamination occurs to determine action level.

US Army Corps of Engineers®

Qualified Results

Test Method: SW8260B Extraction Method: SW5030A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW76-(150.0)	280-101025-7	SO	N	1,1,1,2-Tetrachloroethane	7.70	2.50 U	2.50 UJ		ug/kg	P
FEW4-MW76-(150.0)	280-101025-7	SO	N	1,1,1-Trichloroethane	7.70	2.50 U	2.50 UJ		ug/kg	P
FEW4-MW76-(150.0)	280-101025-7	SO	N	1,1,2,2-Tetrachloroethane	7.70	2.50 U	2.50 UJ		ug/kg	P
FEW4-MW76-(150.0)	280-101025-7	SO	N	1,1,2-Trichloroethane	7.70	4.90 U	4.90 UJ		ug/kg	P
FEW4-MW76-(150.0)	280-101025-7	SO	N	1,1-Dichloroethane	7.70	1.20 U	1.20 UJ		ug/kg	P
FEW4-MW76-(150.0)	280-101025-7	SO	N	1,1-Dichloroethene	7.70	2.50 U	2.50 UJ		ug/kg	P
FEW4-MW76-(150.0)	280-101025-7	SO	N	1,1-Dichloropropene	7.70	2.50 U	2.50 UJ		ug/kg	P
FEW4-MW76-(150.0)	280-101025-7	SO	N	1,2,3-Trichlorobenzene	7.70	2.50 U	2.50 UJ		ug/kg	P
FEW4-MW76-(150.0)	280-101025-7	SO	N	1,2,3-Trichloropropane	7.70	4.90 U	4.90 UJ		ug/kg	P
FEW4-MW76-(150.0)	280-101025-7	SO	N	1,2,4-Trichlorobenzene	7.70	2.50 U	2.50 UJ		ug/kg	P
FEW4-MW76-(150.0)	280-101025-7	SO	N	1,2,4-Trimethylbenzene	7.70	2.50 U	2.50 UJ		ug/kg	P
FEW4-MW76-(150.0)	280-101025-7	SO	N	1,2-Dibromo-3-chloropropane	15.0	2.50 U	2.50 UJ		ug/kg	P
FEW4-MW76-(150.0)	280-101025-7	SO	N	1,2-Dibromoethane (EDB)	7.70	2.50 U	2.50 UJ		ug/kg	P
FEW4-MW76-(150.0)	280-101025-7	SO	N	1,2-Dichlorobenzene	7.70	2.50 U	2.50 UJ		ug/kg	P
FEW4-MW76-(150.0)	280-101025-7	SO	N	1,2-Dichloroethane	7.70	2.50 U	2.50 UJ		ug/kg	P
FEW4-MW76-(150.0)	280-101025-7	SO	N	1,2-Dichloroethene	7.70	2.50 U	2.50 UJ		ug/kg	P
FEW4-MW76-(150.0)	280-101025-7	SO	N	1,2-Dichloropropane	7.70	2.50 U	2.50 UJ		ug/kg	P
FEW4-MW76-(150.0)	280-101025-7	SO	N	1,3,5-Trimethylbenzene	7.70	2.50 U	2.50 UJ		ug/kg	P
FEW4-MW76-(150.0)	280-101025-7	SO	N	1,3-Dichlorobenzene	7.70	2.50 U	2.50 UJ		ug/kg	P
FEW4-MW76-(150.0)	280-101025-7	SO	N	1,3-Dichloropropane	7.70	2.50 U	2.50 UJ		ug/kg	P
FEW4-MW76-(150.0)	280-101025-7	SO	N	1,4-Dichlorobenzene	7.70	2.50 U	2.50 UJ		ug/kg	P
FEW4-MW76-(150.0)	280-101025-7	SO	N	2,2-Dichloropropane	7.70	2.50 U	2.50 UJ		ug/kg	P
FEW4-MW76-(150.0)	280-101025-7	SO	N	2-Butanone (MEK)	31.0	9.90 U	9.90 UJ		ug/kg	P
FEW4-MW76-(150.0)	280-101025-7	SO	N	2-Chlorotoluene	7.70	2.50 U	2.50 UJ		ug/kg	P
FEW4-MW76-(150.0)	280-101025-7	SO	N	2-Hexanone	31.0	20.0 U	20.0 UJ		ug/kg	P
FEW4-MW76-(150.0)	280-101025-7	SO	N	4-Chlorotoluene	7.70	2.50 U	2.50 UJ		ug/kg	P
FEW4-MW76-(150.0)	280-101025-7	SO	N	4-Methyl-2-pentanone (MIBK)	31.0	20.0 U	20.0 UJ		ug/kg	P

US Army Corps of Engineers®

Qualified Results

Test Method: SW8260B Extraction Method: SW5030A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW76-(150.0)	280-101025-7	SO	N	Acetone	31.0	20.0 U	20.0 UJ		ug/kg	P
FEW4-MW76-(150.0)	280-101025-7	SO	N	Benzene	7.70	2.50 U	2.50 UJ		ug/kg	P
FEW4-MW76-(150.0)	280-101025-7	SO	N	Bromobenzene	7.70	2.50 U Q	2.50 UJ		ug/kg	P
FEW4-MW76-(150.0)	280-101025-7	SO	N	Bromochloromethane	7.70	1.20 U	1.20 UJ		ug/kg	P
FEW4-MW76-(150.0)	280-101025-7	SO	N	Bromodichloromethane	7.70	1.20 U	1.20 UJ		ug/kg	P
FEW4-MW76-(150.0)	280-101025-7	SO	N	Bromoform	7.70	1.20 U	1.20 UJ		ug/kg	P
FEW4-MW76-(150.0)	280-101025-7	SO	N	Bromomethane	15.0	2.50 U	2.50 UJ		ug/kg	P
FEW4-MW76-(150.0)	280-101025-7	SO	N	Carbon disulfide	7.70	2.50 U	2.50 UJ		ug/kg	P
FEW4-MW76-(150.0)	280-101025-7	SO	N	Carbon tetrachloride	7.70	2.50 U	2.50 UJ		ug/kg	P
FEW4-MW76-(150.0)	280-101025-7	SO	N	Chlorobenzene	7.70	2.50 U	2.50 UJ		ug/kg	P
FEW4-MW76-(150.0)	280-101025-7	SO	N	Chloroethane	15.0	4.90 U	4.90 UJ		ug/kg	P
FEW4-MW76-(150.0)	280-101025-7	SO	N	Chloroform	15.0	1.20 U	1.20 UJ		ug/kg	P
FEW4-MW76-(150.0)	280-101025-7	SO	N	Chloromethane	15.0	2.50 U	2.50 UJ		ug/kg	P
FEW4-MW76-(150.0)	280-101025-7	SO	N	cis-1,2-Dichloroethene	7.70	2.50 U	2.50 UJ		ug/kg	P
FEW4-MW76-(150.0)	280-101025-7	SO	N	cis-1,3-Dichloropropene	7.70	4.90 U	4.90 UJ		ug/kg	P
FEW4-MW76-(150.0)	280-101025-7	SO	N	Dibromochloromethane	7.70	2.50 U	2.50 UJ		ug/kg	P
FEW4-MW76-(150.0)	280-101025-7	SO	N	Dibromomethane	7.70	4.90 U	4.90 UJ		ug/kg	P
FEW4-MW76-(150.0)	280-101025-7	SO	N	Dichlorodifluoromethane	15.0	2.50 U	2.50 UJ		ug/kg	P
FEW4-MW76-(150.0)	280-101025-7	SO	N	Ethylbenzene	7.70	2.50 U	2.50 UJ		ug/kg	P
FEW4-MW76-(150.0)	280-101025-7	SO	N	Hexachlorobutadiene	7.70	2.50 U	2.50 UJ		ug/kg	P
FEW4-MW76-(150.0)	280-101025-7	SO	N	Isopropylbenzene (Cumene)	7.70	2.50 U	2.50 UJ		ug/kg	P
FEW4-MW76-(150.0)	280-101025-7	SO	N	m,p-Xylene	4.90	4.90 U	4.90 UJ		ug/kg	P
FEW4-MW76-(150.0)	280-101025-7	SO	N	Methyl tert-butyl ether (MTBE)	31.0	1.20 U	1.20 UJ		ug/kg	P
FEW4-MW76-(150.0)	280-101025-7	SO	N	Methylene chloride	7.70	4.90 U	4.90 UJ		ug/kg	P
FEW4-MW76-(150.0)	280-101025-7	SO	N	Naphthalene	7.70	2.50 U	2.50 UJ		ug/kg	P
FEW4-MW76-(150.0)	280-101025-7	SO	N	n-Butylbenzene	7.70	2.50 U	2.50 UJ		ug/kg	P
FEW4-MW76-(150.0)	280-101025-7	SO	N	n-Propylbenzene	7.70	2.50 U	2.50 UJ		ug/kg	P
FEW4-MW76-(150.0)	280-101025-7	SO	N	o-Xylene	7.70	2.50 U	2.50 UJ		ug/kg	P

Qualified Results

Test Method: SW8260B	Extraction Method: SW5030A	Leach Method: NONE								
FieldSample ID	LabSample ID	Matrix	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW76-(150.0)	280-101025-7	SO	N	p-Cymene (p-Isopropyltoluene)	7.70	2.50 U	2.50 UJ		ug/kg	P
FEW4-MW76-(150.0)	280-101025-7	SO	N	sec-Butylbenzene	7.70	2.50 U	2.50 UJ		ug/kg	P
FEW4-MW76-(150.0)	280-101025-7	SO	N	Styrene	7.70	2.50 U	2.50 UJ		ug/kg	P
FEW4-MW76-(150.0)	280-101025-7	SO	N	tert-Butylbenzene	7.70	2.50 U	2.50 UJ		ug/kg	P
FEW4-MW76-(150.0)	280-101025-7	SO	N	Tetrachloroethene (PCE)	7.70	2.50 U	2.50 UJ		ug/kg	P
FEW4-MW76-(150.0)	280-101025-7	SO	N	Toluene	7.70	2.50 U Q	2.50 UJ		ug/kg	P
FEW4-MW76-(150.0)	280-101025-7	SO	N	trans-1,2-Dichloroethene	7.70	1.20 U	1.20 UJ		ug/kg	P
FEW4-MW76-(150.0)	280-101025-7	SO	N	trans-1,3-Dichloropropene	7.70	2.50 U	2.50 UJ		ug/kg	P
FEW4-MW76-(150.0)	280-101025-7	SO	N	Trichlorofluoromethane	15.0	4.90 U	4.90 UJ		ug/kg	P
FEW4-MW76-(150.0)	280-101025-7	SO	N	Vinyl chloride	7.70	4.90 U	4.90 UJ		ug/kg	P

Test Method: SW8260B	Extraction Method: SW5030B	Leach Method: NONE								
FieldSample ID	LabSample ID	Matrix	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW101-107	280-101025-18	WG	N	cis-1,2-Dichloroethene	1.00	0.470 J	0.470 J	+	ug/L	I/TR
FEW4-MW101-107	280-101025-18	WG	N	Toluene	1.00	0.430 J	0.430 J	+	ug/L	I/TR

Test Method: SW8260B	Extraction Method: SW5035A	Leach Method: NONE								
FieldSample ID	LabSample ID	Matrix	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW101-(110.0)	280-101025-17	SO	N	Acetone	29.0	15.0 J	15.0 J		ug/kg	TR
FEW4-MW101-(130.0)	280-101025-20	SO	N	1,2,3-Trichlorobenzene	6.50	1.00 J	1.00 J		ug/kg	TR
FEW4-MW101-(130.0)	280-101025-20	SO	N	1,2,4-Trichlorobenzene	6.50	1.50 J	1.50 J		ug/kg	TR
FEW4-MW101-(130.0)	280-101025-20	SO	N	Acetone	26.0	8.90 J	8.90 J		ug/kg	TR
FEW4-MW101-(130.0)	280-101025-20	SO	N	Hexachlorobutadiene	6.50	0.900 J	0.900 J		ug/kg	TR
FEW4-MW101-(130.0)	280-101025-20	SO	N	n-Butylbenzene	6.50	1.00 J	1.00 J		ug/kg	TR
FEW4-MW101-(160.0)	280-101025-23	SO	N	Acetone	32.0	14.0 J	14.0 J		ug/kg	TR

US Army Corps of Engineers®

Qualified Results

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW101-(160.0)	280-101025-23	SO	N	Trichloroethene (TCE)	8.00	1.70 J	1.70 J		ug/kg	TR
FEW4-MW101-(180.0)	280-101025-25	SO	N	Acetone	27.0	21.0 J	21.0 J		ug/kg	TR
FEW4-MW101-(200.0)	280-101025-27	SO	N	Acetone	37.0	23.0 J	23.0 J		ug/kg	TR
FEW4-MW101-(210.0)	280-101025-28	SO	N	Acetone	24.0	18.0 J	18.0 J		ug/kg	TR
FEW4-MW101-(250.0)	280-101025-32	SO	N	Acetone	25.0	19.0 J	19.0 J		ug/kg	TR
FEW4-MW101-(251.0)	280-101025-33	SO	FD	Acetone	24.0	9.00 J	9.00 J		ug/kg	TR
FEW4-MW101-(260.0)	280-101025-34	SO	N	1,2,3-Trichlorobenzene	7.00	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW101-(260.0)	280-101025-34	SO	N	1,2,4-Trichlorobenzene	7.00	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW101-(260.0)	280-101025-34	SO	N	1,2,4-Trimethylbenzene	7.00	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW101-(260.0)	280-101025-34	SO	N	1,2-Dichlorobenzene	7.00	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW101-(260.0)	280-101025-34	SO	N	1,3,5-Trimethylbenzene	7.00	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW101-(260.0)	280-101025-34	SO	N	1,3-Dichlorobenzene	7.00	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW101-(260.0)	280-101025-34	SO	N	1,4-Dichlorobenzene	7.00	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW101-(260.0)	280-101025-34	SO	N	2-Chlorotoluene	7.00	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW101-(260.0)	280-101025-34	SO	N	4-Chlorotoluene	7.00	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW101-(260.0)	280-101025-34	SO	N	Acetone	28.0	25.0 J	25.0 J		ug/kg	TR
FEW4-MW101-(260.0)	280-101025-34	SO	N	Bromobenzene	7.00	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW101-(260.0)	280-101025-34	SO	N	Chlorobenzene	7.00	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW101-(260.0)	280-101025-34	SO	N	Ethylbenzene	7.00	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW101-(260.0)	280-101025-34	SO	N	Hexachlorobutadiene	7.00	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW101-(260.0)	280-101025-34	SO	N	Isopropylbenzene (Cumene)	7.00	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW101-(260.0)	280-101025-34	SO	N	m,p-Xylene	4.50	4.50 U J	4.50 UJ	-	ug/kg	M
FEW4-MW101-(260.0)	280-101025-34	SO	N	n-Butylbenzene	7.00	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW101-(260.0)	280-101025-34	SO	N	n-Propylbenzene	7.00	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW101-(260.0)	280-101025-34	SO	N	o-Xylene	7.00	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW101-(260.0)	280-101025-34	SO	N	p-Cymene (p-Isopropyltoluene)	7.00	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW101-(260.0)	280-101025-34	SO	N	sec-Butylbenzene	7.00	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW101-(260.0)	280-101025-34	SO	N	Styrene	7.00	2.20 U J	2.20 UJ	-	ug/kg	M

US Army Corps of Engineers®

Qualified Results

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW101-(260.0)	280-101025-34	SO	N	tert-Butylbenzene	7.00	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW101-(260.0)	280-101025-34	SO	N	Tetrachloroethene (PCE)	7.00	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW101-(270.0)	280-101025-35	SO	N	Acetone	29.0	8.20 J	8.20 J		ug/kg	TR
FEW4-MW101-(280.0)	280-101025-36	SO	N	Acetone	37.0	31.0 J	31.0 J		ug/kg	TR
FEW4-MW101-(92.0)	280-101025-14	SO	N	Trichloroethene (TCE)	3.00	0.860 J	0.860 J		ug/kg	TR
FEW4-MW101-(93.0)	280-101025-15	SO	FD	Trichloroethene (TCE)	4.60	1.60 J	1.60 J		ug/kg	TR
FEW4-MW76-(110.0)	280-101025-3	SO	N	1,2,3-Trichlorobenzene	6.50	1.50 J	1.50 J		ug/kg	TR
FEW4-MW76-(110.0)	280-101025-3	SO	N	1,2,4-Trichlorobenzene	6.50	1.80 J	1.80 J		ug/kg	TR
FEW4-MW76-(110.0)	280-101025-3	SO	N	Hexachlorobutadiene	6.50	1.20 J	1.20 J		ug/kg	TR
FEW4-MW76-(110.0)	280-101025-3	SO	N	n-Butylbenzene	6.50	1.10 J	1.10 J		ug/kg	TR
FEW4-MW76-(130.0)	280-101025-12	SO	N	Acetone	25.0	18.0 J	18.0 J		ug/kg	TR
FEW4-MW76-(140.0)	280-101025-5	SO	N	1,2-Dichloroethene	6.30	4.50 J	4.50 J		ug/kg	TR
FEW4-MW76-(140.0)	280-101025-5	SO	N	cis-1,2-Dichloroethene	6.30	4.50 J	4.50 J		ug/kg	TR
FEW4-MW76-(140.0)	280-101025-5	SO	N	Trichloroethene (TCE)	230	810	810 J		ug/kg	D3
FEW4-MW76-(141.0)	280-101025-6	SO	FD	1,2-Dichloroethene	6.50	5.50 J	5.50 J		ug/kg	TR
FEW4-MW76-(141.0)	280-101025-6	SO	FD	cis-1,2-Dichloroethene	6.50	5.50 J	5.50 J		ug/kg	TR
FEW4-MW76-(141.0)	280-101025-6	SO	FD	Trichloroethene (TCE)	510	1600 Q	1600 J	+	ug/kg	I/D3
FEW4-MW76-(150.0)	280-101025-7	SO	N	Trichloroethene (TCE)	410	2000	2000 J	+	ug/kg	I
FEW4-MW76-(160.0)	280-101025-8	SO	N	Acetone	23.0	7.80 J	7.80 J		ug/kg	TR
FEW4-MW76-(160.0)	280-101025-8	SO	N	Trichloroethene (TCE)	380	2100 Q	2100 J	+	ug/kg	I
FEW4-MW76-(164.0)	280-101025-9	SO	N	1,2-Dichloroethene	4.50	2.30 J	2.30 J		ug/kg	TR
FEW4-MW76-(164.0)	280-101025-9	SO	N	Acetone	18.0	5.30 J	5.30 J		ug/kg	TR
FEW4-MW76-(164.0)	280-101025-9	SO	N	cis-1,2-Dichloroethene	4.50	2.30 J	2.30 J		ug/kg	TR
FEW4-MW76-(164.0)	280-101025-9	SO	N	p-Cymene (p-Isopropyltoluene)	4.50	2.00 J	2.00 J		ug/kg	TR
FEW4-MW76-(164.0)	280-101025-9	SO	N	Trichloroethene (TCE)	400	1200	1200 J	+	ug/kg	I
FEW4-MW76-(170.0)	280-101025-10	SO	N	1,2-Dichloroethene	8.50	2.60 J	2.60 J		ug/kg	TR
FEW4-MW76-(170.0)	280-101025-10	SO	N	Acetone	34.0	9.40 J	9.40 J		ug/kg	TR
FEW4-MW76-(170.0)	280-101025-10	SO	N	cis-1,2-Dichloroethene	8.50	2.60 J	2.60 J		ug/kg	TR

US Army Corps of Engineers ®

Qualified Results

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW76-(180.0)	280-101025-11	SO	N	1,2-Dichloroethene	6.70	1.00 J	1.00 J		ug/kg	TR
FEW4-MW76-(180.0)	280-101025-11	SO	N	cis-1,2-Dichloroethene	6.70	1.00 J	1.00 J		ug/kg	TR
FEW4-MW76-(180.0)	280-101025-11	SO	N	Trichloroethene (TCE)	320	200 J	200 J		ug/kg	TR
FEW4-MW76-(181.0)	280-101025-13	SO	FD	Acetone	27.0	19.0 J	19.0 J		ug/kg	TR
FEW4-MW76-(90.0)	280-101025-1	SO	N	1,2,4-Trichlorobenzene	6.00	1.00 J	1.00 J		ug/kg	TR

Qualified analytes in samples are reported as estimated, not detected (UJ) at the Limit of Detection (LOD).

Detected Results

Test Method: SW8260B Extraction Method: SW5030B Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Dilution	Analyte	LOQ	Lab Result	Qualified Result	Units	Reason
FEW4-MW101-107	280-101025-18	WG	N	1	cis-1,2-Dichloroethene	1.00	0.470 J	0.470 J	ug/L	I/TR
FEW4-MW101-107	280-101025-18	WG	N	1	Toluene	1.00	0.430 J	0.430 J	ug/L	I/TR
FEW4-MW101-107	280-101025-18	WG	N	4	Trichloroethene (TCE)	4.00	120 D	120	ug/L	

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Dilution	Analyte	LOQ	Lab Result	Qualified Result	Units	Reason
FEW4-MW101-(101.0)	280-101025-16	SO	N	1	Trichloroethene (TCE)	5.50	13.0	13.0	ug/kg	
FEW4-MW101-(110.0)	280-101025-17	SO	N	1	Acetone	29.0	15.0 J	15.0 J	ug/kg	TR
FEW4-MW101-(110.0)	280-101025-17	SO	N	1	Trichloroethene (TCE)	7.20	99.0	99.0	ug/kg	
FEW4-MW101-(120.0)	280-101025-19	SO	N	1	Acetone	24.0	37.0	37.0	ug/kg	
FEW4-MW101-(120.0)	280-101025-19	SO	N	1	Trichloroethene (TCE)	6.10	130 J	130	ug/kg	
FEW4-MW101-(130.0)	280-101025-20	SO	N	1	1,2,3-Trichlorobenzene	6.50	1.00 J	1.00 J	ug/kg	TR
FEW4-MW101-(130.0)	280-101025-20	SO	N	1	1,2,4-Trichlorobenzene	6.50	1.50 J	1.50 J	ug/kg	TR
FEW4-MW101-(130.0)	280-101025-20	SO	N	1	Acetone	26.0	8.90 J	8.90 J	ug/kg	TR
FEW4-MW101-(130.0)	280-101025-20	SO	N	1	Hexachlorobutadiene	6.50	0.900 J	0.900 J	ug/kg	TR
FEW4-MW101-(130.0)	280-101025-20	SO	N	1	n-Butylbenzene	6.50	1.00 J	1.00 J	ug/kg	TR
FEW4-MW101-(130.0)	280-101025-20	SO	N	1	Trichloroethene (TCE)	6.50	200	200	ug/kg	
FEW4-MW101-(140.0)	280-101025-21	SO	N	1	Trichloroethene (TCE)	7.00	150	150	ug/kg	
FEW4-MW101-(150.0)	280-101025-22	SO	N	1	Trichloroethene (TCE)	6.40	10.0	10.0	ug/kg	
FEW4-MW101-(160.0)	280-101025-23	SO	N	1	Acetone	32.0	14.0 J	14.0 J	ug/kg	TR
FEW4-MW101-(160.0)	280-101025-23	SO	N	1	Trichloroethene (TCE)	8.00	1.70 J	1.70 J	ug/kg	TR
FEW4-MW101-(170.0)	280-101025-24	SO	N	1	Acetone	28.0	29.0	29.0	ug/kg	
FEW4-MW101-(170.0)	280-101025-24	SO	N	1	Trichloroethene (TCE)	7.10	31.0	31.0	ug/kg	
FEW4-MW101-(180.0)	280-101025-25	SO	N	1	Acetone	27.0	21.0 J	21.0 J	ug/kg	TR
FEW4-MW101-(180.0)	280-101025-25	SO	N	1	Trichloroethene (TCE)	6.80	7.50	7.50	ug/kg	

US Army Corps of Engineers®

Detected Results

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Dilution	Analyte	LOQ	Lab Result	Qualified Result	Units	Reason
FEW4-MW101-(190.0)	280-101025-26	SO	N	1	Acetone	25.0	29.0	29.0	ug/kg	
FEW4-MW101-(200.0)	280-101025-27	SO	N	1	Acetone	37.0	23.0 J	23.0 J	ug/kg	TR
FEW4-MW101-(210.0)	280-101025-28	SO	N	1	Acetone	24.0	18.0 J	18.0 J	ug/kg	TR
FEW4-MW101-(220.0)	280-101025-29	SO	N	1	Acetone	50.0	59.0	59.0	ug/kg	
FEW4-MW101-(230.0)	280-101025-30	SO	N	1	Acetone	35.0	50.0	50.0	ug/kg	
FEW4-MW101-(250.0)	280-101025-32	SO	N	1	Acetone	25.0	19.0 J	19.0 J	ug/kg	TR
FEW4-MW101-(251.0)	280-101025-33	SO	FD	1	Acetone	24.0	9.00 J	9.00 J	ug/kg	TR
FEW4-MW101-(260.0)	280-101025-34	SO	N	1	Acetone	28.0	25.0 J	25.0 J	ug/kg	TR
FEW4-MW101-(270.0)	280-101025-35	SO	N	1	Acetone	29.0	8.20 J	8.20 J	ug/kg	TR
FEW4-MW101-(280.0)	280-101025-36	SO	N	1	Acetone	37.0	31.0 J	31.0 J	ug/kg	TR
FEW4-MW101-(300.0)	280-101025-38	SO	N	1	Acetone	26.0	35.0	35.0	ug/kg	
FEW4-MW101-(306.0)	280-101025-39	SO	N	1	Acetone	20.0	38.0	38.0	ug/kg	
FEW4-MW101-(92.0)	280-101025-14	SO	N	1	Acetone	12.0	12.0	12.0	ug/kg	
FEW4-MW101-(92.0)	280-101025-14	SO	N	1	Trichloroethene (TCE)	3.00	0.860 J	0.860 J	ug/kg	TR
FEW4-MW101-(93.0)	280-101025-15	SO	FD	1	Trichloroethene (TCE)	4.60	1.60 J	1.60 J	ug/kg	TR
FEW4-MW76-(100.0)	280-101025-2	SO	N	1	Trichloroethene (TCE)	5.30	75.0 J	75.0	ug/kg	
FEW4-MW76-(110.0)	280-101025-3	SO	N	1	1,2,3-Trichlorobenzene	6.50	1.50 J	1.50 J	ug/kg	TR
FEW4-MW76-(110.0)	280-101025-3	SO	N	1	1,2,4-Trichlorobenzene	6.50	1.80 J	1.80 J	ug/kg	TR
FEW4-MW76-(110.0)	280-101025-3	SO	N	1	Hexachlorobutadiene	6.50	1.20 J	1.20 J	ug/kg	TR
FEW4-MW76-(110.0)	280-101025-3	SO	N	1	n-Butylbenzene	6.50	1.10 J	1.10 J	ug/kg	TR
FEW4-MW76-(130.0)	280-101025-12	SO	N	1	Acetone	25.0	18.0 J	18.0 J	ug/kg	TR
FEW4-MW76-(130.0)	280-101025-12	SO	N	1	Trichloroethene (TCE)	6.20	77.0	77.0	ug/kg	
FEW4-MW76-(140.0)	280-101025-5	SO	N	1	1,2-Dichloroethene	6.30	4.50 J	4.50 J	ug/kg	TR
FEW4-MW76-(140.0)	280-101025-5	SO	N	1	cis-1,2-Dichloroethene	6.30	4.50 J	4.50 J	ug/kg	TR
FEW4-MW76-(140.0)	280-101025-5	SO	N	1	Trichloroethene (TCE)	230	810	810 J	ug/kg	D3
FEW4-MW76-(141.0)	280-101025-6	SO	FD	1	1,2-Dichloroethene	6.50	5.50 J	5.50 J	ug/kg	TR
FEW4-MW76-(141.0)	280-101025-6	SO	FD	1	cis-1,2-Dichloroethene	6.50	5.50 J	5.50 J	ug/kg	TR
FEW4-MW76-(141.0)	280-101025-6	SO	FD	1	Trichloroethene (TCE)	510	1600 Q	1600 J	ug/kg	I/D3

US Army Corps of Engineers ®

Detected Results

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Dilution	Analyte	LOQ	Lab Result	Qualified Result	Units	Reason
FEW4-MW76-(150.0)	280-101025-7	SO	N	1	Trichloroethene (TCE)	410	2000	2000 J	ug/kg	I
FEW4-MW76-(160.0)	280-101025-8	SO	N	1	1,2-Dichloroethene	5.80	7.30	7.30	ug/kg	
FEW4-MW76-(160.0)	280-101025-8	SO	N	1	Acetone	23.0	7.80 J	7.80 J	ug/kg	TR
FEW4-MW76-(160.0)	280-101025-8	SO	N	1	cis-1,2-Dichloroethene	5.80	7.30	7.30	ug/kg	
FEW4-MW76-(160.0)	280-101025-8	SO	N	1	Trichloroethene (TCE)	380	2100 Q	2100 J	ug/kg	I
FEW4-MW76-(164.0)	280-101025-9	SO	N	1	1,2-Dichloroethene	4.50	2.30 J	2.30 J	ug/kg	TR
FEW4-MW76-(164.0)	280-101025-9	SO	N	1	Acetone	18.0	5.30 J	5.30 J	ug/kg	TR
FEW4-MW76-(164.0)	280-101025-9	SO	N	1	cis-1,2-Dichloroethene	4.50	2.30 J	2.30 J	ug/kg	TR
FEW4-MW76-(164.0)	280-101025-9	SO	N	1	p-Cymene (p-Isopropyltoluene)	4.50	2.00 J	2.00 J	ug/kg	TR
FEW4-MW76-(164.0)	280-101025-9	SO	N	1	Trichloroethene (TCE)	400	1200	1200 J	ug/kg	I
FEW4-MW76-(170.0)	280-101025-10	SO	N	1	1,2-Dichloroethene	8.50	2.60 J	2.60 J	ug/kg	TR
FEW4-MW76-(170.0)	280-101025-10	SO	N	1	Acetone	34.0	9.40 J	9.40 J	ug/kg	TR
FEW4-MW76-(170.0)	280-101025-10	SO	N	1	cis-1,2-Dichloroethene	8.50	2.60 J	2.60 J	ug/kg	TR
FEW4-MW76-(170.0)	280-101025-10	SO	N	1	Trichloroethene (TCE)	390	750	750	ug/kg	
FEW4-MW76-(180.0)	280-101025-11	SO	N	1	1,2-Dichloroethene	6.70	1.00 J	1.00 J	ug/kg	TR
FEW4-MW76-(180.0)	280-101025-11	SO	N	1	cis-1,2-Dichloroethene	6.70	1.00 J	1.00 J	ug/kg	TR
FEW4-MW76-(180.0)	280-101025-11	SO	N	1	Trichloroethene (TCE)	320	200 J	200 J	ug/kg	TR
FEW4-MW76-(181.0)	280-101025-13	SO	FD	1	Acetone	27.0	19.0 J	19.0 J	ug/kg	TR
FEW4-MW76-(181.0)	280-101025-13	SO	FD	1	Trichloroethene (TCE)	6.70	200	200	ug/kg	
FEW4-MW76-(90.0)	280-101025-1	SO	N	1	1,2,4-Trichlorobenzene	6.00	1.00 J	1.00 J	ug/kg	TR
FEW4-MW76-(90.0)	280-101025-1	SO	N	1	Trichloroethene (TCE)	6.00	56.0	56.0	ug/kg	

Rejected Results

--No Records Found--

US Army Corps of Engineers ®

Facility:	B08WY0467-02, F.E. Warren AFB, Site 4
Event:	2017-2018 RI Addendum Tasks
SDG:	280-101025-1_52_2a_FUDSChem
Guidance Document:	Draft-Final Uniform Federal Policy-Quality Assurance Project Plan for the Remedial Investigation Addendum 2017-2018 Tasks Atlas "D" Missile Site 4 —Laramie County, Wyoming, July 2017
Prime Contractor:	RMC Consultants, Inc., LAKEWOOD, CO
Project Manager:	David Groy
Contract Laboratory:	TestAmerica Laboratories, Inc., Arvada, CO
Data Review Contractor:	RMC Consultants, Inc.
Data Review Level:	Stage 3VEM
Primary Data Reviewer:	Gary Torf, Contractor Project Chemist
Second Reviewer:	, Senior Scientist
Date Submitted:	

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	SW8260B
FEW4-MW101-(251.0)	280-101025-33	Solid	Field Duplicate/FD	X
FEW4-MW101-(93.0)	280-101025-15	Solid	Field Duplicate/FD	X
FEW4-MW76-(141.0)	280-101025-6	Solid	Field Duplicate/FD	X
FEW4-MW76-(181.0)	280-101025-13	Solid	Field Duplicate/FD	X
FEW4-MW101-(101.0)	280-101025-16	Solid	Field Sample/N	X
FEW4-MW101-(110.0)	280-101025-17	Solid	Field Sample/N	X
FEW4-MW101-(120.0)	280-101025-19	Solid	Field Sample/N	X
FEW4-MW101-(130.0)	280-101025-20	Solid	Field Sample/N	X
FEW4-MW101-(140.0)	280-101025-21	Solid	Field Sample/N	X
FEW4-MW101-(150.0)	280-101025-22	Solid	Field Sample/N	X
FEW4-MW101-(160.0)	280-101025-23	Solid	Field Sample/N	X
FEW4-MW101-(170.0)	280-101025-24	Solid	Field Sample/N	X
FEW4-MW101-(180.0)	280-101025-25	Solid	Field Sample/N	X
FEW4-MW101-(190.0)	280-101025-26	Solid	Field Sample/N	X
FEW4-MW101-(200.0)	280-101025-27	Solid	Field Sample/N	X
FEW4-MW101-(210.0)	280-101025-28	Solid	Field Sample/N	X
FEW4-MW101-(220.0)	280-101025-29	Solid	Field Sample/N	X
FEW4-MW101-(230.0)	280-101025-30	Solid	Field Sample/N	X
FEW4-MW101-(240.0)	280-101025-31	Solid	Field Sample/N	X

US Army Corps of Engineers ®

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	SW8260B
FEW4-MW101-(250.0)	280-101025-32	Solid	Field Sample/N	X
FEW4-MW101-(260.0)	280-101025-34	Solid	Field Sample/N	X
FEW4-MW101-(270.0)	280-101025-35	Solid	Field Sample/N	X
FEW4-MW101-(280.0)	280-101025-36	Solid	Field Sample/N	X
FEW4-MW101-(290.0)	280-101025-37	Solid	Field Sample/N	X
FEW4-MW101-(300.0)	280-101025-38	Solid	Field Sample/N	X
FEW4-MW101-(306.0)	280-101025-39	Solid	Field Sample/N	X
FEW4-MW101-(92.0)	280-101025-14	Solid	Field Sample/N	X
FEW4-MW101-107	280-101025-18	Water	Field Sample/N	X
FEW4-MW76-(100.0)	280-101025-2	Solid	Field Sample/N	X
FEW4-MW76-(110.0)	280-101025-3	Solid	Field Sample/N	X
FEW4-MW76-(120.0)	280-101025-4	Solid	Field Sample/N	X
FEW4-MW76-(130.0)	280-101025-12	Solid	Field Sample/N	X
FEW4-MW76-(140.0)	280-101025-5	Solid	Field Sample/N	X
FEW4-MW76-(150.0)	280-101025-7	Solid	Field Sample/N	X
FEW4-MW76-(160.0)	280-101025-8	Solid	Field Sample/N	X
FEW4-MW76-(164.0)	280-101025-9	Solid	Field Sample/N	X
FEW4-MW76-(170.0)	280-101025-10	Solid	Field Sample/N	X
FEW4-MW76-(180.0)	280-101025-11	Solid	Field Sample/N	X
FEW4-MW76-(90.0)	280-101025-1	Solid	Field Sample/N	X

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the Draft-Final Uniform Federal Policy-Quality Assurance Project Plan for the Remedial Investigation Addendum 2017-2018 Tasks Atlas “D” Missile Site 4 —Laramie County, Wyoming, July 2017 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by RMC Consultants, Inc., LAKEWOOD, CO; analyses were performed by TestAmerica Laboratories, Inc., Arvada, CO and were reported under sample delivery group (SDG) 280-101025-1_52_2a_FUDSChem. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

- Blank
- Blank - Negative
- Field Duplicate RPD
- LCS Recovery
- LCS RPD
- MS Recovery
- MS RPD
- Prep Hold Time
- Surrogate
- Test Hold Time

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 107 results (4.18%) out of the 2560 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected. Trace values, defined as results that are qualified as estimated because they fall between the limit of detection and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

Narrative Comments

Analytical Method	Data Reviewer Comment
SW8260B	Sample FEW4-MW76-(150.0) (280-101025-7) was analyzed for volatile organic compounds (GC/MS) using the soil jar sent in for moisture analysis due to instrument malfunction and QC criteria failures during analysis of the terracore collected samples.

Gary Torf

December 29, 2017

Reviewed by Gary Torf, Contractor Project Chemist, RMC Consultants, Inc.

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of a minimum of 10% of the reported sample results and method quality control data between the two deliverables.

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

Quality Control Outliers for test method SW8260B, Blank

The purpose of laboratory blanks is to determine the existence and magnitude of cross-contamination problems resulting from laboratory activities. Reported results were evaluated to determine compliance with the required acceptance criteria. Summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and contaminants found in laboratory blanks are listed below along with any associated qualified results.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
MB 280-387913/2-A (LB)/ MB 280-387913/2-A	Hexachlorobutadiene	0.7890	< 0.55	< 5	ug/kg	U/None	L	
MB 280-387913/2-A (LB)/ MB 280-387913/2-A	n-Butylbenzene	0.8750	< 0.56	< 5	ug/kg	U/None	L	
MB 280-387913/2-A (LB)/ MB 280-387913/2-A	1,2,3-Trichlorobenzene	1.280	< 0.75	< 5	ug/kg	U/None	L	
MB 280-387913/2-A (LB)/ MB 280-387913/2-A	1,2,4-Trichlorobenzene	1.550	< 0.73	< 5	ug/kg	U/None	L	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

Quality Control Outliers for test method SW8260B, LCS Recovery

The laboratory control sample/laboratory control sample duplicate (LCS/LCSD) serves as a monitor of the overall performance of each step during the analysis, including the sample preparation. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
LCS 280-387913/1-A (BS)/ LCS 280-387913/1-A	Toluene	121.8	77 - 121	77 - 121	percent	J/None	C	
LCS 280-387913/1-A (BS)/ LCS 280-387913/1-A	Ethylbenzene	122.4	76 - 122	76 - 122	percent	J/None	C	
LCS 280-387913/1-A (BS)/ LCS 280-387913/1-A	Bromobenzene	123.4	78 - 121	78 - 121	percent	J/None	C	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

Quality Control Outliers for test method SW8260B, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
FEW4-MW101-(120.0) (MS)/ 280-101025-19MS	Trichloroethene (TCE)	67.21	77 - 123	77 - 123	percent	J/UJ	M	
FEW4-MW101-(260.0) (MS)/ 280-101025-34MS	n-Butylbenzene	39.78	70 - 128	70 - 128	percent	J/UJ	M	
FEW4-MW101-(260.0) (MS)/ 280-101025-34MS	Hexachlorobutadiene	39.96	61 - 135	61 - 135	percent	J/UJ	M	
FEW4-MW101-(260.0) (MS)/ 280-101025-34MS	p-Cymene (p-Isopropyltoluene)	46.59	73 - 127	73 - 127	percent	J/UJ	M	
FEW4-MW101-(260.0) (MS)/ 280-101025-34MS	1,2,4-Trichlorobenzene	46.78	67 - 129	67 - 129	percent	J/UJ	M	
FEW4-MW101-(260.0) (MS)/ 280-101025-34MS	1,2,3-Trichlorobenzene	55.43	66 - 130	66 - 130	percent	J/UJ	M	
FEW4-MW101-(260.0) (MS)/ 280-101025-34MS	sec-Butylbenzene	48.62	73 - 126	73 - 126	percent	J/UJ	M	
FEW4-MW101-(260.0) (MS)/ 280-101025-34MS	n-Propylbenzene	49.54	73 - 125	73 - 125	percent	J/UJ	M	
FEW4-MW101-(260.0) (MS)/ 280-101025-34MS	1,4-Dichlorobenzene	51.01	75 - 120	75 - 120	percent	J/UJ	M	
FEW4-MW101-(260.0) (MS)/ 280-101025-34MS	4-Chlorotoluene	52.12	72 - 124	72 - 124	percent	J/UJ	M	
FEW4-MW101-(260.0) (MS)/ 280-101025-34MS	1,2,4-Trimethylbenzene	52.12	75 - 123	75 - 123	percent	J/UJ	M	
FEW4-MW101-(260.0) (MS)/ 280-101025-34MS	1,3-Dichlorobenzene	52.30	77 - 121	77 - 121	percent	J/UJ	M	
FEW4-MW101-(260.0) (MS)/ 280-101025-34MS	1,3,5-Trimethylbenzene	53.22	73 - 124	73 - 124	percent	J/UJ	M	
FEW4-MW101-(260.0) (MS)/ 280-101025-34MS	tert-Butylbenzene	53.22	73 - 125	73 - 125	percent	J/UJ	M	
FEW4-MW101-(260.0) (MS)/ 280-101025-34MS	2-Chlorotoluene	54.51	75 - 122	75 - 122	percent	J/UJ	M	
FEW4-MW101-(260.0) (MS)/ 280-101025-34MS	Isopropylbenzene (Cumene)	55.06	68 - 134	68 - 134	percent	J/UJ	M	
FEW4-MW101-(260.0) (MS)/ 280-101025-34MS	1,2-Dichlorobenzene	58.56	78 - 121	78 - 121	percent	J/UJ	M	
FEW4-MW101-(260.0) (MS)/ 280-101025-34MS	m,p-Xylene	61.88	77 - 124	77 - 124	percent	J/UJ	M	
FEW4-MW101-(260.0) (MS)/ 280-101025-34MS	Bromobenzene	62.25	78 - 121	78 - 121	percent	J/UJ	M	
FEW4-MW101-(260.0) (MS)/ 280-101025-34MS	Styrene	64.46	76 - 124	76 - 124	percent	J/UJ	M	
FEW4-MW101-(260.0) (MS)/ 280-101025-34MS	Ethylbenzene	65.01	76 - 122	76 - 122	percent	J/UJ	M	
FEW4-MW101-(260.0) (MS)/ 280-101025-34MS	o-Xylene	66.48	77 - 123	77 - 123	percent	J/UJ	M	
FEW4-MW101-(260.0) (MS)/ 280-101025-34MS	Tetrachloroethene (PCE)	69.06	73 - 128	73 - 128	percent	J/UJ	M	
FEW4-MW101-(260.0) (MS)/ 280-101025-34MS	Chlorobenzene	69.43	79 - 120	79 - 120	percent	J/UJ	M	

Quality Control Outliers for test method SW8260B, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
FEW4-MW76-(100.0) (MS)/ 280-101025-2MS	Trichloroethene (TCE)	55.56	77 - 123	77 - 123	percent	J/UJ	M	
FEW4-MW76-(100.0) (SD)/ 280-101025-2MSD	Trichloroethene (TCE)	71.43	77 - 123	77 - 123	percent	J/UJ	M	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the MS Recovery for SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW101-(260.0)	N	1,2,3-Trichlorobenzene	7.00	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW101-(260.0)	N	1,2,4-Trichlorobenzene	7.00	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW101-(260.0)	N	1,2,4-Trimethylbenzene	7.00	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW101-(260.0)	N	1,2-Dichlorobenzene	7.00	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW101-(260.0)	N	1,3,5-Trimethylbenzene	7.00	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW101-(260.0)	N	1,3-Dichlorobenzene	7.00	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW101-(260.0)	N	1,4-Dichlorobenzene	7.00	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW101-(260.0)	N	2-Chlorotoluene	7.00	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW101-(260.0)	N	4-Chlorotoluene	7.00	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW101-(260.0)	N	Bromobenzene	7.00	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW101-(260.0)	N	Chlorobenzene	7.00	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW101-(260.0)	N	Ethylbenzene	7.00	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW101-(260.0)	N	Hexachlorobutadiene	7.00	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW101-(260.0)	N	Isopropylbenzene (Cumene)	7.00	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW101-(260.0)	N	m,p-Xylene	4.50	4.50 U J	4.50 UJ	-	ug/kg	M
FEW4-MW101-(260.0)	N	n-Butylbenzene	7.00	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW101-(260.0)	N	n-Propylbenzene	7.00	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW101-(260.0)	N	o-Xylene	7.00	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW101-(260.0)	N	p-Cymene (p-Isopropyltoluene)	7.00	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW101-(260.0)	N	sec-Butylbenzene	7.00	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW101-(260.0)	N	Styrene	7.00	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW101-(260.0)	N	tert-Butylbenzene	7.00	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW101-(260.0)	N	Tetrachloroethene (PCE)	7.00	2.20 U J	2.20 UJ	-	ug/kg	M

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

Quality Control Outliers for test method SW8260B, MS RPD

The objective of matrix spikes/matrix spike duplicates (MS/MSD) RPD analysis is to demonstrate acceptable method precision by the laboratory at the time of analysis. MS/MSD analyses are also performed to generate data that determines the long-term precision of the analytical method on various matrices. Non-homogenous samples can impact the apparent method precision. Summary forms were evaluated and compared to electronic data deliverables. Matrix spikes/matrix spike duplicates results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
280-101025-34MSD (SD)/ 280-101025-34MSD	1,2,3-Trichloropropane	20.47	< 20	< 20	rpd	J/None	D	
280-101025-34MSD (SD)/ 280-101025-34MSD	1,2-Dibromo-3-chloropropane	21.22	< 20	< 20	rpd	J/None	D	
280-101025-34MSD (SD)/ 280-101025-34MSD	Dichlorodifluoromethane	21.44	< 20	< 20	rpd	J/None	D	
280-101025-34MSD (SD)/ 280-101025-34MSD	1,1,2,2-Tetrachloroethane	22.18	< 20	< 20	rpd	J/None	D	
280-101025-34MSD (SD)/ 280-101025-34MSD	Methyl tert-butyl ether (MTBE)	22.83	< 20	< 20	rpd	J/None	D	
280-101025-34MSD (SD)/ 280-101025-34MSD	Bromomethane	23.35	< 20	< 20	rpd	J/None	D	
280-101025-34MSD (SD)/ 280-101025-34MSD	Chloroethane	23.87	< 20	< 20	rpd	J/None	D	
280-101025-34MSD (SD)/ 280-101025-34MSD	Bromochloromethane	24.26	< 20	< 20	rpd	J/None	D	
280-101025-34MSD (SD)/ 280-101025-34MSD	1,1-Dichloroethane	24.73	< 20	< 20	rpd	J/None	D	
280-101025-34MSD (SD)/ 280-101025-34MSD	1,2-Dichloroethane	24.88	< 20	< 20	rpd	J/None	D	
280-101025-34MSD (SD)/ 280-101025-34MSD	Vinyl chloride	25.22	< 20	< 20	rpd	J/None	D	
280-101025-34MSD (SD)/ 280-101025-34MSD	2,2-Dichloropropane	25.67	< 20	< 20	rpd	J/None	D	
280-101025-34MSD (SD)/ 280-101025-34MSD	Chloromethane	25.76	< 20	< 20	rpd	J/None	D	
280-101025-34MSD (SD)/ 280-101025-34MSD	Dibromomethane	25.95	< 20	< 20	rpd	J/None	D	
280-101025-34MSD (SD)/ 280-101025-34MSD	1,3-Dichloropropane	26.00	< 20	< 20	rpd	J/None	D	
280-101025-34MSD (SD)/ 280-101025-34MSD	Methylene chloride	26.24	< 20	< 20	rpd	J/None	D	
280-101025-34MSD (SD)/ 280-101025-34MSD	1,1-Dichloroethene	26.27	< 20	< 20	rpd	J/None	D	
280-101025-34MSD (SD)/ 280-101025-34MSD	1,2-Dibromoethane (EDB)	26.45	< 20	< 20	rpd	J/None	D	
280-101025-34MSD (SD)/ 280-101025-34MSD	Chloroform	27.04	< 20	< 20	rpd	J/None	D	
280-101025-34MSD (SD)/ 280-101025-34MSD	Bromoform	27.30	< 20	< 20	rpd	J/None	D	
280-101025-34MSD (SD)/ 280-101025-34MSD	Dibromochloromethane	28.24	< 20	< 20	rpd	J/None	D	
280-101025-34MSD (SD)/ 280-101025-34MSD	1,1,2-Trichloroethane	28.34	< 20	< 20	rpd	J/None	D	
280-101025-34MSD (SD)/ 280-101025-34MSD	1,1,1-Trichloroethane	29.05	< 20	< 20	rpd	J/None	D	
280-101025-34MSD (SD)/ 280-101025-34MSD	trans-1,2-Dichloroethene	29.85	< 20	< 20	rpd	J/None	D	
280-101025-34MSD (SD)/ 280-101025-34MSD	1,2-Dichloropropane	30.39	< 20	< 20	rpd	J/None	D	

Quality Control Outliers for test method SW8260B, MS RPD

The objective of matrix spikes/matrix spike duplicates (MS/MSD) RPD analysis is to demonstrate acceptable method precision by the laboratory at the time of analysis. MS/MSD analyses are also performed to generate data that determines the long-term precision of the analytical method on various matrices. Non-homogenous samples can impact the apparent method precision. Summary forms were evaluated and compared to electronic data deliverables. Matrix spikes/matrix spike duplicates results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
280-101025-34MSD (SD)/ 280-101025-34MSD	1,2-Dichloroethene	30.40	< 20	< 20	rpd	J/None	D	
280-101025-34MSD (SD)/ 280-101025-34MSD	Carbon disulfide	30.54	< 20	< 20	rpd	J/None	D	
280-101025-34MSD (SD)/ 280-101025-34MSD	Carbon tetrachloride	31.25	< 20	< 20	rpd	J/None	D	
280-101025-34MSD (SD)/ 280-101025-34MSD	Bromodichloromethane	31.56	< 20	< 20	rpd	J/None	D	
280-101025-34MSD (SD)/ 280-101025-34MSD	cis-1,2-Dichloroethene	31.56	< 20	< 20	rpd	J/None	D	
280-101025-34MSD (SD)/ 280-101025-34MSD	Benzene	32.26	< 20	< 20	rpd	J/None	D	
280-101025-34MSD (SD)/ 280-101025-34MSD	cis-1,3-Dichloropropene	32.46	< 20	< 20	rpd	J/None	D	
280-101025-34MSD (SD)/ 280-101025-34MSD	1,1-Dichloropropene	34.53	< 20	< 20	rpd	J/None	D	
280-101025-34MSD (SD)/ 280-101025-34MSD	trans-1,3-Dichloropropene	35.16	< 20	< 20	rpd	J/None	D	
280-101025-34MSD (SD)/ 280-101025-34MSD	1,1,1,2-Tetrachloroethane	36.52	< 20	< 20	rpd	J/None	D	
280-101025-34MSD (SD)/ 280-101025-34MSD	Trichloroethene (TCE)	37.49	< 20	< 20	rpd	J/None	D	
280-101025-34MSD (SD)/ 280-101025-34MSD	Toluene	41.32	< 20	< 20	rpd	J/None	D	
280-101025-34MSD (SD)/ 280-101025-34MSD	Naphthalene	43.19	< 20	< 20	rpd	J/None	D	
280-101025-34MSD (SD)/ 280-101025-34MSD	Tetrachloroethene (PCE)	46.15	< 20	< 20	rpd	J/None	D	
280-101025-34MSD (SD)/ 280-101025-34MSD	Chlorobenzene	46.75	< 20	< 20	rpd	J/None	D	
280-101025-34MSD (SD)/ 280-101025-34MSD	Bromobenzene	52.72	< 20	< 20	rpd	J/None	D	
280-101025-34MSD (SD)/ 280-101025-34MSD	Ethylbenzene	53.07	< 20	< 20	rpd	J/None	D	
280-101025-34MSD (SD)/ 280-101025-34MSD	Styrene	53.25	< 20	< 20	rpd	J/None	D	
280-101025-34MSD (SD)/ 280-101025-34MSD	o-Xylene	55.60	< 20	< 20	rpd	J/None	D	
280-101025-34MSD (SD)/ 280-101025-34MSD	1,2-Dichlorobenzene	56.76	< 20	< 20	rpd	J/None	D	
280-101025-34MSD (SD)/ 280-101025-34MSD	1,2,3-Trichlorobenzene	57.85	< 20	< 20	rpd	J/None	D	
280-101025-34MSD (SD)/ 280-101025-34MSD	m,p-Xylene	58.38	< 20	< 20	rpd	J/None	D	
280-101025-34MSD (SD)/ 280-101025-34MSD	2-Chlorotoluene	62.80	< 20	< 20	rpd	J/None	D	
280-101025-34MSD (SD)/ 280-101025-34MSD	1,4-Dichlorobenzene	63.04	< 20	< 20	rpd	J/None	D	
280-101025-34MSD (SD)/ 280-101025-34MSD	1,3-Dichlorobenzene	63.46	< 20	< 20	rpd	J/None	D	

Quality Control Outliers for test method SW8260B, MS RPD

The objective of matrix spikes/matrix spike duplicates (MS/MSD) RPD analysis is to demonstrate acceptable method precision by the laboratory at the time of analysis. MS/MSD analyses are also performed to generate data that determines the long-term precision of the analytical method on various matrices. Non-homogenous samples can impact the apparent method precision. Summary forms were evaluated and compared to electronic data deliverables. Matrix spikes/matrix spike duplicates results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
280-101025-34MSD (SD)/ 280-101025-34MSD	Isopropylbenzene (Cumene)	64.55	< 20	< 20	rpd	J/None	D	
280-101025-34MSD (SD)/ 280-101025-34MSD	1,2,4-Trichlorobenzene	64.89	< 20	< 20	rpd	J/None	D	
280-101025-34MSD (SD)/ 280-101025-34MSD	1,3,5-Trimethylbenzene	68.04	< 20	< 20	rpd	J/None	D	
280-101025-34MSD (SD)/ 280-101025-34MSD	4-Chlorotoluene	68.07	< 20	< 20	rpd	J/None	D	
280-101025-34MSD (SD)/ 280-101025-34MSD	1,2,4-Trimethylbenzene	68.22	< 20	< 20	rpd	J/None	D	
280-101025-34MSD (SD)/ 280-101025-34MSD	tert-Butylbenzene	69.82	< 20	< 20	rpd	J/None	D	
280-101025-34MSD (SD)/ 280-101025-34MSD	n-Propylbenzene	71.90	< 20	< 20	rpd	J/None	D	
280-101025-34MSD (SD)/ 280-101025-34MSD	sec-Butylbenzene	75.32	< 20	< 20	rpd	J/None	D	
280-101025-34MSD (SD)/ 280-101025-34MSD	p-Cymene (p-Isopropyltoluene)	76.89	< 20	< 20	rpd	J/None	D	
280-101025-34MSD (SD)/ 280-101025-34MSD	n-Butylbenzene	82.77	< 20	< 20	rpd	J/None	D	
280-101025-34MSD (SD)/ 280-101025-34MSD	Hexachlorobutadiene	86.39	< 20	< 20	rpd	J/None	D	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

Quality Control Outliers for test method SW8260B, Surrogate

Method performance for individual samples is demonstrated through spiking activities. All samples are spiked with surrogate compounds prior to sample preparation. The sample itself may produce effects due to such factors as interferences and high concentrations of analytes. Summary forms were evaluated and compared to electronic data deliverables. Surrogate results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
FEW4-MW101-(290.0) (N)/ 280-101025-37	Toluene-d8	116.8	85 - 116	85 - 116	percent	J/None	I	
FEW4-MW76-(141.0) (FD)/ 280-101025-6	Toluene-d8	160.5	85 - 116	85 - 116	percent	J/None	I	
FEW4-MW76-(141.0) (FD)/ 280-101025-6	1,2-Dichloroethane-d4	170.4	71 - 136	71 - 136	percent	J/None	I	
FEW4-MW76-(141.0) (FD)/ 280-101025-6	Dibromofluoromethane	172.8	78 - 119	78 - 119	percent	J/None	I	

Quality Control Outliers for test method SW8260B, Surrogate

Method performance for individual samples is demonstrated through spiking activities. All samples are spiked with surrogate compounds prior to sample preparation. The sample itself may produce effects due to such factors as interferences and high concentrations of analytes. Summary forms were evaluated and compared to electronic data deliverables. Surrogate results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
FEW4-MW76-(141.0) (FD)/ 280-101025-6	1-Bromo-4-fluorobenzene (4-Bromofluorobenzene)	182.7	79 - 119	79 - 119	percent	J/None	I	
FEW4-MW76-(150.0) (N)/ 280-101025-7	Dibromofluoromethane	122.3	78 - 119	78 - 119	percent	J/None	I	
FEW4-MW76-(160.0) (N)/ 280-101025-8	Toluene-d8	138.2	85 - 116	85 - 116	percent	J/None	I	
FEW4-MW76-(160.0) (N)/ 280-101025-8	1,2-Dichloroethane-d4	144.7	71 - 136	71 - 136	percent	J/None	I	
FEW4-MW76-(160.0) (N)/ 280-101025-8	Dibromofluoromethane	148.0	78 - 119	78 - 119	percent	J/None	I	
FEW4-MW76-(160.0) (N)/ 280-101025-8	1-Bromo-4-fluorobenzene (4-Bromofluorobenzene)	154.6	79 - 119	79 - 119	percent	J/None	I	
FEW4-MW76-(164.0) (N)/ 280-101025-9	Toluene-d8	123.0	85 - 116	85 - 116	percent	J/None	I	
FEW4-MW76-(164.0) (N)/ 280-101025-9	Dibromofluoromethane	132.5	78 - 119	78 - 119	percent	J/None	I	
FEW4-MW76-(164.0) (N)/ 280-101025-9	1-Bromo-4-fluorobenzene (4-Bromofluorobenzene)	132.5	79 - 119	79 - 119	percent	J/None	I	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the Surrogate for SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW76-(141.0)	FD	Trichloroethene (TCE)	510	1600 Q	1600 J	+	ug/kg	I/D3
FEW4-MW76-(150.0)	N	Trichloroethene (TCE)	410	2000	2000 J	+	ug/kg	I
FEW4-MW76-(160.0)	N	Trichloroethene (TCE)	380	2100 Q	2100 J	+	ug/kg	I
FEW4-MW76-(164.0)	N	Trichloroethene (TCE)	400	1200	1200 J	+	ug/kg	I

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

Quality Control Outliers for test method SW8260B, Surrogate

Method performance for individual samples is demonstrated through spiking activities. All samples are spiked with surrogate compounds prior to sample preparation. The sample itself may produce effects due to such factors as interferences and high concentrations of analytes. Summary forms were evaluated and compared to electronic data deliverables. Surrogate results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
FEW4-MW101-107 (N)/ 280-101025-18	1,2-Dichloroethane-d4	120.0	81 - 118	81 - 118	percent	J/None	I	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the Surrogate for SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW101-107	N	cis-1,2-Dichloroethene	1.00	0.470 J	0.470 J	+	ug/l	I/TR
FEW4-MW101-107	N	Toluene	1.00	0.430 J	0.430 J	+	ug/l	I/TR

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

Table of All Qualified Results

Test Method: SW8260B	Extraction Method: SW5030B							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW101-107	N	cis-1,2-Dichloroethene	1.00	0.470 J	0.470 J	+	ug/l	I/TR
FEW4-MW101-107	N	Toluene	1.00	0.430 J	0.430 J	+	ug/l	I/TR

Test Method: SW8260B	Extraction Method: SW5035A							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW101-(260.0)	N	1,2,3-Trichlorobenzene	7.00	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW101-(260.0)	N	1,2,4-Trichlorobenzene	7.00	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW101-(260.0)	N	1,2,4-Trimethylbenzene	7.00	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW101-(260.0)	N	1,2-Dichlorobenzene	7.00	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW101-(260.0)	N	1,3,5-Trimethylbenzene	7.00	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW101-(260.0)	N	1,3-Dichlorobenzene	7.00	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW101-(260.0)	N	1,4-Dichlorobenzene	7.00	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW101-(260.0)	N	2-Chlorotoluene	7.00	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW101-(260.0)	N	4-Chlorotoluene	7.00	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW101-(260.0)	N	Bromobenzene	7.00	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW101-(260.0)	N	Chlorobenzene	7.00	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW101-(260.0)	N	Ethylbenzene	7.00	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW101-(260.0)	N	Hexachlorobutadiene	7.00	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW101-(260.0)	N	Isopropylbenzene (Cumene)	7.00	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW101-(260.0)	N	m,p-Xylene	4.50	4.50 U J	4.50 UJ	-	ug/kg	M
FEW4-MW101-(260.0)	N	n-Butylbenzene	7.00	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW101-(260.0)	N	n-Propylbenzene	7.00	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW101-(260.0)	N	o-Xylene	7.00	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW101-(260.0)	N	p-Cymene (p-Isopropyltoluene)	7.00	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW101-(260.0)	N	sec-Butylbenzene	7.00	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW101-(260.0)	N	Styrene	7.00	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW101-(260.0)	N	tert-Butylbenzene	7.00	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW101-(260.0)	N	Tetrachloroethene (PCE)	7.00	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW76-(141.0)	FD	Trichloroethene (TCE)	510	1600 Q	1600 J	+	ug/kg	I/D3
FEW4-MW76-(150.0)	N	Trichloroethene (TCE)	410	2000	2000 J	+	ug/kg	I
FEW4-MW76-(160.0)	N	Trichloroethene (TCE)	380	2100 Q	2100 J	+	ug/kg	I
FEW4-MW76-(164.0)	N	Trichloroethene (TCE)	400	1200	1200 J	+	ug/kg	I

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
Trace values are not included in the qualified results table unless additional reason codes are associated.

Table of All Trace Results

Test Method: SW8260B	Extraction Method: SW5030B							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW101-107	N	cis-1,2-Dichloroethene	1.00	0.470 J	0.470 J	+	ug/L	I/TR
FEW4-MW101-107	N	Toluene	1.00	0.430 J	0.430 J	+	ug/L	I/TR

Test Method: SW8260B	Extraction Method: SW5035A							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW101-(110.0)	N	Acetone	29.0	15.0 J	15.0 J		ug/kg	TR
FEW4-MW101-(130.0)	N	1,2,3-Trichlorobenzene	6.50	1.00 J	1.00 J		ug/kg	TR
FEW4-MW101-(130.0)	N	1,2,4-Trichlorobenzene	6.50	1.50 J	1.50 J		ug/kg	TR
FEW4-MW101-(130.0)	N	Acetone	26.0	8.90 J	8.90 J		ug/kg	TR
FEW4-MW101-(130.0)	N	Hexachlorobutadiene	6.50	0.900 J	0.900 J		ug/kg	TR
FEW4-MW101-(130.0)	N	n-Butylbenzene	6.50	1.00 J	1.00 J		ug/kg	TR
FEW4-MW101-(160.0)	N	Acetone	32.0	14.0 J	14.0 J		ug/kg	TR
FEW4-MW101-(160.0)	N	Trichloroethene (TCE)	8.00	1.70 J	1.70 J		ug/kg	TR
FEW4-MW101-(180.0)	N	Acetone	27.0	21.0 J	21.0 J		ug/kg	TR
FEW4-MW101-(200.0)	N	Acetone	37.0	23.0 J	23.0 J		ug/kg	TR
FEW4-MW101-(210.0)	N	Acetone	24.0	18.0 J	18.0 J		ug/kg	TR
FEW4-MW101-(250.0)	N	Acetone	25.0	19.0 J	19.0 J		ug/kg	TR
FEW4-MW101-(251.0)	FD	Acetone	24.0	9.00 J	9.00 J		ug/kg	TR
FEW4-MW101-(260.0)	N	Acetone	28.0	25.0 J	25.0 J		ug/kg	TR
FEW4-MW101-(270.0)	N	Acetone	29.0	8.20 J	8.20 J		ug/kg	TR
FEW4-MW101-(280.0)	N	Acetone	37.0	31.0 J	31.0 J		ug/kg	TR
FEW4-MW101-(92.0)	N	Trichloroethene (TCE)	3.00	0.860 J	0.860 J		ug/kg	TR
FEW4-MW101-(93.0)	FD	Trichloroethene (TCE)	4.60	1.60 J	1.60 J		ug/kg	TR
FEW4-MW76-(110.0)	N	1,2,3-Trichlorobenzene	6.50	1.50 J	1.50 J		ug/kg	TR
FEW4-MW76-(110.0)	N	1,2,4-Trichlorobenzene	6.50	1.80 J	1.80 J		ug/kg	TR
FEW4-MW76-(110.0)	N	Hexachlorobutadiene	6.50	1.20 J	1.20 J		ug/kg	TR
FEW4-MW76-(110.0)	N	n-Butylbenzene	6.50	1.10 J	1.10 J		ug/kg	TR
FEW4-MW76-(130.0)	N	Acetone	25.0	18.0 J	18.0 J		ug/kg	TR
FEW4-MW76-(140.0)	N	1,2-Dichloroethene	6.30	4.50 J	4.50 J		ug/kg	TR
FEW4-MW76-(140.0)	N	cis-1,2-Dichloroethene	6.30	4.50 J	4.50 J		ug/kg	TR
FEW4-MW76-(141.0)	FD	1,2-Dichloroethene	6.50	5.50 J	5.50 J		ug/kg	TR
FEW4-MW76-(141.0)	FD	cis-1,2-Dichloroethene	6.50	5.50 J	5.50 J		ug/kg	TR
FEW4-MW76-(160.0)	N	Acetone	23.0	7.80 J	7.80 J		ug/kg	TR
FEW4-MW76-(164.0)	N	1,2-Dichloroethene	4.50	2.30 J	2.30 J		ug/kg	TR
FEW4-MW76-(164.0)	N	Acetone	18.0	5.30 J	5.30 J		ug/kg	TR
FEW4-MW76-(164.0)	N	cis-1,2-Dichloroethene	4.50	2.30 J	2.30 J		ug/kg	TR
FEW4-MW76-(164.0)	N	p-Cymene (p-Isopropyltoluene)	4.50	2.00 J	2.00 J		ug/kg	TR
FEW4-MW76-(170.0)	N	1,2-Dichloroethene	8.50	2.60 J	2.60 J		ug/kg	TR
FEW4-MW76-(170.0)	N	Acetone	34.0	9.40 J	9.40 J		ug/kg	TR
FEW4-MW76-(170.0)	N	cis-1,2-Dichloroethene	8.50	2.60 J	2.60 J		ug/kg	TR
FEW4-MW76-(180.0)	N	1,2-Dichloroethene	6.70	1.00 J	1.00 J		ug/kg	TR
FEW4-MW76-(180.0)	N	cis-1,2-Dichloroethene	6.70	1.00 J	1.00 J		ug/kg	TR

Table of All Trace Results

Test Method: SW8260B	Extraction Method: SW5035A							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW76-(180.0)	N	Trichloroethene (TCE)	320	200 J	200 J		ug/kg	TR
FEW4-MW76-(181.0)	FD	Acetone	27.0	19.0 J	19.0 J		ug/kg	TR
FEW4-MW76-(90.0)	N	1,2,4-Trichlorobenzene	6.00	1.00 J	1.00 J		ug/kg	TR

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW76-(150.0)	N	1,1,1,2-Tetrachloroethane	7.70	2.50 U	2.50 U	2.50 UJ	P
FEW4-MW76-(150.0)	N	1,1,1-Trichloroethane	7.70	2.50 U	2.50 U	2.50 UJ	P
FEW4-MW76-(150.0)	N	1,1,2,2-Tetrachloroethane	7.70	2.50 U	2.50 U	2.50 UJ	P
FEW4-MW76-(150.0)	N	1,1,2-Trichloroethane	7.70	4.90 U	4.90 U	4.90 UJ	P
FEW4-MW76-(150.0)	N	1,1-Dichloroethane	7.70	1.20 U	1.20 U	1.20 UJ	P
FEW4-MW76-(150.0)	N	1,1-Dichloroethene	7.70	2.50 U	2.50 U	2.50 UJ	P
FEW4-MW76-(150.0)	N	1,1-Dichloropropene	7.70	2.50 U	2.50 U	2.50 UJ	P
FEW4-MW76-(150.0)	N	1,2,3-Trichlorobenzene	7.70	2.50 U	2.50 U	2.50 UJ	P
FEW4-MW76-(150.0)	N	1,2,3-Trichloropropane	7.70	4.90 U	4.90 U	4.90 UJ	P
FEW4-MW76-(150.0)	N	1,2,4-Trichlorobenzene	7.70	2.50 U	2.50 U	2.50 UJ	P
FEW4-MW76-(150.0)	N	1,2,4-Trimethylbenzene	7.70	2.50 U	2.50 U	2.50 UJ	P
FEW4-MW76-(150.0)	N	1,2-Dibromo-3-chloropropane	15.0	2.50 U	2.50 U	2.50 UJ	P
FEW4-MW76-(150.0)	N	1,2-Dibromoethane (EDB)	7.70	2.50 U	2.50 U	2.50 UJ	P
FEW4-MW76-(150.0)	N	1,2-Dichlorobenzene	7.70	2.50 U	2.50 U	2.50 UJ	P
FEW4-MW76-(150.0)	N	1,2-Dichloroethane	7.70	2.50 U	2.50 U	2.50 UJ	P
FEW4-MW76-(150.0)	N	1,2-Dichloroethene	7.70	2.50 U	2.50 U	2.50 UJ	P
FEW4-MW76-(150.0)	N	1,2-Dichloropropane	7.70	2.50 U	2.50 U	2.50 UJ	P
FEW4-MW76-(150.0)	N	1,3,5-Trimethylbenzene	7.70	2.50 U	2.50 U	2.50 UJ	P
FEW4-MW76-(150.0)	N	1,3-Dichlorobenzene	7.70	2.50 U	2.50 U	2.50 UJ	P
FEW4-MW76-(150.0)	N	1,3-Dichloropropane	7.70	2.50 U	2.50 U	2.50 UJ	P
FEW4-MW76-(150.0)	N	1,4-Dichlorobenzene	7.70	2.50 U	2.50 U	2.50 UJ	P
FEW4-MW76-(150.0)	N	2,2-Dichloropropane	7.70	2.50 U	2.50 U	2.50 UJ	P
FEW4-MW76-(150.0)	N	2-Butanone (MEK)	31.0	9.90 U	9.90 U	9.90 UJ	P
FEW4-MW76-(150.0)	N	2-Chlorotoluene	7.70	2.50 U	2.50 U	2.50 UJ	P
FEW4-MW76-(150.0)	N	2-Hexanone	31.0	20.0 U	20.0 U	20.0 UJ	P
FEW4-MW76-(150.0)	N	4-Chlorotoluene	7.70	2.50 U	2.50 U	2.50 UJ	P
FEW4-MW76-(150.0)	N	4-Methyl-2-pentanone (MIBK)	31.0	20.0 U	20.0 U	20.0 UJ	P
FEW4-MW76-(150.0)	N	Acetone	31.0	20.0 U	20.0 U	20.0 UJ	P
FEW4-MW76-(150.0)	N	Benzene	7.70	2.50 U	2.50 U	2.50 UJ	P
FEW4-MW76-(150.0)	N	Bromobenzene	7.70	2.50 U Q	2.50 U	2.50 UJ	P
FEW4-MW76-(150.0)	N	Bromochloromethane	7.70	1.20 U	1.20 U	1.20 UJ	P
FEW4-MW76-(150.0)	N	Bromodichloromethane	7.70	1.20 U	1.20 U	1.20 UJ	P
FEW4-MW76-(150.0)	N	Bromoform	7.70	1.20 U	1.20 U	1.20 UJ	P
FEW4-MW76-(150.0)	N	Bromomethane	15.0	2.50 U	2.50 U	2.50 UJ	P
FEW4-MW76-(150.0)	N	Carbon disulfide	7.70	2.50 U	2.50 U	2.50 UJ	P
FEW4-MW76-(150.0)	N	Carbon tetrachloride	7.70	2.50 U	2.50 U	2.50 UJ	P
FEW4-MW76-(150.0)	N	Chlorobenzene	7.70	2.50 U	2.50 U	2.50 UJ	P
FEW4-MW76-(150.0)	N	Chloroethane	15.0	4.90 U	4.90 U	4.90 UJ	P
FEW4-MW76-(150.0)	N	Chloroform	15.0	1.20 U	1.20 U	1.20 UJ	P
FEW4-MW76-(150.0)	N	Chloromethane	15.0	2.50 U	2.50 U	2.50 UJ	P
FEW4-MW76-(150.0)	N	cis-1,2-Dichloroethene	7.70	2.50 U	2.50 U	2.50 UJ	P

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW76-(150.0)	N	cis-1,3-Dichloropropene	7.70	4.90 U	4.90 U	4.90 UJ	P
FEW4-MW76-(150.0)	N	Dibromochloromethane	7.70	2.50 U	2.50 U	2.50 UJ	P
FEW4-MW76-(150.0)	N	Dibromomethane	7.70	4.90 U	4.90 U	4.90 UJ	P
FEW4-MW76-(150.0)	N	Dichlorodifluoromethane	15.0	2.50 U	2.50 U	2.50 UJ	P
FEW4-MW76-(150.0)	N	Ethylbenzene	7.70	2.50 U	2.50 U	2.50 UJ	P
FEW4-MW76-(150.0)	N	Hexachlorobutadiene	7.70	2.50 U	2.50 U	2.50 UJ	P
FEW4-MW76-(150.0)	N	Isopropylbenzene (Cumene)	7.70	2.50 U	2.50 U	2.50 UJ	P
FEW4-MW76-(150.0)	N	m,p-Xylene	4.90	4.90 U	4.90 U	4.90 UJ	P
FEW4-MW76-(150.0)	N	Methyl tert-butyl ether (MTBE)	31.0	1.20 U	1.20 U	1.20 UJ	P
FEW4-MW76-(150.0)	N	Methylene chloride	7.70	4.90 U	4.90 U	4.90 UJ	P
FEW4-MW76-(150.0)	N	Naphthalene	7.70	2.50 U	2.50 U	2.50 UJ	P
FEW4-MW76-(150.0)	N	n-Butylbenzene	7.70	2.50 U	2.50 U	2.50 UJ	P
FEW4-MW76-(150.0)	N	n-Propylbenzene	7.70	2.50 U	2.50 U	2.50 UJ	P
FEW4-MW76-(150.0)	N	o-Xylene	7.70	2.50 U	2.50 U	2.50 UJ	P
FEW4-MW76-(150.0)	N	p-Cymene (p-Isopropyltoluene)	7.70	2.50 U	2.50 U	2.50 UJ	P
FEW4-MW76-(150.0)	N	sec-Butylbenzene	7.70	2.50 U	2.50 U	2.50 UJ	P
FEW4-MW76-(150.0)	N	Styrene	7.70	2.50 U	2.50 U	2.50 UJ	P
FEW4-MW76-(150.0)	N	tert-Butylbenzene	7.70	2.50 U	2.50 U	2.50 UJ	P
FEW4-MW76-(150.0)	N	Tetrachloroethene (PCE)	7.70	2.50 U	2.50 U	2.50 UJ	P
FEW4-MW76-(150.0)	N	Toluene	7.70	2.50 U Q	2.50 U	2.50 UJ	P
FEW4-MW76-(150.0)	N	trans-1,2-Dichloroethene	7.70	1.20 U	1.20 U	1.20 UJ	P
FEW4-MW76-(150.0)	N	trans-1,3-Dichloropropene	7.70	2.50 U	2.50 U	2.50 UJ	P
FEW4-MW76-(150.0)	N	Trichlorofluoromethane	15.0	4.90 U	4.90 U	4.90 UJ	P
FEW4-MW76-(150.0)	N	Vinyl chloride	7.70	4.90 U	4.90 U	4.90 UJ	P

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW101-(120.0)	N	Trichloroethene (TCE)	6.10	130 J	130 J	130	
FEW4-MW101-(150.0)	N	1,2,4-Trichlorobenzene	6.40	2.10 U Q	2.10 U	2.10 UJ	V2
FEW4-MW101-(150.0)	N	Hexachlorobutadiene	6.40	2.10 U Q	2.10 U	2.10 UJ	V2
FEW4-MW101-(150.0)	N	n-Butylbenzene	6.40	2.10 U Q	2.10 U	2.10 UJ	V2
FEW4-MW101-(290.0)	N	1,2,4-Trichlorobenzene	7.30	2.30 U Q	2.30 U	2.30 UJ	V2
FEW4-MW101-(290.0)	N	Hexachlorobutadiene	7.30	2.30 U Q	2.30 U	2.30 UJ	V2
FEW4-MW101-(290.0)	N	n-Butylbenzene	7.30	2.30 U Q	2.30 U	2.30 UJ	V2
FEW4-MW101-(300.0)	N	1,2,4-Trichlorobenzene	6.60	2.10 U Q	2.10 U	2.10 UJ	V2
FEW4-MW101-(300.0)	N	Hexachlorobutadiene	6.60	2.10 U Q	2.10 U	2.10 UJ	V2
FEW4-MW101-(300.0)	N	n-Butylbenzene	6.60	2.10 U Q	2.10 U	2.10 UJ	V2
FEW4-MW101-(306.0)	N	1,2,4-Trichlorobenzene	5.00	1.60 U Q	1.60 U	1.60 UJ	V2
FEW4-MW101-(306.0)	N	Hexachlorobutadiene	5.00	1.60 U Q	1.60 U	1.60 UJ	V2
FEW4-MW101-(306.0)	N	n-Butylbenzene	5.00	1.60 U Q	1.60 U	1.60 UJ	V2
FEW4-MW76-(100.0)	N	Trichloroethene (TCE)	5.30	75.0 J	75.0 J	75.0	

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW76-(140.0)	N	Trichloroethene (TCE)	230	810	810	810 J	D3
FEW4-MW76-(141.0)	FD	Trichloroethene (TCE)	510	1600 Q	1600 J	1600 J	I/D3

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
Trace values are not included in the qualified results table unless additional reason codes are associated.

Reason Code Definitions

Code	Definition
C	LCS Recovery
D	MS RPD
D3	Field Duplicate RPD
I	Surrogate recovery outside project limits.
L	Lab Blank
M	MS Recovery
P	Sample preservation/collection requirement not met.
TR	Trace Level Detect
V2	CCV

Flag Code and Definitions

Flag	Definition
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
J	Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
R	The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making.
B	Blank contamination: The analyte was found in an associated blank above one half the RL, as well as in the sample.
UB	The analyte was also detected in an associated laboratory or field blank at a concentration comparable to the concentration in the sample. The reported result has been requalified as not detected.

Review Questions

Method: SW8260B (Volatile Organic Compounds by Capillary GC/MS)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were sample reciept temperatures met?	•			Sample receipt temperatures were 0.7ºC, 1.9ºC, 3.7ºC and 4.0ºC.
Were QAPP specified Project Quantitation Limit Goals achieved?	•			
Were all QAPP-specified target analytes reported?	•			
Was the GC/MS system properly tuned based on method criteria?	•			
Was the criteria met during each 12 hour shift (prior to ICAL and Cal Ver.)?	•			
Does the initial calibration curve consist of 5 concentration levels, with the low standard near but > MDL?	•			
Did the Calibration Check Compounds (CCCs) have a relative standard deviation within QAPP acceptance limits?	•			
Were the average response factors (RFs) for the System Performance Check Compounds (SPCCs) within QAPP acceptance limits?	•			
Were the ICAL %RSDs for the target compounds within method criteria?	•			
If a quadratic equation curve was used, was the coefficient of determination (COD) within criteria?	•			
If a linear regression curve was used, was the correlation coefficient within criteria?	•			
Check and recalculate the response factors and average response factors for a least one target compound.	•			ICAL VMS-G2 9/9/17 TCE AVG RF = 0.2333
Check and recalculate the %RSD for one of more target compounds and DMCs. Verify that the recalculated values agree with the laboratory reported values.	•			VMS_G2 9/9/17 TCE %RSD = 6.0% 1,2-DCA-d4 %RSD = 5.0%
Was a second source verification analyzed after the ICAL and all analytes within criteria?	•			
Was a CCV run at the beginning of the analytical sequence and every 12 hours?	•			
Was the CCV a mid-level standard from the initial calibration curve?	•			
Did the CCCs have a %Difference within QAPP acceptance limits?	•			
Were the average RFs for the SPCCs within QAPP acceptance limits?	•			

Review Questions

Method: SW8260B (Volatile Organic Compounds by Capillary GC/MS)

Review Questions	Yes	No	NA	Comment
Was the %D (difference or drift) for all target analytes within QAPP acceptance limits?		•		CCV 280-388532/2: 2-butanone (36.2%) exceeded the 20% difference control limit. These analytes were not detected in any associated samples. CCV 280-387908/2: 1,1-dichloropropene (20.9%) and trans-1,2-dichloroethene (22.2%) exceeded the 20% difference control limit. These analytes were not detected in any associated samples. CCVC 280-387924/41): 1,2,4-Trichlorobenzene (-54.4%), hexachlorobutadiene (-63.2%) and n-butylbenzene (-55.4%) exceeded the closing CCV 50% difference control limit. These analytes were not detected in associated samples FEW4-MW101-(150.0), FEW4-MW101-(290.0), FEW4-MW101-(300.0), and FEW4-MW101-(306.0)
Check and recalculate the CCV relative response factor for at least one target compound.		•		VMS-P CCV 280-388532/2 2-butanone RRF = 0.0398
Were the internal standards added to every standard, blank, matrix spike, matrix spike duplicate, and sample?	•			
Were the retention times for all IS compounds within QAPP acceptance limits?	•			
Are the area counts of all IS compounds within QAPP acceptance limits?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than 1/2 LOQ and less than 1/10 the amount in any sample?	•			1,2,3-Trichlorobenzene, 1,2,4-trichlorobenzene, hexachlorobutadiene and n-butylbenzene were detected in a method blank at a concentration less than 1/2 the LOQ associated with sample FEW4-MW76-(150.0).
Were target analytes in the field blank less than 1/2 LOQ and less than 1/10 the amount in any sample?			•	
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?		•		FEW4-MW76-(141.0) is a blind duplicate of FEW4-MW76-(140.0) and did not meet acceptance criteria for TCE - sample FEW4-MW76-(141.0) was noted to have surrogate standard failures; FEW4-MW76-(181.0) is a blind duplicate of FEW4-MW76-(180.0); FEW4-MW101-(93.0) is a blind duplicate of FEW4-MW101-(92.0); FEW4-MW101-(251.0) is a blind duplicate of FEW4-MW101-(250.0)
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were the LCS/LCSD recoveries within QAPP acceptance limits?		•		LCS 280-387913/1-A: bromobenzene and toluene were recovered greater than the upper control limit; these analytes were not detected in the associated sample FEW4-MW76-(150.0).
Were the LCS/LCSD RPDs within QAPP acceptance limits?			•	
Was the duplicate RPD within QAPP acceptance limits?			•	
Was a MS/MSD pair prepared with each batch?	•			

Review Questions

Method: SW8260B (Volatile Organic Compounds by Capillary GC/MS)

Review Questions	Yes	No	NA	Comment
Is the MS/MSD parent sample the one designated by the sampling team?	•			FEW4-MW76-(100.0), FEW4-MW101-(120.0), and FEW4-MW101-(260.0) were designated for matrix spike analyses.
Were MS/MSD recoveries and RPD within QAPP acceptance limits?		•		Trichloroethene was recovered less than the lower control limit for MS and MSD FEW4-MW76-(100.0); this analyte was spiked at a concentration less than the native amount in the sample. Trichloroethene was recovered greater than the upper control limit for MS and less than the lower control limit in FEW4-MW101-(120.0); this analyte was spiked at a concentration less than the native amount in the sample. Several analytes were recovered less than the lower control limit in the MS and several analytes had relative percent difference values greater than the control limit for the MSD of FEW4-MW101-(260.0).
Were surrogate recoveries within QAPP acceptance limits?		•		Surrogates were recovered greater than the upper control limit in the TCE dilution analyses of FEW4-MW76-(141.0), FEW4-MW76-(160.0), and FEW4-MW76-(164.0).
Were reported sample concentrations within calibration range?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			Sample FEW4-MW76-(150.0) (280-101025-7) was analyzed for volatile organic compounds (GC/MS) using the soil jar sent in for moisture analysis due to instrument malfunction and QC criteria failures during analysis of the terracore collected samples. All values for this sample have been qualified as estimated values.
Were instrument run logs present and filled out appropriately?	•			
Were sample prepration sheets present and filled out appropriately?	•			
Check and recalculate the %D for one target compound. Verify that the recalculated values agree with the laboratory-reported values.			•	
Examine raw data to verify correct calculation of sample results reported by the laboratory. Compare quantitation lists and chromatograms to the reported detect and non-detect sample results.	•			FEW4-MW101-(170.0) TCE = 31 ug/kg
Verify that the reporting limits and sample results have been adjusted to reflect all sample dilutions and Percent Moisture factors (non-aqueous samples).	•			

US Army Corps of Engineers ®

Batch Report

Test Method: SW8260B Analysis Batch: 280-387923

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
LABQC	SQ	LCS 280-387923/1-A	LCS 280-387923/1-A		1/1	9/17/2017 19:58	9/17/2017 19:58	9/17/2017 20:28	280-387923/	BS
LABQC	SQ	MB 280-387923/2-A	MB 280-387923/2-A		1/1	9/17/2017 19:58	9/17/2017 19:58	9/17/2017 21:09	280-387923/	LB
FEW4-MW76	SO	FEW4-MW76-(190.0)	280-101054-1		1/1	9/11/2017 09:05	9/11/2017 09:05	9/18/2017 04:10	280-387923/	N
FEW4-MW76	SO	FEW4-MW76-(200.0)	280-101054-2		1/1	9/11/2017 09:10	9/11/2017 09:10	9/18/2017 04:30	280-387923/	N
FEW4-MW76	SO	FEW4-MW76-(210.0)	280-101054-3		1/1	9/11/2017 10:15	9/11/2017 10:15	9/18/2017 04:50	280-387923/	N
FEW4-MW76	SO	FEW4-MW76-(220.0)	280-101054-4		1/1	9/11/2017 10:20	9/11/2017 10:20	9/18/2017 05:10	280-387923/	N
FEW4-MW76	SO	FEW4-MW76-(233.0)	280-101054-5		1/1	9/11/2017 11:55	9/11/2017 11:55	9/18/2017 05:30	280-387923/	N
FEW4-MW76	SO	FEW4-MW76-(240.0)	280-101054-6		1/1	9/11/2017 12:00	9/11/2017 12:00	9/18/2017 05:50	280-387923/	N
FEW4-MW76	SO	FEW4-MW76-(250.0)	280-101054-7		1/1	9/11/2017 14:15	9/11/2017 14:15	9/18/2017 06:10	280-387923/	N

US Army Corps of Engineers ®

Field Batch Report

--No Records Found--

MS Mismatch Report

--No Records Found--

Section to identify Matrix Spike mismatches where parent sample differs from MS by dilution.

US Army Corps of Engineers ®

QC Outlier Report

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

QC Element	Sample ID/ Lab Sample ID	Run#/ Dil'n	Analyte	Result (Units)	Qualifier	Warning Limits	Control Limits	Reason	Comment	Rule	Action Level
Surrogate	FEW4-MW76-(240.0) (N) / 280-101054-6	1 / 1.00	Toluene-d8	118.6 (percent)	J/None	85 - 116	85 - 116	I			

Rule is the multiplier used when blank contamination occurs to determine action level.

US Army Corps of Engineers ®

Qualified Results

--No Records Found--

Detected Results

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Dilution	Analyte	LOQ	Lab Result	Qualified Result	Units	Reason
FEW4-MW76-(190.0)	280-101054-1	SO	N	1	Trichloroethene (TCE)	10.0	130	130	ug/kg	
FEW4-MW76-(200.0)	280-101054-2	SO	N	1	Trichloroethene (TCE)	6.10	21.0	21.0	ug/kg	

US Army Corps of Engineers ®

Rejected Results

--No Records Found--

US Army Corps of Engineers ®

Facility:	B08WY0467-02, F.E. Warren AFB, Site 4
Event:	2017-2018 RI Addendum Tasks
SDG:	280-101054-1_52_2a_FUDSChem
Guidance Document:	Draft-Final Uniform Federal Policy-Quality Assurance Project Plan for the Remedial Investigation Addendum 2017-2018 Tasks Atlas “D” Missile Site 4 —Laramie County, Wyoming, July 2017
Prime Contractor:	RMC Consultants, Inc., LAKEWOOD, CO
Project Manager:	David Groy
Contract Laboratory:	TestAmerica Laboratories, Inc., Arvada, CO
Data Review Contractor:	RMC Consultants
Data Review Level:	Stage 3VEM
Primary Data Reviewer:	Gary Torf, Contractor Project Chemist
Second Reviewer:	, Senior Scientist
Date Submitted:	

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	SW8260B
FEW4-MW76-(190.0)	280-101054-1	Solid	Field Sample/N	X
FEW4-MW76-(200.0)	280-101054-2	Solid	Field Sample/N	X
FEW4-MW76-(210.0)	280-101054-3	Solid	Field Sample/N	X
FEW4-MW76-(220.0)	280-101054-4	Solid	Field Sample/N	X
FEW4-MW76-(233.0)	280-101054-5	Solid	Field Sample/N	X
FEW4-MW76-(240.0)	280-101054-6	Solid	Field Sample/N	X
FEW4-MW76-(250.0)	280-101054-7	Solid	Field Sample/N	X

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the Draft-Final Uniform Federal Policy-Quality Assurance Project Plan for the Remedial Investigation Addendum 2017-2018 Tasks Atlas “D” Missile Site 4 —Laramie County, Wyoming, July 2017 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by RMC Consultants, Inc., LAKEWOOD, CO; analyses were performed by TestAmerica Laboratories, Inc., Arvada, CO and were reported under sample delivery group (SDG) 280-101054-1_52_2a_FUDSChem. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

- Blank
- Blank - Negative
- LCS Recovery
- Prep Hold Time
- Surrogate
- Test Hold Time

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 0 results (0.00%) out of the 462 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected. Trace values, defined as results that are qualified as estimated because they fall between the limit of detection and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

Narrative Comments

Analytical Method	Data Reviewer Comment
SW8260B	No additional comments; see Checklist for detail.

January 01, 2018

Reviewed by Gary Torf, Contractor Project Chemist, RMC Consultants

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of a minimum of 10% of the reported sample results and method quality control data between the two deliverables.

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

Quality Control Outliers for test method SW8260B, Surrogate

Method performance for individual samples is demonstrated through spiking activities. All samples are spiked with surrogate compounds prior to sample preparation. The sample itself may produce effects due to such factors as interferences and high concentrations of analytes. Summary forms were evaluated and compared to electronic data deliverables. Surrogate results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
FEW4-MW76-(240.0) (N)/ 280-101054-6	Toluene-d8	118.6	85 - 116	85 - 116	percent	J/None	I	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

Qualified Results

No results associated with this sample delivery group required qualification.

Trace Results

No results associated with this sample delivery group are considered trace.

Results with Modified Qualifiers

No qualifiers associated with this sample delivery group were modified manually.

Reason Code Definitions

Code	Definition
I	Surrogate recovery outside project limits.
TR	Trace Level Detect

Flag Code and Definitions

Flag	Definition
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
J	Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
R	The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making.
B	Blank contamination: The analyte was found in an associated blank above one half the RL, as well as in the sample.
UB	The analyte was also detected in an associated laboratory or field blank at a concentration comparable to the concentration in the sample. The reported result has been requalified as not detected.

Review Questions

Method: SW8260B (Volatile Organic Compounds by Capillary GC/MS)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were sample reciept temperatures met?	•			Sample receipt temperature was 1.5ºC.
Were QAPP specified Project Quantitation Limit Goals achieved?	•			
Were all QAPP-specified target analytes reported?	•			
Was the GC/MS system properly tuned based on method criteria?	•			
Was the criteria met during each 12 hour shift (prior to ICAL and Cal Ver.)?	•			
Does the initial calibration curve consist of 5 concentration levels, with the low standard near but > MDL?	•			
Did the Calibration Check Compounds (CCCs) have a relative standard deviation within QAPP acceptance limits?	•			
Were the average response factors (RFs) for the System Performance Check Compounds (SPCCs) within QAPP acceptance limits?	•			
Were the ICAL %RSDs for the target compounds within method criteria?	•			
If a quadratic equation curve was used, was the coefficient of determination (COD) within criteria?	•			
If a linear regression curve was used, was the correlation coefficient within criteria?	•			
Check and recalculate the response factors and average response factors for a least one target compound.	•			ICAL VMS-G 9/15/17 TCE AVG RF = 0.2936
Check and recalculate the %RSD for one of more target compounds and DMCs. Verify that the recalculated values agree with the laboratory reported values.	•			VMS_G 9/15/17 TCE %RSD = 7.1% 1,2-DCA-d4 %RSD = 6.9%
Was a second source verification analyzed after the ICAL and all analytes within criteria?	•			
Was a CCV run at the beginning of the analytical sequence and every 12 hours?	•			
Was the CCV a mid-level standard from the initial calibration curve?	•			
Did the CCCs have a %Difference within QAPP acceptance limits?	•			
Were the average RFs for the SPCCs within QAPP acceptance limits?	•			
Was the %D (difference or drift) for all target analytes within QAPP acceptance limits?		•		CCVC 280-387924/41): 1,2,4-Trichlorobenzene (-54.4%), hexachlorobutadiene (-63.2%) and n-butylbenzene (-55.4%) exceeded the closing CCV 50% difference control limit. These analytes were not detected in associated samples FEW4-MW76-(190.0), FEW4-MW76-(200.0), FEW4-MW76-(210.0), FEW4-MW76-(220.0), FEW4-MW76-(233.0), FEW4-MW76-(240.0) and FEW4-MW76-(250.0).
Check and recalculate the CCV relative response factor for at least one target compound.	•			VMS-G 9/17/17 CCV 280-387924/2 TCE = 0.3212
Were the internal standards added to every standard, blank, matrix spike, matrix spike duplicate, and sample?	•			

Review Questions

Method: SW8260B (Volatile Organic Compounds by Capillary GC/MS)

Review Questions	Yes	No	NA	Comment
Were the retention times for all IS compounds within QAPP acceptance limits?	•			
Are the area counts of all IS compounds within QAPP acceptance limits?		•		TBA-d9 was outside the acceptance criteria for several samples; however this IS is not associated with any target analytes.
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than 1/2 LOQ and less than 1/10 the amount in any sample?	•			280-387923/2-A: 1,2,4-trichlorobenzene was detected at a concentration less than 1/2 the LOQ.
Were target analytes in the field blank less than 1/2 LOQ and less than 1/10 the amount in any sample?			•	
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?			•	Field duplicates were not collected with this sample delivery group.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were the LCS/LCSD recoveries within QAPP acceptance limits?	•			
Were the LCS/LCSD RPDs within QAPP acceptance limits?			•	
Was the duplicate RPD within QAPP acceptance limits?			•	
Was a MS/MSD pair prepared with each batch?			•	MS/MSD samples were not designated for analysis with this sample delivery group.
Is the MS/MSD parent sample the one designated by the sampling team?			•	
Were MS/MSD recoveries and RPD within QAPP acceptance limits?			•	
Were surrogate recoveries within QAPP acceptance limits?		•		Toluened8 was recovered (118%) greater than the upper control limit of 116% in sample FEW4-MW76-(240.0). No analytes were detected in this sample.
Were reported sample concentrations within calibration range?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were instrument run logs present and filled out appropriately?	•			
Were sample prepration sheets present and filled out appropriately?	•			
Check and recalculate the %D for one target compound. Verify that the recalculated values agree with the laboratory-reported values.			•	
Examine raw data to verify correct calculation of sample results reported by the laboratory. Compare quantitation lists and chromatograms to the reported detect and non-detect sample results.	•			FEW4-MW76-(200.0) TCE = 21 ug/kg
Verify that the reporting limits and sample results have been adjusted to reflect all sample dilutions and Percent Moisture factors (non-aqueous samples).	•			

US Army Corps of Engineers ®

Batch Report

Test Method: SW8260B Analysis Batch: 280-387922

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
LABQC	SQ	LCS 280-387922/1-A	LCS 280-387922/1-A		1/1	9/17/2017 19:51	9/17/2017 19:51	9/17/2017 20:08	280-387922/	BS
LABQC	SQ	MB 280-387922/2-A	MB 280-387922/2-A		1/1	9/17/2017 19:51	9/17/2017 19:51	9/17/2017 20:49	280-387922/	LB
FEW4-MW97	SO	FEW4-MW97-(11.0)	280-101205-1		1/1	9/13/2017 12:00	9/13/2017 12:00	9/17/2017 21:29	280-387922/	N
FEW4-MW97	SO	FEW4-MW97-(11.0)	280-101205-1MS		1/1	9/13/2017 12:00	9/13/2017 12:00	9/17/2017 21:49	280-387922/	MS
FEW4-MW97	SO	FEW4-MW97-(11.0)	280-101205-1MSD		1/1	9/13/2017 12:00	9/13/2017 12:00	9/17/2017 22:09	280-387922/	SD
FEW4-MW97	SO	FEW4-MW97-(21.0)	280-101205-3		1/1	9/13/2017 13:20	9/13/2017 13:20	9/17/2017 22:29	280-387922/	N
FEW4-MW97	SO	FEW4-MW97-(22.0)	280-101205-4		1/1	9/13/2017 14:20	9/13/2017 14:20	9/17/2017 22:49	280-387922/	FD
FEW4-MW97	SO	FEW4-MW97-(31.0)	280-101205-5		1/1	9/13/2017 13:45	9/13/2017 13:45	9/17/2017 23:09	280-387922/	N
FEW4-MW97	SO	FEW4-MW97-(41.0)	280-101205-6		1/1	9/13/2017 14:14	9/13/2017 14:14	9/17/2017 23:29	280-387922/	N
FEW4-MW97	SO	FEW4-MW97-(51.0)	280-101205-7		1/1	9/13/2017 14:44	9/13/2017 14:44	9/17/2017 23:50	280-387922/	N
FEW4-MW97	SO	FEW4-MW97-(61.0)	280-101205-8		1/1	9/13/2017 15:20	9/13/2017 15:20	9/18/2017 00:10	280-387922/	N
FEW4-MW97	SO	FEW4-MW97-(71.0)	280-101205-9		1/1	9/13/2017 17:17	9/13/2017 17:17	9/18/2017 00:30	280-387922/	N
FEW4-MW97	SO	FEW4-MW97-(81.0)	280-101205-10		1/1	9/14/2017 09:30	9/14/2017 09:30	9/18/2017 00:50	280-387922/	N
FEW4-MW97	SO	FEW4-MW97-(91.0)	280-101205-11		1/1	9/14/2017 10:40	9/14/2017 10:40	9/18/2017 01:10	280-387922/	N
FEW4-MW97	SO	FEW4-MW97-(111.0)	280-101205-12		1/1	9/14/2017 12:12	9/14/2017 12:12	9/18/2017 01:30	280-387922/	N
FEW4-MW97	SO	FEW4-MW97-(112.0)	280-101205-13		1/1	9/14/2017 13:12	9/14/2017 13:12	9/18/2017 01:50	280-387922/	FD

Test Method: SW8260B Analysis Batch: 280-389192

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
LABQC	WQ	MB 280-389192/6	MB 280-389192/6		1/1	9/27/2017 20:46	9/27/2017 20:46	9/27/2017 20:46	280-389192/	LB
LABQC	WQ	LCS 280-389192/4	LCS 280-389192/4		1/1	9/27/2017 21:06	9/27/2017 21:06	9/27/2017 21:06	280-389192/	BS
FEW4-MW97	WG	FEW4-MW97-12	280-101205-2		1/1	9/13/2017 12:50	9/27/2017 21:26	9/27/2017 21:26	280-389192/	N
FEW4-MW97	WG	FEW4-MW97-12	280-101205-2MS		1/1	9/13/2017 12:50	9/28/2017 00:09	9/28/2017 00:09	280-389192/	MS

US Army Corps of Engineers ®

Batch Report

Test Method: SW8260B Analysis Batch: 280-389192

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
FEW4-MW97	WG	FEW4-MW97-12	280-101205-2MSD		1/1	9/13/2017 12:50	9/28/2017 00:28	9/28/2017 00:28	280-389192/	SD

US Army Corps of Engineers ®

Field Batch Report

--No Records Found--

MS Mismatch Report

--No Records Found--

Section to identify Matrix Spike mismatches where parent sample differs from MS by dilution.

US Army Corps of Engineers ®

QC Outlier Report

Test Method: SW8260B Extraction Method: SW5030B Leach Method: NONE

QC Element	Sample ID/ Lab Sample ID	Run#/ Dil'n	Analyte	Result (Units)	Qualifier	Warning Limits	Control Limits	Reason	Comment	Rule	Action Level
MS RPD	280-101205-2MSD (SD) / 280-101205-2MSD	1 / 1.00	Trichlorofluoromethane	20.45 (rpd)	J/None	< 20	< 20	D			
Surrogate	FEW4-MW97-12 (N) / 280-101205-2	1 / 1.00	Toluene-d8	113.0 (percent)	J/None	89 - 112	89 - 112	I			
Test Hold Time	FEW4-MW97-12 (N) / 280-101205-2	1 / 1.00	All in Run	14.36 (days)	J/UJ	< 14	< 14	H1	Test Exceeds UCL		
Test Hold Time	FEW4-MW97-12 (N) / 280-101205-2MS	1 / 1.00	All in Run	14.36 (days)	J/UJ	< 14	< 14	H1	Test Exceeds UCL		
Test Hold Time	FEW4-MW97-12 (N) / 280-101205-2MSD	1 / 1.00	All in Run	14.36 (days)	J/UJ	< 14	< 14	H1	Test Exceeds UCL		

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

QC Element	Sample ID/ Lab Sample ID	Run#/ Dil'n	Analyte	Result (Units)	Qualifier	Warning Limits	Control Limits	Reason	Comment	Rule	Action Level
MS Recovery	FEW4-MW97-(11.0) (SD) / 280-101205-1MSD	1 / 1.00	Bromomethane	51.77 (percent)	J/UJ	53 - 143	53 - 143	M			
MS Recovery	FEW4-MW97-(11.0) (SD) / 280-101205-1MSD	1 / 1.00	Chloroethane	56.06 (percent)	J/UJ	59 - 139	59 - 139	M			
Surrogate	FEW4-MW97-(111.0) (N) / 280-101205-12	1 / 1.00	Toluene-d8	118.8 (percent)	J/None	85 - 116	85 - 116	I			
Surrogate	FEW4-MW97-(41.0) (N) / 280-101205-6	1 / 1.00	Toluene-d8	117.8 (percent)	J/None	85 - 116	85 - 116	I			

Rule is the multiplier used when blank contamination occurs to determine action level.

US Army Corps of Engineers ®

Qualified Results

Test Method: SW8260B Extraction Method: SW5030B Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW97-12	280-101205-2	WG	N	Acetone	10	7.4 J	7.4 J		ug/L	I/TR

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW97-(11.0)	280-101205-1	SO	N	Acetone	16	12 J	12 J		ug/kg	TR
FEW4-MW97-(11.0)	280-101205-1	SO	N	Bromomethane	7.8	1.2 U J	1.2 UJ	-	ug/kg	M
FEW4-MW97-(11.0)	280-101205-1	SO	N	Chloroethane	7.8	2.5 U J	2.5 UJ	-	ug/kg	M
FEW4-MW97-(111.0)	280-101205-12	SO	N	Acetone	17	7.0 J	7.0 J	+	ug/kg	I/TR
FEW4-MW97-(112.0)	280-101205-13	SO	FD	Acetone	15	6.5 J	6.5 J		ug/kg	TR
FEW4-MW97-(21.0)	280-101205-3	SO	N	1,2,3-Trichlorobenzene	4.7	0.94 J	0.94 J		ug/kg	TR
FEW4-MW97-(21.0)	280-101205-3	SO	N	1,2,4-Trichlorobenzene	4.7	1.2 J Q	1.2 J		ug/kg	TR/V2
FEW4-MW97-(21.0)	280-101205-3	SO	N	Hexachlorobutadiene	4.7	0.60 J Q	0.60 J		ug/kg	TR/V2
FEW4-MW97-(21.0)	280-101205-3	SO	N	n-Butylbenzene	4.7	0.79 J Q	0.79 J		ug/kg	TR
FEW4-MW97-(21.0)	280-101205-3	SO	N	n-Propylbenzene	4.7	1.5 U	1.5 UJ		ug/kg	V2
FEW4-MW97-(41.0)	280-101205-6	SO	N	Acetone	19	14 J	14 J	+	ug/kg	I/TR
FEW4-MW97-(51.0)	280-101205-7	SO	N	Acetone	16	4.4 J	4.4 J		ug/kg	TR
FEW4-MW97-(61.0)	280-101205-8	SO	N	Acetone	15	9.6 J	9.6 J		ug/kg	TR
FEW4-MW97-(81.0)	280-101205-10	SO	N	Acetone	13	11 J	11 J		ug/kg	TR
FEW4-MW97-(91.0)	280-101205-11	SO	N	Acetone	18	11 J	11 J		ug/kg	TR

Qualified analytes in samples are reported as estimated, not detected (UJ) at the Limit of Detection (LOD).

Detected Results

Test Method: SW8260B Extraction Method: SW5030B Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Dilution	Analyte	LOQ	Lab Result	Qualified Result	Units	Reason
FEW4-MW97-12	280-101205-2	WG	N	1	Acetone	10	7.4 J	7.4 J	ug/L	I/TR

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Dilution	Analyte	LOQ	Lab Result	Qualified Result	Units	Reason
FEW4-MW97-(11.0)	280-101205-1	SO	N	1	Acetone	16	12 J	12 J	ug/kg	TR
FEW4-MW97-(111.0)	280-101205-12	SO	N	1	Acetone	17	7.0 J	7.0 J	ug/kg	I/TR
FEW4-MW97-(112.0)	280-101205-13	SO	FD	1	Acetone	15	6.5 J	6.5 J	ug/kg	TR
FEW4-MW97-(21.0)	280-101205-3	SO	N	1	1,2,3-Trichlorobenzene	4.7	0.94 J	0.94 J	ug/kg	TR
FEW4-MW97-(21.0)	280-101205-3	SO	N	1	1,2,4-Trichlorobenzene	4.7	1.2 J Q	1.2 J	ug/kg	TR/V2
FEW4-MW97-(21.0)	280-101205-3	SO	N	1	Hexachlorobutadiene	4.7	0.60 J Q	0.60 J	ug/kg	TR/V2
FEW4-MW97-(21.0)	280-101205-3	SO	N	1	n-Butylbenzene	4.7	0.79 J Q	0.79 J	ug/kg	TR
FEW4-MW97-(31.0)	280-101205-5	SO	N	1	Acetone	14	29	29	ug/kg	
FEW4-MW97-(41.0)	280-101205-6	SO	N	1	Acetone	19	14 J	14 J	ug/kg	I/TR
FEW4-MW97-(51.0)	280-101205-7	SO	N	1	Acetone	16	4.4 J	4.4 J	ug/kg	TR
FEW4-MW97-(61.0)	280-101205-8	SO	N	1	Acetone	15	9.6 J	9.6 J	ug/kg	TR
FEW4-MW97-(81.0)	280-101205-10	SO	N	1	Acetone	13	11 J	11 J	ug/kg	TR
FEW4-MW97-(91.0)	280-101205-11	SO	N	1	Acetone	18	11 J	11 J	ug/kg	TR

US Army Corps of Engineers ®

Rejected Results

--No Records Found--

US Army Corps of Engineers ®

Facility:	B08WY0467-02, F.E. Warren AFB, Site 4
Event:	2017-2018 RI Addendum Tasks
SDG:	280-101205-1_52_2a_FUDSChem
Guidance Document:	Draft-Final Uniform Federal Policy-Quality Assurance Project Plan for the Remedial Investigation Addendum 2017-2018 Tasks Atlas “D” Missile Site 4 —Laramie County, Wyoming, July 2017
Prime Contractor:	RMC Consultants, Inc., LAKEWOOD, CO
Project Manager:	David Groy
Contract Laboratory:	TestAmerica Laboratories, Inc., Arvada, CO
Data Review Contractor:	RMC Consultants
Data Review Level:	Stage 3VEM
Primary Data Reviewer:	Gary Torf, Contractor Project Chemist
Second Reviewer:	, Senior Scientist
Date Submitted:	

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	SW8260B
FEW4-MW97-(11.0)	280-101205-1	Solid	Field Sample/N	X
FEW4-MW97-(111.0)	280-101205-12	Solid	Field Sample/N	X
FEW4-MW97-(112.0)	280-101205-13	Solid	Field Duplicate/FD	X
FEW4-MW97-(21.0)	280-101205-3	Solid	Field Sample/N	X
FEW4-MW97-(22.0)	280-101205-4	Solid	Field Duplicate/FD	X
FEW4-MW97-(31.0)	280-101205-5	Solid	Field Sample/N	X
FEW4-MW97-(41.0)	280-101205-6	Solid	Field Sample/N	X
FEW4-MW97-(51.0)	280-101205-7	Solid	Field Sample/N	X
FEW4-MW97-(61.0)	280-101205-8	Solid	Field Sample/N	X
FEW4-MW97-(71.0)	280-101205-9	Solid	Field Sample/N	X
FEW4-MW97-(81.0)	280-101205-10	Solid	Field Sample/N	X
FEW4-MW97-(91.0)	280-101205-11	Solid	Field Sample/N	X
FEW4-MW97-12	280-101205-2	Water	Field Sample/N	X

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the Draft-Final Uniform Federal Policy-Quality Assurance Project Plan for the Remedial Investigation Addendum 2017-2018 Tasks Atlas “D” Missile Site 4 —Laramie County, Wyoming, July 2017 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by RMC Consultants, Inc., LAKEWOOD, CO; analyses were performed by TestAmerica Laboratories, Inc., Arvada, CO and were reported under sample delivery group (SDG) 280-101205-1_52_2a_FUDSChem. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

- Blank
- Blank - Negative
- Field Duplicate RPD
- LCS Recovery
- MS Recovery
- MS RPD
- Prep Hold Time
- Surrogate
- Test Hold Time

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 8 results (0.95%) out of the 844 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected. Trace values, defined as results that are qualified as estimated because they fall between the limit of detection and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

Narrative Comments

Analytical Method	Data Reviewer Comment
SW8260B	No additional comments; see Checklist for detail.

January 01, 2018

Reviewed by Gary Torf, Contractor Project Chemist, RMC Consultants

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of a minimum of 10% of the reported sample results and method quality control data between the two deliverables.

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

Quality Control Outliers for test method SW8260B, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
FEW4-MW97-(11.0) (SD)/ 280-101205-1MSD	Bromomethane	51.77	53 - 143	53 - 143	percent	J/UJ	M	
FEW4-MW97-(11.0) (SD)/ 280-101205-1MSD	Chloroethane	56.06	59 - 139	59 - 139	percent	J/UJ	M	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the MS Recovery for SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW97-(11.0)	N	Bromomethane	7.8	1.2 U J	1.2 UJ	-	ug/kg	M
FEW4-MW97-(11.0)	N	Chloroethane	7.8	2.5 U J	2.5 UJ	-	ug/kg	M

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

Quality Control Outliers for test method SW8260B, MS RPD

The objective of matrix spikes/matrix spike duplicates (MS/MSD) RPD analysis is to demonstrate acceptable method precision by the laboratory at the time of analysis. MS/MSD analyses are also performed to generate data that determines the long-term precision of the analytical method on various matrices. Non-homogenous samples can impact the apparent method precision. Summary forms were evaluated and compared to electronic data deliverables. Matrix spikes/matrix spike duplicates results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
280-101205-2MSD (SD)/ 280-101205-2MSD	Trichlorofluoromethane	20.45	< 20	< 20	rpd	J/None	D	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

Quality Control Outliers for test method SW8260B, Surrogate

Method performance for individual samples is demonstrated through spiking activities. All samples are spiked with surrogate compounds prior to sample preparation. The sample itself may produce effects due to such factors as interferences and high concentrations of analytes. Summary forms were evaluated and compared to electronic data deliverables. Surrogate results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
FEW4-MW97-12 (N)/ 280-101205-2	Toluene-d8	113.0	89 - 112	89 - 112	percent	J/None	I	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the Surrogate for SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW97-12	N	Acetone	10	7.4 J	7.4 J		ug/l	I/TR

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

Quality Control Outliers for test method SW8260B, Surrogate

Method performance for individual samples is demonstrated through spiking activities. All samples are spiked with surrogate compounds prior to sample preparation. The sample itself may produce effects due to such factors as interferences and high concentrations of analytes. Summary forms were evaluated and compared to electronic data deliverables. Surrogate results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
FEW4-MW97-(111.0) (N)/ 280-101205-12	Toluene-d8	118.8	85 - 116	85 - 116	percent	J/None	I	
FEW4-MW97-(41.0) (N)/ 280-101205-6	Toluene-d8	117.8	85 - 116	85 - 116	percent	J/None	I	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the Surrogate for SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW97-(111.0)	N	Acetone	17	7.0 J	7.0 J	+	ug/kg	I/TR
FEW4-MW97-(41.0)	N	Acetone	19	14 J	14 J	+	ug/kg	I/TR

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

Quality Control Outliers for test method SW8260B, Test Hold Time

Hold times are ascertained based on project requirements. Holding times were determined by comparing the chain of custody records with the dates of analysis found in the electronic data deliverable and laboratory summary forms. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
FEW4-MW97-12 (N)/ 280-101205-2		14.36	< 14	< 14	days	J/UJ	H1	Test Exceeds UCL
FEW4-MW97-12 (N)/ 280-101205-2MS		14.36	< 14	< 14	days	J/UJ	H1	Test Exceeds UCL
FEW4-MW97-12 (N)/ 280-101205-2MSD		14.36	< 14	< 14	days	J/UJ	H1	Test Exceeds UCL

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

Table of All Qualified Results

Test Method: SW8260B	Extraction Method: SW5030B							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW97-12	N	Acetone	10	7.4 J	7.4 J		ug/l	I/TR

Test Method: SW8260B	Extraction Method: SW5035A							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW97-(11.0)	N	Bromomethane	7.8	1.2 U J	1.2 UJ	-	ug/kg	M
FEW4-MW97-(11.0)	N	Chloroethane	7.8	2.5 U J	2.5 UJ	-	ug/kg	M
FEW4-MW97-(111.0)	N	Acetone	17	7.0 J	7.0 J	+	ug/kg	I/TR
FEW4-MW97-(41.0)	N	Acetone	19	14 J	14 J	+	ug/kg	I/TR

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
Trace values are not included in the qualified results table unless additional reason codes are associated.

Table of All Trace Results

Test Method: SW8260B	Extraction Method: SW5030B							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW97-12	N	Acetone	10.0	7.40 J	7.40 J		ug/L	I/TR
FEW4-MW97-12	MS	1,2-Dibromo-3-chloropropane	5.00	3.99 J	3.99 J		ug/L	H1/I/TR
FEW4-MW97-12	MS	1,4-Dioxane (p-Dioxane)	220	90.0 J	90.0 J		ug/L	H1/I/TR
FEW4-MW97-12	MS	Methyl tert-butyl ether (MTBE)	5.00	4.40 J	4.40 J		ug/L	H1/I/TR
FEW4-MW97-12	SD	1,2-Dibromo-3-chloropropane	5.00	4.15 J	4.15 J		ug/L	H1/I/TR
FEW4-MW97-12	SD	1,4-Dioxane (p-Dioxane)	220	92.2 J	92.2 J		ug/L	H1/I/TR
FEW4-MW97-12	SD	Methyl tert-butyl ether (MTBE)	5.00	4.72 J	4.72 J		ug/L	H1/I/TR

Test Method: SW8260B	Extraction Method: SW5035A							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW97-(11.0)	N	Acetone	16.0	12.0 J	12.0 J		ug/kg	TR
FEW4-MW97-(111.0)	N	Acetone	17.0	7.00 J	7.00 J	+	ug/kg	I/TR
FEW4-MW97-(112.0)	FD	Acetone	15.0	6.50 J	6.50 J		ug/kg	TR
FEW4-MW97-(21.0)	N	1,2,3-Trichlorobenzene	4.70	0.940 J	0.940 J		ug/kg	TR
FEW4-MW97-(21.0)	N	1,2,4-Trichlorobenzene	4.70	1.20 J Q	1.20 J		ug/kg	TR/V2
FEW4-MW97-(21.0)	N	Hexachlorobutadiene	4.70	0.600 J Q	0.600 J		ug/kg	TR/V2
FEW4-MW97-(21.0)	N	n-Butylbenzene	4.70	0.790 J Q	0.790 J		ug/kg	TR
FEW4-MW97-(41.0)	N	Acetone	19.0	14.0 J	14.0 J	+	ug/kg	I/TR
FEW4-MW97-(51.0)	N	Acetone	16.0	4.40 J	4.40 J		ug/kg	TR
FEW4-MW97-(61.0)	N	Acetone	15.0	9.60 J	9.60 J		ug/kg	TR
FEW4-MW97-(81.0)	N	Acetone	13.0	11.0 J	11.0 J		ug/kg	TR
FEW4-MW97-(91.0)	N	Acetone	18.0	11.0 J	11.0 J		ug/kg	TR

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW97-12	N	1,1,1-Trichloroethane	1.0	0.40 U	0.40 UJ	0.40 U	
FEW4-MW97-12	N	1,1,2,2-Tetrachloroethane	1.0	0.80 U	0.80 UJ	0.80 U	
FEW4-MW97-12	N	1,1,2-Trichloro-1,2,2-trifluoroethane	3.0	1.6 U	1.6 UJ	1.6 U	
FEW4-MW97-12	N	1,1,2-Trichloroethane	1.0	0.80 U	0.80 UJ	0.80 U	
FEW4-MW97-12	N	1,1-Dichloroethane	1.0	0.80 U	0.80 UJ	0.80 U	
FEW4-MW97-12	N	1,1-Dichloroethene	1.0	0.80 U	0.80 UJ	0.80 U	
FEW4-MW97-12	N	1,2,3-Trichlorobenzene	1.0	0.80 U	0.80 UJ	0.80 U	
FEW4-MW97-12	N	1,2,4-Trichlorobenzene	1.0	0.80 U	0.80 UJ	0.80 U	
FEW4-MW97-12	N	1,2-Dibromo-3-chloropropane	5.0	1.6 U	1.6 UJ	1.6 U	
FEW4-MW97-12	N	1,2-Dibromoethane (EDB)	1.0	0.40 U	0.40 UJ	0.40 U	
FEW4-MW97-12	N	1,2-Dichlorobenzene	1.0	0.40 U	0.40 UJ	0.40 U	
FEW4-MW97-12	N	1,2-Dichloroethane	1.0	0.40 U	0.40 UJ	0.40 U	
FEW4-MW97-12	N	1,2-Dichloropropane	1.0	0.40 U	0.40 UJ	0.40 U	
FEW4-MW97-12	N	1,3-Dichlorobenzene	1.0	0.40 U	0.40 UJ	0.40 U	
FEW4-MW97-12	N	1,4-Dichlorobenzene	1.0	0.40 U	0.40 UJ	0.40 U	
FEW4-MW97-12	N	1,4-Dioxane (p-Dioxane)	220	160 U	160 UJ	160 U	
FEW4-MW97-12	N	2-Butanone (MEK)	6.0	4.0 U	4.0 UJ	4.0 U	
FEW4-MW97-12	N	2-Hexanone	5.0	4.0 U	4.0 UJ	4.0 U	
FEW4-MW97-12	N	4-Methyl-2-pentanone (MIBK)	5.0	3.2 U	3.2 UJ	3.2 U	
FEW4-MW97-12	N	Acetone	10	7.4 J	7.4 J	7.4 J	I/TR
FEW4-MW97-12	N	Benzene	1.0	0.40 U	0.40 UJ	0.40 U	
FEW4-MW97-12	N	Bromochloromethane	1.0	0.20 U	0.20 UJ	0.20 U	
FEW4-MW97-12	N	Bromodichloromethane	1.0	0.40 U	0.40 UJ	0.40 U	
FEW4-MW97-12	N	Bromoform	1.0	0.40 U Q	0.40 UJ	0.40 U	
FEW4-MW97-12	N	Bromomethane	2.0	0.80 U	0.80 UJ	0.80 U	
FEW4-MW97-12	N	Carbon disulfide	2.0	1.6 U	1.6 UJ	1.6 U	
FEW4-MW97-12	N	Carbon tetrachloride	2.0	0.40 U	0.40 UJ	0.40 U	
FEW4-MW97-12	N	Chlorobenzene	1.0	0.40 U	0.40 UJ	0.40 U	
FEW4-MW97-12	N	Chloroethane	2.0	1.6 U	1.6 UJ	1.6 U	
FEW4-MW97-12	N	Chloroform	1.0	0.40 U	0.40 UJ	0.40 U	
FEW4-MW97-12	N	Chloromethane	2.0	0.80 U	0.80 UJ	0.80 U	
FEW4-MW97-12	N	cis-1,2-Dichloroethene	1.0	0.40 U	0.40 UJ	0.40 U	
FEW4-MW97-12	N	cis-1,3-Dichloropropene	1.0	0.40 U	0.40 UJ	0.40 U	
FEW4-MW97-12	N	Cyclohexane	2.0	0.80 U	0.80 UJ	0.80 U	
FEW4-MW97-12	N	Dibromochloromethane	1.0	0.40 U	0.40 UJ	0.40 U	
FEW4-MW97-12	N	Dichlorodifluoromethane	2.0	0.80 U	0.80 UJ	0.80 U	
FEW4-MW97-12	N	Ethylbenzene	1.0	0.40 U	0.40 UJ	0.40 U	
FEW4-MW97-12	N	Isopropylbenzene (Cumene)	1.0	0.40 U	0.40 UJ	0.40 U	
FEW4-MW97-12	N	m,p-Xylene	2.0	0.80 U	0.80 UJ	0.80 U	
FEW4-MW97-12	N	Methyl acetate	5.0	4.0 U	4.0 UJ	4.0 U	

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW97-12	N	Methyl tert-butyl ether (MTBE)	5.0	0.80 U	0.80 UJ	0.80 U	
FEW4-MW97-12	N	Methylcyclohexane	2.0	0.80 U	0.80 UJ	0.80 U	
FEW4-MW97-12	N	Methylene chloride	5.0	0.80 U	0.80 UJ	0.80 U	
FEW4-MW97-12	N	o-Xylene	1.0	0.40 U	0.40 UJ	0.40 U	
FEW4-MW97-12	N	Styrene	1.0	0.40 U	0.40 UJ	0.40 U	
FEW4-MW97-12	N	Tetrachloroethene (PCE)	1.0	0.40 U	0.40 UJ	0.40 U	
FEW4-MW97-12	N	Toluene	1.0	0.40 U	0.40 UJ	0.40 U	
FEW4-MW97-12	N	trans-1,2-Dichloroethene	1.0	0.40 U	0.40 UJ	0.40 U	
FEW4-MW97-12	N	trans-1,3-Dichloropropene	1.0	0.40 U	0.40 UJ	0.40 U	
FEW4-MW97-12	N	Trichloroethene (TCE)	1.0	0.40 U	0.40 UJ	0.40 U	
FEW4-MW97-12	N	Trichlorofluoromethane	2.0	0.80 U	0.80 UJ	0.80 U	
FEW4-MW97-12	N	Vinyl chloride	1.5	0.20 U	0.20 UJ	0.20 U	

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW97-(21.0)	N	1,2,4-Trichlorobenzene	4.7	1.2 J Q	1.2 J	1.2 J	TR/V2
FEW4-MW97-(21.0)	N	Hexachlorobutadiene	4.7	0.60 J Q	0.60 J	0.60 J	TR/V2
FEW4-MW97-(21.0)	N	n-Propylbenzene	4.7	1.5 U	1.5 U	1.5 UJ	V2

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
Trace values are not included in the qualified results table unless additional reason codes are associated.

Reason Code Definitions

Code	Definition
D	MS RPD
H1	Test Hold Time
I	Surrogate recovery outside project limits.
M	MS Recovery
TR	Trace Level Detect
V2	CCV

Flag Code and Definitions

Flag	Definition
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
J	Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
R	The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making.
B	Blank contamination: The analyte was found in an associated blank above one half the RL, as well as in the sample.
UB	The analyte was also detected in an associated laboratory or field blank at a concentration comparable to the concentration in the sample. The reported result has been requalified as not detected.

Review Questions

Method: SW8260B (Volatile Organic Compounds by Capillary GC/MS)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			ADR noted that the following samples exceeded the 14 day analysis holding time on the 14th day between 0000 and 2359 hours: FEW4-MW97-12 8.6 hours and the associated MS/MSD. According to DoD ELAP QSM 5.1 FAQ – Holding Time - Days: "the holding time shall be tracked by the day." "...an exceedance of holding time for a sample with a 14-day holding time will occur when the 15th day is reached (at 12am)." Therefore, no holding time exceedance is considered to have occurred for the noted samples.
Were sample reciept temperatures met?	•			Sample receipt temperature was 5.0ºC.
Were QAPP specified Project Quantitation Limit Goals achieved?	•			
Were all QAPP-specified target analytes reported?	•			
Was the GC/MS system properly tuned based on method criteria?	•			
Was the criteria met during each 12 hour shift (prior to ICAL and Cal Ver.)?	•			
Does the initial calibration curve consist of 5 concentration levels, with the low standard near but > MDL?	•			
Did the Calibration Check Compounds (CCCs) have a relative standard deviation within QAPP acceptance limits?	•			
Were the average response factors (RFs) for the System Performance Check Compounds (SPCCs) within QAPP acceptance limits?	•			
Were the ICAL %RSDs for the target compounds within method criteria?	•			
If a quadratic equation curve was used, was the coefficient of determination (COD) within criteria?	•			
If a linear regression curve was used, was the correlation coefficient within criteria?	•			
Check and recalculate the response factors and average response factors for a least one target compound.	•			ICAL VMS-G 9/15/17 TCE AVG RF = 0.2936
Check and recalculate the %RSD for one of more target compounds and DMCs. Verify that the recalculated values agree with the laboratory reported values.	•			VMS_G 9/15/17 TCE %RSD = 7.1% 1,2-DCA-d4 %RSD = 6.9%
Was a second source verification analyzed after the ICAL and all analytes within criteria?	•			
Was a CCV run at the beginning of the analytical sequence and every 12 hours?	•			
Was the CCV a mid-level standard from the initial calibration curve?	•			
Did the CCCs have a %Difference within QAPP acceptance limits?	•			
Were the average RFs for the SPCCs within QAPP acceptance limits?	•			

Review Questions

Method: SW8260B (Volatile Organic Compounds by Capillary GC/MS)

Review Questions	Yes	No	NA	Comment
Was the %D (difference or drift) for all target analytes within QAPP acceptance limits?		•		CCV 280-389192/2: Bromoform (-22.8%) exceeded the 20% difference control limit; the analyte was not detected in associated sample FEW4-MW97-12. CCVC 280-387924/41: 1,2,4-Trichlorobenzene (-54.4%), hexachlorobutadiene (-63.2%) and n-butylbenzene (-55.4%) exceeded the closing CCV 50% difference control limit. The closing CCV was associated with samples FEW4-MW97-(11.0), FEW4-MW97-(21.0), FEW4-MW97-(22.0), FEW4-MW97-(31.0), FEW4-MW97-(41.0), FEW4-MW97-(51.0), FEW4-MW97-(61.0), FEW4-MW97-(71.0), FEW4-MW97-(81.0), FEW4-MW97-(91.0), FEW4-MW97-(111.0) and FEW4-MW97-(112.0).
Check and recalculate the CCV relative response factor for at least one target compound.	•			VMS-G 9/17/17 CCV 280-387924/2 TCE = 0.3212
Were the internal standards added to every standard, blank, matrix spike, matrix spike duplicate, and sample?	•			
Were the retention times for all IS compounds within QAPP acceptance limits?	•			
Are the area counts of all IS compounds within QAPP acceptance limits?		•		TBA-d9 was outside the acceptance criteria for several samples; however this IS is not associated with any target analytes.
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than 1/2 LOQ and less than 1/10 the amount in any sample?	•			280-387922/2-A: 1,2,3-Trichlorobenzene, 1,2,4-trichlorobenzene, hexachlorobutadiene, isopropylbenzene and n-butylbenzene was detected at a concentration less than 1/2 the LOQ.
Were target analytes in the field blank less than 1/2 LOQ and less than 1/10 the amount in any sample?			•	
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?	•			FEW4-MW97-(22.0) is a blind field duplicate of FEW4-MW97-(21.0), FEW4-MW97-(112.0) is a blind field duplicate of FEW4-MW97-(111.0).
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were the LCS/LCSD recoveries within QAPP acceptance limits?	•			
Were the LCS/LCSD RPDs within QAPP acceptance limits?			•	
Was the duplicate RPD within QAPP acceptance limits?			•	
Was a MS/MSD pair prepared with each batch?	•			
Is the MS/MSD parent sample the one designated by the sampling team?	•			FEW4-MW97-(11.0) was designated for MS/MSD analysis.
Were MS/MSD recoveries and RPD within QAPP acceptance limits?		•		Bromomethane was recovered (52%) less than the lower control limit of 53% and chloroethane was recovered (56%) less than the lower control limit of 59%.
Were surrogate recoveries within QAPP acceptance limits?		•		Toluene-d8 was recovered greater than the upper control limit of 116% in sample FEW4-MW97-(41.0) at 118% and in sample FEW4-MW97-(111.0) at 120%.
Were reported sample concentrations within calibration range?	•			

Review Questions

Method: SW8260B (Volatile Organic Compounds by Capillary GC/MS)				
Review Questions	Yes	No	NA	Comment
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were instrument run logs present and filled out appropriately?	•			
Were sample prepration sheets present and filled out appropriately?	•			
Check and recalculate the %D for one target compound. Verify that the recalculated values agree with the laboratory-reported values.			•	
Examine raw data to verify correct calculation of sample results reported by the laboratory. Compare quantitation lists and chromatograms to the reported detect and non-detect sample results.	•			FEW4-MW97-(11.0) MS TCE = 37.8 ug/kg
Verify that the reporting limits and sample results have been adjusted to reflect all sample dilutions and Percent Moisture factors (non-aqueous samples).	•			

US Army Corps of Engineers ®

Batch Report

Test Method: SW8260B Analysis Batch: 280-388702

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
LABQC	SQ	LCS 280-388702/1-A	LCS 280-388702/1-A		1/1	9/24/2017 14:30	9/24/2017 14:30	9/24/2017 15:50	280-388702/	BS
LABQC	SQ	LCSD 280-388702/2-A	LCSD 280-388702/2-A		1/1	9/24/2017 14:30	9/24/2017 14:30	9/24/2017 16:10	280-388702/	BD
LABQC	SQ	MB 280-388702/3-A	MB 280-388702/3-A		1/1	9/24/2017 14:30	9/24/2017 14:30	9/24/2017 17:10	280-388702/	LB
FEW4-MW97	SO	FEW4-MW97-(131.0)	280-101263-2		1/1	9/14/2017 15:30	9/14/2017 15:30	9/24/2017 22:52	280-388702/	N
FEW4-MW97	SO	FEW4-MW97-(151.0)	280-101263-4		1/1	9/14/2017 16:40	9/14/2017 16:40	9/24/2017 23:32	280-388702/	N
FEW4-MW97	SO	FEW4-MW97-(161.0)	280-101263-5		1/1	9/14/2017 17:30	9/14/2017 17:30	9/24/2017 23:52	280-388702/	N
FEW4-MW97	SO	FEW4-MW97-(171.0)	280-101263-6		1/1	9/14/2017 18:10	9/14/2017 18:10	9/25/2017 00:12	280-388702/	N
FEW4-MW97	SO	FEW4-MW97-(181.0)	280-101263-7		1/1	9/15/2017 09:50	9/15/2017 09:50	9/25/2017 00:32	280-388702/	N
FEW4-MW97	SO	FEW4-MW97-(191.0)	280-101263-8		1/1	9/15/2017 10:40	9/15/2017 10:40	9/25/2017 00:52	280-388702/	N
FEW4-MW97	SO	FEW4-MW97-(201.0)	280-101263-9		1/1	9/15/2017 12:22	9/15/2017 12:22	9/25/2017 01:12	280-388702/	N
FEW4-MW95	SO	FEW4-MW95-(121.0)	280-101263-10		1/1	9/15/2017 09:20	9/15/2017 09:20	9/25/2017 01:32	280-388702/	N

Test Method: SW8260B Analysis Batch: 280-389199

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
LABQC	SQ	LCS 280-389199/1-A	LCS 280-389199/1-A		1/1	9/27/2017 17:00	9/27/2017 17:00	9/27/2017 19:40	280-389199/	BS
LABQC	SQ	MB 280-389199/2-A	MB 280-389199/2-A		1/1	9/27/2017 17:00	9/27/2017 17:00	9/27/2017 20:20	280-389199/	LB
FEW4-MW97	SO	FEW4-MW97-(121.0)	280-101263-1		1/1	9/14/2017 14:44	9/14/2017 14:44	9/27/2017 20:41	280-389199/	N
FEW4-MW97	SO	FEW4-MW97-(141.0)	280-101263-3		1/1	9/14/2017 16:06	9/14/2017 16:06	9/27/2017 21:01	280-389199/	N

Test Method: SW8260B Analysis Batch: 280-389413

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
LABQC	WQ	LCS 280-389413/4	LCS 280-389413/4		1/1	9/29/2017 08:28	9/29/2017 08:28	9/29/2017 08:28	280-389413/	BS

US Army Corps of Engineers ®

Batch Report

Test Method: SW8260B Analysis Batch: 280-389413

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
LABQC	WQ	MB 280-389413/6	MB 280-389413/6		1/1	9/29/2017 09:12	9/29/2017 09:12	9/29/2017 09:12	280-389413/	LB
FEW4-MW95	WG	FEW4-MW95-117	280-101263-11		1/1	9/15/2017 13:03	9/29/2017 10:17	9/29/2017 10:17	280-389413/	N

US Army Corps of Engineers ®

Field Batch Report

--No Records Found--

MS Mismatch Report

--No Records Found--

Section to identify Matrix Spike mismatches where parent sample differs from MS by dilution.

QC Outliers Report

--No Records Found--

Qualified Results

Test Method: SW8260B Extraction Method: SW5030B Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW95-117	280-101263-11	WG	N	Acetone	10.0	4.80 J	4.80 J		ug/L	TR

US Army Corps of Engineers ®

Qualified Results

Test Method: SW8260B Extraction Method: SW5030B Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW95-117	280-101263-11	WG	N	Bromoform	1.00	0.340 J	0.340 J		ug/L	TR

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW95-(121.0)	280-101263-10	SO	N	Acetone	16.0	7.10 J	7.10 J		ug/kg	TR
FEW4-MW97-(131.0)	280-101263-2	SO	N	1,2,4-Trimethylbenzene	3.90	0.540 J	0.540 J		ug/kg	TR
FEW4-MW97-(151.0)	280-101263-4	SO	N	Acetone	16.0	8.60 J	8.60 J		ug/kg	TR
FEW4-MW97-(161.0)	280-101263-5	SO	N	Acetone	17.0	12.0 J	12.0 J		ug/kg	TR
FEW4-MW97-(171.0)	280-101263-6	SO	N	1,1,1,2-Tetrachloroethane	3.90	1.30 U Q	1.30 UJ		ug/kg	S
FEW4-MW97-(171.0)	280-101263-6	SO	N	1,1,1-Trichloroethane	3.90	1.30 U Q	1.30 UJ		ug/kg	S
FEW4-MW97-(171.0)	280-101263-6	SO	N	1,1,2,2-Tetrachloroethane	3.90	1.30 U Q	1.30 UJ		ug/kg	S
FEW4-MW97-(171.0)	280-101263-6	SO	N	1,1,2-Trichloroethane	3.90	2.50 U Q	2.50 UJ		ug/kg	S
FEW4-MW97-(171.0)	280-101263-6	SO	N	1,1-Dichloroethane	3.90	0.630 U Q	0.630 UJ		ug/kg	S
FEW4-MW97-(171.0)	280-101263-6	SO	N	1,1-Dichloroethene	3.90	1.30 U Q	1.30 UJ		ug/kg	S
FEW4-MW97-(171.0)	280-101263-6	SO	N	1,1-Dichloropropene	3.90	1.30 U Q	1.30 UJ		ug/kg	S
FEW4-MW97-(171.0)	280-101263-6	SO	N	1,2,3-Trichlorobenzene	3.90	1.30 U Q	1.30 UJ		ug/kg	S
FEW4-MW97-(171.0)	280-101263-6	SO	N	1,2,3-Trichloropropane	3.90	2.50 U Q	2.50 UJ		ug/kg	S
FEW4-MW97-(171.0)	280-101263-6	SO	N	1,2,4-Trichlorobenzene	3.90	1.30 U Q	1.30 UJ		ug/kg	S
FEW4-MW97-(171.0)	280-101263-6	SO	N	1,2,4-Trimethylbenzene	3.90	1.30 U Q	1.30 UJ		ug/kg	S
FEW4-MW97-(171.0)	280-101263-6	SO	N	1,2-Dibromo-3-chloropropane	7.80	1.30 U Q	1.30 UJ		ug/kg	S
FEW4-MW97-(171.0)	280-101263-6	SO	N	1,2-Dibromoethane (EDB)	3.90	1.30 U Q	1.30 UJ		ug/kg	S
FEW4-MW97-(171.0)	280-101263-6	SO	N	1,2-Dichlorobenzene	3.90	1.30 U Q	1.30 UJ		ug/kg	S
FEW4-MW97-(171.0)	280-101263-6	SO	N	1,2-Dichloroethane	3.90	1.30 U Q	1.30 UJ		ug/kg	S
FEW4-MW97-(171.0)	280-101263-6	SO	N	1,2-Dichloroethene	3.90	1.30 U	1.30 UJ		ug/kg	S

Qualified Results

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW97-(171.0)	280-101263-6	SO	N	1,2-Dichloropropane	3.90	1.30 U Q	1.30 UJ		ug/kg	S
FEW4-MW97-(171.0)	280-101263-6	SO	N	1,3,5-Trimethylbenzene	3.90	1.30 U Q	1.30 UJ		ug/kg	S
FEW4-MW97-(171.0)	280-101263-6	SO	N	1,3-Dichlorobenzene	3.90	1.30 U Q	1.30 UJ		ug/kg	S
FEW4-MW97-(171.0)	280-101263-6	SO	N	1,3-Dichloropropane	3.90	1.30 U Q	1.30 UJ		ug/kg	S
FEW4-MW97-(171.0)	280-101263-6	SO	N	1,4-Dichlorobenzene	3.90	1.30 U Q	1.30 UJ		ug/kg	S
FEW4-MW97-(171.0)	280-101263-6	SO	N	2,2-Dichloropropane	3.90	1.30 U Q	1.30 UJ		ug/kg	S
FEW4-MW97-(171.0)	280-101263-6	SO	N	2-Butanone (MEK)	16.0	5.00 U Q	5.00 UJ		ug/kg	S
FEW4-MW97-(171.0)	280-101263-6	SO	N	2-Chlorotoluene	3.90	1.30 U Q	1.30 UJ		ug/kg	S
FEW4-MW97-(171.0)	280-101263-6	SO	N	2-Hexanone	16.0	10.0 U Q	10.0 UJ		ug/kg	S
FEW4-MW97-(171.0)	280-101263-6	SO	N	4-Chlorotoluene	3.90	1.30 U Q	1.30 UJ		ug/kg	S
FEW4-MW97-(171.0)	280-101263-6	SO	N	4-Methyl-2-pentanone (MIBK)	16.0	10.0 U Q	10.0 UJ		ug/kg	S
FEW4-MW97-(171.0)	280-101263-6	SO	N	Acetone	16.0	10.0 U Q	10.0 UJ		ug/kg	S
FEW4-MW97-(171.0)	280-101263-6	SO	N	Benzene	3.90	1.30 U Q	1.30 UJ		ug/kg	S
FEW4-MW97-(171.0)	280-101263-6	SO	N	Bromobenzene	3.90	1.30 U Q	1.30 UJ		ug/kg	S
FEW4-MW97-(171.0)	280-101263-6	SO	N	Bromochloromethane	3.90	0.630 U Q	0.630 UJ		ug/kg	S
FEW4-MW97-(171.0)	280-101263-6	SO	N	Bromodichloromethane	3.90	0.630 U Q	0.630 UJ		ug/kg	S
FEW4-MW97-(171.0)	280-101263-6	SO	N	Bromoform	3.90	0.630 U Q	0.630 UJ		ug/kg	S
FEW4-MW97-(171.0)	280-101263-6	SO	N	Bromomethane	7.80	1.30 U Q	1.30 UJ		ug/kg	S
FEW4-MW97-(171.0)	280-101263-6	SO	N	Carbon disulfide	3.90	1.30 U Q	1.30 UJ		ug/kg	S
FEW4-MW97-(171.0)	280-101263-6	SO	N	Carbon tetrachloride	3.90	1.30 U Q	1.30 UJ		ug/kg	S
FEW4-MW97-(171.0)	280-101263-6	SO	N	Chlorobenzene	3.90	1.30 U Q	1.30 UJ		ug/kg	S
FEW4-MW97-(171.0)	280-101263-6	SO	N	Chloroethane	7.80	2.50 U Q	2.50 UJ		ug/kg	S
FEW4-MW97-(171.0)	280-101263-6	SO	N	Chloroform	7.80	0.630 U Q	0.630 UJ		ug/kg	S
FEW4-MW97-(171.0)	280-101263-6	SO	N	Chloromethane	7.80	1.30 U Q	1.30 UJ		ug/kg	S
FEW4-MW97-(171.0)	280-101263-6	SO	N	cis-1,2-Dichloroethene	3.90	1.30 U Q	1.30 UJ		ug/kg	S
FEW4-MW97-(171.0)	280-101263-6	SO	N	cis-1,3-Dichloropropene	3.90	2.50 U Q	2.50 UJ		ug/kg	S
FEW4-MW97-(171.0)	280-101263-6	SO	N	Dibromochloromethane	3.90	1.30 U Q	1.30 UJ		ug/kg	S
FEW4-MW97-(171.0)	280-101263-6	SO	N	Dibromomethane	3.90	2.50 U Q	2.50 UJ		ug/kg	S

Qualified Results

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW97-(171.0)	280-101263-6	SO	N	Dichlorodifluoromethane	7.80	1.30 U Q	1.30 UJ		ug/kg	S
FEW4-MW97-(171.0)	280-101263-6	SO	N	Ethylbenzene	3.90	1.30 U Q	1.30 UJ		ug/kg	S
FEW4-MW97-(171.0)	280-101263-6	SO	N	Hexachlorobutadiene	3.90	1.30 U Q	1.30 UJ		ug/kg	S
FEW4-MW97-(171.0)	280-101263-6	SO	N	Isopropylbenzene (Cumene)	3.90	1.30 U Q	1.30 UJ		ug/kg	S
FEW4-MW97-(171.0)	280-101263-6	SO	N	m,p-Xylene	2.50	2.50 U Q	2.50 UJ		ug/kg	S
FEW4-MW97-(171.0)	280-101263-6	SO	N	Methyl tert-butyl ether (MTBE)	16.0	0.630 U Q	0.630 UJ		ug/kg	S
FEW4-MW97-(171.0)	280-101263-6	SO	N	Methylene chloride	3.90	2.50 U Q	2.50 UJ		ug/kg	S
FEW4-MW97-(171.0)	280-101263-6	SO	N	Naphthalene	3.90	1.30 U Q	1.30 UJ		ug/kg	S
FEW4-MW97-(171.0)	280-101263-6	SO	N	n-Butylbenzene	3.90	1.30 U Q	1.30 UJ		ug/kg	S
FEW4-MW97-(171.0)	280-101263-6	SO	N	n-Propylbenzene	3.90	1.30 U Q	1.30 UJ		ug/kg	S
FEW4-MW97-(171.0)	280-101263-6	SO	N	o-Xylene	3.90	1.30 U Q	1.30 UJ		ug/kg	S
FEW4-MW97-(171.0)	280-101263-6	SO	N	p-Cymene (p-Isopropyltoluene)	3.90	1.30 U Q	1.30 UJ		ug/kg	S
FEW4-MW97-(171.0)	280-101263-6	SO	N	sec-Butylbenzene	3.90	1.30 U Q	1.30 UJ		ug/kg	S
FEW4-MW97-(171.0)	280-101263-6	SO	N	Styrene	3.90	1.30 U Q	1.30 UJ		ug/kg	S
FEW4-MW97-(171.0)	280-101263-6	SO	N	tert-Butylbenzene	3.90	1.30 U Q	1.30 UJ		ug/kg	S
FEW4-MW97-(171.0)	280-101263-6	SO	N	Tetrachloroethene (PCE)	3.90	1.30 U Q	1.30 UJ		ug/kg	S
FEW4-MW97-(171.0)	280-101263-6	SO	N	Toluene	3.90	1.30 U Q	1.30 UJ		ug/kg	S
FEW4-MW97-(171.0)	280-101263-6	SO	N	trans-1,2-Dichloroethene	3.90	0.630 U Q	0.630 UJ		ug/kg	S
FEW4-MW97-(171.0)	280-101263-6	SO	N	trans-1,3-Dichloropropene	3.90	1.30 U Q	1.30 UJ		ug/kg	S
FEW4-MW97-(171.0)	280-101263-6	SO	N	Trichloroethene (TCE)	3.90	0.630 U Q	0.630 UJ		ug/kg	S
FEW4-MW97-(171.0)	280-101263-6	SO	N	Trichlorofluoromethane	7.80	2.50 U Q	2.50 UJ		ug/kg	S
FEW4-MW97-(171.0)	280-101263-6	SO	N	Vinyl chloride	3.90	2.50 U Q	2.50 UJ		ug/kg	S
FEW4-MW97-(201.0)	280-101263-9	SO	N	Acetone	25.0	18.0 J	18.0 J		ug/kg	TR

Qualified analytes in samples are reported as estimated, not detected (UJ) at the Limit of Detection (LOD).

Detected Results

Test Method: SW8260B Extraction Method: SW5030B Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Dilution	Analyte	LOQ	Lab Result	Qualified Result	Units	Reason
FEW4-MW95-117	280-101263-11	WG	N	1	Acetone	10.0	4.80 J	4.80 J	ug/L	TR
FEW4-MW95-117	280-101263-11	WG	N	1	Bromodichloromethane	1.00	1.70	1.70	ug/L	
FEW4-MW95-117	280-101263-11	WG	N	1	Bromoform	1.00	0.340 J	0.340 J	ug/L	TR
FEW4-MW95-117	280-101263-11	WG	N	1	Chloroform	1.00	4.40	4.40	ug/L	
FEW4-MW95-117	280-101263-11	WG	N	1	Dibromochloromethane	1.00	1.20	1.20	ug/L	

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Dilution	Analyte	LOQ	Lab Result	Qualified Result	Units	Reason
FEW4-MW95-(121.0)	280-101263-10	SO	N	1	Acetone	16.0	7.10 J	7.10 J	ug/kg	TR
FEW4-MW97-(121.0)	280-101263-1	SO	N	1	Acetone	18.0	26.0	26.0	ug/kg	
FEW4-MW97-(131.0)	280-101263-2	SO	N	1	1,2,4-Trimethylbenzene	3.90	0.540 J	0.540 J	ug/kg	TR
FEW4-MW97-(131.0)	280-101263-2	SO	N	1	Acetone	16.0	25.0	25.0	ug/kg	
FEW4-MW97-(141.0)	280-101263-3	SO	N	1	Acetone	15.0	17.0	17.0	ug/kg	
FEW4-MW97-(151.0)	280-101263-4	SO	N	1	Acetone	16.0	8.60 J	8.60 J	ug/kg	TR
FEW4-MW97-(161.0)	280-101263-5	SO	N	1	Acetone	17.0	12.0 J	12.0 J	ug/kg	TR
FEW4-MW97-(201.0)	280-101263-9	SO	N	1	Acetone	25.0	18.0 J	18.0 J	ug/kg	TR

US Army Corps of Engineers ®

Rejected Results

--No Records Found--

US Army Corps of Engineers ®

Facility:	B08WY0467-02, F.E. Warren AFB, Site 4
Event:	2017-2018 RI Addendum Tasks
SDG:	280-101263-1_52_2a_FUDSChem
Guidance Document:	Draft-Final Uniform Federal Policy-Quality Assurance Project Plan for the Remedial Investigation Addendum 2017-2018 Tasks Atlas “D” Missile Site 4 —Laramie County, Wyoming, July 2017
Prime Contractor:	RMC Consultants, Inc., LAKEWOOD, CO
Project Manager:	David Groy
Contract Laboratory:	TestAmerica Laboratories, Inc., Arvada, CO
Data Review Contractor:	RMC Consultants
Data Review Level:	Stage 3VEM
Primary Data Reviewer:	Gary Torf, Contractor Project Chemist
Second Reviewer:	, Senior Scientist
Date Submitted:	

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	SW8260B
FEW4-MW95-(121.0)	280-101263-10	Solid	Field Sample/N	X
FEW4-MW95-117	280-101263-11	Water	Field Sample/N	X
FEW4-MW97-(121.0)	280-101263-1	Solid	Field Sample/N	X
FEW4-MW97-(131.0)	280-101263-2	Solid	Field Sample/N	X
FEW4-MW97-(141.0)	280-101263-3	Solid	Field Sample/N	X
FEW4-MW97-(151.0)	280-101263-4	Solid	Field Sample/N	X
FEW4-MW97-(161.0)	280-101263-5	Solid	Field Sample/N	X
FEW4-MW97-(171.0)	280-101263-6	Solid	Field Sample/N	X
FEW4-MW97-(181.0)	280-101263-7	Solid	Field Sample/N	X
FEW4-MW97-(191.0)	280-101263-8	Solid	Field Sample/N	X
FEW4-MW97-(201.0)	280-101263-9	Solid	Field Sample/N	X

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the Draft-Final Uniform Federal Policy-Quality Assurance Project Plan for the Remedial Investigation Addendum 2017-2018 Tasks Atlas “D” Missile Site 4 —Laramie County, Wyoming, July 2017 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by RMC Consultants, Inc., LAKEWOOD, CO; analyses were performed by TestAmerica Laboratories, Inc., Arvada, CO and were reported under sample delivery group (SDG) 280-101263-1_52_2a_FUDSChem. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

- Blank
- Blank - Negative
- LCS Recovery
- LCS RPD
- Prep Hold Time
- Surrogate
- Test Hold Time

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 66 results (9.27%) out of the 712 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected. Trace values, defined as results that are qualified as estimated because they fall between the limit of detection and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

Narrative Comments

Analytical Method	Data Reviewer Comment
SW8260B	No additional comments; see Checklist for detail.

January 01, 2018

Reviewed by Gary Torf, Contractor Project Chemist, RMC Consultants

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of a minimum of 10% of the reported sample results and method quality control data between the two deliverables.

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

Qualified Results

No results associated with this sample delivery group required qualification.

Table of All Trace Results

Test Method: SW8260B	**Extraction Method: SW5030B**							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW95-117	N	Acetone	10.0	4.80 J	4.80 J		ug/L	TR
FEW4-MW95-117	N	Bromoform	1.00	0.340 J	0.340 J		ug/L	TR

Test Method: SW8260B	**Extraction Method: SW5035A**							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW95-(121.0)	N	Acetone	16.0	7.10 J	7.10 J		ug/kg	TR
FEW4-MW97-(131.0)	N	1,2,4-Trimethylbenzene	3.90	0.540 J	0.540 J		ug/kg	TR
FEW4-MW97-(151.0)	N	Acetone	16.0	8.60 J	8.60 J		ug/kg	TR
FEW4-MW97-(161.0)	N	Acetone	17.0	12.0 J	12.0 J		ug/kg	TR
FEW4-MW97-(201.0)	N	Acetone	25.0	18.0 J	18.0 J		ug/kg	TR

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW97-(171.0)	N	1,1,1,2-Tetrachloroethane	3.90	1.30 U Q	1.30 U	1.30 UJ	S
FEW4-MW97-(171.0)	N	1,1,1-Trichloroethane	3.90	1.30 U Q	1.30 U	1.30 UJ	S
FEW4-MW97-(171.0)	N	1,1,2,2-Tetrachloroethane	3.90	1.30 U Q	1.30 U	1.30 UJ	S
FEW4-MW97-(171.0)	N	1,1,2-Trichloroethane	3.90	2.50 U Q	2.50 U	2.50 UJ	S
FEW4-MW97-(171.0)	N	1,1-Dichloroethane	3.90	0.630 U Q	0.630 U	0.630 UJ	S
FEW4-MW97-(171.0)	N	1,1-Dichloroethene	3.90	1.30 U Q	1.30 U	1.30 UJ	S
FEW4-MW97-(171.0)	N	1,1-Dichloropropene	3.90	1.30 U Q	1.30 U	1.30 UJ	S
FEW4-MW97-(171.0)	N	1,2,3-Trichlorobenzene	3.90	1.30 U Q	1.30 U	1.30 UJ	S
FEW4-MW97-(171.0)	N	1,2,3-Trichloropropane	3.90	2.50 U Q	2.50 U	2.50 UJ	S
FEW4-MW97-(171.0)	N	1,2,4-Trichlorobenzene	3.90	1.30 U Q	1.30 U	1.30 UJ	S
FEW4-MW97-(171.0)	N	1,2,4-Trimethylbenzene	3.90	1.30 U Q	1.30 U	1.30 UJ	S
FEW4-MW97-(171.0)	N	1,2-Dibromo-3-chloropropane	7.80	1.30 U Q	1.30 U	1.30 UJ	S
FEW4-MW97-(171.0)	N	1,2-Dibromoethane (EDB)	3.90	1.30 U Q	1.30 U	1.30 UJ	S
FEW4-MW97-(171.0)	N	1,2-Dichlorobenzene	3.90	1.30 U Q	1.30 U	1.30 UJ	S
FEW4-MW97-(171.0)	N	1,2-Dichloroethane	3.90	1.30 U Q	1.30 U	1.30 UJ	S
FEW4-MW97-(171.0)	N	1,2-Dichloroethene	3.90	1.30 U	1.30 U	1.30 UJ	S
FEW4-MW97-(171.0)	N	1,2-Dichloropropane	3.90	1.30 U Q	1.30 U	1.30 UJ	S
FEW4-MW97-(171.0)	N	1,3,5-Trimethylbenzene	3.90	1.30 U Q	1.30 U	1.30 UJ	S
FEW4-MW97-(171.0)	N	1,3-Dichlorobenzene	3.90	1.30 U Q	1.30 U	1.30 UJ	S
FEW4-MW97-(171.0)	N	1,3-Dichloropropane	3.90	1.30 U Q	1.30 U	1.30 UJ	S
FEW4-MW97-(171.0)	N	1,4-Dichlorobenzene	3.90	1.30 U Q	1.30 U	1.30 UJ	S
FEW4-MW97-(171.0)	N	2,2-Dichloropropane	3.90	1.30 U Q	1.30 U	1.30 UJ	S
FEW4-MW97-(171.0)	N	2-Butanone (MEK)	16.0	5.00 U Q	5.00 U	5.00 UJ	S
FEW4-MW97-(171.0)	N	2-Chlorotoluene	3.90	1.30 U Q	1.30 U	1.30 UJ	S
FEW4-MW97-(171.0)	N	2-Hexanone	16.0	10.0 U Q	10.0 U	10.0 UJ	S
FEW4-MW97-(171.0)	N	4-Chlorotoluene	3.90	1.30 U Q	1.30 U	1.30 UJ	S
FEW4-MW97-(171.0)	N	4-Methyl-2-pentanone (MIBK)	16.0	10.0 U Q	10.0 U	10.0 UJ	S
FEW4-MW97-(171.0)	N	Acetone	16.0	10.0 U Q	10.0 U	10.0 UJ	S
FEW4-MW97-(171.0)	N	Benzene	3.90	1.30 U Q	1.30 U	1.30 UJ	S
FEW4-MW97-(171.0)	N	Bromobenzene	3.90	1.30 U Q	1.30 U	1.30 UJ	S
FEW4-MW97-(171.0)	N	Bromochloromethane	3.90	0.630 U Q	0.630 U	0.630 UJ	S
FEW4-MW97-(171.0)	N	Bromodichloromethane	3.90	0.630 U Q	0.630 U	0.630 UJ	S
FEW4-MW97-(171.0)	N	Bromoform	3.90	0.630 U Q	0.630 U	0.630 UJ	S
FEW4-MW97-(171.0)	N	Bromomethane	7.80	1.30 U Q	1.30 U	1.30 UJ	S
FEW4-MW97-(171.0)	N	Carbon disulfide	3.90	1.30 U Q	1.30 U	1.30 UJ	S
FEW4-MW97-(171.0)	N	Carbon tetrachloride	3.90	1.30 U Q	1.30 U	1.30 UJ	S
FEW4-MW97-(171.0)	N	Chlorobenzene	3.90	1.30 U Q	1.30 U	1.30 UJ	S
FEW4-MW97-(171.0)	N	Chloroethane	7.80	2.50 U Q	2.50 U	2.50 UJ	S
FEW4-MW97-(171.0)	N	Chloroform	7.80	0.630 U Q	0.630 U	0.630 UJ	S
FEW4-MW97-(171.0)	N	Chloromethane	7.80	1.30 U Q	1.30 U	1.30 UJ	S
FEW4-MW97-(171.0)	N	cis-1,2-Dichloroethene	3.90	1.30 U Q	1.30 U	1.30 UJ	S

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW97-(171.0)	N	cis-1,3-Dichloropropene	3.90	2.50 U Q	2.50 U	2.50 UJ	S
FEW4-MW97-(171.0)	N	Dibromochloromethane	3.90	1.30 U Q	1.30 U	1.30 UJ	S
FEW4-MW97-(171.0)	N	Dibromomethane	3.90	2.50 U Q	2.50 U	2.50 UJ	S
FEW4-MW97-(171.0)	N	Dichlorodifluoromethane	7.80	1.30 U Q	1.30 U	1.30 UJ	S
FEW4-MW97-(171.0)	N	Ethylbenzene	3.90	1.30 U Q	1.30 U	1.30 UJ	S
FEW4-MW97-(171.0)	N	Hexachlorobutadiene	3.90	1.30 U Q	1.30 U	1.30 UJ	S
FEW4-MW97-(171.0)	N	Isopropylbenzene (Cumene)	3.90	1.30 U Q	1.30 U	1.30 UJ	S
FEW4-MW97-(171.0)	N	m,p-Xylene	2.50	2.50 U Q	2.50 U	2.50 UJ	S
FEW4-MW97-(171.0)	N	Methyl tert-butyl ether (MTBE)	16.0	0.630 U Q	0.630 U	0.630 UJ	S
FEW4-MW97-(171.0)	N	Methylene chloride	3.90	2.50 U Q	2.50 U	2.50 UJ	S
FEW4-MW97-(171.0)	N	Naphthalene	3.90	1.30 U Q	1.30 U	1.30 UJ	S
FEW4-MW97-(171.0)	N	n-Butylbenzene	3.90	1.30 U Q	1.30 U	1.30 UJ	S
FEW4-MW97-(171.0)	N	n-Propylbenzene	3.90	1.30 U Q	1.30 U	1.30 UJ	S
FEW4-MW97-(171.0)	N	o-Xylene	3.90	1.30 U Q	1.30 U	1.30 UJ	S
FEW4-MW97-(171.0)	N	p-Cymene (p-Isopropyltoluene)	3.90	1.30 U Q	1.30 U	1.30 UJ	S
FEW4-MW97-(171.0)	N	sec-Butylbenzene	3.90	1.30 U Q	1.30 U	1.30 UJ	S
FEW4-MW97-(171.0)	N	Styrene	3.90	1.30 U Q	1.30 U	1.30 UJ	S
FEW4-MW97-(171.0)	N	tert-Butylbenzene	3.90	1.30 U Q	1.30 U	1.30 UJ	S
FEW4-MW97-(171.0)	N	Tetrachloroethene (PCE)	3.90	1.30 U Q	1.30 U	1.30 UJ	S
FEW4-MW97-(171.0)	N	Toluene	3.90	1.30 U Q	1.30 U	1.30 UJ	S
FEW4-MW97-(171.0)	N	trans-1,2-Dichloroethene	3.90	0.630 U Q	0.630 U	0.630 UJ	S
FEW4-MW97-(171.0)	N	trans-1,3-Dichloropropene	3.90	1.30 U Q	1.30 U	1.30 UJ	S
FEW4-MW97-(171.0)	N	Trichloroethene (TCE)	3.90	0.630 U Q	0.630 U	0.630 UJ	S
FEW4-MW97-(171.0)	N	Trichlorofluoromethane	7.80	2.50 U Q	2.50 U	2.50 UJ	S
FEW4-MW97-(171.0)	N	Vinyl chloride	3.90	2.50 U Q	2.50 U	2.50 UJ	S

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
Trace values are not included in the qualified results table unless additional reason codes are associated.

Reason Code Definitions

Code	Definition
S	Internal standard
TR	Trace Level Detect

Flag Code and Definitions

Flag	Definition
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
J	Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
R	The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making.
B	Blank contamination: The analyte was found in an associated blank above one half the RL, as well as in the sample.
UB	The analyte was also detected in an associated laboratory or field blank at a concentration comparable to the concentration in the sample. The reported result has been requalified as not detected.

Review Questions

Method: SW8260B (Volatile Organic Compounds by Capillary GC/MS)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were sample reciept temperatures met?	•			Sample receipt temperature was 5.7ºC.
Were QAPP specified Project Quantitation Limit Goals achieved?	•			
Were all QAPP-specified target analytes reported?	•			
Was the GC/MS system properly tuned based on method criteria?	•			
Was the criteria met during each 12 hour shift (prior to ICAL and Cal Ver.)?	•			
Does the initial calibration curve consist of 5 concentration levels, with the low standard near but > MDL?	•			
Did the Calibration Check Compounds (CCCs) have a relative standard deviation within QAPP acceptance limits?	•			
Were the average response factors (RFs) for the System Performance Check Compounds (SPCCs) within QAPP acceptance limits?	•			
Were the ICAL %RSDs for the target compounds within method criteria?	•			
If a quadratic equation curve was used, was the coefficient of determination (COD) within criteria?	•			
If a linear regression curve was used, was the correlation coefficient within criteria?	•			
Check and recalculate the response factors and average response factors for a least one target compound.	•			ICAL VMS-G 9/15/17 TCE AVG RF = 0.2936
Check and recalculate the %RSD for one of more target compounds and DMCs. Verify that the recalculated values agree with the laboratory reported values.	•			VMS_G 9/15/17 TCE %RSD = 7.1% 1,2-DCA-d4 %RSD = 6.9%
Was a second source verification analyzed after the ICAL and all analytes within criteria?	•			
Was a CCV run at the beginning of the analytical sequence and every 12 hours?	•			
Was the CCV a mid-level standard from the initial calibration curve?	•			
Did the CCCs have a %Difference within QAPP acceptance limits?	•			
Were the average RFs for the SPCCs within QAPP acceptance limits?	•			
Was the %D (difference or drift) for all target analytes within QAPP acceptance limits?		•		CCV 280-388703/2): 2-butanone exceeded the 20% difference control limit at 22.8%; the analyte was not detected in any associated samples. CCV 280-389194/2: 2-butanone (26.8%) and dichlorodifluoromethane (28.6%) exceeded the 20% control limit; the analytes were not detected in any associated samples. CCV 280-389413/2: Dichlorodifluoromethane exceeded the 20% control limit at 30.8%; the analyte was not detected in the associated sample FEW4-MW95-117.

Review Questions

Method: SW8260B (Volatile Organic Compounds by Capillary GC/MS)

Review Questions	Yes	No	NA	Comment
Check and recalculate the CCV relative response factor for at least one target compound.		•		VMS-G 9/24/17 CCV 280-388703/2 TCE = 0.3413
Were the internal standards added to every standard, blank, matrix spike, matrix spike duplicate, and sample?	•			
Were the retention times for all IS compounds within QAPP acceptance limits?	•			
Are the area counts of all IS compounds within QAPP acceptance limits?		•		The internal standards did not meet acceptance criteria for sample FEW4-MW97-(171.0). All analyte results have been qualified as estimated values.
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than 1/2 LOQ and less than 1/10 the amount in any sample?	•			
Were target analytes in the field blank less than 1/2 LOQ and less than 1/10 the amount in any sample?			•	
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?			•	Field duplicates were not collected with the sample delivery group.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were the LCS/LCSD recoveries within QAPP acceptance limits?	•			
Were the LCS/LCSD RPDs within QAPP acceptance limits?			•	
Was the duplicate RPD within QAPP acceptance limits?			•	
Was a MS/MSD pair prepared with each batch?		•		
Is the MS/MSD parent sample the one designated by the sampling team?			•	MS/MSD were not specified for analysis with this sample delivery group.
Were MS/MSD recoveries and RPD within QAPP acceptance limits?			•	
Were surrogate recoveries within QAPP acceptance limits?	•			
Were reported sample concentrations within calibration range?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were instrument run logs present and filled out appropriately?	•			
Were sample prepration sheets present and filled out appropriately?	•			
Check and recalculate the %D for one target compound. Verify that the recalculated values agree with the laboratory-reported values.			•	
Examine raw data to verify correct calculation of sample results reported by the laboratory. Compare quantitation lists and chromatograms to the reported detect and non-detect sample results.	•			FEW4-MW97-(121.0) TCE = Not detected.
Verify that the reporting limits and sample results have been adjusted to reflect all sample dilutions and Percent Moisture factors (non-aqueous samples).	•			

Automated Data Review Detail Report for 280-101273-1_52_2a_FUDSChem
B08WY0467-02, F.E. Warren AFB, Site 4
Draft-Final Uniform Federal Policy-Quality Assurance Project Plan for the Remedial Investigation Addendum 2017-2018 Tasks
Atlas "D" Missile Site 4—Laramie County, Wyoming, July 2017

US Army Corps of Engineers ®

Batch Report

Test Method: SW8260B Analysis Batch: 280-389199

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
LABQC	SQ	LCS 280-389199/1-A	LCS 280-389199/1-A		1/1	9/27/2017 17:00	9/27/2017 17:00	9/27/2017 19:40	280-389199/	BS
LABQC	SQ	MB 280-389199/2-A	MB 280-389199/2-A		1/1	9/27/2017 17:00	9/27/2017 17:00	9/27/2017 20:20	280-389199/	LB
FEW4-MW97	SO	FEW4-MW97-(211.0)	280-101273-1		1/1	9/15/2017 15:30	9/15/2017 15:30	9/28/2017 00:22	280-389199/	N
FEW4-MW97	SO	FEW4-MW97-(221.0)	280-101273-2		1/1	9/15/2017 15:40	9/15/2017 15:40	9/28/2017 00:42	280-389199/	N
FEW4-MW97	SO	FEW4-MW97-(221.0)	280-101273-2MS		1/1	9/15/2017 15:40	9/15/2017 15:40	9/28/2017 01:02	280-389199/	MS
FEW4-MW97	SO	FEW4-MW97-(221.0)	280-101273-2MSD		1/1	9/15/2017 15:40	9/15/2017 15:40	9/28/2017 01:22	280-389199/	SD
FEW4-MW97	SO	FEW4-MW97-(231.0)	280-101273-3		1/1	9/15/2017 17:30	9/15/2017 17:30	9/28/2017 02:02	280-389199/	N
FEW4-MW97	SO	FEW4-MW97-(241.0)	280-101273-4		1/1	9/15/2017 17:40	9/15/2017 17:40	9/28/2017 02:22	280-389199/	N
FEW4-MW95	SO	FEW4-MW95-(131.0)	280-101273-5		1/1	9/15/2017 15:00	9/15/2017 15:00	9/28/2017 05:35	280-389199/	N
FEW4-MW95	SO	FEW4-MW95-(141.0)	280-101273-6		1/1	9/15/2017 15:05	9/15/2017 15:05	9/28/2017 05:55	280-389199/	N

Test Method: SW8260B Analysis Batch: 280-389384

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
LABQC	SQ	LCS 280-389384/1-A	LCS 280-389384/1-A		1/1	9/28/2017 17:00	9/28/2017 17:00	9/28/2017 20:40	280-389384/	BS
LABQC	SQ	LCSD 280-389384/2-A	LCSD 280-389384/2-A		1/1	9/28/2017 17:00	9/28/2017 17:00	9/28/2017 21:00	280-389384/	BD
LABQC	SQ	MB 280-389384/3-A	MB 280-389384/3-A		1/1	9/28/2017 17:00	9/28/2017 17:00	9/28/2017 21:41	280-389384/	LB
FEW4-MW95	SO	FEW4-MW95-(151.0)	280-101273-7		1/1	9/15/2017 16:45	9/15/2017 16:45	9/28/2017 22:01	280-389384/	N
FEW4-MW95	SO	FEW4-MW95-(163.0)	280-101273-8		1/1	9/15/2017 16:50	9/15/2017 16:50	9/28/2017 22:21	280-389384/	N
FEW4-MW95	SO	FEW4-MW95-(171.0)	280-101273-9		1/1	9/15/2017 18:00	9/15/2017 18:00	9/28/2017 22:41	280-389384/	N
FEW4-MW95	SO	FEW4-MW95-(185.0)	280-101273-10		1/1	9/15/2017 18:05	9/15/2017 18:05	9/28/2017 23:01	280-389384/	N
FEW4-MW95	SO	FEW4-MW95-(186.0)	280-101273-11		1/1	9/15/2017 19:05	9/15/2017 19:05	9/28/2017 23:21	280-389384/	FD

US Army Corps of Engineers ®

Field Batch Report

--No Records Found--

MS Mismatch Report

--No Records Found--

Section to identify Matrix Spike mismatches where parent sample differs from MS by dilution.

US Army Corps of Engineers ®

QC Outlier Report

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

QC Element	Sample ID/ Lab Sample ID	Run#/ Dil'n	Analyte	Result (Units)	Qualifier	Warning Limits	Control Limits	Reason	Comment	Rule	Action Level
MS Recovery	FEW4-MW97-(221.0) (MS) / 280-101273-2MS	1 / 1.00	1,2,4-Trichlorobenzene	64.66 (percent)	J/UJ	67 - 129	67 - 129	M			
MS Recovery	FEW4-MW97-(221.0) (MS) / 280-101273-2MS	1 / 1.00	1,2,4-Trimethylbenzene	67.51 (percent)	J/UJ	75 - 123	75 - 123	M			
MS Recovery	FEW4-MW97-(221.0) (MS) / 280-101273-2MS	1 / 1.00	1,2-Dichlorobenzene	73.85 (percent)	J/UJ	78 - 121	78 - 121	M			
MS Recovery	FEW4-MW97-(221.0) (MS) / 280-101273-2MS	1 / 1.00	1,3,5-Trimethylbenzene	66.72 (percent)	J/UJ	73 - 124	73 - 124	M			
MS Recovery	FEW4-MW97-(221.0) (MS) / 280-101273-2MS	1 / 1.00	1,3-Dichlorobenzene	65.93 (percent)	J/UJ	77 - 121	77 - 121	M			
MS Recovery	FEW4-MW97-(221.0) (MS) / 280-101273-2MS	1 / 1.00	1,4-Dichlorobenzene	64.82 (percent)	J/UJ	75 - 120	75 - 120	M			
MS Recovery	FEW4-MW97-(221.0) (MS) / 280-101273-2MS	1 / 1.00	2-Chlorotoluene	67.35 (percent)	J/UJ	75 - 122	75 - 122	M			
MS Recovery	FEW4-MW97-(221.0) (MS) / 280-101273-2MS	1 / 1.00	4-Chlorotoluene	67.04 (percent)	J/UJ	72 - 124	72 - 124	M			
MS Recovery	FEW4-MW97-(221.0) (MS) / 280-101273-2MS	1 / 1.00	Bromobenzene	75.75 (percent)	J/UJ	78 - 121	78 - 121	M			
MS Recovery	FEW4-MW97-(221.0) (MS) / 280-101273-2MS	1 / 1.00	Chlorobenzene	73.85 (percent)	J/UJ	79 - 120	79 - 120	M			
MS Recovery	FEW4-MW97-(221.0) (MS) / 280-101273-2MS	1 / 1.00	Ethylbenzene	74.33 (percent)	J/UJ	76 - 122	76 - 122	M			
MS Recovery	FEW4-MW97-(221.0) (MS) / 280-101273-2MS	1 / 1.00	Hexachlorobutadiene	49.76 (percent)	J/UJ	61 - 135	61 - 135	M			
MS Recovery	FEW4-MW97-(221.0) (MS) / 280-101273-2MS	1 / 1.00	m,p-Xylene	71.32 (percent)	J/UJ	77 - 124	77 - 124	M			
MS Recovery	FEW4-MW97-(221.0) (MS) / 280-101273-2MS	1 / 1.00	n-Butylbenzene	56.58 (percent)	J/UJ	70 - 128	70 - 128	M			
MS Recovery	FEW4-MW97-(221.0) (MS) / 280-101273-2MS	1 / 1.00	n-Propylbenzene	65.45 (percent)	J/UJ	73 - 125	73 - 125	M			
MS Recovery	FEW4-MW97-(221.0) (MS) / 280-101273-2MS	1 / 1.00	p-Cymene (p-Isopropyltoluene)	60.22 (percent)	J/UJ	73 - 127	73 - 127	M			
MS Recovery	FEW4-MW97-(221.0) (MS) / 280-101273-2MS	1 / 1.00	sec-Butylbenzene	63.39 (percent)	J/UJ	73 - 126	73 - 126	M			
MS Recovery	FEW4-MW97-(221.0) (MS) / 280-101273-2MS	1 / 1.00	tert-Butylbenzene	67.67 (percent)	J/UJ	73 - 125	73 - 125	M			

US Army Corps of Engineers ®

QC Outlier Report

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

QC Element	Sample ID/ Lab Sample ID	Run#/ Dil'n	Analyte	Result (Units)	Qualifier	Warning Limits	Control Limits	Reason	Comment	Rule	Action Level
MS Recovery	FEW4-MW97-(221.0) (MS) / 280-101273-2MS	1 / 1.00	Tetrachloroethene (PCE)	70.05 (percent)	J/UJ	73 - 128	73 - 128	M			
MS Recovery	FEW4-MW97-(221.0) (SD) / 280-101273-2MSD	1 / 1.00	1,2,3-Trichlorobenzene	65.95 (percent)	J/UJ	66 - 130	66 - 130	M			
MS Recovery	FEW4-MW97-(221.0) (SD) / 280-101273-2MSD	1 / 1.00	1,2,4-Trichlorobenzene	55.14 (percent)	J/UJ	67 - 129	67 - 129	M			
MS Recovery	FEW4-MW97-(221.0) (SD) / 280-101273-2MSD	1 / 1.00	1,2,4-Trimethylbenzene	58.02 (percent)	J/UJ	75 - 123	75 - 123	M			
MS Recovery	FEW4-MW97-(221.0) (SD) / 280-101273-2MSD	1 / 1.00	1,2-Dichlorobenzene	65.05 (percent)	J/UJ	78 - 121	78 - 121	M			
MS Recovery	FEW4-MW97-(221.0) (SD) / 280-101273-2MSD	1 / 1.00	1,3,5-Trimethylbenzene	62.70 (percent)	J/UJ	73 - 124	73 - 124	M			
MS Recovery	FEW4-MW97-(221.0) (SD) / 280-101273-2MSD	1 / 1.00	1,3-Dichlorobenzene	59.82 (percent)	J/UJ	77 - 121	77 - 121	M			
MS Recovery	FEW4-MW97-(221.0) (SD) / 280-101273-2MSD	1 / 1.00	1,4-Dichlorobenzene	56.04 (percent)	J/UJ	75 - 120	75 - 120	M			
MS Recovery	FEW4-MW97-(221.0) (SD) / 280-101273-2MSD	1 / 1.00	2-Chlorotoluene	63.96 (percent)	J/UJ	75 - 122	75 - 122	M			
MS Recovery	FEW4-MW97-(221.0) (SD) / 280-101273-2MSD	1 / 1.00	4-Chlorotoluene	62.16 (percent)	J/UJ	72 - 124	72 - 124	M			
MS Recovery	FEW4-MW97-(221.0) (SD) / 280-101273-2MSD	1 / 1.00	Bromobenzene	69.91 (percent)	J/UJ	78 - 121	78 - 121	M			
MS Recovery	FEW4-MW97-(221.0) (SD) / 280-101273-2MSD	1 / 1.00	Chlorobenzene	75.32 (percent)	J/UJ	79 - 120	79 - 120	M			
MS Recovery	FEW4-MW97-(221.0) (SD) / 280-101273-2MSD	1 / 1.00	Ethylbenzene	73.69 (percent)	J/UJ	76 - 122	76 - 122	M			
MS Recovery	FEW4-MW97-(221.0) (SD) / 280-101273-2MSD	1 / 1.00	Hexachlorobutadiene	41.44 (percent)	J/UJ	61 - 135	61 - 135	M			
MS Recovery	FEW4-MW97-(221.0) (SD) / 280-101273-2MSD	1 / 1.00	m,p-Xylene	68.65 (percent)	J/UJ	77 - 124	77 - 124	M			
MS Recovery	FEW4-MW97-(221.0) (SD) / 280-101273-2MSD	1 / 1.00	n-Butylbenzene	48.29 (percent)	J/UJ	70 - 128	70 - 128	M			
MS Recovery	FEW4-MW97-(221.0) (SD) / 280-101273-2MSD	1 / 1.00	n-Propylbenzene	60.36 (percent)	J/UJ	73 - 125	73 - 125	M			
MS Recovery	FEW4-MW97-(221.0) (SD) / 280-101273-2MSD	1 / 1.00	o-Xylene	73.87 (percent)	J/UJ	77 - 123	77 - 123	M			

QC Outlier Report

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

QC Element	Sample ID/ Lab Sample ID	Run#/ Dil'n	Analyte	Result (Units)	Qualifier	Warning Limits	Control Limits	Reason	Comment	Rule	Action Level
MS Recovery	FEW4-MW97-(221.0) (SD) / 280-101273-2MSD	1 / 1.00	p-Cymene (p-Isopropyltoluene)	52.43 (percent)	J/UJ	73 - 127	73 - 127	M			
MS Recovery	FEW4-MW97-(221.0) (SD) / 280-101273-2MSD	1 / 1.00	sec-Butylbenzene	58.02 (percent)	J/UJ	73 - 126	73 - 126	M			
MS Recovery	FEW4-MW97-(221.0) (SD) / 280-101273-2MSD	1 / 1.00	tert-Butylbenzene	62.16 (percent)	J/UJ	73 - 125	73 - 125	M			
MS RPD	280-101273-2MSD (SD) / 280-101273-2MSD	1 / 1.00	1,2,3-Trichlorobenzene	21.90 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101273-2MSD (SD) / 280-101273-2MSD	1 / 1.00	1,2,4-Trichlorobenzene	28.57 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101273-2MSD (SD) / 280-101273-2MSD	1 / 1.00	1,2,4-Trimethylbenzene	27.81 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101273-2MSD (SD) / 280-101273-2MSD	1 / 1.00	1,2-Dichlorobenzene	25.39 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101273-2MSD (SD) / 280-101273-2MSD	1 / 1.00	1,3-Dichlorobenzene	22.46 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101273-2MSD (SD) / 280-101273-2MSD	1 / 1.00	1,4-Dichlorobenzene	27.22 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101273-2MSD (SD) / 280-101273-2MSD	1 / 1.00	4-Chlorotoluene	20.31 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101273-2MSD (SD) / 280-101273-2MSD	1 / 1.00	Acetone	21.90 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101273-2MSD (SD) / 280-101273-2MSD	1 / 1.00	Bromobenzene	20.79 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101273-2MSD (SD) / 280-101273-2MSD	1 / 1.00	Hexachlorobutadiene	30.88 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101273-2MSD (SD) / 280-101273-2MSD	1 / 1.00	n-Butylbenzene	28.48 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101273-2MSD (SD) / 280-101273-2MSD	1 / 1.00	n-Propylbenzene	20.86 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101273-2MSD (SD) / 280-101273-2MSD	1 / 1.00	p-Cymene (p-Isopropyltoluene)	26.53 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101273-2MSD (SD) / 280-101273-2MSD	1 / 1.00	sec-Butylbenzene	21.61 (rpd)	J/None	< 20	< 20	D			

US Army Corps of Engineers ®

QC Outlier Report

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

QC Element	Sample ID/ Lab Sample ID	Run#/ Dil'n	Analyte	Result (Units)	Qualifier	Warning Limits	Control Limits	Reason	Comment	Rule	Action Level
MS RPD	280-101273-2MSD (SD) / 280-101273-2MSD	1 / 1.00	tert-Butylbenzene	21.24 (rpd)	J/None	< 20	< 20	D			

Rule is the multiplier used when blank contamination occurs to determine action level.

Qualified Results

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW95-(141.0)	280-101273-6	SO	N	Acetone	20.0	18.0 J	18.0 J		ug/kg	TR
FEW4-MW97-(221.0)	280-101273-2	SO	N	1,2,3-Trichlorobenzene	5.20	1.70 U J	1.70 UJ	-	ug/kg	M
FEW4-MW97-(221.0)	280-101273-2	SO	N	1,2,4-Trichlorobenzene	5.20	1.70 U J	1.70 UJ	-	ug/kg	M
FEW4-MW97-(221.0)	280-101273-2	SO	N	1,2,4-Trimethylbenzene	5.20	1.70 U J	1.70 UJ	-	ug/kg	M
FEW4-MW97-(221.0)	280-101273-2	SO	N	1,2-Dichlorobenzene	5.20	1.70 U J	1.70 UJ	-	ug/kg	M
FEW4-MW97-(221.0)	280-101273-2	SO	N	1,3,5-Trimethylbenzene	5.20	1.70 U J	1.70 UJ	-	ug/kg	M
FEW4-MW97-(221.0)	280-101273-2	SO	N	1,3-Dichlorobenzene	5.20	1.70 U J	1.70 UJ	-	ug/kg	M
FEW4-MW97-(221.0)	280-101273-2	SO	N	1,4-Dichlorobenzene	5.20	1.70 U J	1.70 UJ	-	ug/kg	M
FEW4-MW97-(221.0)	280-101273-2	SO	N	2-Chlorotoluene	5.20	1.70 U J	1.70 UJ	-	ug/kg	M
FEW4-MW97-(221.0)	280-101273-2	SO	N	4-Chlorotoluene	5.20	1.70 U J	1.70 UJ	-	ug/kg	M
FEW4-MW97-(221.0)	280-101273-2	SO	N	Bromobenzene	5.20	1.70 U J	1.70 UJ	-	ug/kg	M
FEW4-MW97-(221.0)	280-101273-2	SO	N	Chlorobenzene	5.20	1.70 U J	1.70 UJ	-	ug/kg	M
FEW4-MW97-(221.0)	280-101273-2	SO	N	Ethylbenzene	5.20	1.70 U J	1.70 UJ	-	ug/kg	M
FEW4-MW97-(221.0)	280-101273-2	SO	N	Hexachlorobutadiene	5.20	1.70 U J	1.70 UJ	-	ug/kg	M
FEW4-MW97-(221.0)	280-101273-2	SO	N	m,p-Xylene	3.30	3.30 U J	3.30 UJ	-	ug/kg	M
FEW4-MW97-(221.0)	280-101273-2	SO	N	n-Butylbenzene	5.20	1.70 U J	1.70 UJ	-	ug/kg	M
FEW4-MW97-(221.0)	280-101273-2	SO	N	n-Propylbenzene	5.20	1.70 U J	1.70 UJ	-	ug/kg	M
FEW4-MW97-(221.0)	280-101273-2	SO	N	o-Xylene	5.20	1.70 U J	1.70 UJ	-	ug/kg	M
FEW4-MW97-(221.0)	280-101273-2	SO	N	p-Cymene (p-Isopropyltoluene)	5.20	1.70 U J	1.70 UJ	-	ug/kg	M
FEW4-MW97-(221.0)	280-101273-2	SO	N	sec-Butylbenzene	5.20	1.70 U J	1.70 UJ	-	ug/kg	M
FEW4-MW97-(221.0)	280-101273-2	SO	N	tert-Butylbenzene	5.20	1.70 U J	1.70 UJ	-	ug/kg	M
FEW4-MW97-(221.0)	280-101273-2	SO	N	Tetrachloroethene (PCE)	5.20	1.70 U J	1.70 UJ	-	ug/kg	M

Qualified analytes in samples are reported as estimated, not detected (UJ) at the Limit of Detection (LOD).

US Army Corps of Engineers ®

Detected Results

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Dilution	Analyte	LOQ	Lab Result	Qualified Result	Units	Reason
FEW4-MW95-(131.0)	280-101273-5	SO	N	1	Acetone	17.0	27.0	27.0	ug/kg	
FEW4-MW95-(141.0)	280-101273-6	SO	N	1	Acetone	20.0	18.0 J	18.0 J	ug/kg	TR
FEW4-MW95-(163.0)	280-101273-8	SO	N	1	Acetone	18.0	20.0	20.0	ug/kg	
FEW4-MW95-(171.0)	280-101273-9	SO	N	1	Acetone	18.0	23.0	23.0	ug/kg	
FEW4-MW95-(185.0)	280-101273-10	SO	N	1	Acetone	18.0	21.0	21.0	ug/kg	
FEW4-MW95-(186.0)	280-101273-11	SO	FD	1	Acetone	20.0	25.0	25.0	ug/kg	
FEW4-MW97-(231.0)	280-101273-3	SO	N	1	Acetone	22.0	30.0	30.0	ug/kg	

US Army Corps of Engineers ®

Rejected Results

--No Records Found--

US Army Corps of Engineers ®

Facility:	B08WY0467-02, F.E. Warren AFB, Site 4
Event:	2017-2018 RI Addendum Tasks
SDG:	280-101273-1_52_2a_FUDSChem
Guidance Document:	Draft-Final Uniform Federal Policy-Quality Assurance Project Plan for the Remedial Investigation Addendum 2017-2018 Tasks Atlas "D" Missile Site 4 —Laramie County, Wyoming, July 2017
Prime Contractor:	RMC Consultants, Inc., LAKEWOOD, CO
Project Manager:	David Groy
Contract Laboratory:	TestAmerica Laboratories, Inc., Arvada, CO
Data Review Contractor:	RMC Consultants
Data Review Level:	Stage 3VEM
Primary Data Reviewer:	Gary Torf, Contractor Project Chemist
Second Reviewer:	, Senior Scientist
Date Submitted:	

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	SW8260B
FEW4-MW95-(186.0)	280-101273-11	Solid	Field Duplicate/FD	X
FEW4-MW95-(131.0)	280-101273-5	Solid	Field Sample/N	X
FEW4-MW95-(141.0)	280-101273-6	Solid	Field Sample/N	X
FEW4-MW95-(151.0)	280-101273-7	Solid	Field Sample/N	X
FEW4-MW95-(163.0)	280-101273-8	Solid	Field Sample/N	X
FEW4-MW95-(171.0)	280-101273-9	Solid	Field Sample/N	X
FEW4-MW95-(185.0)	280-101273-10	Solid	Field Sample/N	X
FEW4-MW97-(211.0)	280-101273-1	Solid	Field Sample/N	X
FEW4-MW97-(221.0)	280-101273-2	Solid	Field Sample/N	X
FEW4-MW97-(231.0)	280-101273-3	Solid	Field Sample/N	X
FEW4-MW97-(241.0)	280-101273-4	Solid	Field Sample/N	X

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the Draft-Final Uniform Federal Policy-Quality Assurance Project Plan for the Remedial Investigation Addendum 2017-2018 Tasks Atlas“D” Missile Site 4 —Laramie County, Wyoming, July 2017 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by RMC Consultants, Inc., LAKEWOOD, CO; analyses were performed by TestAmerica Laboratories, Inc., Arvada, CO and were reported under sample delivery group (SDG) 280-101273-1_52_2a_FUDSChem. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

- Blank
- Blank - Negative
- Field Duplicate RPD
- LCS Recovery
- LCS RPD
- MS Recovery
- MS RPD
- Prep Hold Time
- Surrogate
- Test Hold Time

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 21 results (2.89%) out of the 726 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected. Trace values, defined as results that are qualified as estimated because they fall between the limit of detection and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

Narrative Comments

Analytical Method	Data Reviewer Comment
SW8260B	No additional comments; see Checklist for detail.

Gary Torf

January 02, 2018

Reviewed by Gary Torf, Contractor Project Chemist, RMC Consultants

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of a minimum of 10% of the reported sample results and method quality control data between the two deliverables.

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

Quality Control Outliers for test method SW8260B, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
FEW4-MW97-(221.0) (MS)/ 280-101273-2MS	Hexachlorobutadiene	49.76	61 - 135	61 - 135	percent	J/UJ	M	
FEW4-MW97-(221.0) (MS)/ 280-101273-2MS	n-Butylbenzene	56.58	70 - 128	70 - 128	percent	J/UJ	M	
FEW4-MW97-(221.0) (MS)/ 280-101273-2MS	p-Cymene (p-Isopropyltoluene)	60.22	73 - 127	73 - 127	percent	J/UJ	M	
FEW4-MW97-(221.0) (MS)/ 280-101273-2MS	sec-Butylbenzene	63.39	73 - 126	73 - 126	percent	J/UJ	M	
FEW4-MW97-(221.0) (MS)/ 280-101273-2MS	1,2,4-Trichlorobenzene	64.66	67 - 129	67 - 129	percent	J/UJ	M	
FEW4-MW97-(221.0) (MS)/ 280-101273-2MS	1,4-Dichlorobenzene	64.82	75 - 120	75 - 120	percent	J/UJ	M	
FEW4-MW97-(221.0) (MS)/ 280-101273-2MS	n-Propylbenzene	65.45	73 - 125	73 - 125	percent	J/UJ	M	
FEW4-MW97-(221.0) (MS)/ 280-101273-2MS	1,3-Dichlorobenzene	65.93	77 - 121	77 - 121	percent	J/UJ	M	
FEW4-MW97-(221.0) (MS)/ 280-101273-2MS	1,3,5-Trimethylbenzene	66.72	73 - 124	73 - 124	percent	J/UJ	M	
FEW4-MW97-(221.0) (MS)/ 280-101273-2MS	4-Chlorotoluene	67.04	72 - 124	72 - 124	percent	J/UJ	M	
FEW4-MW97-(221.0) (MS)/ 280-101273-2MS	2-Chlorotoluene	67.35	75 - 122	75 - 122	percent	J/UJ	M	
FEW4-MW97-(221.0) (MS)/ 280-101273-2MS	1,2,4-Trimethylbenzene	67.51	75 - 123	75 - 123	percent	J/UJ	M	
FEW4-MW97-(221.0) (MS)/ 280-101273-2MS	tert-Butylbenzene	67.67	73 - 125	73 - 125	percent	J/UJ	M	
FEW4-MW97-(221.0) (MS)/ 280-101273-2MS	Tetrachloroethene (PCE)	70.05	73 - 128	73 - 128	percent	J/UJ	M	
FEW4-MW97-(221.0) (MS)/ 280-101273-2MS	m,p-Xylene	71.32	77 - 124	77 - 124	percent	J/UJ	M	
FEW4-MW97-(221.0) (MS)/ 280-101273-2MS	1,2-Dichlorobenzene	73.85	78 - 121	78 - 121	percent	J/UJ	M	
FEW4-MW97-(221.0) (MS)/ 280-101273-2MS	Chlorobenzene	73.85	79 - 120	79 - 120	percent	J/UJ	M	
FEW4-MW97-(221.0) (MS)/ 280-101273-2MS	Ethylbenzene	74.33	76 - 122	76 - 122	percent	J/UJ	M	
FEW4-MW97-(221.0) (MS)/ 280-101273-2MS	Bromobenzene	75.75	78 - 121	78 - 121	percent	J/UJ	M	
FEW4-MW97-(221.0) (SD)/ 280-101273-2MSD	Hexachlorobutadiene	41.44	61 - 135	61 - 135	percent	J/UJ	M	
FEW4-MW97-(221.0) (SD)/ 280-101273-2MSD	n-Butylbenzene	48.29	70 - 128	70 - 128	percent	J/UJ	M	
FEW4-MW97-(221.0) (SD)/ 280-101273-2MSD	p-Cymene (p-Isopropyltoluene)	52.43	73 - 127	73 - 127	percent	J/UJ	M	
FEW4-MW97-(221.0) (SD)/ 280-101273-2MSD	1,2,4-Trichlorobenzene	55.14	67 - 129	67 - 129	percent	J/UJ	M	
FEW4-MW97-(221.0) (SD)/ 280-101273-2MSD	1,4-Dichlorobenzene	56.04	75 - 120	75 - 120	percent	J/UJ	M	

Quality Control Outliers for test method SW8260B, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
FEW4-MW97-(221.0) (SD)/ 280-101273-2MSD	sec-Butylbenzene	58.02	73 - 126	73 - 126	percent	J/UJ	M	
FEW4-MW97-(221.0) (SD)/ 280-101273-2MSD	1,2,4-Trimethylbenzene	58.02	75 - 123	75 - 123	percent	J/UJ	M	
FEW4-MW97-(221.0) (SD)/ 280-101273-2MSD	1,3-Dichlorobenzene	59.82	77 - 121	77 - 121	percent	J/UJ	M	
FEW4-MW97-(221.0) (SD)/ 280-101273-2MSD	n-Propylbenzene	60.36	73 - 125	73 - 125	percent	J/UJ	M	
FEW4-MW97-(221.0) (SD)/ 280-101273-2MSD	4-Chlorotoluene	62.16	72 - 124	72 - 124	percent	J/UJ	M	
FEW4-MW97-(221.0) (SD)/ 280-101273-2MSD	tert-Butylbenzene	62.16	73 - 125	73 - 125	percent	J/UJ	M	
FEW4-MW97-(221.0) (SD)/ 280-101273-2MSD	1,3,5-Trimethylbenzene	62.70	73 - 124	73 - 124	percent	J/UJ	M	
FEW4-MW97-(221.0) (SD)/ 280-101273-2MSD	2-Chlorotoluene	63.96	75 - 122	75 - 122	percent	J/UJ	M	
FEW4-MW97-(221.0) (SD)/ 280-101273-2MSD	1,2-Dichlorobenzene	65.05	78 - 121	78 - 121	percent	J/UJ	M	
FEW4-MW97-(221.0) (SD)/ 280-101273-2MSD	1,2,3-Trichlorobenzene	65.95	66 - 130	66 - 130	percent	J/UJ	M	
FEW4-MW97-(221.0) (SD)/ 280-101273-2MSD	m,p-Xylene	68.65	77 - 124	77 - 124	percent	J/UJ	M	
FEW4-MW97-(221.0) (SD)/ 280-101273-2MSD	Bromobenzene	69.91	78 - 121	78 - 121	percent	J/UJ	M	
FEW4-MW97-(221.0) (SD)/ 280-101273-2MSD	Ethylbenzene	73.69	76 - 122	76 - 122	percent	J/UJ	M	
FEW4-MW97-(221.0) (SD)/ 280-101273-2MSD	o-Xylene	73.87	77 - 123	77 - 123	percent	J/UJ	M	
FEW4-MW97-(221.0) (SD)/ 280-101273-2MSD	Chlorobenzene	75.32	79 - 120	79 - 120	percent	J/UJ	M	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the MS Recovery for SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW97-(221.0)	N	Chlorobenzene	5.20	1.70 U J	1.70 UJ	-	ug/kg	M
FEW4-MW97-(221.0)	N	Tetrachloroethene (PCE)	5.20	1.70 U J	1.70 UJ	-	ug/kg	M
FEW4-MW97-(221.0)	N	1,2,3-Trichlorobenzene	5.20	1.70 U J	1.70 UJ	-	ug/kg	M
FEW4-MW97-(221.0)	N	1,2,4-Trichlorobenzene	5.20	1.70 U J	1.70 UJ	-	ug/kg	M
FEW4-MW97-(221.0)	N	1,2,4-Trimethylbenzene	5.20	1.70 U J	1.70 UJ	-	ug/kg	M
FEW4-MW97-(221.0)	N	1,2-Dichlorobenzene	5.20	1.70 U J	1.70 UJ	-	ug/kg	M
FEW4-MW97-(221.0)	N	1,3,5-Trimethylbenzene	5.20	1.70 U J	1.70 UJ	-	ug/kg	M
FEW4-MW97-(221.0)	N	1,3-Dichlorobenzene	5.20	1.70 U J	1.70 UJ	-	ug/kg	M

Qualified Results associated with the MS Recovery for SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW97-(221.0)	N	1,4-Dichlorobenzene	5.20	1.70 U J	1.70 UJ	-	ug/kg	M
FEW4-MW97-(221.0)	N	2-Chlorotoluene	5.20	1.70 U J	1.70 UJ	-	ug/kg	M
FEW4-MW97-(221.0)	N	4-Chlorotoluene	5.20	1.70 U J	1.70 UJ	-	ug/kg	M
FEW4-MW97-(221.0)	N	Bromobenzene	5.20	1.70 U J	1.70 UJ	-	ug/kg	M
FEW4-MW97-(221.0)	N	Ethylbenzene	5.20	1.70 U J	1.70 UJ	-	ug/kg	M
FEW4-MW97-(221.0)	N	Hexachlorobutadiene	5.20	1.70 U J	1.70 UJ	-	ug/kg	M
FEW4-MW97-(221.0)	N	m,p-Xylene	3.30	3.30 U J	3.30 UJ	-	ug/kg	M
FEW4-MW97-(221.0)	N	n-Butylbenzene	5.20	1.70 U J	1.70 UJ	-	ug/kg	M
FEW4-MW97-(221.0)	N	n-Propylbenzene	5.20	1.70 U J	1.70 UJ	-	ug/kg	M
FEW4-MW97-(221.0)	N	o-Xylene	5.20	1.70 U J	1.70 UJ	-	ug/kg	M
FEW4-MW97-(221.0)	N	p-Cymene (p-Isopropyltoluene)	5.20	1.70 U J	1.70 UJ	-	ug/kg	M
FEW4-MW97-(221.0)	N	sec-Butylbenzene	5.20	1.70 U J	1.70 UJ	-	ug/kg	M
FEW4-MW97-(221.0)	N	tert-Butylbenzene	5.20	1.70 U J	1.70 UJ	-	ug/kg	M

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

Quality Control Outliers for test method SW8260B, MS RPD

The objective of matrix spikes/matrix spike duplicates (MS/MSD) RPD analysis is to demonstrate acceptable method precision by the laboratory at the time of analysis. MS/MSD analyses are also performed to generate data that determines the long-term precision of the analytical method on various matrices. Non-homogenous samples can impact the apparent method precision. Summary forms were evaluated and compared to electronic data deliverables. Matrix spikes/matrix spike duplicates results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
280-101273-2MSD (SD)/ 280-101273-2MSD	4-Chlorotoluene	20.31	< 20	< 20	rpd	J/None	D	
280-101273-2MSD (SD)/ 280-101273-2MSD	Bromobenzene	20.79	< 20	< 20	rpd	J/None	D	
280-101273-2MSD (SD)/ 280-101273-2MSD	n-Propylbenzene	20.86	< 20	< 20	rpd	J/None	D	
280-101273-2MSD (SD)/ 280-101273-2MSD	tert-Butylbenzene	21.24	< 20	< 20	rpd	J/None	D	
280-101273-2MSD (SD)/ 280-101273-2MSD	sec-Butylbenzene	21.61	< 20	< 20	rpd	J/None	D	
280-101273-2MSD (SD)/ 280-101273-2MSD	Acetone	21.90	< 20	< 20	rpd	J/None	D	
280-101273-2MSD (SD)/ 280-101273-2MSD	1,2,3-Trichlorobenzene	21.90	< 20	< 20	rpd	J/None	D	
280-101273-2MSD (SD)/ 280-101273-2MSD	1,3-Dichlorobenzene	22.46	< 20	< 20	rpd	J/None	D	
280-101273-2MSD (SD)/ 280-101273-2MSD	1,2-Dichlorobenzene	25.39	< 20	< 20	rpd	J/None	D	
280-101273-2MSD (SD)/ 280-101273-2MSD	p-Cymene (p-Isopropyltoluene)	26.53	< 20	< 20	rpd	J/None	D	
280-101273-2MSD (SD)/ 280-101273-2MSD	1,4-Dichlorobenzene	27.22	< 20	< 20	rpd	J/None	D	
280-101273-2MSD (SD)/ 280-101273-2MSD	1,2,4-Trimethylbenzene	27.81	< 20	< 20	rpd	J/None	D	
280-101273-2MSD (SD)/ 280-101273-2MSD	n-Butylbenzene	28.48	< 20	< 20	rpd	J/None	D	
280-101273-2MSD (SD)/ 280-101273-2MSD	1,2,4-Trichlorobenzene	28.57	< 20	< 20	rpd	J/None	D	

Quality Control Outliers for test method SW8260B, MS RPD

The objective of matrix spikes/matrix spike duplicates (MS/MSD) RPD analysis is to demonstrate acceptable method precision by the laboratory at the time of analysis. MS/MSD analyses are also performed to generate data that determines the long-term precision of the analytical method on various matrices. Non-homogenous samples can impact the apparent method precision. Summary forms were evaluated and compared to electronic data deliverables. Matrix spikes/matrix spike duplicates results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
280-101273-2MSD (SD)/ 280-101273-2MSD	Hexachlorobutadiene	30.88	< 20	< 20	rpd	J/None	D	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

US Army Corps of Engineers ®

Table of All Qualified Results

Test Method: SW8260B	Extraction Method: SW5035A							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW97-(221.0)	N	Chlorobenzene	5.20	1.70 U J	1.70 UJ	-	ug/kg	M
FEW4-MW97-(221.0)	N	Tetrachloroethene (PCE)	5.20	1.70 U J	1.70 UJ	-	ug/kg	M
FEW4-MW97-(221.0)	N	1,2,3-Trichlorobenzene	5.20	1.70 U J	1.70 UJ	-	ug/kg	M
FEW4-MW97-(221.0)	N	1,2,4-Trichlorobenzene	5.20	1.70 U J	1.70 UJ	-	ug/kg	M
FEW4-MW97-(221.0)	N	1,2,4-Trimethylbenzene	5.20	1.70 U J	1.70 UJ	-	ug/kg	M
FEW4-MW97-(221.0)	N	1,2-Dichlorobenzene	5.20	1.70 U J	1.70 UJ	-	ug/kg	M
FEW4-MW97-(221.0)	N	1,3,5-Trimethylbenzene	5.20	1.70 U J	1.70 UJ	-	ug/kg	M
FEW4-MW97-(221.0)	N	1,3-Dichlorobenzene	5.20	1.70 U J	1.70 UJ	-	ug/kg	M
FEW4-MW97-(221.0)	N	1,4-Dichlorobenzene	5.20	1.70 U J	1.70 UJ	-	ug/kg	M
FEW4-MW97-(221.0)	N	2-Chlorotoluene	5.20	1.70 U J	1.70 UJ	-	ug/kg	M
FEW4-MW97-(221.0)	N	4-Chlorotoluene	5.20	1.70 U J	1.70 UJ	-	ug/kg	M
FEW4-MW97-(221.0)	N	Bromobenzene	5.20	1.70 U J	1.70 UJ	-	ug/kg	M
FEW4-MW97-(221.0)	N	Ethylbenzene	5.20	1.70 U J	1.70 UJ	-	ug/kg	M
FEW4-MW97-(221.0)	N	Hexachlorobutadiene	5.20	1.70 U J	1.70 UJ	-	ug/kg	M
FEW4-MW97-(221.0)	N	m,p-Xylene	3.30	3.30 U J	3.30 UJ	-	ug/kg	M
FEW4-MW97-(221.0)	N	n-Butylbenzene	5.20	1.70 U J	1.70 UJ	-	ug/kg	M
FEW4-MW97-(221.0)	N	n-Propylbenzene	5.20	1.70 U J	1.70 UJ	-	ug/kg	M
FEW4-MW97-(221.0)	N	o-Xylene	5.20	1.70 U J	1.70 UJ	-	ug/kg	M
FEW4-MW97-(221.0)	N	p-Cymene (p-Isopropyltoluene)	5.20	1.70 U J	1.70 UJ	-	ug/kg	M
FEW4-MW97-(221.0)	N	sec-Butylbenzene	5.20	1.70 U J	1.70 UJ	-	ug/kg	M
FEW4-MW97-(221.0)	N	tert-Butylbenzene	5.20	1.70 U J	1.70 UJ	-	ug/kg	M

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
Trace values are not included in the qualified results table unless additional reason codes are associated.

Table of All Trace Results

Test Method: SW8260B	Extraction Method: SW5035A							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW95-(141.0)	N	Acetone	20.0	18.0 J	18.0 J		ug/kg	TR

Results with Modified Qualifiers

No qualifiers associated with this sample delivery group were modified manually.

Reason Code Definitions

Code	Definition
D	MS RPD
M	MS Recovery
TR	Trace Level Detect

Flag Code and Definitions

Flag	Definition
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
J	Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
R	The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making.
B	Blank contamination: The analyte was found in an associated blank above one half the RL, as well as in the sample.
UB	The analyte was also detected in an associated laboratory or field blank at a concentration comparable to the concentration in the sample. The reported result has been requalified as not detected.

Review Questions

Method: SW8260B (Volatile Organic Compounds by Capillary GC/MS)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were sample reciept temperatures met?	•			Sample receipt temperature was 5.0ºC.
Were QAPP specified Project Quantitation Limit Goals achieved?	•			
Were all QAPP-specified target analytes reported?	•			
Was the GC/MS system properly tuned based on method criteria?	•			
Was the criteria met during each 12 hour shift (prior to ICAL and Cal Ver.)?	•			
Does the initial calibration curve consist of 5 concentration levels, with the low standard near but > MDL?	•			
Did the Calibration Check Compounds (CCCs) have a relative standard deviation within QAPP acceptance limits?	•			
Were the average response factors (RFs) for the System Performance Check Compounds (SPCCs) within QAPP acceptance limits?	•			
Were the ICAL %RSDs for the target compounds within method criteria?	•			
If a quadratic equation curve was used, was the coefficient of determination (COD) within criteria?	•			
If a linear regression curve was used, was the correlation coefficient within criteria?	•			
Check and recalculate the response factors and average response factors for a least one target compound.	•			ICAL VMS-G 9/26/17 TCE AVG RF = 0.3354
Check and recalculate the %RSD for one of more target compounds and DMCs. Verify that the recalculated values agree with the laboratory reported values.	•			VMS_G 9/26/17 TCE %RSD = 2.3% 1,2-DCA-d4 %RSD = 6.1%
Was a second source verification analyzed after the ICAL and all analytes within criteria?	•			
Was a CCV run at the beginning of the analytical sequence and every 12 hours?	•			
Was the CCV a mid-level standard from the initial calibration curve?	•			
Did the CCCs have a %Difference within QAPP acceptance limits?	•			
Were the average RFs for the SPCCs within QAPP acceptance limits?	•			
Was the %D (difference or drift) for all target analytes within QAPP acceptance limits?		•		CCV 280-389194/2: 2-Butanone (26.8%) and dichlorodifluoromethane (28.6%) exceeded the 20% difference criteria. These analytes were not detected in any associated samples. CCV 280-389356/2: 2-Butanone (20.7%) exceeded the 20% difference criteria. The analyte was not detected in any associated samples.
Check and recalculate the CCV relative response factor for at least one target compound.	•			VMS-G 9/27/17 CCV 280-389194/2 TCE RRF = 0.3366
Were the internal standards added to every standard, blank, matrix spike, matrix spike duplicate, and sample?	•			

Review Questions

Method: SW8260B (Volatile Organic Compounds by Capillary GC/MS)				
Review Questions	Yes	No	NA	Comment
Were the retention times for all IS compounds within QAPP acceptance limits?	•			
Are the area counts of all IS compounds within QAPP acceptance limits?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than 1/2 LOQ and less than 1/10 the amount in any sample?	•			
Were target analytes in the field blank less than 1/2 LOQ and less than 1/10 the amount in any sample?			•	
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?	•			FEW4-MW95-(186.0) was a blind field duplicate of FEW4-MW95-(185.0).
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were the LCS/LCSD recoveries within QAPP acceptance limits?	•			
Were the LCS/LCSD RPDs within QAPP acceptance limits?			•	
Was the duplicate RPD within QAPP acceptance limits?			•	
Was a MS/MSD pair prepared with each batch?	•			
Is the MS/MSD parent sample the one designated by the sampling team?	•			FEW4-MW97-(221.0) was designated for MS/MSD analysis.
Were MS/MSD recoveries and RPD within QAPP acceptance limits?		•		Several analytes were recovered less than the lower control limit in the MS and MSD, and several analytes exceeded the precision limit of 20% RPD.
Were surrogate recoveries within QAPP acceptance limits?	•			
Were reported sample concentrations within calibration range?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were instrument run logs present and filled out appropriately?	•			
Were sample prepration sheets present and filled out appropriately?	•			
Check and recalculate the %D for one target compound. Verify that the recalculated values agree with the laboratory-reported values.			•	
Examine raw data to verify correct calculation of sample results reported by the laboratory. Compare quantitation lists and chromatograms to the reported detect and non-detect sample results.	•			
Verify that the reporting limits and sample results have been adjusted to reflect all sample dilutions and Percent Moisture factors (non-aqueous samples).	•			FEW4-MW95-(185.0) TCE = Not detected.

US Army Corps of Engineers ®

Batch Report

Test Method: SW8260B Analysis Batch: 280-389366

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
LABQC	SQ	LCS 280-389366/1-A	LCS 280-389366/1-A		1/1	9/28/2017 17:00	9/28/2017 17:00	9/28/2017 21:32	280-389366/	BS
LABQC	SQ	MB 280-389366/2-A	MB 280-389366/2-A		1/1	9/28/2017 17:00	9/28/2017 17:00	9/28/2017 22:13	280-389366/	LB
FEW4-MW97	SO	FEW4-MW97-(251.0)	280-101291-1		1/1	9/16/2017 11:35	9/16/2017 11:35	9/28/2017 22:33	280-389366/	N
FEW4-MW97	SO	FEW4-MW97-(261.0)	280-101291-2		1/1	9/16/2017 11:40	9/16/2017 11:40	9/28/2017 22:53	280-389366/	N
FEW4-MW97	SO	FEW4-MW97-(262.0)	280-101291-3		1/1	9/16/2017 12:40	9/16/2017 12:40	9/28/2017 23:13	280-389366/	FD
FEW4-MW97	SO	FEW4-MW97-(271.0)	280-101291-4		1/1	9/16/2017 13:00	9/16/2017 13:00	9/28/2017 23:34	280-389366/	N
FEW4-MW95	SO	FEW4-MW95-(204.0)	280-101291-6		1/1	9/16/2017 11:00	9/16/2017 11:00	9/29/2017 00:14	280-389366/	N
FEW4-MW95	SO	FEW4-MW95-(209.0)	280-101291-7		1/1	9/16/2017 12:40	9/16/2017 12:40	9/29/2017 00:34	280-389366/	N
FEW4-MW95	SO	FEW4-MW95-(224.0)	280-101291-8		1/1	9/16/2017 12:45	9/16/2017 12:45	9/29/2017 00:54	280-389366/	N
FEW4-MW95	SO	FEW4-MW95-(224.0)	280-101291-8MS		1/1	9/16/2017 12:45	9/16/2017 12:45	9/29/2017 01:14	280-389366/	MS
FEW4-MW95	SO	FEW4-MW95-(224.0)	280-101291-8MSD		1/1	9/16/2017 12:45	9/16/2017 12:45	9/29/2017 01:34	280-389366/	SD
FEW4-MW95	SO	FEW4-MW95-(247.0)	280-101291-9		1/1	9/16/2017 14:45	9/16/2017 14:45	9/29/2017 02:15	280-389366/	N
FEW4-MW95	SO	FEW4-MW95-(235.0)	280-101291-10		1/1	9/16/2017 14:55	9/16/2017 14:55	9/29/2017 02:35	280-389366/	N
FEW4-MW97	SO	FEW4-MW97-(291.0)	280-101291-11		1/1	9/16/2017 15:54	9/16/2017 15:54	9/29/2017 02:55	280-389366/	N
FEW4-MW97	SO	FEW4-MW97-(301.0)	280-101291-12		1/1	9/16/2017 16:00	9/16/2017 16:00	9/29/2017 03:15	280-389366/	N
FEW4-MW97	SO	FEW4-MW97-(311.0)	280-101291-13		1/1	9/17/2017 11:55	9/17/2017 11:55	9/29/2017 03:35	280-389366/	N
FEW4-MW97	SO	FEW4-MW97-(321.0)	280-101291-14		1/1	9/17/2017 12:00	9/17/2017 12:00	9/29/2017 03:55	280-389366/	N
FEW4-MW97	SO	FEW4-MW97-(331.0)	280-101291-15		1/1	9/17/2017 13:20	9/17/2017 13:20	9/29/2017 04:15	280-389366/	N
FEW4-MW97	SO	FEW4-MW97-(341.0)	280-101291-16		1/1	9/17/2017 13:30	9/17/2017 13:30	9/29/2017 04:35	280-389366/	N
FEW4-MW97	SO	FEW4-MW97-(351.0)	280-101291-17		1/1	9/17/2017 17:00	9/17/2017 17:00	9/29/2017 04:55	280-389366/	N
FEW4-MW97	SO	FEW4-MW97-(361.0)	280-101291-18		1/1	9/17/2017 17:07	9/17/2017 17:07	9/29/2017 05:15	280-389366/	N
FEW4-MW95	SO	FEW4-MW95-(279.0)	280-101291-19		1/1	9/16/2017 18:40	9/16/2017 18:40	9/29/2017 05:34	280-389366/	N
FEW4-MW95	SO	FEW4-MW95-(289.0)	280-101291-20		1/1	9/16/2017 18:55	9/16/2017 18:55	9/29/2017 05:54	280-389366/	N

US Army Corps of Engineers®

Batch Report

Test Method: SW8260B Analysis Batch: 280-389582

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
LABQC	SQ	LCS 280-389582/1-A	LCS 280-389582/1-A		1/1	9/29/2017 17:00	9/29/2017 17:00	9/29/2017 22:40	280-389582/	BS
LABQC	SQ	MB 280-389582/2-A	MB 280-389582/2-A		1/1	9/29/2017 17:00	9/29/2017 17:00	9/29/2017 23:20	280-389582/	LB
FEW4-MW97	SO	FEW4-MW97-(281.0)	280-101291-5		1/1	9/16/2017 13:05	9/16/2017 13:05	9/30/2017 01:42	280-389582/	N
FEW4-MW95	SO	FEW4-MW95-(290.0)	280-101291-21		1/1	9/16/2017 19:55	9/16/2017 19:55	9/30/2017 02:02	280-389582/	N
FEW4-MW95	SO	FEW4-MW95-(300.0)	280-101291-22		1/1	9/17/2017 10:10	9/17/2017 10:10	9/30/2017 02:23	280-389582/	N
FEW4-MW95	SO	FEW4-MW95-(300.0)	280-101291-22MS		1/1	9/17/2017 10:10	9/17/2017 10:10	9/30/2017 02:43	280-389582/	MS
FEW4-MW95	SO	FEW4-MW95-(300.0)	280-101291-22MSD		1/1	9/17/2017 10:10	9/17/2017 10:10	9/30/2017 03:03	280-389582/	SD
FEW4-MW95	SO	FEW4-MW95-(310.0)	280-101291-23		1/1	9/17/2017 10:20	9/17/2017 10:20	9/30/2017 03:43	280-389582/	N
FEW4-MW95	SO	FEW4-MW95-(311.0)	280-101291-24		1/1	9/17/2017 11:20	9/17/2017 11:20	9/30/2017 04:03	280-389582/	FD
FEW4-MW95	SO	FEW4-MW95-(321.0)	280-101291-25		1/1	9/17/2017 12:10	9/17/2017 12:10	9/30/2017 04:23	280-389582/	N
FEW4-MW95	SO	FEW4-MW95-(333.0)	280-101291-26		1/1	9/17/2017 12:15	9/17/2017 12:15	9/30/2017 04:43	280-389582/	N
FEW4-MW95	SO	FEW4-MW95-(344.0)	280-101291-27		1/1	9/17/2017 14:15	9/17/2017 14:15	9/30/2017 05:03	280-389582/	N
FEW4-MW95	SO	FEW4-MW95-(350.0)	280-101291-28		1/1	9/17/2017 14:25	9/17/2017 14:25	9/30/2017 05:23	280-389582/	N

Field Batch Report

--No Records Found--

MS Mismatch Report

--No Records Found--

Section to identify Matrix Spike mismatches where parent sample differs from MS by dilution.

US Army Corps of Engineers®

QC Outlier Report

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

QC Element	Sample ID/ Lab Sample ID	Run#/ Dil'n	Analyte	Result (Units)	Qualifier	Warning Limits	Control Limits	Reason	Comment	Rule	Action Level
MS Recovery	FEW4-MW95-(224.0) (MS) / 280-101291-8MS	1 / 1.00	1,3-Dichlorobenzene	76.80 (percent)	J/UJ	77 - 121	77 - 121	M			
MS Recovery	FEW4-MW95-(300.0) (SD) / 280-101291-22MSD	1 / 1.00	1,2,4-Trichlorobenzene	66.83 (percent)	J/UJ	67 - 129	67 - 129	M			
MS Recovery	FEW4-MW95-(300.0) (SD) / 280-101291-22MSD	1 / 1.00	1,2-Dibromoethane (EDB)	75.45 (percent)	J/UJ	78 - 122	78 - 122	M			
MS Recovery	FEW4-MW95-(300.0) (SD) / 280-101291-22MSD	1 / 1.00	1,2-Dichlorobenzene	70.89 (percent)	J/UJ	78 - 121	78 - 121	M			
MS Recovery	FEW4-MW95-(300.0) (SD) / 280-101291-22MSD	1 / 1.00	1,2-Dichloropropane	75.45 (percent)	J/UJ	76 - 123	76 - 123	M			
MS Recovery	FEW4-MW95-(300.0) (SD) / 280-101291-22MSD	1 / 1.00	1,3-Dichlorobenzene	69.27 (percent)	J/UJ	77 - 121	77 - 121	M			
MS Recovery	FEW4-MW95-(300.0) (SD) / 280-101291-22MSD	1 / 1.00	1,3-Dichloropropane	73.33 (percent)	J/UJ	77 - 121	77 - 121	M			
MS Recovery	FEW4-MW95-(300.0) (SD) / 280-101291-22MSD	1 / 1.00	1,4-Dichlorobenzene	68.94 (percent)	J/UJ	75 - 120	75 - 120	M			
MS Recovery	FEW4-MW95-(300.0) (SD) / 280-101291-22MSD	1 / 1.00	2-Chlorotoluene	73.50 (percent)	J/UJ	75 - 122	75 - 122	M			
MS Recovery	FEW4-MW95-(300.0) (SD) / 280-101291-22MSD	1 / 1.00	Bromobenzene	71.87 (percent)	J/UJ	78 - 121	78 - 121	M			
MS Recovery	FEW4-MW95-(300.0) (SD) / 280-101291-22MSD	1 / 1.00	Chlorobenzene	73.50 (percent)	J/UJ	79 - 120	79 - 120	M			
MS Recovery	FEW4-MW95-(300.0) (SD) / 280-101291-22MSD	1 / 1.00	Dibromomethane	76.91 (percent)	J/UJ	78 - 125	78 - 125	M			
MS Recovery	FEW4-MW95-(300.0) (SD) / 280-101291-22MSD	1 / 1.00	n-Propylbenzene	72.85 (percent)	J/UJ	73 - 125	73 - 125	M			
MS RPD	280-101291-22MSD (SD) / 280-101291-22MSD	1 / 1.00	1,1,1,2-Tetrachloroethane	26.76 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101291-22MSD (SD) / 280-101291-22MSD	1 / 1.00	1,1,1-Trichloroethane	23.30 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101291-22MSD (SD) / 280-101291-22MSD	1 / 1.00	1,1,2,2-Tetrachloroethane	29.67 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101291-22MSD (SD) / 280-101291-22MSD	1 / 1.00	1,1,2-Trichloroethane	27.81 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101291-22MSD (SD) / 280-101291-22MSD	1 / 1.00	1,1-Dichloroethane	22.91 (rpd)	J/None	< 20	< 20	D			

US Army Corps of Engineers®

QC Outlier Report

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

QC Element	Sample ID/ Lab Sample ID	Run#/ Dil'n	Analyte	Result (Units)	Qualifier	Warning Limits	Control Limits	Reason	Comment	Rule	Action Level
MS RPD	280-101291-22MSD (SD) / 280-101291-22MSD	1 / 1.00	1,1-Dichloropropene	21.92 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101291-22MSD (SD) / 280-101291-22MSD	1 / 1.00	1,2,3-Trichlorobenzene	25.68 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101291-22MSD (SD) / 280-101291-22MSD	1 / 1.00	1,2,3-Trichloropropane	30.54 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101291-22MSD (SD) / 280-101291-22MSD	1 / 1.00	1,2,4-Trichlorobenzene	23.42 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101291-22MSD (SD) / 280-101291-22MSD	1 / 1.00	1,2,4-Trimethylbenzene	25.75 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101291-22MSD (SD) / 280-101291-22MSD	1 / 1.00	1,2-Dibromo-3-chloropropane	33.45 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101291-22MSD (SD) / 280-101291-22MSD	1 / 1.00	1,2-Dibromoethane (EDB)	29.88 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101291-22MSD (SD) / 280-101291-22MSD	1 / 1.00	1,2-Dichlorobenzene	27.84 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101291-22MSD (SD) / 280-101291-22MSD	1 / 1.00	1,2-Dichloroethane	31.91 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101291-22MSD (SD) / 280-101291-22MSD	1 / 1.00	1,2-Dichloroethene	23.01 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101291-22MSD (SD) / 280-101291-22MSD	1 / 1.00	1,2-Dichloropropane	24.74 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101291-22MSD (SD) / 280-101291-22MSD	1 / 1.00	1,3,5-Trimethylbenzene	24.27 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101291-22MSD (SD) / 280-101291-22MSD	1 / 1.00	1,3-Dichlorobenzene	25.77 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101291-22MSD (SD) / 280-101291-22MSD	1 / 1.00	1,3-Dichloropropane	29.65 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101291-22MSD (SD) / 280-101291-22MSD	1 / 1.00	1,4-Dichlorobenzene	24.97 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101291-22MSD (SD) / 280-101291-22MSD	1 / 1.00	2,2-Dichloropropane	24.30 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101291-22MSD (SD) / 280-101291-22MSD	1 / 1.00	2-Butanone (MEK)	34.53 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101291-22MSD (SD) / 280-101291-22MSD	1 / 1.00	2-Chlorotoluene	24.12 (rpd)	J/None	< 20	< 20	D			

US Army Corps of Engineers®

QC Outlier Report

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

QC Element	Sample ID/ Lab Sample ID	Run#/ Dil'n	Analyte	Result (Units)	Qualifier	Warning Limits	Control Limits	Reason	Comment	Rule	Action Level
MS RPD	280-101291-22MSD (SD) / 280-101291-22MSD	1 / 1.00	2-Hexanone	32.76 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101291-22MSD (SD) / 280-101291-22MSD	1 / 1.00	4-Chlorotoluene	23.88 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101291-22MSD (SD) / 280-101291-22MSD	1 / 1.00	4-Methyl-2-pentanone (MIBK)	32.69 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101291-22MSD (SD) / 280-101291-22MSD	1 / 1.00	Acetone	31.58 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101291-22MSD (SD) / 280-101291-22MSD	1 / 1.00	Benzene	22.46 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101291-22MSD (SD) / 280-101291-22MSD	1 / 1.00	Bromobenzene	26.50 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101291-22MSD (SD) / 280-101291-22MSD	1 / 1.00	Bromochloromethane	27.40 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101291-22MSD (SD) / 280-101291-22MSD	1 / 1.00	Bromodichloromethane	28.18 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101291-22MSD (SD) / 280-101291-22MSD	1 / 1.00	Bromoform	30.03 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101291-22MSD (SD) / 280-101291-22MSD	1 / 1.00	Bromomethane	26.36 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101291-22MSD (SD) / 280-101291-22MSD	1 / 1.00	Carbon tetrachloride	24.26 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101291-22MSD (SD) / 280-101291-22MSD	1 / 1.00	Chlorobenzene	24.81 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101291-22MSD (SD) / 280-101291-22MSD	1 / 1.00	Chloroethane	20.62 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101291-22MSD (SD) / 280-101291-22MSD	1 / 1.00	Chloroform	25.20 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101291-22MSD (SD) / 280-101291-22MSD	1 / 1.00	cis-1,2-Dichloroethene	23.47 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101291-22MSD (SD) / 280-101291-22MSD	1 / 1.00	cis-1,3-Dichloropropene	25.38 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101291-22MSD (SD) / 280-101291-22MSD	1 / 1.00	Dibromochloromethane	28.78 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101291-22MSD (SD) / 280-101291-22MSD	1 / 1.00	Dibromomethane	28.16 (rpd)	J/None	< 20	< 20	D			

US Army Corps of Engineers®

QC Outlier Report

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

QC Element	Sample ID/ Lab Sample ID	Run#/ Dil'n	Analyte	Result (Units)	Qualifier	Warning Limits	Control Limits	Reason	Comment	Rule	Action Level
MS RPD	280-101291-22MSD (SD) / 280-101291-22MSD	1 / 1.00	Dichlorodifluoromethane	24.03 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101291-22MSD (SD) / 280-101291-22MSD	1 / 1.00	Ethylbenzene	23.26 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101291-22MSD (SD) / 280-101291-22MSD	1 / 1.00	Hexachlorobutadiene	28.75 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101291-22MSD (SD) / 280-101291-22MSD	1 / 1.00	Isopropylbenzene (Cumene)	23.79 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101291-22MSD (SD) / 280-101291-22MSD	1 / 1.00	m,p-Xylene	23.20 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101291-22MSD (SD) / 280-101291-22MSD	1 / 1.00	Methyl tert-butyl ether (MTBE)	27.60 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101291-22MSD (SD) / 280-101291-22MSD	1 / 1.00	Methylene chloride	25.12 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101291-22MSD (SD) / 280-101291-22MSD	1 / 1.00	Naphthalene	28.52 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101291-22MSD (SD) / 280-101291-22MSD	1 / 1.00	n-Butylbenzene	23.68 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101291-22MSD (SD) / 280-101291-22MSD	1 / 1.00	n-Propylbenzene	23.62 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101291-22MSD (SD) / 280-101291-22MSD	1 / 1.00	o-Xylene	23.75 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101291-22MSD (SD) / 280-101291-22MSD	1 / 1.00	p-Cymene (p-Isopropyltoluene)	24.56 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101291-22MSD (SD) / 280-101291-22MSD	1 / 1.00	sec-Butylbenzene	26.42 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101291-22MSD (SD) / 280-101291-22MSD	1 / 1.00	Styrene	25.78 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101291-22MSD (SD) / 280-101291-22MSD	1 / 1.00	tert-Butylbenzene	25.60 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101291-22MSD (SD) / 280-101291-22MSD	1 / 1.00	Tetrachloroethene (PCE)	23.35 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101291-22MSD (SD) / 280-101291-22MSD	1 / 1.00	Toluene	21.50 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101291-22MSD (SD) / 280-101291-22MSD	1 / 1.00	trans-1,2-Dichloroethene	21.18 (rpd)	J/None	< 20	< 20	D			

US Army Corps of Engineers®

QC Outlier Report

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

QC Element	Sample ID/ Lab Sample ID	Run#/ Dil'n	Analyte	Result (Units)	Qualifier	Warning Limits	Control Limits	Reason	Comment	Rule	Action Level
MS RPD	280-101291-22MSD (SD) / 280-101291-22MSD	1 / 1.00	trans-1,3-Dichloropropene	28.57 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101291-22MSD (SD) / 280-101291-22MSD	1 / 1.00	Trichloroethene (TCE)	22.99 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101291-22MSD (SD) / 280-101291-22MSD	1 / 1.00	Trichlorofluoromethane	24.15 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101291-8MSD (SD) / 280-101291-8MSD	1 / 1.00	1,2,4-Trichlorobenzene	21.63 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101291-8MSD (SD) / 280-101291-8MSD	1 / 1.00	1,2,4-Trimethylbenzene	20.85 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101291-8MSD (SD) / 280-101291-8MSD	1 / 1.00	1,2-Dichlorobenzene	20.11 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101291-8MSD (SD) / 280-101291-8MSD	1 / 1.00	1,3,5-Trimethylbenzene	21.71 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101291-8MSD (SD) / 280-101291-8MSD	1 / 1.00	1,3-Dichlorobenzene	20.14 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101291-8MSD (SD) / 280-101291-8MSD	1 / 1.00	1,4-Dichlorobenzene	20.17 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101291-8MSD (SD) / 280-101291-8MSD	1 / 1.00	2-Chlorotoluene	21.06 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101291-8MSD (SD) / 280-101291-8MSD	1 / 1.00	4-Chlorotoluene	21.48 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101291-8MSD (SD) / 280-101291-8MSD	1 / 1.00	Hexachlorobutadiene	26.89 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101291-8MSD (SD) / 280-101291-8MSD	1 / 1.00	Isopropylbenzene (Cumene)	20.15 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101291-8MSD (SD) / 280-101291-8MSD	1 / 1.00	n-Butylbenzene	27.47 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101291-8MSD (SD) / 280-101291-8MSD	1 / 1.00	n-Propylbenzene	20.94 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101291-8MSD (SD) / 280-101291-8MSD	1 / 1.00	p-Cymene (p-Isopropyltoluene)	23.86 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101291-8MSD (SD) / 280-101291-8MSD	1 / 1.00	sec-Butylbenzene	23.01 (rpd)	J/None	< 20	< 20	D			

US Army Corps of Engineers ®

QC Outlier Report

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

QC Element	Sample ID/ Lab Sample ID	Run#/ Dil'n	Analyte	Result (Units)	Qualifier	Warning Limits	Control Limits	Reason	Comment	Rule	Action Level
MS RPD	280-101291-8MSD (SD) / 280-101291-8MSD	1 / 1.00	tert-Butylbenzene	21.65 (rpd)	J/None	< 20	< 20	D			

Rule is the multiplier used when blank contamination occurs to determine action level.

US Army Corps of Engineers®

Qualified Results

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW95-(224.0)	280-101291-8	SO	N	1,3-Dichlorobenzene	5.30	1.70 U	1.70 UJ	-	ug/kg	M
FEW4-MW95-(279.0)	280-101291-19	SO	N	Trichloroethene (TCE)	6.00	0.400 J	0.400 J		ug/kg	TR
FEW4-MW95-(300.0)	280-101291-22	SO	N	1,2,4-Trichlorobenzene	6.70	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW95-(300.0)	280-101291-22	SO	N	1,2-Dibromoethane (EDB)	6.70	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW95-(300.0)	280-101291-22	SO	N	1,2-Dichlorobenzene	6.70	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW95-(300.0)	280-101291-22	SO	N	1,2-Dichloropropane	6.70	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW95-(300.0)	280-101291-22	SO	N	1,3-Dichlorobenzene	6.70	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW95-(300.0)	280-101291-22	SO	N	1,3-Dichloropropane	6.70	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW95-(300.0)	280-101291-22	SO	N	1,4-Dichlorobenzene	6.70	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW95-(300.0)	280-101291-22	SO	N	2-Chlorotoluene	6.70	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW95-(300.0)	280-101291-22	SO	N	Acetone	27.0	24.0 J	24.0 J		ug/kg	D/TR
FEW4-MW95-(300.0)	280-101291-22	SO	N	Bromobenzene	6.70	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW95-(300.0)	280-101291-22	SO	N	Chlorobenzene	6.70	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW95-(300.0)	280-101291-22	SO	N	Dibromomethane	6.70	4.30 U J	4.30 UJ	-	ug/kg	M
FEW4-MW95-(300.0)	280-101291-22	SO	N	n-Propylbenzene	6.70	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW95-(350.0)	280-101291-28	SO	N	Chloroform	11.0	1.50 J	1.50 J		ug/kg	TR

Qualified analytes in samples are reported as estimated, not detected (UJ) at the Limit of Detection (LOD).

US Army Corps of Engineers ®

Detected Results

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Dilution	Analyte	LOQ	Lab Result	Qualified Result	Units	Reason
FEW4-MW95-(279.0)	280-101291-19	SO	N	1	Trichloroethene (TCE)	6.00	0.400 J	0.400 J	ug/kg	TR
FEW4-MW95-(300.0)	280-101291-22	SO	N	1	Acetone	27.0	24.0 J	24.0 J	ug/kg	D/TR
FEW4-MW95-(310.0)	280-101291-23	SO	N	1	Acetone	31.0	41.0	41.0	ug/kg	
FEW4-MW95-(311.0)	280-101291-24	SO	FD	1	Acetone	22.0	23.0	23.0	ug/kg	
FEW4-MW95-(350.0)	280-101291-28	SO	N	1	Chloroform	11.0	1.50 J	1.50 J	ug/kg	TR
FEW4-MW97-(262.0)	280-101291-3	SO	FD	1	Acetone	17.0	19.0	19.0	ug/kg	
FEW4-MW97-(271.0)	280-101291-4	SO	N	1	Acetone	30.0	41.0	41.0	ug/kg	
FEW4-MW97-(281.0)	280-101291-5	SO	N	1	Acetone	21.0	61.0	61.0	ug/kg	
FEW4-MW97-(301.0)	280-101291-12	SO	N	1	Acetone	19.0	27.0	27.0	ug/kg	
FEW4-MW97-(311.0)	280-101291-13	SO	N	1	Acetone	23.0	85.0	85.0	ug/kg	
FEW4-MW97-(321.0)	280-101291-14	SO	N	1	Acetone	19.0	26.0	26.0	ug/kg	

Rejected Results

--No Records Found--

US Army Corps of Engineers ®

Facility:	B08WY0467-02, F.E. Warren AFB, Site 4
Event:	2017-2018 RI Addendum Tasks
SDG:	280-101291-1_52_2a_FUDSChem
Guidance Document:	Draft-Final Uniform Federal Policy-Quality Assurance Project Plan for the Remedial Investigation Addendum 2017-2018 Tasks Atlas "D" Missile Site 4 —Laramie County, Wyoming, July 2017
Prime Contractor:	RMC Consultants, Inc., LAKEWOOD, CO
Project Manager:	David Groy
Contract Laboratory:	TestAmerica Laboratories, Inc., Arvada, CO
Data Review Contractor:	RMC Consultants
Data Review Level:	Stage 3VEM
Primary Data Reviewer:	Gary Torf, Contractor Project Chemist
Second Reviewer:	, Senior Scientist
Date Submitted:	

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	SW8260B
FEW4-MW95-(311.0)	280-101291-24	Solid	Field Duplicate/FD	X
FEW4-MW97-(262.0)	280-101291-3	Solid	Field Duplicate/FD	X
FEW4-MW95-(204.0)	280-101291-6	Solid	Field Sample/N	X
FEW4-MW95-(209.0)	280-101291-7	Solid	Field Sample/N	X
FEW4-MW95-(224.0)	280-101291-8	Solid	Field Sample/N	X
FEW4-MW95-(235.0)	280-101291-10	Solid	Field Sample/N	X
FEW4-MW95-(247.0)	280-101291-9	Solid	Field Sample/N	X
FEW4-MW95-(279.0)	280-101291-19	Solid	Field Sample/N	X
FEW4-MW95-(289.0)	280-101291-20	Solid	Field Sample/N	X
FEW4-MW95-(290.0)	280-101291-21	Solid	Field Sample/N	X
FEW4-MW95-(300.0)	280-101291-22	Solid	Field Sample/N	X
FEW4-MW95-(310.0)	280-101291-23	Solid	Field Sample/N	X
FEW4-MW95-(321.0)	280-101291-25	Solid	Field Sample/N	X
FEW4-MW95-(333.0)	280-101291-26	Solid	Field Sample/N	X
FEW4-MW95-(344.0)	280-101291-27	Solid	Field Sample/N	X
FEW4-MW95-(350.0)	280-101291-28	Solid	Field Sample/N	X
FEW4-MW97-(251.0)	280-101291-1	Solid	Field Sample/N	X
FEW4-MW97-(261.0)	280-101291-2	Solid	Field Sample/N	X
FEW4-MW97-(271.0)	280-101291-4	Solid	Field Sample/N	X

US Army Corps of Engineers ®

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	SW8260B
FEW4-MW97-(281.0)	280-101291-5	Solid	Field Sample/N	X
FEW4-MW97-(291.0)	280-101291-11	Solid	Field Sample/N	X
FEW4-MW97-(301.0)	280-101291-12	Solid	Field Sample/N	X
FEW4-MW97-(311.0)	280-101291-13	Solid	Field Sample/N	X
FEW4-MW97-(321.0)	280-101291-14	Solid	Field Sample/N	X
FEW4-MW97-(331.0)	280-101291-15	Solid	Field Sample/N	X
FEW4-MW97-(341.0)	280-101291-16	Solid	Field Sample/N	X
FEW4-MW97-(351.0)	280-101291-17	Solid	Field Sample/N	X
FEW4-MW97-(361.0)	280-101291-18	Solid	Field Sample/N	X

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the Draft-Final Uniform Federal Policy-Quality Assurance Project Plan for the Remedial Investigation Addendum 2017-2018 Tasks Atlas “D” Missile Site 4 —Laramie County, Wyoming, July 2017 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by RMC Consultants, Inc., LAKEWOOD, CO; analyses were performed by TestAmerica Laboratories, Inc., Arvada, CO and were reported under sample delivery group (SDG) 280-101291-1_52_2a_FUDSChem. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

- Blank
- Blank - Negative
- Field Duplicate RPD
- LCS Recovery
- MS Recovery
- MS RPD
- Prep Hold Time
- Surrogate
- Test Hold Time

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 14 results (0.76%) out of the 1848 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected. Trace values, defined as results that are qualified as estimated because they fall between the limit of detection and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

Narrative Comments

Analytical Method	Data Reviewer Comment
SW8260B	No additional comments; see Checklist for detail.

Gary Torf

January 02, 2018

Reviewed by Gary Torf, Contractor Project Chemist, RMC Consultants

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of a minimum of 10% of the reported sample results and method quality control data between the two deliverables.

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

Quality Control Outliers for test method SW8260B, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
FEW4-MW95-(224.0) (MS)/ 280-101291-8MS	1,3-Dichlorobenzene	76.80	77 - 121	77 - 121	percent	J/UJ	M	
FEW4-MW95-(300.0) (SD)/ 280-101291-22MSD	1,2,4-Trichlorobenzene	66.83	67 - 129	67 - 129	percent	J/UJ	M	
FEW4-MW95-(300.0) (SD)/ 280-101291-22MSD	1,4-Dichlorobenzene	68.94	75 - 120	75 - 120	percent	J/UJ	M	
FEW4-MW95-(300.0) (SD)/ 280-101291-22MSD	1,3-Dichlorobenzene	69.27	77 - 121	77 - 121	percent	J/UJ	M	
FEW4-MW95-(300.0) (SD)/ 280-101291-22MSD	1,2-Dichlorobenzene	70.89	78 - 121	78 - 121	percent	J/UJ	M	
FEW4-MW95-(300.0) (SD)/ 280-101291-22MSD	Bromobenzene	71.87	78 - 121	78 - 121	percent	J/UJ	M	
FEW4-MW95-(300.0) (SD)/ 280-101291-22MSD	n-Propylbenzene	72.85	73 - 125	73 - 125	percent	J/UJ	M	
FEW4-MW95-(300.0) (SD)/ 280-101291-22MSD	1,3-Dichloropropane	73.33	77 - 121	77 - 121	percent	J/UJ	M	
FEW4-MW95-(300.0) (SD)/ 280-101291-22MSD	2-Chlorotoluene	73.50	75 - 122	75 - 122	percent	J/UJ	M	
FEW4-MW95-(300.0) (SD)/ 280-101291-22MSD	Chlorobenzene	73.50	79 - 120	79 - 120	percent	J/UJ	M	
FEW4-MW95-(300.0) (SD)/ 280-101291-22MSD	1,2-Dichloropropane	75.45	76 - 123	76 - 123	percent	J/UJ	M	
FEW4-MW95-(300.0) (SD)/ 280-101291-22MSD	1,2-Dibromoethane (EDB)	75.45	78 - 122	78 - 122	percent	J/UJ	M	
FEW4-MW95-(300.0) (SD)/ 280-101291-22MSD	Dibromomethane	76.91	78 - 125	78 - 125	percent	J/UJ	M	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the MS Recovery for SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW95-(224.0)	N	1,3-Dichlorobenzene	5.30	1.70 U	1.70 UJ	-	ug/kg	M
FEW4-MW95-(300.0)	N	1,2,4-Trichlorobenzene	6.70	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW95-(300.0)	N	1,2-Dibromoethane (EDB)	6.70	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW95-(300.0)	N	1,2-Dichlorobenzene	6.70	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW95-(300.0)	N	1,2-Dichloropropane	6.70	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW95-(300.0)	N	1,3-Dichlorobenzene	6.70	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW95-(300.0)	N	1,3-Dichloropropane	6.70	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW95-(300.0)	N	1,4-Dichlorobenzene	6.70	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW95-(300.0)	N	2-Chlorotoluene	6.70	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW95-(300.0)	N	Bromobenzene	6.70	2.20 U J	2.20 UJ	-	ug/kg	M

Qualified Results associated with the MS Recovery for SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW95-(300.0)	N	Chlorobenzene	6.70	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW95-(300.0)	N	Dibromomethane	6.70	4.30 U J	4.30 UJ	-	ug/kg	M
FEW4-MW95-(300.0)	N	n-Propylbenzene	6.70	2.20 U J	2.20 UJ	-	ug/kg	M

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

Quality Control Outliers for test method SW8260B, MS RPD

The objective of matrix spikes/matrix spike duplicates (MS/MSD) RPD analysis is to demonstrate acceptable method precision by the laboratory at the time of analysis. MS/MSD analyses are also performed to generate data that determines the long-term precision of the analytical method on various matrices. Non-homogenous samples can impact the apparent method precision. Summary forms were evaluated and compared to electronic data deliverables. Matrix spikes/matrix spike duplicates results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
280-101291-22MSD (SD)/ 280-101291-22MSD	Chloroethane	20.62	< 20	< 20	rpd	J/None	D	
280-101291-22MSD (SD)/ 280-101291-22MSD	trans-1,2-Dichloroethene	21.18	< 20	< 20	rpd	J/None	D	
280-101291-22MSD (SD)/ 280-101291-22MSD	Toluene	21.50	< 20	< 20	rpd	J/None	D	
280-101291-22MSD (SD)/ 280-101291-22MSD	1,1-Dichloropropene	21.92	< 20	< 20	rpd	J/None	D	
280-101291-22MSD (SD)/ 280-101291-22MSD	Benzene	22.46	< 20	< 20	rpd	J/None	D	
280-101291-22MSD (SD)/ 280-101291-22MSD	1,1-Dichloroethane	22.91	< 20	< 20	rpd	J/None	D	
280-101291-22MSD (SD)/ 280-101291-22MSD	Trichloroethene (TCE)	22.99	< 20	< 20	rpd	J/None	D	
280-101291-22MSD (SD)/ 280-101291-22MSD	1,2-Dichloroethene	23.01	< 20	< 20	rpd	J/None	D	
280-101291-22MSD (SD)/ 280-101291-22MSD	m,p-Xylene	23.20	< 20	< 20	rpd	J/None	D	
280-101291-22MSD (SD)/ 280-101291-22MSD	Ethylbenzene	23.26	< 20	< 20	rpd	J/None	D	
280-101291-22MSD (SD)/ 280-101291-22MSD	1,1,1-Trichloroethane	23.30	< 20	< 20	rpd	J/None	D	
280-101291-22MSD (SD)/ 280-101291-22MSD	Tetrachloroethene (PCE)	23.35	< 20	< 20	rpd	J/None	D	
280-101291-22MSD (SD)/ 280-101291-22MSD	1,2,4-Trichlorobenzene	23.42	< 20	< 20	rpd	J/None	D	
280-101291-22MSD (SD)/ 280-101291-22MSD	cis-1,2-Dichloroethene	23.47	< 20	< 20	rpd	J/None	D	
280-101291-22MSD (SD)/ 280-101291-22MSD	n-Propylbenzene	23.62	< 20	< 20	rpd	J/None	D	
280-101291-22MSD (SD)/ 280-101291-22MSD	n-Butylbenzene	23.68	< 20	< 20	rpd	J/None	D	
280-101291-22MSD (SD)/ 280-101291-22MSD	o-Xylene	23.75	< 20	< 20	rpd	J/None	D	
280-101291-22MSD (SD)/ 280-101291-22MSD	Isopropylbenzene (Cumene)	23.79	< 20	< 20	rpd	J/None	D	
280-101291-22MSD (SD)/ 280-101291-22MSD	4-Chlorotoluene	23.88	< 20	< 20	rpd	J/None	D	
280-101291-22MSD (SD)/ 280-101291-22MSD	Dichlorodifluoromethane	24.03	< 20	< 20	rpd	J/None	D	
280-101291-22MSD (SD)/ 280-101291-22MSD	2-Chlorotoluene	24.12	< 20	< 20	rpd	J/None	D	

Quality Control Outliers for test method SW8260B, MS RPD

The objective of matrix spikes/matrix spike duplicates (MS/MSD) RPD analysis is to demonstrate acceptable method precision by the laboratory at the time of analysis. MS/MSD analyses are also performed to generate data that determines the long-term precision of the analytical method on various matrices. Non-homogenous samples can impact the apparent method precision. Summary forms were evaluated and compared to electronic data deliverables. Matrix spikes/matrix spike duplicates results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
280-101291-22MSD (SD)/ 280-101291-22MSD	Trichlorofluoromethane	24.15	< 20	< 20	rpd	J/None	D	
280-101291-22MSD (SD)/ 280-101291-22MSD	Carbon tetrachloride	24.26	< 20	< 20	rpd	J/None	D	
280-101291-22MSD (SD)/ 280-101291-22MSD	1,3,5-Trimethylbenzene	24.27	< 20	< 20	rpd	J/None	D	
280-101291-22MSD (SD)/ 280-101291-22MSD	2,2-Dichloropropane	24.30	< 20	< 20	rpd	J/None	D	
280-101291-22MSD (SD)/ 280-101291-22MSD	p-Cymene (p-Isopropyltoluene)	24.56	< 20	< 20	rpd	J/None	D	
280-101291-22MSD (SD)/ 280-101291-22MSD	1,2-Dichloropropane	24.74	< 20	< 20	rpd	J/None	D	
280-101291-22MSD (SD)/ 280-101291-22MSD	Chlorobenzene	24.81	< 20	< 20	rpd	J/None	D	
280-101291-22MSD (SD)/ 280-101291-22MSD	1,4-Dichlorobenzene	24.97	< 20	< 20	rpd	J/None	D	
280-101291-22MSD (SD)/ 280-101291-22MSD	Methylene chloride	25.12	< 20	< 20	rpd	J/None	D	
280-101291-22MSD (SD)/ 280-101291-22MSD	Chloroform	25.20	< 20	< 20	rpd	J/None	D	
280-101291-22MSD (SD)/ 280-101291-22MSD	cis-1,3-Dichloropropene	25.38	< 20	< 20	rpd	J/None	D	
280-101291-22MSD (SD)/ 280-101291-22MSD	tert-Butylbenzene	25.60	< 20	< 20	rpd	J/None	D	
280-101291-22MSD (SD)/ 280-101291-22MSD	1,2,3-Trichlorobenzene	25.68	< 20	< 20	rpd	J/None	D	
280-101291-22MSD (SD)/ 280-101291-22MSD	1,2,4-Trimethylbenzene	25.75	< 20	< 20	rpd	J/None	D	
280-101291-22MSD (SD)/ 280-101291-22MSD	1,3-Dichlorobenzene	25.77	< 20	< 20	rpd	J/None	D	
280-101291-22MSD (SD)/ 280-101291-22MSD	Styrene	25.78	< 20	< 20	rpd	J/None	D	
280-101291-22MSD (SD)/ 280-101291-22MSD	Bromomethane	26.36	< 20	< 20	rpd	J/None	D	
280-101291-22MSD (SD)/ 280-101291-22MSD	sec-Butylbenzene	26.42	< 20	< 20	rpd	J/None	D	
280-101291-22MSD (SD)/ 280-101291-22MSD	Bromobenzene	26.50	< 20	< 20	rpd	J/None	D	
280-101291-22MSD (SD)/ 280-101291-22MSD	1,1,1,2-Tetrachloroethane	26.76	< 20	< 20	rpd	J/None	D	
280-101291-22MSD (SD)/ 280-101291-22MSD	Bromochloromethane	27.40	< 20	< 20	rpd	J/None	D	
280-101291-22MSD (SD)/ 280-101291-22MSD	Methyl tert-butyl ether (MTBE)	27.60	< 20	< 20	rpd	J/None	D	
280-101291-22MSD (SD)/ 280-101291-22MSD	1,1,2-Trichloroethane	27.81	< 20	< 20	rpd	J/None	D	
280-101291-22MSD (SD)/ 280-101291-22MSD	1,2-Dichlorobenzene	27.84	< 20	< 20	rpd	J/None	D	
280-101291-22MSD (SD)/ 280-101291-22MSD	Dibromomethane	28.16	< 20	< 20	rpd	J/None	D	

Quality Control Outliers for test method SW8260B, MS RPD

The objective of matrix spikes/matrix spike duplicates (MS/MSD) RPD analysis is to demonstrate acceptable method precision by the laboratory at the time of analysis. MS/MSD analyses are also performed to generate data that determines the long-term precision of the analytical method on various matrices. Non-homogenous samples can impact the apparent method precision. Summary forms were evaluated and compared to electronic data deliverables. Matrix spikes/matrix spike duplicates results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
280-101291-22MSD (SD)/ 280-101291-22MSD	Bromodichloromethane	28.18	< 20	< 20	rpd	J/None	D	
280-101291-22MSD (SD)/ 280-101291-22MSD	Naphthalene	28.52	< 20	< 20	rpd	J/None	D	
280-101291-22MSD (SD)/ 280-101291-22MSD	trans-1,3-Dichloropropene	28.57	< 20	< 20	rpd	J/None	D	
280-101291-22MSD (SD)/ 280-101291-22MSD	Hexachlorobutadiene	28.75	< 20	< 20	rpd	J/None	D	
280-101291-22MSD (SD)/ 280-101291-22MSD	Dibromochloromethane	28.78	< 20	< 20	rpd	J/None	D	
280-101291-22MSD (SD)/ 280-101291-22MSD	1,3-Dichloropropane	29.65	< 20	< 20	rpd	J/None	D	
280-101291-22MSD (SD)/ 280-101291-22MSD	1,1,2,2-Tetrachloroethane	29.67	< 20	< 20	rpd	J/None	D	
280-101291-22MSD (SD)/ 280-101291-22MSD	1,2-Dibromoethane (EDB)	29.88	< 20	< 20	rpd	J/None	D	
280-101291-22MSD (SD)/ 280-101291-22MSD	Bromoform	30.03	< 20	< 20	rpd	J/None	D	
280-101291-22MSD (SD)/ 280-101291-22MSD	1,2,3-Trichloropropane	30.54	< 20	< 20	rpd	J/None	D	
280-101291-22MSD (SD)/ 280-101291-22MSD	1,2-Dichloroethane	31.91	< 20	< 20	rpd	J/None	D	
280-101291-22MSD (SD)/ 280-101291-22MSD	4-Methyl-2-pentanone (MIBK)	32.69	< 20	< 20	rpd	J/None	D	
280-101291-22MSD (SD)/ 280-101291-22MSD	2-Hexanone	32.76	< 20	< 20	rpd	J/None	D	
280-101291-22MSD (SD)/ 280-101291-22MSD	1,2-Dibromo-3-chloropropane	33.45	< 20	< 20	rpd	J/None	D	
280-101291-22MSD (SD)/ 280-101291-22MSD	2-Butanone (MEK)	34.53	< 20	< 20	rpd	J/None	D	
280-101291-22MSD (SD)/ 280-101291-22MSD	Acetone	31.58	< 20	< 20	rpd	J/None	D	
280-101291-8MSD (SD)/ 280-101291-8MSD	1,2-Dichlorobenzene	20.11	< 20	< 20	rpd	J/None	D	
280-101291-8MSD (SD)/ 280-101291-8MSD	1,3-Dichlorobenzene	20.14	< 20	< 20	rpd	J/None	D	
280-101291-8MSD (SD)/ 280-101291-8MSD	Isopropylbenzene (Cumene)	20.15	< 20	< 20	rpd	J/None	D	
280-101291-8MSD (SD)/ 280-101291-8MSD	1,4-Dichlorobenzene	20.17	< 20	< 20	rpd	J/None	D	
280-101291-8MSD (SD)/ 280-101291-8MSD	1,2,4-Trimethylbenzene	20.85	< 20	< 20	rpd	J/None	D	
280-101291-8MSD (SD)/ 280-101291-8MSD	n-Propylbenzene	20.94	< 20	< 20	rpd	J/None	D	
280-101291-8MSD (SD)/ 280-101291-8MSD	2-Chlorotoluene	21.06	< 20	< 20	rpd	J/None	D	
280-101291-8MSD (SD)/ 280-101291-8MSD	4-Chlorotoluene	21.48	< 20	< 20	rpd	J/None	D	
280-101291-8MSD (SD)/ 280-101291-8MSD	1,2,4-Trichlorobenzene	21.63	< 20	< 20	rpd	J/None	D	

Quality Control Outliers for test method SW8260B, MS RPD

The objective of matrix spikes/matrix spike duplicates (MS/MSD) RPD analysis is to demonstrate acceptable method precision by the laboratory at the time of analysis. MS/MSD analyses are also performed to generate data that determines the long-term precision of the analytical method on various matrices. Non-homogenous samples can impact the apparent method precision. Summary forms were evaluated and compared to electronic data deliverables. Matrix spikes/matrix spike duplicates results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
280-101291-8MSD (SD)/ 280-101291-8MSD	tert-Butylbenzene	21.65	< 20	< 20	rpd	J/None	D	
280-101291-8MSD (SD)/ 280-101291-8MSD	1,3,5-Trimethylbenzene	21.71	< 20	< 20	rpd	J/None	D	
280-101291-8MSD (SD)/ 280-101291-8MSD	sec-Butylbenzene	23.01	< 20	< 20	rpd	J/None	D	
280-101291-8MSD (SD)/ 280-101291-8MSD	p-Cymene (p-Isopropyltoluene)	23.86	< 20	< 20	rpd	J/None	D	
280-101291-8MSD (SD)/ 280-101291-8MSD	Hexachlorobutadiene	26.89	< 20	< 20	rpd	J/None	D	
280-101291-8MSD (SD)/ 280-101291-8MSD	n-Butylbenzene	27.47	< 20	< 20	rpd	J/None	D	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the MS RPD for SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW95-(300.0)	N	Acetone	27.0	24.0 J	24.0 J		ug/kg	D/TR

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

Table of All Qualified Results

Test Method: SW8260B	Extraction Method: SW5035A							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW95-(224.0)	N	1,3-Dichlorobenzene	5.30	1.70 U	1.70 UJ	-	ug/kg	M
FEW4-MW95-(300.0)	N	1,2,4-Trichlorobenzene	6.70	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW95-(300.0)	N	1,2-Dibromoethane (EDB)	6.70	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW95-(300.0)	N	1,2-Dichlorobenzene	6.70	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW95-(300.0)	N	1,2-Dichloropropane	6.70	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW95-(300.0)	N	1,3-Dichlorobenzene	6.70	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW95-(300.0)	N	1,3-Dichloropropane	6.70	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW95-(300.0)	N	1,4-Dichlorobenzene	6.70	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW95-(300.0)	N	2-Chlorotoluene	6.70	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW95-(300.0)	N	Acetone	27.0	24.0 J	24.0 J		ug/kg	D/TR
FEW4-MW95-(300.0)	N	Bromobenzene	6.70	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW95-(300.0)	N	Chlorobenzene	6.70	2.20 U J	2.20 UJ	-	ug/kg	M
FEW4-MW95-(300.0)	N	Dibromomethane	6.70	4.30 U J	4.30 UJ	-	ug/kg	M
FEW4-MW95-(300.0)	N	n-Propylbenzene	6.70	2.20 U J	2.20 UJ	-	ug/kg	M

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
Trace values are not included in the qualified results table unless additional reason codes are associated.

Table of All Trace Results

Test Method: SW8260B Extraction Method: SW5035A

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW95-(279.0)	N	Trichloroethene (TCE)	6.00	0.400 J	0.400 J		ug/kg	TR
FEW4-MW95-(300.0)	N	Acetone	27.0	24.0 J	24.0 J		ug/kg	D/TR
FEW4-MW95-(350.0)	N	Chloroform	11.0	1.50 J	1.50 J		ug/kg	TR

Results with Modified Qualifiers

No qualifiers associated with this sample delivery group were modified manually.

Reason Code Definitions

Code	Definition
D	MS RPD
M	MS Recovery
TR	Trace Level Detect

Flag Code and Definitions

Flag	Definition
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
J	Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
R	The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making.
B	Blank contamination: The analyte was found in an associated blank above one half the RL, as well as in the sample.
UB	The analyte was also detected in an associated laboratory or field blank at a concentration comparable to the concentration in the sample. The reported result has been requalified as not detected.

Review Questions

Method: SW8260B (Volatile Organic Compounds by Capillary GC/MS)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were sample reciept temperatures met?	•			Sample receipt temperatures were 1.3ºC, 1.5ºC, and 1.7ºC.
Were QAPP specified Project Quantitation Limit Goals achieved?	•			
Were all QAPP-specified target analytes reported?	•			
Was the GC/MS system properly tuned based on method criteria?	•			
Was the criteria met during each 12 hour shift (prior to ICAL and Cal Ver.)?	•			
Does the initial calibration curve consist of 5 concentration levels, with the low standard near but > MDL?	•			
Did the Calibration Check Compounds (CCCs) have a relative standard deviation within QAPP acceptance limits?	•			
Were the average response factors (RFs) for the System Performance Check Compounds (SPCCs) within QAPP acceptance limits?	•			
Were the ICAL %RSDs for the target compounds within method criteria?	•			
If a quadratic equation curve was used, was the coefficient of determination (COD) within criteria?	•			
If a linear regression curve was used, was the correlation coefficient within criteria?	•			
Check and recalculate the response factors and average response factors for a least one target compound.	•			ICAL VMS-G2 9/27/17 TCE AVG RF = 0.3068
Check and recalculate the %RSD for one of more target compounds and DMCs. Verify that the recalculated values agree with the laboratory reported values.	•			ICAL VMS-G2 9/27/17 TCE %RDS = 3.4% 1,2-DCA-d4 %RSD = 4.2%
Was a second source verification analyzed after the ICAL and all analytes within criteria?	•			
Was a CCV run at the beginning of the analytical sequence and every 12 hours?	•			
Was the CCV a mid-level standard from the initial calibration curve?	•			
Did the CCCs have a %Difference within QAPP acceptance limits?	•			
Were the average RFs for the SPCCs within QAPP acceptance limits?	•			
Was the %D (difference or drift) for all target analytes within QAPP acceptance limits?		•		CCV 280-389357/3: 1,2-Dichloroethane-d4 (-26%) exceeded the 20% difference criteria; all associated samples had acceptable recoveries for this surrogate. (CCV 280-389589/2: 2-Hexanone (21.7%), 4-methyl-2-pentanone (28.2%), and dichlorodifluoromethane (24.7%) exceeded the 20% difference criteria; these analytes were not detected in any associated samples.
Check and recalculate the CCV relative response factor for at least one target compound.	•			VMS-G2 9/27/17 CCV 280-389357/3 TCE RRF = 0.3106

Review Questions

Method: SW8260B (Volatile Organic Compounds by Capillary GC/MS)

Review Questions	Yes	No	NA	Comment
Were the internal standards added to every standard, blank, matrix spike, matrix spike duplicate, and sample?	•			
Were the retention times for all IS compounds within QAPP acceptance limits?	•			
Are the area counts of all IS compounds within QAPP acceptance limits?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than 1/2 LOQ and less than 1/10 the amount in any sample?	•			
Were target analytes in the field blank less than 1/2 LOQ and less than 1/10 the amount in any sample?			•	
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?	•			FEW4-MW97-(262.0) is a blind field duplicate of FEW4-MW97-(261.0); FEW4-MW95-(311.0) is a blind field duplicate of FEW4-MW95-(310.0)
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were the LCS/LCSD recoveries within QAPP acceptance limits?	•			
Were the LCS/LCSD RPDs within QAPP acceptance limits?			•	
Was the duplicate RPD within QAPP acceptance limits?			•	
Was a MS/MSD pair prepared with each batch?	•			
Is the MS/MSD parent sample the one designated by the sampling team?	•			FEW4-MW95-(224.0) and FEW4-MW95-(300.0) were designated for MS/MSD analyses.
Were MS/MSD recoveries and RPD within QAPP acceptance limits?		•		Several analytes were recovered less than their lower control limit and exceeded the 20% RPD limit.
Were surrogate recoveries within QAPP acceptance limits?	•			
Were reported sample concentrations within calibration range?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			A mid point was removed from the Surrogate ICAL due to a bad purge. (STD20 point). The ICAL met all other appropriate criteria.
Were instrument run logs present and filled out appropriately?	•			
Were sample prepration sheets present and filled out appropriately?	•			
Check and recalculate the %D for one target compound. Verify that the recalculated values agree with the laboratory-reported values.			•	
Examine raw data to verify correct calculation of sample results reported by the laboratory. Compare quantitation lists and chromatograms to the reported detect and non-detect sample results.	•			
Verify that the reporting limits and sample results have been adjusted to reflect all sample dilutions and Percent Moisture factors (non-aqueous samples).	•			

Automated Data Review Detail Report for 280-101338-1_52_2a_FUDSChem
B08WY0467-02, F.E. Warren AFB, Site 4
Draft-Final Uniform Federal Policy-Quality Assurance Project Plan for the Remedial Investigation Addendum 2017-2018 Tasks
Atlas "D" Missile Site 4—Laramie County, Wyoming, July 2017

US Army Corps of Engineers®

Batch Report

Test Method: SW8260B Analysis Batch: 280-389584

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
LABQC	SQ	LCS 280-389584/1-A	LCS 280-389584/1-A		1/1	9/29/2017 17:00	9/29/2017 17:00	9/29/2017 20:22	280-389584/	BS
LABQC	SQ	MB 280-389584/2-A	MB 280-389584/2-A		1/1	9/29/2017 17:00	9/29/2017 17:00	9/29/2017 21:02	280-389584/	LB
FEW4-MW97	SO	FEW4-MW97-(371.0)	280-101338-1		1/1	9/18/2017 12:05	9/18/2017 12:05	9/30/2017 03:05	280-389584/	N
FEW4-MW97	SO	FEW4-MW97-(381.0)	280-101338-2		1/1	9/18/2017 12:00	9/18/2017 12:00	9/30/2017 03:26	280-389584/	N
FEW4-MW97	SO	FEW4-MW97-(382.0)	280-101338-3		1/1	9/18/2017 12:10	9/18/2017 12:10	9/30/2017 03:46	280-389584/	FD
FEW4-MW97	SO	FEW4-MW97-(391.0)	280-101338-4		1/1	9/18/2017 12:15	9/18/2017 12:15	9/30/2017 04:06	280-389584/	N
FEW4-MW97	SO	FEW4-MW97-(391.0)	280-101338-4MS		1/1	9/18/2017 12:15	9/18/2017 12:15	9/30/2017 04:26	280-389584/	MS
FEW4-MW97	SO	FEW4-MW97-(391.0)	280-101338-4MSD		1/1	9/18/2017 12:15	9/18/2017 12:15	9/30/2017 05:39	280-389584/	SD
FEW4-MW97	SO	FEW4-MW97-(401.0)	280-101338-5		1/1	9/18/2017 17:40	9/18/2017 17:40	9/30/2017 06:19	280-389584/	N

Test Method: SW8260B Analysis Batch: 280-389631

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
LABQC	SQ	LCS 280-389631/1-A	LCS 280-389631/1-A		1/1	10/1/2017 12:00	10/1/2017 12:00	10/1/2017 13:34	280-389631/	BS
LABQC	SQ	LCSD 280-389631/2-A	LCSD 280-389631/2-A		1/1	10/1/2017 12:00	10/1/2017 12:00	10/1/2017 13:54	280-389631/	BD
LABQC	SQ	MB 280-389631/3-A	MB 280-389631/3-A		1/1	10/1/2017 12:00	10/1/2017 12:00	10/1/2017 14:34	280-389631/	LB
FEW4-MW97	SO	FEW4-MW97-(413.0)	280-101338-6		1/1	9/19/2017 10:35	9/19/2017 10:35	10/1/2017 14:55	280-389631/	N
FEW4-MW97	SO	FEW4-MW97-(421.0)	280-101338-7		1/1	9/19/2017 10:40	9/19/2017 10:40	10/1/2017 15:15	280-389631/	N

Field Batch Report

--No Records Found--

MS Mismatch Report

--No Records Found--

Section to identify Matrix Spike mismatches where parent sample differs from MS by dilution.

US Army Corps of Engineers®

QC Outlier Report

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

QC Element	Sample ID/ Lab Sample ID	Run#/ Dil'n	Analyte	Result (Units)	Qualifier	Warning Limits	Control Limits	Reason	Comment	Rule	Action Level
MS Recovery	FEW4-MW97-(391.0) (MS) / 280-101338-4MS	1 / 1.00	1,2-Dichlorobenzene	77.54 (percent)	J/UJ	78 - 121	78 - 121	M			
MS Recovery	FEW4-MW97-(391.0) (MS) / 280-101338-4MS	1 / 1.00	1,3-Dichlorobenzene	73.20 (percent)	J/UJ	77 - 121	77 - 121	M			
MS Recovery	FEW4-MW97-(391.0) (MS) / 280-101338-4MS	1 / 1.00	1,4-Dichlorobenzene	71.86 (percent)	J/UJ	75 - 120	75 - 120	M			
MS Recovery	FEW4-MW97-(391.0) (MS) / 280-101338-4MS	1 / 1.00	Chlorobenzene	74.85 (percent)	J/UJ	79 - 120	79 - 120	M			
MS Recovery	FEW4-MW97-(391.0) (MS) / 280-101338-4MS	1 / 1.00	Ethylbenzene	75.45 (percent)	J/UJ	76 - 122	76 - 122	M			
MS Recovery	FEW4-MW97-(391.0) (MS) / 280-101338-4MS	1 / 1.00	m,p-Xylene	72.46 (percent)	J/UJ	77 - 124	77 - 124	M			
MS Recovery	FEW4-MW97-(391.0) (MS) / 280-101338-4MS	1 / 1.00	Trichloroethene (TCE)	76.95 (percent)	J/UJ	77 - 123	77 - 123	M			
MS Recovery	FEW4-MW97-(391.0) (SD) / 280-101338-4MSD	1 / 1.00	1,1,1,2-Tetrachloroethane	67.79 (percent)	J/UJ	78 - 125	78 - 125	M			
MS Recovery	FEW4-MW97-(391.0) (SD) / 280-101338-4MSD	1 / 1.00	1,1,2,2-Tetrachloroethane	65.61 (percent)	J/UJ	70 - 124	70 - 124	M			
MS Recovery	FEW4-MW97-(391.0) (SD) / 280-101338-4MSD	1 / 1.00	1,1,2-Trichloroethane	69.76 (percent)	J/UJ	78 - 121	78 - 121	M			
MS Recovery	FEW4-MW97-(391.0) (SD) / 280-101338-4MSD	1 / 1.00	1,1-Dichloroethane	71.54 (percent)	J/UJ	76 - 125	76 - 125	M			
MS Recovery	FEW4-MW97-(391.0) (SD) / 280-101338-4MSD	1 / 1.00	1,1-Dichloropropene	72.73 (percent)	J/UJ	76 - 125	76 - 125	M			
MS Recovery	FEW4-MW97-(391.0) (SD) / 280-101338-4MSD	1 / 1.00	1,2,3-Trichlorobenzene	62.25 (percent)	J/UJ	66 - 130	66 - 130	M			
MS Recovery	FEW4-MW97-(391.0) (SD) / 280-101338-4MSD	1 / 1.00	1,2,4-Trichlorobenzene	56.72 (percent)	J/UJ	67 - 129	67 - 129	M			
MS Recovery	FEW4-MW97-(391.0) (SD) / 280-101338-4MSD	1 / 1.00	1,2,4-Trimethylbenzene	66.01 (percent)	J/UJ	75 - 123	75 - 123	M			
MS Recovery	FEW4-MW97-(391.0) (SD) / 280-101338-4MSD	1 / 1.00	1,2-Dibromoethane (EDB)	67.79 (percent)	J/UJ	78 - 122	78 - 122	M			
MS Recovery	FEW4-MW97-(391.0) (SD) / 280-101338-4MSD	1 / 1.00	1,2-Dichlorobenzene	63.64 (percent)	J/UJ	78 - 121	78 - 121	M			
MS Recovery	FEW4-MW97-(391.0) (SD) / 280-101338-4MSD	1 / 1.00	1,2-Dichloroethane	68.97 (percent)	J/UJ	73 - 128	73 - 128	M			

US Army Corps of Engineers®

QC Outlier Report

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

QC Element	Sample ID/ Lab Sample ID	Run#/ Dil'n	Analyte	Result (Units)	Qualifier	Warning Limits	Control Limits	Reason	Comment	Rule	Action Level
MS Recovery	FEW4-MW97-(391.0) (SD) / 280-101338-4MSD	1 / 1.00	1,2-Dichloroethene	69.41 (percent)	J/UJ	78 - 122	78 - 122	M			
MS Recovery	FEW4-MW97-(391.0) (SD) / 280-101338-4MSD	1 / 1.00	1,2-Dichloropropane	67.00 (percent)	J/UJ	76 - 123	76 - 123	M			
MS Recovery	FEW4-MW97-(391.0) (SD) / 280-101338-4MSD	1 / 1.00	1,3,5-Trimethylbenzene	67.00 (percent)	J/UJ	73 - 124	73 - 124	M			
MS Recovery	FEW4-MW97-(391.0) (SD) / 280-101338-4MSD	1 / 1.00	1,3-Dichlorobenzene	61.26 (percent)	J/UJ	77 - 121	77 - 121	M			
MS Recovery	FEW4-MW97-(391.0) (SD) / 280-101338-4MSD	1 / 1.00	1,3-Dichloropropane	66.80 (percent)	J/UJ	77 - 121	77 - 121	M			
MS Recovery	FEW4-MW97-(391.0) (SD) / 280-101338-4MSD	1 / 1.00	1,4-Dichlorobenzene	58.10 (percent)	J/UJ	75 - 120	75 - 120	M			
MS Recovery	FEW4-MW97-(391.0) (SD) / 280-101338-4MSD	1 / 1.00	2,2-Dichloropropane	65.22 (percent)	J/UJ	67 - 133	67 - 133	M			
MS Recovery	FEW4-MW97-(391.0) (SD) / 280-101338-4MSD	1 / 1.00	2-Chlorotoluene	65.81 (percent)	J/UJ	75 - 122	75 - 122	M			
MS Recovery	FEW4-MW97-(391.0) (SD) / 280-101338-4MSD	1 / 1.00	4-Chlorotoluene	66.21 (percent)	J/UJ	72 - 124	72 - 124	M			
MS Recovery	FEW4-MW97-(391.0) (SD) / 280-101338-4MSD	1 / 1.00	Benzene	70.75 (percent)	J/UJ	77 - 121	77 - 121	M			
MS Recovery	FEW4-MW97-(391.0) (SD) / 280-101338-4MSD	1 / 1.00	Bromobenzene	65.42 (percent)	J/UJ	78 - 121	78 - 121	M			
MS Recovery	FEW4-MW97-(391.0) (SD) / 280-101338-4MSD	1 / 1.00	Bromochloromethane	69.57 (percent)	J/UJ	78 - 125	78 - 125	M			
MS Recovery	FEW4-MW97-(391.0) (SD) / 280-101338-4MSD	1 / 1.00	Bromodichloromethane	70.95 (percent)	J/UJ	75 - 127	75 - 127	M			
MS Recovery	FEW4-MW97-(391.0) (SD) / 280-101338-4MSD	1 / 1.00	Bromoform	62.65 (percent)	J/UJ	67 - 132	67 - 132	M			
MS Recovery	FEW4-MW97-(391.0) (SD) / 280-101338-4MSD	1 / 1.00	Chlorobenzene	62.45 (percent)	J/UJ	79 - 120	79 - 120	M			
MS Recovery	FEW4-MW97-(391.0) (SD) / 280-101338-4MSD	1 / 1.00	Chloroform	69.76 (percent)	J/UJ	78 - 123	78 - 123	M			
MS Recovery	FEW4-MW97-(391.0) (SD) / 280-101338-4MSD	1 / 1.00	cis-1,2-Dichloroethene	65.81 (percent)	J/UJ	77 - 123	77 - 123	M			
MS Recovery	FEW4-MW97-(391.0) (SD) / 280-101338-4MSD	1 / 1.00	cis-1,3-Dichloropropene	61.66 (percent)	J/UJ	74 - 126	74 - 126	M			

US Army Corps of Engineers®

QC Outlier Report

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

QC Element	Sample ID/ Lab Sample ID	Run#/ Dil'n	Analyte	Result (Units)	Qualifier	Warning Limits	Control Limits	Reason	Comment	Rule	Action Level
MS Recovery	FEW4-MW97-(391.0) (SD) / 280-101338-4MSD	1 / 1.00	Dibromochloromethane	68.97 (percent)	J/UJ	74 - 126	74 - 126	M			
MS Recovery	FEW4-MW97-(391.0) (SD) / 280-101338-4MSD	1 / 1.00	Dibromomethane	67.19 (percent)	J/UJ	78 - 125	78 - 125	M			
MS Recovery	FEW4-MW97-(391.0) (SD) / 280-101338-4MSD	1 / 1.00	Ethylbenzene	67.59 (percent)	J/UJ	76 - 122	76 - 122	M			
MS Recovery	FEW4-MW97-(391.0) (SD) / 280-101338-4MSD	1 / 1.00	Isopropylbenzene (Cumene)	67.39 (percent)	J/UJ	68 - 134	68 - 134	M			
MS Recovery	FEW4-MW97-(391.0) (SD) / 280-101338-4MSD	1 / 1.00	m,p-Xylene	65.42 (percent)	J/UJ	77 - 124	77 - 124	M			
MS Recovery	FEW4-MW97-(391.0) (SD) / 280-101338-4MSD	1 / 1.00	Methylene chloride	65.42 (percent)	J/UJ	70 - 128	70 - 128	M			
MS Recovery	FEW4-MW97-(391.0) (SD) / 280-101338-4MSD	1 / 1.00	n-Butylbenzene	64.23 (percent)	J/UJ	70 - 128	70 - 128	M			
MS Recovery	FEW4-MW97-(391.0) (SD) / 280-101338-4MSD	1 / 1.00	n-Propylbenzene	67.19 (percent)	J/UJ	73 - 125	73 - 125	M			
MS Recovery	FEW4-MW97-(391.0) (SD) / 280-101338-4MSD	1 / 1.00	o-Xylene	67.79 (percent)	J/UJ	77 - 123	77 - 123	M			
MS Recovery	FEW4-MW97-(391.0) (SD) / 280-101338-4MSD	1 / 1.00	p-Cymene (p-Isopropyltoluene)	64.23 (percent)	J/UJ	73 - 127	73 - 127	M			
MS Recovery	FEW4-MW97-(391.0) (SD) / 280-101338-4MSD	1 / 1.00	sec-Butylbenzene	65.02 (percent)	J/UJ	73 - 126	73 - 126	M			
MS Recovery	FEW4-MW97-(391.0) (SD) / 280-101338-4MSD	1 / 1.00	Styrene	70.36 (percent)	J/UJ	76 - 124	76 - 124	M			
MS Recovery	FEW4-MW97-(391.0) (SD) / 280-101338-4MSD	1 / 1.00	tert-Butylbenzene	66.01 (percent)	J/UJ	73 - 125	73 - 125	M			
MS Recovery	FEW4-MW97-(391.0) (SD) / 280-101338-4MSD	1 / 1.00	Tetrachloroethene (PCE)	67.98 (percent)	J/UJ	73 - 128	73 - 128	M			
MS Recovery	FEW4-MW97-(391.0) (SD) / 280-101338-4MSD	1 / 1.00	Toluene	72.33 (percent)	J/UJ	77 - 121	77 - 121	M			
MS Recovery	FEW4-MW97-(391.0) (SD) / 280-101338-4MSD	1 / 1.00	trans-1,2-Dichloroethene	72.73 (percent)	J/UJ	74 - 125	74 - 125	M			
MS Recovery	FEW4-MW97-(391.0) (SD) / 280-101338-4MSD	1 / 1.00	trans-1,3-Dichloropropene	67.79 (percent)	J/UJ	71 - 130	71 - 130	M			
MS Recovery	FEW4-MW97-(391.0) (SD) / 280-101338-4MSD	1 / 1.00	Trichloroethene (TCE)	70.75 (percent)	J/UJ	77 - 123	77 - 123	M			

US Army Corps of Engineers®

QC Outlier Report

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

QC Element	Sample ID/ Lab Sample ID	Run#/ Dil'n	Analyte	Result (Units)	Qualifier	Warning Limits	Control Limits	Reason	Comment	Rule	Action Level
MS RPD	280-101338-4MSD (SD) / 280-101338-4MSD	1 / 1.00	1,1,1,2-Tetrachloroethane	44.09 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101338-4MSD (SD) / 280-101338-4MSD	1 / 1.00	1,1,1-Trichloroethane	34.18 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101338-4MSD (SD) / 280-101338-4MSD	1 / 1.00	1,1,2,2-Tetrachloroethane	44.68 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101338-4MSD (SD) / 280-101338-4MSD	1 / 1.00	1,1,2-Trichloroethane	47.02 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101338-4MSD (SD) / 280-101338-4MSD	1 / 1.00	1,1-Dichloroethane	37.85 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101338-4MSD (SD) / 280-101338-4MSD	1 / 1.00	1,1-Dichloroethene	28.18 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101338-4MSD (SD) / 280-101338-4MSD	1 / 1.00	1,1-Dichloropropene	34.98 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101338-4MSD (SD) / 280-101338-4MSD	1 / 1.00	1,2,3-Trichlorobenzene	45.02 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101338-4MSD (SD) / 280-101338-4MSD	1 / 1.00	1,2,3-Trichloropropane	41.87 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101338-4MSD (SD) / 280-101338-4MSD	1 / 1.00	1,2,4-Trichlorobenzene	45.70 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101338-4MSD (SD) / 280-101338-4MSD	1 / 1.00	1,2,4-Trimethylbenzene	41.33 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101338-4MSD (SD) / 280-101338-4MSD	1 / 1.00	1,2-Dibromo-3-chloropropane	33.80 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101338-4MSD (SD) / 280-101338-4MSD	1 / 1.00	1,2-Dibromoethane (EDB)	44.27 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101338-4MSD (SD) / 280-101338-4MSD	1 / 1.00	1,2-Dichlorobenzene	46.67 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101338-4MSD (SD) / 280-101338-4MSD	1 / 1.00	1,2-Dichloroethane	45.40 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101338-4MSD (SD) / 280-101338-4MSD	1 / 1.00	1,2-Dichloroethene	41.67 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101338-4MSD (SD) / 280-101338-4MSD	1 / 1.00	1,2-Dichloropropane	40.47 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101338-4MSD (SD) / 280-101338-4MSD	1 / 1.00	1,3,5-Trimethylbenzene	42.33 (rpd)	J/None	< 20	< 20	D			

US Army Corps of Engineers®

QC Outlier Report

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

QC Element	Sample ID/ Lab Sample ID	Run#/ Dil'n	Analyte	Result (Units)	Qualifier	Warning Limits	Control Limits	Reason	Comment	Rule	Action Level
MS RPD	280-101338-4MSD (SD) / 280-101338-4MSD	1 / 1.00	1,3-Dichlorobenzene	44.81 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101338-4MSD (SD) / 280-101338-4MSD	1 / 1.00	1,3-Dichloropropane	42.61 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101338-4MSD (SD) / 280-101338-4MSD	1 / 1.00	1,4-Dichlorobenzene	48.06 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101338-4MSD (SD) / 280-101338-4MSD	1 / 1.00	2,2-Dichloropropane	34.79 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101338-4MSD (SD) / 280-101338-4MSD	1 / 1.00	2-Butanone (MEK)	23.61 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101338-4MSD (SD) / 280-101338-4MSD	1 / 1.00	2-Chlorotoluene	42.55 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101338-4MSD (SD) / 280-101338-4MSD	1 / 1.00	2-Hexanone	28.23 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101338-4MSD (SD) / 280-101338-4MSD	1 / 1.00	4-Chlorotoluene	42.91 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101338-4MSD (SD) / 280-101338-4MSD	1 / 1.00	4-Methyl-2-pentanone (MIBK)	37.10 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101338-4MSD (SD) / 280-101338-4MSD	1 / 1.00	Acetone	26.25 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101338-4MSD (SD) / 280-101338-4MSD	1 / 1.00	Benzene	36.34 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101338-4MSD (SD) / 280-101338-4MSD	1 / 1.00	Bromobenzene	45.15 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101338-4MSD (SD) / 280-101338-4MSD	1 / 1.00	Bromochloromethane	44.93 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101338-4MSD (SD) / 280-101338-4MSD	1 / 1.00	Bromodichloromethane	43.40 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101338-4MSD (SD) / 280-101338-4MSD	1 / 1.00	Bromoform	44.03 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101338-4MSD (SD) / 280-101338-4MSD	1 / 1.00	Bromomethane	36.20 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101338-4MSD (SD) / 280-101338-4MSD	1 / 1.00	Carbon disulfide	34.65 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101338-4MSD (SD) / 280-101338-4MSD	1 / 1.00	Carbon tetrachloride	33.52 (rpd)	J/None	< 20	< 20	D			

US Army Corps of Engineers®

QC Outlier Report

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

QC Element	Sample ID/ Lab Sample ID	Run#/ Dil'n	Analyte	Result (Units)	Qualifier	Warning Limits	Control Limits	Reason	Comment	Rule	Action Level
MS RPD	280-101338-4MSD (SD) / 280-101338-4MSD	1 / 1.00	Chlorobenzene	45.10 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101338-4MSD (SD) / 280-101338-4MSD	1 / 1.00	Chloroethane	29.14 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101338-4MSD (SD) / 280-101338-4MSD	1 / 1.00	Chloroform	39.18 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101338-4MSD (SD) / 280-101338-4MSD	1 / 1.00	cis-1,2-Dichloroethene	45.65 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101338-4MSD (SD) / 280-101338-4MSD	1 / 1.00	cis-1,3-Dichloropropene	47.62 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101338-4MSD (SD) / 280-101338-4MSD	1 / 1.00	Dibromochloromethane	45.58 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101338-4MSD (SD) / 280-101338-4MSD	1 / 1.00	Dibromomethane	47.19 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101338-4MSD (SD) / 280-101338-4MSD	1 / 1.00	Dichlorodifluoromethane	27.30 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101338-4MSD (SD) / 280-101338-4MSD	1 / 1.00	Ethylbenzene	38.30 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101338-4MSD (SD) / 280-101338-4MSD	1 / 1.00	Hexachlorobutadiene	35.29 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101338-4MSD (SD) / 280-101338-4MSD	1 / 1.00	Isopropylbenzene (Cumene)	40.84 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101338-4MSD (SD) / 280-101338-4MSD	1 / 1.00	m,p-Xylene	37.55 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101338-4MSD (SD) / 280-101338-4MSD	1 / 1.00	Methyl tert-butyl ether (MTBE)	40.00 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101338-4MSD (SD) / 280-101338-4MSD	1 / 1.00	Methylene chloride	45.87 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101338-4MSD (SD) / 280-101338-4MSD	1 / 1.00	Naphthalene	41.79 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101338-4MSD (SD) / 280-101338-4MSD	1 / 1.00	n-Butylbenzene	38.91 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101338-4MSD (SD) / 280-101338-4MSD	1 / 1.00	n-Propylbenzene	41.31 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101338-4MSD (SD) / 280-101338-4MSD	1 / 1.00	o-Xylene	40.65 (rpd)	J/None	< 20	< 20	D			

US Army Corps of Engineers ®

QC Outlier Report

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

QC Element	Sample ID/ Lab Sample ID	Run#/ Dil'n	Analyte	Result (Units)	Qualifier	Warning Limits	Control Limits	Reason	Comment	Rule	Action Level
MS RPD	280-101338-4MSD (SD) / 280-101338-4MSD	1 / 1.00	p-Cymene (p-Isopropyltoluene)	40.10 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101338-4MSD (SD) / 280-101338-4MSD	1 / 1.00	sec-Butylbenzene	42.40 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101338-4MSD (SD) / 280-101338-4MSD	1 / 1.00	Styrene	42.83 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101338-4MSD (SD) / 280-101338-4MSD	1 / 1.00	tert-Butylbenzene	38.65 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101338-4MSD (SD) / 280-101338-4MSD	1 / 1.00	Tetrachloroethene (PCE)	36.58 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101338-4MSD (SD) / 280-101338-4MSD	1 / 1.00	Toluene	35.87 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101338-4MSD (SD) / 280-101338-4MSD	1 / 1.00	trans-1,2-Dichloroethene	37.35 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101338-4MSD (SD) / 280-101338-4MSD	1 / 1.00	trans-1,3-Dichloropropene	49.73 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101338-4MSD (SD) / 280-101338-4MSD	1 / 1.00	Trichloroethene (TCE)	35.78 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101338-4MSD (SD) / 280-101338-4MSD	1 / 1.00	Trichlorofluoromethane	39.04 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-101338-4MSD (SD) / 280-101338-4MSD	1 / 1.00	Vinyl chloride	23.20 (rpd)	J/None	< 20	< 20	D			

Rule is the multiplier used when blank contamination occurs to determine action level.

US Army Corps of Engineers®

Qualified Results

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW97-(391.0)	280-101338-4	SO	N	1,1,1,2-Tetrachloroethane	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	280-101338-4	SO	N	1,1,2,2-Tetrachloroethane	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	280-101338-4	SO	N	1,1,2-Trichloroethane	6.40	4.10 U J	4.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	280-101338-4	SO	N	1,1-Dichloroethane	6.40	1.00 U J	1.00 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	280-101338-4	SO	N	1,1-Dichloropropene	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	280-101338-4	SO	N	1,2,3-Trichlorobenzene	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	280-101338-4	SO	N	1,2,4-Trichlorobenzene	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	280-101338-4	SO	N	1,2,4-Trimethylbenzene	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	280-101338-4	SO	N	1,2-Dibromoethane (EDB)	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	280-101338-4	SO	N	1,2-Dichlorobenzene	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	280-101338-4	SO	N	1,2-Dichloroethane	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	280-101338-4	SO	N	1,2-Dichloroethene	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	280-101338-4	SO	N	1,2-Dichloropropane	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	280-101338-4	SO	N	1,3,5-Trimethylbenzene	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	280-101338-4	SO	N	1,3-Dichlorobenzene	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	280-101338-4	SO	N	1,3-Dichloropropane	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	280-101338-4	SO	N	1,4-Dichlorobenzene	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	280-101338-4	SO	N	2,2-Dichloropropane	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	280-101338-4	SO	N	2-Chlorotoluene	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	280-101338-4	SO	N	4-Chlorotoluene	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	280-101338-4	SO	N	Benzene	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	280-101338-4	SO	N	Bromobenzene	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	280-101338-4	SO	N	Bromochloromethane	6.40	1.00 U J	1.00 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	280-101338-4	SO	N	Bromodichloromethane	6.40	1.00 U J	1.00 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	280-101338-4	SO	N	Bromoform	6.40	1.00 U J	1.00 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	280-101338-4	SO	N	Chlorobenzene	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	280-101338-4	SO	N	Chloroform	13.0	1.00 U J	1.00 UJ	-	ug/kg	M

US Army Corps of Engineers®

Qualified Results

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW97-(391.0)	280-101338-4	SO	N	cis-1,2-Dichloroethene	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	280-101338-4	SO	N	cis-1,3-Dichloropropene	6.40	4.10 U J	4.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	280-101338-4	SO	N	Dibromochloromethane	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	280-101338-4	SO	N	Dibromomethane	6.40	4.10 U J	4.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	280-101338-4	SO	N	Ethylbenzene	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	280-101338-4	SO	N	Isopropylbenzene (Cumene)	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	280-101338-4	SO	N	m,p-Xylene	4.10	4.10 U J	4.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	280-101338-4	SO	N	Methylene chloride	6.40	4.10 U J	4.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	280-101338-4	SO	N	n-Butylbenzene	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	280-101338-4	SO	N	n-Propylbenzene	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	280-101338-4	SO	N	o-Xylene	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	280-101338-4	SO	N	p-Cymene (p-Isopropyltoluene)	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	280-101338-4	SO	N	sec-Butylbenzene	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	280-101338-4	SO	N	Styrene	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	280-101338-4	SO	N	tert-Butylbenzene	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	280-101338-4	SO	N	Tetrachloroethene (PCE)	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	280-101338-4	SO	N	Toluene	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	280-101338-4	SO	N	trans-1,2-Dichloroethene	6.40	1.00 U J	1.00 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	280-101338-4	SO	N	trans-1,3-Dichloropropene	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	280-101338-4	SO	N	Trichloroethene (TCE)	6.40	1.00 U J	1.00 UJ	-	ug/kg	M

Qualified analytes in samples are reported as estimated, not detected (UJ) at the Limit of Detection (LOD).

US Army Corps of Engineers ®

Detected Results

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Dilution	Analyte	LOQ	Lab Result	Qualified Result	Units	Reason
FEW4-MW97-(371.0)	280-101338-1	SO	N	1	Acetone	27.0	54.0	54.0	ug/kg	
FEW4-MW97-(381.0)	280-101338-2	SO	N	1	Acetone	28.0	39.0	39.0	ug/kg	
FEW4-MW97-(401.0)	280-101338-5	SO	N	1	Acetone	23.0	28.0	28.0	ug/kg	
FEW4-MW97-(413.0)	280-101338-6	SO	N	1	Acetone	24.0	32.0	32.0	ug/kg	
FEW4-MW97-(421.0)	280-101338-7	SO	N	1	Acetone	26.0	31.0	31.0	ug/kg	

Rejected Results

--No Records Found--

US Army Corps of Engineers ®

Facility:	B08WY0467-02, F.E. Warren AFB, Site 4
Event:	2017-2018 RI Addendum Tasks
SDG:	280-101338-1_52_2a_FUDSChem
Guidance Document:	Draft-Final Uniform Federal Policy-Quality Assurance Project Plan for the Remedial Investigation Addendum 2017-2018 Tasks Atlas “D” Missile Site 4 —Laramie County, Wyoming, July 2017
Prime Contractor:	RMC Consultants, Inc., LAKEWOOD, CO
Project Manager:	David Groy
Contract Laboratory:	TestAmerica Laboratories, Inc., Arvada, CO
Data Review Contractor:	RMC Consutants
Data Review Level:	Stage 3VEM
Primary Data Reviewer:	Gary Torf, Contractor Project Chemist
Second Reviewer:	, Senior Scientist
Date Submitted:	

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	SW8260B
FEW4-MW97-(382.0)	280-101338-3	Solid	Field Duplicate/FD	X
FEW4-MW97-(371.0)	280-101338-1	Solid	Field Sample/N	X
FEW4-MW97-(381.0)	280-101338-2	Solid	Field Sample/N	X
FEW4-MW97-(391.0)	280-101338-4	Solid	Field Sample/N	X
FEW4-MW97-(401.0)	280-101338-5	Solid	Field Sample/N	X
FEW4-MW97-(413.0)	280-101338-6	Solid	Field Sample/N	X
FEW4-MW97-(421.0)	280-101338-7	Solid	Field Sample/N	X

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the Draft-Final Uniform Federal Policy-Quality Assurance Project Plan for the Remedial Investigation Addendum 2017-2018 Tasks Atlas “D” Missile Site 4 —Laramie County, Wyoming, July 2017 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by RMC Consultants, Inc., LAKEWOOD, CO; analyses were performed by TestAmerica Laboratories, Inc., Arvada, CO and were reported under sample delivery group (SDG) 280-101338-1_52_2a_FUDSChem. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

- Blank
- Blank - Negative
- Field Duplicate RPD
- LCS Recovery
- LCS RPD
- MS Recovery
- MS RPD
- Prep Hold Time
- Surrogate
- Test Hold Time

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 47 results (10.17%) out of the 462 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected. Trace values, defined as results that are qualified as estimated because they fall between the limit of detection and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

Narrative Comments

Analytical Method	Data Reviewer Comment
SW8260B	No additional comments; see Checklist for detail.

January 02, 2018

Reviewed by Gary Torf, Contractor Project Chemist, RMC Consutants

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of a minimum of 10% of the reported sample results and method quality control data between the two deliverables.

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

Quality Control Outliers for test method SW8260B, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
FEW4-MW97-(391.0) (MS)/ 280-101338-4MS	1,4-Dichlorobenzene	71.86	75 - 120	75 - 120	percent	J/UJ	M	
FEW4-MW97-(391.0) (MS)/ 280-101338-4MS	m,p-Xylene	72.46	77 - 124	77 - 124	percent	J/UJ	M	
FEW4-MW97-(391.0) (MS)/ 280-101338-4MS	1,3-Dichlorobenzene	73.20	77 - 121	77 - 121	percent	J/UJ	M	
FEW4-MW97-(391.0) (MS)/ 280-101338-4MS	Chlorobenzene	74.85	79 - 120	79 - 120	percent	J/UJ	M	
FEW4-MW97-(391.0) (MS)/ 280-101338-4MS	Ethylbenzene	75.45	76 - 122	76 - 122	percent	J/UJ	M	
FEW4-MW97-(391.0) (MS)/ 280-101338-4MS	Trichloroethene (TCE)	76.95	77 - 123	77 - 123	percent	J/UJ	M	
FEW4-MW97-(391.0) (MS)/ 280-101338-4MS	1,2-Dichlorobenzene	77.54	78 - 121	78 - 121	percent	J/UJ	M	
FEW4-MW97-(391.0) (SD)/ 280-101338-4MSD	1,2,4-Trichlorobenzene	56.72	67 - 129	67 - 129	percent	J/UJ	M	
FEW4-MW97-(391.0) (SD)/ 280-101338-4MSD	1,4-Dichlorobenzene	58.10	75 - 120	75 - 120	percent	J/UJ	M	
FEW4-MW97-(391.0) (SD)/ 280-101338-4MSD	1,3-Dichlorobenzene	61.26	77 - 121	77 - 121	percent	J/UJ	M	
FEW4-MW97-(391.0) (SD)/ 280-101338-4MSD	cis-1,3-Dichloropropene	61.66	74 - 126	74 - 126	percent	J/UJ	M	
FEW4-MW97-(391.0) (SD)/ 280-101338-4MSD	1,2,3-Trichlorobenzene	62.25	66 - 130	66 - 130	percent	J/UJ	M	
FEW4-MW97-(391.0) (SD)/ 280-101338-4MSD	Chlorobenzene	62.45	79 - 120	79 - 120	percent	J/UJ	M	
FEW4-MW97-(391.0) (SD)/ 280-101338-4MSD	Bromoform	62.65	67 - 132	67 - 132	percent	J/UJ	M	
FEW4-MW97-(391.0) (SD)/ 280-101338-4MSD	1,2-Dichlorobenzene	63.64	78 - 121	78 - 121	percent	J/UJ	M	
FEW4-MW97-(391.0) (SD)/ 280-101338-4MSD	n-Butylbenzene	64.23	70 - 128	70 - 128	percent	J/UJ	M	
FEW4-MW97-(391.0) (SD)/ 280-101338-4MSD	p-Cymene (p-Isopropyltoluene)	64.23	73 - 127	73 - 127	percent	J/UJ	M	
FEW4-MW97-(391.0) (SD)/ 280-101338-4MSD	sec-Butylbenzene	65.02	73 - 126	73 - 126	percent	J/UJ	M	
FEW4-MW97-(391.0) (SD)/ 280-101338-4MSD	2,2-Dichloropropane	65.22	67 - 133	67 - 133	percent	J/UJ	M	
FEW4-MW97-(391.0) (SD)/ 280-101338-4MSD	Methylene chloride	65.42	70 - 128	70 - 128	percent	J/UJ	M	
FEW4-MW97-(391.0) (SD)/ 280-101338-4MSD	m,p-Xylene	65.42	77 - 124	77 - 124	percent	J/UJ	M	
FEW4-MW97-(391.0) (SD)/ 280-101338-4MSD	Bromobenzene	65.42	78 - 121	78 - 121	percent	J/UJ	M	
FEW4-MW97-(391.0) (SD)/ 280-101338-4MSD	1,1,2,2-Tetrachloroethane	65.61	70 - 124	70 - 124	percent	J/UJ	M	
FEW4-MW97-(391.0) (SD)/ 280-101338-4MSD	2-Chlorotoluene	65.81	75 - 122	75 - 122	percent	J/UJ	M	

Quality Control Outliers for test method SW8260B, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
FEW4-MW97-(391.0) (SD)/ 280-101338-4MSD	cis-1,2-Dichloroethene	65.81	77 - 123	77 - 123	percent	J/UJ	M	
FEW4-MW97-(391.0) (SD)/ 280-101338-4MSD	tert-Butylbenzene	66.01	73 - 125	73 - 125	percent	J/UJ	M	
FEW4-MW97-(391.0) (SD)/ 280-101338-4MSD	1,2,4-Trimethylbenzene	66.01	75 - 123	75 - 123	percent	J/UJ	M	
FEW4-MW97-(391.0) (SD)/ 280-101338-4MSD	4-Chlorotoluene	66.21	72 - 124	72 - 124	percent	J/UJ	M	
FEW4-MW97-(391.0) (SD)/ 280-101338-4MSD	1,3-Dichloropropane	66.80	77 - 121	77 - 121	percent	J/UJ	M	
FEW4-MW97-(391.0) (SD)/ 280-101338-4MSD	1,3,5-Trimethylbenzene	67.00	73 - 124	73 - 124	percent	J/UJ	M	
FEW4-MW97-(391.0) (SD)/ 280-101338-4MSD	1,2-Dichloropropane	67.00	76 - 123	76 - 123	percent	J/UJ	M	
FEW4-MW97-(391.0) (SD)/ 280-101338-4MSD	n-Propylbenzene	67.19	73 - 125	73 - 125	percent	J/UJ	M	
FEW4-MW97-(391.0) (SD)/ 280-101338-4MSD	Dibromomethane	67.19	78 - 125	78 - 125	percent	J/UJ	M	
FEW4-MW97-(391.0) (SD)/ 280-101338-4MSD	Isopropylbenzene (Cumene)	67.39	68 - 134	68 - 134	percent	J/UJ	M	
FEW4-MW97-(391.0) (SD)/ 280-101338-4MSD	Ethylbenzene	67.59	76 - 122	76 - 122	percent	J/UJ	M	
FEW4-MW97-(391.0) (SD)/ 280-101338-4MSD	trans-1,3-Dichloropropene	67.79	71 - 130	71 - 130	percent	J/UJ	M	
FEW4-MW97-(391.0) (SD)/ 280-101338-4MSD	o-Xylene	67.79	77 - 123	77 - 123	percent	J/UJ	M	
FEW4-MW97-(391.0) (SD)/ 280-101338-4MSD	1,2-Dibromoethane (EDB)	67.79	78 - 122	78 - 122	percent	J/UJ	M	
FEW4-MW97-(391.0) (SD)/ 280-101338-4MSD	1,1,1,2-Tetrachloroethane	67.79	78 - 125	78 - 125	percent	J/UJ	M	
FEW4-MW97-(391.0) (SD)/ 280-101338-4MSD	Tetrachloroethene (PCE)	67.98	73 - 128	73 - 128	percent	J/UJ	M	
FEW4-MW97-(391.0) (SD)/ 280-101338-4MSD	1,2-Dichloroethane	68.97	73 - 128	73 - 128	percent	J/UJ	M	
FEW4-MW97-(391.0) (SD)/ 280-101338-4MSD	Dibromochloromethane	68.97	74 - 126	74 - 126	percent	J/UJ	M	
FEW4-MW97-(391.0) (SD)/ 280-101338-4MSD	1,2-Dichloroethene	69.41	78 - 122	78 - 122	percent	J/UJ	M	
FEW4-MW97-(391.0) (SD)/ 280-101338-4MSD	Bromochloromethane	69.57	78 - 125	78 - 125	percent	J/UJ	M	
FEW4-MW97-(391.0) (SD)/ 280-101338-4MSD	1,1,2-Trichloroethane	69.76	78 - 121	78 - 121	percent	J/UJ	M	
FEW4-MW97-(391.0) (SD)/ 280-101338-4MSD	Chloroform	69.76	78 - 123	78 - 123	percent	J/UJ	M	
FEW4-MW97-(391.0) (SD)/ 280-101338-4MSD	Styrene	70.36	76 - 124	76 - 124	percent	J/UJ	M	
FEW4-MW97-(391.0) (SD)/ 280-101338-4MSD	Benzene	70.75	77 - 121	77 - 121	percent	J/UJ	M	

Quality Control Outliers for test method SW8260B, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
FEW4-MW97-(391.0) (SD)/ 280-101338-4MSD	Trichloroethene (TCE)	70.75	77 - 123	77 - 123	percent	J/UJ	M	
FEW4-MW97-(391.0) (SD)/ 280-101338-4MSD	Bromodichloromethane	70.95	75 - 127	75 - 127	percent	J/UJ	M	
FEW4-MW97-(391.0) (SD)/ 280-101338-4MSD	1,1-Dichloroethane	71.54	76 - 125	76 - 125	percent	J/UJ	M	
FEW4-MW97-(391.0) (SD)/ 280-101338-4MSD	Toluene	72.33	77 - 121	77 - 121	percent	J/UJ	M	
FEW4-MW97-(391.0) (SD)/ 280-101338-4MSD	trans-1,2-Dichloroethene	72.73	74 - 125	74 - 125	percent	J/UJ	M	
FEW4-MW97-(391.0) (SD)/ 280-101338-4MSD	1,1-Dichloropropene	72.73	76 - 125	76 - 125	percent	J/UJ	M	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the MS Recovery for SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW97-(391.0)	N	1,1,1,2-Tetrachloroethane	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	1,1,2,2-Tetrachloroethane	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	1,1,2-Trichloroethane	6.40	4.10 U J	4.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	1,1-Dichloroethane	6.40	1.00 U J	1.00 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	1,1-Dichloropropene	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	1,2,3-Trichlorobenzene	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	1,2,4-Trichlorobenzene	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	1,2,4-Trimethylbenzene	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	1,2-Dibromoethane (EDB)	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	1,2-Dichlorobenzene	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	1,2-Dichloroethane	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	1,2-Dichloroethene	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	1,2-Dichloropropane	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	1,3,5-Trimethylbenzene	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	1,3-Dichlorobenzene	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	1,3-Dichloropropane	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	1,4-Dichlorobenzene	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	2,2-Dichloropropane	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	2-Chlorotoluene	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	4-Chlorotoluene	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	Benzene	6.40	2.10 U J	2.10 UJ	-	ug/kg	M

Qualified Results associated with the MS Recovery for SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW97-(391.0)	N	Bromobenzene	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	Bromochloromethane	6.40	1.00 U J	1.00 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	Bromodichloromethane	6.40	1.00 U J	1.00 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	Bromoform	6.40	1.00 U J	1.00 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	Chlorobenzene	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	Chloroform	13.0	1.00 U J	1.00 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	cis-1,2-Dichloroethene	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	cis-1,3-Dichloropropene	6.40	4.10 U J	4.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	Dibromochloromethane	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	Dibromomethane	6.40	4.10 U J	4.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	Ethylbenzene	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	Isopropylbenzene (Cumene)	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	m,p-Xylene	4.10	4.10 U J	4.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	Methylene chloride	6.40	4.10 U J	4.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	n-Butylbenzene	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	n-Propylbenzene	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	o-Xylene	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	p-Cymene (p-Isopropyltoluene)	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	sec-Butylbenzene	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	Styrene	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	tert-Butylbenzene	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	Tetrachloroethene (PCE)	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	Toluene	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	trans-1,2-Dichloroethene	6.40	1.00 U J	1.00 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	trans-1,3-Dichloropropene	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	Trichloroethene (TCE)	6.40	1.00 U J	1.00 UJ	-	ug/kg	M

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

Quality Control Outliers for test method SW8260B, MS RPD

The objective of matrix spikes/matrix spike duplicates (MS/MSD) RPD analysis is to demonstrate acceptable method precision by the laboratory at the time of analysis. MS/MSD analyses are also performed to generate data that determines the long-term precision of the analytical method on various matrices. Non-homogenous samples can impact the apparent method precision. Summary forms were evaluated and compared to electronic data deliverables. Matrix spikes/matrix spike duplicates results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
280-101338-4MSD (SD)/ 280-101338-4MSD	Vinyl chloride	23.20	< 20	< 20	rpd	J/None	D	
280-101338-4MSD (SD)/ 280-101338-4MSD	2-Butanone (MEK)	23.61	< 20	< 20	rpd	J/None	D	
280-101338-4MSD (SD)/ 280-101338-4MSD	Acetone	26.25	< 20	< 20	rpd	J/None	D	
280-101338-4MSD (SD)/ 280-101338-4MSD	Dichlorodifluoromethane	27.30	< 20	< 20	rpd	J/None	D	
280-101338-4MSD (SD)/ 280-101338-4MSD	1,1-Dichloroethene	28.18	< 20	< 20	rpd	J/None	D	

Quality Control Outliers for test method SW8260B, MS RPD

The objective of matrix spikes/matrix spike duplicates (MS/MSD) RPD analysis is to demonstrate acceptable method precision by the laboratory at the time of analysis. MS/MSD analyses are also performed to generate data that determines the long-term precision of the analytical method on various matrices. Non-homogenous samples can impact the apparent method precision. Summary forms were evaluated and compared to electronic data deliverables. Matrix spikes/matrix spike duplicates results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
280-101338-4MSD (SD)/ 280-101338-4MSD	2-Hexanone	28.23	< 20	< 20	rpd	J/None	D	
280-101338-4MSD (SD)/ 280-101338-4MSD	Chloroethane	29.14	< 20	< 20	rpd	J/None	D	
280-101338-4MSD (SD)/ 280-101338-4MSD	Carbon tetrachloride	33.52	< 20	< 20	rpd	J/None	D	
280-101338-4MSD (SD)/ 280-101338-4MSD	1,2-Dibromo-3-chloropropane	33.80	< 20	< 20	rpd	J/None	D	
280-101338-4MSD (SD)/ 280-101338-4MSD	1,1,1-Trichloroethane	34.18	< 20	< 20	rpd	J/None	D	
280-101338-4MSD (SD)/ 280-101338-4MSD	Carbon disulfide	34.65	< 20	< 20	rpd	J/None	D	
280-101338-4MSD (SD)/ 280-101338-4MSD	2,2-Dichloropropane	34.79	< 20	< 20	rpd	J/None	D	
280-101338-4MSD (SD)/ 280-101338-4MSD	1,1-Dichloropropene	34.98	< 20	< 20	rpd	J/None	D	
280-101338-4MSD (SD)/ 280-101338-4MSD	Hexachlorobutadiene	35.29	< 20	< 20	rpd	J/None	D	
280-101338-4MSD (SD)/ 280-101338-4MSD	Trichloroethene (TCE)	35.78	< 20	< 20	rpd	J/None	D	
280-101338-4MSD (SD)/ 280-101338-4MSD	Toluene	35.87	< 20	< 20	rpd	J/None	D	
280-101338-4MSD (SD)/ 280-101338-4MSD	Bromomethane	36.20	< 20	< 20	rpd	J/None	D	
280-101338-4MSD (SD)/ 280-101338-4MSD	Benzene	36.34	< 20	< 20	rpd	J/None	D	
280-101338-4MSD (SD)/ 280-101338-4MSD	Tetrachloroethene (PCE)	36.58	< 20	< 20	rpd	J/None	D	
280-101338-4MSD (SD)/ 280-101338-4MSD	4-Methyl-2-pentanone (MIBK)	37.10	< 20	< 20	rpd	J/None	D	
280-101338-4MSD (SD)/ 280-101338-4MSD	trans-1,2-Dichloroethene	37.35	< 20	< 20	rpd	J/None	D	
280-101338-4MSD (SD)/ 280-101338-4MSD	m,p-Xylene	37.55	< 20	< 20	rpd	J/None	D	
280-101338-4MSD (SD)/ 280-101338-4MSD	1,1-Dichloroethane	37.85	< 20	< 20	rpd	J/None	D	
280-101338-4MSD (SD)/ 280-101338-4MSD	Ethylbenzene	38.30	< 20	< 20	rpd	J/None	D	
280-101338-4MSD (SD)/ 280-101338-4MSD	tert-Butylbenzene	38.65	< 20	< 20	rpd	J/None	D	
280-101338-4MSD (SD)/ 280-101338-4MSD	n-Butylbenzene	38.91	< 20	< 20	rpd	J/None	D	
280-101338-4MSD (SD)/ 280-101338-4MSD	Trichlorofluoromethane	39.04	< 20	< 20	rpd	J/None	D	
280-101338-4MSD (SD)/ 280-101338-4MSD	Chloroform	39.18	< 20	< 20	rpd	J/None	D	
280-101338-4MSD (SD)/ 280-101338-4MSD	Methyl tert-butyl ether (MTBE)	40.00	< 20	< 20	rpd	J/None	D	
280-101338-4MSD (SD)/ 280-101338-4MSD	p-Cymene (p-Isopropyltoluene)	40.10	< 20	< 20	rpd	J/None	D	

Quality Control Outliers for test method SW8260B, MS RPD

The objective of matrix spikes/matrix spike duplicates (MS/MSD) RPD analysis is to demonstrate acceptable method precision by the laboratory at the time of analysis. MS/MSD analyses are also performed to generate data that determines the long-term precision of the analytical method on various matrices. Non-homogenous samples can impact the apparent method precision. Summary forms were evaluated and compared to electronic data deliverables. Matrix spikes/matrix spike duplicates results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
280-101338-4MSD (SD)/ 280-101338-4MSD	1,2-Dichloropropane	40.47	< 20	< 20	rpd	J/None	D	
280-101338-4MSD (SD)/ 280-101338-4MSD	o-Xylene	40.65	< 20	< 20	rpd	J/None	D	
280-101338-4MSD (SD)/ 280-101338-4MSD	Isopropylbenzene (Cumene)	40.84	< 20	< 20	rpd	J/None	D	
280-101338-4MSD (SD)/ 280-101338-4MSD	n-Propylbenzene	41.31	< 20	< 20	rpd	J/None	D	
280-101338-4MSD (SD)/ 280-101338-4MSD	1,2,4-Trimethylbenzene	41.33	< 20	< 20	rpd	J/None	D	
280-101338-4MSD (SD)/ 280-101338-4MSD	1,2-Dichloroethene	41.67	< 20	< 20	rpd	J/None	D	
280-101338-4MSD (SD)/ 280-101338-4MSD	Naphthalene	41.79	< 20	< 20	rpd	J/None	D	
280-101338-4MSD (SD)/ 280-101338-4MSD	1,2,3-Trichloropropane	41.87	< 20	< 20	rpd	J/None	D	
280-101338-4MSD (SD)/ 280-101338-4MSD	1,3,5-Trimethylbenzene	42.33	< 20	< 20	rpd	J/None	D	
280-101338-4MSD (SD)/ 280-101338-4MSD	sec-Butylbenzene	42.40	< 20	< 20	rpd	J/None	D	
280-101338-4MSD (SD)/ 280-101338-4MSD	2-Chlorotoluene	42.55	< 20	< 20	rpd	J/None	D	
280-101338-4MSD (SD)/ 280-101338-4MSD	1,3-Dichloropropane	42.61	< 20	< 20	rpd	J/None	D	
280-101338-4MSD (SD)/ 280-101338-4MSD	Styrene	42.83	< 20	< 20	rpd	J/None	D	
280-101338-4MSD (SD)/ 280-101338-4MSD	4-Chlorotoluene	42.91	< 20	< 20	rpd	J/None	D	
280-101338-4MSD (SD)/ 280-101338-4MSD	Bromodichloromethane	43.40	< 20	< 20	rpd	J/None	D	
280-101338-4MSD (SD)/ 280-101338-4MSD	Bromoform	44.03	< 20	< 20	rpd	J/None	D	
280-101338-4MSD (SD)/ 280-101338-4MSD	1,1,1,2-Tetrachloroethane	44.09	< 20	< 20	rpd	J/None	D	
280-101338-4MSD (SD)/ 280-101338-4MSD	1,2-Dibromoethane (EDB)	44.27	< 20	< 20	rpd	J/None	D	
280-101338-4MSD (SD)/ 280-101338-4MSD	1,1,2,2-Tetrachloroethane	44.68	< 20	< 20	rpd	J/None	D	
280-101338-4MSD (SD)/ 280-101338-4MSD	1,3-Dichlorobenzene	44.81	< 20	< 20	rpd	J/None	D	
280-101338-4MSD (SD)/ 280-101338-4MSD	Bromochloromethane	44.93	< 20	< 20	rpd	J/None	D	
280-101338-4MSD (SD)/ 280-101338-4MSD	1,2,3-Trichlorobenzene	45.02	< 20	< 20	rpd	J/None	D	
280-101338-4MSD (SD)/ 280-101338-4MSD	Chlorobenzene	45.10	< 20	< 20	rpd	J/None	D	
280-101338-4MSD (SD)/ 280-101338-4MSD	Bromobenzene	45.15	< 20	< 20	rpd	J/None	D	
280-101338-4MSD (SD)/ 280-101338-4MSD	1,2-Dichloroethane	45.40	< 20	< 20	rpd	J/None	D	

Quality Control Outliers for test method SW8260B, MS RPD

The objective of matrix spikes/matrix spike duplicates (MS/MSD) RPD analysis is to demonstrate acceptable method precision by the laboratory at the time of analysis. MS/MSD analyses are also performed to generate data that determines the long-term precision of the analytical method on various matrices. Non-homogenous samples can impact the apparent method precision. Summary forms were evaluated and compared to electronic data deliverables. Matrix spikes/matrix spike duplicates results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
280-101338-4MSD (SD)/ 280-101338-4MSD	Dibromochloromethane	45.58	< 20	< 20	rpd	J/None	D	
280-101338-4MSD (SD)/ 280-101338-4MSD	cis-1,2-Dichloroethene	45.65	< 20	< 20	rpd	J/None	D	
280-101338-4MSD (SD)/ 280-101338-4MSD	1,2,4-Trichlorobenzene	45.70	< 20	< 20	rpd	J/None	D	
280-101338-4MSD (SD)/ 280-101338-4MSD	Methylene chloride	45.87	< 20	< 20	rpd	J/None	D	
280-101338-4MSD (SD)/ 280-101338-4MSD	1,2-Dichlorobenzene	46.67	< 20	< 20	rpd	J/None	D	
280-101338-4MSD (SD)/ 280-101338-4MSD	1,1,2-Trichloroethane	47.02	< 20	< 20	rpd	J/None	D	
280-101338-4MSD (SD)/ 280-101338-4MSD	Dibromomethane	47.19	< 20	< 20	rpd	J/None	D	
280-101338-4MSD (SD)/ 280-101338-4MSD	cis-1,3-Dichloropropene	47.62	< 20	< 20	rpd	J/None	D	
280-101338-4MSD (SD)/ 280-101338-4MSD	1,4-Dichlorobenzene	48.06	< 20	< 20	rpd	J/None	D	
280-101338-4MSD (SD)/ 280-101338-4MSD	trans-1,3-Dichloropropene	49.73	< 20	< 20	rpd	J/None	D	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

Table of All Qualified Results

Test Method: SW8260B	Extraction Method: SW5035A							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW97-(391.0)	N	1,1,1,2-Tetrachloroethane	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	1,1,2,2-Tetrachloroethane	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	1,1,2-Trichloroethane	6.40	4.10 U J	4.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	1,1-Dichloroethane	6.40	1.00 U J	1.00 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	1,1-Dichloropropene	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	1,2,3-Trichlorobenzene	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	1,2,4-Trichlorobenzene	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	1,2,4-Trimethylbenzene	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	1,2-Dibromoethane (EDB)	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	1,2-Dichlorobenzene	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	1,2-Dichloroethane	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	1,2-Dichloroethene	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	1,2-Dichloropropane	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	1,3,5-Trimethylbenzene	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	1,3-Dichlorobenzene	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	1,3-Dichloropropane	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	1,4-Dichlorobenzene	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	2,2-Dichloropropane	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	2-Chlorotoluene	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	4-Chlorotoluene	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	Benzene	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	Bromobenzene	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	Bromochloromethane	6.40	1.00 U J	1.00 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	Bromodichloromethane	6.40	1.00 U J	1.00 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	Bromoform	6.40	1.00 U J	1.00 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	Chlorobenzene	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	Chloroform	13.0	1.00 U J	1.00 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	cis-1,2-Dichloroethene	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	cis-1,3-Dichloropropene	6.40	4.10 U J	4.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	Dibromochloromethane	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	Dibromomethane	6.40	4.10 U J	4.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	Ethylbenzene	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	Isopropylbenzene (Cumene)	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	m,p-Xylene	4.10	4.10 U J	4.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	Methylene chloride	6.40	4.10 U J	4.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	n-Butylbenzene	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	n-Propylbenzene	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	o-Xylene	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	p-Cymene (p-Isopropyltoluene)	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	sec-Butylbenzene	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	Styrene	6.40	2.10 U J	2.10 UJ	-	ug/kg	M

Table of All Qualified Results

Test Method: SW8260B	Extraction Method: SW5035A							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW97-(391.0)	N	tert-Butylbenzene	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	Tetrachloroethene (PCE)	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	Toluene	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	trans-1,2-Dichloroethene	6.40	1.00 U J	1.00 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	trans-1,3-Dichloropropene	6.40	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW97-(391.0)	N	Trichloroethene (TCE)	6.40	1.00 U J	1.00 UJ	-	ug/kg	M

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
Trace values are not included in the qualified results table unless additional reason codes are associated.

Trace Results

No results associated with this sample delivery group are considered trace.

Results with Modified Qualifiers

No qualifiers associated with this sample delivery group were modified manually.

Reason Code Definitions

Code	Definition
D	MS RPD
M	MS Recovery

Flag Code and Definitions

Flag	Definition
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
J	Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
R	The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making.
B	Blank contamination: The analyte was found in an associated blank above one half the RL, as well as in the sample.
UB	The analyte was also detected in an associated laboratory or field blank at a concentration comparable to the concentration in the sample. The reported result has been requalified as not detected.

Review Questions

Method: SW8260B (Volatile Organic Compounds by Capillary GC/MS)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were sample reciept temperatures met?	•			Sample receipt temperature was 3.6ºC.
Were QAPP specified Project Quantitation Limit Goals achieved?	•			
Were all QAPP-specified target analytes reported?	•			
Was the GC/MS system properly tuned based on method criteria?	•			
Was the criteria met during each 12 hour shift (prior to ICAL and Cal Ver.)?	•			
Does the initial calibration curve consist of 5 concentration levels, with the low standard near but > MDL?	•			
Did the Calibration Check Compounds (CCCs) have a relative standard deviation within QAPP acceptance limits?	•			
Were the average response factors (RFs) for the System Performance Check Compounds (SPCCs) within QAPP acceptance limits?	•			
Were the ICAL %RSDs for the target compounds within method criteria?	•			
If a quadratic equation curve was used, was the coefficient of determination (COD) within criteria?	•			
If a linear regression curve was used, was the correlation coefficient within criteria?	•			
Check and recalculate the response factors and average response factors for a least one target compound.	•			ICAL VMS-G 9/26/17 TCE AVG RF = 0.3354
Check and recalculate the %RSD for one of more target compounds and DMCs. Verify that the recalculated values agree with the laboratory reported values.	•			ICAL VMS-G 9/26/17 TCE %RDS = 2.3% 1,2-DCA-d4 %RSD = 6.1%
Was a second source verification analyzed after the ICAL and all analytes within criteria?	•			
Was a CCV run at the beginning of the analytical sequence and every 12 hours?	•			
Was the CCV a mid-level standard from the initial calibration curve?	•			
Did the CCCs have a %Difference within QAPP acceptance limits?	•			
Were the average RFs for the SPCCs within QAPP acceptance limits?	•			
Was the %D (difference or drift) for all target analytes within QAPP acceptance limits?		•		CCV 280-389588/2: 2-Butanone (25.2%) exceeded the 20% difference criteria; the analyte was not detected in any associated samples.
Check and recalculate the CCV relative response factor for at least one target compound.	•			VMS-G 9/29/17 CCV 280-389588/2 TCE RRF = 0.3290
Were the internal standards added to every standard, blank, matrix spike, matrix spike duplicate, and sample?	•			
Were the retention times for all IS compounds within QAPP acceptance limits?	•			
Are the area counts of all IS compounds within QAPP acceptance limits?	•			

Review Questions

Method: SW8260B (Volatile Organic Compounds by Capillary GC/MS)

Review Questions	Yes	No	NA	Comment
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes in the method blank less than 1/2 LOQ and less than 1/10 the amount in any sample?	•			
Were target analytes in the field blank less than 1/2 LOQ and less than 1/10 the amount in any sample?			•	
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?	•			FEW4-MW97-(382.0) is a blind field duplicate of FEW4-MW97-(381.0)
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were the LCS/LCSD recoveries within QAPP acceptance limits?	•			
Were the LCS/LCSD RPDs within QAPP acceptance limits?			•	
Was the duplicate RPD within QAPP acceptance limits?			•	
Was a MS/MSD pair prepared with each batch?	•			
Is the MS/MSD parent sample the one designated by the sampling team?	•			FEW4-MW97-(391.0) was designated for MS/MSD analysis.
Were MS/MSD recoveries and RPD within QAPP acceptance limits?		•		Several analytes were recovered less than their lower control limit and exceeded the 20% RPD limit.
Were surrogate recoveries within QAPP acceptance limits?	•			
Were reported sample concentrations within calibration range?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were instrument run logs present and filled out appropriately?	•			
Were sample prepration sheets present and filled out appropriately?	•			
Check and recalculate the %D for one target compound. Verify that the recalculated values agree with the laboratory-reported values.			•	
Examine raw data to verify correct calculation of sample results reported by the laboratory. Compare quantitation lists and chromatograms to the reported detect and non-detect sample results.	•			
Verify that the reporting limits and sample results have been adjusted to reflect all sample dilutions and Percent Moisture factors (non-aqueous samples).	•			FEW4-MW97-(371.0) TCE = Not detected.

US Army Corps of Engineers ®

Batch Report

Test Method: SW8260B Analysis Batch: 280-382491

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
LABQC	WQ	LCS 280-382491/4	LCS 280-382491/4		1/1	7/29/2017 10:58	7/29/2017 10:58	7/29/2017 10:58	280-382491/	BS
LABQC	WQ	MB 280-382491/6	MB 280-382491/6		1/1	7/29/2017 11:19	7/29/2017 11:19	7/29/2017 11:19	280-382491/	LB
FEW4-MW81	WG	FEW4-MW81-(68)	280-99478-11		1/1	7/21/2017 11:05	7/29/2017 14:46	7/29/2017 14:46	280-382491/	N

Test Method: SW8260B Analysis Batch: 280-382525

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
LABQC	SQ	LCS 280-382534/2-A	LCS 280-382534/2-A		1/1	7/30/2017 12:00	7/30/2017 12:00	7/30/2017 15:27	280-382525/	BS
LABQC	SQ	MB 280-382534/1-A	MB 280-382534/1-A		1/1	7/30/2017 12:00	7/30/2017 12:00	7/30/2017 16:08	280-382525/	LB
FEW4-MW81	SO	FEW4-MW81-(0.5)	280-99478-1		1/1	7/20/2017 13:30	7/30/2017 13:30	7/30/2017 16:28	280-382525/	N
FEW4-MW81	SO	FEW4-MW81-(2.0)	280-99478-2		1/1	7/20/2017 13:40	7/20/2017 13:40	7/30/2017 16:49	280-382525/	N
FEW4-MW81	SO	FEW4-MW81-(9.0)	280-99478-3		1/1	7/20/2017 13:45	7/20/2017 13:45	7/30/2017 17:10	280-382525/	N
FEW4-MW81	SO	FEW4-MW81-(20.0)	280-99478-4		1/1	7/20/2017 14:05	7/20/2017 14:05	7/30/2017 17:30	280-382525/	N
FEW4-MW81	SO	FEW4-MW81-(30.0)	280-99478-5		1/1	7/20/2017 17:15	7/20/2017 17:15	7/30/2017 17:51	280-382525/	N
FEW4-MW81	SO	FEW4-MW81-(40.0)	280-99478-6		1/1	7/21/2017 09:00	7/21/2017 09:00	7/30/2017 22:27	280-382525/	N
FEW4-MW81	SO	FEW4-MW81-(70.0)	280-99478-9		1/1	7/21/2017 10:20	7/21/2017 10:20	7/30/2017 22:48	280-382525/	N
FEW4-MW81	SO	FEW4-MW81-(70.0)	280-99478-9MS		1/1	7/21/2017 10:20	7/21/2017 10:20	7/30/2017 23:08	280-382525/	MS
FEW4-MW81	SO	FEW4-MW81-(70.0)	280-99478-9MSD		1/1	7/21/2017 10:20	7/21/2017 10:20	7/30/2017 23:29	280-382525/	SD

Test Method: SW8260B Analysis Batch: 280-382591

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
LABQC	SQ	MB 280-382534/1-A	MB 280-382534/1-A		1/1	7/30/2017 12:00	7/30/2017 12:00	7/31/2017 12:06	280-382591/	LB
FEW4-MW81	SO	FEW4-MW81-(50.0)	280-99478-7		1/1	7/21/2017 09:15	7/21/2017 09:15	7/31/2017 12:26	280-382591/	N

US Army Corps of Engineers ®

Batch Report

Test Method: SW8260B Analysis Batch: 280-382591

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
FEW4-MW81	SO	FEW4-MW81-(60.0)	280-99478-8		1/1	7/21/2017 10:00	7/21/2017 10:00	7/31/2017 12:46	280-382591/	N
FEW4-MW81	SO	FEW4-MW81-(80.0)	280-99478-10		1/1	7/21/2017 12:10	7/21/2017 12:10	7/31/2017 13:07	280-382591/	N
LABQC	SQ	LCS 280-382534/2-A	LCS 280-382534/2-A		1/1	7/30/2017 12:00	7/30/2017 12:00	7/31/2017 13:27	280-382591/	BS
LABQC	SQ	LCSD 280-382534/21-A	LCSD 280-382534/21-A		1/1	7/30/2017 12:00	7/30/2017 12:00	7/31/2017 13:48	280-382591/	BD

US Army Corps of Engineers ®

Field Batch Report

--No Records Found--

MS Mismatch Report

--No Records Found--

Section to identify Matrix Spike mismatches where parent sample differs from MS by dilution.

US Army Corps of Engineers ®

QC Outlier Report

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

QC Element	Sample ID/ Lab Sample ID	Run#/ Dil'n	Analyte	Result (Units)	Qualifier	Warning Limits	Control Limits	Reason	Comment	Rule	Action Level
MS Recovery	FEW4-MW81-(70.0) (MS) / 280-99478-9MS	1 / 1.00	1,2,3-Trichlorobenzene	56.61 (percent)	J/UJ	66 - 130	66 - 130	M			
MS Recovery	FEW4-MW81-(70.0) (MS) / 280-99478-9MS	1 / 1.00	1,2,4-Trichlorobenzene	51.86 (percent)	J/UJ	67 - 129	67 - 129	M			
MS Recovery	FEW4-MW81-(70.0) (MS) / 280-99478-9MS	1 / 1.00	1,2,4-Trimethylbenzene	55.27 (percent)	J/UJ	75 - 123	75 - 123	M			
MS Recovery	FEW4-MW81-(70.0) (MS) / 280-99478-9MS	1 / 1.00	1,2-Dichlorobenzene	59.29 (percent)	J/UJ	78 - 121	78 - 121	M			
MS Recovery	FEW4-MW81-(70.0) (MS) / 280-99478-9MS	1 / 1.00	1,3,5-Trimethylbenzene	60.18 (percent)	J/UJ	73 - 124	73 - 124	M			
MS Recovery	FEW4-MW81-(70.0) (MS) / 280-99478-9MS	1 / 1.00	1,3-Dichlorobenzene	52.90 (percent)	J/UJ	77 - 121	77 - 121	M			
MS Recovery	FEW4-MW81-(70.0) (MS) / 280-99478-9MS	1 / 1.00	1,4-Dichlorobenzene	52.60 (percent)	J/UJ	75 - 120	75 - 120	M			
MS Recovery	FEW4-MW81-(70.0) (MS) / 280-99478-9MS	1 / 1.00	2-Chlorotoluene	56.76 (percent)	J/UJ	75 - 122	75 - 122	M			
MS Recovery	FEW4-MW81-(70.0) (MS) / 280-99478-9MS	1 / 1.00	4-Chlorotoluene	56.61 (percent)	J/UJ	72 - 124	72 - 124	M			
MS Recovery	FEW4-MW81-(70.0) (MS) / 280-99478-9MS	1 / 1.00	Bromobenzene	64.78 (percent)	J/UJ	78 - 121	78 - 121	M			
MS Recovery	FEW4-MW81-(70.0) (MS) / 280-99478-9MS	1 / 1.00	Chlorobenzene	68.20 (percent)	J/UJ	79 - 120	79 - 120	M			
MS Recovery	FEW4-MW81-(70.0) (MS) / 280-99478-9MS	1 / 1.00	Ethylbenzene	66.72 (percent)	J/UJ	76 - 122	76 - 122	M			
MS Recovery	FEW4-MW81-(70.0) (MS) / 280-99478-9MS	1 / 1.00	Hexachlorobutadiene	42.20 (percent)	J/UJ	61 - 135	61 - 135	M			
MS Recovery	FEW4-MW81-(70.0) (MS) / 280-99478-9MS	1 / 1.00	Isopropylbenzene (Cumene)	59.88 (percent)	J/UJ	68 - 134	68 - 134	M			
MS Recovery	FEW4-MW81-(70.0) (MS) / 280-99478-9MS	1 / 1.00	m,p-Xylene	67.16 (percent)	J/UJ	77 - 124	77 - 124	M			
MS Recovery	FEW4-MW81-(70.0) (MS) / 280-99478-9MS	1 / 1.00	n-Butylbenzene	42.94 (percent)	J/UJ	70 - 128	70 - 128	M			
MS Recovery	FEW4-MW81-(70.0) (MS) / 280-99478-9MS	1 / 1.00	n-Propylbenzene	54.09 (percent)	J/UJ	73 - 125	73 - 125	M			
MS Recovery	FEW4-MW81-(70.0) (MS) / 280-99478-9MS	1 / 1.00	o-Xylene	71.62 (percent)	J/UJ	77 - 123	77 - 123	M			

US Army Corps of Engineers ®

QC Outlier Report

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

QC Element	Sample ID/ Lab Sample ID	Run#/ Dil'n	Analyte	Result (Units)	Qualifier	Warning Limits	Control Limits	Reason	Comment	Rule	Action Level
MS Recovery	FEW4-MW81-(70.0) (MS) / 280-99478-9MS	1 / 1.00	p-Cymene (p-Isopropyltoluene)	49.78 (percent)	J/UJ	73 - 127	73 - 127	M			
MS Recovery	FEW4-MW81-(70.0) (MS) / 280-99478-9MS	1 / 1.00	sec-Butylbenzene	55.87 (percent)	J/UJ	73 - 126	73 - 126	M			
MS Recovery	FEW4-MW81-(70.0) (MS) / 280-99478-9MS	1 / 1.00	Styrene	67.31 (percent)	J/UJ	76 - 124	76 - 124	M			
MS Recovery	FEW4-MW81-(70.0) (MS) / 280-99478-9MS	1 / 1.00	tert-Butylbenzene	60.48 (percent)	J/UJ	73 - 125	73 - 125	M			
MS Recovery	FEW4-MW81-(70.0) (MS) / 280-99478-9MS	1 / 1.00	Toluene	74.00 (percent)	J/UJ	77 - 121	77 - 121	M			
MS Recovery	FEW4-MW81-(70.0) (SD) / 280-99478-9MSD	1 / 1.00	1,2,4-Trichlorobenzene	66.56 (percent)	J/UJ	67 - 129	67 - 129	M			
MS Recovery	FEW4-MW81-(70.0) (SD) / 280-99478-9MSD	1 / 1.00	1,2,4-Trimethylbenzene	70.08 (percent)	J/UJ	75 - 123	75 - 123	M			
MS Recovery	FEW4-MW81-(70.0) (SD) / 280-99478-9MSD	1 / 1.00	1,2-Dichlorobenzene	70.08 (percent)	J/UJ	78 - 121	78 - 121	M			
MS Recovery	FEW4-MW81-(70.0) (SD) / 280-99478-9MSD	1 / 1.00	1,3,5-Trimethylbenzene	71.68 (percent)	J/UJ	73 - 124	73 - 124	M			
MS Recovery	FEW4-MW81-(70.0) (SD) / 280-99478-9MSD	1 / 1.00	1,3-Dichlorobenzene	67.68 (percent)	J/UJ	77 - 121	77 - 121	M			
MS Recovery	FEW4-MW81-(70.0) (SD) / 280-99478-9MSD	1 / 1.00	1,4-Dichlorobenzene	64.32 (percent)	J/UJ	75 - 120	75 - 120	M			
MS Recovery	FEW4-MW81-(70.0) (SD) / 280-99478-9MSD	1 / 1.00	2-Chlorotoluene	68.00 (percent)	J/UJ	75 - 122	75 - 122	M			
MS Recovery	FEW4-MW81-(70.0) (SD) / 280-99478-9MSD	1 / 1.00	4-Chlorotoluene	69.76 (percent)	J/UJ	72 - 124	72 - 124	M			
MS Recovery	FEW4-MW81-(70.0) (SD) / 280-99478-9MSD	1 / 1.00	Bromobenzene	76.32 (percent)	J/UJ	78 - 121	78 - 121	M			
MS Recovery	FEW4-MW81-(70.0) (SD) / 280-99478-9MSD	1 / 1.00	Chlorobenzene	74.40 (percent)	J/UJ	79 - 120	79 - 120	M			
MS Recovery	FEW4-MW81-(70.0) (SD) / 280-99478-9MSD	1 / 1.00	Ethylbenzene	74.40 (percent)	J/UJ	76 - 122	76 - 122	M			
MS Recovery	FEW4-MW81-(70.0) (SD) / 280-99478-9MSD	1 / 1.00	Hexachlorobutadiene	59.04 (percent)	J/UJ	61 - 135	61 - 135	M			
MS Recovery	FEW4-MW81-(70.0) (SD) / 280-99478-9MSD	1 / 1.00	n-Butylbenzene	57.92 (percent)	J/UJ	70 - 128	70 - 128	M			

US Army Corps of Engineers ®

QC Outlier Report

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

QC Element	Sample ID/ Lab Sample ID	Run#/ Dil'n	Analyte	Result (Units)	Qualifier	Warning Limits	Control Limits	Reason	Comment	Rule	Action Level
MS Recovery	FEW4-MW81-(70.0) (SD) / 280-99478-9MSD	1 / 1.00	n-Propylbenzene	70.56 (percent)	J/UJ	73 - 125	73 - 125	M			
MS Recovery	FEW4-MW81-(70.0) (SD) / 280-99478-9MSD	1 / 1.00	p-Cymene (p-Isopropyltoluene)	65.12 (percent)	J/UJ	73 - 127	73 - 127	M			
MS Recovery	FEW4-MW81-(70.0) (SD) / 280-99478-9MSD	1 / 1.00	sec-Butylbenzene	72.16 (percent)	J/UJ	73 - 126	73 - 126	M			
MS Recovery	FEW4-MW81-(70.0) (SD) / 280-99478-9MSD	1 / 1.00	Styrene	75.68 (percent)	J/UJ	76 - 124	76 - 124	M			

Rule is the multiplier used when blank contamination occurs to determine action level.

US Army Corps of Engineers ®

Qualified Results

Test Method: SW8260B Extraction Method: SW5030B Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW81-(68)	280-99478-11	WG	N	2-Butanone (MEK)	6.00	2.40 J	2.40 J		ug/L	TR
FEW4-MW81-(68)	280-99478-11	WG	N	Chloromethane	2.00	1.80 J	1.80 J		ug/L	TR
FEW4-MW81-(68)	280-99478-11	WG	N	Ethylbenzene	1.00	0.300 J	0.300 J		ug/L	TR
FEW4-MW81-(68)	280-99478-11	WG	N	o-Xylene	1.00	0.230 J	0.230 J		ug/L	TR

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW81-(2.0)	280-99478-2	SO	N	Acetone	24.0	23.0 J	23.0 J		ug/kg	TR
FEW4-MW81-(30.0)	280-99478-5	SO	N	Acetone	19.0	15.0 J	15.0 J		ug/kg	TR
FEW4-MW81-(50.0)	280-99478-7	SO	N	Acetone	18.0	10.0 J	10.0 J		ug/kg	TR
FEW4-MW81-(60.0)	280-99478-8	SO	N	Acetone	18.0	16.0 J	16.0 J		ug/kg	TR
FEW4-MW81-(70.0)	280-99478-9	SO	N	1,2,3-Trichlorobenzene	6.50	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW81-(70.0)	280-99478-9	SO	N	1,2,4-Trichlorobenzene	6.50	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW81-(70.0)	280-99478-9	SO	N	1,2,4-Trimethylbenzene	6.50	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW81-(70.0)	280-99478-9	SO	N	1,2-Dichlorobenzene	6.50	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW81-(70.0)	280-99478-9	SO	N	1,3,5-Trimethylbenzene	6.50	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW81-(70.0)	280-99478-9	SO	N	1,3-Dichlorobenzene	6.50	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW81-(70.0)	280-99478-9	SO	N	1,4-Dichlorobenzene	6.50	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW81-(70.0)	280-99478-9	SO	N	2-Chlorotoluene	6.50	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW81-(70.0)	280-99478-9	SO	N	4-Chlorotoluene	6.50	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW81-(70.0)	280-99478-9	SO	N	Acetone	26.0	21.0 J	21.0 J		ug/kg	TR
FEW4-MW81-(70.0)	280-99478-9	SO	N	Bromobenzene	6.50	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW81-(70.0)	280-99478-9	SO	N	Chlorobenzene	6.50	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW81-(70.0)	280-99478-9	SO	N	Ethylbenzene	6.50	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW81-(70.0)	280-99478-9	SO	N	Hexachlorobutadiene	6.50	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW81-(70.0)	280-99478-9	SO	N	Isopropylbenzene (Cumene)	6.50	2.10 U J	2.10 UJ	-	ug/kg	M

US Army Corps of Engineers ®

Qualified Results

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW81-(70.0)	280-99478-9	SO	N	m,p-Xylene	4.10	4.10 U J	4.10 UJ	-	ug/kg	M
FEW4-MW81-(70.0)	280-99478-9	SO	N	n-Butylbenzene	6.50	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW81-(70.0)	280-99478-9	SO	N	n-Propylbenzene	6.50	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW81-(70.0)	280-99478-9	SO	N	o-Xylene	6.50	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW81-(70.0)	280-99478-9	SO	N	p-Cymene (p-Isopropyltoluene)	6.50	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW81-(70.0)	280-99478-9	SO	N	sec-Butylbenzene	6.50	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW81-(70.0)	280-99478-9	SO	N	Styrene	6.50	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW81-(70.0)	280-99478-9	SO	N	tert-Butylbenzene	6.50	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW81-(70.0)	280-99478-9	SO	N	Toluene	6.50	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW81-(70.0)	280-99478-9	SO	N	Trichloroethene (TCE)	6.50	1.40 J	1.40 J		ug/kg	TR
FEW4-MW81-(80.0)	280-99478-10	SO	N	Acetone	29.0	24.0 J	24.0 J		ug/kg	TR
FEW4-MW81-(80.0)	280-99478-10	SO	N	Trichloroethene (TCE)	7.20	2.00 J	2.00 J		ug/kg	TR
FEW4-MW81-(9.0)	280-99478-3	SO	N	Acetone	16.0	15.0 J	15.0 J		ug/kg	TR

Qualified analytes in samples are reported as estimated, not detected (UJ) at the Limit of Detection (LOD).

US Army Corps of Engineers ®

Detected Results

Test Method: SW8260B Extraction Method: SW5030B Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Dilution	Analyte	LOQ	Lab Result	Qualified Result	Units	Reason
FEW4-MW81-(68)	280-99478-11	WG	N	1	2-Butanone (MEK)	6.00	2.40 J	2.40 J	ug/L	TR
FEW4-MW81-(68)	280-99478-11	WG	N	1	Acetone	10.0	17.0	17.0	ug/L	
FEW4-MW81-(68)	280-99478-11	WG	N	1	Benzene	1.00	1.10	1.10	ug/L	
FEW4-MW81-(68)	280-99478-11	WG	N	1	Chloromethane	2.00	1.80 J	1.80 J	ug/L	TR
FEW4-MW81-(68)	280-99478-11	WG	N	1	Ethylbenzene	1.00	0.300 J	0.300 J	ug/L	TR
FEW4-MW81-(68)	280-99478-11	WG	N	1	o-Xylene	1.00	0.230 J	0.230 J	ug/L	TR
FEW4-MW81-(68)	280-99478-11	WG	N	1	Toluene	1.00	1.40	1.40	ug/L	
FEW4-MW81-(68)	280-99478-11	WG	N	1	Trichloroethene (TCE)	1.00	2.10	2.10	ug/L	

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Dilution	Analyte	LOQ	Lab Result	Qualified Result	Units	Reason
FEW4-MW81-(2.0)	280-99478-2	SO	N	1	Acetone	24.0	23.0 J	23.0 J	ug/kg	TR
FEW4-MW81-(20.0)	280-99478-4	SO	N	1	Acetone	16.0	16.0	16.0	ug/kg	
FEW4-MW81-(30.0)	280-99478-5	SO	N	1	Acetone	19.0	15.0 J	15.0 J	ug/kg	TR
FEW4-MW81-(40.0)	280-99478-6	SO	N	1	Acetone	19.0	20.0	20.0	ug/kg	
FEW4-MW81-(50.0)	280-99478-7	SO	N	1	Acetone	18.0	10.0 J	10.0 J	ug/kg	TR
FEW4-MW81-(60.0)	280-99478-8	SO	N	1	Acetone	18.0	16.0 J	16.0 J	ug/kg	TR
FEW4-MW81-(70.0)	280-99478-9	SO	N	1	Acetone	26.0	21.0 J	21.0 J	ug/kg	TR
FEW4-MW81-(70.0)	280-99478-9	SO	N	1	Trichloroethene (TCE)	6.50	1.40 J	1.40 J	ug/kg	TR
FEW4-MW81-(80.0)	280-99478-10	SO	N	1	Acetone	29.0	24.0 J	24.0 J	ug/kg	TR
FEW4-MW81-(80.0)	280-99478-10	SO	N	1	Trichloroethene (TCE)	7.20	2.00 J	2.00 J	ug/kg	TR
FEW4-MW81-(9.0)	280-99478-3	SO	N	1	Acetone	16.0	15.0 J	15.0 J	ug/kg	TR

US Army Corps of Engineers ®

Rejected Results

--No Records Found--

US Army Corps of Engineers ®

Facility:	B08WY0467-02, F.E. Warren AFB, Site 4
Event:	2017-2018 RI Addendum Tasks
SDG:	280-99478-1_52_2a_FUDSChem
Guidance Document:	Draft-Final Uniform Federal Policy-Quality Assurance Project Plan for the Remedial Investigation Addendum 2017-2018 Tasks Atlas “D” Missile Site 4 —Laramie County, Wyoming, July 2017
Prime Contractor:	RMC Consultants, Inc., LAKEWOOD, CO
Project Manager:	David Groy
Contract Laboratory:	TestAmerica Laboratories, Inc., Arvada, CO
Data Review Contractor:	RMC Consultants
Data Review Level:	Stage 3VEM
Primary Data Reviewer:	Gary Torf, Contractor Project Chemist
Second Reviewer:	, Senior Scientist
Date Submitted:	

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	SW8260B
FEW4-MW81-(0.5)	280-99478-1	Solid	Field Sample/N	X
FEW4-MW81-(2.0)	280-99478-2	Solid	Field Sample/N	X
FEW4-MW81-(20.0)	280-99478-4	Solid	Field Sample/N	X
FEW4-MW81-(30.0)	280-99478-5	Solid	Field Sample/N	X
FEW4-MW81-(40.0)	280-99478-6	Solid	Field Sample/N	X
FEW4-MW81-(50.0)	280-99478-7	Solid	Field Sample/N	X
FEW4-MW81-(60.0)	280-99478-8	Solid	Field Sample/N	X
FEW4-MW81-(68)	280-99478-11	Water	Field Sample/N	X
FEW4-MW81-(70.0)	280-99478-9	Solid	Field Sample/N	X
FEW4-MW81-(80.0)	280-99478-10	Solid	Field Sample/N	X
FEW4-MW81-(9.0)	280-99478-3	Solid	Field Sample/N	X

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the Draft-Final Uniform Federal Policy-Quality Assurance Project Plan for the Remedial Investigation Addendum 2017-2018 Tasks Atlas “D” Missile Site 4 —Laramie County, Wyoming, July 2017 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by RMC Consultants, Inc., LAKEWOOD, CO; analyses were performed by TestAmerica Laboratories, Inc., Arvada, CO and were reported under sample delivery group (SDG) 280-99478-1_52_2a_FUDSChem. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

- Blank
- Blank - Negative
- LCS Recovery
- LCS RPD
- MS Recovery
- MS RPD
- Prep Hold Time
- Surrogate
- Test Hold Time

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 23 results (3.23%) out of the 712 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected. Trace values, defined as results that are qualified as estimated because they fall between the limit of detection and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

Narrative Comments

An additional label was inadvertently placed on the terracore soil sample containers during field sample collection, causing the vial tare weight to be heavier by approximately 0.26 g than originally recorded. This may result in a detected analyte concentration low bias (underestimation) of approximately 4.5%. No analyte results have been qualified due to this occurrence.

Analytical Method	Data Reviewer Comment
SW8260B	No additional comments; see Checklist for detail.

September 07, 2017

Reviewed by Gary Torf, Contractor Project Chemist, RMC Consultants

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of a minimum of 10% of the reported sample results and method quality control data between the two deliverables.

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

Quality Control Outliers for test method SW8260B, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
FEW4-MW81-(70.0) (MS)/ 280-99478-9MS	Hexachlorobutadiene	42.20	61 - 135	61 - 135	percent	J/UJ	M	
FEW4-MW81-(70.0) (MS)/ 280-99478-9MS	n-Butylbenzene	42.94	70 - 128	70 - 128	percent	J/UJ	M	
FEW4-MW81-(70.0) (MS)/ 280-99478-9MS	p-Cymene (p-Isopropyltoluene)	49.78	73 - 127	73 - 127	percent	J/UJ	M	
FEW4-MW81-(70.0) (MS)/ 280-99478-9MS	1,2,4-Trichlorobenzene	51.86	67 - 129	67 - 129	percent	J/UJ	M	
FEW4-MW81-(70.0) (MS)/ 280-99478-9MS	1,4-Dichlorobenzene	52.60	75 - 120	75 - 120	percent	J/UJ	M	
FEW4-MW81-(70.0) (MS)/ 280-99478-9MS	1,3-Dichlorobenzene	52.90	77 - 121	77 - 121	percent	J/UJ	M	
FEW4-MW81-(70.0) (MS)/ 280-99478-9MS	n-Propylbenzene	54.09	73 - 125	73 - 125	percent	J/UJ	M	
FEW4-MW81-(70.0) (MS)/ 280-99478-9MS	1,2,4-Trimethylbenzene	55.27	75 - 123	75 - 123	percent	J/UJ	M	
FEW4-MW81-(70.0) (MS)/ 280-99478-9MS	sec-Butylbenzene	55.87	73 - 126	73 - 126	percent	J/UJ	M	
FEW4-MW81-(70.0) (MS)/ 280-99478-9MS	1,2,3-Trichlorobenzene	56.61	66 - 130	66 - 130	percent	J/UJ	M	
FEW4-MW81-(70.0) (MS)/ 280-99478-9MS	4-Chlorotoluene	56.61	72 - 124	72 - 124	percent	J/UJ	M	
FEW4-MW81-(70.0) (MS)/ 280-99478-9MS	2-Chlorotoluene	56.76	75 - 122	75 - 122	percent	J/UJ	M	
FEW4-MW81-(70.0) (MS)/ 280-99478-9MS	1,2-Dichlorobenzene	59.29	78 - 121	78 - 121	percent	J/UJ	M	
FEW4-MW81-(70.0) (MS)/ 280-99478-9MS	Isopropylbenzene (Cumene)	59.88	68 - 134	68 - 134	percent	J/UJ	M	
FEW4-MW81-(70.0) (MS)/ 280-99478-9MS	1,3,5-Trimethylbenzene	60.18	73 - 124	73 - 124	percent	J/UJ	M	
FEW4-MW81-(70.0) (MS)/ 280-99478-9MS	tert-Butylbenzene	60.48	73 - 125	73 - 125	percent	J/UJ	M	
FEW4-MW81-(70.0) (MS)/ 280-99478-9MS	Bromobenzene	64.78	78 - 121	78 - 121	percent	J/UJ	M	
FEW4-MW81-(70.0) (MS)/ 280-99478-9MS	Ethylbenzene	66.72	76 - 122	76 - 122	percent	J/UJ	M	
FEW4-MW81-(70.0) (MS)/ 280-99478-9MS	m,p-Xylene	67.16	77 - 124	77 - 124	percent	J/UJ	M	
FEW4-MW81-(70.0) (MS)/ 280-99478-9MS	Styrene	67.31	76 - 124	76 - 124	percent	J/UJ	M	
FEW4-MW81-(70.0) (MS)/ 280-99478-9MS	Chlorobenzene	68.20	79 - 120	79 - 120	percent	J/UJ	M	
FEW4-MW81-(70.0) (MS)/ 280-99478-9MS	o-Xylene	71.62	77 - 123	77 - 123	percent	J/UJ	M	
FEW4-MW81-(70.0) (MS)/ 280-99478-9MS	Toluene	74.00	77 - 121	77 - 121	percent	J/UJ	M	
FEW4-MW81-(70.0) (SD)/ 280-99478-9MSD	n-Butylbenzene	57.92	70 - 128	70 - 128	percent	J/UJ	M	

Quality Control Outliers for test method SW8260B, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
FEW4-MW81-(70.0) (SD)/ 280-99478-9MSD	Hexachlorobutadiene	59.04	61 - 135	61 - 135	percent	J/UJ	M	
FEW4-MW81-(70.0) (SD)/ 280-99478-9MSD	1,4-Dichlorobenzene	64.32	75 - 120	75 - 120	percent	J/UJ	M	
FEW4-MW81-(70.0) (SD)/ 280-99478-9MSD	p-Cymene (p-Isopropyltoluene)	65.12	73 - 127	73 - 127	percent	J/UJ	M	
FEW4-MW81-(70.0) (SD)/ 280-99478-9MSD	1,2,4-Trichlorobenzene	66.56	67 - 129	67 - 129	percent	J/UJ	M	
FEW4-MW81-(70.0) (SD)/ 280-99478-9MSD	1,3-Dichlorobenzene	67.68	77 - 121	77 - 121	percent	J/UJ	M	
FEW4-MW81-(70.0) (SD)/ 280-99478-9MSD	2-Chlorotoluene	68.00	75 - 122	75 - 122	percent	J/UJ	M	
FEW4-MW81-(70.0) (SD)/ 280-99478-9MSD	4-Chlorotoluene	69.76	72 - 124	72 - 124	percent	J/UJ	M	
FEW4-MW81-(70.0) (SD)/ 280-99478-9MSD	1,2,4-Trimethylbenzene	70.08	75 - 123	75 - 123	percent	J/UJ	M	
FEW4-MW81-(70.0) (SD)/ 280-99478-9MSD	1,2-Dichlorobenzene	70.08	78 - 121	78 - 121	percent	J/UJ	M	
FEW4-MW81-(70.0) (SD)/ 280-99478-9MSD	n-Propylbenzene	70.56	73 - 125	73 - 125	percent	J/UJ	M	
FEW4-MW81-(70.0) (SD)/ 280-99478-9MSD	1,3,5-Trimethylbenzene	71.68	73 - 124	73 - 124	percent	J/UJ	M	
FEW4-MW81-(70.0) (SD)/ 280-99478-9MSD	sec-Butylbenzene	72.16	73 - 126	73 - 126	percent	J/UJ	M	
FEW4-MW81-(70.0) (SD)/ 280-99478-9MSD	Ethylbenzene	74.40	76 - 122	76 - 122	percent	J/UJ	M	
FEW4-MW81-(70.0) (SD)/ 280-99478-9MSD	Chlorobenzene	74.40	79 - 120	79 - 120	percent	J/UJ	M	
FEW4-MW81-(70.0) (SD)/ 280-99478-9MSD	Styrene	75.68	76 - 124	76 - 124	percent	J/UJ	M	
FEW4-MW81-(70.0) (SD)/ 280-99478-9MSD	Bromobenzene	76.32	78 - 121	78 - 121	percent	J/UJ	M	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the MS Recovery for SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW81-(70.0)	N	1,2,3-Trichlorobenzene	6.50	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW81-(70.0)	N	1,2,4-Trichlorobenzene	6.50	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW81-(70.0)	N	1,2,4-Trimethylbenzene	6.50	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW81-(70.0)	N	1,2-Dichlorobenzene	6.50	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW81-(70.0)	N	1,3,5-Trimethylbenzene	6.50	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW81-(70.0)	N	1,3-Dichlorobenzene	6.50	2.10 U J	2.10 UJ	-	ug/kg	M

Qualified Results associated with the MS Recovery for SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW81-(70.0)	N	1,4-Dichlorobenzene	6.50	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW81-(70.0)	N	2-Chlorotoluene	6.50	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW81-(70.0)	N	4-Chlorotoluene	6.50	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW81-(70.0)	N	Bromobenzene	6.50	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW81-(70.0)	N	Chlorobenzene	6.50	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW81-(70.0)	N	Ethylbenzene	6.50	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW81-(70.0)	N	Hexachlorobutadiene	6.50	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW81-(70.0)	N	Isopropylbenzene (Cumene)	6.50	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW81-(70.0)	N	m,p-Xylene	4.10	4.10 U J	4.10 UJ	-	ug/kg	M
FEW4-MW81-(70.0)	N	n-Butylbenzene	6.50	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW81-(70.0)	N	n-Propylbenzene	6.50	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW81-(70.0)	N	o-Xylene	6.50	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW81-(70.0)	N	p-Cymene (p-Isopropyltoluene)	6.50	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW81-(70.0)	N	sec-Butylbenzene	6.50	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW81-(70.0)	N	Styrene	6.50	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW81-(70.0)	N	tert-Butylbenzene	6.50	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW81-(70.0)	N	Toluene	6.50	2.10 U J	2.10 UJ	-	ug/kg	M

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

Table of All Qualified Results

Test Method: SW8260B	Extraction Method: SW5035A							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW81-(70.0)	N	1,2,3-Trichlorobenzene	6.50	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW81-(70.0)	N	1,2,4-Trichlorobenzene	6.50	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW81-(70.0)	N	1,2,4-Trimethylbenzene	6.50	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW81-(70.0)	N	1,2-Dichlorobenzene	6.50	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW81-(70.0)	N	1,3,5-Trimethylbenzene	6.50	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW81-(70.0)	N	1,3-Dichlorobenzene	6.50	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW81-(70.0)	N	1,4-Dichlorobenzene	6.50	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW81-(70.0)	N	2-Chlorotoluene	6.50	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW81-(70.0)	N	4-Chlorotoluene	6.50	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW81-(70.0)	N	Bromobenzene	6.50	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW81-(70.0)	N	Chlorobenzene	6.50	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW81-(70.0)	N	Ethylbenzene	6.50	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW81-(70.0)	N	Hexachlorobutadiene	6.50	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW81-(70.0)	N	Isopropylbenzene (Cumene)	6.50	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW81-(70.0)	N	m,p-Xylene	4.10	4.10 U J	4.10 UJ	-	ug/kg	M
FEW4-MW81-(70.0)	N	n-Butylbenzene	6.50	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW81-(70.0)	N	n-Propylbenzene	6.50	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW81-(70.0)	N	o-Xylene	6.50	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW81-(70.0)	N	p-Cymene (p-Isopropyltoluene)	6.50	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW81-(70.0)	N	sec-Butylbenzene	6.50	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW81-(70.0)	N	Styrene	6.50	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW81-(70.0)	N	tert-Butylbenzene	6.50	2.10 U J	2.10 UJ	-	ug/kg	M
FEW4-MW81-(70.0)	N	Toluene	6.50	2.10 U J	2.10 UJ	-	ug/kg	M

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
Trace values are not included in the qualified results table unless additional reason codes are associated.

Table of All Trace Results

Test Method: SW8260B	Extraction Method: SW5030B							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW81-(68)	N	2-Butanone (MEK)	6.00	2.40 J	2.40 J		ug/L	TR
FEW4-MW81-(68)	N	Chloromethane	2.00	1.80 J	1.80 J		ug/L	TR
FEW4-MW81-(68)	N	Ethylbenzene	1.00	0.300 J	0.300 J		ug/L	TR
FEW4-MW81-(68)	N	o-Xylene	1.00	0.230 J	0.230 J		ug/L	TR

Test Method: SW8260B	Extraction Method: SW5035A							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW81-(2.0)	N	Acetone	24.0	23.0 J	23.0 J		ug/kg	TR
FEW4-MW81-(30.0)	N	Acetone	19.0	15.0 J	15.0 J		ug/kg	TR
FEW4-MW81-(50.0)	N	Acetone	18.0	10.0 J	10.0 J		ug/kg	TR
FEW4-MW81-(60.0)	N	Acetone	18.0	16.0 J	16.0 J		ug/kg	TR
FEW4-MW81-(70.0)	N	Acetone	26.0	21.0 J	21.0 J		ug/kg	TR
FEW4-MW81-(70.0)	N	Trichloroethene (TCE)	6.50	1.40 J	1.40 J		ug/kg	TR
FEW4-MW81-(80.0)	N	Acetone	29.0	24.0 J	24.0 J		ug/kg	TR
FEW4-MW81-(80.0)	N	Trichloroethene (TCE)	7.20	2.00 J	2.00 J		ug/kg	TR
FEW4-MW81-(9.0)	N	Acetone	16.0	15.0 J	15.0 J		ug/kg	TR

Results with Modified Qualifiers

No qualifiers associated with this sample delivery group were modified manually.

Reason Code Definitions

Code	Definition
M	MS Recovery
TR	Trace Level Detect

Flag Code and Definitions

Flag	Definition
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
J	Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
R	The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making.
B	Blank contamination: The analyte was found in an associated blank above one half the RL, as well as in the sample.
UB	The analyte was also detected in an associated laboratory or field blank at a concentration comparable to the concentration in the sample. The reported result has been requalified as not detected.

Review Questions

Method: SW8260B (Volatile Organic Compounds by Capillary GC/MS)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were sample reciept temperatures met?	•			The cooler receipt temperature was 5.1ºC.
Were QAPP specified PQLs achieved?	•			
Were all QAPP-specified target analytes reported?	•			
Was the GC/MS system properly tuned based on method criteria?	•			
Was the criteria met during each 12 hour shift (prior to ICAL and Cal Ver.)?	•			
Does the initial calibration curve consist of 5 concentration levels, with the low standard near but > MDL?	•			
Did the Calibration Check Compounds (CCCs) have a relative standard deviation within QAPP acceptance limits?	•			
Were the average response factors (RFs) for the System Performance Check Compounds (SPCCs) within QAPP acceptance limits?	•			
Were the ICAL %RSDs for the target compounds within method criteria?	•			
If a quadratic equation curve was used, was the coefficient of determination (COD) within criteria?	•			
If a linear regression curve was used, was the correlation coefficient within criteria?	•			
Check and recalculate the response factors and average response factors for a least one target compound.	•			ICAL VMS-G 7/30/17 Trichloroethene Average RF = 0.3243
Check and recalculate the %RSD for one of more target compounds and DMCs. Verify that the recalculated values agree with the laboratory reported values.	•			ICAL VMS-G 7/30/17 Trichloroethene % RSD = 9.5%1,2-Dichloroethane-d4 % RSD = 7.6%
Was a second source verification analyzed after the ICAL and all analytes within criteria?		•		The ICV percent difference was above the upper control limit for dichlorodifluoromethane at 34.4%. All associated sample results were non-detect for this analyte, therefore no data qualification is warranted.
Was a CCV run at the beginning of the analytical sequence and every 12 hours?	•			
Was the CCV a mid-level standard from the initial calibration curve?	•			
Did the CCCs have a %Difference within QAPP acceptance limits?	•			
Were the average RFs for the SPCCs within QAPP acceptance limits?	•			
Was the %D (difference or drift) for all target analytes within QAPP acceptance limits?		•		The CCV percent difference was above the control limit for n-butylbenzene at 21.5%. All associated sample results were non-detect for this analyte, therefore no data qualification is warranted.
Check and recalculate the CCV relative response factor for at least one target compound.	•			ICAL VMS-G 7/30/17 Trichloroethene RRF = 0.3258
Were the internal standards added to every standard, blank, matrix spike, matrix spike duplicate, and sample?	•			
Were the retention times for all IS compounds within QAPP acceptance limits?	•			

Review Questions

Method: SW8260B (Volatile Organic Compounds by Capillary GC/MS)

Review Questions	Yes	No	NA	Comment
Are the area counts of all IS compounds within QAPP acceptance limits?		•		The IS TBA-d9 is not used for any target analytes.
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes detected in the method blank above the MDL?	•			Naphthalene and 1,2,3-trichlorobenzene were detected in a method blank at concentrations less than one half the LOQ, therefore corrective action was not warranted.
Were target analytes reported in the field blank analyses above the MDL?			•	
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?			•	
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were the LCS/LCSD recoveries within QAPP acceptance limits?	•			
Were the LCS/LCSD RPDs within QAPP acceptance limits?	•			
Was the duplicate RPD within QAPP acceptance limits?	•			
Was a MS/MSD pair prepared with each batch?	•			
Is the MS/MSD parent sample the one designated by the sampling team?	•			FEW4-MW81-(70.0)
Were MS/MSD recoveries and RPD within QAPP acceptance limits?		•		Several analyte spike recoveries were less than the lower control limit in the MS and/or MSD.
Were surrogate recoveries within QAPP acceptance limits?	•			
Were reported sample concentrations within calibration range?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were instrument run logs present and filled out appropriately?	•			
Were sample prepration sheets present and filled out appropriately?	•			
Check and recalculate the %D for one target compound. Verify that the recalculated values agree with the laboratory-reported values.			•	
Examine raw data to verify correct calculation of sample results reported by the laboratory. Compare quantitation lists and chromatograms to the reported detect and non-detect sample results.	•			FEW4-MW81-(70.0)Trichloroethene = 1.45 ug/kg; extra label bias result: 1.52 ug/kg
Verify that the reporting limits and sample results have been adjusted to reflect all sample dilutions and Percent Moisture factors (non-aqueous samples).	•			

US Army Corps of Engineers ®

Batch Report

Test Method: SW8260B Analysis Batch: 280-382591

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
LABQC	SQ	MB 280-382534/1-A	MB 280-382534/1-A		1/1	7/30/2017 12:00	7/30/2017 12:00	7/31/2017 12:06	280-382591/	LB
LABQC	SQ	LCS 280-382534/2-A	LCS 280-382534/2-A		1/1	7/30/2017 12:00	7/30/2017 12:00	7/31/2017 13:27	280-382591/	BS
LABQC	SQ	LCSD 280-382534/21-A	LCSD 280-382534/21-A		1/1	7/30/2017 12:00	7/30/2017 12:00	7/31/2017 13:48	280-382591/	BD
FEW4-MW81	SO	FEW4-MW81-(90.0)	280-99496-1		1/1	7/21/2017 15:15	7/21/2017 15:15	7/31/2017 18:15	280-382591/	N
FEW4-MW81	SO	FEW4-MW81-(91.0)	280-99496-2		1/1	7/21/2017 16:15	7/21/2017 16:15	7/31/2017 18:36	280-382591/	FD
FEW4-MW81	SO	FEW4-MW81-(110.0)	280-99496-4		1/1	7/21/2017 16:20	7/21/2017 16:20	7/31/2017 19:56	280-382591/	N
FEW4-MW81	SO	FEW4-MW81-(120.0)	280-99496-5		1/1	7/21/2017 16:40	7/21/2017 16:40	7/31/2017 20:17	280-382591/	N
FEW4-MW81	SO	FEW4-MW81-(130.0)	280-99496-6		1/1	7/21/2017 17:20	7/21/2017 17:20	7/31/2017 20:37	280-382591/	N
FEW4-MW81	SO	FEW4-MW81-(100.0)	280-99496-3		1/1	7/21/2017 15:30	7/21/2017 15:30	7/31/2017 20:57	280-382591/	N

US Army Corps of Engineers ®

Field Batch Report

--No Records Found--

MS Mismatch Report

--No Records Found--

Section to identify Matrix Spike mismatches where parent sample differs from MS by dilution.

QC Outliers Report

--No Records Found--

Qualified Results

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW81-(100.0)	280-99496-3	SO	N	1,1,1,2-Tetrachloroethane	6.7	2.1 U	2.1 UJ	-	ug/kg	U

US Army Corps of Engineers®

Qualified Results

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW81-(100.0)	280-99496-3	SO	N	1,1,1-Trichloroethane	6.7	2.1 U	2.1 UJ	-	ug/kg	U
FEW4-MW81-(100.0)	280-99496-3	SO	N	1,1,2,2-Tetrachloroethane	6.7	2.1 U	2.1 UJ	-	ug/kg	U
FEW4-MW81-(100.0)	280-99496-3	SO	N	1,1,2-Trichloroethane	6.7	4.3 U	4.3 UJ	-	ug/kg	U
FEW4-MW81-(100.0)	280-99496-3	SO	N	1,1-Dichloroethane	6.7	1.1 U	1.1 UJ	-	ug/kg	U
FEW4-MW81-(100.0)	280-99496-3	SO	N	1,1-Dichloroethene	6.7	2.1 U	2.1 UJ	-	ug/kg	U
FEW4-MW81-(100.0)	280-99496-3	SO	N	1,1-Dichloropropene	6.7	2.1 U	2.1 UJ	-	ug/kg	U
FEW4-MW81-(100.0)	280-99496-3	SO	N	1,2,3-Trichlorobenzene	6.7	2.1 U	2.1 UJ	-	ug/kg	U
FEW4-MW81-(100.0)	280-99496-3	SO	N	1,2,3-Trichloropropane	6.7	4.3 U	4.3 UJ	-	ug/kg	U
FEW4-MW81-(100.0)	280-99496-3	SO	N	1,2,4-Trichlorobenzene	6.7	2.1 U	2.1 UJ	-	ug/kg	U
FEW4-MW81-(100.0)	280-99496-3	SO	N	1,2,4-Trimethylbenzene	6.7	2.1 U	2.1 UJ	-	ug/kg	U
FEW4-MW81-(100.0)	280-99496-3	SO	N	1,2-Dibromo-3-chloropropane	13	2.1 U	2.1 UJ	-	ug/kg	U
FEW4-MW81-(100.0)	280-99496-3	SO	N	1,2-Dibromoethane (EDB)	6.7	2.1 U	2.1 UJ	-	ug/kg	U
FEW4-MW81-(100.0)	280-99496-3	SO	N	1,2-Dichlorobenzene	6.7	2.1 U	2.1 UJ	-	ug/kg	U
FEW4-MW81-(100.0)	280-99496-3	SO	N	1,2-Dichloroethane	6.7	2.1 U	2.1 UJ	-	ug/kg	U
FEW4-MW81-(100.0)	280-99496-3	SO	N	1,2-Dichloroethene	6.7	2.1 U	2.1 UJ	-	ug/kg	U
FEW4-MW81-(100.0)	280-99496-3	SO	N	1,2-Dichloropropane	6.7	2.1 U	2.1 UJ	-	ug/kg	U
FEW4-MW81-(100.0)	280-99496-3	SO	N	1,3,5-Trimethylbenzene	6.7	2.1 U	2.1 UJ	-	ug/kg	U
FEW4-MW81-(100.0)	280-99496-3	SO	N	1,3-Dichlorobenzene	6.7	2.1 U	2.1 UJ	-	ug/kg	U
FEW4-MW81-(100.0)	280-99496-3	SO	N	1,3-Dichloropropane	6.7	2.1 U	2.1 UJ	-	ug/kg	U
FEW4-MW81-(100.0)	280-99496-3	SO	N	1,4-Dichlorobenzene	6.7	2.1 U	2.1 UJ	-	ug/kg	U
FEW4-MW81-(100.0)	280-99496-3	SO	N	2,2-Dichloropropane	6.7	2.1 U	2.1 UJ	-	ug/kg	U
FEW4-MW81-(100.0)	280-99496-3	SO	N	2-Butanone (MEK)	27	8.5 U	8.5 UJ	-	ug/kg	U
FEW4-MW81-(100.0)	280-99496-3	SO	N	2-Chlorotoluene	6.7	2.1 U	2.1 UJ	-	ug/kg	U
FEW4-MW81-(100.0)	280-99496-3	SO	N	2-Hexanone	27	17 U	17 UJ	-	ug/kg	U
FEW4-MW81-(100.0)	280-99496-3	SO	N	4-Chlorotoluene	6.7	2.1 U	2.1 UJ	-	ug/kg	U
FEW4-MW81-(100.0)	280-99496-3	SO	N	4-Methyl-2-pentanone (MIBK)	27	17 U	17 UJ	-	ug/kg	U
FEW4-MW81-(100.0)	280-99496-3	SO	N	Acetone	27	17 U	17 UJ	-	ug/kg	U
FEW4-MW81-(100.0)	280-99496-3	SO	N	Benzene	6.7	2.1 U	2.1 UJ	-	ug/kg	U

US Army Corps of Engineers®

Qualified Results

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW81-(100.0)	280-99496-3	SO	N	Bromobenzene	6.7	2.1 U	2.1 UJ	-	ug/kg	U
FEW4-MW81-(100.0)	280-99496-3	SO	N	Bromochloromethane	6.7	1.1 U	1.1 UJ	-	ug/kg	U
FEW4-MW81-(100.0)	280-99496-3	SO	N	Bromodichloromethane	6.7	1.1 U	1.1 UJ	-	ug/kg	U
FEW4-MW81-(100.0)	280-99496-3	SO	N	Bromoform	6.7	1.1 U	1.1 UJ	-	ug/kg	U
FEW4-MW81-(100.0)	280-99496-3	SO	N	Bromomethane	13	2.1 U	2.1 UJ	-	ug/kg	U
FEW4-MW81-(100.0)	280-99496-3	SO	N	Carbon disulfide	6.7	2.1 U	2.1 UJ	-	ug/kg	U
FEW4-MW81-(100.0)	280-99496-3	SO	N	Carbon tetrachloride	6.7	2.1 U	2.1 UJ	-	ug/kg	U
FEW4-MW81-(100.0)	280-99496-3	SO	N	Chlorobenzene	6.7	2.1 U	2.1 UJ	-	ug/kg	U
FEW4-MW81-(100.0)	280-99496-3	SO	N	Chloroethane	13	4.3 U	4.3 UJ	-	ug/kg	U
FEW4-MW81-(100.0)	280-99496-3	SO	N	Chloroform	13	1.1 U	1.1 UJ	-	ug/kg	U
FEW4-MW81-(100.0)	280-99496-3	SO	N	Chloromethane	13	2.1 U	2.1 UJ	-	ug/kg	U
FEW4-MW81-(100.0)	280-99496-3	SO	N	cis-1,2-Dichloroethene	6.7	2.1 U	2.1 UJ	-	ug/kg	U
FEW4-MW81-(100.0)	280-99496-3	SO	N	cis-1,3-Dichloropropene	6.7	4.3 U	4.3 UJ	-	ug/kg	U
FEW4-MW81-(100.0)	280-99496-3	SO	N	Dibromochloromethane	6.7	2.1 U	2.1 UJ	-	ug/kg	U
FEW4-MW81-(100.0)	280-99496-3	SO	N	Dibromomethane	6.7	4.3 U	4.3 UJ	-	ug/kg	U
FEW4-MW81-(100.0)	280-99496-3	SO	N	Dichlorodifluoromethane	13	2.1 U Q	2.1 UJ	-	ug/kg	U
FEW4-MW81-(100.0)	280-99496-3	SO	N	Ethylbenzene	6.7	2.1 U	2.1 UJ	-	ug/kg	U
FEW4-MW81-(100.0)	280-99496-3	SO	N	Hexachlorobutadiene	6.7	2.1 U	2.1 UJ	-	ug/kg	U
FEW4-MW81-(100.0)	280-99496-3	SO	N	Isopropylbenzene (Cumene)	6.7	2.1 U	2.1 UJ	-	ug/kg	U
FEW4-MW81-(100.0)	280-99496-3	SO	N	m,p-Xylene	4.3	4.3 U	4.3 UJ	-	ug/kg	U
FEW4-MW81-(100.0)	280-99496-3	SO	N	Methyl tert-butyl ether (MTBE)	27	1.1 U	1.1 UJ	-	ug/kg	U
FEW4-MW81-(100.0)	280-99496-3	SO	N	Methylene chloride	6.7	4.3 U	4.3 UJ	-	ug/kg	U
FEW4-MW81-(100.0)	280-99496-3	SO	N	Naphthalene	6.7	2.1 U	2.1 UJ	-	ug/kg	U
FEW4-MW81-(100.0)	280-99496-3	SO	N	n-Butylbenzene	6.7	2.1 U Q	2.1 UJ	-	ug/kg	U
FEW4-MW81-(100.0)	280-99496-3	SO	N	n-Propylbenzene	6.7	2.1 U	2.1 UJ	-	ug/kg	U
FEW4-MW81-(100.0)	280-99496-3	SO	N	o-Xylene	6.7	2.1 U	2.1 UJ	-	ug/kg	U
FEW4-MW81-(100.0)	280-99496-3	SO	N	p-Cymene (p-Isopropyltoluene)	6.7	2.1 U	2.1 UJ	-	ug/kg	U
FEW4-MW81-(100.0)	280-99496-3	SO	N	sec-Butylbenzene	6.7	2.1 U	2.1 UJ	-	ug/kg	U

US Army Corps of Engineers®

Qualified Results

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW81-(100.0)	280-99496-3	SO	N	Styrene	6.7	2.1 U	2.1 UJ	-	ug/kg	U
FEW4-MW81-(100.0)	280-99496-3	SO	N	tert-Butylbenzene	6.7	2.1 U	2.1 UJ	-	ug/kg	U
FEW4-MW81-(100.0)	280-99496-3	SO	N	Tetrachloroethene (PCE)	6.7	2.1 U	2.1 UJ	-	ug/kg	U
FEW4-MW81-(100.0)	280-99496-3	SO	N	Toluene	6.7	2.1 U	2.1 UJ	-	ug/kg	U
FEW4-MW81-(100.0)	280-99496-3	SO	N	trans-1,2-Dichloroethene	6.7	1.1 U	1.1 UJ	-	ug/kg	U
FEW4-MW81-(100.0)	280-99496-3	SO	N	trans-1,3-Dichloropropene	6.7	2.1 U	2.1 UJ	-	ug/kg	U
FEW4-MW81-(100.0)	280-99496-3	SO	N	Trichloroethene (TCE)	6.7	74	74 J	-	ug/kg	U
FEW4-MW81-(100.0)	280-99496-3	SO	N	Trichlorofluoromethane	13	4.3 U	4.3 UJ	-	ug/kg	U
FEW4-MW81-(100.0)	280-99496-3	SO	N	Vinyl chloride	6.7	4.3 U	4.3 UJ	-	ug/kg	U
FEW4-MW81-(110.0)	280-99496-4	SO	N	1,1,1,2-Tetrachloroethane	5.1	1.6 U	1.6 UJ	-	ug/kg	U
FEW4-MW81-(110.0)	280-99496-4	SO	N	1,1,1-Trichloroethane	5.1	1.6 U	1.6 UJ	-	ug/kg	U
FEW4-MW81-(110.0)	280-99496-4	SO	N	1,1,2,2-Tetrachloroethane	5.1	1.6 U	1.6 UJ	-	ug/kg	U
FEW4-MW81-(110.0)	280-99496-4	SO	N	1,1,2-Trichloroethane	5.1	3.2 U	3.2 UJ	-	ug/kg	U
FEW4-MW81-(110.0)	280-99496-4	SO	N	1,1-Dichloroethane	5.1	0.81 U	0.81 UJ	-	ug/kg	U
FEW4-MW81-(110.0)	280-99496-4	SO	N	1,1-Dichloroethene	5.1	1.6 U	1.6 UJ	-	ug/kg	U
FEW4-MW81-(110.0)	280-99496-4	SO	N	1,1-Dichloropropene	5.1	1.6 U	1.6 UJ	-	ug/kg	U
FEW4-MW81-(110.0)	280-99496-4	SO	N	1,2,3-Trichlorobenzene	5.1	1.6 U	1.6 UJ	-	ug/kg	U
FEW4-MW81-(110.0)	280-99496-4	SO	N	1,2,3-Trichloropropane	5.1	3.2 U	3.2 UJ	-	ug/kg	U
FEW4-MW81-(110.0)	280-99496-4	SO	N	1,2,4-Trichlorobenzene	5.1	1.6 U	1.6 UJ	-	ug/kg	U
FEW4-MW81-(110.0)	280-99496-4	SO	N	1,2,4-Trimethylbenzene	5.1	1.6 U	1.6 UJ	-	ug/kg	U
FEW4-MW81-(110.0)	280-99496-4	SO	N	1,2-Dibromo-3-chloropropane	10	1.6 U	1.6 UJ	-	ug/kg	U
FEW4-MW81-(110.0)	280-99496-4	SO	N	1,2-Dibromoethane (EDB)	5.1	1.6 U	1.6 UJ	-	ug/kg	U
FEW4-MW81-(110.0)	280-99496-4	SO	N	1,2-Dichlorobenzene	5.1	1.6 U	1.6 UJ	-	ug/kg	U
FEW4-MW81-(110.0)	280-99496-4	SO	N	1,2-Dichloroethane	5.1	1.6 U	1.6 UJ	-	ug/kg	U
FEW4-MW81-(110.0)	280-99496-4	SO	N	1,2-Dichloroethene	5.1	1.6 U	1.6 UJ	-	ug/kg	U
FEW4-MW81-(110.0)	280-99496-4	SO	N	1,2-Dichloropropane	5.1	1.6 U	1.6 UJ	-	ug/kg	U
FEW4-MW81-(110.0)	280-99496-4	SO	N	1,3,5-Trimethylbenzene	5.1	1.6 U	1.6 UJ	-	ug/kg	U
FEW4-MW81-(110.0)	280-99496-4	SO	N	1,3-Dichlorobenzene	5.1	1.6 U	1.6 UJ	-	ug/kg	U

US Army Corps of Engineers®

Qualified Results

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW81-(110.0)	280-99496-4	SO	N	1,3-Dichloropropane	5.1	1.6 U	1.6 UJ	-	ug/kg	U
FEW4-MW81-(110.0)	280-99496-4	SO	N	1,4-Dichlorobenzene	5.1	1.6 U	1.6 UJ	-	ug/kg	U
FEW4-MW81-(110.0)	280-99496-4	SO	N	2,2-Dichloropropane	5.1	1.6 U	1.6 UJ	-	ug/kg	U
FEW4-MW81-(110.0)	280-99496-4	SO	N	2-Butanone (MEK)	20	6.5 U	6.5 UJ	-	ug/kg	U
FEW4-MW81-(110.0)	280-99496-4	SO	N	2-Chlorotoluene	5.1	1.6 U	1.6 UJ	-	ug/kg	U
FEW4-MW81-(110.0)	280-99496-4	SO	N	2-Hexanone	20	13 U	13 UJ	-	ug/kg	U
FEW4-MW81-(110.0)	280-99496-4	SO	N	4-Chlorotoluene	5.1	1.6 U	1.6 UJ	-	ug/kg	U
FEW4-MW81-(110.0)	280-99496-4	SO	N	4-Methyl-2-pentanone (MIBK)	20	13 U	13 UJ	-	ug/kg	U
FEW4-MW81-(110.0)	280-99496-4	SO	N	Acetone	20	16 J	16 J	-	ug/kg	TR/U
FEW4-MW81-(110.0)	280-99496-4	SO	N	Benzene	5.1	1.6 U	1.6 UJ	-	ug/kg	U
FEW4-MW81-(110.0)	280-99496-4	SO	N	Bromobenzene	5.1	1.6 U	1.6 UJ	-	ug/kg	U
FEW4-MW81-(110.0)	280-99496-4	SO	N	Bromochloromethane	5.1	0.81 U	0.81 UJ	-	ug/kg	U
FEW4-MW81-(110.0)	280-99496-4	SO	N	Bromodichloromethane	5.1	0.81 U	0.81 UJ	-	ug/kg	U
FEW4-MW81-(110.0)	280-99496-4	SO	N	Bromoform	5.1	0.81 U	0.81 UJ	-	ug/kg	U
FEW4-MW81-(110.0)	280-99496-4	SO	N	Bromomethane	10	1.6 U	1.6 UJ	-	ug/kg	U
FEW4-MW81-(110.0)	280-99496-4	SO	N	Carbon disulfide	5.1	1.6 U	1.6 UJ	-	ug/kg	U
FEW4-MW81-(110.0)	280-99496-4	SO	N	Carbon tetrachloride	5.1	1.6 U	1.6 UJ	-	ug/kg	U
FEW4-MW81-(110.0)	280-99496-4	SO	N	Chlorobenzene	5.1	1.6 U	1.6 UJ	-	ug/kg	U
FEW4-MW81-(110.0)	280-99496-4	SO	N	Chloroethane	10	3.2 U	3.2 UJ	-	ug/kg	U
FEW4-MW81-(110.0)	280-99496-4	SO	N	Chloroform	10	0.81 U	0.81 UJ	-	ug/kg	U
FEW4-MW81-(110.0)	280-99496-4	SO	N	Chloromethane	10	1.6 U	1.6 UJ	-	ug/kg	U
FEW4-MW81-(110.0)	280-99496-4	SO	N	cis-1,2-Dichloroethene	5.1	1.6 U	1.6 UJ	-	ug/kg	U
FEW4-MW81-(110.0)	280-99496-4	SO	N	cis-1,3-Dichloropropene	5.1	3.2 U	3.2 UJ	-	ug/kg	U
FEW4-MW81-(110.0)	280-99496-4	SO	N	Dibromochloromethane	5.1	1.6 U	1.6 UJ	-	ug/kg	U
FEW4-MW81-(110.0)	280-99496-4	SO	N	Dibromomethane	5.1	3.2 U	3.2 UJ	-	ug/kg	U
FEW4-MW81-(110.0)	280-99496-4	SO	N	Dichlorodifluoromethane	10	1.6 U Q	1.6 UJ	-	ug/kg	U
FEW4-MW81-(110.0)	280-99496-4	SO	N	Ethylbenzene	5.1	1.6 U	1.6 UJ	-	ug/kg	U
FEW4-MW81-(110.0)	280-99496-4	SO	N	Hexachlorobutadiene	5.1	1.6 U	1.6 UJ	-	ug/kg	U

US Army Corps of Engineers®

Qualified Results

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW81-(110.0)	280-99496-4	SO	N	Isopropylbenzene (Cumene)	5.1	1.6 U	1.6 UJ	-	ug/kg	U
FEW4-MW81-(110.0)	280-99496-4	SO	N	m,p-Xylene	3.2	3.2 U	3.2 UJ	-	ug/kg	U
FEW4-MW81-(110.0)	280-99496-4	SO	N	Methyl tert-butyl ether (MTBE)	20	0.81 U	0.81 UJ	-	ug/kg	U
FEW4-MW81-(110.0)	280-99496-4	SO	N	Methylene chloride	5.1	3.2 U	3.2 UJ	-	ug/kg	U
FEW4-MW81-(110.0)	280-99496-4	SO	N	Naphthalene	5.1	1.6 U	1.6 UJ	-	ug/kg	U
FEW4-MW81-(110.0)	280-99496-4	SO	N	n-Butylbenzene	5.1	1.6 U Q	1.6 UJ	-	ug/kg	U
FEW4-MW81-(110.0)	280-99496-4	SO	N	n-Propylbenzene	5.1	1.6 U	1.6 UJ	-	ug/kg	U
FEW4-MW81-(110.0)	280-99496-4	SO	N	o-Xylene	5.1	1.6 U	1.6 UJ	-	ug/kg	U
FEW4-MW81-(110.0)	280-99496-4	SO	N	p-Cymene (p-Isopropyltoluene)	5.1	1.6 U	1.6 UJ	-	ug/kg	U
FEW4-MW81-(110.0)	280-99496-4	SO	N	sec-Butylbenzene	5.1	1.6 U	1.6 UJ	-	ug/kg	U
FEW4-MW81-(110.0)	280-99496-4	SO	N	Styrene	5.1	1.6 U	1.6 UJ	-	ug/kg	U
FEW4-MW81-(110.0)	280-99496-4	SO	N	tert-Butylbenzene	5.1	1.6 U	1.6 UJ	-	ug/kg	U
FEW4-MW81-(110.0)	280-99496-4	SO	N	Tetrachloroethene (PCE)	5.1	1.6 U	1.6 UJ	-	ug/kg	U
FEW4-MW81-(110.0)	280-99496-4	SO	N	Toluene	5.1	1.6 U	1.6 UJ	-	ug/kg	U
FEW4-MW81-(110.0)	280-99496-4	SO	N	trans-1,2-Dichloroethene	5.1	0.81 U	0.81 UJ	-	ug/kg	U
FEW4-MW81-(110.0)	280-99496-4	SO	N	trans-1,3-Dichloropropene	5.1	1.6 U	1.6 UJ	-	ug/kg	U
FEW4-MW81-(110.0)	280-99496-4	SO	N	Trichloroethene (TCE)	5.1	19	19 J	-	ug/kg	U
FEW4-MW81-(110.0)	280-99496-4	SO	N	Trichlorofluoromethane	10	3.2 U	3.2 UJ	-	ug/kg	U
FEW4-MW81-(110.0)	280-99496-4	SO	N	Vinyl chloride	5.1	3.2 U	3.2 UJ	-	ug/kg	U
FEW4-MW81-(120.0)	280-99496-5	SO	N	1,1,1,2-Tetrachloroethane	5.1	1.6 U	1.6 UJ	-	ug/kg	U
FEW4-MW81-(120.0)	280-99496-5	SO	N	1,1,1-Trichloroethane	5.1	1.6 U	1.6 UJ	-	ug/kg	U
FEW4-MW81-(120.0)	280-99496-5	SO	N	1,1,2,2-Tetrachloroethane	5.1	1.6 U	1.6 UJ	-	ug/kg	U
FEW4-MW81-(120.0)	280-99496-5	SO	N	1,1,2-Trichloroethane	5.1	3.2 U	3.2 UJ	-	ug/kg	U
FEW4-MW81-(120.0)	280-99496-5	SO	N	1,1-Dichloroethane	5.1	0.81 U	0.81 UJ	-	ug/kg	U
FEW4-MW81-(120.0)	280-99496-5	SO	N	1,1-Dichloroethene	5.1	1.6 U	1.6 UJ	-	ug/kg	U
FEW4-MW81-(120.0)	280-99496-5	SO	N	1,1-Dichloropropene	5.1	1.6 U	1.6 UJ	-	ug/kg	U
FEW4-MW81-(120.0)	280-99496-5	SO	N	1,2,3-Trichlorobenzene	5.1	1.6 U	1.6 UJ	-	ug/kg	U
FEW4-MW81-(120.0)	280-99496-5	SO	N	1,2,3-Trichloropropane	5.1	3.2 U	3.2 UJ	-	ug/kg	U

US Army Corps of Engineers®

Qualified Results

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW81-(120.0)	280-99496-5	SO	N	1,2,4-Trichlorobenzene	5.1	1.6 U	1.6 UJ	-	ug/kg	U
FEW4-MW81-(120.0)	280-99496-5	SO	N	1,2,4-Trimethylbenzene	5.1	1.6 U	1.6 UJ	-	ug/kg	U
FEW4-MW81-(120.0)	280-99496-5	SO	N	1,2-Dibromo-3-chloropropane	10	1.6 U	1.6 UJ	-	ug/kg	U
FEW4-MW81-(120.0)	280-99496-5	SO	N	1,2-Dibromoethane (EDB)	5.1	1.6 U	1.6 UJ	-	ug/kg	U
FEW4-MW81-(120.0)	280-99496-5	SO	N	1,2-Dichlorobenzene	5.1	1.6 U	1.6 UJ	-	ug/kg	U
FEW4-MW81-(120.0)	280-99496-5	SO	N	1,2-Dichloroethane	5.1	1.6 U	1.6 UJ	-	ug/kg	U
FEW4-MW81-(120.0)	280-99496-5	SO	N	1,2-Dichloroethene	5.1	1.6 U	1.6 UJ	-	ug/kg	U
FEW4-MW81-(120.0)	280-99496-5	SO	N	1,2-Dichloropropane	5.1	1.6 U	1.6 UJ	-	ug/kg	U
FEW4-MW81-(120.0)	280-99496-5	SO	N	1,3,5-Trimethylbenzene	5.1	1.6 U	1.6 UJ	-	ug/kg	U
FEW4-MW81-(120.0)	280-99496-5	SO	N	1,3-Dichlorobenzene	5.1	1.6 U	1.6 UJ	-	ug/kg	U
FEW4-MW81-(120.0)	280-99496-5	SO	N	1,3-Dichloropropane	5.1	1.6 U	1.6 UJ	-	ug/kg	U
FEW4-MW81-(120.0)	280-99496-5	SO	N	1,4-Dichlorobenzene	5.1	1.6 U	1.6 UJ	-	ug/kg	U
FEW4-MW81-(120.0)	280-99496-5	SO	N	2,2-Dichloropropane	5.1	1.6 U	1.6 UJ	-	ug/kg	U
FEW4-MW81-(120.0)	280-99496-5	SO	N	2-Butanone (MEK)	20	6.5 U	6.5 UJ	-	ug/kg	U
FEW4-MW81-(120.0)	280-99496-5	SO	N	2-Chlorotoluene	5.1	1.6 U	1.6 UJ	-	ug/kg	U
FEW4-MW81-(120.0)	280-99496-5	SO	N	2-Hexanone	20	13 U	13 UJ	-	ug/kg	U
FEW4-MW81-(120.0)	280-99496-5	SO	N	4-Chlorotoluene	5.1	1.6 U	1.6 UJ	-	ug/kg	U
FEW4-MW81-(120.0)	280-99496-5	SO	N	4-Methyl-2-pentanone (MIBK)	20	13 U	13 UJ	-	ug/kg	U
FEW4-MW81-(120.0)	280-99496-5	SO	N	Acetone	20	13 U	13 UJ	-	ug/kg	U
FEW4-MW81-(120.0)	280-99496-5	SO	N	Benzene	5.1	1.6 U	1.6 UJ	-	ug/kg	U
FEW4-MW81-(120.0)	280-99496-5	SO	N	Bromobenzene	5.1	1.6 U	1.6 UJ	-	ug/kg	U
FEW4-MW81-(120.0)	280-99496-5	SO	N	Bromochloromethane	5.1	0.81 U	0.81 UJ	-	ug/kg	U
FEW4-MW81-(120.0)	280-99496-5	SO	N	Bromodichloromethane	5.1	0.81 U	0.81 UJ	-	ug/kg	U
FEW4-MW81-(120.0)	280-99496-5	SO	N	Bromoform	5.1	0.81 U	0.81 UJ	-	ug/kg	U
FEW4-MW81-(120.0)	280-99496-5	SO	N	Bromomethane	10	1.6 U	1.6 UJ	-	ug/kg	U
FEW4-MW81-(120.0)	280-99496-5	SO	N	Carbon disulfide	5.1	1.6 U	1.6 UJ	-	ug/kg	U
FEW4-MW81-(120.0)	280-99496-5	SO	N	Carbon tetrachloride	5.1	1.6 U	1.6 UJ	-	ug/kg	U
FEW4-MW81-(120.0)	280-99496-5	SO	N	Chlorobenzene	5.1	1.6 U	1.6 UJ	-	ug/kg	U

US Army Corps of Engineers®

Qualified Results

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW81-(120.0)	280-99496-5	SO	N	Chloroethane	10	3.2 U	3.2 UJ	-	ug/kg	U
FEW4-MW81-(120.0)	280-99496-5	SO	N	Chloroform	10	0.81 U	0.81 UJ	-	ug/kg	U
FEW4-MW81-(120.0)	280-99496-5	SO	N	Chloromethane	10	1.6 U	1.6 UJ	-	ug/kg	U
FEW4-MW81-(120.0)	280-99496-5	SO	N	cis-1,2-Dichloroethene	5.1	1.6 U	1.6 UJ	-	ug/kg	U
FEW4-MW81-(120.0)	280-99496-5	SO	N	cis-1,3-Dichloropropene	5.1	3.2 U	3.2 UJ	-	ug/kg	U
FEW4-MW81-(120.0)	280-99496-5	SO	N	Dibromochloromethane	5.1	1.6 U	1.6 UJ	-	ug/kg	U
FEW4-MW81-(120.0)	280-99496-5	SO	N	Dibromomethane	5.1	3.2 U	3.2 UJ	-	ug/kg	U
FEW4-MW81-(120.0)	280-99496-5	SO	N	Dichlorodifluoromethane	10	1.6 U Q	1.6 UJ	-	ug/kg	U
FEW4-MW81-(120.0)	280-99496-5	SO	N	Ethylbenzene	5.1	1.6 U	1.6 UJ	-	ug/kg	U
FEW4-MW81-(120.0)	280-99496-5	SO	N	Hexachlorobutadiene	5.1	1.6 U	1.6 UJ	-	ug/kg	U
FEW4-MW81-(120.0)	280-99496-5	SO	N	Isopropylbenzene (Cumene)	5.1	1.6 U	1.6 UJ	-	ug/kg	U
FEW4-MW81-(120.0)	280-99496-5	SO	N	m,p-Xylene	3.2	3.2 U	3.2 UJ	-	ug/kg	U
FEW4-MW81-(120.0)	280-99496-5	SO	N	Methyl tert-butyl ether (MTBE)	20	0.81 U	0.81 UJ	-	ug/kg	U
FEW4-MW81-(120.0)	280-99496-5	SO	N	Methylene chloride	5.1	3.2 U	3.2 UJ	-	ug/kg	U
FEW4-MW81-(120.0)	280-99496-5	SO	N	Naphthalene	5.1	1.6 U	1.6 UJ	-	ug/kg	U
FEW4-MW81-(120.0)	280-99496-5	SO	N	n-Butylbenzene	5.1	1.6 U Q	1.6 UJ	-	ug/kg	U
FEW4-MW81-(120.0)	280-99496-5	SO	N	n-Propylbenzene	5.1	1.6 U	1.6 UJ	-	ug/kg	U
FEW4-MW81-(120.0)	280-99496-5	SO	N	o-Xylene	5.1	1.6 U	1.6 UJ	-	ug/kg	U
FEW4-MW81-(120.0)	280-99496-5	SO	N	p-Cymene (p-Isopropyltoluene)	5.1	1.6 U	1.6 UJ	-	ug/kg	U
FEW4-MW81-(120.0)	280-99496-5	SO	N	sec-Butylbenzene	5.1	1.6 U	1.6 UJ	-	ug/kg	U
FEW4-MW81-(120.0)	280-99496-5	SO	N	Styrene	5.1	1.6 U	1.6 UJ	-	ug/kg	U
FEW4-MW81-(120.0)	280-99496-5	SO	N	tert-Butylbenzene	5.1	1.6 U	1.6 UJ	-	ug/kg	U
FEW4-MW81-(120.0)	280-99496-5	SO	N	Tetrachloroethene (PCE)	5.1	1.6 U	1.6 UJ	-	ug/kg	U
FEW4-MW81-(120.0)	280-99496-5	SO	N	Toluene	5.1	1.6 U	1.6 UJ	-	ug/kg	U
FEW4-MW81-(120.0)	280-99496-5	SO	N	trans-1,2-Dichloroethene	5.1	0.81 U	0.81 UJ	-	ug/kg	U
FEW4-MW81-(120.0)	280-99496-5	SO	N	trans-1,3-Dichloropropene	5.1	1.6 U	1.6 UJ	-	ug/kg	U
FEW4-MW81-(120.0)	280-99496-5	SO	N	Trichloroethene (TCE)	5.1	41	41 J	-	ug/kg	U
FEW4-MW81-(120.0)	280-99496-5	SO	N	Trichlorofluoromethane	10	3.2 U	3.2 UJ	-	ug/kg	U

US Army Corps of Engineers®

Qualified Results

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW81-(120.0)	280-99496-5	SO	N	Vinyl chloride	5.1	3.2 U	3.2 UJ	-	ug/kg	U
FEW4-MW81-(130.0)	280-99496-6	SO	N	1,1,1,2-Tetrachloroethane	5.5	1.8 U	1.8 UJ	-	ug/kg	U
FEW4-MW81-(130.0)	280-99496-6	SO	N	1,1,1-Trichloroethane	5.5	1.8 U	1.8 UJ	-	ug/kg	U
FEW4-MW81-(130.0)	280-99496-6	SO	N	1,1,2,2-Tetrachloroethane	5.5	1.8 U	1.8 UJ	-	ug/kg	U
FEW4-MW81-(130.0)	280-99496-6	SO	N	1,1,2-Trichloroethane	5.5	3.5 U	3.5 UJ	-	ug/kg	U
FEW4-MW81-(130.0)	280-99496-6	SO	N	1,1-Dichloroethane	5.5	0.89 U	0.89 UJ	-	ug/kg	U
FEW4-MW81-(130.0)	280-99496-6	SO	N	1,1-Dichloroethene	5.5	1.8 U	1.8 UJ	-	ug/kg	U
FEW4-MW81-(130.0)	280-99496-6	SO	N	1,1-Dichloropropene	5.5	1.8 U	1.8 UJ	-	ug/kg	U
FEW4-MW81-(130.0)	280-99496-6	SO	N	1,2,3-Trichlorobenzene	5.5	1.8 U	1.8 UJ	-	ug/kg	U
FEW4-MW81-(130.0)	280-99496-6	SO	N	1,2,3-Trichloropropane	5.5	3.5 U	3.5 UJ	-	ug/kg	U
FEW4-MW81-(130.0)	280-99496-6	SO	N	1,2,4-Trichlorobenzene	5.5	1.8 U	1.8 UJ	-	ug/kg	U
FEW4-MW81-(130.0)	280-99496-6	SO	N	1,2,4-Trimethylbenzene	5.5	1.8 U	1.8 UJ	-	ug/kg	U
FEW4-MW81-(130.0)	280-99496-6	SO	N	1,2-Dibromo-3-chloropropane	11	1.8 U	1.8 UJ	-	ug/kg	U
FEW4-MW81-(130.0)	280-99496-6	SO	N	1,2-Dibromoethane (EDB)	5.5	1.8 U	1.8 UJ	-	ug/kg	U
FEW4-MW81-(130.0)	280-99496-6	SO	N	1,2-Dichlorobenzene	5.5	1.8 U	1.8 UJ	-	ug/kg	U
FEW4-MW81-(130.0)	280-99496-6	SO	N	1,2-Dichloroethane	5.5	1.8 U	1.8 UJ	-	ug/kg	U
FEW4-MW81-(130.0)	280-99496-6	SO	N	1,2-Dichloroethene	5.5	1.8 U	1.8 UJ	-	ug/kg	U
FEW4-MW81-(130.0)	280-99496-6	SO	N	1,2-Dichloropropane	5.5	1.8 U	1.8 UJ	-	ug/kg	U
FEW4-MW81-(130.0)	280-99496-6	SO	N	1,3,5-Trimethylbenzene	5.5	1.8 U	1.8 UJ	-	ug/kg	U
FEW4-MW81-(130.0)	280-99496-6	SO	N	1,3-Dichlorobenzene	5.5	1.8 U	1.8 UJ	-	ug/kg	U
FEW4-MW81-(130.0)	280-99496-6	SO	N	1,3-Dichloropropane	5.5	1.8 U	1.8 UJ	-	ug/kg	U
FEW4-MW81-(130.0)	280-99496-6	SO	N	1,4-Dichlorobenzene	5.5	1.8 U	1.8 UJ	-	ug/kg	U
FEW4-MW81-(130.0)	280-99496-6	SO	N	2,2-Dichloropropane	5.5	1.8 U	1.8 UJ	-	ug/kg	U
FEW4-MW81-(130.0)	280-99496-6	SO	N	2-Butanone (MEK)	22	7.1 U	7.1 UJ	-	ug/kg	U
FEW4-MW81-(130.0)	280-99496-6	SO	N	2-Chlorotoluene	5.5	1.8 U	1.8 UJ	-	ug/kg	U
FEW4-MW81-(130.0)	280-99496-6	SO	N	2-Hexanone	22	14 U	14 UJ	-	ug/kg	U
FEW4-MW81-(130.0)	280-99496-6	SO	N	4-Chlorotoluene	5.5	1.8 U	1.8 UJ	-	ug/kg	U
FEW4-MW81-(130.0)	280-99496-6	SO	N	4-Methyl-2-pentanone (MIBK)	22	14 U	14 UJ	-	ug/kg	U

US Army Corps of Engineers®

Qualified Results

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW81-(130.0)	280-99496-6	SO	N	Acetone	22	14 U	14 UJ	-	ug/kg	U
FEW4-MW81-(130.0)	280-99496-6	SO	N	Benzene	5.5	1.8 U	1.8 UJ	-	ug/kg	U
FEW4-MW81-(130.0)	280-99496-6	SO	N	Bromobenzene	5.5	1.8 U	1.8 UJ	-	ug/kg	U
FEW4-MW81-(130.0)	280-99496-6	SO	N	Bromochloromethane	5.5	0.89 U	0.89 UJ	-	ug/kg	U
FEW4-MW81-(130.0)	280-99496-6	SO	N	Bromodichloromethane	5.5	0.89 U	0.89 UJ	-	ug/kg	U
FEW4-MW81-(130.0)	280-99496-6	SO	N	Bromoform	5.5	0.89 U	0.89 UJ	-	ug/kg	U
FEW4-MW81-(130.0)	280-99496-6	SO	N	Bromomethane	11	1.8 U	1.8 UJ	-	ug/kg	U
FEW4-MW81-(130.0)	280-99496-6	SO	N	Carbon disulfide	5.5	1.8 U	1.8 UJ	-	ug/kg	U
FEW4-MW81-(130.0)	280-99496-6	SO	N	Carbon tetrachloride	5.5	1.8 U	1.8 UJ	-	ug/kg	U
FEW4-MW81-(130.0)	280-99496-6	SO	N	Chlorobenzene	5.5	1.8 U	1.8 UJ	-	ug/kg	U
FEW4-MW81-(130.0)	280-99496-6	SO	N	Chloroethane	11	3.5 U	3.5 UJ	-	ug/kg	U
FEW4-MW81-(130.0)	280-99496-6	SO	N	Chloroform	11	0.89 U	0.89 UJ	-	ug/kg	U
FEW4-MW81-(130.0)	280-99496-6	SO	N	Chloromethane	11	1.8 U	1.8 UJ	-	ug/kg	U
FEW4-MW81-(130.0)	280-99496-6	SO	N	cis-1,2-Dichloroethene	5.5	1.8 U	1.8 UJ	-	ug/kg	U
FEW4-MW81-(130.0)	280-99496-6	SO	N	cis-1,3-Dichloropropene	5.5	3.5 U	3.5 UJ	-	ug/kg	U
FEW4-MW81-(130.0)	280-99496-6	SO	N	Dibromochloromethane	5.5	1.8 U	1.8 UJ	-	ug/kg	U
FEW4-MW81-(130.0)	280-99496-6	SO	N	Dibromomethane	5.5	3.5 U	3.5 UJ	-	ug/kg	U
FEW4-MW81-(130.0)	280-99496-6	SO	N	Dichlorodifluoromethane	11	1.8 U Q	1.8 UJ	-	ug/kg	U
FEW4-MW81-(130.0)	280-99496-6	SO	N	Ethylbenzene	5.5	1.8 U	1.8 UJ	-	ug/kg	U
FEW4-MW81-(130.0)	280-99496-6	SO	N	Hexachlorobutadiene	5.5	1.8 U	1.8 UJ	-	ug/kg	U
FEW4-MW81-(130.0)	280-99496-6	SO	N	Isopropylbenzene (Cumene)	5.5	1.8 U	1.8 UJ	-	ug/kg	U
FEW4-MW81-(130.0)	280-99496-6	SO	N	m,p-Xylene	3.5	3.5 U	3.5 UJ	-	ug/kg	U
FEW4-MW81-(130.0)	280-99496-6	SO	N	Methyl tert-butyl ether (MTBE)	22	0.89 U	0.89 UJ	-	ug/kg	U
FEW4-MW81-(130.0)	280-99496-6	SO	N	Methylene chloride	5.5	3.5 U	3.5 UJ	-	ug/kg	U
FEW4-MW81-(130.0)	280-99496-6	SO	N	Naphthalene	5.5	1.8 U	1.8 UJ	-	ug/kg	U
FEW4-MW81-(130.0)	280-99496-6	SO	N	n-Butylbenzene	5.5	1.8 U Q	1.8 UJ	-	ug/kg	U
FEW4-MW81-(130.0)	280-99496-6	SO	N	n-Propylbenzene	5.5	1.8 U	1.8 UJ	-	ug/kg	U
FEW4-MW81-(130.0)	280-99496-6	SO	N	o-Xylene	5.5	1.8 U	1.8 UJ	-	ug/kg	U

US Army Corps of Engineers®

Qualified Results

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW81-(130.0)	280-99496-6	SO	N	p-Cymene (p-Isopropyltoluene)	5.5	1.8 U	1.8 UJ	-	ug/kg	U
FEW4-MW81-(130.0)	280-99496-6	SO	N	sec-Butylbenzene	5.5	1.8 U	1.8 UJ	-	ug/kg	U
FEW4-MW81-(130.0)	280-99496-6	SO	N	Styrene	5.5	1.8 U	1.8 UJ	-	ug/kg	U
FEW4-MW81-(130.0)	280-99496-6	SO	N	tert-Butylbenzene	5.5	1.8 U	1.8 UJ	-	ug/kg	U
FEW4-MW81-(130.0)	280-99496-6	SO	N	Tetrachloroethene (PCE)	5.5	1.8 U	1.8 UJ	-	ug/kg	U
FEW4-MW81-(130.0)	280-99496-6	SO	N	Toluene	5.5	1.8 U	1.8 UJ	-	ug/kg	U
FEW4-MW81-(130.0)	280-99496-6	SO	N	trans-1,2-Dichloroethene	5.5	0.89 U	0.89 UJ	-	ug/kg	U
FEW4-MW81-(130.0)	280-99496-6	SO	N	trans-1,3-Dichloropropene	5.5	1.8 U	1.8 UJ	-	ug/kg	U
FEW4-MW81-(130.0)	280-99496-6	SO	N	Trichloroethene (TCE)	5.5	32	32 J	-	ug/kg	U
FEW4-MW81-(130.0)	280-99496-6	SO	N	Trichlorofluoromethane	11	3.5 U	3.5 UJ	-	ug/kg	U
FEW4-MW81-(130.0)	280-99496-6	SO	N	Vinyl chloride	5.5	3.5 U	3.5 UJ	-	ug/kg	U
FEW4-MW81-(90.0)	280-99496-1	SO	N	1,1,1,2-Tetrachloroethane	5.9	1.9 U	1.9 UJ	-	ug/kg	U
FEW4-MW81-(90.0)	280-99496-1	SO	N	1,1,1-Trichloroethane	5.9	1.9 U	1.9 UJ	-	ug/kg	U
FEW4-MW81-(90.0)	280-99496-1	SO	N	1,1,2,2-Tetrachloroethane	5.9	1.9 U	1.9 UJ	-	ug/kg	U
FEW4-MW81-(90.0)	280-99496-1	SO	N	1,1,2-Trichloroethane	5.9	3.8 U	3.8 UJ	-	ug/kg	U
FEW4-MW81-(90.0)	280-99496-1	SO	N	1,1-Dichloroethane	5.9	0.94 U	0.94 UJ	-	ug/kg	U
FEW4-MW81-(90.0)	280-99496-1	SO	N	1,1-Dichloroethene	5.9	1.9 U	1.9 UJ	-	ug/kg	U
FEW4-MW81-(90.0)	280-99496-1	SO	N	1,1-Dichloropropene	5.9	1.9 U	1.9 UJ	-	ug/kg	U
FEW4-MW81-(90.0)	280-99496-1	SO	N	1,2,3-Trichlorobenzene	5.9	1.9 U	1.9 UJ	-	ug/kg	U
FEW4-MW81-(90.0)	280-99496-1	SO	N	1,2,3-Trichloropropane	5.9	3.8 U	3.8 UJ	-	ug/kg	U
FEW4-MW81-(90.0)	280-99496-1	SO	N	1,2,4-Trichlorobenzene	5.9	1.9 U	1.9 UJ	-	ug/kg	U
FEW4-MW81-(90.0)	280-99496-1	SO	N	1,2,4-Trimethylbenzene	5.9	1.9 U	1.9 UJ	-	ug/kg	U
FEW4-MW81-(90.0)	280-99496-1	SO	N	1,2-Dibromo-3-chloropropane	12	1.9 U	1.9 UJ	-	ug/kg	U
FEW4-MW81-(90.0)	280-99496-1	SO	N	1,2-Dibromoethane (EDB)	5.9	1.9 U	1.9 UJ	-	ug/kg	U
FEW4-MW81-(90.0)	280-99496-1	SO	N	1,2-Dichlorobenzene	5.9	1.9 U	1.9 UJ	-	ug/kg	U
FEW4-MW81-(90.0)	280-99496-1	SO	N	1,2-Dichloroethane	5.9	1.9 U	1.9 UJ	-	ug/kg	U
FEW4-MW81-(90.0)	280-99496-1	SO	N	1,2-Dichloroethene	5.9	1.9 U	1.9 UJ	-	ug/kg	U
FEW4-MW81-(90.0)	280-99496-1	SO	N	1,2-Dichloropropane	5.9	1.9 U	1.9 UJ	-	ug/kg	U

US Army Corps of Engineers®

Qualified Results

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW81-(90.0)	280-99496-1	SO	N	1,3,5-Trimethylbenzene	5.9	1.9 U	1.9 UJ	-	ug/kg	U
FEW4-MW81-(90.0)	280-99496-1	SO	N	1,3-Dichlorobenzene	5.9	1.9 U	1.9 UJ	-	ug/kg	U
FEW4-MW81-(90.0)	280-99496-1	SO	N	1,3-Dichloropropane	5.9	1.9 U	1.9 UJ	-	ug/kg	U
FEW4-MW81-(90.0)	280-99496-1	SO	N	1,4-Dichlorobenzene	5.9	1.9 U	1.9 UJ	-	ug/kg	U
FEW4-MW81-(90.0)	280-99496-1	SO	N	2,2-Dichloropropane	5.9	1.9 U	1.9 UJ	-	ug/kg	U
FEW4-MW81-(90.0)	280-99496-1	SO	N	2-Butanone (MEK)	23	7.5 U	7.5 UJ	-	ug/kg	U
FEW4-MW81-(90.0)	280-99496-1	SO	N	2-Chlorotoluene	5.9	1.9 U	1.9 UJ	-	ug/kg	U
FEW4-MW81-(90.0)	280-99496-1	SO	N	2-Hexanone	23	15 U	15 UJ	-	ug/kg	U
FEW4-MW81-(90.0)	280-99496-1	SO	N	4-Chlorotoluene	5.9	1.9 U	1.9 UJ	-	ug/kg	U
FEW4-MW81-(90.0)	280-99496-1	SO	N	4-Methyl-2-pentanone (MIBK)	23	15 U	15 UJ	-	ug/kg	U
FEW4-MW81-(90.0)	280-99496-1	SO	N	Acetone	23	18 J	18 J	-	ug/kg	TR/U
FEW4-MW81-(90.0)	280-99496-1	SO	N	Benzene	5.9	1.9 U	1.9 UJ	-	ug/kg	U
FEW4-MW81-(90.0)	280-99496-1	SO	N	Bromobenzene	5.9	1.9 U	1.9 UJ	-	ug/kg	U
FEW4-MW81-(90.0)	280-99496-1	SO	N	Bromochloromethane	5.9	0.94 U	0.94 UJ	-	ug/kg	U
FEW4-MW81-(90.0)	280-99496-1	SO	N	Bromodichloromethane	5.9	0.94 U	0.94 UJ	-	ug/kg	U
FEW4-MW81-(90.0)	280-99496-1	SO	N	Bromoform	5.9	0.94 U	0.94 UJ	-	ug/kg	U
FEW4-MW81-(90.0)	280-99496-1	SO	N	Bromomethane	12	1.9 U	1.9 UJ	-	ug/kg	U
FEW4-MW81-(90.0)	280-99496-1	SO	N	Carbon disulfide	5.9	1.9 U	1.9 UJ	-	ug/kg	U
FEW4-MW81-(90.0)	280-99496-1	SO	N	Carbon tetrachloride	5.9	1.9 U	1.9 UJ	-	ug/kg	U
FEW4-MW81-(90.0)	280-99496-1	SO	N	Chlorobenzene	5.9	1.9 U	1.9 UJ	-	ug/kg	U
FEW4-MW81-(90.0)	280-99496-1	SO	N	Chloroethane	12	3.8 U	3.8 UJ	-	ug/kg	U
FEW4-MW81-(90.0)	280-99496-1	SO	N	Chloroform	12	0.94 U	0.94 UJ	-	ug/kg	U
FEW4-MW81-(90.0)	280-99496-1	SO	N	Chloromethane	12	1.9 U	1.9 UJ	-	ug/kg	U
FEW4-MW81-(90.0)	280-99496-1	SO	N	cis-1,2-Dichloroethene	5.9	1.9 U	1.9 UJ	-	ug/kg	U
FEW4-MW81-(90.0)	280-99496-1	SO	N	cis-1,3-Dichloropropene	5.9	3.8 U	3.8 UJ	-	ug/kg	U
FEW4-MW81-(90.0)	280-99496-1	SO	N	Dibromochloromethane	5.9	1.9 U	1.9 UJ	-	ug/kg	U
FEW4-MW81-(90.0)	280-99496-1	SO	N	Dibromomethane	5.9	3.8 U	3.8 UJ	-	ug/kg	U
FEW4-MW81-(90.0)	280-99496-1	SO	N	Dichlorodifluoromethane	12	1.9 U Q	1.9 UJ	-	ug/kg	U

US Army Corps of Engineers®

Qualified Results

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW81-(90.0)	280-99496-1	SO	N	Ethylbenzene	5.9	1.9 U	1.9 UJ	-	ug/kg	U
FEW4-MW81-(90.0)	280-99496-1	SO	N	Hexachlorobutadiene	5.9	1.9 U	1.9 UJ	-	ug/kg	U
FEW4-MW81-(90.0)	280-99496-1	SO	N	Isopropylbenzene (Cumene)	5.9	1.9 U	1.9 UJ	-	ug/kg	U
FEW4-MW81-(90.0)	280-99496-1	SO	N	m,p-Xylene	3.8	3.8 U	3.8 UJ	-	ug/kg	U
FEW4-MW81-(90.0)	280-99496-1	SO	N	Methyl tert-butyl ether (MTBE)	23	0.94 U	0.94 UJ	-	ug/kg	U
FEW4-MW81-(90.0)	280-99496-1	SO	N	Methylene chloride	5.9	3.8 U	3.8 UJ	-	ug/kg	U
FEW4-MW81-(90.0)	280-99496-1	SO	N	Naphthalene	5.9	2.2 J	2.2 J	-	ug/kg	TR/U
FEW4-MW81-(90.0)	280-99496-1	SO	N	n-Butylbenzene	5.9	1.9 U Q	1.9 UJ	-	ug/kg	U
FEW4-MW81-(90.0)	280-99496-1	SO	N	n-Propylbenzene	5.9	1.9 U	1.9 UJ	-	ug/kg	U
FEW4-MW81-(90.0)	280-99496-1	SO	N	o-Xylene	5.9	1.9 U	1.9 UJ	-	ug/kg	U
FEW4-MW81-(90.0)	280-99496-1	SO	N	p-Cymene (p-Isopropyltoluene)	5.9	1.9 U	1.9 UJ	-	ug/kg	U
FEW4-MW81-(90.0)	280-99496-1	SO	N	sec-Butylbenzene	5.9	1.9 U	1.9 UJ	-	ug/kg	U
FEW4-MW81-(90.0)	280-99496-1	SO	N	Styrene	5.9	1.9 U	1.9 UJ	-	ug/kg	U
FEW4-MW81-(90.0)	280-99496-1	SO	N	tert-Butylbenzene	5.9	1.9 U	1.9 UJ	-	ug/kg	U
FEW4-MW81-(90.0)	280-99496-1	SO	N	Tetrachloroethene (PCE)	5.9	1.9 U	1.9 UJ	-	ug/kg	U
FEW4-MW81-(90.0)	280-99496-1	SO	N	Toluene	5.9	1.9 U	1.9 UJ	-	ug/kg	U
FEW4-MW81-(90.0)	280-99496-1	SO	N	trans-1,2-Dichloroethene	5.9	0.94 U	0.94 UJ	-	ug/kg	U
FEW4-MW81-(90.0)	280-99496-1	SO	N	trans-1,3-Dichloropropene	5.9	1.9 U	1.9 UJ	-	ug/kg	U
FEW4-MW81-(90.0)	280-99496-1	SO	N	Trichloroethene (TCE)	5.9	3.0 J	3.0 J	-	ug/kg	TR/U
FEW4-MW81-(90.0)	280-99496-1	SO	N	Trichlorofluoromethane	12	3.8 U	3.8 UJ	-	ug/kg	U
FEW4-MW81-(90.0)	280-99496-1	SO	N	Vinyl chloride	5.9	3.8 U	3.8 UJ	-	ug/kg	U
FEW4-MW81-(91.0)	280-99496-2	SO	FD	1,1,1,2-Tetrachloroethane	6.4	2.0 U	2.0 UJ	-	ug/kg	U
FEW4-MW81-(91.0)	280-99496-2	SO	FD	1,1,1-Trichloroethane	6.4	2.0 U	2.0 UJ	-	ug/kg	U
FEW4-MW81-(91.0)	280-99496-2	SO	FD	1,1,2,2-Tetrachloroethane	6.4	2.0 U	2.0 UJ	-	ug/kg	U
FEW4-MW81-(91.0)	280-99496-2	SO	FD	1,1,2-Trichloroethane	6.4	4.1 U	4.1 UJ	-	ug/kg	U
FEW4-MW81-(91.0)	280-99496-2	SO	FD	1,1-Dichloroethane	6.4	1.0 U	1.0 UJ	-	ug/kg	U
FEW4-MW81-(91.0)	280-99496-2	SO	FD	1,1-Dichloroethene	6.4	2.0 U	2.0 UJ	-	ug/kg	U
FEW4-MW81-(91.0)	280-99496-2	SO	FD	1,1-Dichloropropene	6.4	2.0 U	2.0 UJ	-	ug/kg	U

US Army Corps of Engineers®

Qualified Results

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW81-(91.0)	280-99496-2	SO	FD	1,2,3-Trichlorobenzene	6.4	2.0 U	2.0 UJ	-	ug/kg	U
FEW4-MW81-(91.0)	280-99496-2	SO	FD	1,2,3-Trichloropropane	6.4	4.1 U	4.1 UJ	-	ug/kg	U
FEW4-MW81-(91.0)	280-99496-2	SO	FD	1,2,4-Trichlorobenzene	6.4	2.0 U	2.0 UJ	-	ug/kg	U
FEW4-MW81-(91.0)	280-99496-2	SO	FD	1,2,4-Trimethylbenzene	6.4	2.0 U	2.0 UJ	-	ug/kg	U
FEW4-MW81-(91.0)	280-99496-2	SO	FD	1,2-Dibromo-3-chloropropane	13	2.0 U	2.0 UJ	-	ug/kg	U
FEW4-MW81-(91.0)	280-99496-2	SO	FD	1,2-Dibromoethane (EDB)	6.4	2.0 U	2.0 UJ	-	ug/kg	U
FEW4-MW81-(91.0)	280-99496-2	SO	FD	1,2-Dichlorobenzene	6.4	2.0 U	2.0 UJ	-	ug/kg	U
FEW4-MW81-(91.0)	280-99496-2	SO	FD	1,2-Dichloroethane	6.4	2.0 U	2.0 UJ	-	ug/kg	U
FEW4-MW81-(91.0)	280-99496-2	SO	FD	1,2-Dichloroethene	6.4	2.0 U	2.0 UJ	-	ug/kg	U
FEW4-MW81-(91.0)	280-99496-2	SO	FD	1,2-Dichloropropane	6.4	2.0 U	2.0 UJ	-	ug/kg	U
FEW4-MW81-(91.0)	280-99496-2	SO	FD	1,3,5-Trimethylbenzene	6.4	2.0 U	2.0 UJ	-	ug/kg	U
FEW4-MW81-(91.0)	280-99496-2	SO	FD	1,3-Dichlorobenzene	6.4	2.0 U	2.0 UJ	-	ug/kg	U
FEW4-MW81-(91.0)	280-99496-2	SO	FD	1,3-Dichloropropane	6.4	2.0 U	2.0 UJ	-	ug/kg	U
FEW4-MW81-(91.0)	280-99496-2	SO	FD	1,4-Dichlorobenzene	6.4	2.0 U	2.0 UJ	-	ug/kg	U
FEW4-MW81-(91.0)	280-99496-2	SO	FD	2,2-Dichloropropane	6.4	2.0 U	2.0 UJ	-	ug/kg	U
FEW4-MW81-(91.0)	280-99496-2	SO	FD	2-Butanone (MEK)	26	8.2 U	8.2 UJ	-	ug/kg	U
FEW4-MW81-(91.0)	280-99496-2	SO	FD	2-Chlorotoluene	6.4	2.0 U	2.0 UJ	-	ug/kg	U
FEW4-MW81-(91.0)	280-99496-2	SO	FD	2-Hexanone	26	16 U	16 UJ	-	ug/kg	U
FEW4-MW81-(91.0)	280-99496-2	SO	FD	4-Chlorotoluene	6.4	2.0 U	2.0 UJ	-	ug/kg	U
FEW4-MW81-(91.0)	280-99496-2	SO	FD	4-Methyl-2-pentanone (MIBK)	26	16 U	16 UJ	-	ug/kg	U
FEW4-MW81-(91.0)	280-99496-2	SO	FD	Acetone	26	25 J	25 J	-	ug/kg	TR/U
FEW4-MW81-(91.0)	280-99496-2	SO	FD	Benzene	6.4	2.0 U	2.0 UJ	-	ug/kg	U
FEW4-MW81-(91.0)	280-99496-2	SO	FD	Bromobenzene	6.4	2.0 U	2.0 UJ	-	ug/kg	U
FEW4-MW81-(91.0)	280-99496-2	SO	FD	Bromochloromethane	6.4	1.0 U	1.0 UJ	-	ug/kg	U
FEW4-MW81-(91.0)	280-99496-2	SO	FD	Bromodichloromethane	6.4	1.0 U	1.0 UJ	-	ug/kg	U
FEW4-MW81-(91.0)	280-99496-2	SO	FD	Bromoform	6.4	1.0 U	1.0 UJ	-	ug/kg	U
FEW4-MW81-(91.0)	280-99496-2	SO	FD	Bromomethane	13	2.0 U	2.0 UJ	-	ug/kg	U
FEW4-MW81-(91.0)	280-99496-2	SO	FD	Carbon disulfide	6.4	2.0 U	2.0 UJ	-	ug/kg	U

US Army Corps of Engineers®

Qualified Results

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW81-(91.0)	280-99496-2	SO	FD	Carbon tetrachloride	6.4	2.0 U	2.0 UJ	-	ug/kg	U
FEW4-MW81-(91.0)	280-99496-2	SO	FD	Chlorobenzene	6.4	2.0 U	2.0 UJ	-	ug/kg	U
FEW4-MW81-(91.0)	280-99496-2	SO	FD	Chloroethane	13	4.1 U	4.1 UJ	-	ug/kg	U
FEW4-MW81-(91.0)	280-99496-2	SO	FD	Chloroform	13	1.0 U	1.0 UJ	-	ug/kg	U
FEW4-MW81-(91.0)	280-99496-2	SO	FD	Chloromethane	13	2.0 U	2.0 UJ	-	ug/kg	U
FEW4-MW81-(91.0)	280-99496-2	SO	FD	cis-1,2-Dichloroethene	6.4	2.0 U	2.0 UJ	-	ug/kg	U
FEW4-MW81-(91.0)	280-99496-2	SO	FD	cis-1,3-Dichloropropene	6.4	4.1 U	4.1 UJ	-	ug/kg	U
FEW4-MW81-(91.0)	280-99496-2	SO	FD	Dibromochloromethane	6.4	2.0 U	2.0 UJ	-	ug/kg	U
FEW4-MW81-(91.0)	280-99496-2	SO	FD	Dibromomethane	6.4	4.1 U	4.1 UJ	-	ug/kg	U
FEW4-MW81-(91.0)	280-99496-2	SO	FD	Dichlorodifluoromethane	13	2.0 U Q	2.0 UJ	-	ug/kg	U
FEW4-MW81-(91.0)	280-99496-2	SO	FD	Ethylbenzene	6.4	2.0 U	2.0 UJ	-	ug/kg	U
FEW4-MW81-(91.0)	280-99496-2	SO	FD	Hexachlorobutadiene	6.4	2.0 U	2.0 UJ	-	ug/kg	U
FEW4-MW81-(91.0)	280-99496-2	SO	FD	Isopropylbenzene (Cumene)	6.4	2.0 U	2.0 UJ	-	ug/kg	U
FEW4-MW81-(91.0)	280-99496-2	SO	FD	m,p-Xylene	4.1	4.1 U	4.1 UJ	-	ug/kg	U
FEW4-MW81-(91.0)	280-99496-2	SO	FD	Methyl tert-butyl ether (MTBE)	26	1.0 U	1.0 UJ	-	ug/kg	U
FEW4-MW81-(91.0)	280-99496-2	SO	FD	Methylene chloride	6.4	4.1 U	4.1 UJ	-	ug/kg	U
FEW4-MW81-(91.0)	280-99496-2	SO	FD	Naphthalene	6.4	2.0 U	2.0 UJ	-	ug/kg	U
FEW4-MW81-(91.0)	280-99496-2	SO	FD	n-Butylbenzene	6.4	2.0 U Q	2.0 UJ	-	ug/kg	U
FEW4-MW81-(91.0)	280-99496-2	SO	FD	n-Propylbenzene	6.4	2.0 U	2.0 UJ	-	ug/kg	U
FEW4-MW81-(91.0)	280-99496-2	SO	FD	o-Xylene	6.4	2.0 U	2.0 UJ	-	ug/kg	U
FEW4-MW81-(91.0)	280-99496-2	SO	FD	p-Cymene (p-Isopropyltoluene)	6.4	2.0 U	2.0 UJ	-	ug/kg	U
FEW4-MW81-(91.0)	280-99496-2	SO	FD	sec-Butylbenzene	6.4	2.0 U	2.0 UJ	-	ug/kg	U
FEW4-MW81-(91.0)	280-99496-2	SO	FD	Styrene	6.4	2.0 U	2.0 UJ	-	ug/kg	U
FEW4-MW81-(91.0)	280-99496-2	SO	FD	tert-Butylbenzene	6.4	2.0 U	2.0 UJ	-	ug/kg	U
FEW4-MW81-(91.0)	280-99496-2	SO	FD	Tetrachloroethene (PCE)	6.4	2.0 U	2.0 UJ	-	ug/kg	U
FEW4-MW81-(91.0)	280-99496-2	SO	FD	Toluene	6.4	2.0 U	2.0 UJ	-	ug/kg	U
FEW4-MW81-(91.0)	280-99496-2	SO	FD	trans-1,2-Dichloroethene	6.4	1.0 U	1.0 UJ	-	ug/kg	U

US Army Corps of Engineers ®

Qualified Results

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW81-(91.0)	280-99496-2	SO	FD	trans-1,3-Dichloropropene	6.4	2.0 U	2.0 UJ	-	ug/kg	U
FEW4-MW81-(91.0)	280-99496-2	SO	FD	Trichloroethene (TCE)	6.4	1.1 J	1.1 J	-	ug/kg	TR/U
FEW4-MW81-(91.0)	280-99496-2	SO	FD	Trichlorofluoromethane	13	4.1 U	4.1 UJ	-	ug/kg	U
FEW4-MW81-(91.0)	280-99496-2	SO	FD	Vinyl chloride	6.4	4.1 U	4.1 UJ	-	ug/kg	U

Qualified analytes in samples are reported as estimated, not detected (UJ) at the Limit of Detection (LOD).

US Army Corps of Engineers ®

Detected Results

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Dilution	Analyte	LOQ	Lab Result	Qualified Result	Units	Reason
FEW4-MW81-(100.0)	280-99496-3	SO	N	1	Trichloroethene (TCE)	6.7	74	74 J	ug/kg	U
FEW4-MW81-(110.0)	280-99496-4	SO	N	1	Acetone	20	16 J	16 J	ug/kg	TR/U
FEW4-MW81-(110.0)	280-99496-4	SO	N	1	Trichloroethene (TCE)	5.1	19	19 J	ug/kg	U
FEW4-MW81-(120.0)	280-99496-5	SO	N	1	Trichloroethene (TCE)	5.1	41	41 J	ug/kg	U
FEW4-MW81-(130.0)	280-99496-6	SO	N	1	Trichloroethene (TCE)	5.5	32	32 J	ug/kg	U
FEW4-MW81-(90.0)	280-99496-1	SO	N	1	Acetone	23	18 J	18 J	ug/kg	TR/U
FEW4-MW81-(90.0)	280-99496-1	SO	N	1	Naphthalene	5.9	2.2 J	2.2 J	ug/kg	TR/U
FEW4-MW81-(90.0)	280-99496-1	SO	N	1	Trichloroethene (TCE)	5.9	3.0 J	3.0 J	ug/kg	TR/U
FEW4-MW81-(91.0)	280-99496-2	SO	FD	1	Acetone	26	25 J	25 J	ug/kg	TR/U
FEW4-MW81-(91.0)	280-99496-2	SO	FD	1	Trichloroethene (TCE)	6.4	1.1 J	1.1 J	ug/kg	TR/U

Rejected Results

--No Records Found--

US Army Corps of Engineers ®

Facility:	B08WY0467-02, F.E. Warren AFB, Site 4
Event:	2017-2018 RI Addendum Tasks
SDG:	280-99496-1_52_2a_FUDSChem
Guidance Document:	Draft-Final Uniform Federal Policy-Quality Assurance Project Plan for the Remedial Investigation Addendum 2017-2018 Tasks Atlas “D” Missile Site 4 —Laramie County, Wyoming, July 2017
Prime Contractor:	RMC Consultants, Inc., LAKEWOOD, CO
Project Manager:	David Groy
Contract Laboratory:	TestAmerica Laboratories, Inc., Arvada, CO
Data Review Contractor:	RMC Consultants
Data Review Level:	Stage 3VEM
Primary Data Reviewer:	Gary Torf, Contractor Project Chemist
Second Reviewer:	, Senior Scientist
Date Submitted:	

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	SW8260B
FEW4-MW81-(100.0)	280-99496-3	Solid	Field Sample/N	X
FEW4-MW81-(110.0)	280-99496-4	Solid	Field Sample/N	X
FEW4-MW81-(120.0)	280-99496-5	Solid	Field Sample/N	X
FEW4-MW81-(130.0)	280-99496-6	Solid	Field Sample/N	X
FEW4-MW81-(90.0)	280-99496-1	Solid	Field Sample/N	X
FEW4-MW81-(91.0)	280-99496-2	Solid	Field Duplicate/FD	X

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the Draft-Final Uniform Federal Policy-Quality Assurance Project Plan for the Remedial Investigation Addendum 2017-2018 Tasks Atlas “D” Missile Site 4 —Laramie County, Wyoming, July 2017 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by RMC Consultants, Inc., LAKEWOOD, CO; analyses were performed by TestAmerica Laboratories, Inc., Arvada, CO and were reported under sample delivery group (SDG) 280-99496-1_52_2a_FUDSChem. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

- Blank
- Blank - Negative
- Field Duplicate RPD
- LCS Recovery
- LCS RPD
- Prep Hold Time
- Surrogate
- Test Hold Time

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 396 results (100.00%) out of the 396 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected. Trace values, defined as results that are qualified as estimated because they fall between the limit of detection and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

Narrative Comments

An additional label was inadvertently placed on the terracore soil sample containers during field sample collection, causing the vial tare weight to be heavier by approximately 0.26 g than originally recorded. This may result in a detected analyte concentration low bias (underestimation) of approximately 4.5%. No analyte results have been qualified due to this occurrence.

Analytical Method	Data Reviewer Comment
SW8260B	No additional comments; see Checklist for detail.

Gary Torf

September 07, 2017

Reviewed by Gary Torf, Contractor Project Chemist, RMC Consultants

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of a minimum of 10% of the reported sample results and method quality control data between the two deliverables.

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

Qualified Results

No results associated with this sample delivery group required qualification.

Table of All Trace Results

Test Method: SW8260B Extraction Method: SW5035A

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW81-(110.0)	N	Acetone	20.0	16.0 J	16.0 J	-	ug/kg	TR/U
FEW4-MW81-(90.0)	N	Acetone	23.0	18.0 J	18.0 J	-	ug/kg	TR/U
FEW4-MW81-(90.0)	N	Naphthalene	5.90	2.20 J	2.20 J	-	ug/kg	TR/U
FEW4-MW81-(90.0)	N	Trichloroethene (TCE)	5.90	3.00 J	3.00 J	-	ug/kg	TR/U
FEW4-MW81-(91.0)	FD	Acetone	26.0	25.0 J	25.0 J	-	ug/kg	TR/U
FEW4-MW81-(91.0)	FD	Trichloroethene (TCE)	6.40	1.10 J	1.10 J	-	ug/kg	TR/U

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW81-(100.0)	N	1,1,1,2-Tetrachloroethane	6.7	2.1 U	2.1 U	2.1 UJ	U
FEW4-MW81-(100.0)	N	1,1,1-Trichloroethane	6.7	2.1 U	2.1 U	2.1 UJ	U
FEW4-MW81-(100.0)	N	1,1,2,2-Tetrachloroethane	6.7	2.1 U	2.1 U	2.1 UJ	U
FEW4-MW81-(100.0)	N	1,1,2-Trichloroethane	6.7	4.3 U	4.3 U	4.3 UJ	U
FEW4-MW81-(100.0)	N	1,1-Dichloroethane	6.7	1.1 U	1.1 U	1.1 UJ	U
FEW4-MW81-(100.0)	N	1,1-Dichloroethene	6.7	2.1 U	2.1 U	2.1 UJ	U
FEW4-MW81-(100.0)	N	1,1-Dichloropropene	6.7	2.1 U	2.1 U	2.1 UJ	U
FEW4-MW81-(100.0)	N	1,2,3-Trichlorobenzene	6.7	2.1 U	2.1 U	2.1 UJ	U
FEW4-MW81-(100.0)	N	1,2,3-Trichloropropane	6.7	4.3 U	4.3 U	4.3 UJ	U
FEW4-MW81-(100.0)	N	1,2,4-Trichlorobenzene	6.7	2.1 U	2.1 U	2.1 UJ	U
FEW4-MW81-(100.0)	N	1,2,4-Trimethylbenzene	6.7	2.1 U	2.1 U	2.1 UJ	U
FEW4-MW81-(100.0)	N	1,2-Dibromo-3-chloropropane	13	2.1 U	2.1 U	2.1 UJ	U
FEW4-MW81-(100.0)	N	1,2-Dibromoethane (EDB)	6.7	2.1 U	2.1 U	2.1 UJ	U
FEW4-MW81-(100.0)	N	1,2-Dichlorobenzene	6.7	2.1 U	2.1 U	2.1 UJ	U
FEW4-MW81-(100.0)	N	1,2-Dichloroethane	6.7	2.1 U	2.1 U	2.1 UJ	U
FEW4-MW81-(100.0)	N	1,2-Dichloroethene	6.7	2.1 U	2.1 U	2.1 UJ	U
FEW4-MW81-(100.0)	N	1,2-Dichloropropane	6.7	2.1 U	2.1 U	2.1 UJ	U
FEW4-MW81-(100.0)	N	1,3,5-Trimethylbenzene	6.7	2.1 U	2.1 U	2.1 UJ	U
FEW4-MW81-(100.0)	N	1,3-Dichlorobenzene	6.7	2.1 U	2.1 U	2.1 UJ	U
FEW4-MW81-(100.0)	N	1,3-Dichloropropane	6.7	2.1 U	2.1 U	2.1 UJ	U
FEW4-MW81-(100.0)	N	1,4-Dichlorobenzene	6.7	2.1 U	2.1 U	2.1 UJ	U
FEW4-MW81-(100.0)	N	2,2-Dichloropropane	6.7	2.1 U	2.1 U	2.1 UJ	U
FEW4-MW81-(100.0)	N	2-Butanone (MEK)	27	8.5 U	8.5 U	8.5 UJ	U
FEW4-MW81-(100.0)	N	2-Chlorotoluene	6.7	2.1 U	2.1 U	2.1 UJ	U
FEW4-MW81-(100.0)	N	2-Hexanone	27	17 U	17 U	17 UJ	U
FEW4-MW81-(100.0)	N	4-Chlorotoluene	6.7	2.1 U	2.1 U	2.1 UJ	U
FEW4-MW81-(100.0)	N	4-Methyl-2-pentanone (MIBK)	27	17 U	17 U	17 UJ	U
FEW4-MW81-(100.0)	N	Acetone	27	17 U	17 U	17 UJ	U
FEW4-MW81-(100.0)	N	Benzene	6.7	2.1 U	2.1 U	2.1 UJ	U
FEW4-MW81-(100.0)	N	Bromobenzene	6.7	2.1 U	2.1 U	2.1 UJ	U
FEW4-MW81-(100.0)	N	Bromochloromethane	6.7	1.1 U	1.1 U	1.1 UJ	U
FEW4-MW81-(100.0)	N	Bromodichloromethane	6.7	1.1 U	1.1 U	1.1 UJ	U
FEW4-MW81-(100.0)	N	Bromoform	6.7	1.1 U	1.1 U	1.1 UJ	U
FEW4-MW81-(100.0)	N	Bromomethane	13	2.1 U	2.1 U	2.1 UJ	U
FEW4-MW81-(100.0)	N	Carbon disulfide	6.7	2.1 U	2.1 U	2.1 UJ	U
FEW4-MW81-(100.0)	N	Carbon tetrachloride	6.7	2.1 U	2.1 U	2.1 UJ	U
FEW4-MW81-(100.0)	N	Chlorobenzene	6.7	2.1 U	2.1 U	2.1 UJ	U
FEW4-MW81-(100.0)	N	Chloroethane	13	4.3 U	4.3 U	4.3 UJ	U
FEW4-MW81-(100.0)	N	Chloroform	13	1.1 U	1.1 U	1.1 UJ	U
FEW4-MW81-(100.0)	N	Chloromethane	13	2.1 U	2.1 U	2.1 UJ	U
FEW4-MW81-(100.0)	N	cis-1,2-Dichloroethene	6.7	2.1 U	2.1 U	2.1 UJ	U

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW81-(100.0)	N	cis-1,3-Dichloropropene	6.7	4.3 U	4.3 U	4.3 UJ	U
FEW4-MW81-(100.0)	N	Dibromochloromethane	6.7	2.1 U	2.1 U	2.1 UJ	U
FEW4-MW81-(100.0)	N	Dibromomethane	6.7	4.3 U	4.3 U	4.3 UJ	U
FEW4-MW81-(100.0)	N	Dichlorodifluoromethane	13	2.1 U Q	2.1 U	2.1 UJ	U
FEW4-MW81-(100.0)	N	Ethylbenzene	6.7	2.1 U	2.1 U	2.1 UJ	U
FEW4-MW81-(100.0)	N	Hexachlorobutadiene	6.7	2.1 U	2.1 U	2.1 UJ	U
FEW4-MW81-(100.0)	N	Isopropylbenzene (Cumene)	6.7	2.1 U	2.1 U	2.1 UJ	U
FEW4-MW81-(100.0)	N	m,p-Xylene	4.3	4.3 U	4.3 U	4.3 UJ	U
FEW4-MW81-(100.0)	N	Methyl tert-butyl ether (MTBE)	27	1.1 U	1.1 U	1.1 UJ	U
FEW4-MW81-(100.0)	N	Methylene chloride	6.7	4.3 U	4.3 U	4.3 UJ	U
FEW4-MW81-(100.0)	N	Naphthalene	6.7	2.1 U	2.1 U	2.1 UJ	U
FEW4-MW81-(100.0)	N	n-Butylbenzene	6.7	2.1 U Q	2.1 U	2.1 UJ	U
FEW4-MW81-(100.0)	N	n-Propylbenzene	6.7	2.1 U	2.1 U	2.1 UJ	U
FEW4-MW81-(100.0)	N	o-Xylene	6.7	2.1 U	2.1 U	2.1 UJ	U
FEW4-MW81-(100.0)	N	p-Cymene (p-Isopropyltoluene)	6.7	2.1 U	2.1 U	2.1 UJ	U
FEW4-MW81-(100.0)	N	sec-Butylbenzene	6.7	2.1 U	2.1 U	2.1 UJ	U
FEW4-MW81-(100.0)	N	Styrene	6.7	2.1 U	2.1 U	2.1 UJ	U
FEW4-MW81-(100.0)	N	tert-Butylbenzene	6.7	2.1 U	2.1 U	2.1 UJ	U
FEW4-MW81-(100.0)	N	Tetrachloroethene (PCE)	6.7	2.1 U	2.1 U	2.1 UJ	U
FEW4-MW81-(100.0)	N	Toluene	6.7	2.1 U	2.1 U	2.1 UJ	U
FEW4-MW81-(100.0)	N	trans-1,2-Dichloroethene	6.7	1.1 U	1.1 U	1.1 UJ	U
FEW4-MW81-(100.0)	N	trans-1,3-Dichloropropene	6.7	2.1 U	2.1 U	2.1 UJ	U
FEW4-MW81-(100.0)	N	Trichloroethene (TCE)	6.7	74	74	74 J	U
FEW4-MW81-(100.0)	N	Trichlorofluoromethane	13	4.3 U	4.3 U	4.3 UJ	U
FEW4-MW81-(100.0)	N	Vinyl chloride	6.7	4.3 U	4.3 U	4.3 UJ	U
FEW4-MW81-(110.0)	N	1,1,1,2-Tetrachloroethane	5.1	1.6 U	1.6 U	1.6 UJ	U
FEW4-MW81-(110.0)	N	1,1,1-Trichloroethane	5.1	1.6 U	1.6 U	1.6 UJ	U
FEW4-MW81-(110.0)	N	1,1,2,2-Tetrachloroethane	5.1	1.6 U	1.6 U	1.6 UJ	U
FEW4-MW81-(110.0)	N	1,1,2-Trichloroethane	5.1	3.2 U	3.2 U	3.2 UJ	U
FEW4-MW81-(110.0)	N	1,1-Dichloroethane	5.1	0.81 U	0.81 U	0.81 UJ	U
FEW4-MW81-(110.0)	N	1,1-Dichloroethene	5.1	1.6 U	1.6 U	1.6 UJ	U
FEW4-MW81-(110.0)	N	1,1-Dichloropropene	5.1	1.6 U	1.6 U	1.6 UJ	U
FEW4-MW81-(110.0)	N	1,2,3-Trichlorobenzene	5.1	1.6 U	1.6 U	1.6 UJ	U
FEW4-MW81-(110.0)	N	1,2,3-Trichloropropane	5.1	3.2 U	3.2 U	3.2 UJ	U
FEW4-MW81-(110.0)	N	1,2,4-Trichlorobenzene	5.1	1.6 U	1.6 U	1.6 UJ	U
FEW4-MW81-(110.0)	N	1,2,4-Trimethylbenzene	5.1	1.6 U	1.6 U	1.6 UJ	U
FEW4-MW81-(110.0)	N	1,2-Dibromo-3-chloropropane	10	1.6 U	1.6 U	1.6 UJ	U
FEW4-MW81-(110.0)	N	1,2-Dibromoethane (EDB)	5.1	1.6 U	1.6 U	1.6 UJ	U
FEW4-MW81-(110.0)	N	1,2-Dichlorobenzene	5.1	1.6 U	1.6 U	1.6 UJ	U
FEW4-MW81-(110.0)	N	1,2-Dichloroethane	5.1	1.6 U	1.6 U	1.6 UJ	U

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW81-(110.0)	N	1,2-Dichloroethene	5.1	1.6 U	1.6 U	1.6 UJ	U
FEW4-MW81-(110.0)	N	1,2-Dichloropropane	5.1	1.6 U	1.6 U	1.6 UJ	U
FEW4-MW81-(110.0)	N	1,3,5-Trimethylbenzene	5.1	1.6 U	1.6 U	1.6 UJ	U
FEW4-MW81-(110.0)	N	1,3-Dichlorobenzene	5.1	1.6 U	1.6 U	1.6 UJ	U
FEW4-MW81-(110.0)	N	1,3-Dichloropropane	5.1	1.6 U	1.6 U	1.6 UJ	U
FEW4-MW81-(110.0)	N	1,4-Dichlorobenzene	5.1	1.6 U	1.6 U	1.6 UJ	U
FEW4-MW81-(110.0)	N	2,2-Dichloropropane	5.1	1.6 U	1.6 U	1.6 UJ	U
FEW4-MW81-(110.0)	N	2-Butanone (MEK)	20	6.5 U	6.5 U	6.5 UJ	U
FEW4-MW81-(110.0)	N	2-Chlorotoluene	5.1	1.6 U	1.6 U	1.6 UJ	U
FEW4-MW81-(110.0)	N	2-Hexanone	20	13 U	13 U	13 UJ	U
FEW4-MW81-(110.0)	N	4-Chlorotoluene	5.1	1.6 U	1.6 U	1.6 UJ	U
FEW4-MW81-(110.0)	N	4-Methyl-2-pentanone (MIBK)	20	13 U	13 U	13 UJ	U
FEW4-MW81-(110.0)	N	Acetone	20	16 J	16 J	16 J	TR/U
FEW4-MW81-(110.0)	N	Benzene	5.1	1.6 U	1.6 U	1.6 UJ	U
FEW4-MW81-(110.0)	N	Bromobenzene	5.1	1.6 U	1.6 U	1.6 UJ	U
FEW4-MW81-(110.0)	N	Bromochloromethane	5.1	0.81 U	0.81 U	0.81 UJ	U
FEW4-MW81-(110.0)	N	Bromodichloromethane	5.1	0.81 U	0.81 U	0.81 UJ	U
FEW4-MW81-(110.0)	N	Bromoform	5.1	0.81 U	0.81 U	0.81 UJ	U
FEW4-MW81-(110.0)	N	Bromomethane	10	1.6 U	1.6 U	1.6 UJ	U
FEW4-MW81-(110.0)	N	Carbon disulfide	5.1	1.6 U	1.6 U	1.6 UJ	U
FEW4-MW81-(110.0)	N	Carbon tetrachloride	5.1	1.6 U	1.6 U	1.6 UJ	U
FEW4-MW81-(110.0)	N	Chlorobenzene	5.1	1.6 U	1.6 U	1.6 UJ	U
FEW4-MW81-(110.0)	N	Chloroethane	10	3.2 U	3.2 U	3.2 UJ	U
FEW4-MW81-(110.0)	N	Chloroform	10	0.81 U	0.81 U	0.81 UJ	U
FEW4-MW81-(110.0)	N	Chloromethane	10	1.6 U	1.6 U	1.6 UJ	U
FEW4-MW81-(110.0)	N	cis-1,2-Dichloroethene	5.1	1.6 U	1.6 U	1.6 UJ	U
FEW4-MW81-(110.0)	N	cis-1,3-Dichloropropene	5.1	3.2 U	3.2 U	3.2 UJ	U
FEW4-MW81-(110.0)	N	Dibromochloromethane	5.1	1.6 U	1.6 U	1.6 UJ	U
FEW4-MW81-(110.0)	N	Dibromomethane	5.1	3.2 U	3.2 U	3.2 UJ	U
FEW4-MW81-(110.0)	N	Dichlorodifluoromethane	10	1.6 U Q	1.6 U	1.6 UJ	U
FEW4-MW81-(110.0)	N	Ethylbenzene	5.1	1.6 U	1.6 U	1.6 UJ	U
FEW4-MW81-(110.0)	N	Hexachlorobutadiene	5.1	1.6 U	1.6 U	1.6 UJ	U
FEW4-MW81-(110.0)	N	Isopropylbenzene (Cumene)	5.1	1.6 U	1.6 U	1.6 UJ	U
FEW4-MW81-(110.0)	N	m,p-Xylene	3.2	3.2 U	3.2 U	3.2 UJ	U
FEW4-MW81-(110.0)	N	Methyl tert-butyl ether (MTBE)	20	0.81 U	0.81 U	0.81 UJ	U
FEW4-MW81-(110.0)	N	Methylene chloride	5.1	3.2 U	3.2 U	3.2 UJ	U
FEW4-MW81-(110.0)	N	Naphthalene	5.1	1.6 U	1.6 U	1.6 UJ	U
FEW4-MW81-(110.0)	N	n-Butylbenzene	5.1	1.6 U Q	1.6 U	1.6 UJ	U
FEW4-MW81-(110.0)	N	n-Propylbenzene	5.1	1.6 U	1.6 U	1.6 UJ	U
FEW4-MW81-(110.0)	N	o-Xylene	5.1	1.6 U	1.6 U	1.6 UJ	U

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW81-(110.0)	N	p-Cymene (p-Isopropyltoluene)	5.1	1.6 U	1.6 U	1.6 UJ	U
FEW4-MW81-(110.0)	N	sec-Butylbenzene	5.1	1.6 U	1.6 U	1.6 UJ	U
FEW4-MW81-(110.0)	N	Styrene	5.1	1.6 U	1.6 U	1.6 UJ	U
FEW4-MW81-(110.0)	N	tert-Butylbenzene	5.1	1.6 U	1.6 U	1.6 UJ	U
FEW4-MW81-(110.0)	N	Tetrachloroethene (PCE)	5.1	1.6 U	1.6 U	1.6 UJ	U
FEW4-MW81-(110.0)	N	Toluene	5.1	1.6 U	1.6 U	1.6 UJ	U
FEW4-MW81-(110.0)	N	trans-1,2-Dichloroethene	5.1	0.81 U	0.81 U	0.81 UJ	U
FEW4-MW81-(110.0)	N	trans-1,3-Dichloropropene	5.1	1.6 U	1.6 U	1.6 UJ	U
FEW4-MW81-(110.0)	N	Trichloroethene (TCE)	5.1	19	19	19 J	U
FEW4-MW81-(110.0)	N	Trichlorofluoromethane	10	3.2 U	3.2 U	3.2 UJ	U
FEW4-MW81-(110.0)	N	Vinyl chloride	5.1	3.2 U	3.2 U	3.2 UJ	U
FEW4-MW81-(120.0)	N	1,1,1,2-Tetrachloroethane	5.1	1.6 U	1.6 U	1.6 UJ	U
FEW4-MW81-(120.0)	N	1,1,1-Trichloroethane	5.1	1.6 U	1.6 U	1.6 UJ	U
FEW4-MW81-(120.0)	N	1,1,2,2-Tetrachloroethane	5.1	1.6 U	1.6 U	1.6 UJ	U
FEW4-MW81-(120.0)	N	1,1,2-Trichloroethane	5.1	3.2 U	3.2 U	3.2 UJ	U
FEW4-MW81-(120.0)	N	1,1-Dichloroethane	5.1	0.81 U	0.81 U	0.81 UJ	U
FEW4-MW81-(120.0)	N	1,1-Dichloroethene	5.1	1.6 U	1.6 U	1.6 UJ	U
FEW4-MW81-(120.0)	N	1,1-Dichloropropene	5.1	1.6 U	1.6 U	1.6 UJ	U
FEW4-MW81-(120.0)	N	1,2,3-Trichlorobenzene	5.1	1.6 U	1.6 U	1.6 UJ	U
FEW4-MW81-(120.0)	N	1,2,3-Trichloropropane	5.1	3.2 U	3.2 U	3.2 UJ	U
FEW4-MW81-(120.0)	N	1,2,4-Trichlorobenzene	5.1	1.6 U	1.6 U	1.6 UJ	U
FEW4-MW81-(120.0)	N	1,2,4-Trimethylbenzene	5.1	1.6 U	1.6 U	1.6 UJ	U
FEW4-MW81-(120.0)	N	1,2-Dibromo-3-chloropropane	10	1.6 U	1.6 U	1.6 UJ	U
FEW4-MW81-(120.0)	N	1,2-Dibromoethane (EDB)	5.1	1.6 U	1.6 U	1.6 UJ	U
FEW4-MW81-(120.0)	N	1,2-Dichlorobenzene	5.1	1.6 U	1.6 U	1.6 UJ	U
FEW4-MW81-(120.0)	N	1,2-Dichloroethane	5.1	1.6 U	1.6 U	1.6 UJ	U
FEW4-MW81-(120.0)	N	1,2-Dichloroethene	5.1	1.6 U	1.6 U	1.6 UJ	U
FEW4-MW81-(120.0)	N	1,2-Dichloropropane	5.1	1.6 U	1.6 U	1.6 UJ	U
FEW4-MW81-(120.0)	N	1,3,5-Trimethylbenzene	5.1	1.6 U	1.6 U	1.6 UJ	U
FEW4-MW81-(120.0)	N	1,3-Dichlorobenzene	5.1	1.6 U	1.6 U	1.6 UJ	U
FEW4-MW81-(120.0)	N	1,3-Dichloropropane	5.1	1.6 U	1.6 U	1.6 UJ	U
FEW4-MW81-(120.0)	N	1,4-Dichlorobenzene	5.1	1.6 U	1.6 U	1.6 UJ	U
FEW4-MW81-(120.0)	N	2,2-Dichloropropane	5.1	1.6 U	1.6 U	1.6 UJ	U
FEW4-MW81-(120.0)	N	2-Butanone (MEK)	20	6.5 U	6.5 U	6.5 UJ	U
FEW4-MW81-(120.0)	N	2-Chlorotoluene	5.1	1.6 U	1.6 U	1.6 UJ	U
FEW4-MW81-(120.0)	N	2-Hexanone	20	13 U	13 U	13 UJ	U
FEW4-MW81-(120.0)	N	4-Chlorotoluene	5.1	1.6 U	1.6 U	1.6 UJ	U
FEW4-MW81-(120.0)	N	4-Methyl-2-pentanone (MIBK)	20	13 U	13 U	13 UJ	U
FEW4-MW81-(120.0)	N	Acetone	20	13 U	13 U	13 UJ	U
FEW4-MW81-(120.0)	N	Benzene	5.1	1.6 U	1.6 U	1.6 UJ	U
FEW4-MW81-(120.0)	N	Bromobenzene	5.1	1.6 U	1.6 U	1.6 UJ	U

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW81-(120.0)	N	Bromochloromethane	5.1	0.81 U	0.81 U	0.81 UJ	U
FEW4-MW81-(120.0)	N	Bromodichloromethane	5.1	0.81 U	0.81 U	0.81 UJ	U
FEW4-MW81-(120.0)	N	Bromoform	5.1	0.81 U	0.81 U	0.81 UJ	U
FEW4-MW81-(120.0)	N	Bromomethane	10	1.6 U	1.6 U	1.6 UJ	U
FEW4-MW81-(120.0)	N	Carbon disulfide	5.1	1.6 U	1.6 U	1.6 UJ	U
FEW4-MW81-(120.0)	N	Carbon tetrachloride	5.1	1.6 U	1.6 U	1.6 UJ	U
FEW4-MW81-(120.0)	N	Chlorobenzene	5.1	1.6 U	1.6 U	1.6 UJ	U
FEW4-MW81-(120.0)	N	Chloroethane	10	3.2 U	3.2 U	3.2 UJ	U
FEW4-MW81-(120.0)	N	Chloroform	10	0.81 U	0.81 U	0.81 UJ	U
FEW4-MW81-(120.0)	N	Chloromethane	10	1.6 U	1.6 U	1.6 UJ	U
FEW4-MW81-(120.0)	N	cis-1,2-Dichloroethene	5.1	1.6 U	1.6 U	1.6 UJ	U
FEW4-MW81-(120.0)	N	cis-1,3-Dichloropropene	5.1	3.2 U	3.2 U	3.2 UJ	U
FEW4-MW81-(120.0)	N	Dibromochloromethane	5.1	1.6 U	1.6 U	1.6 UJ	U
FEW4-MW81-(120.0)	N	Dibromomethane	5.1	3.2 U	3.2 U	3.2 UJ	U
FEW4-MW81-(120.0)	N	Dichlorodifluoromethane	10	1.6 U Q	1.6 U	1.6 UJ	U
FEW4-MW81-(120.0)	N	Ethylbenzene	5.1	1.6 U	1.6 U	1.6 UJ	U
FEW4-MW81-(120.0)	N	Hexachlorobutadiene	5.1	1.6 U	1.6 U	1.6 UJ	U
FEW4-MW81-(120.0)	N	Isopropylbenzene (Cumene)	5.1	1.6 U	1.6 U	1.6 UJ	U
FEW4-MW81-(120.0)	N	m,p-Xylene	3.2	3.2 U	3.2 U	3.2 UJ	U
FEW4-MW81-(120.0)	N	Methyl tert-butyl ether (MTBE)	20	0.81 U	0.81 U	0.81 UJ	U
FEW4-MW81-(120.0)	N	Methylene chloride	5.1	3.2 U	3.2 U	3.2 UJ	U
FEW4-MW81-(120.0)	N	Naphthalene	5.1	1.6 U	1.6 U	1.6 UJ	U
FEW4-MW81-(120.0)	N	n-Butylbenzene	5.1	1.6 U Q	1.6 U	1.6 UJ	U
FEW4-MW81-(120.0)	N	n-Propylbenzene	5.1	1.6 U	1.6 U	1.6 UJ	U
FEW4-MW81-(120.0)	N	o-Xylene	5.1	1.6 U	1.6 U	1.6 UJ	U
FEW4-MW81-(120.0)	N	p-Cymene (p-Isopropyltoluene)	5.1	1.6 U	1.6 U	1.6 UJ	U
FEW4-MW81-(120.0)	N	sec-Butylbenzene	5.1	1.6 U	1.6 U	1.6 UJ	U
FEW4-MW81-(120.0)	N	Styrene	5.1	1.6 U	1.6 U	1.6 UJ	U
FEW4-MW81-(120.0)	N	tert-Butylbenzene	5.1	1.6 U	1.6 U	1.6 UJ	U
FEW4-MW81-(120.0)	N	Tetrachloroethene (PCE)	5.1	1.6 U	1.6 U	1.6 UJ	U
FEW4-MW81-(120.0)	N	Toluene	5.1	1.6 U	1.6 U	1.6 UJ	U
FEW4-MW81-(120.0)	N	trans-1,2-Dichloroethene	5.1	0.81 U	0.81 U	0.81 UJ	U
FEW4-MW81-(120.0)	N	trans-1,3-Dichloropropene	5.1	1.6 U	1.6 U	1.6 UJ	U
FEW4-MW81-(120.0)	N	Trichloroethene (TCE)	5.1	41	41	41 J	U
FEW4-MW81-(120.0)	N	Trichlorofluoromethane	10	3.2 U	3.2 U	3.2 UJ	U
FEW4-MW81-(120.0)	N	Vinyl chloride	5.1	3.2 U	3.2 U	3.2 UJ	U
FEW4-MW81-(130.0)	N	1,1,1,2-Tetrachloroethane	5.5	1.8 U	1.8 U	1.8 UJ	U
FEW4-MW81-(130.0)	N	1,1,1-Trichloroethane	5.5	1.8 U	1.8 U	1.8 UJ	U
FEW4-MW81-(130.0)	N	1,1,2,2-Tetrachloroethane	5.5	1.8 U	1.8 U	1.8 UJ	U
FEW4-MW81-(130.0)	N	1,1,2-Trichloroethane	5.5	3.5 U	3.5 U	3.5 UJ	U
FEW4-MW81-(130.0)	N	1,1-Dichloroethane	5.5	0.89 U	0.89 U	0.89 UJ	U

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW81-(130.0)	N	1,1-Dichloroethene	5.5	1.8 U	1.8 U	1.8 UJ	U
FEW4-MW81-(130.0)	N	1,1-Dichloropropene	5.5	1.8 U	1.8 U	1.8 UJ	U
FEW4-MW81-(130.0)	N	1,2,3-Trichlorobenzene	5.5	1.8 U	1.8 U	1.8 UJ	U
FEW4-MW81-(130.0)	N	1,2,3-Trichloropropane	5.5	3.5 U	3.5 U	3.5 UJ	U
FEW4-MW81-(130.0)	N	1,2,4-Trichlorobenzene	5.5	1.8 U	1.8 U	1.8 UJ	U
FEW4-MW81-(130.0)	N	1,2,4-Trimethylbenzene	5.5	1.8 U	1.8 U	1.8 UJ	U
FEW4-MW81-(130.0)	N	1,2-Dibromo-3-chloropropane	11	1.8 U	1.8 U	1.8 UJ	U
FEW4-MW81-(130.0)	N	1,2-Dibromoethane (EDB)	5.5	1.8 U	1.8 U	1.8 UJ	U
FEW4-MW81-(130.0)	N	1,2-Dichlorobenzene	5.5	1.8 U	1.8 U	1.8 UJ	U
FEW4-MW81-(130.0)	N	1,2-Dichloroethane	5.5	1.8 U	1.8 U	1.8 UJ	U
FEW4-MW81-(130.0)	N	1,2-Dichloroethene	5.5	1.8 U	1.8 U	1.8 UJ	U
FEW4-MW81-(130.0)	N	1,2-Dichloropropane	5.5	1.8 U	1.8 U	1.8 UJ	U
FEW4-MW81-(130.0)	N	1,3,5-Trimethylbenzene	5.5	1.8 U	1.8 U	1.8 UJ	U
FEW4-MW81-(130.0)	N	1,3-Dichlorobenzene	5.5	1.8 U	1.8 U	1.8 UJ	U
FEW4-MW81-(130.0)	N	1,3-Dichloropropane	5.5	1.8 U	1.8 U	1.8 UJ	U
FEW4-MW81-(130.0)	N	1,4-Dichlorobenzene	5.5	1.8 U	1.8 U	1.8 UJ	U
FEW4-MW81-(130.0)	N	2,2-Dichloropropane	5.5	1.8 U	1.8 U	1.8 UJ	U
FEW4-MW81-(130.0)	N	2-Butanone (MEK)	22	7.1 U	7.1 U	7.1 UJ	U
FEW4-MW81-(130.0)	N	2-Chlorotoluene	5.5	1.8 U	1.8 U	1.8 UJ	U
FEW4-MW81-(130.0)	N	2-Hexanone	22	14 U	14 U	14 UJ	U
FEW4-MW81-(130.0)	N	4-Chlorotoluene	5.5	1.8 U	1.8 U	1.8 UJ	U
FEW4-MW81-(130.0)	N	4-Methyl-2-pentanone (MIBK)	22	14 U	14 U	14 UJ	U
FEW4-MW81-(130.0)	N	Acetone	22	14 U	14 U	14 UJ	U
FEW4-MW81-(130.0)	N	Benzene	5.5	1.8 U	1.8 U	1.8 UJ	U
FEW4-MW81-(130.0)	N	Bromobenzene	5.5	1.8 U	1.8 U	1.8 UJ	U
FEW4-MW81-(130.0)	N	Bromochloromethane	5.5	0.89 U	0.89 U	0.89 UJ	U
FEW4-MW81-(130.0)	N	Bromodichloromethane	5.5	0.89 U	0.89 U	0.89 UJ	U
FEW4-MW81-(130.0)	N	Bromoform	5.5	0.89 U	0.89 U	0.89 UJ	U
FEW4-MW81-(130.0)	N	Bromomethane	11	1.8 U	1.8 U	1.8 UJ	U
FEW4-MW81-(130.0)	N	Carbon disulfide	5.5	1.8 U	1.8 U	1.8 UJ	U
FEW4-MW81-(130.0)	N	Carbon tetrachloride	5.5	1.8 U	1.8 U	1.8 UJ	U
FEW4-MW81-(130.0)	N	Chlorobenzene	5.5	1.8 U	1.8 U	1.8 UJ	U
FEW4-MW81-(130.0)	N	Chloroethane	11	3.5 U	3.5 U	3.5 UJ	U
FEW4-MW81-(130.0)	N	Chloroform	11	0.89 U	0.89 U	0.89 UJ	U
FEW4-MW81-(130.0)	N	Chloromethane	11	1.8 U	1.8 U	1.8 UJ	U
FEW4-MW81-(130.0)	N	cis-1,2-Dichloroethene	5.5	1.8 U	1.8 U	1.8 UJ	U
FEW4-MW81-(130.0)	N	cis-1,3-Dichloropropene	5.5	3.5 U	3.5 U	3.5 UJ	U
FEW4-MW81-(130.0)	N	Dibromochloromethane	5.5	1.8 U	1.8 U	1.8 UJ	U
FEW4-MW81-(130.0)	N	Dibromomethane	5.5	3.5 U	3.5 U	3.5 UJ	U
FEW4-MW81-(130.0)	N	Dichlorodifluoromethane	11	1.8 U Q	1.8 U	1.8 UJ	U
FEW4-MW81-(130.0)	N	Ethylbenzene	5.5	1.8 U	1.8 U	1.8 UJ	U

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW81-(130.0)	N	Hexachlorobutadiene	5.5	1.8 U	1.8 U	1.8 UJ	U
FEW4-MW81-(130.0)	N	Isopropylbenzene (Cumene)	5.5	1.8 U	1.8 U	1.8 UJ	U
FEW4-MW81-(130.0)	N	m,p-Xylene	3.5	3.5 U	3.5 U	3.5 UJ	U
FEW4-MW81-(130.0)	N	Methyl tert-butyl ether (MTBE)	22	0.89 U	0.89 U	0.89 UJ	U
FEW4-MW81-(130.0)	N	Methylene chloride	5.5	3.5 U	3.5 U	3.5 UJ	U
FEW4-MW81-(130.0)	N	Naphthalene	5.5	1.8 U	1.8 U	1.8 UJ	U
FEW4-MW81-(130.0)	N	n-Butylbenzene	5.5	1.8 U Q	1.8 U	1.8 UJ	U
FEW4-MW81-(130.0)	N	n-Propylbenzene	5.5	1.8 U	1.8 U	1.8 UJ	U
FEW4-MW81-(130.0)	N	o-Xylene	5.5	1.8 U	1.8 U	1.8 UJ	U
FEW4-MW81-(130.0)	N	p-Cymene (p-Isopropyltoluene)	5.5	1.8 U	1.8 U	1.8 UJ	U
FEW4-MW81-(130.0)	N	sec-Butylbenzene	5.5	1.8 U	1.8 U	1.8 UJ	U
FEW4-MW81-(130.0)	N	Styrene	5.5	1.8 U	1.8 U	1.8 UJ	U
FEW4-MW81-(130.0)	N	tert-Butylbenzene	5.5	1.8 U	1.8 U	1.8 UJ	U
FEW4-MW81-(130.0)	N	Tetrachloroethene (PCE)	5.5	1.8 U	1.8 U	1.8 UJ	U
FEW4-MW81-(130.0)	N	Toluene	5.5	1.8 U	1.8 U	1.8 UJ	U
FEW4-MW81-(130.0)	N	trans-1,2-Dichloroethene	5.5	0.89 U	0.89 U	0.89 UJ	U
FEW4-MW81-(130.0)	N	trans-1,3-Dichloropropene	5.5	1.8 U	1.8 U	1.8 UJ	U
FEW4-MW81-(130.0)	N	Trichloroethene (TCE)	5.5	32	32	32 J	U
FEW4-MW81-(130.0)	N	Trichlorofluoromethane	11	3.5 U	3.5 U	3.5 UJ	U
FEW4-MW81-(130.0)	N	Vinyl chloride	5.5	3.5 U	3.5 U	3.5 UJ	U
FEW4-MW81-(90.0)	N	1,1,1,2-Tetrachloroethane	5.9	1.9 U	1.9 U	1.9 UJ	U
FEW4-MW81-(90.0)	N	1,1,1-Trichloroethane	5.9	1.9 U	1.9 U	1.9 UJ	U
FEW4-MW81-(90.0)	N	1,1,2,2-Tetrachloroethane	5.9	1.9 U	1.9 U	1.9 UJ	U
FEW4-MW81-(90.0)	N	1,1,2-Trichloroethane	5.9	3.8 U	3.8 U	3.8 UJ	U
FEW4-MW81-(90.0)	N	1,1-Dichloroethane	5.9	0.94 U	0.94 U	0.94 UJ	U
FEW4-MW81-(90.0)	N	1,1-Dichloroethene	5.9	1.9 U	1.9 U	1.9 UJ	U
FEW4-MW81-(90.0)	N	1,1-Dichloropropene	5.9	1.9 U	1.9 U	1.9 UJ	U
FEW4-MW81-(90.0)	N	1,2,3-Trichlorobenzene	5.9	1.9 U	1.9 U	1.9 UJ	U
FEW4-MW81-(90.0)	N	1,2,3-Trichloropropane	5.9	3.8 U	3.8 U	3.8 UJ	U
FEW4-MW81-(90.0)	N	1,2,4-Trichlorobenzene	5.9	1.9 U	1.9 U	1.9 UJ	U
FEW4-MW81-(90.0)	N	1,2,4-Trimethylbenzene	5.9	1.9 U	1.9 U	1.9 UJ	U
FEW4-MW81-(90.0)	N	1,2-Dibromo-3-chloropropane	12	1.9 U	1.9 U	1.9 UJ	U
FEW4-MW81-(90.0)	N	1,2-Dibromoethane (EDB)	5.9	1.9 U	1.9 U	1.9 UJ	U
FEW4-MW81-(90.0)	N	1,2-Dichlorobenzene	5.9	1.9 U	1.9 U	1.9 UJ	U
FEW4-MW81-(90.0)	N	1,2-Dichloroethane	5.9	1.9 U	1.9 U	1.9 UJ	U
FEW4-MW81-(90.0)	N	1,2-Dichloroethene	5.9	1.9 U	1.9 U	1.9 UJ	U
FEW4-MW81-(90.0)	N	1,2-Dichloropropane	5.9	1.9 U	1.9 U	1.9 UJ	U
FEW4-MW81-(90.0)	N	1,3,5-Trimethylbenzene	5.9	1.9 U	1.9 U	1.9 UJ	U
FEW4-MW81-(90.0)	N	1,3-Dichlorobenzene	5.9	1.9 U	1.9 U	1.9 UJ	U
FEW4-MW81-(90.0)	N	1,3-Dichloropropane	5.9	1.9 U	1.9 U	1.9 UJ	U

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW81-(90.0)	N	1,4-Dichlorobenzene	5.9	1.9 U	1.9 U	1.9 UJ	U
FEW4-MW81-(90.0)	N	2,2-Dichloropropane	5.9	1.9 U	1.9 U	1.9 UJ	U
FEW4-MW81-(90.0)	N	2-Butanone (MEK)	23	7.5 U	7.5 U	7.5 UJ	U
FEW4-MW81-(90.0)	N	2-Chlorotoluene	5.9	1.9 U	1.9 U	1.9 UJ	U
FEW4-MW81-(90.0)	N	2-Hexanone	23	15 U	15 U	15 UJ	U
FEW4-MW81-(90.0)	N	4-Chlorotoluene	5.9	1.9 U	1.9 U	1.9 UJ	U
FEW4-MW81-(90.0)	N	4-Methyl-2-pentanone (MIBK)	23	15 U	15 U	15 UJ	U
FEW4-MW81-(90.0)	N	Acetone	23	18 J	18 J	18 J	TR/U
FEW4-MW81-(90.0)	N	Benzene	5.9	1.9 U	1.9 U	1.9 UJ	U
FEW4-MW81-(90.0)	N	Bromobenzene	5.9	1.9 U	1.9 U	1.9 UJ	U
FEW4-MW81-(90.0)	N	Bromochloromethane	5.9	0.94 U	0.94 U	0.94 UJ	U
FEW4-MW81-(90.0)	N	Bromodichloromethane	5.9	0.94 U	0.94 U	0.94 UJ	U
FEW4-MW81-(90.0)	N	Bromoform	5.9	0.94 U	0.94 U	0.94 UJ	U
FEW4-MW81-(90.0)	N	Bromomethane	12	1.9 U	1.9 U	1.9 UJ	U
FEW4-MW81-(90.0)	N	Carbon disulfide	5.9	1.9 U	1.9 U	1.9 UJ	U
FEW4-MW81-(90.0)	N	Carbon tetrachloride	5.9	1.9 U	1.9 U	1.9 UJ	U
FEW4-MW81-(90.0)	N	Chlorobenzene	5.9	1.9 U	1.9 U	1.9 UJ	U
FEW4-MW81-(90.0)	N	Chloroethane	12	3.8 U	3.8 U	3.8 UJ	U
FEW4-MW81-(90.0)	N	Chloroform	12	0.94 U	0.94 U	0.94 UJ	U
FEW4-MW81-(90.0)	N	Chloromethane	12	1.9 U	1.9 U	1.9 UJ	U
FEW4-MW81-(90.0)	N	cis-1,2-Dichloroethene	5.9	1.9 U	1.9 U	1.9 UJ	U
FEW4-MW81-(90.0)	N	cis-1,3-Dichloropropene	5.9	3.8 U	3.8 U	3.8 UJ	U
FEW4-MW81-(90.0)	N	Dibromochloromethane	5.9	1.9 U	1.9 U	1.9 UJ	U
FEW4-MW81-(90.0)	N	Dibromomethane	5.9	3.8 U	3.8 U	3.8 UJ	U
FEW4-MW81-(90.0)	N	Dichlorodifluoromethane	12	1.9 U Q	1.9 U	1.9 UJ	U
FEW4-MW81-(90.0)	N	Ethylbenzene	5.9	1.9 U	1.9 U	1.9 UJ	U
FEW4-MW81-(90.0)	N	Hexachlorobutadiene	5.9	1.9 U	1.9 U	1.9 UJ	U
FEW4-MW81-(90.0)	N	Isopropylbenzene (Cumene)	5.9	1.9 U	1.9 U	1.9 UJ	U
FEW4-MW81-(90.0)	N	m,p-Xylene	3.8	3.8 U	3.8 U	3.8 UJ	U
FEW4-MW81-(90.0)	N	Methyl tert-butyl ether (MTBE)	23	0.94 U	0.94 U	0.94 UJ	U
FEW4-MW81-(90.0)	N	Methylene chloride	5.9	3.8 U	3.8 U	3.8 UJ	U
FEW4-MW81-(90.0)	N	Naphthalene	5.9	2.2 J	2.2 J	2.2 J	TR/U
FEW4-MW81-(90.0)	N	n-Butylbenzene	5.9	1.9 U Q	1.9 U	1.9 UJ	U
FEW4-MW81-(90.0)	N	n-Propylbenzene	5.9	1.9 U	1.9 U	1.9 UJ	U
FEW4-MW81-(90.0)	N	o-Xylene	5.9	1.9 U	1.9 U	1.9 UJ	U
FEW4-MW81-(90.0)	N	p-Cymene (p-Isopropyltoluene)	5.9	1.9 U	1.9 U	1.9 UJ	U
FEW4-MW81-(90.0)	N	sec-Butylbenzene	5.9	1.9 U	1.9 U	1.9 UJ	U
FEW4-MW81-(90.0)	N	Styrene	5.9	1.9 U	1.9 U	1.9 UJ	U
FEW4-MW81-(90.0)	N	tert-Butylbenzene	5.9	1.9 U	1.9 U	1.9 UJ	U
FEW4-MW81-(90.0)	N	Tetrachloroethene (PCE)	5.9	1.9 U	1.9 U	1.9 UJ	U

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW81-(90.0)	N	Toluene	5.9	1.9 U	1.9 U	1.9 UJ	U
FEW4-MW81-(90.0)	N	trans-1,2-Dichloroethene	5.9	0.94 U	0.94 U	0.94 UJ	U
FEW4-MW81-(90.0)	N	trans-1,3-Dichloropropene	5.9	1.9 U	1.9 U	1.9 UJ	U
FEW4-MW81-(90.0)	N	Trichloroethene (TCE)	5.9	3.0 J	3.0 J	3.0 J	TR/U
FEW4-MW81-(90.0)	N	Trichlorofluoromethane	12	3.8 U	3.8 U	3.8 UJ	U
FEW4-MW81-(90.0)	N	Vinyl chloride	5.9	3.8 U	3.8 U	3.8 UJ	U
FEW4-MW81-(91.0)	FD	1,1,1,2-Tetrachloroethane	6.4	2.0 U	2.0 U	2.0 UJ	U
FEW4-MW81-(91.0)	FD	1,1,1-Trichloroethane	6.4	2.0 U	2.0 U	2.0 UJ	U
FEW4-MW81-(91.0)	FD	1,1,2,2-Tetrachloroethane	6.4	2.0 U	2.0 U	2.0 UJ	U
FEW4-MW81-(91.0)	FD	1,1,2-Trichloroethane	6.4	4.1 U	4.1 U	4.1 UJ	U
FEW4-MW81-(91.0)	FD	1,1-Dichloroethane	6.4	1.0 U	1.0 U	1.0 UJ	U
FEW4-MW81-(91.0)	FD	1,1-Dichloroethene	6.4	2.0 U	2.0 U	2.0 UJ	U
FEW4-MW81-(91.0)	FD	1,1-Dichloropropene	6.4	2.0 U	2.0 U	2.0 UJ	U
FEW4-MW81-(91.0)	FD	1,2,3-Trichlorobenzene	6.4	2.0 U	2.0 U	2.0 UJ	U
FEW4-MW81-(91.0)	FD	1,2,3-Trichloropropane	6.4	4.1 U	4.1 U	4.1 UJ	U
FEW4-MW81-(91.0)	FD	1,2,4-Trichlorobenzene	6.4	2.0 U	2.0 U	2.0 UJ	U
FEW4-MW81-(91.0)	FD	1,2,4-Trimethylbenzene	6.4	2.0 U	2.0 U	2.0 UJ	U
FEW4-MW81-(91.0)	FD	1,2-Dibromo-3-chloropropane	13	2.0 U	2.0 U	2.0 UJ	U
FEW4-MW81-(91.0)	FD	1,2-Dibromoethane (EDB)	6.4	2.0 U	2.0 U	2.0 UJ	U
FEW4-MW81-(91.0)	FD	1,2-Dichlorobenzene	6.4	2.0 U	2.0 U	2.0 UJ	U
FEW4-MW81-(91.0)	FD	1,2-Dichloroethane	6.4	2.0 U	2.0 U	2.0 UJ	U
FEW4-MW81-(91.0)	FD	1,2-Dichloroethene	6.4	2.0 U	2.0 U	2.0 UJ	U
FEW4-MW81-(91.0)	FD	1,2-Dichloropropane	6.4	2.0 U	2.0 U	2.0 UJ	U
FEW4-MW81-(91.0)	FD	1,3,5-Trimethylbenzene	6.4	2.0 U	2.0 U	2.0 UJ	U
FEW4-MW81-(91.0)	FD	1,3-Dichlorobenzene	6.4	2.0 U	2.0 U	2.0 UJ	U
FEW4-MW81-(91.0)	FD	1,3-Dichloropropane	6.4	2.0 U	2.0 U	2.0 UJ	U
FEW4-MW81-(91.0)	FD	1,4-Dichlorobenzene	6.4	2.0 U	2.0 U	2.0 UJ	U
FEW4-MW81-(91.0)	FD	2,2-Dichloropropane	6.4	2.0 U	2.0 U	2.0 UJ	U
FEW4-MW81-(91.0)	FD	2-Butanone (MEK)	26	8.2 U	8.2 U	8.2 UJ	U
FEW4-MW81-(91.0)	FD	2-Chlorotoluene	6.4	2.0 U	2.0 U	2.0 UJ	U
FEW4-MW81-(91.0)	FD	2-Hexanone	26	16 U	16 U	16 UJ	U
FEW4-MW81-(91.0)	FD	4-Chlorotoluene	6.4	2.0 U	2.0 U	2.0 UJ	U
FEW4-MW81-(91.0)	FD	4-Methyl-2-pentanone (MIBK)	26	16 U	16 U	16 UJ	U
FEW4-MW81-(91.0)	FD	Acetone	26	25 J	25 J	25 J	TR/U
FEW4-MW81-(91.0)	FD	Benzene	6.4	2.0 U	2.0 U	2.0 UJ	U
FEW4-MW81-(91.0)	FD	Bromobenzene	6.4	2.0 U	2.0 U	2.0 UJ	U
FEW4-MW81-(91.0)	FD	Bromochloromethane	6.4	1.0 U	1.0 U	1.0 UJ	U
FEW4-MW81-(91.0)	FD	Bromodichloromethane	6.4	1.0 U	1.0 U	1.0 UJ	U
FEW4-MW81-(91.0)	FD	Bromoform	6.4	1.0 U	1.0 U	1.0 UJ	U
FEW4-MW81-(91.0)	FD	Bromomethane	13	2.0 U	2.0 U	2.0 UJ	U
FEW4-MW81-(91.0)	FD	Carbon disulfide	6.4	2.0 U	2.0 U	2.0 UJ	U

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW81-(91.0)	FD	Carbon tetrachloride	6.4	2.0 U	2.0 U	2.0 UJ	U
FEW4-MW81-(91.0)	FD	Chlorobenzene	6.4	2.0 U	2.0 U	2.0 UJ	U
FEW4-MW81-(91.0)	FD	Chloroethane	13	4.1 U	4.1 U	4.1 UJ	U
FEW4-MW81-(91.0)	FD	Chloroform	13	1.0 U	1.0 U	1.0 UJ	U
FEW4-MW81-(91.0)	FD	Chloromethane	13	2.0 U	2.0 U	2.0 UJ	U
FEW4-MW81-(91.0)	FD	cis-1,2-Dichloroethene	6.4	2.0 U	2.0 U	2.0 UJ	U
FEW4-MW81-(91.0)	FD	cis-1,3-Dichloropropene	6.4	4.1 U	4.1 U	4.1 UJ	U
FEW4-MW81-(91.0)	FD	Dibromochloromethane	6.4	2.0 U	2.0 U	2.0 UJ	U
FEW4-MW81-(91.0)	FD	Dibromomethane	6.4	4.1 U	4.1 U	4.1 UJ	U
FEW4-MW81-(91.0)	FD	Dichlorodifluoromethane	13	2.0 U Q	2.0 U	2.0 UJ	U
FEW4-MW81-(91.0)	FD	Ethylbenzene	6.4	2.0 U	2.0 U	2.0 UJ	U
FEW4-MW81-(91.0)	FD	Hexachlorobutadiene	6.4	2.0 U	2.0 U	2.0 UJ	U
FEW4-MW81-(91.0)	FD	Isopropylbenzene (Cumene)	6.4	2.0 U	2.0 U	2.0 UJ	U
FEW4-MW81-(91.0)	FD	m,p-Xylene	4.1	4.1 U	4.1 U	4.1 UJ	U
FEW4-MW81-(91.0)	FD	Methyl tert-butyl ether (MTBE)	26	1.0 U	1.0 U	1.0 UJ	U
FEW4-MW81-(91.0)	FD	Methylene chloride	6.4	4.1 U	4.1 U	4.1 UJ	U
FEW4-MW81-(91.0)	FD	Naphthalene	6.4	2.0 U	2.0 U	2.0 UJ	U
FEW4-MW81-(91.0)	FD	n-Butylbenzene	6.4	2.0 U Q	2.0 U	2.0 UJ	U
FEW4-MW81-(91.0)	FD	n-Propylbenzene	6.4	2.0 U	2.0 U	2.0 UJ	U
FEW4-MW81-(91.0)	FD	o-Xylene	6.4	2.0 U	2.0 U	2.0 UJ	U
FEW4-MW81-(91.0)	FD	p-Cymene (p-Isopropyltoluene)	6.4	2.0 U	2.0 U	2.0 UJ	U
FEW4-MW81-(91.0)	FD	sec-Butylbenzene	6.4	2.0 U	2.0 U	2.0 UJ	U
FEW4-MW81-(91.0)	FD	Styrene	6.4	2.0 U	2.0 U	2.0 UJ	U
FEW4-MW81-(91.0)	FD	tert-Butylbenzene	6.4	2.0 U	2.0 U	2.0 UJ	U
FEW4-MW81-(91.0)	FD	Tetrachloroethene (PCE)	6.4	2.0 U	2.0 U	2.0 UJ	U
FEW4-MW81-(91.0)	FD	Toluene	6.4	2.0 U	2.0 U	2.0 UJ	U
FEW4-MW81-(91.0)	FD	trans-1,2-Dichloroethene	6.4	1.0 U	1.0 U	1.0 UJ	U
FEW4-MW81-(91.0)	FD	trans-1,3-Dichloropropene	6.4	2.0 U	2.0 U	2.0 UJ	U
FEW4-MW81-(91.0)	FD	Trichloroethene (TCE)	6.4	1.1 J	1.1 J	1.1 J	TR/U
FEW4-MW81-(91.0)	FD	Trichlorofluoromethane	13	4.1 U	4.1 U	4.1 UJ	U
FEW4-MW81-(91.0)	FD	Vinyl chloride	6.4	4.1 U	4.1 U	4.1 UJ	U

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
Trace values are not included in the qualified results table unless additional reason codes are associated.

Reason Code Definitions

Code	Definition
TR	Trace Level Detect
U	Receipt Temperature

Flag Code and Definitions

Flag	Definition
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
J	Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
R	The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making.
B	Blank contamination: The analyte was found in an associated blank above one half the RL, as well as in the sample.
UB	The analyte was also detected in an associated laboratory or field blank at a concentration comparable to the concentration in the sample. The reported result has been requalified as not detected.

Review Questions

Method: SW8260B (Volatile Organic Compounds by Capillary GC/MS)

Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were sample reciept temperatures met?		•		The cooler receipt temperature was 6.6ºC, outside the acceptable temperature range of 0-6ºC. All detected analyte concentrations and all non-detected analyte concentrations have been qualified as estimated values (J) due to the minor (0.6ºC) temperature exceedance.
Were QAPP specified PQLs achieved?	•			
Were all QAPP-specified target analytes reported?	•			
Was the GC/MS system properly tuned based on method criteria?	•			
Was the criteria met during each 12 hour shift (prior to ICAL and Cal Ver.)?	•			
Does the initial calibration curve consist of 5 concentration levels, with the low standard near but > MDL?	•			
Did the Calibration Check Compounds (CCCs) have a relative standard deviation within QAPP acceptance limits?	•			
Were the average response factors (RFs) for the System Performance Check Compounds (SPCCs) within QAPP acceptance limits?	•			
Were the ICAL %RSDs for the target compounds within method criteria?	•			
If a quadratic equation curve was used, was the coefficient of determination (COD) within criteria?	•			
If a linear regression curve was used, was the correlation coefficient within criteria?	•			
Check and recalculate the response factors and average response factors for a least one target compound.	•			ICAL VMS-G2 7/21/17 Trichloroethene Average RF = 0.2399
Check and recalculate the %RSD for one of more target compounds and DMCs. Verify that the recalculated values agree with the laboratory reported values.	•			ICAL VMS-G2 7/21/17 Trichloroethene % RSD = 2.6%; 1,2-Dichloroethane-d4 % RSD = 4.8%
Was a second source verification analyzed after the ICAL and all analytes within criteria?		•		The ICV percent difference was above the upper control limit for dichlorodifluoromethane at 34.4%. All associated sample results were non-detect for this analyte, therefore no data qualification is warranted.
Was a CCV run at the beginning of the analytical sequence and every 12 hours?	•			
Was the CCV a mid-level standard from the initial calibration curve?	•			
Did the CCCs have a %Difference within QAPP acceptance limits?	•			
Were the average RFs for the SPCCs within QAPP acceptance limits?	•			
Was the %D (difference or drift) for all target analytes within QAPP acceptance limits?		•		The CCV percent difference was above the control limit for n-butylbenzene at 21.5%. All associated sample results were non-detect for this analyte, therefore no data qualification is warranted.

Review Questions

Method: SW8260B (Volatile Organic Compounds by Capillary GC/MS)

Review Questions	Yes	No	NA	Comment
Check and recalculate the CCV relative response factor for at least one target compound.	•			ICAL VMS-G2 7/21/17 Trichloroethene RRF = 0.2571
Were the internal standards added to every standard, blank, matrix spike, matrix spike duplicate, and sample?	•			
Were the retention times for all IS compounds within QAPP acceptance limits?	•			
Are the area counts of all IS compounds within QAPP acceptance limits?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes detected in the method blank above the MDL?		•		
Were target analytes reported in the field blank analyses above the MDL?			•	
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?	•			FEW4-MW81-(91.0) was a blind field duplicate of FEW4-MW81-(90.0); no analytes were detected in both field duplicates at concentrations greater than the LOQ.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were the LCS/LCSD recoveries within QAPP acceptance limits?	•			
Were the LCS/LCSD RPDs within QAPP acceptance limits?	•			
Was the duplicate RPD within QAPP acceptance limits?	•			
Was a MS/MSD pair prepared with each batch?		•		
Is the MS/MSD parent sample the one designated by the sampling team?			•	
Were MS/MSD recoveries and RPD within QAPP acceptance limits?			•	
Were surrogate recoveries within QAPP acceptance limits?	•			
Were reported sample concentrations within calibration range?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were instrument run logs present and filled out appropriately?	•			
Were sample prepration sheets present and filled out appropriately?	•			
Check and recalculate the %D for one target compound. Verify that the recalculated values agree with the laboratory-reported values.			•	
Examine raw data to verify correct calculation of sample results reported by the laboratory. Compare quantitation lists and chromatograms to the reported detect and non-detect sample results.	•			FEW4-MW81-(120.0)Trichloroethene = 41 ug/kg; extra label bias result: 42 ug/kg
Verify that the reporting limits and sample results have been adjusted to reflect all sample dilutions and Percent Moisture factors (non-aqueous samples).	•			

US Army Corps of Engineers ®

Batch Report

Test Method: SW8260B Analysis Batch: 280-382992

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
LABQC	SQ	LCS 280-383001/1-A	LCS 280-383001/1-A		1/1	8/2/2017 19:00	8/2/2017 19:00	8/2/2017 21:01	280-382992/	BS
LABQC	SQ	MB 280-383001/2-A	MB 280-383001/2-A		1/1	8/2/2017 19:00	8/2/2017 19:00	8/2/2017 21:42	280-382992/	LB
FEW4-MW81	SO	FEW4-MW81-(180.0)	280-99507-6		1/1	7/22/2017 01:14	7/22/2017 11:45	8/3/2017 02:46	280-382992/	N
FEW4-MW81	SO	FEW4-MW81-(220.0)	280-99507-10		1/1	7/22/2017 16:20	7/22/2017 16:20	8/3/2017 03:06	280-382992/	N
FEW4-MW81	SO	FEW4-MW81-(240.0)	280-99507-12		1/1	7/23/2017 09:50	7/23/2017 09:50	8/3/2017 03:26	280-382992/	N

Test Method: SW8260B Analysis Batch: 280-383004

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
LABQC	SQ	LCS 280-382851/1-A	LCS 280-382851/1-A		1/1	8/1/2017 19:00	8/1/2017 19:00	8/1/2017 19:47	280-383004/	BS
LABQC	SQ	MB 280-382851/2-A	MB 280-382851/2-A		1/1	8/1/2017 19:00	8/1/2017 19:00	8/1/2017 20:28	280-383004/	LB
FEW4-MW81	SO	FEW4-MW81-(140.0)	280-99507-1		1/1	7/22/2017 10:30	7/22/2017 10:30	8/1/2017 22:30	280-383004/	N
FEW4-MW81	SO	FEW4-MW81-(140.0)	280-99507-1MS		1/1	7/22/2017 10:30	7/22/2017 10:30	8/1/2017 22:51	280-383004/	MS
FEW4-MW81	SO	FEW4-MW81-(140.0)	280-99507-1MSD		1/1	7/22/2017 10:30	7/22/2017 10:30	8/1/2017 23:11	280-383004/	SD
FEW4-MW81	SO	FEW4-MW81-(150.0)	280-99507-2		1/1	7/22/2017 10:40	7/22/2017 10:40	8/1/2017 23:31	280-383004/	N
FEW4-MW81	SO	FEW4-MW81-(160.0)	280-99507-3		1/1	7/22/2017 11:00	7/22/2017 11:00	8/1/2017 23:52	280-383004/	N
FEW4-MW81	SO	FEW4-MW81-(161.0)	280-99507-4		1/1	7/22/2017 12:00	7/22/2017 12:00	8/2/2017 00:12	280-383004/	FD
FEW4-MW81	SO	FEW4-MW81-(170.0)	280-99507-5		1/1	7/22/2017 11:15	7/22/2017 11:15	8/2/2017 00:32	280-383004/	N
FEW4-MW81	SO	FEW4-MW81-(190.0)	280-99507-7		1/1	7/22/2017 12:05	7/22/2017 12:05	8/2/2017 01:12	280-383004/	N
FEW4-MW81	SO	FEW4-MW81-(200.0)	280-99507-8		1/1	7/22/2017 12:20	7/22/2017 12:20	8/2/2017 01:33	280-383004/	N
FEW4-MW81	SO	FEW4-MW81-(210.0)	280-99507-9		1/1	7/22/2017 15:00	7/22/2017 15:00	8/2/2017 01:53	280-383004/	N
FEW4-MW81	SO	FEW4-MW81-(232.0)	280-99507-11		1/1	7/23/2017 09:40	7/23/2017 09:40	8/2/2017 02:33	280-383004/	N
FEW4-MW81	SO	FEW4-MW81-(250.0)	280-99507-13		1/1	7/23/2017 10:00	7/23/2017 10:00	8/2/2017 03:13	280-383004/	N

US Army Corps of Engineers ®

Field Batch Report

--No Records Found--

MS Mismatch Report

--No Records Found--

Section to identify Matrix Spike mismatches where parent sample differs from MS by dilution.

US Army Corps of Engineers ®

QC Outlier Report

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

QC Element	Sample ID/ Lab Sample ID	Run#/ Dil'n	Analyte	Result (Units)	Qualifier	Warning Limits	Control Limits	Reason	Comment	Rule	Action Level
Surrogate	FEW4-MW81-(240.0) (N) / 280-99507-12	1 / 1.00	Dibromofluoromethane	122.6 (percent)	J/None	78 - 119	78 - 119	I			

Rule is the multiplier used when blank contamination occurs to determine action level.

Qualified Results

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW81-(140.0)	280-99507-1	SO	N	Acetone	21.0	12.0 J	12.0 J		ug/kg	TR
FEW4-MW81-(150.0)	280-99507-2	SO	N	1,2,3-Trichlorobenzene	4.70	0.830 J	0.830 J		ug/kg	TR
FEW4-MW81-(150.0)	280-99507-2	SO	N	Acetone	19.0	15.0 J	15.0 J		ug/kg	TR
FEW4-MW81-(150.0)	280-99507-2	SO	N	Naphthalene	4.70	1.90 J	1.90 J		ug/kg	TR
FEW4-MW81-(160.0)	280-99507-3	SO	N	Acetone	20.0	16.0 J	16.0 J		ug/kg	TR
FEW4-MW81-(160.0)	280-99507-3	SO	N	Trichloroethene (TCE)	5.10	1.70 J	1.70 J		ug/kg	TR
FEW4-MW81-(161.0)	280-99507-4	SO	FD	Acetone	24.0	10.0 J	10.0 J		ug/kg	TR
FEW4-MW81-(161.0)	280-99507-4	SO	FD	Trichloroethene (TCE)	5.90	1.10 J	1.10 J		ug/kg	TR
FEW4-MW81-(170.0)	280-99507-5	SO	N	Acetone	22.0	15.0 J	15.0 J		ug/kg	TR
FEW4-MW81-(190.0)	280-99507-7	SO	N	Acetone	24.0	14.0 J	14.0 J		ug/kg	TR
FEW4-MW81-(210.0)	280-99507-9	SO	N	Acetone	15.0	13.0 J	13.0 J		ug/kg	TR
FEW4-MW81-(220.0)	280-99507-10	SO	N	Toluene	5.50	2.50 J Q	2.50 J		ug/kg	TR
FEW4-MW81-(232.0)	280-99507-11	SO	N	Acetone	23.0	12.0 J	12.0 J		ug/kg	TR
FEW4-MW81-(250.0)	280-99507-13	SO	N	Acetone	26.0	15.0 J	15.0 J		ug/kg	TR

Qualified analytes in samples are reported as estimated, not detected (UJ) at the Limit of Detection (LOD).

US Army Corps of Engineers ®

Detected Results

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Dilution	Analyte	LOQ	Lab Result	Qualified Result	Units	Reason
FEW4-MW81-(140.0)	280-99507-1	SO	N	1	Acetone	21.0	12.0 J	12.0 J	ug/kg	TR
FEW4-MW81-(150.0)	280-99507-2	SO	N	1	1,2,3-Trichlorobenzene	4.70	0.830 J	0.830 J	ug/kg	TR
FEW4-MW81-(150.0)	280-99507-2	SO	N	1	Acetone	19.0	15.0 J	15.0 J	ug/kg	TR
FEW4-MW81-(150.0)	280-99507-2	SO	N	1	Naphthalene	4.70	1.90 J	1.90 J	ug/kg	TR
FEW4-MW81-(160.0)	280-99507-3	SO	N	1	Acetone	20.0	16.0 J	16.0 J	ug/kg	TR
FEW4-MW81-(160.0)	280-99507-3	SO	N	1	Trichloroethene (TCE)	5.10	1.70 J	1.70 J	ug/kg	TR
FEW4-MW81-(161.0)	280-99507-4	SO	FD	1	Acetone	24.0	10.0 J	10.0 J	ug/kg	TR
FEW4-MW81-(161.0)	280-99507-4	SO	FD	1	Trichloroethene (TCE)	5.90	1.10 J	1.10 J	ug/kg	TR
FEW4-MW81-(170.0)	280-99507-5	SO	N	1	Acetone	22.0	15.0 J	15.0 J	ug/kg	TR
FEW4-MW81-(170.0)	280-99507-5	SO	N	1	Trichloroethene (TCE)	5.50	13.0	13.0	ug/kg	
FEW4-MW81-(180.0)	280-99507-6	SO	N	1	Trichloroethene (TCE)	5.70	50.0	50.0	ug/kg	
FEW4-MW81-(190.0)	280-99507-7	SO	N	1	Acetone	24.0	14.0 J	14.0 J	ug/kg	TR
FEW4-MW81-(190.0)	280-99507-7	SO	N	1	Trichloroethene (TCE)	6.00	150	150	ug/kg	
FEW4-MW81-(200.0)	280-99507-8	SO	N	1	Acetone	23.0	24.0	24.0	ug/kg	
FEW4-MW81-(200.0)	280-99507-8	SO	N	1	Trichloroethene (TCE)	5.70	190	190	ug/kg	
FEW4-MW81-(210.0)	280-99507-9	SO	N	1	Acetone	15.0	13.0 J	13.0 J	ug/kg	TR
FEW4-MW81-(210.0)	280-99507-9	SO	N	1	Trichloroethene (TCE)	3.90	42.0	42.0	ug/kg	
FEW4-MW81-(220.0)	280-99507-10	SO	N	1	Toluene	5.50	2.50 J Q	2.50 J	ug/kg	TR
FEW4-MW81-(232.0)	280-99507-11	SO	N	1	Acetone	23.0	12.0 J	12.0 J	ug/kg	TR
FEW4-MW81-(250.0)	280-99507-13	SO	N	1	Acetone	26.0	15.0 J	15.0 J	ug/kg	TR

US Army Corps of Engineers ®

Rejected Results

--No Records Found--

US Army Corps of Engineers ®

Facility:	B08WY0467-02, F.E. Warren AFB, Site 4
Event:	2017-2018 RI Addendum Tasks
SDG:	280-99507-1_52_2a_FUDSChem
Guidance Document:	Draft-Final Uniform Federal Policy-Quality Assurance Project Plan for the Remedial Investigation Addendum 2017-2018 Tasks Atlas "D" Missile Site 4 —Laramie County, Wyoming, July 2017
Prime Contractor:	RMC Consultants, Inc., LAKEWOOD, CO
Project Manager:	David Groy
Contract Laboratory:	TestAmerica Laboratories, Inc., Arvada, CO
Data Review Contractor:	RMC Consultants
Data Review Level:	Stage 3VEM
Primary Data Reviewer:	Gary Torf, Contractor Project Chemist
Second Reviewer:	, Senior Scientist
Date Submitted:	

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	SW8260B
FEW4-MW81-(161.0)	280-99507-4	Solid	Field Duplicate/FD	X
FEW4-MW81-(140.0)	280-99507-1	Solid	Field Sample/N	X
FEW4-MW81-(150.0)	280-99507-2	Solid	Field Sample/N	X
FEW4-MW81-(160.0)	280-99507-3	Solid	Field Sample/N	X
FEW4-MW81-(170.0)	280-99507-5	Solid	Field Sample/N	X
FEW4-MW81-(180.0)	280-99507-6	Solid	Field Sample/N	X
FEW4-MW81-(190.0)	280-99507-7	Solid	Field Sample/N	X
FEW4-MW81-(200.0)	280-99507-8	Solid	Field Sample/N	X
FEW4-MW81-(210.0)	280-99507-9	Solid	Field Sample/N	X
FEW4-MW81-(220.0)	280-99507-10	Solid	Field Sample/N	X
FEW4-MW81-(232.0)	280-99507-11	Solid	Field Sample/N	X
FEW4-MW81-(240.0)	280-99507-12	Solid	Field Sample/N	X
FEW4-MW81-(250.0)	280-99507-13	Solid	Field Sample/N	X

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the Draft-Final Uniform Federal Policy-Quality Assurance Project Plan for the Remedial Investigation Addendum 2017-2018 Tasks Atlas “D” Missile Site 4 —Laramie County, Wyoming, July 2017 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by RMC Consultants, Inc., LAKEWOOD, CO; analyses were performed by TestAmerica Laboratories, Inc., Arvada, CO and were reported under sample delivery group (SDG) 280-99507-1_52_2a_FUDSChem. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

- Blank
- Blank - Negative
- Field Duplicate RPD
- LCS Recovery
- MS Recovery
- MS RPD
- Prep Hold Time
- Surrogate
- Test Hold Time

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 0 results (0.00%) out of the 858 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected. Trace values, defined as results that are qualified as estimated because they fall between the limit of detection and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

Narrative Comments

An additional label was inadvertently placed on the terracore soil sample containers during field sample collection, causing the vial tare weight to be heavier by approximately 0.26 g than originally recorded. This may result in a detected analyte concentration low bias (underestimation) of approximately 4.5%. No analyte results have been qualified due to this occurrence.

Analytical Method	Data Reviewer Comment
SW8260B	No additional comments; see Checklist for detail.

Gary Torf

September 07, 2017

Reviewed by Gary Torf, Contractor Project Chemist, RMC Consultants

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of a minimum of 10% of the reported sample results and method quality control data between the two deliverables.

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

Quality Control Outliers for test method SW8260B, Surrogate

Method performance for individual samples is demonstrated through spiking activities. All samples are spiked with surrogate compounds prior to sample preparation. The sample itself may produce effects due to such factors as interferences and high concentrations of analytes. Summary forms were evaluated and compared to electronic data deliverables. Surrogate results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
FEW4-MW81-(240.0) (N)/ 280-99507-12	Dibromofluoromethane	122.6	78 - 119	78 - 119	percent	J/None	I	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

Qualified Results

No results associated with this sample delivery group required qualification.

Table of All Trace Results

Test Method: SW8260B Extraction Method: SW5035A

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW81-(140.0)	N	Acetone	21.0	12.0 J	12.0 J		ug/kg	TR
FEW4-MW81-(150.0)	N	1,2,3-Trichlorobenzene	4.70	0.830 J	0.830 J		ug/kg	TR
FEW4-MW81-(150.0)	N	Acetone	19.0	15.0 J	15.0 J		ug/kg	TR
FEW4-MW81-(150.0)	N	Naphthalene	4.70	1.90 J	1.90 J		ug/kg	TR
FEW4-MW81-(160.0)	N	Acetone	20.0	16.0 J	16.0 J		ug/kg	TR
FEW4-MW81-(160.0)	N	Trichloroethene (TCE)	5.10	1.70 J	1.70 J		ug/kg	TR
FEW4-MW81-(161.0)	FD	Acetone	24.0	10.0 J	10.0 J		ug/kg	TR
FEW4-MW81-(161.0)	FD	Trichloroethene (TCE)	5.90	1.10 J	1.10 J		ug/kg	TR
FEW4-MW81-(170.0)	N	Acetone	22.0	15.0 J	15.0 J		ug/kg	TR
FEW4-MW81-(190.0)	N	Acetone	24.0	14.0 J	14.0 J		ug/kg	TR
FEW4-MW81-(210.0)	N	Acetone	15.0	13.0 J	13.0 J		ug/kg	TR
FEW4-MW81-(220.0)	N	Toluene	5.50	2.50 J Q	2.50 J		ug/kg	TR
FEW4-MW81-(232.0)	N	Acetone	23.0	12.0 J	12.0 J		ug/kg	TR
FEW4-MW81-(250.0)	N	Acetone	26.0	15.0 J	15.0 J		ug/kg	TR

Results with Modified Qualifiers

No qualifiers associated with this sample delivery group were modified manually.

Reason Code Definitions

Code	Definition
I	Surrogate recovery outside project limits.
TR	Trace Level Detect

Flag Code and Definitions

Flag	Definition
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
J	Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
R	The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making.
B	Blank contamination: The analyte was found in an associated blank above one half the RL, as well as in the sample.
UB	The analyte was also detected in an associated laboratory or field blank at a concentration comparable to the concentration in the sample. The reported result has been requalified as not detected.

Review Questions

Method: SW8260B (Volatile Organic Compounds by Capillary GC/MS)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were sample reciept temperatures met?	•			
Were QAPP specified PQLs achieved?	•			
Were all QAPP-specified target analytes reported?	•			
Was the GC/MS system properly tuned based on method criteria?	•			
Was the criteria met during each 12 hour shift (prior to ICAL and Cal Ver.)?	•			
Does the initial calibration curve consist of 5 concentration levels, with the low standard near but > MDL?	•			
Did the Calibration Check Compounds (CCCs) have a relative standard deviation within QAPP acceptance limits?	•			
Were the average response factors (RFs) for the System Performance Check Compounds (SPCCs) within QAPP acceptance limits?	•			
Were the ICAL %RSDs for the target compounds within method criteria?	•			
If a quadratic equation curve was used, was the coefficient of determination (COD) within criteria?	•			
If a linear regression curve was used, was the correlation coefficient within criteria?	•			
Check and recalculate the response factors and average response factors for a least one target compound.	•			ICAL VMS-G2 7/21/17 Trichloroethene Average RF = 0.2399
Check and recalculate the %RSD for one of more target compounds and DMCs. Verify that the recalculated values agree with the laboratory reported values.	•			ICAL VMS-G2 7/21/17 Trichloroethene % RSD = 2.6%; 1,2-Dichloroethane-d4 % RSD = 4.8%
Was a second source verification analyzed after the ICAL and all analytes within criteria?		•		The ICV percent difference was above the upper control limit for dichlorodifluoromethane at 34.4%. All associated sample results were nondetect for this analyte, therefore no data qualification is warranted.
Was a CCV run at the beginning of the analytical sequence and every 12 hours?	•			
Was the CCV a mid-level standard from the initial calibration curve?	•			
Did the CCCs have a %Difference within QAPP acceptance limits?	•			
Were the average RFs for the SPCCs within QAPP acceptance limits?	•			
Was the %D (difference or drift) for all target analytes within QAPP acceptance limits?		•		A CCV percent difference was above the control limit for n-butylbenzene at 22.6%; a CCV percent difference was above the control limit for acetone at 23.2%, 2-butanone at 20.4%, and n-butylbenzene at 25.6%. All associated sample results were non-detect for these analytes, therefore no data qualification is warranted.
Check and recalculate the CCV relative response factor for at least one target compound.	•			ICAL VMS-G2 7/21/17 Trichloroethene RRF = 0.2616
Were the internal standards added to every standard, blank, matrix spike, matrix spike duplicate, and sample?	•			

Review Questions

Method: SW8260B (Volatile Organic Compounds by Capillary GC/MS)

Review Questions	Yes	No	NA	Comment
Were the retention times for all IS compounds within QAPP acceptance limits?	•			
Are the area counts of all IS compounds within QAPP acceptance limits?		•		The response for IS TBA-d9 was outside the acceptance criteria for an LCS. This internal standard is not used for the quantitation of any analyte, therefore no data qualification is warranted.
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes detected in the method blank above the MDL?	•			2-Hexanone was detected in a method blank at a concentration less than one half the LOQ, therefore corrective action was not warranted.
Were target analytes reported in the field blank analyses above the MDL?			•	
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?	•			FEW4-MW81-(161.0) was a blind field duplicate of FEW4-MW81-(160.0); no analytes were detected in both field duplicates at concentrations greater than the LOQ.
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were the LCS/LCSD recoveries within QAPP acceptance limits?		•		An LCS recovery of n-butylbenzene (129%), 1,1-dichloropropene (134%), and toluene (126%) were greater than the upper control limit; These analytes were not detected in any associated samples above the LOQ, therefore no data qualification was warranted.
Were the LCS/LCSD RPDs within QAPP acceptance limits?			•	
Was the duplicate RPD within QAPP acceptance limits?			•	
Was a MS/MSD pair prepared with each batch?			•	
Is the MS/MSD parent sample the one designated by the sampling team?	•			FEW4-MW81-(140.0)
Were MS/MSD recoveries and RPD within QAPP acceptance limits?	•			
Were surrogate recoveries within QAPP acceptance limits?		•		The recovery of dibromofluoromethane (123%) was greater than the upper control limit of 119% in sample FEW4-MW81-(240.0). No analytes were detected in the sample, therefore no data qualification was warranted.
Were reported sample concentrations within calibration range?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were instrument run logs present and filled out appropriately?	•			
Were sample prepration sheets present and filled out appropriately?	•			
Check and recalculate the %D for one target compound. Verify that the recalculated values agree with the laboratory-reported values.	•			
Examine raw data to verify correct calculation of sample results reported by the laboratory. Compare quantitation lists and chromatograms to the reported detect and non-detect sample results.	•			FEW4-MW81-(210.0)Trichloroethene = 42 ug/kg; extra label bias result: 43 ug/kg
Verify that the reporting limits and sample results have been adjusted to reflect all sample dilutions and Percent Moisture factors (non-aqueous samples).	•			

US Army Corps of Engineers ®

Batch Report

Test Method: SW8260B Analysis Batch: 280-382992

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
LABQC	SQ	LCS 280-383001/1-A	LCS 280-383001/1-A		1/1	8/2/2017 19:00	8/2/2017 19:00	8/2/2017 21:01	280-382992/	BS
LABQC	SQ	MB 280-383001/2-A	MB 280-383001/2-A		1/1	8/2/2017 19:00	8/2/2017 19:00	8/2/2017 21:42	280-382992/	LB
FEW4-MW81	SO	FEW4-MW81-(269.0)	280-99522-3		1/1	7/23/2017 18:20	7/23/2017 18:20	8/2/2017 22:43	280-382992/	N
FEW4-MW81	SO	FEW4-MW81-(300.0)	280-99522-4		1/1	7/24/2017 10:30	7/24/2017 10:30	8/2/2017 23:04	280-382992/	N

Test Method: SW8260B Analysis Batch: 280-383141

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
LABQC	SQ	LCS 280-383148/1-A	LCS 280-383148/1-A		1/1	8/3/2017 20:00	8/3/2017 20:00	8/3/2017 20:32	280-383141/	BS
LABQC	SQ	MB 280-383148/2-A	MB 280-383148/2-A		1/1	8/3/2017 20:00	8/3/2017 20:00	8/3/2017 21:12	280-383141/	LB
FEW4-MW81	SO	FEW4-MW81-(260.0)	280-99522-2		1/1	7/23/2017 16:23	8/3/2017 20:43	8/3/2017 21:52	280-383141/	N
FEW4-MW81	SO	FEW4-MW81-(260.0)	280-99522-2MS		1/1	7/23/2017 16:23	8/3/2017 20:43	8/3/2017 22:12	280-383141/	MS
FEW4-MW81	SO	FEW4-MW81-(260.0)	280-99522-2MSD		1/1	7/23/2017 16:23	8/3/2017 20:43	8/3/2017 22:32	280-383141/	SD

Test Method: SW8260B Analysis Batch: 280-383185

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
LABQC	SQ	LCS 280-383231/2-A	LCS 280-383231/2-A		1/1	8/4/2017 10:56	8/4/2017 10:56	8/4/2017 11:58	280-383185/	BS
LABQC	SQ	LCSD 280-383231/3-A	LCSD 280-383231/3-A		1/1	8/4/2017 10:56	8/4/2017 10:56	8/4/2017 12:17	280-383185/	BD
FEW4-MW81	SO	FEW4-MW81-(260.0)	280-99522-2		2/1	7/23/2017 16:23	8/4/2017 10:56	8/4/2017 12:57	280-383185/	N
LABQC	SQ	MB 280-383231/1-A	MB 280-383231/1-A		1/1	8/4/2017 10:56	8/4/2017 10:56	8/4/2017 15:59	280-383185/	LB

US Army Corps of Engineers ®

Batch Report

Test Method: SW8260B Analysis Batch: 280-383306

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
LABQC	SQ	LCS 280-383305/1-A	LCS 280-383305/1-A		1/1	8/4/2017 16:00	8/4/2017 16:00	8/4/2017 21:49	280-383306/	BS
LABQC	SQ	LCSD 280-383305/2-A	LCSD 280-383305/2-A		1/1	8/4/2017 16:00	8/4/2017 16:00	8/4/2017 22:09	280-383306/	BD
LABQC	SQ	MB 280-383305/3-A	MB 280-383305/3-A		1/1	8/4/2017 16:00	8/4/2017 16:00	8/4/2017 22:50	280-383306/	LB
FEW4-MW81	SO	FEW4-MW81-(252.0)	280-99522-1		1/1	7/23/2017 16:20	7/23/2017 16:20	8/5/2017 00:32	280-383306/	N

US Army Corps of Engineers ®

Field Batch Report

--No Records Found--

MS Mismatch Report

--No Records Found--

Section to identify Matrix Spike mismatches where parent sample differs from MS by dilution.

US Army Corps of Engineers ®

QC Outlier Report

Test Method: SW8260B Extraction Method: SW5030A Leach Method: NONE

QC Element	Sample ID/ Lab Sample ID	Run#/ Dil'n	Analyte	Result (Units)	Qualifier	Warning Limits	Control Limits	Reason	Comment	Rule	Action Level
LCS Recovery	LCS 280-383148/1-A (BS) / LCS 280-383148/1-A	1 / 1.00	n-Butylbenzene	132.4 (percent)	J/None	70 - 128	70 - 128	C			

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

QC Element	Sample ID/ Lab Sample ID	Run#/ Dil'n	Analyte	Result (Units)	Qualifier	Warning Limits	Control Limits	Reason	Comment	Rule	Action Level
Surrogate	FEW4-MW81-(260.0) (N) / 280-99522-2	2 / 1.00	1-Bromo-4-fluorobenzene (4-Bromofluorobenzene)	120.3 (percent)	J/None	79 - 119	79 - 119	I			

Rule is the multiplier used when blank contamination occurs to determine action level.

US Army Corps of Engineers ®

Qualified Results

Test Method: SW8260B Extraction Method: SW5030A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW81-(260.0)	280-99522-2	SO	N	1,1,1,2-Tetrachloroethane	6.20	2.00 U	2.00 UJ		ug/kg	P
FEW4-MW81-(260.0)	280-99522-2	SO	N	1,1,1-Trichloroethane	6.20	2.00 U	2.00 UJ		ug/kg	P
FEW4-MW81-(260.0)	280-99522-2	SO	N	1,1,2,2-Tetrachloroethane	6.20	2.00 U	2.00 UJ		ug/kg	P
FEW4-MW81-(260.0)	280-99522-2	SO	N	1,1,2-Trichloroethane	6.20	4.00 U	4.00 UJ		ug/kg	P
FEW4-MW81-(260.0)	280-99522-2	SO	N	1,1-Dichloroethane	6.20	0.990 U	0.990 UJ		ug/kg	P
FEW4-MW81-(260.0)	280-99522-2	SO	N	1,1-Dichloroethene	6.20	2.00 U	2.00 UJ		ug/kg	P
FEW4-MW81-(260.0)	280-99522-2	SO	N	1,1-Dichloropropene	6.20	2.00 U	2.00 UJ		ug/kg	P
FEW4-MW81-(260.0)	280-99522-2	SO	N	1,2,3-Trichlorobenzene	6.20	2.00 U	2.00 UJ		ug/kg	P
FEW4-MW81-(260.0)	280-99522-2	SO	N	1,2,3-Trichloropropane	6.20	4.00 U	4.00 UJ		ug/kg	P
FEW4-MW81-(260.0)	280-99522-2	SO	N	1,2,4-Trichlorobenzene	6.20	2.00 U Q	2.00 UJ		ug/kg	P
FEW4-MW81-(260.0)	280-99522-2	SO	N	1,2,4-Trimethylbenzene	6.20	2.00 U	2.00 UJ		ug/kg	P
FEW4-MW81-(260.0)	280-99522-2	SO	N	1,2-Dibromo-3-chloropropane	12.0	2.00 U	2.00 UJ		ug/kg	P
FEW4-MW81-(260.0)	280-99522-2	SO	N	1,2-Dibromoethane (EDB)	6.20	2.00 U	2.00 UJ		ug/kg	P
FEW4-MW81-(260.0)	280-99522-2	SO	N	1,2-Dichlorobenzene	6.20	2.00 U	2.00 UJ		ug/kg	P
FEW4-MW81-(260.0)	280-99522-2	SO	N	1,2-Dichloroethane	6.20	2.00 U	2.00 UJ		ug/kg	P
FEW4-MW81-(260.0)	280-99522-2	SO	N	1,2-Dichloroethene	6.20	2.00 U	2.00 UJ		ug/kg	P
FEW4-MW81-(260.0)	280-99522-2	SO	N	1,2-Dichloropropane	6.20	2.00 U	2.00 UJ		ug/kg	P
FEW4-MW81-(260.0)	280-99522-2	SO	N	1,3,5-Trimethylbenzene	6.20	2.00 U	2.00 UJ		ug/kg	P
FEW4-MW81-(260.0)	280-99522-2	SO	N	1,3-Dichlorobenzene	6.20	2.00 U	2.00 UJ		ug/kg	P
FEW4-MW81-(260.0)	280-99522-2	SO	N	1,3-Dichloropropane	6.20	2.00 U	2.00 UJ		ug/kg	P
FEW4-MW81-(260.0)	280-99522-2	SO	N	1,4-Dichlorobenzene	6.20	2.00 U	2.00 UJ		ug/kg	P
FEW4-MW81-(260.0)	280-99522-2	SO	N	2,2-Dichloropropane	6.20	2.00 U	2.00 UJ		ug/kg	P
FEW4-MW81-(260.0)	280-99522-2	SO	N	2-Butanone (MEK)	25.0	7.90 U	7.90 UJ		ug/kg	P
FEW4-MW81-(260.0)	280-99522-2	SO	N	2-Chlorotoluene	6.20	2.00 U	2.00 UJ		ug/kg	P
FEW4-MW81-(260.0)	280-99522-2	SO	N	2-Hexanone	25.0	16.0 U	16.0 UJ		ug/kg	P
FEW4-MW81-(260.0)	280-99522-2	SO	N	4-Chlorotoluene	6.20	2.00 U	2.00 UJ		ug/kg	P
FEW4-MW81-(260.0)	280-99522-2	SO	N	4-Methyl-2-pentanone (MIBK)	25.0	16.0 U	16.0 UJ		ug/kg	P

US Army Corps of Engineers ®

Qualified Results

Test Method: SW8260B Extraction Method: SW5030A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW81-(260.0)	280-99522-2	SO	N	Acetone	25.0	16.0 U	16.0 UJ		ug/kg	P
FEW4-MW81-(260.0)	280-99522-2	SO	N	Benzene	6.20	2.00 U	2.00 UJ		ug/kg	P
FEW4-MW81-(260.0)	280-99522-2	SO	N	Bromobenzene	6.20	2.00 U	2.00 UJ		ug/kg	P
FEW4-MW81-(260.0)	280-99522-2	SO	N	Bromochloromethane	6.20	0.990 U	0.990 UJ		ug/kg	P
FEW4-MW81-(260.0)	280-99522-2	SO	N	Bromodichloromethane	6.20	0.990 U	0.990 UJ		ug/kg	P
FEW4-MW81-(260.0)	280-99522-2	SO	N	Bromoform	6.20	0.990 U	0.990 UJ		ug/kg	P
FEW4-MW81-(260.0)	280-99522-2	SO	N	Bromomethane	12.0	2.00 U	2.00 UJ		ug/kg	P
FEW4-MW81-(260.0)	280-99522-2	SO	N	Carbon disulfide	6.20	2.00 U	2.00 UJ		ug/kg	P
FEW4-MW81-(260.0)	280-99522-2	SO	N	Carbon tetrachloride	6.20	2.00 U	2.00 UJ		ug/kg	P
FEW4-MW81-(260.0)	280-99522-2	SO	N	Chlorobenzene	6.20	2.00 U	2.00 UJ		ug/kg	P
FEW4-MW81-(260.0)	280-99522-2	SO	N	Chloroethane	12.0	4.00 U	4.00 UJ		ug/kg	P
FEW4-MW81-(260.0)	280-99522-2	SO	N	Chloroform	12.0	0.990 U	0.990 UJ		ug/kg	P
FEW4-MW81-(260.0)	280-99522-2	SO	N	Chloromethane	12.0	2.00 U	2.00 UJ		ug/kg	P
FEW4-MW81-(260.0)	280-99522-2	SO	N	cis-1,2-Dichloroethene	6.20	2.00 U	2.00 UJ		ug/kg	P
FEW4-MW81-(260.0)	280-99522-2	SO	N	cis-1,3-Dichloropropene	6.20	4.00 U	4.00 UJ		ug/kg	P
FEW4-MW81-(260.0)	280-99522-2	SO	N	Dibromochloromethane	6.20	2.00 U	2.00 UJ		ug/kg	P
FEW4-MW81-(260.0)	280-99522-2	SO	N	Dibromomethane	6.20	4.00 U	4.00 UJ		ug/kg	P
FEW4-MW81-(260.0)	280-99522-2	SO	N	Dichlorodifluoromethane	12.0	2.00 U Q	2.00 UJ		ug/kg	P
FEW4-MW81-(260.0)	280-99522-2	SO	N	Ethylbenzene	6.20	2.00 U	2.00 UJ		ug/kg	P
FEW4-MW81-(260.0)	280-99522-2	SO	N	Hexachlorobutadiene	6.20	2.00 U Q	2.00 UJ		ug/kg	P
FEW4-MW81-(260.0)	280-99522-2	SO	N	Isopropylbenzene (Cumene)	6.20	2.00 U	2.00 UJ		ug/kg	P
FEW4-MW81-(260.0)	280-99522-2	SO	N	m,p-Xylene	4.00	4.00 U	4.00 UJ		ug/kg	P
FEW4-MW81-(260.0)	280-99522-2	SO	N	Methyl tert-butyl ether (MTBE)	25.0	0.990 U	0.990 UJ		ug/kg	P
FEW4-MW81-(260.0)	280-99522-2	SO	N	Methylene chloride	6.20	4.00 U	4.00 UJ		ug/kg	P
FEW4-MW81-(260.0)	280-99522-2	SO	N	Naphthalene	6.20	2.00 U	2.00 UJ		ug/kg	P
FEW4-MW81-(260.0)	280-99522-2	SO	N	n-Butylbenzene	6.20	2.00 U Q	2.00 UJ		ug/kg	P
FEW4-MW81-(260.0)	280-99522-2	SO	N	n-Propylbenzene	6.20	2.00 U	2.00 UJ		ug/kg	P
FEW4-MW81-(260.0)	280-99522-2	SO	N	o-Xylene	6.20	2.00 U	2.00 UJ		ug/kg	P

US Army Corps of Engineers ®

Qualified Results

Test Method: SW8260B Extraction Method: SW5030A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW81-(260.0)	280-99522-2	SO	N	p-Cymene (p-Isopropyltoluene)	6.20	2.00 U Q	2.00 UJ		ug/kg	P
FEW4-MW81-(260.0)	280-99522-2	SO	N	sec-Butylbenzene	6.20	2.00 U	2.00 UJ		ug/kg	P
FEW4-MW81-(260.0)	280-99522-2	SO	N	Styrene	6.20	2.00 U	2.00 UJ		ug/kg	P
FEW4-MW81-(260.0)	280-99522-2	SO	N	tert-Butylbenzene	6.20	2.00 U	2.00 UJ		ug/kg	P
FEW4-MW81-(260.0)	280-99522-2	SO	N	Tetrachloroethene (PCE)	6.20	2.00 U	2.00 UJ		ug/kg	P
FEW4-MW81-(260.0)	280-99522-2	SO	N	Toluene	6.20	2.00 U	2.00 UJ		ug/kg	P
FEW4-MW81-(260.0)	280-99522-2	SO	N	trans-1,2-Dichloroethene	6.20	0.990 U	0.990 UJ		ug/kg	P
FEW4-MW81-(260.0)	280-99522-2	SO	N	trans-1,3-Dichloropropene	6.20	2.00 U	2.00 UJ		ug/kg	P
FEW4-MW81-(260.0)	280-99522-2	SO	N	Trichloroethene (TCE)	6.20	0.990 U	0.990 UJ		ug/kg	P
FEW4-MW81-(260.0)	280-99522-2	SO	N	Trichlorofluoromethane	12.0	4.00 U	4.00 UJ		ug/kg	P
FEW4-MW81-(260.0)	280-99522-2	SO	N	Vinyl chloride	6.20	4.00 U	4.00 UJ		ug/kg	P

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW81-(252.0)	280-99522-1	SO	N	Acetone	26.0	25.0 J Q	25.0 J		ug/kg	TR
FEW4-MW81-(260.0)	280-99522-2	SO	N	1,2-Dibromo-3-chloropropane	330	210 U Q	210 UJ		ug/kg	V2
FEW4-MW81-(260.0)	280-99522-2	SO	N	4-Methyl-2-pentanone (MIBK)	660	420 U Q	420 UJ		ug/kg	V2
FEW4-MW81-(260.0)	280-99522-2	SO	N	Methyl tert-butyl ether (MTBE)	170	110 U Q	110 UJ		ug/kg	V2
FEW4-MW81-(269.0)	280-99522-3	SO	N	Acetone	27.0	16.0 J Q	16.0 J		ug/kg	TR

Qualified analytes in samples are reported as estimated, not detected (UJ) at the Limit of Detection (LOD).

US Army Corps of Engineers ®

Detected Results

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Dilution	Analyte	LOQ	Lab Result	Qualified Result	Units	Reason
FEW4-MW81-(252.0)	280-99522-1	SO	N	1	Acetone	26.0	25.0 J Q	25.0 J	ug/kg	TR
FEW4-MW81-(269.0)	280-99522-3	SO	N	1	Acetone	27.0	16.0 J Q	16.0 J	ug/kg	TR
FEW4-MW81-(300.0)	280-99522-4	SO	N	1	Acetone	19.0	29.0 Q	29.0	ug/kg	

US Army Corps of Engineers ®

Rejected Results

--No Records Found--

US Army Corps of Engineers ®

Facility:	B08WY0467-02, F.E. Warren AFB, Site 4
Event:	2017-2018 RI Addendum Tasks
SDG:	280-99522-1_52_2a_FUDSChem
Guidance Document:	Draft-Final Uniform Federal Policy-Quality Assurance Project Plan for the Remedial Investigation Addendum 2017-2018 Tasks Atlas “D” Missile Site 4 —Laramie County, Wyoming, July 2017
Prime Contractor:	RMC Consultants, Inc., LAKEWOOD, CO
Project Manager:	David Groy
Contract Laboratory:	TestAmerica Laboratories, Inc., Arvada, CO
Data Review Contractor:	RMC Consultants
Data Review Level:	Stage 3VEM
Primary Data Reviewer:	Gary Torf, Contractor Project Chemist
Second Reviewer:	, Senior Scientist
Date Submitted:	

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	SW8260B
FEW4-MW81-(252.0)	280-99522-1	Solid	Field Sample/N	X
FEW4-MW81-(260.0)	280-99522-2	Solid	Field Sample/N	X
FEW4-MW81-(269.0)	280-99522-3	Solid	Field Sample/N	X
FEW4-MW81-(300.0)	280-99522-4	Solid	Field Sample/N	X

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the Draft-Final Uniform Federal Policy-Quality Assurance Project Plan for the Remedial Investigation Addendum 2017-2018 Tasks Atlas “D” Missile Site 4 —Laramie County, Wyoming, July 2017 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by RMC Consultants, Inc., LAKEWOOD, CO; analyses were performed by TestAmerica Laboratories, Inc., Arvada, CO and were reported under sample delivery group (SDG) 280-99522-1_52_2a_FUDSChem. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

- Blank
- Blank - Negative
- LCS Recovery
- LCS RPD
- MS Recovery
- MS RPD
- Prep Hold Time
- Surrogate
- Test Hold Time

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 69 results (20.91%) out of the 330 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected. Trace values, defined as results that are qualified as estimated because they fall between the limit of detection and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

Narrative Comments

Analytical Method	Data Reviewer Comment
SW8260B	An additional label was inadvertently placed on the terracore soil sample containers during field samplecollection, causing the vial tare weight to be heavier by approximately 0.26 g than originally recorded. This may result in a detected analyte concentration low bias (underestimation) of approximately 4.5%. No analyte results have been qualified due to this occurrence. The low level terracore aliquots for sample FEW4-MW81-(260.0) (280-99522-2) arrived at the laboratory with too much soil in them. A medium level terracore sample and a low level analysis from a soil jar were both analyzed.

Gary Torf — October 19, 2017

Reviewed by Gary Torf, Contractor Project Chemist, RMC Consultants

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of a minimum of 10% of the reported sample results and method quality control data between the two deliverables.

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

Quality Control Outliers for test method SW8260B, LCS Recovery

The laboratory control sample/laboratory control sample duplicate (LCS/LCSD) serves as a monitor of the overall performance of each step during the analysis, including the sample preparation. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
LCS 280-383148/1-A (BS)/ LCS 280-383148/1-A	n-Butylbenzene	132.4	70 - 128	70 - 128	percent	J/None	C	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

Quality Control Outliers for test method SW8260B, Surrogate

Method performance for individual samples is demonstrated through spiking activities. All samples are spiked with surrogate compounds prior to sample preparation. The sample itself may produce effects due to such factors as interferences and high concentrations of analytes. Summary forms were evaluated and compared to electronic data deliverables. Surrogate results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
FEW4-MW81-(260.0) (N)/ 280-99522-2	1-Bromo-4-fluorobenzene (4-Bromofluorobenzene)	120.3	79 - 119	79 - 119	percent	J/None	I	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

Qualified Results

No results associated with this sample delivery group required qualification.

Table of All Trace Results

Test Method: SW8260B Extraction Method: SW5035A

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW81-(252.0)	N	Acetone	26.0	25.0 J Q	25.0 J		ug/kg	TR
FEW4-MW81-(269.0)	N	Acetone	27.0	16.0 J Q	16.0 J		ug/kg	TR

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW81-(260.0)	N	1,1,1,2-Tetrachloroethane	6.20	2.00 U	2.00 U	2.00 UJ	P
FEW4-MW81-(260.0)	N	1,1,1-Trichloroethane	6.20	2.00 U	2.00 U	2.00 UJ	P
FEW4-MW81-(260.0)	N	1,1,2,2-Tetrachloroethane	6.20	2.00 U	2.00 U	2.00 UJ	P
FEW4-MW81-(260.0)	N	1,1,2-Trichloroethane	6.20	4.00 U	4.00 U	4.00 UJ	P
FEW4-MW81-(260.0)	N	1,1-Dichloroethane	6.20	0.990 U	0.990 U	0.990 UJ	P
FEW4-MW81-(260.0)	N	1,1-Dichloroethene	6.20	2.00 U	2.00 U	2.00 UJ	P
FEW4-MW81-(260.0)	N	1,1-Dichloropropene	6.20	2.00 U	2.00 U	2.00 UJ	P
FEW4-MW81-(260.0)	N	1,2,3-Trichlorobenzene	6.20	2.00 U	2.00 U	2.00 UJ	P
FEW4-MW81-(260.0)	N	1,2,3-Trichloropropane	6.20	4.00 U	4.00 U	4.00 UJ	P
FEW4-MW81-(260.0)	N	1,2,4-Trichlorobenzene	6.20	2.00 U Q	2.00 U	2.00 UJ	P
FEW4-MW81-(260.0)	N	1,2,4-Trimethylbenzene	6.20	2.00 U	2.00 U	2.00 UJ	P
FEW4-MW81-(260.0)	N	1,2-Dibromo-3-chloropropane	12.0	2.00 U	2.00 U	2.00 UJ	P
FEW4-MW81-(260.0)	N	1,2-Dibromoethane (EDB)	6.20	2.00 U	2.00 U	2.00 UJ	P
FEW4-MW81-(260.0)	N	1,2-Dichlorobenzene	6.20	2.00 U	2.00 U	2.00 UJ	P
FEW4-MW81-(260.0)	N	1,2-Dichloroethane	6.20	2.00 U	2.00 U	2.00 UJ	P
FEW4-MW81-(260.0)	N	1,2-Dichloroethene	6.20	2.00 U	2.00 U	2.00 UJ	P
FEW4-MW81-(260.0)	N	1,2-Dichloropropane	6.20	2.00 U	2.00 U	2.00 UJ	P
FEW4-MW81-(260.0)	N	1,3,5-Trimethylbenzene	6.20	2.00 U	2.00 U	2.00 UJ	P
FEW4-MW81-(260.0)	N	1,3-Dichlorobenzene	6.20	2.00 U	2.00 U	2.00 UJ	P
FEW4-MW81-(260.0)	N	1,3-Dichloropropane	6.20	2.00 U	2.00 U	2.00 UJ	P
FEW4-MW81-(260.0)	N	1,4-Dichlorobenzene	6.20	2.00 U	2.00 U	2.00 UJ	P
FEW4-MW81-(260.0)	N	2,2-Dichloropropane	6.20	2.00 U	2.00 U	2.00 UJ	P
FEW4-MW81-(260.0)	N	2-Butanone (MEK)	25.0	7.90 U	7.90 U	7.90 UJ	P
FEW4-MW81-(260.0)	N	2-Chlorotoluene	6.20	2.00 U	2.00 U	2.00 UJ	P
FEW4-MW81-(260.0)	N	2-Hexanone	25.0	16.0 U	16.0 U	16.0 UJ	P
FEW4-MW81-(260.0)	N	4-Chlorotoluene	6.20	2.00 U	2.00 U	2.00 UJ	P
FEW4-MW81-(260.0)	N	4-Methyl-2-pentanone (MIBK)	25.0	16.0 U	16.0 U	16.0 UJ	P
FEW4-MW81-(260.0)	N	Acetone	25.0	16.0 U	16.0 U	16.0 UJ	P
FEW4-MW81-(260.0)	N	Benzene	6.20	2.00 U	2.00 U	2.00 UJ	P
FEW4-MW81-(260.0)	N	Bromobenzene	6.20	2.00 U	2.00 U	2.00 UJ	P
FEW4-MW81-(260.0)	N	Bromochloromethane	6.20	0.990 U	0.990 U	0.990 UJ	P
FEW4-MW81-(260.0)	N	Bromodichloromethane	6.20	0.990 U	0.990 U	0.990 UJ	P
FEW4-MW81-(260.0)	N	Bromoform	6.20	0.990 U	0.990 U	0.990 UJ	P
FEW4-MW81-(260.0)	N	Bromomethane	12.0	2.00 U	2.00 U	2.00 UJ	P
FEW4-MW81-(260.0)	N	Carbon disulfide	6.20	2.00 U	2.00 U	2.00 UJ	P
FEW4-MW81-(260.0)	N	Carbon tetrachloride	6.20	2.00 U	2.00 U	2.00 UJ	P
FEW4-MW81-(260.0)	N	Chlorobenzene	6.20	2.00 U	2.00 U	2.00 UJ	P
FEW4-MW81-(260.0)	N	Chloroethane	12.0	4.00 U	4.00 U	4.00 UJ	P
FEW4-MW81-(260.0)	N	Chloroform	12.0	0.990 U	0.990 U	0.990 UJ	P
FEW4-MW81-(260.0)	N	Chloromethane	12.0	2.00 U	2.00 U	2.00 UJ	P
FEW4-MW81-(260.0)	N	cis-1,2-Dichloroethene	6.20	2.00 U	2.00 U	2.00 UJ	P

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW81-(260.0)	N	cis-1,3-Dichloropropene	6.20	4.00 U	4.00 U	4.00 UJ	P
FEW4-MW81-(260.0)	N	Dibromochloromethane	6.20	2.00 U	2.00 U	2.00 UJ	P
FEW4-MW81-(260.0)	N	Dibromomethane	6.20	4.00 U	4.00 U	4.00 UJ	P
FEW4-MW81-(260.0)	N	Dichlorodifluoromethane	12.0	2.00 U Q	2.00 U	2.00 UJ	P
FEW4-MW81-(260.0)	N	Ethylbenzene	6.20	2.00 U	2.00 U	2.00 UJ	P
FEW4-MW81-(260.0)	N	Hexachlorobutadiene	6.20	2.00 U Q	2.00 U	2.00 UJ	P
FEW4-MW81-(260.0)	N	Isopropylbenzene (Cumene)	6.20	2.00 U	2.00 U	2.00 UJ	P
FEW4-MW81-(260.0)	N	m,p-Xylene	4.00	4.00 U	4.00 U	4.00 UJ	P
FEW4-MW81-(260.0)	N	Methyl tert-butyl ether (MTBE)	25.0	0.990 U	0.990 U	0.990 UJ	P
FEW4-MW81-(260.0)	N	Methylene chloride	6.20	4.00 U	4.00 U	4.00 UJ	P
FEW4-MW81-(260.0)	N	Naphthalene	6.20	2.00 U	2.00 U	2.00 UJ	P
FEW4-MW81-(260.0)	N	n-Butylbenzene	6.20	2.00 U Q	2.00 U	2.00 UJ	P
FEW4-MW81-(260.0)	N	n-Propylbenzene	6.20	2.00 U	2.00 U	2.00 UJ	P
FEW4-MW81-(260.0)	N	o-Xylene	6.20	2.00 U	2.00 U	2.00 UJ	P
FEW4-MW81-(260.0)	N	p-Cymene (p-Isopropyltoluene)	6.20	2.00 U Q	2.00 U	2.00 UJ	P
FEW4-MW81-(260.0)	N	sec-Butylbenzene	6.20	2.00 U	2.00 U	2.00 UJ	P
FEW4-MW81-(260.0)	N	Styrene	6.20	2.00 U	2.00 U	2.00 UJ	P
FEW4-MW81-(260.0)	N	tert-Butylbenzene	6.20	2.00 U	2.00 U	2.00 UJ	P
FEW4-MW81-(260.0)	N	Tetrachloroethene (PCE)	6.20	2.00 U	2.00 U	2.00 UJ	P
FEW4-MW81-(260.0)	N	Toluene	6.20	2.00 U	2.00 U	2.00 UJ	P
FEW4-MW81-(260.0)	N	trans-1,2-Dichloroethene	6.20	0.990 U	0.990 U	0.990 UJ	P
FEW4-MW81-(260.0)	N	trans-1,3-Dichloropropene	6.20	2.00 U	2.00 U	2.00 UJ	P
FEW4-MW81-(260.0)	N	Trichloroethene (TCE)	6.20	0.990 U	0.990 U	0.990 UJ	P
FEW4-MW81-(260.0)	N	Trichlorofluoromethane	12.0	4.00 U	4.00 U	4.00 UJ	P
FEW4-MW81-(260.0)	N	Vinyl chloride	6.20	4.00 U	4.00 U	4.00 UJ	P

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW81-(260.0)	N	1,2-Dibromo-3-chloropropane	330	210 U Q	210 U	210 UJ	V2
FEW4-MW81-(260.0)	N	4-Methyl-2-pentanone (MIBK)	660	420 U Q	420 U	420 UJ	V2
FEW4-MW81-(260.0)	N	Methyl tert-butyl ether (MTBE)	170	110 U Q	110 U	110 UJ	V2

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
Trace values are not included in the qualified results table unless additional reason codes are associated.

Reason Code Definitions

Code	Definition
C	LCS Recovery
I	Surrogate recovery outside project limits.
P	Sample preservation/collection requirement not met.
TR	Trace Level Detect
V2	CCV

Flag Code and Definitions

Flag	Definition
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
J	Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
R	The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making.
B	Blank contamination: The analyte was found in an associated blank above one half the RL, as well as in the sample.
UB	The analyte was also detected in an associated laboratory or field blank at a concentration comparable to the concentration in the sample. The reported result has been requalified as not detected.

Review Questions

Method: SW8260B (Volatile Organic Compounds by Capillary GC/MS)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?		•		The low level terracore aliquots for sample FEW4-MW81-(260.0) (280-99522-2) arrived at the laboratory with too much soil in them. A medium level terracore sample and a low level analysis from a soil jar were both analyzed.
Were holding times met?	•			
Were sample reciept temperatures met?	•			The cooler receipt temperature was 2.4ºC.
Were QAPP specified PQLs achieved?	•			
Were all QAPP-specified target analytes reported?	•			
Was the GC/MS system properly tuned based on method criteria?	•			
Was the criteria met during each 12 hour shift (prior to ICAL and Cal Ver.)?	•			
Does the initial calibration curve consist of 5 concentration levels, with the low standard near but > MDL?	•			
Did the Calibration Check Compounds (CCCs) have a relative standard deviation within QAPP acceptance limits?	•			
Were the average response factors (RFs) for the System Performance Check Compounds (SPCCs) within QAPP acceptance limits?	•			
Were the ICAL %RSDs for the target compounds within method criteria?	•			
If a quadratic equation curve was used, was the coefficient of determination (COD) within criteria?	•			
If a linear regression curve was used, was the correlation coefficient within criteria?	•			
Check and recalculate the response factors and average response factors for a least one target compound.	•			ICAL VMS-P 7/24/17Trichloroethene Average RF = 0.2962
Check and recalculate the %RSD for one of more target compounds and DMCs. Verify that the recalculated values agree with the laboratory reported values.	•			ICAL VMS-P 7/24/17Trichloroethene % RSD = 6.5%1,2-Dichloroethane-d4 % RSD = 6.4%
Was a second source verification analyzed after the ICAL and all analytes within criteria?		•		The ICV percent difference was above the uppercontrol limit for dichlorodifluoromethane at34.4%. All associated sample results were nondetectfor this analyte, therefore no dataqualification is warranted.
Was a CCV run at the beginning of the analytical sequence and every 12 hours?	•			
Was the CCV a mid-level standard from the initial calibration curve?	•			
Did the CCCs have a %Difference within QAPP acceptance limits?	•			
Were the average RFs for the SPCCs within QAPP acceptance limits?	•			

Review Questions

Method: SW8260B (Volatile Organic Compounds by Capillary GC/MS)

Review Questions	Yes	No	NA	Comment
Was the %D (difference or drift) for all target analytes within QAPP acceptance limits?		•		A CCV percent difference was above the control limit for acetone at 23.2%, hexachlorobutadiene at 25.3% and 22.8% and 25.4%, 2-butanone at 20.4%, n-butylbenzene at 25.6% and 32.7% and 25.7%, 4-isopropyltoleuene at 24.0%, and 1,2,4-trichlorobenzene at 25.2%; all associated sample results were non-detect for these analytes, therefore no data qualification is warranted. A CCV percent difference was below the control limit for 1,2-dibromo-3-chloropropane at -21.8%, 4-methyl-2-pentanone at -20.7%, methyl tert-butyl ether at -22.0%, and naphthalene at -21.9%; the associated sample FEW4-MW81-(260.0) medium level analysis results were non-detect for these analytes, and have been qualified as non-detect but estimated values.
Check and recalculate the CCV relative response factor for at least one target compound.	•			CCV VMS-P 7/24/17Trichloroethene RRF = 0.3266
Were the internal standards added to every standard, blank, matrix spike, matrix spike duplicate, and sample?	•			
Were the retention times for all IS compounds within QAPP acceptance limits?	•			
Are the area counts of all IS compounds within QAPP acceptance limits?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes detected in the method blank above the MDL?		•		
Were target analytes reported in the field blank analyses above the MDL?			•	
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?			•	
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were the LCS/LCSD recoveries within QAPP acceptance limits?		•		Analytes recovered above the respective upper control limit in an LCS included 4-chlorotoluene at 127%, 1,1-dichloropropene at 134%, hexachlrobutadiene at 143% and 146%, n-butylbenzene at 129% and 132% and 130%, sec-butylbenzene at 126% and 133%, toluene at 126%, and 1,2,4-trimethylbenzene at 127% and 129%. These analytes were not detected in any associated samples therefore no data qualification is warranted.
Were the LCS/LCSD RPDs within QAPP acceptance limits?		•		Carbon disulfide exceeded the precision control limit of 20%RPD at 32%.
Was the duplicate RPD within QAPP acceptance limits?			•	
Was a MS/MSD pair prepared with each batch?			•	A MS/MSD sample was not designated in the field.
Is the MS/MSD parent sample the one designated by the sampling team?		•		A MS/MSD analysis was performed by the lab on field sample FEW4-MW81-(260.0). This analysis was performed on an aliquot taken from a 4oz jar rather than a terracore sample. The results are therefore not considered applicable to the project.
Were MS/MSD recoveries and RPD within QAPP acceptance limits?			•	

Review Questions

Method: SW8260B (Volatile Organic Compounds by Capillary GC/MS)

Review Questions	Yes	No	NA	Comment
Were surrogate recoveries within QAPP acceptance limits?		•		4-Bromofluorobenzene was recovered above the control limit in sample FEW4-MW81-(260.0); no analytes were detected therefore no data qualification is warranted.
Were reported sample concentrations within calibration range?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were instrument run logs present and filled out appropriately?	•			
Were sample prepration sheets present and filled out appropriately?	•			
Check and recalculate the %D for one target compound. Verify that the recalculated values agree with the laboratory-reported values.	•			FEW4-MW81-(260.0) medium level analysis; Trichloroethene = not detected
Examine raw data to verify correct calculation of sample results reported by the laboratory. Compare quantitation lists and chromatograms to the reported detect and non-detect sample results.	•			
Verify that the reporting limits and sample results have been adjusted to reflect all sample dilutions and Percent Moisture factors (non-aqueous samples).	•			

US Army Corps of Engineers ®

Batch Report

Test Method: SW8260B Analysis Batch: 280-382992

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
LABQC	SQ	LCS 280-383001/1-A	LCS 280-383001/1-A		1/1	8/2/2017 19:00	8/2/2017 19:00	8/2/2017 21:01	280-382992/	BS
LABQC	SQ	MB 280-383001/2-A	MB 280-383001/2-A		1/1	8/2/2017 19:00	8/2/2017 19:00	8/2/2017 21:42	280-382992/	LB
FEW4-MW83	SO	FEW4-MW83-(95.0)	280-99601-7		1/1	7/26/2017 13:00	7/26/2017 13:00	8/2/2017 23:24	280-382992/	N
FEW4-MW83	SO	FEW4-MW83-(95.0)	280-99601-7MS		1/1	7/26/2017 13:00	7/26/2017 13:00	8/2/2017 23:44	280-382992/	MS
FEW4-MW83	SO	FEW4-MW83-(95.0)	280-99601-7MSD		1/1	7/26/2017 13:00	7/26/2017 13:00	8/3/2017 00:04	280-382992/	SD
FEW4-MW83	SO	FEW4-MW83-(0.5)	280-99601-1		1/1	7/25/2017 15:54	7/25/2017 15:54	8/3/2017 00:25	280-382992/	N
FEW4-MW83	SO	FEW4-MW83-(2.0)	280-99601-2		1/1	7/25/2017 16:00	7/25/2017 16:00	8/3/2017 00:45	280-382992/	N
FEW4-MW83	SO	FEW4-MW83-(9.0)	280-99601-3		1/1	7/25/2017 16:08	7/25/2017 16:08	8/3/2017 01:05	280-382992/	N
FEW4-MW83	SO	FEW4-MW83-(75.0)	280-99601-4		1/1	7/26/2017 10:00	7/26/2017 10:00	8/3/2017 01:25	280-382992/	N
FEW4-MW83	SO	FEW4-MW83-(85.0)	280-99601-6		1/1	7/26/2017 12:00	7/26/2017 12:00	8/3/2017 01:46	280-382992/	N
FEW4-MW83	SO	FEW4-MW83-(105.0)	280-99601-8		1/1	7/26/2017 14:40	7/26/2017 14:40	8/3/2017 02:06	280-382992/	N
FEW4-MW83	SO	FEW4-MW83-(106.0)	280-99601-9		1/1	7/26/2017 15:40	7/26/2017 15:40	8/3/2017 02:26	280-382992/	FD

Test Method: SW8260B Analysis Batch: 280-383279

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
LABQC	WQ	LCS 280-383279/4	LCS 280-383279/4		1/1	8/4/2017 18:32	8/4/2017 18:32	8/4/2017 18:32	280-383279/	BS
LABQC	WQ	MB 280-383279/6	MB 280-383279/6		1/1	8/4/2017 18:53	8/4/2017 18:53	8/4/2017 18:53	280-383279/	LB
FEW4-MW83	WG	FEW4-MW83-79.0	280-99601-5		1/1	7/26/2017 10:20	8/5/2017 03:21	8/5/2017 03:21	280-383279/	N

Test Method: SW8260B Analysis Batch: 280-383351

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
LABQC	SQ	MB 280-383231/1-A	MB 280-383231/1-A		1/1	8/4/2017 10:56	8/4/2017 10:56	8/7/2017 12:46	280-383351/	LB

US Army Corps of Engineers ®

Batch Report

Test Method: SW8260B Analysis Batch: 280-383351

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
LABQC	SQ	MB 280-383377/1-A	MB 280-383377/1-A		1/1	8/7/2017 09:57	8/7/2017 09:57	8/7/2017 13:23	280-383351/	LB
LABQC	SQ	LCS 280-383231/2-A	LCS 280-383231/2-A		1/1	8/4/2017 10:56	8/4/2017 10:56	8/7/2017 16:17	280-383351/	BS
LABQC	SQ	LCSD 280-383231/3-A	LCSD 280-383231/3-A		1/1	8/4/2017 10:56	8/4/2017 10:56	8/7/2017 16:37	280-383351/	BD
FEW4-MW83	SO	FEW4-MW83-(105.0)	280-99601-8		2/1	7/26/2017 14:40	8/4/2017 10:56	8/7/2017 16:56	280-383351/	N
FEW4-MW83	SO	FEW4-MW83-(106.0)	280-99601-9		2/1	7/26/2017 15:40	8/4/2017 10:56	8/7/2017 17:15	280-383351/	FD

US Army Corps of Engineers ®

Field Batch Report

--No Records Found--

MS Mismatch Report

--No Records Found--

Section to identify Matrix Spike mismatches where parent sample differs from MS by dilution.

US Army Corps of Engineers ®

QC Outlier Report

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

QC Element	Sample ID/ Lab Sample ID	Run#/ Dil'n	Analyte	Result (Units)	Qualifier	Warning Limits	Control Limits	Reason	Comment	Rule	Action Level
MS Recovery	FEW4-MW83-(95.0) (MS) / 280-99601-7MS	1 / 1.00	Chlorobenzene	77.95 (percent)	J/UJ	79 - 120	79 - 120	M			
MS RPD	280-99601-7MSD (SD) / 280-99601-7MSD	1 / 1.00	Chloroethane	22.38 (rpd)	J/None	< 20	< 20	D			
Surrogate	FEW4-MW83-(105.0) (N) / 280-99601-8	2 / 1.00	Toluene-d8	80.81 (percent)	J/UJ	85 - 116	85 - 116	I			
Surrogate	FEW4-MW83-(106.0) (FD) / 280-99601-9	1 / 1.00	Dibromofluoromethane	119.7 (percent)	J/None	78 - 119	78 - 119	I			
Surrogate	FEW4-MW83-(106.0) (FD) / 280-99601-9	2 / 1.00	Toluene-d8	84.91 (percent)	J/UJ	85 - 116	85 - 116	I			
Surrogate	FEW4-MW83-(2.0) (N) / 280-99601-2	1 / 1.00	Dibromofluoromethane	124.7 (percent)	J/None	78 - 119	78 - 119	I			
Surrogate	FEW4-MW83-(85.0) (N) / 280-99601-6	1 / 1.00	Dibromofluoromethane	124.3 (percent)	J/None	78 - 119	78 - 119	I			

Rule is the multiplier used when blank contamination occurs to determine action level.

US Army Corps of Engineers ®

Qualified Results

Test Method: SW8260B Extraction Method: SW5030B Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW83-79.0	280-99601-5	WG	N	Chloromethane	2.00	1.20 J	1.20 J		ug/L	TR

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW83-(0.5)	280-99601-1	SO	N	1,2,3-Trichlorobenzene	3.80	0.610 J	0.610 J		ug/kg	TR
FEW4-MW83-(105.0)	280-99601-8	SO	N	1,2-Dichloroethene	7.20	3.40 J	3.40 J		ug/kg	TR
FEW4-MW83-(105.0)	280-99601-8	SO	N	cis-1,2-Dichloroethene	7.20	3.40 J	3.40 J		ug/kg	TR
FEW4-MW83-(105.0)	280-99601-8	SO	N	Trichloroethene (TCE)	250	880	880 J	-	ug/kg	I
FEW4-MW83-(106.0)	280-99601-9	SO	FD	1,2-Dichloroethene	5.30	3.50 J	3.50 J	+	ug/kg	I/TR
FEW4-MW83-(106.0)	280-99601-9	SO	FD	cis-1,2-Dichloroethene	5.30	3.50 J Q	3.50 J	+	ug/kg	I/TR
FEW4-MW83-(106.0)	280-99601-9	SO	FD	Trichloroethene (TCE)	260	720	720 J	-	ug/kg	I
FEW4-MW83-(75.0)	280-99601-4	SO	N	Acetone	18.0	15.0 J Q	15.0 J		ug/kg	TR
FEW4-MW83-(85.0)	280-99601-6	SO	N	Trichloroethene (TCE)	5.80	16.0	16.0 J	+	ug/kg	I
FEW4-MW83-(9.0)	280-99601-3	SO	N	Acetone	19.0	12.0 J Q	12.0 J		ug/kg	TR
FEW4-MW83-(95.0)	280-99601-7	SO	N	Chlorobenzene	5.20	1.70 U J	1.70 UJ	-	ug/kg	M

Qualified analytes in samples are reported as estimated, not detected (UJ) at the Limit of Detection (LOD).

US Army Corps of Engineers ®

Detected Results

Test Method: SW8260B Extraction Method: SW5030B Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Dilution	Analyte	LOQ	Lab Result	Qualified Result	Units	Reason
FEW4-MW83-79.0	280-99601-5	WG	N	1	Chloromethane	2.00	1.20 J	1.20 J	ug/L	TR
FEW4-MW83-79.0	280-99601-5	WG	N	1	Trichloroethene (TCE)	1.00	34.0	34.0	ug/L	

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Dilution	Analyte	LOQ	Lab Result	Qualified Result	Units	Reason
FEW4-MW83-(0.5)	280-99601-1	SO	N	1	1,2,3-Trichlorobenzene	3.80	0.610 J	0.610 J	ug/kg	TR
FEW4-MW83-(0.5)	280-99601-1	SO	N	1	Acetone	15.0	15.0 Q	15.0	ug/kg	
FEW4-MW83-(105.0)	280-99601-8	SO	N	1	1,2-Dichloroethene	7.20	3.40 J	3.40 J	ug/kg	TR
FEW4-MW83-(105.0)	280-99601-8	SO	N	1	cis-1,2-Dichloroethene	7.20	3.40 J	3.40 J	ug/kg	TR
FEW4-MW83-(105.0)	280-99601-8	SO	N	1	Trichloroethene (TCE)	250	880	880 J	ug/kg	I
FEW4-MW83-(106.0)	280-99601-9	SO	FD	1	1,2-Dichloroethene	5.30	3.50 J	3.50 J	ug/kg	I/TR
FEW4-MW83-(106.0)	280-99601-9	SO	FD	1	cis-1,2-Dichloroethene	5.30	3.50 J Q	3.50 J	ug/kg	I/TR
FEW4-MW83-(106.0)	280-99601-9	SO	FD	1	Trichloroethene (TCE)	260	720	720 J	ug/kg	I
FEW4-MW83-(75.0)	280-99601-4	SO	N	1	Acetone	18.0	15.0 J Q	15.0 J	ug/kg	TR
FEW4-MW83-(85.0)	280-99601-6	SO	N	1	Trichloroethene (TCE)	5.80	16.0	16.0 J	ug/kg	I
FEW4-MW83-(9.0)	280-99601-3	SO	N	1	Acetone	19.0	12.0 J Q	12.0 J	ug/kg	TR
FEW4-MW83-(95.0)	280-99601-7	SO	N	1	Trichloroethene (TCE)	5.20	71.0	71.0	ug/kg	

US Army Corps of Engineers ®

Rejected Results

--No Records Found--

Facility:	B08WY0467-02, F.E. Warren AFB, Site 4
Event:	2017-2018 RI Addendum Tasks
SDG:	280-99601-1_52_2a_FUDSChem
Guidance Document:	Draft-Final Uniform Federal Policy-Quality Assurance Project Plan for the Remedial Investigation Addendum 2017-2018 Tasks Atlas “D” Missile Site 4 —Laramie County, Wyoming, July 2017
Prime Contractor:	RMC Consultants, Inc., LAKEWOOD, CO
Project Manager:	David Groy
Contract Laboratory:	TestAmerica Laboratories, Inc., Arvada, CO
Data Review Contractor:	RMC Consultants
Data Review Level:	Stage 3VEM
Primary Data Reviewer:	Gary Torf, Contractor Project Chemist
Second Reviewer:	, Senior Scientist
Date Submitted:	

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	SW8260B
FEW4-MW83-(106.0)	280-99601-9	Solid	Field Duplicate/FD	X
FEW4-MW83-(0.5)	280-99601-1	Solid	Field Sample/N	X
FEW4-MW83-(105.0)	280-99601-8	Solid	Field Sample/N	X
FEW4-MW83-(2.0)	280-99601-2	Solid	Field Sample/N	X
FEW4-MW83-(75.0)	280-99601-4	Solid	Field Sample/N	X
FEW4-MW83-(85.0)	280-99601-6	Solid	Field Sample/N	X
FEW4-MW83-(9.0)	280-99601-3	Solid	Field Sample/N	X
FEW4-MW83-(95.0)	280-99601-7	Solid	Field Sample/N	X
FEW4-MW83-79.0	280-99601-5	Water	Field Sample/N	X

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the Draft-Final Uniform Federal Policy-Quality Assurance Project Plan for the Remedial Investigation Addendum 2017-2018 Tasks Atlas “D” Missile Site 4 —Laramie County, Wyoming, July 2017 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by RMC Consultants, Inc., LAKEWOOD, CO; analyses were performed by TestAmerica Laboratories, Inc., Arvada, CO and were reported under sample delivery group (SDG) 280-99601-1_52_2a_FUDSChem. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

- Blank
- Blank - Negative
- Field Duplicate RPD
- LCS Recovery
- LCS RPD
- MS Recovery
- MS RPD
- Prep Hold Time
- Surrogate
- Test Hold Time

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 6 results (1.03%) out of the 580 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected. Trace values, defined as results that are qualified as estimated because they fall between the limit of detection and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

Narrative Comments

Analytical Method	Data Reviewer Comment
SW8260B	No additional comments; see Checklist for detail.

Gary Torf

October 18, 2017

Reviewed by Gary Torf, Contractor Project Chemist, RMC Consultants

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of a minimum of 10% of the reported sample results and method quality control data between the two deliverables.

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

Quality Control Outliers for test method SW8260B, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
FEW4-MW83-(95.0) (MS)/ 280-99601-7MS	Chlorobenzene	77.95	79 - 120	79 - 120	percent	J/UJ	M	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the MS Recovery for SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW83-(95.0)	N	Chlorobenzene	5.20	1.70 U J	1.70 UJ	-	ug/kg	M

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

Quality Control Outliers for test method SW8260B, MS RPD

The objective of matrix spikes/matrix spike duplicates (MS/MSD) RPD analysis is to demonstrate acceptable method precision by the laboratory at the time of analysis. MS/MSD analyses are also performed to generate data that determines the long-term precision of the analytical method on various matrices. Non-homogenous samples can impact the apparent method precision. Summary forms were evaluated and compared to electronic data deliverables. Matrix spikes/matrix spike duplicates results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
280-99601-7MSD (SD)/ 280-99601-7MSD	Chloroethane	22.38	< 20	< 20	rpd	J/None	D	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

Quality Control Outliers for test method SW8260B, Surrogate

Method performance for individual samples is demonstrated through spiking activities. All samples are spiked with surrogate compounds prior to sample preparation. The sample itself may produce effects due to such factors as interferences and high concentrations of analytes. Summary forms were evaluated and compared to electronic data deliverables. Surrogate results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
FEW4-MW83-(105.0) (N)/ 280-99601-8	Toluene-d8	80.81	85 - 116	85 - 116	percent	J/UJ	I	
FEW4-MW83-(106.0) (FD)/ 280-99601-9	Dibromofluoromethane	119.7	78 - 119	78 - 119	percent	J/None	I	
FEW4-MW83-(106.0) (FD)/ 280-99601-9	Toluene-d8	84.91	85 - 116	85 - 116	percent	J/UJ	I	
FEW4-MW83-(2.0) (N)/ 280-99601-2	Dibromofluoromethane	124.7	78 - 119	78 - 119	percent	J/None	I	
FEW4-MW83-(85.0) (N)/ 280-99601-6	Dibromofluoromethane	124.3	78 - 119	78 - 119	percent	J/None	I	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the Surrogate for SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW83-(105.0)	N	Trichloroethene (TCE)	250	880	880 J	-	ug/kg	I
FEW4-MW83-(106.0)	FD	1,2-Dichloroethene	5.30	3.50 J	3.50 J	+	ug/kg	I/TR
FEW4-MW83-(106.0)	FD	cis-1,2-Dichloroethene	5.30	3.50 J Q	3.50 J	+	ug/kg	I/TR
FEW4-MW83-(106.0)	FD	Trichloroethene (TCE)	260	720	720 J	-	ug/kg	I
FEW4-MW83-(85.0)	N	Trichloroethene (TCE)	5.80	16.0	16.0 J	+	ug/kg	I

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

Table of All Qualified Results

Test Method: SW8260B	**Extraction Method: SW5035A**							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW83-(105.0)	N	Trichloroethene (TCE)	250	880	880 J	-	ug/kg	I
FEW4-MW83-(106.0)	FD	1,2-Dichloroethene	5.30	3.50 J	3.50 J	+	ug/kg	I/TR
FEW4-MW83-(106.0)	FD	cis-1,2-Dichloroethene	5.30	3.50 J Q	3.50 J	+	ug/kg	I/TR
FEW4-MW83-(106.0)	FD	Trichloroethene (TCE)	260	720	720 J	-	ug/kg	I
FEW4-MW83-(85.0)	N	Trichloroethene (TCE)	5.80	16.0	16.0 J	+	ug/kg	I
FEW4-MW83-(95.0)	N	Chlorobenzene	5.20	1.70 U J	1.70 UJ	-	ug/kg	M

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
Trace values are not included in the qualified results table unless additional reason codes are associated.

Table of All Trace Results

Test Method: SW8260B	Extraction Method: SW5030B							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW83-79.0	N	Chloromethane	2.00	1.20 J	1.20 J		ug/L	TR

Test Method: SW8260B	Extraction Method: SW5035A							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW83-(0.5)	N	1,2,3-Trichlorobenzene	3.80	0.610 J	0.610 J		ug/kg	TR
FEW4-MW83-(105.0)	N	1,2-Dichloroethene	7.20	3.40 J	3.40 J		ug/kg	TR
FEW4-MW83-(105.0)	N	cis-1,2-Dichloroethene	7.20	3.40 J	3.40 J		ug/kg	TR
FEW4-MW83-(106.0)	FD	1,2-Dichloroethene	5.30	3.50 J	3.50 J	+	ug/kg	I/TR
FEW4-MW83-(106.0)	FD	cis-1,2-Dichloroethene	5.30	3.50 J Q	3.50 J	+	ug/kg	I/TR
FEW4-MW83-(75.0)	N	Acetone	18.0	15.0 J Q	15.0 J		ug/kg	TR
FEW4-MW83-(9.0)	N	Acetone	19.0	12.0 J Q	12.0 J		ug/kg	TR

Results with Modified Qualifiers

No qualifiers associated with this sample delivery group were modified manually.

Reason Code Definitions

Code	Definition
D	MS RPD
I	Surrogate recovery outside project limits.
M	MS Recovery
TR	Trace Level Detect

Flag Code and Definitions

Flag	Definition
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
J	Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
R	The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making.
B	Blank contamination: The analyte was found in an associated blank above one half the RL, as well as in the sample.
UB	The analyte was also detected in an associated laboratory or field blank at a concentration comparable to the concentration in the sample. The reported result has been requalified as not detected.

Review Questions

Method: SW8260B (Volatile Organic Compounds by Capillary GC/MS)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were sample reciept temperatures met?	•			The cooler receipt temperature was 2.4ºC.
Were QAPP specified PQLs achieved?	•			
Were all QAPP-specified target analytes reported?	•			
Was the GC/MS system properly tuned based on method criteria?	•			
Was the criteria met during each 12 hour shift (prior to ICAL and Cal Ver.)?	•			
Does the initial calibration curve consist of 5 concentration levels, with the low standard near but > MDL?	•			
Did the Calibration Check Compounds (CCCs) have a relative standard deviation within QAPP acceptance limits?	•			
Were the average response factors (RFs) for the System Performance Check Compounds (SPCCs) within QAPP acceptance limits?	•			
Were the ICAL %RSDs for the target compounds within method criteria?	•			
If a quadratic equation curve was used, was the coefficient of determination (COD) within criteria?	•			
If a linear regression curve was used, was the correlation coefficient within criteria?	•			
Check and recalculate the response factors and average response factors for a least one target compound.	•			ICAL VMS-G2 7/21/17 Trichloroethene Average RF = 0.2399
Check and recalculate the %RSD for one of more target compounds and DMCs. Verify that the recalculated values agree with the laboratory reported values.				ICAL VMS-G2 7/21/17 Trichloroethene %RSD = 2.6%; 1,2-Dichloroethene-d4 %RSD = 4.8%
Was a second source verification analyzed after the ICAL and all analytes within criteria?		•		The ICV percent difference was above the upper control limit for dichlorodifluoromethane at 34.4%. All associated sample results were nondetect for this analyte, therefore no data qualification is warranted.
Was a CCV run at the beginning of the analytical sequence and every 12 hours?	•			
Was the CCV a mid-level standard from the initial calibration curve?	•			
Did the CCCs have a %Difference within QAPP acceptance limits?	•			
Were the average RFs for the SPCCs within QAPP acceptance limits?	•			
Was the %D (difference or drift) for all target analytes within QAPP acceptance limits?		•		A CCV percent difference was above the controllimit for n-butylbenzene at 25.6% and 2-butanone at 20.4%; a CCV percent difference was above the control limit for acetone at 23.2%. All associated sample results were non-detect for these analytes, therefore no data qualification is warranted.
Check and recalculate the CCV relative response factor for at least one target compound.	•			VMS-G2 CCV 280-382992/2 Trichloroethene RRF = 0.2758
Were the internal standards added to every standard, blank, matrix spike, matrix spike duplicate, and sample?	•			

Review Questions

Method: SW8260B (Volatile Organic Compounds by Capillary GC/MS)				
Review Questions	Yes	No	NA	Comment
Were the retention times for all IS compounds within QAPP acceptance limits?	•			
Are the area counts of all IS compounds within QAPP acceptance limits?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes detected in the method blank above the MDL?	•			n-Butylbenzene was detected in a method blank at a concentration less than 1/2 the LOQ.
Were target analytes reported in the field blank analyses above the MDL?			•	
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?	•			FEW4-MW83-(106) was a blind duplicate of FEW4-MW83-105).
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were the LCS/LCSD recoveries within QAPP acceptance limits?		•		In LCS 280-383001/1-A: n-Butylbenzene was recovered at 129%, greater than the upper control limit of 129%;1,1-Dichloropropene was recovered at 134%, greater than the upper control limit of 125%; and toluene was recovered at 126%, greater than the upper control limit of 121%. These analytes were not detected in any associated samples, therefore no data qualification was warranted.
Were the LCS/LCSD RPDs within QAPP acceptance limits?	•			
Was the duplicate RPD within QAPP acceptance limits?			•	
Was a MS/MSD pair prepared with each batch?	•			
Is the MS/MSD parent sample the one designated by the sampling team?	•			FEW4-MW83-(95.0) was designated for MS/MSD analysis.
Were MS/MSD recoveries and RPD within QAPP acceptance limits?		•		Chlorobenzene was recovered less than the lower control limit of 79% at 78% in the MS; chloroethane exceeded the precision limit of 20% at 22%. These analytes have been qualified for the parent sample.
Were surrogate recoveries within QAPP acceptance limits?		•		Dibromofluoromethane was above the upper control limit of 119% at 124%, 124%, 122%, and 120%.
Were reported sample concentrations within calibration range?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were instrument run logs present and filled out appropriately?	•			
Were sample prepration sheets present and filled out appropriately?	•			
Check and recalculate the %D for one target compound. Verify that the recalculated values agree with the laboratory-reported values.			•	
Examine raw data to verify correct calculation of sample results reported by the laboratory. Compare quantitation lists and chromatograms to the reported detect and non-detect sample results.	•			FEW4-MW83-79 Trichloroethene = 34 ug/L
Verify that the reporting limits and sample results have been adjusted to reflect all sample dilutions and Percent Moisture factors (non-aqueous samples).	•			

US Army Corps of Engineers ®

Batch Report

Test Method: SW8260B Analysis Batch: 280-383162

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
LABQC	SQ	LCS 280-383155/1-A	LCS 280-383155/1-A		1/1	8/3/2017 20:00	8/3/2017 20:00	8/3/2017 20:32	280-383162/	BS
LABQC	SQ	MB 280-383155/2-A	MB 280-383155/2-A		1/1	8/3/2017 20:00	8/3/2017 20:00	8/3/2017 21:12	280-383162/	LB
FEW4-MW83	SO	FEW4-MW83-(204.0)	280-99654-11		1/1	7/27/2017 11:30	7/27/2017 11:30	8/3/2017 22:52	280-383162/	N
FEW4-MW83	SO	FEW4-MW83-(204.0)	280-99654-11MS		1/1	7/27/2017 11:30	7/27/2017 11:30	8/3/2017 23:13	280-383162/	MS
FEW4-MW83	SO	FEW4-MW83-(204.0)	280-99654-11MSD		1/1	7/27/2017 11:30	7/27/2017 11:30	8/3/2017 23:33	280-383162/	SD
FEW4-MW83	SO	FEW4-MW83-(115.0)	280-99654-1		1/1	7/26/2017 16:40	7/26/2017 16:40	8/3/2017 23:53	280-383162/	N
FEW4-MW83	SO	FEW4-MW83-(124.0)	280-99654-2		1/1	7/26/2017 17:00	7/26/2017 17:00	8/4/2017 00:13	280-383162/	N
FEW4-MW83	SO	FEW4-MW83-(133.0)	280-99654-3		1/1	7/26/2017 18:05	7/26/2017 18:05	8/4/2017 00:33	280-383162/	N
FEW4-MW83	SO	FEW4-MW83-(145.0)	280-99654-4		1/1	7/26/2017 18:15	7/26/2017 18:15	8/4/2017 00:53	280-383162/	N
FEW4-MW83	SO	FEW4-MW83-(149.0)	280-99654-5		1/1	7/27/2017 10:00	7/27/2017 10:00	8/4/2017 01:13	280-383162/	N
FEW4-MW83	SO	FEW4-MW83-(157.0)	280-99654-6		1/1	7/27/2017 10:10	7/27/2017 10:10	8/4/2017 01:33	280-383162/	N
FEW4-MW83	SO	FEW4-MW83-(169.0)	280-99654-7		1/1	7/27/2017 10:40	7/27/2017 10:40	8/4/2017 01:53	280-383162/	N
FEW4-MW83	SO	FEW4-MW83-(178.0)	280-99654-8		1/1	7/27/2017 10:50	7/27/2017 10:50	8/4/2017 02:13	280-383162/	N
FEW4-MW83	SO	FEW4-MW83-(185.0)	280-99654-9		1/1	7/27/2017 11:00	7/27/2017 11:00	8/4/2017 02:33	280-383162/	N
FEW4-MW83	SO	FEW4-MW83-(193.0)	280-99654-10		1/1	7/27/2017 11:20	7/27/2017 11:20	8/4/2017 02:53	280-383162/	N
FEW4-MW83	SO	FEW4-MW83-(212.0)	280-99654-12		1/1	7/27/2017 12:12	7/27/2017 12:12	8/4/2017 03:13	280-383162/	N
FEW4-MW83	SO	FEW4-MW83-(213.0)	280-99654-13		1/1	7/27/2017 13:12	7/27/2017 13:12	8/4/2017 03:33	280-383162/	FD
FEW4-MW83	SO	FEW4-MW83-(225.0)	280-99654-14		1/1	7/27/2017 14:05	7/27/2017 14:05	8/4/2017 03:53	280-383162/	N

Test Method: SW8260B Analysis Batch: 280-383351

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
LABQC	SQ	MB 280-383231/1-A	MB 280-383231/1-A		1/1	8/4/2017 10:56	8/4/2017 10:56	8/7/2017 12:46	280-383351/	LB
LABQC	SQ	LCS 280-383231/2-A	LCS 280-383231/2-A		1/1	8/4/2017 10:56	8/4/2017 10:56	8/7/2017 16:17	280-383351/	BS
LABQC	SQ	LCSD 280-383231/3-A	LCSD 280-383231/3-A		1/1	8/4/2017 10:56	8/4/2017 10:56	8/7/2017 16:37	280-383351/	BD

US Army Corps of Engineers ®

Batch Report

Test Method: SW8260B Analysis Batch: 280-383351

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
FEW4-MW83	SO	FEW4-MW83-(115.0)	280-99654-1		2/1	7/26/2017 16:40	8/4/2017 10:56	8/7/2017 17:35	280-383351/	N
FEW4-MW83	SO	FEW4-MW83-(124.0)	280-99654-2		2/1	7/26/2017 17:00	8/4/2017 10:56	8/7/2017 17:54	280-383351/	N
FEW4-MW83	SO	FEW4-MW83-(133.0)	280-99654-3		2/1	7/26/2017 18:05	8/4/2017 10:56	8/7/2017 18:13	280-383351/	N
FEW4-MW83	SO	FEW4-MW83-(145.0)	280-99654-4		2/1	7/26/2017 18:15	8/4/2017 10:56	8/7/2017 18:33	280-383351/	N
FEW4-MW83	SO	FEW4-MW83-(149.0)	280-99654-5		2/1	7/27/2017 10:00	8/4/2017 10:56	8/7/2017 18:52	280-383351/	N

US Army Corps of Engineers ®

Field Batch Report

--No Records Found--

MS Mismatch Report

--No Records Found--

Section to identify Matrix Spike mismatches where parent sample differs from MS by dilution.

US Army Corps of Engineers ®

QC Outlier Report

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

QC Element	Sample ID/ Lab Sample ID	Run#/ Dil'n	Analyte	Result (Units)	Qualifier	Warning Limits	Control Limits	Reason	Comment	Rule	Action Level
MS RPD	280-99654-11MSD (SD) / 280-99654-11MSD	1 / 1.00	Acetone	21.67 (rpd)	J/None	< 20	< 20	D			
Surrogate	FEW4-MW83-(124.0) (N) / 280-99654-2	2 / 1.00	1-Bromo-4-fluorobenzene (4-Bromofluorobenzene)	133.3 (percent)	J/None	79 - 119	79 - 119	I			
Surrogate	FEW4-MW83-(124.0) (N) / 280-99654-2	2 / 1.00	Toluene-d8	117.6 (percent)	J/None	85 - 116	85 - 116	I			
Surrogate	FEW4-MW83-(133.0) (N) / 280-99654-3	2 / 1.00	1-Bromo-4-fluorobenzene (4-Bromofluorobenzene)	125.0 (percent)	J/None	79 - 119	79 - 119	I			
Surrogate	FEW4-MW83-(145.0) (N) / 280-99654-4	2 / 1.00	Toluene-d8	76.63 (percent)	J/UJ	85 - 116	85 - 116	I			
Surrogate	FEW4-MW83-(149.0) (N) / 280-99654-5	2 / 1.00	1-Bromo-4-fluorobenzene (4-Bromofluorobenzene)	147.6 (percent)	J/None	79 - 119	79 - 119	I			
Surrogate	FEW4-MW83-(149.0) (N) / 280-99654-5	2 / 1.00	Dibromofluoromethane	125.5 (percent)	J/None	78 - 119	78 - 119	I			
Surrogate	FEW4-MW83-(149.0) (N) / 280-99654-5	2 / 1.00	Toluene-d8	132.8 (percent)	J/None	85 - 116	85 - 116	I			

Rule is the multiplier used when blank contamination occurs to determine action level.

US Army Corps of Engineers ®

Qualified Results

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW83-(115.0)	280-99654-1	SO	N	1,2,3-Trichlorobenzene	7.30	1.50 J	1.50 J		ug/kg	TR
FEW4-MW83-(115.0)	280-99654-1	SO	N	1,2-Dichloroethene	7.30	4.20 J	4.20 J		ug/kg	TR
FEW4-MW83-(115.0)	280-99654-1	SO	N	Acetone	29.0	9.00 J	9.00 J		ug/kg	TR
FEW4-MW83-(115.0)	280-99654-1	SO	N	cis-1,2-Dichloroethene	7.30	4.20 J	4.20 J		ug/kg	TR
FEW4-MW83-(115.0)	280-99654-1	SO	N	Naphthalene	7.30	2.90 J	2.90 J		ug/kg	TR
FEW4-MW83-(124.0)	280-99654-2	SO	N	1,2-Dichloroethene	5.80	1.40 J	1.40 J		ug/kg	TR
FEW4-MW83-(124.0)	280-99654-2	SO	N	Acetone	23.0	13.0 J	13.0 J		ug/kg	TR
FEW4-MW83-(124.0)	280-99654-2	SO	N	cis-1,2-Dichloroethene	5.80	1.40 J	1.40 J		ug/kg	TR
FEW4-MW83-(124.0)	280-99654-2	SO	N	Trichloroethene (TCE)	320	760	760 J	+	ug/kg	I
FEW4-MW83-(133.0)	280-99654-3	SO	N	1,2-Dichloroethene	6.40	1.30 J	1.30 J		ug/kg	TR
FEW4-MW83-(133.0)	280-99654-3	SO	N	Acetone	26.0	9.30 J	9.30 J		ug/kg	TR
FEW4-MW83-(133.0)	280-99654-3	SO	N	cis-1,2-Dichloroethene	6.40	1.30 J	1.30 J		ug/kg	TR
FEW4-MW83-(133.0)	280-99654-3	SO	N	Trichloroethene (TCE)	270	660	660 J	+	ug/kg	I
FEW4-MW83-(145.0)	280-99654-4	SO	N	1,2-Dichloroethene	6.90	1.10 J	1.10 J		ug/kg	TR
FEW4-MW83-(145.0)	280-99654-4	SO	N	cis-1,2-Dichloroethene	6.90	1.10 J	1.10 J		ug/kg	TR
FEW4-MW83-(145.0)	280-99654-4	SO	N	Trichloroethene (TCE)	330	530	530 J	-	ug/kg	I
FEW4-MW83-(149.0)	280-99654-5	SO	N	1,2-Dichloroethene	7.30	1.70 J	1.70 J		ug/kg	TR
FEW4-MW83-(149.0)	280-99654-5	SO	N	Acetone	29.0	28.0 J	28.0 J		ug/kg	TR
FEW4-MW83-(149.0)	280-99654-5	SO	N	cis-1,2-Dichloroethene	7.30	1.70 J	1.70 J		ug/kg	TR
FEW4-MW83-(149.0)	280-99654-5	SO	N	Trichloroethene (TCE)	340	400	400 J	+	ug/kg	I
FEW4-MW83-(169.0)	280-99654-7	SO	N	Acetone	25.0	21.0 J	21.0 J		ug/kg	TR
FEW4-MW83-(185.0)	280-99654-9	SO	N	Acetone	28.0	22.0 J	22.0 J		ug/kg	TR
FEW4-MW83-(204.0)	280-99654-11	SO	N	1,2,3-Trichlorobenzene	8.20	1.70 J	1.70 J		ug/kg	TR
FEW4-MW83-(204.0)	280-99654-11	SO	N	Acetone	33.0	27.0 J	27.0 J		ug/kg	D/TR
FEW4-MW83-(204.0)	280-99654-11	SO	N	Naphthalene	8.20	3.20 J	3.20 J		ug/kg	TR
FEW4-MW83-(213.0)	280-99654-13	SO	FD	Acetone	23.0	11.0 J	11.0 J		ug/kg	TR

US Army Corps of Engineers ®

Qualified Results

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW83-(225.0)	280-99654-14	SO	N	Acetone	21.0	19.0 J	19.0 J		ug/kg	TR

Qualified analytes in samples are reported as estimated, not detected (UJ) at the Limit of Detection (LOD).

Detected Results

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Dilution	Analyte	LOQ	Lab Result	Qualified Result	Units	Reason
FEW4-MW83-(115.0)	280-99654-1	SO	N	1	1,2,3-Trichlorobenzene	7.30	1.50 J	1.50 J	ug/kg	TR
FEW4-MW83-(115.0)	280-99654-1	SO	N	1	1,2-Dichloroethene	7.30	4.20 J	4.20 J	ug/kg	TR
FEW4-MW83-(115.0)	280-99654-1	SO	N	1	Acetone	29.0	9.00 J	9.00 J	ug/kg	TR
FEW4-MW83-(115.0)	280-99654-1	SO	N	1	cis-1,2-Dichloroethene	7.30	4.20 J	4.20 J	ug/kg	TR
FEW4-MW83-(115.0)	280-99654-1	SO	N	1	Naphthalene	7.30	2.90 J	2.90 J	ug/kg	TR
FEW4-MW83-(115.0)	280-99654-1	SO	N	1	Trichloroethene (TCE)	330	1400	1400	ug/kg	
FEW4-MW83-(124.0)	280-99654-2	SO	N	1	1,2-Dichloroethene	5.80	1.40 J	1.40 J	ug/kg	TR
FEW4-MW83-(124.0)	280-99654-2	SO	N	1	Acetone	23.0	13.0 J	13.0 J	ug/kg	TR
FEW4-MW83-(124.0)	280-99654-2	SO	N	1	cis-1,2-Dichloroethene	5.80	1.40 J	1.40 J	ug/kg	TR
FEW4-MW83-(124.0)	280-99654-2	SO	N	1	Trichloroethene (TCE)	320	760	760 J	ug/kg	I
FEW4-MW83-(133.0)	280-99654-3	SO	N	1	1,2-Dichloroethene	6.40	1.30 J	1.30 J	ug/kg	TR
FEW4-MW83-(133.0)	280-99654-3	SO	N	1	Acetone	26.0	9.30 J	9.30 J	ug/kg	TR
FEW4-MW83-(133.0)	280-99654-3	SO	N	1	cis-1,2-Dichloroethene	6.40	1.30 J	1.30 J	ug/kg	TR
FEW4-MW83-(133.0)	280-99654-3	SO	N	1	Trichloroethene (TCE)	270	660	660 J	ug/kg	I
FEW4-MW83-(145.0)	280-99654-4	SO	N	1	1,2-Dichloroethene	6.90	1.10 J	1.10 J	ug/kg	TR
FEW4-MW83-(145.0)	280-99654-4	SO	N	1	cis-1,2-Dichloroethene	6.90	1.10 J	1.10 J	ug/kg	TR
FEW4-MW83-(145.0)	280-99654-4	SO	N	1	Trichloroethene (TCE)	330	530	530 J	ug/kg	I
FEW4-MW83-(149.0)	280-99654-5	SO	N	1	1,2-Dichloroethene	7.30	1.70 J	1.70 J	ug/kg	TR
FEW4-MW83-(149.0)	280-99654-5	SO	N	1	Acetone	29.0	28.0 J	28.0 J	ug/kg	TR
FEW4-MW83-(149.0)	280-99654-5	SO	N	1	cis-1,2-Dichloroethene	7.30	1.70 J	1.70 J	ug/kg	TR
FEW4-MW83-(149.0)	280-99654-5	SO	N	1	Trichloroethene (TCE)	340	400	400 J	ug/kg	I
FEW4-MW83-(157.0)	280-99654-6	SO	N	1	Acetone	22.0	23.0	23.0	ug/kg	
FEW4-MW83-(157.0)	280-99654-6	SO	N	1	Trichloroethene (TCE)	5.60	21.0	21.0	ug/kg	
FEW4-MW83-(169.0)	280-99654-7	SO	N	1	Acetone	25.0	21.0 J	21.0 J	ug/kg	TR
FEW4-MW83-(178.0)	280-99654-8	SO	N	1	Acetone	23.0	25.0	25.0	ug/kg	
FEW4-MW83-(185.0)	280-99654-9	SO	N	1	Acetone	28.0	22.0 J	22.0 J	ug/kg	TR
FEW4-MW83-(204.0)	280-99654-11	SO	N	1	1,2,3-Trichlorobenzene	8.20	1.70 J	1.70 J	ug/kg	TR

US Army Corps of Engineers ®

Detected Results

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Dilution	Analyte	LOQ	Lab Result	Qualified Result	Units	Reason
FEW4-MW83-(204.0)	280-99654-11	SO	N	1	Acetone	33.0	27.0 J	27.0 J	ug/kg	D/TR
FEW4-MW83-(204.0)	280-99654-11	SO	N	1	Naphthalene	8.20	3.20 J	3.20 J	ug/kg	TR
FEW4-MW83-(213.0)	280-99654-13	SO	FD	1	Acetone	23.0	11.0 J	11.0 J	ug/kg	TR
FEW4-MW83-(225.0)	280-99654-14	SO	N	1	Acetone	21.0	19.0 J	19.0 J	ug/kg	TR

US Army Corps of Engineers ®

Rejected Results

--No Records Found--

Facility:	B08WY0467-02, F.E. Warren AFB, Site 4
Event:	2017-2018 RI Addendum Tasks
SDG:	280-99654-1_52_2a_FUDSChem
Guidance Document:	Draft-Final Uniform Federal Policy-Quality Assurance Project Plan for the Remedial Investigation Addendum 2017-2018 Tasks Atlas “D” Missile Site 4 —Laramie County, Wyoming, July 2017
Prime Contractor:	RMC Consultants, Inc., LAKEWOOD, CO
Project Manager:	David Groy
Contract Laboratory:	TestAmerica Laboratories, Inc., Arvada, CO
Data Review Contractor:	RMC Consultants
Data Review Level:	Stage 3VEM
Primary Data Reviewer:	Gary Torf, Contractor Project Chemist
Second Reviewer:	, Senior Scientist
Date Submitted:	

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	SW8260B
FEW4-MW83-(213.0)	280-99654-13	Solid	Field Duplicate/FD	X
FEW4-MW83-(115.0)	280-99654-1	Solid	Field Sample/N	X
FEW4-MW83-(124.0)	280-99654-2	Solid	Field Sample/N	X
FEW4-MW83-(133.0)	280-99654-3	Solid	Field Sample/N	X
FEW4-MW83-(145.0)	280-99654-4	Solid	Field Sample/N	X
FEW4-MW83-(149.0)	280-99654-5	Solid	Field Sample/N	X
FEW4-MW83-(157.0)	280-99654-6	Solid	Field Sample/N	X
FEW4-MW83-(169.0)	280-99654-7	Solid	Field Sample/N	X
FEW4-MW83-(178.0)	280-99654-8	Solid	Field Sample/N	X
FEW4-MW83-(185.0)	280-99654-9	Solid	Field Sample/N	X
FEW4-MW83-(193.0)	280-99654-10	Solid	Field Sample/N	X
FEW4-MW83-(204.0)	280-99654-11	Solid	Field Sample/N	X
FEW4-MW83-(212.0)	280-99654-12	Solid	Field Sample/N	X
FEW4-MW83-(225.0)	280-99654-14	Solid	Field Sample/N	X

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the Draft-Final Uniform Federal Policy-Quality Assurance Project Plan for the Remedial Investigation Addendum 2017-2018 Tasks Atlas “D” Missile Site 4 —Laramie County, Wyoming, July 2017 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by RMC Consultants, Inc., LAKEWOOD, CO; analyses were performed by TestAmerica Laboratories, Inc., Arvada, CO and were reported under sample delivery group (SDG) 280-99654-1_52_2a_FUDSChem. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

- Blank
- Blank - Negative
- Field Duplicate RPD
- LCS Recovery
- LCS RPD
- MS Recovery
- MS RPD
- Prep Hold Time
- Surrogate
- Test Hold Time

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 5 results (0.54%) out of the 924 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected. Trace values, defined as results that are qualified as estimated because they fall between the limit of detection and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

Narrative Comments

Analytical Method	Data Reviewer Comment
SW8260B	No additional comments; see Checklist for detail.

Gary Torf

October 20, 2017

Reviewed by Gary Torf, Contractor Project Chemist, RMC Consultants

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of a minimum of 10% of the reported sample results and method quality control data between the two deliverables.

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

Quality Control Outliers for test method SW8260B, MS RPD

The objective of matrix spikes/matrix spike duplicates (MS/MSD) RPD analysis is to demonstrate acceptable method precision by the laboratory at the time of analysis. MS/MSD analyses are also performed to generate data that determines the long-term precision of the analytical method on various matrices. Non-homogenous samples can impact the apparent method precision. Summary forms were evaluated and compared to electronic data deliverables. Matrix spikes/matrix spike duplicates results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
280-99654-11MSD (SD)/ 280-99654-11MSD	Acetone	21.67	< 20	< 20	rpd	J/None	D	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the MS RPD for SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW83-(204.0)	N	Acetone	33.0	27.0 J	27.0 J		ug/kg	D/TR

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

Quality Control Outliers for test method SW8260B, Surrogate

Method performance for individual samples is demonstrated through spiking activities. All samples are spiked with surrogate compounds prior to sample preparation. The sample itself may produce effects due to such factors as interferences and high concentrations of analytes. Summary forms were evaluated and compared to electronic data deliverables. Surrogate results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
FEW4-MW83-(124.0) (N)/ 280-99654-2	Toluene-d8	117.6	85 - 116	85 - 116	percent	J/None	I	
FEW4-MW83-(124.0) (N)/ 280-99654-2	1-Bromo-4-fluorobenzene (4-Bromofluorobenzene)	133.3	79 - 119	79 - 119	percent	J/None	I	
FEW4-MW83-(133.0) (N)/ 280-99654-3	1-Bromo-4-fluorobenzene (4-Bromofluorobenzene)	125.0	79 - 119	79 - 119	percent	J/None	I	
FEW4-MW83-(145.0) (N)/ 280-99654-4	Toluene-d8	76.63	85 - 116	85 - 116	percent	J/UJ	I	
FEW4-MW83-(149.0) (N)/ 280-99654-5	Dibromofluoromethane	125.5	78 - 119	78 - 119	percent	J/None	I	
FEW4-MW83-(149.0) (N)/ 280-99654-5	Toluene-d8	132.8	85 - 116	85 - 116	percent	J/None	I	
FEW4-MW83-(149.0) (N)/ 280-99654-5	1-Bromo-4-fluorobenzene (4-Bromofluorobenzene)	147.6	79 - 119	79 - 119	percent	J/None	I	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the Surrogate for SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW83-(124.0)	N	Trichloroethene (TCE)	320	760	760 J	+	ug/kg	I
FEW4-MW83-(133.0)	N	Trichloroethene (TCE)	270	660	660 J	+	ug/kg	I
FEW4-MW83-(145.0)	N	Trichloroethene (TCE)	330	530	530 J	-	ug/kg	I
FEW4-MW83-(149.0)	N	Trichloroethene (TCE)	340	400	400 J	+	ug/kg	I

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

Table of All Qualified Results

Test Method: SW8260B	**Extraction Method: SW5035A**							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW83-(124.0)	N	Trichloroethene (TCE)	320	760	760 J	+	ug/kg	I
FEW4-MW83-(133.0)	N	Trichloroethene (TCE)	270	660	660 J	+	ug/kg	I
FEW4-MW83-(145.0)	N	Trichloroethene (TCE)	330	530	530 J	-	ug/kg	I
FEW4-MW83-(149.0)	N	Trichloroethene (TCE)	340	400	400 J	+	ug/kg	I
FEW4-MW83-(204.0)	N	Acetone	33.0	27.0 J	27.0 J		ug/kg	D/TR

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
Trace values are not included in the qualified results table unless additional reason codes are associated.

Table of All Trace Results

Test Method: SW8260B	Extraction Method: SW5035A							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW83-(115.0)	N	1,2,3-Trichlorobenzene	7.30	1.50 J	1.50 J		ug/kg	TR
FEW4-MW83-(115.0)	N	1,2-Dichloroethene	7.30	4.20 J	4.20 J		ug/kg	TR
FEW4-MW83-(115.0)	N	Acetone	29.0	9.00 J	9.00 J		ug/kg	TR
FEW4-MW83-(115.0)	N	cis-1,2-Dichloroethene	7.30	4.20 J	4.20 J		ug/kg	TR
FEW4-MW83-(115.0)	N	Naphthalene	7.30	2.90 J	2.90 J		ug/kg	TR
FEW4-MW83-(124.0)	N	1,2-Dichloroethene	5.80	1.40 J	1.40 J		ug/kg	TR
FEW4-MW83-(124.0)	N	Acetone	23.0	13.0 J	13.0 J		ug/kg	TR
FEW4-MW83-(124.0)	N	cis-1,2-Dichloroethene	5.80	1.40 J	1.40 J		ug/kg	TR
FEW4-MW83-(133.0)	N	1,2-Dichloroethene	6.40	1.30 J	1.30 J		ug/kg	TR
FEW4-MW83-(133.0)	N	Acetone	26.0	9.30 J	9.30 J		ug/kg	TR
FEW4-MW83-(133.0)	N	cis-1,2-Dichloroethene	6.40	1.30 J	1.30 J		ug/kg	TR
FEW4-MW83-(145.0)	N	1,2-Dichloroethene	6.90	1.10 J	1.10 J		ug/kg	TR
FEW4-MW83-(145.0)	N	cis-1,2-Dichloroethene	6.90	1.10 J	1.10 J		ug/kg	TR
FEW4-MW83-(149.0)	N	1,2-Dichloroethene	7.30	1.70 J	1.70 J		ug/kg	TR
FEW4-MW83-(149.0)	N	Acetone	29.0	28.0 J	28.0 J		ug/kg	TR
FEW4-MW83-(149.0)	N	cis-1,2-Dichloroethene	7.30	1.70 J	1.70 J		ug/kg	TR
FEW4-MW83-(169.0)	N	Acetone	25.0	21.0 J	21.0 J		ug/kg	TR
FEW4-MW83-(185.0)	N	Acetone	28.0	22.0 J	22.0 J		ug/kg	TR
FEW4-MW83-(204.0)	N	1,2,3-Trichlorobenzene	8.20	1.70 J	1.70 J		ug/kg	TR
FEW4-MW83-(204.0)	N	Acetone	33.0	27.0 J	27.0 J		ug/kg	D/TR
FEW4-MW83-(204.0)	N	Naphthalene	8.20	3.20 J	3.20 J		ug/kg	TR
FEW4-MW83-(213.0)	FD	Acetone	23.0	11.0 J	11.0 J		ug/kg	TR
FEW4-MW83-(225.0)	N	Acetone	21.0	19.0 J	19.0 J		ug/kg	TR

Results with Modified Qualifiers

No qualifiers associated with this sample delivery group were modified manually.

Reason Code Definitions

Code	Definition
D	MS RPD
I	Surrogate recovery outside project limits.
TR	Trace Level Detect

Flag Code and Definitions

Flag	Definition
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
J	Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
R	The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making.
B	Blank contamination: The analyte was found in an associated blank above one half the RL, as well as in the sample.
UB	The analyte was also detected in an associated laboratory or field blank at a concentration comparable to the concentration in the sample. The reported result has been requalified as not detected.

Review Questions

Method: SW8260B (Volatile Organic Compounds by Capillary GC/MS)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were sample reciept temperatures met?	•			The cooler receipt temperature was 2.4ºC.
Were QAPP specified PQLs achieved?	•			
Were all QAPP-specified target analytes reported?	•			
Was the GC/MS system properly tuned based on method criteria?	•			
Was the criteria met during each 12 hour shift (prior to ICAL and Cal Ver.)?	•			
Does the initial calibration curve consist of 5 concentration levels, with the low standard near but > MDL?	•			
Did the Calibration Check Compounds (CCCs) have a relative standard deviation within QAPP acceptance limits?	•			
Were the average response factors (RFs) for the System Performance Check Compounds (SPCCs) within QAPP acceptance limits?	•			
Were the ICAL %RSDs for the target compounds within method criteria?				
If a quadratic equation curve was used, was the coefficient of determination (COD) within criteria?	•			
If a linear regression curve was used, was the correlation coefficient within criteria?	•			
Check and recalculate the response factors and average response factors for a least one target compound.	•			ICAL VMS-P 8/7/17Trichloroethene Average RF = 0.3072
Check and recalculate the %RSD for one of more target compounds and DMCs. Verify that the recalculated values agree with the laboratory reported values.	•			ICAL VMS-P 8/7/17 Trichloroethene % RSD = 7.6% 1,2-Dichloroethane-d4 % RSD = 3.76%
Was a second source verification analyzed after the ICAL and all analytes within criteria?	•			
Was a CCV run at the beginning of the analytical sequence and every 12 hours?	•			
Was the CCV a mid-level standard from the initial calibration curve?	•			
Did the CCCs have a %Difference within QAPP acceptance limits?	•			
Were the average RFs for the SPCCs within QAPP acceptance limits?	•			
Was the %D (difference or drift) for all target analytes within QAPP acceptance limits?		•		A CCV percent difference was above the control limit for n-butylbenzene at 32.7%, hexachlorobutadiene at 25.3%, 4-isopropyltoluene at 24.0%, and 1,2,4-trichlorobenzene at 25.2%; all associated sample results were non-detect for these analytes, therefore no data qualification is warranted.
Check and recalculate the CCV relative response factor for at least one target compound.	•			VMS-P 8/7/17 CCVC 280-383351/33 Trichloroethene RRF = 0.3030
Were the internal standards added to every standard, blank, matrix spike, matrix spike duplicate, and sample?	•			
Were the retention times for all IS compounds within QAPP acceptance limits?	•			

Review Questions

Method: SW8260B (Volatile Organic Compounds by Capillary GC/MS)

Review Questions	Yes	No	NA	Comment
Are the area counts of all IS compounds within QAPP acceptance limits?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes detected in the method blank above the MDL?	•			n-Butylbenzene was detected in a method blank at a concentration less than 1/2 the LOQ, therefore no data qualification is necessary.
Were target analytes reported in the field blank analyses above the MDL?			•	
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?	•			FEW4-MW83-(213.0) was a blind duplicate of FEW4-MW83-(212.0).
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were the LCS/LCSD recoveries within QAPP acceptance limits?		•		In LCS 280-383155/1-A, n-Butylbenzene was recovered greater than the upper control limit of 128% at 132%. The analyte was not detected in any associated samples, therefore no data qualification is warranted. In LCS 280-383231/2-A, several analytes were outside control limits. However, this LCS was only associated with a dilution result for trichloroethene, which was in control. No data qualification was warranted.
Were the LCS/LCSD RPDs within QAPP acceptance limits?	•			
Was the duplicate RPD within QAPP acceptance limits?			•	
Was a MS/MSD pair prepared with each batch?	•			
Is the MS/MSD parent sample the one designated by the sampling team?	•			MS/MSD analysis was performed on FEW4-MW83-(204.0).
Were MS/MSD recoveries and RPD within QAPP acceptance limits?		•		The acetone RPD result of 22% was greater than the precision limit of 20% RPD.
Were surrogate recoveries within QAPP acceptance limits?		•		Recoveries of bromofluorobenzene, toluene-d8, and dibromofluoromethane were greater than the upper control limit for the trichloroethene dilution analyses of FEW4-MW83-(124.0), FEW4-MW83-(133.0), FEW4-MW83-(145.0), and FEW4-MW83-(149.0).
Were reported sample concentrations within calibration range?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were instrument run logs present and filled out appropriately?	•			
Were sample prepration sheets present and filled out appropriately?	•			
Check and recalculate the %D for one target compound. Verify that the recalculated values agree with the laboratory-reported values.			•	
Examine raw data to verify correct calculation of sample results reported by the laboratory. Compare quantitation lists and chromatograms to the reported detect and non-detect sample results.	•			FEW4-MW83-(124.0) DL Trichloroethene = 760 ug/kg
Verify that the reporting limits and sample results have been adjusted to reflect all sample dilutions and Percent Moisture factors (non-aqueous samples).	•			

US Army Corps of Engineers®

Batch Report

Test Method: SW8260B Analysis Batch: 280-383306

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
LABQC	SQ	LCS 280-383305/1-A	LCS 280-383305/1-A		1/1	8/4/2017 16:00	8/4/2017 16:00	8/4/2017 21:49	280-383306/	BS
LABQC	SQ	LCSD 280-383305/2-A	LCSD 280-383305/2-A		1/1	8/4/2017 16:00	8/4/2017 16:00	8/4/2017 22:09	280-383306/	BD
LABQC	SQ	MB 280-383305/3-A	MB 280-383305/3-A		1/1	8/4/2017 16:00	8/4/2017 16:00	8/4/2017 22:50	280-383306/	LB
FEW4-MW77	SO	FEW4-MW77-(55.0)	280-99716-8		1/1	7/28/2017 10:10	7/28/2017 10:10	8/5/2017 00:52	280-383306/	N
FEW4-MW77	SO	FEW4-MW77-(55.0)	280-99716-8MS		1/1	7/28/2017 10:10	7/28/2017 10:10	8/5/2017 01:13	280-383306/	MS
FEW4-MW77	SO	FEW4-MW77-(55.0)	280-99716-8MSD		1/1	7/28/2017 10:10	7/28/2017 10:10	8/5/2017 01:33	280-383306/	SD
FEW4-MW83	SO	FEW4-MW83-(239.0)	280-99716-1		1/1	7/27/2017 16:20	7/27/2017 16:20	8/5/2017 02:13	280-383306/	N
FEW4-MW83	SO	FEW4-MW83-(244.0)	280-99716-2		1/1	7/27/2017 16:30	7/27/2017 16:30	8/5/2017 02:33	280-383306/	N
FEW4-MW83	SO	FEW4-MW83-(255.0)	280-99716-3		1/1	7/27/2017 17:20	7/27/2017 17:20	8/5/2017 02:54	280-383306/	N
FEW4-MW77	SO	FEW4-MW77-(28.0)	280-99716-4		1/1	7/28/2017 09:40	7/28/2017 09:40	8/5/2017 03:14	280-383306/	N
FEW4-MW77	SO	FEW4-MW77-(35.0)	280-99716-5		1/1	7/28/2017 09:50	7/28/2017 09:50	8/5/2017 03:34	280-383306/	N
FEW4-MW77	SO	FEW4-MW77-(45.0)	280-99716-6		1/1	7/28/2017 10:00	7/28/2017 10:00	8/5/2017 03:54	280-383306/	N
FEW4-MW77	SO	FEW4-MW77-(65.0)	280-99716-9		1/1	7/28/2017 11:11	7/28/2017 11:11	8/5/2017 04:14	280-383306/	N
FEW4-MW77	SO	FEW4-MW77-(73.0)	280-99716-10		1/1	7/28/2017 12:20	7/28/2017 12:20	8/5/2017 04:34	280-383306/	N
FEW4-MW77	SO	FEW4-MW77-(74.0)	280-99716-11		1/1	7/28/2017 13:20	7/28/2017 13:20	8/5/2017 04:54	280-383306/	FD
FEW4-MW77	SO	FEW4-MW77-(85.0)	280-99716-12		1/1	7/28/2017 12:12	7/28/2017 12:12	8/5/2017 05:14	280-383306/	N
FEW4-MW77	SO	FEW4-MW77-(96.0)	280-99716-13		1/1	7/28/2017 12:22	7/28/2017 12:22	8/5/2017 05:34	280-383306/	N
FEW4-MW77	SO	FEW4-MW77-(105.0)	280-99716-14		1/1	7/28/2017 14:10	7/28/2017 14:10	8/5/2017 05:54	280-383306/	N
FEW4-MW77	SO	FEW4-MW77-(115.0)	280-99716-15		1/1	7/28/2017 14:20	7/28/2017 14:20	8/5/2017 06:14	280-383306/	N
FEW4-MW83	SO	FEW4-MW83-(265.0)	280-99716-16		1/1	7/28/2017 14:45	7/28/2017 14:45	8/5/2017 06:34	280-383306/	N

Test Method: SW8260B Analysis Batch: 280-383941

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
LABQC	WQ	MB 280-383941/8	MB 280-383941/8		1/1	8/11/2017 10:00	8/11/2017 10:00	8/11/2017 10:00	280-383941/	LB

US Army Corps of Engineers®

Batch Report

Test Method: SW8260B Analysis Batch: 280-383941

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
LABQC	WQ	LCS 280-383941/4	LCS 280-383941/4		1/1	8/11/2017 10:39	8/11/2017 10:39	8/11/2017 10:39	280-383941/	BS
FEW4-MW77	WG	FEW4-MW77-41	280-99716-7		1/1	7/28/2017 09:25	8/11/2017 14:32	8/11/2017 14:32	280-383941/	N

Field Batch Report

--No Records Found--

MS Mismatch Report

--No Records Found--

Section to identify Matrix Spike mismatches where parent sample differs from MS by dilution.

US Army Corps of Engineers®

QC Outlier Report

Test Method: SW8260B Extraction Method: SW5030B Leach Method: NONE

QC Element	Sample ID/ Lab Sample ID	Run#/ Dil'n	Analyte	Result (Units)	Qualifier	Warning Limits	Control Limits	Reason	Comment	Rule	Action Level
Surrogate	FEW4-MW77-41 (N) / 280-99716-7	1 / 1.00	1-Bromo-4-fluorobenzene (4-Bromofluorobenzene)	120.0 (percent)	J/None	85 - 114	85 - 114	I			
Test Hold Time	FEW4-MW77-41 (N) / 280-99716-7	1 / 1.00	All in Run	14.21 (days)	J/UJ	< 14	< 14	H1	Test Exceeds UCL		

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

QC Element	Sample ID/ Lab Sample ID	Run#/ Dil'n	Analyte	Result (Units)	Qualifier	Warning Limits	Control Limits	Reason	Comment	Rule	Action Level
MS RPD	280-99716-8MSD (SD) / 280-99716-8MSD	1 / 1.00	1,1,1,2-Tetrachloroethane	25.48 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99716-8MSD (SD) / 280-99716-8MSD	1 / 1.00	1,1,1-Trichloroethane	22.90 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99716-8MSD (SD) / 280-99716-8MSD	1 / 1.00	1,1,2,2-Tetrachloroethane	31.16 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99716-8MSD (SD) / 280-99716-8MSD	1 / 1.00	1,1,2-Trichloroethane	26.17 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99716-8MSD (SD) / 280-99716-8MSD	1 / 1.00	1,1-Dichloroethane	26.40 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99716-8MSD (SD) / 280-99716-8MSD	1 / 1.00	1,1-Dichloroethene	26.51 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99716-8MSD (SD) / 280-99716-8MSD	1 / 1.00	1,1-Dichloropropene	25.40 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99716-8MSD (SD) / 280-99716-8MSD	1 / 1.00	1,2,3-Trichlorobenzene	29.80 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99716-8MSD (SD) / 280-99716-8MSD	1 / 1.00	1,2,3-Trichloropropane	28.84 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99716-8MSD (SD) / 280-99716-8MSD	1 / 1.00	1,2,4-Trichlorobenzene	28.14 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99716-8MSD (SD) / 280-99716-8MSD	1 / 1.00	1,2,4-Trimethylbenzene	28.06 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99716-8MSD (SD) / 280-99716-8MSD	1 / 1.00	1,2-Dibromo-3-chloropropane	30.85 (rpd)	J/None	< 20	< 20	D			

US Army Corps of Engineers®

QC Outlier Report

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

QC Element	Sample ID/ Lab Sample ID	Run#/ Dil'n	Analyte	Result (Units)	Qualifier	Warning Limits	Control Limits	Reason	Comment	Rule	Action Level
MS RPD	280-99716-8MSD (SD) / 280-99716-8MSD	1 / 1.00	1,2-Dibromoethane (EDB)	28.48 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99716-8MSD (SD) / 280-99716-8MSD	1 / 1.00	1,2-Dichlorobenzene	26.74 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99716-8MSD (SD) / 280-99716-8MSD	1 / 1.00	1,2-Dichloroethane	25.48 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99716-8MSD (SD) / 280-99716-8MSD	1 / 1.00	1,2-Dichloroethene	26.16 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99716-8MSD (SD) / 280-99716-8MSD	1 / 1.00	1,2-Dichloropropane	28.28 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99716-8MSD (SD) / 280-99716-8MSD	1 / 1.00	1,3,5-Trimethylbenzene	27.71 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99716-8MSD (SD) / 280-99716-8MSD	1 / 1.00	1,3-Dichlorobenzene	27.42 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99716-8MSD (SD) / 280-99716-8MSD	1 / 1.00	1,3-Dichloropropane	28.38 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99716-8MSD (SD) / 280-99716-8MSD	1 / 1.00	1,4-Dichlorobenzene	27.59 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99716-8MSD (SD) / 280-99716-8MSD	1 / 1.00	2,2-Dichloropropane	22.26 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99716-8MSD (SD) / 280-99716-8MSD	1 / 1.00	2-Butanone (MEK)	32.95 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99716-8MSD (SD) / 280-99716-8MSD	1 / 1.00	2-Chlorotoluene	27.12 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99716-8MSD (SD) / 280-99716-8MSD	1 / 1.00	2-Hexanone	32.56 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99716-8MSD (SD) / 280-99716-8MSD	1 / 1.00	4-Chlorotoluene	26.26 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99716-8MSD (SD) / 280-99716-8MSD	1 / 1.00	4-Methyl-2-pentanone (MIBK)	32.96 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99716-8MSD (SD) / 280-99716-8MSD	1 / 1.00	Acetone	21.13 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99716-8MSD (SD) / 280-99716-8MSD	1 / 1.00	Benzene	25.89 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99716-8MSD (SD) / 280-99716-8MSD	1 / 1.00	Bromobenzene	29.20 (rpd)	J/None	< 20	< 20	D			

US Army Corps of Engineers®

QC Outlier Report

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

QC Element	Sample ID/ Lab Sample ID	Run#/ Dil'n	Analyte	Result (Units)	Qualifier	Warning Limits	Control Limits	Reason	Comment	Rule	Action Level
MS RPD	280-99716-8MSD (SD) / 280-99716-8MSD	1 / 1.00	Bromochloromethane	26.74 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99716-8MSD (SD) / 280-99716-8MSD	1 / 1.00	Bromodichloromethane	25.22 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99716-8MSD (SD) / 280-99716-8MSD	1 / 1.00	Bromoform	29.17 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99716-8MSD (SD) / 280-99716-8MSD	1 / 1.00	Bromomethane	28.00 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99716-8MSD (SD) / 280-99716-8MSD	1 / 1.00	Carbon disulfide	25.59 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99716-8MSD (SD) / 280-99716-8MSD	1 / 1.00	Carbon tetrachloride	22.33 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99716-8MSD (SD) / 280-99716-8MSD	1 / 1.00	Chlorobenzene	25.51 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99716-8MSD (SD) / 280-99716-8MSD	1 / 1.00	Chloroform	25.32 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99716-8MSD (SD) / 280-99716-8MSD	1 / 1.00	Chloromethane	31.72 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99716-8MSD (SD) / 280-99716-8MSD	1 / 1.00	cis-1,2-Dichloroethene	25.02 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99716-8MSD (SD) / 280-99716-8MSD	1 / 1.00	cis-1,3-Dichloropropene	27.82 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99716-8MSD (SD) / 280-99716-8MSD	1 / 1.00	Dibromochloromethane	27.29 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99716-8MSD (SD) / 280-99716-8MSD	1 / 1.00	Dibromomethane	27.67 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99716-8MSD (SD) / 280-99716-8MSD	1 / 1.00	Dichlorodifluoromethane	29.35 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99716-8MSD (SD) / 280-99716-8MSD	1 / 1.00	Ethylbenzene	24.72 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99716-8MSD (SD) / 280-99716-8MSD	1 / 1.00	Hexachlorobutadiene	23.11 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99716-8MSD (SD) / 280-99716-8MSD	1 / 1.00	Isopropylbenzene (Cumene)	27.98 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99716-8MSD (SD) / 280-99716-8MSD	1 / 1.00	m,p-Xylene	23.97 (rpd)	J/None	< 20	< 20	D			

US Army Corps of Engineers®

QC Outlier Report

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

QC Element	Sample ID/ Lab Sample ID	Run#/ Dil'n	Analyte	Result (Units)	Qualifier	Warning Limits	Control Limits	Reason	Comment	Rule	Action Level
MS RPD	280-99716-8MSD (SD) / 280-99716-8MSD	1 / 1.00	Methyl tert-butyl ether (MTBE)	27.71 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99716-8MSD (SD) / 280-99716-8MSD	1 / 1.00	Methylene chloride	27.44 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99716-8MSD (SD) / 280-99716-8MSD	1 / 1.00	Naphthalene	30.38 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99716-8MSD (SD) / 280-99716-8MSD	1 / 1.00	n-Butylbenzene	25.23 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99716-8MSD (SD) / 280-99716-8MSD	1 / 1.00	n-Propylbenzene	26.83 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99716-8MSD (SD) / 280-99716-8MSD	1 / 1.00	o-Xylene	26.40 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99716-8MSD (SD) / 280-99716-8MSD	1 / 1.00	p-Cymene (p-Isopropyltoluene)	25.92 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99716-8MSD (SD) / 280-99716-8MSD	1 / 1.00	sec-Butylbenzene	25.84 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99716-8MSD (SD) / 280-99716-8MSD	1 / 1.00	Styrene	26.19 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99716-8MSD (SD) / 280-99716-8MSD	1 / 1.00	tert-Butylbenzene	25.89 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99716-8MSD (SD) / 280-99716-8MSD	1 / 1.00	Tetrachloroethene (PCE)	25.16 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99716-8MSD (SD) / 280-99716-8MSD	1 / 1.00	Toluene	26.52 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99716-8MSD (SD) / 280-99716-8MSD	1 / 1.00	trans-1,2-Dichloroethene	28.72 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99716-8MSD (SD) / 280-99716-8MSD	1 / 1.00	trans-1,3-Dichloropropene	26.86 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99716-8MSD (SD) / 280-99716-8MSD	1 / 1.00	Trichloroethene (TCE)	24.09 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99716-8MSD (SD) / 280-99716-8MSD	1 / 1.00	Trichlorofluoromethane	27.46 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99716-8MSD (SD) / 280-99716-8MSD	1 / 1.00	Vinyl chloride	32.95 (rpd)	J/None	< 20	< 20	D			

US Army Corps of Engineers ®

QC Outlier Report

Rule is the multiplier used when blank contamination occurs to determine action level.

US Army Corps of Engineers®

Qualified Results

Test Method: SW8260B Extraction Method: SW5030B Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW77-41	280-99716-7	WG	N	Acetone	10	2.3 J	2.3 J		ug/L	TR/I
FEW4-MW77-41	280-99716-7	WG	N	Trichloroethene (TCE)	1.0	52	52 J		ug/L	I

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW77-(28.0)	280-99716-4	SO	N	Acetone	27	23 J Q	23 J		ug/kg	TR
FEW4-MW77-(45.0)	280-99716-6	SO	N	Trichloroethene (TCE)	8.6	1.7 J	1.7 J		ug/kg	TR
FEW4-MW77-(55.0)	280-99716-8	SO	N	Acetone	23	19 Q J	19 J		ug/kg	D/TR
FEW4-MW77-(55.0)	280-99716-8	SO	N	Trichloroethene (TCE)	5.8	2.5 J	2.5 J		ug/kg	D/TR
FEW4-MW77-(85.0)	280-99716-12	SO	N	Trichloroethene (TCE)	11	2.5 J	2.5 J		ug/kg	TR
FEW4-MW77-(96.0)	280-99716-13	SO	N	Trichloroethene (TCE)	5.8	3.1 J	3.1 J		ug/kg	TR
FEW4-MW83-(244.0)	280-99716-2	SO	N	Acetone	18	11 J Q	11 J		ug/kg	TR
FEW4-MW83-(265.0)	280-99716-16	SO	N	Acetone	21	20 J Q	20 J		ug/kg	TR

Qualified analytes in samples are reported as estimated, not detected (UJ) at the Limit of Detection (LOD).

US Army Corps of Engineers®

Detected Results

Test Method: SW8260B Extraction Method: SW5030B Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Dilution	Analyte	LOQ	Lab Result	Qualified Result	Units	Reason
FEW4-MW77-41	280-99716-7	WG	N	1	Acetone	10	2.3 J	2.3 J	ug/L	TR/I
FEW4-MW77-41	280-99716-7	WG	N	1	Trichloroethene (TCE)	1.0	52	52 J	ug/L	I

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Dilution	Analyte	LOQ	Lab Result	Qualified Result	Units	Reason
FEW4-MW77-(105.0)	280-99716-14	SO	N	1	Acetone	45	91 Q	91	ug/kg	
FEW4-MW77-(115.0)	280-99716-15	SO	N	1	Acetone	31	38 Q	38	ug/kg	
FEW4-MW77-(28.0)	280-99716-4	SO	N	1	Acetone	27	23 J Q	23 J	ug/kg	TR
FEW4-MW77-(45.0)	280-99716-6	SO	N	1	Trichloroethene (TCE)	8.6	1.7 J	1.7 J	ug/kg	TR
FEW4-MW77-(55.0)	280-99716-8	SO	N	1	Acetone	23	19 Q J	19 J	ug/kg	D/TR
FEW4-MW77-(55.0)	280-99716-8	SO	N	1	Trichloroethene (TCE)	5.8	2.5 J	2.5 J	ug/kg	D/TR
FEW4-MW77-(73.0)	280-99716-10	SO	N	1	Acetone	25	35 Q	35	ug/kg	
FEW4-MW77-(74.0)	280-99716-11	SO	FD	1	Acetone	24	54 Q	54	ug/kg	
FEW4-MW77-(85.0)	280-99716-12	SO	N	1	Trichloroethene (TCE)	11	2.5 J	2.5 J	ug/kg	TR
FEW4-MW77-(96.0)	280-99716-13	SO	N	1	Trichloroethene (TCE)	5.8	3.1 J	3.1 J	ug/kg	TR
FEW4-MW83-(239.0)	280-99716-1	SO	N	1	Acetone	52	63 Q	63	ug/kg	
FEW4-MW83-(244.0)	280-99716-2	SO	N	1	Acetone	18	11 J Q	11 J	ug/kg	TR
FEW4-MW83-(265.0)	280-99716-16	SO	N	1	Acetone	21	20 J Q	20 J	ug/kg	TR

Rejected Results

--No Records Found--

US Army Corps of Engineers ®

Facility:	B08WY0467-02, F.E. Warren AFB, Site 4
Event:	2017-2018 RI Addendum Tasks
SDG:	280-99716-1_52_2a_FUDSChem
Guidance Document:	Draft-Final Uniform Federal Policy-Quality Assurance Project Plan for the Remedial Investigation Addendum 2017-2018 Tasks Atlas "D" Missile Site 4 —Laramie County, Wyoming, July 2017
Prime Contractor:	RMC Consultants, Inc., LAKEWOOD, CO
Project Manager:	David Groy
Contract Laboratory:	TestAmerica Laboratories, Inc., Arvada, CO
Data Review Contractor:	RMC Consultants
Data Review Level:	Stage 3VEM
Primary Data Reviewer:	Gary Torf, Contractor Project Chemist
Second Reviewer:	, Senior Scientist
Date Submitted:	

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	SW8260B
FEW4-MW77-(105.0)	280-99716-14	Solid	Field Sample/N	X
FEW4-MW77-(115.0)	280-99716-15	Solid	Field Sample/N	X
FEW4-MW77-(28.0)	280-99716-4	Solid	Field Sample/N	X
FEW4-MW77-(35.0)	280-99716-5	Solid	Field Sample/N	X
FEW4-MW77-(45.0)	280-99716-6	Solid	Field Sample/N	X
FEW4-MW77-(55.0)	280-99716-8	Solid	Field Sample/N	X
FEW4-MW77-(65.0)	280-99716-9	Solid	Field Sample/N	X
FEW4-MW77-(73.0)	280-99716-10	Solid	Field Sample/N	X
FEW4-MW77-(74.0)	280-99716-11	Solid	Field Duplicate/FD	X
FEW4-MW77-(85.0)	280-99716-12	Solid	Field Sample/N	X
FEW4-MW77-(96.0)	280-99716-13	Solid	Field Sample/N	X
FEW4-MW83-(239.0)	280-99716-1	Solid	Field Sample/N	X
FEW4-MW83-(244.0)	280-99716-2	Solid	Field Sample/N	X
FEW4-MW83-(255.0)	280-99716-3	Solid	Field Sample/N	X
FEW4-MW83-(265.0)	280-99716-16	Solid	Field Sample/N	X
FEW4-MW77-41	280-99716-7	Water	Field Sample/N	X

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the Draft-Final Uniform Federal Policy-Quality Assurance Project Plan for the Remedial Investigation Addendum 2017-2018 Tasks Atlas “D” Missile Site 4 —Laramie County, Wyoming, July 2017 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by RMC Consultants, Inc., LAKEWOOD, CO; analyses were performed by TestAmerica Laboratories, Inc., Arvada, CO and were reported under sample delivery group (SDG) 280-99716-1_52_2a_FUDSChem. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

- Blank
- Blank - Negative
- Field Duplicate RPD
- LCS Recovery
- LCS RPD
- MS Recovery
- MS RPD
- Prep Hold Time
- Surrogate
- Test Hold Time

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 4 results (0.38%) out of the 1042 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected. Trace values, defined as results that are qualified as estimated because they fall between the limit of detection and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

Narrative Comments

Analytical Method	Data Reviewer Comment
SW8260B	No additional comments; see Checklist for detail.

October 22, 2017

Reviewed by Gary Torf, Contractor Project Chemist, RMC Consultants

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of a minimum of 10% of the reported sample results and method quality control data between the two deliverables.

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

Quality Control Outliers for test method SW8260B, MS RPD

The objective of matrix spikes/matrix spike duplicates (MS/MSD) RPD analysis is to demonstrate acceptable method precision by the laboratory at the time of analysis. MS/MSD analyses are also performed to generate data that determines the long-term precision of the analytical method on various matrices. Non-homogenous samples can impact the apparent method precision. Summary forms were evaluated and compared to electronic data deliverables. Matrix spikes/matrix spike duplicates results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
280-99716-8MSD (SD)/ 280-99716-8MSD	Acetone	21.13	< 20	< 20	rpd	J/None	D	
280-99716-8MSD (SD)/ 280-99716-8MSD	2,2-Dichloropropane	22.26	< 20	< 20	rpd	J/None	D	
280-99716-8MSD (SD)/ 280-99716-8MSD	Carbon tetrachloride	22.33	< 20	< 20	rpd	J/None	D	
280-99716-8MSD (SD)/ 280-99716-8MSD	1,1,1-Trichloroethane	22.90	< 20	< 20	rpd	J/None	D	
280-99716-8MSD (SD)/ 280-99716-8MSD	Hexachlorobutadiene	23.11	< 20	< 20	rpd	J/None	D	
280-99716-8MSD (SD)/ 280-99716-8MSD	m,p-Xylene	23.97	< 20	< 20	rpd	J/None	D	
280-99716-8MSD (SD)/ 280-99716-8MSD	Trichloroethene (TCE)	24.09	< 20	< 20	rpd	J/None	D	
280-99716-8MSD (SD)/ 280-99716-8MSD	Ethylbenzene	24.72	< 20	< 20	rpd	J/None	D	
280-99716-8MSD (SD)/ 280-99716-8MSD	cis-1,2-Dichloroethene	25.02	< 20	< 20	rpd	J/None	D	
280-99716-8MSD (SD)/ 280-99716-8MSD	Tetrachloroethene (PCE)	25.16	< 20	< 20	rpd	J/None	D	
280-99716-8MSD (SD)/ 280-99716-8MSD	Bromodichloromethane	25.22	< 20	< 20	rpd	J/None	D	
280-99716-8MSD (SD)/ 280-99716-8MSD	n-Butylbenzene	25.23	< 20	< 20	rpd	J/None	D	
280-99716-8MSD (SD)/ 280-99716-8MSD	Chloroform	25.32	< 20	< 20	rpd	J/None	D	
280-99716-8MSD (SD)/ 280-99716-8MSD	1,1-Dichloropropene	25.40	< 20	< 20	rpd	J/None	D	
280-99716-8MSD (SD)/ 280-99716-8MSD	1,2-Dichloroethane	25.48	< 20	< 20	rpd	J/None	D	
280-99716-8MSD (SD)/ 280-99716-8MSD	1,1,1,2-Tetrachloroethane	25.48	< 20	< 20	rpd	J/None	D	
280-99716-8MSD (SD)/ 280-99716-8MSD	Chlorobenzene	25.51	< 20	< 20	rpd	J/None	D	
280-99716-8MSD (SD)/ 280-99716-8MSD	Carbon disulfide	25.59	< 20	< 20	rpd	J/None	D	
280-99716-8MSD (SD)/ 280-99716-8MSD	sec-Butylbenzene	25.84	< 20	< 20	rpd	J/None	D	
280-99716-8MSD (SD)/ 280-99716-8MSD	tert-Butylbenzene	25.89	< 20	< 20	rpd	J/None	D	
280-99716-8MSD (SD)/ 280-99716-8MSD	Benzene	25.89	< 20	< 20	rpd	J/None	D	
280-99716-8MSD (SD)/ 280-99716-8MSD	p-Cymene (p-Isopropyltoluene)	25.92	< 20	< 20	rpd	J/None	D	
280-99716-8MSD (SD)/ 280-99716-8MSD	1,2-Dichloroethene	26.16	< 20	< 20	rpd	J/None	D	
280-99716-8MSD (SD)/ 280-99716-8MSD	1,1,2-Trichloroethane	26.17	< 20	< 20	rpd	J/None	D	
280-99716-8MSD (SD)/ 280-99716-8MSD	Styrene	26.19	< 20	< 20	rpd	J/None	D	

Quality Control Outliers for test method SW8260B, MS RPD

The objective of matrix spikes/matrix spike duplicates (MS/MSD) RPD analysis is to demonstrate acceptable method precision by the laboratory at the time of analysis. MS/MSD analyses are also performed to generate data that determines the long-term precision of the analytical method on various matrices. Non-homogenous samples can impact the apparent method precision. Summary forms were evaluated and compared to electronic data deliverables. Matrix spikes/matrix spike duplicates results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
280-99716-8MSD (SD)/ 280-99716-8MSD	4-Chlorotoluene	26.26	< 20	< 20	rpd	J/None	D	
280-99716-8MSD (SD)/ 280-99716-8MSD	1,1-Dichloroethane	26.40	< 20	< 20	rpd	J/None	D	
280-99716-8MSD (SD)/ 280-99716-8MSD	o-Xylene	26.40	< 20	< 20	rpd	J/None	D	
280-99716-8MSD (SD)/ 280-99716-8MSD	1,1-Dichloroethene	26.51	< 20	< 20	rpd	J/None	D	
280-99716-8MSD (SD)/ 280-99716-8MSD	Toluene	26.52	< 20	< 20	rpd	J/None	D	
280-99716-8MSD (SD)/ 280-99716-8MSD	Bromochloromethane	26.74	< 20	< 20	rpd	J/None	D	
280-99716-8MSD (SD)/ 280-99716-8MSD	1,2-Dichlorobenzene	26.74	< 20	< 20	rpd	J/None	D	
280-99716-8MSD (SD)/ 280-99716-8MSD	n-Propylbenzene	26.83	< 20	< 20	rpd	J/None	D	
280-99716-8MSD (SD)/ 280-99716-8MSD	trans-1,3-Dichloropropene	26.86	< 20	< 20	rpd	J/None	D	
280-99716-8MSD (SD)/ 280-99716-8MSD	2-Chlorotoluene	27.12	< 20	< 20	rpd	J/None	D	
280-99716-8MSD (SD)/ 280-99716-8MSD	Dibromochloromethane	27.29	< 20	< 20	rpd	J/None	D	
280-99716-8MSD (SD)/ 280-99716-8MSD	1,3-Dichlorobenzene	27.42	< 20	< 20	rpd	J/None	D	
280-99716-8MSD (SD)/ 280-99716-8MSD	Methylene chloride	27.44	< 20	< 20	rpd	J/None	D	
280-99716-8MSD (SD)/ 280-99716-8MSD	Trichlorofluoromethane	27.46	< 20	< 20	rpd	J/None	D	
280-99716-8MSD (SD)/ 280-99716-8MSD	1,4-Dichlorobenzene	27.59	< 20	< 20	rpd	J/None	D	
280-99716-8MSD (SD)/ 280-99716-8MSD	Dibromomethane	27.67	< 20	< 20	rpd	J/None	D	
280-99716-8MSD (SD)/ 280-99716-8MSD	Methyl tert-butyl ether (MTBE)	27.71	< 20	< 20	rpd	J/None	D	
280-99716-8MSD (SD)/ 280-99716-8MSD	1,3,5-Trimethylbenzene	27.71	< 20	< 20	rpd	J/None	D	
280-99716-8MSD (SD)/ 280-99716-8MSD	cis-1,3-Dichloropropene	27.82	< 20	< 20	rpd	J/None	D	
280-99716-8MSD (SD)/ 280-99716-8MSD	Isopropylbenzene (Cumene)	27.98	< 20	< 20	rpd	J/None	D	
280-99716-8MSD (SD)/ 280-99716-8MSD	Bromomethane	28.00	< 20	< 20	rpd	J/None	D	
280-99716-8MSD (SD)/ 280-99716-8MSD	1,2,4-Trimethylbenzene	28.06	< 20	< 20	rpd	J/None	D	
280-99716-8MSD (SD)/ 280-99716-8MSD	1,2,4-Trichlorobenzene	28.14	< 20	< 20	rpd	J/None	D	
280-99716-8MSD (SD)/ 280-99716-8MSD	1,2-Dichloropropane	28.28	< 20	< 20	rpd	J/None	D	
280-99716-8MSD (SD)/ 280-99716-8MSD	1,3-Dichloropropane	28.38	< 20	< 20	rpd	J/None	D	

Quality Control Outliers for test method SW8260B, MS RPD

The objective of matrix spikes/matrix spike duplicates (MS/MSD) RPD analysis is to demonstrate acceptable method precision by the laboratory at the time of analysis. MS/MSD analyses are also performed to generate data that determines the long-term precision of the analytical method on various matrices. Non-homogenous samples can impact the apparent method precision. Summary forms were evaluated and compared to electronic data deliverables. Matrix spikes/matrix spike duplicates results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
280-99716-8MSD (SD)/ 280-99716-8MSD	1,2-Dibromoethane (EDB)	28.48	< 20	< 20	rpd	J/None	D	
280-99716-8MSD (SD)/ 280-99716-8MSD	trans-1,2-Dichloroethene	28.72	< 20	< 20	rpd	J/None	D	
280-99716-8MSD (SD)/ 280-99716-8MSD	1,2,3-Trichloropropane	28.84	< 20	< 20	rpd	J/None	D	
280-99716-8MSD (SD)/ 280-99716-8MSD	Bromoform	29.17	< 20	< 20	rpd	J/None	D	
280-99716-8MSD (SD)/ 280-99716-8MSD	Bromobenzene	29.20	< 20	< 20	rpd	J/None	D	
280-99716-8MSD (SD)/ 280-99716-8MSD	Dichlorodifluoromethane	29.35	< 20	< 20	rpd	J/None	D	
280-99716-8MSD (SD)/ 280-99716-8MSD	1,2,3-Trichlorobenzene	29.80	< 20	< 20	rpd	J/None	D	
280-99716-8MSD (SD)/ 280-99716-8MSD	Naphthalene	30.38	< 20	< 20	rpd	J/None	D	
280-99716-8MSD (SD)/ 280-99716-8MSD	1,2-Dibromo-3-chloropropane	30.85	< 20	< 20	rpd	J/None	D	
280-99716-8MSD (SD)/ 280-99716-8MSD	1,1,2,2-Tetrachloroethane	31.16	< 20	< 20	rpd	J/None	D	
280-99716-8MSD (SD)/ 280-99716-8MSD	Chloromethane	31.72	< 20	< 20	rpd	J/None	D	
280-99716-8MSD (SD)/ 280-99716-8MSD	2-Hexanone	32.56	< 20	< 20	rpd	J/None	D	
280-99716-8MSD (SD)/ 280-99716-8MSD	2-Butanone (MEK)	32.95	< 20	< 20	rpd	J/None	D	
280-99716-8MSD (SD)/ 280-99716-8MSD	Vinyl chloride	32.95	< 20	< 20	rpd	J/None	D	
280-99716-8MSD (SD)/ 280-99716-8MSD	4-Methyl-2-pentanone (MIBK)	32.96	< 20	< 20	rpd	J/None	D	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the MS RPD for SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW77-(55.0)	N	Acetone	23	19 Q J	19 J		ug/kg	D/TR
FEW4-MW77-(55.0)	N	Trichloroethene (TCE)	5.8	2.5 J	2.5 J		ug/kg	D/TR

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

Quality Control Outliers for test method SW8260B, Surrogate

Method performance for individual samples is demonstrated through spiking activities. All samples are spiked with surrogate compounds prior to sample preparation. The sample itself may produce effects due to such factors as interferences and high concentrations of analytes. Summary forms were evaluated and compared to electronic data deliverables. Surrogate results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
FEW4-MW77-41 (N)/ 280-99716-7	1-Bromo-4-fluorobenzene (4-Bromofluorobenzene)	120.0	85 - 114	85 - 114	percent	J/None	I	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the Surrogate for SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW77-41	N	Acetone	10	2.3 J	2.3 J		ug/l	TR/I
FEW4-MW77-41	N	Trichloroethene (TCE)	1.0	52	52 J		ug/l	I

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

Quality Control Outliers for test method SW8260B, Test Hold Time

Hold times are ascertained based on project requirements. Holding times were determined by comparing the chain of custody records with the dates of analysis found in the electronic data deliverable and laboratory summary forms. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
FEW4-MW77-41 (N)/ 280-99716-7		14.21	< 14	< 14	days	J/UJ	H1	Test Exceeds UCL

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

Table of All Qualified Results

Test Method: SW8260B	Extraction Method: SW5030B							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW77-41	N	Acetone	10	2.3 J	2.3 J		ug/l	TR/I
FEW4-MW77-41	N	Trichloroethene (TCE)	1.0	52	52 J		ug/l	I

Test Method: SW8260B	Extraction Method: SW5035A							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW77-(55.0)	N	Acetone	23	19 Q J	19 J		ug/kg	D/TR
FEW4-MW77-(55.0)	N	Trichloroethene (TCE)	5.8	2.5 J	2.5 J		ug/kg	D/TR

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
Trace values are not included in the qualified results table unless additional reason codes are associated.

Table of All Trace Results

Test Method: SW8260B	Extraction Method: SW5030B							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW77-41	N	Acetone	10.0	2.30 J	2.30 J		ug/L	TR/I

Test Method: SW8260B	Extraction Method: SW5035A							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW77-(28.0)	N	Acetone	27.0	23.0 J Q	23.0 J		ug/kg	TR
FEW4-MW77-(45.0)	N	Trichloroethene (TCE)	8.60	1.70 J	1.70 J		ug/kg	TR
FEW4-MW77-(55.0)	N	Acetone	23.0	19.0 Q J	19.0 J		ug/kg	D/TR
FEW4-MW77-(55.0)	N	Trichloroethene (TCE)	5.80	2.50 J	2.50 J		ug/kg	D/TR
FEW4-MW77-(85.0)	N	Trichloroethene (TCE)	11.0	2.50 J	2.50 J		ug/kg	TR
FEW4-MW77-(96.0)	N	Trichloroethene (TCE)	5.80	3.10 J	3.10 J		ug/kg	TR
FEW4-MW83-(244.0)	N	Acetone	18.0	11.0 J Q	11.0 J		ug/kg	TR
FEW4-MW83-(265.0)	N	Acetone	21.0	20.0 J Q	20.0 J		ug/kg	TR

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW77-41	N	1,1,1-Trichloroethane	1.0	0.40 U	0.40 UJ	0.40 U	
FEW4-MW77-41	N	1,1,2,2-Tetrachloroethane	1.0	0.80 U Q	0.80 UJ	0.80 U	
FEW4-MW77-41	N	1,1,2-Trichloro-1,2,2-trifluoroethane	3.0	1.6 U	1.6 UJ	1.6 U	
FEW4-MW77-41	N	1,1,2-Trichloroethane	1.0	0.80 U	0.80 UJ	0.80 U	
FEW4-MW77-41	N	1,1-Dichloroethane	1.0	0.80 U	0.80 UJ	0.80 U	
FEW4-MW77-41	N	1,1-Dichloroethene	1.0	0.80 U	0.80 UJ	0.80 U	
FEW4-MW77-41	N	1,2,3-Trichlorobenzene	1.0	0.80 U Q	0.80 UJ	0.80 U	
FEW4-MW77-41	N	1,2,4-Trichlorobenzene	1.0	0.80 U Q	0.80 UJ	0.80 U	
FEW4-MW77-41	N	1,2-Dibromo-3-chloropropane	5.0	1.6 U Q	1.6 UJ	1.6 U	
FEW4-MW77-41	N	1,2-Dibromoethane (EDB)	1.0	0.40 U	0.40 UJ	0.40 U	
FEW4-MW77-41	N	1,2-Dichlorobenzene	1.0	0.40 U Q	0.40 UJ	0.40 U	
FEW4-MW77-41	N	1,2-Dichloroethane	1.0	0.40 U	0.40 UJ	0.40 U	
FEW4-MW77-41	N	1,2-Dichloropropane	1.0	0.40 U	0.40 UJ	0.40 U	
FEW4-MW77-41	N	1,3-Dichlorobenzene	1.0	0.40 U Q	0.40 UJ	0.40 U	
FEW4-MW77-41	N	1,4-Dichlorobenzene	1.0	0.40 U Q	0.40 UJ	0.40 U	
FEW4-MW77-41	N	1,4-Dioxane (p-Dioxane)	220	160 U	160 UJ	160 U	
FEW4-MW77-41	N	2-Butanone (MEK)	6.0	4.0 U	4.0 UJ	4.0 U	
FEW4-MW77-41	N	2-Hexanone	5.0	4.0 U	4.0 UJ	4.0 U	
FEW4-MW77-41	N	4-Methyl-2-pentanone (MIBK)	5.0	3.2 U	3.2 UJ	3.2 U	
FEW4-MW77-41	N	Acetone	10	2.3 J	2.3 J	2.3 J	TR/I
FEW4-MW77-41	N	Benzene	1.0	0.40 U	0.40 UJ	0.40 U	
FEW4-MW77-41	N	Bromochloromethane	1.0	0.20 U	0.20 UJ	0.20 U	
FEW4-MW77-41	N	Bromodichloromethane	1.0	0.40 U	0.40 UJ	0.40 U	
FEW4-MW77-41	N	Bromoform	1.0	0.40 U	0.40 UJ	0.40 U	
FEW4-MW77-41	N	Bromomethane	2.0	0.80 U	0.80 UJ	0.80 U	
FEW4-MW77-41	N	Carbon disulfide	2.0	1.6 U	1.6 UJ	1.6 U	
FEW4-MW77-41	N	Carbon tetrachloride	2.0	0.40 U	0.40 UJ	0.40 U	
FEW4-MW77-41	N	Chlorobenzene	1.0	0.40 U	0.40 UJ	0.40 U	
FEW4-MW77-41	N	Chloroethane	2.0	1.6 U	1.6 UJ	1.6 U	
FEW4-MW77-41	N	Chloroform	1.0	0.40 U	0.40 UJ	0.40 U	
FEW4-MW77-41	N	Chloromethane	2.0	0.80 U	0.80 UJ	0.80 U	
FEW4-MW77-41	N	cis-1,2-Dichloroethene	1.0	0.40 U	0.40 UJ	0.40 U	
FEW4-MW77-41	N	cis-1,3-Dichloropropene	1.0	0.40 U	0.40 UJ	0.40 U	
FEW4-MW77-41	N	Cyclohexane	2.0	0.80 U	0.80 UJ	0.80 U	
FEW4-MW77-41	N	Dibromochloromethane	1.0	0.40 U	0.40 UJ	0.40 U	
FEW4-MW77-41	N	Dichlorodifluoromethane	2.0	0.80 U Q	0.80 UJ	0.80 U	
FEW4-MW77-41	N	Ethylbenzene	1.0	0.40 U	0.40 UJ	0.40 U	
FEW4-MW77-41	N	Isopropylbenzene (Cumene)	1.0	0.40 U Q	0.40 UJ	0.40 U	
FEW4-MW77-41	N	m,p-Xylene	2.0	0.80 U	0.80 UJ	0.80 U	
FEW4-MW77-41	N	Methyl acetate	5.0	4.0 U	4.0 UJ	4.0 U	

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW77-41	N	Methyl tert-butyl ether (MTBE)	5.0	0.80 U	0.80 UJ	0.80 U	
FEW4-MW77-41	N	Methylcyclohexane	2.0	0.80 U	0.80 UJ	0.80 U	
FEW4-MW77-41	N	Methylene chloride	5.0	0.80 U	0.80 UJ	0.80 U	
FEW4-MW77-41	N	o-Xylene	1.0	0.40 U	0.40 UJ	0.40 U	
FEW4-MW77-41	N	Styrene	1.0	0.40 U	0.40 UJ	0.40 U	
FEW4-MW77-41	N	Tetrachloroethene (PCE)	1.0	0.40 U	0.40 UJ	0.40 U	
FEW4-MW77-41	N	Toluene	1.0	0.40 U	0.40 UJ	0.40 U	
FEW4-MW77-41	N	trans-1,2-Dichloroethene	1.0	0.40 U	0.40 UJ	0.40 U	
FEW4-MW77-41	N	trans-1,3-Dichloropropene	1.0	0.40 U	0.40 UJ	0.40 U	
FEW4-MW77-41	N	Trichloroethene (TCE)	1.0	52	52 J	52 J	I
FEW4-MW77-41	N	Trichlorofluoromethane	2.0	0.80 U	0.80 UJ	0.80 U	
FEW4-MW77-41	N	Vinyl chloride	1.5	0.20 U	0.20 UJ	0.20 U	

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
Trace values are not included in the qualified results table unless additional reason codes are associated.

Reason Code Definitions

Code	Definition
D	MS RPD
H1	Test Hold Time
I	Surrogate recovery outside project limits.
TR	Trace Level Detect

Flag Code and Definitions

Flag	Definition
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
J	Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
R	The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making.
B	Blank contamination: The analyte was found in an associated blank above one half the RL, as well as in the sample.
UB	The analyte was also detected in an associated laboratory or field blank at a concentration comparable to the concentration in the sample. The reported result has been requalified as not detected.

Review Questions

Method: SW8260B (Volatile Organic Compounds by Capillary GC/MS)				
Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			ADR noted that the following sample exceeded the 14 day analysis holding time on the 14th day between 0000 and 2359 hours: Sample FEW4-MW77-41 (2 hours). According to DoD ELAP QSM 5.1 FAQ – Holding Time - Days: "the holding time shall be tracked by the day." "...an exceedance of holding time for a sample with a 14-day holding time will occur when the 15th day is reached (at 12am)." Therefore, no holding time exceedance is considered to have occurred for the noted sample.
Were sample reciept temperatures met?	•			The cooler receipt temperature was 3.8ºC.
Were QAPP specified PQLs achieved?	•			
Were all QAPP-specified target analytes reported?	•			
Was the GC/MS system properly tuned based on method criteria?	•			
Was the criteria met during each 12 hour shift (prior to ICAL and Cal Ver.)?	•			
Does the initial calibration curve consist of 5 concentration levels, with the low standard near but > MDL?	•			
Did the Calibration Check Compounds (CCCs) have a relative standard deviation within QAPP acceptance limits?	•			
Were the average response factors (RFs) for the System Performance Check Compounds (SPCCs) within QAPP acceptance limits?	•			
Were the ICAL %RSDs for the target compounds within method criteria?	•			
If a quadratic equation curve was used, was the coefficient of determination (COD) within criteria?	•			
If a linear regression curve was used, was the correlation coefficient within criteria?	•			
Check and recalculate the response factors and average response factors for a least one target compound.	•			ICAL VMS-G2 7/21/17TCE Average RF = 0.2399
Check and recalculate the %RSD for one of more target compounds and DMCs. Verify that the recalculated values agree with the laboratory reported values.	•			ICAL VMS-G2 7/21/17 TCE %RSD = 2.6% 1,2-DCA-d4 = 4.8%
Was a second source verification analyzed after the ICAL and all analytes within criteria?		•		Dichlorodifluoromethane had a percent difference greater than the control limit at 34.4%. All associated sample results were non-detect for this analyte, therefore no data qualification is warranted.
Was a CCV run at the beginning of the analytical sequence and every 12 hours?	•			
Was the CCV a mid-level standard from the initial calibration curve?	•			
Did the CCCs have a %Difference within QAPP acceptance limits?	•			
Were the average RFs for the SPCCs within QAPP acceptance limits?	•			

Review Questions

Method: SW8260B (Volatile Organic Compounds by Capillary GC/MS)

Review Questions	Yes	No	NA	Comment
Was the %D (difference or drift) for all target analytes within QAPP acceptance limits?				A CCV had a percent difference was greater than the control limit for acetone at 23.6%; a CCV had percent differences was greater than the control limit for n-butylbenzene at 25.7% and hexachlorobutadiene at 22.8%,; a CCV had a percent difference greater than the control limit for dichlorodifluoromethane at 21.6%. All associated sample results were non-detect for these analytes, therefore no data qualification is warranted.
Check and recalculate the CCV relative response factor for at least one target compound.	•			VMS-G2 8/4/17CCV 280-383306/2 TCE RRF = 0.2541
Were the internal standards added to every standard, blank, matrix spike, matrix spike duplicate, and sample?	•			
Were the retention times for all IS compounds within QAPP acceptance limits?	•			
Are the area counts of all IS compounds within QAPP acceptance limits?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes detected in the method blank above the MDL?		•		
Were target analytes reported in the field blank analyses above the MDL?			•	
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?	•			FEW4-MW77-(74.0) was a blind duplicate of FEW4-MW77-(73.0).
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were the LCS/LCSD recoveries within QAPP acceptance limits?	•			
Were the LCS/LCSD RPDs within QAPP acceptance limits?	•			
Was the duplicate RPD within QAPP acceptance limits?			•	
Was a MS/MSD pair prepared with each batch?	•			
Is the MS/MSD parent sample the one designated by the sampling team?	•			
Were MS/MSD recoveries and RPD within QAPP acceptance limits?		•		The RPDs for several analytes were greater than the control limit.
Were surrogate recoveries within QAPP acceptance limits?		•		Bromofluorobenzene was recovered greater than the upper control limit of 114% at 119% in field sample FEW4-MW77- 41; TCE was detected and the result has been qualified as an estimated value.
Were reported sample concentrations within calibration range?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were instrument run logs present and filled out appropriately?	•			
Were sample prepration sheets present and filled out appropriately?	•			
Check and recalculate the %D for one target compound. Verify that the recalculated values agree with the laboratory-reported values.			•	

Review Questions

Method: SW8260B (Volatile Organic Compounds by Capillary GC/MS)

Review Questions	Yes	No	NA	Comment
Examine raw data to verify correct calculation of sample results reported by the laboratory. Compare quantitation lists and chromatograms to the reported detect and non-detect sample results.	•			FEW4-MW77-(55.0) TCE = 2.5J
Verify that the reporting limits and sample results have been adjusted to reflect all sample dilutions and Percent Moisture factors (non-aqueous samples).	•			

US Army Corps of Engineers ®

Batch Report

Test Method: SW8260B Analysis Batch: 280-383457

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
LABQC	SQ	LCS 280-383465/1-A	LCS 280-383465/1-A		1/1	8/7/2017 16:00	8/7/2017 16:00	8/7/2017 20:03	280-383457/	BS
LABQC	SQ	MB 280-383465/2-A	MB 280-383465/2-A		1/1	8/7/2017 16:00	8/7/2017 16:00	8/7/2017 20:43	280-383457/	LB
FEW4-MW77	SO	FEW4-MW77-(177.0)	280-99735-7		1/1	7/29/2017 11:12	7/29/2017 11:12	8/7/2017 21:44	280-383457/	N
FEW4-MW77	SO	FEW4-MW77-(177.0)	280-99735-7MS		1/1	7/29/2017 11:12	7/29/2017 11:12	8/7/2017 22:04	280-383457/	MS
FEW4-MW77	SO	FEW4-MW77-(177.0)	280-99735-7MSD		1/1	7/29/2017 11:12	7/29/2017 11:12	8/7/2017 22:24	280-383457/	SD
FEW4-MW77	SO	FEW4-MW77-(126.0)	280-99735-1		1/1	7/29/2017 09:40	7/29/2017 09:40	8/7/2017 22:44	280-383457/	N
FEW4-MW77	SO	FEW4-MW77-(134.0)	280-99735-2		1/1	7/29/2017 09:50	7/29/2017 09:50	8/7/2017 23:04	280-383457/	N
FEW4-MW77	SO	FEW4-MW77-(139.0)	280-99735-3		1/1	7/29/2017 10:30	7/29/2017 10:30	8/7/2017 23:25	280-383457/	N
FEW4-MW77	SO	FEW4-MW77-(145.0)	280-99735-4		1/1	7/29/2017 10:40	7/29/2017 10:40	8/7/2017 23:45	280-383457/	N
FEW4-MW77	SO	FEW4-MW77-(155.0)	280-99735-5		1/1	7/29/2017 10:50	7/29/2017 10:50	8/8/2017 00:05	280-383457/	N
FEW4-MW77	SO	FEW4-MW77-(169.0)	280-99735-6		1/1	7/29/2017 11:11	7/29/2017 11:11	8/8/2017 00:25	280-383457/	N
FEW4-MW77	SO	FEW4-MW77-(182.0)	280-99735-8		1/1	7/29/2017 12:15	7/29/2017 12:15	8/8/2017 00:45	280-383457/	N
FEW4-MW77	SO	FEW4-MW77-(200.0)	280-99735-10		1/1	7/29/2017 13:30	7/29/2017 13:30	8/8/2017 01:26	280-383457/	N
FEW4-MW77	SO	FEW4-MW77-(215.0)	280-99735-11		1/1	7/29/2017 13:33	7/29/2017 13:33	8/8/2017 01:46	280-383457/	N
FEW4-MW77	SO	FEW4-MW77-(224.0)	280-99735-13		1/1	7/29/2017 16:55	7/29/2017 16:55	8/8/2017 02:26	280-383457/	N
FEW4-MW77	SO	FEW4-MW77-(235.0)	280-99735-14		1/1	7/29/2017 17:00	7/29/2017 17:00	8/8/2017 02:46	280-383457/	N
FEW4-MW77	SO	FEW4-MW77-(245.0)	280-99735-15		1/1	7/29/2017 17:45	7/29/2017 17:45	8/8/2017 03:06	280-383457/	N
FEW4-MW77	SO	FEW4-MW77-(254.0)	280-99735-16		1/1	7/30/2017 08:27	7/30/2017 08:27	8/8/2017 03:26	280-383457/	N

Test Method: SW8260B Analysis Batch: 280-385299

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
LABQC	SQ	LCS 280-383928/1-A	LCS 280-383928/1-A		1/1	8/10/2017 16:00	8/10/2017 16:00	8/10/2017 21:06	280-385299/	BS
LABQC	SQ	LCSD 280-383928/2-A	LCSD 280-383928/2-A		1/1	8/10/2017 16:00	8/10/2017 16:00	8/10/2017 21:27	280-385299/	BD
LABQC	SQ	MB 280-383928/3-A	MB 280-383928/3-A		1/1	8/10/2017 16:00	8/10/2017 16:00	8/10/2017 22:07	280-385299/	LB

US Army Corps of Engineers ®

Batch Report

Test Method: SW8260B Analysis Batch: 280-385299

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
FEW4-MW77	SO	FEW4-MW77-(195.0)	280-99735-9		1/1	7/29/2017 12:22	7/29/2017 12:22	8/11/2017 01:47	280-385299/	N
FEW4-MW77	SO	FEW4-MW77-(216.0)	280-99735-12		1/1	7/29/2017 14:33	7/29/2017 14:33	8/11/2017 02:07	280-385299/	FD
FEW4-MW84	SO	FEW4-MW84-(91.0)	280-99735-17		1/1	7/30/2017 18:20	7/30/2017 18:20	8/11/2017 02:47	280-385299/	N

US Army Corps of Engineers ®

Field Batch Report

--No Records Found--

MS Mismatch Report

--No Records Found--

Section to identify Matrix Spike mismatches where parent sample differs from MS by dilution.

US Army Corps of Engineers ®

QC Outlier Report

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

QC Element	Sample ID/ Lab Sample ID	Run#/ Dil'n	Analyte	Result (Units)	Qualifier	Warning Limits	Control Limits	Reason	Comment	Rule	Action Level
MS RPD	280-99735-7MSD (SD) / 280-99735-7MSD	1 / 1.00	1,2,3-Trichloropropane	21.74 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99735-7MSD (SD) / 280-99735-7MSD	1 / 1.00	1,2-Dibromo-3-chloropropane	22.22 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99735-7MSD (SD) / 280-99735-7MSD	1 / 1.00	Bromoform	20.55 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99735-7MSD (SD) / 280-99735-7MSD	1 / 1.00	Methyl tert-butyl ether (MTBE)	20.43 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99735-7MSD (SD) / 280-99735-7MSD	1 / 1.00	Naphthalene	23.15 (rpd)	J/None	< 20	< 20	D			
Surrogate	FEW4-MW77-(215.0) (N) / 280-99735-11	1 / 1.00	Dibromofluoromethane	126.4 (percent)	J/None	78 - 119	78 - 119	I			
Surrogate	FEW4-MW77-(224.0) (N) / 280-99735-13	1 / 1.00	Dibromofluoromethane	123.2 (percent)	J/None	78 - 119	78 - 119	I			
Surrogate	FEW4-MW77-(235.0) (N) / 280-99735-14	1 / 1.00	Dibromofluoromethane	123.7 (percent)	J/None	78 - 119	78 - 119	I			
Surrogate	FEW4-MW77-(245.0) (N) / 280-99735-15	1 / 1.00	1,2-Dichloroethane-d4	137.4 (percent)	J/None	71 - 136	71 - 136	I			
Surrogate	FEW4-MW77-(245.0) (N) / 280-99735-15	1 / 1.00	Dibromofluoromethane	132.2 (percent)	J/None	78 - 119	78 - 119	I			
Surrogate	FEW4-MW77-(254.0) (N) / 280-99735-16	1 / 1.00	Dibromofluoromethane	122.0 (percent)	J/None	78 - 119	78 - 119	I			
Surrogate	FEW4-MW84-(91.0) (N) / 280-99735-17	1 / 1.00	Dibromofluoromethane	119.4 (percent)	J/None	78 - 119	78 - 119	I			

Rule is the multiplier used when blank contamination occurs to determine action level.

Qualified Results

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW77-(126.0)	280-99735-1	SO	N	1,2,3-Trichlorobenzene	8.70	1.60 J	1.60 J		ug/kg	TR
FEW4-MW77-(126.0)	280-99735-1	SO	N	Acetone	35.0	30.0 J	30.0 J		ug/kg	TR
FEW4-MW77-(126.0)	280-99735-1	SO	N	Naphthalene	8.70	3.10 J	3.10 J		ug/kg	TR
FEW4-MW77-(139.0)	280-99735-3	SO	N	Acetone	33.0	13.0 J	13.0 J		ug/kg	TR
FEW4-MW77-(155.0)	280-99735-5	SO	N	Acetone	22.0	12.0 J	12.0 J		ug/kg	TR
FEW4-MW77-(169.0)	280-99735-6	SO	N	Acetone	26.0	12.0 J	12.0 J		ug/kg	TR
FEW4-MW77-(177.0)	280-99735-7	SO	N	1,2,3-Trichlorobenzene	5.30	0.910 J	0.910 J		ug/kg	TR
FEW4-MW77-(177.0)	280-99735-7	SO	N	Naphthalene	5.30	1.80 J	1.80 J		ug/kg	D/TR
FEW4-MW77-(195.0)	280-99735-9	SO	N	1,1-Dichloroethene	5.70	1.00 J	1.00 J		ug/kg	TR
FEW4-MW77-(195.0)	280-99735-9	SO	N	Acetone	23.0	7.70 J	7.70 J		ug/kg	TR
FEW4-MW77-(216.0)	280-99735-12	SO	FD	Acetone	22.0	8.00 J	8.00 J		ug/kg	TR
FEW4-MW77-(245.0)	280-99735-15	SO	N	Acetone	26.0	48.0 Q	48.0 J	+	ug/kg	I
FEW4-MW77-(254.0)	280-99735-16	SO	N	Acetone	19.0	7.30 J Q	7.30 J	+	ug/kg	I/TR

Qualified analytes in samples are reported as estimated, not detected (UJ) at the Limit of Detection (LOD).

US Army Corps of Engineers ®

Detected Results

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Dilution	Analyte	LOQ	Lab Result	Qualified Result	Units	Reason
FEW4-MW77-(126.0)	280-99735-1	SO	N	1	1,2,3-Trichlorobenzene	8.70	1.60 J	1.60 J	ug/kg	TR
FEW4-MW77-(126.0)	280-99735-1	SO	N	1	Acetone	35.0	30.0 J	30.0 J	ug/kg	TR
FEW4-MW77-(126.0)	280-99735-1	SO	N	1	Naphthalene	8.70	3.10 J	3.10 J	ug/kg	TR
FEW4-MW77-(134.0)	280-99735-2	SO	N	1	Acetone	24.0	34.0	34.0	ug/kg	
FEW4-MW77-(139.0)	280-99735-3	SO	N	1	Acetone	33.0	13.0 J	13.0 J	ug/kg	TR
FEW4-MW77-(155.0)	280-99735-5	SO	N	1	Acetone	22.0	12.0 J	12.0 J	ug/kg	TR
FEW4-MW77-(169.0)	280-99735-6	SO	N	1	Acetone	26.0	12.0 J	12.0 J	ug/kg	TR
FEW4-MW77-(177.0)	280-99735-7	SO	N	1	1,2,3-Trichlorobenzene	5.30	0.910 J	0.910 J	ug/kg	TR
FEW4-MW77-(177.0)	280-99735-7	SO	N	1	Acetone	21.0	28.0	28.0	ug/kg	
FEW4-MW77-(177.0)	280-99735-7	SO	N	1	Naphthalene	5.30	1.80 J	1.80 J	ug/kg	D/TR
FEW4-MW77-(182.0)	280-99735-8	SO	N	1	Acetone	39.0	58.0	58.0	ug/kg	
FEW4-MW77-(195.0)	280-99735-9	SO	N	1	1,1-Dichloroethene	5.70	1.00 J	1.00 J	ug/kg	TR
FEW4-MW77-(195.0)	280-99735-9	SO	N	1	Acetone	23.0	7.70 J	7.70 J	ug/kg	TR
FEW4-MW77-(200.0)	280-99735-10	SO	N	1	Acetone	36.0	48.0	48.0	ug/kg	
FEW4-MW77-(216.0)	280-99735-12	SO	FD	1	Acetone	22.0	8.00 J	8.00 J	ug/kg	TR
FEW4-MW77-(245.0)	280-99735-15	SO	N	1	Acetone	26.0	48.0 Q	48.0 J	ug/kg	I
FEW4-MW77-(254.0)	280-99735-16	SO	N	1	Acetone	19.0	7.30 J Q	7.30 J	ug/kg	I/TR

US Army Corps of Engineers ®

Rejected Results

--No Records Found--

Facility:	B08WY0467-02, F.E. Warren AFB, Site 4
Event:	2017-2018 RI Addendum Tasks
SDG:	280-99735-1_52_2a_FUDSChem
Guidance Document:	Draft-Final Uniform Federal Policy-Quality Assurance Project Plan for the Remedial Investigation Addendum 2017-2018 Tasks Atlas "D" Missile Site 4 —Laramie County, Wyoming, July 2017
Prime Contractor:	RMC Consultants, Inc., LAKEWOOD, CO
Project Manager:	David Groy
Contract Laboratory:	TestAmerica Laboratories, Inc., Arvada, CO
Data Review Contractor:	RMC Consultants
Data Review Level:	Stage 3VEM
Primary Data Reviewer:	Gary Torf, Contractor Project Chemist
Second Reviewer:	, Senior Scientist
Date Submitted:	

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	SW8260B
FEW4-MW77-(216.0)	280-99735-12	Solid	Field Duplicate/FD	X
FEW4-MW77-(126.0)	280-99735-1	Solid	Field Sample/N	X
FEW4-MW77-(134.0)	280-99735-2	Solid	Field Sample/N	X
FEW4-MW77-(139.0)	280-99735-3	Solid	Field Sample/N	X
FEW4-MW77-(145.0)	280-99735-4	Solid	Field Sample/N	X
FEW4-MW77-(155.0)	280-99735-5	Solid	Field Sample/N	X
FEW4-MW77-(169.0)	280-99735-6	Solid	Field Sample/N	X
FEW4-MW77-(177.0)	280-99735-7	Solid	Field Sample/N	X
FEW4-MW77-(182.0)	280-99735-8	Solid	Field Sample/N	X
FEW4-MW77-(195.0)	280-99735-9	Solid	Field Sample/N	X
FEW4-MW77-(200.0)	280-99735-10	Solid	Field Sample/N	X
FEW4-MW77-(215.0)	280-99735-11	Solid	Field Sample/N	X
FEW4-MW77-(224.0)	280-99735-13	Solid	Field Sample/N	X
FEW4-MW77-(235.0)	280-99735-14	Solid	Field Sample/N	X
FEW4-MW77-(245.0)	280-99735-15	Solid	Field Sample/N	X
FEW4-MW77-(254.0)	280-99735-16	Solid	Field Sample/N	X
FEW4-MW84-(91.0)	280-99735-17	Solid	Field Sample/N	X

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the Draft-Final Uniform Federal Policy-Quality Assurance Project Plan for the Remedial Investigation Addendum 2017-2018 Tasks Atlas “D” Missile Site 4 —Laramie County, Wyoming, July 2017 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by RMC Consultants, Inc., LAKEWOOD, CO; analyses were performed by TestAmerica Laboratories, Inc., Arvada, CO and were reported under sample delivery group (SDG) 280-99735-1_52_2a_FUDSChem. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

- Blank
- Blank - Negative
- Field Duplicate RPD
- LCS Recovery
- LCS RPD
- MS Recovery
- MS RPD
- Prep Hold Time
- Surrogate
- Test Hold Time

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 3 results (0.27%) out of the 1122 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected. Trace values, defined as results that are qualified as estimated because they fall between the limit of detection and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

Narrative Comments

Analytical Method	Data Reviewer Comment
SW8260B	No additional comments; see Checklist for detail.

October 23, 2017

Reviewed by Gary Torf, Contractor Project Chemist, RMC Consultants

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of a minimum of 10% of the reported sample results and method quality control data between the two deliverables.

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

Quality Control Outliers for test method SW8260B, MS RPD

The objective of matrix spikes/matrix spike duplicates (MS/MSD) RPD analysis is to demonstrate acceptable method precision by the laboratory at the time of analysis. MS/MSD analyses are also performed to generate data that determines the long-term precision of the analytical method on various matrices. Non-homogenous samples can impact the apparent method precision. Summary forms were evaluated and compared to electronic data deliverables. Matrix spikes/matrix spike duplicates results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
280-99735-7MSD (SD)/ 280-99735-7MSD	Methyl tert-butyl ether (MTBE)	20.43	< 20	< 20	rpd	J/None	D	
280-99735-7MSD (SD)/ 280-99735-7MSD	Bromoform	20.55	< 20	< 20	rpd	J/None	D	
280-99735-7MSD (SD)/ 280-99735-7MSD	1,2,3-Trichloropropane	21.74	< 20	< 20	rpd	J/None	D	
280-99735-7MSD (SD)/ 280-99735-7MSD	1,2-Dibromo-3-chloropropane	22.22	< 20	< 20	rpd	J/None	D	
280-99735-7MSD (SD)/ 280-99735-7MSD	Naphthalene	23.15	< 20	< 20	rpd	J/None	D	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the MS RPD for SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW77-(177.0)	N	Naphthalene	5.30	1.80 J	1.80 J		ug/kg	D/TR

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

Quality Control Outliers for test method SW8260B, Surrogate

Method performance for individual samples is demonstrated through spiking activities. All samples are spiked with surrogate compounds prior to sample preparation. The sample itself may produce effects due to such factors as interferences and high concentrations of analytes. Summary forms were evaluated and compared to electronic data deliverables. Surrogate results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
FEW4-MW77-(215.0) (N)/ 280-99735-11	Dibromofluoromethane	126.4	78 - 119	78 - 119	percent	J/None	I	
FEW4-MW77-(224.0) (N)/ 280-99735-13	Dibromofluoromethane	123.2	78 - 119	78 - 119	percent	J/None	I	
FEW4-MW77-(235.0) (N)/ 280-99735-14	Dibromofluoromethane	123.7	78 - 119	78 - 119	percent	J/None	I	
FEW4-MW77-(245.0) (N)/ 280-99735-15	Dibromofluoromethane	132.2	78 - 119	78 - 119	percent	J/None	I	
FEW4-MW77-(245.0) (N)/ 280-99735-15	1,2-Dichloroethane-d4	137.4	71 - 136	71 - 136	percent	J/None	I	
FEW4-MW77-(254.0) (N)/ 280-99735-16	Dibromofluoromethane	122.0	78 - 119	78 - 119	percent	J/None	I	
FEW4-MW84-(91.0) (N)/ 280-99735-17	Dibromofluoromethane	119.4	78 - 119	78 - 119	percent	J/None	I	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the Surrogate for SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW77-(245.0)	N	Acetone	26.0	48.0 Q	48.0 J	+	ug/kg	I
FEW4-MW77-(254.0)	N	Acetone	19.0	7.30 J Q	7.30 J	+	ug/kg	I/TR

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

Table of All Qualified Results

Test Method: SW8260B	**Extraction Method: SW5035A**							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW77-(177.0)	N	Naphthalene	5.30	1.80 J	1.80 J		ug/kg	D/TR
FEW4-MW77-(245.0)	N	Acetone	26.0	48.0 Q	48.0 J	+	ug/kg	I
FEW4-MW77-(254.0)	N	Acetone	19.0	7.30 J Q	7.30 J	+	ug/kg	I/TR

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
Trace values are not included in the qualified results table unless additional reason codes are associated.

Table of All Trace Results

Test Method: SW8260B	Extraction Method: SW5035A							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW77-(126.0)	N	1,2,3-Trichlorobenzene	8.70	1.60 J	1.60 J		ug/kg	TR
FEW4-MW77-(126.0)	N	Acetone	35.0	30.0 J	30.0 J		ug/kg	TR
FEW4-MW77-(126.0)	N	Naphthalene	8.70	3.10 J	3.10 J		ug/kg	TR
FEW4-MW77-(139.0)	N	Acetone	33.0	13.0 J	13.0 J		ug/kg	TR
FEW4-MW77-(155.0)	N	Acetone	22.0	12.0 J	12.0 J		ug/kg	TR
FEW4-MW77-(169.0)	N	Acetone	26.0	12.0 J	12.0 J		ug/kg	TR
FEW4-MW77-(177.0)	N	1,2,3-Trichlorobenzene	5.30	0.910 J	0.910 J		ug/kg	TR
FEW4-MW77-(177.0)	N	Naphthalene	5.30	1.80 J	1.80 J		ug/kg	D/TR
FEW4-MW77-(195.0)	N	1,1-Dichloroethene	5.70	1.00 J	1.00 J		ug/kg	TR
FEW4-MW77-(195.0)	N	Acetone	23.0	7.70 J	7.70 J		ug/kg	TR
FEW4-MW77-(216.0)	FD	Acetone	22.0	8.00 J	8.00 J		ug/kg	TR
FEW4-MW77-(254.0)	N	Acetone	19.0	7.30 J Q	7.30 J	+	ug/kg	I/TR

Results with Modified Qualifiers

No qualifiers associated with this sample delivery group were modified manually.

Reason Code Definitions

Code	Definition
D	MS RPD
I	Surrogate recovery outside project limits.
TR	Trace Level Detect

Flag Code and Definitions

Flag	Definition
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
J	Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
R	The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making.
B	Blank contamination: The analyte was found in an associated blank above one half the RL, as well as in the sample.
UB	The analyte was also detected in an associated laboratory or field blank at a concentration comparable to the concentration in the sample. The reported result has been requalified as not detected.

Review Questions

Method: SW8260B (Volatile Organic Compounds by Capillary GC/MS)

Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were sample reciept temperatures met?	•			The sample receipt temperature was 2.9º C.
Were QAPP specified PQLs achieved?	•			
Were all QAPP-specified target analytes reported?	•			
Was the GC/MS system properly tuned based on method criteria?	•			
Was the criteria met during each 12 hour shift (prior to ICAL and Cal Ver.)?	•			
Does the initial calibration curve consist of 5 concentration levels, with the low standard near but > MDL?	•			
Did the Calibration Check Compounds (CCCs) have a relative standard deviation within QAPP acceptance limits?	•			
Were the average response factors (RFs) for the System Performance Check Compounds (SPCCs) within QAPP acceptance limits?	•			
Were the ICAL %RSDs for the target compounds within method criteria?	•			
If a quadratic equation curve was used, was the coefficient of determination (COD) within criteria?	•			
If a linear regression curve was used, was the correlation coefficient within criteria?	•			
Check and recalculate the response factors and average response factors for a least one target compound.	•			ICAL VMS-G2 7/21/17 TCE Average RF = 0.2399
Check and recalculate the %RSD for one of more target compounds and DMCs. Verify that the recalculated values agree with the laboratory reported values.	•			ICAL VMS-G2 7/21/17 TCE %RSD = 2.6% 1,2-DCA-d4 = 4.8%
Was a second source verification analyzed after the ICAL and all analytes within criteria?		•		Dichlorodifluoromethane had a percent difference greater than the control limit at 34.4%. All associated sample results were non-detect for this analyte, therefore no data qualification is warranted.
Was a CCV run at the beginning of the analytical sequence and every 12 hours?	•			
Was the CCV a mid-level standard from the initial calibration curve?	•			
Did the CCCs have a %Difference within QAPP acceptance limits?	•			
Were the average RFs for the SPCCs within QAPP acceptance limits?	•			
Was the %D (difference or drift) for all target analytes within QAPP acceptance limits?		•		A CCV had a percent difference was greaterthan the control limit for chloromethane at 21.2%. Chloromethane was not detected in any associated samples, therefore no data qualification is warranted.
Check and recalculate the CCV relative response factor for at least one target compound.	•			VMS-G2 8/7/17 CCV 280-383457/2 TCE RRF = 0.2521
Were the internal standards added to every standard, blank, matrix spike, matrix spike duplicate, and sample?	•			
Were the retention times for all IS compounds within QAPP acceptance limits?	•			

Review Questions

Method: SW8260B (Volatile Organic Compounds by Capillary GC/MS)

Review Questions	Yes	No	NA	Comment
Are the area counts of all IS compounds within QAPP acceptance limits?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes detected in the method blank above the MDL?		•		
Were target analytes reported in the field blank analyses above the MDL?			•	FEW4-MW77-(216.0) was a blind duplicate of FEW4-MW77-(215.0)
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?	•			
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were the LCS/LCSD recoveries within QAPP acceptance limits?		•		The 133% recovery of n-butylbenzene and 127% recovery of 1,1-dichloropropene were greater than the upper control limits of 128% and 125% respectively. These analytes were not detected in any associated samples and have therefore not been qualified.
Were the LCS/LCSD RPDs within QAPP acceptance limits?	•			
Was the duplicate RPD within QAPP acceptance limits?			•	
Was a MS/MSD pair prepared with each batch?	•			
Is the MS/MSD parent sample the one designated by the sampling team?	•			FEW4-MW77-(177.0) was designated for MS/MSD analysis.
Were MS/MSD recoveries and RPD within QAPP acceptance limits?		•		The RPDs of bromoform (21%), 1,2-Dibromo-3-chloropropane (22%), naphthalene (23%), and 1,2,3-trichloropropane (22%) were greater than the control limit of 20%.
Were surrogate recoveries within QAPP acceptance limits?		•		The 138% recovery of 1,2-DCE was greater than the upper control limit of 136% in sample FEW4-MW77-(245.0); the 120% (FEW4-MW77-(145.0)), 127% (FEW4-MW77-(215.0)), 121% (FEW4-MW77-(224.0)), 124% (FEW4-MW77-(235.0)), 132% (FEW4-MW77-(245.0)), and 122% (FEW4-MW77-(254.0)) recoveries of DBFM were greater than the upper control limit of 119%. Detected analytes values have been qualified as estimated for these samples.
Were reported sample concentrations within calibration range?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were instrument run logs present and filled out appropriately?	•			
Were sample prepration sheets present and filled out appropriately?	•			
Check and recalculate the %D for one target compound. Verify that the recalculated values agree with the laboratory-reported values.			•	
Examine raw data to verify correct calculation of sample results reported by the laboratory. Compare quantitation lists and chromatograms to the reported detect and non-detect sample results.	•			FEW4-MW77-(169.0) Acetone = 12 ug/kg
Verify that the reporting limits and sample results have been adjusted to reflect all sample dilutions and Percent Moisture factors (non-aqueous samples).	•			

US Army Corps of Engineers®

Batch Report

Test Method: SW8260B Analysis Batch: 280-383941

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
LABQC	WQ	MB 280-383941/8	MB 280-383941/8		1/1	8/11/2017 10:00	8/11/2017 10:00	8/11/2017 10:00	280-383941/	LB
LABQC	WQ	LCS 280-383941/4	LCS 280-383941/4		1/1	8/11/2017 10:39	8/11/2017 10:39	8/11/2017 10:39	280-383941/	BS
FEW4-MW84	WG	FEW4-MW84-87	280-99750-1		1/1	7/31/2017 09:30	8/11/2017 14:51	8/11/2017 14:51	280-383941/	N

Test Method: SW8260B Analysis Batch: 280-384106

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
LABQC	SQ	MB 280-384103/1-A	MB 280-384103/1-A		1/1	8/13/2017 15:00	8/13/2017 15:00	8/13/2017 17:54	280-384106/	LB
LABQC	SQ	LCS 280-384103/2-A	LCS 280-384103/2-A		1/1	8/13/2017 15:00	8/13/2017 15:00	8/13/2017 18:34	280-384106/	BS
FEW4-MW84	SO	FEW4-MW84-(101.0)	280-99750-2		1/1	7/31/2017 10:20	7/31/2017 10:20	8/13/2017 21:58	280-384106/	N
FEW4-MW84	SO	FEW4-MW84-(101.0)	280-99750-2MS		1/1	7/31/2017 10:20	7/31/2017 10:20	8/13/2017 22:18	280-384106/	MS
FEW4-MW84	SO	FEW4-MW84-(101.0)	280-99750-2MSD		1/1	7/31/2017 10:20	7/31/2017 10:20	8/13/2017 22:38	280-384106/	SD
FEW4-MW84	SO	FEW4-MW84-(113.0)	280-99750-3		1/1	7/31/2017 11:33	7/31/2017 11:33	8/13/2017 23:19	280-384106/	N
FEW4-MW84	SO	FEW4-MW84-(114.0)	280-99750-4		1/1	7/31/2017 12:33	7/31/2017 12:33	8/13/2017 23:39	280-384106/	FD
FEW4-MW84	SO	FEW4-MW84-(125.0)	280-99750-5		1/1	7/31/2017 12:22	7/31/2017 12:22	8/13/2017 23:59	280-384106/	N
FEW4-MW84	SO	FEW4-MW84-(135.0)	280-99750-6		1/1	7/31/2017 13:40	7/31/2017 13:40	8/14/2017 00:19	280-384106/	N
FEW4-MW84	SO	FEW4-MW84-(145.0)	280-99750-7		1/1	7/31/2017 13:50	7/31/2017 13:50	8/14/2017 00:39	280-384106/	N
FEW4-MW84	SO	FEW4-MW84-(155.0)	280-99750-8		1/1	7/31/2017 14:20	7/31/2017 14:20	8/14/2017 00:59	280-384106/	N
FEW4-MW84	SO	FEW4-MW84-(162.0)	280-99750-9		1/1	7/31/2017 14:30	7/31/2017 14:30	8/14/2017 01:20	280-384106/	N
FEW4-MW84	SO	FEW4-MW84-(175.0)	280-99750-10		1/1	7/31/2017 15:05	7/31/2017 15:05	8/14/2017 01:40	280-384106/	N
FEW4-MW84	SO	FEW4-MW84-(185.0)	280-99750-11		1/1	7/31/2017 15:54	7/31/2017 15:54	8/14/2017 02:00	280-384106/	N
FEW4-MW84	SO	FEW4-MW84-(195.0)	280-99750-12		1/1	7/31/2017 16:20	7/31/2017 16:20	8/14/2017 02:20	280-384106/	N
FEW4-MW84	SO	FEW4-MW84-(200.0)	280-99750-13		1/1	7/31/2017 16:30	7/31/2017 16:30	8/14/2017 02:40	280-384106/	N
FEW4-MW84	SO	FEW4-MW84-(212.0)	280-99750-14		1/1	7/31/2017 16:54	7/31/2017 16:54	8/14/2017 03:00	280-384106/	N

US Army Corps of Engineers®

Batch Report

Test Method: SW8260B Analysis Batch: 280-384106

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
FEW4-MW84	SO	FEW4-MW84-(225.0)	280-99750-15		1/1	7/31/2017 19:00	7/31/2017 19:00	8/14/2017 03:20	280-384106/	N

Test Method: SW8260B Analysis Batch: 280-384119

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
LABQC	SQ	LCS 280-384148/1-A	LCS 280-384148/1-A		1/1	8/14/2017 07:00	8/14/2017 07:00	8/14/2017 09:02	280-384119/	BS
LABQC	SQ	LCSD 280-384148/2-A	LCSD 280-384148/2-A		1/1	8/14/2017 07:00	8/14/2017 07:00	8/14/2017 09:22	280-384119/	BD
LABQC	SQ	MB 280-384148/3-A	MB 280-384148/3-A		1/1	8/14/2017 07:00	8/14/2017 07:00	8/14/2017 09:43	280-384119/	LB
FEW4-MW86	SO	FEW4-MW86-(102.0)	280-99750-16		1/1	7/31/2017 15:35	7/31/2017 15:35	8/14/2017 10:44	280-384119/	N
FEW4-MW86	SO	FEW4-MW86-(103.0)	280-99750-17		1/1	7/31/2017 16:35	7/31/2017 16:35	8/14/2017 11:04	280-384119/	FD
FEW4-MW86	SO	FEW4-MW86-(118.0)	280-99750-18		1/1	7/31/2017 16:30	7/31/2017 16:30	8/14/2017 11:25	280-384119/	N
FEW4-MW86	SO	FEW4-MW86-(112.0)	280-99750-19		1/1	7/31/2017 16:40	7/31/2017 16:40	8/14/2017 11:45	280-384119/	N
FEW4-MW86	SO	FEW4-MW86-(128.0)	280-99750-20		1/1	7/31/2017 16:50	7/31/2017 16:50	8/14/2017 12:06	280-384119/	N
FEW4-MW86	SO	FEW4-MW86-(136.0)	280-99750-21		1/1	7/31/2017 17:10	7/31/2017 17:10	8/14/2017 12:27	280-384119/	N
FEW4-MW86	SO	FEW4-MW86-(146.0)	280-99750-22		1/1	7/31/2017 17:25	7/31/2017 17:25	8/14/2017 12:47	280-384119/	N
FEW4-MW86	SO	FEW4-MW86-(15.0)	280-99750-23		1/1	7/31/2017 09:45	7/31/2017 09:45	8/14/2017 13:08	280-384119/	N
FEW4-MW86	SO	FEW4-MW86-(25.0)	280-99750-24		1/1	7/31/2017 10:30	7/31/2017 10:30	8/14/2017 13:28	280-384119/	N
FEW4-MW86	SO	FEW4-MW86-(28.0)	280-99750-25		1/1	7/31/2017 11:30	7/31/2017 11:30	8/14/2017 13:49	280-384119/	N
FEW4-MW86	SO	FEW4-MW86-(40.0)	280-99750-26		1/1	7/31/2017 11:43	7/31/2017 11:43	8/14/2017 14:10	280-384119/	N
FEW4-MW86	SO	FEW4-MW86-(52.0)	280-99750-27		1/1	7/31/2017 12:25	7/31/2017 12:25	8/14/2017 14:30	280-384119/	N
FEW4-MW86	SO	FEW4-MW86-(62.0)	280-99750-28		1/1	7/31/2017 12:35	7/31/2017 12:35	8/14/2017 14:51	280-384119/	N
FEW4-MW86	SO	FEW4-MW86-(72.0)	280-99750-29		1/1	7/31/2017 14:20	7/31/2017 14:20	8/14/2017 15:12	280-384119/	N
FEW4-MW86	SO	FEW4-MW86-(82.0)	280-99750-30		1/1	7/31/2017 14:35	7/31/2017 14:35	8/14/2017 15:33	280-384119/	N

US Army Corps of Engineers ®

Batch Report

Test Method: SW8260B Analysis Batch: 280-384119

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
FEW4-MW86	SO	FEW4-MW86-(92.0)	280-99750-31		1/1	7/31/2017 15:15	7/31/2017 15:15	8/14/2017 15:53	280-384119/	N

Field Batch Report

--No Records Found--

MS Mismatch Report

--No Records Found--

Section to identify Matrix Spike mismatches where parent sample differs from MS by dilution.

US Army Corps of Engineers®

QC Outlier Report

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

QC Element	Sample ID/ Lab Sample ID	Run#/ Dil'n	Analyte	Result (Units)	Qualifier	Warning Limits	Control Limits	Reason	Comment	Rule	Action Level
MS Recovery	FEW4-MW84-(101.0) (MS) / 280-99750-2MS	1 / 1.00	o-Xylene	76.12 (percent)	J/UJ	77 - 123	77 - 123	M			
MS Recovery	FEW4-MW84-(101.0) (SD) / 280-99750-2MSD	1 / 1.00	1,1,1,2-Tetrachloroethane	77.47 (percent)	J/UJ	78 - 125	78 - 125	M			
MS Recovery	FEW4-MW84-(101.0) (SD) / 280-99750-2MSD	1 / 1.00	1,1-Dichloroethane	73.12 (percent)	J/UJ	76 - 125	76 - 125	M			
MS Recovery	FEW4-MW84-(101.0) (SD) / 280-99750-2MSD	1 / 1.00	1,2,4-Trichlorobenzene	66.40 (percent)	J/UJ	67 - 129	67 - 129	M			
MS Recovery	FEW4-MW84-(101.0) (SD) / 280-99750-2MSD	1 / 1.00	1,2,4-Trimethylbenzene	67.79 (percent)	J/UJ	75 - 123	75 - 123	M			
MS Recovery	FEW4-MW84-(101.0) (SD) / 280-99750-2MSD	1 / 1.00	1,2-Dichlorobenzene	70.75 (percent)	J/UJ	78 - 121	78 - 121	M			
MS Recovery	FEW4-MW84-(101.0) (SD) / 280-99750-2MSD	1 / 1.00	1,2-Dichloroethene	73.66 (percent)	J/UJ	78 - 122	78 - 122	M			
MS Recovery	FEW4-MW84-(101.0) (SD) / 280-99750-2MSD	1 / 1.00	1,2-Dichloropropane	73.91 (percent)	J/UJ	76 - 123	76 - 123	M			
MS Recovery	FEW4-MW84-(101.0) (SD) / 280-99750-2MSD	1 / 1.00	1,3,5-Trimethylbenzene	67.00 (percent)	J/UJ	73 - 124	73 - 124	M			
MS Recovery	FEW4-MW84-(101.0) (SD) / 280-99750-2MSD	1 / 1.00	1,3-Dichlorobenzene	68.18 (percent)	J/UJ	77 - 121	77 - 121	M			
MS Recovery	FEW4-MW84-(101.0) (SD) / 280-99750-2MSD	1 / 1.00	1,4-Dichlorobenzene	67.98 (percent)	J/UJ	75 - 120	75 - 120	M			
MS Recovery	FEW4-MW84-(101.0) (SD) / 280-99750-2MSD	1 / 1.00	2-Chlorotoluene	70.36 (percent)	J/UJ	75 - 122	75 - 122	M			
MS Recovery	FEW4-MW84-(101.0) (SD) / 280-99750-2MSD	1 / 1.00	4-Chlorotoluene	70.55 (percent)	J/UJ	72 - 124	72 - 124	M			
MS Recovery	FEW4-MW84-(101.0) (SD) / 280-99750-2MSD	1 / 1.00	Benzene	74.11 (percent)	J/UJ	77 - 121	77 - 121	M			
MS Recovery	FEW4-MW84-(101.0) (SD) / 280-99750-2MSD	1 / 1.00	Bromobenzene	70.95 (percent)	J/UJ	78 - 121	78 - 121	M			
MS Recovery	FEW4-MW84-(101.0) (SD) / 280-99750-2MSD	1 / 1.00	Chlorobenzene	70.75 (percent)	J/UJ	79 - 120	79 - 120	M			
MS Recovery	FEW4-MW84-(101.0) (SD) / 280-99750-2MSD	1 / 1.00	Chloroform	76.09 (percent)	J/UJ	78 - 123	78 - 123	M			
MS Recovery	FEW4-MW84-(101.0) (SD) / 280-99750-2MSD	1 / 1.00	cis-1,2-Dichloroethene	72.73 (percent)	J/UJ	77 - 123	77 - 123	M			

US Army Corps of Engineers®

QC Outlier Report

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

QC Element	Sample ID/ Lab Sample ID	Run#/ Dil'n	Analyte	Result (Units)	Qualifier	Warning Limits	Control Limits	Reason	Comment	Rule	Action Level
MS Recovery	FEW4-MW84-(101.0) (SD) / 280-99750-2MSD	1 / 1.00	Ethylbenzene	66.21 (percent)	J/UJ	76 - 122	76 - 122	M			
MS Recovery	FEW4-MW84-(101.0) (SD) / 280-99750-2MSD	1 / 1.00	Isopropylbenzene (Cumene)	63.83 (percent)	J/UJ	68 - 134	68 - 134	M			
MS Recovery	FEW4-MW84-(101.0) (SD) / 280-99750-2MSD	1 / 1.00	m,p-Xylene	74.70 (percent)	J/UJ	77 - 124	77 - 124	M			
MS Recovery	FEW4-MW84-(101.0) (SD) / 280-99750-2MSD	1 / 1.00	n-Butylbenzene	64.03 (percent)	J/UJ	70 - 128	70 - 128	M			
MS Recovery	FEW4-MW84-(101.0) (SD) / 280-99750-2MSD	1 / 1.00	n-Propylbenzene	66.21 (percent)	J/UJ	73 - 125	73 - 125	M			
MS Recovery	FEW4-MW84-(101.0) (SD) / 280-99750-2MSD	1 / 1.00	o-Xylene	66.01 (percent)	J/UJ	77 - 123	77 - 123	M			
MS Recovery	FEW4-MW84-(101.0) (SD) / 280-99750-2MSD	1 / 1.00	p-Cymene (p-Isopropyltoluene)	64.23 (percent)	J/UJ	73 - 127	73 - 127	M			
MS Recovery	FEW4-MW84-(101.0) (SD) / 280-99750-2MSD	1 / 1.00	sec-Butylbenzene	66.40 (percent)	J/UJ	73 - 126	73 - 126	M			
MS Recovery	FEW4-MW84-(101.0) (SD) / 280-99750-2MSD	1 / 1.00	Styrene	67.59 (percent)	J/UJ	76 - 124	76 - 124	M			
MS Recovery	FEW4-MW84-(101.0) (SD) / 280-99750-2MSD	1 / 1.00	tert-Butylbenzene	64.03 (percent)	J/UJ	73 - 125	73 - 125	M			
MS Recovery	FEW4-MW84-(101.0) (SD) / 280-99750-2MSD	1 / 1.00	Tetrachloroethene (PCE)	70.95 (percent)	J/UJ	73 - 128	73 - 128	M			
MS Recovery	FEW4-MW84-(101.0) (SD) / 280-99750-2MSD	1 / 1.00	Toluene	76.68 (percent)	J/UJ	77 - 121	77 - 121	M			
MS Recovery	FEW4-MW84-(101.0) (SD) / 280-99750-2MSD	1 / 1.00	Trichloroethene (TCE)	71.94 (percent)	J/UJ	77 - 123	77 - 123	M			
MS RPD	280-99750-2MSD (SD) / 280-99750-2MSD	1 / 1.00	1,1,1,2-Tetrachloroethane	29.38 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99750-2MSD (SD) / 280-99750-2MSD	1 / 1.00	1,1,1-Trichloroethane	29.41 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99750-2MSD (SD) / 280-99750-2MSD	1 / 1.00	1,1,2,2-Tetrachloroethane	28.69 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99750-2MSD (SD) / 280-99750-2MSD	1 / 1.00	1,1,2-Trichloroethane	28.57 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99750-2MSD (SD) / 280-99750-2MSD	1 / 1.00	1,1-Dichloroethane	29.30 (rpd)	J/None	< 20	< 20	D			

US Army Corps of Engineers®

QC Outlier Report

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

QC Element	Sample ID/ Lab Sample ID	Run#/ Dil'n	Analyte	Result (Units)	Qualifier	Warning Limits	Control Limits	Reason	Comment	Rule	Action Level
MS RPD	280-99750-2MSD (SD) / 280-99750-2MSD	1 / 1.00	1,1-Dichloroethene	24.73 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99750-2MSD (SD) / 280-99750-2MSD	1 / 1.00	1,1-Dichloropropene	26.65 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99750-2MSD (SD) / 280-99750-2MSD	1 / 1.00	1,2,3-Trichlorobenzene	26.11 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99750-2MSD (SD) / 280-99750-2MSD	1 / 1.00	1,2,3-Trichloropropane	27.72 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99750-2MSD (SD) / 280-99750-2MSD	1 / 1.00	1,2,4-Trichlorobenzene	26.13 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99750-2MSD (SD) / 280-99750-2MSD	1 / 1.00	1,2,4-Trimethylbenzene	28.07 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99750-2MSD (SD) / 280-99750-2MSD	1 / 1.00	1,2-Dibromo-3-chloropropane	25.14 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99750-2MSD (SD) / 280-99750-2MSD	1 / 1.00	1,2-Dibromoethane (EDB)	29.03 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99750-2MSD (SD) / 280-99750-2MSD	1 / 1.00	1,2-Dichlorobenzene	29.52 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99750-2MSD (SD) / 280-99750-2MSD	1 / 1.00	1,2-Dichloroethane	32.21 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99750-2MSD (SD) / 280-99750-2MSD	1 / 1.00	1,2-Dichloroethene	30.33 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99750-2MSD (SD) / 280-99750-2MSD	1 / 1.00	1,2-Dichloropropane	30.96 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99750-2MSD (SD) / 280-99750-2MSD	1 / 1.00	1,3,5-Trimethylbenzene	28.57 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99750-2MSD (SD) / 280-99750-2MSD	1 / 1.00	1,3-Dichlorobenzene	29.84 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99750-2MSD (SD) / 280-99750-2MSD	1 / 1.00	1,3-Dichloropropane	28.26 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99750-2MSD (SD) / 280-99750-2MSD	1 / 1.00	1,4-Dichlorobenzene	29.91 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99750-2MSD (SD) / 280-99750-2MSD	1 / 1.00	2,2-Dichloropropane	30.07 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99750-2MSD (SD) / 280-99750-2MSD	1 / 1.00	2-Chlorotoluene	28.64 (rpd)	J/None	< 20	< 20	D			

US Army Corps of Engineers®

QC Outlier Report

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

QC Element	Sample ID/ Lab Sample ID	Run#/ Dil'n	Analyte	Result (Units)	Qualifier	Warning Limits	Control Limits	Reason	Comment	Rule	Action Level
MS RPD	280-99750-2MSD (SD) / 280-99750-2MSD	1 / 1.00	4-Chlorotoluene	26.07 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99750-2MSD (SD) / 280-99750-2MSD	1 / 1.00	Acetone	20.27 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99750-2MSD (SD) / 280-99750-2MSD	1 / 1.00	Benzene	27.19 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99750-2MSD (SD) / 280-99750-2MSD	1 / 1.00	Bromobenzene	29.25 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99750-2MSD (SD) / 280-99750-2MSD	1 / 1.00	Bromochloromethane	28.57 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99750-2MSD (SD) / 280-99750-2MSD	1 / 1.00	Bromodichloromethane	29.10 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99750-2MSD (SD) / 280-99750-2MSD	1 / 1.00	Bromoform	28.00 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99750-2MSD (SD) / 280-99750-2MSD	1 / 1.00	Bromomethane	31.00 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99750-2MSD (SD) / 280-99750-2MSD	1 / 1.00	Carbon disulfide	26.49 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99750-2MSD (SD) / 280-99750-2MSD	1 / 1.00	Carbon tetrachloride	29.71 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99750-2MSD (SD) / 280-99750-2MSD	1 / 1.00	Chlorobenzene	29.32 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99750-2MSD (SD) / 280-99750-2MSD	1 / 1.00	Chloroform	30.58 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99750-2MSD (SD) / 280-99750-2MSD	1 / 1.00	cis-1,2-Dichloroethene	29.43 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99750-2MSD (SD) / 280-99750-2MSD	1 / 1.00	cis-1,3-Dichloropropene	30.45 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99750-2MSD (SD) / 280-99750-2MSD	1 / 1.00	Dibromochloromethane	31.90 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99750-2MSD (SD) / 280-99750-2MSD	1 / 1.00	Dibromomethane	30.46 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99750-2MSD (SD) / 280-99750-2MSD	1 / 1.00	Ethylbenzene	28.21 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99750-2MSD (SD) / 280-99750-2MSD	1 / 1.00	Hexachlorobutadiene	25.03 (rpd)	J/None	< 20	< 20	D			

US Army Corps of Engineers ®

QC Outlier Report

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

QC Element	Sample ID/ Lab Sample ID	Run#/ Dil'n	Analyte	Result (Units)	Qualifier	Warning Limits	Control Limits	Reason	Comment	Rule	Action Level
MS RPD	280-99750-2MSD (SD) / 280-99750-2MSD	1 / 1.00	Isopropylbenzene (Cumene)	27.50 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99750-2MSD (SD) / 280-99750-2MSD	1 / 1.00	m,p-Xylene	28.96 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99750-2MSD (SD) / 280-99750-2MSD	1 / 1.00	Methyl tert-butyl ether (MTBE)	26.60 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99750-2MSD (SD) / 280-99750-2MSD	1 / 1.00	Methylene chloride	32.95 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99750-2MSD (SD) / 280-99750-2MSD	1 / 1.00	Naphthalene	26.05 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99750-2MSD (SD) / 280-99750-2MSD	1 / 1.00	n-Butylbenzene	26.97 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99750-2MSD (SD) / 280-99750-2MSD	1 / 1.00	n-Propylbenzene	28.43 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99750-2MSD (SD) / 280-99750-2MSD	1 / 1.00	o-Xylene	27.39 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99750-2MSD (SD) / 280-99750-2MSD	1 / 1.00	p-Cymene (p-Isopropyltoluene)	26.90 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99750-2MSD (SD) / 280-99750-2MSD	1 / 1.00	sec-Butylbenzene	27.69 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99750-2MSD (SD) / 280-99750-2MSD	1 / 1.00	Styrene	30.06 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99750-2MSD (SD) / 280-99750-2MSD	1 / 1.00	tert-Butylbenzene	28.57 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99750-2MSD (SD) / 280-99750-2MSD	1 / 1.00	Tetrachloroethene (PCE)	23.80 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99750-2MSD (SD) / 280-99750-2MSD	1 / 1.00	Toluene	29.07 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99750-2MSD (SD) / 280-99750-2MSD	1 / 1.00	trans-1,2-Dichloroethene	30.25 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99750-2MSD (SD) / 280-99750-2MSD	1 / 1.00	trans-1,3-Dichloropropene	28.39 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99750-2MSD (SD) / 280-99750-2MSD	1 / 1.00	Trichloroethene (TCE)	26.46 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99750-2MSD (SD) / 280-99750-2MSD	1 / 1.00	Trichlorofluoromethane	22.46 (rpd)	J/None	< 20	< 20	D			

US Army Corps of Engineers®

QC Outlier Report

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

QC Element	Sample ID/ Lab Sample ID	Run#/ Dil'n	Analyte	Result (Units)	Qualifier	Warning Limits	Control Limits	Reason	Comment	Rule	Action Level
Surrogate	FEW4-MW84-(175.0) (N) / 280-99750-10	1 / 1.00	Dibromofluoromethane	122.4 (percent)	J/None	78 - 119	78 - 119	I			
Surrogate	FEW4-MW84-(195.0) (N) / 280-99750-12	1 / 1.00	Dibromofluoromethane	119.0 (percent)	J/None	78 - 119	78 - 119	I			
Surrogate	FEW4-MW84-(212.0) (N) / 280-99750-14	1 / 1.00	Dibromofluoromethane	120.2 (percent)	J/None	78 - 119	78 - 119	I			
Surrogate	FEW4-MW84-(225.0) (N) / 280-99750-15	1 / 1.00	Dibromofluoromethane	119.7 (percent)	J/None	78 - 119	78 - 119	I			
Surrogate	FEW4-MW86-(92.0) (N) / 280-99750-31	1 / 1.00	Dibromofluoromethane	119.2 (percent)	J/None	78 - 119	78 - 119	I			
Test Hold Time	FEW4-MW86-(15.0) (N) / 280-99750-23	1 / 1.00	All in Run	14.14 (days)	J/UJ	< 14	< 14	H1	Test Exceeds UCL		
Test Hold Time	FEW4-MW86-(25.0) (N) / 280-99750-24	1 / 1.00	All in Run	14.12 (days)	J/UJ	< 14	< 14	H1	Test Exceeds UCL		
Test Hold Time	FEW4-MW86-(28.0) (N) / 280-99750-25	1 / 1.00	All in Run	14.10 (days)	J/UJ	< 14	< 14	H1	Test Exceeds UCL		
Test Hold Time	FEW4-MW86-(40.0) (N) / 280-99750-26	1 / 1.00	All in Run	14.10 (days)	J/UJ	< 14	< 14	H1	Test Exceeds UCL		
Test Hold Time	FEW4-MW86-(52.0) (N) / 280-99750-27	1 / 1.00	All in Run	14.09 (days)	J/UJ	< 14	< 14	H1	Test Exceeds UCL		
Test Hold Time	FEW4-MW86-(62.0) (N) / 280-99750-28	1 / 1.00	All in Run	14.09 (days)	J/UJ	< 14	< 14	H1	Test Exceeds UCL		
Test Hold Time	FEW4-MW86-(72.0) (N) / 280-99750-29	1 / 1.00	All in Run	14.04 (days)	J/UJ	< 14	< 14	H1	Test Exceeds UCL		
Test Hold Time	FEW4-MW86-(82.0) (N) / 280-99750-30	1 / 1.00	All in Run	14.04 (days)	J/UJ	< 14	< 14	H1	Test Exceeds UCL		
Test Hold Time	FEW4-MW86-(92.0) (N) / 280-99750-31	1 / 1.00	All in Run	14.03 (days)	J/UJ	< 14	< 14	H1	Test Exceeds UCL		

US Army Corps of Engineers ®

QC Outlier Report

Rule is the multiplier used when blank contamination occurs to determine action level.

US Army Corps of Engineers®

Qualified Results

Test Method: SW8260B Extraction Method: SW5030B Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW84-87	280-99750-1	WG	N	Acetone	10	3.0 J	3.0 J		ug/L	TR
FEW4-MW84-87	280-99750-1	WG	N	Chloromethane	2.0	0.71 J	0.71 J		ug/L	TR

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW84-(101.0)	280-99750-2	SO	N	1,1,1,2-Tetrachloroethane	5.4	1.7 U J	1.7 UJ	-	ug/kg	M
FEW4-MW84-(101.0)	280-99750-2	SO	N	1,1-Dichloroethane	5.4	0.87 U J	0.87 UJ	-	ug/kg	M
FEW4-MW84-(101.0)	280-99750-2	SO	N	1,2,4-Trichlorobenzene	5.4	1.7 U J	1.7 UJ	-	ug/kg	M
FEW4-MW84-(101.0)	280-99750-2	SO	N	1,2,4-Trimethylbenzene	5.4	1.7 U J	1.7 UJ	-	ug/kg	M
FEW4-MW84-(101.0)	280-99750-2	SO	N	1,2-Dichlorobenzene	5.4	1.7 U J	1.7 UJ	-	ug/kg	M
FEW4-MW84-(101.0)	280-99750-2	SO	N	1,2-Dichloroethene	5.4	1.7 U J	1.7 UJ	-	ug/kg	M
FEW4-MW84-(101.0)	280-99750-2	SO	N	1,2-Dichloropropane	5.4	1.7 U J	1.7 UJ	-	ug/kg	M
FEW4-MW84-(101.0)	280-99750-2	SO	N	1,3,5-Trimethylbenzene	5.4	1.7 U J	1.7 UJ	-	ug/kg	M
FEW4-MW84-(101.0)	280-99750-2	SO	N	1,3-Dichlorobenzene	5.4	1.7 U J	1.7 UJ	-	ug/kg	M
FEW4-MW84-(101.0)	280-99750-2	SO	N	1,4-Dichlorobenzene	5.4	1.7 U J	1.7 UJ	-	ug/kg	M
FEW4-MW84-(101.0)	280-99750-2	SO	N	2-Chlorotoluene	5.4	1.7 U J	1.7 UJ	-	ug/kg	M
FEW4-MW84-(101.0)	280-99750-2	SO	N	4-Chlorotoluene	5.4	1.7 U J	1.7 UJ	-	ug/kg	M
FEW4-MW84-(101.0)	280-99750-2	SO	N	Benzene	5.4	1.7 U J	1.7 UJ	-	ug/kg	M
FEW4-MW84-(101.0)	280-99750-2	SO	N	Bromobenzene	5.4	1.7 U J	1.7 UJ	-	ug/kg	M
FEW4-MW84-(101.0)	280-99750-2	SO	N	Chlorobenzene	5.4	1.7 U J	1.7 UJ	-	ug/kg	M
FEW4-MW84-(101.0)	280-99750-2	SO	N	Chloroform	11	0.87 U J	0.87 UJ	-	ug/kg	M
FEW4-MW84-(101.0)	280-99750-2	SO	N	cis-1,2-Dichloroethene	5.4	1.7 U J	1.7 UJ	-	ug/kg	M
FEW4-MW84-(101.0)	280-99750-2	SO	N	Ethylbenzene	5.4	1.7 U J	1.7 UJ	-	ug/kg	M
FEW4-MW84-(101.0)	280-99750-2	SO	N	Isopropylbenzene (Cumene)	5.4	1.7 U J	1.7 UJ	-	ug/kg	M
FEW4-MW84-(101.0)	280-99750-2	SO	N	m,p-Xylene	3.5	3.5 U J	3.5 UJ	-	ug/kg	M
FEW4-MW84-(101.0)	280-99750-2	SO	N	n-Butylbenzene	5.4	1.7 U J	1.7 UJ	-	ug/kg	M

US Army Corps of Engineers®

Qualified Results

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW84-(101.0)	280-99750-2	SO	N	n-Propylbenzene	5.4	1.7 U J	1.7 UJ	-	ug/kg	M
FEW4-MW84-(101.0)	280-99750-2	SO	N	o-Xylene	5.4	1.7 U J	1.7 UJ	-	ug/kg	M
FEW4-MW84-(101.0)	280-99750-2	SO	N	p-Cymene (p-Isopropyltoluene)	5.4	1.7 U J	1.7 UJ	-	ug/kg	M
FEW4-MW84-(101.0)	280-99750-2	SO	N	sec-Butylbenzene	5.4	1.7 U J	1.7 UJ	-	ug/kg	M
FEW4-MW84-(101.0)	280-99750-2	SO	N	Styrene	5.4	1.7 U J	1.7 UJ	-	ug/kg	M
FEW4-MW84-(101.0)	280-99750-2	SO	N	tert-Butylbenzene	5.4	1.7 U J	1.7 UJ	-	ug/kg	M
FEW4-MW84-(101.0)	280-99750-2	SO	N	Tetrachloroethene (PCE)	5.4	1.7 U J	1.7 UJ	-	ug/kg	M
FEW4-MW84-(101.0)	280-99750-2	SO	N	Toluene	5.4	1.7 U J	1.7 UJ	-	ug/kg	M
FEW4-MW84-(101.0)	280-99750-2	SO	N	Trichloroethene (TCE)	5.4	0.87 U J	0.87 UJ	-	ug/kg	M
FEW4-MW84-(114.0)	280-99750-4	SO	FD	Acetone	30	18 J	18 J		ug/kg	TR
FEW4-MW84-(125.0)	280-99750-5	SO	N	Acetone	23	18 J	18 J		ug/kg	TR
FEW4-MW84-(155.0)	280-99750-8	SO	N	Acetone	29	28 J	28 J		ug/kg	TR
FEW4-MW84-(162.0)	280-99750-9	SO	N	Acetone	26	23 J	23 J		ug/kg	TR
FEW4-MW84-(195.0)	280-99750-12	SO	N	Acetone	28	30	30 J	+	ug/kg	I
FEW4-MW86-(102.0)	280-99750-16	SO	N	1,2,4-Trimethylbenzene	7.7	1.1 J	1.1 J		ug/kg	TR
FEW4-MW86-(102.0)	280-99750-16	SO	N	Acetone	31	23 J	23 J		ug/kg	TR
FEW4-MW86-(102.0)	280-99750-16	SO	N	Naphthalene	7.7	2.6 J	2.6 J		ug/kg	TR
FEW4-MW86-(102.0)	280-99750-16	SO	N	n-Butylbenzene	7.7	0.94 J	0.94 J		ug/kg	TR
FEW4-MW86-(102.0)	280-99750-16	SO	N	Trichloroethene (TCE)	7.7	6.6 J	6.6 J		ug/kg	TR
FEW4-MW86-(103.0)	280-99750-17	SO	FD	Acetone	41	28 J	28 J		ug/kg	TR
FEW4-MW86-(103.0)	280-99750-17	SO	FD	Naphthalene	10	1.7 J	1.7 J		ug/kg	TR
FEW4-MW86-(103.0)	280-99750-17	SO	FD	Trichloroethene (TCE)	10	5.7 J	5.7 J		ug/kg	TR
FEW4-MW86-(112.0)	280-99750-19	SO	N	Trichloroethene (TCE)	9.2	4.4 J	4.4 J		ug/kg	TR
FEW4-MW86-(118.0)	280-99750-18	SO	N	Trichloroethene (TCE)	7.0	2.3 J	2.3 J		ug/kg	TR
FEW4-MW86-(128.0)	280-99750-20	SO	N	Acetone	33	13 J	13 J		ug/kg	TR
FEW4-MW86-(128.0)	280-99750-20	SO	N	Trichloroethene (TCE)	8.1	7.5 J	7.5 J		ug/kg	TR
FEW4-MW86-(136.0)	280-99750-21	SO	N	Trichloroethene (TCE)	8.8	5.5 J	5.5 J		ug/kg	TR
FEW4-MW86-(146.0)	280-99750-22	SO	N	Trichloroethene (TCE)	7.2	0.96 J	0.96 J		ug/kg	TR

US Army Corps of Engineers ®

Qualified Results

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW86-(28.0)	280-99750-25	SO	N	Acetone	45	22 J	22 J		ug/kg	TR
FEW4-MW86-(40.0)	280-99750-26	SO	N	Trichloroethene (TCE)	7.1	0.71 J	0.71 J		ug/kg	TR
FEW4-MW86-(62.0)	280-99750-28	SO	N	Acetone	21	14 J	14 J		ug/kg	TR
FEW4-MW86-(62.0)	280-99750-28	SO	N	Trichloroethene (TCE)	5.1	3.4 J	3.4 J		ug/kg	TR
FEW4-MW86-(72.0)	280-99750-29	SO	N	Acetone	34	23 J	23 J		ug/kg	TR
FEW4-MW86-(72.0)	280-99750-29	SO	N	Trichloroethene (TCE)	8.5	4.0 J	4.0 J		ug/kg	TR
FEW4-MW86-(92.0)	280-99750-31	SO	N	Trichloroethene (TCE)	7.4	14	14 J	+	ug/kg	I

Qualified analytes in samples are reported as estimated, not detected (UJ) at the Limit of Detection (LOD).

US Army Corps of Engineers ®

Detected Results

Test Method: SW8260B Extraction Method: SW5030B Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Dilution	Analyte	LOQ	Lab Result	Qualified Result	Units	Reason
FEW4-MW84-87	280-99750-1	WG	N	1	Acetone	10	3.0 J	3.0 J	ug/L	TR
FEW4-MW84-87	280-99750-1	WG	N	1	Chloromethane	2.0	0.71 J	0.71 J	ug/L	TR
FEW4-MW84-87	280-99750-1	WG	N	1	Trichloroethene (TCE)	1.0	15	15	ug/L	

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Dilution	Analyte	LOQ	Lab Result	Qualified Result	Units	Reason
FEW4-MW84-(114.0)	280-99750-4	SO	FD	1	Acetone	30	18 J	18 J	ug/kg	TR
FEW4-MW84-(125.0)	280-99750-5	SO	N	1	Acetone	23	18 J	18 J	ug/kg	TR
FEW4-MW84-(155.0)	280-99750-8	SO	N	1	Acetone	29	28 J	28 J	ug/kg	TR
FEW4-MW84-(162.0)	280-99750-9	SO	N	1	Acetone	26	23 J	23 J	ug/kg	TR
FEW4-MW84-(195.0)	280-99750-12	SO	N	1	Acetone	28	30	30 J	ug/kg	I
FEW4-MW86-(102.0)	280-99750-16	SO	N	1	1,2,4-Trimethylbenzene	7.7	1.1 J	1.1 J	ug/kg	TR
FEW4-MW86-(102.0)	280-99750-16	SO	N	1	Acetone	31	23 J	23 J	ug/kg	TR
FEW4-MW86-(102.0)	280-99750-16	SO	N	1	Naphthalene	7.7	2.6 J	2.6 J	ug/kg	TR
FEW4-MW86-(102.0)	280-99750-16	SO	N	1	n-Butylbenzene	7.7	0.94 J	0.94 J	ug/kg	TR
FEW4-MW86-(102.0)	280-99750-16	SO	N	1	Trichloroethene (TCE)	7.7	6.6 J	6.6 J	ug/kg	TR
FEW4-MW86-(103.0)	280-99750-17	SO	FD	1	Acetone	41	28 J	28 J	ug/kg	TR
FEW4-MW86-(103.0)	280-99750-17	SO	FD	1	Naphthalene	10	1.7 J	1.7 J	ug/kg	TR
FEW4-MW86-(103.0)	280-99750-17	SO	FD	1	Trichloroethene (TCE)	10	5.7 J	5.7 J	ug/kg	TR
FEW4-MW86-(112.0)	280-99750-19	SO	N	1	Trichloroethene (TCE)	9.2	4.4 J	4.4 J	ug/kg	TR
FEW4-MW86-(118.0)	280-99750-18	SO	N	1	Acetone	28	47	47	ug/kg	
FEW4-MW86-(118.0)	280-99750-18	SO	N	1	Trichloroethene (TCE)	7.0	2.3 J	2.3 J	ug/kg	TR
FEW4-MW86-(128.0)	280-99750-20	SO	N	1	Acetone	33	13 J	13 J	ug/kg	TR
FEW4-MW86-(128.0)	280-99750-20	SO	N	1	Trichloroethene (TCE)	8.1	7.5 J	7.5 J	ug/kg	TR
FEW4-MW86-(136.0)	280-99750-21	SO	N	1	Acetone	35	79	79	ug/kg	

US Army Corps of Engineers®

Detected Results

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Dilution	Analyte	LOQ	Lab Result	Qualified Result	Units	Reason
FEW4-MW86-(136.0)	280-99750-21	SO	N	1	Trichloroethene (TCE)	8.8	5.5 J	5.5 J	ug/kg	TR
FEW4-MW86-(146.0)	280-99750-22	SO	N	1	Trichloroethene (TCE)	7.2	0.96 J	0.96 J	ug/kg	TR
FEW4-MW86-(15.0)	280-99750-23	SO	N	1	Acetone	26	41	41	ug/kg	
FEW4-MW86-(25.0)	280-99750-24	SO	N	1	Trichloroethene (TCE)	5.7	7.1	7.1	ug/kg	
FEW4-MW86-(28.0)	280-99750-25	SO	N	1	Acetone	45	22 J	22 J	ug/kg	TR
FEW4-MW86-(40.0)	280-99750-26	SO	N	1	Trichloroethene (TCE)	7.1	0.71 J	0.71 J	ug/kg	TR
FEW4-MW86-(62.0)	280-99750-28	SO	N	1	Acetone	21	14 J	14 J	ug/kg	TR
FEW4-MW86-(62.0)	280-99750-28	SO	N	1	Trichloroethene (TCE)	5.1	3.4 J	3.4 J	ug/kg	TR
FEW4-MW86-(72.0)	280-99750-29	SO	N	1	Acetone	34	23 J	23 J	ug/kg	TR
FEW4-MW86-(72.0)	280-99750-29	SO	N	1	Trichloroethene (TCE)	8.5	4.0 J	4.0 J	ug/kg	TR
FEW4-MW86-(82.0)	280-99750-30	SO	N	1	Trichloroethene (TCE)	7.7	8.8	8.8 J	ug/kg	
FEW4-MW86-(92.0)	280-99750-31	SO	N	1	Trichloroethene (TCE)	7.4	14	14 J	ug/kg	I

Rejected Results

--No Records Found--

US Army Corps of Engineers ®

Facility:	B08WY0467-02, F.E. Warren AFB, Site 4
Event:	2017-2018 RI Addendum Tasks
SDG:	280-99750-1_52_2a_FUDSChem
Guidance Document:	Draft-Final Uniform Federal Policy-Quality Assurance Project Plan for the Remedial Investigation Addendum 2017-2018 Tasks Atlas "D" Missile Site 4 —Laramie County, Wyoming, July 2017
Prime Contractor:	RMC Consultants, Inc., LAKEWOOD, CO
Project Manager:	David Groy
Contract Laboratory:	TestAmerica Laboratories, Inc., Arvada, CO
Data Review Contractor:	RMC Consultants
Data Review Level:	Stage 3VEM
Primary Data Reviewer:	Gary Torf, Contractor Project Chemist
Second Reviewer:	, Senior Scientist
Date Submitted:	

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	SW8260B
FEW4-MW84-(101.0)	280-99750-2	Solid	Field Sample/N	X
FEW4-MW84-(113.0)	280-99750-3	Solid	Field Sample/N	X
FEW4-MW84-(114.0)	280-99750-4	Solid	Field Duplicate/FD	X
FEW4-MW84-(125.0)	280-99750-5	Solid	Field Sample/N	X
FEW4-MW84-(135.0)	280-99750-6	Solid	Field Sample/N	X
FEW4-MW84-(145.0)	280-99750-7	Solid	Field Sample/N	X
FEW4-MW84-(155.0)	280-99750-8	Solid	Field Sample/N	X
FEW4-MW84-(162.0)	280-99750-9	Solid	Field Sample/N	X
FEW4-MW84-(175.0)	280-99750-10	Solid	Field Sample/N	X
FEW4-MW84-(185.0)	280-99750-11	Solid	Field Sample/N	X
FEW4-MW84-(195.0)	280-99750-12	Solid	Field Sample/N	X
FEW4-MW84-(200.0)	280-99750-13	Solid	Field Sample/N	X
FEW4-MW84-(212.0)	280-99750-14	Solid	Field Sample/N	X
FEW4-MW84-(225.0)	280-99750-15	Solid	Field Sample/N	X
FEW4-MW86-(102.0)	280-99750-16	Solid	Field Sample/N	X
FEW4-MW86-(103.0)	280-99750-17	Solid	Field Duplicate/FD	X
FEW4-MW86-(112.0)	280-99750-19	Solid	Field Sample/N	X
FEW4-MW86-(118.0)	280-99750-18	Solid	Field Sample/N	X
FEW4-MW86-(128.0)	280-99750-20	Solid	Field Sample/N	X

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	SW8260B
FEW4-MW86-(136.0)	280-99750-21	Solid	Field Sample/N	X
FEW4-MW86-(146.0)	280-99750-22	Solid	Field Sample/N	X
FEW4-MW86-(15.0)	280-99750-23	Solid	Field Sample/N	X
FEW4-MW86-(25.0)	280-99750-24	Solid	Field Sample/N	X
FEW4-MW86-(28.0)	280-99750-25	Solid	Field Sample/N	X
FEW4-MW86-(40.0)	280-99750-26	Solid	Field Sample/N	X
FEW4-MW86-(52.0)	280-99750-27	Solid	Field Sample/N	X
FEW4-MW86-(62.0)	280-99750-28	Solid	Field Sample/N	X
FEW4-MW86-(72.0)	280-99750-29	Solid	Field Sample/N	X
FEW4-MW86-(82.0)	280-99750-30	Solid	Field Sample/N	X
FEW4-MW86-(92.0)	280-99750-31	Solid	Field Sample/N	X
FEW4-MW84-87	280-99750-1	Water	Field Sample/N	X

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the Draft-Final Uniform Federal Policy-Quality Assurance Project Plan for the Remedial Investigation Addendum 2017-2018 Tasks Atlas “D” Missile Site 4 —Laramie County, Wyoming, July 2017 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by RMC Consultants, Inc., LAKEWOOD, CO; analyses were performed by TestAmerica Laboratories, Inc., Arvada, CO and were reported under sample delivery group (SDG) 280-99750-1_52_2a_FUDSChem. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

- Blank
- Blank - Negative
- Field Duplicate RPD
- LCS Recovery
- LCS RPD
- MS Recovery
- MS RPD
- Prep Hold Time
- Surrogate
- Test Hold Time

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 32 results (1.57%) out of the 2032 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected. Trace values, defined as results that are qualified as estimated because they fall between the limit of detection and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

Narrative Comments

Analytical Method	Data Reviewer Comment
SW8260B	No additional comments; see Checklist for detail.

October 23, 2017

Reviewed by Gary Torf, Contractor Project Chemist, RMC Consultants

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of a minimum of 10% of the reported sample results and method quality control data between the two deliverables.

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

Quality Control Outliers for test method SW8260B, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
FEW4-MW84-(101.0) (MS)/ 280-99750-2MS	o-Xylene	76.12	77 - 123	77 - 123	percent	J/UJ	M	
FEW4-MW84-(101.0) (SD)/ 280-99750-2MSD	n-Butylbenzene	64.03	70 - 128	70 - 128	percent	J/UJ	M	
FEW4-MW84-(101.0) (SD)/ 280-99750-2MSD	1,2,4-Trimethylbenzene	67.79	75 - 123	75 - 123	percent	J/UJ	M	
FEW4-MW84-(101.0) (SD)/ 280-99750-2MSD	Trichloroethene (TCE)	71.94	77 - 123	77 - 123	percent	J/UJ	M	
FEW4-MW84-(101.0) (SD)/ 280-99750-2MSD	Isopropylbenzene (Cumene)	63.83	68 - 134	68 - 134	percent	J/UJ	M	
FEW4-MW84-(101.0) (SD)/ 280-99750-2MSD	tert-Butylbenzene	64.03	73 - 125	73 - 125	percent	J/UJ	M	
FEW4-MW84-(101.0) (SD)/ 280-99750-2MSD	p-Cymene (p-Isopropyltoluene)	64.23	73 - 127	73 - 127	percent	J/UJ	M	
FEW4-MW84-(101.0) (SD)/ 280-99750-2MSD	o-Xylene	66.01	77 - 123	77 - 123	percent	J/UJ	M	
FEW4-MW84-(101.0) (SD)/ 280-99750-2MSD	n-Propylbenzene	66.21	73 - 125	73 - 125	percent	J/UJ	M	
FEW4-MW84-(101.0) (SD)/ 280-99750-2MSD	Ethylbenzene	66.21	76 - 122	76 - 122	percent	J/UJ	M	
FEW4-MW84-(101.0) (SD)/ 280-99750-2MSD	1,2,4-Trichlorobenzene	66.40	67 - 129	67 - 129	percent	J/UJ	M	
FEW4-MW84-(101.0) (SD)/ 280-99750-2MSD	sec-Butylbenzene	66.40	73 - 126	73 - 126	percent	J/UJ	M	
FEW4-MW84-(101.0) (SD)/ 280-99750-2MSD	1,3,5-Trimethylbenzene	67.00	73 - 124	73 - 124	percent	J/UJ	M	
FEW4-MW84-(101.0) (SD)/ 280-99750-2MSD	Styrene	67.59	76 - 124	76 - 124	percent	J/UJ	M	
FEW4-MW84-(101.0) (SD)/ 280-99750-2MSD	1,4-Dichlorobenzene	67.98	75 - 120	75 - 120	percent	J/UJ	M	
FEW4-MW84-(101.0) (SD)/ 280-99750-2MSD	1,3-Dichlorobenzene	68.18	77 - 121	77 - 121	percent	J/UJ	M	
FEW4-MW84-(101.0) (SD)/ 280-99750-2MSD	2-Chlorotoluene	70.36	75 - 122	75 - 122	percent	J/UJ	M	
FEW4-MW84-(101.0) (SD)/ 280-99750-2MSD	4-Chlorotoluene	70.55	72 - 124	72 - 124	percent	J/UJ	M	
FEW4-MW84-(101.0) (SD)/ 280-99750-2MSD	1,2-Dichlorobenzene	70.75	78 - 121	78 - 121	percent	J/UJ	M	
FEW4-MW84-(101.0) (SD)/ 280-99750-2MSD	Chlorobenzene	70.75	79 - 120	79 - 120	percent	J/UJ	M	
FEW4-MW84-(101.0) (SD)/ 280-99750-2MSD	Tetrachloroethene (PCE)	70.95	73 - 128	73 - 128	percent	J/UJ	M	
FEW4-MW84-(101.0) (SD)/ 280-99750-2MSD	Bromobenzene	70.95	78 - 121	78 - 121	percent	J/UJ	M	
FEW4-MW84-(101.0) (SD)/ 280-99750-2MSD	cis-1,2-Dichloroethene	72.73	77 - 123	77 - 123	percent	J/UJ	M	
FEW4-MW84-(101.0) (SD)/ 280-99750-2MSD	1,1-Dichloroethane	73.12	76 - 125	76 - 125	percent	J/UJ	M	

Quality Control Outliers for test method SW8260B, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
FEW4-MW84-(101.0) (SD)/ 280-99750-2MSD	1,2-Dichloroethene	73.66	78 - 122	78 - 122	percent	J/UJ	M	
FEW4-MW84-(101.0) (SD)/ 280-99750-2MSD	1,2-Dichloropropane	73.91	76 - 123	76 - 123	percent	J/UJ	M	
FEW4-MW84-(101.0) (SD)/ 280-99750-2MSD	Benzene	74.11	77 - 121	77 - 121	percent	J/UJ	M	
FEW4-MW84-(101.0) (SD)/ 280-99750-2MSD	m,p-Xylene	74.70	77 - 124	77 - 124	percent	J/UJ	M	
FEW4-MW84-(101.0) (SD)/ 280-99750-2MSD	Chloroform	76.09	78 - 123	78 - 123	percent	J/UJ	M	
FEW4-MW84-(101.0) (SD)/ 280-99750-2MSD	Toluene	76.68	77 - 121	77 - 121	percent	J/UJ	M	
FEW4-MW84-(101.0) (SD)/ 280-99750-2MSD	1,1,1,2-Tetrachloroethane	77.47	78 - 125	78 - 125	percent	J/UJ	M	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the MS Recovery for SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW84-(101.0)	N	1,1,1,2-Tetrachloroethane	5.4	1.7 U J	1.7 UJ	-	ug/kg	M
FEW4-MW84-(101.0)	N	1,1-Dichloroethane	5.4	0.87 U J	0.87 UJ	-	ug/kg	M
FEW4-MW84-(101.0)	N	1,2,4-Trichlorobenzene	5.4	1.7 U J	1.7 UJ	-	ug/kg	M
FEW4-MW84-(101.0)	N	1,2,4-Trimethylbenzene	5.4	1.7 U J	1.7 UJ	-	ug/kg	M
FEW4-MW84-(101.0)	N	1,2-Dichlorobenzene	5.4	1.7 U J	1.7 UJ	-	ug/kg	M
FEW4-MW84-(101.0)	N	1,2-Dichloroethene	5.4	1.7 U J	1.7 UJ	-	ug/kg	M
FEW4-MW84-(101.0)	N	1,2-Dichloropropane	5.4	1.7 U J	1.7 UJ	-	ug/kg	M
FEW4-MW84-(101.0)	N	1,3,5-Trimethylbenzene	5.4	1.7 U J	1.7 UJ	-	ug/kg	M
FEW4-MW84-(101.0)	N	1,3-Dichlorobenzene	5.4	1.7 U J	1.7 UJ	-	ug/kg	M
FEW4-MW84-(101.0)	N	1,4-Dichlorobenzene	5.4	1.7 U J	1.7 UJ	-	ug/kg	M
FEW4-MW84-(101.0)	N	2-Chlorotoluene	5.4	1.7 U J	1.7 UJ	-	ug/kg	M
FEW4-MW84-(101.0)	N	4-Chlorotoluene	5.4	1.7 U J	1.7 UJ	-	ug/kg	M
FEW4-MW84-(101.0)	N	Benzene	5.4	1.7 U J	1.7 UJ	-	ug/kg	M
FEW4-MW84-(101.0)	N	Bromobenzene	5.4	1.7 U J	1.7 UJ	-	ug/kg	M
FEW4-MW84-(101.0)	N	Chlorobenzene	5.4	1.7 U J	1.7 UJ	-	ug/kg	M
FEW4-MW84-(101.0)	N	Chloroform	11	0.87 U J	0.87 UJ	-	ug/kg	M
FEW4-MW84-(101.0)	N	cis-1,2-Dichloroethene	5.4	1.7 U J	1.7 UJ	-	ug/kg	M
FEW4-MW84-(101.0)	N	Ethylbenzene	5.4	1.7 U J	1.7 UJ	-	ug/kg	M
FEW4-MW84-(101.0)	N	Isopropylbenzene (Cumene)	5.4	1.7 U J	1.7 UJ	-	ug/kg	M

Qualified Results associated with the MS Recovery for SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW84-(101.0)	N	m,p-Xylene	3.5	3.5 U J	3.5 UJ	-	ug/kg	M
FEW4-MW84-(101.0)	N	n-Butylbenzene	5.4	1.7 U J	1.7 UJ	-	ug/kg	M
FEW4-MW84-(101.0)	N	n-Propylbenzene	5.4	1.7 U J	1.7 UJ	-	ug/kg	M
FEW4-MW84-(101.0)	N	o-Xylene	5.4	1.7 U J	1.7 UJ	-	ug/kg	M
FEW4-MW84-(101.0)	N	p-Cymene (p-Isopropyltoluene)	5.4	1.7 U J	1.7 UJ	-	ug/kg	M
FEW4-MW84-(101.0)	N	sec-Butylbenzene	5.4	1.7 U J	1.7 UJ	-	ug/kg	M
FEW4-MW84-(101.0)	N	Styrene	5.4	1.7 U J	1.7 UJ	-	ug/kg	M
FEW4-MW84-(101.0)	N	tert-Butylbenzene	5.4	1.7 U J	1.7 UJ	-	ug/kg	M
FEW4-MW84-(101.0)	N	Tetrachloroethene (PCE)	5.4	1.7 U J	1.7 UJ	-	ug/kg	M
FEW4-MW84-(101.0)	N	Toluene	5.4	1.7 U J	1.7 UJ	-	ug/kg	M
FEW4-MW84-(101.0)	N	Trichloroethene (TCE)	5.4	0.87 U J	0.87 UJ	-	ug/kg	M

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

Quality Control Outliers for test method SW8260B, MS RPD

The objective of matrix spikes/matrix spike duplicates (MS/MSD) RPD analysis is to demonstrate acceptable method precision by the laboratory at the time of analysis. MS/MSD analyses are also performed to generate data that determines the long-term precision of the analytical method on various matrices. Non-homogenous samples can impact the apparent method precision. Summary forms were evaluated and compared to electronic data deliverables. Matrix spikes/matrix spike duplicates results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
280-99750-2MSD (SD)/ 280-99750-2MSD	Acetone	20.27	< 20	< 20	rpd	J/None	D	
280-99750-2MSD (SD)/ 280-99750-2MSD	Trichlorofluoromethane	22.46	< 20	< 20	rpd	J/None	D	
280-99750-2MSD (SD)/ 280-99750-2MSD	Tetrachloroethene (PCE)	23.80	< 20	< 20	rpd	J/None	D	
280-99750-2MSD (SD)/ 280-99750-2MSD	1,1-Dichloroethene	24.73	< 20	< 20	rpd	J/None	D	
280-99750-2MSD (SD)/ 280-99750-2MSD	Hexachlorobutadiene	25.03	< 20	< 20	rpd	J/None	D	
280-99750-2MSD (SD)/ 280-99750-2MSD	1,2-Dibromo-3-chloropropane	25.14	< 20	< 20	rpd	J/None	D	
280-99750-2MSD (SD)/ 280-99750-2MSD	Naphthalene	26.05	< 20	< 20	rpd	J/None	D	
280-99750-2MSD (SD)/ 280-99750-2MSD	4-Chlorotoluene	26.07	< 20	< 20	rpd	J/None	D	
280-99750-2MSD (SD)/ 280-99750-2MSD	1,2,3-Trichlorobenzene	26.11	< 20	< 20	rpd	J/None	D	
280-99750-2MSD (SD)/ 280-99750-2MSD	1,2,4-Trichlorobenzene	26.13	< 20	< 20	rpd	J/None	D	
280-99750-2MSD (SD)/ 280-99750-2MSD	Trichloroethene (TCE)	26.46	< 20	< 20	rpd	J/None	D	
280-99750-2MSD (SD)/ 280-99750-2MSD	Carbon disulfide	26.49	< 20	< 20	rpd	J/None	D	
280-99750-2MSD (SD)/ 280-99750-2MSD	Methyl tert-butyl ether (MTBE)	26.60	< 20	< 20	rpd	J/None	D	
280-99750-2MSD (SD)/ 280-99750-2MSD	1,1-Dichloropropene	26.65	< 20	< 20	rpd	J/None	D	
280-99750-2MSD (SD)/ 280-99750-2MSD	p-Cymene (p-Isopropyltoluene)	26.90	< 20	< 20	rpd	J/None	D	

Quality Control Outliers for test method SW8260B, MS RPD

The objective of matrix spikes/matrix spike duplicates (MS/MSD) RPD analysis is to demonstrate acceptable method precision by the laboratory at the time of analysis. MS/MSD analyses are also performed to generate data that determines the long-term precision of the analytical method on various matrices. Non-homogenous samples can impact the apparent method precision. Summary forms were evaluated and compared to electronic data deliverables. Matrix spikes/matrix spike duplicates results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
280-99750-2MSD (SD)/ 280-99750-2MSD	n-Butylbenzene	26.97	< 20	< 20	rpd	J/None	D	
280-99750-2MSD (SD)/ 280-99750-2MSD	Benzene	27.19	< 20	< 20	rpd	J/None	D	
280-99750-2MSD (SD)/ 280-99750-2MSD	o-Xylene	27.39	< 20	< 20	rpd	J/None	D	
280-99750-2MSD (SD)/ 280-99750-2MSD	Isopropylbenzene (Cumene)	27.50	< 20	< 20	rpd	J/None	D	
280-99750-2MSD (SD)/ 280-99750-2MSD	sec-Butylbenzene	27.69	< 20	< 20	rpd	J/None	D	
280-99750-2MSD (SD)/ 280-99750-2MSD	1,2,3-Trichloropropane	27.72	< 20	< 20	rpd	J/None	D	
280-99750-2MSD (SD)/ 280-99750-2MSD	Bromoform	28.00	< 20	< 20	rpd	J/None	D	
280-99750-2MSD (SD)/ 280-99750-2MSD	1,2,4-Trimethylbenzene	28.07	< 20	< 20	rpd	J/None	D	
280-99750-2MSD (SD)/ 280-99750-2MSD	Ethylbenzene	28.21	< 20	< 20	rpd	J/None	D	
280-99750-2MSD (SD)/ 280-99750-2MSD	1,3-Dichloropropane	28.26	< 20	< 20	rpd	J/None	D	
280-99750-2MSD (SD)/ 280-99750-2MSD	trans-1,3-Dichloropropene	28.39	< 20	< 20	rpd	J/None	D	
280-99750-2MSD (SD)/ 280-99750-2MSD	n-Propylbenzene	28.43	< 20	< 20	rpd	J/None	D	
280-99750-2MSD (SD)/ 280-99750-2MSD	Bromochloromethane	28.57	< 20	< 20	rpd	J/None	D	
280-99750-2MSD (SD)/ 280-99750-2MSD	tert-Butylbenzene	28.57	< 20	< 20	rpd	J/None	D	
280-99750-2MSD (SD)/ 280-99750-2MSD	1,1,2-Trichloroethane	28.57	< 20	< 20	rpd	J/None	D	
280-99750-2MSD (SD)/ 280-99750-2MSD	1,3,5-Trimethylbenzene	28.57	< 20	< 20	rpd	J/None	D	
280-99750-2MSD (SD)/ 280-99750-2MSD	2-Chlorotoluene	28.64	< 20	< 20	rpd	J/None	D	
280-99750-2MSD (SD)/ 280-99750-2MSD	1,1,2,2-Tetrachloroethane	28.69	< 20	< 20	rpd	J/None	D	
280-99750-2MSD (SD)/ 280-99750-2MSD	m,p-Xylene	28.96	< 20	< 20	rpd	J/None	D	
280-99750-2MSD (SD)/ 280-99750-2MSD	1,2-Dibromoethane (EDB)	29.03	< 20	< 20	rpd	J/None	D	
280-99750-2MSD (SD)/ 280-99750-2MSD	Toluene	29.07	< 20	< 20	rpd	J/None	D	
280-99750-2MSD (SD)/ 280-99750-2MSD	Bromodichloromethane	29.10	< 20	< 20	rpd	J/None	D	
280-99750-2MSD (SD)/ 280-99750-2MSD	Bromobenzene	29.25	< 20	< 20	rpd	J/None	D	
280-99750-2MSD (SD)/ 280-99750-2MSD	1,1-Dichloroethane	29.30	< 20	< 20	rpd	J/None	D	
280-99750-2MSD (SD)/ 280-99750-2MSD	Chlorobenzene	29.32	< 20	< 20	rpd	J/None	D	

Quality Control Outliers for test method SW8260B, MS RPD

The objective of matrix spikes/matrix spike duplicates (MS/MSD) RPD analysis is to demonstrate acceptable method precision by the laboratory at the time of analysis. MS/MSD analyses are also performed to generate data that determines the long-term precision of the analytical method on various matrices. Non-homogenous samples can impact the apparent method precision. Summary forms were evaluated and compared to electronic data deliverables. Matrix spikes/matrix spike duplicates results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
280-99750-2MSD (SD)/ 280-99750-2MSD	1,1,1,2-Tetrachloroethane	29.38	< 20	< 20	rpd	J/None	D	
280-99750-2MSD (SD)/ 280-99750-2MSD	1,1,1-Trichloroethane	29.41	< 20	< 20	rpd	J/None	D	
280-99750-2MSD (SD)/ 280-99750-2MSD	cis-1,2-Dichloroethene	29.43	< 20	< 20	rpd	J/None	D	
280-99750-2MSD (SD)/ 280-99750-2MSD	1,2-Dichlorobenzene	29.52	< 20	< 20	rpd	J/None	D	
280-99750-2MSD (SD)/ 280-99750-2MSD	Carbon tetrachloride	29.71	< 20	< 20	rpd	J/None	D	
280-99750-2MSD (SD)/ 280-99750-2MSD	1,3-Dichlorobenzene	29.84	< 20	< 20	rpd	J/None	D	
280-99750-2MSD (SD)/ 280-99750-2MSD	1,4-Dichlorobenzene	29.91	< 20	< 20	rpd	J/None	D	
280-99750-2MSD (SD)/ 280-99750-2MSD	Styrene	30.06	< 20	< 20	rpd	J/None	D	
280-99750-2MSD (SD)/ 280-99750-2MSD	2,2-Dichloropropane	30.07	< 20	< 20	rpd	J/None	D	
280-99750-2MSD (SD)/ 280-99750-2MSD	trans-1,2-Dichloroethene	30.25	< 20	< 20	rpd	J/None	D	
280-99750-2MSD (SD)/ 280-99750-2MSD	1,2-Dichloroethene	30.33	< 20	< 20	rpd	J/None	D	
280-99750-2MSD (SD)/ 280-99750-2MSD	cis-1,3-Dichloropropene	30.45	< 20	< 20	rpd	J/None	D	
280-99750-2MSD (SD)/ 280-99750-2MSD	Dibromomethane	30.46	< 20	< 20	rpd	J/None	D	
280-99750-2MSD (SD)/ 280-99750-2MSD	Chloroform	30.58	< 20	< 20	rpd	J/None	D	
280-99750-2MSD (SD)/ 280-99750-2MSD	1,2-Dichloropropane	30.96	< 20	< 20	rpd	J/None	D	
280-99750-2MSD (SD)/ 280-99750-2MSD	Bromomethane	31.00	< 20	< 20	rpd	J/None	D	
280-99750-2MSD (SD)/ 280-99750-2MSD	Dibromochloromethane	31.90	< 20	< 20	rpd	J/None	D	
280-99750-2MSD (SD)/ 280-99750-2MSD	1,2-Dichloroethane	32.21	< 20	< 20	rpd	J/None	D	
280-99750-2MSD (SD)/ 280-99750-2MSD	Methylene chloride	32.95	< 20	< 20	rpd	J/None	D	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

Quality Control Outliers for test method SW8260B, Surrogate

Method performance for individual samples is demonstrated through spiking activities. All samples are spiked with surrogate compounds prior to sample preparation. The sample itself may produce effects due to such factors as interferences and high concentrations of analytes. Summary forms were evaluated and compared to electronic data deliverables. Surrogate results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
FEW4-MW84-(175.0) (N)/ 280-99750-10	Dibromofluoromethane	122.4	78 - 119	78 - 119	percent	J/None	I	
FEW4-MW84-(195.0) (N)/ 280-99750-12	Dibromofluoromethane	119.0	78 - 119	78 - 119	percent	J/None	I	
FEW4-MW84-(212.0) (N)/ 280-99750-14	Dibromofluoromethane	120.2	78 - 119	78 - 119	percent	J/None	I	
FEW4-MW84-(225.0) (N)/ 280-99750-15	Dibromofluoromethane	119.7	78 - 119	78 - 119	percent	J/None	I	
FEW4-MW86-(92.0) (N)/ 280-99750-31	Dibromofluoromethane	119.2	78 - 119	78 - 119	percent	J/None	I	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the Surrogate for SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW84-(195.0)	N	Acetone	28	30	30 J	+	ug/kg	I
FEW4-MW86-(92.0)	N	Trichloroethene (TCE)	7.4	14	14 J	+	ug/kg	I

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

Quality Control Outliers for test method SW8260B, Test Hold Time

Hold times are ascertained based on project requirements. Holding times were determined by comparing the chain of custody records with the dates of analysis found in the electronic data deliverable and laboratory summary forms. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
FEW4-MW86-(15.0) (N)/ 280-99750-23		14.14	< 14	< 14	days	J/UJ	H1	Test Exceeds UCL
FEW4-MW86-(25.0) (N)/ 280-99750-24		14.12	< 14	< 14	days	J/UJ	H1	Test Exceeds UCL
FEW4-MW86-(28.0) (N)/ 280-99750-25		14.10	< 14	< 14	days	J/UJ	H1	Test Exceeds UCL
FEW4-MW86-(40.0) (N)/ 280-99750-26		14.10	< 14	< 14	days	J/UJ	H1	Test Exceeds UCL
FEW4-MW86-(52.0) (N)/ 280-99750-27		14.09	< 14	< 14	days	J/UJ	H1	Test Exceeds UCL
FEW4-MW86-(62.0) (N)/ 280-99750-28		14.09	< 14	< 14	days	J/UJ	H1	Test Exceeds UCL
FEW4-MW86-(72.0) (N)/ 280-99750-29		14.04	< 14	< 14	days	J/UJ	H1	Test Exceeds UCL
FEW4-MW86-(82.0) (N)/ 280-99750-30		14.04	< 14	< 14	days	J/UJ	H1	Test Exceeds UCL
FEW4-MW86-(92.0) (N)/ 280-99750-31		14.03	< 14	< 14	days	J/UJ	H1	Test Exceeds UCL

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

Table of All Qualified Results

Test Method: SW8260B	Extraction Method: SW5035A							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW84-(101.0)	N	1,1,1,2-Tetrachloroethane	5.4	1.7 U J	1.7 UJ	-	ug/kg	M
FEW4-MW84-(101.0)	N	1,1-Dichloroethane	5.4	0.87 U J	0.87 UJ	-	ug/kg	M
FEW4-MW84-(101.0)	N	1,2,4-Trichlorobenzene	5.4	1.7 U J	1.7 UJ	-	ug/kg	M
FEW4-MW84-(101.0)	N	1,2,4-Trimethylbenzene	5.4	1.7 U J	1.7 UJ	-	ug/kg	M
FEW4-MW84-(101.0)	N	1,2-Dichlorobenzene	5.4	1.7 U J	1.7 UJ	-	ug/kg	M
FEW4-MW84-(101.0)	N	1,2-Dichloroethene	5.4	1.7 U J	1.7 UJ	-	ug/kg	M
FEW4-MW84-(101.0)	N	1,2-Dichloropropane	5.4	1.7 U J	1.7 UJ	-	ug/kg	M
FEW4-MW84-(101.0)	N	1,3,5-Trimethylbenzene	5.4	1.7 U J	1.7 UJ	-	ug/kg	M
FEW4-MW84-(101.0)	N	1,3-Dichlorobenzene	5.4	1.7 U J	1.7 UJ	-	ug/kg	M
FEW4-MW84-(101.0)	N	1,4-Dichlorobenzene	5.4	1.7 U J	1.7 UJ	-	ug/kg	M
FEW4-MW84-(101.0)	N	2-Chlorotoluene	5.4	1.7 U J	1.7 UJ	-	ug/kg	M
FEW4-MW84-(101.0)	N	4-Chlorotoluene	5.4	1.7 U J	1.7 UJ	-	ug/kg	M
FEW4-MW84-(101.0)	N	Benzene	5.4	1.7 U J	1.7 UJ	-	ug/kg	M
FEW4-MW84-(101.0)	N	Bromobenzene	5.4	1.7 U J	1.7 UJ	-	ug/kg	M
FEW4-MW84-(101.0)	N	Chlorobenzene	5.4	1.7 U J	1.7 UJ	-	ug/kg	M
FEW4-MW84-(101.0)	N	Chloroform	11	0.87 U J	0.87 UJ	-	ug/kg	M
FEW4-MW84-(101.0)	N	cis-1,2-Dichloroethene	5.4	1.7 U J	1.7 UJ	-	ug/kg	M
FEW4-MW84-(101.0)	N	Ethylbenzene	5.4	1.7 U J	1.7 UJ	-	ug/kg	M
FEW4-MW84-(101.0)	N	Isopropylbenzene (Cumene)	5.4	1.7 U J	1.7 UJ	-	ug/kg	M
FEW4-MW84-(101.0)	N	m,p-Xylene	3.5	3.5 U J	3.5 UJ	-	ug/kg	M
FEW4-MW84-(101.0)	N	n-Butylbenzene	5.4	1.7 U J	1.7 UJ	-	ug/kg	M
FEW4-MW84-(101.0)	N	n-Propylbenzene	5.4	1.7 U J	1.7 UJ	-	ug/kg	M
FEW4-MW84-(101.0)	N	o-Xylene	5.4	1.7 U J	1.7 UJ	-	ug/kg	M
FEW4-MW84-(101.0)	N	p-Cymene (p-Isopropyltoluene)	5.4	1.7 U J	1.7 UJ	-	ug/kg	M
FEW4-MW84-(101.0)	N	sec-Butylbenzene	5.4	1.7 U J	1.7 UJ	-	ug/kg	M
FEW4-MW84-(101.0)	N	Styrene	5.4	1.7 U J	1.7 UJ	-	ug/kg	M
FEW4-MW84-(101.0)	N	tert-Butylbenzene	5.4	1.7 U J	1.7 UJ	-	ug/kg	M
FEW4-MW84-(101.0)	N	Tetrachloroethene (PCE)	5.4	1.7 U J	1.7 UJ	-	ug/kg	M
FEW4-MW84-(101.0)	N	Toluene	5.4	1.7 U J	1.7 UJ	-	ug/kg	M
FEW4-MW84-(101.0)	N	Trichloroethene (TCE)	5.4	0.87 U J	0.87 UJ	-	ug/kg	M
FEW4-MW84-(195.0)	N	Acetone	28	30	30 J	+	ug/kg	I
FEW4-MW86-(92.0)	N	Trichloroethene (TCE)	7.4	14	14 J	+	ug/kg	I

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
Trace values are not included in the qualified results table unless additional reason codes are associated.

Table of All Trace Results

Test Method: SW8260B	Extraction Method: SW5030B							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW84-87	N	Acetone	10.0	3.00 J	3.00 J		ug/L	TR
FEW4-MW84-87	N	Chloromethane	2.00	0.710 J	0.710 J		ug/L	TR

Test Method: SW8260B	Extraction Method: SW5035A							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW84-(114.0)	FD	Acetone	30.0	18.0 J	18.0 J		ug/kg	TR
FEW4-MW84-(125.0)	N	Acetone	23.0	18.0 J	18.0 J		ug/kg	TR
FEW4-MW84-(155.0)	N	Acetone	29.0	28.0 J	28.0 J		ug/kg	TR
FEW4-MW84-(162.0)	N	Acetone	26.0	23.0 J	23.0 J		ug/kg	TR
FEW4-MW86-(102.0)	N	1,2,4-Trimethylbenzene	7.70	1.10 J	1.10 J		ug/kg	TR
FEW4-MW86-(102.0)	N	Acetone	31.0	23.0 J	23.0 J		ug/kg	TR
FEW4-MW86-(102.0)	N	Naphthalene	7.70	2.60 J	2.60 J		ug/kg	TR
FEW4-MW86-(102.0)	N	n-Butylbenzene	7.70	0.940 J	0.940 J		ug/kg	TR
FEW4-MW86-(102.0)	N	Trichloroethene (TCE)	7.70	6.60 J	6.60 J		ug/kg	TR
FEW4-MW86-(103.0)	FD	Acetone	41.0	28.0 J	28.0 J		ug/kg	TR
FEW4-MW86-(103.0)	FD	Naphthalene	10.0	1.70 J	1.70 J		ug/kg	TR
FEW4-MW86-(103.0)	FD	Trichloroethene (TCE)	10.0	5.70 J	5.70 J		ug/kg	TR
FEW4-MW86-(112.0)	N	Trichloroethene (TCE)	9.20	4.40 J	4.40 J		ug/kg	TR
FEW4-MW86-(118.0)	N	Trichloroethene (TCE)	7.00	2.30 J	2.30 J		ug/kg	TR
FEW4-MW86-(128.0)	N	Acetone	33.0	13.0 J	13.0 J		ug/kg	TR
FEW4-MW86-(128.0)	N	Trichloroethene (TCE)	8.10	7.50 J	7.50 J		ug/kg	TR
FEW4-MW86-(136.0)	N	Trichloroethene (TCE)	8.80	5.50 J	5.50 J		ug/kg	TR
FEW4-MW86-(146.0)	N	Trichloroethene (TCE)	7.20	0.960 J	0.960 J		ug/kg	TR
FEW4-MW86-(28.0)	N	Acetone	45.0	22.0 J	22.0 J		ug/kg	TR
FEW4-MW86-(40.0)	N	Trichloroethene (TCE)	7.10	0.710 J	0.710 J		ug/kg	TR
FEW4-MW86-(62.0)	N	Acetone	21.0	14.0 J	14.0 J		ug/kg	TR
FEW4-MW86-(62.0)	N	Trichloroethene (TCE)	5.10	3.40 J	3.40 J		ug/kg	TR
FEW4-MW86-(72.0)	N	Acetone	34.0	23.0 J	23.0 J		ug/kg	TR
FEW4-MW86-(72.0)	N	Trichloroethene (TCE)	8.50	4.00 J	4.00 J		ug/kg	TR

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW86-(15.0)	N	1,1,1,2-Tetrachloroethane	6.5	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(15.0)	N	1,1,1-Trichloroethane	6.5	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(15.0)	N	1,1,2,2-Tetrachloroethane	6.5	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(15.0)	N	1,1,2-Trichloroethane	6.5	4.1 U	4.1 UJ	4.1 U	
FEW4-MW86-(15.0)	N	1,1-Dichloroethane	6.5	1.0 U	1.0 UJ	1.0 U	
FEW4-MW86-(15.0)	N	1,1-Dichloroethene	6.5	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(15.0)	N	1,1-Dichloropropene	6.5	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(15.0)	N	1,2,3-Trichlorobenzene	6.5	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(15.0)	N	1,2,3-Trichloropropane	6.5	4.1 U	4.1 UJ	4.1 U	
FEW4-MW86-(15.0)	N	1,2,4-Trichlorobenzene	6.5	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(15.0)	N	1,2,4-Trimethylbenzene	6.5	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(15.0)	N	1,2-Dibromo-3-chloropropane	13	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(15.0)	N	1,2-Dibromoethane (EDB)	6.5	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(15.0)	N	1,2-Dichlorobenzene	6.5	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(15.0)	N	1,2-Dichloroethane	6.5	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(15.0)	N	1,2-Dichloroethene	6.5	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(15.0)	N	1,2-Dichloropropane	6.5	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(15.0)	N	1,3,5-Trimethylbenzene	6.5	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(15.0)	N	1,3-Dichlorobenzene	6.5	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(15.0)	N	1,3-Dichloropropane	6.5	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(15.0)	N	1,4-Dichlorobenzene	6.5	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(15.0)	N	2,2-Dichloropropane	6.5	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(15.0)	N	2-Butanone (MEK)	26	8.3 U	8.3 UJ	8.3 U	
FEW4-MW86-(15.0)	N	2-Chlorotoluene	6.5	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(15.0)	N	2-Hexanone	26	17 U	17 UJ	17 U	
FEW4-MW86-(15.0)	N	4-Chlorotoluene	6.5	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(15.0)	N	4-Methyl-2-pentanone (MIBK)	26	17 U	17 UJ	17 U	
FEW4-MW86-(15.0)	N	Acetone	26	41	41 J	41	
FEW4-MW86-(15.0)	N	Benzene	6.5	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(15.0)	N	Bromobenzene	6.5	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(15.0)	N	Bromochloromethane	6.5	1.0 U	1.0 UJ	1.0 U	
FEW4-MW86-(15.0)	N	Bromodichloromethane	6.5	1.0 U	1.0 UJ	1.0 U	
FEW4-MW86-(15.0)	N	Bromoform	6.5	1.0 U	1.0 UJ	1.0 U	
FEW4-MW86-(15.0)	N	Bromomethane	13	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(15.0)	N	Carbon disulfide	6.5	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(15.0)	N	Carbon tetrachloride	6.5	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(15.0)	N	Chlorobenzene	6.5	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(15.0)	N	Chloroethane	13	4.1 U	4.1 UJ	4.1 U	
FEW4-MW86-(15.0)	N	Chloroform	13	1.0 U	1.0 UJ	1.0 U	
FEW4-MW86-(15.0)	N	Chloromethane	13	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(15.0)	N	cis-1,2-Dichloroethene	6.5	2.1 U	2.1 UJ	2.1 U	

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW86-(15.0)	N	cis-1,3-Dichloropropene	6.5	4.1 U	4.1 UJ	4.1 U	
FEW4-MW86-(15.0)	N	Dibromochloromethane	6.5	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(15.0)	N	Dibromomethane	6.5	4.1 U	4.1 UJ	4.1 U	
FEW4-MW86-(15.0)	N	Dichlorodifluoromethane	13	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(15.0)	N	Ethylbenzene	6.5	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(15.0)	N	Hexachlorobutadiene	6.5	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(15.0)	N	Isopropylbenzene (Cumene)	6.5	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(15.0)	N	m,p-Xylene	4.1	4.1 U	4.1 UJ	4.1 U	
FEW4-MW86-(15.0)	N	Methyl tert-butyl ether (MTBE)	26	1.0 U	1.0 UJ	1.0 U	
FEW4-MW86-(15.0)	N	Methylene chloride	6.5	4.1 U	4.1 UJ	4.1 U	
FEW4-MW86-(15.0)	N	Naphthalene	6.5	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(15.0)	N	n-Butylbenzene	6.5	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(15.0)	N	n-Propylbenzene	6.5	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(15.0)	N	o-Xylene	6.5	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(15.0)	N	p-Cymene (p-Isopropyltoluene)	6.5	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(15.0)	N	sec-Butylbenzene	6.5	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(15.0)	N	Styrene	6.5	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(15.0)	N	tert-Butylbenzene	6.5	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(15.0)	N	Tetrachloroethene (PCE)	6.5	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(15.0)	N	Toluene	6.5	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(15.0)	N	trans-1,2-Dichloroethene	6.5	1.0 U	1.0 UJ	1.0 U	
FEW4-MW86-(15.0)	N	trans-1,3-Dichloropropene	6.5	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(15.0)	N	Trichloroethene (TCE)	6.5	1.0 U	1.0 UJ	1.0 U	
FEW4-MW86-(15.0)	N	Trichlorofluoromethane	13	4.1 U	4.1 UJ	4.1 U	
FEW4-MW86-(15.0)	N	Vinyl chloride	6.5	4.1 U	4.1 UJ	4.1 U	
FEW4-MW86-(25.0)	N	1,1,1,2-Tetrachloroethane	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(25.0)	N	1,1,1-Trichloroethane	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(25.0)	N	1,1,2,2-Tetrachloroethane	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(25.0)	N	1,1,2-Trichloroethane	5.7	3.6 U	3.6 UJ	3.6 U	
FEW4-MW86-(25.0)	N	1,1-Dichloroethane	5.7	0.91 U	0.91 UJ	0.91 U	
FEW4-MW86-(25.0)	N	1,1-Dichloroethene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(25.0)	N	1,1-Dichloropropene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(25.0)	N	1,2,3-Trichlorobenzene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(25.0)	N	1,2,3-Trichloropropane	5.7	3.6 U	3.6 UJ	3.6 U	
FEW4-MW86-(25.0)	N	1,2,4-Trichlorobenzene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(25.0)	N	1,2,4-Trimethylbenzene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(25.0)	N	1,2-Dibromo-3-chloropropane	11	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(25.0)	N	1,2-Dibromoethane (EDB)	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(25.0)	N	1,2-Dichlorobenzene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(25.0)	N	1,2-Dichloroethane	5.7	1.8 U	1.8 UJ	1.8 U	

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW86-(25.0)	N	1,2-Dichloroethene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(25.0)	N	1,2-Dichloropropane	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(25.0)	N	1,3,5-Trimethylbenzene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(25.0)	N	1,3-Dichlorobenzene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(25.0)	N	1,3-Dichloropropane	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(25.0)	N	1,4-Dichlorobenzene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(25.0)	N	2,2-Dichloropropane	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(25.0)	N	2-Butanone (MEK)	23	7.3 U	7.3 UJ	7.3 U	
FEW4-MW86-(25.0)	N	2-Chlorotoluene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(25.0)	N	2-Hexanone	23	15 U	15 UJ	15 U	
FEW4-MW86-(25.0)	N	4-Chlorotoluene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(25.0)	N	4-Methyl-2-pentanone (MIBK)	23	15 U	15 UJ	15 U	
FEW4-MW86-(25.0)	N	Acetone	23	15 U	15 UJ	15 U	
FEW4-MW86-(25.0)	N	Benzene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(25.0)	N	Bromobenzene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(25.0)	N	Bromochloromethane	5.7	0.91 U	0.91 UJ	0.91 U	
FEW4-MW86-(25.0)	N	Bromodichloromethane	5.7	0.91 U	0.91 UJ	0.91 U	
FEW4-MW86-(25.0)	N	Bromoform	5.7	0.91 U	0.91 UJ	0.91 U	
FEW4-MW86-(25.0)	N	Bromomethane	11	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(25.0)	N	Carbon disulfide	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(25.0)	N	Carbon tetrachloride	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(25.0)	N	Chlorobenzene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(25.0)	N	Chloroethane	11	3.6 U	3.6 UJ	3.6 U	
FEW4-MW86-(25.0)	N	Chloroform	11	0.91 U	0.91 UJ	0.91 U	
FEW4-MW86-(25.0)	N	Chloromethane	11	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(25.0)	N	cis-1,2-Dichloroethene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(25.0)	N	cis-1,3-Dichloropropene	5.7	3.6 U	3.6 UJ	3.6 U	
FEW4-MW86-(25.0)	N	Dibromochloromethane	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(25.0)	N	Dibromomethane	5.7	3.6 U	3.6 UJ	3.6 U	
FEW4-MW86-(25.0)	N	Dichlorodifluoromethane	11	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(25.0)	N	Ethylbenzene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(25.0)	N	Hexachlorobutadiene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(25.0)	N	Isopropylbenzene (Cumene)	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(25.0)	N	m,p-Xylene	3.6	3.6 U	3.6 UJ	3.6 U	
FEW4-MW86-(25.0)	N	Methyl tert-butyl ether (MTBE)	23	0.91 U	0.91 UJ	0.91 U	
FEW4-MW86-(25.0)	N	Methylene chloride	5.7	3.6 U	3.6 UJ	3.6 U	
FEW4-MW86-(25.0)	N	Naphthalene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(25.0)	N	n-Butylbenzene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(25.0)	N	n-Propylbenzene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(25.0)	N	o-Xylene	5.7	1.8 U	1.8 UJ	1.8 U	

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW86-(25.0)	N	p-Cymene (p-Isopropyltoluene)	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(25.0)	N	sec-Butylbenzene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(25.0)	N	Styrene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(25.0)	N	tert-Butylbenzene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(25.0)	N	Tetrachloroethene (PCE)	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(25.0)	N	Toluene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(25.0)	N	trans-1,2-Dichloroethene	5.7	0.91 U	0.91 UJ	0.91 U	
FEW4-MW86-(25.0)	N	trans-1,3-Dichloropropene	5.7	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(25.0)	N	Trichloroethene (TCE)	5.7	7.1	7.1 J	7.1	
FEW4-MW86-(25.0)	N	Trichlorofluoromethane	11	3.6 U	3.6 UJ	3.6 U	
FEW4-MW86-(25.0)	N	Vinyl chloride	5.7	3.6 U	3.6 UJ	3.6 U	
FEW4-MW86-(28.0)	N	1,1,1,2-Tetrachloroethane	11	3.6 U	3.6 UJ	3.6 U	
FEW4-MW86-(28.0)	N	1,1,1-Trichloroethane	11	3.6 U	3.6 UJ	3.6 U	
FEW4-MW86-(28.0)	N	1,1,2,2-Tetrachloroethane	11	3.6 U	3.6 UJ	3.6 U	
FEW4-MW86-(28.0)	N	1,1,2-Trichloroethane	11	7.2 U	7.2 UJ	7.2 U	
FEW4-MW86-(28.0)	N	1,1-Dichloroethane	11	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(28.0)	N	1,1-Dichloroethene	11	3.6 U	3.6 UJ	3.6 U	
FEW4-MW86-(28.0)	N	1,1-Dichloropropene	11	3.6 U	3.6 UJ	3.6 U	
FEW4-MW86-(28.0)	N	1,2,3-Trichlorobenzene	11	3.6 U	3.6 UJ	3.6 U	
FEW4-MW86-(28.0)	N	1,2,3-Trichloropropane	11	7.2 U	7.2 UJ	7.2 U	
FEW4-MW86-(28.0)	N	1,2,4-Trichlorobenzene	11	3.6 U	3.6 UJ	3.6 U	
FEW4-MW86-(28.0)	N	1,2,4-Trimethylbenzene	11	3.6 U	3.6 UJ	3.6 U	
FEW4-MW86-(28.0)	N	1,2-Dibromo-3-chloropropane	23	3.6 U	3.6 UJ	3.6 U	
FEW4-MW86-(28.0)	N	1,2-Dibromoethane (EDB)	11	3.6 U	3.6 UJ	3.6 U	
FEW4-MW86-(28.0)	N	1,2-Dichlorobenzene	11	3.6 U	3.6 UJ	3.6 U	
FEW4-MW86-(28.0)	N	1,2-Dichloroethane	11	3.6 U	3.6 UJ	3.6 U	
FEW4-MW86-(28.0)	N	1,2-Dichloroethene	11	3.6 U	3.6 UJ	3.6 U	
FEW4-MW86-(28.0)	N	1,2-Dichloropropane	11	3.6 U	3.6 UJ	3.6 U	
FEW4-MW86-(28.0)	N	1,3,5-Trimethylbenzene	11	3.6 U	3.6 UJ	3.6 U	
FEW4-MW86-(28.0)	N	1,3-Dichlorobenzene	11	3.6 U	3.6 UJ	3.6 U	
FEW4-MW86-(28.0)	N	1,3-Dichloropropane	11	3.6 U	3.6 UJ	3.6 U	
FEW4-MW86-(28.0)	N	1,4-Dichlorobenzene	11	3.6 U	3.6 UJ	3.6 U	
FEW4-MW86-(28.0)	N	2,2-Dichloropropane	11	3.6 U	3.6 UJ	3.6 U	
FEW4-MW86-(28.0)	N	2-Butanone (MEK)	45	14 U	14 UJ	14 U	
FEW4-MW86-(28.0)	N	2-Chlorotoluene	11	3.6 U	3.6 UJ	3.6 U	
FEW4-MW86-(28.0)	N	2-Hexanone	45	29 U	29 UJ	29 U	
FEW4-MW86-(28.0)	N	4-Chlorotoluene	11	3.6 U	3.6 UJ	3.6 U	
FEW4-MW86-(28.0)	N	4-Methyl-2-pentanone (MIBK)	45	29 U	29 UJ	29 U	
FEW4-MW86-(28.0)	N	Acetone	45	22 J	22 J	22 J	TR
FEW4-MW86-(28.0)	N	Benzene	11	3.6 U	3.6 UJ	3.6 U	
FEW4-MW86-(28.0)	N	Bromobenzene	11	3.6 U	3.6 UJ	3.6 U	

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW86-(28.0)	N	Bromochloromethane	11	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(28.0)	N	Bromodichloromethane	11	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(28.0)	N	Bromoform	11	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(28.0)	N	Bromomethane	23	3.6 U	3.6 UJ	3.6 U	
FEW4-MW86-(28.0)	N	Carbon disulfide	11	3.6 U	3.6 UJ	3.6 U	
FEW4-MW86-(28.0)	N	Carbon tetrachloride	11	3.6 U	3.6 UJ	3.6 U	
FEW4-MW86-(28.0)	N	Chlorobenzene	11	3.6 U	3.6 UJ	3.6 U	
FEW4-MW86-(28.0)	N	Chloroethane	23	7.2 U	7.2 UJ	7.2 U	
FEW4-MW86-(28.0)	N	Chloroform	23	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(28.0)	N	Chloromethane	23	3.6 U	3.6 UJ	3.6 U	
FEW4-MW86-(28.0)	N	cis-1,2-Dichloroethene	11	3.6 U	3.6 UJ	3.6 U	
FEW4-MW86-(28.0)	N	cis-1,3-Dichloropropene	11	7.2 U	7.2 UJ	7.2 U	
FEW4-MW86-(28.0)	N	Dibromochloromethane	11	3.6 U	3.6 UJ	3.6 U	
FEW4-MW86-(28.0)	N	Dibromomethane	11	7.2 U	7.2 UJ	7.2 U	
FEW4-MW86-(28.0)	N	Dichlorodifluoromethane	23	3.6 U	3.6 UJ	3.6 U	
FEW4-MW86-(28.0)	N	Ethylbenzene	11	3.6 U	3.6 UJ	3.6 U	
FEW4-MW86-(28.0)	N	Hexachlorobutadiene	11	3.6 U	3.6 UJ	3.6 U	
FEW4-MW86-(28.0)	N	Isopropylbenzene (Cumene)	11	3.6 U	3.6 UJ	3.6 U	
FEW4-MW86-(28.0)	N	m,p-Xylene	7.2	7.2 U	7.2 UJ	7.2 U	
FEW4-MW86-(28.0)	N	Methyl tert-butyl ether (MTBE)	45	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(28.0)	N	Methylene chloride	11	7.2 U	7.2 UJ	7.2 U	
FEW4-MW86-(28.0)	N	Naphthalene	11	3.6 U	3.6 UJ	3.6 U	
FEW4-MW86-(28.0)	N	n-Butylbenzene	11	3.6 U	3.6 UJ	3.6 U	
FEW4-MW86-(28.0)	N	n-Propylbenzene	11	3.6 U	3.6 UJ	3.6 U	
FEW4-MW86-(28.0)	N	o-Xylene	11	3.6 U	3.6 UJ	3.6 U	
FEW4-MW86-(28.0)	N	p-Cymene (p-Isopropyltoluene)	11	3.6 U	3.6 UJ	3.6 U	
FEW4-MW86-(28.0)	N	sec-Butylbenzene	11	3.6 U	3.6 UJ	3.6 U	
FEW4-MW86-(28.0)	N	Styrene	11	3.6 U	3.6 UJ	3.6 U	
FEW4-MW86-(28.0)	N	tert-Butylbenzene	11	3.6 U	3.6 UJ	3.6 U	
FEW4-MW86-(28.0)	N	Tetrachloroethene (PCE)	11	3.6 U	3.6 UJ	3.6 U	
FEW4-MW86-(28.0)	N	Toluene	11	3.6 U	3.6 UJ	3.6 U	
FEW4-MW86-(28.0)	N	trans-1,2-Dichloroethene	11	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(28.0)	N	trans-1,3-Dichloropropene	11	3.6 U	3.6 UJ	3.6 U	
FEW4-MW86-(28.0)	N	Trichloroethene (TCE)	11	1.8 U	1.8 UJ	1.8 U	
FEW4-MW86-(28.0)	N	Trichlorofluoromethane	23	7.2 U	7.2 UJ	7.2 U	
FEW4-MW86-(28.0)	N	Vinyl chloride	11	7.2 U	7.2 UJ	7.2 U	
FEW4-MW86-(40.0)	N	1,1,1,2-Tetrachloroethane	7.1	2.3 U	2.3 UJ	2.3 U	
FEW4-MW86-(40.0)	N	1,1,1-Trichloroethane	7.1	2.3 U	2.3 UJ	2.3 U	
FEW4-MW86-(40.0)	N	1,1,2,2-Tetrachloroethane	7.1	2.3 U	2.3 UJ	2.3 U	
FEW4-MW86-(40.0)	N	1,1,2-Trichloroethane	7.1	4.6 U	4.6 UJ	4.6 U	
FEW4-MW86-(40.0)	N	1,1-Dichloroethane	7.1	1.1 U	1.1 UJ	1.1 U	

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW86-(40.0)	N	1,1-Dichloroethene	7.1	2.3 U	2.3 UJ	2.3 U	
FEW4-MW86-(40.0)	N	1,1-Dichloropropene	7.1	2.3 U	2.3 UJ	2.3 U	
FEW4-MW86-(40.0)	N	1,2,3-Trichlorobenzene	7.1	2.3 U	2.3 UJ	2.3 U	
FEW4-MW86-(40.0)	N	1,2,3-Trichloropropane	7.1	4.6 U	4.6 UJ	4.6 U	
FEW4-MW86-(40.0)	N	1,2,4-Trichlorobenzene	7.1	2.3 U	2.3 UJ	2.3 U	
FEW4-MW86-(40.0)	N	1,2,4-Trimethylbenzene	7.1	2.3 U	2.3 UJ	2.3 U	
FEW4-MW86-(40.0)	N	1,2-Dibromo-3-chloropropane	14	2.3 U	2.3 UJ	2.3 U	
FEW4-MW86-(40.0)	N	1,2-Dibromoethane (EDB)	7.1	2.3 U	2.3 UJ	2.3 U	
FEW4-MW86-(40.0)	N	1,2-Dichlorobenzene	7.1	2.3 U	2.3 UJ	2.3 U	
FEW4-MW86-(40.0)	N	1,2-Dichloroethane	7.1	2.3 U	2.3 UJ	2.3 U	
FEW4-MW86-(40.0)	N	1,2-Dichloroethene	7.1	2.3 U	2.3 UJ	2.3 U	
FEW4-MW86-(40.0)	N	1,2-Dichloropropane	7.1	2.3 U	2.3 UJ	2.3 U	
FEW4-MW86-(40.0)	N	1,3,5-Trimethylbenzene	7.1	2.3 U	2.3 UJ	2.3 U	
FEW4-MW86-(40.0)	N	1,3-Dichlorobenzene	7.1	2.3 U	2.3 UJ	2.3 U	
FEW4-MW86-(40.0)	N	1,3-Dichloropropane	7.1	2.3 U	2.3 UJ	2.3 U	
FEW4-MW86-(40.0)	N	1,4-Dichlorobenzene	7.1	2.3 U	2.3 UJ	2.3 U	
FEW4-MW86-(40.0)	N	2,2-Dichloropropane	7.1	2.3 U	2.3 UJ	2.3 U	
FEW4-MW86-(40.0)	N	2-Butanone (MEK)	28	9.1 U	9.1 UJ	9.1 U	
FEW4-MW86-(40.0)	N	2-Chlorotoluene	7.1	2.3 U	2.3 UJ	2.3 U	
FEW4-MW86-(40.0)	N	2-Hexanone	28	18 U	18 UJ	18 U	
FEW4-MW86-(40.0)	N	4-Chlorotoluene	7.1	2.3 U	2.3 UJ	2.3 U	
FEW4-MW86-(40.0)	N	4-Methyl-2-pentanone (MIBK)	28	18 U	18 UJ	18 U	
FEW4-MW86-(40.0)	N	Acetone	28	18 U	18 UJ	18 U	
FEW4-MW86-(40.0)	N	Benzene	7.1	2.3 U	2.3 UJ	2.3 U	
FEW4-MW86-(40.0)	N	Bromobenzene	7.1	2.3 U	2.3 UJ	2.3 U	
FEW4-MW86-(40.0)	N	Bromochloromethane	7.1	1.1 U	1.1 UJ	1.1 U	
FEW4-MW86-(40.0)	N	Bromodichloromethane	7.1	1.1 U	1.1 UJ	1.1 U	
FEW4-MW86-(40.0)	N	Bromoform	7.1	1.1 U	1.1 UJ	1.1 U	
FEW4-MW86-(40.0)	N	Bromomethane	14	2.3 U	2.3 UJ	2.3 U	
FEW4-MW86-(40.0)	N	Carbon disulfide	7.1	2.3 U	2.3 UJ	2.3 U	
FEW4-MW86-(40.0)	N	Carbon tetrachloride	7.1	2.3 U	2.3 UJ	2.3 U	
FEW4-MW86-(40.0)	N	Chlorobenzene	7.1	2.3 U	2.3 UJ	2.3 U	
FEW4-MW86-(40.0)	N	Chloroethane	14	4.6 U	4.6 UJ	4.6 U	
FEW4-MW86-(40.0)	N	Chloroform	14	1.1 U	1.1 UJ	1.1 U	
FEW4-MW86-(40.0)	N	Chloromethane	14	2.3 U	2.3 UJ	2.3 U	
FEW4-MW86-(40.0)	N	cis-1,2-Dichloroethene	7.1	2.3 U	2.3 UJ	2.3 U	
FEW4-MW86-(40.0)	N	cis-1,3-Dichloropropene	7.1	4.6 U	4.6 UJ	4.6 U	
FEW4-MW86-(40.0)	N	Dibromochloromethane	7.1	2.3 U	2.3 UJ	2.3 U	
FEW4-MW86-(40.0)	N	Dibromomethane	7.1	4.6 U	4.6 UJ	4.6 U	
FEW4-MW86-(40.0)	N	Dichlorodifluoromethane	14	2.3 U	2.3 UJ	2.3 U	
FEW4-MW86-(40.0)	N	Ethylbenzene	7.1	2.3 U	2.3 UJ	2.3 U	

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW86-(40.0)	N	Hexachlorobutadiene	7.1	2.3 U	2.3 UJ	2.3 U	
FEW4-MW86-(40.0)	N	Isopropylbenzene (Cumene)	7.1	2.3 U	2.3 UJ	2.3 U	
FEW4-MW86-(40.0)	N	m,p-Xylene	4.6	4.6 U	4.6 UJ	4.6 U	
FEW4-MW86-(40.0)	N	Methyl tert-butyl ether (MTBE)	28	1.1 U	1.1 UJ	1.1 U	
FEW4-MW86-(40.0)	N	Methylene chloride	7.1	4.6 U	4.6 UJ	4.6 U	
FEW4-MW86-(40.0)	N	Naphthalene	7.1	2.3 U	2.3 UJ	2.3 U	
FEW4-MW86-(40.0)	N	n-Butylbenzene	7.1	2.3 U	2.3 UJ	2.3 U	
FEW4-MW86-(40.0)	N	n-Propylbenzene	7.1	2.3 U	2.3 UJ	2.3 U	
FEW4-MW86-(40.0)	N	o-Xylene	7.1	2.3 U	2.3 UJ	2.3 U	
FEW4-MW86-(40.0)	N	p-Cymene (p-Isopropyltoluene)	7.1	2.3 U	2.3 UJ	2.3 U	
FEW4-MW86-(40.0)	N	sec-Butylbenzene	7.1	2.3 U	2.3 UJ	2.3 U	
FEW4-MW86-(40.0)	N	Styrene	7.1	2.3 U	2.3 UJ	2.3 U	
FEW4-MW86-(40.0)	N	tert-Butylbenzene	7.1	2.3 U	2.3 UJ	2.3 U	
FEW4-MW86-(40.0)	N	Tetrachloroethene (PCE)	7.1	2.3 U	2.3 UJ	2.3 U	
FEW4-MW86-(40.0)	N	Toluene	7.1	2.3 U	2.3 UJ	2.3 U	
FEW4-MW86-(40.0)	N	trans-1,2-Dichloroethene	7.1	1.1 U	1.1 UJ	1.1 U	
FEW4-MW86-(40.0)	N	trans-1,3-Dichloropropene	7.1	2.3 U	2.3 UJ	2.3 U	
FEW4-MW86-(40.0)	N	Trichloroethene (TCE)	7.1	0.71 J	0.71 J	0.71 J	TR
FEW4-MW86-(40.0)	N	Trichlorofluoromethane	14	4.6 U	4.6 UJ	4.6 U	
FEW4-MW86-(40.0)	N	Vinyl chloride	7.1	4.6 U	4.6 UJ	4.6 U	
FEW4-MW86-(52.0)	N	1,1,1,2-Tetrachloroethane	6.7	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(52.0)	N	1,1,1-Trichloroethane	6.7	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(52.0)	N	1,1,2,2-Tetrachloroethane	6.7	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(52.0)	N	1,1,2-Trichloroethane	6.7	4.3 U	4.3 UJ	4.3 U	
FEW4-MW86-(52.0)	N	1,1-Dichloroethane	6.7	1.1 U	1.1 UJ	1.1 U	
FEW4-MW86-(52.0)	N	1,1-Dichloroethene	6.7	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(52.0)	N	1,1-Dichloropropene	6.7	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(52.0)	N	1,2,3-Trichlorobenzene	6.7	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(52.0)	N	1,2,3-Trichloropropane	6.7	4.3 U	4.3 UJ	4.3 U	
FEW4-MW86-(52.0)	N	1,2,4-Trichlorobenzene	6.7	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(52.0)	N	1,2,4-Trimethylbenzene	6.7	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(52.0)	N	1,2-Dibromo-3-chloropropane	13	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(52.0)	N	1,2-Dibromoethane (EDB)	6.7	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(52.0)	N	1,2-Dichlorobenzene	6.7	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(52.0)	N	1,2-Dichloroethane	6.7	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(52.0)	N	1,2-Dichloroethene	6.7	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(52.0)	N	1,2-Dichloropropane	6.7	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(52.0)	N	1,3,5-Trimethylbenzene	6.7	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(52.0)	N	1,3-Dichlorobenzene	6.7	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(52.0)	N	1,3-Dichloropropane	6.7	2.1 U	2.1 UJ	2.1 U	

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW86-(52.0)	N	1,4-Dichlorobenzene	6.7	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(52.0)	N	2,2-Dichloropropane	6.7	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(52.0)	N	2-Butanone (MEK)	27	8.6 U	8.6 UJ	8.6 U	
FEW4-MW86-(52.0)	N	2-Chlorotoluene	6.7	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(52.0)	N	2-Hexanone	27	17 U	17 UJ	17 U	
FEW4-MW86-(52.0)	N	4-Chlorotoluene	6.7	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(52.0)	N	4-Methyl-2-pentanone (MIBK)	27	17 U	17 UJ	17 U	
FEW4-MW86-(52.0)	N	Acetone	27	17 U	17 UJ	17 U	
FEW4-MW86-(52.0)	N	Benzene	6.7	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(52.0)	N	Bromobenzene	6.7	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(52.0)	N	Bromochloromethane	6.7	1.1 U	1.1 UJ	1.1 U	
FEW4-MW86-(52.0)	N	Bromodichloromethane	6.7	1.1 U	1.1 UJ	1.1 U	
FEW4-MW86-(52.0)	N	Bromoform	6.7	1.1 U	1.1 UJ	1.1 U	
FEW4-MW86-(52.0)	N	Bromomethane	13	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(52.0)	N	Carbon disulfide	6.7	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(52.0)	N	Carbon tetrachloride	6.7	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(52.0)	N	Chlorobenzene	6.7	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(52.0)	N	Chloroethane	13	4.3 U	4.3 UJ	4.3 U	
FEW4-MW86-(52.0)	N	Chloroform	13	1.1 U	1.1 UJ	1.1 U	
FEW4-MW86-(52.0)	N	Chloromethane	13	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(52.0)	N	cis-1,2-Dichloroethene	6.7	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(52.0)	N	cis-1,3-Dichloropropene	6.7	4.3 U	4.3 UJ	4.3 U	
FEW4-MW86-(52.0)	N	Dibromochloromethane	6.7	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(52.0)	N	Dibromomethane	6.7	4.3 U	4.3 UJ	4.3 U	
FEW4-MW86-(52.0)	N	Dichlorodifluoromethane	13	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(52.0)	N	Ethylbenzene	6.7	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(52.0)	N	Hexachlorobutadiene	6.7	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(52.0)	N	Isopropylbenzene (Cumene)	6.7	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(52.0)	N	m,p-Xylene	4.3	4.3 U	4.3 UJ	4.3 U	
FEW4-MW86-(52.0)	N	Methyl tert-butyl ether (MTBE)	27	1.1 U	1.1 UJ	1.1 U	
FEW4-MW86-(52.0)	N	Methylene chloride	6.7	4.3 U	4.3 UJ	4.3 U	
FEW4-MW86-(52.0)	N	Naphthalene	6.7	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(52.0)	N	n-Butylbenzene	6.7	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(52.0)	N	n-Propylbenzene	6.7	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(52.0)	N	o-Xylene	6.7	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(52.0)	N	p-Cymene (p-Isopropyltoluene)	6.7	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(52.0)	N	sec-Butylbenzene	6.7	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(52.0)	N	Styrene	6.7	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(52.0)	N	tert-Butylbenzene	6.7	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(52.0)	N	Tetrachloroethene (PCE)	6.7	2.1 U	2.1 UJ	2.1 U	

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW86-(52.0)	N	Toluene	6.7	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(52.0)	N	trans-1,2-Dichloroethene	6.7	1.1 U	1.1 UJ	1.1 U	
FEW4-MW86-(52.0)	N	trans-1,3-Dichloropropene	6.7	2.1 U	2.1 UJ	2.1 U	
FEW4-MW86-(52.0)	N	Trichloroethene (TCE)	6.7	1.1 U	1.1 UJ	1.1 U	
FEW4-MW86-(52.0)	N	Trichlorofluoromethane	13	4.3 U	4.3 UJ	4.3 U	
FEW4-MW86-(52.0)	N	Vinyl chloride	6.7	4.3 U	4.3 UJ	4.3 U	
FEW4-MW86-(62.0)	N	1,1,1,2-Tetrachloroethane	5.1	1.6 U	1.6 UJ	1.6 U	
FEW4-MW86-(62.0)	N	1,1,1-Trichloroethane	5.1	1.6 U	1.6 UJ	1.6 U	
FEW4-MW86-(62.0)	N	1,1,2,2-Tetrachloroethane	5.1	1.6 U	1.6 UJ	1.6 U	
FEW4-MW86-(62.0)	N	1,1,2-Trichloroethane	5.1	3.3 U	3.3 UJ	3.3 U	
FEW4-MW86-(62.0)	N	1,1-Dichloroethane	5.1	0.82 U	0.82 UJ	0.82 U	
FEW4-MW86-(62.0)	N	1,1-Dichloroethene	5.1	1.6 U	1.6 UJ	1.6 U	
FEW4-MW86-(62.0)	N	1,1-Dichloropropene	5.1	1.6 U	1.6 UJ	1.6 U	
FEW4-MW86-(62.0)	N	1,2,3-Trichlorobenzene	5.1	1.6 U	1.6 UJ	1.6 U	
FEW4-MW86-(62.0)	N	1,2,3-Trichloropropane	5.1	3.3 U	3.3 UJ	3.3 U	
FEW4-MW86-(62.0)	N	1,2,4-Trichlorobenzene	5.1	1.6 U	1.6 UJ	1.6 U	
FEW4-MW86-(62.0)	N	1,2,4-Trimethylbenzene	5.1	1.6 U	1.6 UJ	1.6 U	
FEW4-MW86-(62.0)	N	1,2-Dibromo-3-chloropropane	10	1.6 U	1.6 UJ	1.6 U	
FEW4-MW86-(62.0)	N	1,2-Dibromoethane (EDB)	5.1	1.6 U	1.6 UJ	1.6 U	
FEW4-MW86-(62.0)	N	1,2-Dichlorobenzene	5.1	1.6 U	1.6 UJ	1.6 U	
FEW4-MW86-(62.0)	N	1,2-Dichloroethane	5.1	1.6 U	1.6 UJ	1.6 U	
FEW4-MW86-(62.0)	N	1,2-Dichloroethene	5.1	1.6 U	1.6 UJ	1.6 U	
FEW4-MW86-(62.0)	N	1,2-Dichloropropane	5.1	1.6 U	1.6 UJ	1.6 U	
FEW4-MW86-(62.0)	N	1,3,5-Trimethylbenzene	5.1	1.6 U	1.6 UJ	1.6 U	
FEW4-MW86-(62.0)	N	1,3-Dichlorobenzene	5.1	1.6 U	1.6 UJ	1.6 U	
FEW4-MW86-(62.0)	N	1,3-Dichloropropane	5.1	1.6 U	1.6 UJ	1.6 U	
FEW4-MW86-(62.0)	N	1,4-Dichlorobenzene	5.1	1.6 U	1.6 UJ	1.6 U	
FEW4-MW86-(62.0)	N	2,2-Dichloropropane	5.1	1.6 U	1.6 UJ	1.6 U	
FEW4-MW86-(62.0)	N	2-Butanone (MEK)	21	6.6 U	6.6 UJ	6.6 U	
FEW4-MW86-(62.0)	N	2-Chlorotoluene	5.1	1.6 U	1.6 UJ	1.6 U	
FEW4-MW86-(62.0)	N	2-Hexanone	21	13 U	13 UJ	13 U	
FEW4-MW86-(62.0)	N	4-Chlorotoluene	5.1	1.6 U	1.6 UJ	1.6 U	
FEW4-MW86-(62.0)	N	4-Methyl-2-pentanone (MIBK)	21	13 U	13 UJ	13 U	
FEW4-MW86-(62.0)	N	Acetone	21	14 J	14 J	14 J	TR
FEW4-MW86-(62.0)	N	Benzene	5.1	1.6 U	1.6 UJ	1.6 U	
FEW4-MW86-(62.0)	N	Bromobenzene	5.1	1.6 U	1.6 UJ	1.6 U	
FEW4-MW86-(62.0)	N	Bromochloromethane	5.1	0.82 U	0.82 UJ	0.82 U	
FEW4-MW86-(62.0)	N	Bromodichloromethane	5.1	0.82 U	0.82 UJ	0.82 U	
FEW4-MW86-(62.0)	N	Bromoform	5.1	0.82 U	0.82 UJ	0.82 U	
FEW4-MW86-(62.0)	N	Bromomethane	10	1.6 U	1.6 UJ	1.6 U	
FEW4-MW86-(62.0)	N	Carbon disulfide	5.1	1.6 U	1.6 UJ	1.6 U	

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW86-(62.0)	N	Carbon tetrachloride	5.1	1.6 U	1.6 UJ	1.6 U	
FEW4-MW86-(62.0)	N	Chlorobenzene	5.1	1.6 U	1.6 UJ	1.6 U	
FEW4-MW86-(62.0)	N	Chloroethane	10	3.3 U	3.3 UJ	3.3 U	
FEW4-MW86-(62.0)	N	Chloroform	10	0.82 U	0.82 UJ	0.82 U	
FEW4-MW86-(62.0)	N	Chloromethane	10	1.6 U	1.6 UJ	1.6 U	
FEW4-MW86-(62.0)	N	cis-1,2-Dichloroethene	5.1	1.6 U	1.6 UJ	1.6 U	
FEW4-MW86-(62.0)	N	cis-1,3-Dichloropropene	5.1	3.3 U	3.3 UJ	3.3 U	
FEW4-MW86-(62.0)	N	Dibromochloromethane	5.1	1.6 U	1.6 UJ	1.6 U	
FEW4-MW86-(62.0)	N	Dibromomethane	5.1	3.3 U	3.3 UJ	3.3 U	
FEW4-MW86-(62.0)	N	Dichlorodifluoromethane	10	1.6 U	1.6 UJ	1.6 U	
FEW4-MW86-(62.0)	N	Ethylbenzene	5.1	1.6 U	1.6 UJ	1.6 U	
FEW4-MW86-(62.0)	N	Hexachlorobutadiene	5.1	1.6 U	1.6 UJ	1.6 U	
FEW4-MW86-(62.0)	N	Isopropylbenzene (Cumene)	5.1	1.6 U	1.6 UJ	1.6 U	
FEW4-MW86-(62.0)	N	m,p-Xylene	3.3	3.3 U	3.3 UJ	3.3 U	
FEW4-MW86-(62.0)	N	Methyl tert-butyl ether (MTBE)	21	0.82 U	0.82 UJ	0.82 U	
FEW4-MW86-(62.0)	N	Methylene chloride	5.1	3.3 U	3.3 UJ	3.3 U	
FEW4-MW86-(62.0)	N	Naphthalene	5.1	1.6 U	1.6 UJ	1.6 U	
FEW4-MW86-(62.0)	N	n-Butylbenzene	5.1	1.6 U	1.6 UJ	1.6 U	
FEW4-MW86-(62.0)	N	n-Propylbenzene	5.1	1.6 U	1.6 UJ	1.6 U	
FEW4-MW86-(62.0)	N	o-Xylene	5.1	1.6 U	1.6 UJ	1.6 U	
FEW4-MW86-(62.0)	N	p-Cymene (p-Isopropyltoluene)	5.1	1.6 U	1.6 UJ	1.6 U	
FEW4-MW86-(62.0)	N	sec-Butylbenzene	5.1	1.6 U	1.6 UJ	1.6 U	
FEW4-MW86-(62.0)	N	Styrene	5.1	1.6 U	1.6 UJ	1.6 U	
FEW4-MW86-(62.0)	N	tert-Butylbenzene	5.1	1.6 U	1.6 UJ	1.6 U	
FEW4-MW86-(62.0)	N	Tetrachloroethene (PCE)	5.1	1.6 U	1.6 UJ	1.6 U	
FEW4-MW86-(62.0)	N	Toluene	5.1	1.6 U	1.6 UJ	1.6 U	
FEW4-MW86-(62.0)	N	trans-1,2-Dichloroethene	5.1	0.82 U	0.82 UJ	0.82 U	
FEW4-MW86-(62.0)	N	trans-1,3-Dichloropropene	5.1	1.6 U	1.6 UJ	1.6 U	
FEW4-MW86-(62.0)	N	Trichloroethene (TCE)	5.1	3.4 J	3.4 J	3.4 J	TR
FEW4-MW86-(62.0)	N	Trichlorofluoromethane	10	3.3 U	3.3 UJ	3.3 U	
FEW4-MW86-(62.0)	N	Vinyl chloride	5.1	3.3 U	3.3 UJ	3.3 U	
FEW4-MW86-(72.0)	N	1,1,1,2-Tetrachloroethane	8.5	2.7 U	2.7 UJ	2.7 U	
FEW4-MW86-(72.0)	N	1,1,1-Trichloroethane	8.5	2.7 U	2.7 UJ	2.7 U	
FEW4-MW86-(72.0)	N	1,1,2,2-Tetrachloroethane	8.5	2.7 U	2.7 UJ	2.7 U	
FEW4-MW86-(72.0)	N	1,1,2-Trichloroethane	8.5	5.4 U	5.4 UJ	5.4 U	
FEW4-MW86-(72.0)	N	1,1-Dichloroethane	8.5	1.4 U	1.4 UJ	1.4 U	
FEW4-MW86-(72.0)	N	1,1-Dichloroethene	8.5	2.7 U	2.7 UJ	2.7 U	
FEW4-MW86-(72.0)	N	1,1-Dichloropropene	8.5	2.7 U	2.7 UJ	2.7 U	
FEW4-MW86-(72.0)	N	1,2,3-Trichlorobenzene	8.5	2.7 U	2.7 UJ	2.7 U	
FEW4-MW86-(72.0)	N	1,2,3-Trichloropropane	8.5	5.4 U	5.4 UJ	5.4 U	
FEW4-MW86-(72.0)	N	1,2,4-Trichlorobenzene	8.5	2.7 U	2.7 UJ	2.7 U	

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW86-(72.0)	N	1,2,4-Trimethylbenzene	8.5	2.7 U	2.7 UJ	2.7 U	
FEW4-MW86-(72.0)	N	1,2-Dibromo-3-chloropropane	17	2.7 U	2.7 UJ	2.7 U	
FEW4-MW86-(72.0)	N	1,2-Dibromoethane (EDB)	8.5	2.7 U	2.7 UJ	2.7 U	
FEW4-MW86-(72.0)	N	1,2-Dichlorobenzene	8.5	2.7 U	2.7 UJ	2.7 U	
FEW4-MW86-(72.0)	N	1,2-Dichloroethane	8.5	2.7 U	2.7 UJ	2.7 U	
FEW4-MW86-(72.0)	N	1,2-Dichloroethene	8.5	2.7 U	2.7 UJ	2.7 U	
FEW4-MW86-(72.0)	N	1,2-Dichloropropane	8.5	2.7 U	2.7 UJ	2.7 U	
FEW4-MW86-(72.0)	N	1,3,5-Trimethylbenzene	8.5	2.7 U	2.7 UJ	2.7 U	
FEW4-MW86-(72.0)	N	1,3-Dichlorobenzene	8.5	2.7 U	2.7 UJ	2.7 U	
FEW4-MW86-(72.0)	N	1,3-Dichloropropane	8.5	2.7 U	2.7 UJ	2.7 U	
FEW4-MW86-(72.0)	N	1,4-Dichlorobenzene	8.5	2.7 U	2.7 UJ	2.7 U	
FEW4-MW86-(72.0)	N	2,2-Dichloropropane	8.5	2.7 U	2.7 UJ	2.7 U	
FEW4-MW86-(72.0)	N	2-Butanone (MEK)	34	11 U	11 UJ	11 U	
FEW4-MW86-(72.0)	N	2-Chlorotoluene	8.5	2.7 U	2.7 UJ	2.7 U	
FEW4-MW86-(72.0)	N	2-Hexanone	34	22 U	22 UJ	22 U	
FEW4-MW86-(72.0)	N	4-Chlorotoluene	8.5	2.7 U	2.7 UJ	2.7 U	
FEW4-MW86-(72.0)	N	4-Methyl-2-pentanone (MIBK)	34	22 U	22 UJ	22 U	
FEW4-MW86-(72.0)	N	Acetone	34	23 J	23 J	23 J	TR
FEW4-MW86-(72.0)	N	Benzene	8.5	2.7 U	2.7 UJ	2.7 U	
FEW4-MW86-(72.0)	N	Bromobenzene	8.5	2.7 U	2.7 UJ	2.7 U	
FEW4-MW86-(72.0)	N	Bromochloromethane	8.5	1.4 U	1.4 UJ	1.4 U	
FEW4-MW86-(72.0)	N	Bromodichloromethane	8.5	1.4 U	1.4 UJ	1.4 U	
FEW4-MW86-(72.0)	N	Bromoform	8.5	1.4 U	1.4 UJ	1.4 U	
FEW4-MW86-(72.0)	N	Bromomethane	17	2.7 U	2.7 UJ	2.7 U	
FEW4-MW86-(72.0)	N	Carbon disulfide	8.5	2.7 U	2.7 UJ	2.7 U	
FEW4-MW86-(72.0)	N	Carbon tetrachloride	8.5	2.7 U	2.7 UJ	2.7 U	
FEW4-MW86-(72.0)	N	Chlorobenzene	8.5	2.7 U	2.7 UJ	2.7 U	
FEW4-MW86-(72.0)	N	Chloroethane	17	5.4 U	5.4 UJ	5.4 U	
FEW4-MW86-(72.0)	N	Chloroform	17	1.4 U	1.4 UJ	1.4 U	
FEW4-MW86-(72.0)	N	Chloromethane	17	2.7 U	2.7 UJ	2.7 U	
FEW4-MW86-(72.0)	N	cis-1,2-Dichloroethene	8.5	2.7 U	2.7 UJ	2.7 U	
FEW4-MW86-(72.0)	N	cis-1,3-Dichloropropene	8.5	5.4 U	5.4 UJ	5.4 U	
FEW4-MW86-(72.0)	N	Dibromochloromethane	8.5	2.7 U	2.7 UJ	2.7 U	
FEW4-MW86-(72.0)	N	Dibromomethane	8.5	5.4 U	5.4 UJ	5.4 U	
FEW4-MW86-(72.0)	N	Dichlorodifluoromethane	17	2.7 U	2.7 UJ	2.7 U	
FEW4-MW86-(72.0)	N	Ethylbenzene	8.5	2.7 U	2.7 UJ	2.7 U	
FEW4-MW86-(72.0)	N	Hexachlorobutadiene	8.5	2.7 U	2.7 UJ	2.7 U	
FEW4-MW86-(72.0)	N	Isopropylbenzene (Cumene)	8.5	2.7 U	2.7 UJ	2.7 U	
FEW4-MW86-(72.0)	N	m,p-Xylene	5.4	5.4 U	5.4 UJ	5.4 U	
FEW4-MW86-(72.0)	N	Methyl tert-butyl ether (MTBE)	34	1.4 U	1.4 UJ	1.4 U	

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW86-(72.0)	N	Methylene chloride	8.5	5.4 U	5.4 UJ	5.4 U	
FEW4-MW86-(72.0)	N	Naphthalene	8.5	2.7 U	2.7 UJ	2.7 U	
FEW4-MW86-(72.0)	N	n-Butylbenzene	8.5	2.7 U	2.7 UJ	2.7 U	
FEW4-MW86-(72.0)	N	n-Propylbenzene	8.5	2.7 U	2.7 UJ	2.7 U	
FEW4-MW86-(72.0)	N	o-Xylene	8.5	2.7 U	2.7 UJ	2.7 U	
FEW4-MW86-(72.0)	N	p-Cymene (p-Isopropyltoluene)	8.5	2.7 U	2.7 UJ	2.7 U	
FEW4-MW86-(72.0)	N	sec-Butylbenzene	8.5	2.7 U	2.7 UJ	2.7 U	
FEW4-MW86-(72.0)	N	Styrene	8.5	2.7 U	2.7 UJ	2.7 U	
FEW4-MW86-(72.0)	N	tert-Butylbenzene	8.5	2.7 U	2.7 UJ	2.7 U	
FEW4-MW86-(72.0)	N	Tetrachloroethene (PCE)	8.5	2.7 U	2.7 UJ	2.7 U	
FEW4-MW86-(72.0)	N	Toluene	8.5	2.7 U	2.7 UJ	2.7 U	
FEW4-MW86-(72.0)	N	trans-1,2-Dichloroethene	8.5	1.4 U	1.4 UJ	1.4 U	
FEW4-MW86-(72.0)	N	trans-1,3-Dichloropropene	8.5	2.7 U	2.7 UJ	2.7 U	
FEW4-MW86-(72.0)	N	Trichloroethene (TCE)	8.5	4.0 J	4.0 J	4.0 J	TR
FEW4-MW86-(72.0)	N	Trichlorofluoromethane	17	5.4 U	5.4 UJ	5.4 U	
FEW4-MW86-(72.0)	N	Vinyl chloride	8.5	5.4 U	5.4 UJ	5.4 U	
FEW4-MW86-(82.0)	N	1,1,1,2-Tetrachloroethane	7.7	2.5 U	2.5 UJ	2.5 U	
FEW4-MW86-(82.0)	N	1,1,1-Trichloroethane	7.7	2.5 U	2.5 UJ	2.5 U	
FEW4-MW86-(82.0)	N	1,1,2,2-Tetrachloroethane	7.7	2.5 U	2.5 UJ	2.5 U	
FEW4-MW86-(82.0)	N	1,1,2-Trichloroethane	7.7	5.0 U	5.0 UJ	5.0 U	
FEW4-MW86-(82.0)	N	1,1-Dichloroethane	7.7	1.2 U	1.2 UJ	1.2 U	
FEW4-MW86-(82.0)	N	1,1-Dichloroethene	7.7	2.5 U	2.5 UJ	2.5 U	
FEW4-MW86-(82.0)	N	1,1-Dichloropropene	7.7	2.5 U	2.5 UJ	2.5 U	
FEW4-MW86-(82.0)	N	1,2,3-Trichlorobenzene	7.7	2.5 U	2.5 UJ	2.5 U	
FEW4-MW86-(82.0)	N	1,2,3-Trichloropropane	7.7	5.0 U	5.0 UJ	5.0 U	
FEW4-MW86-(82.0)	N	1,2,4-Trichlorobenzene	7.7	2.5 U	2.5 UJ	2.5 U	
FEW4-MW86-(82.0)	N	1,2,4-Trimethylbenzene	7.7	2.5 U	2.5 UJ	2.5 U	
FEW4-MW86-(82.0)	N	1,2-Dibromo-3-chloropropane	15	2.5 U	2.5 UJ	2.5 U	
FEW4-MW86-(82.0)	N	1,2-Dibromoethane (EDB)	7.7	2.5 U	2.5 UJ	2.5 U	
FEW4-MW86-(82.0)	N	1,2-Dichlorobenzene	7.7	2.5 U	2.5 UJ	2.5 U	
FEW4-MW86-(82.0)	N	1,2-Dichloroethane	7.7	2.5 U	2.5 UJ	2.5 U	
FEW4-MW86-(82.0)	N	1,2-Dichloroethene	7.7	2.5 U	2.5 UJ	2.5 U	
FEW4-MW86-(82.0)	N	1,2-Dichloropropane	7.7	2.5 U	2.5 UJ	2.5 U	
FEW4-MW86-(82.0)	N	1,3,5-Trimethylbenzene	7.7	2.5 U	2.5 UJ	2.5 U	
FEW4-MW86-(82.0)	N	1,3-Dichlorobenzene	7.7	2.5 U	2.5 UJ	2.5 U	
FEW4-MW86-(82.0)	N	1,3-Dichloropropane	7.7	2.5 U	2.5 UJ	2.5 U	
FEW4-MW86-(82.0)	N	1,4-Dichlorobenzene	7.7	2.5 U	2.5 UJ	2.5 U	
FEW4-MW86-(82.0)	N	2,2-Dichloropropane	7.7	2.5 U	2.5 UJ	2.5 U	
FEW4-MW86-(82.0)	N	2-Butanone (MEK)	31	9.9 U	9.9 UJ	9.9 U	
FEW4-MW86-(82.0)	N	2-Chlorotoluene	7.7	2.5 U	2.5 UJ	2.5 U	
FEW4-MW86-(82.0)	N	2-Hexanone	31	20 U	20 UJ	20 U	

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW86-(82.0)	N	4-Chlorotoluene	7.7	2.5 U	2.5 UJ	2.5 U	
FEW4-MW86-(82.0)	N	4-Methyl-2-pentanone (MIBK)	31	20 U	20 UJ	20 U	
FEW4-MW86-(82.0)	N	Acetone	31	20 U	20 UJ	20 U	
FEW4-MW86-(82.0)	N	Benzene	7.7	2.5 U	2.5 UJ	2.5 U	
FEW4-MW86-(82.0)	N	Bromobenzene	7.7	2.5 U	2.5 UJ	2.5 U	
FEW4-MW86-(82.0)	N	Bromochloromethane	7.7	1.2 U	1.2 UJ	1.2 U	
FEW4-MW86-(82.0)	N	Bromodichloromethane	7.7	1.2 U	1.2 UJ	1.2 U	
FEW4-MW86-(82.0)	N	Bromoform	7.7	1.2 U	1.2 UJ	1.2 U	
FEW4-MW86-(82.0)	N	Bromomethane	15	2.5 U	2.5 UJ	2.5 U	
FEW4-MW86-(82.0)	N	Carbon disulfide	7.7	2.5 U	2.5 UJ	2.5 U	
FEW4-MW86-(82.0)	N	Carbon tetrachloride	7.7	2.5 U	2.5 UJ	2.5 U	
FEW4-MW86-(82.0)	N	Chlorobenzene	7.7	2.5 U	2.5 UJ	2.5 U	
FEW4-MW86-(82.0)	N	Chloroethane	15	5.0 U	5.0 UJ	5.0 U	
FEW4-MW86-(82.0)	N	Chloroform	15	1.2 U	1.2 UJ	1.2 U	
FEW4-MW86-(82.0)	N	Chloromethane	15	2.5 U	2.5 UJ	2.5 U	
FEW4-MW86-(82.0)	N	cis-1,2-Dichloroethene	7.7	2.5 U	2.5 UJ	2.5 U	
FEW4-MW86-(82.0)	N	cis-1,3-Dichloropropene	7.7	5.0 U	5.0 UJ	5.0 U	
FEW4-MW86-(82.0)	N	Dibromochloromethane	7.7	2.5 U	2.5 UJ	2.5 U	
FEW4-MW86-(82.0)	N	Dibromomethane	7.7	5.0 U	5.0 UJ	5.0 U	
FEW4-MW86-(82.0)	N	Dichlorodifluoromethane	15	2.5 U	2.5 UJ	2.5 U	
FEW4-MW86-(82.0)	N	Ethylbenzene	7.7	2.5 U	2.5 UJ	2.5 U	
FEW4-MW86-(82.0)	N	Hexachlorobutadiene	7.7	2.5 U	2.5 UJ	2.5 U	
FEW4-MW86-(82.0)	N	Isopropylbenzene (Cumene)	7.7	2.5 U	2.5 UJ	2.5 U	
FEW4-MW86-(82.0)	N	m,p-Xylene	5.0	5.0 U	5.0 UJ	5.0 U	
FEW4-MW86-(82.0)	N	Methyl tert-butyl ether (MTBE)	31	1.2 U	1.2 UJ	1.2 U	
FEW4-MW86-(82.0)	N	Methylene chloride	7.7	5.0 U	5.0 UJ	5.0 U	
FEW4-MW86-(82.0)	N	Naphthalene	7.7	2.5 U	2.5 UJ	2.5 U	
FEW4-MW86-(82.0)	N	n-Butylbenzene	7.7	2.5 U	2.5 UJ	2.5 U	
FEW4-MW86-(82.0)	N	n-Propylbenzene	7.7	2.5 U	2.5 UJ	2.5 U	
FEW4-MW86-(82.0)	N	o-Xylene	7.7	2.5 U	2.5 UJ	2.5 U	
FEW4-MW86-(82.0)	N	p-Cymene (p-Isopropyltoluene)	7.7	2.5 U	2.5 UJ	2.5 U	
FEW4-MW86-(82.0)	N	sec-Butylbenzene	7.7	2.5 U	2.5 UJ	2.5 U	
FEW4-MW86-(82.0)	N	Styrene	7.7	2.5 U	2.5 UJ	2.5 U	
FEW4-MW86-(82.0)	N	tert-Butylbenzene	7.7	2.5 U	2.5 UJ	2.5 U	
FEW4-MW86-(82.0)	N	Tetrachloroethene (PCE)	7.7	2.5 U	2.5 UJ	2.5 U	
FEW4-MW86-(82.0)	N	Toluene	7.7	2.5 U	2.5 UJ	2.5 U	
FEW4-MW86-(82.0)	N	trans-1,2-Dichloroethene	7.7	1.2 U	1.2 UJ	1.2 U	
FEW4-MW86-(82.0)	N	trans-1,3-Dichloropropene	7.7	2.5 U	2.5 UJ	2.5 U	
FEW4-MW86-(82.0)	N	Trichloroethene (TCE)	7.7	8.8	8.8 J	8.8 J	
FEW4-MW86-(82.0)	N	Trichlorofluoromethane	15	5.0 U	5.0 UJ	5.0 U	

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW86-(82.0)	N	Vinyl chloride	7.7	5.0 U	5.0 UJ	5.0 U	
FEW4-MW86-(92.0)	N	1,1,1,2-Tetrachloroethane	7.4	2.4 U	2.4 UJ	2.4 U	
FEW4-MW86-(92.0)	N	1,1,1-Trichloroethane	7.4	2.4 U	2.4 UJ	2.4 U	
FEW4-MW86-(92.0)	N	1,1,2,2-Tetrachloroethane	7.4	2.4 U	2.4 UJ	2.4 U	
FEW4-MW86-(92.0)	N	1,1,2-Trichloroethane	7.4	4.7 U	4.7 UJ	4.7 U	
FEW4-MW86-(92.0)	N	1,1-Dichloroethane	7.4	1.2 U	1.2 UJ	1.2 U	
FEW4-MW86-(92.0)	N	1,1-Dichloroethene	7.4	2.4 U	2.4 UJ	2.4 U	
FEW4-MW86-(92.0)	N	1,1-Dichloropropene	7.4	2.4 U	2.4 UJ	2.4 U	
FEW4-MW86-(92.0)	N	1,2,3-Trichlorobenzene	7.4	2.4 U	2.4 UJ	2.4 U	
FEW4-MW86-(92.0)	N	1,2,3-Trichloropropane	7.4	4.7 U	4.7 UJ	4.7 U	
FEW4-MW86-(92.0)	N	1,2,4-Trichlorobenzene	7.4	2.4 U	2.4 UJ	2.4 U	
FEW4-MW86-(92.0)	N	1,2,4-Trimethylbenzene	7.4	2.4 U	2.4 UJ	2.4 U	
FEW4-MW86-(92.0)	N	1,2-Dibromo-3-chloropropane	15	2.4 U	2.4 UJ	2.4 U	
FEW4-MW86-(92.0)	N	1,2-Dibromoethane (EDB)	7.4	2.4 U	2.4 UJ	2.4 U	
FEW4-MW86-(92.0)	N	1,2-Dichlorobenzene	7.4	2.4 U	2.4 UJ	2.4 U	
FEW4-MW86-(92.0)	N	1,2-Dichloroethane	7.4	2.4 U	2.4 UJ	2.4 U	
FEW4-MW86-(92.0)	N	1,2-Dichloroethene	7.4	2.4 U	2.4 UJ	2.4 U	
FEW4-MW86-(92.0)	N	1,2-Dichloropropane	7.4	2.4 U	2.4 UJ	2.4 U	
FEW4-MW86-(92.0)	N	1,3,5-Trimethylbenzene	7.4	2.4 U	2.4 UJ	2.4 U	
FEW4-MW86-(92.0)	N	1,3-Dichlorobenzene	7.4	2.4 U	2.4 UJ	2.4 U	
FEW4-MW86-(92.0)	N	1,3-Dichloropropane	7.4	2.4 U	2.4 UJ	2.4 U	
FEW4-MW86-(92.0)	N	1,4-Dichlorobenzene	7.4	2.4 U	2.4 UJ	2.4 U	
FEW4-MW86-(92.0)	N	2,2-Dichloropropane	7.4	2.4 U	2.4 UJ	2.4 U	
FEW4-MW86-(92.0)	N	2-Butanone (MEK)	29	9.4 U	9.4 UJ	9.4 U	
FEW4-MW86-(92.0)	N	2-Chlorotoluene	7.4	2.4 U	2.4 UJ	2.4 U	
FEW4-MW86-(92.0)	N	2-Hexanone	29	19 U	19 UJ	19 U	
FEW4-MW86-(92.0)	N	4-Chlorotoluene	7.4	2.4 U	2.4 UJ	2.4 U	
FEW4-MW86-(92.0)	N	4-Methyl-2-pentanone (MIBK)	29	19 U	19 UJ	19 U	
FEW4-MW86-(92.0)	N	Acetone	29	19 U	19 UJ	19 U	
FEW4-MW86-(92.0)	N	Benzene	7.4	2.4 U	2.4 UJ	2.4 U	
FEW4-MW86-(92.0)	N	Bromobenzene	7.4	2.4 U	2.4 UJ	2.4 U	
FEW4-MW86-(92.0)	N	Bromochloromethane	7.4	1.2 U	1.2 UJ	1.2 U	
FEW4-MW86-(92.0)	N	Bromodichloromethane	7.4	1.2 U	1.2 UJ	1.2 U	
FEW4-MW86-(92.0)	N	Bromoform	7.4	1.2 U	1.2 UJ	1.2 U	
FEW4-MW86-(92.0)	N	Bromomethane	15	2.4 U	2.4 UJ	2.4 U	
FEW4-MW86-(92.0)	N	Carbon disulfide	7.4	2.4 U	2.4 UJ	2.4 U	
FEW4-MW86-(92.0)	N	Carbon tetrachloride	7.4	2.4 U	2.4 UJ	2.4 U	
FEW4-MW86-(92.0)	N	Chlorobenzene	7.4	2.4 U	2.4 UJ	2.4 U	
FEW4-MW86-(92.0)	N	Chloroethane	15	4.7 U	4.7 UJ	4.7 U	
FEW4-MW86-(92.0)	N	Chloroform	15	1.2 U	1.2 UJ	1.2 U	
FEW4-MW86-(92.0)	N	Chloromethane	15	2.4 U	2.4 UJ	2.4 U	

Table of Results with Modified Qualifiers

Modified Qualifiers for test method SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	ADR Result	Modified Result	Reason
FEW4-MW86-(92.0)	N	cis-1,2-Dichloroethene	7.4	2.4 U	2.4 UJ	2.4 U	
FEW4-MW86-(92.0)	N	cis-1,3-Dichloropropene	7.4	4.7 U	4.7 UJ	4.7 U	
FEW4-MW86-(92.0)	N	Dibromochloromethane	7.4	2.4 U	2.4 UJ	2.4 U	
FEW4-MW86-(92.0)	N	Dibromomethane	7.4	4.7 U	4.7 UJ	4.7 U	
FEW4-MW86-(92.0)	N	Dichlorodifluoromethane	15	2.4 U	2.4 UJ	2.4 U	
FEW4-MW86-(92.0)	N	Ethylbenzene	7.4	2.4 U	2.4 UJ	2.4 U	
FEW4-MW86-(92.0)	N	Hexachlorobutadiene	7.4	2.4 U	2.4 UJ	2.4 U	
FEW4-MW86-(92.0)	N	Isopropylbenzene (Cumene)	7.4	2.4 U	2.4 UJ	2.4 U	
FEW4-MW86-(92.0)	N	m,p-Xylene	4.7	4.7 U	4.7 UJ	4.7 U	
FEW4-MW86-(92.0)	N	Methyl tert-butyl ether (MTBE)	29	1.2 U	1.2 UJ	1.2 U	
FEW4-MW86-(92.0)	N	Methylene chloride	7.4	4.7 U	4.7 UJ	4.7 U	
FEW4-MW86-(92.0)	N	Naphthalene	7.4	2.4 U	2.4 UJ	2.4 U	
FEW4-MW86-(92.0)	N	n-Butylbenzene	7.4	2.4 U	2.4 UJ	2.4 U	
FEW4-MW86-(92.0)	N	n-Propylbenzene	7.4	2.4 U	2.4 UJ	2.4 U	
FEW4-MW86-(92.0)	N	o-Xylene	7.4	2.4 U	2.4 UJ	2.4 U	
FEW4-MW86-(92.0)	N	p-Cymene (p-Isopropyltoluene)	7.4	2.4 U	2.4 UJ	2.4 U	
FEW4-MW86-(92.0)	N	sec-Butylbenzene	7.4	2.4 U	2.4 UJ	2.4 U	
FEW4-MW86-(92.0)	N	Styrene	7.4	2.4 U	2.4 UJ	2.4 U	
FEW4-MW86-(92.0)	N	tert-Butylbenzene	7.4	2.4 U	2.4 UJ	2.4 U	
FEW4-MW86-(92.0)	N	Tetrachloroethene (PCE)	7.4	2.4 U	2.4 UJ	2.4 U	
FEW4-MW86-(92.0)	N	Toluene	7.4	2.4 U	2.4 UJ	2.4 U	
FEW4-MW86-(92.0)	N	trans-1,2-Dichloroethene	7.4	1.2 U	1.2 UJ	1.2 U	
FEW4-MW86-(92.0)	N	trans-1,3-Dichloropropene	7.4	2.4 U	2.4 UJ	2.4 U	
FEW4-MW86-(92.0)	N	Trichloroethene (TCE)	7.4	14	14 J	14 J	I
FEW4-MW86-(92.0)	N	Trichlorofluoromethane	15	4.7 U	4.7 UJ	4.7 U	
FEW4-MW86-(92.0)	N	Vinyl chloride	7.4	4.7 U	4.7 UJ	4.7 U	

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
Trace values are not included in the qualified results table unless additional reason codes are associated.

Reason Code Definitions

Code	Definition
D	MS RPD
H1	Test Hold Time
I	Surrogate recovery outside project limits.
M	MS Recovery
TR	Trace Level Detect

Flag Code and Definitions

Flag	Definition
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
J	Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
R	The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making.
B	Blank contamination: The analyte was found in an associated blank above one half the RL, as well as in the sample.
UB	The analyte was also detected in an associated laboratory or field blank at a concentration comparable to the concentration in the sample. The reported result has been requalified as not detected.

Review Questions

Method: SW8260B (Volatile Organic Compounds by Capillary GC/MS)

Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			ADR noted that the following samples exceeded the 14 day analysis holding time on the 14th day between 0000 and 2359 hours: FEW4-MW86-(15.0) 3.4 hours, FEW4-MW86-(25.0) 2.9 hours, FEW4-MW86-(28.0) 2.4 hours, FEW4-MW86-(40.0) 2.4 hours, FEW4-MW86-(52.0) 2.2 hours, FEW4-MW86-(62.0) 2.2 hours, FEW4-MW86-(72.0) 1.0 hour, FEW4-MW86-(82.0) 1.0 hour, and FEW4-MW86-(92.0) 0.7 hours. According to DoD ELAP QSM 5.1 FAQ – Holding Time - Days: "the holding time shall be tracked by the day." "...an exceedance of holding time for a sample with a 14-day holding time will occur when the 15th day is reached (at 12am)." Therefore, no holding time exceedance is considered to have occurred for the noted samples.
Were sample reciept temperatures met?	•			The sample receipt temperatures were 4.2ºC and 4.9ºC.
Were QAPP specified PQLs achieved?	•			
Were all QAPP-specified target analytes reported?	•			
Was the GC/MS system properly tuned based on method criteria?	•			
Was the criteria met during each 12 hour shift (prior to ICAL and Cal Ver.)?	•			
Does the initial calibration curve consist of 5 concentration levels, with the low standard near but > MDL?	•			The raw data for calibration of GC/MS VMS-G2 on 8/12/17 was not present in the raw data package. This information was included and reviewed in the subsequent SDG 280-99791 raw data package.
Did the Calibration Check Compounds (CCCs) have a relative standard deviation within QAPP acceptance limits?	•			
Were the average response factors (RFs) for the System Performance Check Compounds (SPCCs) within QAPP acceptance limits?	•			
Were the ICAL %RSDs for the target compounds within method criteria?	•			
If a quadratic equation curve was used, was the coefficient of determination (COD) within criteria?	•			
If a linear regression curve was used, was the correlation coefficient within criteria?	•			
Check and recalculate the response factors and average response factors for a least one target compound.	•			
Check and recalculate the %RSD for one of more target compounds and DMCs. Verify that the recalculated values agree with the laboratory reported values.	•			ICAL VMS-P 8/10/17 TCE %RSD = 2.8%; AVG RF = 0.3251
Was a second source verification analyzed after the ICAL and all analytes within criteria?	•	•		The ICV for VMS-G2 analyzed on 8/12/17 was greater than the 20%D limits for dichlorofluoromethane at 24.5%D. This analyte was not detected in any associated samples, therefore no data qualification is warranted.
Was a CCV run at the beginning of the analytical sequence and every 12 hours?	•			

Review Questions

Method: SW8260B (Volatile Organic Compounds by Capillary GC/MS)				
Review Questions	Yes	No	NA	Comment
Was the CCV a mid-level standard from the initial calibration curve?	•			
Did the CCCs have a %Difference within QAPP acceptance limits?	•			
Were the average RFs for the SPCCs within QAPP acceptance limits?	•			
Was the %D (difference or drift) for all target analytes within QAPP acceptance limits?		•		A CCV for VMS-G2 analyzed on 8/12/17 was greater than the 20%D limits for dichlorodifluoromethane (25.6%), trichlorofluoromethane (22.0%), 1,1,2-trichloro-1,2,2-trifluoroethane (28.8%), 1,1,1-trichloroethane (21.3%), carbon tetrchloride (26.6%), methylcyclohexane (22.7%, and dibromomethane (21.0%). A CCV associated with VMS-P analyzed on 8/11/17 was greater than the 20%D limit for dichlorodifluoromethane at 21.6% and dichlorofluoromethane at 22.7%. These analytes were not detected in any associated samples, therefore data qualification is not warranted.
Check and recalculate the CCV relative response factor for at least one target compound.	•			VMS_P CCVC 280-383941/36 TCE RRF = 0.3139
Were the internal standards added to every standard, blank, matrix spike, matrix spike duplicate, and sample?	•			
Were the retention times for all IS compounds within QAPP acceptance limits?	•			
Are the area counts of all IS compounds within QAPP acceptance limits?	•			
Was a method blank prepared and analyzed with each batch?	•			
Were target analytes detected in the method blank above the MDL?	•			Naphthalene, 1,2,3-trichlorobenzene, and 1,2,4-trichlorobenzene were detected in a method blank at concentrations less than 1/2 the LOQ.
Were target analytes reported in the field blank analyses above the MDL?			•	
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?	•			FEW4-MW86-(103.0) was a blind duplicate of FEW4-MW86-(102.0).
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were the LCS/LCSD recoveries within QAPP acceptance limits?	•			
Were the LCS/LCSD RPDs within QAPP acceptance limits?	•			
Was the duplicate RPD within QAPP acceptance limits?			•	
Was a MS/MSD pair prepared with each batch?	•			
Is the MS/MSD parent sample the one designated by the sampling team?	•			FEW4-MW84-(101.0) was designated for MS/MSD analysis.
Were MS/MSD recoveries and RPD within QAPP acceptance limits?		•		Xylene was recovered less than the lower control limit of 77% at 76% in the MS; the majority of analytes had precision values greater than the RPD control limit of 20% likely due to the a sample size difference.
Were surrogate recoveries within QAPP acceptance limits?		•		DBFM was recovered greater than the upper control limit of 119% at 121% in FEW4-MW84-(175.0) and at 120% in FEW4-MW84-(212.0). No analytes were detected in either sample.

Review Questions

Method: SW8260B (Volatile Organic Compounds by Capillary GC/MS)

Review Questions	Yes	No	NA	Comment
Were reported sample concentrations within calibration range?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were instrument run logs present and filled out appropriately?	•			
Were sample prepration sheets present and filled out appropriately?	•			
Check and recalculate the %D for one target compound. Verify that the recalculated values agree with the laboratory-reported values.			•	
Examine raw data to verify correct calculation of sample results reported by the laboratory. Compare quantitation lists and chromatograms to the reported detect and non-detect sample results.	•			
Verify that the reporting limits and sample results have been adjusted to reflect all sample dilutions and Percent Moisture factors (non-aqueous samples).	•			FEW4-MW84-87 TCE = 15 ug/L

US Army Corps of Engineers ®

Batch Report

Test Method: SW8260B Analysis Batch: 280-384373

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
LABQC	SQ	LCS 280-384241/1-A	LCS 280-384241/1-A		1/1	8/14/2017 16:00	8/14/2017 16:00	8/14/2017 19:27	280-384373/	BS
LABQC	SQ	LCSD 280-384241/2-A	LCSD 280-384241/2-A		1/1	8/14/2017 16:00	8/14/2017 16:00	8/14/2017 19:48	280-384373/	BD
LABQC	SQ	MB 280-384241/3-A	MB 280-384241/3-A		1/1	8/14/2017 16:00	8/14/2017 16:00	8/14/2017 20:29	280-384373/	LB
FEW4-MW84	SO	FEW4-MW84-(232.0)	280-99791-1		1/1	8/1/2017 11:10	8/1/2017 11:10	8/14/2017 21:31	280-384373/	N
FEW4-MW84	SO	FEW4-MW84-(245.0)	280-99791-2		1/1	8/1/2017 11:11	8/1/2017 11:11	8/14/2017 21:51	280-384373/	N
FEW4-MW84	SO	FEW4-MW84-(245.0)	280-99791-2MS		1/1	8/1/2017 11:11	8/1/2017 11:11	8/14/2017 22:12	280-384373/	MS
FEW4-MW84	SO	FEW4-MW84-(245.0)	280-99791-2MSD		1/1	8/1/2017 11:11	8/1/2017 11:11	8/14/2017 22:32	280-384373/	SD
FEW4-MW84	SO	FEW4-MW84-(256.0)	280-99791-3		1/1	8/1/2017 12:35	8/1/2017 12:35	8/14/2017 23:13	280-384373/	N
FEW4-MW84	SO	FEW4-MW84-(265.0)	280-99791-4		1/1	8/1/2017 12:40	8/1/2017 12:40	8/14/2017 23:34	280-384373/	N
FEW4-MW84	SO	FEW4-MW84-(266.0)	280-99791-5		1/1	8/1/2017 13:40	8/1/2017 13:40	8/14/2017 23:54	280-384373/	FD
FEW4-MW84	SO	FEW4-MW84-(275.0)	280-99791-6		1/1	8/1/2017 01:44	8/1/2017 14:44	8/15/2017 00:15	280-384373/	N
FEW4-MW84	SO	FEW4-MW84-(286.0)	280-99791-7		1/1	8/1/2017 14:54	8/1/2017 14:54	8/15/2017 00:35	280-384373/	N
FEW4-MW84	SO	FEW4-MW84-(297.0)	280-99791-8		1/1	8/1/2017 17:10	8/1/2017 17:10	8/15/2017 00:55	280-384373/	N
FEW4-MW84	SO	FEW4-MW84-(307.0)	280-99791-9		1/1	8/1/2017 17:20	8/1/2017 17:20	8/15/2017 01:16	280-384373/	N
FEW4-MW86	SO	FEW4-MW86-(156.0)	280-99791-10		1/1	8/1/2017 11:50	8/1/2017 11:50	8/15/2017 01:36	280-384373/	N
FEW4-MW86	SO	FEW4-MW86-(166.0)	280-99791-11		1/1	8/1/2017 12:00	8/1/2017 12:00	8/15/2017 01:56	280-384373/	N
FEW4-MW86	SO	FEW4-MW86-(176.0)	280-99791-12		1/1	8/1/2017 13:10	8/1/2017 13:10	8/15/2017 02:16	280-384373/	N
FEW4-MW86	SO	FEW4-MW86-(189.0)	280-99791-13		1/1	8/1/2017 13:20	8/1/2017 13:20	8/15/2017 02:37	280-384373/	N
FEW4-MW86	SO	FEW4-MW86-(189.0)	280-99791-13MS		1/1	8/1/2017 13:20	8/1/2017 13:20	8/15/2017 02:57	280-384373/	MS
FEW4-MW86	SO	FEW4-MW86-(189.0)	280-99791-13MSD		1/1	8/1/2017 13:20	8/1/2017 13:20	8/15/2017 03:17	280-384373/	SD
FEW4-MW86	SO	FEW4-MW86-(199.0)	280-99791-14		1/1	8/1/2017 14:05	8/1/2017 14:05	8/15/2017 03:57	280-384373/	N
FEW4-MW86	SO	FEW4-MW86-(209.0)	280-99791-15		1/1	8/1/2017 14:15	8/1/2017 14:15	8/15/2017 04:17	280-384373/	N
FEW4-MW86	SO	FEW4-MW86-(210.0)	280-99791-16		1/1	8/1/2017 15:15	8/1/2017 15:15	8/15/2017 04:37	280-384373/	FD
FEW4-MW86	SO	FEW4-MW86-(216.0)	280-99791-17		1/1	8/1/2017 15:35	8/1/2017 15:35	8/15/2017 04:57	280-384373/	N

US Army Corps of Engineers ®

Batch Report

Test Method: SW8260B Analysis Batch: 280-384373

Location	Matrix	Field Sample ID	Lab Sample ID	Calibration Ref	Run#/ Dil'n	Collection Date/Time	Extraction Date/Time	Analysis Date/Time	Prep/Leach Batch	Sample Type
FEW4-MW86	SO	FEW4-MW86-(226.0)	280-99791-18		1/1	8/1/2017 15:45	8/1/2017 15:45	8/15/2017 05:17	280-384373/	N

US Army Corps of Engineers ®

Field Batch Report

--No Records Found--

MS Mismatch Report

--No Records Found--

Section to identify Matrix Spike mismatches where parent sample differs from MS by dilution.

US Army Corps of Engineers ®

QC Outlier Report

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

QC Element	Sample ID/ Lab Sample ID	Run#/ Dil'n	Analyte	Result (Units)	Qualifier	Warning Limits	Control Limits	Reason	Comment	Rule	Action Level
MS Recovery	FEW4-MW84-(245.0) (MS) / 280-99791-2MS	1 / 1.00	4-Methyl-2-pentanone (MIBK)	136.8 (percent)	J/None	65 - 135	65 - 135	M			
MS RPD	280-99791-13MSD (SD) / 280-99791-13MSD	1 / 1.00	Acetone	26.77 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99791-2MSD (SD) / 280-99791-2MSD	1 / 1.00	2-Chlorotoluene	20.38 (rpd)	J/None	< 20	< 20	D			
MS RPD	280-99791-2MSD (SD) / 280-99791-2MSD	1 / 1.00	4-Chlorotoluene	20.17 (rpd)	J/None	< 20	< 20	D			
Surrogate	FEW4-MW84-(297.0) (N) / 280-99791-8	1 / 1.00	Dibromofluoromethane	123.2 (percent)	J/None	78 - 119	78 - 119	I			
Surrogate	FEW4-MW86-(176.0) (N) / 280-99791-12	1 / 1.00	Dibromofluoromethane	121.3 (percent)	J/None	78 - 119	78 - 119	I			
Surrogate	FEW4-MW86-(216.0) (N) / 280-99791-17	1 / 1.00	Dibromofluoromethane	123.6 (percent)	J/None	78 - 119	78 - 119	I			
Surrogate	FEW4-MW86-(226.0) (N) / 280-99791-18	1 / 1.00	Dibromofluoromethane	119.0 (percent)	J/None	78 - 119	78 - 119	I			

Rule is the multiplier used when blank contamination occurs to determine action level.

US Army Corps of Engineers ®

Qualified Results

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW84-(266.0)	280-99791-5	SO	FD	Acetone	20.0	11.0 J	11.0 J		ug/kg	TR
FEW4-MW84-(297.0)	280-99791-8	SO	N	Acetone	22.0	19.0 J Q	19.0 J	+	ug/kg	I/TR
FEW4-MW86-(176.0)	280-99791-12	SO	N	Acetone	29.0	33.0 Q	33.0 J	+	ug/kg	I
FEW4-MW86-(189.0)	280-99791-13	SO	N	Acetone	17.0	33.0 J	33.0 J		ug/kg	D
FEW4-MW86-(216.0)	280-99791-17	SO	N	Acetone	32.0	66.0 Q	66.0 J	+	ug/kg	I

Qualified analytes in samples are reported as estimated, not detected (UJ) at the Limit of Detection (LOD).

US Army Corps of Engineers ®

Detected Results

Test Method: SW8260B Extraction Method: SW5035A Leach Method: NONE

FieldSample ID	LabSample ID	Matrix	Type	Dilution	Analyte	LOQ	Lab Result	Qualified Result	Units	Reason
FEW4-MW84-(232.0)	280-99791-1	SO	N	1	Acetone	28.0	28.0	28.0	ug/kg	
FEW4-MW84-(256.0)	280-99791-3	SO	N	1	Acetone	28.0	43.0	43.0	ug/kg	
FEW4-MW84-(266.0)	280-99791-5	SO	FD	1	Acetone	20.0	11.0 J	11.0 J	ug/kg	TR
FEW4-MW84-(297.0)	280-99791-8	SO	N	1	Acetone	22.0	19.0 J Q	19.0 J	ug/kg	I/TR
FEW4-MW86-(156.0)	280-99791-10	SO	N	1	Acetone	32.0	45.0	45.0	ug/kg	
FEW4-MW86-(176.0)	280-99791-12	SO	N	1	Acetone	29.0	33.0 Q	33.0 J	ug/kg	I
FEW4-MW86-(189.0)	280-99791-13	SO	N	1	Acetone	17.0	33.0 J	33.0 J	ug/kg	D
FEW4-MW86-(199.0)	280-99791-14	SO	N	1	Acetone	33.0	75.0	75.0	ug/kg	
FEW4-MW86-(209.0)	280-99791-15	SO	N	1	Acetone	28.0	49.0	49.0	ug/kg	
FEW4-MW86-(216.0)	280-99791-17	SO	N	1	Acetone	32.0	66.0 Q	66.0 J	ug/kg	I

US Army Corps of Engineers ®

Rejected Results

--No Records Found--

Facility:	B08WY0467-02, F.E. Warren AFB, Site 4
Event:	2017-2018 RI Addendum Tasks
SDG:	280-99791-1_52_2a_FUDSChem
Guidance Document:	Draft-Final Uniform Federal Policy-Quality Assurance Project Plan for the Remedial Investigation Addendum 2017-2018 Tasks Atlas "D" Missile Site 4 —Laramie County, Wyoming, July 2017
Prime Contractor:	RMC Consultants, Inc., LAKEWOOD, CO
Project Manager:	David Groy
Contract Laboratory:	TestAmerica Laboratories, Inc., Arvada, CO
Data Review Contractor:	RMC Consultants
Data Review Level:	Stage 3VEM
Primary Data Reviewer:	Gary Torf, Contractor Project Chemist
Second Reviewer:	, Senior Scientist
Date Submitted:	

Field Sample ID	Lab Sample ID	Matrix	Type/Type Code	SW8260B
FEW4-MW84-(266.0)	280-99791-5	Solid	Field Duplicate/FD	X
FEW4-MW86-(210.0)	280-99791-16	Solid	Field Duplicate/FD	X
FEW4-MW84-(232.0)	280-99791-1	Solid	Field Sample/N	X
FEW4-MW84-(245.0)	280-99791-2	Solid	Field Sample/N	X
FEW4-MW84-(256.0)	280-99791-3	Solid	Field Sample/N	X
FEW4-MW84-(265.0)	280-99791-4	Solid	Field Sample/N	X
FEW4-MW84-(275.0)	280-99791-6	Solid	Field Sample/N	X
FEW4-MW84-(286.0)	280-99791-7	Solid	Field Sample/N	X
FEW4-MW84-(297.0)	280-99791-8	Solid	Field Sample/N	X
FEW4-MW84-(307.0)	280-99791-9	Solid	Field Sample/N	X
FEW4-MW86-(156.0)	280-99791-10	Solid	Field Sample/N	X
FEW4-MW86-(166.0)	280-99791-11	Solid	Field Sample/N	X
FEW4-MW86-(176.0)	280-99791-12	Solid	Field Sample/N	X
FEW4-MW86-(189.0)	280-99791-13	Solid	Field Sample/N	X
FEW4-MW86-(199.0)	280-99791-14	Solid	Field Sample/N	X
FEW4-MW86-(209.0)	280-99791-15	Solid	Field Sample/N	X
FEW4-MW86-(216.0)	280-99791-17	Solid	Field Sample/N	X
FEW4-MW86-(226.0)	280-99791-18	Solid	Field Sample/N	X

This report assesses the analytical data quality associated with the analyses listed on the preceding cover page. This assessment has been made through a combination of automated data review (ADR) and supplemental manual review, the details of which are described below. The approach taken in the review of this data set is consistent with the requirements contained in the Draft-Final Uniform Federal Policy-Quality Assurance Project Plan for the Remedial Investigation Addendum 2017-2018 Tasks Atlas “D” Missile Site 4 —Laramie County, Wyoming, July 2017 and the additional guidance documents incorporated by reference to the extent possible. Where definitive guidance is not provided, results have been evaluated in a conservative manner using professional judgment.

Sample collection was managed and directed by RMC Consultants, Inc., LAKEWOOD, CO; analyses were performed by TestAmerica Laboratories, Inc., Arvada, CO and were reported under sample delivery group (SDG) 280-99791-1_52_2a_FUDSChem. Data have been evaluated electronically based on electronic data deliverables (EDDs) provided by the laboratory, and hard copy data summary forms have also been reviewed during this effort and compared to the automated review output by the reviewers whose signatures appear on the following page. Findings based on the automated data submission and manual data verification processes are detailed in the ADR narrative and throughout this report.

All quality control (QC) elements associated with this SDG have been reviewed by a project chemist in accordance with the requirements defined for the project. This review is documented in the attached Data Review Checklists. The QC elements listed below were supported by the electronic deliverable and were evaluated using ADR processes.

- Blank
- Blank - Negative
- Field Duplicate RPD
- LCS Recovery
- LCS RPD
- MS Recovery
- MS RPD
- Prep Hold Time
- Surrogate
- Test Hold Time

Results of the ADR process were subsequently reviewed and updated as applicable by the data review chemists identified on the signature page. Quality control elements that were not included in the electronic deliverable were reviewed manually and findings are documented within this report. Summaries of findings and associated qualified results are documented throughout this report.

A total of 4 results (0.34%) out of the 1188 results (sample and field QC samples) reported are qualified based on review and 0 results (0.00%) have been rejected. Trace values, defined as results that are qualified as estimated because they fall between the limit of detection and the reporting limit/limit of quantitation, are not counted as qualified results in the above count. The qualified results are detailed throughout this report and discussed in the narrative below, where appropriate.

Narrative Comments

Analytical Method	Data Reviewer Comment
SW8260B	No additional comments; see Checklist for detail.

Gary Torf

October 23, 2017

Reviewed by Gary Torf, Contractor Project Chemist, RMC Consultants

As the First Reviewer, I certify that I have performed a data review process in accordance with the requirements of the project guidance document, and have compared the electronic data to the laboratory's hard copy report and have verified the consistency of a minimum of 10% of the reported sample results and method quality control data between the two deliverables.

As the Second Reviewer, I certify that I have performed a quality assurance review of the report generated by the First Reviewer.

Quality Control Outliers for test method SW8260B, MS Recovery

Data for matrix spikes/matrix spike duplicates (MS/MSD) are generated to determine long-term precision and accuracy of the analytical method on various matrices and to demonstrate acceptable compound recovery by the laboratory at the time of sample analysis. These data alone cannot be used to evaluate the precision and accuracy of individual samples. However, when exercising professional judgment, MS/MSD data can be used in conjunction with other available QC information. Reported results were evaluated to determine compliance with the required acceptance criteria, and summary forms were evaluated and compared to electronic data deliverables. Findings of this review, and any associated qualified results, are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
FEW4-MW84-(245.0) (MS)/ 280-99791-2MS	4-Methyl-2-pentanone (MIBK)	136.8	65 - 135	65 - 135	percent	J/None	M	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

No results associated with this QC element required qualification.

Quality Control Outliers for test method SW8260B, MS RPD

The objective of matrix spikes/matrix spike duplicates (MS/MSD) RPD analysis is to demonstrate acceptable method precision by the laboratory at the time of analysis. MS/MSD analyses are also performed to generate data that determines the long-term precision of the analytical method on various matrices. Non-homogenous samples can impact the apparent method precision. Summary forms were evaluated and compared to electronic data deliverables. Matrix spikes/matrix spike duplicates results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
280-99791-13MSD (SD)/ 280-99791-13MSD	Acetone	26.77	< 20	< 20	rpd	J/None	D	
280-99791-2MSD (SD)/ 280-99791-2MSD	4-Chlorotoluene	20.17	< 20	< 20	rpd	J/None	D	
280-99791-2MSD (SD)/ 280-99791-2MSD	2-Chlorotoluene	20.38	< 20	< 20	rpd	J/None	D	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the MS RPD for SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW86-(189.0)	N	Acetone	17.0	33.0 J	33.0 J		ug/kg	D

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

Quality Control Outliers for test method SW8260B, Surrogate

Method performance for individual samples is demonstrated through spiking activities. All samples are spiked with surrogate compounds prior to sample preparation. The sample itself may produce effects due to such factors as interferences and high concentrations of analytes. Summary forms were evaluated and compared to electronic data deliverables. Surrogate results that were outside of the acceptance criteria are listed below.

Sample ID/ Lab Sample ID	Analyte	Result	Warning Limits	Control Limits	Units	Qualifier	Reason Code	Comment
FEW4-MW84-(297.0) (N)/ 280-99791-8	Dibromofluoromethane	123.2	78 - 119	78 - 119	percent	J/None	I	
FEW4-MW86-(176.0) (N)/ 280-99791-12	Dibromofluoromethane	121.3	78 - 119	78 - 119	percent	J/None	I	
FEW4-MW86-(216.0) (N)/ 280-99791-17	Dibromofluoromethane	123.6	78 - 119	78 - 119	percent	J/None	I	
FEW4-MW86-(226.0) (N)/ 280-99791-18	Dibromofluoromethane	119.0	78 - 119	78 - 119	percent	J/None	I	

Where two qualifiers are listed, such as 'J/UJ', the first applies to positive results, and the second to non-detect results.
Upper and Lower Warning and Control Limits are abbreviated UWL, LWL, UCL, and LCL in the Comment field.

Qualified Results associated with the Surrogate for SW8260B

FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW84-(297.0)	N	Acetone	22.0	19.0 J Q	19.0 J	+	ug/kg	I/TR
FEW4-MW86-(176.0)	N	Acetone	29.0	33.0 Q	33.0 J	+	ug/kg	I
FEW4-MW86-(216.0)	N	Acetone	32.0	66.0 Q	66.0 J	+	ug/kg	I

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).

Table of All Qualified Results

Test Method: SW8260B	**Extraction Method: SW5035A**							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW84-(297.0)	N	Acetone	22.0	19.0 J Q	19.0 J	+	ug/kg	I/TR
FEW4-MW86-(176.0)	N	Acetone	29.0	33.0 Q	33.0 J	+	ug/kg	I
FEW4-MW86-(189.0)	N	Acetone	17.0	33.0 J	33.0 J		ug/kg	D
FEW4-MW86-(216.0)	N	Acetone	32.0	66.0 Q	66.0 J	+	ug/kg	I

Analytes not found in project samples are reported as not detected at the limit of detection (LOD).
Trace values are not included in the qualified results table unless additional reason codes are associated.

Table of All Trace Results

Test Method: SW8260B	Extraction Method: SW5035A							
FieldSample ID	Type	Analyte	LOQ	Lab Result	Qualified Result	Bias	Units	Reason
FEW4-MW84-(266.0)	FD	Acetone	20.0	11.0 J	11.0 J		ug/kg	TR
FEW4-MW84-(297.0)	N	Acetone	22.0	19.0 J Q	19.0 J	+	ug/kg	I/TR

Results with Modified Qualifiers

No qualifiers associated with this sample delivery group were modified manually.

Reason Code Definitions

Code	Definition
D	MS RPD
I	Surrogate recovery outside project limits.
M	MS Recovery
TR	Trace Level Detect

Flag Code and Definitions

Flag	Definition
U	Undetected: The analyte was analyzed for, but not detected.
UJ	The analyte was not detected; however, the result is estimated due to discrepancies in meeting certain analyte-specific quality control criteria.
J	Estimated: The analyte was positively identified, the quantitation is an estimation due to discrepancies in meeting certain analyte-specific quality control criteria.
R	The data are rejected due to deficiencies in meeting QC criteria and may not be used for decision making.
B	Blank contamination: The analyte was found in an associated blank above one half the RL, as well as in the sample.
UB	The analyte was also detected in an associated laboratory or field blank at a concentration comparable to the concentration in the sample. The reported result has been requalified as not detected.

Review Questions

Method: SW8260B (Volatile Organic Compounds by Capillary GC/MS)

Review Questions	Yes	No	NA	Comment
Did Chain-of-Custody information agree with laboratory report and EDD for requested field samples and tests?	•			
Were samples preserved properly and received in good condition?	•			
Were holding times met?	•			
Were sample reciept temperatures met?	•			Sample receipt temperatures were 3.0ºC and 3.1ºC.
Were QAPP specified PQLs achieved?	•			
Were all QAPP-specified target analytes reported?	•			
Was the GC/MS system properly tuned based on method criteria?	•			
Was the criteria met during each 12 hour shift (prior to ICAL and Cal Ver.)?	•			
Does the initial calibration curve consist of 5 concentration levels, with the low standard near but > MDL?	•			
Did the Calibration Check Compounds (CCCs) have a relative standard deviation within QAPP acceptance limits?	•			
Were the average response factors (RFs) for the System Performance Check Compounds (SPCCs) within QAPP acceptance limits?	•			
Were the ICAL %RSDs for the target compounds within method criteria?	•			
If a quadratic equation curve was used, was the coefficient of determination (COD) within criteria?	•			
If a linear regression curve was used, was the correlation coefficient within criteria?	•			
Check and recalculate the response factors and average response factors for a least one target compound.	•			ICAL VMS-G2 8/12/17 TCE AVG RF = 0.2698
Check and recalculate the %RSD for one of more target compounds and DMCs. Verify that the recalculated values agree with the laboratory reported values.	•			ICAL VMS-G2 8/12/17 TCE %RSD = 3.9%; 1,2-DCA-d4 % RSD = 4.3%
Was a second source verification analyzed after the ICAL and all analytes within criteria?	•			
Was a CCV run at the beginning of the analytical sequence and every 12 hours?	•			
Was the CCV a mid-level standard from the initial calibration curve?	•			
Did the CCCs have a %Difference within QAPP acceptance limits?	•			
Were the average RFs for the SPCCs within QAPP acceptance limits?	•			
Was the %D (difference or drift) for all target analytes within QAPP acceptance limits?	•			
Check and recalculate the CCV relative response factor for at least one target compound.	•			VMS-G2 8/14/17 CCV 280-384373/2 TCE RRF = 0.2857
Were the internal standards added to every standard, blank, matrix spike, matrix spike duplicate, and sample?	•			
Were the retention times for all IS compounds within QAPP acceptance limits?	•			
Are the area counts of all IS compounds within QAPP acceptance limits?	•			
Was a method blank prepared and analyzed with each batch?	•			

Review Questions

Method: SW8260B (Volatile Organic Compounds by Capillary GC/MS)

Review Questions	Yes	No	NA	Comment
Were target analytes detected in the method blank above the MDL?		•		
Were target analytes reported in the field blank analyses above the MDL?			•	
If a field duplicate was analyzed, were the RPDs within QAPP acceptance limits?	•			FEW4-MW84-(266.0) was a blind duplicate of FEW4-MW84-(265.0); FEW4-MW86-(210.0) was a blind duplicate of FEW4-MW86-(209.0).
Was an LCS/LCSD pair prepared and analyzed with each batch?	•			
Were the LCS/LCSD recoveries within QAPP acceptance limits?	•			
Were the LCS/LCSD RPDs within QAPP acceptance limits?		•		Chloroethane exceeded the precision limit of 20% at 22%.
Was the duplicate RPD within QAPP acceptance limits?			•	
Was a MS/MSD pair prepared with each batch?	•			
Is the MS/MSD parent sample the one designated by the sampling team?	•			FEW4-MW84-(245.0) and FEW4-MW86-(189.0) were designated for MS/MSD analyses.
Were MS/MSD recoveries and RPD within QAPP acceptance limits?		•		The 4-Methyl-2-pentanone recovery of 137% in the MS of FEW4-MW84-(245.0) was greater than the upper control limit of 135%. The acetone RPD of 27%, the 2-chlorotoluene RPD of 20.4%, and the 4-chlorotoluene RPD of 20.2% for the MSD of FEW4-MW86-(189.0) was greater than the 20% control limit.
Were surrogate recoveries within QAPP acceptance limits?		•		DBFM was recovered at 124% in FEW4-MW84-(297.0), 122% in FEW4-MW86-(176.0), 123% in FEW4-MW86-(216.0), and 120% in FEW4-MW86-(226.0).
Were reported sample concentrations within calibration range?	•			
Have all Laboratory Case Narrative comments/findings been addressed in the data review process?	•			
Were instrument run logs present and filled out appropriately?	•			
Were sample prepration sheets present and filled out appropriately?	•			
Check and recalculate the %D for one target compound. Verify that the recalculated values agree with the laboratory-reported values.			•	
Examine raw data to verify correct calculation of sample results reported by the laboratory. Compare quantitation lists and chromatograms to the reported detect and non-detect sample results.	•			FEW4-MW86-(216.0) Acetone = 65.9 ug/kg
Verify that the reporting limits and sample results have been adjusted to reflect all sample dilutions and Percent Moisture factors (non-aqueous samples).	•			

Appendix E. Physical Parameter Testing Reports

Core Lab
RESERVOIR OPTIMIZATION

Petroleum Services Division
3437 Landco Dr.
Bakersfield, California 93308
Tel: 661-325-5657
Fax: 661-325-5808
www.corelab.com

November 30, 2017

David Groy
RMC Consultants, Inc.
12295 W. 48th Avenue - Unit A
Wheat Ridge, CO 80033

Subject: Grain Size & Atterberg Limits
Project:E15-019-201
CL File No: 1704035

Dear Mr. Groy,

The attached file presents the final Grain Size Analysis and Atterberg Limits results for 41 soil samples submitted from your Atlas Missile Site 4 RI Addendum project.

Appropriate ASTM, EPA or API methodologies were used for this project and SOP's are available on request. The sample material for this project will be disposed after 30 days unless otherwise requested.

Thank you for this opportunity to be of service to RMC Consultants, Inc. Please do not hesitate to contact us at (661-325-5657) if you have any questions regarding these results or if we can be of any additional service.

Sincerely,
Core Laboratories, LP

Michael Carter

Michael Carter
Core Analyst

The analyses, opinions or interpretations contained in this report are based upon observations and material supplied by the client for whose exclusive and confidential use this report has been made. The interpretations or opinions expressed represent the best judgment of Core Laboratories. Core Laboratories assumes no responsibility and makes no warranty or representations, expressed or implied, as to the productivity, proper operations or profitableness, however, of any oil, gas, coal or other mineral, property, well or sand in connection with which such report is used or relied upon for any reason whatsoever.

CLB Listed NYSE

ATTERBERG LIMITS AND SOIL CLASSIFICATION DATA

PETROLEUM SERVICES

RMC Consultants, Inc.
Project Name : Atlas Site 4 - RI Addendum
Project Number : E15-019-201

Core Lab File No: 1704035EN

METHODS:		ASTM D4318			ASTM D4318	ASTM D2487	USDA
		Atterberg Limits [1]			USCS / Plasticity	USCS	USDA/SCS [2]
Sample ID	Depth, ft.	Liquid Limit LL	Plastic Limit PL	Plasticity Index PI	Chart Symbol (Fines: <#40 Sieve)	Classification Group Symbol: Name	Soil Texture Scheme
FEW4-MW75-304	304	30	15	15	SC	Clayey Sand	Sandy Loam
FEW4-MW75-90	90	36	31	5	ML	Sandy Silt	Silt Loam
FEW4-MW75-380	380	41	18	23	SP-SC	Poorly Graded Sand with Clay	Sand
FEW4-MW84-256	256	78	42	36	MH	Elastic Silt	Silty Clay Loam
FEW4-MW84-297	297	52	27	25	SC	Clayey Sand	Loamy Sand
FEW4-MW84-91	91	85	46	39	MH	Elastic Silt with Sand	Silt Loam
FEW4-MW97-321	321	36	29	7	ML	Silt with Sand	Silt Loam
FEW4-MW97-261	261	46	25	21	SC	Clayey Sand	Loamy Sand
FEW4-MW85-88	88	79	40	39	MH	Elastic Silt with Sand	Silt Loam
FEW4-MW85-148	148	70	60	10	MH	Elastic Silt with Sand	Silt Loam
FEW4-MW85-208	208	60	25	35	SC	Clayey Sand	Sandy Loam
FEW4-MW101-240	240	53	45	8	MH	Elastic Silt	Silt Loam
FEW4-MW101-130	130	35	29	6	ML	Sandy Silt	Silt Loam
FEW4-MW101-101	101	37	33	4	ML	Sandy Silt	Silt Loam
FEW4-MW80-215	215	36	33	3	ML	Silt with Sand	Silt Loam
FEW4-MW80284	284	20	19	1	SP-SM	Poorly Graded Sand with Silt	Sand
FEW4-MW80-125	125	39	33	6	ML	Silt with Sand	Silt Loam
FEW4-MW77-134	134	48	37	11	ML	Silt with Sand	Silt Loam
FEW4-MW77-35	35	67	41	26	MH	Elastic Silt with Sand	Silt Loam
FEW4-MW77-255	255	28	21	7	SP-SC	Poorly Graded Sand with Clay	Sand
FEW4-MW83-124	124	50	41	9	MH	Elastic Silt with Sand	Silt Loam

USCS: Unified Soil Classification System
USDA: US Department of Agriculture
SCS: Soil Conservation Service

(1) Silt assumed as the fine fraction for NON-PLASTIC samples.
(2) Sand considered to be >No. 200 sieve for USDA Soil Texture Scheme.

ATTERBERG LIMITS AND SOIL CLASSIFICATION DATA

PETROLEUM SERVICES

RMC Consultants, Inc.
Project Name : Atlas Site 4 - RI Addendum
Project Number : E15-019-201

Core Lab File No: 1704035EN

METHODS:		ASTM D4318			ASTM D4318	ASTM D2487	USDA
		Atterberg Limits [1]			USCS / Plasticity	USCS	USDA/SCS [2]
Sample ID	Depth, ft.	Liquid Limit LL	Plastic Limit PL	Plasticity Index PI	Chart Symbol (Fines: <#40 Sieve)	Classification Group Symbol: Name	Soil Texture Scheme
FEW4-MW83-85	85	76	42	34	MH	Elastic Silt	Silt Loam
FEW4-MW83-265	265	68	37	31	MH	Elastic Silt	Silt Loam
FEW4-MW86-189	189	40	35	5	SM	Silty Sand	Sandy Loam
FEW4-MW86-52	52	55	37	18	MH	Elastic Silt	Silt Loam
FEW4-MW86-362	362	54	28	26	CH	Fat Clay	Silty Clay Loam
FEW4-MW74-354	354	81	38	43	SM	Silty Sand	Loamy Sand
FEW4-MW74-104	104	41	38	3	ML	Silt	Silt Loam
FEW4-MW74-262	262	76	41	35	MH	Elastic Silt	Silty Clay Loam
FEW4-MW95-163	163	40	23	17	SP-SC	Poorly Graded Sand with Clay	Sand
FEW4-MW95-289	289	53	32	21	MH	Sandy Elastic Silt	Silt Loam
FEW4-MW95-204	204	34	19	15	SP-SC	Poorly Graded Sand with Clay	Sand
FEW4-MW82-154	154	30	26	4	SM	Silty Sand	Sandy Loam
FEW4-MW82-135	135	42	37	5	ML	Silt	Silt Loam
FEW4-MW82-83	83	57	34	23	SM	Silty Sand	Sand
FEW4-MW76-120	120	66	59	7	MH	Elastic Silt	Silt Loam
FEW4-MW76-90	90	77	42	35	MH	Elastic Silt	Silty Clay Loam
FEW4-MW76-250	250	25	22	3	ML	Silt	Silt Loam
FEW4-MW81-200	200	42	38	4	ML	Silt with Sand	Silt Loam
FEW4-MW81-269	269	57	32	25	MH	Sandy Elastic Silt	Silt Loam
FEW4-MW81-100	100	49	44	5	ML	Silt	Silt Loam

USCS: Unified Soil Classification System
USDA: US Department of Agriculture
SCS: Soil Conservation Service

(1) Silt assumed as the fine fraction for NON-PLASTIC samples.
(2) Sand considered to be >No. 200 sieve for USDA Soil Texture Scheme.

Core Lab
RESERVOIR OPTIMIZATION

SIEVE and LASER PARTICLE SIZE SUMMARY

(METHODOLOGY: ASTM D422/D4464M)

Petroleum Services

Company: RMC Consultants, Inc.
Project Name: Atlas Missile Site 4 RI Addendum
Project Number: E15-019-201

CL File Number: 1704035
Date: 11/13/2017

Sample ID	Grain Size Description (Mean from Folk)	Median Grain Size, mm	Component Percentages								Silt & Clay
			Gravel	Sand Size					Silt	Clay	
				VCoarse	Coarse	Medium	Fine	VFine			
FEW4-MW75-304	mgr	1.3342	39.93	16.50	9.95	5.67	3.14	2.96	14.13	7.72	21.8
FEW4-MW75-90	silt	0.0470	0.00	0.00	0.01	3.50	14.32	22.29	51.36	8.52	59.9
FEW4-MW75-380	cgr	1.7499	46.47	17.94	10.49	3.75	1.89	2.06	11.54	5.87	17.4
FEW4-MW84-256	silt	0.0080	0.00	0.00	0.75	1.02	1.08	3.19	62.88	31.08	94.0
FEW4-MW84-297	cgr	1.1769	28.40	27.05	13.18	6.23	5.20	4.79	12.20	2.95	15.2
FEW4-MW84-91	silt	0.0263	0.00	0.04	3.26	3.06	9.43	13.47	56.91	13.83	70.7
FEW4-MW97-321	silt	0.0276	0.00	0.00	0.00	0.00	2.38	19.37	62.31	15.95	78.3
FEW4-MW97-261	mgr	0.5356	14.55	10.90	26.77	13.41	6.81	4.88	15.67	7.02	22.7
FEW4-MW85-88	silt	0.0181	0.00	0.00	0.01	1.68	7.80	11.67	62.57	16.27	78.8
FEW4-MW85-148	silt	0.0238	0.00	0.00	0.00	1.35	7.41	15.80	59.88	15.57	75.4
FEW4-MW85-208	mgr	1.2525	35.74	19.19	11.66	4.62	2.26	1.93	14.50	10.11	24.6
FEW4-MW101-240	silt	0.0153	0.00	0.00	0.00	0.00	1.83	13.29	63.93	20.95	84.9
FEW4-MW101-130	silt	0.0499	0.00	0.00	0.13	10.76	15.25	17.48	45.95	10.43	56.4
FEW4-MW101-101	vfgr	0.0558	4.67	6.99	5.93	4.40	7.83	16.89	44.98	8.31	53.3
FEW4-MW80-215	silt	0.0299	0.00	0.00	0.00	0.56	5.84	19.95	58.94	14.71	73.7
FEW4-MW80-284	vcgr	2.1198	52.39	17.92	10.05	5.70	4.12	2.47	5.76	1.59	7.4
FEW4-MW80-125	silt	0.0276	0.00	0.00	0.00	1.21	7.53	15.93	62.82	12.51	75.3
FEW4-MW77-134	silt	0.0292	0.00	0.00	0.00	1.38	8.92	18.15	57.97	13.58	71.6
FEW4-MW77-35	silt	0.0209	0.00	0.00	0.00	0.52	6.30	15.34	61.19	16.64	77.8
FEW4-MW77-255	vcgr	1.3796	31.45	34.13	20.47	5.66	1.65	1.26	4.20	1.18	5.4
FEW4-MW83-124	silt	0.0165	0.00	0.00	0.00	0.66	5.03	13.06	61.37	19.88	81.2
FEW4-MW83-85	silt	0.0091	0.00	0.00	0.00	0.00	0.00	1.81	74.34	23.85	98.2
FEW4-MW83-265	silt	0.0081	0.00	0.00	0.00	0.00	0.01	1.97	74.27	23.75	98.0
FEW4-MW86-189	fgr	0.1346	14.48	5.48	5.90	10.25	15.53	14.15	28.73	5.49	34.2
FEW4-MW86-52	silt	0.0203	0.00	0.00	0.00	0.34	3.87	12.51	69.18	14.10	83.3
FEW4-MW86-362	silt	0.0099	0.00	0.00	0.00	0.71	6.65	8.89	55.67	28.08	83.7
FEW4-MW74-354	mgr	0.1795	35.05	2.93	4.28	4.93	6.81	9.92	29.55	6.54	36.1
FEW4-MW74-104	silt	0.0212	0.00	0.00	0.00	0.42	3.46	13.34	68.33	14.45	82.8
FEW4-MW74-262	silt	0.0059	0.00	0.00	0.00	0.00	0.00	0.84	65.47	33.70	99.2
FEW4-MW95-163	cgr	1.3843	30.10	33.78	12.58	4.43	4.14	3.87	6.15	4.96	11.1

** Distribution pattern precludes calculation of these statistical parameters.

SIEVE and LASER PARTICLE SIZE SUMMARY

(METHODOLOGY: ASTM D422/D4464M)

Petroleum Services

Company: RMC Consultants, Inc.
Project Name: Atlas Missile Site 4 RI Addendum
Project Number: E15-019-201

CL File Number: 1704035
Date: 11/13/2017

Sample ID	Grain Size Description (Mean from Folk)	Median Grain Size, mm	Component Percentages								Silt & Clay
				Sand Size							
			Gravel	VCoarse	Coarse	Medium	Fine	VFine	Silt	Clay	
FEW4-MW95-289	silt	0.0348	0.00	0.00	0.01	2.56	11.41	21.63	49.38	15.01	64.4
FEW4-MW95-204	cgr	1.1399	39.90	12.15	8.96	5.50	4.72	6.48	17.62	4.67	22.3
FEW4-MW82-154	fgr	0.4021	2.20	19.49	23.00	14.23	8.53	5.73	21.75	5.08	26.8
FEW4-MW82-135	silt	0.0182	0.00	0.00	0.00	0.00	0.99	12.91	67.93	18.17	86.1
FEW4-MW82-83	cgr	1.1367	19.82	35.36	17.23	7.51	4.22	3.51	9.56	2.79	12.3
FEW4-MW76-120	silt	0.0099	0.00	0.00	0.00	0.00	0.58	4.26	70.69	24.46	95.2
FEW4-MW76-90	silt	0.0066	0.00	0.00	0.00	0.00	0.00	0.18	67.20	32.62	99.8
FEW4-MW76-250	silt	0.0092	0.00	0.00	0.00	0.00	0.21	4.55	71.28	23.95	95.2
FEW4-MW81-200	silt	0.0325	0.00	0.00	0.03	3.10	9.76	18.83	54.51	13.78	68.3
FEW4-MW81-269	silt	0.0316	1.00	2.90	4.13	7.06	8.46	10.53	52.80	13.12	65.9
FEW4-MW81-100	silt	0.0173	0.00	0.00	0.00	0.48	3.83	12.89	64.60	18.20	82.8

Wentworth Classification

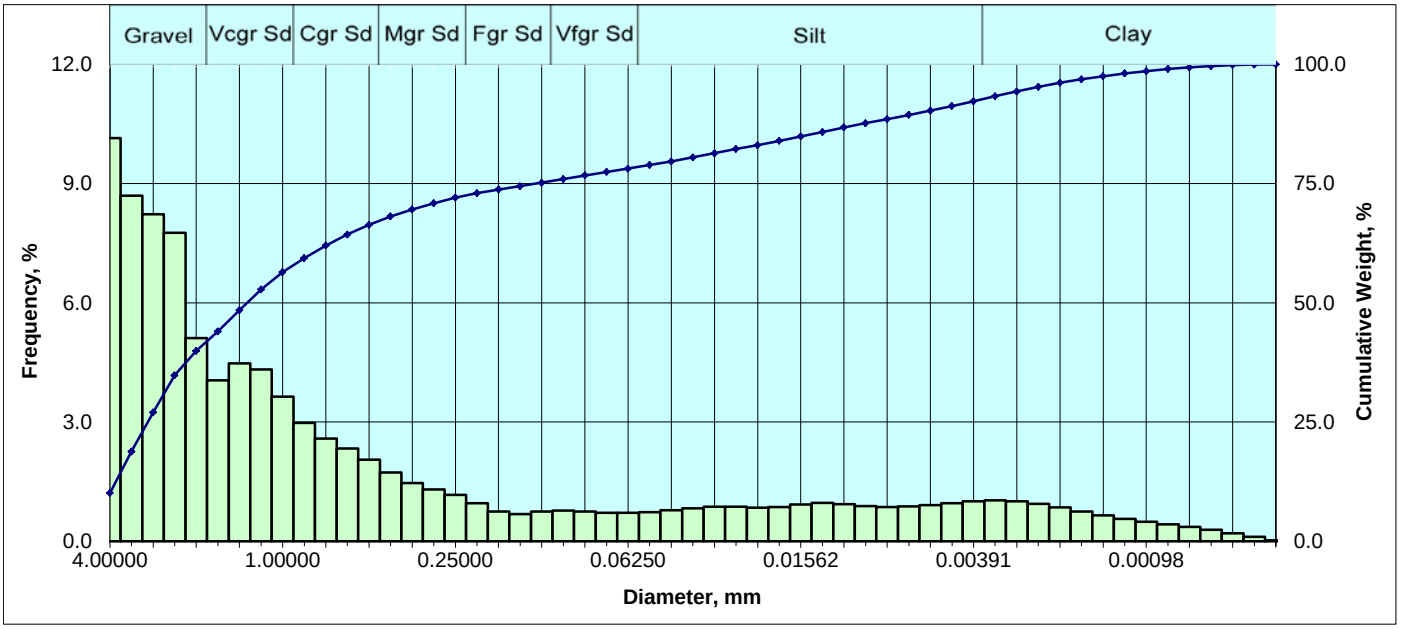
** Distribution pattern precludes calculation of these statistical parameters.

Core Lab
RESERVOIR OPTIMIZATION

Company: RMC Consultants, Inc.
Project Name: Atlas Missile Site 4 RI Addendum
Project Number: E15-019-201

CL File Number: 1704035
Sample ID: FEW4-MW75-304

Sieve and Laser Particle Size Analysis



Particle Size Distribution

	Diameter [US Mesh]	Diameter [in.]	Diameter [mm]	Diameter [ϕ]	Weight % [Incl.]	Weight % [Cum.]
Granule	5	0.157480	4.00000	-2.00	10.142	10.14
	6	0.132425	3.36359	-1.75	8.693	18.84
	7	0.111355	2.82843	-1.50	8.226	27.06
	8	0.093638	2.37841	-1.25	7.760	34.82
	10	0.078740	2.00000	-1.00	5.113	39.93
V Crse Sand	12	0.066212	1.68179	-0.75	4.053	43.99
	14	0.055678	1.41421	-0.50	4.473	48.46
	16	0.046819	1.18921	-0.25	4.328	52.79
	18	0.039370	1.00000	0.00	3.642	56.43
Coarse Sand	20	0.033106	0.84090	0.25	2.976	59.41
	25	0.027839	0.70711	0.50	2.581	61.99
	30	0.023410	0.59460	0.75	2.338	64.33
	35	0.019685	0.50000	1.00	2.056	66.38
Medium Sand	40	0.016553	0.42045	1.25	1.730	68.11
	45	0.013919	0.35355	1.50	1.466	69.58
	50	0.011705	0.29730	1.75	1.307	70.88
	60	0.009843	0.25000	2.00	1.167	72.05
Fine Sand	70	0.008277	0.21022	2.25	0.958	73.01
	80	0.006960	0.17678	2.50	0.748	73.76
	100	0.005852	0.14865	2.75	0.688	74.45
	120	0.004921	0.12500	3.00	0.747	75.19
V. Fine Sand	140	0.004138	0.10511	3.25	0.777	75.97
	170	0.003480	0.08839	3.50	0.748	76.72
	200	0.002926	0.07433	3.75	0.719	77.44
	230	0.002461	0.06250	4.00	0.717	78.15
Silt	270	0.002069	0.05256	4.25	0.736	78.89
	325	0.001740	0.04419	4.50	0.779	79.67
	400	0.001463	0.03716	4.75	0.833	80.50
	450	0.001230	0.03125	5.00	0.871	81.37
	500	0.001035	0.02628	5.25	0.867	82.24
	635	0.000870	0.02210	5.50	0.846	83.09
		0.000732	0.01858	5.75	0.865	83.95
		0.000615	0.01562	6.00	0.927	84.88
		0.000517	0.01314	6.25	0.968	85.85
		0.000435	0.01105	6.50	0.936	86.78
		0.000366	0.00929	6.75	0.885	87.67
		0.000308	0.00781	7.00	0.862	88.53
		0.000259	0.00657	7.25	0.875	89.40
		0.000217	0.00552	7.50	0.912	90.32
		0.000183	0.00465	7.75	0.960	91.28
		0.000154	0.00391	8.00	1.009	92.28
Clay		0.000129	0.00328	8.25	1.028	93.31
		0.000109	0.00276	8.50	1.005	94.32
		0.000091	0.00232	8.75	0.943	95.26
		0.000077	0.00195	9.00	0.853	96.11
		0.000065	0.00164	9.25	0.750	96.86
		0.000054	0.00138	9.50	0.652	97.52
		0.000046	0.00116	9.75	0.567	98.08
		0.000038	0.00098	10.00	0.494	98.58
		0.000032	0.00082	10.25	0.429	99.01
		0.000027	0.00069	10.50	0.362	99.37
		0.000023	0.00058	10.75	0.288	99.66
		0.000019	0.00049	11.00	0.205	99.86
		0.000016	0.00041	11.25	0.111	99.97
		0.000015	0.00038	11.50	0.027	100.00

Sorting Statistics (Folk)

Parameter	Trask	Inman	Folk
Median	Very coarse sand sized		
(in)	0.0525	0.0525	0.0525
(mm)	1.3342	1.3342	1.3342
Mean	Medium sand sized		
(in)	0.0609	0.0101	0.0175
(mm)	1.5468	0.2565	0.4444
Sorting	V. Poor		
	4.754	3.799	3.633
Skewness	Strongly fine skewed		
	0.467	0.887	0.608
Kurtosis	Mesokurtic		
	0.348	0.506	1.043

Component Percentages

Gravel	Sand	Silt	Clay	Silt + Clay
39.93	38.22	14.13	7.72	21.85

Percentile [Weight, %]	Particle Diameter [in.]	[mm]	[phi]
5	0.2678	6.8013	-2.7658
10	0.1605	4.0776	-2.0277
16	0.1406	3.5712	-1.8364
25	0.1166	2.9625	-1.5668
30	0.1046	2.6580	-1.4104
40	0.0785	1.9949	-0.9963
50	0.0525	1.3342	-0.4160
60	0.0319	0.8102	0.3037
75	0.0052	0.1311	2.9313
84	0.0007	0.0184	5.7622
90	0.0002	0.0059	7.4084
95	0.0001	0.0024	8.6763

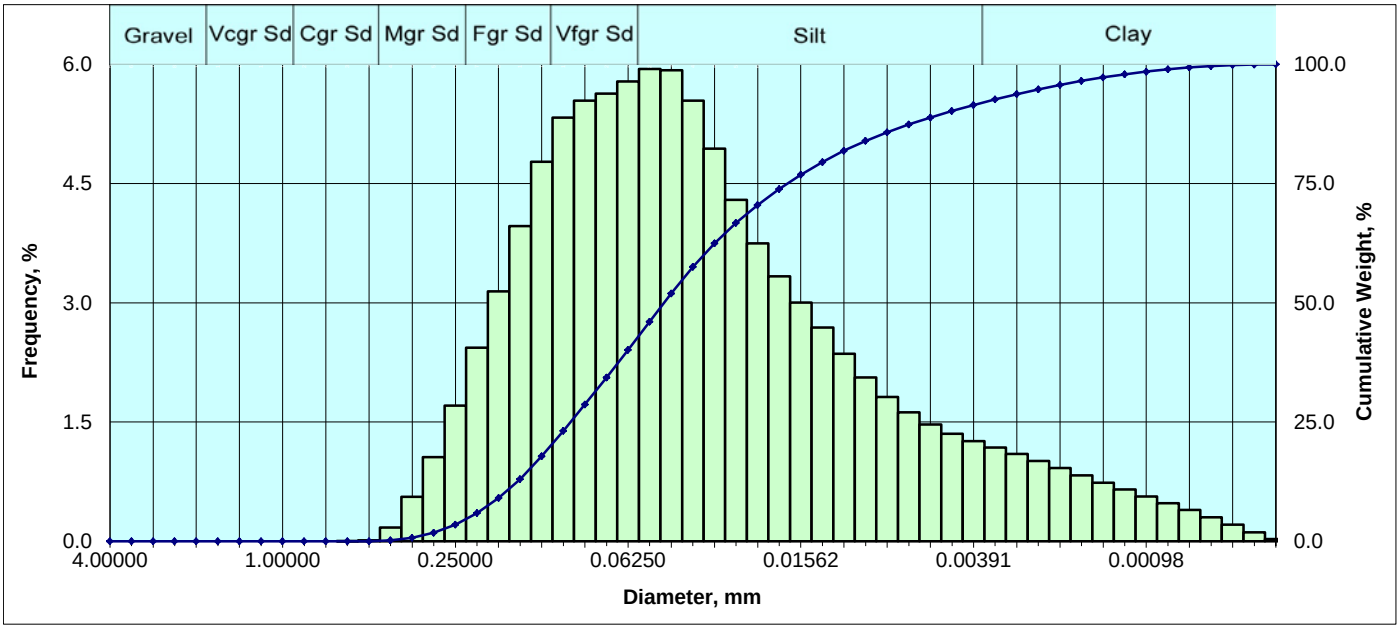
** Distribution pattern precludes calculation of these statistical parameters.

Core Lab
RESERVOIR OPTIMIZATION

Company: RMC Consultants, Inc.
Project Name: Atlas Missile Site 4 RI Addendum
Project Number: E15-019-201

CL File Number: 1704035
Sample ID: FEW4-MW75-90

Sieve and Laser Particle Size Analysis



Particle Size Distribution

	Diameter				Weight %	
	[US Mesh]	[in.]	[mm]	[ϕ]	[Incl.]	[Cum.]
Granule	5	0.157480	4.00000	-2.00	0.000	0.00
	6	0.132425	3.36359	-1.75	0.000	0.00
	7	0.111355	2.82843	-1.50	0.000	0.00
	8	0.093638	2.37841	-1.25	0.000	0.00
	10	0.078740	2.00000	-1.00	0.000	0.00
V Crse Sand	12	0.066212	1.68179	-0.75	0.000	0.00
	14	0.055678	1.41421	-0.50	0.000	0.00
	16	0.046819	1.18921	-0.25	0.000	0.00
	18	0.039370	1.00000	0.00	0.000	0.00
Coarse Sand	20	0.033106	0.84090	0.25	0.000	0.00
	25	0.027839	0.70711	0.50	0.000	0.00
	30	0.023410	0.59460	0.75	0.000	0.00
	35	0.019685	0.50000	1.00	0.011	0.01
Medium Sand	40	0.016553	0.42045	1.25	0.173	0.18
	45	0.013919	0.35355	1.50	0.558	0.74
	50	0.011705	0.29730	1.75	1.059	1.80
	60	0.009843	0.25000	2.00	1.707	3.51
Fine Sand	70	0.008277	0.21022	2.25	2.435	5.94
	80	0.006960	0.17678	2.50	3.144	9.09
	100	0.005852	0.14865	2.75	3.966	13.05
	120	0.004921	0.12500	3.00	4.776	17.83
V. Fine Sand	140	0.004138	0.10511	3.25	5.329	23.16
	170	0.003480	0.08839	3.50	5.543	28.70
	200	0.002926	0.07433	3.75	5.632	34.33
	230	0.002461	0.06250	4.00	5.786	40.12
Silt	270	0.002069	0.05256	4.25	5.943	46.06
	325	0.001740	0.04419	4.50	5.924	51.98
	400	0.001463	0.03716	4.75	5.544	57.53
	450	0.001230	0.03125	5.00	4.939	62.47
	500	0.001035	0.02628	5.25	4.294	66.76
	635	0.000870	0.02210	5.50	3.746	70.51
		0.000732	0.01858	5.75	3.333	73.84
		0.000615	0.01562	6.00	3.003	76.84
		0.000517	0.01314	6.25	2.688	79.53
		0.000435	0.01105	6.50	2.361	81.89
		0.000366	0.00929	6.75	2.062	83.96
		0.000308	0.00781	7.00	1.817	85.77
		0.000259	0.00657	7.25	1.623	87.40
		0.000217	0.00552	7.50	1.471	88.87
		0.000183	0.00465	7.75	1.353	90.22
		0.000154	0.00391	8.00	1.262	91.48
Clay		0.000129	0.00328	8.25	1.180	92.66
		0.000109	0.00276	8.50	1.098	93.76
		0.000091	0.00232	8.75	1.011	94.77
		0.000077	0.00195	9.00	0.921	95.69
		0.000065	0.00164	9.25	0.828	96.52
		0.000054	0.00138	9.50	0.737	97.26
		0.000046	0.00116	9.75	0.651	97.91
		0.000038	0.00098	10.00	0.565	98.47
		0.000032	0.00082	10.25	0.481	98.95
		0.000027	0.00069	10.50	0.394	99.35
		0.000023	0.00058	10.75	0.304	99.65
		0.000019	0.00049	11.00	0.210	99.86
		0.000016	0.00041	11.25	0.111	99.97
		0.000015	0.00038	11.50	0.027	100.00

Sorting Statistics (Folk)

Parameter	Trask	Inman	Folk
Median	**Silt sized**		
(in)	0.0019	0.0019	0.0019
(mm)	0.0470	0.0470	0.0470
Mean	**Silt sized**		
(in)	0.0023	0.0014	0.0015
(mm)	0.0585	0.0352	0.0388
Sorting	**Poor**		
	2.389	1.928	1.973
Skewness	**Finely skewed**		
	0.887	0.553	0.268
Kurtosis	**Mesokurtic**		
	0.248	0.727	1.086

Component Percentages

Gravel	Sand	Silt	Clay	Silt + Clay
0.00	40.12	51.36	8.52	59.88

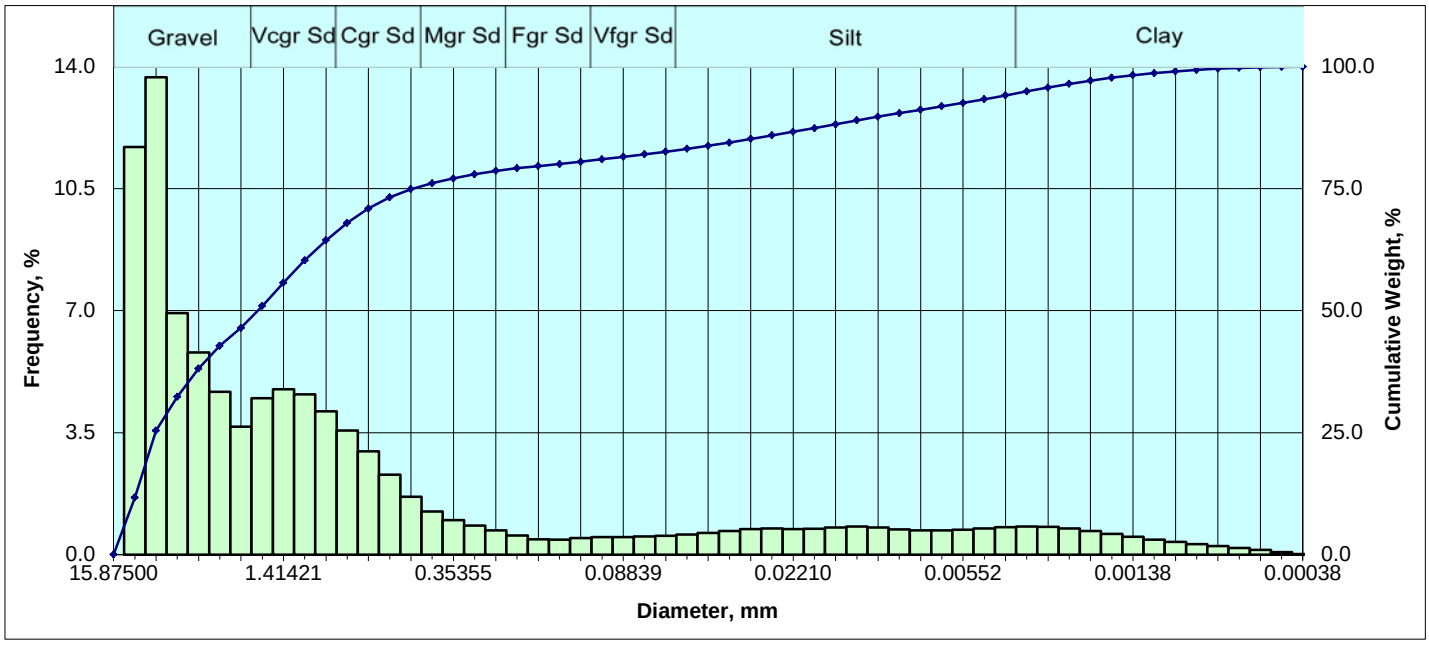
Percentile [Weight, %]	Particle Diameter [in.]	[mm]	[phi]
5	0.0089	0.2256	2.1480
10	0.0067	0.1703	2.5539
16	0.0053	0.1341	2.8991
25	0.0039	0.0996	3.3284
30	0.0034	0.0851	3.5540
40	0.0025	0.0627	3.9945
50	0.0019	0.0470	4.4113
60	0.0013	0.0342	4.8697
75	0.0007	0.0174	5.8414
84	0.0004	0.0093	6.7556
90	0.0002	0.0048	7.7064
95	0.0001	0.0022	8.8085

** Distribution pattern precludes calculation of these statistical parameters.

Company: RMC Consultants, Inc.
Project Name: Atlas Missile Site 4 RI Addendum
Project Number: E15-019-201

CL File Number: 1704035
Sample ID: FEW4-MW75-380

Sieve and Laser Particle Size Analysis



Particle Size Distribution

	Diameter				Weight %	
	[US Mesh]	[in.]	[mm]	[ϕ]	[Incl.]	[Cum.]
		0.625000	15.87500	-3.99	0.000	0.000
		0.375000	9.52500	-3.25	11.697	11.697
Granule	5	0.157480	4.00000	-2.00	13.701	25.398
	6	0.132425	3.36359	-1.75	6.932	32.331
	7	0.111355	2.82843	-1.50	5.802	38.133
	8	0.093638	2.37841	-1.25	4.671	42.804
	10	0.078740	2.00000	-1.00	3.666	46.470
	12	0.066212	1.68179	-0.75	4.491	50.961
V Crse Sand	14	0.055678	1.41421	-0.50	4.747	55.709
	16	0.046819	1.18921	-0.25	4.594	60.302
	18	0.039370	1.00000	0.00	4.109	64.411
	20	0.033106	0.84090	0.25	3.564	67.975
Coarse Sand	25	0.027839	0.70711	0.50	2.966	70.941
	30	0.023410	0.59460	0.75	2.295	73.236
	35	0.019685	0.50000	1.00	1.661	74.897
	40	0.016553	0.42045	1.25	1.235	76.132
Medium Sand	45	0.013919	0.35355	1.50	0.987	77.119
	50	0.011705	0.29730	1.75	0.834	77.953
	60	0.009843	0.25000	2.00	0.692	78.644
	70	0.008277	0.21022	2.25	0.545	79.189
Fine Sand	80	0.006960	0.17678	2.50	0.440	79.630
	100	0.005852	0.14865	2.75	0.430	80.059
	120	0.004921	0.12500	3.00	0.472	80.531
	140	0.004138	0.10511	3.25	0.498	81.029
V. Fine Sand	170	0.003480	0.08839	3.50	0.504	81.533
	200	0.002926	0.07433	3.75	0.518	82.051
	230	0.002461	0.06250	4.00	0.543	82.594
	270	0.002069	0.05256	4.25	0.571	83.164
	325	0.001740	0.04419	4.50	0.617	83.781
	400	0.001463	0.03716	4.75	0.680	84.461
	450	0.001230	0.03125	5.00	0.735	85.196
Silt	500	0.001035	0.02628	5.25	0.748	85.943
	635	0.000870	0.02210	5.50	0.732	86.676
		0.000732	0.01858	5.75	0.739	87.414
		0.000615	0.01562	6.00	0.780	88.194
		0.000517	0.01314	6.25	0.806	89.001
		0.000435	0.01105	6.50	0.773	89.774
		0.000366	0.00929	6.75	0.723	90.497
		0.000308	0.00781	7.00	0.693	91.190
		0.000259	0.00657	7.25	0.693	91.883
		0.000217	0.00552	7.50	0.714	92.597
		0.000183	0.00465	7.75	0.748	93.345
		0.000154	0.00391	8.00	0.787	94.132
		0.000129	0.00328	8.25	0.805	94.936
		0.000109	0.00276	8.50	0.793	95.729
		0.000091	0.00232	8.75	0.749	96.478
Clay		0.000077	0.00195	9.00	0.679	97.158
		0.000065	0.00164	9.25	0.595	97.753
		0.000054	0.00138	9.50	0.510	98.263
		0.000046	0.00116	9.75	0.430	98.693
		0.000038	0.00098	10.00	0.360	99.053
		0.000032	0.00082	10.25	0.300	99.353
		0.000027	0.00069	10.50	0.243	99.596
		0.000023	0.00058	10.75	0.187	99.783
		0.000019	0.00049	11.00	0.130	99.913
		0.000016	0.00041	11.25	0.070	99.983
		0.000015	0.00038	11.50	0.017	100.000

Sorting Statistics (Folk)

Parameter	Trask	Inman	Folk
Median	Very coarse sand sized		
(in)	0.0689	0.0689	0.0689
(mm)	1.7499	1.7499	1.7499
Mean	Coarse sand sized		
(in)	0.0916	0.0225	0.0327
(mm)	2.3270	0.5715	0.8299
Sorting	V. Poor		
	2.904	3.769	3.701
Skewness	Strongly fine skewed		
	0.819	0.818	0.471
Kurtosis	Very leptokurtic		
	0.176	0.590	1.597

Component Percentages

Gravel	Sand	Silt	Clay	Silt + Clay
46.47	36.12	11.54	5.87	17.41

Percentile [Weight, %]	Particle Diameter [in.]	[mm]	[phi]
5	0.5181	13.1607	-3.7182
10	0.4113	10.4463	-3.3849
16	0.3067	7.7899	-2.9616
25	0.1638	4.1607	-2.0568
30	0.1408	3.5776	-1.8390
40	0.1043	2.6485	-1.4052
50	0.0689	1.7499	-0.8073
60	0.0474	1.2040	-0.2679
75	0.0194	0.4934	1.0193
84	0.0017	0.0419	4.5758
90	0.0004	0.0105	6.5736
95	0.0001	0.0032	8.2685

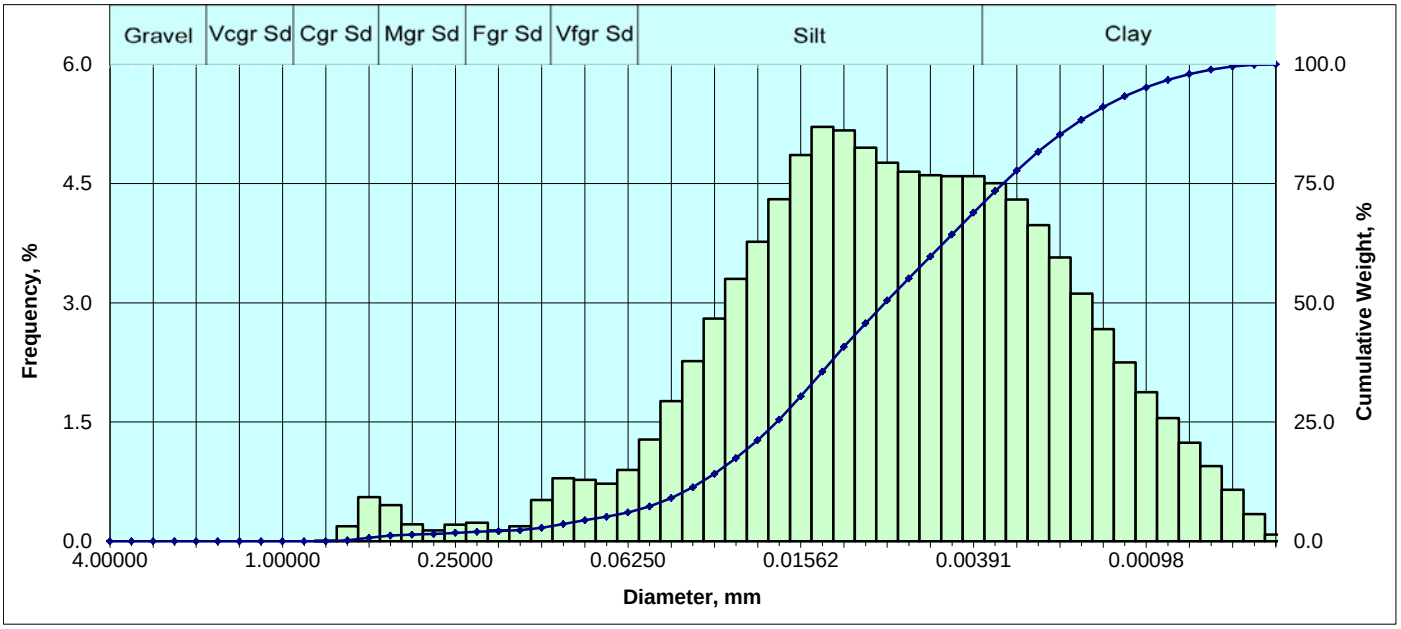
** Distribution pattern precludes calculation of these statistical parameters.

Core Lab
RESERVOIR OPTIMIZATION

Company: RMC Consultants, Inc.
Project Name: Atlas Missile Site 4 RI Addendum
Project Number: E15-019-201

CL File Number: 1704035
Sample ID: FEW4-MW84-256

Sieve and Laser Particle Size Analysis



Particle Size Distribution

	Diameter				Weight %	
	[US Mesh]	[in.]	[mm]	[ϕ]	[Incl.]	[Cum.]
Granule	5	0.157480	4.00000	-2.00	0.000	0.00
	6	0.132425	3.36359	-1.75	0.000	0.00
	7	0.111355	2.82843	-1.50	0.000	0.00
	8	0.093638	2.37841	-1.25	0.000	0.00
	10	0.078740	2.00000	-1.00	0.000	0.00
V Crse Sand	12	0.066212	1.68179	-0.75	0.000	0.00
	14	0.055678	1.41421	-0.50	0.000	0.00
	16	0.046819	1.18921	-0.25	0.000	0.00
	18	0.039370	1.00000	0.00	0.000	0.00
Coarse Sand	20	0.033106	0.84090	0.25	0.000	0.00
	25	0.027839	0.70711	0.50	0.010	0.01
	30	0.023410	0.59460	0.75	0.188	0.20
	35	0.019685	0.50000	1.00	0.554	0.75
Medium Sand	40	0.016553	0.42045	1.25	0.457	1.21
	45	0.013919	0.35355	1.50	0.215	1.42
	50	0.011705	0.29730	1.75	0.136	1.56
	60	0.009843	0.25000	2.00	0.209	1.77
Fine Sand	70	0.008277	0.21022	2.25	0.234	2.00
	80	0.006960	0.17678	2.50	0.138	2.14
	100	0.005852	0.14865	2.75	0.189	2.33
	120	0.004921	0.12500	3.00	0.518	2.85
V. Fine Sand	140	0.004138	0.10511	3.25	0.793	3.64
	170	0.003480	0.08839	3.50	0.775	4.42
	200	0.002926	0.07433	3.75	0.725	5.14
	230	0.002461	0.06250	4.00	0.898	6.04
Silt	270	0.002069	0.05256	4.25	1.281	7.32
	325	0.001740	0.04419	4.50	1.766	9.08
	400	0.001463	0.03716	4.75	2.268	11.35
	450	0.001230	0.03125	5.00	2.801	14.15
	500	0.001035	0.02628	5.25	3.300	17.45
	635	0.000870	0.02210	5.50	3.767	21.22
		0.000732	0.01858	5.75	4.302	25.52
		0.000615	0.01562	6.00	4.861	30.38
		0.000517	0.01314	6.25	5.215	35.60
		0.000435	0.01105	6.50	5.167	40.76
		0.000366	0.00929	6.75	4.952	45.72
		0.000308	0.00781	7.00	4.763	50.48
		0.000259	0.00657	7.25	4.650	55.13
		0.000217	0.00552	7.50	4.605	59.73
		0.000183	0.00465	7.75	4.594	64.33
		0.000154	0.00391	8.00	4.595	68.92
Clay		0.000129	0.00328	8.25	4.504	73.43
		0.000109	0.00276	8.50	4.298	77.72
		0.000091	0.00232	8.75	3.977	81.70
		0.000077	0.00195	9.00	3.569	85.27
		0.000065	0.00164	9.25	3.117	88.39
		0.000054	0.00138	9.50	2.668	91.05
		0.000046	0.00116	9.75	2.252	93.31
		0.000038	0.00098	10.00	1.877	95.18
		0.000032	0.00082	10.25	1.550	96.73
		0.000027	0.00069	10.50	1.242	97.98
		0.000023	0.00058	10.75	0.946	98.92
		0.000019	0.00049	11.00	0.650	99.57
		0.000016	0.00041	11.25	0.344	99.92
		0.000015	0.00038	11.50	0.084	100.00

Sorting Statistics (Folk)

Parameter	Trask	Inman	Folk
Median	**Silt sized**		
(in)	0.0003	0.0003	0.0003
(mm)	0.0080	0.0080	0.0080
Mean	**Silt sized**		
(in)	0.0004	0.0003	0.0003
(mm)	0.0111	0.0077	0.0078
Sorting	**Poor**		
	2.479	1.886	1.894
Skewness	**Near symmetrical**		
	0.963	-0.073	-0.009
Kurtosis	**Mesokurtic**		
	0.200	0.664	0.982

Component Percentages

Gravel	Sand	Silt	Clay	Silt + Clay
0.00	6.04	62.88	31.08	93.96

Percentile [Weight, %]	Particle Diameter [in.]	[mm]	[phi]
5	0.0030	0.0770	3.6982
10	0.0016	0.0414	4.5958
16	0.0011	0.0285	5.1345
25	0.0007	0.0190	5.7173
30	0.0006	0.0159	5.9787
40	0.0004	0.0114	6.4602
50	0.0003	0.0080	6.9728
60	0.0002	0.0055	7.5133
75	0.0001	0.0031	8.3366
84	0.0001	0.0021	8.9060
90	0.0001	0.0015	9.3960
95	0.0000	0.0010	9.9735

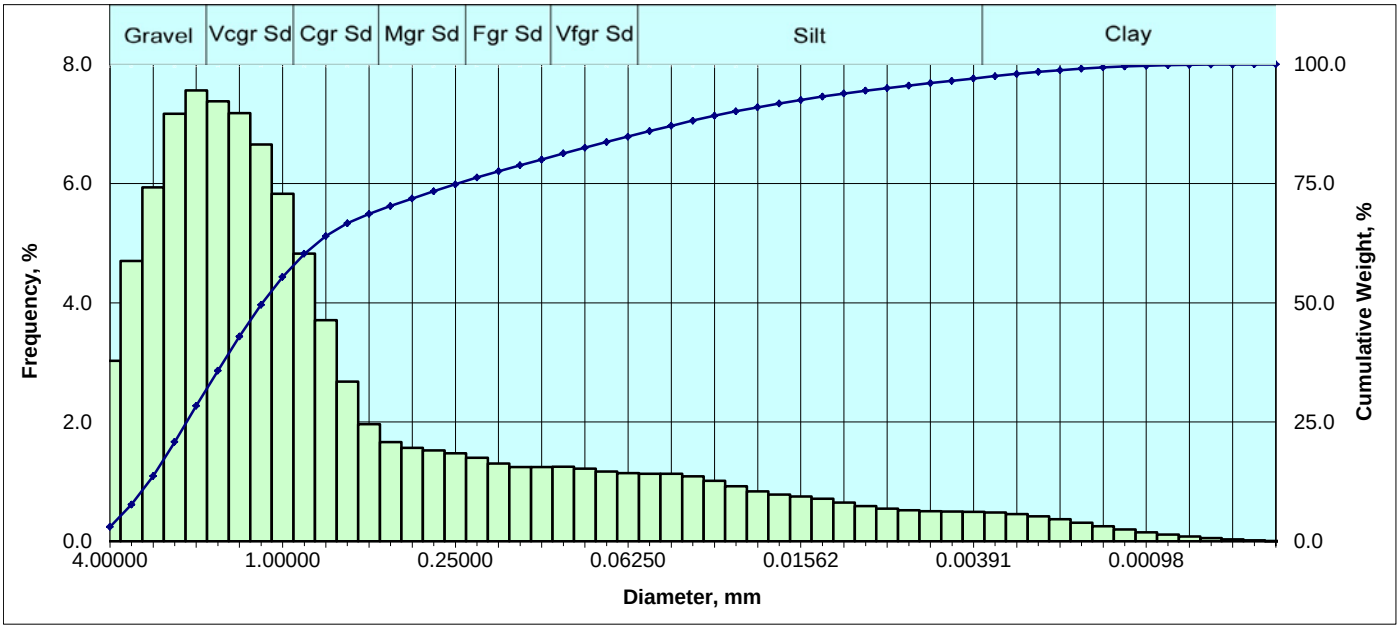
** Distribution pattern precludes calculation of these statistical parameters.

Core Lab
RESERVOIR OPTIMIZATION

Company: RMC Consultants, Inc.
Project Name: Atlas Missile Site 4 RI Addendum
Project Number: E15-019-201

CL File Number: 1704035
Sample ID: FEW4-MW84-297

Sieve and Laser Particle Size Analysis



Particle Size Distribution

	Diameter [US Mesh]	[in.]	[mm]	[ϕ]	Weight % [Incl.]	[Cum.]
Granule	5	0.157480	4.00000	-2.00	3.026	3.03
	6	0.132425	3.36359	-1.75	4.704	7.73
	7	0.111355	2.82843	-1.50	5.937	13.67
	8	0.093638	2.37841	-1.25	7.170	20.84
	10	0.078740	2.00000	-1.00	7.561	28.40
V Crse Sand	12	0.066212	1.68179	-0.75	7.380	35.78
	14	0.055678	1.41421	-0.50	7.184	42.96
	16	0.046819	1.18921	-0.25	6.659	49.62
	18	0.039370	1.00000	0.00	5.831	55.45
Coarse Sand	20	0.033106	0.84090	0.25	4.825	60.28
	25	0.027839	0.70711	0.50	3.712	63.99
	30	0.023410	0.59460	0.75	2.678	66.67
	35	0.019685	0.50000	1.00	1.965	68.63
Medium Sand	40	0.016553	0.42045	1.25	1.664	70.30
	45	0.013919	0.35355	1.50	1.567	71.86
	50	0.011705	0.29730	1.75	1.526	73.39
	60	0.009843	0.25000	2.00	1.475	74.87
Fine Sand	70	0.008277	0.21022	2.25	1.400	76.27
	80	0.006960	0.17678	2.50	1.304	77.57
	100	0.005852	0.14865	2.75	1.247	78.82
	120	0.004921	0.12500	3.00	1.247	80.06
V. Fine Sand	140	0.004138	0.10511	3.25	1.252	81.32
	170	0.003480	0.08839	3.50	1.221	82.54
	200	0.002926	0.07433	3.75	1.172	83.71
	230	0.002461	0.06250	4.00	1.141	84.85
Silt	270	0.002069	0.05256	4.25	1.134	85.98
	325	0.001740	0.04419	4.50	1.132	87.11
	400	0.001463	0.03716	4.75	1.093	88.21
	450	0.001230	0.03125	5.00	1.017	89.22
	500	0.001035	0.02628	5.25	0.922	90.15
	635	0.000870	0.02210	5.50	0.839	90.99
		0.000732	0.01858	5.75	0.786	91.77
		0.000615	0.01562	6.00	0.753	92.52
		0.000517	0.01314	6.25	0.712	93.24
		0.000435	0.01105	6.50	0.651	93.89
		0.000366	0.00929	6.75	0.592	94.48
		0.000308	0.00781	7.00	0.548	95.03
		0.000259	0.00657	7.25	0.521	95.55
		0.000217	0.00552	7.50	0.507	96.06
		0.000183	0.00465	7.75	0.500	96.56
		0.000154	0.00391	8.00	0.496	97.05
Clay		0.000129	0.00328	8.25	0.483	97.54
		0.000109	0.00276	8.50	0.458	97.99
		0.000091	0.00232	8.75	0.419	98.41
		0.000077	0.00195	9.00	0.369	98.78
		0.000065	0.00164	9.25	0.312	99.09
		0.000054	0.00138	9.50	0.254	99.35
		0.000046	0.00116	9.75	0.199	99.55
		0.000038	0.00098	10.00	0.151	99.70
		0.000032	0.00082	10.25	0.111	99.81
		0.000027	0.00069	10.50	0.080	99.89
		0.000023	0.00058	10.75	0.055	99.94
		0.000019	0.00049	11.00	0.035	99.98
		0.000016	0.00041	11.25	0.018	100.00
		0.000015	0.00038	11.50	0.004	100.00

Sorting Statistics (Folk)

Parameter	Trask	Inman	Folk
Median	Very coarse sand sized		
(in)	0.0463	0.0463	0.0463
(mm)	1.1769	1.1769	1.1769
Mean	Coarse sand sized		
(in)	0.0476	0.0172	0.0239
(mm)	1.2081	0.4373	0.6083
Sorting	V. Poor		
	2.969	2.617	2.655
Skewness	Strongly fine skewed		
	0.621	1.062	0.586
Kurtosis	Lepokurtic		
	0.307	0.698	1.160

Component Percentages

Gravel	Sand	Silt	Clay	Silt + Clay
28.40	56.45	12.20	2.95	15.15

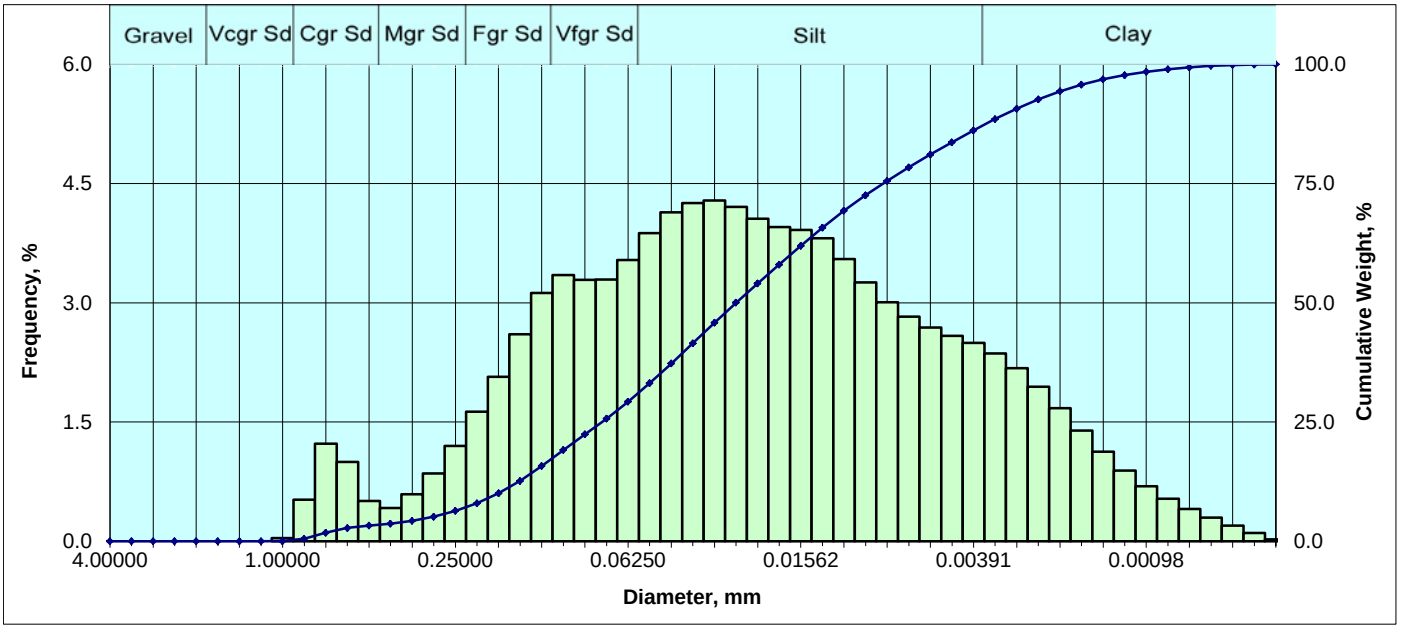
Percentile [Weight, %]	Particle Diameter [in.]	[mm]	[phi]
5	0.1470	3.7329	-1.9003
10	0.1244	3.1590	-1.6595
16	0.1056	2.6820	-1.4233
25	0.0854	2.1701	-1.1177
30	0.0760	1.9309	-0.9493
40	0.0600	1.5246	-0.6084
50	0.0463	1.1769	-0.2350
60	0.0335	0.8500	0.2344
75	0.0097	0.2462	2.0221
84	0.0028	0.0713	3.8099
90	0.0011	0.0271	5.2072
95	0.0003	0.0079	6.9863

** Distribution pattern precludes calculation of these statistical parameters.

Company: RMC Consultants, Inc.
Project Name: Atlas Missile Site 4 RI Addendum
Project Number: E15-019-201

CL File Number: 1704035
Sample ID: FEW4-MW84-91

Sieve and Laser Particle Size Analysis



Particle Size Distribution	Diameter				Weight %	
	[US Mesh]	[in.]	[mm]	[ϕ]	[Incl.]	[Cum.]
Granule	5	0.157480	4.00000	-2.00	0.000	0.00
	6	0.132425	3.36359	-1.75	0.000	0.00
	7	0.111355	2.82843	-1.50	0.000	0.00
	8	0.093638	2.37841	-1.25	0.000	0.00
	10	0.078740	2.00000	-1.00	0.000	0.00
V Crse Sand	12	0.066212	1.68179	-0.75	0.000	0.00
	14	0.055678	1.41421	-0.50	0.000	0.00
	16	0.046819	1.18921	-0.25	0.000	0.00
	18	0.039370	1.00000	0.00	0.040	0.04
Coarse Sand	20	0.033106	0.84090	0.25	0.524	0.56
	25	0.027839	0.70711	0.50	1.227	1.79
	30	0.023410	0.59460	0.75	1.000	2.79
	35	0.019685	0.50000	1.00	0.507	3.30
Medium Sand	40	0.016553	0.42045	1.25	0.417	3.72
	45	0.013919	0.35355	1.50	0.592	4.31
	50	0.011705	0.29730	1.75	0.854	5.16
	60	0.009843	0.25000	2.00	1.200	6.36
Fine Sand	70	0.008277	0.21022	2.25	1.630	7.99
	80	0.006960	0.17678	2.50	2.068	10.06
	100	0.005852	0.14865	2.75	2.605	12.66
	120	0.004921	0.12500	3.00	3.123	15.79
V. Fine Sand	140	0.004138	0.10511	3.25	3.350	19.14
	170	0.003480	0.08839	3.50	3.290	22.43
	200	0.002926	0.07433	3.75	3.293	25.72
	230	0.002461	0.06250	4.00	3.540	29.26
Silt	270	0.002069	0.05256	4.25	3.875	33.14
	325	0.001740	0.04419	4.50	4.137	37.27
	400	0.001463	0.03716	4.75	4.255	41.53
	450	0.001230	0.03125	5.00	4.287	45.81
	500	0.001035	0.02628	5.25	4.207	50.02
	635	0.000870	0.02210	5.50	4.057	54.08
		0.000732	0.01858	5.75	3.955	58.03
		0.000615	0.01562	6.00	3.915	61.95
		0.000517	0.01314	6.25	3.812	65.76
		0.000435	0.01105	6.50	3.552	69.31
		0.000366	0.00929	6.75	3.256	72.57
		0.000308	0.00781	7.00	3.009	75.58
		0.000259	0.00657	7.25	2.824	78.40
		0.000217	0.00552	7.50	2.691	81.09
		0.000183	0.00465	7.75	2.586	83.68
		0.000154	0.00391	8.00	2.494	86.17
Clay		0.000129	0.00328	8.25	2.363	88.54
		0.000109	0.00276	8.50	2.179	90.72
		0.000091	0.00232	8.75	1.945	92.66
		0.000077	0.00195	9.00	1.675	94.34
		0.000065	0.00164	9.25	1.393	95.73
		0.000054	0.00138	9.50	1.126	96.86
		0.000046	0.00116	9.75	0.888	97.74
		0.000038	0.00098	10.00	0.691	98.43
		0.000032	0.00082	10.25	0.535	98.97
		0.000027	0.00069	10.50	0.406	99.38
		0.000023	0.00058	10.75	0.297	99.67
		0.000019	0.00049	11.00	0.198	99.87
		0.000016	0.00041	11.25	0.104	99.97
		0.000015	0.00038	11.50	0.025	100.00

Sorting Statistics (Folk)			
Parameter	Trask	Inman	Folk
Median	Silt sized		
(in)	0.0010	0.0010	0.0010
(mm)	0.0263	0.0263	0.0263
Mean	Silt sized		
(in)	0.0017	0.0009	0.0010
(mm)	0.0427	0.0237	0.0246
Sorting	V. Poor		
	3.092	2.383	2.315
Skewness	Near symmetrical		
	0.952	0.066	0.052
Kurtosis	Mesokurtic		
	0.198	0.556	0.933

Component Percentages				
Gravel	Sand	Silt	Clay	Silt + Clay
0.00	29.26	56.91	13.83	70.74

Percentile [Weight, %]	Particle Diameter		
	[in.]	[mm]	[phi]
5	0.0121	0.3080	1.6992
10	0.0070	0.1777	2.4922
16	0.0049	0.1237	3.0146
25	0.0030	0.0774	3.6915
30	0.0024	0.0606	4.0445
40	0.0016	0.0397	4.6552
50	0.0010	0.0263	5.2486
60	0.0007	0.0171	5.8702
75	0.0003	0.0081	6.9485
84	0.0002	0.0046	7.7798
90	0.0001	0.0029	8.4130
95	0.0001	0.0018	9.1138

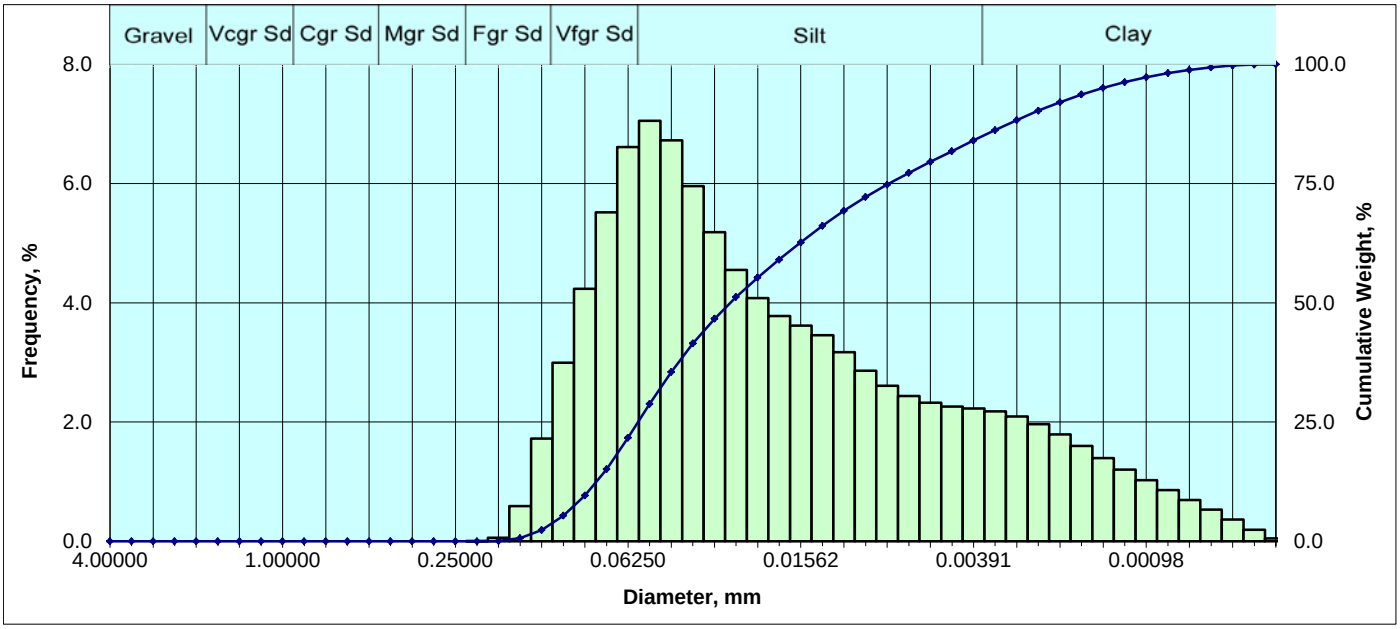
** Distribution pattern precludes calculation of these statistical parameters.

Core Lab
RESERVOIR OPTIMIZATION

Company: RMC Consultants, Inc.
Project Name: Atlas Missile Site 4 RI Addendum
Project Number: E15-019-201

CL File Number: 1704035
Sample ID: FEW4-MW97-321

Sieve and Laser Particle Size Analysis



Particle Size Distribution

	Diameter				Weight %	
	[US Mesh]	[in.]	[mm]	[ϕ]	[Incl.]	[Cum.]
Granule	5	0.157480	4.00000	-2.00	0.000	0.00
	6	0.132425	3.36359	-1.75	0.000	0.00
	7	0.111355	2.82843	-1.50	0.000	0.00
	8	0.093638	2.37841	-1.25	0.000	0.00
	10	0.078740	2.00000	-1.00	0.000	0.00
V Crse Sand	12	0.066212	1.68179	-0.75	0.000	0.00
	14	0.055678	1.41421	-0.50	0.000	0.00
	16	0.046819	1.18921	-0.25	0.000	0.00
	18	0.039370	1.00000	0.00	0.000	0.00
Coarse Sand	20	0.033106	0.84090	0.25	0.000	0.00
	25	0.027839	0.70711	0.50	0.000	0.00
	30	0.023410	0.59460	0.75	0.000	0.00
	35	0.019685	0.50000	1.00	0.000	0.00
Medium Sand	40	0.016553	0.42045	1.25	0.000	0.00
	45	0.013919	0.35355	1.50	0.000	0.00
	50	0.011705	0.29730	1.75	0.000	0.00
	60	0.009843	0.25000	2.00	0.000	0.00
Fine Sand	70	0.008277	0.21022	2.25	0.002	0.00
	80	0.006960	0.17678	2.50	0.062	0.06
	100	0.005852	0.14865	2.75	0.589	0.65
	120	0.004921	0.12500	3.00	1.726	2.38
V. Fine Sand	140	0.004138	0.10511	3.25	2.998	5.38
	170	0.003480	0.08839	3.50	4.235	9.61
	200	0.002926	0.07433	3.75	5.519	15.13
	230	0.002461	0.06250	4.00	6.614	21.74
Silt	270	0.002069	0.05256	4.25	7.054	28.80
	325	0.001740	0.04419	4.50	6.727	35.52
	400	0.001463	0.03716	4.75	5.956	41.48
	450	0.001230	0.03125	5.00	5.185	46.67
	500	0.001035	0.02628	5.25	4.554	51.22
	635	0.000870	0.02210	5.50	4.079	55.30
		0.000732	0.01858	5.75	3.781	59.08
		0.000615	0.01562	6.00	3.620	62.70
		0.000517	0.01314	6.25	3.457	66.16
		0.000435	0.01105	6.50	3.173	69.33
		0.000366	0.00929	6.75	2.862	72.19
		0.000308	0.00781	7.00	2.611	74.80
		0.000259	0.00657	7.25	2.436	77.24
		0.000217	0.00552	7.50	2.324	79.56
		0.000183	0.00465	7.75	2.259	81.82
		0.000154	0.00391	8.00	2.228	84.05
Clay		0.000129	0.00328	8.25	2.181	86.23
		0.000109	0.00276	8.50	2.096	88.33
		0.000091	0.00232	8.75	1.965	90.29
		0.000077	0.00195	9.00	1.794	92.08
		0.000065	0.00164	9.25	1.597	93.68
		0.000054	0.00138	9.50	1.396	95.08
		0.000046	0.00116	9.75	1.205	96.28
		0.000038	0.00098	10.00	1.023	97.31
		0.000032	0.00082	10.25	0.857	98.16
		0.000027	0.00069	10.50	0.694	98.86
		0.000023	0.00058	10.75	0.532	99.39
		0.000019	0.00049	11.00	0.367	99.76
		0.000016	0.00041	11.25	0.195	99.95
		0.000015	0.00038	11.50	0.048	100.00

Sorting Statistics (Folk)

Parameter	Trask	Inman	Folk
Median	**Silt sized**		
(in)	0.0011	0.0011	0.0011
(mm)	0.0276	0.0276	0.0276
Mean	**Silt sized**		
(in)	0.0013	0.0007	0.0008
(mm)	0.0328	0.0169	0.0199
Sorting	**V. Poor**		
	2.740	2.107	2.003
Skewness	**Strongly fine skewed**		
	0.765	0.556	0.355
Kurtosis	**Platykurtic**		
	0.295	0.488	0.883

Component Percentages

Gravel	Sand	Silt	Clay	Silt + Clay
0.00	21.74	62.31	15.95	78.26

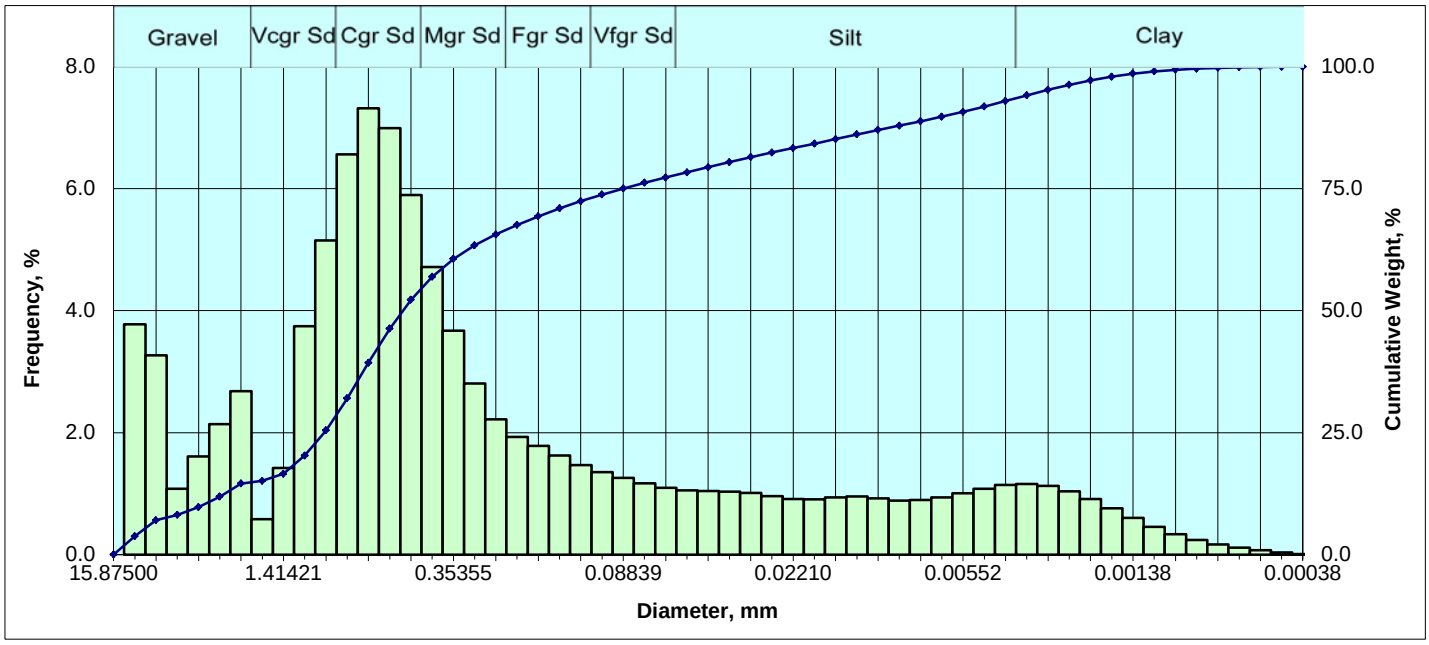
Percentile [Weight, %]	Particle Diameter [in.]	[mm]	[phi]
5	0.0042	0.1076	3.2162
10	0.0034	0.0874	3.5163
16	0.0029	0.0728	3.7805
25	0.0023	0.0579	4.1100
30	0.0020	0.0511	4.2916
40	0.0015	0.0389	4.6837
50	0.0011	0.0276	5.1787
60	0.0007	0.0178	5.8095
75	0.0003	0.0077	7.0186
84	0.0002	0.0039	7.9939
90	0.0001	0.0024	8.7101
95	0.0001	0.0014	9.4847

** Distribution pattern precludes calculation of these statistical parameters.

Company: RMC Consultants, Inc.
Project Name: Atlas Missile Site 4 RI Addendum
Project Number: E15-019-201

CL File Number: 1704035
Sample ID: FEW4-MW97-261

Sieve and Laser Particle Size Analysis



Particle Size Distribution		Diameter			Weight %	
	[US Mesh]	[in.]	[mm]	[ϕ]	[Incl.]	[Cum.]
Granule		0.625000	15.87500	-3.99	0.000	0.000
		0.375000	9.52500	-3.25	3.779	3.779
	5	0.157480	4.00000	-2.00	3.265	7.044
	6	0.132425	3.36359	-1.75	1.079	8.122
	7	0.111355	2.82843	-1.50	1.609	9.731
	8	0.093638	2.37841	-1.25	2.139	11.870
	10	0.078740	2.00000	-1.00	2.678	14.548
V Crse Sand	12	0.066212	1.68179	-0.75	0.579	15.127
	14	0.055678	1.41421	-0.50	1.420	16.547
	16	0.046819	1.18921	-0.25	3.744	20.291
	18	0.039370	1.00000	0.00	5.154	25.445
Coarse Sand	20	0.033106	0.84090	0.25	6.562	32.007
	25	0.027839	0.70711	0.50	7.319	39.326
	30	0.023410	0.59460	0.75	6.991	46.318
	35	0.019685	0.50000	1.00	5.899	52.217
Medium Sand	40	0.016553	0.42045	1.25	4.716	56.933
	45	0.013919	0.35355	1.50	3.671	60.604
	50	0.011705	0.29730	1.75	2.806	63.410
	60	0.009843	0.25000	2.00	2.216	65.626
Fine Sand	70	0.008277	0.21022	2.25	1.930	67.556
	80	0.006960	0.17678	2.50	1.783	69.339
	100	0.005852	0.14865	2.75	1.627	70.966
	120	0.004921	0.12500	3.00	1.468	72.434
V. Fine Sand	140	0.004138	0.10511	3.25	1.354	73.787
	170	0.003480	0.08839	3.50	1.260	75.047
	200	0.002926	0.07433	3.75	1.169	76.216
	230	0.002461	0.06250	4.00	1.097	77.312
Silt	270	0.002069	0.05256	4.25	1.053	78.366
	325	0.001740	0.04419	4.50	1.042	79.407
	400	0.001463	0.03716	4.75	1.034	80.442
	450	0.001230	0.03125	5.00	1.011	81.452
	500	0.001035	0.02628	5.25	0.961	82.413
	635	0.000870	0.02210	5.50	0.911	83.324
		0.000732	0.01858	5.75	0.905	84.229
		0.000615	0.01562	6.00	0.938	85.167
		0.000517	0.01314	6.25	0.954	86.121
		0.000435	0.01105	6.50	0.919	87.041
		0.000366	0.00929	6.75	0.887	87.927
		0.000308	0.00781	7.00	0.893	88.821
		0.000259	0.00657	7.25	0.938	89.759
		0.000217	0.00552	7.50	1.005	90.763
		0.000183	0.00465	7.75	1.077	91.840
		0.000154	0.00391	8.00	1.141	92.981
Clay		0.000129	0.00328	8.25	1.160	94.141
		0.000109	0.00276	8.50	1.125	95.266
		0.000091	0.00232	8.75	1.038	96.304
		0.000077	0.00195	9.00	0.910	97.214
		0.000065	0.00164	9.25	0.758	97.972
		0.000054	0.00138	9.50	0.603	98.576
		0.000046	0.00116	9.75	0.457	99.033
		0.000038	0.00098	10.00	0.335	99.368
		0.000032	0.00082	10.25	0.239	99.607
		0.000027	0.00069	10.50	0.167	99.774
		0.000023	0.00058	10.75	0.112	99.886
		0.000019	0.00049	11.00	0.070	99.956
		0.000016	0.00041	11.25	0.035	99.991
		0.000015	0.00038	11.50	0.009	100.000

Sorting Statistics (Folk)			
Parameter	Trask	Inman	Folk
Median	Coarse sand sized		
(in)	0.0211	0.0211	0.0211
(mm)	0.5356	0.5356	0.5356
Mean	Medium sand sized		
(in)	0.0218	0.0068	0.0099
(mm)	0.5527	0.1719	0.2511
Sorting	V. Poor		
	3.379	3.142	3.289
Skewness	Strongly fine skewed		
	0.562	0.595	0.426
Kurtosis	Lepokurtic		
	0.168	0.804	1.322

Component Percentages				
Gravel	Sand	Silt	Clay	Silt + Clay
14.55	62.76	15.67	7.02	22.69

Percentile [Weight, %]	Particle Diameter [in.]	[mm]	[phi]
5	0.2936	7.4581	-2.8988
10	0.1091	2.7719	-1.4709
16	0.0597	1.5173	-0.6015
25	0.0400	1.0163	-0.0234
30	0.0350	0.8896	0.1688
40	0.0274	0.6963	0.5223
50	0.0211	0.5356	0.9009
60	0.0144	0.3646	1.4558
75	0.0035	0.0890	3.4899
84	0.0008	0.0195	5.6825
90	0.0002	0.0063	7.3062
95	0.0001	0.0029	8.4369

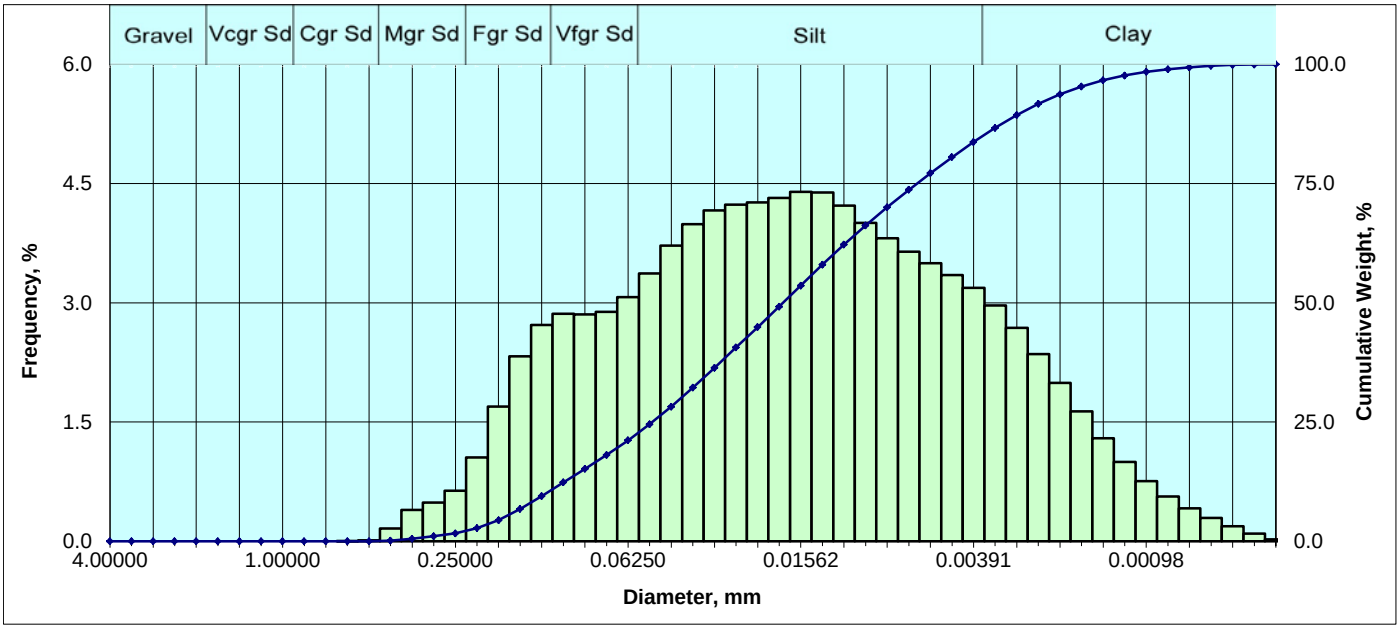
** Distribution pattern precludes calculation of these statistical parameters.

Core Lab
RESERVOIR OPTIMIZATION

Company: RMC Consultants, Inc.
Project Name: Atlas Missile Site 4 RI Addendum
Project Number: E15-019-201

CL File Number: 1704035
Sample ID: FEW4-MW85-88

Sieve and Laser Particle Size Analysis



Particle Size Distribution

	Diameter [US Mesh]	Diameter [in.]	Diameter [mm]	Diameter [ϕ]	Weight % [Incl.]	Weight % [Cum.]
Granule	5	0.157480	4.00000	-2.00	0.000	0.00
	6	0.132425	3.36359	-1.75	0.000	0.00
	7	0.111355	2.82843	-1.50	0.000	0.00
	8	0.093638	2.37841	-1.25	0.000	0.00
	10	0.078740	2.00000	-1.00	0.000	0.00
V Crse Sand	12	0.066212	1.68179	-0.75	0.000	0.00
	14	0.055678	1.41421	-0.50	0.000	0.00
	16	0.046819	1.18921	-0.25	0.000	0.00
	18	0.039370	1.00000	0.00	0.000	0.00
Coarse Sand	20	0.033106	0.84090	0.25	0.000	0.00
	25	0.027839	0.70711	0.50	0.000	0.00
	30	0.023410	0.59460	0.75	0.000	0.00
	35	0.019685	0.50000	1.00	0.011	0.01
Medium Sand	40	0.016553	0.42045	1.25	0.159	0.17
	45	0.013919	0.35355	1.50	0.394	0.56
	50	0.011705	0.29730	1.75	0.489	1.05
	60	0.009843	0.25000	2.00	0.635	1.69
Fine Sand	70	0.008277	0.21022	2.25	1.057	2.74
	80	0.006960	0.17678	2.50	1.694	4.44
	100	0.005852	0.14865	2.75	2.328	6.77
	120	0.004921	0.12500	3.00	2.720	9.49
V. Fine Sand	140	0.004138	0.10511	3.25	2.862	12.35
	170	0.003480	0.08839	3.50	2.854	15.20
	200	0.002926	0.07433	3.75	2.886	18.09
	230	0.002461	0.06250	4.00	3.071	21.16
Silt	270	0.002069	0.05256	4.25	3.370	24.53
	325	0.001740	0.04419	4.50	3.719	28.25
	400	0.001463	0.03716	4.75	3.988	32.24
	450	0.001230	0.03125	5.00	4.164	36.40
	500	0.001035	0.02628	5.25	4.237	40.64
	635	0.000870	0.02210	5.50	4.261	44.90
		0.000732	0.01858	5.75	4.321	49.22
		0.000615	0.01562	6.00	4.398	53.62
		0.000517	0.01314	6.25	4.390	58.01
		0.000435	0.01105	6.50	4.222	62.23
		0.000366	0.00929	6.75	4.005	66.23
		0.000308	0.00781	7.00	3.810	70.04
		0.000259	0.00657	7.25	3.645	73.69
		0.000217	0.00552	7.50	3.499	77.19
		0.000183	0.00465	7.75	3.351	80.54
		0.000154	0.00391	8.00	3.189	83.73
Clay		0.000129	0.00328	8.25	2.966	86.69
		0.000109	0.00276	8.50	2.684	89.38
		0.000091	0.00232	8.75	2.354	91.73
		0.000077	0.00195	9.00	1.995	93.73
		0.000065	0.00164	9.25	1.634	95.36
		0.000054	0.00138	9.50	1.298	96.66
		0.000046	0.00116	9.75	1.000	97.66
		0.000038	0.00098	10.00	0.756	98.41
		0.000032	0.00082	10.25	0.565	98.98
		0.000027	0.00069	10.50	0.415	99.39
		0.000023	0.00058	10.75	0.293	99.69
		0.000019	0.00049	11.00	0.191	99.88
		0.000016	0.00041	11.25	0.098	99.98
		0.000015	0.00038	11.50	0.024	100.00

Sorting Statistics (Folk)

Parameter	Trask	Inman	Folk
Median	**Silt sized**		
(in)	0.0007	0.0007	0.0007
(mm)	0.0181	0.0181	0.0181
Mean	**Silt sized**		
(in)	0.0011	0.0007	0.0007
(mm)	0.0288	0.0180	0.0180
Sorting	**V. Poor**		
	2.887	2.228	2.119
Skewness	**Near symmetrical**		
	0.988	0.037	0.013
Kurtosis	**Platykurtic**		
	0.191	0.489	0.889

Component Percentages

Gravel	Sand	Silt	Clay	Silt + Clay
0.00	21.16	62.57	16.27	78.84

Percentile [Weight, %]	Particle Diameter [in.]	[mm]	[phi]
5	0.0067	0.1700	2.5564
10	0.0048	0.1214	3.0418
16	0.0033	0.0845	3.5649
25	0.0020	0.0515	4.2794
30	0.0016	0.0411	4.6046
40	0.0011	0.0270	5.2096
50	0.0007	0.0181	5.7914
60	0.0005	0.0122	6.3627
75	0.0002	0.0062	7.3387
84	0.0002	0.0038	8.0213
90	0.0001	0.0026	8.5620
95	0.0001	0.0017	9.1911

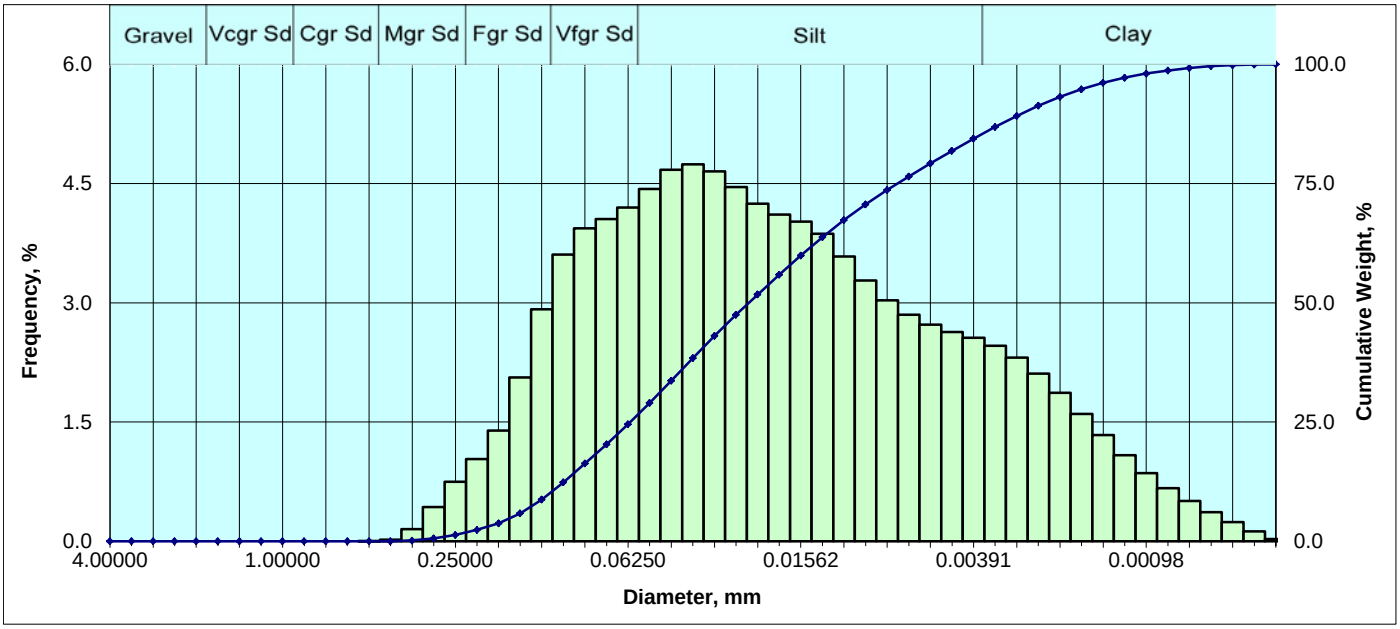
** Distribution pattern precludes calculation of these statistical parameters.

Core Lab
RESERVOIR OPTIMIZATION

Company: RMC Consultants, Inc.
Project Name: Atlas Missile Site 4 RI Addendum
Project Number: E15-019-201

CL File Number: 1704035
Sample ID: FEW4-MW85-148

Sieve and Laser Particle Size Analysis



Particle Size Distribution

	Diameter				Weight %	
	[US Mesh]	[in.]	[mm]	[ϕ]	[Incl.]	[Cum.]
Granule	5	0.157480	4.00000	-2.00	0.000	0.00
	6	0.132425	3.36359	-1.75	0.000	0.00
	7	0.111355	2.82843	-1.50	0.000	0.00
	8	0.093638	2.37841	-1.25	0.000	0.00
	10	0.078740	2.00000	-1.00	0.000	0.00
V Crse Sand	12	0.066212	1.68179	-0.75	0.000	0.00
	14	0.055678	1.41421	-0.50	0.000	0.00
	16	0.046819	1.18921	-0.25	0.000	0.00
	18	0.039370	1.00000	0.00	0.000	0.00
Coarse Sand	20	0.033106	0.84090	0.25	0.000	0.00
	25	0.027839	0.70711	0.50	0.000	0.00
	30	0.023410	0.59460	0.75	0.000	0.00
	35	0.019685	0.50000	1.00	0.000	0.00
Medium Sand	40	0.016553	0.42045	1.25	0.019	0.02
	45	0.013919	0.35355	1.50	0.154	0.17
	50	0.011705	0.29730	1.75	0.432	0.61
	60	0.009843	0.25000	2.00	0.748	1.35
Fine Sand	70	0.008277	0.21022	2.25	1.035	2.39
	80	0.006960	0.17678	2.50	1.392	3.78
	100	0.005852	0.14865	2.75	2.061	5.84
	120	0.004921	0.12500	3.00	2.919	8.76
V. Fine Sand	140	0.004138	0.10511	3.25	3.608	12.37
	170	0.003480	0.08839	3.50	3.937	16.30
	200	0.002926	0.07433	3.75	4.055	20.36
	230	0.002461	0.06250	4.00	4.199	24.56
Silt	270	0.002069	0.05256	4.25	4.431	28.99
	325	0.001740	0.04419	4.50	4.674	33.66
	400	0.001463	0.03716	4.75	4.743	38.41
	450	0.001230	0.03125	5.00	4.653	43.06
	500	0.001035	0.02628	5.25	4.457	47.52
	635	0.000870	0.02210	5.50	4.246	51.76
		0.000732	0.01858	5.75	4.110	55.87
		0.000615	0.01562	6.00	4.023	59.90
		0.000517	0.01314	6.25	3.870	63.77
		0.000435	0.01105	6.50	3.584	67.35
		0.000366	0.00929	6.75	3.280	70.63
		0.000308	0.00781	7.00	3.032	73.66
		0.000259	0.00657	7.25	2.851	76.51
		0.000217	0.00552	7.50	2.725	79.24
		0.000183	0.00465	7.75	2.633	81.87
		0.000154	0.00391	8.00	2.562	84.43
Clay		0.000129	0.00328	8.25	2.459	86.89
		0.000109	0.00276	8.50	2.309	89.20
		0.000091	0.00232	8.75	2.109	91.31
		0.000077	0.00195	9.00	1.868	93.18
		0.000065	0.00164	9.25	1.603	94.78
		0.000054	0.00138	9.50	1.337	96.12
		0.000046	0.00116	9.75	1.084	97.20
		0.000038	0.00098	10.00	0.859	98.06
		0.000032	0.00082	10.25	0.669	98.73
		0.000027	0.00069	10.50	0.506	99.24
		0.000023	0.00058	10.75	0.366	99.60
		0.000019	0.00049	11.00	0.241	99.84
		0.000016	0.00041	11.25	0.125	99.97
		0.000015	0.00038	11.50	0.030	100.00

Sorting Statistics (Folk)

Parameter	Trask	Inman	Folk
Median	**Silt sized**		
(in)	0.0009	0.0009	0.0009
(mm)	0.0238	0.0238	0.0238
Mean	**Silt sized**		
(in)	0.0014	0.0007	0.0008
(mm)	0.0344	0.0190	0.0205
Sorting	**V. Poor**		
	2.917	2.238	2.126
Skewness	**Finely skewed**		
	0.885	0.257	0.159
Kurtosis	**Platykurtic**		
	0.235	0.485	0.882

Component Percentages

Gravel	Sand	Silt	Clay	Silt + Clay
0.00	24.56	59.88	15.57	75.44

Percentile [Weight, %]	Particle Diameter [in.]	[mm]	[phi]
5	0.0063	0.1601	2.6427
10	0.0047	0.1182	3.0811
16	0.0035	0.0897	3.4790
25	0.0024	0.0615	4.0231
30	0.0020	0.0507	4.3005
40	0.0014	0.0351	4.8309
50	0.0009	0.0238	5.3910
60	0.0006	0.0156	6.0062
75	0.0003	0.0072	7.1120
84	0.0002	0.0040	7.9546
90	0.0001	0.0026	8.5897
95	0.0001	0.0016	9.2880

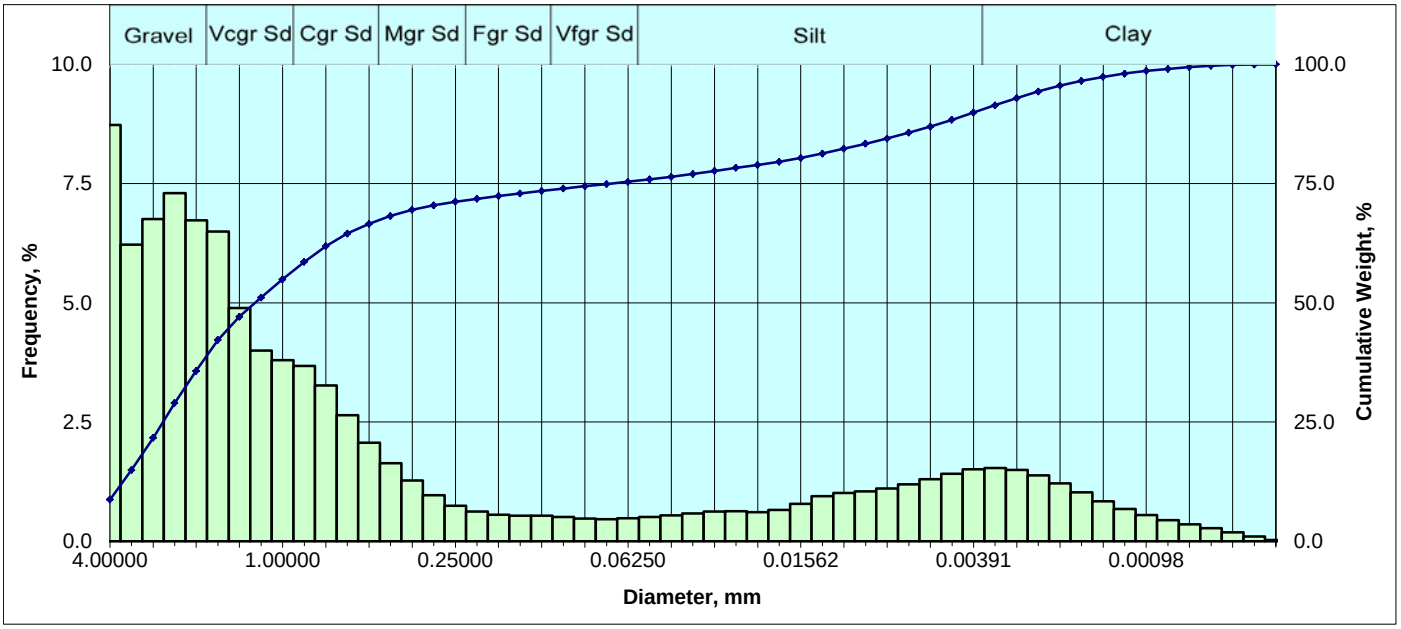
** Distribution pattern precludes calculation of these statistical parameters.

Core Lab
RESERVOIR OPTIMIZATION

Company: RMC Consultants, Inc.
Project Name: Atlas Missile Site 4 RI Addendum
Project Number: E15-019-201

CL File Number: 1704035
Sample ID: FEW4-MW85-208

Sieve and Laser Particle Size Analysis



Particle Size Distribution

	Diameter				Weight %	
	[US Mesh]	[in.]	[mm]	[ϕ]	[Incl.]	[Cum.]
Granule	5	0.157480	4.00000	-2.00	8.732	8.73
	6	0.132425	3.36359	-1.75	6.218	14.95
	7	0.111355	2.82843	-1.50	6.759	21.71
	8	0.093638	2.37841	-1.25	7.300	29.01
	10	0.078740	2.00000	-1.00	6.728	35.74
V Crse Sand	12	0.066212	1.68179	-0.75	6.494	42.23
	14	0.055678	1.41421	-0.50	4.894	47.12
	16	0.046819	1.18921	-0.25	3.999	51.12
	18	0.039370	1.00000	0.00	3.800	54.92
Coarse Sand	20	0.033106	0.84090	0.25	3.680	58.60
	25	0.027839	0.70711	0.50	3.266	61.87
	30	0.023410	0.59460	0.75	2.645	64.52
	35	0.019685	0.50000	1.00	2.064	66.58
Medium Sand	40	0.016553	0.42045	1.25	1.636	68.22
	45	0.013919	0.35355	1.50	1.275	69.49
	50	0.011705	0.29730	1.75	0.965	70.46
	60	0.009843	0.25000	2.00	0.744	71.20
Fine Sand	70	0.008277	0.21022	2.25	0.623	71.82
	80	0.006960	0.17678	2.50	0.561	72.38
	100	0.005852	0.14865	2.75	0.539	72.92
	120	0.004921	0.12500	3.00	0.535	73.46
V. Fine Sand	140	0.004138	0.10511	3.25	0.512	73.97
	170	0.003480	0.08839	3.50	0.475	74.44
	200	0.002926	0.07433	3.75	0.462	74.91
	230	0.002461	0.06250	4.00	0.484	75.39
Silt	270	0.002069	0.05256	4.25	0.512	75.90
	325	0.001740	0.04419	4.50	0.543	76.45
	400	0.001463	0.03716	4.75	0.586	77.03
	450	0.001230	0.03125	5.00	0.628	77.66
	500	0.001035	0.02628	5.25	0.631	78.29
	635	0.000870	0.02210	5.50	0.614	78.91
		0.000732	0.01858	5.75	0.655	79.56
		0.000615	0.01562	6.00	0.789	80.35
		0.000517	0.01314	6.25	0.944	81.29
		0.000435	0.01105	6.50	1.016	82.31
		0.000366	0.00929	6.75	1.049	83.36
		0.000308	0.00781	7.00	1.105	84.46
		0.000259	0.00657	7.25	1.196	85.66
		0.000217	0.00552	7.50	1.305	86.97
		0.000183	0.00465	7.75	1.414	88.38
		0.000154	0.00391	8.00	1.509	89.89
Clay		0.000129	0.00328	8.25	1.539	91.43
		0.000109	0.00276	8.50	1.496	92.92
		0.000091	0.00232	8.75	1.381	94.30
		0.000077	0.00195	9.00	1.215	95.52
		0.000065	0.00164	9.25	1.025	96.54
		0.000054	0.00138	9.50	0.840	97.38
		0.000046	0.00116	9.75	0.679	98.06
		0.000038	0.00098	10.00	0.547	98.61
		0.000032	0.00082	10.25	0.444	99.06
		0.000027	0.00069	10.50	0.355	99.41
		0.000023	0.00058	10.75	0.273	99.68
		0.000019	0.00049	11.00	0.190	99.87
		0.000016	0.00041	11.25	0.102	99.97
		0.000015	0.00038	11.50	0.025	100.00

Sorting Statistics (Folk)

Parameter	Trask	Inman	Folk
Median	Very coarse sand sized		
(in)	0.0493	0.0493	0.0493
(mm)	1.2525	1.2525	1.2525
Mean	Medium sand sized		
(in)	0.0531	0.0065	0.0128
(mm)	1.3488	0.1663	0.3260
Sorting	V. Poor		
	6.036	4.302	3.902
Skewness	Strongly fine skewed		
	0.347	0.798	0.636
Kurtosis	Mesokurtic		
	0.330	0.343	0.913

Component Percentages

Gravel	Sand	Silt	Clay	Silt + Clay
35.74	39.65	14.50	10.11	24.61

Percentile [Weight, %]	Particle Diameter [in.]	[mm]	[phi]
5	0.2505	6.3614	-2.6694
10	0.1524	3.8702	-1.9524
16	0.1292	3.2804	-1.7139
25	0.1034	2.6255	-1.3926
30	0.0914	2.3226	-1.2158
40	0.0705	1.7911	-0.8408
50	0.0493	1.2525	-0.3248
60	0.0309	0.7837	0.3516
75	0.0028	0.0721	3.7946
84	0.0003	0.0084	6.8896
90	0.0002	0.0039	8.0167
95	0.0001	0.0021	8.8877

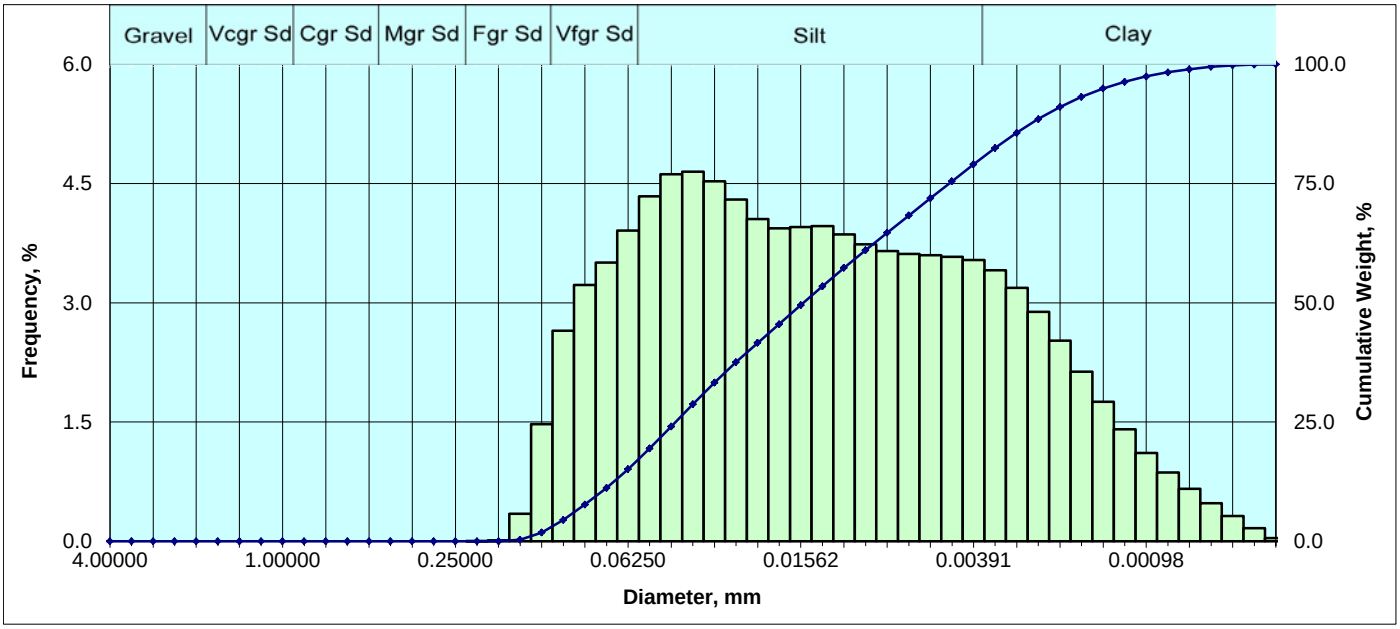
** Distribution pattern precludes calculation of these statistical parameters.

Core Lab
RESERVOIR OPTIMIZATION

Company: RMC Consultants, Inc.
Project Name: Atlas Missile Site 4 RI Addendum
Project Number: E15-019-201

CL File Number: 1704035
Sample ID: FEW4-MW101-240

Sieve and Laser Particle Size Analysis



Particle Size Distribution

	Diameter [US Mesh]	Diameter [in.]	Diameter [mm]	Diameter [ϕ]	Weight % [Incl.]	Weight % [Cum.]
Granule	5	0.157480	4.00000	-2.00	0.000	0.00
	6	0.132425	3.36359	-1.75	0.000	0.00
	7	0.111355	2.82843	-1.50	0.000	0.00
	8	0.093638	2.37841	-1.25	0.000	0.00
	10	0.078740	2.00000	-1.00	0.000	0.00
V Crse Sand	12	0.066212	1.68179	-0.75	0.000	0.00
	14	0.055678	1.41421	-0.50	0.000	0.00
	16	0.046819	1.18921	-0.25	0.000	0.00
	18	0.039370	1.00000	0.00	0.000	0.00
Coarse Sand	20	0.033106	0.84090	0.25	0.000	0.00
	25	0.027839	0.70711	0.50	0.000	0.00
	30	0.023410	0.59460	0.75	0.000	0.00
	35	0.019685	0.50000	1.00	0.000	0.00
Medium Sand	40	0.016553	0.42045	1.25	0.000	0.00
	45	0.013919	0.35355	1.50	0.000	0.00
	50	0.011705	0.29730	1.75	0.000	0.00
	60	0.009843	0.25000	2.00	0.000	0.00
Fine Sand	70	0.008277	0.21022	2.25	0.000	0.00
	80	0.006960	0.17678	2.50	0.014	0.01
	100	0.005852	0.14865	2.75	0.346	0.36
	120	0.004921	0.12500	3.00	1.472	1.83
V. Fine Sand	140	0.004138	0.10511	3.25	2.648	4.48
	170	0.003480	0.08839	3.50	3.223	7.70
	200	0.002926	0.07433	3.75	3.508	11.21
	230	0.002461	0.06250	4.00	3.907	15.12
Silt	270	0.002069	0.05256	4.25	4.341	19.46
	325	0.001740	0.04419	4.50	4.619	24.08
	400	0.001463	0.03716	4.75	4.650	28.73
	450	0.001230	0.03125	5.00	4.530	33.26
	500	0.001035	0.02628	5.25	4.298	37.56
	635	0.000870	0.02210	5.50	4.053	41.61
		0.000732	0.01858	5.75	3.936	45.55
		0.000615	0.01562	6.00	3.951	49.50
		0.000517	0.01314	6.25	3.967	53.46
		0.000435	0.01105	6.50	3.861	57.33
		0.000366	0.00929	6.75	3.734	61.06
		0.000308	0.00781	7.00	3.652	64.71
		0.000259	0.00657	7.25	3.614	68.33
		0.000217	0.00552	7.50	3.600	71.93
		0.000183	0.00465	7.75	3.581	75.51
		0.000154	0.00391	8.00	3.540	79.05
Clay		0.000129	0.00328	8.25	3.411	82.46
		0.000109	0.00276	8.50	3.190	85.65
		0.000091	0.00232	8.75	2.885	88.53
		0.000077	0.00195	9.00	2.523	91.06
		0.000065	0.00164	9.25	2.135	93.19
		0.000054	0.00138	9.50	1.757	94.95
		0.000046	0.00116	9.75	1.411	96.36
		0.000038	0.00098	10.00	1.112	97.47
		0.000032	0.00082	10.25	0.866	98.34
		0.000027	0.00069	10.50	0.659	99.00
		0.000023	0.00058	10.75	0.480	99.48
		0.000019	0.00049	11.00	0.319	99.79
		0.000016	0.00041	11.25	0.166	99.96
		0.000015	0.00038	11.50	0.040	100.00

Sorting Statistics (Folk)

Parameter	Trask	Inman	Folk
Median		**Silt sized**	
(in)	0.0006	0.0006	0.0006
(mm)	0.0153	0.0153	0.0153
Mean		**Silt sized**	
(in)	0.0009	0.0005	0.0006
(mm)	0.0238	0.0135	0.0141
Sorting		**V. Poor**	
	2.996	2.159	2.022
Skewness		**Finely skewed**	
	0.933	0.171	0.100
Kurtosis		**Platykurtic**	
	0.247	0.441	0.805

Component Percentages

Gravel	Sand	Silt	Clay	Silt + Clay
0.00	15.12	63.93	20.95	84.88

Percentile [Weight, %]	Particle Diameter [in.]	[mm]	[phi]
5	0.0040	0.1024	3.2875
10	0.0031	0.0792	3.6587
16	0.0024	0.0605	4.0474
25	0.0017	0.0428	4.5462
30	0.0014	0.0355	4.8159
40	0.0009	0.0238	5.3954
50	0.0006	0.0153	6.0294
60	0.0004	0.0098	6.6745
75	0.0002	0.0048	7.7118
84	0.0001	0.0030	8.3654
90	0.0001	0.0021	8.8901
95	0.0001	0.0014	9.5085

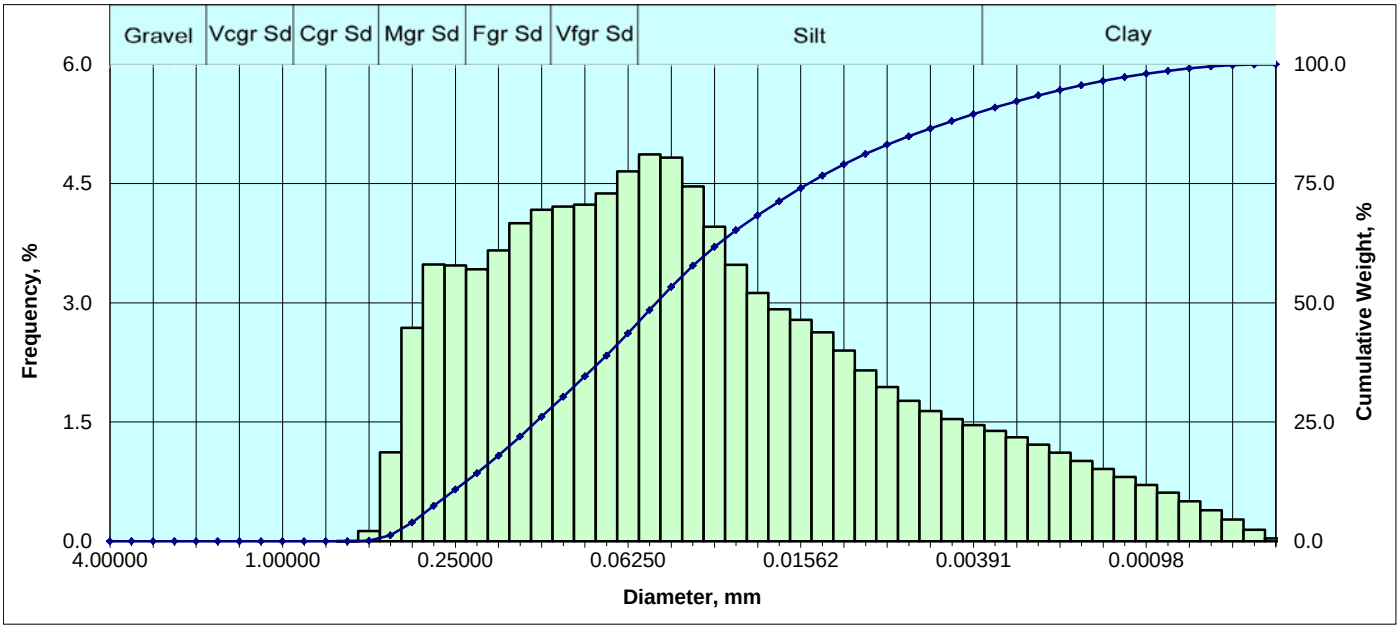
** Distribution pattern precludes calculation of these statistical parameters.

Core Lab
RESERVOIR OPTIMIZATION

Company: RMC Consultants, Inc.
Project Name: Atlas Missile Site 4 RI Addendum
Project Number: E15-019-201

CL File Number: 1704035
Sample ID: FEW4-MW101-130

Sieve and Laser Particle Size Analysis



Particle Size Distribution

	Diameter				Weight %	
	[US Mesh]	[in.]	[mm]	[ϕ]	[Incl.]	[Cum.]
Granule	5	0.157480	4.00000	-2.00	0.000	0.00
	6	0.132425	3.36359	-1.75	0.000	0.00
	7	0.111355	2.82843	-1.50	0.000	0.00
	8	0.093638	2.37841	-1.25	0.000	0.00
	10	0.078740	2.00000	-1.00	0.000	0.00
V Crse Sand	12	0.066212	1.68179	-0.75	0.000	0.00
	14	0.055678	1.41421	-0.50	0.000	0.00
	16	0.046819	1.18921	-0.25	0.000	0.00
	18	0.039370	1.00000	0.00	0.000	0.00
Coarse Sand	20	0.033106	0.84090	0.25	0.000	0.00
	25	0.027839	0.70711	0.50	0.000	0.00
	30	0.023410	0.59460	0.75	0.001	0.00
	35	0.019685	0.50000	1.00	0.131	0.13
Medium Sand	40	0.016553	0.42045	1.25	1.121	1.25
	45	0.013919	0.35355	1.50	2.686	3.94
	50	0.011705	0.29730	1.75	3.483	7.42
	60	0.009843	0.25000	2.00	3.471	10.89
Fine Sand	70	0.008277	0.21022	2.25	3.420	14.31
	80	0.006960	0.17678	2.50	3.660	17.97
	100	0.005852	0.14865	2.75	4.001	21.97
	120	0.004921	0.12500	3.00	4.172	26.15
V. Fine Sand	140	0.004138	0.10511	3.25	4.212	30.36
	170	0.003480	0.08839	3.50	4.234	34.59
	200	0.002926	0.07433	3.75	4.377	38.97
	230	0.002461	0.06250	4.00	4.652	43.62
Silt	270	0.002069	0.05256	4.25	4.867	48.49
	325	0.001740	0.04419	4.50	4.829	53.32
	400	0.001463	0.03716	4.75	4.463	57.78
	450	0.001230	0.03125	5.00	3.958	61.74
	500	0.001035	0.02628	5.25	3.478	65.22
	635	0.000870	0.02210	5.50	3.125	68.34
		0.000732	0.01858	5.75	2.917	71.26
		0.000615	0.01562	6.00	2.784	74.04
		0.000517	0.01314	6.25	2.629	76.67
		0.000435	0.01105	6.50	2.398	79.07
		0.000366	0.00929	6.75	2.152	81.22
		0.000308	0.00781	7.00	1.939	83.16
		0.000259	0.00657	7.25	1.769	84.93
		0.000217	0.00552	7.50	1.638	86.57
		0.000183	0.00465	7.75	1.537	88.11
		0.000154	0.00391	8.00	1.462	89.57
Clay		0.000129	0.00328	8.25	1.388	90.96
		0.000109	0.00276	8.50	1.308	92.26
		0.000091	0.00232	8.75	1.217	93.48
		0.000077	0.00195	9.00	1.117	94.60
		0.000065	0.00164	9.25	1.012	95.61
		0.000054	0.00138	9.50	0.909	96.52
		0.000046	0.00116	9.75	0.810	97.33
		0.000038	0.00098	10.00	0.710	98.04
		0.000032	0.00082	10.25	0.611	98.65
		0.000027	0.00069	10.50	0.505	99.15
		0.000023	0.00058	10.75	0.392	99.55
		0.000019	0.00049	11.00	0.273	99.82
		0.000016	0.00041	11.25	0.145	99.96
		0.000015	0.00038	11.50	0.035	100.00

Sorting Statistics (Folk)

Parameter	Trask	Inman	Folk
Median	**Silt sized**		
(in)	0.0020	0.0020	0.0020
(mm)	0.0499	0.0499	0.0499
Mean	**Silt sized**		
(in)	0.0029	0.0015	0.0016
(mm)	0.0731	0.0375	0.0413
Sorting	**V. Poor**		
	2.989	2.377	2.328
Skewness	**Finely skewed**		
	0.881	0.425	0.221
Kurtosis	**Mesokurtic**		
	0.226	0.583	0.976

Component Percentages

Gravel	Sand	Silt	Clay	Silt + Clay
0.00	43.62	45.95	10.43	56.38

Percentile [Weight, %]	Particle Diameter [in.]	[mm]	[phi]
5	0.0132	0.3364	1.5717
10	0.0103	0.2622	1.9315
16	0.0077	0.1948	2.3599
25	0.0052	0.1315	2.9269
30	0.0042	0.1068	3.2270
40	0.0028	0.0717	3.8018
50	0.0020	0.0499	4.3237
60	0.0013	0.0338	4.8848
75	0.0006	0.0147	6.0861
84	0.0003	0.0072	7.1132
90	0.0001	0.0037	8.0734
95	0.0001	0.0018	9.0945

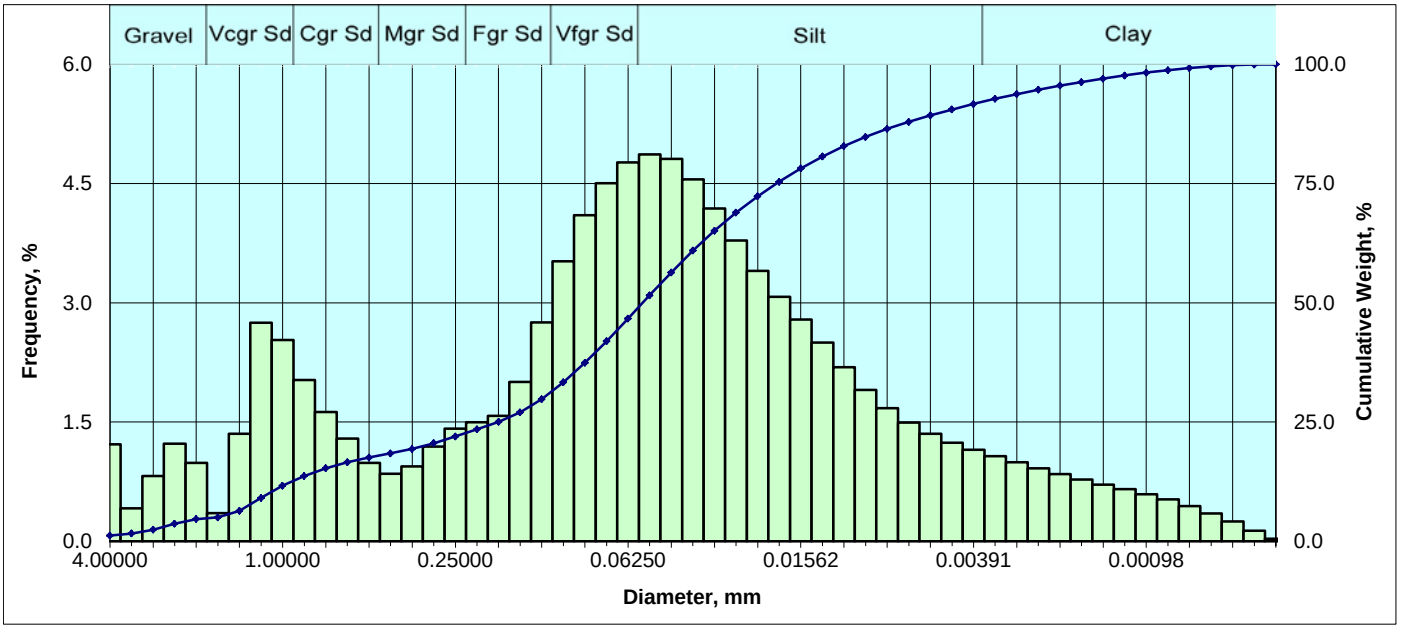
** Distribution pattern precludes calculation of these statistical parameters.

Core Lab
RESERVOIR OPTIMIZATION

Company: RMC Consultants, Inc.
Project Name: Atlas Missile Site 4 RI Addendum
Project Number: E15-019-201

CL File Number: 1704035
Sample ID: FEW4-MW101-101

Sieve and Laser Particle Size Analysis



Particle Size Distribution

	Diameter				Weight %	
	[US Mesh]	[in.]	[mm]	[ϕ]	[Incl.]	[Cum.]
Granule	5	0.157480	4.00000	-2.00	1.218	1.22
	6	0.132425	3.36359	-1.75	0.413	1.63
	7	0.111355	2.82843	-1.50	0.821	2.45
	8	0.093638	2.37841	-1.25	1.228	3.68
	10	0.078740	2.00000	-1.00	0.986	4.67
V Crse Sand	12	0.066212	1.68179	-0.75	0.353	5.02
	14	0.055678	1.41421	-0.50	1.352	6.37
	16	0.046819	1.18921	-0.25	2.748	9.12
	18	0.039370	1.00000	0.00	2.532	11.65
Coarse Sand	20	0.033106	0.84090	0.25	2.031	13.68
	25	0.027839	0.70711	0.50	1.626	15.31
	30	0.023410	0.59460	0.75	1.292	16.60
	35	0.019685	0.50000	1.00	0.985	17.59
Medium Sand	40	0.016553	0.42045	1.25	0.849	18.43
	45	0.013919	0.35355	1.50	0.942	19.38
	50	0.011705	0.29730	1.75	1.190	20.57
	60	0.009843	0.25000	2.00	1.416	21.98
Fine Sand	70	0.008277	0.21022	2.25	1.498	23.48
	80	0.006960	0.17678	2.50	1.578	25.06
	100	0.005852	0.14865	2.75	2.003	27.06
	120	0.004921	0.12500	3.00	2.756	29.82
V. Fine Sand	140	0.004138	0.10511	3.25	3.522	33.34
	170	0.003480	0.08839	3.50	4.102	37.44
	200	0.002926	0.07433	3.75	4.505	41.94
	230	0.002461	0.06250	4.00	4.766	46.71
Silt	270	0.002069	0.05256	4.25	4.868	51.58
	325	0.001740	0.04419	4.50	4.810	56.39
	400	0.001463	0.03716	4.75	4.555	60.94
	450	0.001230	0.03125	5.00	4.189	65.13
	500	0.001035	0.02628	5.25	3.783	68.91
	635	0.000870	0.02210	5.50	3.400	72.31
		0.000732	0.01858	5.75	3.077	75.39
		0.000615	0.01562	6.00	2.792	78.18
		0.000517	0.01314	6.25	2.499	80.68
		0.000435	0.01105	6.50	2.189	82.87
		0.000366	0.00929	6.75	1.906	84.78
		0.000308	0.00781	7.00	1.676	86.45
		0.000259	0.00657	7.25	1.495	87.95
		0.000217	0.00552	7.50	1.354	89.30
		0.000183	0.00465	7.75	1.241	90.54
		0.000154	0.00391	8.00	1.152	91.69
Clay		0.000129	0.00328	8.25	1.071	92.77
		0.000109	0.00276	8.50	0.994	93.76
		0.000091	0.00232	8.75	0.918	94.68
		0.000077	0.00195	9.00	0.846	95.52
		0.000065	0.00164	9.25	0.777	96.30
		0.000054	0.00138	9.50	0.713	97.01
		0.000046	0.00116	9.75	0.656	97.67
		0.000038	0.00098	10.00	0.593	98.26
		0.000032	0.00082	10.25	0.526	98.79
		0.000027	0.00069	10.50	0.445	99.23
		0.000023	0.00058	10.75	0.352	99.59
		0.000019	0.00049	11.00	0.249	99.83
		0.000016	0.00041	11.25	0.133	99.97
		0.000015	0.00038	11.50	0.032	100.00

Sorting Statistics (Folk)

Parameter	Trask	Inman	Folk
Median	Silt sized		
(in)	0.0022	0.0022	0.0022
(mm)	0.0558	0.0558	0.0558
Mean	Very fine sand sized		
(in)	0.0039	0.0032	0.0028
(mm)	0.0985	0.0805	0.0712
Sorting	V. Poor		
	3.058	3.007	2.959
Skewness	Coarse skewed		
	1.043	-0.042	-0.101
Kurtosis	Lepokurtic		
	0.071	0.597	1.220

Component Percentages

Gravel	Sand	Silt	Clay	Silt + Clay
4.67	42.05	44.98	8.31	53.29

Percentile [Weight, %]	Particle Diameter [in.]	[mm]	[phi]
5	0.0669	1.6988	-0.7645
10	0.0442	1.1233	-0.1678
16	0.0255	0.6468	0.6286
25	0.0070	0.1780	2.4901
30	0.0049	0.1240	3.0120
40	0.0032	0.0804	3.6367
50	0.0022	0.0558	4.1641
60	0.0015	0.0386	4.6946
75	0.0007	0.0190	5.7157
84	0.0004	0.0100	6.6428
90	0.0002	0.0050	7.6353
95	0.0001	0.0022	8.8400

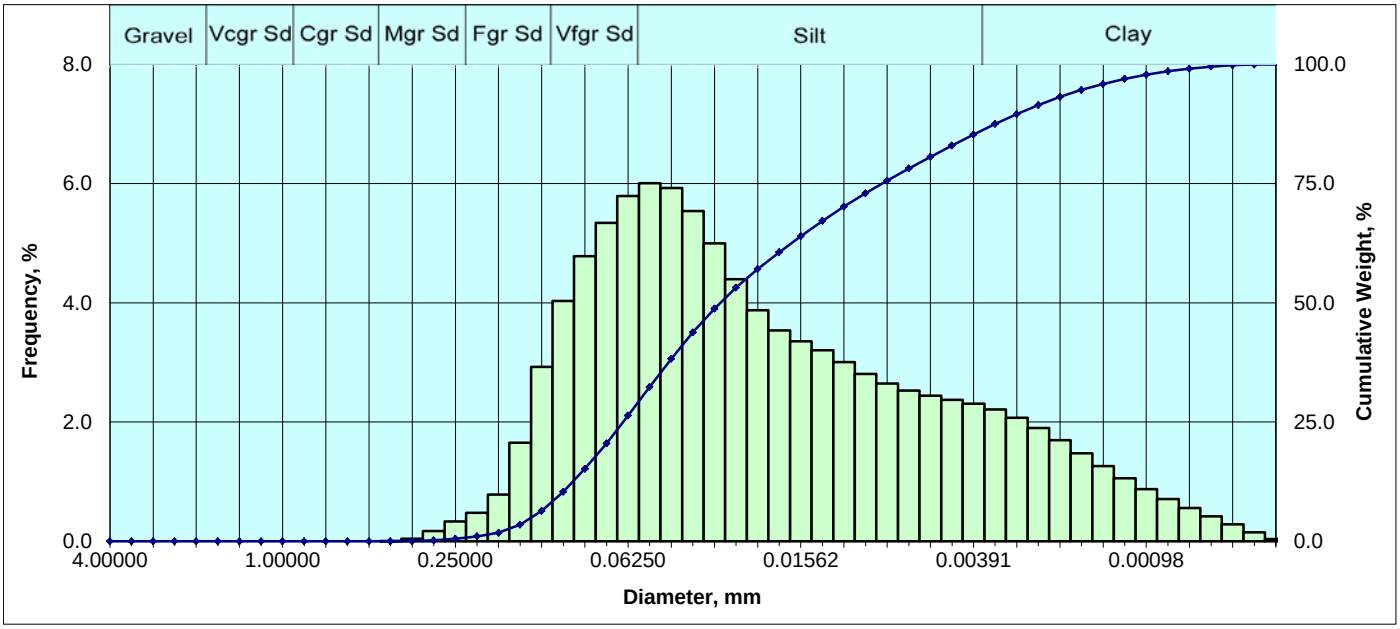
** Distribution pattern precludes calculation of these statistical parameters.

Core Lab
RESERVOIR OPTIMIZATION

Company: RMC Consultants, Inc.
Project Name: Atlas Missile Site 4 RI Addendum
Project Number: E15-019-201

CL File Number: 1704035
Sample ID: FEW4-MW80-215

Sieve and Laser Particle Size Analysis



Particle Size Distribution

	Diameter				Weight %	
	[US Mesh]	[in.]	[mm]	[ϕ]	[Incl.]	[Cum.]
Granule	5	0.157480	4.00000	-2.00	0.000	0.00
	6	0.132425	3.36359	-1.75	0.000	0.00
	7	0.111355	2.82843	-1.50	0.000	0.00
	8	0.093638	2.37841	-1.25	0.000	0.00
	10	0.078740	2.00000	-1.00	0.000	0.00
V Crse Sand	12	0.066212	1.68179	-0.75	0.000	0.00
	14	0.055678	1.41421	-0.50	0.000	0.00
	16	0.046819	1.18921	-0.25	0.000	0.00
	18	0.039370	1.00000	0.00	0.000	0.00
Coarse Sand	20	0.033106	0.84090	0.25	0.000	0.00
	25	0.027839	0.70711	0.50	0.000	0.00
	30	0.023410	0.59460	0.75	0.000	0.00
	35	0.019685	0.50000	1.00	0.000	0.00
Medium Sand	40	0.016553	0.42045	1.25	0.002	0.00
	45	0.013919	0.35355	1.50	0.045	0.05
	50	0.011705	0.29730	1.75	0.175	0.22
	60	0.009843	0.25000	2.00	0.335	0.56
Fine Sand	70	0.008277	0.21022	2.25	0.480	1.04
	80	0.006960	0.17678	2.50	0.785	1.82
	100	0.005852	0.14865	2.75	1.652	3.47
	120	0.004921	0.12500	3.00	2.924	6.40
V. Fine Sand	140	0.004138	0.10511	3.25	4.033	10.43
	170	0.003480	0.08839	3.50	4.782	15.21
	200	0.002926	0.07433	3.75	5.344	20.56
	230	0.002461	0.06250	4.00	5.792	26.35
Silt	270	0.002069	0.05256	4.25	6.006	32.35
	325	0.001740	0.04419	4.50	5.924	38.28
	400	0.001463	0.03716	4.75	5.539	43.82
	450	0.001230	0.03125	5.00	4.995	48.81
	500	0.001035	0.02628	5.25	4.397	53.21
	635	0.000870	0.02210	5.50	3.876	57.09
		0.000732	0.01858	5.75	3.536	60.62
		0.000615	0.01562	6.00	3.353	63.98
		0.000517	0.01314	6.25	3.207	67.18
		0.000435	0.01105	6.50	3.006	70.19
		0.000366	0.00929	6.75	2.806	73.00
		0.000308	0.00781	7.00	2.647	75.64
		0.000259	0.00657	7.25	2.530	78.17
		0.000217	0.00552	7.50	2.443	80.62
		0.000183	0.00465	7.75	2.371	82.99
		0.000154	0.00391	8.00	2.307	85.29
Clay		0.000129	0.00328	8.25	2.209	87.50
		0.000109	0.00276	8.50	2.073	89.58
		0.000091	0.00232	8.75	1.898	91.47
		0.000077	0.00195	9.00	1.696	93.17
		0.000065	0.00164	9.25	1.478	94.65
		0.000054	0.00138	9.50	1.262	95.91
		0.000046	0.00116	9.75	1.060	96.97
		0.000038	0.00098	10.00	0.874	97.84
		0.000032	0.00082	10.25	0.710	98.55
		0.000027	0.00069	10.50	0.559	99.11
		0.000023	0.00058	10.75	0.419	99.53
		0.000019	0.00049	11.00	0.284	99.82
		0.000016	0.00041	11.25	0.149	99.96
		0.000015	0.00038	11.50	0.036	100.00

Sorting Statistics (Folk)

Parameter	Trask	Inman	Folk
Median	**Silt sized**		
(in)	0.0012	0.0012	0.0012
(mm)	0.0299	0.0299	0.0299
Mean	**Silt sized**		
(in)	0.0014	0.0008	0.0009
(mm)	0.0367	0.0193	0.0223
Sorting	**V. Poor**		
	2.826	2.160	2.056
Skewness	**Strongly fine skewed**		
	0.772	0.478	0.306
Kurtosis	**Platykurtic**		
	0.273	0.491	0.881

Component Percentages

Gravel	Sand	Silt	Clay	Silt + Clay
0.00	26.35	58.94	14.71	73.65

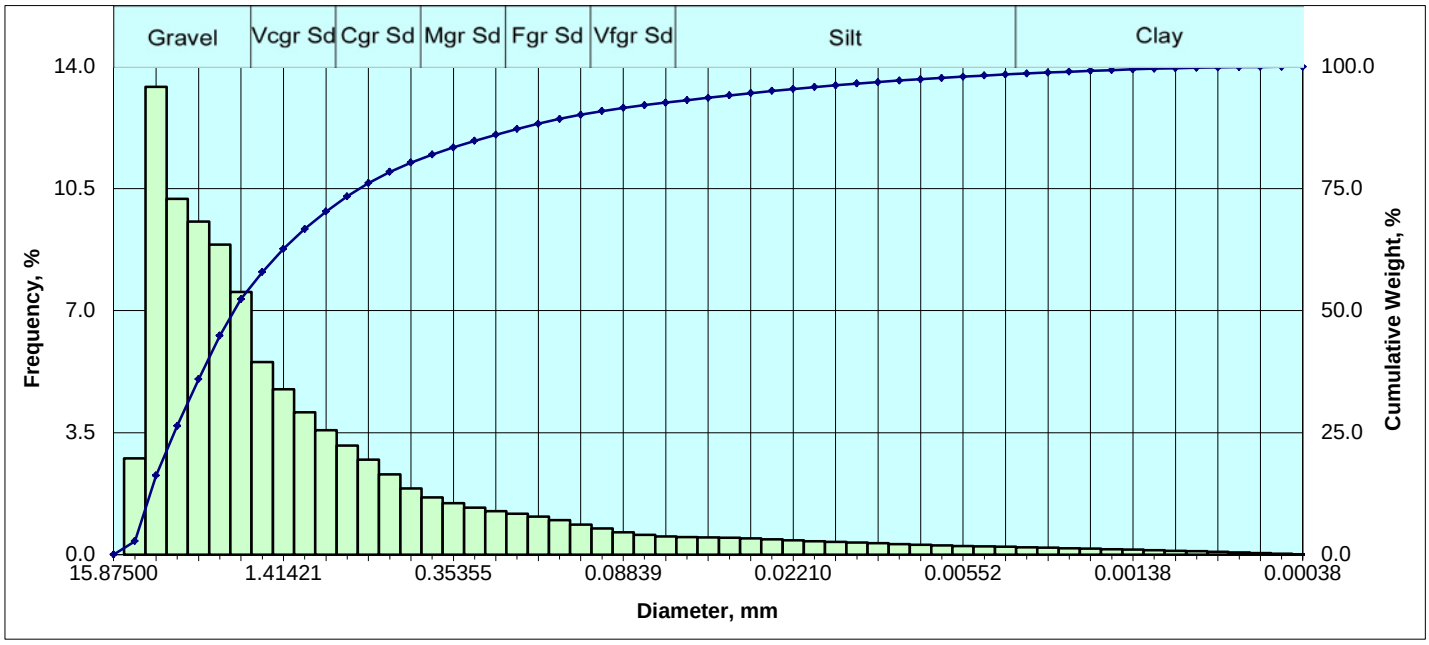
Percentile [Weight, %]	Particle Diameter [in.]	[mm]	[phi]
5	0.0054	0.1363	2.8750
10	0.0042	0.1072	3.2211
16	0.0034	0.0863	3.5342
25	0.0026	0.0653	3.9378
30	0.0022	0.0565	4.1468
40	0.0017	0.0420	4.5732
50	0.0012	0.0299	5.0633
60	0.0008	0.0192	5.7027
75	0.0003	0.0082	6.9352
84	0.0002	0.0043	7.8545
90	0.0001	0.0027	8.5523
95	0.0001	0.0016	9.3156

** Distribution pattern precludes calculation of these statistical parameters.

Company: RMC Consultants, Inc.
Project Name: Atlas Missile Site 4 RI Addendum
Project Number: E15-019-201

CL File Number: 1704035
Sample ID: FEW4-MW80-284

Sieve and Laser Particle Size Analysis



Particle Size Distribution

	Diameter				Weight %	
	[US Mesh]	[in.]	[mm]	[ϕ]	[Incl.]	[Cum.]
Granule		0.625000	15.87500	-3.99	0.000	0.000
		0.375000	9.52500	-3.25	2.761	2.761
	5	0.157480	4.00000	-2.00	13.426	16.186
	6	0.132425	3.36359	-1.75	10.210	26.396
	7	0.111355	2.82843	-1.50	9.554	35.950
	8	0.093638	2.37841	-1.25	8.898	44.848
	10	0.078740	2.00000	-1.00	7.540	52.388
V Crse Sand	12	0.066212	1.68179	-0.75	5.528	57.915
	14	0.055678	1.41421	-0.50	4.743	62.658
	16	0.046819	1.18921	-0.25	4.082	66.740
	18	0.039370	1.00000	0.00	3.570	70.310
Coarse Sand	20	0.033106	0.84090	0.25	3.130	73.440
	25	0.027839	0.70711	0.50	2.725	76.165
	30	0.023410	0.59460	0.75	2.298	78.462
	35	0.019685	0.50000	1.00	1.897	80.359
Medium Sand	40	0.016553	0.42045	1.25	1.639	81.998
	45	0.013919	0.35355	1.50	1.473	83.470
	50	0.011705	0.29730	1.75	1.344	84.814
	60	0.009843	0.25000	2.00	1.243	86.057
Fine Sand	70	0.008277	0.21022	2.25	1.173	87.230
	80	0.006960	0.17678	2.50	1.093	88.323
	100	0.005852	0.14865	2.75	0.985	89.308
	120	0.004921	0.12500	3.00	0.864	90.172
V. Fine Sand	140	0.004138	0.10511	3.25	0.747	90.919
	170	0.003480	0.08839	3.50	0.642	91.561
	200	0.002926	0.07433	3.75	0.564	92.125
	230	0.002461	0.06250	4.00	0.522	92.647
Silt	270	0.002069	0.05256	4.25	0.504	93.151
	325	0.001740	0.04419	4.50	0.497	93.648
	400	0.001463	0.03716	4.75	0.483	94.131
	450	0.001230	0.03125	5.00	0.463	94.593
	500	0.001035	0.02628	5.25	0.437	95.031
	635	0.000870	0.02210	5.50	0.410	95.441
		0.000732	0.01858	5.75	0.387	95.828
		0.000615	0.01562	6.00	0.367	96.195
		0.000517	0.01314	6.25	0.348	96.542
		0.000435	0.01105	6.50	0.324	96.866
		0.000366	0.00929	6.75	0.300	97.166
		0.000308	0.00781	7.00	0.280	97.446
		0.000259	0.00657	7.25	0.262	97.708
		0.000217	0.00552	7.50	0.247	97.955
		0.000183	0.00465	7.75	0.233	98.188
		0.000154	0.00391	8.00	0.222	98.409
Clay		0.000129	0.00328	8.25	0.209	98.619
		0.000109	0.00276	8.50	0.197	98.816
		0.000091	0.00232	8.75	0.183	98.999
		0.000077	0.00195	9.00	0.170	99.169
		0.000065	0.00164	9.25	0.155	99.324
		0.000054	0.00138	9.50	0.141	99.464
		0.000046	0.00116	9.75	0.126	99.590
		0.000038	0.00098	10.00	0.110	99.701
		0.000032	0.00082	10.25	0.094	99.795
		0.000027	0.00069	10.50	0.077	99.872
		0.000023	0.00058	10.75	0.060	99.932
		0.000019	0.00049	11.00	0.041	99.973
		0.000016	0.00041	11.25	0.022	99.995
		0.000015	0.00038	11.50	0.005	100.000

Sorting Statistics (Folk)

Parameter	Trask	Inman	Folk
Median	**Granule sized**		
(in)	0.0835	0.0835	0.0835
(mm)	2.1198	2.1198	2.1198
Mean	**Very coarse sand sized**		
(in)	0.0830	0.0458	0.0559
(mm)	2.1074	1.1623	1.4201
Sorting	**V. Poor**		
	2.125	1.810	2.168
Skewness	**Strongly fine skewed**		
	0.766	1.186	0.497
Kurtosis	**Very leptokurtic**		
	0.209	1.302	1.571

Component Percentages

Gravel	Sand	Silt	Clay	Silt + Clay
52.39	40.26	5.76	1.59	7.35

Percentile [Weight, %]	Particle Diameter [in.]	[mm]	[phi]
5	0.3387	8.6035	-3.1049
10	0.2577	6.5458	-2.7106
16	0.1605	4.0767	-2.0274
25	0.1359	3.4506	-1.7868
30	0.1245	3.1617	-1.6607
40	0.1033	2.6236	-1.3915
50	0.0835	2.1198	-1.0840
60	0.0616	1.5642	-0.6454
75	0.0301	0.7643	0.3878
84	0.0130	0.3314	1.5935
90	0.0051	0.1297	2.9466
95	0.0010	0.0266	5.2309

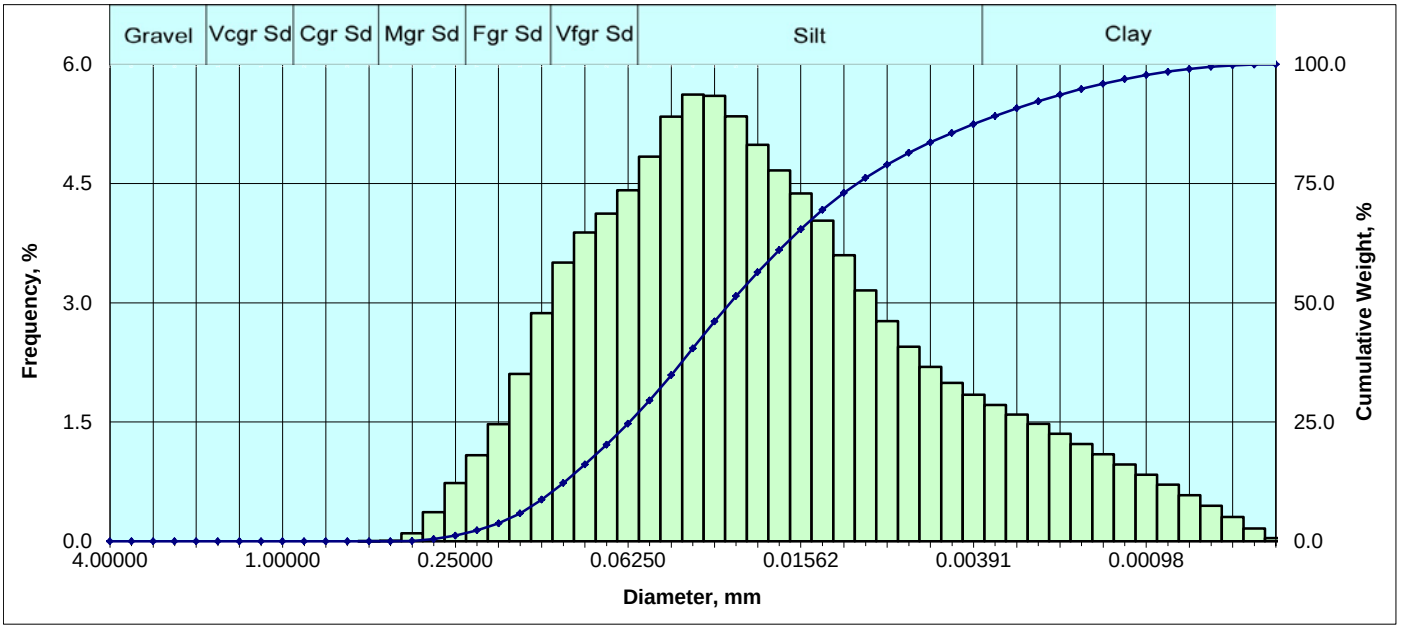
** Distribution pattern precludes calculation of these statistical parameters.

Core Lab
RESERVOIR OPTIMIZATION

Company: RMC Consultants, Inc.
Project Name: Atlas Missile Site 4 RI Addendum
Project Number: E15-019-201

CL File Number: 1704035
Sample ID: FEW4-MW80-125

Sieve and Laser Particle Size Analysis



Particle Size Distribution

	Diameter [US Mesh]	Diameter [in.]	Diameter [mm]	Diameter [ϕ]	Weight % [Incl.]	Weight % [Cum.]
Granule	5	0.157480	4.00000	-2.00	0.000	0.00
	6	0.132425	3.36359	-1.75	0.000	0.00
	7	0.111355	2.82843	-1.50	0.000	0.00
	8	0.093638	2.37841	-1.25	0.000	0.00
	10	0.078740	2.00000	-1.00	0.000	0.00
V Crse Sand	12	0.066212	1.68179	-0.75	0.000	0.00
	14	0.055678	1.41421	-0.50	0.000	0.00
	16	0.046819	1.18921	-0.25	0.000	0.00
	18	0.039370	1.00000	0.00	0.000	0.00
Coarse Sand	20	0.033106	0.84090	0.25	0.000	0.00
	25	0.027839	0.70711	0.50	0.000	0.00
	30	0.023410	0.59460	0.75	0.000	0.00
	35	0.019685	0.50000	1.00	0.000	0.00
Medium Sand	40	0.016553	0.42045	1.25	0.007	0.01
	45	0.013919	0.35355	1.50	0.099	0.11
	50	0.011705	0.29730	1.75	0.368	0.47
	60	0.009843	0.25000	2.00	0.732	1.21
Fine Sand	70	0.008277	0.21022	2.25	1.085	2.29
	80	0.006960	0.17678	2.50	1.472	3.76
	100	0.005852	0.14865	2.75	2.105	5.87
	120	0.004921	0.12500	3.00	2.872	8.74
V. Fine Sand	140	0.004138	0.10511	3.25	3.506	12.25
	170	0.003480	0.08839	3.50	3.883	16.13
	200	0.002926	0.07433	3.75	4.122	20.25
	230	0.002461	0.06250	4.00	4.415	24.67
Silt	270	0.002069	0.05256	4.25	4.841	29.51
	325	0.001740	0.04419	4.50	5.343	34.85
	400	0.001463	0.03716	4.75	5.621	40.47
	450	0.001230	0.03125	5.00	5.605	46.08
	500	0.001035	0.02628	5.25	5.345	51.42
	635	0.000870	0.02210	5.50	4.987	56.41
		0.000732	0.01858	5.75	4.664	61.07
		0.000615	0.01562	6.00	4.376	65.45
		0.000517	0.01314	6.25	4.034	69.48
		0.000435	0.01105	6.50	3.597	73.08
		0.000366	0.00929	6.75	3.155	76.24
		0.000308	0.00781	7.00	2.768	79.00
		0.000259	0.00657	7.25	2.449	81.45
		0.000217	0.00552	7.50	2.195	83.65
		0.000183	0.00465	7.75	1.995	85.64
		0.000154	0.00391	8.00	1.844	87.49
Clay		0.000129	0.00328	8.25	1.716	89.20
		0.000109	0.00276	8.50	1.596	90.80
		0.000091	0.00232	8.75	1.476	92.27
		0.000077	0.00195	9.00	1.353	93.63
		0.000065	0.00164	9.25	1.224	94.85
		0.000054	0.00138	9.50	1.095	95.95
		0.000046	0.00116	9.75	0.968	96.91
		0.000038	0.00098	10.00	0.839	97.75
		0.000032	0.00082	10.25	0.712	98.47
		0.000027	0.00069	10.50	0.580	99.05
		0.000023	0.00058	10.75	0.445	99.49
		0.000019	0.00049	11.00	0.307	99.80
		0.000016	0.00041	11.25	0.162	99.96
		0.000015	0.00038	11.50	0.040	100.00

Sorting Statistics (Folk)

Parameter	Trask	Inman	Folk
Median	**Silt sized**		
(in)	0.0011	0.0011	0.0011
(mm)	0.0276	0.0276	0.0276
Mean	**Silt sized**		
(in)	0.0014	0.0009	0.0009
(mm)	0.0359	0.0219	0.0236
Sorting	**V. Poor**		
	2.489	2.025	2.019
Skewness	**Finely skewed**		
	0.900	0.386	0.201
Kurtosis	**Mesokurtic**		
	0.226	0.639	1.034

Component Percentages

Gravel	Sand	Silt	Clay	Silt + Clay
0.00	24.67	62.82	12.51	75.33

Percentile [Weight, %]	Particle Diameter [in.]	[mm]	[phi]
5	0.0063	0.1603	2.6416
10	0.0046	0.1179	3.0850
16	0.0035	0.0889	3.4910
25	0.0024	0.0618	4.0159
30	0.0020	0.0518	4.2713
40	0.0015	0.0378	4.7273
50	0.0011	0.0276	5.1792
60	0.0008	0.0194	5.6886
75	0.0004	0.0100	6.6469
84	0.0002	0.0054	7.5411
90	0.0001	0.0030	8.3696
95	0.0001	0.0016	9.2816

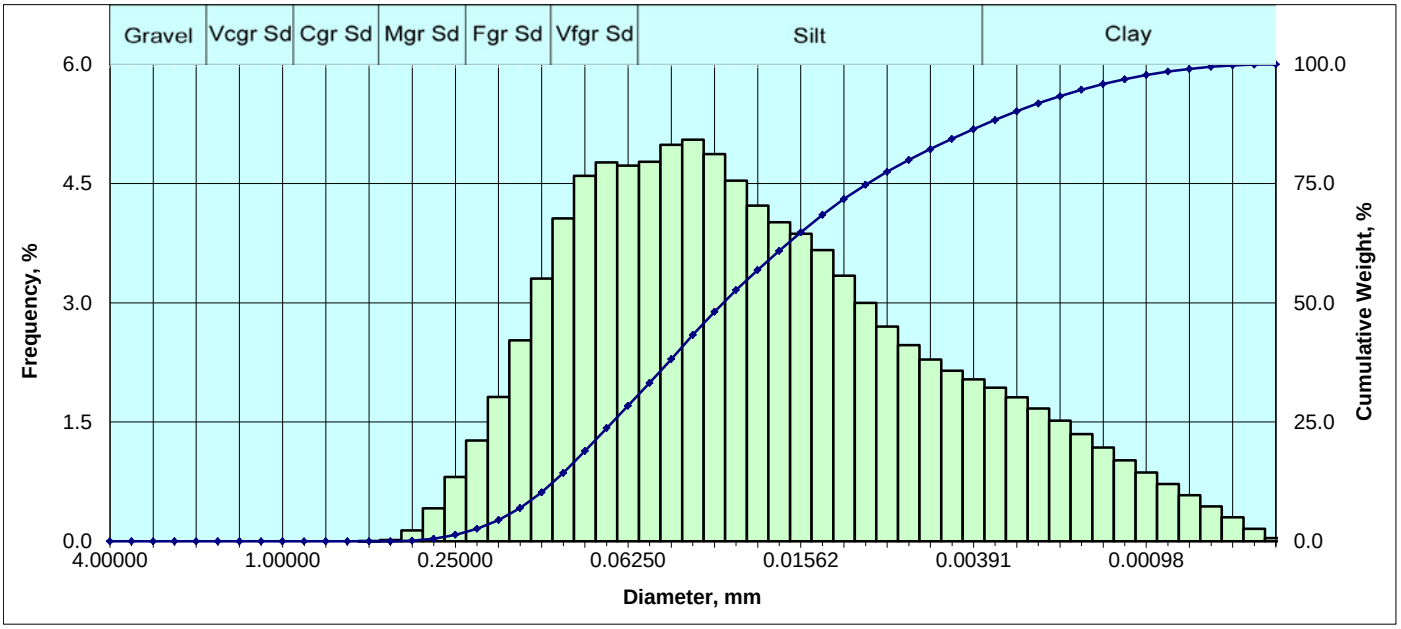
** Distribution pattern precludes calculation of these statistical parameters.

Core Lab
RESERVOIR OPTIMIZATION

Company: RMC Consultants, Inc.
Project Name: Atlas Missile Site 4 RI Addendum
Project Number: E15-019-201

CL File Number: 1704035
Sample ID: FEW4-MW77-134

Sieve and Laser Particle Size Analysis



Particle Size Distribution

	Diameter				Weight %	
	[US Mesh]	[in.]	[mm]	[ϕ]	[Incl.]	[Cum.]
Granule	5	0.157480	4.00000	-2.00	0.000	0.00
	6	0.132425	3.36359	-1.75	0.000	0.00
	7	0.111355	2.82843	-1.50	0.000	0.00
	8	0.093638	2.37841	-1.25	0.000	0.00
	10	0.078740	2.00000	-1.00	0.000	0.00
V Crse Sand	12	0.066212	1.68179	-0.75	0.000	0.00
	14	0.055678	1.41421	-0.50	0.000	0.00
	16	0.046819	1.18921	-0.25	0.000	0.00
	18	0.039370	1.00000	0.00	0.000	0.00
Coarse Sand	20	0.033106	0.84090	0.25	0.000	0.00
	25	0.027839	0.70711	0.50	0.000	0.00
	30	0.023410	0.59460	0.75	0.000	0.00
	35	0.019685	0.50000	1.00	0.000	0.00
Medium Sand	40	0.016553	0.42045	1.25	0.016	0.02
	45	0.013919	0.35355	1.50	0.137	0.15
	50	0.011705	0.29730	1.75	0.416	0.57
	60	0.009843	0.25000	2.00	0.808	1.38
Fine Sand	70	0.008277	0.21022	2.25	1.269	2.65
	80	0.006960	0.17678	2.50	1.815	4.46
	100	0.005852	0.14865	2.75	2.527	6.99
	120	0.004921	0.12500	3.00	3.304	10.29
V. Fine Sand	140	0.004138	0.10511	3.25	4.063	14.36
	170	0.003480	0.08839	3.50	4.598	18.95
	200	0.002926	0.07433	3.75	4.765	23.72
	230	0.002461	0.06250	4.00	4.726	28.45
Silt	270	0.002069	0.05256	4.25	4.774	33.22
	325	0.001740	0.04419	4.50	4.987	38.21
	400	0.001463	0.03716	4.75	5.054	43.26
	450	0.001230	0.03125	5.00	4.871	48.13
	500	0.001035	0.02628	5.25	4.538	52.67
	635	0.000870	0.02210	5.50	4.221	56.89
		0.000732	0.01858	5.75	4.014	60.91
		0.000615	0.01562	6.00	3.867	64.77
		0.000517	0.01314	6.25	3.664	68.44
		0.000435	0.01105	6.50	3.342	71.78
		0.000366	0.00929	6.75	2.999	74.78
		0.000308	0.00781	7.00	2.703	77.48
		0.000259	0.00657	7.25	2.467	79.95
		0.000217	0.00552	7.50	2.285	82.23
		0.000183	0.00465	7.75	2.144	84.38
		0.000154	0.00391	8.00	2.038	86.42
Clay		0.000129	0.00328	8.25	1.931	88.35
		0.000109	0.00276	8.50	1.811	90.16
		0.000091	0.00232	8.75	1.673	91.83
		0.000077	0.00195	9.00	1.516	93.35
		0.000065	0.00164	9.25	1.349	94.70
		0.000054	0.00138	9.50	1.181	95.88
		0.000046	0.00116	9.75	1.020	96.90
		0.000038	0.00098	10.00	0.864	97.76
		0.000032	0.00082	10.25	0.721	98.48
		0.000027	0.00069	10.50	0.579	99.06
		0.000023	0.00058	10.75	0.440	99.50
		0.000019	0.00049	11.00	0.302	99.80
		0.000016	0.00041	11.25	0.159	99.96
		0.000015	0.00038	11.50	0.039	100.00

Sorting Statistics (Folk)

Parameter	Trask	Inman	Folk
Median	**Silt sized**		
(in)	0.0011	0.0011	0.0011
(mm)	0.0292	0.0292	0.0292
Mean	**Silt sized**		
(in)	0.0016	0.0009	0.0009
(mm)	0.0401	0.0218	0.0240
Sorting	**V. Poor**		
	2.785	2.184	2.116
Skewness	**Finely skewed**		
	0.874	0.381	0.219
Kurtosis	**Mesokurtic**		
	0.249	0.548	0.938

Component Percentages

Gravel	Sand	Silt	Clay	Silt + Clay
0.00	28.45	57.97	13.58	71.55

Percentile [Weight, %]	Particle Diameter [in.]	[mm]	[phi]
5	0.0067	0.1708	2.5497
10	0.0050	0.1271	2.9760
16	0.0039	0.0991	3.3345
25	0.0028	0.0711	3.8136
30	0.0023	0.0593	4.0767
40	0.0016	0.0417	4.5838
50	0.0011	0.0292	5.0977
60	0.0008	0.0194	5.6897
75	0.0004	0.0092	6.7690
84	0.0002	0.0048	7.7027
90	0.0001	0.0028	8.4764
95	0.0001	0.0016	9.3104

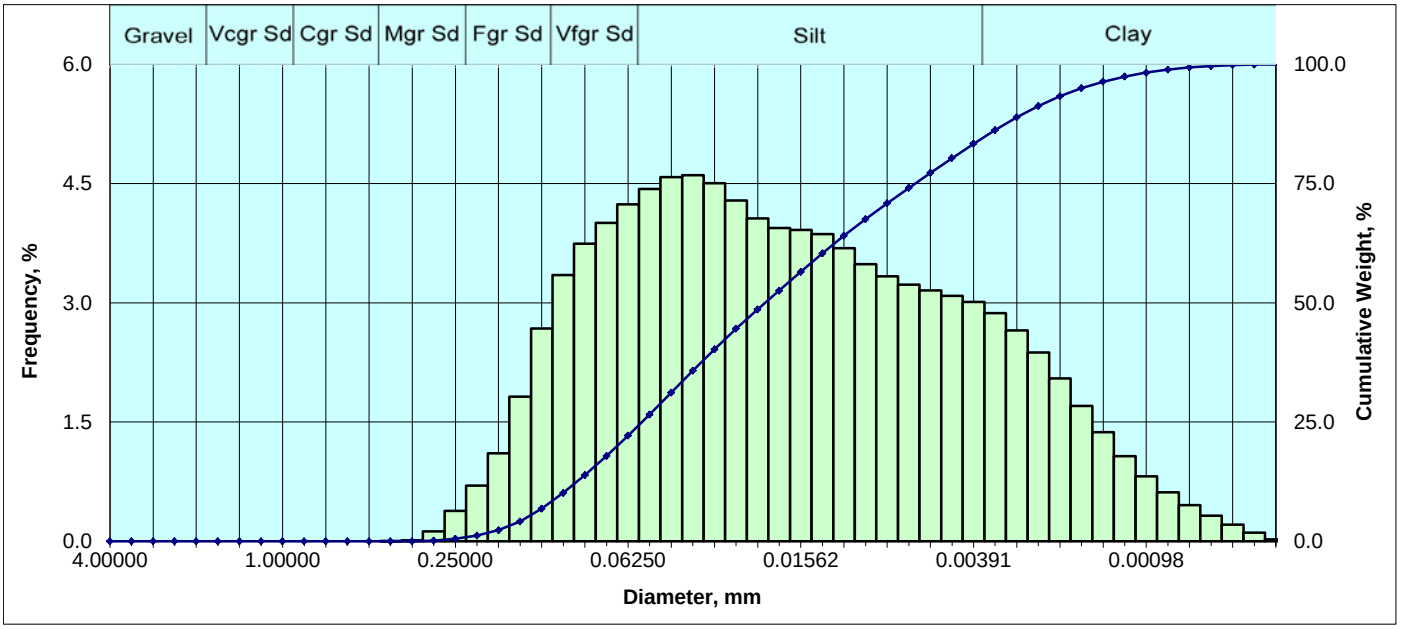
** Distribution pattern precludes calculation of these statistical parameters.

Core Lab
RESERVOIR OPTIMIZATION

Company: RMC Consultants, Inc.
Project Name: Atlas Missile Site 4 RI Addendum
Project Number: E15-019-201

CL File Number: 1704035
Sample ID: FEW4-MW77-35

Sieve and Laser Particle Size Analysis



Particle Size Distribution

	Diameter [US Mesh]	Diameter [in.]	Diameter [mm]	Diameter [ϕ]	Weight % [Incl.]	Weight % [Cum.]
Granule	5	0.157480	4.00000	-2.00	0.000	0.00
	6	0.132425	3.36359	-1.75	0.000	0.00
	7	0.111355	2.82843	-1.50	0.000	0.00
	8	0.093638	2.37841	-1.25	0.000	0.00
	10	0.078740	2.00000	-1.00	0.000	0.00
V Crse Sand	12	0.066212	1.68179	-0.75	0.000	0.00
	14	0.055678	1.41421	-0.50	0.000	0.00
	16	0.046819	1.18921	-0.25	0.000	0.00
	18	0.039370	1.00000	0.00	0.000	0.00
Coarse Sand	20	0.033106	0.84090	0.25	0.000	0.00
	25	0.027839	0.70711	0.50	0.000	0.00
	30	0.023410	0.59460	0.75	0.000	0.00
	35	0.019685	0.50000	1.00	0.000	0.00
Medium Sand	40	0.016553	0.42045	1.25	0.000	0.00
	45	0.013919	0.35355	1.50	0.013	0.01
	50	0.011705	0.29730	1.75	0.123	0.14
	60	0.009843	0.25000	2.00	0.381	0.52
Fine Sand	70	0.008277	0.21022	2.25	0.702	1.22
	80	0.006960	0.17678	2.50	1.109	2.33
	100	0.005852	0.14865	2.75	1.818	4.15
	120	0.004921	0.12500	3.00	2.677	6.82
V. Fine Sand	140	0.004138	0.10511	3.25	3.349	10.17
	170	0.003480	0.08839	3.50	3.743	13.91
	200	0.002926	0.07433	3.75	4.007	17.92
	230	0.002461	0.06250	4.00	4.241	22.16
Silt	270	0.002069	0.05256	4.25	4.433	26.60
	325	0.001740	0.04419	4.50	4.582	31.18
	400	0.001463	0.03716	4.75	4.606	35.78
	450	0.001230	0.03125	5.00	4.504	40.29
	500	0.001035	0.02628	5.25	4.289	44.58
	635	0.000870	0.02210	5.50	4.061	48.64
		0.000732	0.01858	5.75	3.942	52.58
		0.000615	0.01562	6.00	3.918	56.50
		0.000517	0.01314	6.25	3.865	60.36
		0.000435	0.01105	6.50	3.688	64.05
		0.000366	0.00929	6.75	3.488	67.54
		0.000308	0.00781	7.00	3.334	70.87
		0.000259	0.00657	7.25	3.228	74.10
		0.000217	0.00552	7.50	3.155	77.25
		0.000183	0.00465	7.75	3.089	80.34
		0.000154	0.00391	8.00	3.013	83.36
Clay		0.000129	0.00328	8.25	2.870	86.23
		0.000109	0.00276	8.50	2.654	88.88
		0.000091	0.00232	8.75	2.374	91.25
		0.000077	0.00195	9.00	2.047	93.30
		0.000065	0.00164	9.25	1.704	95.00
		0.000054	0.00138	9.50	1.373	96.38
		0.000046	0.00116	9.75	1.071	97.45
		0.000038	0.00098	10.00	0.818	98.27
		0.000032	0.00082	10.25	0.616	98.88
		0.000027	0.00069	10.50	0.454	99.34
		0.000023	0.00058	10.75	0.322	99.66
		0.000019	0.00049	11.00	0.209	99.87
		0.000016	0.00041	11.25	0.108	99.97
		0.000015	0.00038	11.50	0.026	100.00

Sorting Statistics (Folk)

Parameter	Trask	Inman	Folk
Median	**Silt sized**		
(in)	0.0008	0.0008	0.0008
(mm)	0.0209	0.0209	0.0209
Mean	**Silt sized**		
(in)	0.0012	0.0007	0.0007
(mm)	0.0312	0.0175	0.0185
Sorting	**V. Poor**		
	2.992	2.214	2.080
Skewness	**Finely skewed**		
	0.899	0.206	0.129
Kurtosis	**Platykurtic**		
	0.241	0.451	0.833

Component Percentages

Gravel	Sand	Silt	Clay	Silt + Clay
0.00	22.16	61.19	16.64	77.84

Percentile [Weight, %]	Particle Diameter [in.]	[mm]	[phi]
5	0.0056	0.1411	2.8251
10	0.0042	0.1061	3.2361
16	0.0032	0.0811	3.6247
25	0.0022	0.0561	4.1550
30	0.0018	0.0463	4.4315
40	0.0012	0.0316	4.9827
50	0.0008	0.0209	5.5817
60	0.0005	0.0134	6.2247
75	0.0002	0.0063	7.3171
84	0.0001	0.0038	8.0525
90	0.0001	0.0026	8.6126
95	0.0001	0.0016	9.2493

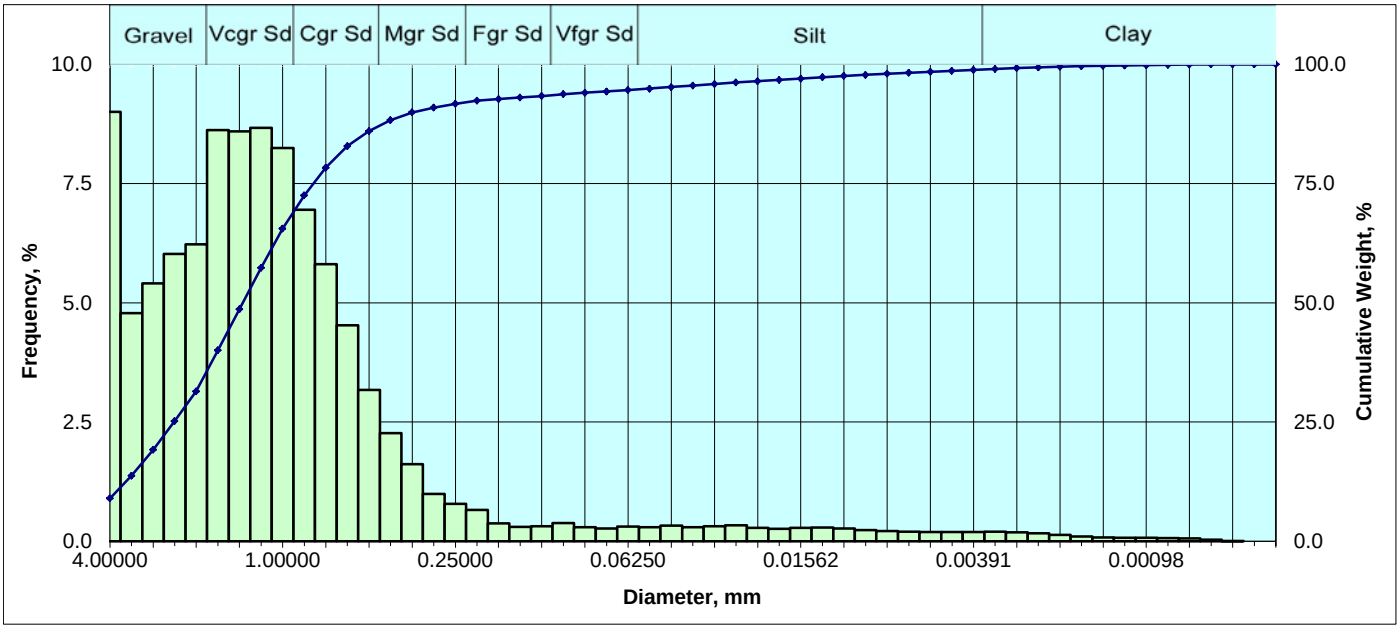
** Distribution pattern precludes calculation of these statistical parameters.

Core Lab
RESERVOIR OPTIMIZATION

Company: RMC Consultants, Inc.
Project Name: Atlas Missile Site 4 RI Addendum
Project Number: E15-019-201

CL File Number: 1704035
Sample ID: FEW4-MW77-255

Sieve and Laser Particle Size Analysis



Particle Size Distribution

	Diameter				Weight %	
	[US Mesh]	[in.]	[mm]	[ϕ]	[Incl.]	[Cum.]
Granule	5	0.157480	4.00000	-2.00	9.003	9.00
	6	0.132425	3.36359	-1.75	4.785	13.79
	7	0.111355	2.82843	-1.50	5.406	19.19
	8	0.093638	2.37841	-1.25	6.027	25.22
	10	0.078740	2.00000	-1.00	6.229	31.45
V Crse Sand	12	0.066212	1.68179	-0.75	8.621	40.07
	14	0.055678	1.41421	-0.50	8.597	48.67
	16	0.046819	1.18921	-0.25	8.670	57.34
	18	0.039370	1.00000	0.00	8.244	65.58
Coarse Sand	20	0.033106	0.84090	0.25	6.948	72.53
	25	0.027839	0.70711	0.50	5.811	78.34
	30	0.023410	0.59460	0.75	4.529	82.87
	35	0.019685	0.50000	1.00	3.177	86.05
Medium Sand	40	0.016553	0.42045	1.25	2.271	88.32
	45	0.013919	0.35355	1.50	1.617	89.94
	50	0.011705	0.29730	1.75	0.992	90.93
	60	0.009843	0.25000	2.00	0.784	91.71
Fine Sand	70	0.008277	0.21022	2.25	0.659	92.37
	80	0.006960	0.17678	2.50	0.375	92.75
	100	0.005852	0.14865	2.75	0.301	93.05
	120	0.004921	0.12500	3.00	0.316	93.36
V. Fine Sand	140	0.004138	0.10511	3.25	0.381	93.74
	170	0.003480	0.08839	3.50	0.298	94.04
	200	0.002926	0.07433	3.75	0.272	94.31
	230	0.002461	0.06250	4.00	0.307	94.62
Silt	270	0.002069	0.05256	4.25	0.297	94.92
	325	0.001740	0.04419	4.50	0.329	95.25
	400	0.001463	0.03716	4.75	0.293	95.54
	450	0.001230	0.03125	5.00	0.318	95.86
	500	0.001035	0.02628	5.25	0.333	96.19
	635	0.000870	0.02210	5.50	0.282	96.47
		0.000732	0.01858	5.75	0.264	96.74
		0.000615	0.01562	6.00	0.284	97.02
		0.000517	0.01314	6.25	0.291	97.31
		0.000435	0.01105	6.50	0.269	97.58
		0.000366	0.00929	6.75	0.238	97.82
		0.000308	0.00781	7.00	0.215	98.03
		0.000259	0.00657	7.25	0.203	98.24
		0.000217	0.00552	7.50	0.196	98.43
		0.000183	0.00465	7.75	0.194	98.63
		0.000154	0.00391	8.00	0.198	98.82
Clay		0.000129	0.00328	8.25	0.199	99.02
		0.000109	0.00276	8.50	0.190	99.21
		0.000091	0.00232	8.75	0.167	99.38
		0.000077	0.00195	9.00	0.133	99.51
		0.000065	0.00164	9.25	0.101	99.61
		0.000054	0.00138	9.50	0.079	99.69
		0.000046	0.00116	9.75	0.071	99.76
		0.000038	0.00098	10.00	0.072	99.84
		0.000032	0.00082	10.25	0.071	99.91
		0.000027	0.00069	10.50	0.058	99.97
		0.000023	0.00058	10.75	0.031	100.00
		0.000019	0.00049	11.00	0.004	100.00
		0.000016	0.00041	11.25	0.000	100.00
		0.000015	0.00038	11.50	0.000	100.00

Sorting Statistics (Folk)

Parameter	Trask	Inman	Folk
Median	Very coarse sand sized		
(in)	0.0543	0.0543	0.0543
(mm)	1.3796	1.3796	1.3796
Mean	Very coarse sand sized		
(in)	0.0626	0.0523	0.0530
(mm)	1.5895	1.3282	1.3451
Sorting	Poor		
	1.748	1.243	1.682
Skewness	Finely skewed		
	0.993	1.024	0.204
Kurtosis	Very leptokurtic		
	0.229	1.815	1.781

Component Percentages

Gravel	Sand	Silt	Clay	Silt + Clay
31.45	63.17	4.20	1.18	5.38

Percentile [Weight, %]	Particle Diameter [in.]	[mm]	[phi]
5	0.2542	6.4566	-2.6908
10	0.1523	3.8674	-1.9514
16	0.1238	3.1446	-1.6529
25	0.0943	2.3949	-1.2600
30	0.0822	2.0881	-1.0622
40	0.0663	1.6844	-0.7522
50	0.0543	1.3796	-0.4643
60	0.0444	1.1281	-0.1739
75	0.0309	0.7840	0.3510
84	0.0221	0.5610	0.8340
90	0.0138	0.3499	1.5150
95	0.0020	0.0504	4.3093

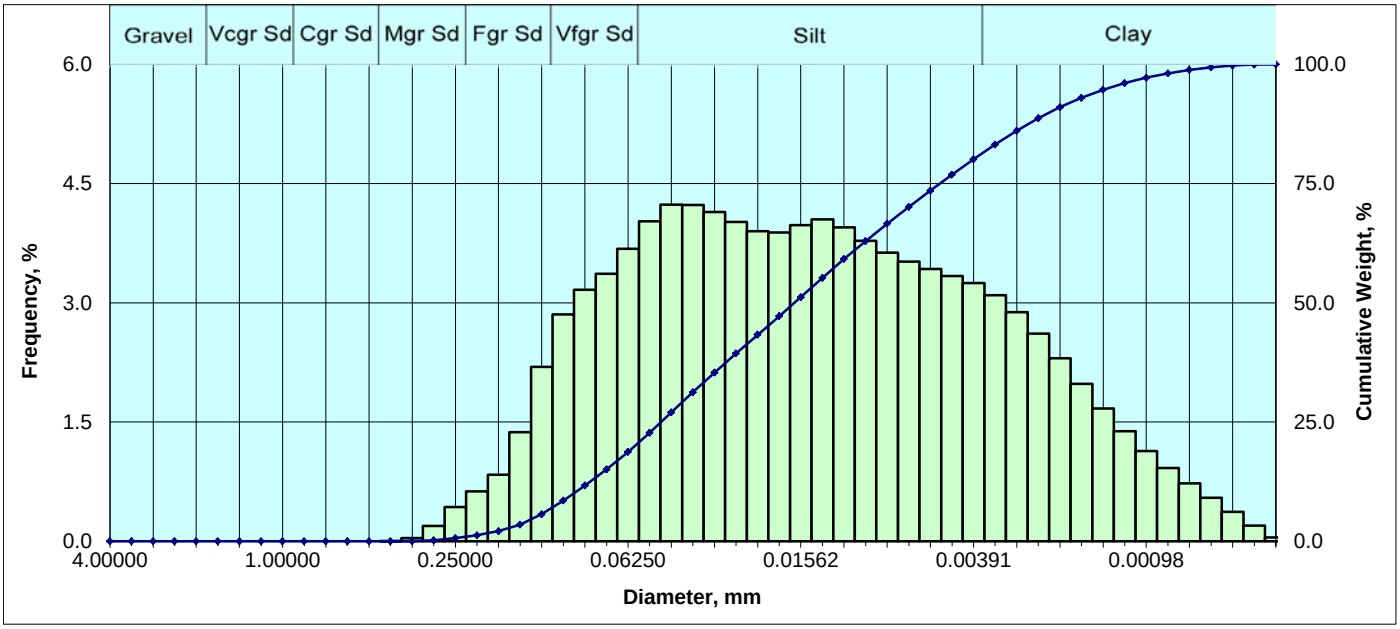
** Distribution pattern precludes calculation of these statistical parameters.

Core Lab
RESERVOIR OPTIMIZATION

Company: RMC Consultants, Inc.
Project Name: Atlas Missile Site 4 RI Addendum
Project Number: E15-019-201

CL File Number: 1704035
Sample ID: FEW4-MW83-124

Sieve and Laser Particle Size Analysis



Particle Size Distribution

	Diameter [US Mesh]	Diameter [in.]	Diameter [mm]	Diameter [ϕ]	Weight % [Incl.]	Weight % [Cum.]
Granule	5	0.157480	4.00000	-2.00	0.000	0.00
	6	0.132425	3.36359	-1.75	0.000	0.00
	7	0.111355	2.82843	-1.50	0.000	0.00
	8	0.093638	2.37841	-1.25	0.000	0.00
	10	0.078740	2.00000	-1.00	0.000	0.00
V Crse Sand	12	0.066212	1.68179	-0.75	0.000	0.00
	14	0.055678	1.41421	-0.50	0.000	0.00
	16	0.046819	1.18921	-0.25	0.000	0.00
	18	0.039370	1.00000	0.00	0.000	0.00
Coarse Sand	20	0.033106	0.84090	0.25	0.000	0.00
	25	0.027839	0.70711	0.50	0.000	0.00
	30	0.023410	0.59460	0.75	0.000	0.00
	35	0.019685	0.50000	1.00	0.000	0.00
Medium Sand	40	0.016553	0.42045	1.25	0.002	0.00
	45	0.013919	0.35355	1.50	0.039	0.04
	50	0.011705	0.29730	1.75	0.192	0.23
	60	0.009843	0.25000	2.00	0.429	0.66
Fine Sand	70	0.008277	0.21022	2.25	0.626	1.29
	80	0.006960	0.17678	2.50	0.836	2.12
	100	0.005852	0.14865	2.75	1.371	3.50
	120	0.004921	0.12500	3.00	2.193	5.69
V. Fine Sand	140	0.004138	0.10511	3.25	2.855	8.54
	170	0.003480	0.08839	3.50	3.164	11.71
	200	0.002926	0.07433	3.75	3.365	15.07
	230	0.002461	0.06250	4.00	3.680	18.75
Silt	270	0.002069	0.05256	4.25	4.026	22.78
	325	0.001740	0.04419	4.50	4.237	27.02
	400	0.001463	0.03716	4.75	4.232	31.25
	450	0.001230	0.03125	5.00	4.144	35.39
	500	0.001035	0.02628	5.25	4.019	39.41
	635	0.000870	0.02210	5.50	3.902	43.31
		0.000732	0.01858	5.75	3.887	47.20
		0.000615	0.01562	6.00	3.979	51.18
		0.000517	0.01314	6.25	4.050	55.23
		0.000435	0.01105	6.50	3.950	59.18
		0.000366	0.00929	6.75	3.782	62.96
		0.000308	0.00781	7.00	3.633	66.59
		0.000259	0.00657	7.25	3.517	70.11
		0.000217	0.00552	7.50	3.425	73.53
		0.000183	0.00465	7.75	3.338	76.87
		0.000154	0.00391	8.00	3.247	80.12
Clay		0.000129	0.00328	8.25	3.097	83.22
		0.000109	0.00276	8.50	2.883	86.10
		0.000091	0.00232	8.75	2.612	88.71
		0.000077	0.00195	9.00	2.304	91.02
		0.000065	0.00164	9.25	1.980	93.00
		0.000054	0.00138	9.50	1.669	94.67
		0.000046	0.00116	9.75	1.386	96.05
		0.000038	0.00098	10.00	1.136	97.19
		0.000032	0.00082	10.25	0.922	98.11
		0.000027	0.00069	10.50	0.728	98.84
		0.000023	0.00058	10.75	0.547	99.38
		0.000019	0.00049	11.00	0.372	99.76
		0.000016	0.00041	11.25	0.196	99.95
		0.000015	0.00038	11.50	0.048	100.00

Sorting Statistics (Folk)

Parameter	Trask	Inman	Folk
Median	**Silt sized**		
(in)	0.0006	0.0006	0.0006
(mm)	0.0165	0.0165	0.0165
Mean	**Silt sized**		
(in)	0.0010	0.0006	0.0006
(mm)	0.0267	0.0150	0.0155
Sorting	**V. Poor**		
	3.062	2.252	2.132
Skewness	**Near symmetrical**		
	0.954	0.140	0.079
Kurtosis	**Platykurtic**		
	0.226	0.474	0.843

Component Percentages

Gravel	Sand	Silt	Clay	Silt + Clay
0.00	18.75	61.37	19.88	81.25

Percentile [Weight, %]	Particle Diameter [in.]	[mm]	[phi]
5	0.0052	0.1324	2.9168
10	0.0038	0.0974	3.3597
16	0.0028	0.0713	3.8090
25	0.0019	0.0482	4.3757
30	0.0015	0.0392	4.6717
40	0.0010	0.0256	5.2851
50	0.0006	0.0165	5.9214
60	0.0004	0.0107	6.5508
75	0.0002	0.0051	7.6045
84	0.0001	0.0031	8.3138
90	0.0001	0.0021	8.8844
95	0.0001	0.0013	9.5565

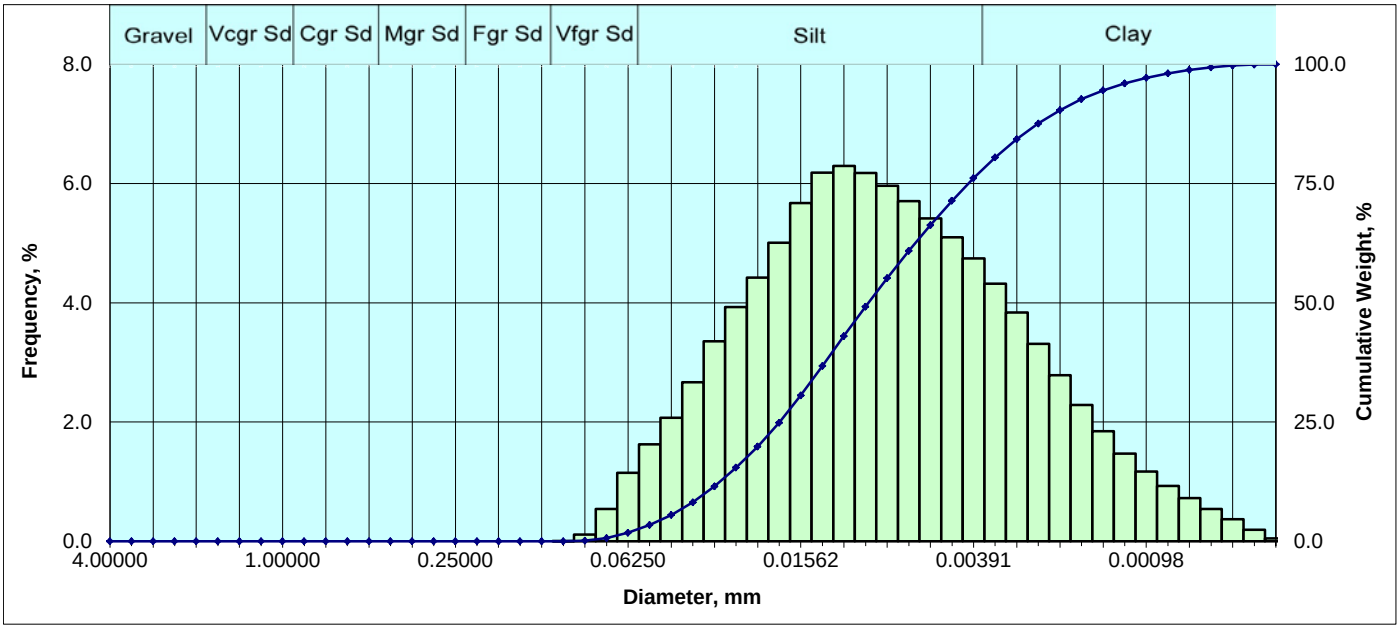
** Distribution pattern precludes calculation of these statistical parameters.

Core Lab
RESERVOIR OPTIMIZATION

Company: RMC Consultants, Inc.
Project Name: Atlas Missile Site 4 RI Addendum
Project Number: E15-019-201

CL File Number: 1704035
Sample ID: FEW4-MW83-85

Sieve and Laser Particle Size Analysis



Particle Size Distribution

	Diameter [US Mesh]	Diameter [in.]	Diameter [mm]	Diameter [ϕ]	Weight % [Incl.]	Weight % [Cum.]
Granule	5	0.157480	4.00000	-2.00	0.000	0.00
	6	0.132425	3.36359	-1.75	0.000	0.00
	7	0.111355	2.82843	-1.50	0.000	0.00
	8	0.093638	2.37841	-1.25	0.000	0.00
	10	0.078740	2.00000	-1.00	0.000	0.00
V Crse Sand	12	0.066212	1.68179	-0.75	0.000	0.00
	14	0.055678	1.41421	-0.50	0.000	0.00
	16	0.046819	1.18921	-0.25	0.000	0.00
	18	0.039370	1.00000	0.00	0.000	0.00
Coarse Sand	20	0.033106	0.84090	0.25	0.000	0.00
	25	0.027839	0.70711	0.50	0.000	0.00
	30	0.023410	0.59460	0.75	0.000	0.00
	35	0.019685	0.50000	1.00	0.000	0.00
Medium Sand	40	0.016553	0.42045	1.25	0.000	0.00
	45	0.013919	0.35355	1.50	0.000	0.00
	50	0.011705	0.29730	1.75	0.000	0.00
	60	0.009843	0.25000	2.00	0.000	0.00
Fine Sand	70	0.008277	0.21022	2.25	0.000	0.00
	80	0.006960	0.17678	2.50	0.000	0.00
	100	0.005852	0.14865	2.75	0.000	0.00
	120	0.004921	0.12500	3.00	0.000	0.00
V. Fine Sand	140	0.004138	0.10511	3.25	0.004	0.00
	170	0.003480	0.08839	3.50	0.112	0.12
	200	0.002926	0.07433	3.75	0.542	0.66
	230	0.002461	0.06250	4.00	1.152	1.81
Silt	270	0.002069	0.05256	4.25	1.628	3.44
	325	0.001740	0.04419	4.50	2.072	5.51
	400	0.001463	0.03716	4.75	2.668	8.18
	450	0.001230	0.03125	5.00	3.353	11.53
	500	0.001035	0.02628	5.25	3.931	15.46
	635	0.000870	0.02210	5.50	4.424	19.89
		0.000732	0.01858	5.75	5.010	24.90
		0.000615	0.01562	6.00	5.673	30.57
		0.000517	0.01314	6.25	6.182	36.75
		0.000435	0.01105	6.50	6.295	43.05
		0.000366	0.00929	6.75	6.178	49.22
		0.000308	0.00781	7.00	5.965	55.19
		0.000259	0.00657	7.25	5.704	60.89
		0.000217	0.00552	7.50	5.417	66.31
		0.000183	0.00465	7.75	5.098	71.41
		0.000154	0.00391	8.00	4.747	76.15
Clay		0.000129	0.00328	8.25	4.321	80.48
		0.000109	0.00276	8.50	3.835	84.31
		0.000091	0.00232	8.75	3.313	87.62
		0.000077	0.00195	9.00	2.786	90.41
		0.000065	0.00164	9.25	2.287	92.70
		0.000054	0.00138	9.50	1.845	94.54
		0.000046	0.00116	9.75	1.472	96.01
		0.000038	0.00098	10.00	1.170	97.18
		0.000032	0.00082	10.25	0.931	98.11
		0.000027	0.00069	10.50	0.727	98.84
		0.000023	0.00058	10.75	0.544	99.39
		0.000019	0.00049	11.00	0.371	99.76
		0.000016	0.00041	11.25	0.196	99.95
		0.000015	0.00038	11.50	0.048	100.00

Sorting Statistics (Folk)

Parameter	Trask	Inman	Folk
Median	**Silt sized**		
(in)	0.0004	0.0004	0.0004
(mm)	0.0091	0.0091	0.0091
Mean	**Silt sized**		
(in)	0.0004	0.0003	0.0003
(mm)	0.0113	0.0085	0.0087
Sorting	**Poor**		
	2.129	1.600	1.579
Skewness	**Near symmetrical**		
	0.956	0.140	0.074
Kurtosis	**Mesokurtic**		
	0.226	0.606	0.966

Component Percentages

Gravel	Sand	Silt	Clay	Silt + Clay
0.00	1.81	74.34	23.85	98.19

Percentile [Weight, %]	Particle Diameter [in.]	[mm]	[phi]
5	0.0018	0.0463	4.4343
10	0.0013	0.0340	4.8804
16	0.0010	0.0258	5.2782
25	0.0007	0.0185	5.7542
30	0.0006	0.0159	5.9729
40	0.0005	0.0121	6.3736
50	0.0004	0.0091	6.7802
60	0.0003	0.0068	7.2079
75	0.0002	0.0041	7.9351
84	0.0001	0.0028	8.4781
90	0.0001	0.0020	8.9604
95	0.0001	0.0013	9.5732

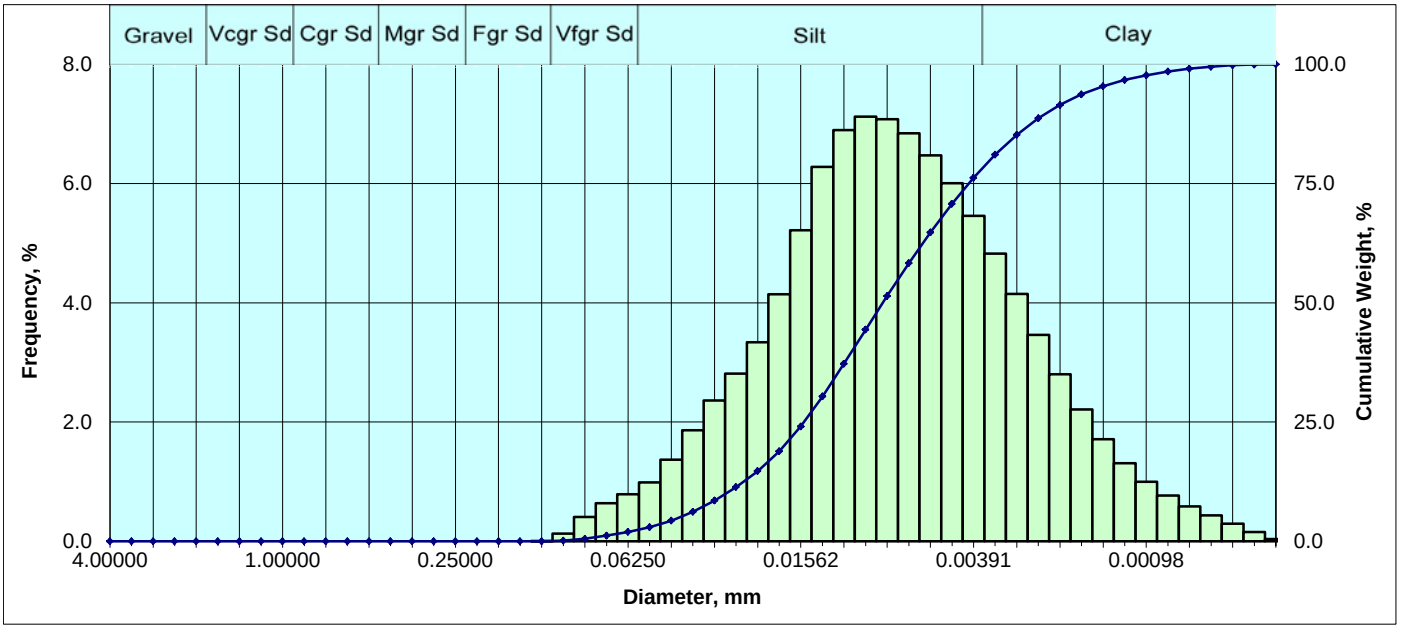
** Distribution pattern precludes calculation of these statistical parameters.

Core Lab
RESERVOIR OPTIMIZATION

Company: RMC Consultants, Inc.
Project Name: Atlas Missile Site 4 RI Addendum
Project Number: E15-019-201

CL File Number: 1704035
Sample ID: FEW4-MW83-265

Sieve and Laser Particle Size Analysis



Particle Size Distribution

	Diameter				Weight %	
	[US Mesh]	[in.]	[mm]	[ϕ]	[Incl.]	[Cum.]
Granule	5	0.157480	4.00000	-2.00	0.000	0.00
	6	0.132425	3.36359	-1.75	0.000	0.00
	7	0.111355	2.82843	-1.50	0.000	0.00
	8	0.093638	2.37841	-1.25	0.000	0.00
	10	0.078740	2.00000	-1.00	0.000	0.00
V Crse Sand	12	0.066212	1.68179	-0.75	0.000	0.00
	14	0.055678	1.41421	-0.50	0.000	0.00
	16	0.046819	1.18921	-0.25	0.000	0.00
	18	0.039370	1.00000	0.00	0.000	0.00
Coarse Sand	20	0.033106	0.84090	0.25	0.000	0.00
	25	0.027839	0.70711	0.50	0.000	0.00
	30	0.023410	0.59460	0.75	0.000	0.00
	35	0.019685	0.50000	1.00	0.000	0.00
Medium Sand	40	0.016553	0.42045	1.25	0.000	0.00
	45	0.013919	0.35355	1.50	0.000	0.00
	50	0.011705	0.29730	1.75	0.000	0.00
	60	0.009843	0.25000	2.00	0.000	0.00
Fine Sand	70	0.008277	0.21022	2.25	0.000	0.00
	80	0.006960	0.17678	2.50	0.000	0.00
	100	0.005852	0.14865	2.75	0.000	0.00
	120	0.004921	0.12500	3.00	0.008	0.01
V. Fine Sand	140	0.004138	0.10511	3.25	0.130	0.14
	170	0.003480	0.08839	3.50	0.408	0.55
	200	0.002926	0.07433	3.75	0.641	1.19
	230	0.002461	0.06250	4.00	0.788	1.97
Silt	270	0.002069	0.05256	4.25	0.987	2.96
	325	0.001740	0.04419	4.50	1.369	4.33
	400	0.001463	0.03716	4.75	1.864	6.19
	450	0.001230	0.03125	5.00	2.363	8.56
	500	0.001035	0.02628	5.25	2.815	11.37
	635	0.000870	0.02210	5.50	3.341	14.71
		0.000732	0.01858	5.75	4.146	18.86
		0.000615	0.01562	6.00	5.217	24.08
		0.000517	0.01314	6.25	6.282	30.36
		0.000435	0.01105	6.50	6.899	37.26
		0.000366	0.00929	6.75	7.125	44.38
		0.000308	0.00781	7.00	7.081	51.46
		0.000259	0.00657	7.25	6.843	58.31
		0.000217	0.00552	7.50	6.475	64.78
		0.000183	0.00465	7.75	6.006	70.79
		0.000154	0.00391	8.00	5.460	76.25
Clay		0.000129	0.00328	8.25	4.826	81.07
		0.000109	0.00276	8.50	4.147	85.22
		0.000091	0.00232	8.75	3.460	88.68
		0.000077	0.00195	9.00	2.805	91.49
		0.000065	0.00164	9.25	2.214	93.70
		0.000054	0.00138	9.50	1.714	95.41
		0.000046	0.00116	9.75	1.309	96.72
		0.000038	0.00098	10.00	0.999	97.72
		0.000032	0.00082	10.25	0.770	98.49
		0.000027	0.00069	10.50	0.588	99.08
		0.000023	0.00058	10.75	0.434	99.51
		0.000019	0.00049	11.00	0.294	99.81
		0.000016	0.00041	11.25	0.155	99.96
		0.000015	0.00038	11.50	0.038	100.00

Sorting Statistics (Folk)

Parameter	Trask	Inman	Folk
Median	Silt sized		
(in)	0.0003	0.0003	0.0003
(mm)	0.0081	0.0081	0.0081
Mean	Silt sized		
(in)	0.0004	0.0003	0.0003
(mm)	0.0097	0.0078	0.0079
Sorting	Poor		
	1.935	1.424	1.447
Skewness	Near symmetrical		
	0.971	0.046	0.032
Kurtosis	Mesokurtic		
	0.211	0.703	1.044

Component Percentages

Gravel	Sand	Silt	Clay	Silt + Clay
0.00	1.97	74.27	23.75	98.03

Percentile [Weight, %]	Particle Diameter [in.]	[mm]	[phi]
5	0.0016	0.0417	4.5848
10	0.0011	0.0287	5.1226
16	0.0008	0.0210	5.5730
25	0.0006	0.0153	6.0341
30	0.0005	0.0133	6.2345
40	0.0004	0.0104	6.5911
50	0.0003	0.0081	6.9446
60	0.0002	0.0063	7.3113
75	0.0002	0.0041	7.9389
84	0.0001	0.0029	8.4218
90	0.0001	0.0021	8.8622
95	0.0001	0.0014	9.4356

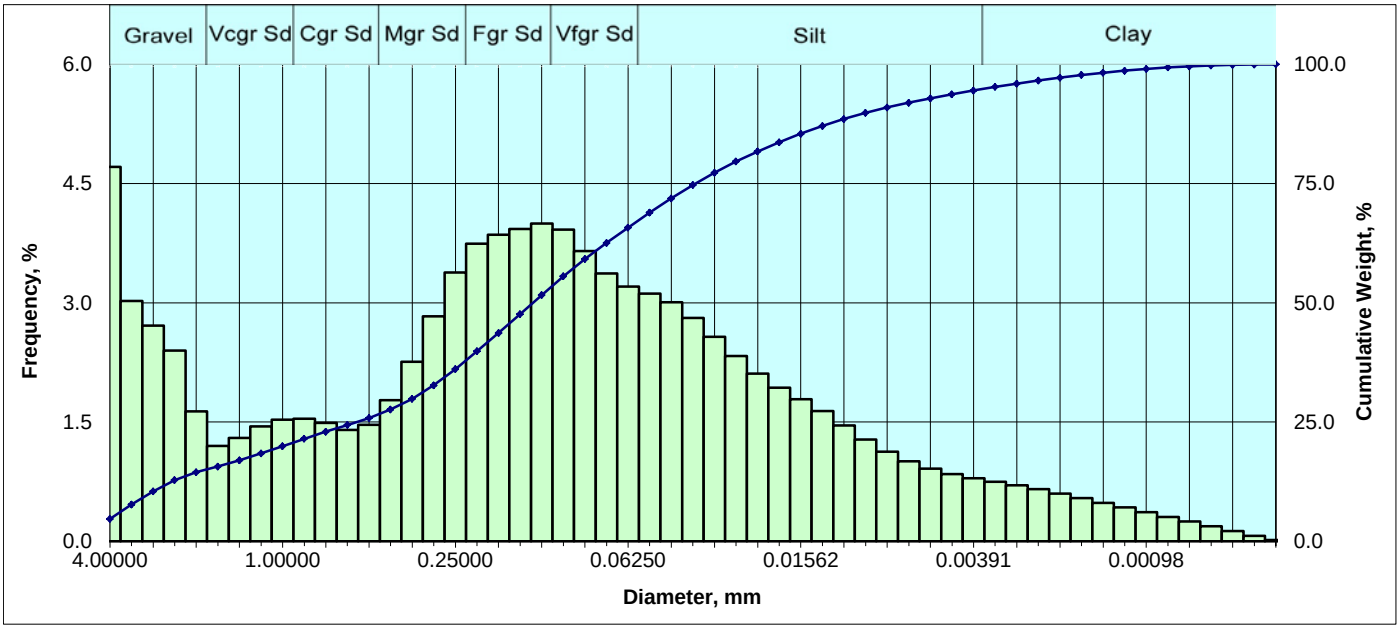
** Distribution pattern precludes calculation of these statistical parameters.

Core Lab
RESERVOIR OPTIMIZATION

Company: RMC Consultants, Inc.
Project Name: Atlas Missile Site 4 RI Addendum
Project Number: E15-019-201

CL File Number: 1704035
Sample ID: FEW4-MW86-189

Sieve and Laser Particle Size Analysis



Particle Size Distribution

	Diameter				Weight %	
	[US Mesh]	[in.]	[mm]	[ϕ]	[Incl.]	[Cum.]
Granule	5	0.157480	4.00000	-2.00	4.710	4.71
	6	0.132425	3.36359	-1.75	3.024	7.73
	7	0.111355	2.82843	-1.50	2.712	10.45
	8	0.093638	2.37841	-1.25	2.400	12.84
	10	0.078740	2.00000	-1.00	1.633	14.48
V Crse Sand	12	0.066212	1.68179	-0.75	1.198	15.68
	14	0.055678	1.41421	-0.50	1.302	16.98
	16	0.046819	1.18921	-0.25	1.447	18.43
	18	0.039370	1.00000	0.00	1.528	19.95
Coarse Sand	20	0.033106	0.84090	0.25	1.544	21.50
	25	0.027839	0.70711	0.50	1.490	22.99
	30	0.023410	0.59460	0.75	1.403	24.39
	35	0.019685	0.50000	1.00	1.465	25.86
Medium Sand	40	0.016553	0.42045	1.25	1.774	27.63
	45	0.013919	0.35355	1.50	2.259	29.89
	50	0.011705	0.29730	1.75	2.830	32.72
	60	0.009843	0.25000	2.00	3.383	36.10
Fine Sand	70	0.008277	0.21022	2.25	3.744	39.85
	80	0.006960	0.17678	2.50	3.855	43.70
	100	0.005852	0.14865	2.75	3.928	47.63
	120	0.004921	0.12500	3.00	3.999	51.63
V. Fine Sand	140	0.004138	0.10511	3.25	3.919	55.55
	170	0.003480	0.08839	3.50	3.653	59.20
	200	0.002926	0.07433	3.75	3.371	62.57
	230	0.002461	0.06250	4.00	3.204	65.78
Silt	270	0.002069	0.05256	4.25	3.115	68.89
	325	0.001740	0.04419	4.50	3.006	71.90
	400	0.001463	0.03716	4.75	2.810	74.71
	450	0.001230	0.03125	5.00	2.574	77.28
	500	0.001035	0.02628	5.25	2.333	79.61
	635	0.000870	0.02210	5.50	2.112	81.73
		0.000732	0.01858	5.75	1.934	83.66
		0.000615	0.01562	6.00	1.790	85.45
		0.000517	0.01314	6.25	1.639	87.09
		0.000435	0.01105	6.50	1.458	88.54
		0.000366	0.00929	6.75	1.279	89.82
		0.000308	0.00781	7.00	1.127	90.95
		0.000259	0.00657	7.25	1.007	91.96
		0.000217	0.00552	7.50	0.914	92.87
		0.000183	0.00465	7.75	0.844	93.72
		0.000154	0.00391	8.00	0.793	94.51
Clay		0.000129	0.00328	8.25	0.749	95.26
		0.000109	0.00276	8.50	0.704	95.96
		0.000091	0.00232	8.75	0.655	96.62
		0.000077	0.00195	9.00	0.602	97.22
		0.000065	0.00164	9.25	0.544	97.76
		0.000054	0.00138	9.50	0.484	98.25
		0.000046	0.00116	9.75	0.425	98.67
		0.000038	0.00098	10.00	0.365	99.04
		0.000032	0.00082	10.25	0.308	99.34
		0.000027	0.00069	10.50	0.249	99.59
		0.000023	0.00058	10.75	0.190	99.78
		0.000019	0.00049	11.00	0.131	99.91
		0.000016	0.00041	11.25	0.069	99.98
		0.000015	0.00038	11.50	0.017	100.00

Sorting Statistics (Folk)

Parameter	Trask	Inman	Folk
Median	Fine sand sized		
(in)	0.0053	0.0053	0.0053
(mm)	0.1346	0.1346	0.1346
Mean	Fine sand sized		
(in)	0.0116	0.0067	0.0062
(mm)	0.2959	0.1706	0.1576
Sorting	V. Poor		
	3.901	3.243	3.157
Skewness	Near symmetrical		
	1.057	0.061	-0.033
Kurtosis	Mesokurtic		
	0.089	0.563	1.058

Component Percentages

Gravel	Sand	Silt	Clay	Silt + Clay
14.48	51.30	28.73	5.49	34.22

Percentile [Weight, %]	Particle Diameter [in.]	[mm]	[phi]
5	0.1551	3.9389	-1.9778
10	0.1148	2.9163	-1.5441
16	0.0636	1.6152	-0.6917
25	0.0219	0.5552	0.8489
30	0.0138	0.3513	1.5091
40	0.0082	0.2089	2.2592
50	0.0053	0.1346	2.8929
60	0.0033	0.0851	3.5555
75	0.0014	0.0365	4.7764
84	0.0007	0.0180	5.7944
90	0.0004	0.0091	6.7864
95	0.0001	0.0035	8.1592

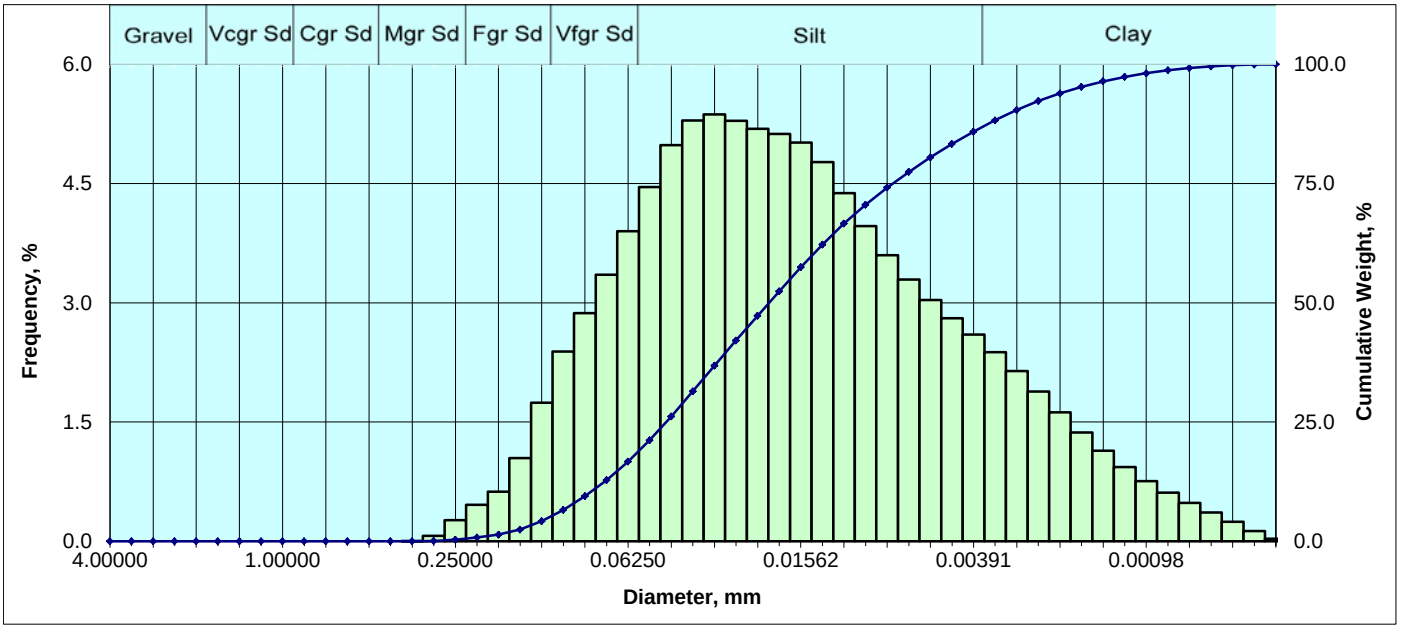
** Distribution pattern precludes calculation of these statistical parameters.

Core Lab
RESERVOIR OPTIMIZATION

Company: RMC Consultants, Inc.
Project Name: Atlas Missile Site 4 RI Addendum
Project Number: E15-019-201

CL File Number: 1704035
Sample ID: FEW4-MW86-52

Sieve and Laser Particle Size Analysis



Particle Size Distribution

	Diameter				Weight %	
	[US Mesh]	[in.]	[mm]	[ϕ]	[Incl.]	[Cum.]
Granule	5	0.157480	4.00000	-2.00	0.000	0.00
	6	0.132425	3.36359	-1.75	0.000	0.00
	7	0.111355	2.82843	-1.50	0.000	0.00
	8	0.093638	2.37841	-1.25	0.000	0.00
	10	0.078740	2.00000	-1.00	0.000	0.00
V Crse Sand	12	0.066212	1.68179	-0.75	0.000	0.00
	14	0.055678	1.41421	-0.50	0.000	0.00
	16	0.046819	1.18921	-0.25	0.000	0.00
	18	0.039370	1.00000	0.00	0.000	0.00
Coarse Sand	20	0.033106	0.84090	0.25	0.000	0.00
	25	0.027839	0.70711	0.50	0.000	0.00
	30	0.023410	0.59460	0.75	0.000	0.00
	35	0.019685	0.50000	1.00	0.000	0.00
Medium Sand	40	0.016553	0.42045	1.25	0.000	0.00
	45	0.013919	0.35355	1.50	0.004	0.00
	50	0.011705	0.29730	1.75	0.070	0.07
	60	0.009843	0.25000	2.00	0.267	0.34
Fine Sand	70	0.008277	0.21022	2.25	0.460	0.80
	80	0.006960	0.17678	2.50	0.624	1.42
	100	0.005852	0.14865	2.75	1.047	2.47
	120	0.004921	0.12500	3.00	1.744	4.22
V. Fine Sand	140	0.004138	0.10511	3.25	2.386	6.60
	170	0.003480	0.08839	3.50	2.871	9.47
	200	0.002926	0.07433	3.75	3.352	12.83
	230	0.002461	0.06250	4.00	3.901	16.73
Silt	270	0.002069	0.05256	4.25	4.457	21.18
	325	0.001740	0.04419	4.50	4.984	26.17
	400	0.001463	0.03716	4.75	5.293	31.46
	450	0.001230	0.03125	5.00	5.371	36.83
	500	0.001035	0.02628	5.25	5.291	42.12
	635	0.000870	0.02210	5.50	5.188	47.31
		0.000732	0.01858	5.75	5.124	52.43
		0.000615	0.01562	6.00	5.017	57.45
		0.000517	0.01314	6.25	4.771	62.22
		0.000435	0.01105	6.50	4.379	66.60
		0.000366	0.00929	6.75	3.966	70.57
		0.000308	0.00781	7.00	3.601	74.17
		0.000259	0.00657	7.25	3.294	77.46
		0.000217	0.00552	7.50	3.035	80.49
		0.000183	0.00465	7.75	2.807	83.30
		0.000154	0.00391	8.00	2.600	85.90
Clay		0.000129	0.00328	8.25	2.380	88.28
		0.000109	0.00276	8.50	2.141	90.42
		0.000091	0.00232	8.75	1.886	92.31
		0.000077	0.00195	9.00	1.625	93.93
		0.000065	0.00164	9.25	1.370	95.30
		0.000054	0.00138	9.50	1.138	96.44
		0.000046	0.00116	9.75	0.933	97.37
		0.000038	0.00098	10.00	0.759	98.13
		0.000032	0.00082	10.25	0.613	98.75
		0.000027	0.00069	10.50	0.483	99.23
		0.000023	0.00058	10.75	0.362	99.59
		0.000019	0.00049	11.00	0.247	99.84
		0.000016	0.00041	11.25	0.130	99.97
		0.000015	0.00038	11.50	0.032	100.00

Sorting Statistics (Folk)

Parameter	Trask	Inman	Folk
Median	**Silt sized**		
(in)	0.0008	0.0008	0.0008
(mm)	0.0203	0.0203	0.0203
Mean	**Silt sized**		
(in)	0.0011	0.0007	0.0007
(mm)	0.0268	0.0170	0.0180
Sorting	**Poor**		
	2.481	1.931	1.892
Skewness	**Finely skewed**		
	0.919	0.263	0.149
Kurtosis	**Mesokurtic**		
	0.232	0.583	0.956

Component Percentages

Gravel	Sand	Silt	Clay	Silt + Clay
0.00	16.73	69.18	14.10	83.27

Percentile [Weight, %]	Particle Diameter [in.]	[mm]	[phi]
5	0.0047	0.1185	3.0775
10	0.0034	0.0862	3.5365
16	0.0025	0.0647	3.9500
25	0.0018	0.0462	4.4375
30	0.0015	0.0391	4.6766
40	0.0011	0.0283	5.1445
50	0.0008	0.0203	5.6259
60	0.0006	0.0143	6.1282
75	0.0003	0.0075	7.0593
84	0.0002	0.0044	7.8130
90	0.0001	0.0029	8.4471
95	0.0001	0.0017	9.1907

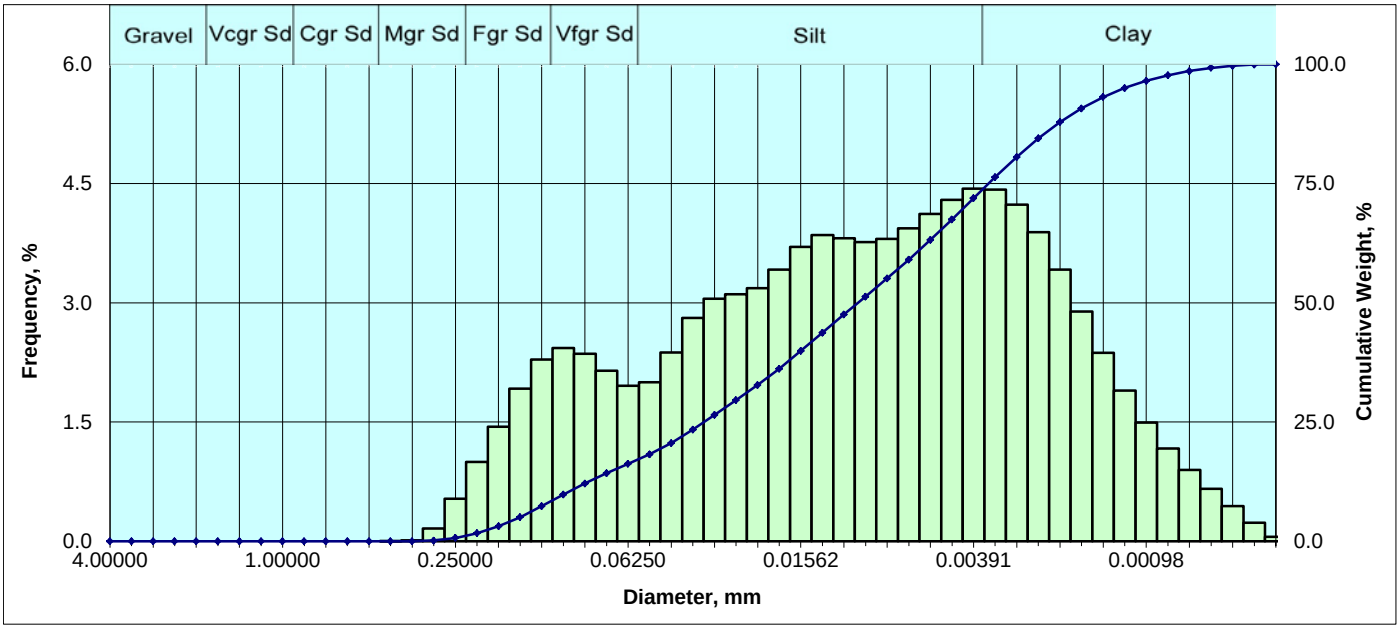
** Distribution pattern precludes calculation of these statistical parameters.

Core Lab
RESERVOIR OPTIMIZATION

Company: RMC Consultants, Inc.
Project Name: Atlas Missile Site 4 RI Addendum
Project Number: E15-019-201

CL File Number: 1704035
Sample ID: FEW4-MW86-362

Sieve and Laser Particle Size Analysis



Particle Size Distribution

	Diameter				Weight %	
	[US Mesh]	[in.]	[mm]	[ϕ]	[Incl.]	[Cum.]
Granule	5	0.157480	4.00000	-2.00	0.000	0.00
	6	0.132425	3.36359	-1.75	0.000	0.00
	7	0.111355	2.82843	-1.50	0.000	0.00
	8	0.093638	2.37841	-1.25	0.000	0.00
	10	0.078740	2.00000	-1.00	0.000	0.00
V Crse Sand	12	0.066212	1.68179	-0.75	0.000	0.00
	14	0.055678	1.41421	-0.50	0.000	0.00
	16	0.046819	1.18921	-0.25	0.000	0.00
	18	0.039370	1.00000	0.00	0.000	0.00
Coarse Sand	20	0.033106	0.84090	0.25	0.000	0.00
	25	0.027839	0.70711	0.50	0.000	0.00
	30	0.023410	0.59460	0.75	0.000	0.00
	35	0.019685	0.50000	1.00	0.000	0.00
Medium Sand	40	0.016553	0.42045	1.25	0.000	0.00
	45	0.013919	0.35355	1.50	0.014	0.01
	50	0.011705	0.29730	1.75	0.159	0.17
	60	0.009843	0.25000	2.00	0.536	0.71
Fine Sand	70	0.008277	0.21022	2.25	0.999	1.71
	80	0.006960	0.17678	2.50	1.443	3.15
	100	0.005852	0.14865	2.75	1.919	5.07
	120	0.004921	0.12500	3.00	2.286	7.36
V. Fine Sand	140	0.004138	0.10511	3.25	2.431	9.79
	170	0.003480	0.08839	3.50	2.358	12.15
	200	0.002926	0.07433	3.75	2.147	14.29
	230	0.002461	0.06250	4.00	1.958	16.25
Silt	270	0.002069	0.05256	4.25	2.000	18.25
	325	0.001740	0.04419	4.50	2.377	20.63
	400	0.001463	0.03716	4.75	2.812	23.44
	450	0.001230	0.03125	5.00	3.052	26.49
	500	0.001035	0.02628	5.25	3.107	29.60
	635	0.000870	0.02210	5.50	3.185	32.78
		0.000732	0.01858	5.75	3.419	36.20
		0.000615	0.01562	6.00	3.702	39.90
		0.000517	0.01314	6.25	3.852	43.76
		0.000435	0.01105	6.50	3.812	47.57
		0.000366	0.00929	6.75	3.762	51.33
		0.000308	0.00781	7.00	3.805	55.13
		0.000259	0.00657	7.25	3.938	59.07
		0.000217	0.00552	7.50	4.118	63.19
		0.000183	0.00465	7.75	4.295	67.49
		0.000154	0.00391	8.00	4.438	71.92
Clay		0.000129	0.00328	8.25	4.424	76.35
		0.000109	0.00276	8.50	4.237	80.58
		0.000091	0.00232	8.75	3.887	84.47
		0.000077	0.00195	9.00	3.418	87.89
		0.000065	0.00164	9.25	2.891	90.78
		0.000054	0.00138	9.50	2.371	93.15
		0.000046	0.00116	9.75	1.895	95.05
		0.000038	0.00098	10.00	1.493	96.54
		0.000032	0.00082	10.25	1.169	97.71
		0.000027	0.00069	10.50	0.897	98.61
		0.000023	0.00058	10.75	0.661	99.27
		0.000019	0.00049	11.00	0.444	99.71
		0.000016	0.00041	11.25	0.233	99.94
		0.000015	0.00038	11.50	0.057	100.00

Sorting Statistics (Folk)

Parameter	Trask	Inman	Folk
Median	**Silt sized**		
(in)	0.0004	0.0004	0.0004
(mm)	0.0099	0.0099	0.0099
Mean	**Silt sized**		
(in)	0.0007	0.0005	0.0005
(mm)	0.0188	0.0123	0.0115
Sorting	**V. Poor**		
	3.135	2.376	2.249
Skewness	**Coarse skewed**		
	1.099	-0.175	-0.126
Kurtosis	**Platykurtic**		
	0.150	0.474	0.871

Component Percentages

Gravel	Sand	Silt	Clay	Silt + Clay
0.00	16.25	55.67	28.08	83.75

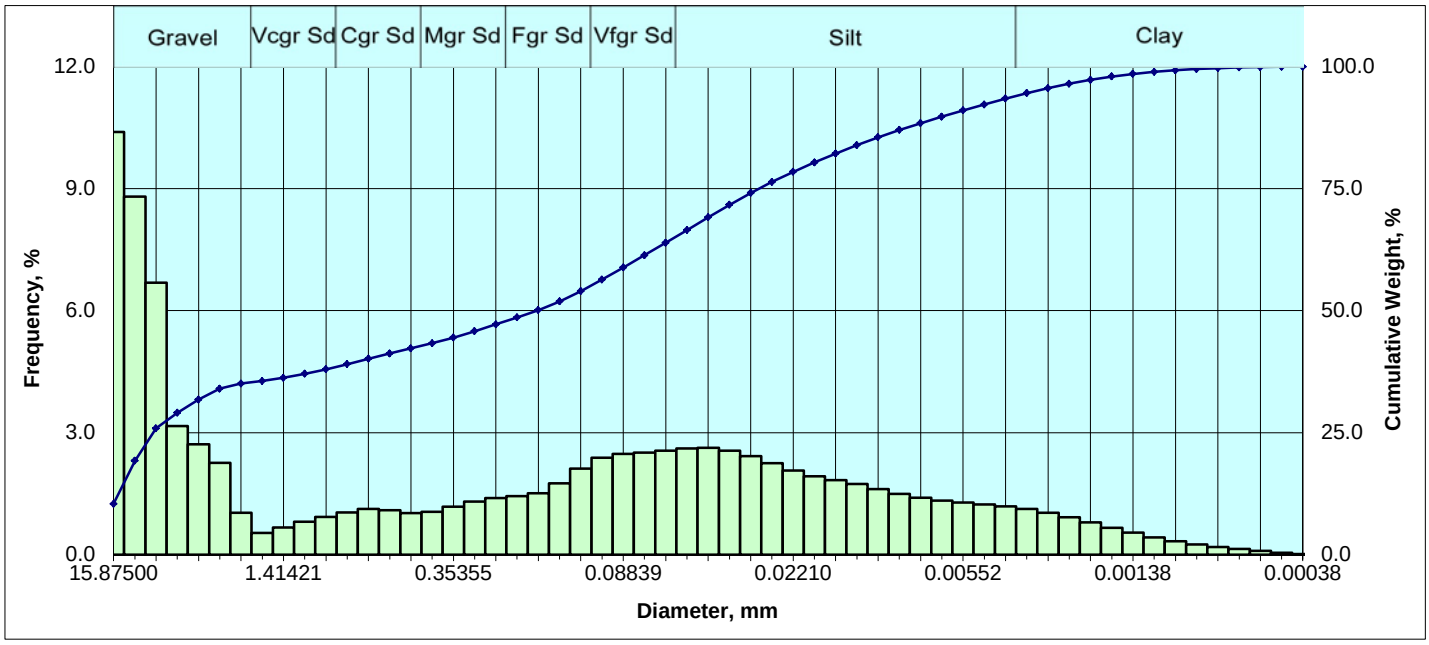
Percentile [Weight, %]	Particle Diameter [in.]	[mm]	[phi]
5	0.0059	0.1497	2.7400
10	0.0041	0.1036	3.2708
16	0.0025	0.0640	3.9655
25	0.0013	0.0341	4.8725
30	0.0010	0.0257	5.2793
40	0.0006	0.0156	6.0058
50	0.0004	0.0099	6.6566
60	0.0002	0.0063	7.3027
75	0.0001	0.0035	8.1691
84	0.0001	0.0024	8.7172
90	0.0001	0.0017	9.1781
95	0.0000	0.0012	9.7432

** Distribution pattern precludes calculation of these statistical parameters.

Company: RMC Consultants, Inc.
Project Name: Atlas Missile Site 4 RI Addendum
Project Number: E15-019-201

CL File Number: 1704035
Sample ID: FEW4-MW74-354

Sieve and Laser Particle Size Analysis



Particle Size Distribution

	Diameter [US Mesh]	[in.]	[mm]	[ϕ]	Weight % [Incl.]	[Cum.]
		0.625000	15.87500	-3.99	10.396	10.396
		0.375000	9.52500	-3.25	8.805	19.201
Granule	5	0.157480	4.00000	-2.00	6.687	25.888
	6	0.132425	3.36359	-1.75	3.163	29.051
	7	0.111355	2.82843	-1.50	2.711	31.762
	8	0.093638	2.37841	-1.25	2.258	34.020
	10	0.078740	2.00000	-1.00	1.028	35.049
	12	0.066212	1.68179	-0.75	0.535	35.584
V Crse Sand	14	0.055678	1.41421	-0.50	0.663	36.247
	16	0.046819	1.18921	-0.25	0.810	37.058
	18	0.039370	1.00000	0.00	0.922	37.980
	20	0.033106	0.84090	0.25	1.038	39.018
Coarse Sand	25	0.027839	0.70711	0.50	1.123	40.140
	30	0.023410	0.59460	0.75	1.093	41.233
	35	0.019685	0.50000	1.00	1.022	42.255
	40	0.016553	0.42045	1.25	1.053	43.308
Medium Sand	45	0.013919	0.35355	1.50	1.177	44.485
	50	0.011705	0.29730	1.75	1.306	45.791
	60	0.009843	0.25000	2.00	1.391	47.182
	70	0.008277	0.21022	2.25	1.435	48.617
Fine Sand	80	0.006960	0.17678	2.50	1.506	50.123
	100	0.005852	0.14865	2.75	1.753	51.876
	120	0.004921	0.12500	3.00	2.112	53.987
	140	0.004138	0.10511	3.25	2.381	56.368
V. Fine Sand	170	0.003480	0.08839	3.50	2.478	58.846
	200	0.002926	0.07433	3.75	2.505	61.351
	230	0.002461	0.06250	4.00	2.558	63.909
	270	0.002069	0.05256	4.25	2.613	66.522
	325	0.001740	0.04419	4.50	2.627	69.149
	400	0.001463	0.03716	4.75	2.555	71.704
	450	0.001230	0.03125	5.00	2.425	74.129
Silt	500	0.001035	0.02628	5.25	2.251	76.380
	635	0.000870	0.02210	5.50	2.067	78.446
		0.000732	0.01858	5.75	1.924	80.370
		0.000615	0.01562	6.00	1.829	82.199
		0.000517	0.01314	6.25	1.736	83.935
		0.000435	0.01105	6.50	1.611	85.546
		0.000366	0.00929	6.75	1.491	87.037
		0.000308	0.00781	7.00	1.397	88.434
		0.000259	0.00657	7.25	1.329	89.763
		0.000217	0.00552	7.50	1.277	91.041
		0.000183	0.00465	7.75	1.232	92.273
		0.000154	0.00391	8.00	1.187	93.460
		0.000129	0.00328	8.25	1.120	94.581
		0.000109	0.00276	8.50	1.030	95.611
		0.000091	0.00232	8.75	0.918	96.529
		0.000077	0.00195	9.00	0.792	97.321
		0.000065	0.00164	9.25	0.662	97.983
		0.000054	0.00138	9.50	0.537	98.521
		0.000046	0.00116	9.75	0.425	98.945
		0.000038	0.00098	10.00	0.329	99.275
		0.000032	0.00082	10.25	0.252	99.527
		0.000027	0.00069	10.50	0.189	99.717
		0.000023	0.00058	10.75	0.136	99.853
		0.000019	0.00049	11.00	0.090	99.942
		0.000016	0.00041	11.25	0.046	99.989
Clay		0.000015	0.00038	11.50	0.011	100.000

Sorting Statistics (Folk)

Parameter	Trask	Inman	Folk
Median	**Fine sand sized**		
(in)	0.0071	0.0071	0.0071
(mm)	0.1795	0.1795	0.1795
Mean	**Medium sand sized**		
(in)	0.0938	0.0155	0.0119
(mm)	2.3814	0.3930	0.3027
Sorting	******		
	12.705	**	**
Skewness	******		
	2.076	**	**
Kurtosis	******		
	**	**	**

Component Percentages				
Gravel	Sand	Silt	Clay	Silt + Clay
35.05	28.86	29.55	6.54	36.09

Percentile [Weight, %]	Particle Diameter [in.]	[mm]	[phi]
5	**	**	**
10	**	**	**
16	0.4659	11.8336	-3.5648
25	0.1864	4.7335	-2.2429
30	0.1250	3.1762	-1.6673
40	0.0285	0.7238	0.4662
50	0.0071	0.1795	2.4779
60	0.0032	0.0819	3.6098
75	0.0012	0.0293	5.0917
84	0.0005	0.0131	6.2593
90	0.0003	0.0064	7.2932
95	0.0001	0.0031	8.3466

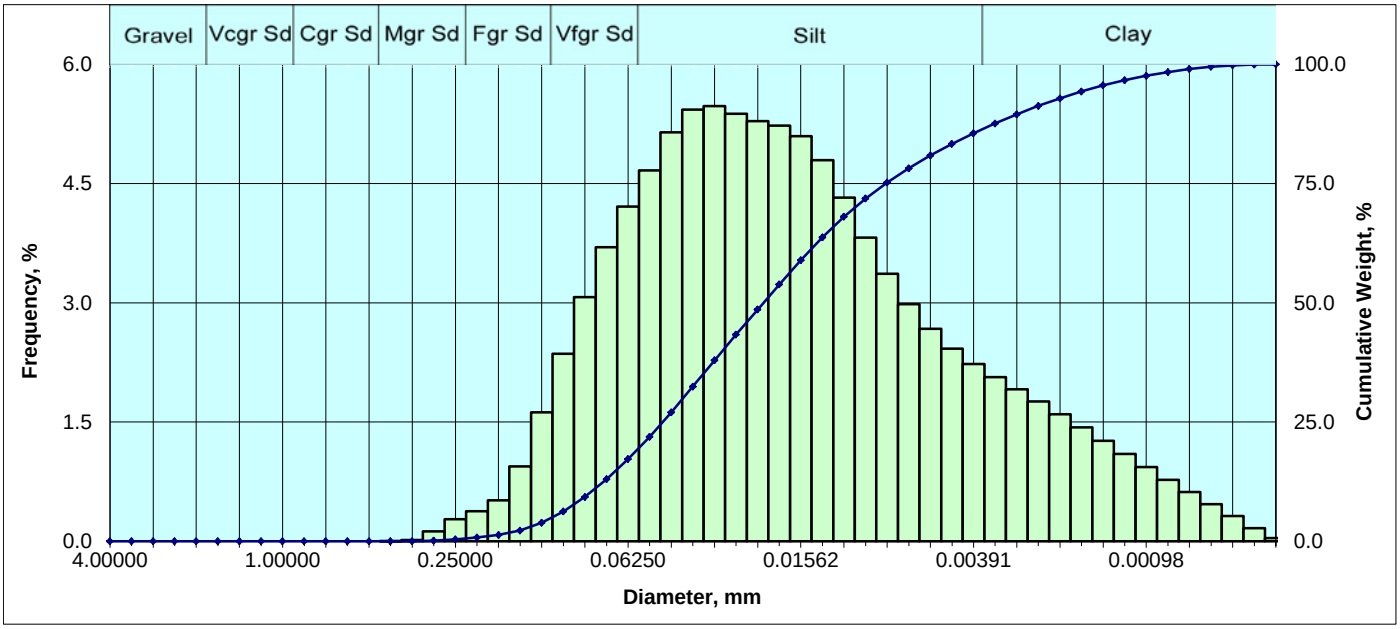
** Distribution pattern precludes calculation of these statistical parameters.

Core Lab
RESERVOIR OPTIMIZATION

Company: RMC Consultants, Inc.
Project Name: Atlas Missile Site 4 RI Addendum
Project Number: E15-019-201

CL File Number: 1704035
Sample ID: FEW4-MW74-104

Sieve and Laser Particle Size Analysis



Particle Size Distribution

	Diameter [US Mesh]	Diameter [in.]	Diameter [mm]	Diameter [ϕ]	Weight % [Incl.]	Weight % [Cum.]
Granule	5	0.157480	4.00000	-2.00	0.000	0.00
	6	0.132425	3.36359	-1.75	0.000	0.00
	7	0.111355	2.82843	-1.50	0.000	0.00
	8	0.093638	2.37841	-1.25	0.000	0.00
	10	0.078740	2.00000	-1.00	0.000	0.00
V Crse Sand	12	0.066212	1.68179	-0.75	0.000	0.00
	14	0.055678	1.41421	-0.50	0.000	0.00
	16	0.046819	1.18921	-0.25	0.000	0.00
	18	0.039370	1.00000	0.00	0.000	0.00
Coarse Sand	20	0.033106	0.84090	0.25	0.000	0.00
	25	0.027839	0.70711	0.50	0.000	0.00
	30	0.023410	0.59460	0.75	0.000	0.00
	35	0.019685	0.50000	1.00	0.000	0.00
Medium Sand	40	0.016553	0.42045	1.25	0.000	0.00
	45	0.013919	0.35355	1.50	0.018	0.02
	50	0.011705	0.29730	1.75	0.124	0.14
	60	0.009843	0.25000	2.00	0.279	0.42
Fine Sand	70	0.008277	0.21022	2.25	0.378	0.80
	80	0.006960	0.17678	2.50	0.517	1.32
	100	0.005852	0.14865	2.75	0.942	2.26
	120	0.004921	0.12500	3.00	1.621	3.88
V. Fine Sand	140	0.004138	0.10511	3.25	2.360	6.24
	170	0.003480	0.08839	3.50	3.071	9.31
	200	0.002926	0.07433	3.75	3.699	13.01
	230	0.002461	0.06250	4.00	4.210	17.22
Silt	270	0.002069	0.05256	4.25	4.666	21.89
	325	0.001740	0.04419	4.50	5.146	27.03
	400	0.001463	0.03716	4.75	5.431	32.46
	450	0.001230	0.03125	5.00	5.476	37.94
	500	0.001035	0.02628	5.25	5.380	43.32
	635	0.000870	0.02210	5.50	5.288	48.61
		0.000732	0.01858	5.75	5.229	53.84
		0.000615	0.01562	6.00	5.097	58.93
		0.000517	0.01314	6.25	4.794	63.73
		0.000435	0.01105	6.50	4.324	68.05
		0.000366	0.00929	6.75	3.820	71.87
		0.000308	0.00781	7.00	3.365	75.23
		0.000259	0.00657	7.25	2.984	78.22
		0.000217	0.00552	7.50	2.673	80.89
		0.000183	0.00465	7.75	2.424	83.32
		0.000154	0.00391	8.00	2.232	85.55
Clay		0.000129	0.00328	8.25	2.067	87.61
		0.000109	0.00276	8.50	1.913	89.53
		0.000091	0.00232	8.75	1.759	91.29
		0.000077	0.00195	9.00	1.600	92.89
		0.000065	0.00164	9.25	1.433	94.32
		0.000054	0.00138	9.50	1.265	95.58
		0.000046	0.00116	9.75	1.098	96.68
		0.000038	0.00098	10.00	0.932	97.62
		0.000032	0.00082	10.25	0.775	98.39
		0.000027	0.00069	10.50	0.619	99.01
		0.000023	0.00058	10.75	0.467	99.48
		0.000019	0.00049	11.00	0.318	99.79
		0.000016	0.00041	11.25	0.166	99.96
		0.000015	0.00038	11.50	0.040	100.00

Sorting Statistics (Folk)

Parameter	Trask	Inman	Folk
Median	**Silt sized**		
(in)	0.0008	0.0008	0.0008
(mm)	0.0212	0.0212	0.0212
Mean	**Silt sized**		
(in)	0.0011	0.0007	0.0007
(mm)	0.0277	0.0171	0.0183
Sorting	**Poor**		
	2.449	1.950	1.924
Skewness	**Finely skewed**		
	0.916	0.351	0.189
Kurtosis	**Mesokurtic**		
	0.238	0.607	0.993

Component Percentages

Gravel	Sand	Silt	Clay	Silt + Clay
0.00	17.22	68.33	14.45	82.78

Percentile [Weight, %]	Particle Diameter [in.]	[mm]	[phi]
5	0.0045	0.1156	3.1133
10	0.0034	0.0858	3.5435
16	0.0026	0.0659	3.9231
25	0.0019	0.0475	4.3961
30	0.0016	0.0404	4.6313
40	0.0012	0.0293	5.0907
50	0.0008	0.0212	5.5625
60	0.0006	0.0151	6.0521
75	0.0003	0.0079	6.9811
84	0.0002	0.0044	7.8222
90	0.0001	0.0026	8.5631
95	0.0001	0.0015	9.3791

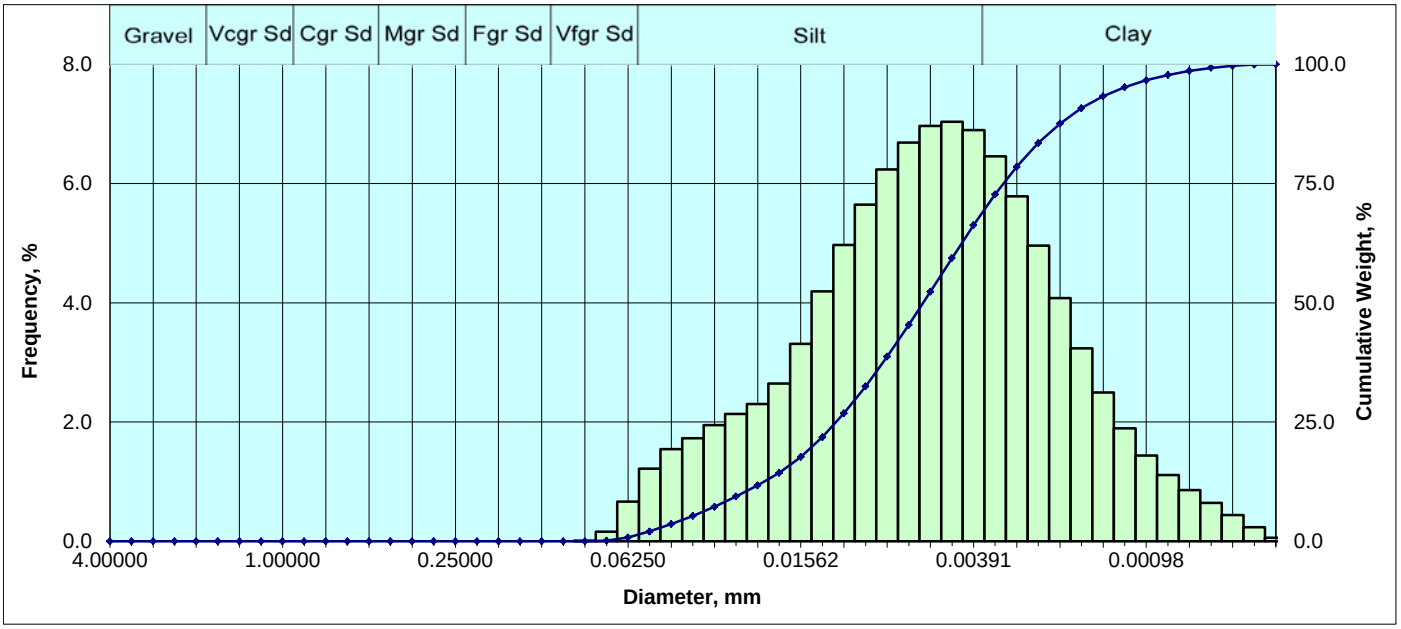
** Distribution pattern precludes calculation of these statistical parameters.

Core Lab
RESERVOIR OPTIMIZATION

Company: RMC Consultants, Inc.
Project Name: Atlas Missile Site 4 RI Addendum
Project Number: E15-019-201

CL File Number: 1704035
Sample ID: FEW4-MW74-262

Sieve and Laser Particle Size Analysis



Particle Size Distribution

	Diameter				Weight %	
	[US Mesh]	[in.]	[mm]	[ϕ]	[Incl.]	[Cum.]
Granule	5	0.157480	4.00000	-2.00	0.000	0.00
	6	0.132425	3.36359	-1.75	0.000	0.00
	7	0.111355	2.82843	-1.50	0.000	0.00
	8	0.093638	2.37841	-1.25	0.000	0.00
	10	0.078740	2.00000	-1.00	0.000	0.00
V Crse Sand	12	0.066212	1.68179	-0.75	0.000	0.00
	14	0.055678	1.41421	-0.50	0.000	0.00
	16	0.046819	1.18921	-0.25	0.000	0.00
	18	0.039370	1.00000	0.00	0.000	0.00
Coarse Sand	20	0.033106	0.84090	0.25	0.000	0.00
	25	0.027839	0.70711	0.50	0.000	0.00
	30	0.023410	0.59460	0.75	0.000	0.00
	35	0.019685	0.50000	1.00	0.000	0.00
Medium Sand	40	0.016553	0.42045	1.25	0.000	0.00
	45	0.013919	0.35355	1.50	0.000	0.00
	50	0.011705	0.29730	1.75	0.000	0.00
	60	0.009843	0.25000	2.00	0.000	0.00
Fine Sand	70	0.008277	0.21022	2.25	0.000	0.00
	80	0.006960	0.17678	2.50	0.000	0.00
	100	0.005852	0.14865	2.75	0.000	0.00
	120	0.004921	0.12500	3.00	0.000	0.00
V. Fine Sand	140	0.004138	0.10511	3.25	0.000	0.00
	170	0.003480	0.08839	3.50	0.009	0.01
	200	0.002926	0.07433	3.75	0.163	0.17
	230	0.002461	0.06250	4.00	0.664	0.84
Silt	270	0.002069	0.05256	4.25	1.220	2.06
	325	0.001740	0.04419	4.50	1.544	3.60
	400	0.001463	0.03716	4.75	1.728	5.33
	450	0.001230	0.03125	5.00	1.947	7.27
	500	0.001035	0.02628	5.25	2.138	9.41
	635	0.000870	0.02210	5.50	2.303	11.72
		0.000732	0.01858	5.75	2.648	14.36
		0.000615	0.01562	6.00	3.311	17.67
		0.000517	0.01314	6.25	4.191	21.87
		0.000435	0.01105	6.50	4.969	26.83
		0.000366	0.00929	6.75	5.646	32.48
		0.000308	0.00781	7.00	6.235	38.72
		0.000259	0.00657	7.25	6.687	45.40
		0.000217	0.00552	7.50	6.965	52.37
		0.000183	0.00465	7.75	7.039	59.41
		0.000154	0.00391	8.00	6.897	66.30
Clay		0.000129	0.00328	8.25	6.456	72.76
		0.000109	0.00276	8.50	5.786	78.54
		0.000091	0.00232	8.75	4.961	83.51
		0.000077	0.00195	9.00	4.080	87.59
		0.000065	0.00164	9.25	3.234	90.82
		0.000054	0.00138	9.50	2.496	93.32
		0.000046	0.00116	9.75	1.894	95.21
		0.000038	0.00098	10.00	1.441	96.65
		0.000032	0.00082	10.25	1.114	97.77
		0.000027	0.00069	10.50	0.859	98.62
		0.000023	0.00058	10.75	0.642	99.27
		0.000019	0.00049	11.00	0.440	99.71
		0.000016	0.00041	11.25	0.235	99.94
		0.000015	0.00038	11.50	0.058	100.00

Sorting Statistics (Folk)

Parameter	Trask	Inman	Folk
Median	**Silt sized**		
(in)	0.0002	0.0002	0.0002
(mm)	0.0059	0.0059	0.0059
Mean	**Silt sized**		
(in)	0.0003	0.0002	0.0002
(mm)	0.0075	0.0062	0.0061
Sorting	**Poor**		
	1.958	1.455	1.488
Skewness	**Near symmetrical**		
	1.027	-0.138	-0.070
Kurtosis	**Mesokurtic**		
	0.186	0.725	1.061

Component Percentages

Gravel	Sand	Silt	Clay	Silt + Clay
0.00	0.84	65.47	33.70	99.16

Percentile [Weight, %]	Particle Diameter [in.]	[mm]	[phi]
5	0.0015	0.0385	4.6991
10	0.0010	0.0252	5.3098
16	0.0007	0.0171	5.8681
25	0.0005	0.0118	6.4026
30	0.0004	0.0101	6.6348
40	0.0003	0.0076	7.0448
50	0.0002	0.0059	7.4101
60	0.0002	0.0046	7.7699
75	0.0001	0.0031	8.3418
84	0.0001	0.0023	8.7781
90	0.0001	0.0017	9.1823
95	0.0000	0.0012	9.7199

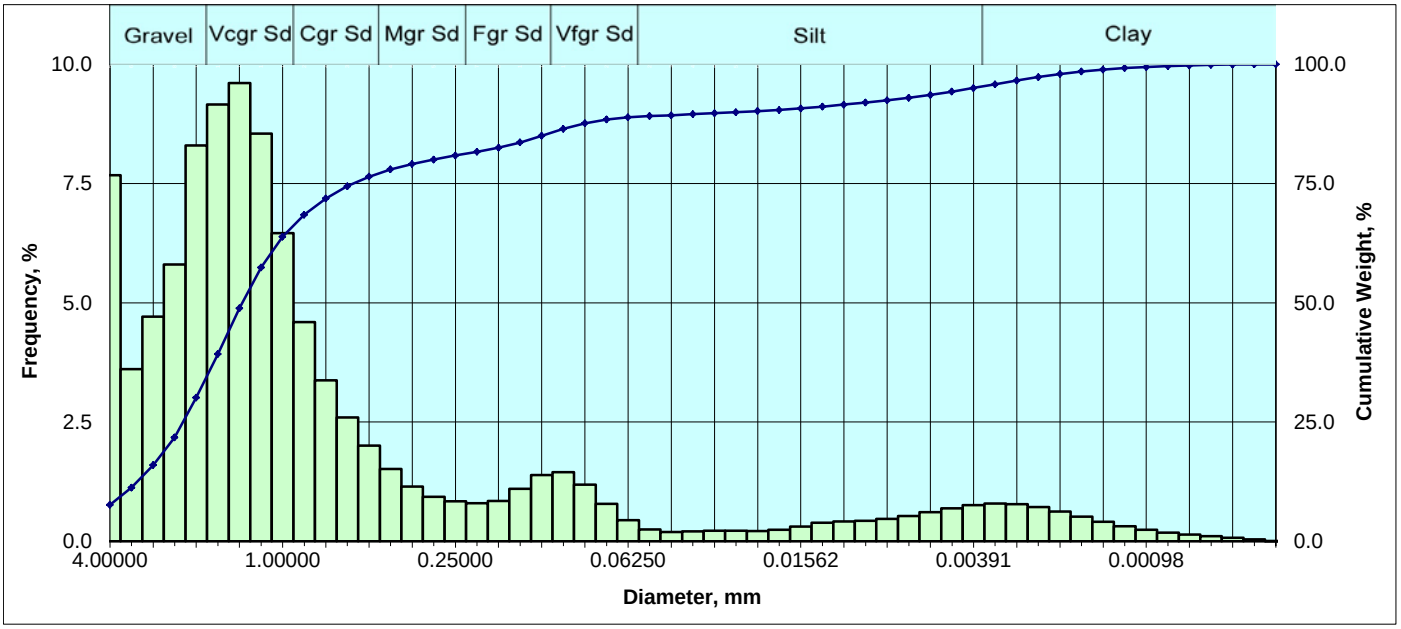
** Distribution pattern precludes calculation of these statistical parameters.

Core Lab
RESERVOIR OPTIMIZATION

Company: RMC Consultants, Inc.
Project Name: Atlas Missile Site 4 RI Addendum
Project Number: E15-019-201

CL File Number: 1704035
Sample ID: FEW4-MW95-163

Sieve and Laser Particle Size Analysis



Particle Size Distribution

	Diameter				Weight %	
	[US Mesh]	[in.]	[mm]	[ϕ]	[Incl.]	[Cum.]
Granule	5	0.157480	4.00000	-2.00	7.673	7.67
	6	0.132425	3.36359	-1.75	3.609	11.28
	7	0.111355	2.82843	-1.50	4.707	15.99
	8	0.093638	2.37841	-1.25	5.806	21.79
	10	0.078740	2.00000	-1.00	8.303	30.10
V Crse Sand	12	0.066212	1.68179	-0.75	9.161	39.26
	14	0.055678	1.41421	-0.50	9.607	48.87
	16	0.046819	1.18921	-0.25	8.549	57.41
	18	0.039370	1.00000	0.00	6.462	63.88
Coarse Sand	20	0.033106	0.84090	0.25	4.597	68.47
	25	0.027839	0.70711	0.50	3.376	71.85
	30	0.023410	0.59460	0.75	2.599	74.45
	35	0.019685	0.50000	1.00	2.003	76.45
Medium Sand	40	0.016553	0.42045	1.25	1.519	77.97
	45	0.013919	0.35355	1.50	1.144	79.11
	50	0.011705	0.29730	1.75	0.933	80.05
	60	0.009843	0.25000	2.00	0.838	80.89
Fine Sand	70	0.008277	0.21022	2.25	0.798	81.68
	80	0.006960	0.17678	2.50	0.849	82.53
	100	0.005852	0.14865	2.75	1.099	83.63
	120	0.004921	0.12500	3.00	1.391	85.02
V. Fine Sand	140	0.004138	0.10511	3.25	1.447	86.47
	170	0.003480	0.08839	3.50	1.190	87.66
	200	0.002926	0.07433	3.75	0.788	88.45
	230	0.002461	0.06250	4.00	0.443	88.89
Silt	270	0.002069	0.05256	4.25	0.250	89.14
	325	0.001740	0.04419	4.50	0.193	89.33
	400	0.001463	0.03716	4.75	0.206	89.54
	450	0.001230	0.03125	5.00	0.225	89.76
	500	0.001035	0.02628	5.25	0.222	89.99
	635	0.000870	0.02210	5.50	0.213	90.20
		0.000732	0.01858	5.75	0.241	90.44
		0.000615	0.01562	6.00	0.312	90.75
		0.000517	0.01314	6.25	0.388	91.14
		0.000435	0.01105	6.50	0.418	91.56
		0.000366	0.00929	6.75	0.432	91.99
		0.000308	0.00781	7.00	0.467	92.46
		0.000259	0.00657	7.25	0.530	92.99
		0.000217	0.00552	7.50	0.608	93.59
		0.000183	0.00465	7.75	0.688	94.28
		0.000154	0.00391	8.00	0.761	95.04
Clay		0.000129	0.00328	8.25	0.794	95.84
		0.000109	0.00276	8.50	0.780	96.62
		0.000091	0.00232	8.75	0.721	97.34
		0.000077	0.00195	9.00	0.627	97.97
		0.000065	0.00164	9.25	0.518	98.48
		0.000054	0.00138	9.50	0.410	98.89
		0.000046	0.00116	9.75	0.315	99.21
		0.000038	0.00098	10.00	0.240	99.45
		0.000032	0.00082	10.25	0.185	99.63
		0.000027	0.00069	10.50	0.141	99.78
		0.000023	0.00058	10.75	0.105	99.88
		0.000019	0.00049	11.00	0.072	99.95
		0.000016	0.00041	11.25	0.038	99.99
		0.000015	0.00038	11.50	0.009	100.00

Sorting Statistics (Folk)

Parameter	Trask	Inman	Folk
Median	Very coarse sand sized		
(in)	0.0545	0.0545	0.0545
(mm)	1.3843	1.3843	1.3843
Mean	Coarse sand sized		
(in)	0.0551	0.0250	0.0324
(mm)	1.4004	0.6345	0.8229
Sorting	V. Poor		
	1.982	2.156	2.677
Skewness	Strongly fine skewed		
	0.814	1.474	0.562
Kurtosis	Very leptokurtic		
	0.233	1.447	2.191

Component Percentages

Gravel	Sand	Silt	Clay	Silt + Clay
30.10	58.79	6.15	4.96	11.11

Percentile [Weight, %]	Particle Diameter [in.]	[mm]	[phi]
5	0.2333	5.9246	-2.5667
10	0.1413	3.5896	-1.8438
16	0.1113	2.8275	-1.4995
25	0.0879	2.2323	-1.1585
30	0.0789	2.0044	-1.0032
40	0.0654	1.6611	-0.7322
50	0.0545	1.3843	-0.4692
60	0.0438	1.1135	-0.1551
75	0.0224	0.5685	0.8147
84	0.0056	0.1424	2.8123
90	0.0010	0.0260	5.2646
95	0.0002	0.0039	7.9842

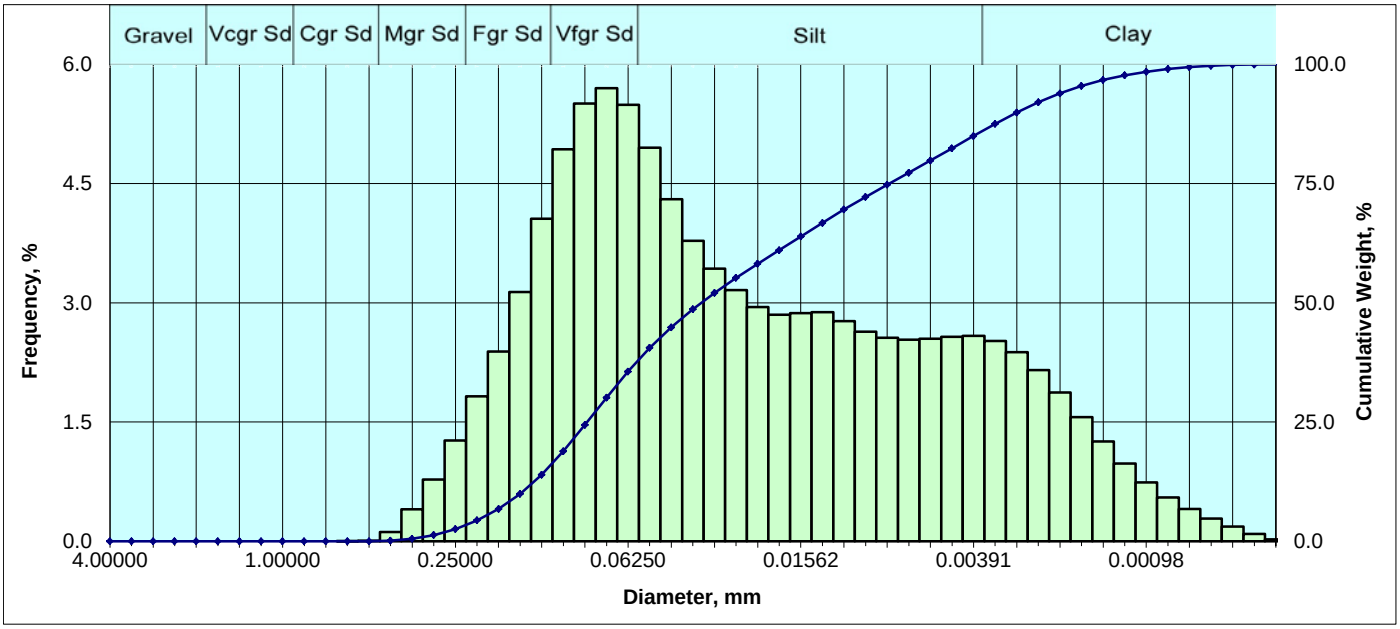
** Distribution pattern precludes calculation of these statistical parameters.

Core Lab
RESERVOIR OPTIMIZATION

Company: RMC Consultants, Inc.
Project Name: Atlas Missile Site 4 RI Addendum
Project Number: E15-019-201

CL File Number: 1704035
Sample ID: FEW4-MW95-289

Sieve and Laser Particle Size Analysis



Particle Size Distribution

	Diameter				Weight %	
	[US Mesh]	[in.]	[mm]	[ϕ]	[Incl.]	[Cum.]
Granule	5	0.157480	4.00000	-2.00	0.000	0.00
	6	0.132425	3.36359	-1.75	0.000	0.00
	7	0.111355	2.82843	-1.50	0.000	0.00
	8	0.093638	2.37841	-1.25	0.000	0.00
	10	0.078740	2.00000	-1.00	0.000	0.00
V Crse Sand	12	0.066212	1.68179	-0.75	0.000	0.00
	14	0.055678	1.41421	-0.50	0.000	0.00
	16	0.046819	1.18921	-0.25	0.000	0.00
	18	0.039370	1.00000	0.00	0.000	0.00
Coarse Sand	20	0.033106	0.84090	0.25	0.000	0.00
	25	0.027839	0.70711	0.50	0.000	0.00
	30	0.023410	0.59460	0.75	0.000	0.00
	35	0.019685	0.50000	1.00	0.007	0.01
Medium Sand	40	0.016553	0.42045	1.25	0.119	0.13
	45	0.013919	0.35355	1.50	0.401	0.53
	50	0.011705	0.29730	1.75	0.775	1.30
	60	0.009843	0.25000	2.00	1.267	2.57
Fine Sand	70	0.008277	0.21022	2.25	1.825	4.39
	80	0.006960	0.17678	2.50	2.387	6.78
	100	0.005852	0.14865	2.75	3.137	9.92
	120	0.004921	0.12500	3.00	4.059	13.98
V. Fine Sand	140	0.004138	0.10511	3.25	4.930	18.91
	170	0.003480	0.08839	3.50	5.508	24.41
	200	0.002926	0.07433	3.75	5.700	30.11
	230	0.002461	0.06250	4.00	5.491	35.61
Silt	270	0.002069	0.05256	4.25	4.952	40.56
	325	0.001740	0.04419	4.50	4.303	44.86
	400	0.001463	0.03716	4.75	3.779	48.64
	450	0.001230	0.03125	5.00	3.429	52.07
	500	0.001035	0.02628	5.25	3.162	55.23
	635	0.000870	0.02210	5.50	2.947	58.18
		0.000732	0.01858	5.75	2.851	61.03
		0.000615	0.01562	6.00	2.872	63.90
		0.000517	0.01314	6.25	2.881	66.78
		0.000435	0.01105	6.50	2.770	69.55
		0.000366	0.00929	6.75	2.638	72.19
		0.000308	0.00781	7.00	2.559	74.75
		0.000259	0.00657	7.25	2.536	77.28
		0.000217	0.00552	7.50	2.549	79.83
		0.000183	0.00465	7.75	2.572	82.41
		0.000154	0.00391	8.00	2.584	84.99
Clay		0.000129	0.00328	8.25	2.522	87.51
		0.000109	0.00276	8.50	2.377	89.89
		0.000091	0.00232	8.75	2.154	92.04
		0.000077	0.00195	9.00	1.873	93.91
		0.000065	0.00164	9.25	1.563	95.48
		0.000054	0.00138	9.50	1.258	96.74
		0.000046	0.00116	9.75	0.977	97.71
		0.000038	0.00098	10.00	0.741	98.45
		0.000032	0.00082	10.25	0.554	99.01
		0.000027	0.00069	10.50	0.405	99.41
		0.000023	0.00058	10.75	0.285	99.70
		0.000019	0.00049	11.00	0.185	99.88
		0.000016	0.00041	11.25	0.095	99.98
		0.000015	0.00038	11.50	0.023	100.00

Sorting Statistics (Folk)

Parameter	Trask	Inman	Folk
Median	**Silt sized**		
(in)	0.0014	0.0014	0.0014
(mm)	0.0348	0.0348	0.0348
Mean	**Silt sized**		
(in)	0.0019	0.0009	0.0010
(mm)	0.0473	0.0221	0.0257
Sorting	**V. Poor**		
	3.363	2.401	2.240
Skewness	**Finely skewed**		
	0.743	0.373	0.267
Kurtosis	**Platykurtic**		
	0.272	0.429	0.803

Component Percentages

Gravel	Sand	Silt	Clay	Silt + Clay
0.00	35.61	49.38	15.01	64.39

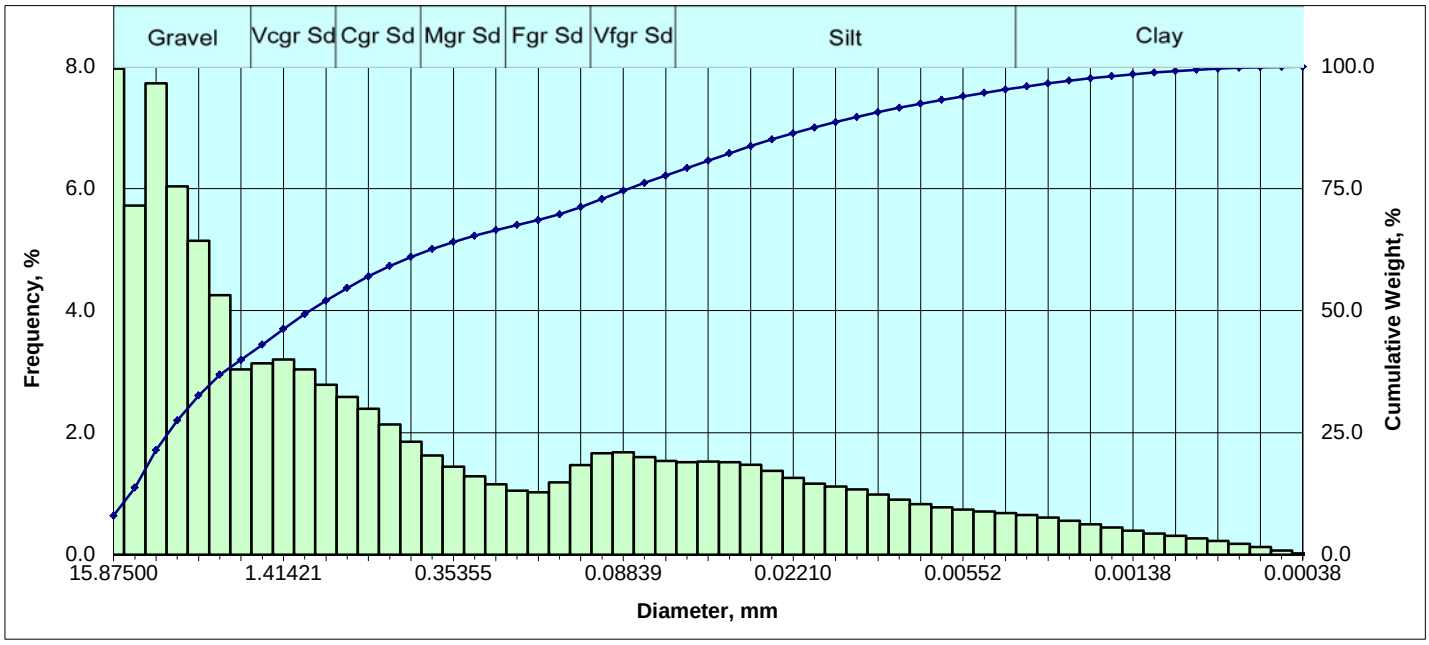
Percentile [Weight, %]	Particle Diameter [in.]	[mm]	[phi]
5	0.0079	0.2017	2.3095
10	0.0058	0.1482	2.7546
16	0.0046	0.1168	3.0974
25	0.0034	0.0869	3.5238
30	0.0029	0.0746	3.7445
40	0.0021	0.0537	4.2196
50	0.0014	0.0348	4.8441
60	0.0008	0.0198	5.6548
75	0.0003	0.0077	7.0230
84	0.0002	0.0042	7.8992
90	0.0001	0.0027	8.5120
95	0.0001	0.0017	9.1689

** Distribution pattern precludes calculation of these statistical parameters.

Company: RMC Consultants, Inc.
Project Name: Atlas Missile Site 4 RI Addendum
Project Number: E15-019-201

CL File Number: 1704035
Sample ID: FEW4-MW95-204

Sieve and Laser Particle Size Analysis



Particle Size Distribution

	Diameter				Weight %	
	[US Mesh]	[in.]	[mm]	[ϕ]	[Incl.]	[Cum.]
Granule		0.625000	15.87500	-3.99	7.972	7.972
		0.375000	9.52500	-3.25	5.724	13.696
	5	0.157480	4.00000	-2.00	7.727	21.424
	6	0.132425	3.36359	-1.75	6.039	27.463
	7	0.111355	2.82843	-1.50	5.147	32.609
	8	0.093638	2.37841	-1.25	4.254	36.863
	10	0.078740	2.00000	-1.00	3.039	39.903
V Crse Sand	12	0.066212	1.68179	-0.75	3.136	43.039
	14	0.055678	1.41421	-0.50	3.198	46.237
	16	0.046819	1.18921	-0.25	3.038	49.275
	18	0.039370	1.00000	0.00	2.783	52.057
Coarse Sand	20	0.033106	0.84090	0.25	2.583	54.640
	25	0.027839	0.70711	0.50	2.389	57.030
	30	0.023410	0.59460	0.75	2.132	59.162
	35	0.019685	0.50000	1.00	1.851	61.013
Medium Sand	40	0.016553	0.42045	1.25	1.624	62.636
	45	0.013919	0.35355	1.50	1.439	64.075
	50	0.011705	0.29730	1.75	1.282	65.358
	60	0.009843	0.25000	2.00	1.151	66.508
Fine Sand	70	0.008277	0.21022	2.25	1.048	67.557
	80	0.006960	0.17678	2.50	1.023	68.580
	100	0.005852	0.14865	2.75	1.186	69.766
	120	0.004921	0.12500	3.00	1.466	71.232
V. Fine Sand	140	0.004138	0.10511	3.25	1.662	72.894
	170	0.003480	0.08839	3.50	1.679	74.573
	200	0.002926	0.07433	3.75	1.601	76.174
	230	0.002461	0.06250	4.00	1.535	77.709
Silt	270	0.002069	0.05256	4.25	1.513	79.222
	325	0.001740	0.04419	4.50	1.523	80.745
	400	0.001463	0.03716	4.75	1.516	82.261
	450	0.001230	0.03125	5.00	1.471	83.732
	500	0.001035	0.02628	5.25	1.374	85.106
	635	0.000870	0.02210	5.50	1.255	86.361
		0.000732	0.01858	5.75	1.164	87.526
		0.000615	0.01562	6.00	1.114	88.640
		0.000517	0.01314	6.25	1.066	89.706
		0.000435	0.01105	6.50	0.986	90.692
		0.000366	0.00929	6.75	0.899	91.591
		0.000308	0.00781	7.00	0.829	92.420
		0.000259	0.00657	7.25	0.777	93.197
		0.000217	0.00552	7.50	0.738	93.935
		0.000183	0.00465	7.75	0.708	94.644
		0.000154	0.00391	8.00	0.683	95.327
Clay		0.000129	0.00328	8.25	0.650	95.976
		0.000109	0.00276	8.50	0.607	96.583
		0.000091	0.00232	8.75	0.555	97.138
		0.000077	0.00195	9.00	0.499	97.637
		0.000065	0.00164	9.25	0.443	98.080
		0.000054	0.00138	9.50	0.391	98.471
		0.000046	0.00116	9.75	0.347	98.818
		0.000038	0.00098	10.00	0.305	99.123
		0.000032	0.00082	10.25	0.267	99.390
		0.000027	0.00069	10.50	0.224	99.614
		0.000023	0.00058	10.75	0.177	99.791
		0.000019	0.00049	11.00	0.125	99.916
		0.000016	0.00041	11.25	0.067	99.984
		0.000015	0.00038	11.50	0.016	100.000

Sorting Statistics (Folk)

Parameter	Trask	Inman	Folk
Median	Very coarse sand sized		
(in)	0.0449	0.0449	0.0449
(mm)	1.1399	1.1399	1.1399
Mean	Coarse sand sized		
(in)	0.0730	0.0192	0.0255
(mm)	1.8539	0.4884	0.6478
Sorting	**		
	6.543	4.012	**
Skewness	**		
	0.486	**	**
Kurtosis	**		
	0.130	**	**

Component Percentages				
Gravel	Sand	Silt	Clay	Silt + Clay
39.90	37.81	17.62	4.67	22.29

Percentile [Weight, %]	Particle Diameter [in.]	[mm]	[phi]
5	**	**	**
10	0.5364	13.6252	-3.7682
16	0.3101	7.8778	-2.9778
25	0.1426	3.6231	-1.8572
30	0.1220	3.0998	-1.6322
40	0.0784	1.9901	-0.9929
50	0.0449	1.1399	-0.1889
60	0.0217	0.5518	0.8579
75	0.0033	0.0846	3.5625
84	0.0012	0.0303	5.0455
90	0.0005	0.0125	6.3201
95	0.0002	0.0043	7.8750

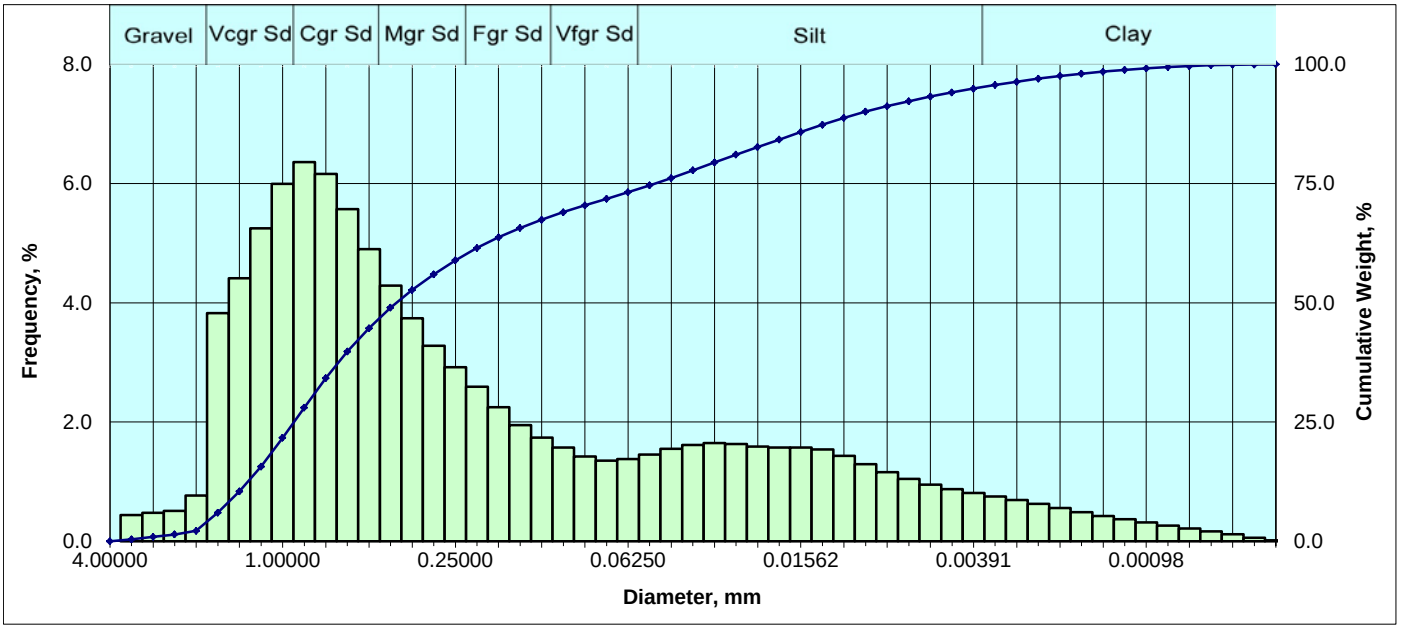
** Distribution pattern precludes calculation of these statistical parameters.

Core Lab
RESERVOIR OPTIMIZATION

Company: RMC Consultants, Inc.
Project Name: Atlas Missile Site 4 RI Addendum
Project Number: E15-019-201

CL File Number: 1704035
Sample ID: FEW4-MW82-154

Sieve and Laser Particle Size Analysis



Particle Size Distribution

	Diameter				Weight %	
	[US Mesh]	[in.]	[mm]	[ϕ]	[Incl.]	[Cum.]
Granule	5	0.157480	4.00000	-2.00	0.000	0.00
	6	0.132425	3.36359	-1.75	0.441	0.44
	7	0.111355	2.82843	-1.50	0.477	0.92
	8	0.093638	2.37841	-1.25	0.512	1.43
	10	0.078740	2.00000	-1.00	0.770	2.20
V Crse Sand	12	0.066212	1.68179	-0.75	3.825	6.02
	14	0.055678	1.41421	-0.50	4.415	10.44
	16	0.046819	1.18921	-0.25	5.251	15.69
	18	0.039370	1.00000	0.00	5.996	21.69
Coarse Sand	20	0.033106	0.84090	0.25	6.359	28.05
	25	0.027839	0.70711	0.50	6.164	34.21
	30	0.023410	0.59460	0.75	5.574	39.78
	35	0.019685	0.50000	1.00	4.900	44.68
Medium Sand	40	0.016553	0.42045	1.25	4.290	48.97
	45	0.013919	0.35355	1.50	3.740	52.71
	50	0.011705	0.29730	1.75	3.277	55.99
	60	0.009843	0.25000	2.00	2.918	58.91
Fine Sand	70	0.008277	0.21022	2.25	2.594	61.50
	80	0.006960	0.17678	2.50	2.247	63.75
	100	0.005852	0.14865	2.75	1.948	65.70
	120	0.004921	0.12500	3.00	1.742	67.44
V. Fine Sand	140	0.004138	0.10511	3.25	1.571	69.01
	170	0.003480	0.08839	3.50	1.423	70.43
	200	0.002926	0.07433	3.75	1.355	71.79
	230	0.002461	0.06250	4.00	1.381	73.17
Silt	270	0.002069	0.05256	4.25	1.457	74.63
	325	0.001740	0.04419	4.50	1.550	76.18
	400	0.001463	0.03716	4.75	1.618	77.79
	450	0.001230	0.03125	5.00	1.651	79.45
	500	0.001035	0.02628	5.25	1.632	81.08
	635	0.000870	0.02210	5.50	1.590	82.67
		0.000732	0.01858	5.75	1.571	84.24
		0.000615	0.01562	6.00	1.573	85.81
		0.000517	0.01314	6.25	1.541	87.35
		0.000435	0.01105	6.50	1.433	88.79
		0.000366	0.00929	6.75	1.293	90.08
		0.000308	0.00781	7.00	1.160	91.24
		0.000259	0.00657	7.25	1.045	92.28
		0.000217	0.00552	7.50	0.951	93.24
		0.000183	0.00465	7.75	0.875	94.11
		0.000154	0.00391	8.00	0.813	94.92
Clay		0.000129	0.00328	8.25	0.754	95.68
		0.000109	0.00276	8.50	0.693	96.37
		0.000091	0.00232	8.75	0.627	97.00
		0.000077	0.00195	9.00	0.559	97.56
		0.000065	0.00164	9.25	0.491	98.05
		0.000054	0.00138	9.50	0.427	98.47
		0.000046	0.00116	9.75	0.368	98.84
		0.000038	0.00098	10.00	0.315	99.16
		0.000032	0.00082	10.25	0.266	99.42
		0.000027	0.00069	10.50	0.217	99.64
		0.000023	0.00058	10.75	0.167	99.81
		0.000019	0.00049	11.00	0.116	99.92
		0.000016	0.00041	11.25	0.062	99.98
		0.000015	0.00038	11.50	0.015	100.00

Sorting Statistics (Folk)

Parameter	Trask	Inman	Folk
Median	Medium sand sized		
(in)	0.0158	0.0158	0.0158
(mm)	0.4021	0.4021	0.4021
Mean	Fine sand sized		
(in)	0.0190	0.0059	0.0082
(mm)	0.4838	0.1501	0.2085
Sorting	V. Poor		
	4.260	2.974	2.827
Skewness	Strongly fine skewed		
	0.535	0.769	0.497
Kurtosis	Platykurtic		
	0.303	0.487	0.867

Component Percentages

Gravel	Sand	Silt	Clay	Silt + Clay
2.20	70.97	21.75	5.08	26.83

Percentile [Weight, %]	Particle Diameter [in.]	[mm]	[phi]
5	0.0696	1.7671	-0.8213
10	0.0567	1.4408	-0.5269
16	0.0464	1.1794	-0.2381
25	0.0361	0.9171	0.1248
30	0.0314	0.7985	0.3247
40	0.0232	0.5904	0.7602
50	0.0158	0.4021	1.3144
60	0.0092	0.2333	2.0999
75	0.0020	0.0505	4.3064
84	0.0008	0.0191	5.7092
90	0.0004	0.0094	6.7336
95	0.0002	0.0038	8.0237

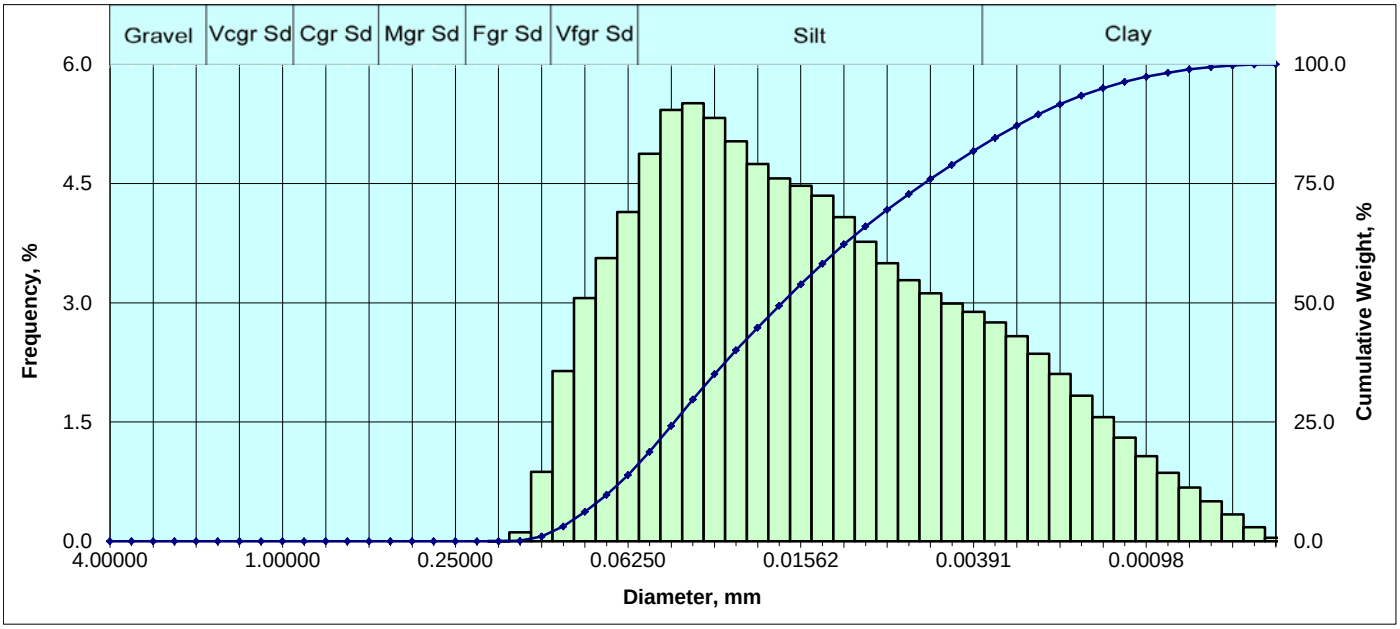
** Distribution pattern precludes calculation of these statistical parameters.

Core Lab
RESERVOIR OPTIMIZATION

Company: RMC Consultants, Inc.
Project Name: Atlas Missile Site 4 RI Addendum
Project Number: E15-019-201

CL File Number: 1704035
Sample ID: FEW4-MW82-135

Sieve and Laser Particle Size Analysis



Particle Size Distribution

	Diameter				Weight %	
	[US Mesh]	[in.]	[mm]	[ϕ]	[Incl.]	[Cum.]
Granule	5	0.157480	4.00000	-2.00	0.000	0.00
	6	0.132425	3.36359	-1.75	0.000	0.00
	7	0.111355	2.82843	-1.50	0.000	0.00
	8	0.093638	2.37841	-1.25	0.000	0.00
	10	0.078740	2.00000	-1.00	0.000	0.00
V Crse Sand	12	0.066212	1.68179	-0.75	0.000	0.00
	14	0.055678	1.41421	-0.50	0.000	0.00
	16	0.046819	1.18921	-0.25	0.000	0.00
	18	0.039370	1.00000	0.00	0.000	0.00
Coarse Sand	20	0.033106	0.84090	0.25	0.000	0.00
	25	0.027839	0.70711	0.50	0.000	0.00
	30	0.023410	0.59460	0.75	0.000	0.00
	35	0.019685	0.50000	1.00	0.000	0.00
Medium Sand	40	0.016553	0.42045	1.25	0.000	0.00
	45	0.013919	0.35355	1.50	0.000	0.00
	50	0.011705	0.29730	1.75	0.000	0.00
	60	0.009843	0.25000	2.00	0.000	0.00
Fine Sand	70	0.008277	0.21022	2.25	0.000	0.00
	80	0.006960	0.17678	2.50	0.001	0.00
	100	0.005852	0.14865	2.75	0.112	0.11
	120	0.004921	0.12500	3.00	0.874	0.99
V. Fine Sand	140	0.004138	0.10511	3.25	2.142	3.13
	170	0.003480	0.08839	3.50	3.059	6.19
	200	0.002926	0.07433	3.75	3.563	9.75
	230	0.002461	0.06250	4.00	4.144	13.90
Silt	270	0.002069	0.05256	4.25	4.875	18.77
	325	0.001740	0.04419	4.50	5.427	24.20
	400	0.001463	0.03716	4.75	5.513	29.71
	450	0.001230	0.03125	5.00	5.326	35.04
	500	0.001035	0.02628	5.25	5.033	40.07
	635	0.000870	0.02210	5.50	4.746	44.82
		0.000732	0.01858	5.75	4.564	49.38
		0.000615	0.01562	6.00	4.472	53.85
		0.000517	0.01314	6.25	4.348	58.20
		0.000435	0.01105	6.50	4.079	62.28
		0.000366	0.00929	6.75	3.768	66.05
		0.000308	0.00781	7.00	3.497	69.54
		0.000259	0.00657	7.25	3.284	72.83
		0.000217	0.00552	7.50	3.121	75.95
		0.000183	0.00465	7.75	2.992	78.94
		0.000154	0.00391	8.00	2.887	81.83
Clay		0.000129	0.00328	8.25	2.753	84.58
		0.000109	0.00276	8.50	2.579	87.16
		0.000091	0.00232	8.75	2.360	89.52
		0.000077	0.00195	9.00	2.107	91.63
		0.000065	0.00164	9.25	1.834	93.46
		0.000054	0.00138	9.50	1.562	95.02
		0.000046	0.00116	9.75	1.305	96.33
		0.000038	0.00098	10.00	1.070	97.40
		0.000032	0.00082	10.25	0.864	98.26
		0.000027	0.00069	10.50	0.676	98.94
		0.000023	0.00058	10.75	0.503	99.44
		0.000019	0.00049	11.00	0.339	99.78
		0.000016	0.00041	11.25	0.178	99.96
		0.000015	0.00038	11.50	0.043	100.00

Sorting Statistics (Folk)

Parameter	Trask	Inman	Folk
Median	**Silt sized**		
(in)	0.0007	0.0007	0.0007
(mm)	0.0182	0.0182	0.0182
Mean	**Silt sized**		
(in)	0.0010	0.0006	0.0006
(mm)	0.0245	0.0141	0.0153
Sorting	**Poor**		
	2.718	2.045	1.947
Skewness	**Finely skewed**		
	0.874	0.325	0.198
Kurtosis	**Platykurtic**		
	0.261	0.491	0.866

Component Percentages

Gravel	Sand	Silt	Clay	Silt + Clay
0.00	13.90	67.93	18.17	86.10

Percentile [Weight, %]	Particle Diameter [in.]	[mm]	[phi]
5	0.0037	0.0949	3.3977
10	0.0029	0.0736	3.7639
16	0.0023	0.0582	4.1027
25	0.0017	0.0432	4.5338
30	0.0015	0.0368	4.7625
40	0.0010	0.0263	5.2462
50	0.0007	0.0182	5.7822
60	0.0005	0.0122	6.3551
75	0.0002	0.0058	7.4193
84	0.0001	0.0034	8.1935
90	0.0001	0.0022	8.8032
95	0.0001	0.0014	9.4960

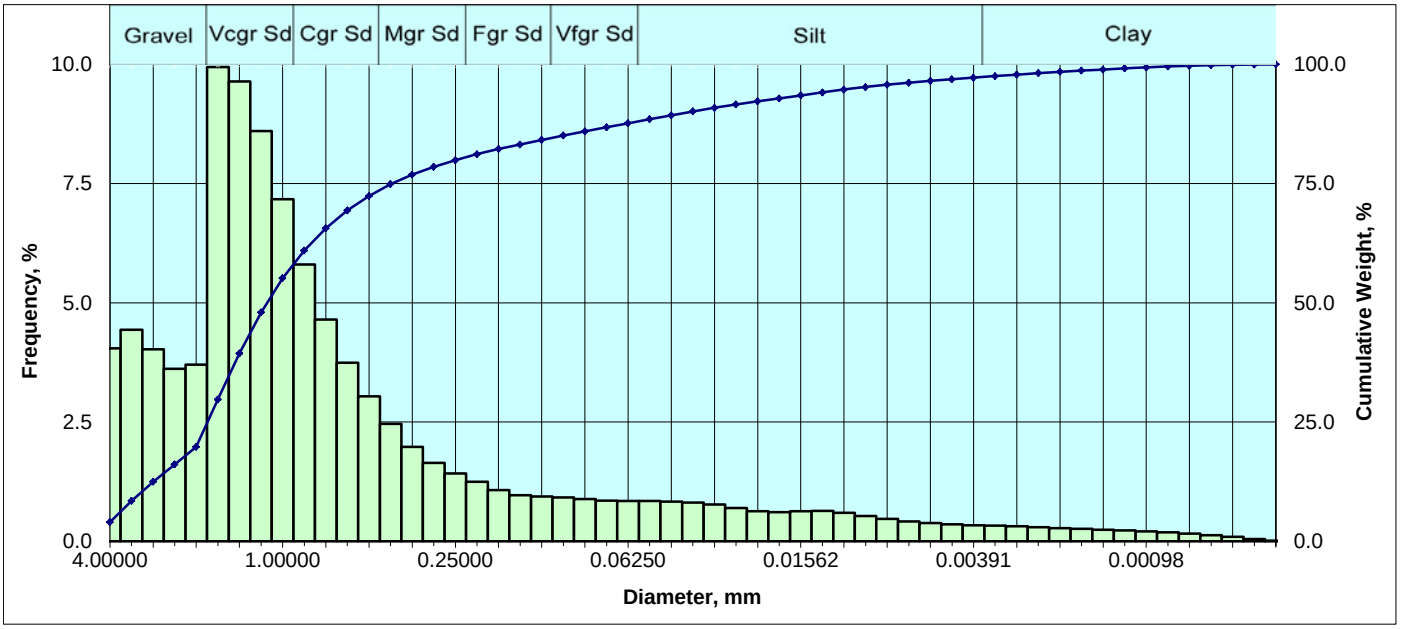
** Distribution pattern precludes calculation of these statistical parameters.

Core Lab
RESERVOIR OPTIMIZATION

Company: RMC Consultants, Inc.
Project Name: Atlas Missile Site 4 RI Addendum
Project Number: E15-019-201

CL File Number: 1704035
Sample ID: FEW4-MW82-83

Sieve and Laser Particle Size Analysis



Particle Size Distribution

	Diameter				Weight %	
	[US Mesh]	[in.]	[mm]	[ϕ]	[Incl.]	[Cum.]
Granule	5	0.157480	4.00000	-2.00	4.047	4.05
	6	0.132425	3.36359	-1.75	4.434	8.48
	7	0.111355	2.82843	-1.50	4.024	12.51
	8	0.093638	2.37841	-1.25	3.615	16.12
	10	0.078740	2.00000	-1.00	3.702	19.82
V Crse Sand	12	0.066212	1.68179	-0.75	9.942	29.76
	14	0.055678	1.41421	-0.50	9.642	39.41
	16	0.046819	1.18921	-0.25	8.602	48.01
	18	0.039370	1.00000	0.00	7.175	55.18
Coarse Sand	20	0.033106	0.84090	0.25	5.802	60.98
	25	0.027839	0.70711	0.50	4.647	65.63
	30	0.023410	0.59460	0.75	3.748	69.38
	35	0.019685	0.50000	1.00	3.037	72.42
Medium Sand	40	0.016553	0.42045	1.25	2.461	74.88
	45	0.013919	0.35355	1.50	1.982	76.86
	50	0.011705	0.29730	1.75	1.644	78.50
	60	0.009843	0.25000	2.00	1.423	79.93
Fine Sand	70	0.008277	0.21022	2.25	1.245	81.17
	80	0.006960	0.17678	2.50	1.072	82.24
	100	0.005852	0.14865	2.75	0.963	83.21
	120	0.004921	0.12500	3.00	0.938	84.14
V. Fine Sand	140	0.004138	0.10511	3.25	0.923	85.07
	170	0.003480	0.08839	3.50	0.884	85.95
	200	0.002926	0.07433	3.75	0.853	86.80
	230	0.002461	0.06250	4.00	0.847	87.65
Silt	270	0.002069	0.05256	4.25	0.843	88.50
	325	0.001740	0.04419	4.50	0.833	89.33
	400	0.001463	0.03716	4.75	0.811	90.14
	450	0.001230	0.03125	5.00	0.769	90.91
	500	0.001035	0.02628	5.25	0.700	91.61
	635	0.000870	0.02210	5.50	0.634	92.24
		0.000732	0.01858	5.75	0.613	92.86
		0.000615	0.01562	6.00	0.633	93.49
		0.000517	0.01314	6.25	0.640	94.13
		0.000435	0.01105	6.50	0.595	94.72
		0.000366	0.00929	6.75	0.529	95.25
		0.000308	0.00781	7.00	0.467	95.72
		0.000259	0.00657	7.25	0.417	96.14
		0.000217	0.00552	7.50	0.380	96.52
		0.000183	0.00465	7.75	0.355	96.87
		0.000154	0.00391	8.00	0.339	97.21
Clay		0.000129	0.00328	8.25	0.327	97.54
		0.000109	0.00276	8.50	0.313	97.85
		0.000091	0.00232	8.75	0.297	98.15
		0.000077	0.00195	9.00	0.279	98.43
		0.000065	0.00164	9.25	0.259	98.69
		0.000054	0.00138	9.50	0.241	98.93
		0.000046	0.00116	9.75	0.225	99.15
		0.000038	0.00098	10.00	0.208	99.36
		0.000032	0.00082	10.25	0.188	99.55
		0.000027	0.00069	10.50	0.162	99.71
		0.000023	0.00058	10.75	0.131	99.84
		0.000019	0.00049	11.00	0.094	99.94
		0.000016	0.00041	11.25	0.051	99.99
		0.000015	0.00038	11.50	0.012	100.00

Sorting Statistics (Folk)

Parameter	Trask	Inman	Folk
Median	Very coarse sand sized		
(in)	0.0448	0.0448	0.0448
(mm)	1.1367	1.1367	1.1367
Mean	Coarse sand sized		
(in)	0.0443	0.0218	0.0277
(mm)	1.1253	0.5549	0.7047
Sorting	V. Poor		
	2.099	2.109	2.354
Skewness	Strongly fine skewed		
	0.769	1.196	0.539
Kurtosis	Very leptokurtic		
	0.227	1.033	1.643

Component Percentages

Gravel	Sand	Silt	Clay	Silt + Clay
19.82	67.83	9.56	2.79	12.35

Percentile [Weight, %]	Particle Diameter [in.]	[mm]	[phi]
5	0.1521	3.8632	-1.9498
10	0.1245	3.1616	-1.6606
16	0.0942	2.3934	-1.2590
25	0.0722	1.8343	-0.8752
30	0.0660	1.6753	-0.7444
40	0.0551	1.3987	-0.4841
50	0.0448	1.1367	-0.1848
60	0.0342	0.8679	0.2044
75	0.0164	0.4163	1.2642
84	0.0051	0.1287	2.9585
90	0.0015	0.0384	4.7038
95	0.0004	0.0101	6.6247

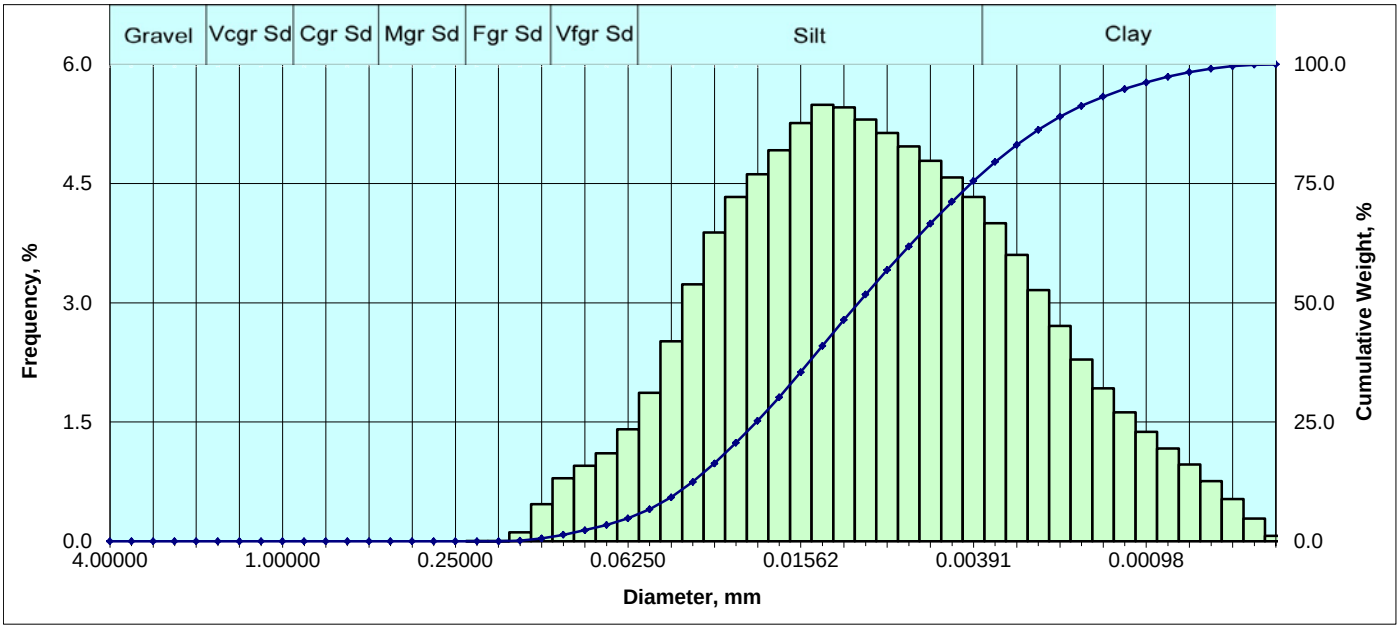
** Distribution pattern precludes calculation of these statistical parameters.

Core Lab
RESERVOIR OPTIMIZATION

Company: RMC Consultants, Inc.
Project Name: Atlas Missile Site 4 RI Addendum
Project Number: E15-019-201

CL File Number: 1704035
Sample ID: FEW4-MW76-120

Sieve and Laser Particle Size Analysis



Particle Size Distribution

	Diameter				Weight %	
	[US Mesh]	[in.]	[mm]	[ϕ]	[Incl.]	[Cum.]
Granule	5	0.157480	4.00000	-2.00	0.000	0.00
	6	0.132425	3.36359	-1.75	0.000	0.00
	7	0.111355	2.82843	-1.50	0.000	0.00
	8	0.093638	2.37841	-1.25	0.000	0.00
	10	0.078740	2.00000	-1.00	0.000	0.00
V Crse Sand	12	0.066212	1.68179	-0.75	0.000	0.00
	14	0.055678	1.41421	-0.50	0.000	0.00
	16	0.046819	1.18921	-0.25	0.000	0.00
	18	0.039370	1.00000	0.00	0.000	0.00
Coarse Sand	20	0.033106	0.84090	0.25	0.000	0.00
	25	0.027839	0.70711	0.50	0.000	0.00
	30	0.023410	0.59460	0.75	0.000	0.00
	35	0.019685	0.50000	1.00	0.000	0.00
Medium Sand	40	0.016553	0.42045	1.25	0.000	0.00
	45	0.013919	0.35355	1.50	0.000	0.00
	50	0.011705	0.29730	1.75	0.000	0.00
	60	0.009843	0.25000	2.00	0.000	0.00
Fine Sand	70	0.008277	0.21022	2.25	0.000	0.00
	80	0.006960	0.17678	2.50	0.004	0.00
	100	0.005852	0.14865	2.75	0.113	0.12
	120	0.004921	0.12500	3.00	0.466	0.58
V. Fine Sand	140	0.004138	0.10511	3.25	0.792	1.38
	170	0.003480	0.08839	3.50	0.952	2.33
	200	0.002926	0.07433	3.75	1.109	3.44
	230	0.002461	0.06250	4.00	1.409	4.85
Silt	270	0.002069	0.05256	4.25	1.870	6.71
	325	0.001740	0.04419	4.50	2.516	9.23
	400	0.001463	0.03716	4.75	3.231	12.46
	450	0.001230	0.03125	5.00	3.883	16.35
	500	0.001035	0.02628	5.25	4.331	20.68
	635	0.000870	0.02210	5.50	4.619	25.30
		0.000732	0.01858	5.75	4.920	30.22
		0.000615	0.01562	6.00	5.261	35.48
		0.000517	0.01314	6.25	5.493	40.97
		0.000435	0.01105	6.50	5.458	46.43
		0.000366	0.00929	6.75	5.307	51.73
		0.000308	0.00781	7.00	5.138	56.87
		0.000259	0.00657	7.25	4.967	61.84
		0.000217	0.00552	7.50	4.787	66.63
		0.000183	0.00465	7.75	4.579	71.20
		0.000154	0.00391	8.00	4.333	75.54
Clay		0.000129	0.00328	8.25	4.003	79.54
		0.000109	0.00276	8.50	3.603	83.14
		0.000091	0.00232	8.75	3.159	86.30
		0.000077	0.00195	9.00	2.710	89.01
		0.000065	0.00164	9.25	2.288	91.30
		0.000054	0.00138	9.50	1.923	93.22
		0.000046	0.00116	9.75	1.624	94.85
		0.000038	0.00098	10.00	1.376	96.22
		0.000032	0.00082	10.25	1.169	97.39
		0.000027	0.00069	10.50	0.966	98.36
		0.000023	0.00058	10.75	0.756	99.11
		0.000019	0.00049	11.00	0.532	99.64
		0.000016	0.00041	11.25	0.286	99.93
		0.000015	0.00038	11.50	0.070	100.00

Sorting Statistics (Folk)

Parameter	Trask	Inman	Folk
Median	**Silt sized**		
(in)	0.0004	0.0004	0.0004
(mm)	0.0099	0.0099	0.0099
Mean	**Silt sized**		
(in)	0.0005	0.0004	0.0004
(mm)	0.0132	0.0092	0.0094
Sorting	**Poor**		
	2.365	1.794	1.769
Skewness	**Near symmetrical**		
	0.959	0.131	0.070
Kurtosis	**Mesokurtic**		
	0.226	0.605	0.950

Component Percentages

Gravel	Sand	Silt	Clay	Silt + Clay
0.00	4.85	70.69	24.46	95.15

Percentile [Weight, %]	Particle Diameter [in.]	[mm]	[phi]
5	0.0024	0.0617	4.0191
10	0.0017	0.0425	4.5557
16	0.0013	0.0318	4.9759
25	0.0009	0.0224	5.4827
30	0.0007	0.0187	5.7381
40	0.0005	0.0136	6.2026
50	0.0004	0.0099	6.6635
60	0.0003	0.0070	7.1523
75	0.0002	0.0040	7.9665
84	0.0001	0.0026	8.5637
90	0.0001	0.0018	9.1028
95	0.0000	0.0011	9.7760

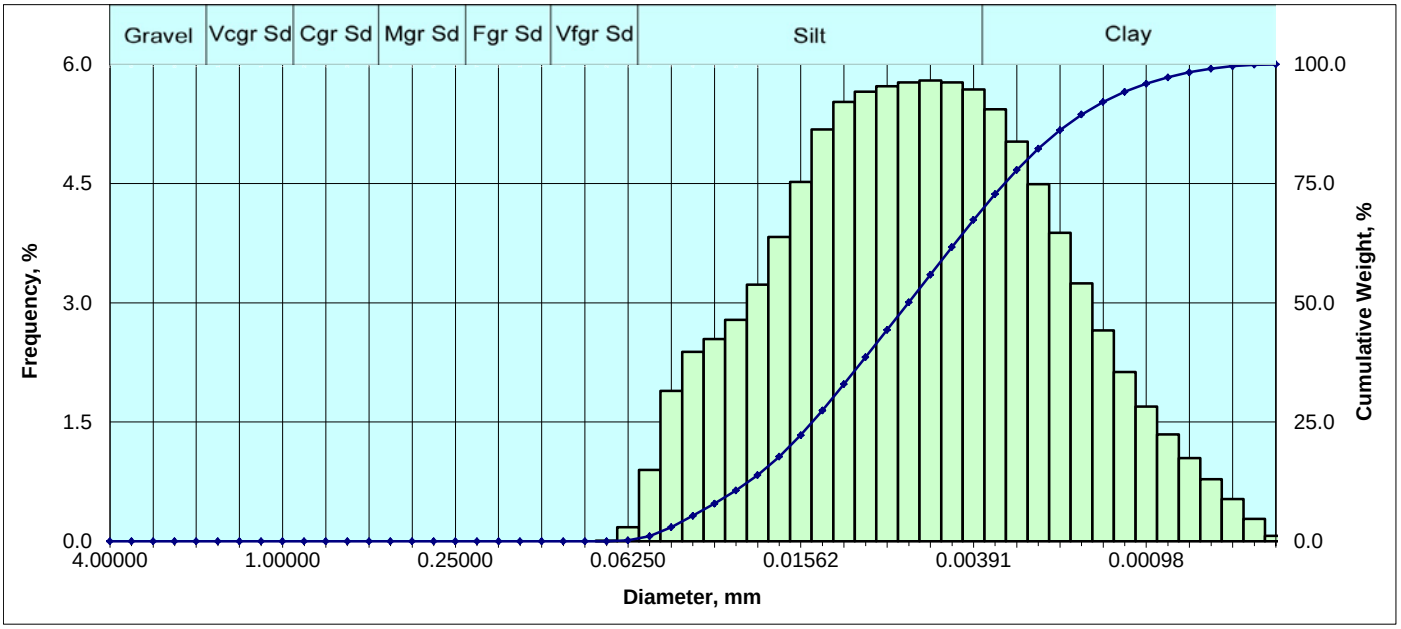
** Distribution pattern precludes calculation of these statistical parameters.

Core Lab
RESERVOIR OPTIMIZATION

Company: RMC Consultants, Inc.
Project Name: Atlas Missile Site 4 RI Addendum
Project Number: E15-019-201

CL File Number: 1704035
Sample ID: FEW4-MW76-90

Sieve and Laser Particle Size Analysis



Particle Size Distribution

	Diameter				Weight %	
	[US Mesh]	[in.]	[mm]	[ϕ]	[Incl.]	[Cum.]
Granule	5	0.157480	4.00000	-2.00	0.000	0.00
	6	0.132425	3.36359	-1.75	0.000	0.00
	7	0.111355	2.82843	-1.50	0.000	0.00
	8	0.093638	2.37841	-1.25	0.000	0.00
	10	0.078740	2.00000	-1.00	0.000	0.00
V Crse Sand	12	0.066212	1.68179	-0.75	0.000	0.00
	14	0.055678	1.41421	-0.50	0.000	0.00
	16	0.046819	1.18921	-0.25	0.000	0.00
	18	0.039370	1.00000	0.00	0.000	0.00
Coarse Sand	20	0.033106	0.84090	0.25	0.000	0.00
	25	0.027839	0.70711	0.50	0.000	0.00
	30	0.023410	0.59460	0.75	0.000	0.00
	35	0.019685	0.50000	1.00	0.000	0.00
Medium Sand	40	0.016553	0.42045	1.25	0.000	0.00
	45	0.013919	0.35355	1.50	0.000	0.00
	50	0.011705	0.29730	1.75	0.000	0.00
	60	0.009843	0.25000	2.00	0.000	0.00
Fine Sand	70	0.008277	0.21022	2.25	0.000	0.00
	80	0.006960	0.17678	2.50	0.000	0.00
	100	0.005852	0.14865	2.75	0.000	0.00
	120	0.004921	0.12500	3.00	0.000	0.00
V. Fine Sand	140	0.004138	0.10511	3.25	0.000	0.00
	170	0.003480	0.08839	3.50	0.000	0.00
	200	0.002926	0.07433	3.75	0.007	0.01
	230	0.002461	0.06250	4.00	0.176	0.18
Silt	270	0.002069	0.05256	4.25	0.898	1.08
	325	0.001740	0.04419	4.50	1.891	2.97
	400	0.001463	0.03716	4.75	2.385	5.36
	450	0.001230	0.03125	5.00	2.546	7.90
	500	0.001035	0.02628	5.25	2.784	10.69
	635	0.000870	0.02210	5.50	3.227	13.91
		0.000732	0.01858	5.75	3.827	17.74
		0.000615	0.01562	6.00	4.520	22.26
		0.000517	0.01314	6.25	5.183	27.44
		0.000435	0.01105	6.50	5.529	32.97
		0.000366	0.00929	6.75	5.656	38.63
		0.000308	0.00781	7.00	5.724	44.35
		0.000259	0.00657	7.25	5.774	50.13
		0.000217	0.00552	7.50	5.797	55.93
		0.000183	0.00465	7.75	5.774	61.70
		0.000154	0.00391	8.00	5.686	67.38
Clay		0.000129	0.00328	8.25	5.435	72.82
		0.000109	0.00276	8.50	5.030	77.85
		0.000091	0.00232	8.75	4.494	82.34
		0.000077	0.00195	9.00	3.879	86.22
		0.000065	0.00164	9.25	3.246	89.47
		0.000054	0.00138	9.50	2.652	92.12
		0.000046	0.00116	9.75	2.129	94.25
		0.000038	0.00098	10.00	1.695	95.94
		0.000032	0.00082	10.25	1.346	97.29
		0.000027	0.00069	10.50	1.048	98.34
		0.000023	0.00058	10.75	0.782	99.12
		0.000019	0.00049	11.00	0.531	99.65
		0.000016	0.00041	11.25	0.280	99.93
		0.000015	0.00038	11.50	0.068	100.00

Sorting Statistics (Folk)

Parameter	Trask	Inman	Folk
Median	Silt sized		
(in)	0.0003	0.0003	0.0003
(mm)	0.0066	0.0066	0.0066
Mean	Silt sized		
(in)	0.0003	0.0003	0.0003
(mm)	0.0087	0.0066	0.0066
Sorting	Poor		
	2.163	1.610	1.585
Skewness	Near symmetrical		
	1.003	0.024	0.007
Kurtosis	Mesokurtic		
	0.217	0.598	0.947

Component Percentages

Gravel	Sand	Silt	Clay	Silt + Clay
0.00	0.18	67.20	32.62	99.82

Percentile [Weight, %]	Particle Diameter [in.]	[mm]	[phi]
5	0.0015	0.0382	4.7097
10	0.0011	0.0275	5.1841
16	0.0008	0.0202	5.6308
25	0.0006	0.0143	6.1267
30	0.0005	0.0122	6.3602
40	0.0004	0.0089	6.8060
50	0.0003	0.0066	7.2440
60	0.0002	0.0049	7.6718
75	0.0001	0.0031	8.3531
84	0.0001	0.0022	8.8515
90	0.0001	0.0016	9.2968
95	0.0000	0.0011	9.8554

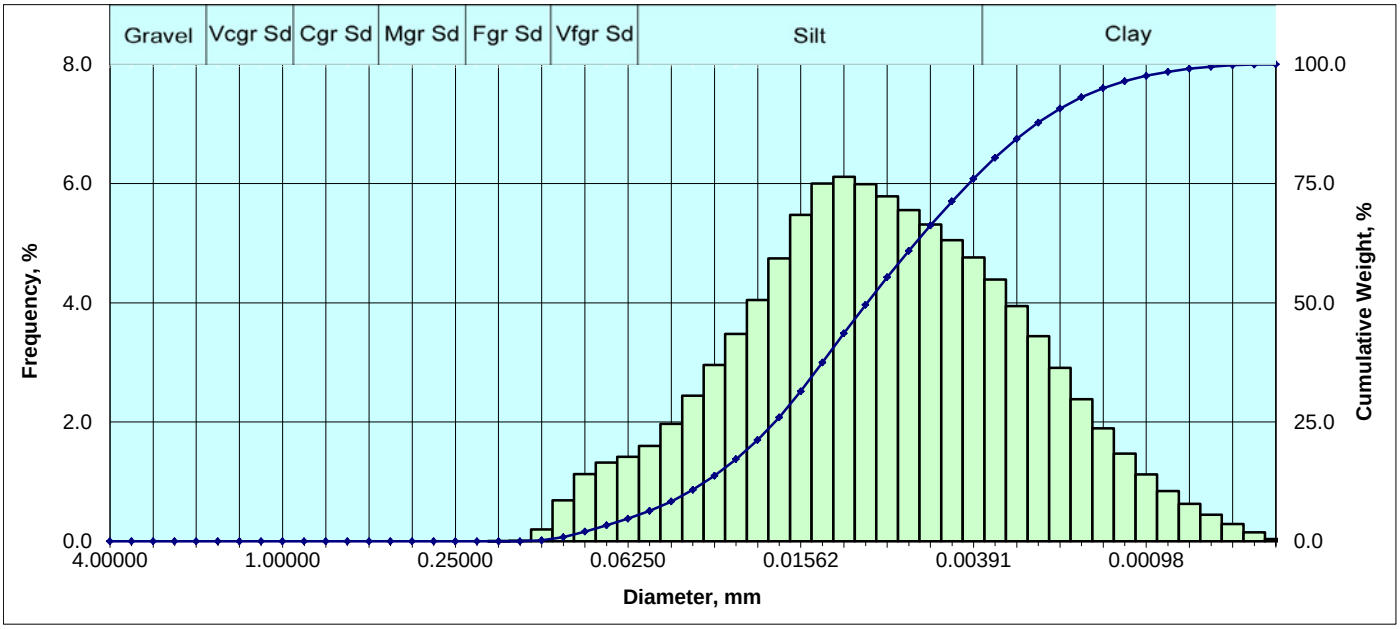
** Distribution pattern precludes calculation of these statistical parameters.

Core Lab
RESERVOIR OPTIMIZATION

Company: RMC Consultants, Inc.
Project Name: Atlas Missile Site 4 RI Addendum
Project Number: E15-019-201

CL File Number: 1704035
Sample ID: FEW4-MW76-250

Sieve and Laser Particle Size Analysis



Particle Size Distribution

	Diameter [US Mesh]	Diameter [in.]	Diameter [mm]	Diameter [ϕ]	Weight % [Incl.]	Weight % [Cum.]
Granule	5	0.157480	4.00000	-2.00	0.000	0.00
	6	0.132425	3.36359	-1.75	0.000	0.00
	7	0.111355	2.82843	-1.50	0.000	0.00
	8	0.093638	2.37841	-1.25	0.000	0.00
	10	0.078740	2.00000	-1.00	0.000	0.00
V Crse Sand	12	0.066212	1.68179	-0.75	0.000	0.00
	14	0.055678	1.41421	-0.50	0.000	0.00
	16	0.046819	1.18921	-0.25	0.000	0.00
	18	0.039370	1.00000	0.00	0.000	0.00
Coarse Sand	20	0.033106	0.84090	0.25	0.000	0.00
	25	0.027839	0.70711	0.50	0.000	0.00
	30	0.023410	0.59460	0.75	0.000	0.00
	35	0.019685	0.50000	1.00	0.000	0.00
Medium Sand	40	0.016553	0.42045	1.25	0.000	0.00
	45	0.013919	0.35355	1.50	0.000	0.00
	50	0.011705	0.29730	1.75	0.000	0.00
	60	0.009843	0.25000	2.00	0.000	0.00
Fine Sand	70	0.008277	0.21022	2.25	0.000	0.00
	80	0.006960	0.17678	2.50	0.000	0.00
	100	0.005852	0.14865	2.75	0.011	0.01
	120	0.004921	0.12500	3.00	0.200	0.21
V. Fine Sand	140	0.004138	0.10511	3.25	0.689	0.90
	170	0.003480	0.08839	3.50	1.129	2.03
	200	0.002926	0.07433	3.75	1.322	3.35
	230	0.002461	0.06250	4.00	1.415	4.76
Silt	270	0.002069	0.05256	4.25	1.601	6.37
	325	0.001740	0.04419	4.50	1.968	8.33
	400	0.001463	0.03716	4.75	2.442	10.78
	450	0.001230	0.03125	5.00	2.960	13.74
	500	0.001035	0.02628	5.25	3.476	17.21
	635	0.000870	0.02210	5.50	4.045	21.26
		0.000732	0.01858	5.75	4.745	26.00
		0.000615	0.01562	6.00	5.475	31.48
		0.000517	0.01314	6.25	6.001	37.48
		0.000435	0.01105	6.50	6.111	43.59
		0.000366	0.00929	6.75	5.991	49.58
		0.000308	0.00781	7.00	5.788	55.37
		0.000259	0.00657	7.25	5.556	60.92
		0.000217	0.00552	7.50	5.312	66.24
		0.000183	0.00465	7.75	5.049	71.29
		0.000154	0.00391	8.00	4.760	76.05
Clay		0.000129	0.00328	8.25	4.390	80.44
		0.000109	0.00276	8.50	3.945	84.38
		0.000091	0.00232	8.75	3.442	87.82
		0.000077	0.00195	9.00	2.909	90.73
		0.000065	0.00164	9.25	2.383	93.11
		0.000054	0.00138	9.50	1.897	95.01
		0.000046	0.00116	9.75	1.470	96.48
		0.000038	0.00098	10.00	1.120	97.60
		0.000032	0.00082	10.25	0.845	98.45
		0.000027	0.00069	10.50	0.626	99.07
		0.000023	0.00058	10.75	0.447	99.52
		0.000019	0.00049	11.00	0.292	99.81
		0.000016	0.00041	11.25	0.151	99.96
		0.000015	0.00038	11.50	0.037	100.00

Sorting Statistics (Folk)

Parameter	Trask	Inman	Folk
Median	**Silt sized**		
(in)	0.0004	0.0004	0.0004
(mm)	0.0092	0.0092	0.0092
Mean	**Silt sized**		
(in)	0.0005	0.0003	0.0004
(mm)	0.0117	0.0089	0.0090
Sorting	**Poor**		
	2.179	1.658	1.657
Skewness	**Near symmetrical**		
	0.966	0.000	0.015
Kurtosis	**Mesokurtic**		
	0.204	0.648	0.996

Component Percentages

Gravel	Sand	Silt	Clay	Silt + Clay
0.00	4.76	71.28	23.95	95.24

Percentile [Weight, %]	Particle Diameter [in.]	[mm]	[phi]
5	0.0024	0.0610	4.0341
10	0.0016	0.0394	4.6658
16	0.0011	0.0280	5.1579
25	0.0008	0.0193	5.6935
30	0.0006	0.0164	5.9282
40	0.0005	0.0123	6.3480
50	0.0004	0.0092	6.7667
60	0.0003	0.0068	7.2053
75	0.0002	0.0041	7.9412
84	0.0001	0.0028	8.4739
90	0.0001	0.0020	8.9329
95	0.0001	0.0014	9.4983

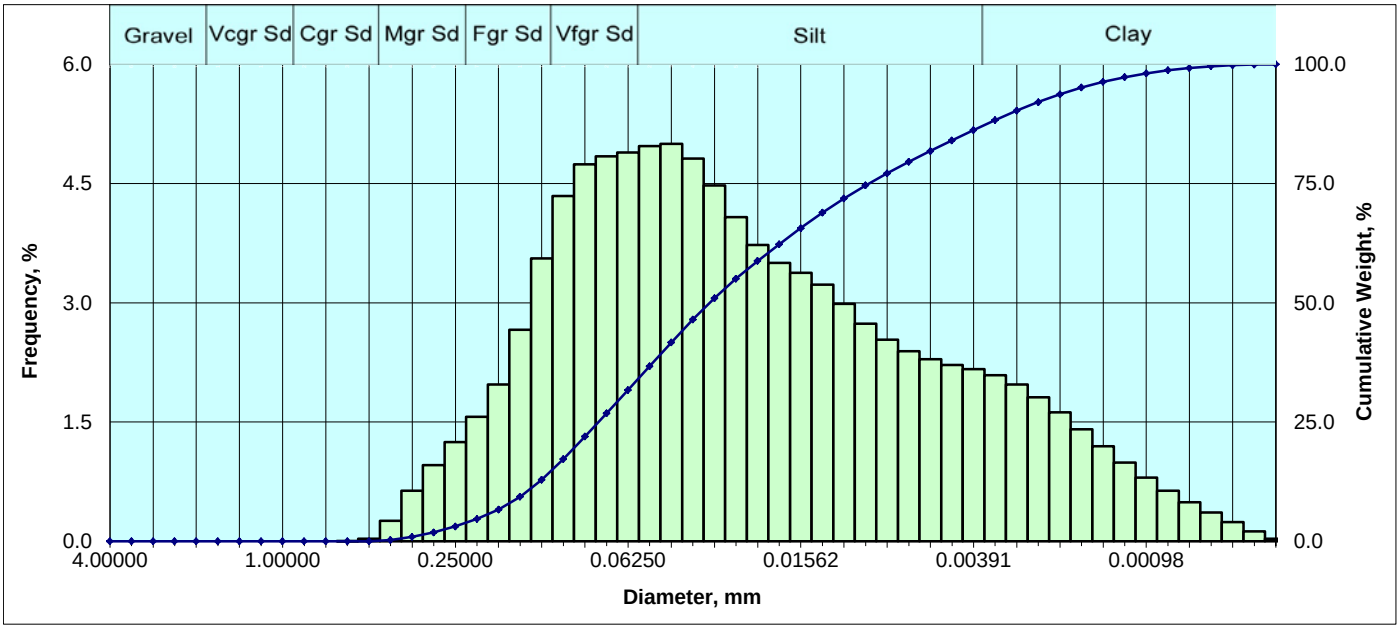
** Distribution pattern precludes calculation of these statistical parameters.

Core Lab
RESERVOIR OPTIMIZATION

Company: RMC Consultants, Inc.
Project Name: Atlas Missile Site 4 RI Addendum
Project Number: E15-019-201

CL File Number: 1704035
Sample ID: FEW4-MW81-200

Sieve and Laser Particle Size Analysis



Particle Size Distribution

	Diameter				Weight %	
	[US Mesh]	[in.]	[mm]	[ϕ]	[Incl.]	[Cum.]
Granule	5	0.157480	4.00000	-2.00	0.000	0.00
	6	0.132425	3.36359	-1.75	0.000	0.00
	7	0.111355	2.82843	-1.50	0.000	0.00
	8	0.093638	2.37841	-1.25	0.000	0.00
	10	0.078740	2.00000	-1.00	0.000	0.00
V Crse Sand	12	0.066212	1.68179	-0.75	0.000	0.00
	14	0.055678	1.41421	-0.50	0.000	0.00
	16	0.046819	1.18921	-0.25	0.000	0.00
	18	0.039370	1.00000	0.00	0.000	0.00
Coarse Sand	20	0.033106	0.84090	0.25	0.000	0.00
	25	0.027839	0.70711	0.50	0.000	0.00
	30	0.023410	0.59460	0.75	0.000	0.00
	35	0.019685	0.50000	1.00	0.032	0.03
Medium Sand	40	0.016553	0.42045	1.25	0.258	0.29
	45	0.013919	0.35355	1.50	0.635	0.92
	50	0.011705	0.29730	1.75	0.957	1.88
	60	0.009843	0.25000	2.00	1.246	3.13
Fine Sand	70	0.008277	0.21022	2.25	1.568	4.70
	80	0.006960	0.17678	2.50	1.974	6.67
	100	0.005852	0.14865	2.75	2.660	9.33
	120	0.004921	0.12500	3.00	3.558	12.89
V. Fine Sand	140	0.004138	0.10511	3.25	4.345	17.23
	170	0.003480	0.08839	3.50	4.744	21.98
	200	0.002926	0.07433	3.75	4.844	26.82
	230	0.002461	0.06250	4.00	4.892	31.71
Silt	270	0.002069	0.05256	4.25	4.971	36.68
	325	0.001740	0.04419	4.50	5.000	41.68
	400	0.001463	0.03716	4.75	4.815	46.50
	450	0.001230	0.03125	5.00	4.478	50.98
	500	0.001035	0.02628	5.25	4.079	55.06
	635	0.000870	0.02210	5.50	3.727	58.78
		0.000732	0.01858	5.75	3.504	62.29
		0.000615	0.01562	6.00	3.377	65.66
		0.000517	0.01314	6.25	3.230	68.90
		0.000435	0.01105	6.50	2.988	71.88
		0.000366	0.00929	6.75	2.736	74.62
		0.000308	0.00781	7.00	2.535	77.15
		0.000259	0.00657	7.25	2.390	79.54
		0.000217	0.00552	7.50	2.291	81.84
		0.000183	0.00465	7.75	2.220	84.06
		0.000154	0.00391	8.00	2.167	86.22
Clay		0.000129	0.00328	8.25	2.088	88.31
		0.000109	0.00276	8.50	1.971	90.28
		0.000091	0.00232	8.75	1.813	92.09
		0.000077	0.00195	9.00	1.622	93.72
		0.000065	0.00164	9.25	1.410	95.13
		0.000054	0.00138	9.50	1.195	96.32
		0.000046	0.00116	9.75	0.989	97.31
		0.000038	0.00098	10.00	0.801	98.11
		0.000032	0.00082	10.25	0.638	98.75
		0.000027	0.00069	10.50	0.492	99.24
		0.000023	0.00058	10.75	0.362	99.60
		0.000019	0.00049	11.00	0.241	99.84
		0.000016	0.00041	11.25	0.126	99.97
		0.000015	0.00038	11.50	0.031	100.00

Sorting Statistics (Folk)

Parameter	Trask	Inman	Folk
Median	**Silt sized**		
(in)	0.0013	0.0013	0.0013
(mm)	0.0325	0.0325	0.0325
Mean	**Silt sized**		
(in)	0.0017	0.0009	0.0010
(mm)	0.0443	0.0227	0.0256
Sorting	**V. Poor**		
	2.963	2.284	2.194
Skewness	**Finely skewed**		
	0.826	0.356	0.231
Kurtosis	**Mesokurtic**		
	0.250	0.519	0.908

Component Percentages

Gravel	Sand	Silt	Clay	Silt + Clay
0.00	31.71	54.51	13.78	68.29

Percentile [Weight, %]	Particle Diameter [in.]	[mm]	[phi]
5	0.0081	0.2051	2.2858
10	0.0057	0.1442	2.7939
16	0.0044	0.1108	3.1745
25	0.0031	0.0796	3.6508
30	0.0026	0.0666	3.9074
40	0.0019	0.0470	4.4108
50	0.0013	0.0325	4.9416
60	0.0008	0.0209	5.5820
75	0.0004	0.0091	6.7849
84	0.0002	0.0047	7.7432
90	0.0001	0.0028	8.4616
95	0.0001	0.0017	9.2258

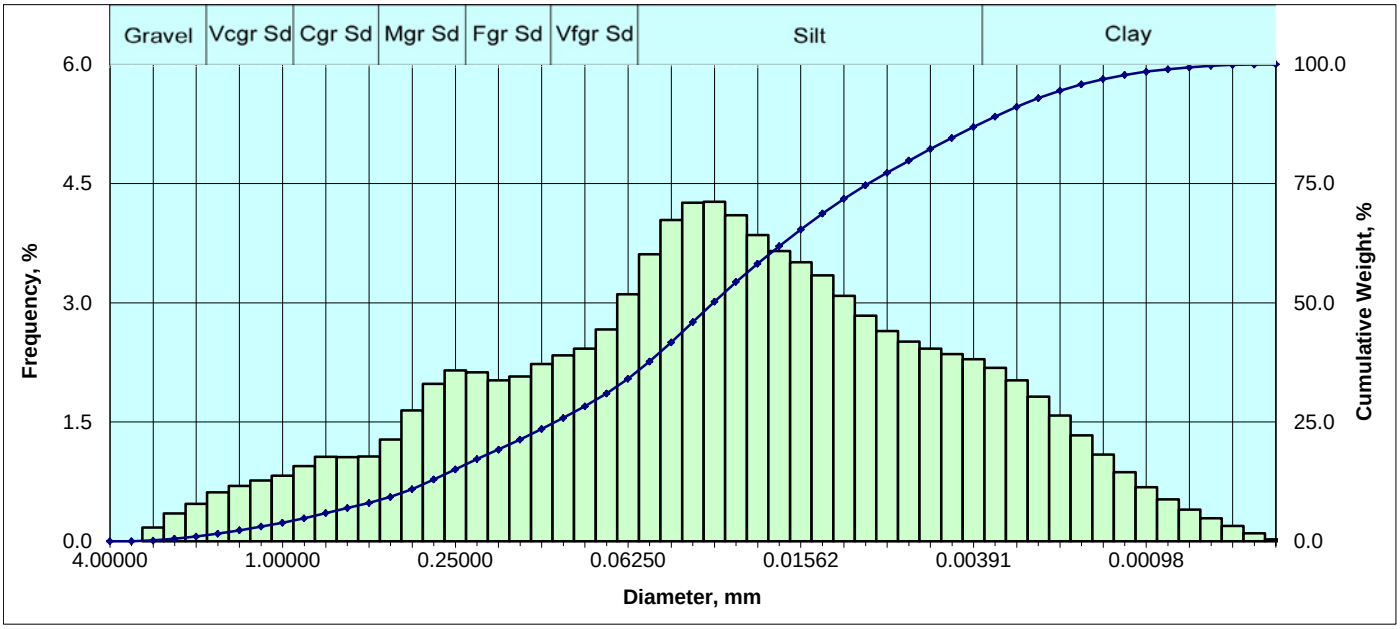
** Distribution pattern precludes calculation of these statistical parameters.

Core Lab
RESERVOIR OPTIMIZATION

Company: RMC Consultants, Inc.
Project Name: Atlas Missile Site 4 RI Addendum
Project Number: E15-019-201

CL File Number: 1704035
Sample ID: FEW4-MW81-269

Sieve and Laser Particle Size Analysis



Particle Size Distribution

	Diameter				Weight %	
	[US Mesh]	[in.]	[mm]	[ϕ]	[Incl.]	[Cum.]
Granule	5	0.157480	4.00000	-2.00	0.000	0.00
	6	0.132425	3.36359	-1.75	0.000	0.00
	7	0.111355	2.82843	-1.50	0.175	0.18
	8	0.093638	2.37841	-1.25	0.351	0.53
	10	0.078740	2.00000	-1.00	0.472	1.00
V Crse Sand	12	0.066212	1.68179	-0.75	0.615	1.61
	14	0.055678	1.41421	-0.50	0.695	2.31
	16	0.046819	1.18921	-0.25	0.766	3.07
	18	0.039370	1.00000	0.00	0.824	3.90
Coarse Sand	20	0.033106	0.84090	0.25	0.946	4.84
	25	0.027839	0.70711	0.50	1.062	5.91
	30	0.023410	0.59460	0.75	1.058	6.96
	35	0.019685	0.50000	1.00	1.066	8.03
Medium Sand	40	0.016553	0.42045	1.25	1.279	9.31
	45	0.013919	0.35355	1.50	1.647	10.96
	50	0.011705	0.29730	1.75	1.983	12.94
	60	0.009843	0.25000	2.00	2.152	15.09
Fine Sand	70	0.008277	0.21022	2.25	2.125	17.22
	80	0.006960	0.17678	2.50	2.026	19.24
	100	0.005852	0.14865	2.75	2.073	21.31
	120	0.004921	0.12500	3.00	2.232	23.55
V. Fine Sand	140	0.004138	0.10511	3.25	2.338	25.88
	170	0.003480	0.08839	3.50	2.423	28.31
	200	0.002926	0.07433	3.75	2.665	30.97
	230	0.002461	0.06250	4.00	3.109	34.08
Silt	270	0.002069	0.05256	4.25	3.609	37.69
	325	0.001740	0.04419	4.50	4.042	41.73
	400	0.001463	0.03716	4.75	4.258	45.99
	450	0.001230	0.03125	5.00	4.272	50.26
	500	0.001035	0.02628	5.25	4.103	54.37
	635	0.000870	0.02210	5.50	3.853	58.22
		0.000732	0.01858	5.75	3.651	61.87
		0.000615	0.01562	6.00	3.512	65.38
		0.000517	0.01314	6.25	3.344	68.72
		0.000435	0.01105	6.50	3.089	71.81
		0.000366	0.00929	6.75	2.837	74.65
		0.000308	0.00781	7.00	2.646	77.30
		0.000259	0.00657	7.25	2.514	79.81
		0.000217	0.00552	7.50	2.425	82.24
		0.000183	0.00465	7.75	2.355	84.59
		0.000154	0.00391	8.00	2.290	86.88
Clay		0.000129	0.00328	8.25	2.182	89.06
		0.000109	0.00276	8.50	2.024	91.09
		0.000091	0.00232	8.75	1.820	92.91
		0.000077	0.00195	9.00	1.582	94.49
		0.000065	0.00164	9.25	1.332	95.82
		0.000054	0.00138	9.50	1.090	96.91
		0.000046	0.00116	9.75	0.870	97.78
		0.000038	0.00098	10.00	0.682	98.46
		0.000032	0.00082	10.25	0.529	98.99
		0.000027	0.00069	10.50	0.400	99.39
		0.000023	0.00058	10.75	0.291	99.68
		0.000019	0.00049	11.00	0.193	99.88
		0.000016	0.00041	11.25	0.100	99.98
		0.000015	0.00038	11.50	0.024	100.00

Sorting Statistics (Folk)

Parameter	Trask	Inman	Folk
Median	Silt sized		
(in)	0.0012	0.0012	0.0012
(mm)	0.0316	0.0316	0.0316
Mean	Silt sized		
(in)	0.0024	0.0013	0.0013
(mm)	0.0609	0.0337	0.0330
Sorting	V. Poor		
	3.519	2.791	2.730
Skewness	Near symmetrical		
	1.013	-0.106	-0.050
Kurtosis	Mesokurtic		
	0.133	0.578	0.994

Component Percentages

Gravel	Sand	Silt	Clay	Silt + Clay
1.00	33.08	52.80	13.12	65.92

Percentile [Weight, %]	Particle Diameter [in.]	[mm]	[phi]
5	0.0323	0.8213	0.2840
10	0.0154	0.3924	1.3496
16	0.0092	0.2330	2.1017
25	0.0044	0.1126	3.1502
30	0.0031	0.0795	3.6537
40	0.0019	0.0478	4.3875
50	0.0012	0.0316	4.9834
60	0.0008	0.0204	5.6166
75	0.0004	0.0091	6.7806
84	0.0002	0.0049	7.6831
90	0.0001	0.0030	8.3604
95	0.0001	0.0018	9.0909

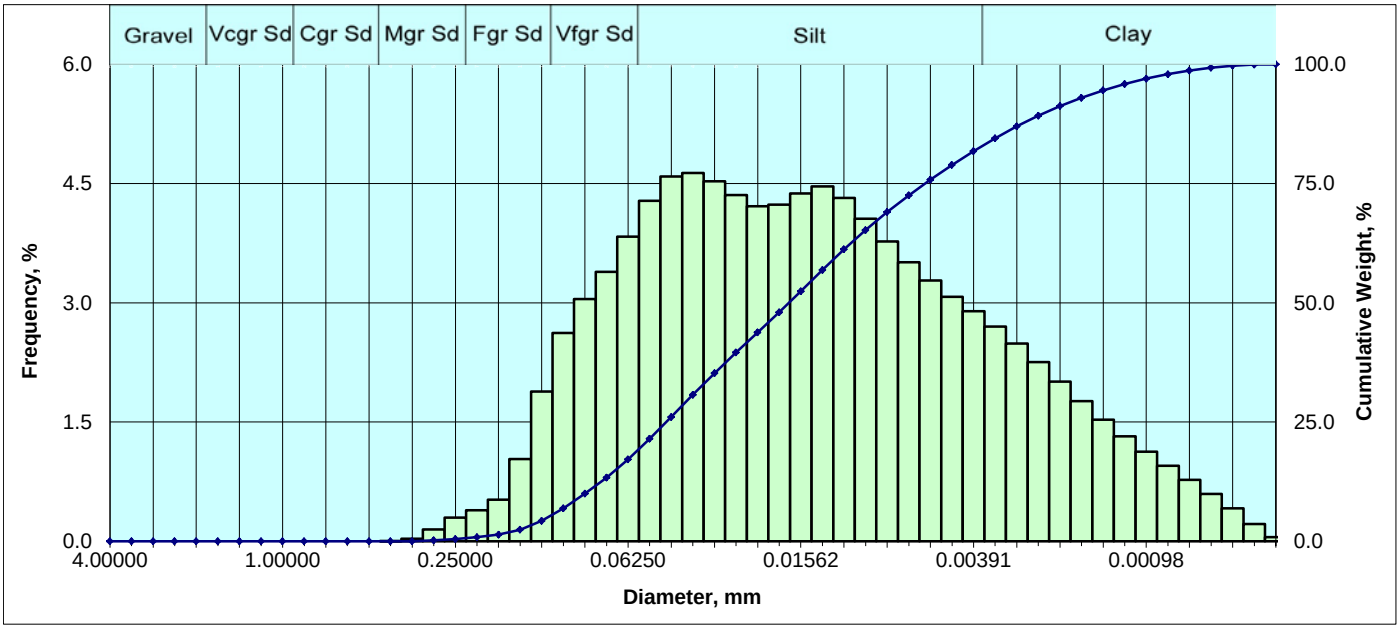
** Distribution pattern precludes calculation of these statistical parameters.

Core Lab
RESERVOIR OPTIMIZATION

Company: RMC Consultants, Inc.
Project Name: Atlas Missile Site 4 RI Addendum
Project Number: E15-019-201

CL File Number: 1704035
Sample ID: FEW4-MW81-100

Sieve and Laser Particle Size Analysis



Particle Size Distribution

	Diameter [US Mesh]	Diameter [in.]	Diameter [mm]	Diameter [ϕ]	Weight % [Incl.]	Weight % [Cum.]
Granule	5	0.157480	4.00000	-2.00	0.000	0.00
	6	0.132425	3.36359	-1.75	0.000	0.00
	7	0.111355	2.82843	-1.50	0.000	0.00
	8	0.093638	2.37841	-1.25	0.000	0.00
	10	0.078740	2.00000	-1.00	0.000	0.00
V Crse Sand	12	0.066212	1.68179	-0.75	0.000	0.00
	14	0.055678	1.41421	-0.50	0.000	0.00
	16	0.046819	1.18921	-0.25	0.000	0.00
	18	0.039370	1.00000	0.00	0.000	0.00
Coarse Sand	20	0.033106	0.84090	0.25	0.000	0.00
	25	0.027839	0.70711	0.50	0.000	0.00
	30	0.023410	0.59460	0.75	0.000	0.00
	35	0.019685	0.50000	1.00	0.000	0.00
Medium Sand	40	0.016553	0.42045	1.25	0.001	0.00
	45	0.013919	0.35355	1.50	0.033	0.03
	50	0.011705	0.29730	1.75	0.150	0.18
	60	0.009843	0.25000	2.00	0.300	0.48
Fine Sand	70	0.008277	0.21022	2.25	0.389	0.87
	80	0.006960	0.17678	2.50	0.525	1.40
	100	0.005852	0.14865	2.75	1.033	2.43
	120	0.004921	0.12500	3.00	1.883	4.31
V. Fine Sand	140	0.004138	0.10511	3.25	2.619	6.93
	170	0.003480	0.08839	3.50	3.047	9.98
	200	0.002926	0.07433	3.75	3.390	13.37
	230	0.002461	0.06250	4.00	3.833	17.20
Silt	270	0.002069	0.05256	4.25	4.284	21.49
	325	0.001740	0.04419	4.50	4.588	26.08
	400	0.001463	0.03716	4.75	4.633	30.71
	450	0.001230	0.03125	5.00	4.530	35.24
	500	0.001035	0.02628	5.25	4.355	39.59
	635	0.000870	0.02210	5.50	4.217	43.81
		0.000732	0.01858	5.75	4.234	48.04
		0.000615	0.01562	6.00	4.377	52.42
		0.000517	0.01314	6.25	4.464	56.89
		0.000435	0.01105	6.50	4.322	61.21
		0.000366	0.00929	6.75	4.057	65.26
		0.000308	0.00781	7.00	3.774	69.04
		0.000259	0.00657	7.25	3.511	72.55
		0.000217	0.00552	7.50	3.280	75.83
		0.000183	0.00465	7.75	3.076	78.90
		0.000154	0.00391	8.00	2.895	81.80
Clay		0.000129	0.00328	8.25	2.702	84.50
		0.000109	0.00276	8.50	2.489	86.99
		0.000091	0.00232	8.75	2.255	89.25
		0.000077	0.00195	9.00	2.009	91.25
		0.000065	0.00164	9.25	1.762	93.02
		0.000054	0.00138	9.50	1.530	94.55
		0.000046	0.00116	9.75	1.320	95.87
		0.000038	0.00098	10.00	1.127	96.99
		0.000032	0.00082	10.25	0.950	97.94
		0.000027	0.00069	10.50	0.774	98.72
		0.000023	0.00058	10.75	0.596	99.31
		0.000019	0.00049	11.00	0.413	99.73
		0.000016	0.00041	11.25	0.219	99.95
		0.000015	0.00038	11.50	0.054	100.00

Sorting Statistics (Folk)

Parameter	Trask	Inman	Folk
Median	**Silt sized**		
(in)	0.0007	0.0007	0.0007
(mm)	0.0173	0.0173	0.0173
Mean	**Silt sized**		
(in)	0.0010	0.0006	0.0006
(mm)	0.0260	0.0150	0.0157
Sorting	**V. Poor**		
	2.824	2.142	2.059
Skewness	**Finely skewed**		
	0.947	0.217	0.118
Kurtosis	**Platykurtic**		
	0.234	0.522	0.892

Component Percentages

Gravel	Sand	Silt	Clay	Silt + Clay
0.00	17.20	64.60	18.20	82.80

Percentile [Weight, %]	Particle Diameter [in.]	[mm]	[phi]
5	0.0047	0.1198	3.0614
10	0.0035	0.0883	3.5013
16	0.0026	0.0662	3.9168
25	0.0018	0.0462	4.4374
30	0.0015	0.0382	4.7089
40	0.0010	0.0259	5.2723
50	0.0007	0.0173	5.8564
60	0.0005	0.0116	6.4257
75	0.0002	0.0058	7.4327
84	0.0001	0.0034	8.2002
90	0.0001	0.0022	8.8389
95	0.0001	0.0013	9.5812

** Distribution pattern precludes calculation of these statistical parameters.

CHAIN OF CUSTODY RECORD

Company	RMC CONSULTANTS, INC
Address	12295 W. 48TH AVE. WHEAT RIDGE, CO 80033
Project Manager	DAWN GROW
Phone	303 980-4101
Project Name	ATLAS SITE 4 - RI ADDENDUM
Fax	
Project No.	E15-019-201
Email	smastromarino@rmc-consultants.com
Site Location	CHEYENNE, WY
Sampler Signature	

ANALYSIS REQUEST

Sample ID	Date	Time	Depth, ft.	Number of Samples	SOIL: Vadose Zone Suite	SOIL: Saturated Zone Suite	SOIL: Pore Fluid Saturation Suite	SOIL: Moisture Content: ASTM D2216	SOIL: Porosity: Total, API RP40	SOIL: Porosity: Effective, ASTM D425M	SOIL: Bulk Density: API RP40 / ASTM D2937	SOIL: Hydraulic Conductivity: API RP40	SOIL: Grain Size Distribution: ASTM D422/D4464M	SOIL: Atterberg Limits: ASTM D4318	SOIL: TOC: Walkley-Black	FLUID: Fluid Properties Suite	FLUID: Viscosity: ASTM D445	FLUID: Density/Gravity: ASTM D1481	FLUID: Pryo-Chromatography (Fingerprinting)	Comments
✓ FEW4-MW75-304	8/21/17	1740	304										X	X						
✓ FEW4-MW75-90	8/18/17	1615	90										X	X						
✓ FEW4-MW75-380	8/21/17	1650	380										X	X						
✓ FEW4-MW84-256	8/1/17	1245	256										X	X						
✓ FEW4-MW84-297	8/1/17	1720	297										X	X						
✓ FEW4-MW84-91	7/31/17	1830	91										X	X						

PO#

Turnaround Time

24 HR	
48 HR	
72 HR	
5 Day	
Normal	X

CL Bid No.

CL File No.

1. Relinquished By:	2. Received By:	2. Relinquished By:	2. Received By:
Company: RMC CONSULTANTS	Company: Core Lab	Company:	Company:
Date: 10/23/17 Time: 1430	Date: 10/25/17 Time: 1307	Date: Time:	Date: Time:

CHAIN OF CUSTODY RECORD

Company	RMC CONSULTANTS, INC.
Address	12295 W 48TH AVE. WHEAT RIDGE, CO 80033
Project Manager	DAVID GRAY
Phone	303 980-4101
Project Name	ATLAS SITE 4 - RI ADDENDUM
Fax	
Project No.	E15-019-201
Email	jmastromarchi@rmc-consultants.com
Site Location	CHEYENNE, WY
Sampler Signature	Joseph Mastromarchi

ANALYSIS REQUEST

Sample ID	Date	Time	Depth, ft.	Number of Samples	SOIL: Vadose Zone Suite	SOIL: Saturated Zone Suite	SOIL: Pore Fluid Saturation Suite	SOIL: Moisture Content: ASTM D2216	SOIL: Porosity: Total, API RP40	SOIL: Porosity: Effective, ASTM D425M	SOIL: Bulk Density: API RP40 / ASTM D2937	SOIL: Hydraulic Conductivity: API RP40	SOIL: Grain Size Distribution: ASTM D422/D4464M	SOIL: Atterberg Limits: ASTM D4318	SOIL: TOC: Walkley-Black	FLUID: Fluid Properties Suite	FLUID: Viscosity: ASTM D445	FLUID: Density/Gravity: ASTM D1481	FLUID: Pyro-Chromatography (Fingerprinting)	Comments
✓ FEW4-MW80-125	8/13/17	1410	125										X	X						
✓ FEW4-MW77-134	7/29/17	1000	134										X	X						
✓ FEW4-MW77-35	7/28/17	1000	35										X	X						
✓ FEW4-MW77-255	7/30/17	0835	255										X	X						
✓ FEW4-MW83-124	7/26/17	1710	124										X	X						
✓ FEW4-MW83-85	7/26/17	1210	85										X	X						
✓ FEW4-MW83-265	7/28/17	1455	265										X	X						

1. Relinquished By:	Joseph Mastromarchi	2. Received By:	Haley Bishop
Company	RMC CONSULTANTS	Company	Core Lab
Date	10/23/17	Time	1430
Date	10-25-17	Time	1316

2. Relinquished By:		2. Received By:	
Company		Company	
Date		Time	
Date		Time	

PO#

Turnaround Time

24 HR	
48 HR	
72 HR	
5 Day	
Normal	X

CL Bid No.

CL File No.

CHAIN OF CUSTODY RECORD

Company	RMC CONSULTANTS, INC
Address	12295 W. 48TH AVE WHEAT RIDGE, CO 80033
Project Manager	DAVID GRAY
Phone	303 980-4101
Project Name	ATLAS SITE 4 - RI ADDENDUM
Fax	
Project No.	E15-019-201
Email	jmastromarchi@rmcconsultants.com
Site Location	CHEYENNE, WY
Sampler Signature	Joseph Mastromarchi

ANALYSIS REQUEST

PO#

Turnaround Time: 24 HR ☐ 48 HR ☐ 72 HR ☐ 5 Day ☐ Normal ☒

CL Bid No.

CL File No.

Comments

Sample ID	Date	Time	Depth, ft.	Number of Samples	SOIL: Vadose Zone Suite	SOIL: Saturated Zone Suite	SOIL: Pore Fluid Saturation Suite	SOIL: Moisture Content: ASTM D2216	SOIL: Porosity: Total, API RP40	SOIL: Porosity: Effective, ASTM D425M	SOIL: Bulk Density: API RP40 / ASTM D2937	SOIL: Hydraulic Conductivity: API RP40	SOIL: Grain Size Distribution: ASTM D422/D4464M	SOIL: Atterberg Limits: ASTM D4318	SOIL: TOC: Walkley-Black	SOIL:	SOIL:	SOIL:	FLUID: Fluid Properties Suite	FLUID: Viscosity: ASTM D445	FLUID: Density/Gravity: ASTM D1481	FLUID: Pryo-Chromatography (Fingerprinting)	FLUID:	FLUID:	FLUID:	Comments
✓ FEW4-MW97-321	9/17/17	1210	321										X	X												
✓ FEW4-MW97-261	9/16/17	1150	261										X	X												
✓ FEW4-MW85-88	8/24/17	1555	88										X	X												
✓ FEW4-MW85-148	8/25/17	0950	148										X	X												
✓ FEW4-MW85-208	8/25/17	1375	208										X	X												
✓ FEW4-MW101-240	9/10/17	0930	240										X	X												
✓ FEW4-MW101-130	9/9/17	1455	130										X	X												
✓ FEW4-MW101-101	9/9/17	1145	101										X	X												
✓ FEW4-MW80-215	8/14/17	1320	215										X	X												
FEW4-MW80-284	8/15/17	1345	284										X	X												

1. Relinquished By: Joseph Mastromarchi	2. Received By: Stacey Bishop	2. Relinquished By:	2. Received By:
Company: RMC CONSULTANTS,	Company: Core Lab	Company:	Company:
Date: 10/23/17 Time: 1430	Date: 10-25-17 Time: 1316	Date: Time:	Date: Time:

CHAIN OF CUSTODY RECORD

Company	RMC CONSULTANTS, INC.
Address	12295 W. 48TH AVE WHEAT RIDGE, CO 80033
Project Manager	DAVID GLOY
Phone	303 980-4101
Project Name	ATLAS SITE 4 - RI ADDENDUM
Fax	
Project No.	E15-019-201
Email	jmastromarchi@rmc-consultants.com
Site Location	CHEYENNE, WY
Sampler Signature	Joseph Mastromarchi

ANALYSIS REQUEST

PO#

Turnaround Time: 24 HR ☐ 48 HR ☐ 72 HR ☐ 5 Day ☐ Normal ☒

CL Bid No.

CL File No.

Comments

	Sample ID	Date	Time	Depth, ft.	Number of Samples	SOIL: Vadose Zone Suite	SOIL: Saturated Zone Suite	SOIL: Pore Fluid Saturation Suite	SOIL: Moisture Content: ASTM D2216	SOIL: Porosity: Total, API RP40	SOIL: Porosity: Effective, ASTM D425M	SOIL: Bulk Density: API RP40 / ASTM D2937	SOIL: Hydraulic Conductivity: API RP40	SOIL: Grain Size Distribution: ASTM D422/D4464M	SOIL: Atterberg Limits: ASTM D4318	SOIL: TOC: Walkley-Black	FLUID: Fluid Properties Suite	FLUID: Viscosity: ASTM D445	FLUID: Density/Gravity: ASTM D1481	FLUID: Pyro-Chromatography (Fingerprinting)
✓	FEW4-MW82-135	8/18/17	1140	135										X	X					
✓	FEW4-MW82-83	8/17/17	1820	83										X	X					
✓	FEW4-MW76-120	9/10/17	1050	120										X	X					
✓	FEW4-MW76-90	9/9/17	1810	90										X	X					
✓	FEW4-MW76-250	9/11/17	1425	250										X	X					
✓	FEW4-MW81-200	7/22/17	1230	200										X	X					
✓	FEW4-MW81-269	7/23/17	1830	269										X	X					
✓	FEW4-MW81-100	7/21/17	1540	100										X	X					

1. Relinquished By:	Joseph Mastromarchi	2. Received By:	Haley Bishop
Company	RMC CONSULTANTS, INC	Company	Core Lab
Date / Time	10/23/17 1430	Date / Time	10-25-17 1327
2. Relinquished By:		2. Received By:	
Company		Company	
Date / Time		Date / Time	

CORE LABORATORIES - 3437 Landco Dr. - Bakersfield, CA 93308 • Phone 661-325-5657 • Fax 661-325-5808

CHAIN OF CUSTODY RECORD

Company	RMC CONSULTANTS, INC.
Address	12295 W. 48TH AVE. WHEAT RIDGE, CO 80033
Project Manager	DAVID GREY
Phone	303 980-4101
Project Name	ATLAS SITE 4 - RI ADDENDUM
Fax	
Project No.	E15-019-201
Email	jmastromarchie rmc-consultants.com
Site Location	CHEYENNE, WY
Sampler Signature	Joseph Mastromarchi

ANALYSIS REQUEST

PO#

Turnaround Time: 24 HR ☐ 48 HR ☐ 72 HR ☐ 5 Day ☐ Normal ☒

CL Bid No.

CL File No.

Comments

Sample ID	Date	Time	Depth, ft.	Number of Samples	SOIL: Vadose Zone Suite	SOIL: Saturated Zone Suite	SOIL: Pore Fluid Saturation Suite	SOIL: Moisture Content: ASTM D2216	SOIL: Porosity: Total, API RP40	SOIL: Porosity: Effective, ASTM D425M	SOIL: Bulk Density: API RP40 / ASTM D2937	SOIL: Hydraulic Conductivity: API RP40	SOIL: Grain Size Distribution: ASTM D422/D4464M	SOIL: Atterberg Limits: ASTM D4318	SOIL: TOC: Walkley-Black	SOIL:	SOIL:	SOIL:	FLUID: Fluid Properties Suite	FLUID: Viscosity: ASTM D445	FLUID: Density/Gravity: ASTM D1481	FLUID: Pyro-Chromatography (Fingerprinting)	FLUID:	FLUID:	FLUID:
FEW4-MW86-189	8/1/17	1330	189										X	X											
FEW4-MW86-52	7/31/17	1235	52										X	X											
FEW4-MW86-362	8/9/17	1735	362										X	X											
FEW4-MW74-354	8/27/17	1500	354										X	X											
FEW4-MW74-104	8/25/17	0925	104										X	X											
FEW4-MW74-262	8/26/17	1740	262										X	X											
FEW4-MW95-163	9/5/17	1700	163										X	X											
FEW4-MW95-289	9/16/17	1905	289										X	X											
FEW4-MW95-204	9/16/17	1110	204										X	X											
FEW4-MW82-154	8/18/17	1204	154										X	X											

1. Relinquished By:	2. Received By:	2. Relinquished By:	2. Received By:
Joseph Mastromarchi	Tracey Bishop		
Company: RMC CONSULTANTS	Company: Core Lab	Company:	Company:
Date: 10/23/17 Time: 1430	Date: 10-25-17 Time: 1327	Date: Time:	Date: Time:

Core Lab
RESERVOIR OPTIMIZATION

Petroleum Services Division
3437 Landco Dr.
Bakersfield, California 93308
Tel: 661-325-5657
Fax: 661-325-5808
www.corelab.com

June 15, 2018

Joseph Mastromarchi
RMC Consultants, Inc.
12295 W. 48th Avenue - Unit A
Wheat Ridge, CO 80033

Subject: Physical Properties Analysis
Project:E15-019-201
CL File No: 1703345

Dear Mr. Mastromarchi,

The attached file presents the final physical properties results for one soil sample submitted from your Atlas Missile Site 4 RI Addendum project. The initial report has been revised to include vertical hudraulic conductivity results on the sample.

Appropriate ASTM, EPA or API methodologies were used for this project and SOP's are available on request. The sample material for this project will be disposed after 30 days unless otherwise requested.

Thank you for this opportunity to be of service to RMC Consultants, Inc. Please do not hesitate to contact us at (661-325-5657) if you have any questions regarding these results or if we can be of any additional service.

Sincerely,
Core Laboratories, LP

Michael Carter
Core Analyst

The analyses, opinions or interpretations contained in this report are based upon observations and material supplied by the client for whose exclusive and confidential use this report has been made. The interpretations or opinions expressed represent the best judgment of Core Laboratories. Core Laboratories assumes no responsibility and makes no warranty or representations, expressed or implied, as to the productivity, proper operations or profitableness, however, of any oil, gas, coal or other mineral, property, well or sand in connection with which such report is used or relied upon for any reason whatsoever.

CLB
NYSE

PORE FLUID SATURATION DATA

Core Lab
RESERVOIR OPTIMIZATION

PETROLEUM SERVICES

RMC Consultants, Inc.

Core Lab File No: 1703345EN

Project Name : Atlas Missile Site 4 RI Addendum
Project Number : E15-019-201
Project Location : Cheyenne, Wyoming

		METHODS:		API RP 40 / ASTM D2216	API RP 40		API RP 40			API RP 40		Walkley-Black		API RP 40; ASTM D5084: EPA 9100 100 psi Net Confining Stress	
Sample ID.	Depth, ft.	Sample Date/Time	Sample [1] Orientation	Moisture Content, percent	Density, g/cc		Porosity, %Vb [2]			Pore Fluid Saturations, % Pv [3]		Total Organic Carbon mg/kg	Fractional Organic Carbon g/g	Effective [4,5] Permeability to Water millidarcy	Hydraulic [4,5] Conductivity cm/s
					Dry Bulk	Grain	Total	Air Filled	Effective	Water	NAPL				
FEW4-MW75-(193-194)	193-194	8/19/17 18:30	H	48.2	1.13	2.66	57.6	3.11	12.8	94.6	0.00	3900	3.90E-03	8.07	8.24E-06
			V											1.64	1.71E-06

(1) Sample Orientation: H = horizontal; V = vertical

(2) Total Porosity = no pore fluids in place; all interconnected pore channels; Air Filled = pore channels not occupied by pore fluids; Effective Porosity = drainage porosity.

(3) Water = 0.9996 g/cc, Hydrocarbon = 0.80 g/cc;

(4) Native State or Effective = With as-received pore fluids in place.

(5) Permeability to water and hydraulic conductivity measured at saturated conditions.

Vb = Bulk Volume, cc; Pv = Pore Volume, cc; ND = Not Detected

-- = Not requested

CATION EXCHANGE CAPACITY RESULTS*

Core Lab
RESERVOIR OPTIMIZATION

PETROLEUM SERVICES

RMC Consultants, Inc.
Project No: E15-019-201

Core Lab File No: 1703345EN

Sample No.	Depth, ft	Date	Time	Detection Limit meq/100g	Cation Exchange Capacity meq/100g
1703345-1	193-194	08/19/17	18:30	0.5	34.

*Ammonium Acetate Method in accordance with "Methods of Soil Analysis" published by the American Society of Agronomy in 1965

CHAIN OF CUSTODY RECORD

CL# 1703345

Company	RMC CONSULTANTS, INC,
Address	12295 W, 48TH AVE WHEAT RIDGE, CO 80033
Project Manager	DAVID GROY
Phone	303 980 4101
Project Name	ATLAS D MISSILE SITE 4 RIADA
Fax	
Project No.	E15-019-201
Email	
Site Location	CHEYENNE, WY
Sampler Signature	Brigid Mastromarchi

ANALYSIS REQUEST

Sample ID	Date	Time	Depth, ft.	Number of Samples	SOIL: Vadose Zone Suite	SOIL: Saturated Zone Suite	SOIL: Pore Fluid Saturation Suite	SOIL: Moisture Content: ASTM D2216	SOIL: Porosity: Total, API RP40	SOIL: Porosity: Effective, ASTM D425M	SOIL: Bulk Density: API RP40 / ASTM D2937	SOIL: Hydraulic Conductivity: API RP40 - HORIZ	SOIL: Grain Size Distribution: ASTM D422/D4464M	SOIL: Atterberg Limits: ASTM D4318	SOIL: TOC: Walkley-Black	SOIL: dec- EPA 9081	SOIL: Nuclear Magnetic Res	FLUID: Fluid Properties Suite	FLUID: Viscosity: ASTM D445	FLUID: Density/Gravity: ASTM D1481	FLUID: Pyro-Chromatography (Fingerprinting)			
FEW4-MW75 -(193-194)	8/19/17	1830	193-194			X				X		X			X	X	X							

Turnaround Time: 24 HR ☐ 48 HR ☐ 72 HR ☐ 5 Day ☐ Normal ☒

PO#

CL Bid No.

CL File No.

Comments

1. Relinquished By:	2. Received By:	2. Relinquished By:	2. Received By:
Brigid Mastromarchi	Tracey Bishop		
Company: RMC CONSULTANTS	Company: Core Lab	Company:	Company:
Date: 8/29/17 Time:	Date: 8-30-17 Time: 10AM	Date: Time:	Date: Time:

Core Lab
RESERVOIR OPTIMIZATION

Petroleum Services Division
3437 Landco Dr.
Bakersfield, California 93308
Tel: 661-325-5657
Fax: 661-325-5808
www.corelab.com

June 15, 2018

Joseph Mastromarchi
RMC Consultants, Inc.
12295 W. 48th Avenue - Unit A
Wheat Ridge, CO 80033

Subject: Physical Properties Analysis
Project:E15-019-201
CL File No: 1703468EN

Dear Mr. Mastromarchi,

The attached file presents the final physical properties results for one soil sample submitted from your Atlas Missile Site 4 RI Addendum project. The initial report has been revised to include vertical hydraulic conductivity results on the sample.

Appropriate ASTM, EPA or API methodologies were used for this project and SOP's are available on request. The sample material for this project will be disposed after 30 days unless otherwise requested.

Thank you for this opportunity to be of service to RMC Consultants, Inc. Please do not hesitate to contact us at (661-325-5657) if you have any questions regarding these results or if we can be of any additional service.

Sincerely,
Core Laboratories, LP

Michael Carter
Core Analyst

The analyses, opinions or interpretations contained in this report are based upon observations and material supplied by the client for whose exclusive and confidential use this report has been made. The interpretations or opinions expressed represent the best judgment of Core Laboratories. Core Laboratories assumes no responsibility and makes no warranty or representations, expressed or implied, as to the productivity, proper operations or profitableness, however, of any oil, gas, coal or other mineral, property, well or sand in connection with which such report is used or relied upon for any reason whatsoever.

CLB listed NYSE

PORE FLUID SATURATION DATA

PETROLEUM SERVICES

RMC Consultants, Inc.

Core Lab File No: 1703468EN

Project Name : Atlas Missile Site 4 RI Addendum

Project Number : E15-019-201

Project Location : Cheyenne, Wyoming

METHODS:				API RP 40 / ASTM D2216	API RP 40		API RP 40			API RP 40		Walkley-Black		API RP 40; ASTM D5084: EPA 9100 100 psi Net Confining Stress	
Sample ID.	Depth, ft.	Sample Date/Time	Sample [1] Orientation	Moisture Content, percent	Density, g/cc		Porosity, %Vb [2]			Pore Fluid Saturations, % Pv [3]		Total Organic Carbon mg/kg	Fractional Organic Carbon g/g	Effective [4,5] Permeability to Water millidarcy	Hydraulic [4,5] Conductivity cm/s
					Dry Bulk	Grain	Total	Air Filled	Effective	Water	NAPL				
FEW4-MW76-(167-168)	167-168	9/11/17 12:30	H	21.7	1.46	2.63	44.3	12.5	14.4	71.7	0.00	4200	4.20E-03	1.77	2.08E-06
			V											1.31	1.37E-06

(1) Sample Orientation: H = horizontal; V = vertical

(2) Total Porosity = no pore fluids in place; all interconnected pore channels; Air Filled = pore channels not occupied by pore fluids; Effective Porosity = drainage porosity.

(3) Water = 0.9996 g/cc, Hydrocarbon = 0.80 g/cc;

(4) Native State or Effective = With as-received pore fluids in place.

(5) Permeability to water and hydraulic conductivity measured at saturated conditions.

Vb = Bulk Volume, cc; Pv = Pore Volume, cc; ND = Not Detected

-- = Not requested

CATION EXCHANGE CAPACITY RESULTS*

PETROLEUM SERVICES

RMC Consultants, Inc.
Project No: E15-019-201

Core Lab File No: 1703468EN

Sample No.	Depth, ft	Date	Time	Detection Limit meq/100g	Cation Exchange Capacity meq/100g
1703468-1	167-168	09/11/17	12:30	0.5	26.

*Ammonium Acetate Method in accordance with "Methods of Soil Analysis" published by the American Society of Agronomy in 1965

CHAIN OF CUSTODY RECORD

CL# 1703468

Company	RMC Consultants Inc
Address	12295 W. 48th Ave Wheat Ridge, CO 80033
Project Manager	David Grog
Phone	303-980-4101
Project Name	Atlas D Missle site 4 RI ADDM
Fax	
Project No.	E15-019-201
Email	mastromarichi@rmc-consultants.com
Site Location	Cheyenne, WY
Sampler Signature	

ANALYSIS REQUEST

PO# E15-019-20/

Turnaround Time: 24 HR ☐ 48 HR ☐ 72 HR ☐ 5 Day ☐ Normal ☒

CL Bid No.

CL File No.

Sample ID	Date	Time	Depth, ft.	Number of Samples	SOIL: Vadose Zone Suite	Saturated Zone Suite	Pore Fluid Saturation Suite	Moisture Content: ASTM D2216	Porosity: Total, API RP40	Porosity: Effective, ASTM D425M	Bulk Density: API RP40 / ASTM D2937	Hydraulic Conductivity: API RP40_Horizontal	Grain Size Distribution: ASTM D422/D4464M	Atterberg Limits: ASTM D4318	TOC: Walkley-Black	CEC-9081	Nuclear Magnetic Resonance	FLUID: Fluid Properties Suite	Viscosity: ASTM D445	Density/Gravity: ASTM D1481	Pyro-Chromatography (Fingerprinting)	Comments
✓ FEW4-MW76-(167.0-168.0)	9/11/17	1230	167-168'	1		X				X		X				X	X					
✓ FEW4-MW76-(185.0-186.0)	9/11/17	1220	185-186'														X					

1. Relinquished By:	2. Received By:	2. Relinquished By:	2. Received By:
	Tracey Bishop		
Company: RMC Consultants Inc	Company: Core Lab	Company:	Company:
Date / Time: 9/13/17 0800	Date / Time: 9-14-17 10:00 AM	Date / Time:	Date / Time:

CORE LABORATORIES - 3437 Landco Dr. - Bakersfield, CA 93308 • Phone 661-325-5657 • Fax 661-325-5808

Core Lab
RESERVOIR OPTIMIZATION

Petroleum Services Division
3437 Landco Dr.
Bakersfield, California 93308
Tel: 661-325-5657
Fax: 661-325-5808
www.corelab.com

June 15, 2018

Joseph Mastromarchi
RMC Consultants, Inc.
12295 W. 48th Avenue - Unit A
Wheat Ridge, CO 80033

Subject: Physical Properties Results
Project:E15-019-201
CL File No: 1703191

Dear Mr. Mastromarchi,

The attached file presents the final physical properties results for two soil samples submitted from your Atlas Missile Site 4 RI Addendum project. The initial report has been revised to include vertical hydraulic conductivity results on the two samples.

Appropriate ASTM, EPA or API methodologies were used for this project and SOP's are available on request. The sample material for this project will be disposed after 30 days unless otherwise requested.

Thank you for this opportunity to be of service to RMC Consultants, Inc. Please do not hesitate to contact us at (661-325-5657) if you have any questions regarding these results or if we can be of any additional service.

Sincerely,
Core Laboratories, LP

Michael Carter

Michael Carter
Core Analyst

The analyses, opinions or interpretations contained in this report are based upon observations and material supplied by the client for whose exclusive and confidential use this report has been made. The interpretations or opinions expressed represent the best judgment of Core Laboratories. Core Laboratories assumes no responsibility and makes no warranty or representations, expressed or implied, as to the productivity, proper operations or profitableness, however, of any oil, gas, coal or other mineral, property, well or sand in connection with which such report is used or relied upon for any reason whatsoever.

CLB Listed NYSE

PORE FLUID SATURATION DATA

Core Lab
RESERVOIR OPTIMIZATION

PETROLEUM SERVICES

RMC Consultants, Inc.

Core Lab File No: 1703191EN

Project Name : Atlas Missile Site 4 RI Addendum
Project Number : E15-019-201
Project Location : Cheyenne, Wyoming

METHODS:				API RP 40 / ASTM D2216	API RP 40		API RP 40			API RP 40		Walkley-Black		API RP 40; ASTM D5084: EPA 9100	
														100 psi Net Confining Stress	
Sample ID.	Depth, ft.	Sample Date/Time	Sample [1] Orientation	Moisture Content, percent	Density, g/cc		Porosity, %Vb [2]			Pore Fluid Saturations, % Pv [3]		Total Organic Carbon mg/kg	Fractional Organic Carbon g/g	Effective [4,5] Permeability to Water millidarcy	Hydraulic [4,5] Conductivity cm/s
					Dry Bulk	Grain	Total	Air Filled	Effective	Water	NAPL				
FEW4-MW80-(177-178)	177'-178'	8/15/17 9:00	H	45.0	1.14	2.65	57.0	5.91	19.11	89.6	0.00	3200	3.20E-03	228	2.28E-04
			V											0.17	1.74E-07
FEW4-MW82-(201-202)	201'-202'	8/18/17 16:20	H	28.3	1.41	2.73	48.1	8.07	7.54	83.2	0.00	2500	2.50E-03	0.059	6.10E-08
			V											0.029	3.12E-08

(1) Sample Orientation: H = horizontal; V = vertical

(2) Total Porosity = no pore fluids in place; all interconnected pore channels; Air Filled = pore channels not occupied by pore fluids; Effective Porosity = drainage porosity.

(3) Water = 0.9996 g/cc, Hydrocarbon = 0.80 g/cc;

(4) Native State or Effective = With as-received pore fluids in place.

(5) Permeability to water and hydraulic conductivity measured at saturated conditions.

Vb = Bulk Volume, cc; Pv = Pore Volume, cc; ND = Not Detected

-- = Not requested

CATION EXCHANGE CAPACITY RESULTS*

PETROLEUM SERVICES

RMC Consultants, Inc.
Project No: E15-019-201

Core Lab File No: 1703191EN

Sample No.	Depth, ft	Date	Time	Detection Limit meq/100g	Cation Exchange Capacity meq/100g
FEW4-MW80-(177-178)	177'-178'	08/15/17	9:00	0.5	26.
FEW4-MW82-(201-202)	201'-202'	08/18/17	16:20	0.5	21.

*Ammonium Acetate Method in accordance with "Methods of Soil Analysis" published by the American Society of Agronomy in 1965

CL#1703191

CHAIN OF CUSTODY RECORD

Company	RMC CONSULTANTS, INC.
Address	12295 W. 48TH AVE. WHEATRIDGE, CO 80033
Project Manager	DAVID GROY
Phone	303 980 4101
Project Name	ATLAS SITE 4 RI ADD'M
Fax	
Project No.	E15-019-201
Email	
Site Location	CHEYENNE, WY
Sampler Signature	Joseph Martinowski

ANALYSIS REQUEST

PO#

Turnaround Time: 24 HR ☐ 48 HR ☐ 72 HR ☐ 5 Day ☐ Normal ☐

CL Bid No.

CL File No.

Sample ID	Date	Time	Depth, ft.	Number of Samples	SOIL: Vadose Zone Suite	SOIL: Saturated Zone Suite	SOIL: Pore Fluid Saturation Suite	SOIL: Moisture Content: ASTM D2216	SOIL: Porosity: Total, API RP40	SOIL: Porosity: Effective, ASTM D425M	SOIL: Bulk Density: API RP40 / ASTM D2937	SOIL: Hydraulic Conductivity: API RP40 - HORIZONTAL	SOIL: Grain Size Distribution: ASTM D422/D4464M	SOIL: Atterberg Limits: ASTM D4318	SOIL: TOC: Walkley-Black	SOIL: CEC - EPA 9081	SOIL:	SOIL: NUCLEAR MAGNETIC RESONANCE	FLUID: Fluid Properties Suite	FLUID: Viscosity: ASTM D445	FLUID: Density/Gravity: ASTM D1481	FLUID: Pryo-Chromatography (Fingerprinting)	FLUID:	FLUID:	FLUID:	Comments
✓ FEN4-MW80-(132-133)	8/14/17	1150	132-133															X							
✓ FEN4-MW80-(177-178)	8/15/17	0900	177-178			X				X		X			X	X									
✓ FEN4-MW80 (178-179)	8/15/17	0910	178-179															X							
✓ FEN4-MW82-(201-202)	8/18/17	1620	201-202			X				X		X			X	X									

1. Relinquished By:	2. Received By:	2. Relinquished By:	2. Received By:
Joseph Martinowski	Tracey Bishop		
Company: RMC CONS.	Company: Core Lab	Company:	Company:
Date: 8/22/17 Time: 0900	Date: 8-23-17 Time: 1555	Date: Time:	Date: Time:

Core Lab
RESERVOIR OPTIMIZATION

Petroleum Services Division
3437 Landco Dr.
Bakersfield, California 93308
Tel: 661-325-5657
Fax: 661-325-5808
www.corelab.com

June 15, 2018

Joseph Mastromarchi
RMC Consultants, Inc.
12295 W. 48th Avenue - Unit A
Wheat Ridge, CO 80033

Subject: Physical Properties Results
Project:E15-019-201
CL File No: 1702924

Dear Mr. Mastromarchi,

The attached file presents the final physical properties results for three soil samples submitted from your Atlas Missile Site 4 RI Addendum project. The initial report has been revised to include vertical hydraulic conductivity results on two of the samples and to correct a sample ID.

Appropriate ASTM, EPA or API methodologies were used for this project and SOP's are available on request. The sample material for this project will be disposed after 30 days unless otherwise requested.

Thank you for this opportunity to be of service to RMC Consultants, Inc. Please do not hesitate to contact us at (661-325-5657) if you have any questions regarding these results or if we can be of any additional service.

Sincerely,
Core Laboratories, LP

Michael Carter
Core Analyst

The analyses, opinions or interpretations contained in this report are based upon observations and material supplied by the client for whose exclusive and confidential use this report has been made. The interpretations or opinions expressed represent the best judgment of Core Laboratories. Core Laboratories assumes no responsibility and makes no warranty or representations, expressed or implied, as to the productivity, proper operations or profitableness, however, of any oil, gas, coal or other mineral, property, well or sand in connection with which such report is used or relied upon for any reason whatsoever.

CLB
NYSE

PORE FLUID SATURATION DATA

PETROLEUM SERVICES

RMC Consultants, Inc.

Core Lab File No: 1702924EN

Project Name : Atlas Missile Site 4 RI Addendum

Project Number : E15-019-201

Project Location : Cheyenne, Wyoming

METHODS:				API RP 40 / ASTM D2216	API RP 40		API RP 40, ASTM D425M			API RP 40		Walkley-Black		API RP 40; ASTM D5084: EPA 9100 100 psi Net Confining Stress	
Sample ID.	Depth, ft.	Sample Date/Time	Sample [1] Orientation	Moisture Content, percent	Density, g/cc		Porosity, %Vb [2]			Pore Fluid Saturations, % Pv [3]		Total Organic Carbon	Fractional Organic Carbon	Effective [4,5] Permeability to Water	Hydraulic [4,5] Conductivity
					Dry Bulk	Grain	Total	Air Filled	Effective	Water	NAPL	mg/kg	g/g	millidarcy	cm/s
FEW4-MW83-(111-112)	111-112	7/26/17 17:15	H	33.7	1.38	2.69	48.5	1.94	15.4	96.0	0.00	4500	4.50E-03	0.272	2.88E-07
			V											0.256	2.65E-07
FEW4-MW83-(143-144)	143-144	7/26/17 18:30		--	--	--	--	--		--	--	--	--	--	--
FEW4-MW77-(85-86)	85-86	7/28/17 12:40	H	47.2	1.08	2.61	58.6	7.59	15.4	87.0	0.00	4400	4.40E-03	2.19	2.36E-06
			V											2.55	2.73E-06

(1) Sample Orientation: H = horizontal; V = vertical

(2) Total Porosity = no pore fluids in place; all interconnected pore channels; Air Filled = pore channels not occupied by pore fluids

(3) Water = 0.9996 g/cc, Hydrocarbon = 0.80 g/cc;

(4) Native State or Effective = With as-received pore fluids in place.

(5) Permeability to water and hydraulic conductivity measured at saturated conditions.

Vb = Bulk Volume, cc; Pv = Pore Volume, cc; ND = Not Detected

-- = Not requested

CATION EXCHANGE CAPACITY RESULTS*

Core Lab
RESERVOIR OPTIMIZATION

PETROLEUM SERVICES

RMC Consultants, Inc.
Project No: E15-019-201

Core Lab File No: 1702924EN

Sample No.	Depth, ft	Date	Time	Detection Limit meq/100g	Cation Exchange Capacity meq/100g
1702924-1	111.00	07/26/17	17:15	0.5	15.
1702924-3	85.00	07/28/17	12:40	0.5	25.

*Ammonium Acetate Method in accordance with "Methods of Soil Analysis" published by the American Society of Agronomy in 1965

Job #: 1702924

CHAIN OF CUSTODY RECORD

Company	RMC CONSULTANTS, INC
Address	12295 W. 48th Ave Wheat Ridge, CO 80033
Project Manager	DAVID GROY
Phone	303 980 4101
Project Name	ATLAS D MISSILE SITE 4 RI ADD'M
Fax	
Project No.	E15-019-201
Email	jmastromarchi@rmc-consultants.com
Site Location	CHEYENNE, WY
Sampler Signature	Joseph Mastromarchi

ANALYSIS REQUEST

Sample ID	Date	Time	Depth, ft.	Number of Samples	SOIL: Vadose Zone Suite	SOIL: Saturated Zone Suite	SOIL: Pore Fluid Saturation Suite	SOIL: Moisture Content: ASTM D2216	SOIL: Porosity: Total, API RP40	SOIL: Porosity: Effective, ASTM D425M	SOIL: Bulk Density: API RP40 / ASTM D2937	SOIL: Hydraulic Conductivity: API RP40 - Horizontal	SOIL: Grain Size Distribution: ASTM D422/D4464M	SOIL: Atterberg Limits: ASTM D4318	SOIL: TOC: Walkley-Black	SOIL: CEC - 9081	SOIL: Nuclear Magnetic Resonance	FLUID: Fluid Properties Suite	FLUID: Viscosity: ASTM D445	FLUID: Density/Gravity: ASTM D1481	FLUID: Pyro-Chromatography (Fingerprinting)	Comments
FEW4-MW83-(111-112)	7/26/17	1715	111-112	1		X				X		X			X	X						SAMPLE NOT FULLY INDURATED - PLEASE ADVISE
FEW4-MW83-(143-144)	7/26/17	1830	143-144	1													X					11
FEW4-MW77-(85-86)	7/28/17	1240	85-86	1		X				X		X			X	X	X					

Turnaround Time: 24 HR ☐ 48 HR ☐ 72 HR ☐ 5 Day ☐ Normal ☒

PO# E15-019-201

CL Bid No.

CL File No.

1. Relinquished By: Joseph Mastromarchi	2. Received By: Crystal Grinstead	2. Relinquished By:	2. Received By:
Company: RMC CONSULTANTS	Company: Core Lab	Company:	Company:
Date: 8/3/17 Time: 1100	Date: 8/4/17 Time: 11:30am	Date: Time:	Date: Time:

Core Lab
RESERVOIR OPTIMIZATION

Petroleum Services Division
3437 Landco Dr.
Bakersfield, California 93308
Tel: 661-325-5657
Fax: 661-325-5808
www.corelab.com

June 15, 2018

Joseph Mastromarchi
RMC Consultants, Inc.
12295 W. 48th Avenue - Unit A
Wheat Ridge, CO 80033

Subject: Physical Properties Results
Project:E15-019-201
CL File No: 1703114

Dear Mr. Mastromarchi,

The attached file presents the final physical properties results for two soil samples submitted from your Atlas Missile Site 4 RI Addendum project. The initial report has been revised to include vertical hydraulic conductivity results on the two samples.

Appropriate ASTM, EPA or API methodologies were used for this project and SOP's are available on request. The sample material for this project will be disposed after 30 days unless otherwise requested.

Thank you for this opportunity to be of service to RMC Consultants, Inc. Please do not hesitate to contact us at (661-325-5657) if you have any questions regarding these results or if we can be of any additional service.

Sincerely,
Core Laboratories, LP

Michael Carter
Core Analyst

The analyses, opinions or interpretations contained in this report are based upon observations and material supplied by the client for whose exclusive and confidential use this report has been made. The interpretations or opinions expressed represent the best judgment of Core Laboratories. Core Laboratories assumes no responsibility and makes no warranty or representations, expressed or implied, as to the productivity, proper operations or profitableness, however, of any oil, gas, coal or other mineral, property, well or sand in connection with which such report is used or relied upon for any reason whatsoever.

CLB Listed NYSE

PORE FLUID SATURATION DATA

Core Lab
RESERVOIR OPTIMIZATION

PETROLEUM SERVICES

RMC Consultants, Inc.

Core Lab File No: 1703114EN

Project Name : Atlas Missile Site 4 RI Addendum
Project Number : E15-019-201
Project Location : Cheyenne, Wyoming

		METHODS:		API RP 40 / ASTM D2216	API RP 40		API RP 40			API RP 40		Walkley-Black		API RP 40; ASTM D5084: EPA 9100 100 psi Net Confining Stress	
Sample ID.	Depth, ft.	Sample Date/Time	Sample [1] Orientation	Moisture Content, percent	Density, g/cc		Porosity, %Vb [2]			Pore Fluid Saturations, % Pv [3]		Total Organic Carbon mg/kg	Fractional Organic Carbon g/g	Effective [4,5] Permeability to Water millidarcy	Hydraulic [4,5] Conductivity cm/s
					Dry Bulk	Grain	Total	Air Filled	Effective	Water	NAPL				
FEW4-MW86-(78-79)	78-79	8/1/17 10:25	H	25.1	1.49	2.51	40.6	3.26	15.47	92.0	0.00	3600	3.60E-03	32.8	3.28E-05
			V											16.6	1.79E-05
FEW4-MW84-(259-260)	259-260	8/1/17 13:40	H	33.3	1.36	2.66	48.8	3.54	6.90	92.8	0.00	4900	4.90E-03	31.7	3.17E-05
			V											0.0002	2.64E-10

(1) Sample Orientation: H = horizontal; V = vertical

(2) Total Porosity = no pore fluids in place; all interconnected pore channels; Air Filled = pore channels not occupied by pore fluids; Effective Porosity = drainage porosity.

(3) Water = 0.9996 g/cc, Hydrocarbon = 0.80 g/cc;

(4) Native State or Effective = With as-received pore fluids in place.

(5) Permeability to water and hydraulic conductivity measured at saturated conditions.

Vb = Bulk Volume, cc; Pv = Pore Volume, cc; ND = Not Detected

-- = Not requested

CATION EXCHANGE CAPACITY RESULTS*

PETROLEUM SERVICES

RMC Consultants, Inc.
Project No: E15-019-201

Core Lab File No: 1703114EN

Sample No.	Depth, ft	Date	Time	Detection Limit meq/100g	Cation Exchange Capacity meq/100g
FEW4-MW86-(78-79)	78-79	08/01/17	10:25	0.5	20.
FEW4-MW84-(259-260)	259-260	08/01/17	13:40	0.5	22.

*Ammonium Acetate Method in accordance with "Methods of Soil Analysis" published by the American Society of Agronomy in 1965

CHAIN OF CUSTODY RECORD

Company: RMC CONSULTANTS, INC.
Address: 12295 W. 48TH AVE WHEAT RIDGE, CO 80033
Project Manager: DAVID GROY
Phone: 303 980 4101
Project Name: ATLAS D MISSILE SITE 4 RI ADD'M
Fax:
Project No.: ~~E19~~ E15-019-201
Email:
Site Location: CHEYENNE, WY
Sampler Signature: Joseph Mastromarchi

PO#:

Turnaround Time: 24 HR ☐ 48 HR ☐ 72 HR ☐ 5 Day ☐ Normal ☒

CL Bid No.:

CL File No.:

ANALYSIS REQUEST

Sample ID	Date	Time	Depth, ft.	Number of Samples	SOIL: Vadose Zone Suite	SOIL: Saturated Zone Suite	SOIL: Pore Fluid Saturation Suite	SOIL: Moisture Content: ASTM D2216	SOIL: Porosity: Total, API RP40	SOIL: Porosity: Effective, ASTM D425M	SOIL: Bulk Density: API RP40 / ASTM D2937	SOIL: Hydraulic Conductivity: API RP40 - Horizontal	SOIL: Grain Size Distribution: ASTM D422/D4464M	SOIL: Atterberg Limits: ASTM D4318	SOIL: TOC: Walkley-Black	SOIL: CEC - EPA 9081	SOIL: Nuclear Magnetic Resonance	FLUID: Fluid Properties Suite	FLUID: Viscosity: ASTM D445	FLUID: Density/Gravity: ASTM D1481	FLUID: Pryo-Chromatography (Fingerprinting)	Comments
8/17 FEW4-MW86-(78-79)	8/1/17	1025	78-79			X				X		X			X	X						
8/16 FEW4-MW86 (74-75)	8/1/17	1035	74-75														X					
8/17 FEW4-MW84 (259-260)	8/1/17	1340	259-260			X				X		X			X	X						

1. Relinquished By: Joseph Mastromarchi
Company: RMC
Date/Time: 8/15/17 0800

2. Received By: Tracey Bishop
Company: Core Lab
Date/Time: 8/16 + 8/17 2017

2. Relinquished By:
Company:
Date/Time:

2. Received By:
Company:
Date/Time:

Core Lab
RESERVOIR OPTIMIZATION

Petroleum Services Division
3437 Landco Dr.
Bakersfield, California 93308
Tel: 661-325-5657
Fax: 661-325-5808
www.corelab.com

January 16, 2018

David Groy
RMC Consultants, Inc.
12295 W. 48th Avenue - Unit A
Wheat Ridge, CO 80033

Subject: Physical Properties Analysis
Project:E15-019-201
CL File No: 1703345

Dear Mr. Groy,

The attached file presents the nuclear magnetic resonnance results for one soil sample submitted from your Atlas Missile Site 4 RI Addendum project.

Appropriate ASTM, EPA or API methodologies were used for this project and SOP's are available on request. The sample material for this project will be disposed after 30 days unless otherwise requested.

Thank you for this opportunity to be of service to RMC Consultants, Inc. Please do not hesitate to contact us at (661-325-5657) if you have any questions regarding these results or if we can be of any additional service.

Sincerely,
Core Laboratories, LP

Michael Carter
Core Analyst

The analyses, opinions or interpretations contained in this report are based upon observations and material supplied by the client for whose exclusive and confidential use this report has been made. The interpretations or opinions expressed represent the best judgment of Core Laboratories. Core Laboratories assumes no responsibility and makes no warranty or representations, expressed or implied, as to the productivity, proper operations or profitableness, however, of any oil, gas, coal or other mineral, property, well or sand in connection with which such report is used or relied upon for any reason whatsoever.

CLB
NYSE

NMR DATA SUMMARY

Core Lab
RESERVOIR OPTIMIZATION

PETROLEUM SERVICES

Company: RMC Consultants, Inc.
Project #: Atlas D Missile Site 4 RI
Location: Wyoming, USA

File No.: 1703345EN
Date: 1/12/18

		Core Analysis Data						NMR Data							
									100% Water Saturation			Partial Water Saturation			
Sample ID	Depth (ft)	Net Confining Stress (psi)	Total Porosity (%)	Air Permeability (md)	Grain Density (g/cm^3)	Bulk Density (g/cm^3)	Irreducible Water Saturation (%)	Net Confining Stress (psi)	Total Porosity (%)	Effective Porosity (%)	T_2 Log Mean (ms)	Irreducible Bulk Volume (%)	Free Fluid Index (%)	Irreducible Water Saturation (%)	T2 Cutoff (ms)
8NMR	193.45	250	56.7	45.5	2.85	1.80	64.3	250	55.8	25.6	2.70	37.5	18.4	67.1	5.50

Core Laboratories

NMR T2 MEASUREMENT @ AMBIENT STRESS

Incremental and Cumulative Distribution

Core Lab RESERVOIR OPTIMIZATION

PETROLEUM SERVICES

Sample ID	8NMR
Company:	RMC Consultants, Inc.
Project #:	Atlas D Missile Site 4 RI
Location:	Wyoming, USA
Depth (ft):	193.45
Core Lab File No.:	1703345EN

Core Analysis Data (@ 250 psig O.B.)

Permeability (md):	45.5
Porosity, Total (pu):	56.7
Pore Volume (cm^3):	31.4
Bulk Volume (cm^3):	55.4
Grain Density (g/cm^3):	2.85
Bulk Density (g/cm^3):	1.80

Notes

Factor (Sat) :	0.468
Factor (Desat) :	0.466

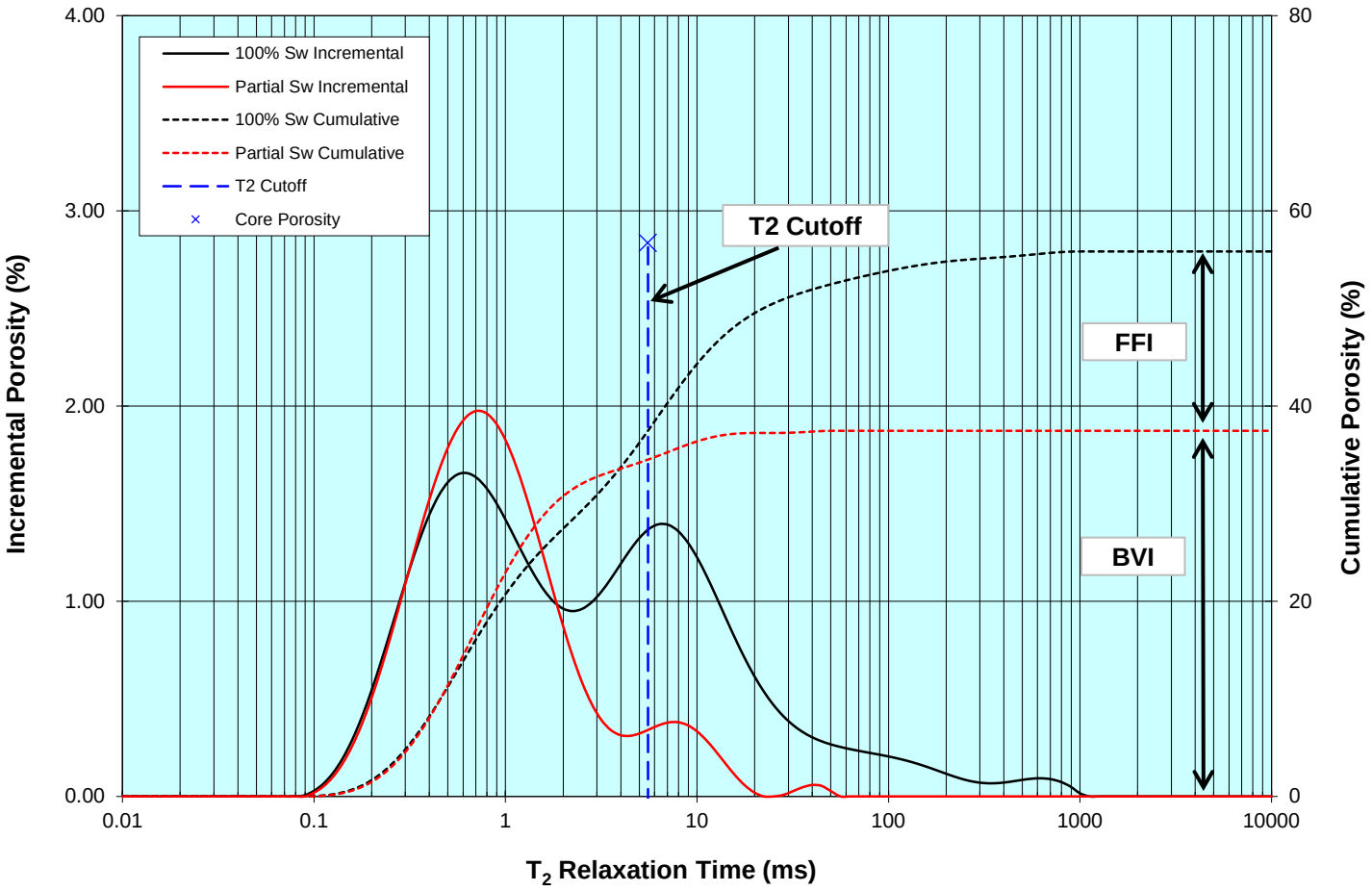
NMR Parameters

Hydrogen Index:	1
Echo Spacing (ms):	0.20
Signal/Noise (Sat):	250
Signal/Noise (Desat):	250
Gradient:	None
Temperature (degC):	28.0

NMR Data (@ Ambient psig O.B.)

Log Mean T2 @ Sw=100% (msec):	2.68
NMR Porosity @ Sw=100% (pu):	55.8
Effective Porosity, T2min=2.8ms (pu):	25.6
Clay Bound Water, T2max=2.8ms (pu):	30.3
NMR Derived T2 Cutoff (msec):	5.54
Free Fluid Index (FFI) @ T2 Cutoff (pu):	18.4
Bulk Volume Irreducible (BVI) @ T2 Cutoff (pu):	37.5
Irreducbile Water Sat. (Swir) @ T2 Cutoff (%):	67.1

NMR T_2 Distribution



Core Lab
RESERVOIR OPTIMIZATION

Petroleum Services Division
3437 Landco Dr.
Bakersfield, California 93308
Tel: 661-325-5657
Fax: 661-325-5808
www.corelab.com

January 16, 2018

David Groy
RMC Consultants, Inc.
12295 W. 48th Avenue - Unit A
Wheat Ridge, CO 80033

Subject: Physical Properties Analysis
Project:E15-019-201
CL File No: 1703468EN

Dear Mr. Groy,

The attached file presents the nuclear magnetic resonnance results for two soil samples submitted from your Atlas Missile Site 4 RI Addendum project.

Appropriate ASTM, EPA or API methodologies were used for this project and SOP's are available on request. The sample material for this project will be disposed after 30 days unless otherwise requested.

Thank you for this opportunity to be of service to RMC Consultants, Inc. Please do not hesitate to contact us at (661-325-5657) if you have any questions regarding these results or if we can be of any additional service.

Sincerely,
Core Laboratories, LP

Michael Carter

Michael Carter
Core Analyst

The analyses, opinions or interpretations contained in this report are based upon observations and material supplied by the client for whose exclusive and confidential use this report has been made. The interpretations or opinions expressed represent the best judgment of Core Laboratories. Core Laboratories assumes no responsibility and makes no warranty or representations, expressed or implied, as to the productivity, proper operations or profitableness, however, of any oil, gas, coal or other mineral, property, well or sand in connection with which such report is used or relied upon for any reason whatsoever.

CLB NYSE

NMR DATA SUMMARY

Core Lab
RESERVOIR OPTIMIZATION

PETROLEUM SERVICES

Company: RMC Consultants, Inc.
Project #: Atlas D Missile Site 4 RI
Location: Wyoming, USA

File No.: 1703468EN
Date: 1/12/18

		Core Analysis Data						NMR Data							
									100% Water Saturation			Partial Water Saturation			
Sample ID	Depth (ft)	Net Confining Stress (psi)	Total Porosity (%)	Air Permeability (md)	Grain Density (g/cm^3)	Bulk Density (g/cm^3)	Irreducible Water Saturation (%)	Net Confining Stress (psi)	Total Porosity (%)	Effective Porosity (%)	T_2 Log Mean (ms)	Irreducible Bulk Volume (%)	Free Fluid Index (%)	Irreducible Water Saturation (%)	T2 Cutoff (ms)
6NMR	167.35	250	41.5	1.58	2.75	2.02	78.1	250.0	41.8	16.9	2.20	29.0	12.8	69.4	4.60
7NMR	185.50	250	49.6	23.6	2.82	1.92	75.0	250.0	50.0	20.2	2.00	36.6	13.4	73.1	5.70

NMR T2 MEASUREMENT @ AMBIENT STRESS

Incremental and Cumulative Distribution

Core Lab RESERVOIR OPTIMIZATION

PETROLEUM SERVICES

Sample ID	6NMR
Company:	RMC Consultants, Inc.
Project #:	Atlas D Missile Site 4 RI Add
Location:	Wyoming, USA
Depth (ft):	167.35
Core Lab File No.:	1703468EN

Core Analysis Data (@ 250 psig O.B.)

Permeability (md):	1.58
Porosity, Total (pu):	41.5
Pore Volume (cm^3):	22.6
Bulk Volume (cm^3):	54.6
Grain Density (g/cm^3):	2.75
Bulk Density (g/cm^3):	2.02

Notes

Factor (Sat) :	0.468
Factor (Desat) :	0.466

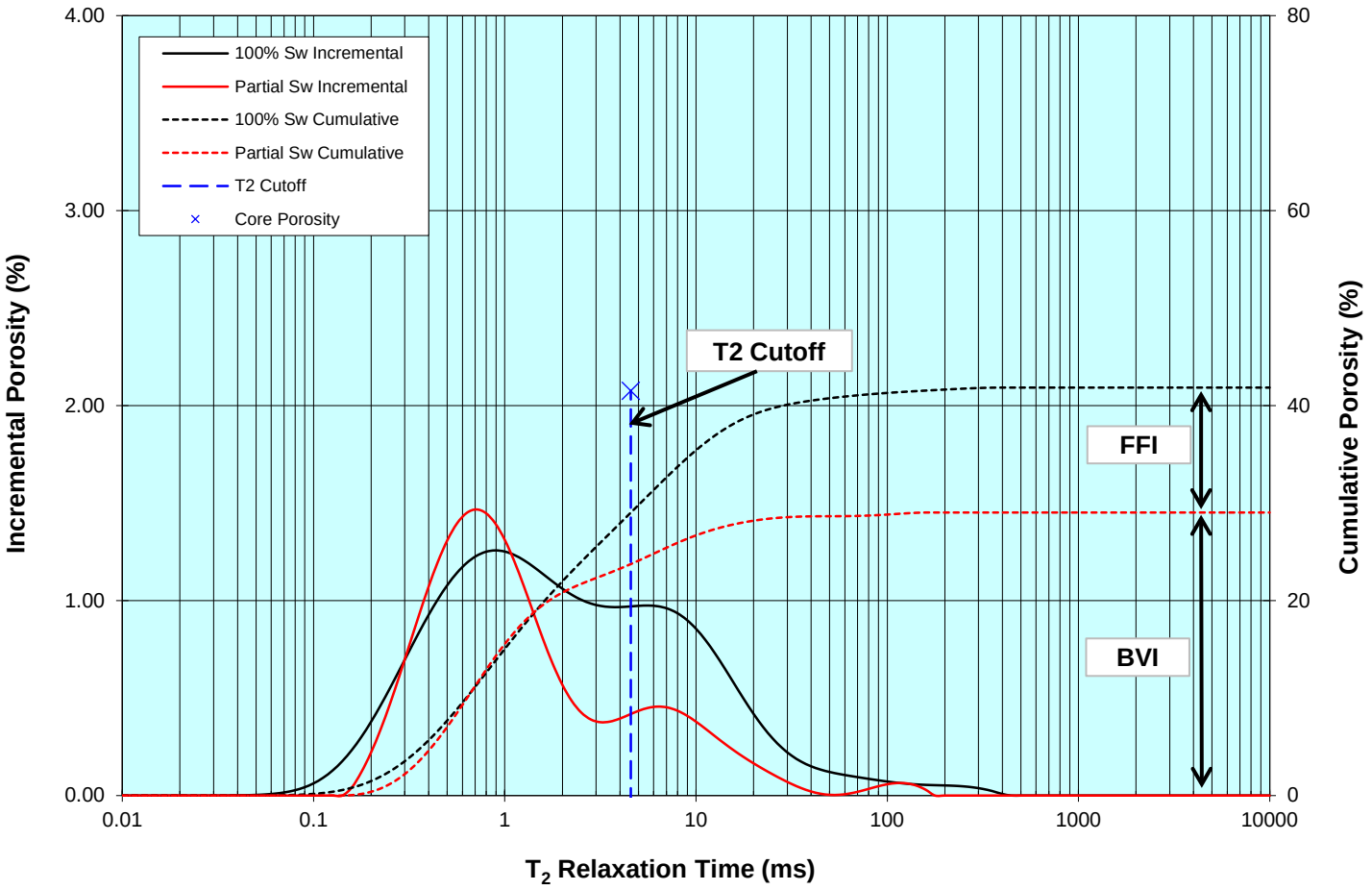
NMR Parameters

Hydrogen Index:	1
Echo Spacing (ms):	0.20
Signal/Noise (Sat):	250
Signal/Noise (Desat):	250
Gradient:	None
Temperature (degC):	28.0

NMR Data (@ Ambient psig O.B.)

Log Mean T2 @ Sw=100% (msec):	2.19
NMR Porosity @ Sw=100% (pu):	41.8
Effective Porosity, T2min=2.8ms (pu):	16.9
Clay Bound Water, T2max=2.8ms (pu):	24.9
NMR Derived T2 Cutoff (msec):	4.57
Free Fluid Index (FFI) @ T2 Cutoff (pu):	12.8
Bulk Volume Irreducible (BVI) @ T2 Cutoff (pu):	29.0
Irreducbile Water Sat. (Swir) @ T2 Cutoff (%):	69.4

NMR T_2 Distribution



NMR T2 MEASUREMENT @ AMBIENT STRESS

Incremental and Cumulative Distribution

Core Lab RESERVOIR OPTIMIZATION

PETROLEUM SERVICES

Sample ID	7NMR
Company:	RMC Consultants, Inc.
Project #:	Atlas D Missile Site 4 RI Add
Location:	Wyoming, USA
Depth (ft):	185.50
Core Lab File No.:	1703468EN

Core Analysis Data (@ 250 psig O.B.)

Permeability (md):	23.6
Porosity, Total (pu):	49.6
Pore Volume (cm^3):	24.0
Bulk Volume (cm^3):	48.4
Grain Density (g/cm^3):	2.82
Bulk Density (g/cm^3):	1.92

Notes

Factor (Sat) :	0.468
Factor (Desat) :	0.466

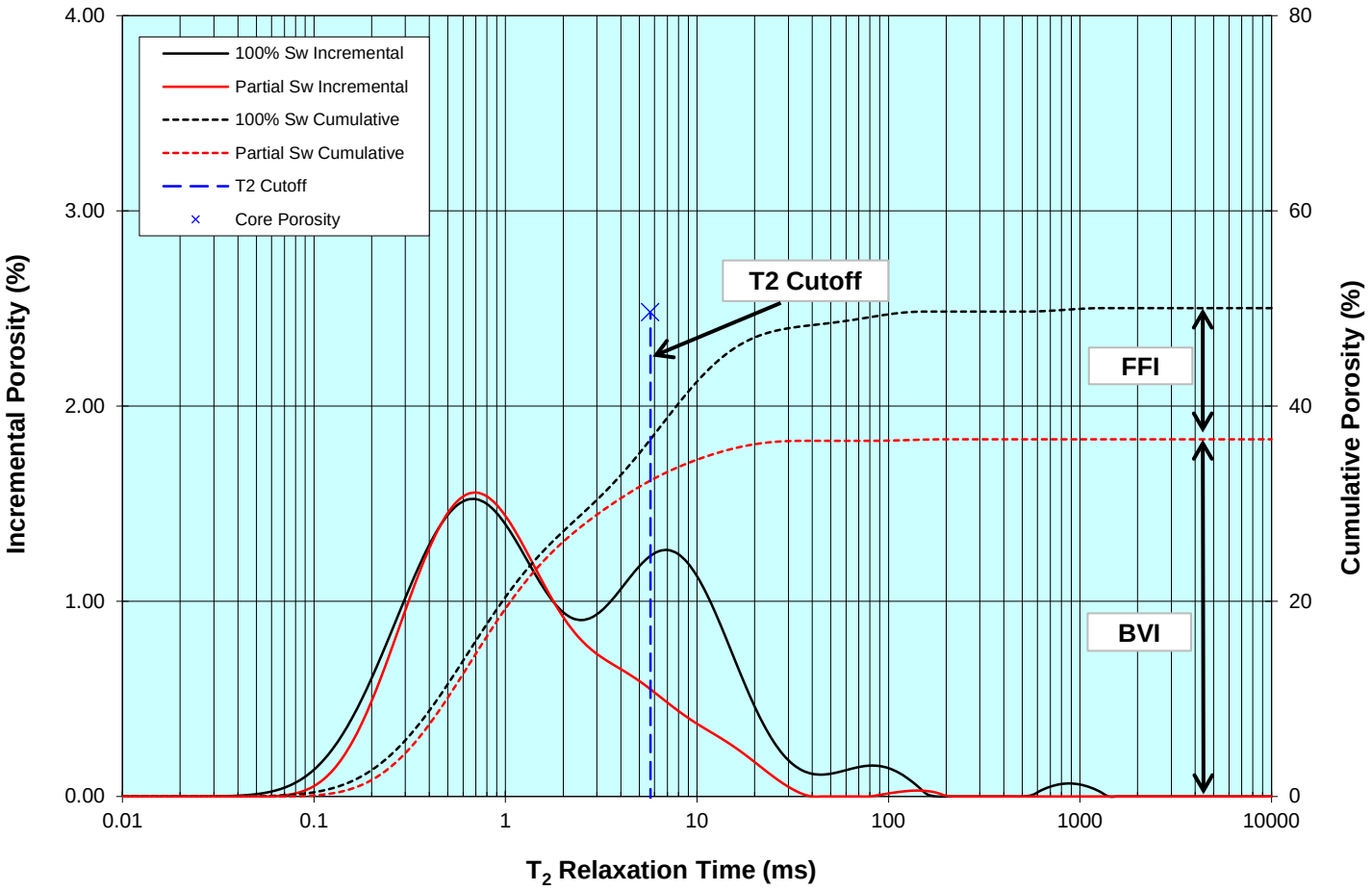
NMR Parameters

Hydrogen Index:	1
Echo Spacing (ms):	0.20
Signal/Noise (Sat):	250
Signal/Noise (Desat):	250
Gradient:	None
Temperature (degC):	28.0

NMR Data (@ Ambient psig O.B.)

Log Mean T2 @ Sw=100% (msec):	2.01
NMR Porosity @ Sw=100% (pu):	50.0
Effective Porosity, T2min=2.8ms (pu):	20.2
Clay Bound Water, T2max=2.8ms (pu):	29.8
NMR Derived T2 Cutoff (msec):	5.72
Free Fluid Index (FFI) @ T2 Cutoff (pu):	13.4
Bulk Volume Irreducible (BVI) @ T2 Cutoff (pu):	36.6
Irreducbile Water Sat. (Swir) @ T2 Cutoff (%):	73.1

NMR T_2 Distribution



Core Lab
RESERVOIR OPTIMIZATION

Petroleum Services Division
3437 Landco Dr.
Bakersfield, California 93308
Tel: 661-325-5657
Fax: 661-325-5808
www.corelab.com

December 22, 2017

David Groy
RMC Consultants, Inc.
12295 W. 48th Avenue - Unit A
Wheat Ridge, CO 80033

Subject: NMR Group Analysis
Project:E15-019-201
CL File No: 1702924

Dear Mr. Groy,

The attached file presents the nuclear magnetic resonnance results for two soil samples submitted from your Atlas Missile Site 4 RI Addendum project.

Appropriate ASTM, EPA or API methodologies were used for this project and SOP's are available on request. The sample material for this project will be disposed after 30 days unless otherwise requested.

Thank you for this opportunity to be of service to RMC Consultants, Inc. Please do not hesitate to contact us at (661-325-5657) if you have any questions regarding these results or if we can be of any additional service.

Sincerely,
Core Laboratories, LP

Michael Carter

Michael Carter
Core Analyst

The analyses, opinions or interpretations contained in this report are based upon observations and material supplied by the client for whose exclusive and confidential use this report has been made. The interpretations or opinions expressed represent the best judgment of Core Laboratories. Core Laboratories assumes no responsibility and makes no warranty or representations, expressed or implied, as to the productivity, proper operations or profitableness, however, of any oil, gas, coal or other mineral, property, well or sand in connection with which such report is used or relied upon for any reason whatsoever.

CLB listed NYSE

NMR DATA SUMMARY

Core Lab
RESERVOIR OPTIMIZATION

PETROLEUM SERVICES

Company: RMC Consultants Inc
Project #: E15-019-201
Location: Wyoming, USA

File No.: 1702924EN
Date: 12/22/17

		Core Analysis Data						NMR Data							
									100% Water Saturation			Partial Water Saturation			
Sample ID	Depth (ft)	Net Confining Stress (psi)	Total Porosity (%)	Air Permeability (md)	Grain Density (g/cm^3)	Bulk Density (g/cm^3)	Irreducible Water Saturation (%)	Net Confining Stress (psi)	Total Porosity (%)	Effective Porosity (%)	T_2 Log Mean (ms)	Irreducible Bulk Volume (%)	Free Fluid Index (%)	Irreducible Water Saturation (%)	T2 Cutoff (ms)
4NMR	85.60	250	54.5	24.6	2.61	1.73	52.9	Ambient	55.1	27.1	3.40	33.2	21.9	60.3	4.50
5NMR	143.00	250	56.1	405.0	2.64	1.72	49.5	Ambient	56.8	29.2	3.60	26.9	29.9	47.4	2.60

NMR T2 MEASUREMENT @ AMBIENT STRESS

Incremental and Cumulative Distribution

Core Lab RESERVOIR OPTIMIZATION

PETROLEUM SERVICES

Sample ID	4NMR
Company:	RMC Consultants Inc
Project #:	E15-019-201
Location:	Wyoming, USA
Depth (ft):	85.60
Core Lab File No.:	HOU-1702924

Core Analysis Data (@ 250 psig O.B.)

Permeability (md):	24.6
Porosity, Total (pu):	54.5
Pore Volume (cm^3):	28.7
Bulk Volume (cm^3):	52.7
Grain Density (g/cm^3):	2.61
Bulk Density (g/cm^3):	1.73

Notes

Factor (Sat) :	0.467
Factor (Desat) :	0.469

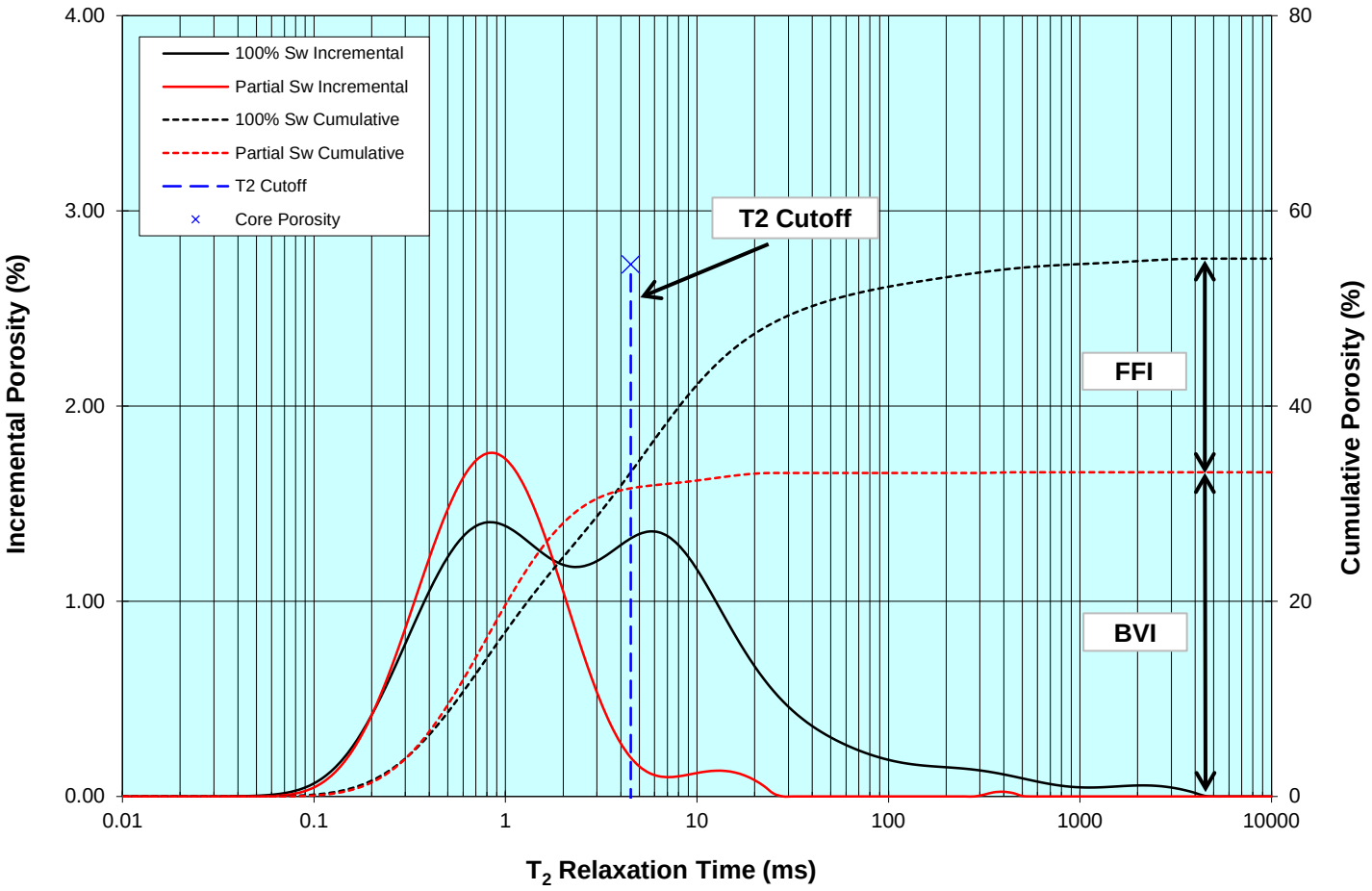
NMR Parameters

Hydrogen Index:	1
Echo Spacing (ms):	0.20
Signal/Noise (Sat):	250
Signal/Noise (Desat):	250
Gradient:	None
Temperature (degC):	28.0

NMR Data (@ Ambient psig O.B.)

Log Mean T2 @ Sw=100% (msec):	3.38
NMR Porosity @ Sw=100% (pu):	55.1
Effective Porosity, T2min=2.8ms (pu):	27.1
Clay Bound Water, T2max=2.8ms (pu):	28.0
NMR Derived T2 Cutoff (msec):	4.51
Free Fluid Index (FFI) @ T2 Cutoff (pu):	21.9
Bulk Volume Irreducible (BVI) @ T2 Cutoff (pu):	33.2
Irreducbile Water Sat. (Swir) @ T2 Cutoff (%):	60.3

NMR T_2 Distribution



NMR T2 MEASUREMENT @ AMBIENT STRESS

Incremental and Cumulative Distribution

Core Lab RESERVOIR OPTIMIZATION

PETROLEUM SERVICES

Sample ID	5NMR
Company:	RMC Consultants Inc
Project #:	E15-019-201
Location:	Wyoming, USA
Depth (ft):	143.00
Core Lab File No.:	HOU-1702924

Core Analysis Data (@ 250 psig O.B.)

Permeability (md):	405
Porosity, Total (pu):	56.1
Pore Volume (cm^3):	29.1
Bulk Volume (cm^3):	51.9
Grain Density (g/cm^3):	2.64
Bulk Density (g/cm^3):	1.72

Notes

Factor (Sat) :	0.467
Factor (Desat) :	0.469

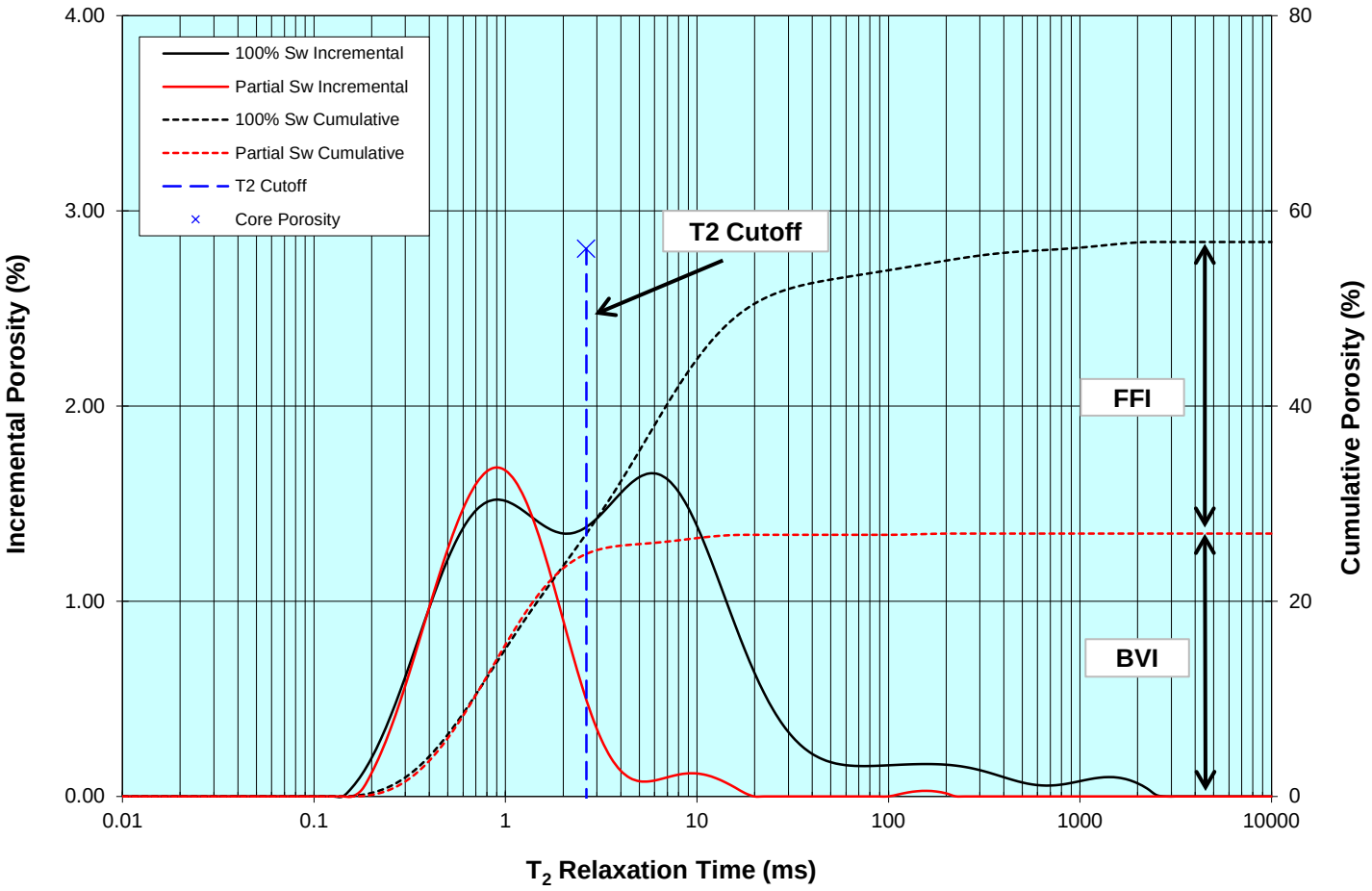
NMR Parameters

Hydrogen Index:	1
Echo Spacing (ms):	0.20
Signal/Noise (Sat):	250
Signal/Noise (Desat):	250
Gradient:	None
Temperature (degC):	28.0

NMR Data (@ Ambient psig O.B.)

Log Mean T2 @ Sw=100% (msec):	3.58
NMR Porosity @ Sw=100% (pu):	56.8
Effective Porosity, T2min=2.8ms (pu):	29.2
Clay Bound Water, T2max=2.8ms (pu):	27.6
NMR Derived T2 Cutoff (msec):	2.64
Free Fluid Index (FFI) @ T2 Cutoff (pu):	29.9
Bulk Volume Irreducible (BVI) @ T2 Cutoff (pu):	26.9
Irreducbile Water Sat. (Swir) @ T2 Cutoff (%):	47.4

NMR T_2 Distribution



Petroleum Services Division
3437 Landco Dr.
Bakersfield, California 93308
Tel: 661-325-5657
Fax: 661-325-5808
www.corelab.com

December 22, 2017

David Groy
RMC Consultants, Inc.
12295 W. 48th Avenue - Unit A
Wheat Ridge, CO 80033

Subject: NMR Group Analysis
Project:E15-019-201
CL File No: 1703191

Dear Mr. Groy,

The attached file presents the nuclear magnetic resonance group results for two soil samples submitted from your Atlas Missile Site 4 RI Addendum project.

NMR is in progress and will be reported at a later date. Appropriate ASTM, EPA or API methodologies were used for this project and SOP's are available on request. The sample material for this project will be disposed after 30 days unless otherwise requested.

Thank you for this opportunity to be of service to RMC Consultants, Inc. Please do not hesitate to contact us at (661-325-5657) if you have any questions regarding these results or if we can be of any additional service.

Sincerely,
Core Laboratories, LP

Michael Carter

Michael Carter
Core Analyst

The analyses, opinions or interpretations contained in this report are based upon observations and material supplied by the client for whose exclusive and confidential use this report has been made. The interpretations or opinions expressed represent the best judgment of Core Laboratories. Core Laboratories assumes no responsibility and makes no warranty or representations, expressed or implied, as to the productivity, proper operations or profitableness, however, of any oil, gas, coal or other mineral, property, well or sand in connection with which such report is used or relied upon for any reason whatsoever.

CLB Listed NYSE

NMR DATA SUMMARY

Core Lab
RESERVOIR OPTIMIZATION

PETROLEUM SERVICES

Company: RMC Consultants Inc
Project #: E15-019-201
Location: Wyoming, USA

File No.: 1703191EN
Date: 12/22/17

		Core Analysis Data						NMR Data							
									100% Water Saturation			Partial Water Saturation			
Sample ID	Depth (ft)	Net Confining Stress (psi)	Total Porosity (%)	Air Permeability (md)	Grain Density (g/cm^3)	Bulk Density (g/cm^3)	Irreducible Water Saturation (%)	Net Confining Stress (psi)	Total Porosity (%)	Effective Porosity (%)	T_2 Log Mean (ms)	Irreducible Bulk Volume (%)	Free Fluid Index (%)	Irreducible Water Saturation (%)	T2 Cutoff (ms)
1NMR	132.50	250	30.8	0.02	2.65	2.14	93.2	Ambient	30.8	10.4	1.80	24.8	6.0	80.4	7.20
2NMR	178.50	250	37.2	2.30	2.67	2.05	88.7	Ambient	37.3	12.1	1.80	34.8	2.5	93.2	25.60

NMR T2 MEASUREMENT @ AMBIENT STRESS

Incremental and Cumulative Distribution

Core Lab RESERVOIR OPTIMIZATION

PETROLEUM SERVICES

Sample ID	1NMR
Company:	RMC Consultants Inc
Project #:	E15-019-201
Location:	Wyoming, USA
Depth (ft):	132.50
Core Lab File No.:	HOU-1703191

Core Analysis Data (@ 250 psig O.B.)

Permeability (md):	0.02
Porosity, Total (pu):	30.8
Pore Volume (cm^3):	18.1
Bulk Volume (cm^3):	58.6
Grain Density (g/cm^3):	2.65
Bulk Density (g/cm^3):	2.14

Notes

Factor (Sat) :	0.467
Factor (Desat) :	0.469

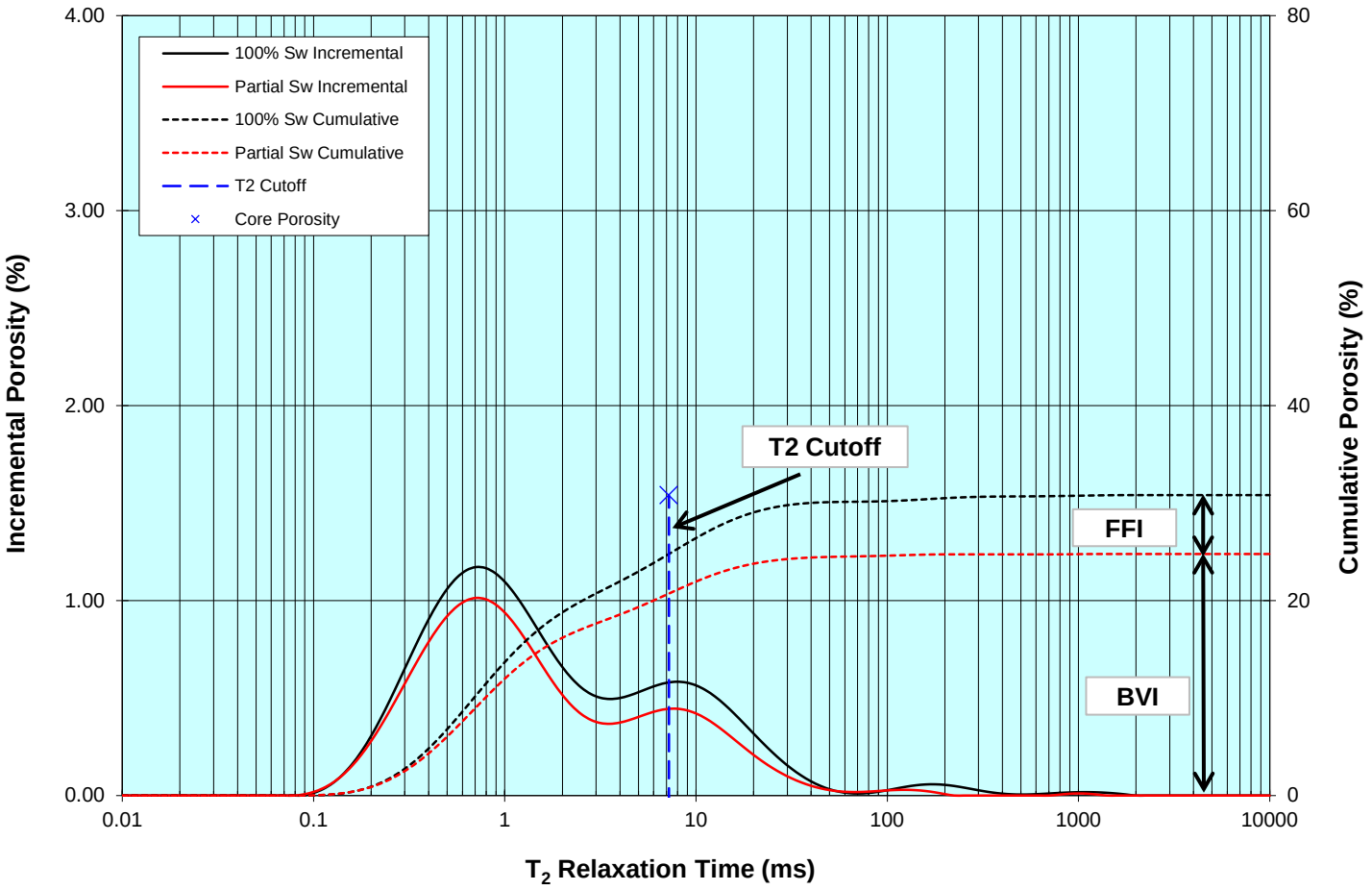
NMR Parameters

Hydrogen Index:	1
Echo Spacing (ms):	0.20
Signal/Noise (Sat):	250
Signal/Noise (Desat):	250
Gradient:	None
Temperature (degC):	28.0

NMR Data (@ Ambient psig O.B.)

Log Mean T2 @ Sw=100% (msec):	1.84
NMR Porosity @ Sw=100% (pu):	30.8
Effective Porosity, T2min=2.8ms (pu):	10.4
Clay Bound Water, T2max=2.8ms (pu):	20.4
NMR Derived T2 Cutoff (msec):	7.21
Free Fluid Index (FFI) @ T2 Cutoff (pu):	6.04
Bulk Volume Irreducible (BVI) @ T2 Cutoff (pu):	24.8
Irreducbile Water Sat. (Swir) @ T2 Cutoff (%):	80.4

NMR T_2 Distribution



NMR T2 MEASUREMENT @ AMBIENT STRESS

Incremental and Cumulative Distribution

Core Lab RESERVOIR OPTIMIZATION

PETROLEUM SERVICES

Sample ID	2NMR
Company:	RMC Consultants Inc
Project #:	E15-019-201
Location:	Wyoming, USA
Depth (ft):	178.50
Core Lab File No.:	HOU-1703191

Core Analysis Data (@ 250 psig O.B.)

Permeability (md):	2.30
Porosity, Total (pu):	37.2
Pore Volume (cm^3):	21.6
Bulk Volume (cm^3):	57.9
Grain Density (g/cm^3):	2.67
Bulk Density (g/cm^3):	2.05

Notes

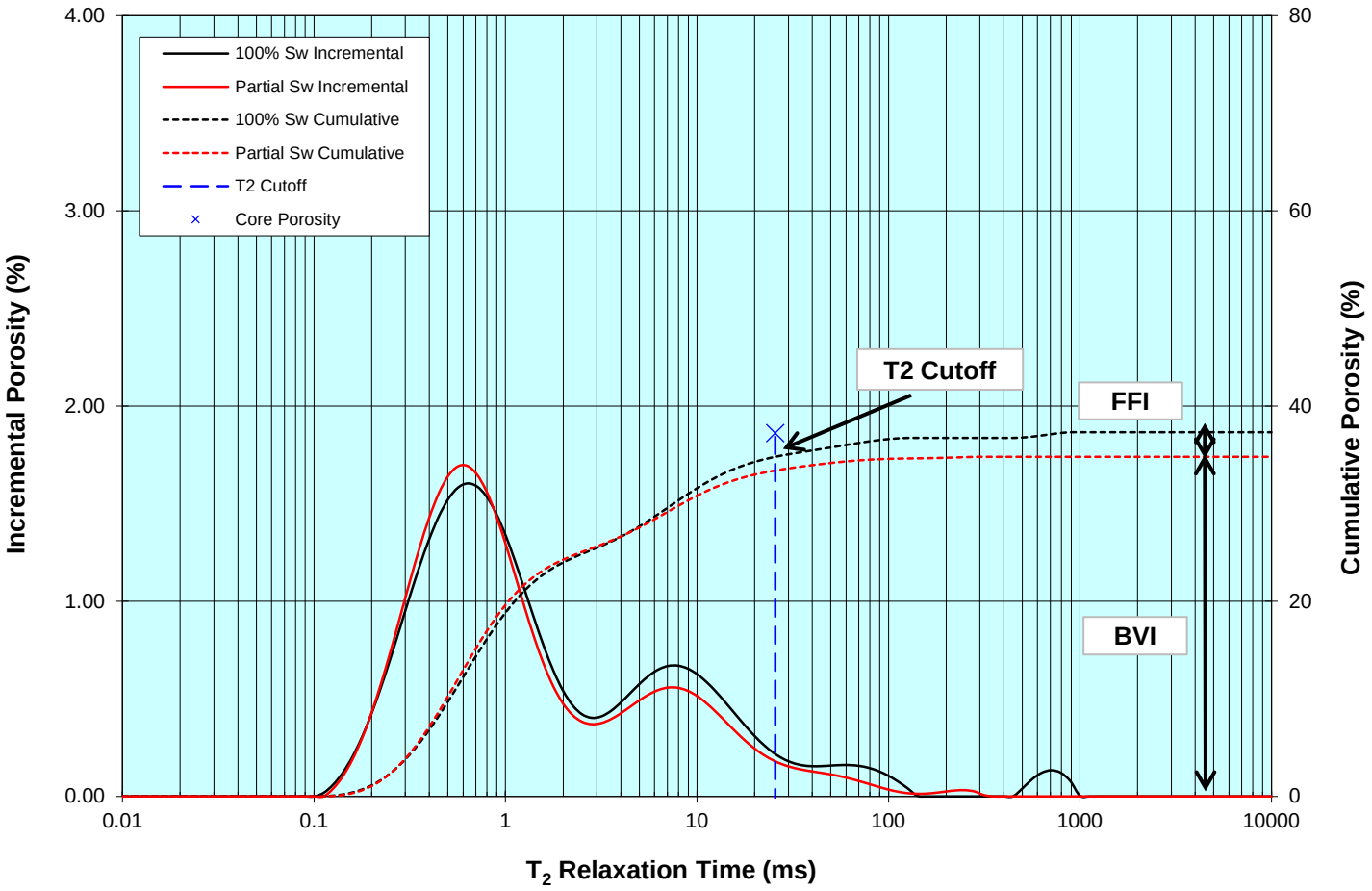
Factor (Sat) :	0.467
Factor (Desat) :	0.469

NMR Parameters	1
Hydrogen Index:	0.20
Echo Spacing (ms):	250
Signal/Noise (Sat):	250
Signal/Noise (Desat):	None
Gradient:	28.0
Temperature (degC):	

NMR Data (@ Ambient psig O.B.)

Log Mean T2 @ Sw=100% (msec):	1.77
NMR Porosity @ Sw=100% (pu):	37.3
Effective Porosity, T2min=2.8ms (pu):	12.1
Clay Bound Water, T2max=2.8ms (pu):	25.2
NMR Derived T2 Cutoff (msec):	25.6
Free Fluid Index (FFI) @ T2 Cutoff (pu):	2.52
Bulk Volume Irreducible (BVI) @ T2 Cutoff (pu):	34.8
Irreducbile Water Sat. (Swir) @ T2 Cutoff (%):	93.2

NMR T_2 Distribution



Core Lab
RESERVOIR OPTIMIZATION

Petroleum Services Division
3437 Landco Dr.
Bakersfield, California 93308
Tel: 661-325-5657
Fax: 661-325-5808
www.corelab.com

December 22, 2017

David Groy
RMC Consultants, Inc.
12295 W. 48th Avenue - Unit A
Wheat Ridge, CO 80033

Subject: NMR Group Analysis
Project:E15-019-201
CL File No: 1703114

Dear Mr. Groy,

The attached file presents the nuclear magnetic resonance group results for one soil sample submitted from your Atlas Missile Site 4 RI Addendum project.

NMR is in progress and will be reported at a later date. Appropriate ASTM, EPA or API methodologies were used for this project and SOP's are available on request. The sample material for this project will be disposed after 30 days unless otherwise requested.

Thank you for this opportunity to be of service to RMC Consultants, Inc. Please do not hesitate to contact us at (661-325-5657) if you have any questions regarding these results or if we can be of any additional service.

Sincerely,
Core Laboratories, LP

Michael Carter
Core Analyst

The analyses, opinions or interpretations contained in this report are based upon observations and material supplied by the client for whose exclusive and confidential use this report has been made. The interpretations or opinions expressed represent the best judgment of Core Laboratories. Core Laboratories assumes no responsibility and makes no warranty or representations, expressed or implied, as to the productivity, proper operations or profitableness, however, of any oil, gas, coal or other mineral, property, well or sand in connection with which such report is used or relied upon for any reason whatsoever.

CLB Listed NYSE

NMR DATA SUMMARY

Core Lab
RESERVOIR OPTIMIZATION

PETROLEUM SERVICES

Company: RMC Consultants Inc
Project #: E15-019-201
Location: Wyoming, USA

File No.: 1703114EN
Date: 12/22/17

		Core Analysis Data						NMR Data							
									100% Water Saturation			Partial Water Saturation			
Sample ID	Depth (ft)	Net Confining Stress (psi)	Total Porosity (%)	Air Permeability (md)	Grain Density (g/cm^3)	Bulk Density (g/cm^3)	Irreducible Water Saturation (%)	Net Confining Stress (psi)	Total Porosity (%)	Effective Porosity (%)	T_2 Log Mean (ms)	Irreducible Bulk Volume (%)	Free Fluid Index (%)	Irreducible Water Saturation (%)	T2 Cutoff (ms)
3NMR	74.50	250	41.0	11.7	2.55	1.91	59.9	Ambient	41.6	17.1	2.40	22.3	19.4	53.5	2.30

Core Laboratories

NMR T2 MEASUREMENT @ AMBIENT STRESS

Incremental and Cumulative Distribution

Core Lab RESERVOIR OPTIMIZATION

PETROLEUM SERVICES

Sample ID	3NMR
Company:	RMC Consultants Inc
Project #:	Atlas D Missile Site 4 RI Add
Location:	Wyoming, USA
Depth (ft):	74.50
Core Lab File No.:	HOU-1703114

Core Analysis Data (@ 250 psig O.B.)

Permeability (md):	11.7
Porosity, Total (pu):	41.0
Pore Volume (cm^3):	23.8
Bulk Volume (cm^3):	58.1
Grain Density (g/cm^3):	2.55
Bulk Density (g/cm^3):	1.91

Notes

Factor (Sat) :	0.467
Factor (Desat) :	0.469

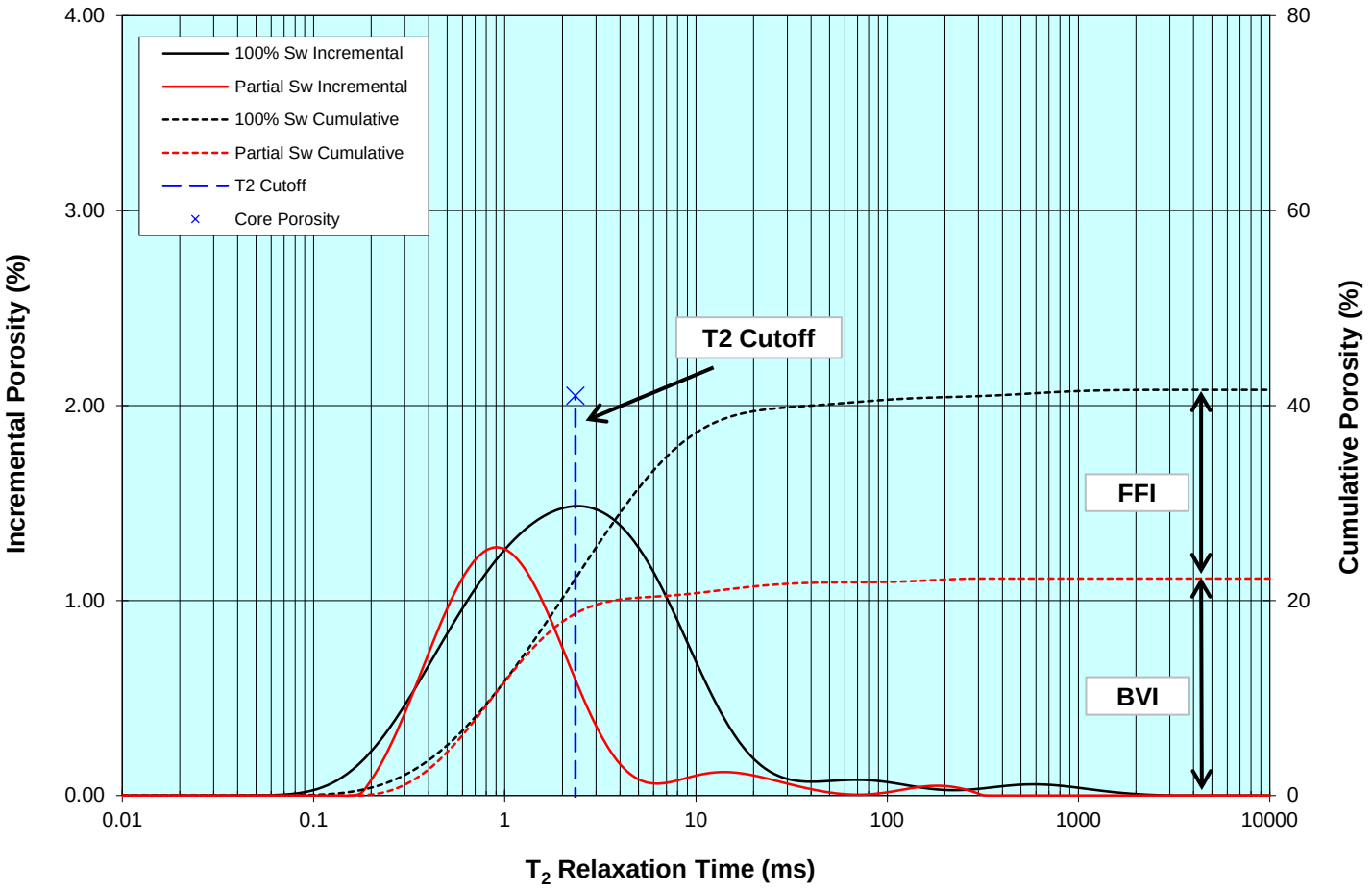
NMR Parameters

Hydrogen Index:	1
Echo Spacing (ms):	0.20
Signal/Noise (Sat):	250
Signal/Noise (Desat):	250
Gradient:	None
Temperature (degC):	28.0

NMR Data (@ Ambient psig O.B.)

Log Mean T2 @ Sw=100% (msec):	2.43
NMR Porosity @ Sw=100% (pu):	41.6
Effective Porosity, T2min=2.8ms (pu):	17.1
Clay Bound Water, T2max=2.8ms (pu):	24.6
NMR Derived T2 Cutoff (msec):	2.34
Free Fluid Index (FFI) @ T2 Cutoff (pu):	19.4
Bulk Volume Irreducible (BVI) @ T2 Cutoff (pu):	22.3
Irreducbile Water Sat. (Swir) @ T2 Cutoff (%):	53.5

NMR T_2 Distribution



Appendix F. Matrix Diffusion Testing Report

(provided separately)

Appendix G. Borehole Hydrophysical and Geophysical Reports

Focused Density

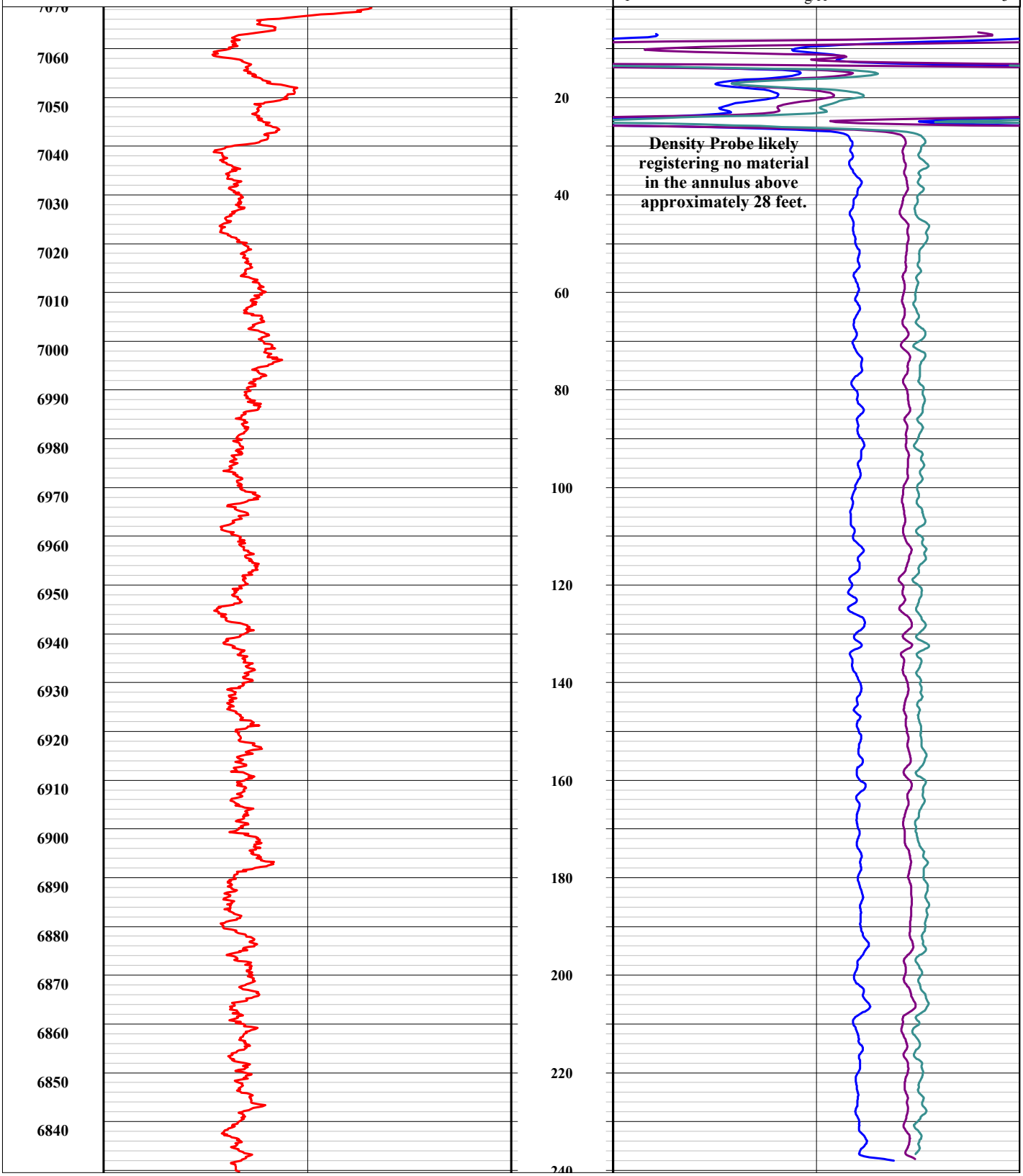
COMPANY: RMC - Consultants | PROJECT: Atlas Missile Site 4 Phase 2

DATE LOGGED: 16 August 2017 | WELL: MW-77

Colog, Inc.
810 Quail Street, Suite E, Lakewood, CO 80215
Phone: (303) 279-0171, Fax: (303) 278-0135
www.colog.com

borehole geophysics / hydrophysics

Elevation	Natural Gamma	Depth	Near Density	Far Density	Compensated Density
ft msl	0 CPS 200	1ft:340ft	1 g/cc 3	1 g/cc 3	1 g/cc 3



Dual Induction & Magnetic Susceptibility

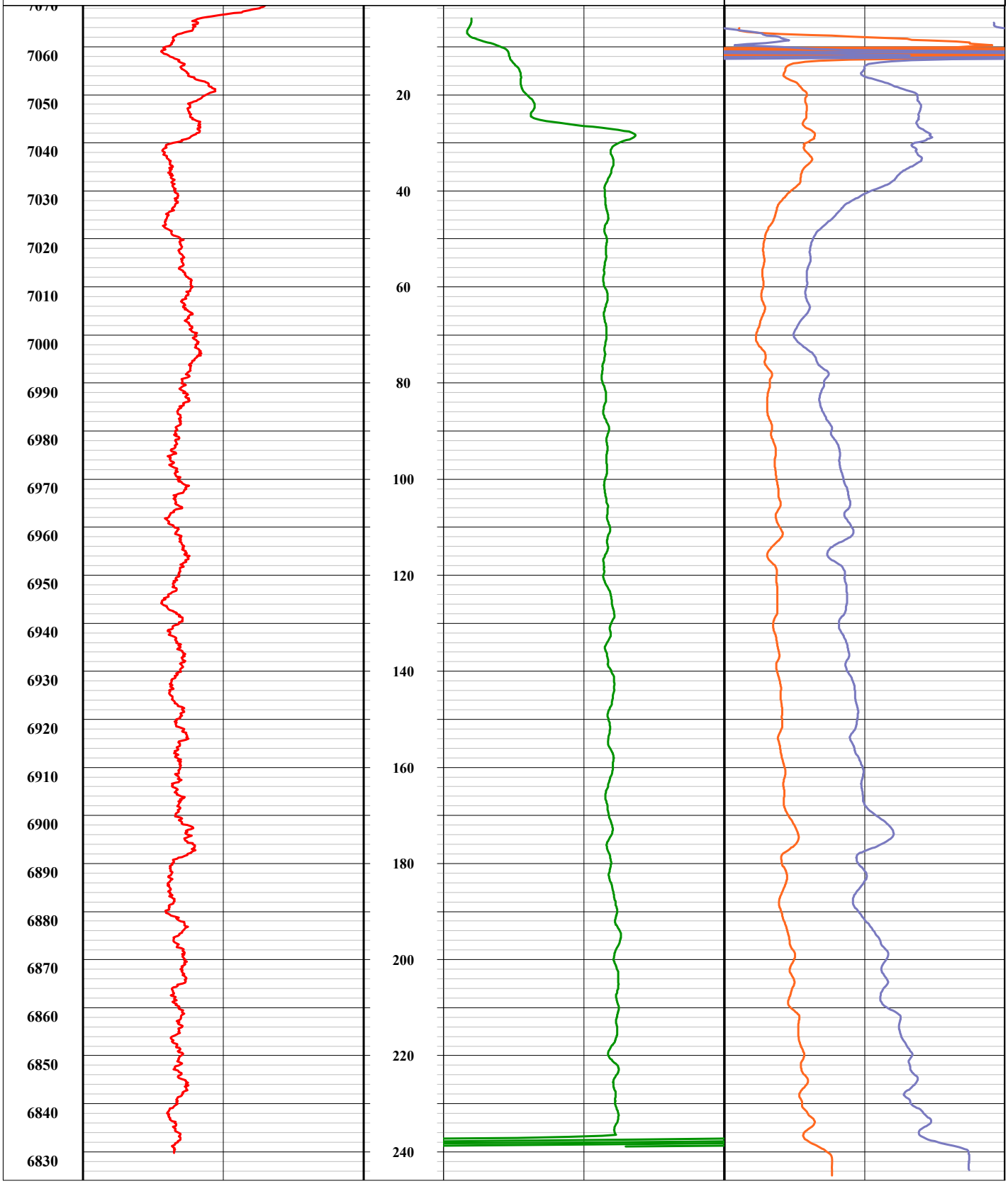
COLOG
borehole geophysics / hydrophysics

COMPANY: RMC - Consultants | PROJECT: Atlas Missile Site 4 Phase 2

DATE LOGGED: 16 August 2017 | WELL: MW-77

Colog, Inc.
810 Quail Street, Suite E, Lakewood, CO 80215
Phone: (303) 279-0171, Fax: (303) 278-0135
www.colog.com

Elevation ft msl	Natural Gamma 0 CPS 200	Depth 1ft:340ft	Magnetic Susceptibility 0 ppt 100	Conductivity (short) 0 mS/m 1000	Conductivity (long) 0 mS/m 1000



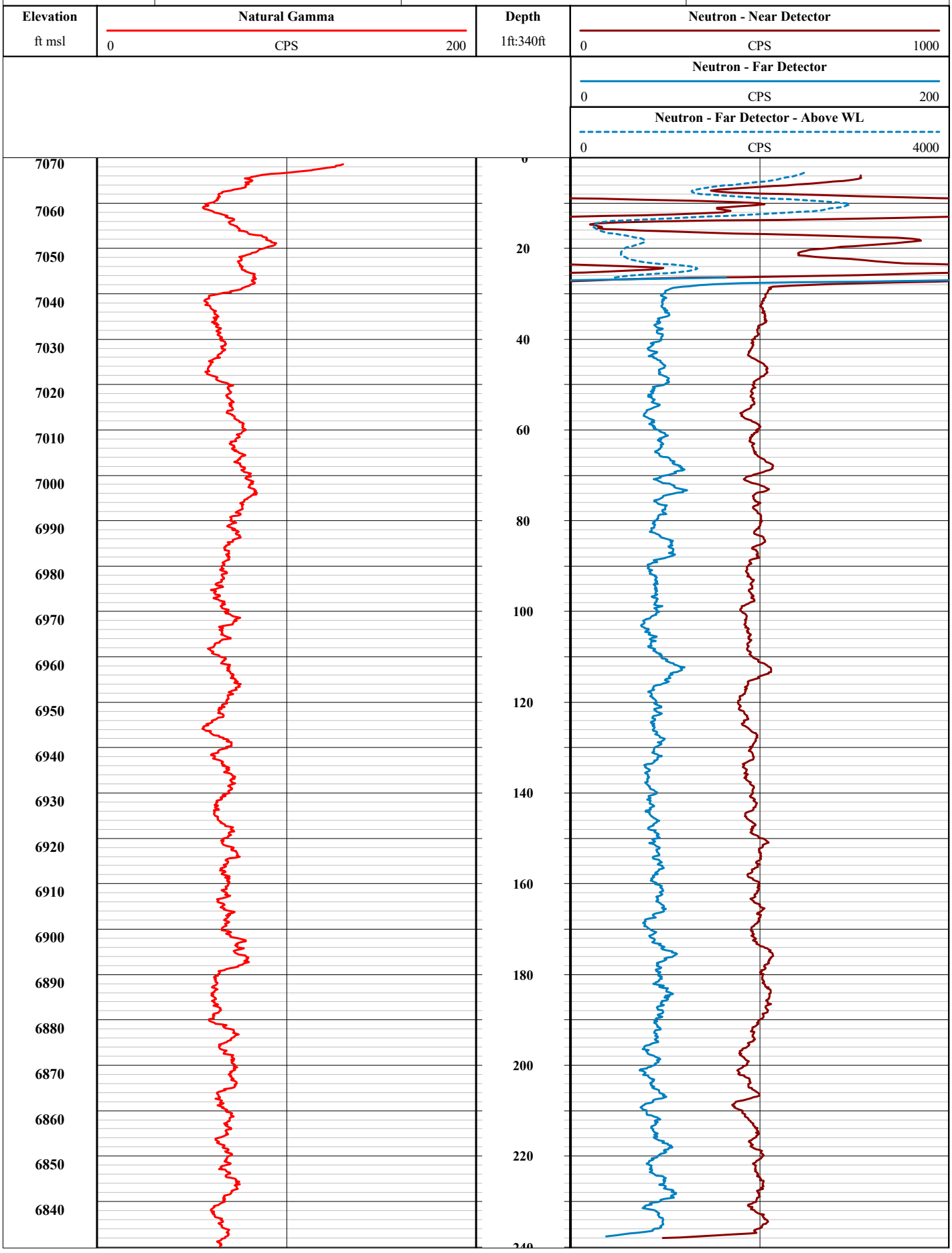
Dual Neutron

COLOG
borehole geophysics / hydrophysics

COMPANY: RMC - Consultants | PROJECT: Atlas Missile Site 4 Phase 2

DATE LOGGED: 16 August 2017 | WELL: MW-77

Colog, Inc.
810 Quail Street, Suite E, Lakewood, CO 80215
Phone: (303) 279-0171, Fax: (303) 278-0135
www.colog.com

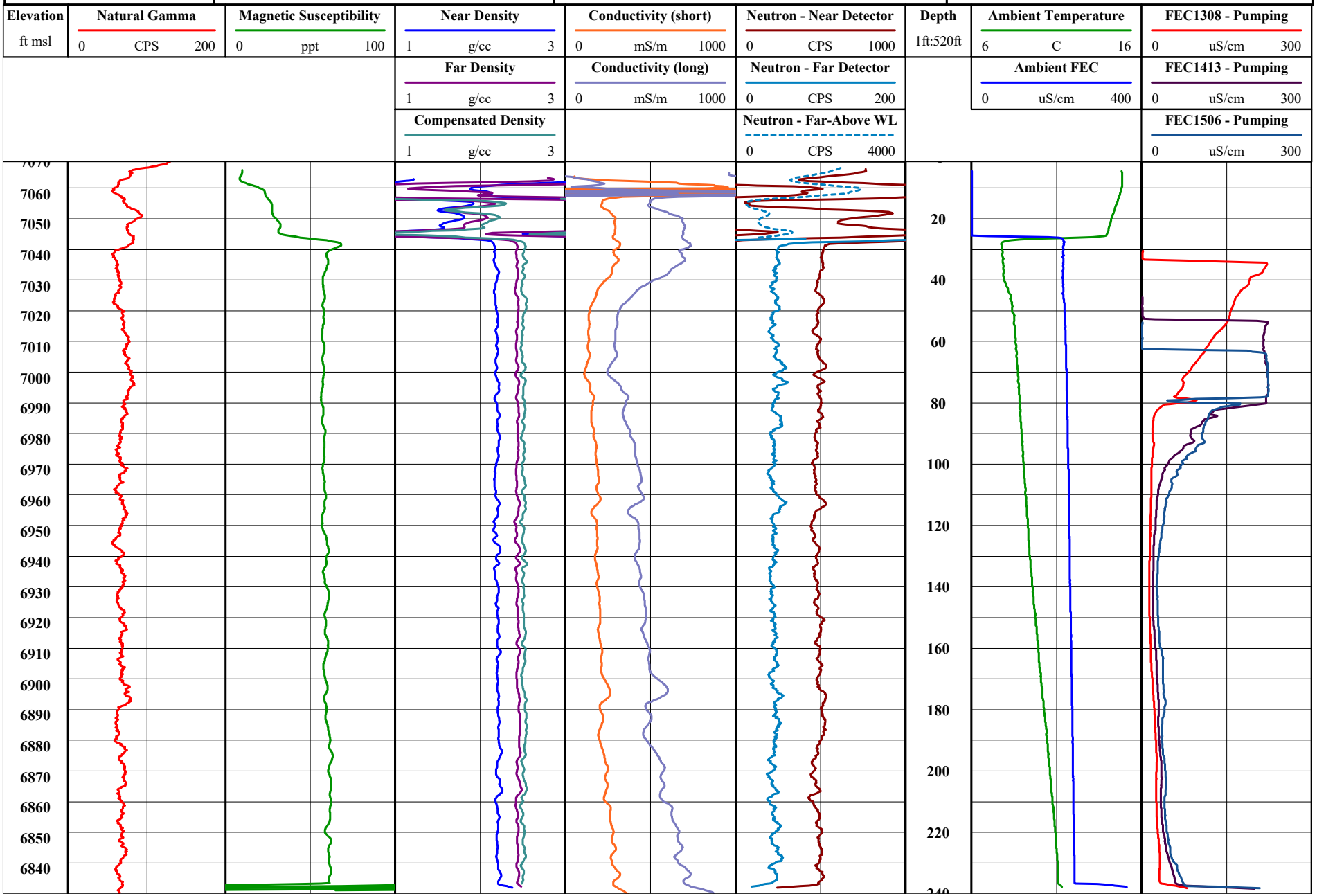


Geophysical/Hydrophysical Summary Plot

COLOG
borehole geophysics / hydrophysics

COMPANY: RMC - Consultants
PROJECT: Atlas Missile Site 4 Phase 2
DATE LOGGED: 16 August 2017
WELL: MW-77

COLOG Main Office
810 Quail Street, Suite E, Lakewood, CO 80215
Phone: (303) 279-0171, Fax: (303) 278-0135
www.colog.com



COLOG

borehole geophysics / hydrophysics

Geophysical/Hydrophysical Summary Plot

COMPANY: RMC - Consultants	PROJECT: Atlas Missile Site 4 Phase 2
DATE LOGGED: 16 August 2017	WELL: MW-77

COLOG Main Office

810 Quail Street, Suite E, Lakewood, CO 80215

Phone: (303) 279-0171, Fax: (303) 278-0135

www.colog.com

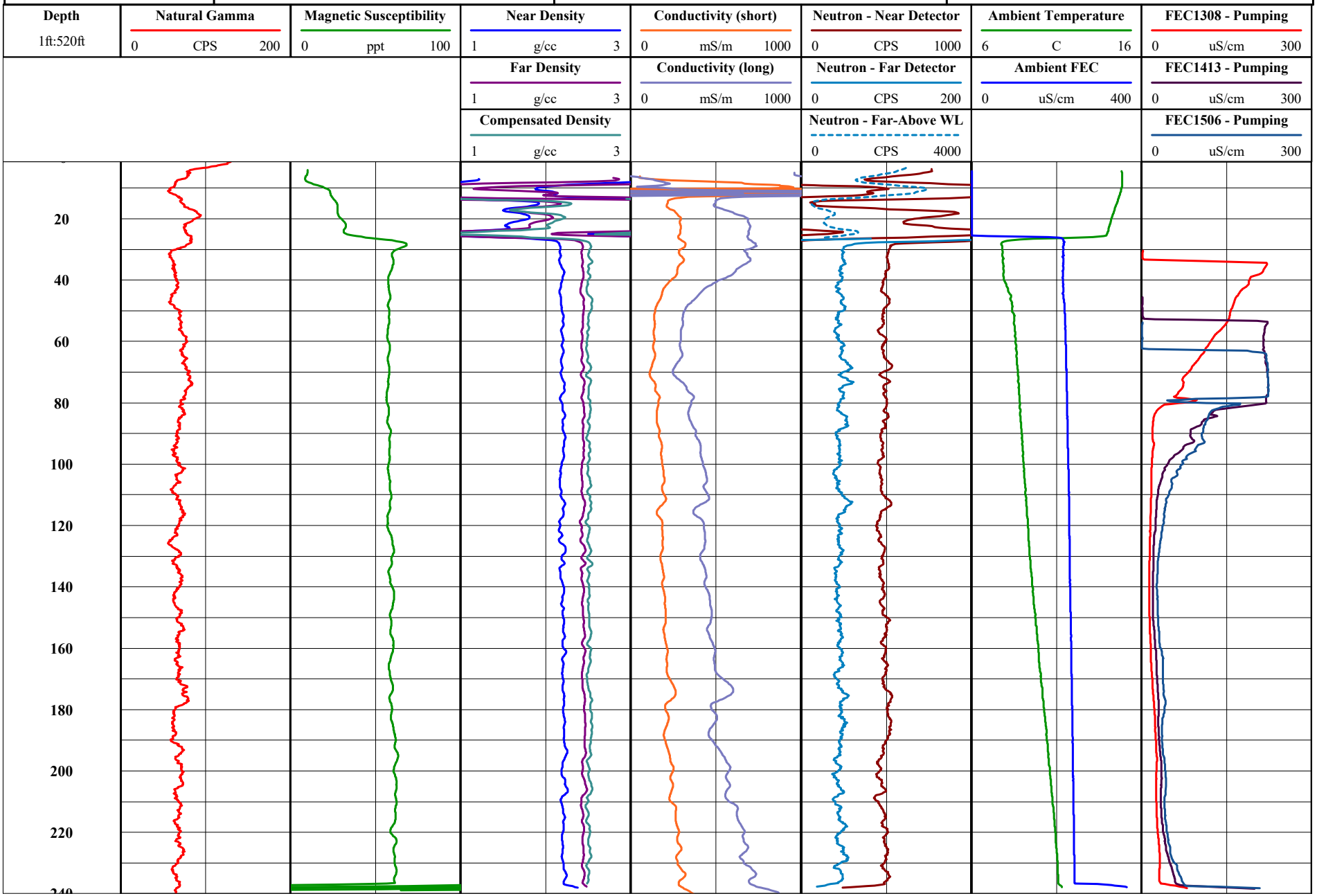


FIGURE MW-77:1. Ambient Temperature and Fluid Electrical Conductivity; RMC Consultants; Atlas Missile Site 4; Cheyenne, WY; Wellbore: MW-77

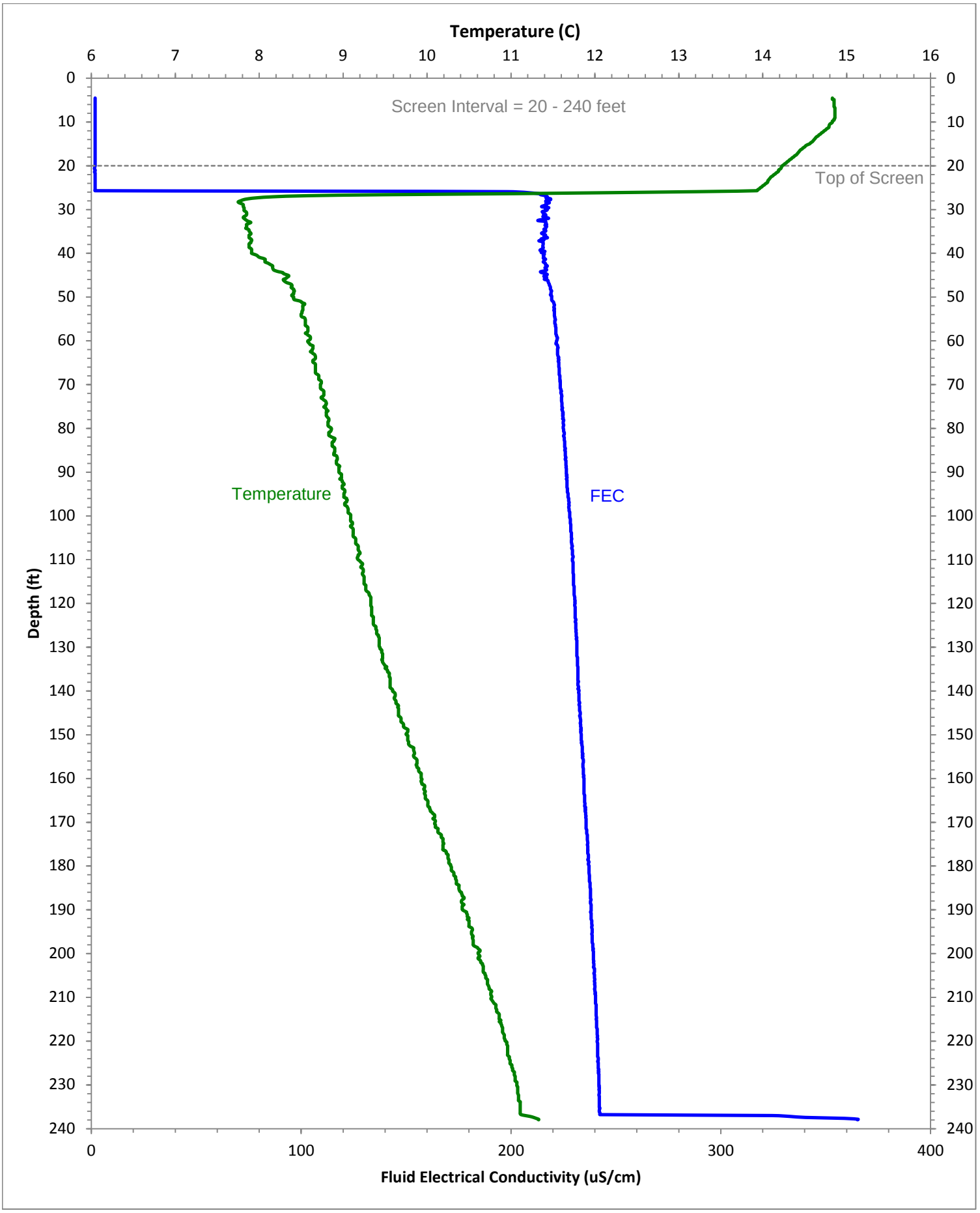


FIGURE MW-77:2. Summary of Hydrophysical Logs During Ambient Flow Characterization; RMC Consultants; Atlas Missile Site 4; Cheyenne, WY; Wellbore: MW-77

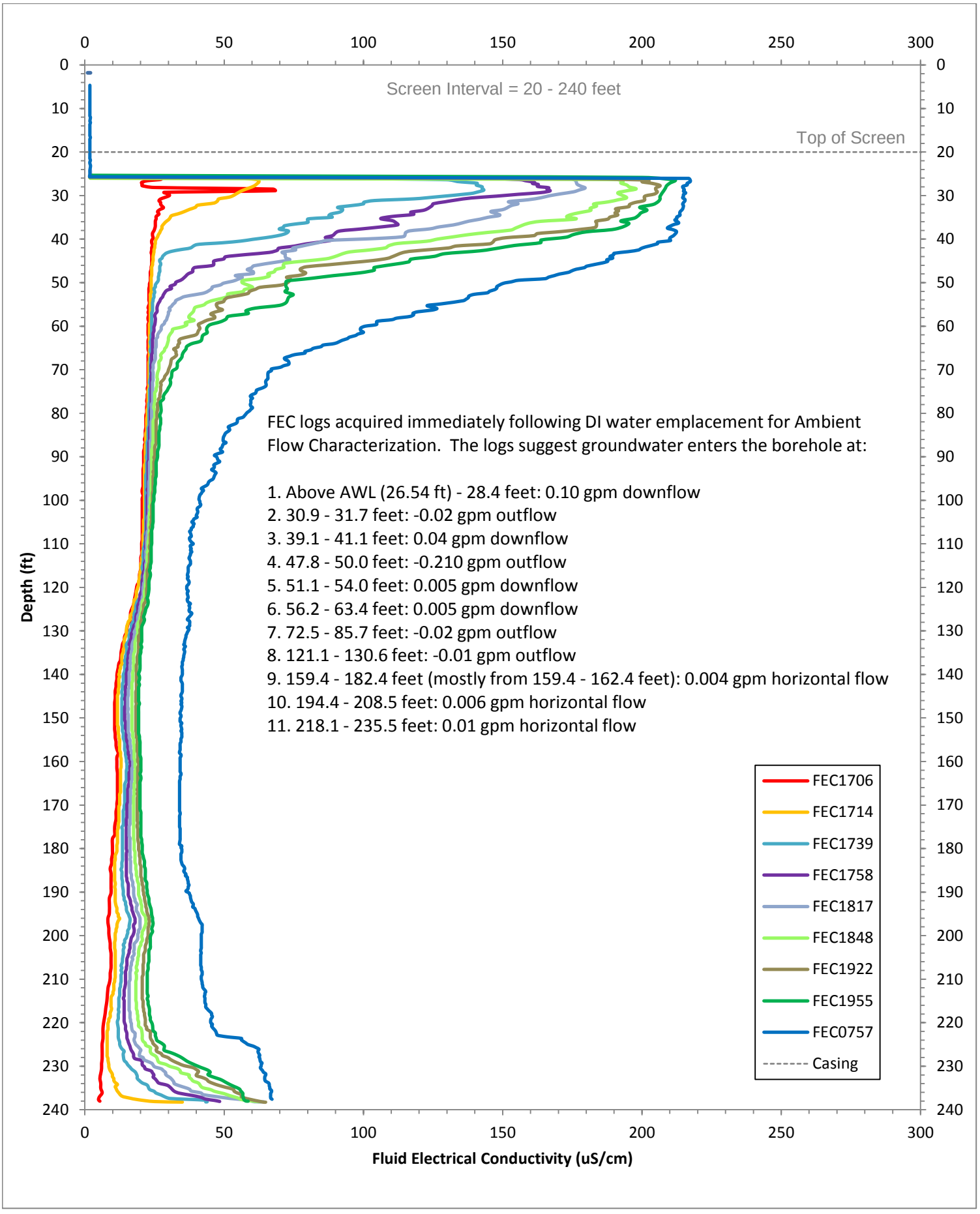


FIGURE MW-77:3. Pumping and Drawdown Data During Low-Rate Pumping at 2 GPM After DI Water Emplacement; RMC Consultants; Atlas Missile Site 4; Cheyenne, WY; Wellbore: MW-77

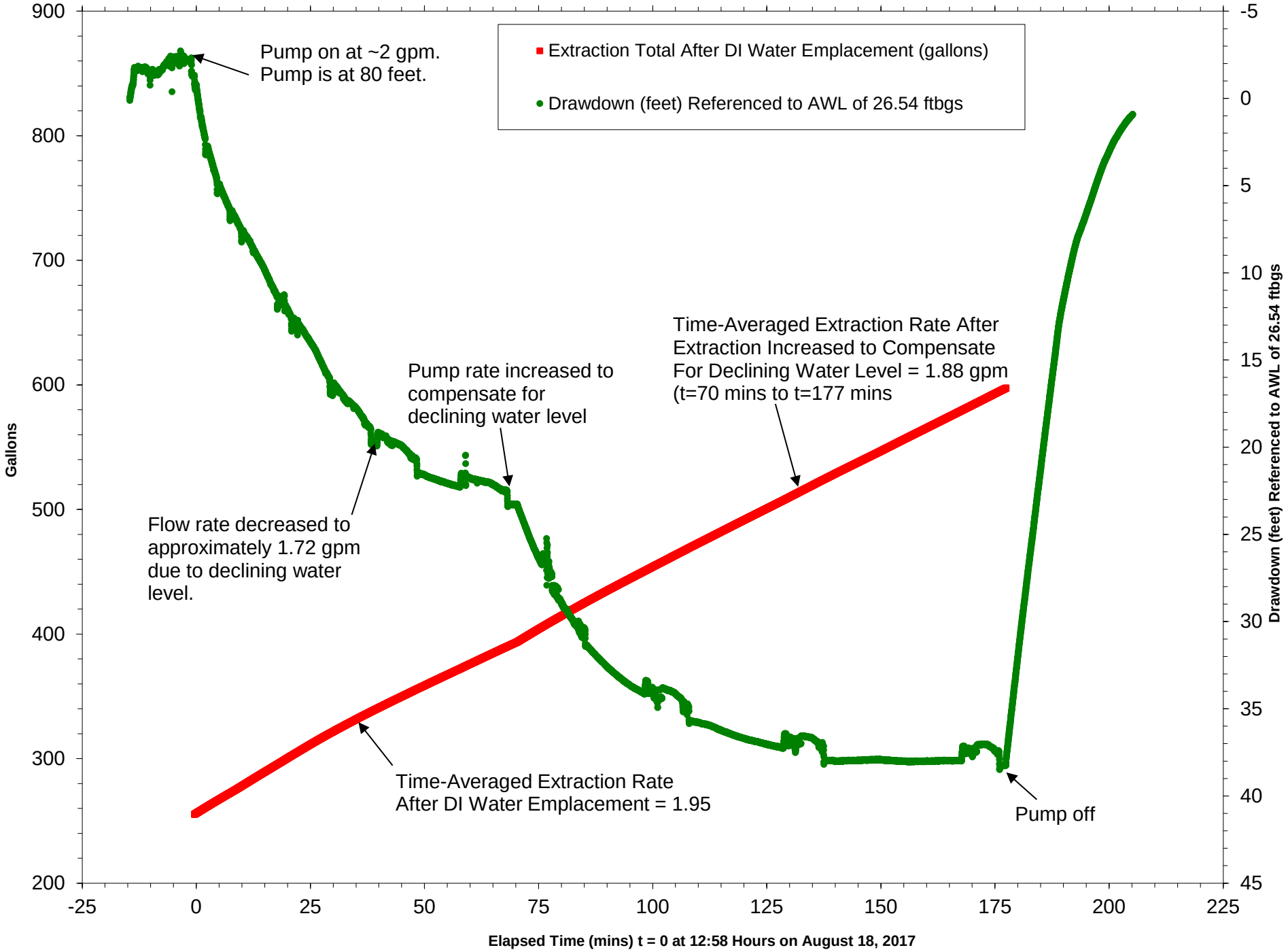


FIGURE MW-77:4. Summary of Hydrophysical Logs During Low-Rate Pumping at 2 GPM After DI Water Emplacement; RMC Consultants; Atlas Missile Site 4; Cheyenne, WY; Wellbore: MW-77

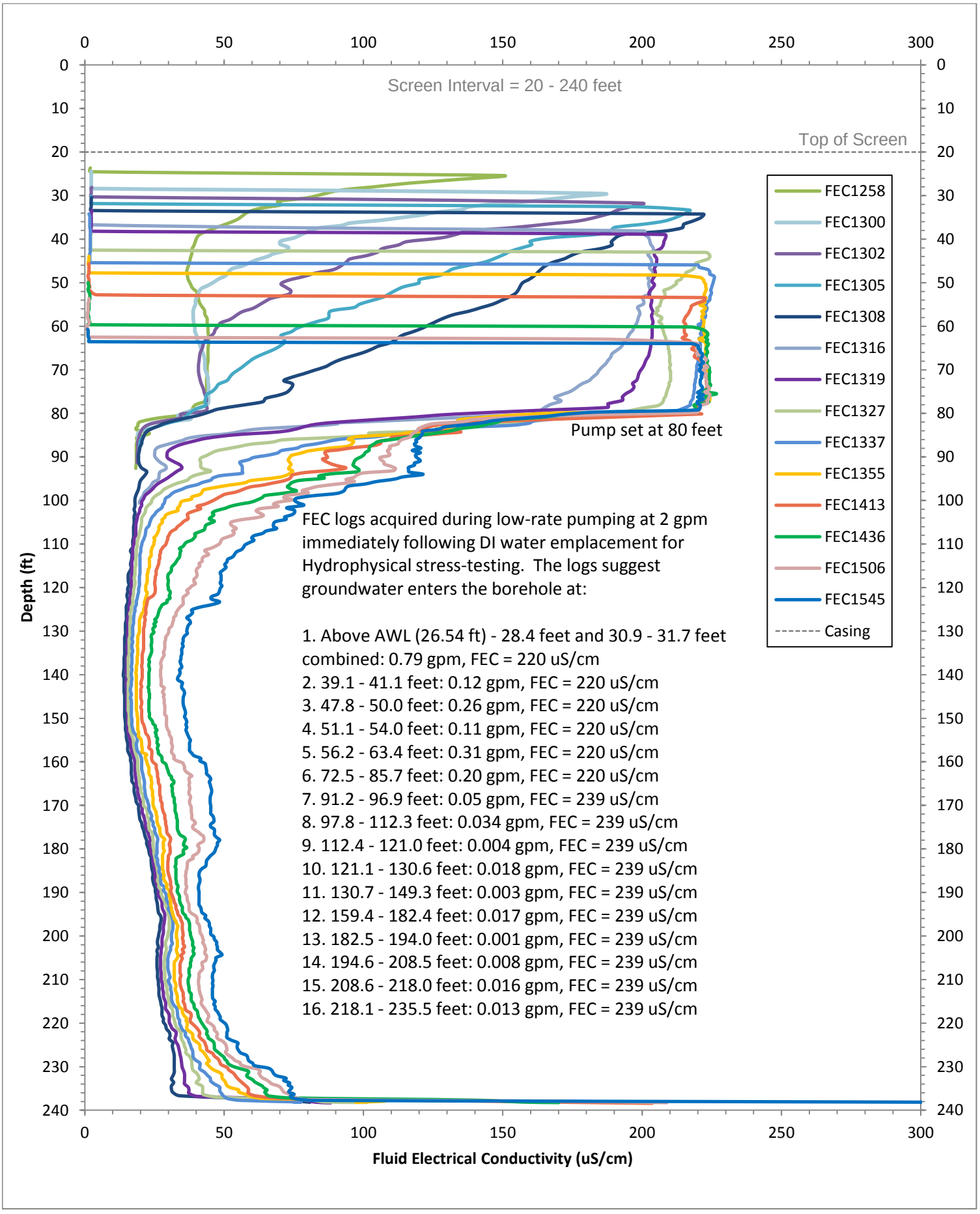


Table MW-77:1. Summary Of Hydrophysical Logging Results With Hydraulic Conductivity And Transmissivity Estimations; RMC Consultants; Atlas Missile Site 4; Cheyenne, WY; Wellbore: MW-77

Well Name	MW-77
Ambient Depth to Water (ftbtoc)	28.34
Ambient Depth to Water (ftbgs)	26.54
Screen Interval (ftbgs)	20 - 240

Diameter of Well (ft)	0.33
Maximum Drawdown (ft)	38.01
Effective Radius (ft)	100
Well Specific Capacity (gpm/ft-dd)	0.051

Hydrophysical Logging Results - MW-77									
Interval No.	**Top of Interval (ft)**	**Bottom of Interval (ft)**	**Length of Interval (ft)**	**Ambient Flow[1] (gpm)**	**Darcy Velocity in Aquifer[2] (ft/day)**	**Interval-Specific Flow Rate During Pumping (gpm)**	**Interval-Specific Hydraulic Conductivity[3] (ft/day)**	**Transmissivity (ft^2/day)**	**Interval-Specific Fluid Electrical Conductivity (uS/cm)**
1*	26.5	28.4	1.9	0.100	NA	0.790	5.28E+00	2.74E+01	220
2	30.9	31.7	0.8	-0.02	NA				
3	39.1	41.1	2.0	0.04	NA	0.120	2.07E-01	4.13E-01	220
4	47.8	50.0	2.2	-0.10	NA	0.260	8.46E-01	1.86E+00	220
5	51.1	54.0	2.9	0.005	NA	0.110	1.87E-01	5.43E-01	220
6	56.2	63.4	7.2	0.005	NA	0.310	2.19E-01	1.58E+00	220
7	72.5	85.7	13.2	-0.02	NA	0.200	8.61E-02	1.14E+00	220
8	91.2	96.9	5.7	0.00	NA	0.050	4.53E-02	2.58E-01	239
9	97.8	112.3	14.5	0.00	NA	0.034	1.21E-02	1.76E-01	239
10	112.4	121.0	8.6	0.00	NA	0.004	2.40E-03	2.07E-02	239
11	121.1	130.6	9.5	-0.01	NA	0.018	1.52E-02	1.45E-01	239
12	130.7	149.3	18.6	0.00	NA	0.003	8.33E-04	1.55E-02	239
13	159.4	182.4	23.0	0.004	0.03	0.017	2.92E-03	6.72E-02	239
14	182.5	194.0	11.5	0.00	NA	0.001	4.49E-04	5.17E-03	239
15	194.6	208.5	13.9	0.006	0.08	0.008	7.06E-04	9.82E-03	239
16	208.6	218.0	9.4	0.00	NA	0.016	8.80E-03	8.27E-02	239
17	218.1	235.5	17.4	0.01	0.11	0.013	8.91E-04	1.55E-02	239
Borehole Transmissivity Using Thiem Equation (ft^2/day)								**3.38E+01**	
Borehole Hydraulic Conductivity (K=T/b; b=length of borehole of 26.5'-240.0' = 213.5') (ft/day)							**1.58E-01**		

Note: Negative flow, if any, is outflow from the borehole to the aquifer, positive flow is inflow to the borehole.

* The top of this interval is AWL of 26.5 ftbgs. It is possible some of this inflow is coming in from above AWL.

[1] Downward flow and horizontal flow are identified in this borehole under ambient conditions.

[2] Darcy Velocity, or Specific Discharge in aquifer, is calculated using the observed volumetric flow rate, the cross-sectional area of the flow interval in the wellbore and a wellbore convergence factor of 3.0 (Drost, 1968). The Darcy Velocity is only applicable to ambient horizontal flow.

[3] Hydraulic conductivity and transmissivity estimates are based on single well drawdown data, a porous-medium equivalent model and the Thiem equation.

NA = Not Applicable

Density & Natural Gamma

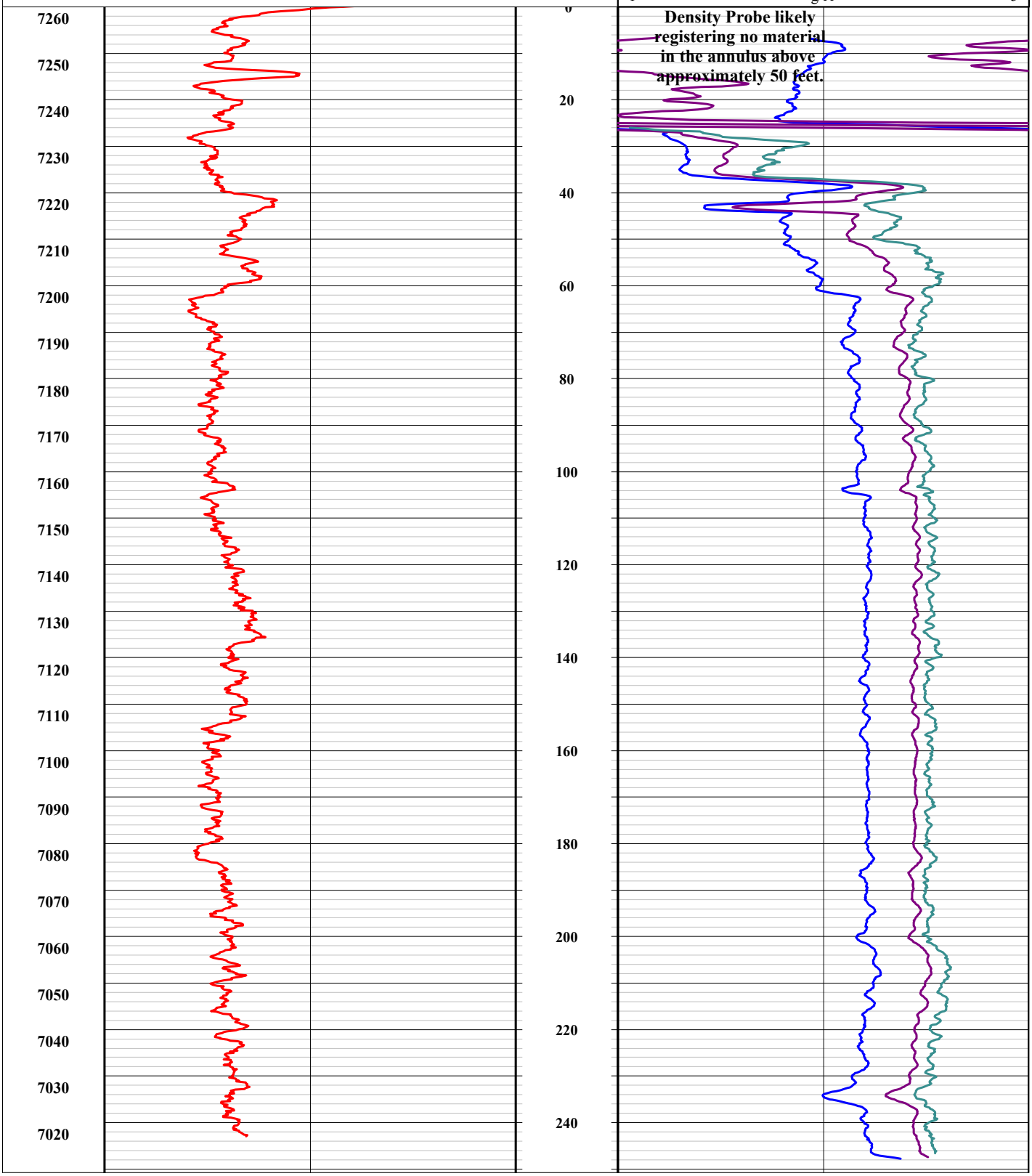
COLOG
borehole geophysics / hydrophysics

COMPANY: RMC - Consultants | PROJECT: Atlas Missile Site 4 Phase 2

DATE LOGGED: 29 July 2017 | WELL: MW-81

Colog, Inc.
810 Quail Street, Suite E, Lakewood, CO 80215
Phone: (303) 279-0171, Fax: (303) 278-0135
www.colog.com

Elevation	Natural Gamma	Depth	Near Density	Far Density	Compensated Density
ft msl	0 CPS 200	1ft:360ft	1 g/cc 3	1 g/cc 3	1 g/cc 3

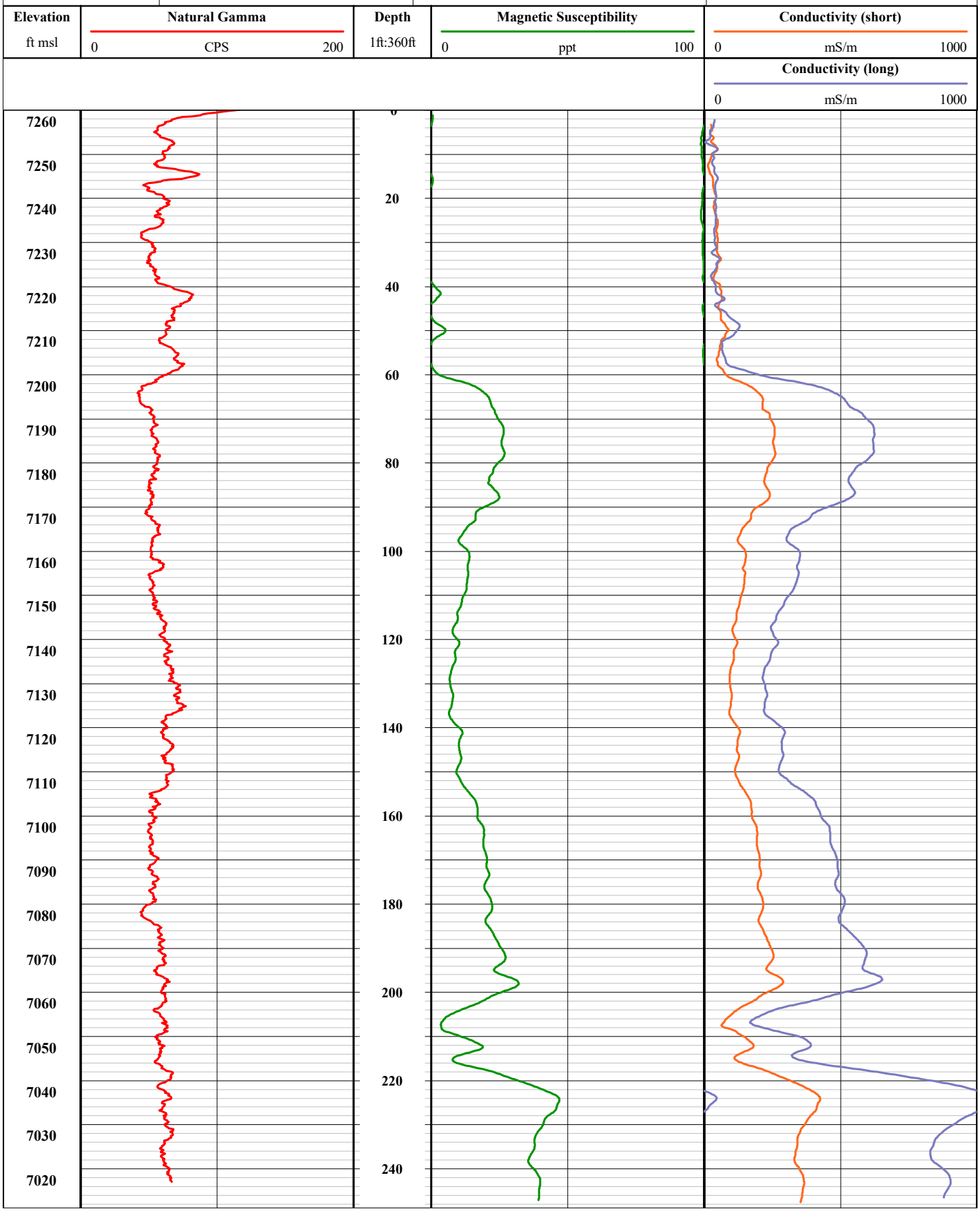


Dual Induction & Magnetic Susceptibility

COLOG
borehole geophysics / hydrophysics

COMPANY: RMC - Consultants
PROJECT: Atlas Missile Site 4 Phase 2
DATE LOGGED: 29 July 2017
WELL: MW-81

Colog, Inc.
810 Quail Street, Suite E, Lakewood, CO 80215
Phone: (303) 279-0171, Fax: (303) 278-0135
www.colog.com



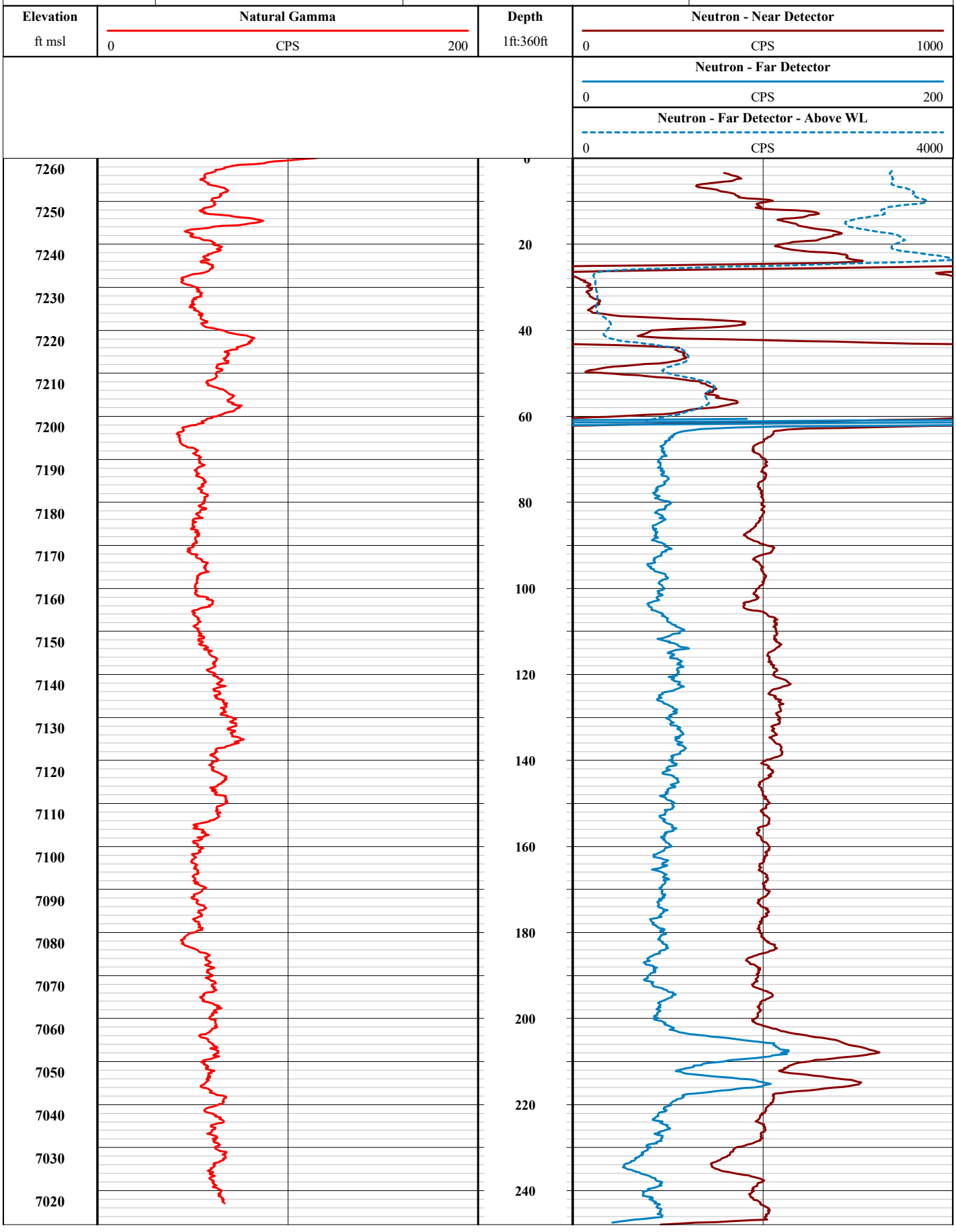
Dual Neutron & Natural Gamma

COLOG
borehole geophysics / hydrophysics

COMPANY: RMC - Consultants | PROJECT: Atlas Missile Site 4 Phase 2

DATE LOGGED: 29 July 2017 | WELL: MW-81

Colog, Inc.
810 Quail Street, Suite E, Lakewood, CO 80215
Phone: (303) 279-0171, Fax: (303) 278-0135
www.colog.com

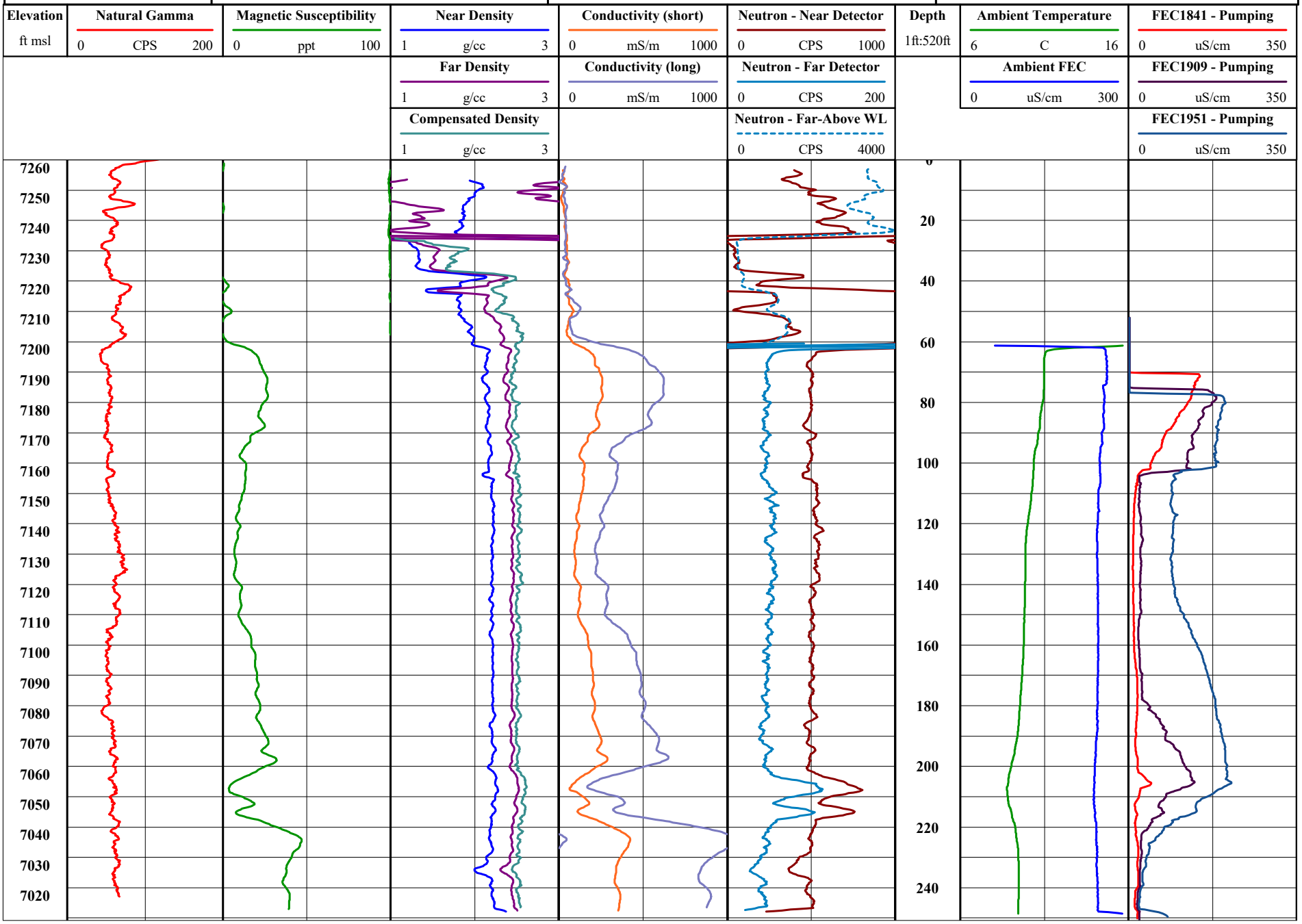


Geophysical/Hydrophysical Summary Plot

COLOG
borehole geophysics / hydrophysics

COMPANY: RMC - Consultants
PROJECT: Atlas Missile Site 4 Phase 2
DATE LOGGED: 29 July 2017
WELL: MW-81

COLOG Main Office
810 Quail Street, Suite E, Lakewood, CO 80215
Phone: (303) 279-0171, Fax: (303) 278-0135
www.colog.com



Geophysical/Hydrophysical Summary Plot

COLOG
borehole geophysics / hydrophysics

COMPANY: RMC - Consultants
PROJECT: Atlas Missile Site 4 Phase 2
DATE LOGGED: 29 July 2017
WELL: MW-81

COLOG Main Office
810 Quail Street, Suite E, Lakewood, CO 80215
Phone: (303) 279-0171, Fax: (303) 278-0135
www.colog.com

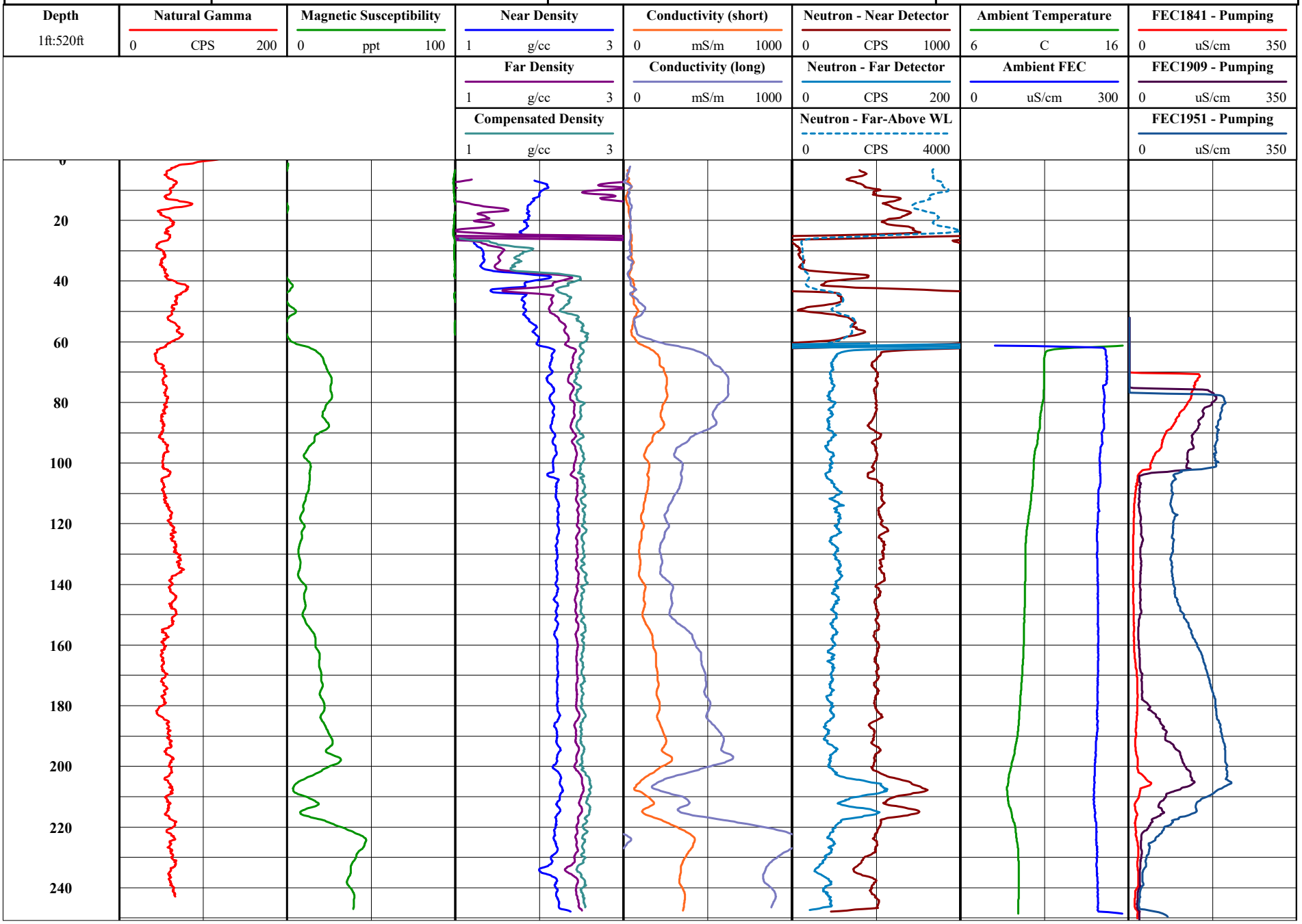


FIGURE MW-81:1. Ambient Temperature and Fluid Electrical Conductivity; RMC Consultants; Atlas Misslie Site 4; Cheyenne, WY; Wellbore: MW-81

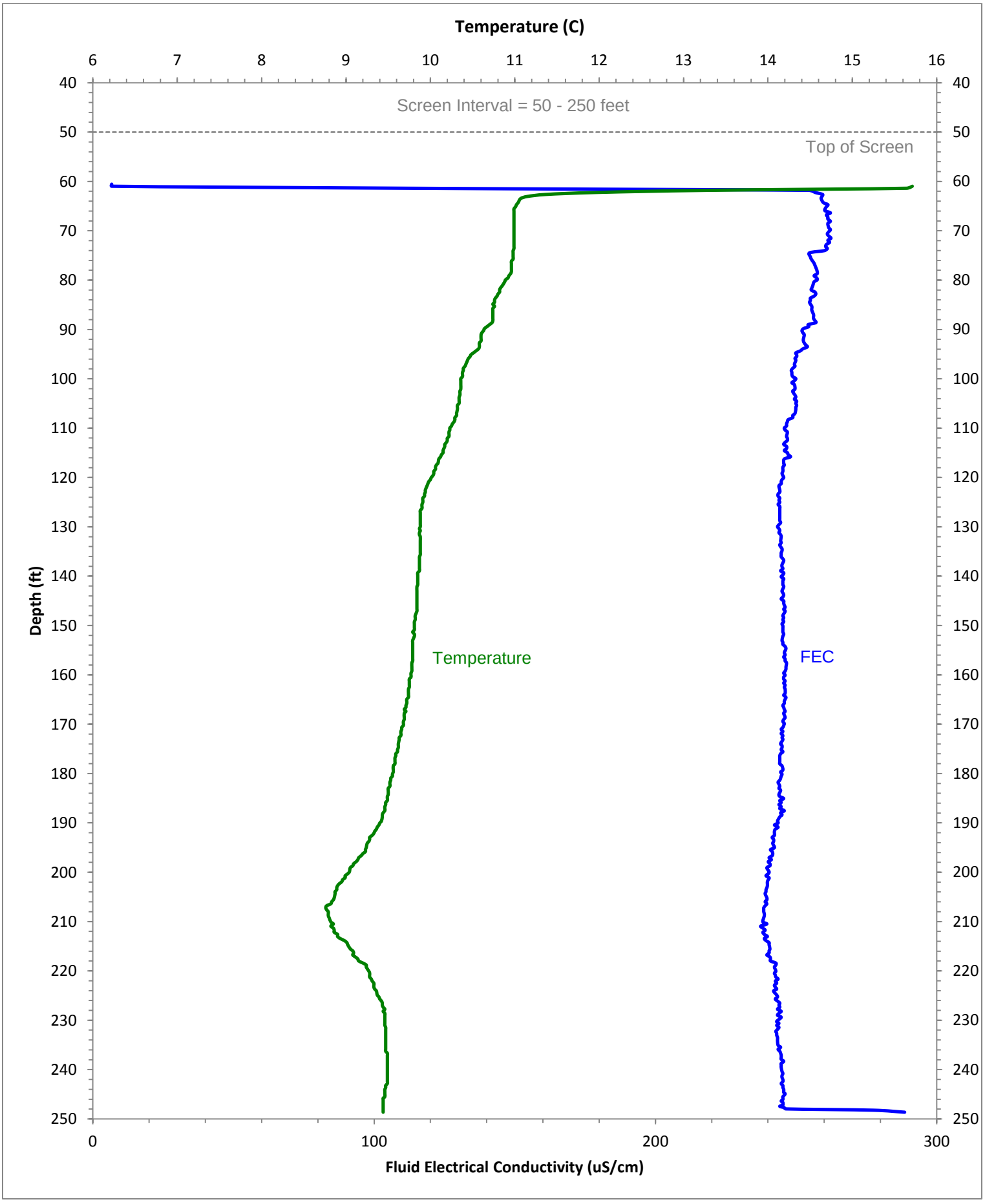


FIGURE MW-81:2. Summary of Hydrophysical Logs During Ambient Flow Characterization; RMC Consultants; Atlas Misslie Site 4; Cheyenne, WY ; Wellbore: MW-81

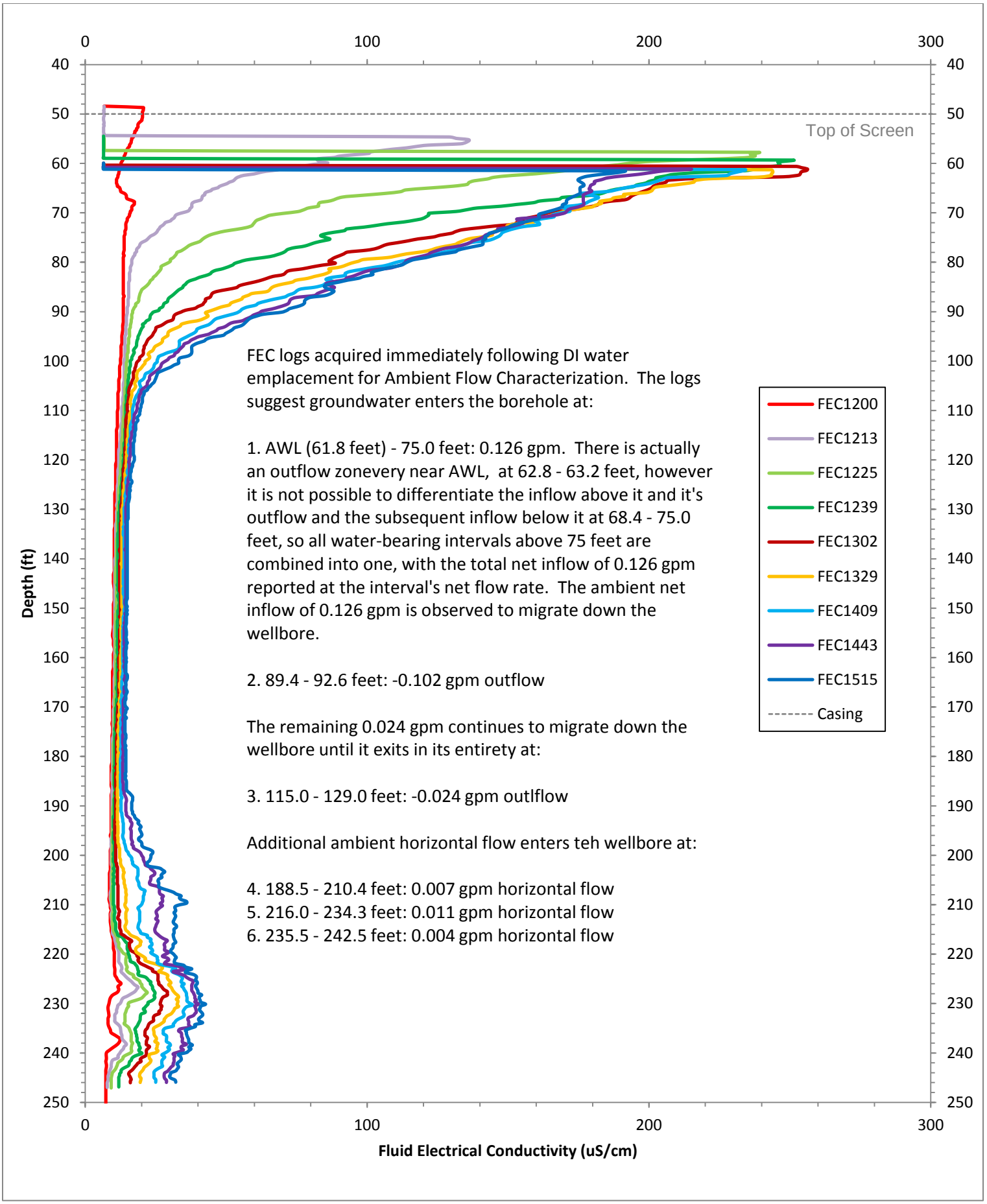


FIGURE MW-81:3. Pumping and Drawdown Data During Low-Rate Pumping at 1.5 GPM After DI Water Emplacement; RMC Consultants; Atlas Missile Site 4; Cheyenne, WY; Wellbore: MW-81

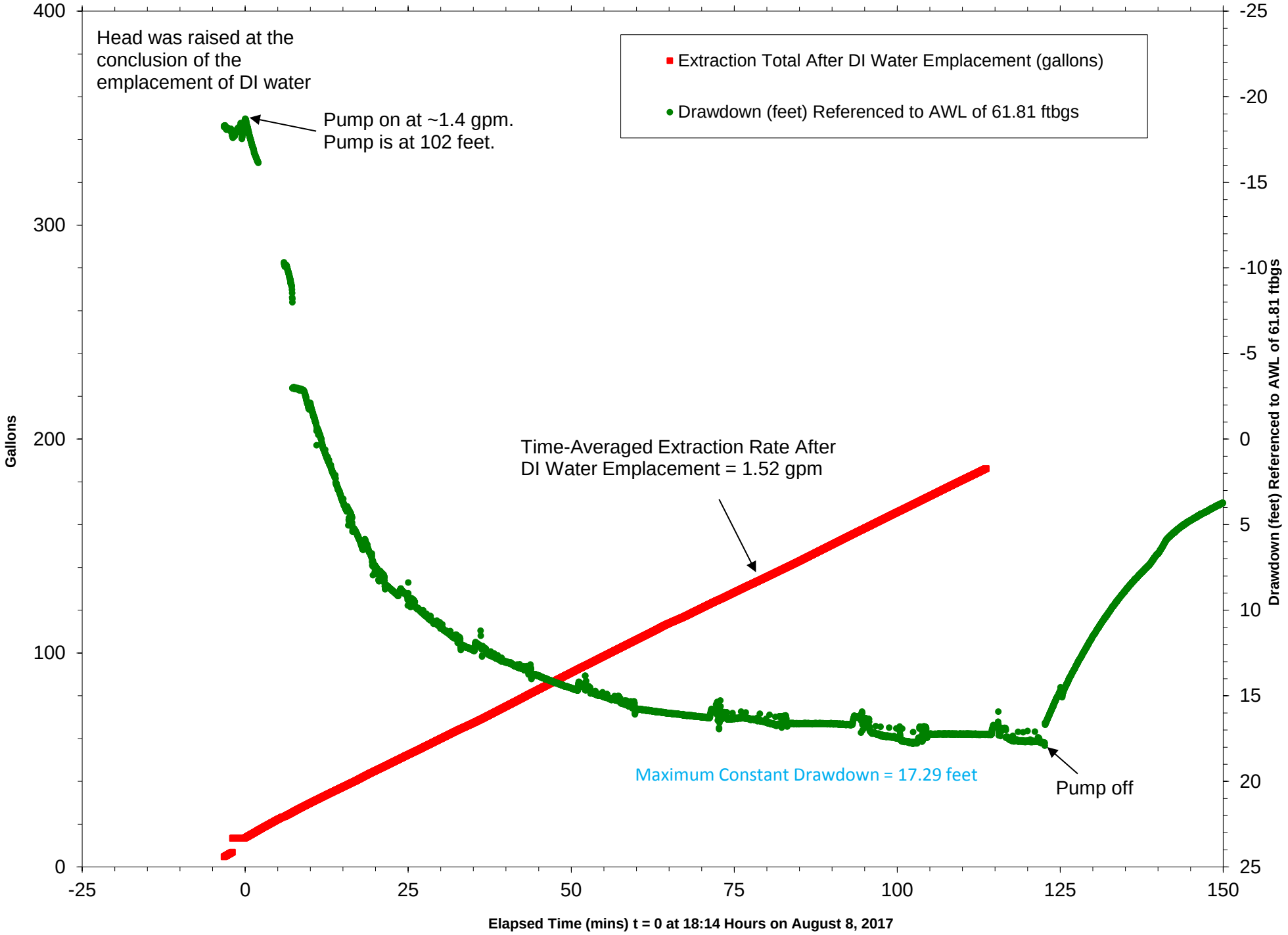


FIGURE MW-81:4. Summary of Hydrophysical Logs During Low-Rate Pumping at 1.52 GPM After Emplacement; RMC Consultants; Atlas Misslie Site 4; Cheyenne, WY; Wellbore: MW-81

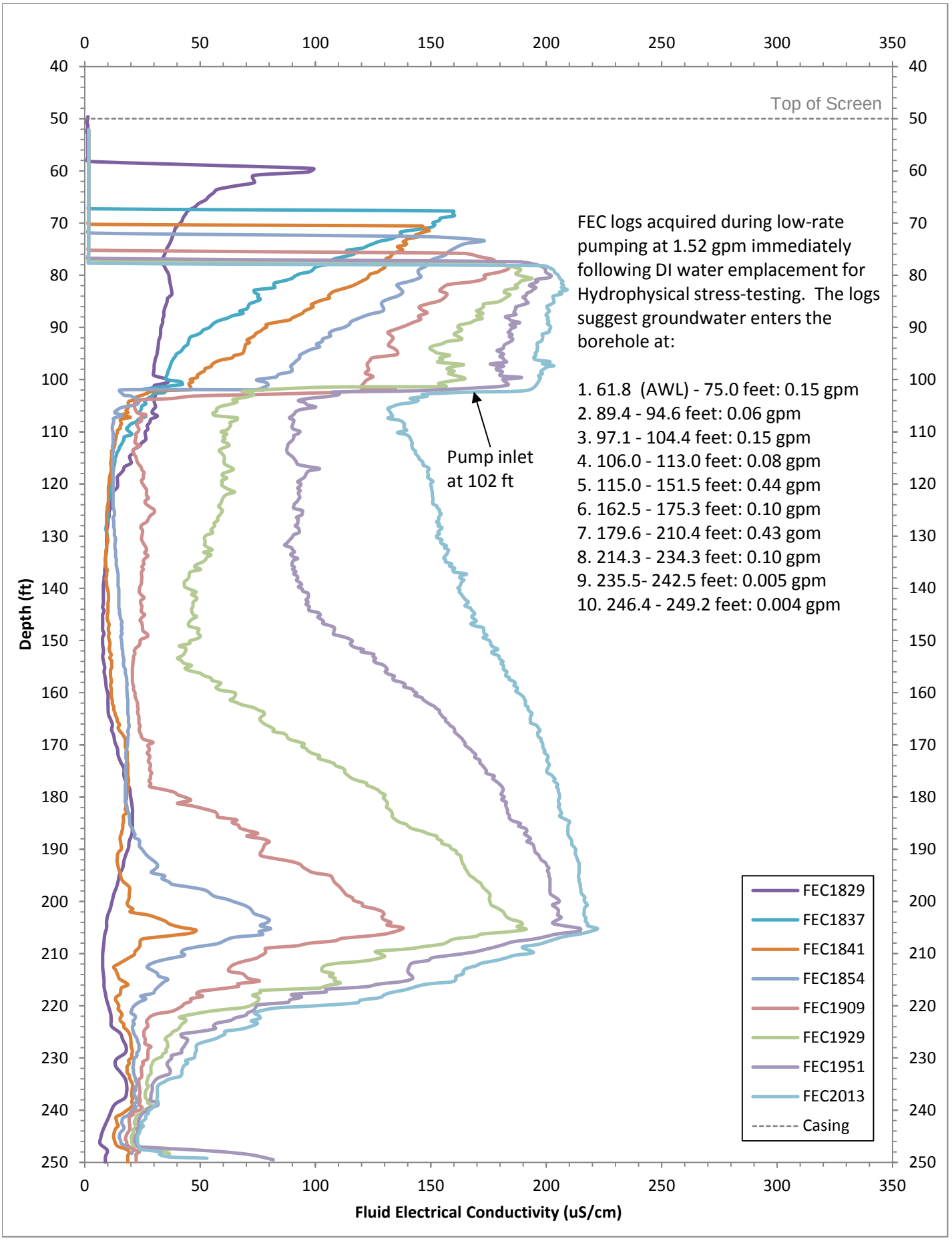


Table MW-81:1. Summary Of Hydrophysical Logging Results With Hydraulic Conductivity And Transmissivity Estimations; RMC Consultants; Atlas Missile Site 4; Cheyenne, WY; Wellbore: MW-81

Well Name	MW-81
Ambient Depth to Water (ftbtoc)	63.81
Ambient Depth to Water (ftbgs)	61.81
Screen Interval (ftbgs)	50 - 250

Diameter of Well (ft)	0.33
Maximum Drawdown (ft)	17.29
Effective Radius (ft)	100
Well Specific Capacity (gpm/ft-dd)	0.088

Hydrophysical Logging Results - MW-81									
Interval No.	**Top of Interval (ft)**	**Bottom of Interval (ft)**	**Length of Interval (ft)**	**Ambient Flow[1] (gpm)**	**Darcy Velocity in Aquifer[2] (ft/day)**	**Interval-Specific Flow Rate During Pumping (gpm)**	**Interval-Specific Hydraulic Conductivity[3] (ft/day)**	**Transmissivity (ft^2/day)**	**Interval-Specific Fluid Electrical Conductivity (uS/cm)**
1*	61.8	75.0	13.2	0.126	NA	0.15	2.07E-02	2.73E-01	237
2	89.4	94.6	5.2	-0.102	NA	0.06	3.54E-01	1.84E+00	237
3	97.1	104.4	7.3	0.000	NA	0.15	2.33E-01	1.70E+00	237
4	106.0	113.0	7.0	0.000	NA	0.08	1.30E-01	9.09E-01	237
5	115.0	151.5	14.0	-0.024	NA	0.44	3.76E-01	5.27E+00	237
6	162.5	175.3	12.8	0.000	NA	0.10	8.87E-02	1.14E+00	237
7	179.6	210.4	30.8	0.007	0.04	0.43	1.56E-01	4.81E+00	255
8	214.3	234.3	20.0	0.011	0.11	0.100	5.05E-02	1.01E+00	237
9	235.5	242.5	7.0	0.004	0.11	0.005	1.62E-03	1.14E-02	237
10	248.0	248.5	0.5	0.000	NA	0.004	9.09E-02	4.54E-02	237
Borehole Transmissivity Using Thiem Equation (ft^2/day)								**1.70E+01**	
Borehole Hydraulic Conductivity (K=T/b; b=length of borehole of 61.8'-250.0' = 188.2') (ft/day)							**9.04E-02**		

Note: Negative flow, if any, is outflow from the borehole to the aquifer, positive flow is inflow to the borehole.

* The top of this interval is AWL of 61.8 ftbgs. It is possible some of this inflow is coming in from above AWL.

[1] Downward flow and horizontal flow are identified in this borehole under ambient conditions.

[2] Darcy Velocity, or Specific Discharge in aquifer, is calculated using the observed volumetric flow rate, the cross-sectional area of the flow interval in the wellbore and a wellbore convergence factor of 3.0 (Drost, 1968). The Darcy Velocity is only applicable to ambient horizontal flow.

[3] Hydraulic conductivity and transmissivity estimates are based on single well drawdown data, a porous-medium equivalent model and the Thiem equation.

NA = Not Applicable

Focused Density

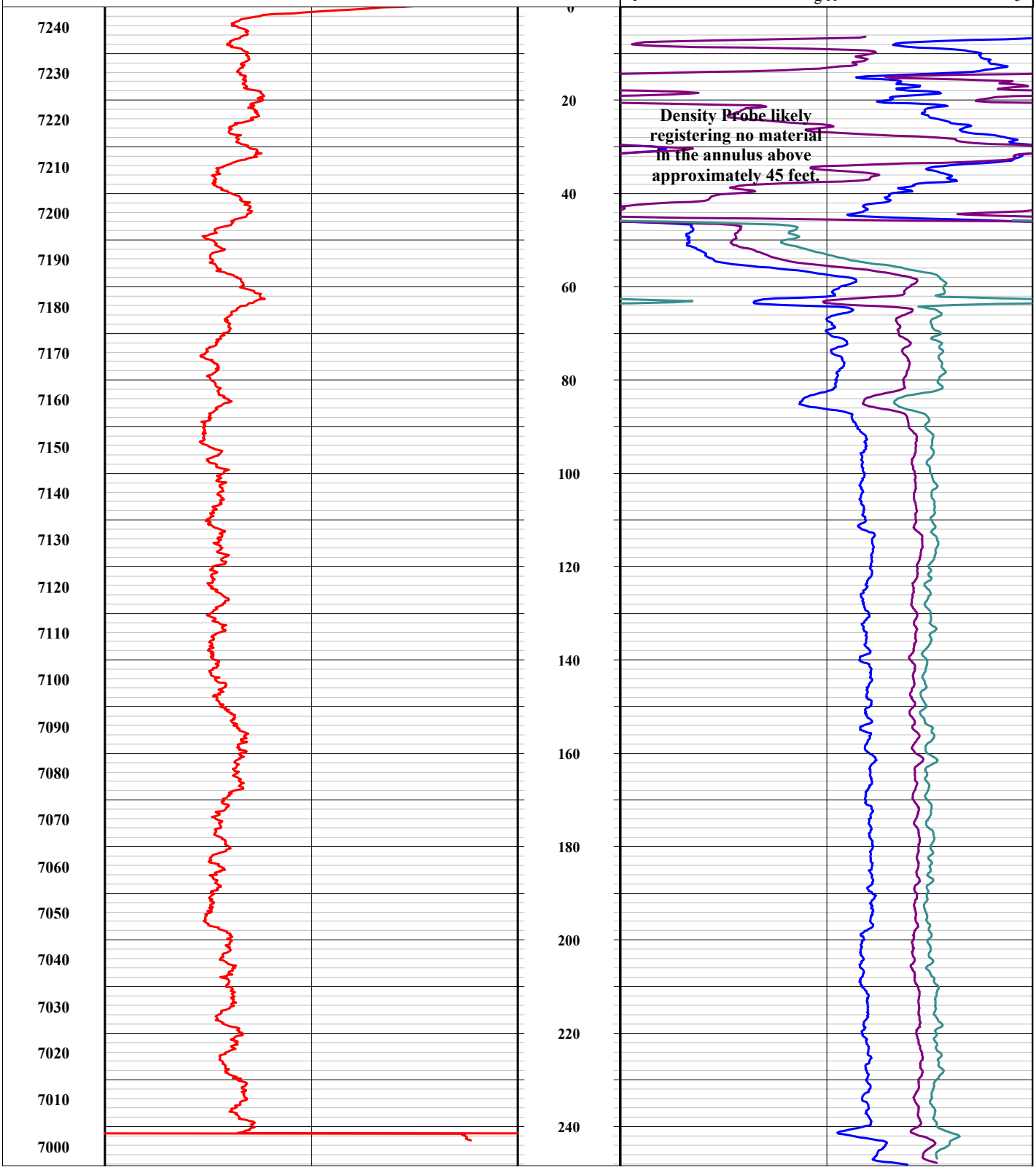
COMPANY: RMC - Consultants | PROJECT: Atlas Missile Site 4 Phase 2

DATE LOGGED: 1 August 2017 | WELL: MW-83

Colog, Inc.
810 Quail Street, Suite E, Lakewood, CO 80215
Phone: (303) 279-0171, Fax: (303) 278-0135
www.colog.com

borehole geophysics / hydrophysics

Elevation	Natural Gamma	Depth	Near Density	Far Density	Compensated Density
ft msl	0 CPS 200	1ft:360ft	1 g/cc 3	1 g/cc 3	1 g/cc 3

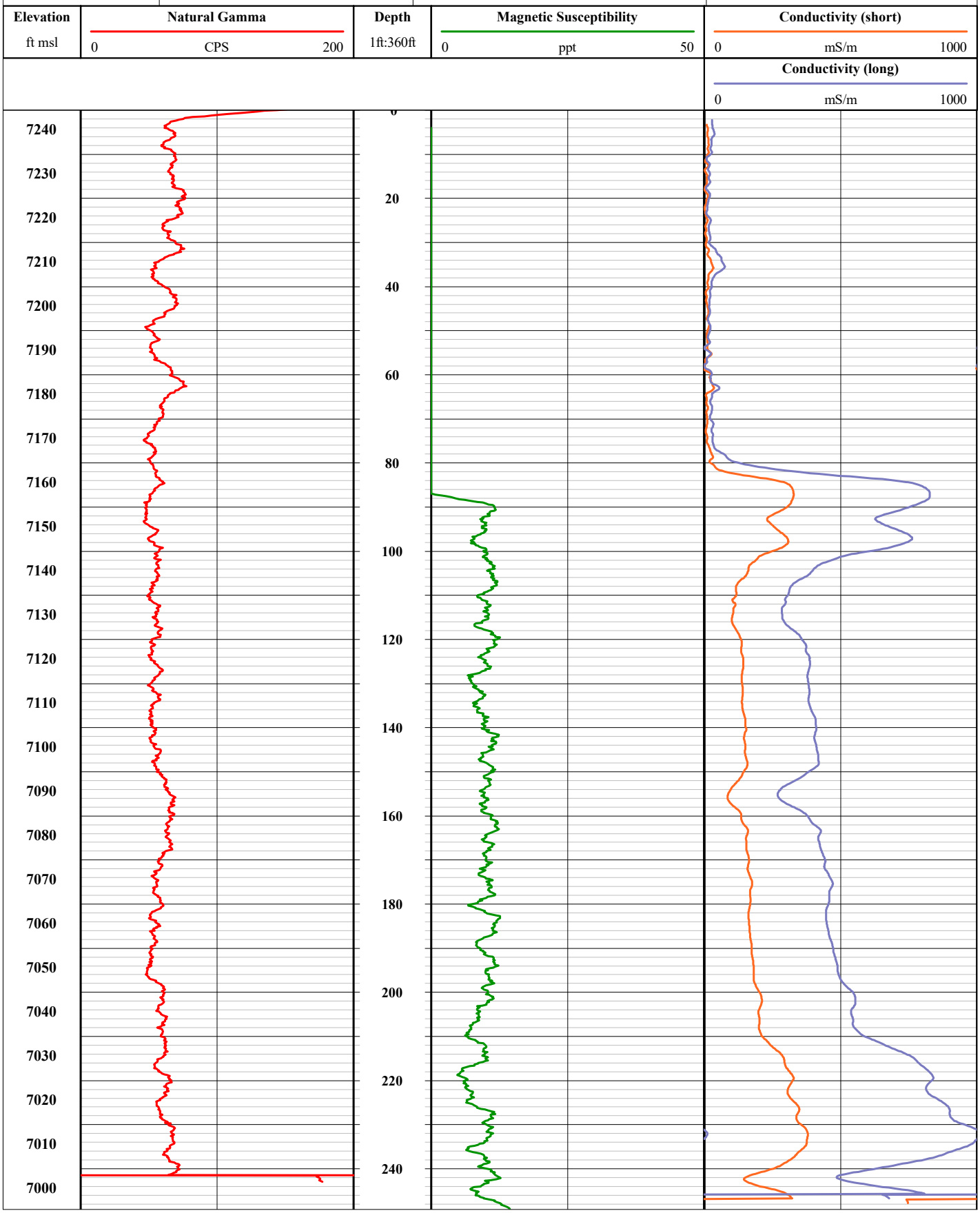


Dual Induction & Magnetic Susceptibility

COLOG
borehole geophysics / hydrophysics

COMPANY: RMC - Consultants
PROJECT: Atlas Missile Site 4 Phase 2
DATE LOGGED: 1 August 2017
WELL: MW-83

Colog, Inc.
810 Quail Street, Suite E, Lakewood, CO 80215
Phone: (303) 279-0171, Fax: (303) 278-0135
www.colog.com



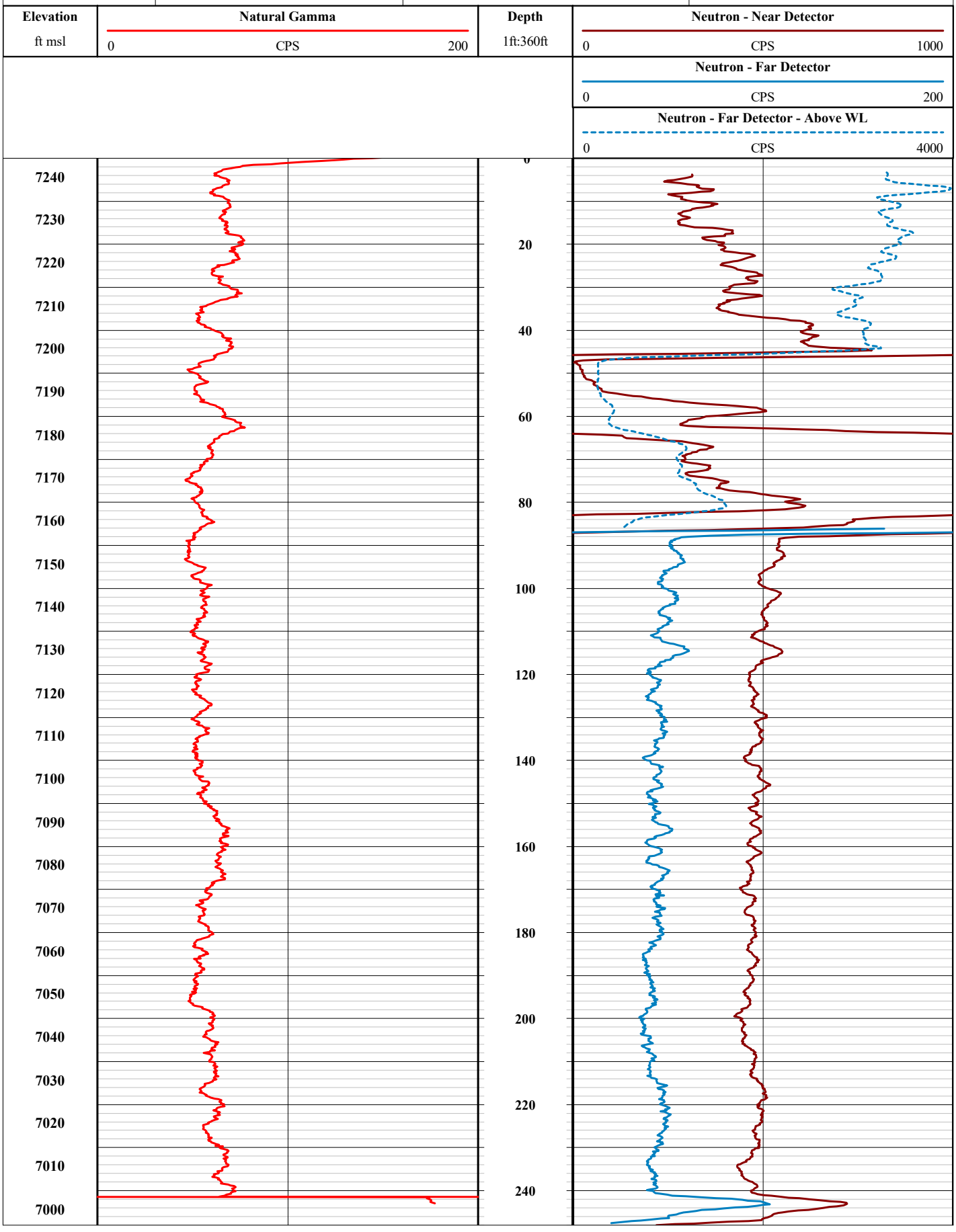
Dual Neutron

COLOG
borehole geophysics / hydrophysics

COMPANY: RMC - Consultants | PROJECT: Atlas Missile Site 4 Phase 2

DATE LOGGED: 1 August 2017 | WELL: MW-83

Colog, Inc.
810 Quail Street, Suite E, Lakewood, CO 80215
Phone: (303) 279-0171, Fax: (303) 278-0135
www.colog.com

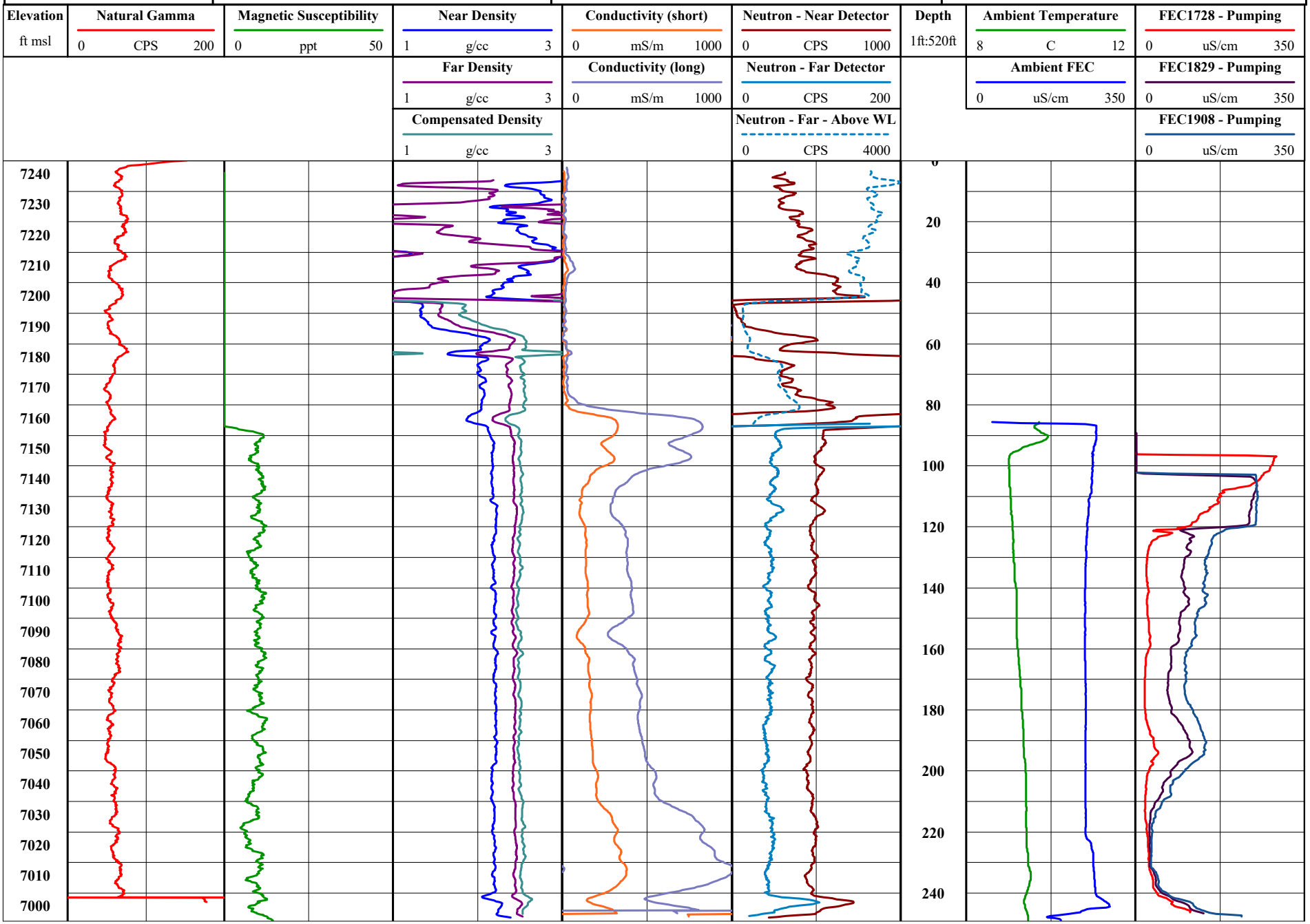


Geophysical/Hydrophysical Summary Plot

COLOG
borehole geophysics / hydrophysics

COMPANY: RMC - Consultants
PROJECT: Atlas Missile Site 4 Phase 2
DATE LOGGED: 1 & 9 August 2017
WELL: MW-83

COLOG Main Office
810 Quail Street, Suite E, Lakewood, CO 80215
Phone: (303) 279-0171, Fax: (303) 278-0135
www.colog.com



COLOG
borehole geophysics / hydrophysics

Geophysical/Hydrophysical Summary Plot

COMPANY: RMC - Consultants

PROJECT: Atlas Missile Site 4 Phase 2

DATE LOGGED: 1 & 9 August 2017

WELL: MW-83

COLOG Main Office

810 Quail Street, Suite E, Lakewood, CO 80215

Phone: (303) 279-0171, Fax: (303) 278-0135

www.colog.com

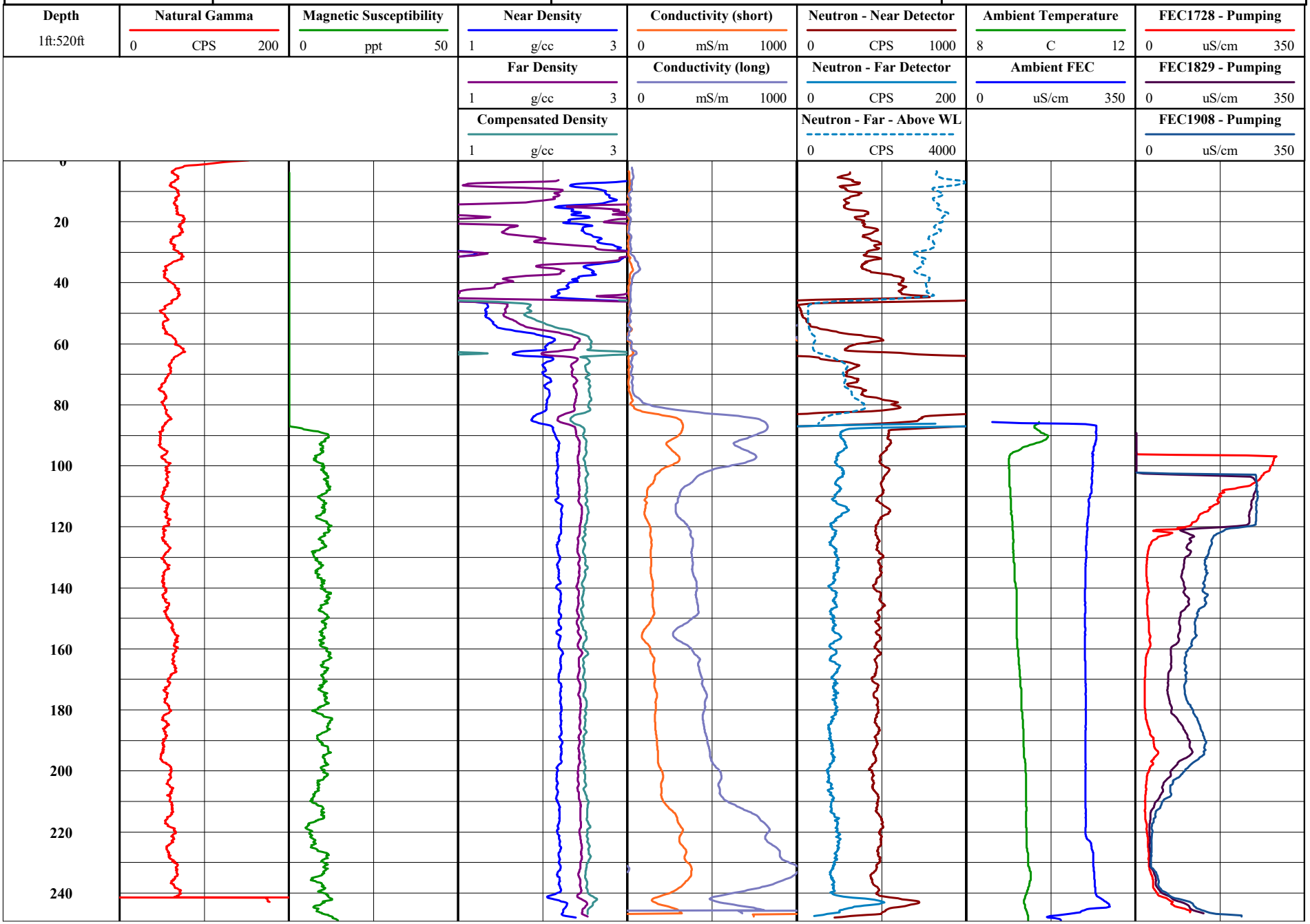


FIGURE MW-83:1. Ambient Temperature and Fluid Electrical Conductivity; RMC Consultants; Atlas Missile Site 4; Cheyenne, WY; Wellbore: MW-83

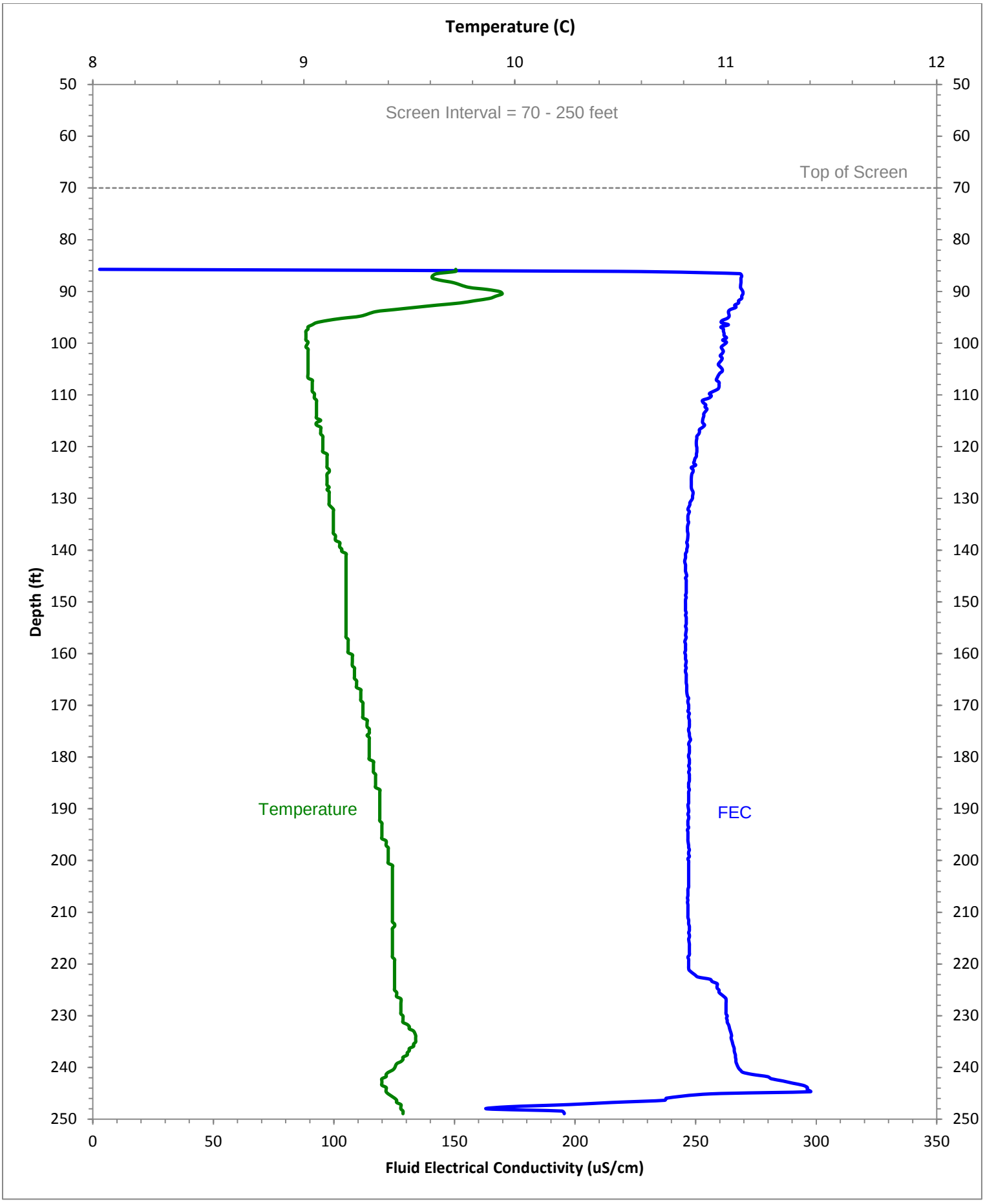


FIGURE MW-83:2. Summary of Hydrophysical Logs During Ambient Flow Characterization; RMC Consultants; Atlas Missile Site 4; Cheyenne, WY; Wellbore: MW-83

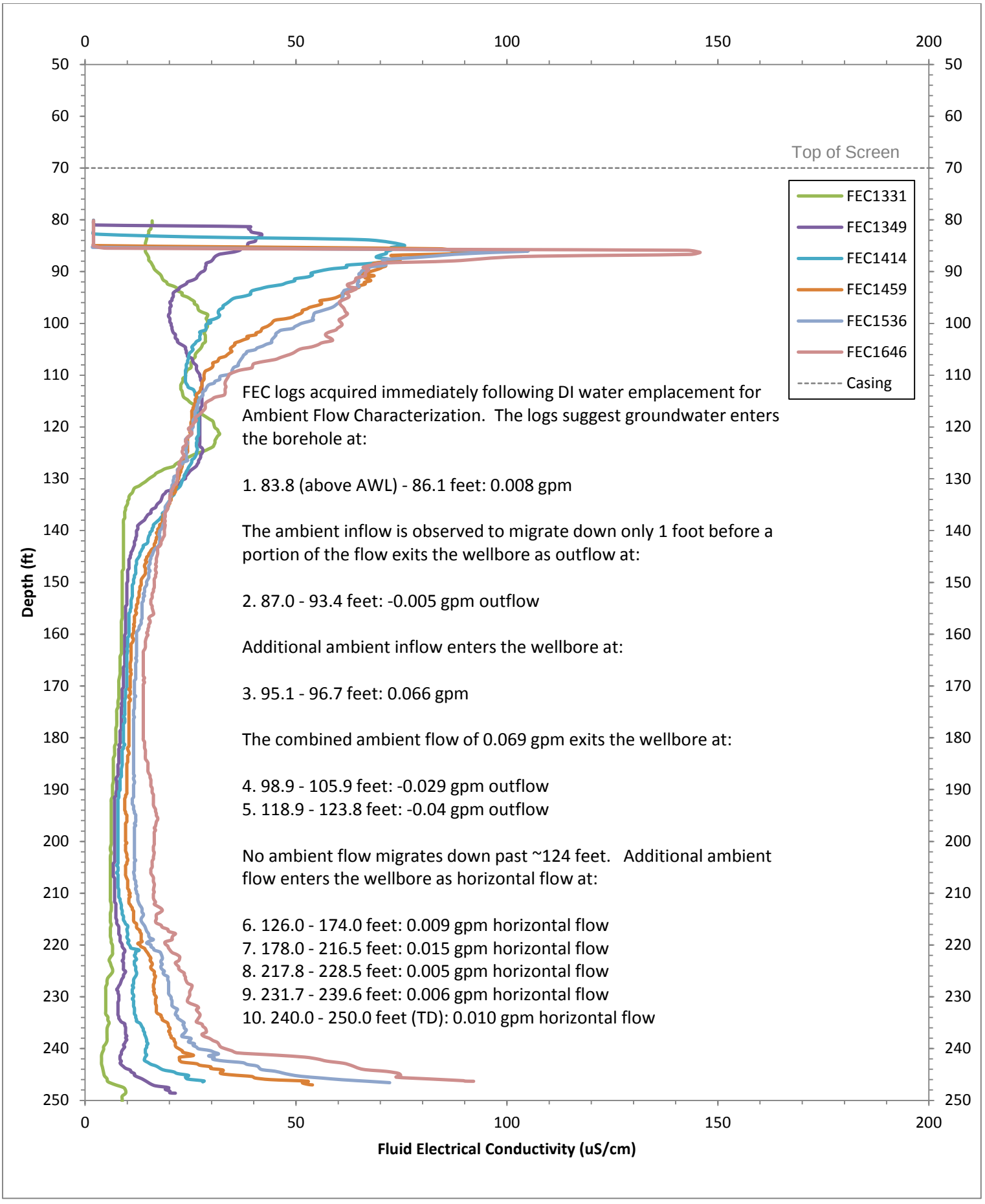


FIGURE MW-83:3. Pumping and Drawdown Data During Low-Rate Pumping at 1 GPM After DI Water Emplacement; RMC Consultants; Atlas Missile Site 4; Cheyenne, WY; Wellbore: MW-83

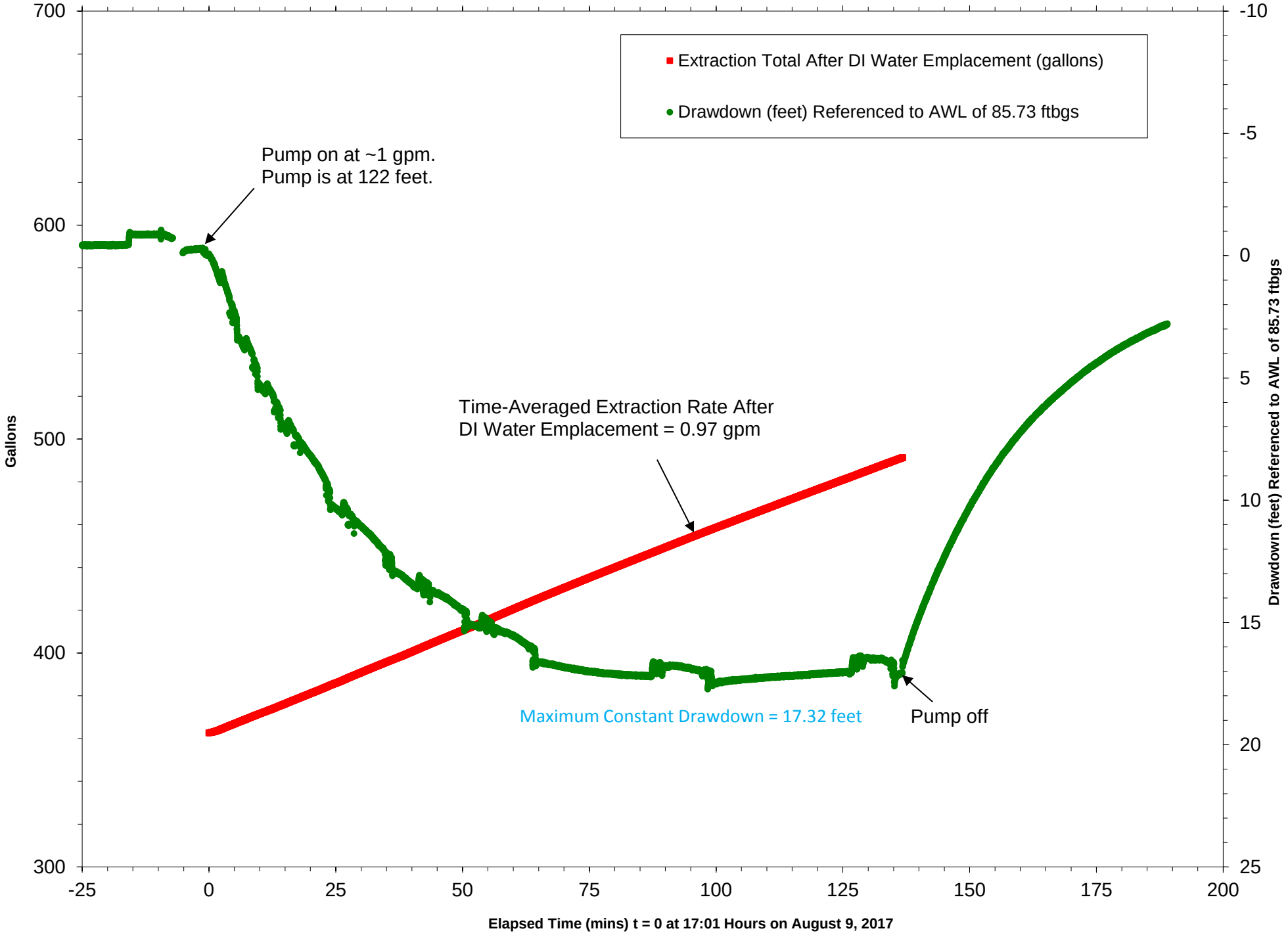


FIGURE MW-83:4. Summary of Hydrophysical Logs During Low-Rate Pumping at 1 GPM After DI Water Emplacement for Hydrophysical Stress-Test; RMC Consultants; Atlas Missile Site 4; Cheyenne, WY; Wellbore: MW-83

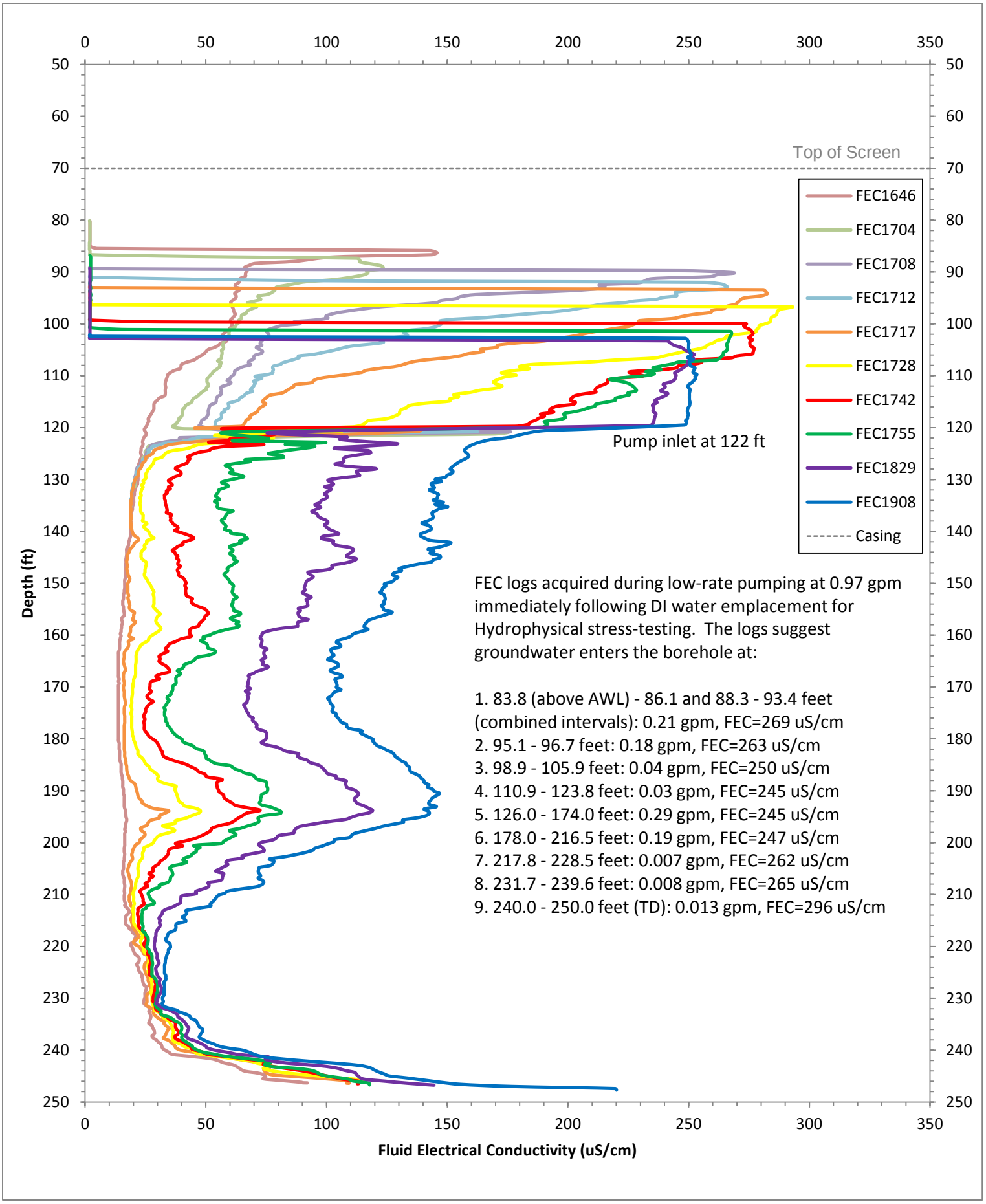


Table MW-83:1. Summary Of Hydrophysical Logging Results With Hydraulic Conductivity And Transmissivity Estimations; RMC Consultants; Atlas Missile Site 4; Cheyenne, WY; Wellbore: MW-83

Well Name	MW-83
Ambient Depth to Water (ftbtoc)	87.73
Ambient Depth to Water (ftbgs)	85.73
Screen Interval (ftbgs)	70 - 250

Diameter of Well (ft)	0.33
Maximum Drawdown (ft)	17.32
Effective Radius (ft)	100
Well Specific Capacity (gpm/ft-dd)	0.056

Hydrophysical Logging Results - MW-83									
Interval No.	**Top of Interval (ft)**	**Bottom of Interval (ft)**	**Length of Interval (ft)**	**Ambient Flow[1] (gpm)**	**Darcy Velocity in Aquifer[2] (ft/day)**	**Interval-Specific Flow Rate During Pumping (gpm)**	**Interval-Specific Hydraulic Conductivity[3] (ft/day)**	**Transmissivity (ft^2/day)**	**Interval-Specific Fluid Electrical Conductivity (uS/cm)**
1*	83.8	86.1	2.3	0.008	NA	0.21	7.27E+00	1.67E+01	269
2	87.0	93.4	6.4	-0.005	NA				
3	95.1	96.7	1.6	0.066	NA	0.18	8.08E-01	1.29E+00	263
4	98.9	105.0	6.1	-0.029	NA	0.04	1.28E-01	7.82E-01	250
5	110.9	123.8	12.9	-0.040	NA	0.03	6.15E-02	7.94E-01	245
6	126.0	174.0	48.0	0.009	0.04	0.29	6.64E-02	3.19E+00	245
7	178.0	216.5	38.5	0.015	0.08	0.19	5.15E-02	1.98E+00	247
8	217.8	228.5	10.7	0.005	0.09	0.007	2.12E-03	2.27E-02	262
9	231.7	239.6	7.9	0.006	0.15	0.008	2.87E-03	2.27E-02	265
10	240.0	250.0	10.0	0.010	0.19	0.013	3.40E-03	3.40E-02	296
Borehole Transmissivity Using Thiem Equation (ft^2/day)								**2.48E+01**	
Borehole Hydraulic Conductivity (K=T/b; b=length of borehole of 83.8'-250.0' = 166.2') (ft/day)							**1.49E-01**		

Note: Negative flow, if any, is outflow from the borehole to the aquifer, positive flow is inflow to the borehole.

* The top of this interval is above AWL of 85.73 ftbgs and was identified when WL was raised above AWL during emplacement of DI water.

[1] Downward flow and horizontal flow are identified in this borehole under ambient conditions.

[2] Darcy Velocity, or Specific Discharge in aquifer, is calculated using the observed volumetric flow rate, the cross-sectional area of the flow interval in the wellbore and a wellbore convergence factor of 3.0 (Drost, 1968). The Darcy Velocity is only applicable to ambient horizontal flow.

[3] Hydraulic conductivity and transmissivity estimates are based on single well drawdown data, a porous-medium equivalent model and the Thiem equation.

NA = Not Applicable

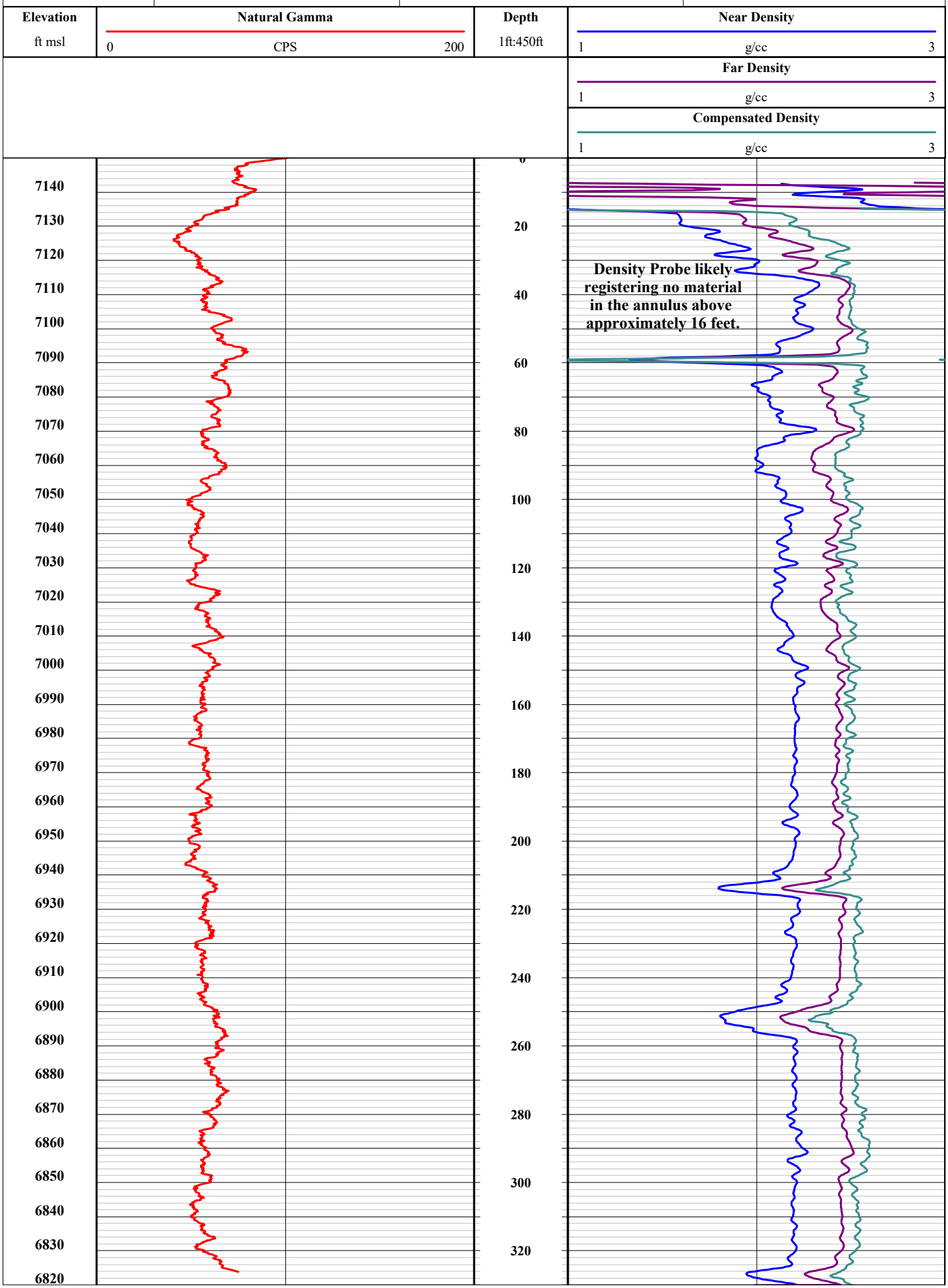
Focused Density

COMPANY: RMC - Consultants | PROJECT: Atlas Missile Site 4 Phase 2

DATE LOGGED: 16 August 2017 | WELL: MW-84

Colog, Inc.
810 Quail Street, Suite E, Lakewood, CO 80215
Phone: (303) 279-0171, Fax: (303) 278-0135
www.colog.com

borehole geophysics / hydrophysics

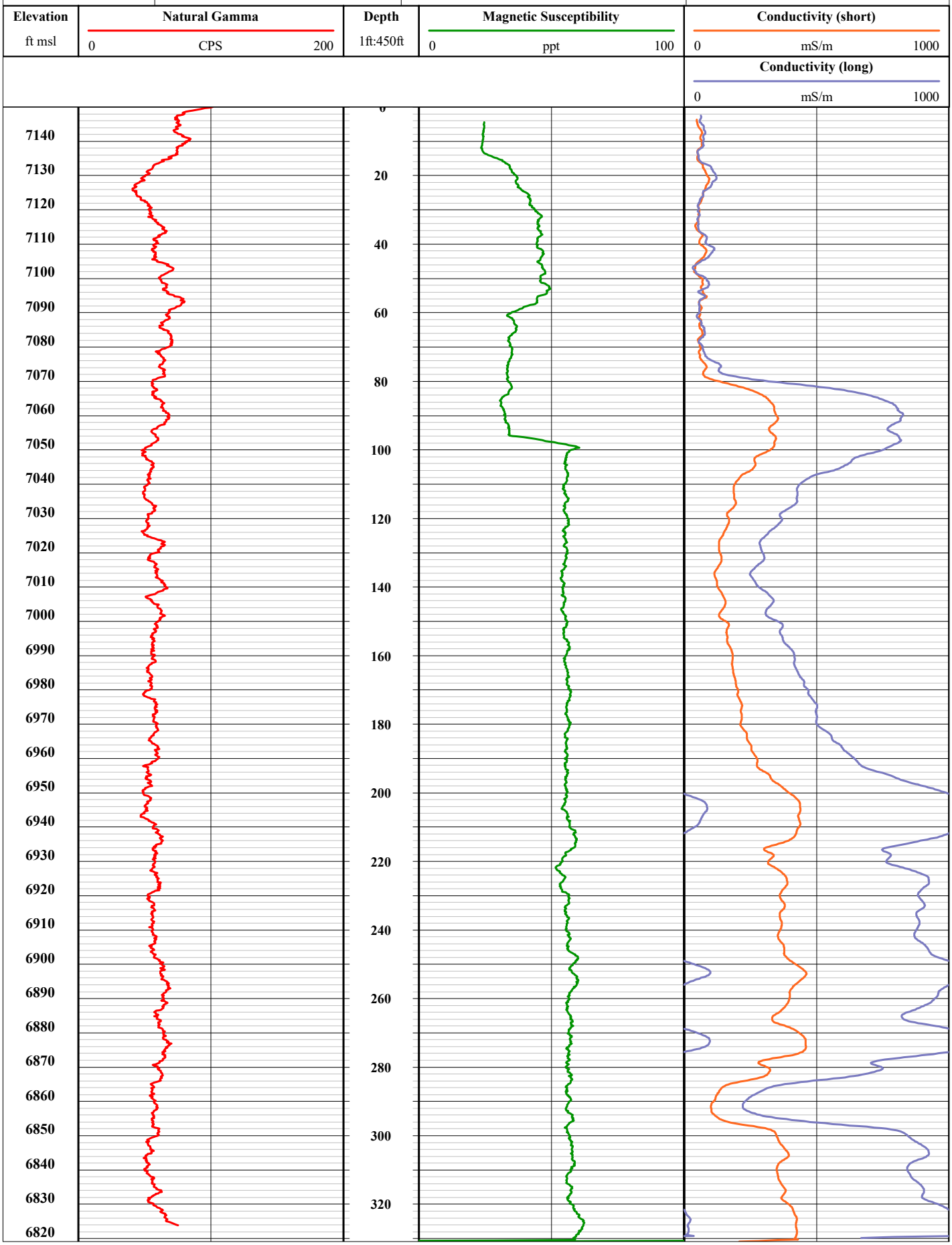


Dual Induction & Magnetic Susceptibility

COLOG
borehole geophysics / hydrophysics

COMPANY: RMC - Consultants
PROJECT: Atlas Missile Site 4 Phase 2
DATE LOGGED: 16 August 2017
WELL: MW-84

Colog, Inc.
810 Quail Street, Suite E, Lakewood, CO 80215
Phone: (303) 279-0171, Fax: (303) 278-0135
www.colog.com



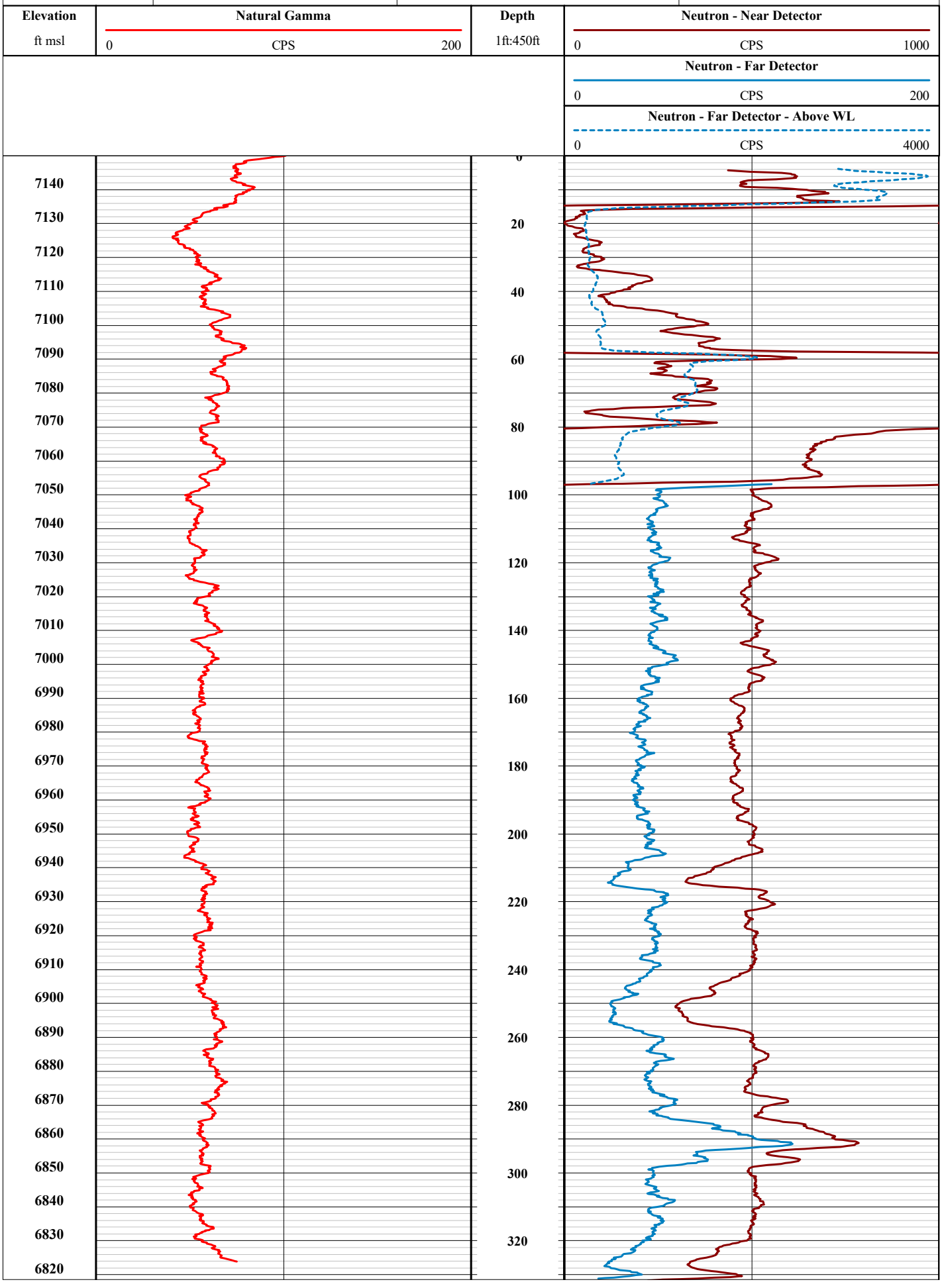
Dual Neutron

COLOG
borehole geophysics / hydrophysics

COMPANY: RMC - Consultants | PROJECT: Atlas Missile Site 4 Phase 2

DATE LOGGED: 16 August 2017 | WELL: MW-84

Colog, Inc.
810 Quail Street, Suite E, Lakewood, CO 80215
Phone: (303) 279-0171, Fax: (303) 278-0135
www.colog.com



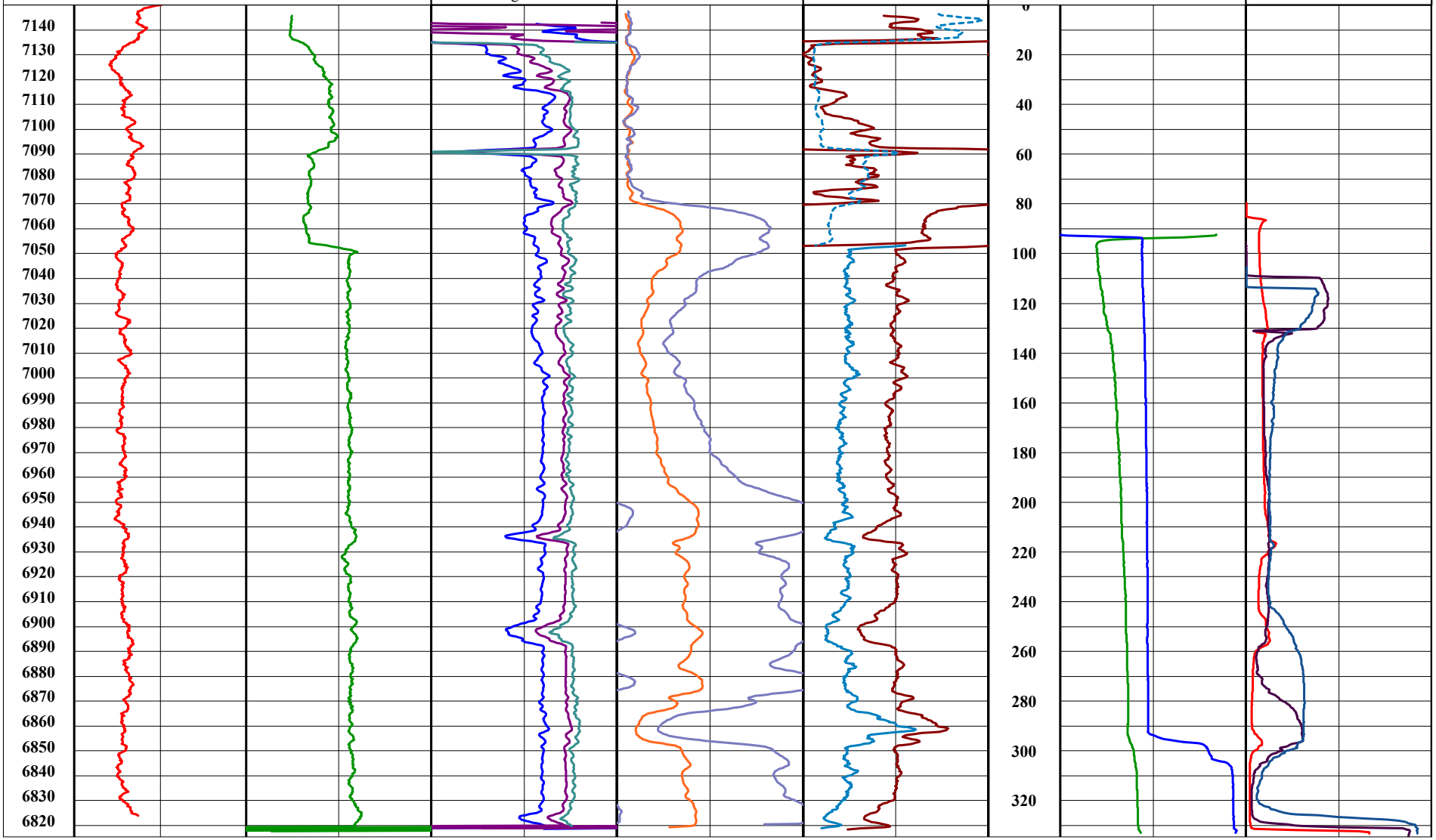
Geophysical/Hydrophysical Summary Plot

COLOG
borehole geophysics / hydrophysics

COMPANY: RMC - Consultants
PROJECT: Atlas Missile Site 4 Phase 2
DATE LOGGED: 16 & 26 August 2017
WELL: MW-84

COLOG Main Office
810 Quail Street, Suite E, Lakewood, CO 80215
Phone: (303) 279-0171, Fax: (303) 278-0135
www.colog.com

Elevation	Natural Gamma	Magnetic Susceptibility	Near Density	Conductivity (short)	Neutron - Near Detector	Depth	Ambient Temperature	FEC0857 - Pumping
ft msl	0 CPS 200	0 ppt 100	1 g/cc 3	0 mS/m 1000	0 CPS 1000	1ft:700ft	8 C 16	0 uS/cm 600
			Far Density	Conductivity (long)	Neutron - Far Detector		Ambient FEC	FEC0956 - Pumping
			1 g/cc 3	0 mS/m 1000	0 CPS 200		0 uS/cm 600	0 uS/cm 600
			Compensated Density		Neutron - Above WL			FEC1130 - Pumping
			1 g/cc 3		0 CPS 4000			0 uS/cm 600



Geophysical/Hydrophysical Summary Plot

COLOG
borehole geophysics / hydrophysics

COMPANY: RMC - Consultants
PROJECT: Atlas Missile Site 4 Phase 2
DATE LOGGED: 16 & 26 August 2017
WELL: MW-84

COLOG Main Office
810 Quail Street, Suite E, Lakewood, CO 80215
Phone: (303) 279-0171, Fax: (303) 278-0135
www.colog.com

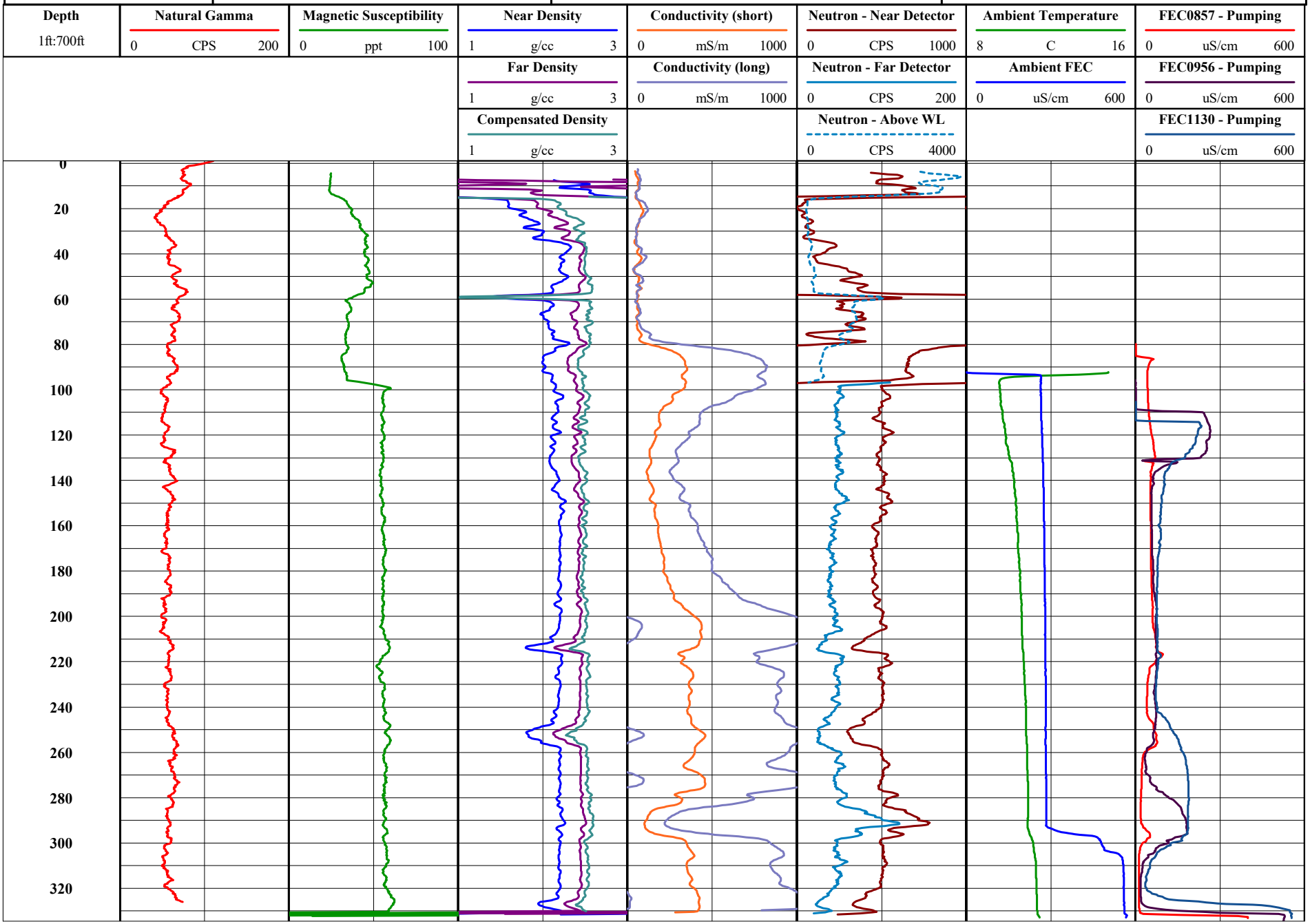
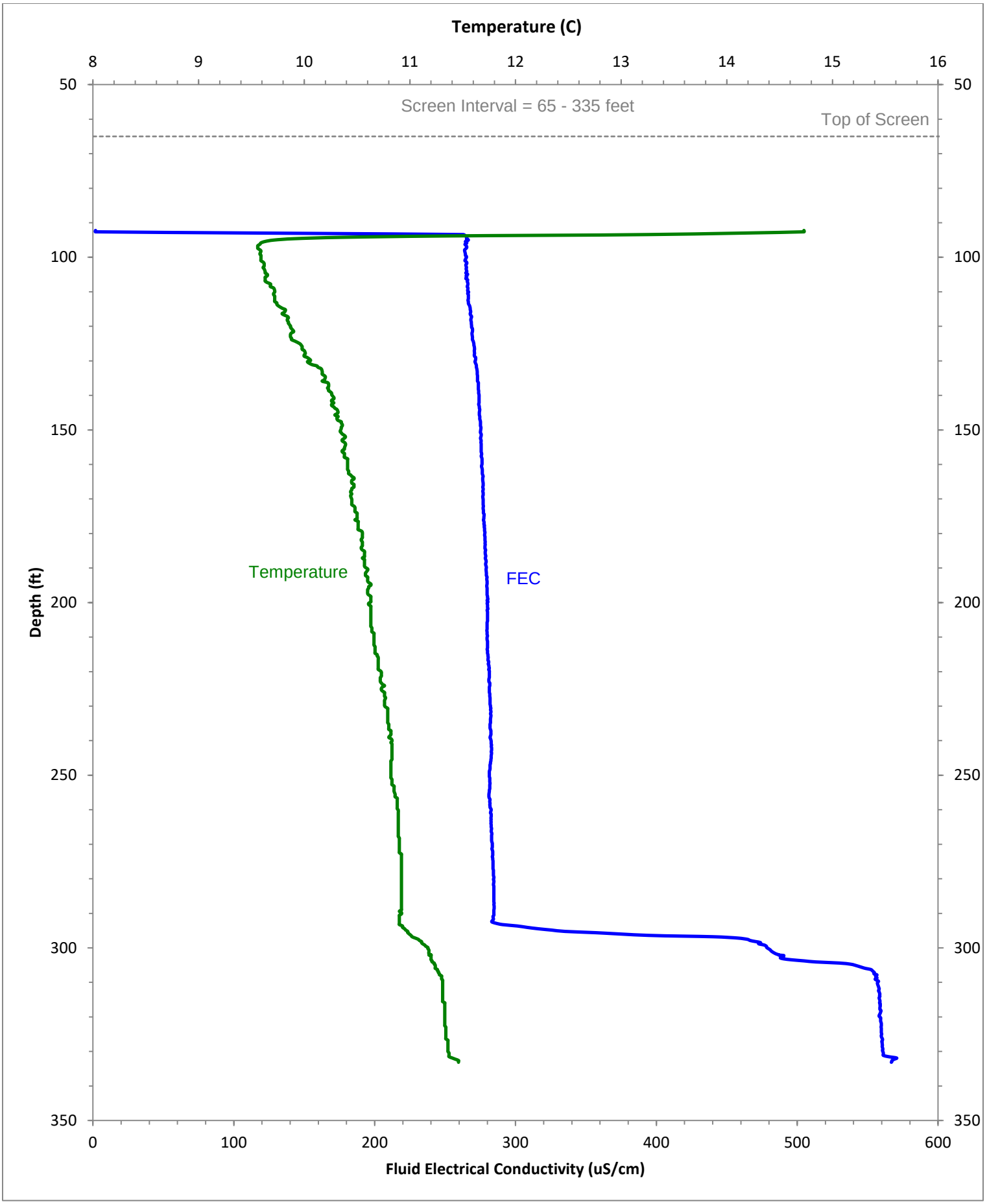


FIGURE MW-84:1. Ambient Temperature and Fluid Electrical Conductivity; RMC Consultants; Atlas Missile Site 4; Cheyenne, WY; Wellbore:MW-84



MW-84-fig1.xls

FIGURE MW-84:2. Summary of Hydrophysical Logs During Ambient Flow Characterization; RMC Consultants; Atlas Missile Site 4; Cheyenne, WY; Wellbore: MW-84

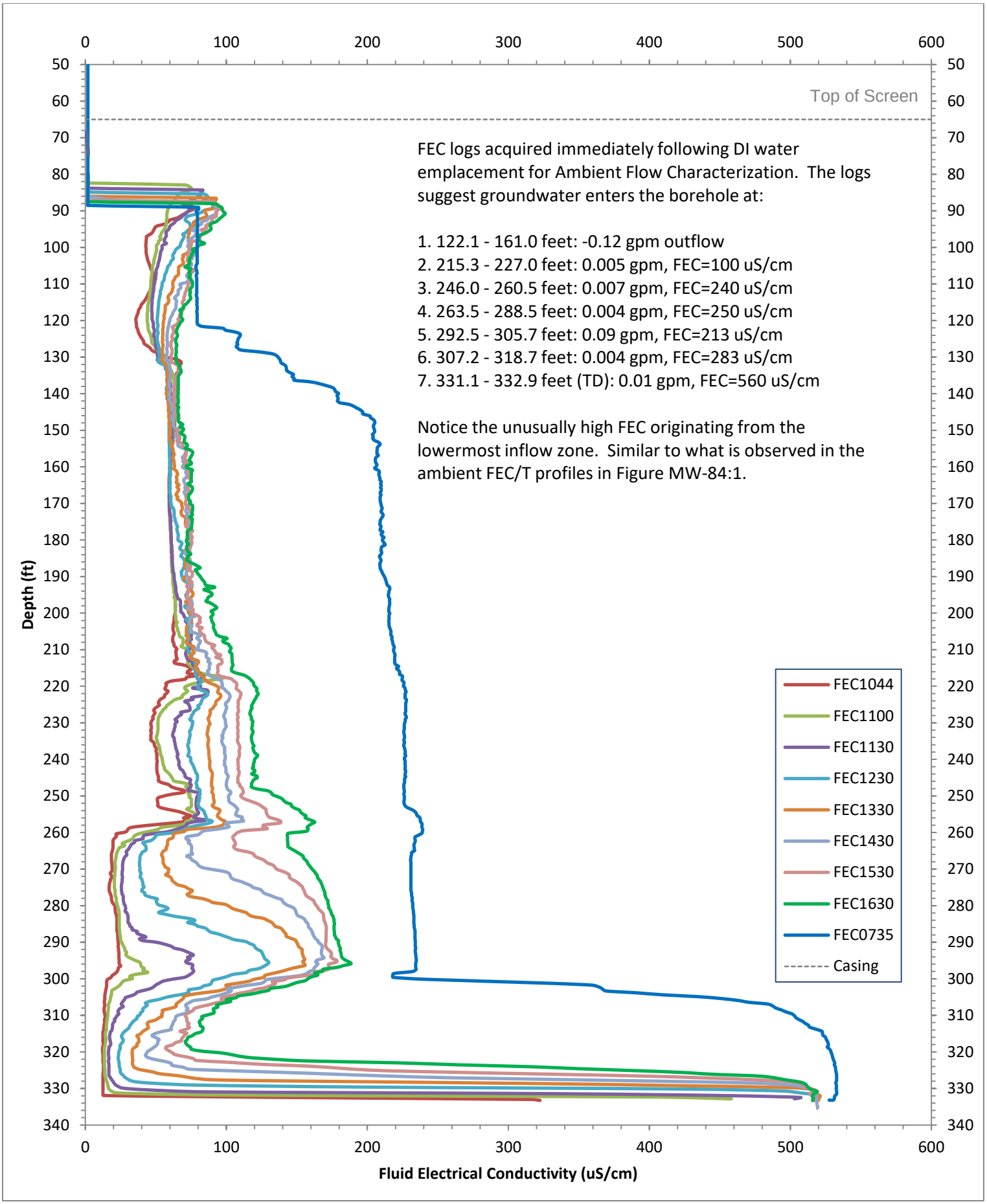


FIGURE MW-84:3. Pumping and Drawdown Data During Low-Rate Pumping at 0.5 GPM After DI Water Emplacement; RMC Consultants; Atlas Missile Site 4; Cheyenne, WY; Wellbore: MW-84

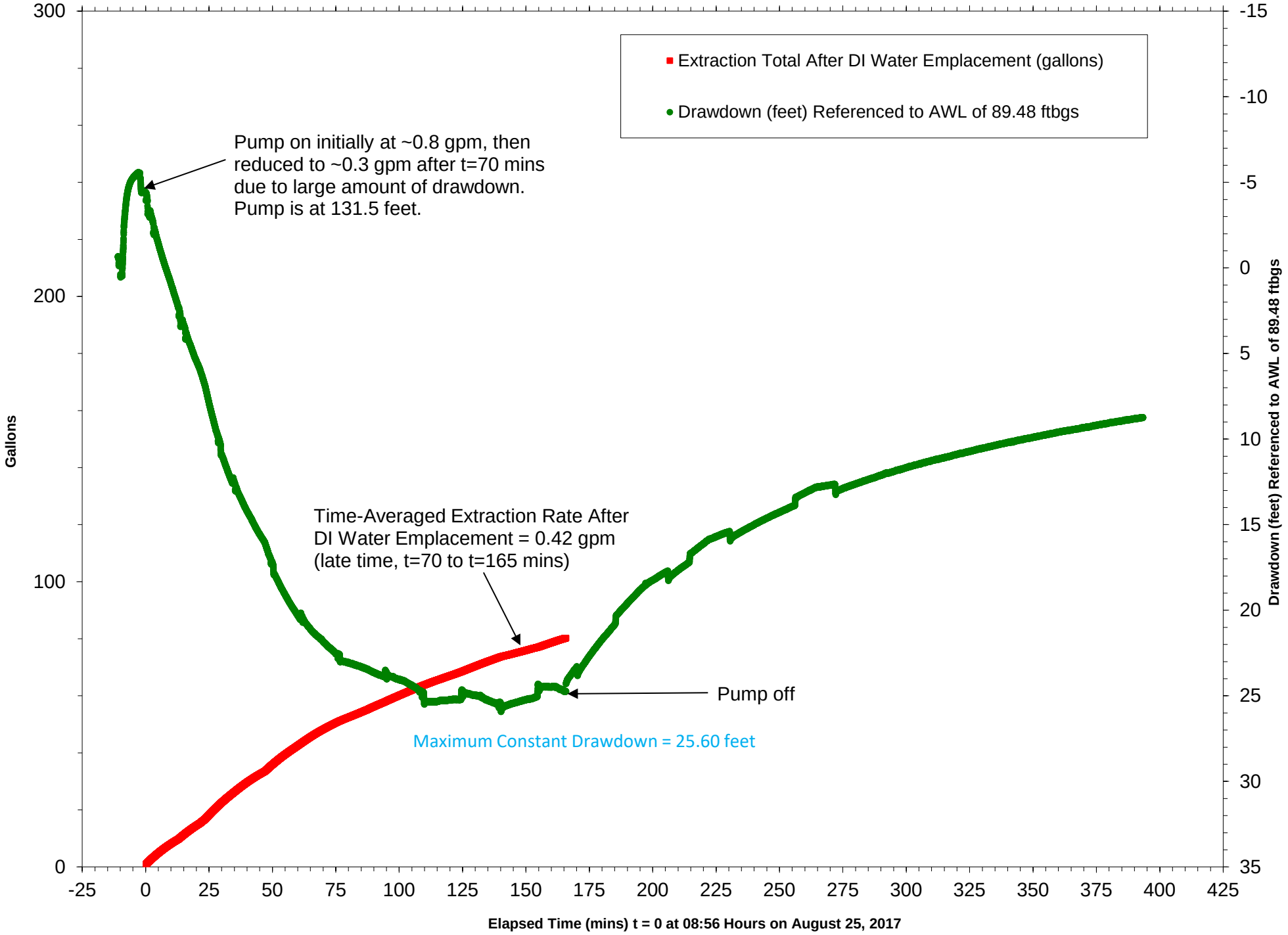


FIGURE MW-84:4. Summary of Hydrophysical Logs During Low-Rate Pumping at 0.5 GPM After DI Water Emplacement For Hydrophysical Stress-Testing; RMC Consultants; Atlas Missile Site 4; Cheyenne, WY; Wellbore: MW-84

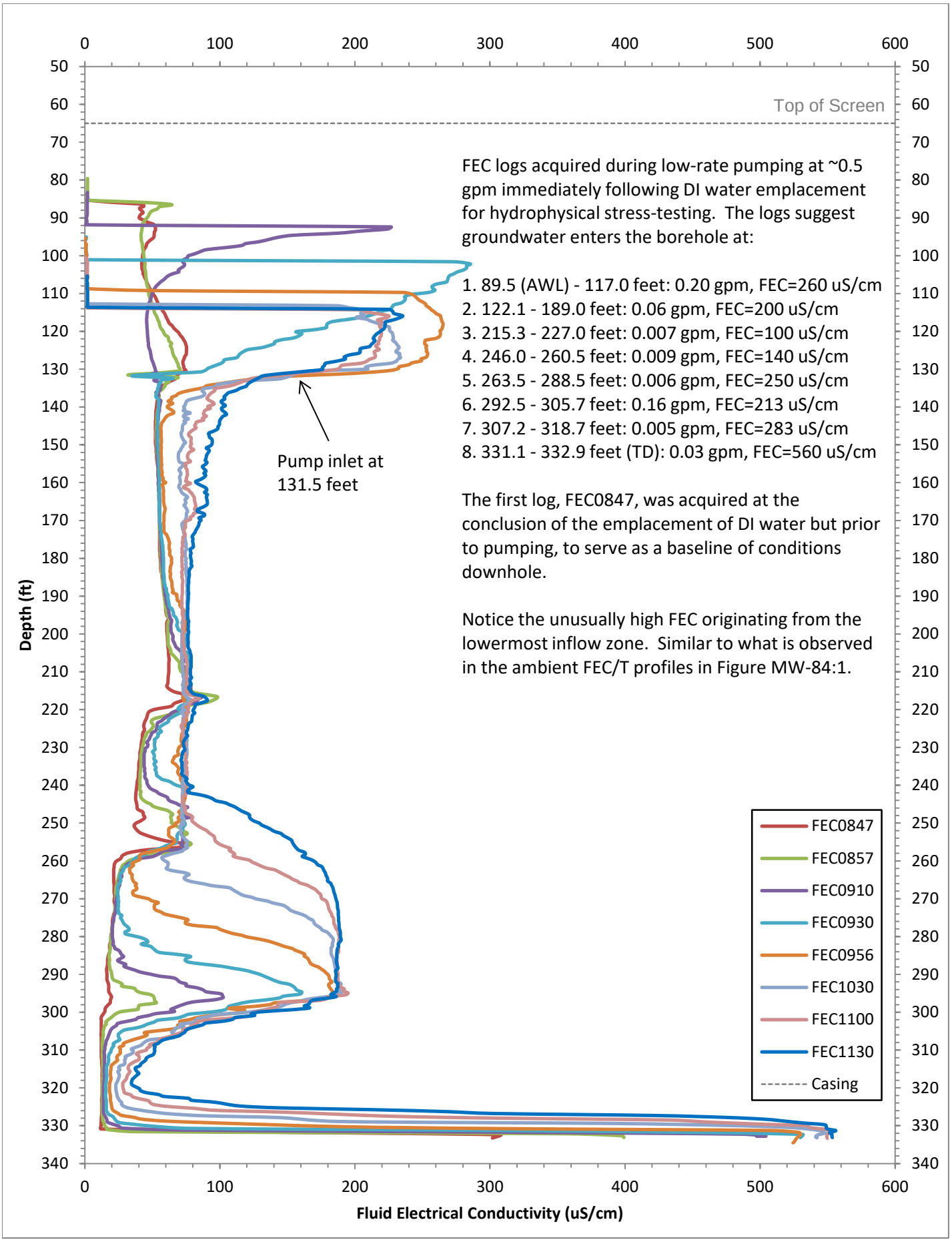


Table MW-84:1. Summary Of Hydrophysical Logging Results With Hydraulic Conductivity And Transmissivity Estimations; RMC Consultants; Atlas Missile Site 4; Cheyenne, WY; Wellbore: MW-84

Well Name	MW-84
Ambient Depth to Water (ftbtoc)	90.78
Ambient Depth to Water (ftbgs)	89.48
Screen Interval (ftbgs)	65 - 335

Diameter of Well (ft)	0.33
Maximum Drawdown (ft)	25.6
Effective Radius (ft)	100
Well Specific Capacity (gpm/ft-dd)	0.019

Hydrophysical Logging Results - MW-84									
Interval No.	**Top of Interval (ft)**	**Bottom of Interval (ft)**	**Length of Interval (ft)**	**Ambient Flow[1] (gpm)**	**Darcy Velocity in Aquifer[2] (ft/day)**	**Interval-Specific Flow Rate During Pumping (gpm)**	**Interval-Specific Hydraulic Conductivity[3] (ft/day)**	**Transmissivity (ft^2/day)**	**Interval-Specific Fluid Electrical Conductivity (uS/cm)**
1*	89.5	117.0	27.5	0.000	NA	0.20	5.58E-02	1.53E+00	260
2	122.1	189.0	66.9	-0.12	NA	0.06	2.06E-02	1.38E+00	200
3	215.3	227.0	11.7	0.005	NA	0.007	1.31E-03	1.53E-02	100
4	246.0	260.5	14.5	0.007	NA	0.009	1.06E-03	1.53E-02	140
5	263.5	288.5	25.0	0.004	NA	0.006	6.14E-04	1.53E-02	250
6	292.5	305.7	13.2	0.090	NA	0.16	4.07E-02	5.37E-01	213
7	307.2	318.7	11.5	0.004	NA	0.005	6.67E-04	7.67E-03	283
8	331.1	332.9	1.8	0.010	NA	0.03	8.52E-02	1.53E-01	560
Borehole Transmissivity Using Thiem Equation (ft^2/day)								**3.66E+00**	
Borehole Hydraulic Conductivity (K=T/b; b=length of borehole of 89.5'-335.0' = 245.5') (ft/day)							**1.49E-02**		

Note: Negative flow, if any, is outflow from the borehole to the aquifer, positive flow is inflow to the borehole.

* The top of this interval is assumed to be AWL of 89.48 ftbgs.

[1] Upward vertical flow is identified in this borehole under ambient conditions.

[2] Darcy Velocity, or Specific Discharge in aquifer, is calculated using the observed volumetric flow rate, the cross-sectional area of the flow interval in the wellbore and a wellbore convergence factor of 3.0 (Drost, 1968). The Darcy Velocity is only applicable to ambient horizontal flow.

[3] Hydraulic conductivity and transmissivity estimates are based on single well drawdown data, a porous-medium equivalent model and the Thiem equation.

NA = Not Applicable

FIGURE MW-85:1. Ambient Temperature and Fluid Electrical Conductivity; RMC Consultants; Atlas Missile Site 4; Cheyenne, WY; Wellbore: MW-85

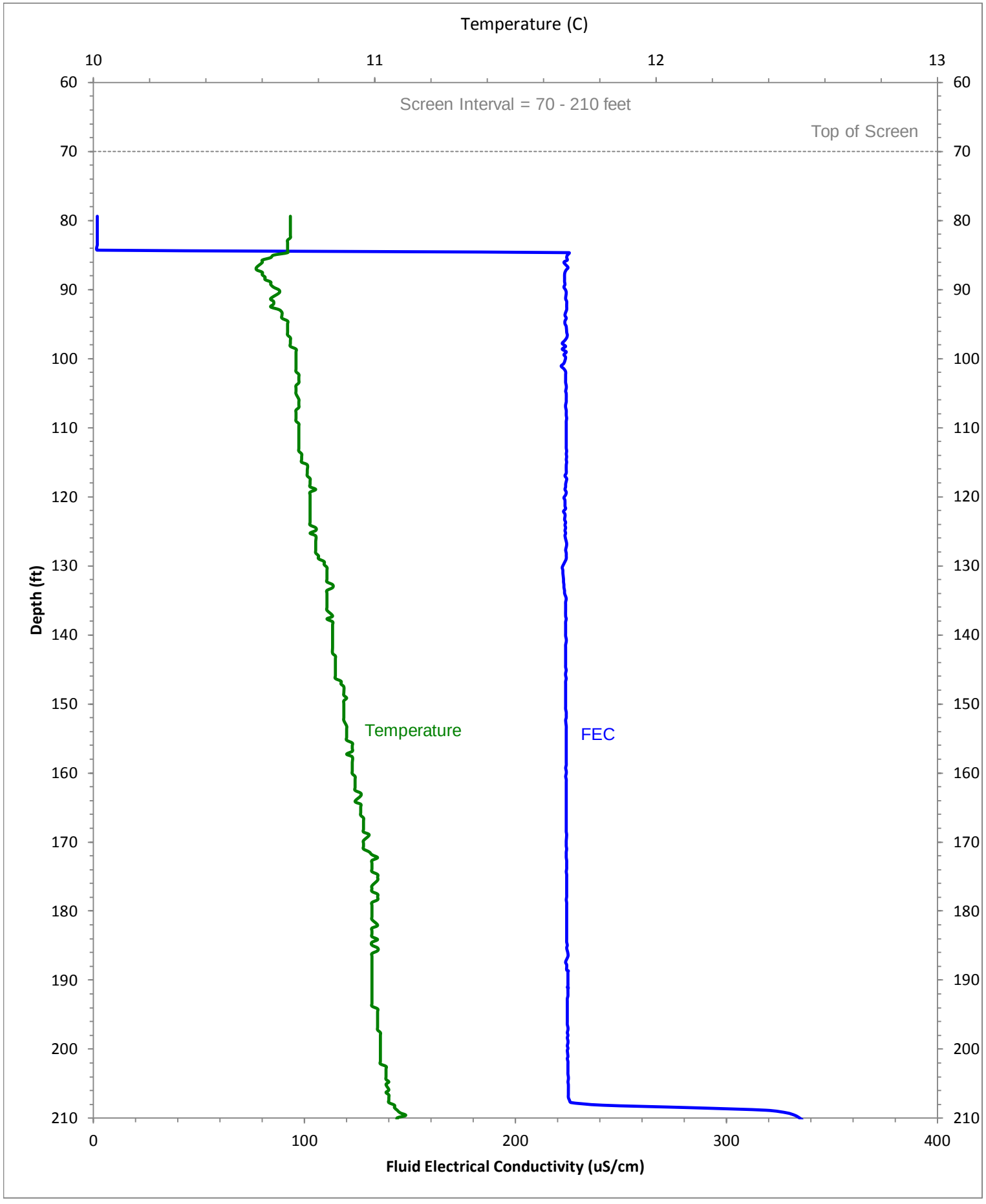


FIGURE MW-85:2. Summary of Hydrophysical Logs During Ambient Flow Characterization; RMC Consultants; Atlas Missile Site 4; Cheyenne, WY; Wellbore: MW-85

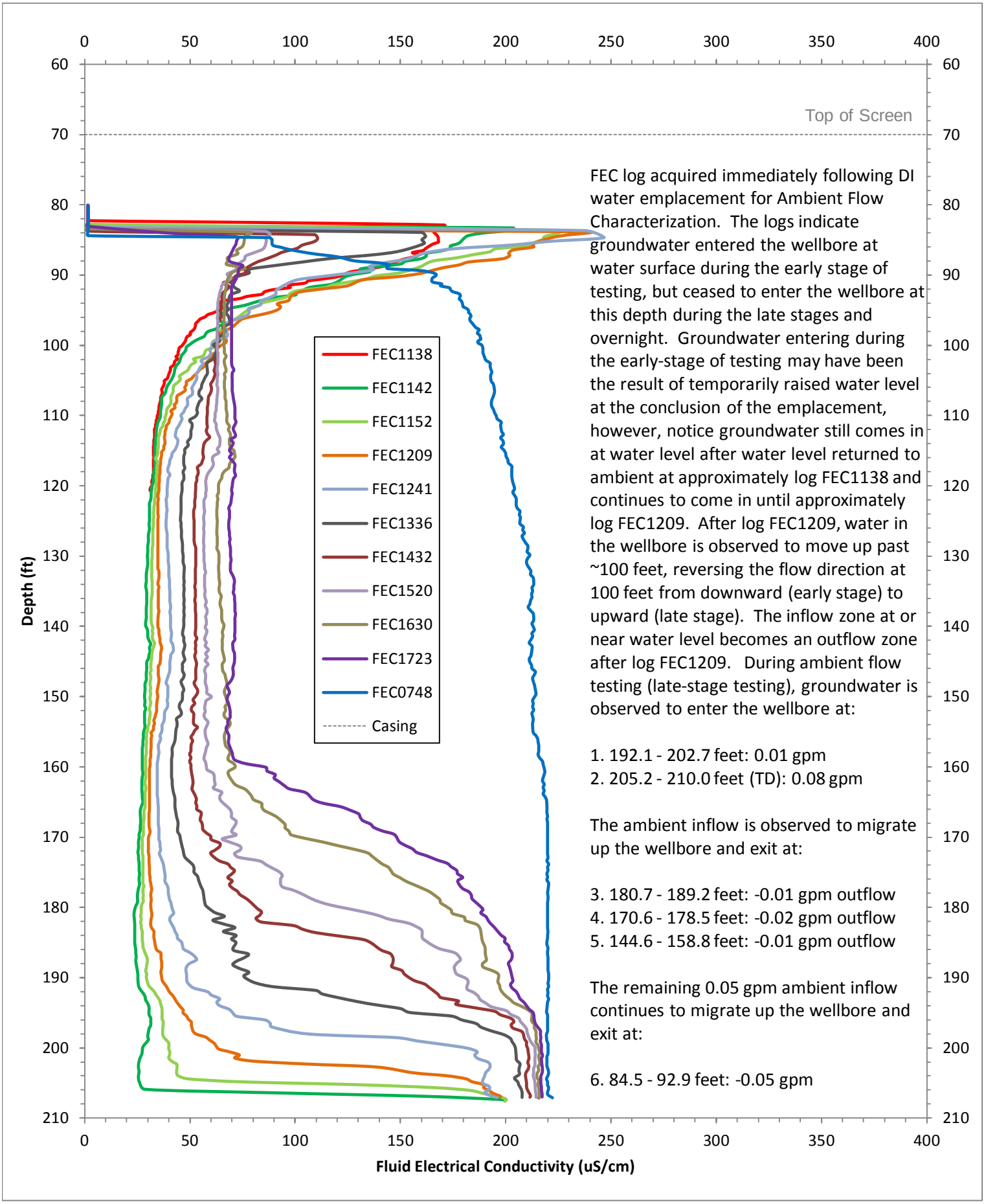


FIGURE MW-85:3. Pumping and Drawdown Data During Low-Rate Pumping at 1.4 GPM After DI Water Emplacement; RMC Consultants; Atlas Missile Site 4; Cheyenne, WY; Wellbore: MW-85

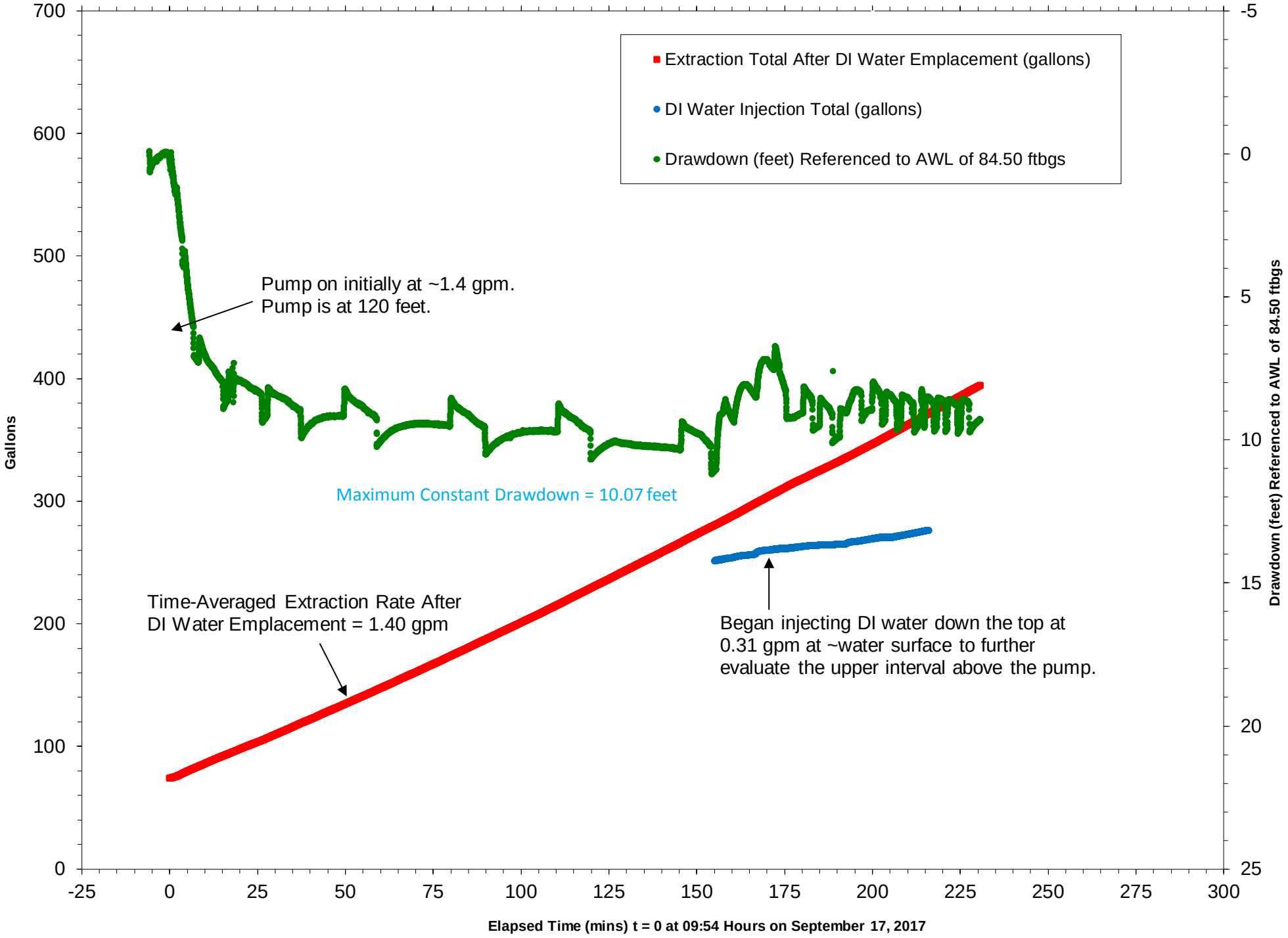


FIGURE MW-85:4. Summary of Hydrophysical Logs During Low-Rate Pumping at 1.4 GPM Immediately Following DI Water Emplacement; RMC Consultants; Atlas Missile Site 4; Cheyenne, WY; Wellbore: MW-85

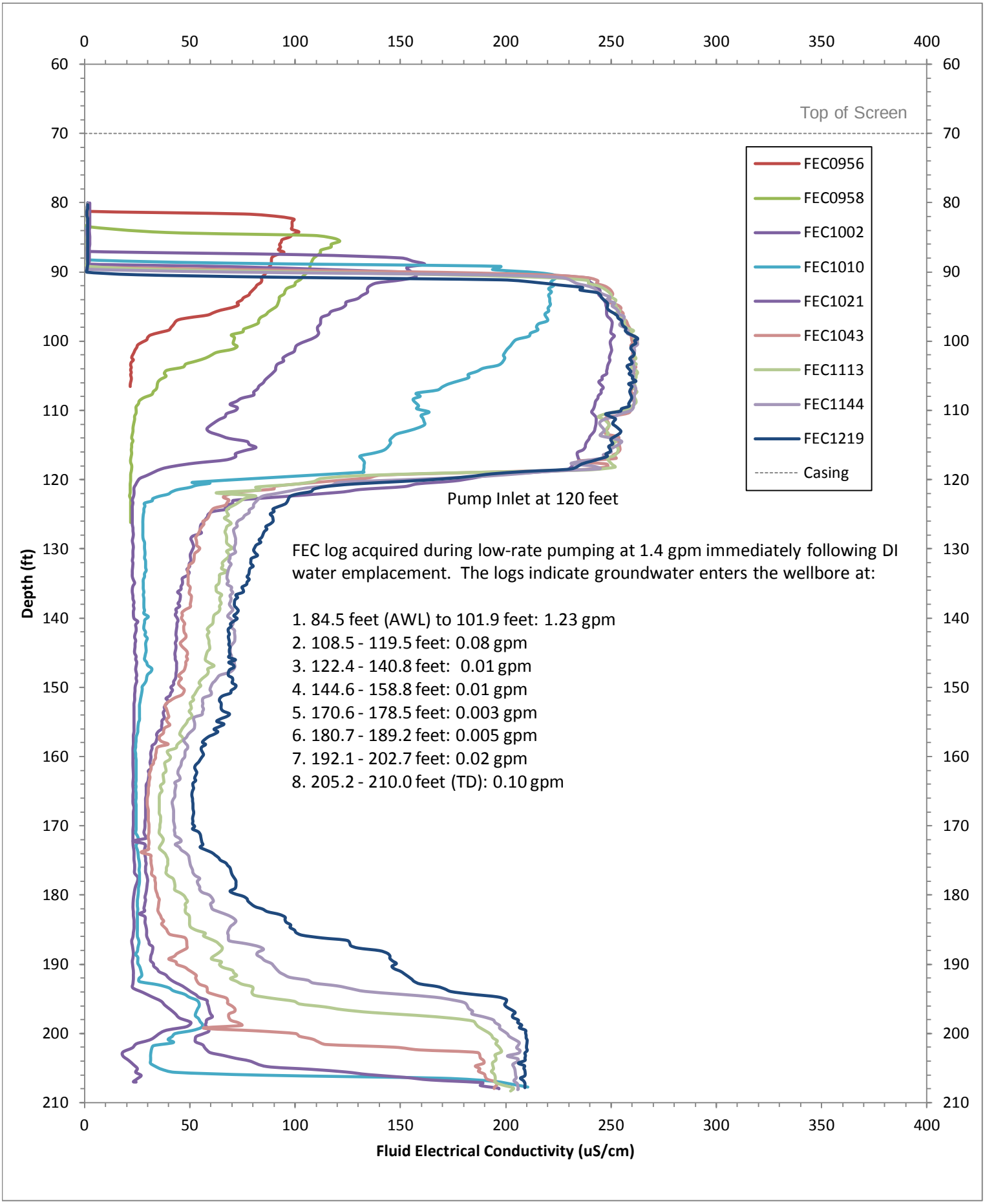


FIGURE MW-85:4. Summary of Hydrophysical Logs During Low-Rate Pumping at 1.4 GPM And Simultaneous DI water Injection Down the Top at 0.31 GPM; RMC Consultants; Atlas Missile Site 4; Cheyenne, WY; Wellbore: MW-85

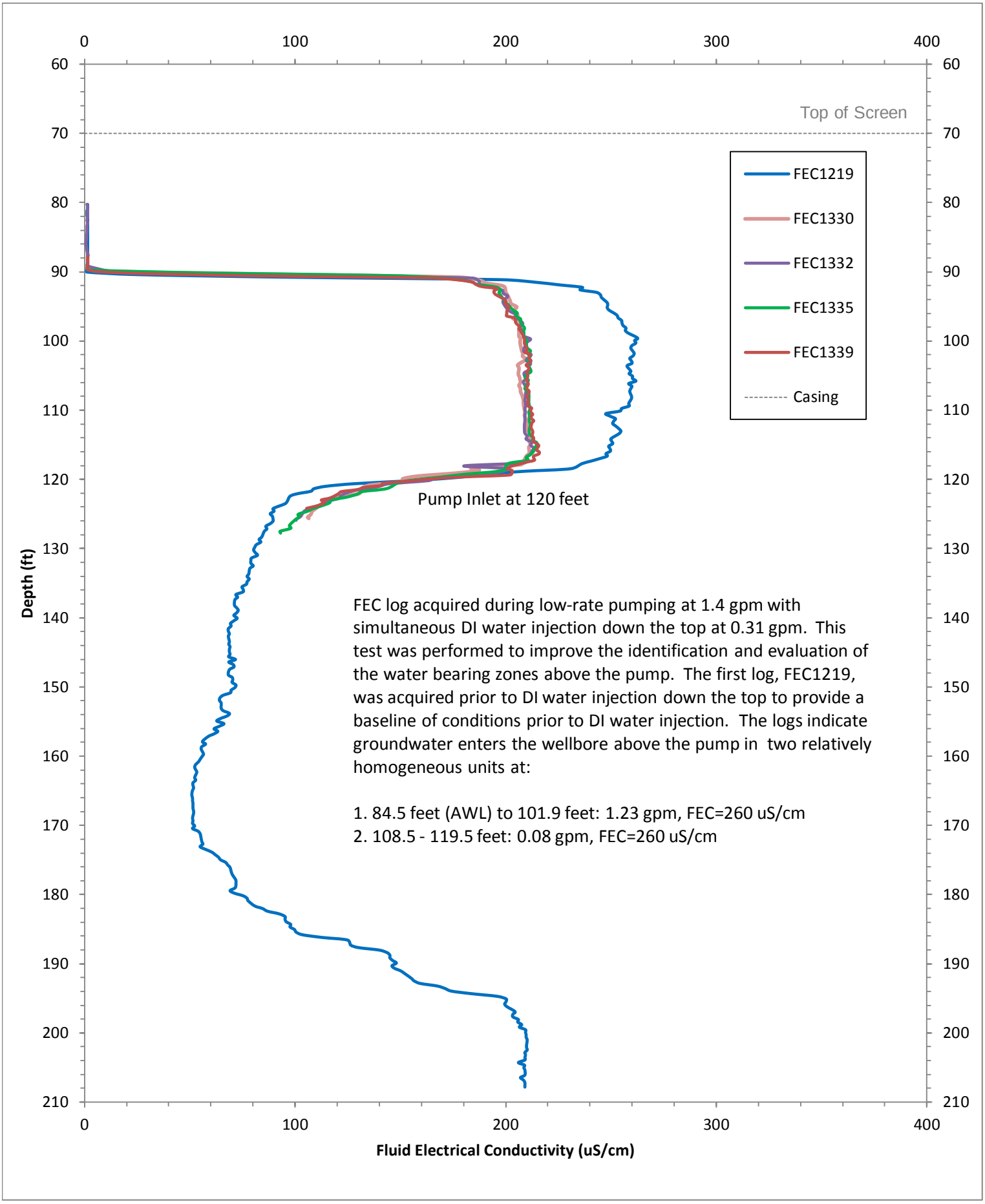


Table MW-85:1. Summary Of Hydrophysical Logging Results With Hydraulic Conductivity And Transmissivity Estimations; RMC Consultants; Atlas Missile Site 4; Cheyenne, WY; Wellbore: MW-85

Well Name	MW-85
Ambient Depth to Water (ftbtoc)	85.50
Ambient Depth to Water (ftbgs)	84.50
Screen Interval (ftbgs)	70 - 210

Diameter of Well (ft)	0.33
Maximum Drawdown (ft)	10.07
Effective Radius (ft)	100
Well Specific Capacity (gpm/ft-dd)	0.145

Hydrophysical Logging Results - MW-85									
Interval No.	**Top of Interval (ft)**	**Bottom of Interval (ft)**	**Length of Interval (ft)**	**Ambient Flow[1] (gpm)**	**Darcy Velocity in Aquifer[2] (ft/day)**	**Interval-Specific Flow Rate During Pumping (gpm)**	**Interval-Specific Hydraulic Conductivity[3] (ft/day)**	**Transmissivity (ft^2/day)**	**Interval-Specific Fluid Electrical Conductivity (uS/cm)**
1*	84.5	101.9	17.4	-0.05	NA	1.23	1.43E+00	2.50E+01	260
2	108.5	119.5	11.0	0.00	NA	0.08	1.42E-01	1.56E+00	260
3	122.4	140.8	18.4	0.00	NA	0.01	1.06E-02	1.95E-01	224
4	144.6	158.8	14.2	-0.01	NA	0.01	2.75E-02	3.90E-01	224
5	170.6	178.5	7.9	-0.02	NA	0.003	5.68E-02	4.49E-01	224
6	180.7	189.2	8.5	-0.01	NA	0.005	3.44E-02	2.93E-01	224
7	192.1	202.7	10.6	0.01	NA	0.02	1.84E-02	1.95E-01	224
8	205.2	210.0	4.8	0.08	NA	0.10	8.13E-02	3.90E-01	224
Borehole Transmissivity Using Thiem Equation (ft^2/day)								**2.84E+01**	
Borehole Hydraulic Conductivity (K=T/b; b=length of borehole of 84.5'-210.0' = 125.5') (ft/day)							**2.27E-01**		

Note: Negative flow, if any, is outflow from the borehole to the aquifer, positive flow is inflow to the borehole.

* The top of this interval is assumed to be AWL of 84.50 ftbgs.

[1] Upward vertical flow is identified in this borehole under ambient conditions.

[2] Darcy Velocity, or Specific Discharge in aquifer, is calculated using the observed volumetric flow rate, the cross-sectional area of the flow interval in the wellbore and a wellbore convergence factor of 3.0 (Drost, 1968). The Darcy Velocity is only applicable to ambient horizontal flow.

[3] Hydraulic conductivity and transmissivity estimates are based on single well drawdown data, a porous-medium equivalent model and the Thiem equation.

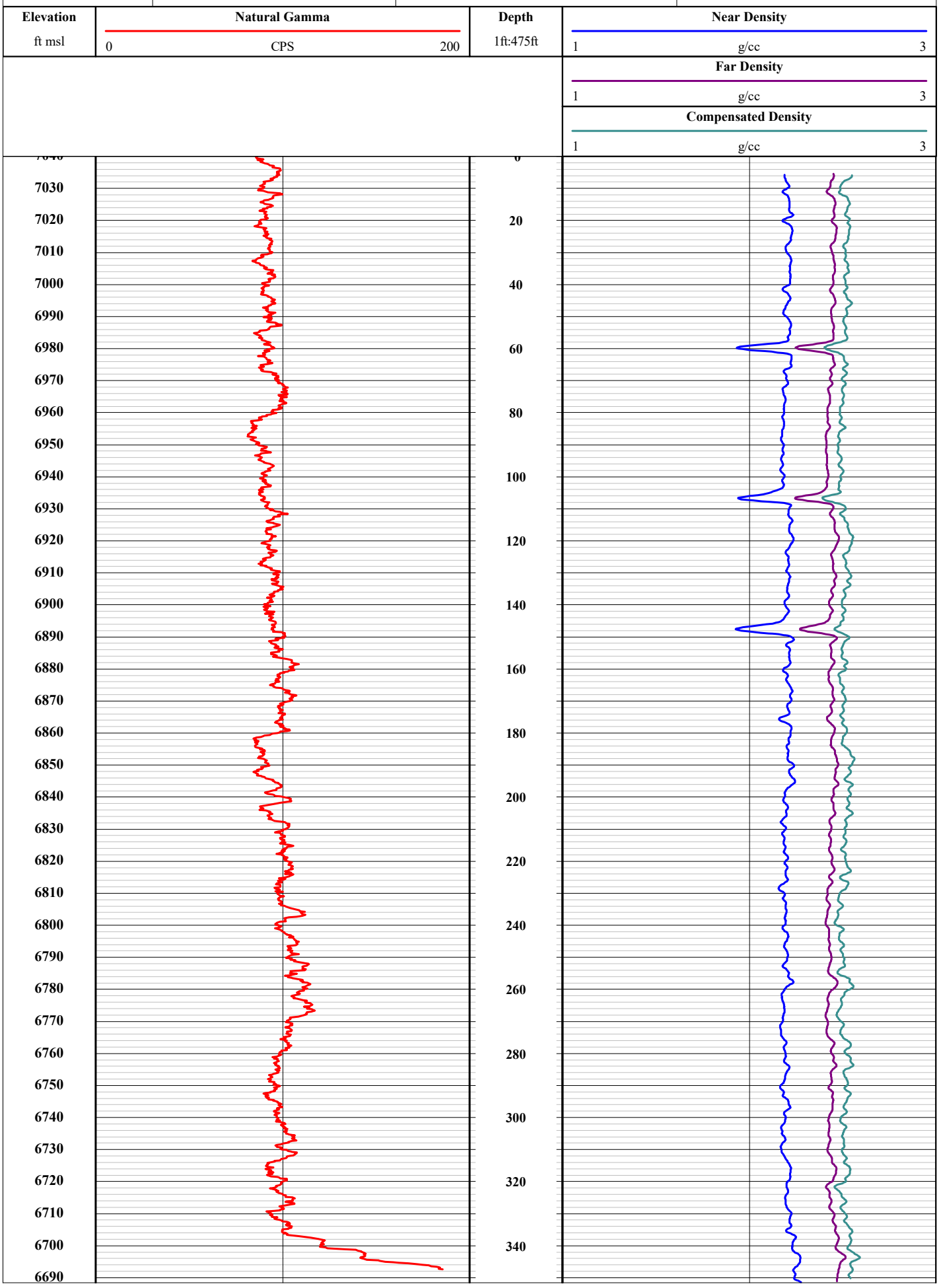
NA = Not Applicable

Focused Density

COLOG
borehole geophysics / hydrophysics

COMPANY: RMC - Consultants
PROJECT: Atlas Missile Site 4 Phase 2
DATE LOGGED: 15 August 2017
WELL: MW-86

Colog, Inc.
810 Quail Street, Suite E, Lakewood, CO 80215
Phone: (303) 279-0171, Fax: (303) 278-0135
www.colog.com



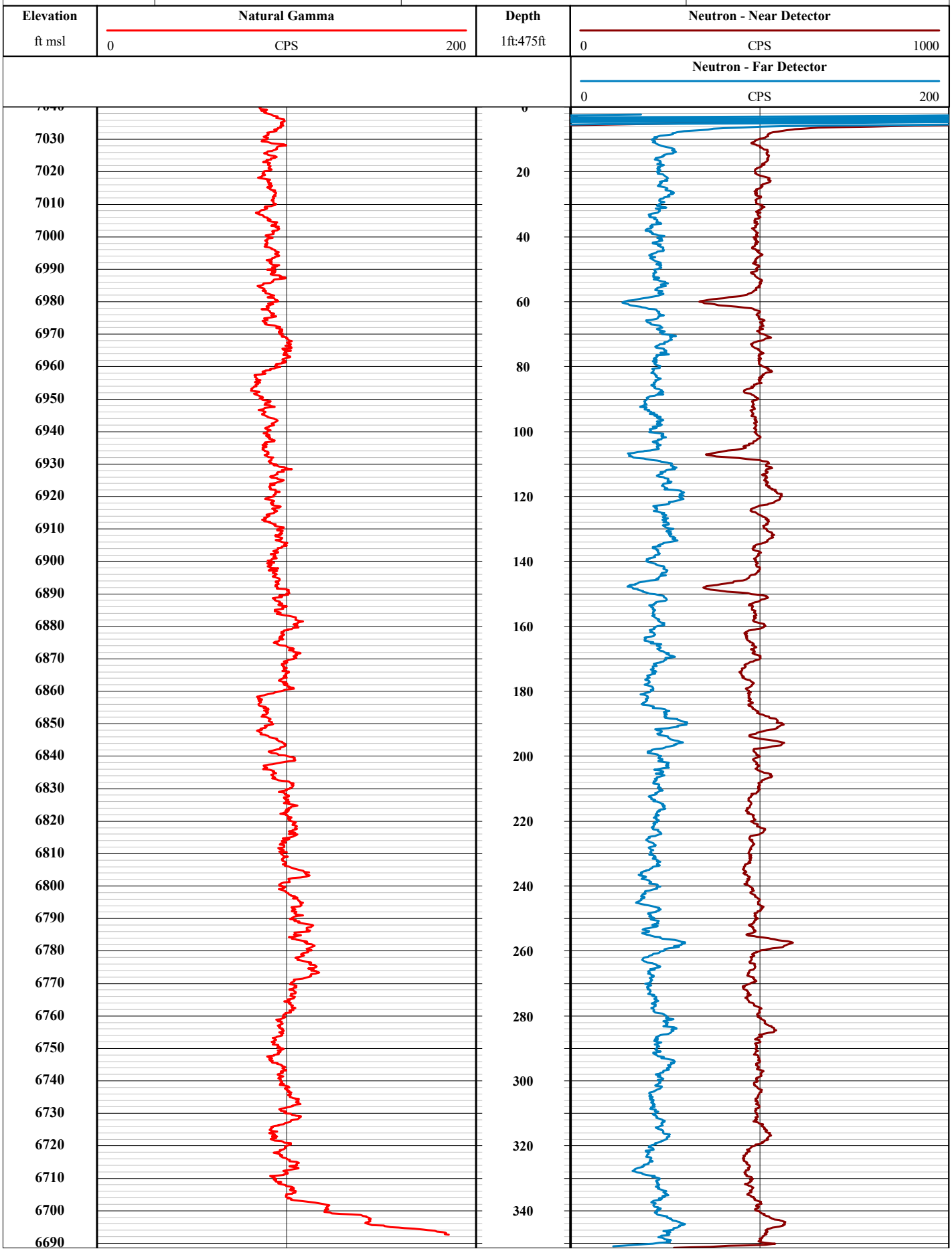
Dual Neutron

COLOG
borehole geophysics / hydrophysics

COMPANY: RMC - Consultants | PROJECT: Atlas Missile Site 4 Phase 2

DATE LOGGED: 15 August 2017 | WELL: MW-86

Colog, Inc.
810 Quail Street, Suite E, Lakewood, CO 80215
Phone: (303) 279-0171, Fax: (303) 278-0135
www.colog.com

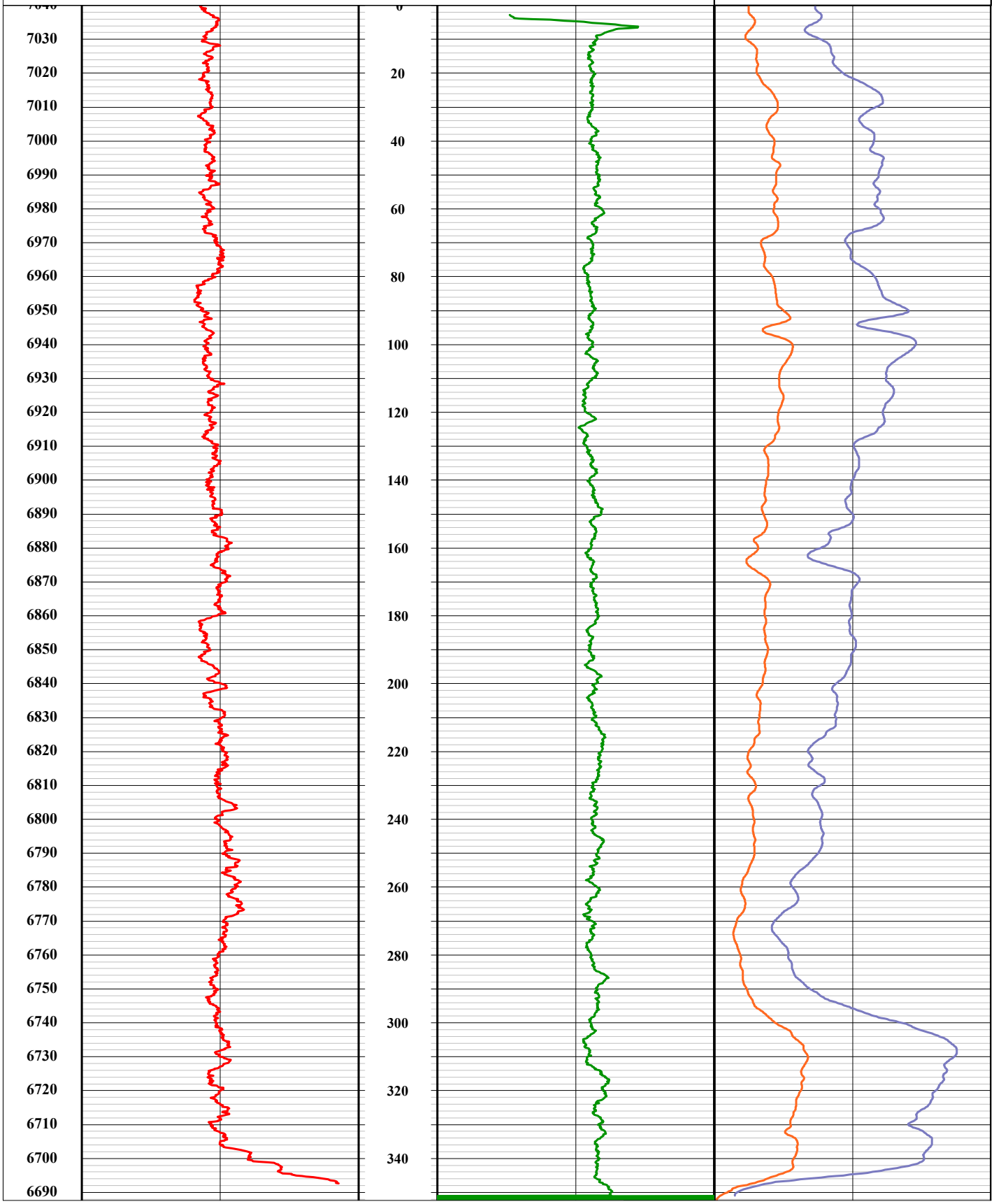


Dual Induction & Magnetic Susceptibility

COLOG
borehole geophysics / hydrophysics

COMPANY: RMC - Consultants
PROJECT: Atlas Missile Site 4 Phase 2
DATE LOGGED: 15 August 2017
WELL: MW-86

Colog, Inc.
810 Quail Street, Suite E, Lakewood, CO 80215
Phone: (303) 279-0171, Fax: (303) 278-0135
www.colog.com



COLOG
borehole geophysics / hydrophysics

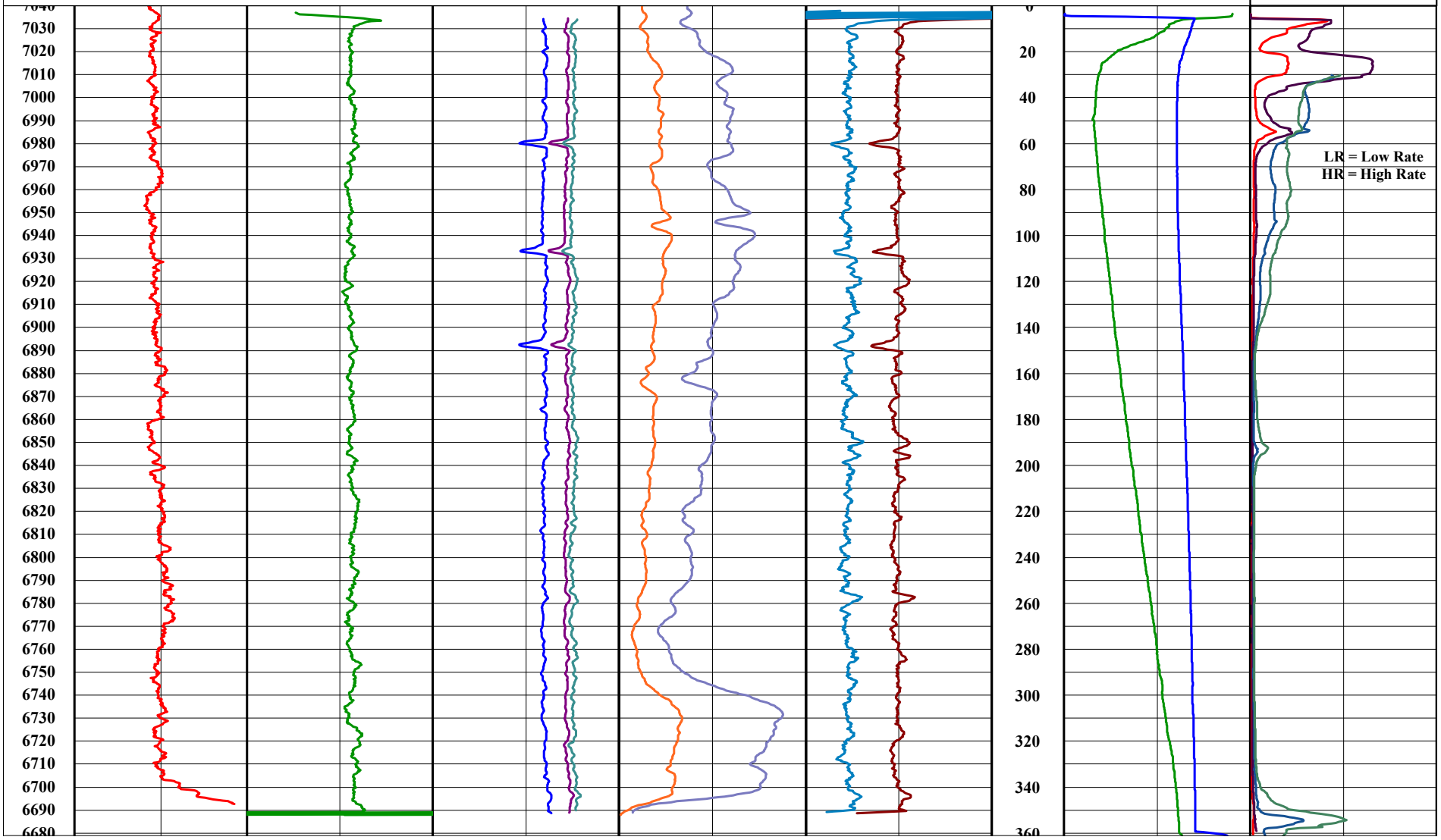
Geophysical/Hydrophysical Summary Plot

COMPANY: RMC - Consultants | PROJECT: Atlas Missile Site 4 Phase 2

DATE LOGGED: 15 Aug. 21-22 Sept. 17 | WELL: MW-86

COLOG Main Office
810 Quail Street, Suite E, Lakewood, CO 80215
Phone: (303) 279-0171, Fax: (303) 278-0135
www.colog.com

Elevation	Natural Gamma	Magnetic Susceptibility	Near Density	Conductivity (short)	Neutron - Near Detector	Depth	Ambient Temperature	FEC1123 - Pumping LR
ft msl	0 CPS 200	0 ppt 100	1 g/cc 3	0 mS/m 1000	0 CPS 1000	1ft:760ft	8 C 18	0 uS/cm 350
			Far Density	Conductivity (long)	Neutron - Far Detector		Ambient FEC	FEC1138 - Pumping LR
			1 g/cc 3	0 mS/m 1000	0 CPS 200		0 uS/cm 350	0 uS/cm 350
			Compensated Density					FEC1251 - Pumping HR
			1 g/cc 3					0 uS/cm 350
								FEC1320 - Pumping HR
								0 uS/cm 350



Geophysical/Hydrophysical Summary Plot

COLOG
borehole geophysics / hydrophysics

COMPANY: RMC - Consultants
PROJECT: Atlas Missile Site 4 Phase 2
DATE LOGGED: 15 Aug. 21-22 Sept. 17
WELL: MW-86

COLOG Main Office
810 Quail Street, Suite E, Lakewood, CO 80215
Phone: (303) 279-0171, Fax: (303) 278-0135
www.colog.com

Depth	Natural Gamma	Magnetic Susceptibility	Near Density	Conductivity (short)	Neutron - Near Detector	Ambient Temperature	FEC1123 - Pumping LR
1ft:760ft	0 CPS 200	0 ppt 100	1 g/cc 3	0 mS/m 1000	0 CPS 1000	8 C 18	0 uS/cm 350
			Far Density	Conductivity (long)	Neutron - Far Detector	Ambient FEC	FEC1138 - Pumping LR
			1 g/cc 3	0 mS/m 1000	0 CPS 200	0 uS/cm 350	0 uS/cm 350
			Compensated Density				FEC1251 - Pumping HR
			1 g/cc 3				0 uS/cm 350
							FEC1320 - Pumping HR
							0 uS/cm 350

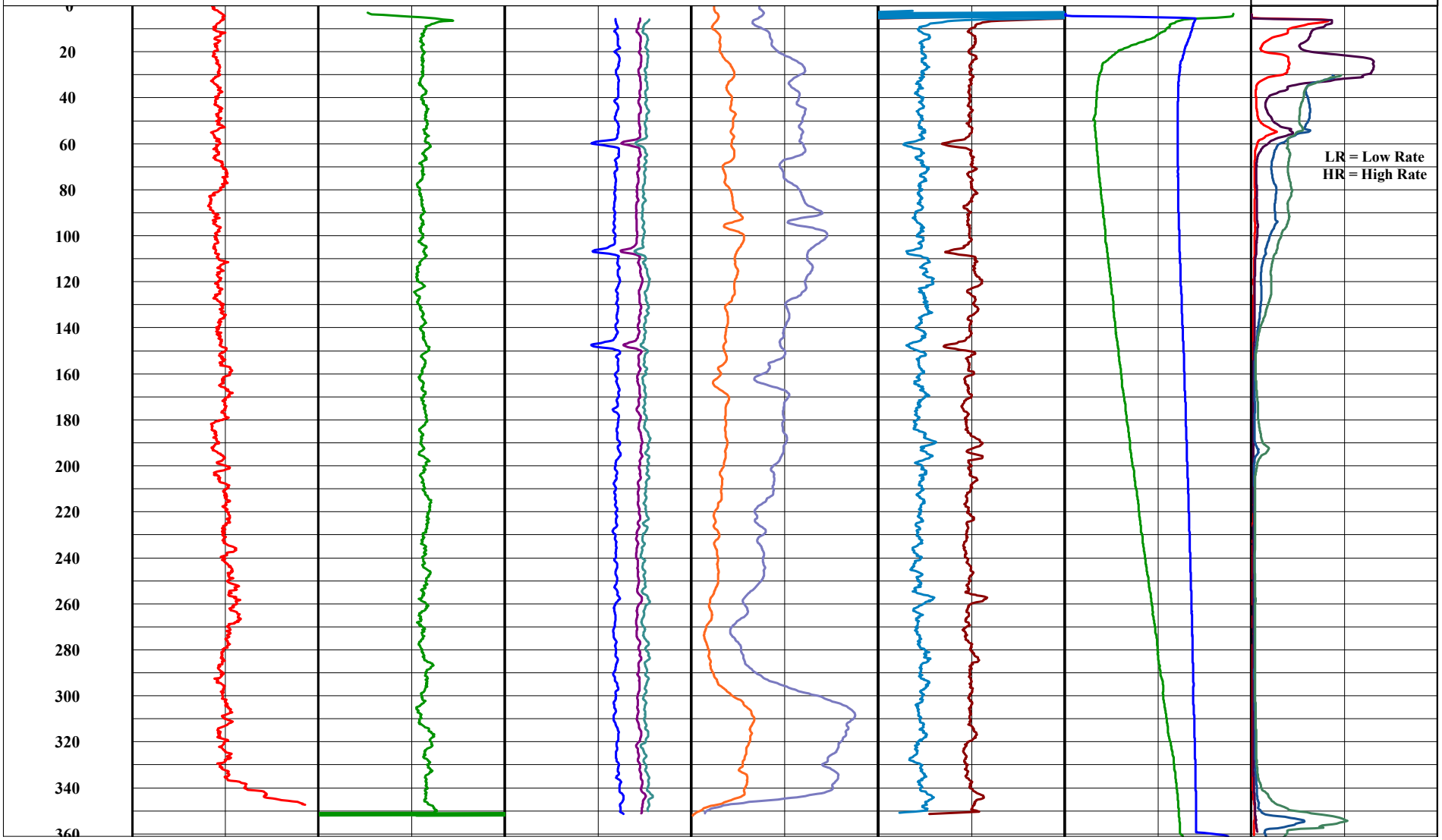


FIGURE MW-86:1. Ambient Temperature and Fluid Electrical Conductivity; RMC Consultants; Atlas Missile Site 4; Cheyenne, WY; Wellbore: MW-86

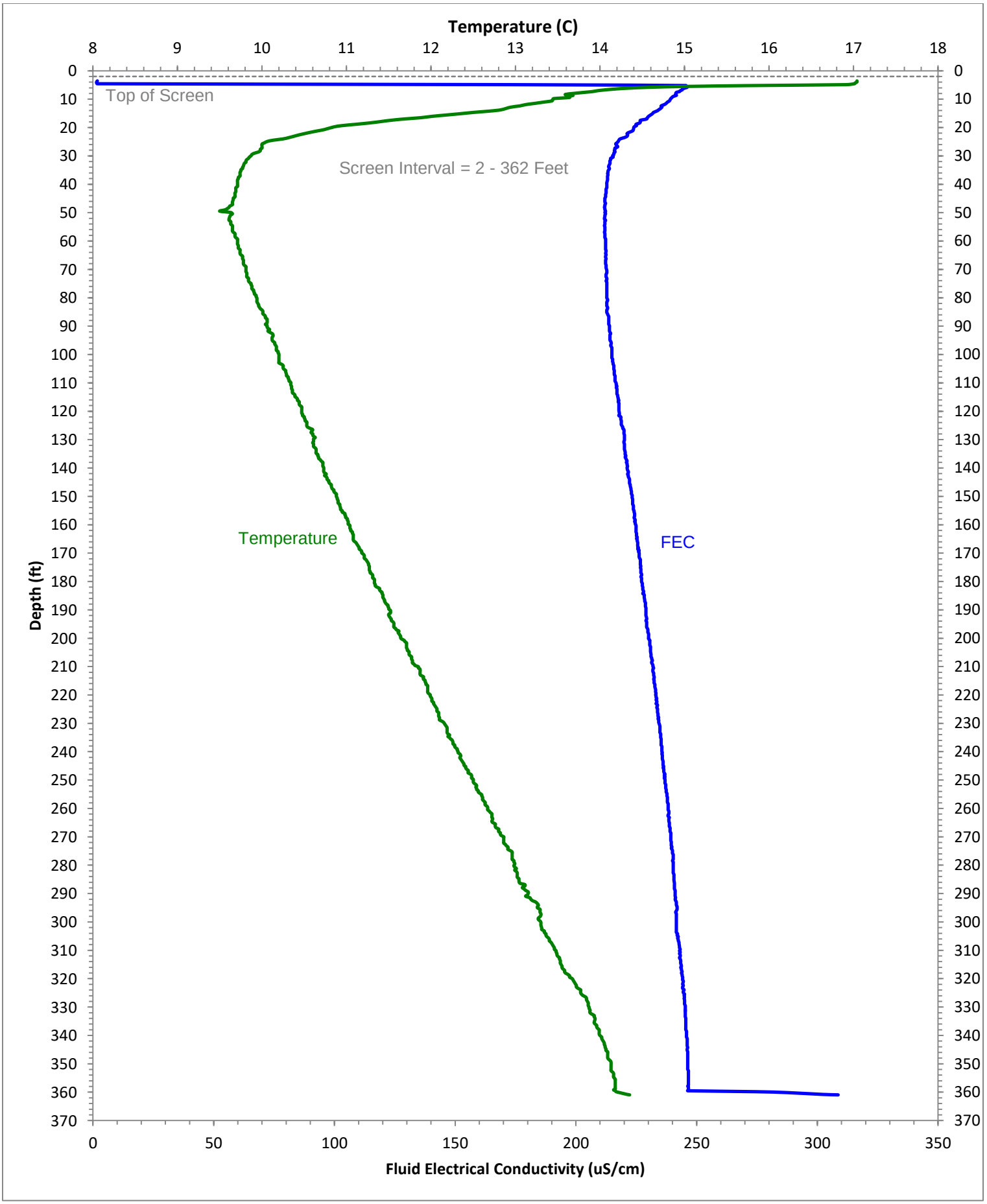


FIGURE MW-86:2. Summary of Hydrophysical Logs During Ambient Flow Characterization; RMC Consultants; Atlas Missile Site 4; Cheyenne, WY; Wellbore: MW-86

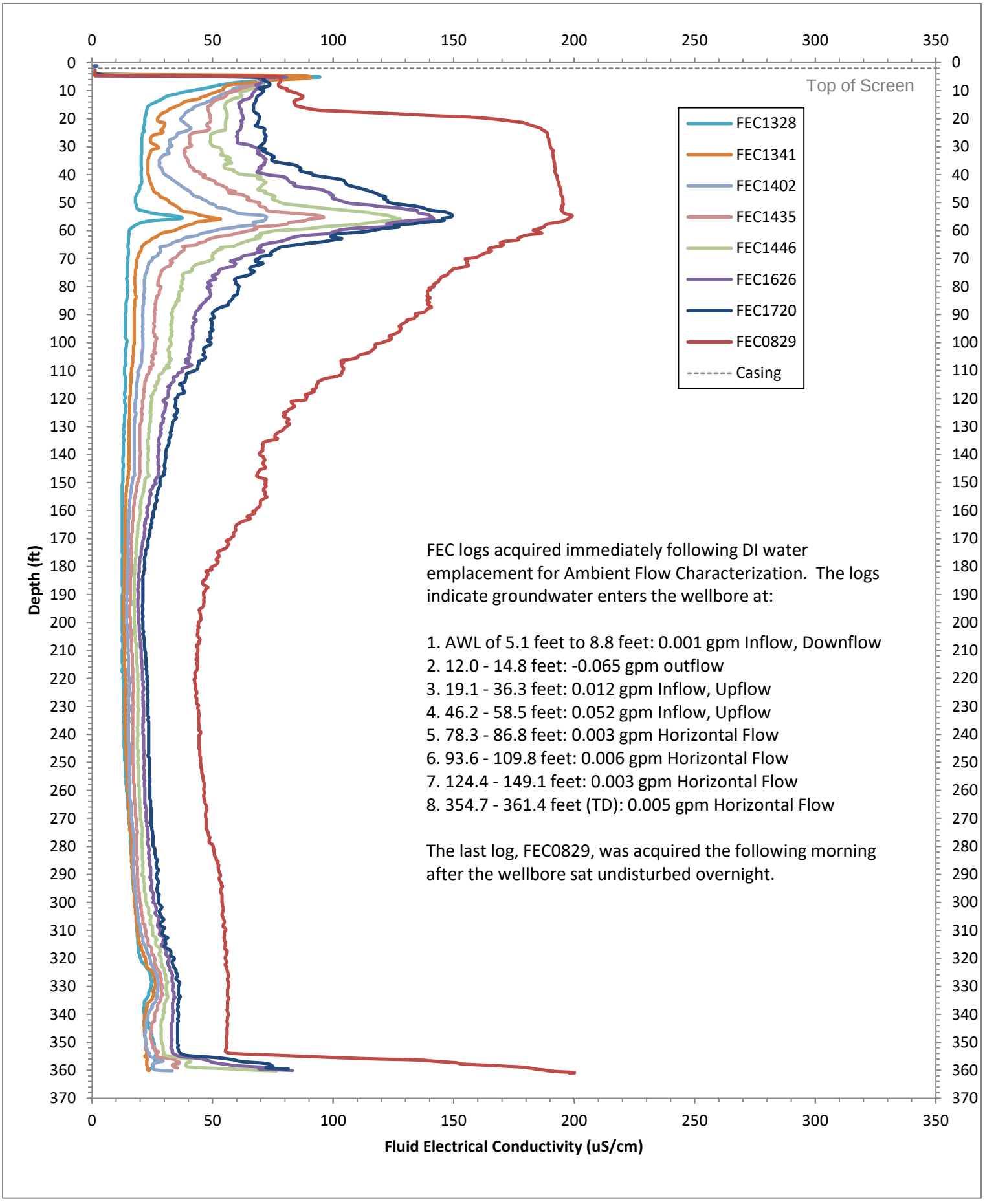


FIGURE MW-86:3. Pumping and Drawdown Data During Low-Rate and High-Rate Pumping at 3 GPM and 12 GPM After DI Water Emplacement; RMC Consultants; Atlas Missile Site 4; Cheyenne, WY; Wellbore: MW-86

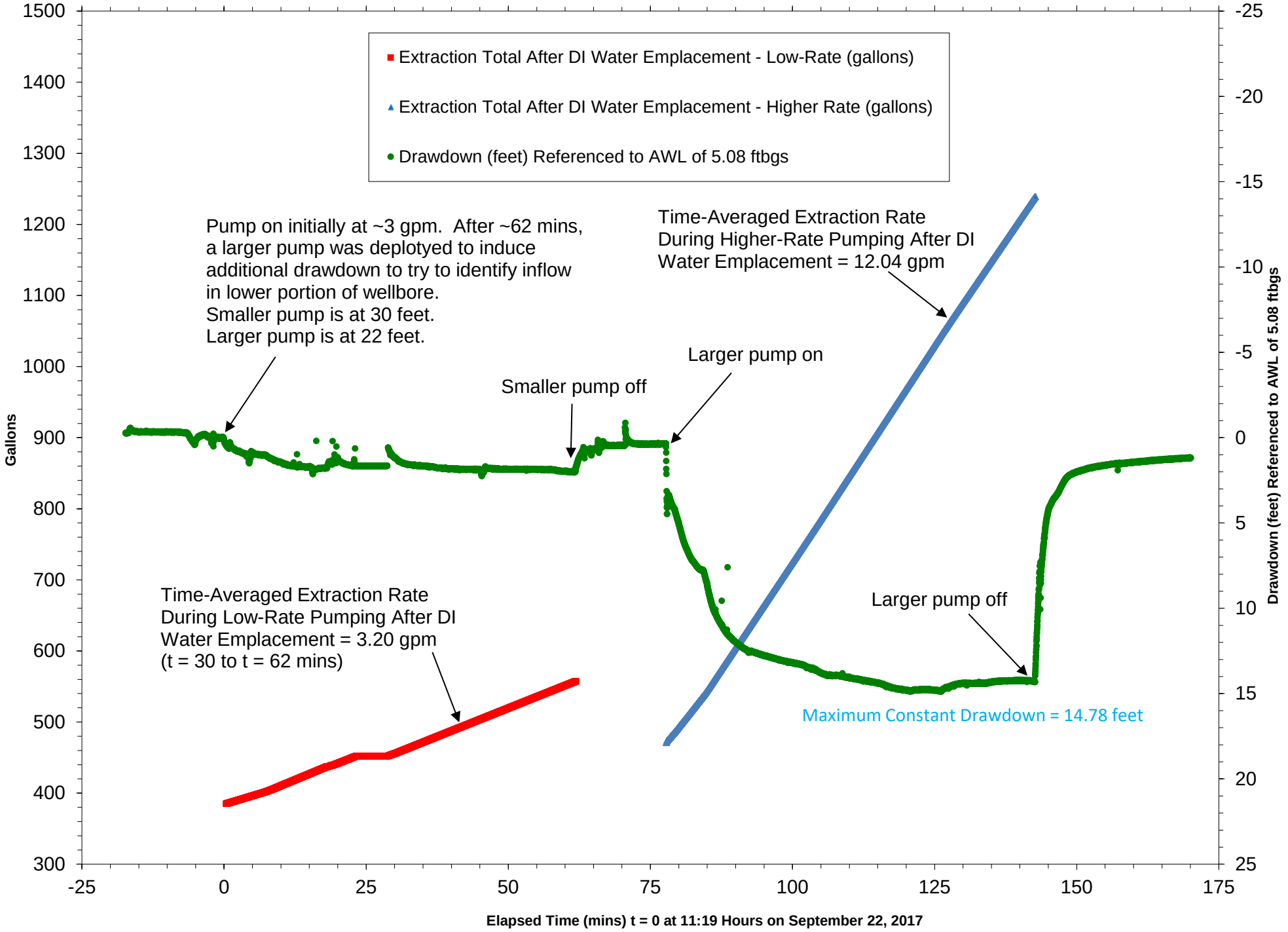


FIGURE MW-86:4A. Summary of Hydrophysical Logs During Low-Rate Pumping at 3 GPM After DI Water Emaplacement For Hydrophysical Stress-Testing; RMC Consultants; Atlas Missile Site 4; Cheyenne, WY; Wellbore: MW-86

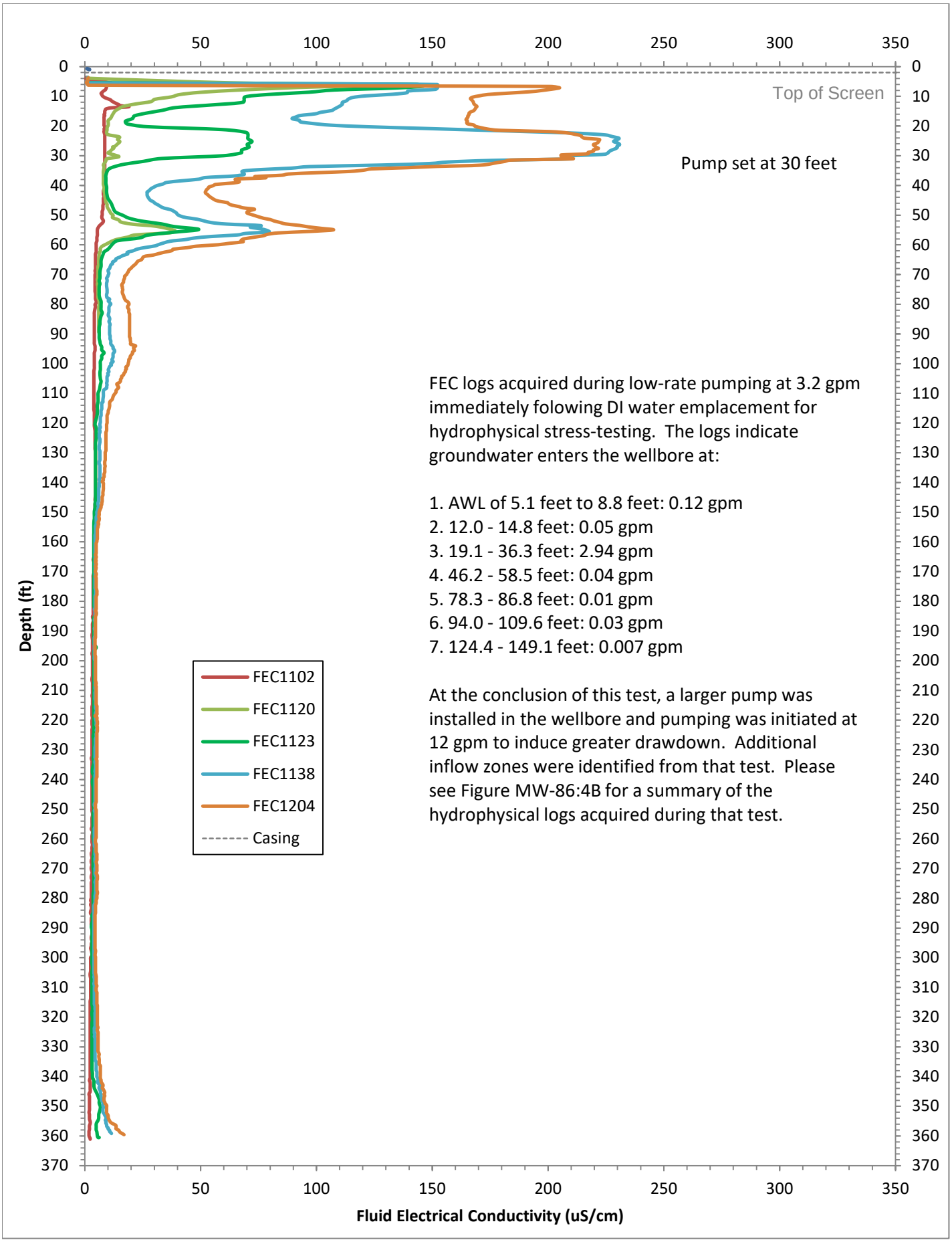


FIGURE MW-86:4B. Summary of Hydrophysical Logs During Higher-Rate Pumping at 11 GPM After DI Water Emplacement; RMC Consultants; Atlas Missile Site 4; Cheyenne, WY; Wellbore: MW-86

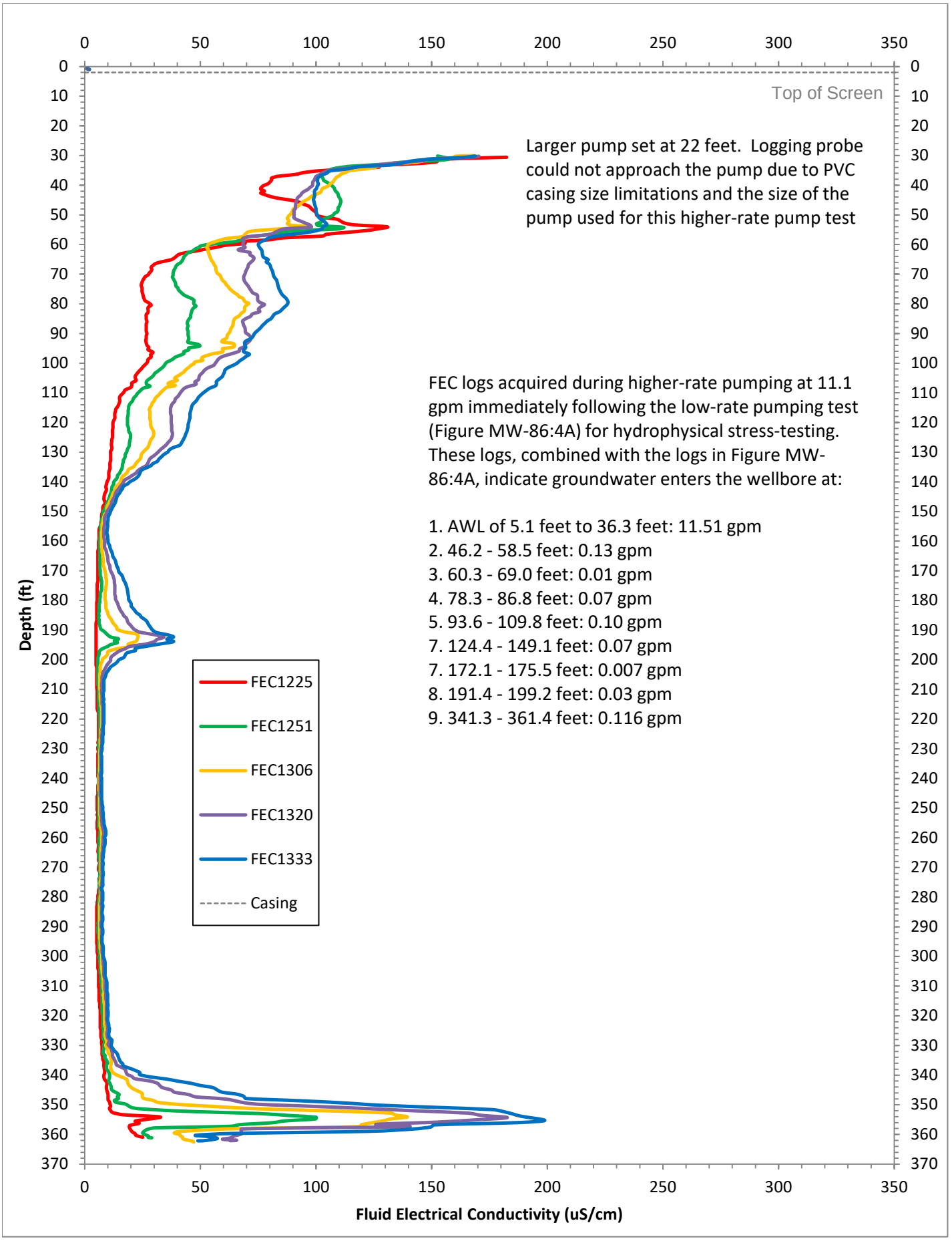


Table MW-86:1. Summary Of Hydrophysical Logging Results With Hydraulic Conductivity And Transmissivity Estimations; RMC Consultants; Atlas Missile Site 4; Cheyenne, WY; Wellbore: MW-86

Well Name	MW-86
Ambient Depth to Water (ftbtoc)	8.08
Ambient Depth to Water (ftbgs)	5.08
Screen Interval (ftbgs)	2 - 362

Diameter of Well (ft)	0.33
Maximum Drawdown (ft)	14.78
Effective Radius (ft)	100
Well Specific Capacity (gpm/ft-dd)	0.815

Hydrophysical Logging Results - MW-86									
Interval No.	**Top of Interval (ft)**	**Bottom of Interval (ft)**	**Length of Interval (ft)**	**Ambient Flow[1] (gpm)**	**Darcy Velocity in Aquifer[2] (ft/day)**	**Interval-Specific Flow Rate During Higher-Rate Pumping (gpm)**	**Interval-Specific Hydraulic Conductivity[3] (ft/day)**	**Transmissivity (ft^2/day)**	**Interval-Specific Fluid Electrical Conductivity (uS/cm)**
1*	5.1	8.8	3.7	0.001	NA	11.51	4.13E+01	1.53E+02	240
2	12.0	16.0	4.0	-0.065	NA				
3	19.1	36.3	17.2	0.012	NA				
4	46.2	58.5	12.3	0.052	NA	0.13	8.43E-02	1.04E+00	212
5	60.3	69.0	8.7	0.000	NA	0.01	1.53E-02	1.33E-01	212
6	78.3	86.8	8.5	0.003	0.07	0.07	1.05E-01	8.90E-01	212
7	93.6	109.8	16.2	0.006	0.07	0.10	7.71E-02	1.25E+00	212
8	124.4	149.1	24.7	0.003	0.02	0.07	3.63E-02	8.96E-01	215
9	172.1	175.5	3.4	0.000	0.00	0.007	2.74E-02	9.30E-02	225
10	191.4	199.2	7.8	0.000	0.00	0.03	5.11E-02	3.99E-01	225
11	354.7	361.4	6.7	0.005	0.15	0.116	2.20E-01	1.48E+00	245
Borehole Transmissivity Using Thiem Equation (ft^2/day)								**1.59E+02**	
Borehole Hydraulic Conductivity (K=T/b; b=length of borehole of 5.1'-362.0' = 356.9') (ft/day)							**4.46E-01**		

Note: Negative flow, if any, is outflow from the borehole to the aquifer, positive flow is inflow to the borehole.

* The top of this interval is AWL of 5.08 ftbgs. It is possible some of this inflow is coming in from above AWL.

[1] Downward, upward and horizontal flow are identified in this borehole under ambient conditions.

[2] Darcy Velocity, or Specific Discharge in aquifer, is calculated using the observed volumetric flow rate, the cross-sectional area of the flow interval in the wellbore and a wellbore convergence factor of 3.0 (Drost, 1968). The Darcy Velocity is only applicable to ambient horizontal flow.

[3] Hydraulic conductivity and transmissivity estimates are based on single well drawdown data, a porous-medium equivalent model and the Thiem equation.

NA = Not Applicable

Focused Density

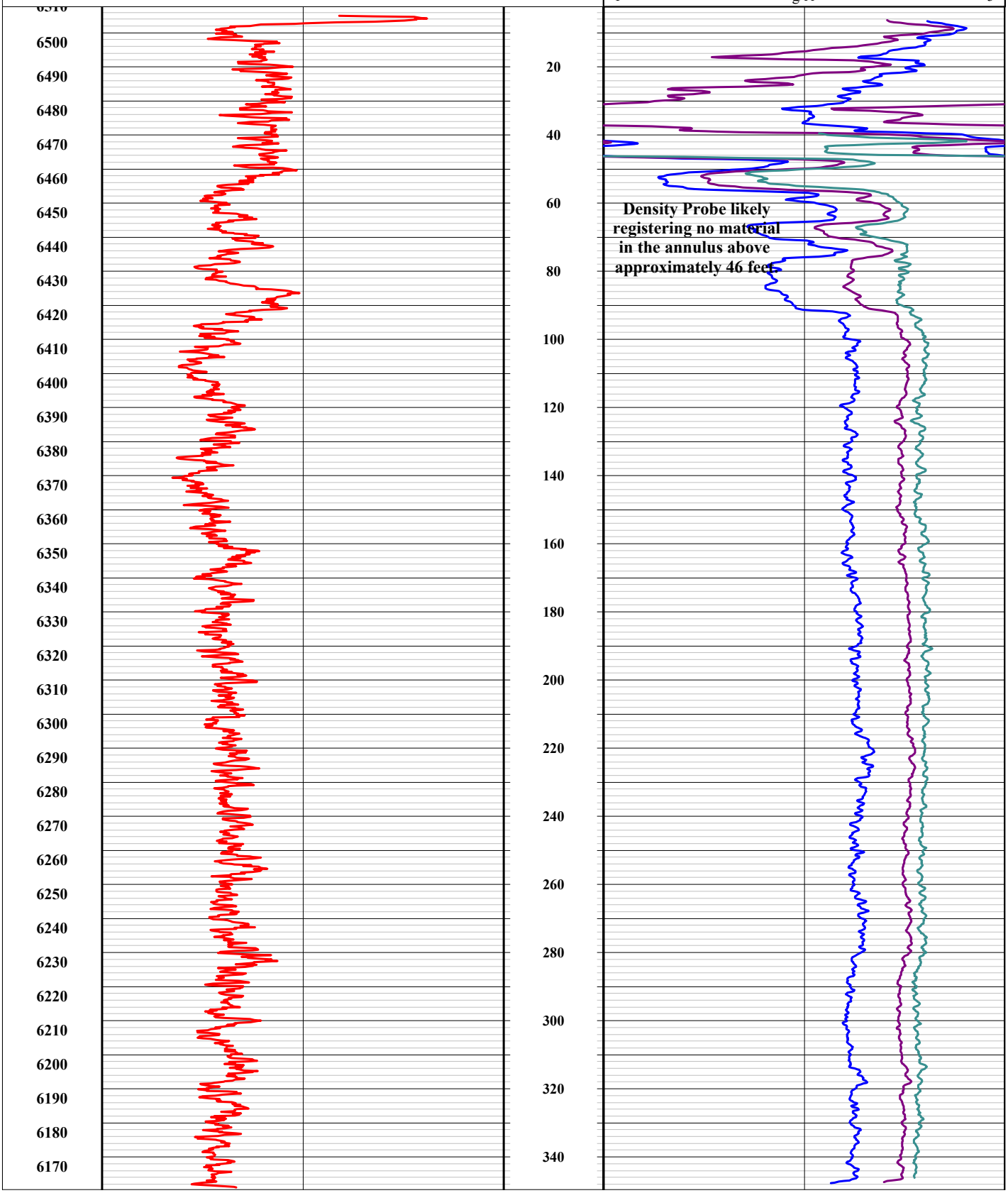
COLOG
borehole geophysics / hydrophysics

COMPANY: RMC - Consultants | PROJECT: Atlas Missile Site 4 Phase 2

DATE LOGGED: 29 Sept. 2017 | WELL: MW-95

Colog, Inc.
810 Quail Street, Suite E, Lakewood, CO 80215
Phone: (303) 279-0171, Fax: (303) 278-0135
www.colog.com

Elevation	Natural Gamma	Depth	Near Density	Far Density	Compensated Density
ft msl	0 CPS 200	1ft:480ft	1 g/cc 3	1 g/cc 3	1 g/cc 3



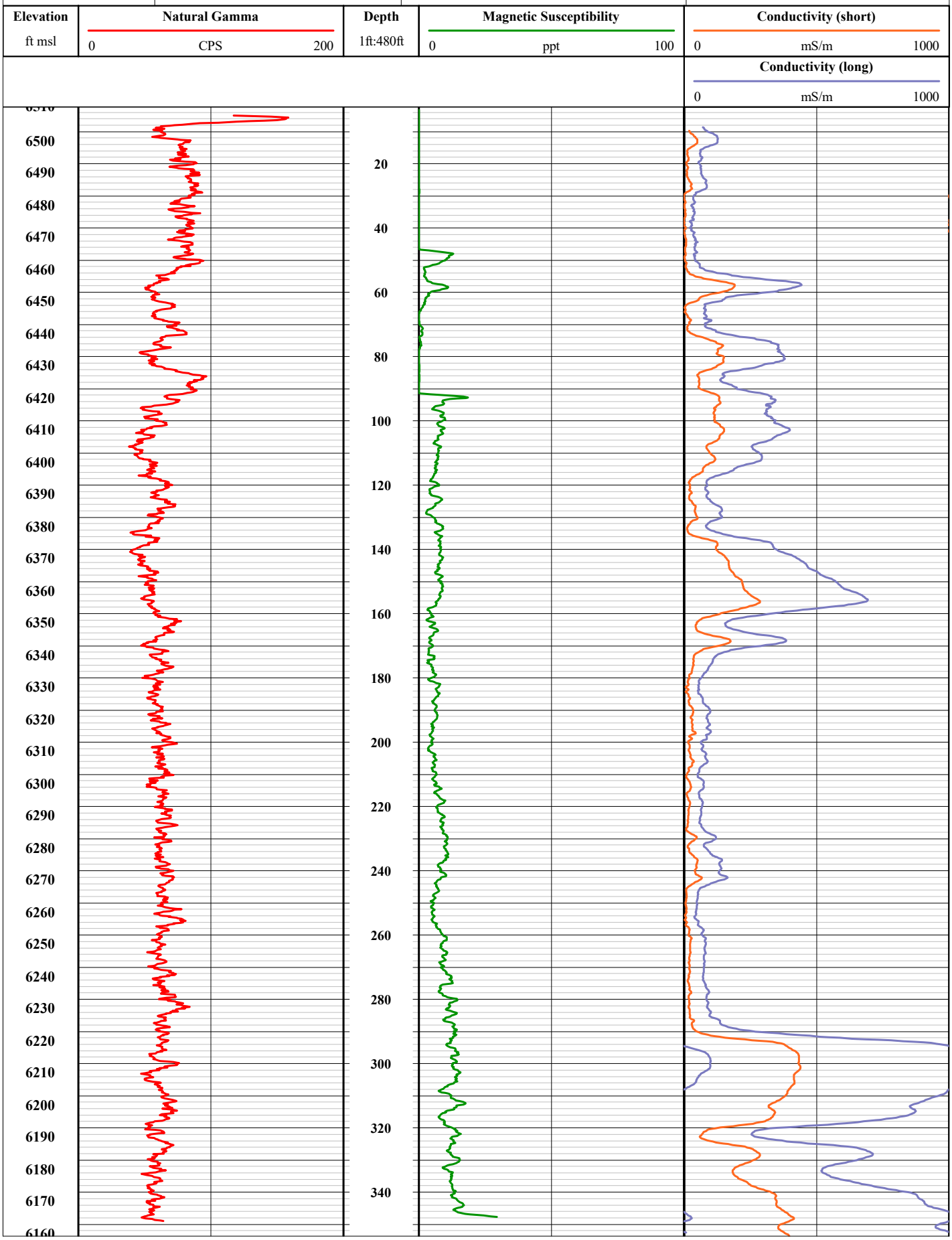
Dual Induction & Magnetic Susceptibility

COLOG
borehole geophysics / hydrophysics

COMPANY: RMC - Consultants | PROJECT: Atlas Missile Site 4 Phase 2

DATE LOGGED: 29 Sept. 2017 | WELL: MW-95

Colog, Inc.
810 Quail Street, Suite E, Lakewood, CO 80215
Phone: (303) 279-0171, Fax: (303) 278-0135
www.colog.com



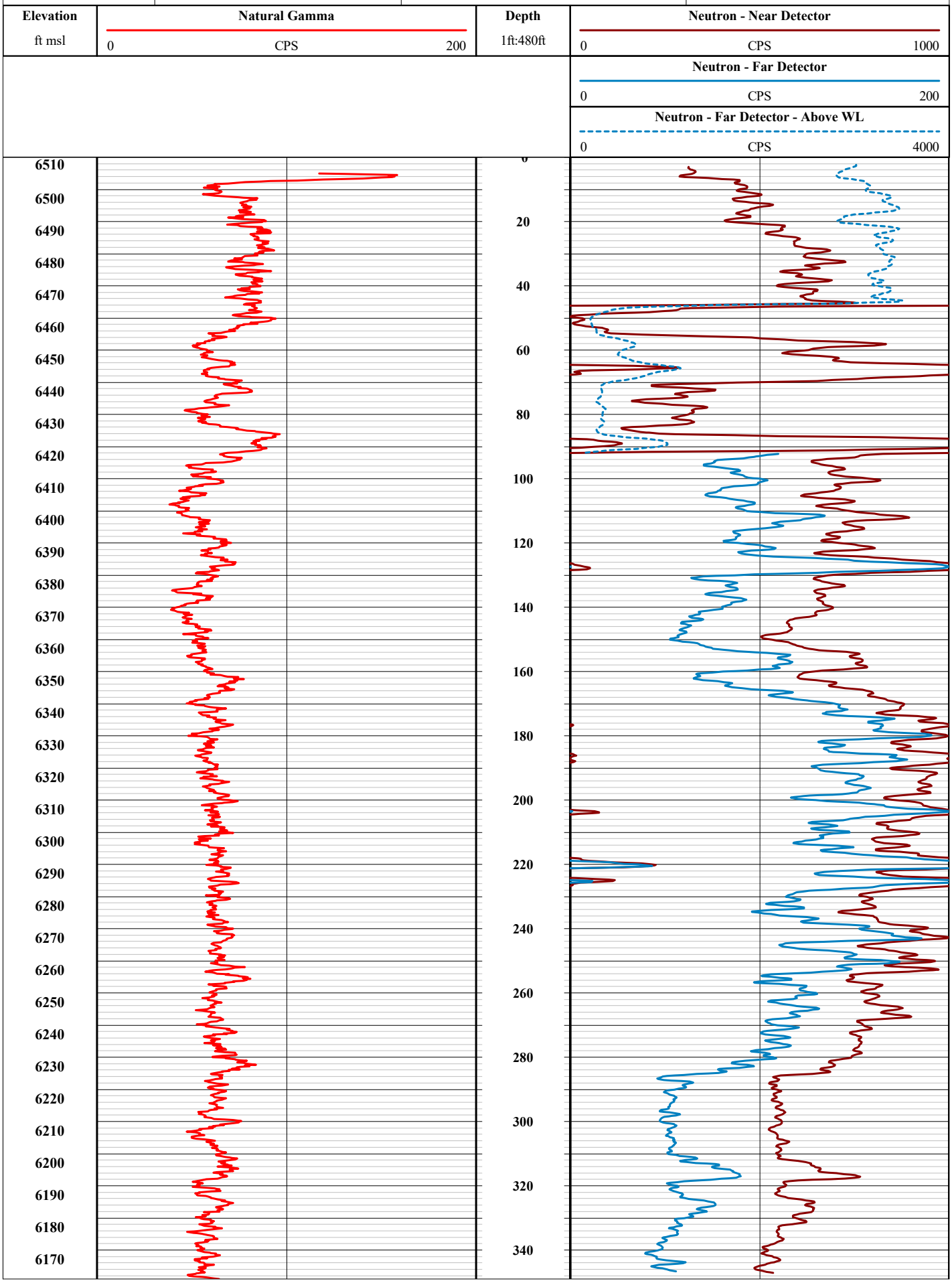
Dual Neutron

COMPANY: RMC - Consultants | PROJECT: Atlas Missile Site 4 Phase 2

DATE LOGGED: 29 Sept. 2017 | WELL: MW-95

COLOG
borehole geophysics / hydrophysics

Colog, Inc.
810 Quail Street, Suite E, Lakewood, CO 80215
Phone: (303) 279-0171, Fax: (303) 278-0135
www.colog.com



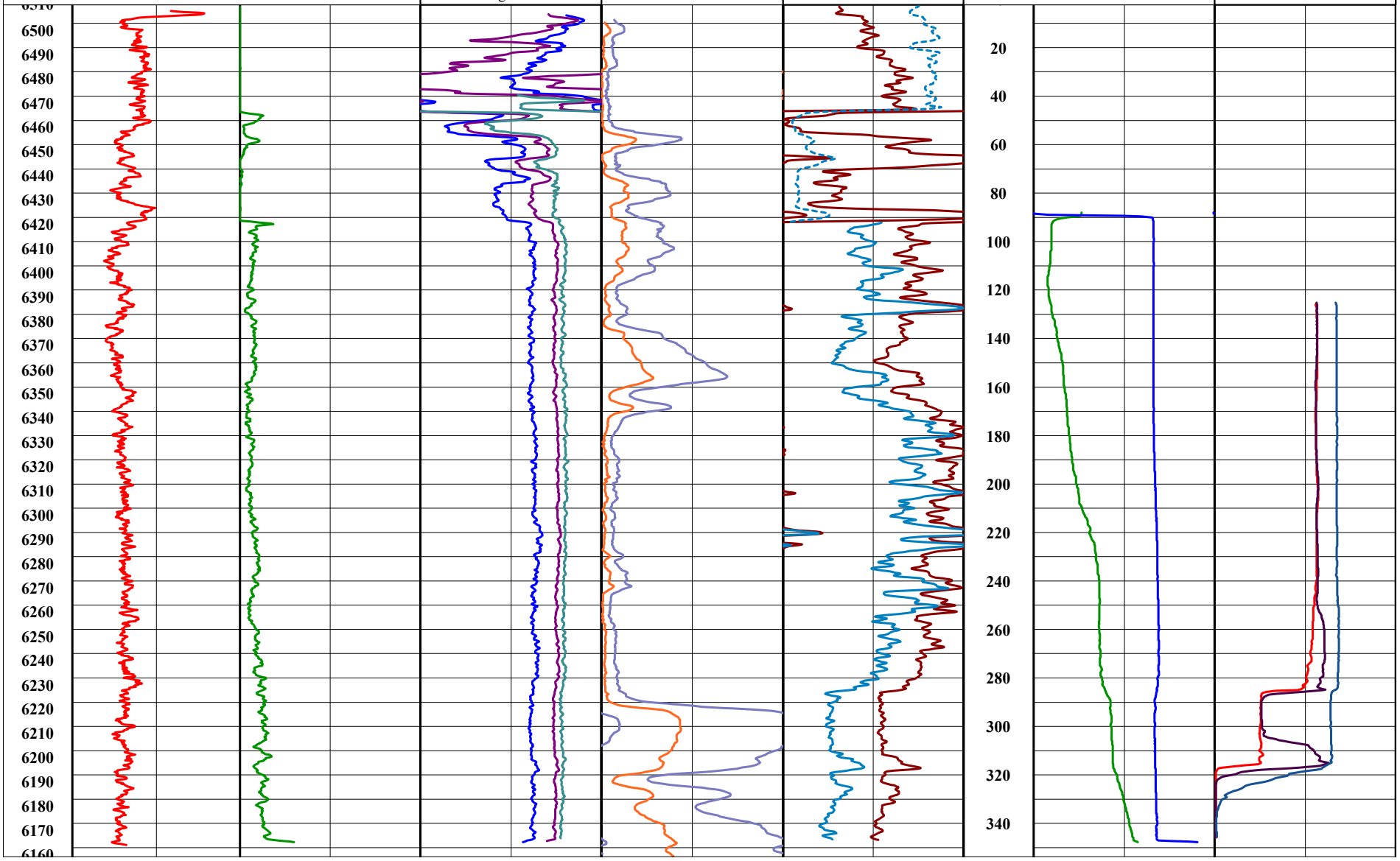
Geophysical/Hydrophysical Summary Plot

COLOG
borehole geophysics / hydrophysics

COMPANY: RMC - Consultants
PROJECT: Atlas Missile Site 4 Phase 2
DATE LOGGED: 29 September 2017
WELL: MW-95

COLOG Main Office
810 Quail Street, Suite E, Lakewood, CO 80215
Phone: (303) 279-0171, Fax: (303) 278-0135
www.colog.com

Elevation	Natural Gamma	Magnetic Susceptibility	Near Density	Conductivity (short)	Neutron - Near Detector	Depth	Ambient Temperature	FEC1211 - Pumping
ft msl	0 CPS 200	0 ppt 100	1 g/cc 3	0 mS/m 1000	0 CPS 1000	1ft:700ft	11 C 15	0 uS/cm 300
			Far Density	Conductivity (long)	Neutron - Far Detector		Ambient FEC	FEC1222 - Pumping
			1 g/cc 3	0 mS/m 1000	0 CPS 200		0 uS/cm 300	0 uS/cm 300
			Compensated Density		Neutron - Far-Above WL			FEC1302 - Pumping
			1 g/cc 3		0 CPS 4000			0 uS/cm 300



COLOG

borehole geophysics / hydrophysics

Geophysical/Hydrophysical Summary Plot

COMPANY: RMC - Consultants	PROJECT: Atlas Missile Site 4 Phase 2
DATE LOGGED: 29 September 2017	WELL: MW-95

COLOG Main Office

810 Quail Street, Suite E, Lakewood, CO 80215

Phone: (303) 279-0171, Fax: (303) 278-0135

www.colog.com

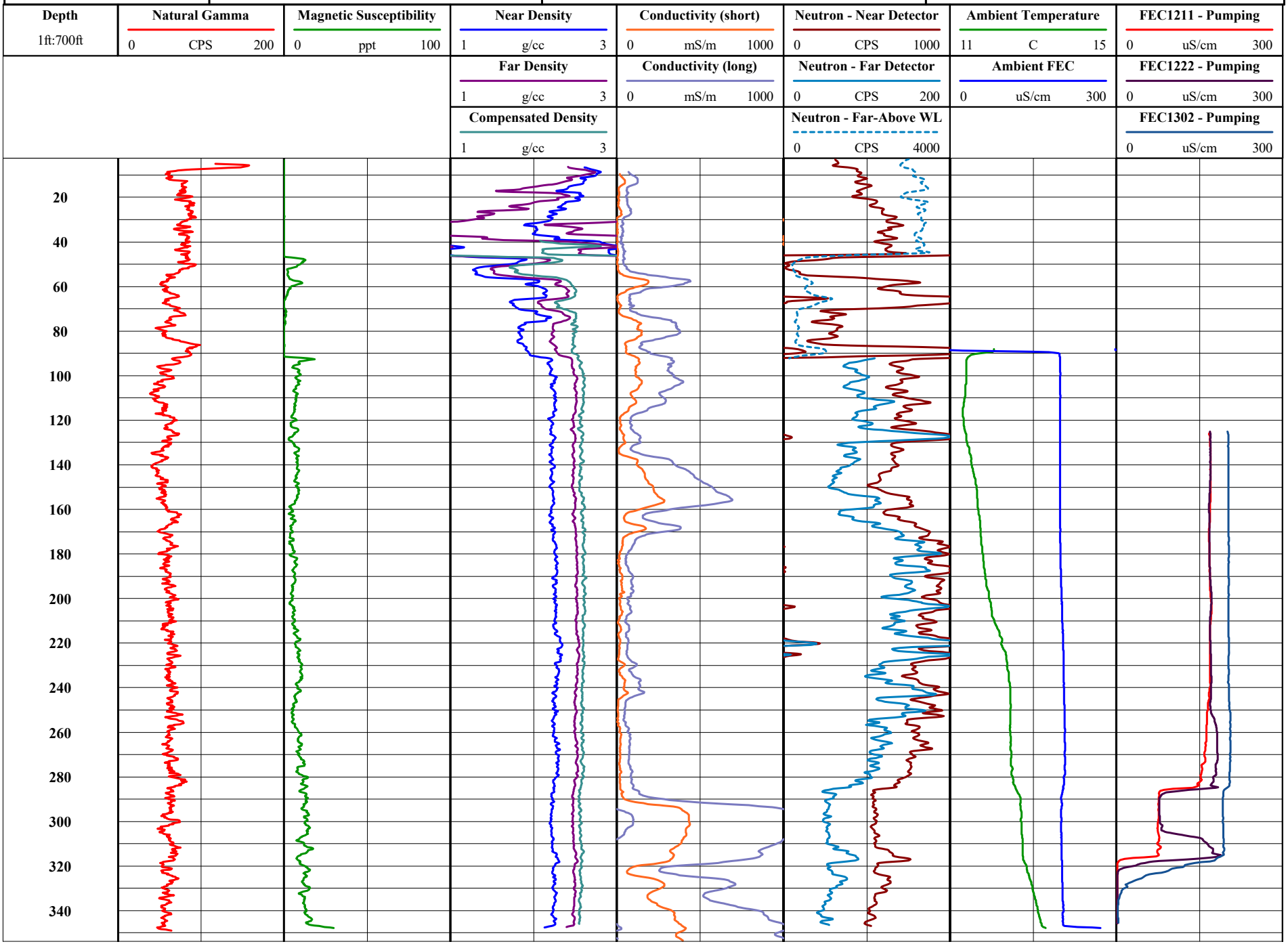


FIGURE MW-95:1. Ambient Temperature and Fluid Electrical Conductivity; RMC Consultants; Atlas Missile Site 4; Cheyenne, WY; Wellbore: MW-95

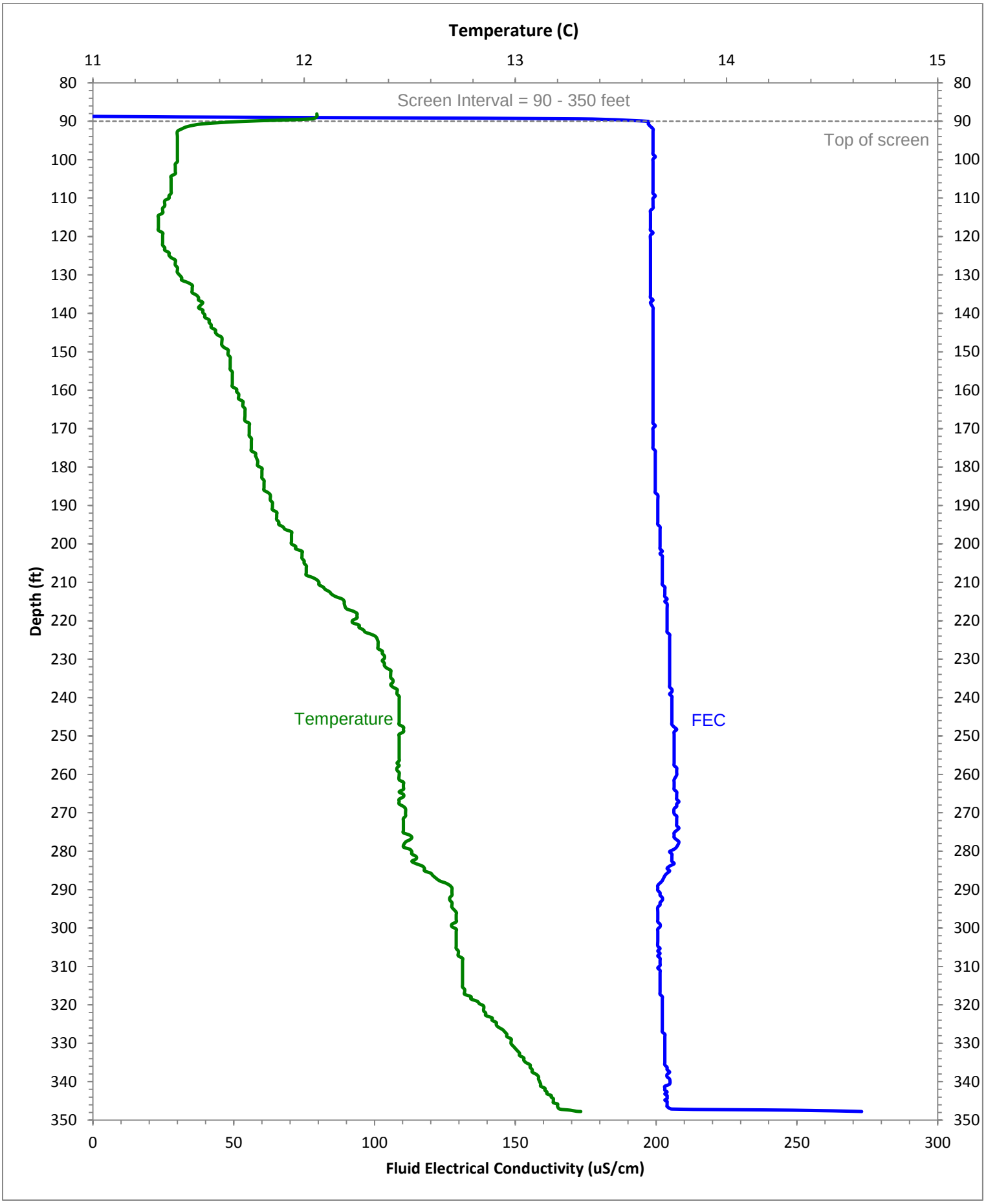


FIGURE MW-95:2. Summary of Hydrophysical Logs During Ambient Flow Characterization; RMC Consultants; Atlas Missile Site 4; Cheyenne, WY; Wellbore: MW-95

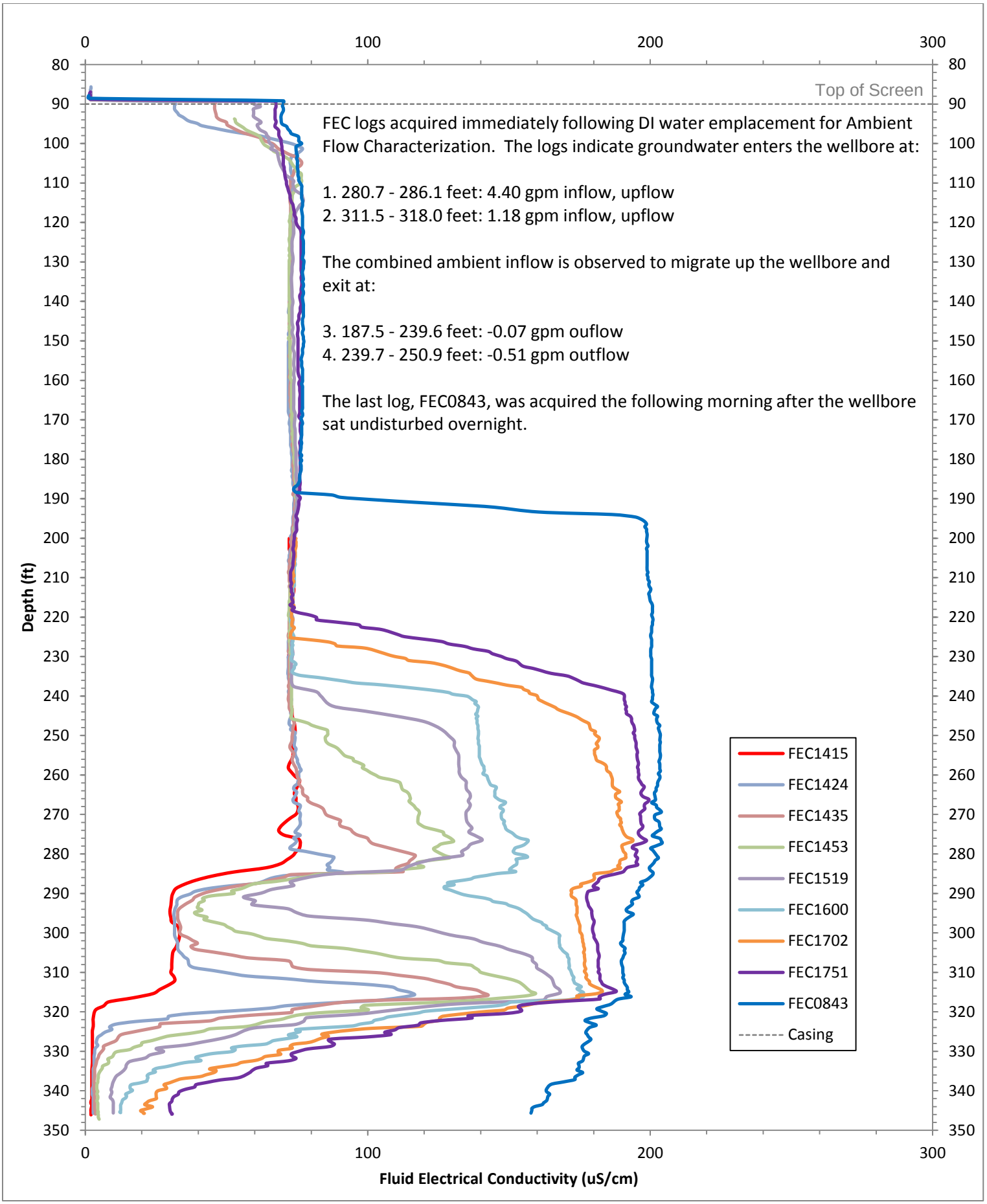


FIGURE MW-95:3. Pumping and Drawdown Data During 9 GPM Hydrophysical Pumping Test; RMC Consultants; Atlas Missile Site 4; Cheyenne, WY; Wellbore: MW-95

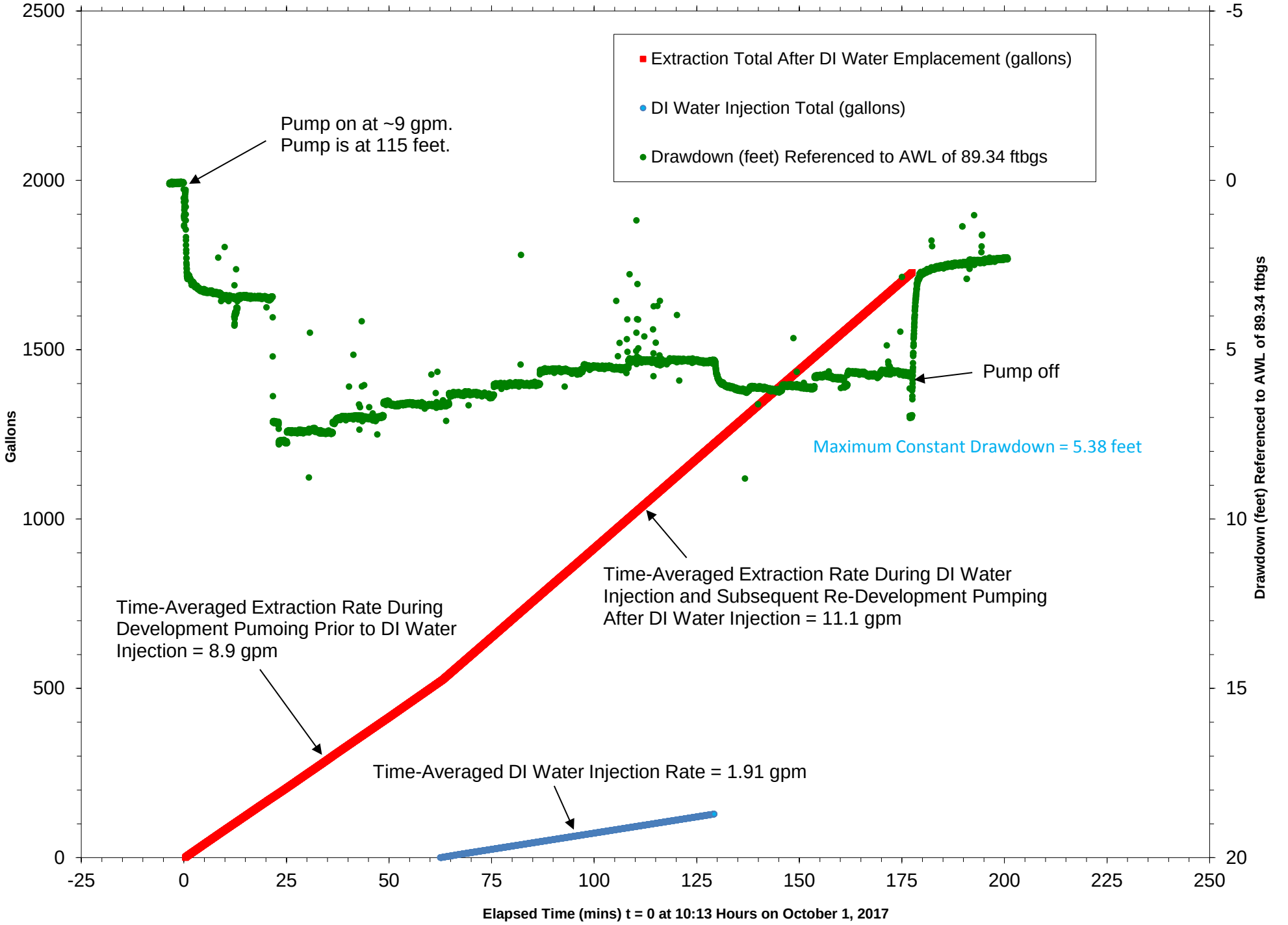


FIGURE MW-95:4A. Summary of Hydrophysical Logs During 9 GPM Production Test; RMC Consultants; Atlas Missile Site 4; Cheyenne, WY; Wellbore: MW-95

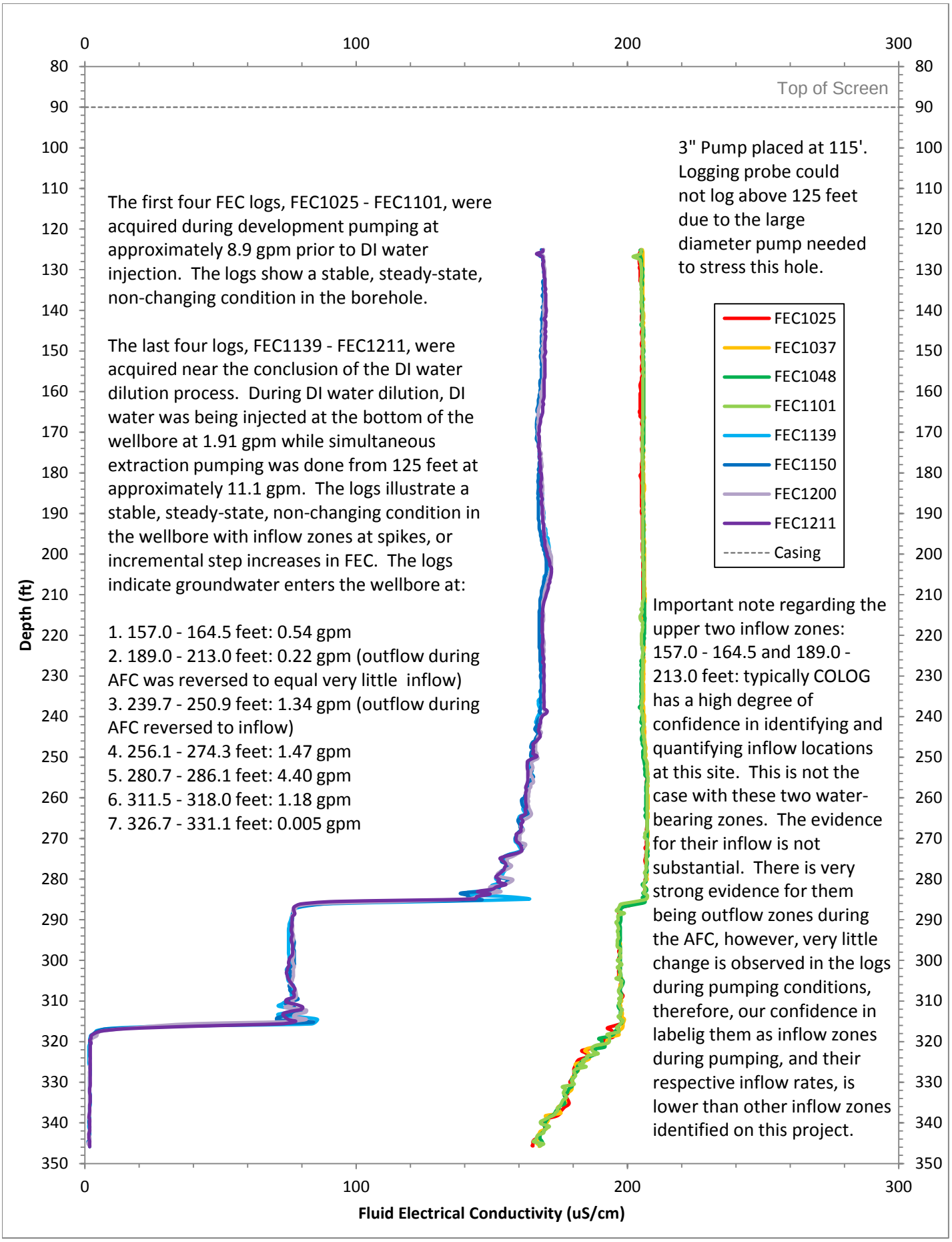


FIGURE MW-95:4B. Summary of Hydrophysical Logs During Re-Development Pumping at 9 GPM After DI Water Dilution; RMC Consultants; Atlas Missile Site 4; Cheyenne, WY; Wellbore: MW-95

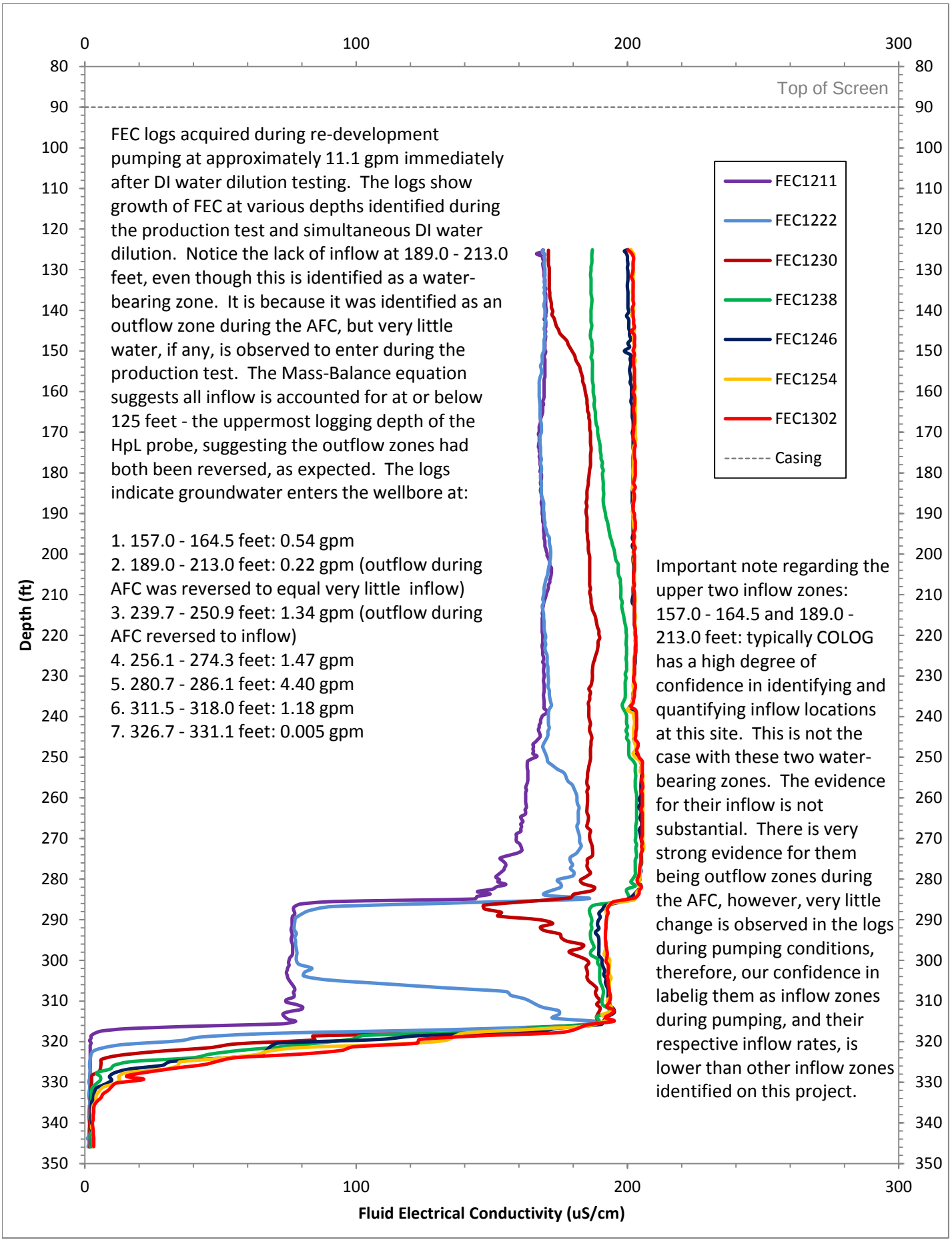


Table MW-95:1. Summary Of Hydrophysical Logging Results With Hydraulic Conductivity And Transmissivity Estimations; RMC Consultants; Atlas Missile Site 4; Cheyenne, WY; Wellbore: MW-95

Well Name	MW-95
Ambient Depth to Water (ftbtoc)	92.04
Ambient Depth to Water (ftbgs)	89.34
Screen Interval (ftbgs)	90 - 350

Diameter of Well (ft)	0.33
Maximum Drawdown (ft)	5.38
Effective Radius (ft)	300
Well Specific Capacity (gpm/ft-dd)	1.702

Hydrophysical Logging Results - MW-95									
Interval No.	**Top of Interval (ft)**	**Bottom of Interval (ft)**	**Length of Interval (ft)**	**Ambient Flow[1] (gpm)**	**Darcy Velocity in Aquifer[2] (ft/day)**	**Interval-Specific Flow Rate During Pumping (gpm)**	**Interval-Specific Hydraulic Conductivity[3] (ft/day)**	**Transmissivity (ft^2/day)**	**Interval-Specific Fluid Electrical Conductivity (uS/cm)**
1	157.0	164.5	7.5	0.00	NA	0.54	3.08E+00	2.31E+01	205
2	189.0	213.0	24.0	-0.07	NA	0.22	5.20E-01	1.25E+01	205
3	239.7	250.9	11.2	-0.51	NA	1.34	7.05E+00	7.89E+01	196
4	256.1	274.3	18.2	0.00	NA	1.47	3.45E+00	6.29E+01	209
5	280.7	286.1	5.4	0.38	NA	4.40	3.18E+01	1.72E+02	209
6	311.5	318.0	6.5	0.20	NA	1.18	6.46E+00	4.20E+01	197
7	326.7	331.1	4.4	0.00	NA	0.005	4.86E-02	2.14E-01	187
Borehole Transmissivity Using Thiem Equation (ft^2/day)								**3.92E+02**	
Borehole Hydraulic Conductivity (K=T/b; b=length of borehole of 90.0'-350.0' = 260.0') (ft/day)							**1.51E+00**		

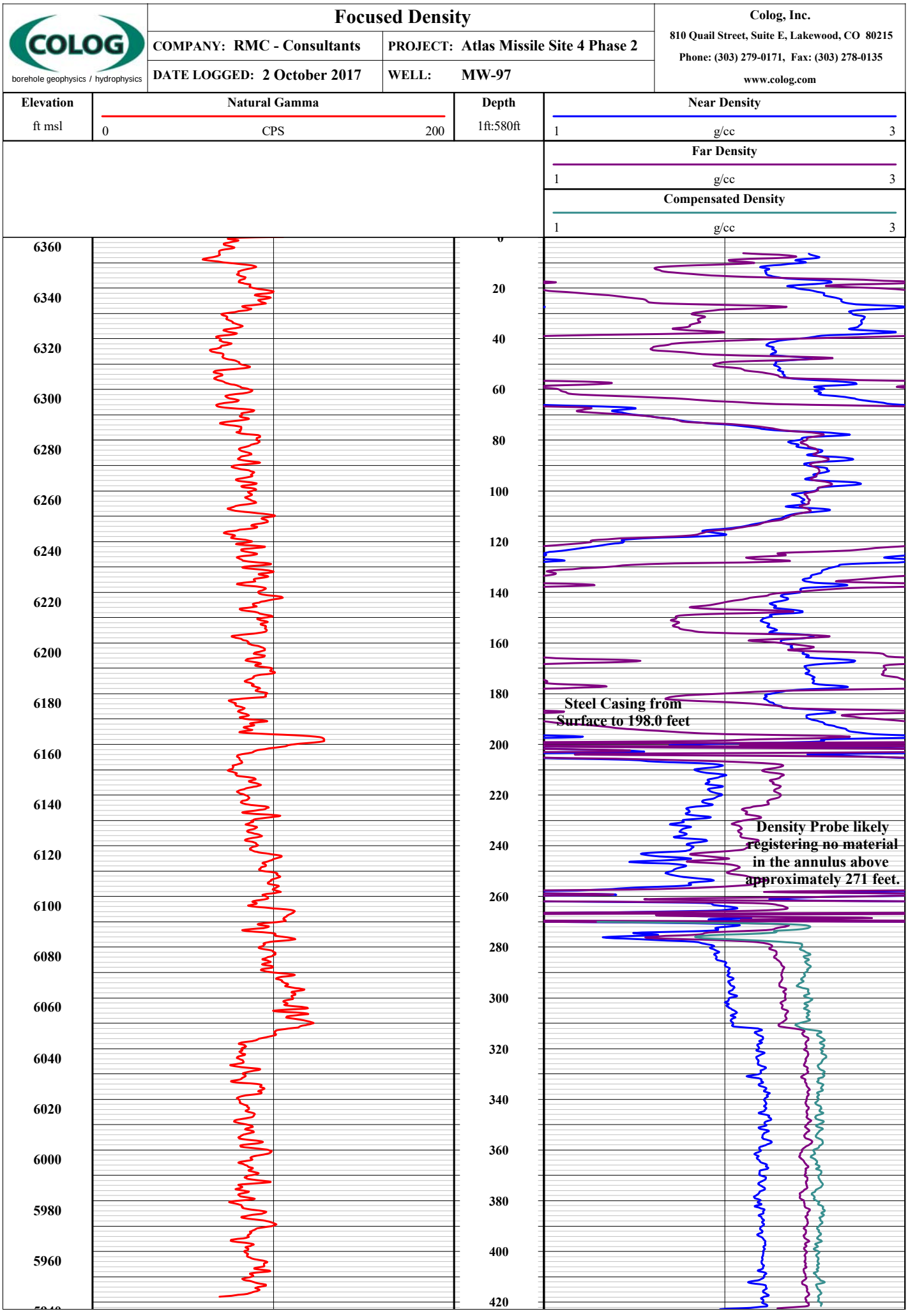
Note: Negative flow, if any, is outflow from the borehole to the aquifer, positive flow is inflow to the borehole.

[1] Upward vertical flow is identified in this borehole under ambient conditions.

[2] Darcy Velocity, or Specific Discharge in aquifer, is calculated using the observed volumetric flow rate, the cross-sectional area of the flow interval in the wellbore and a wellbore convergence factor of 3.0 (Drost, 1968). The Darcy Velocity is only applicable to ambient horizontal flow.

[3] Hydraulic conductivity and transmissivity estimates are based on single well drawdown data, a porous-medium equivalent model and the Thiem equation.

NA = Not Applicable


COLOG
borehole geophysics / hydrophysics
Focused Density
COMPANY: RMC - Consultants
PROJECT: Atlas Missile Site 4 Phase 2
DATE LOGGED: 2 October 2017
WELL: MW-97
Colog, Inc.
810 Quail Street, Suite E, Lakewood, CO 80215
Phone: (303) 279-0171, Fax: (303) 278-0135
www.colog.com
Elevation
ft msl
Natural Gamma
0
CPS
200
Depth
1ft:580ft
Near Density
1
g/cc
3
Far Density
1
g/cc
3
Compensated Density
1
g/cc
3
6360
6340
6320
6300
6280
6260
6240
6220
6200
6180
6160
6140
6120
6100
6080
6060
6040
6020
6000
5980
5960
0
20
40
60
80
100
120
140
160
180
200
220
240
260
280
300
320
340
360
380
400
420
Steel Casing from
Surface to 198.0 feet
Density Probe likely
registering no material
in the annulus above
approximately 271 feet.

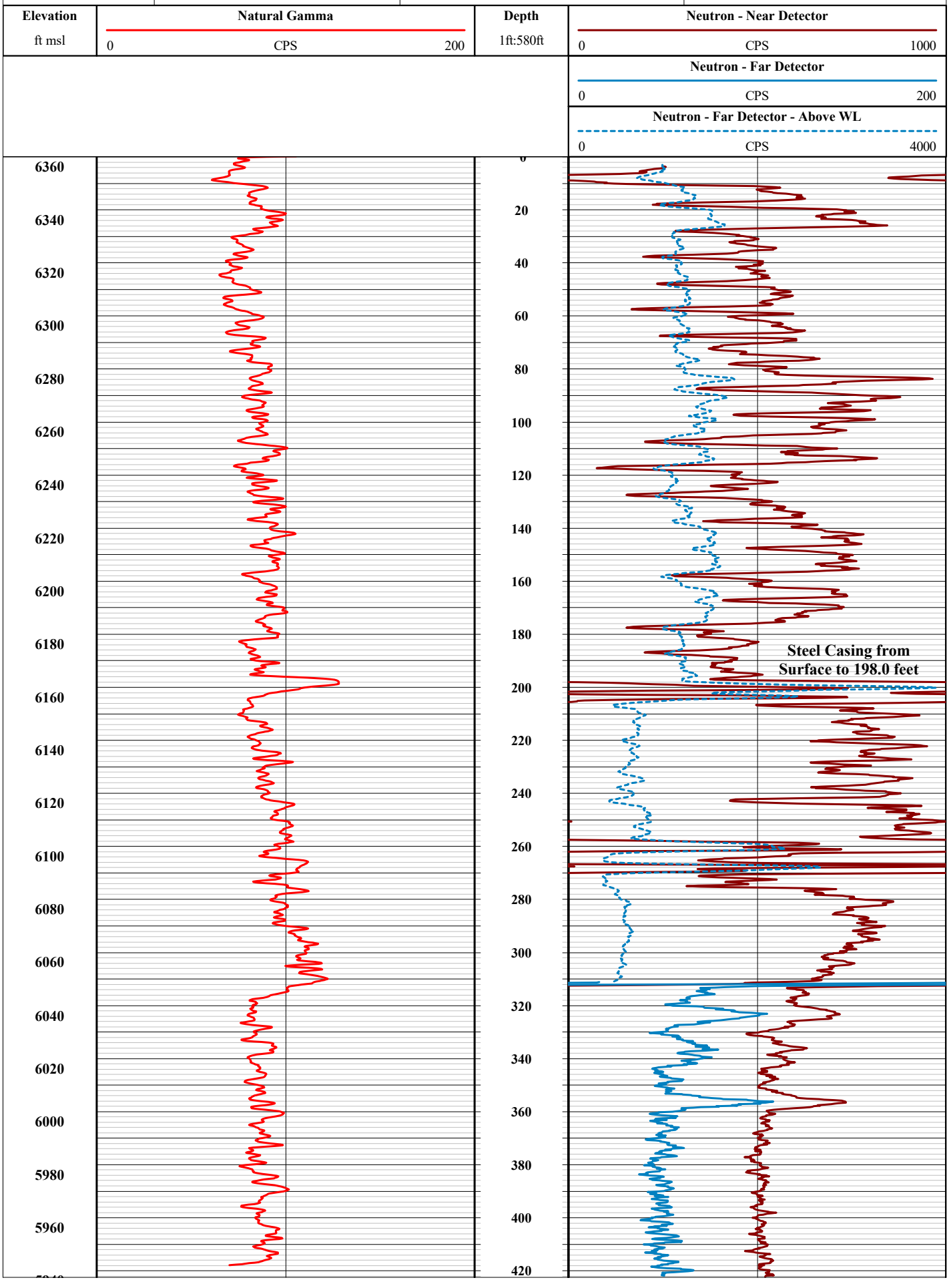
Dual Neutron

COMPANY: RMC - Consultants | PROJECT: Atlas Missile Site 4 Phase 2

DATE LOGGED: 2 October 2017 | WELL: MW-97

Colog, Inc.
810 Quail Street, Suite E, Lakewood, CO 80215
Phone: (303) 279-0171, Fax: (303) 278-0135
www.colog.com

borehole geophysics / hydrophysics

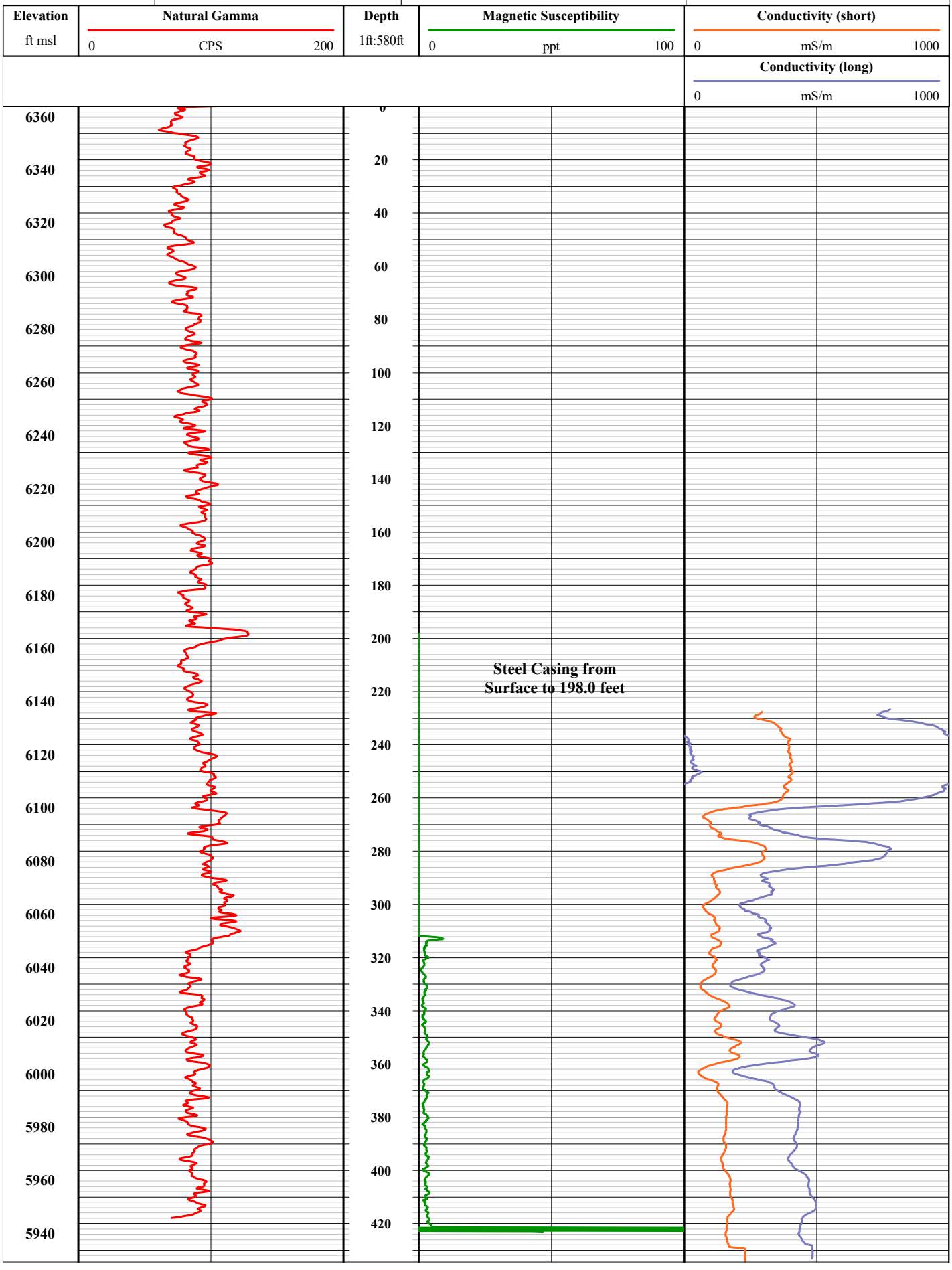


Dual Induction & Magnetic Susceptibility

COLOG
borehole geophysics / hydrophysics

COMPANY: RMC - Consultants
PROJECT: Atlas Missile Site 4 Phase 2
DATE LOGGED: 2 October 2017
WELL: MW-97

Colog, Inc.
810 Quail Street, Suite E, Lakewood, CO 80215
Phone: (303) 279-0171, Fax: (303) 278-0135
www.colog.com

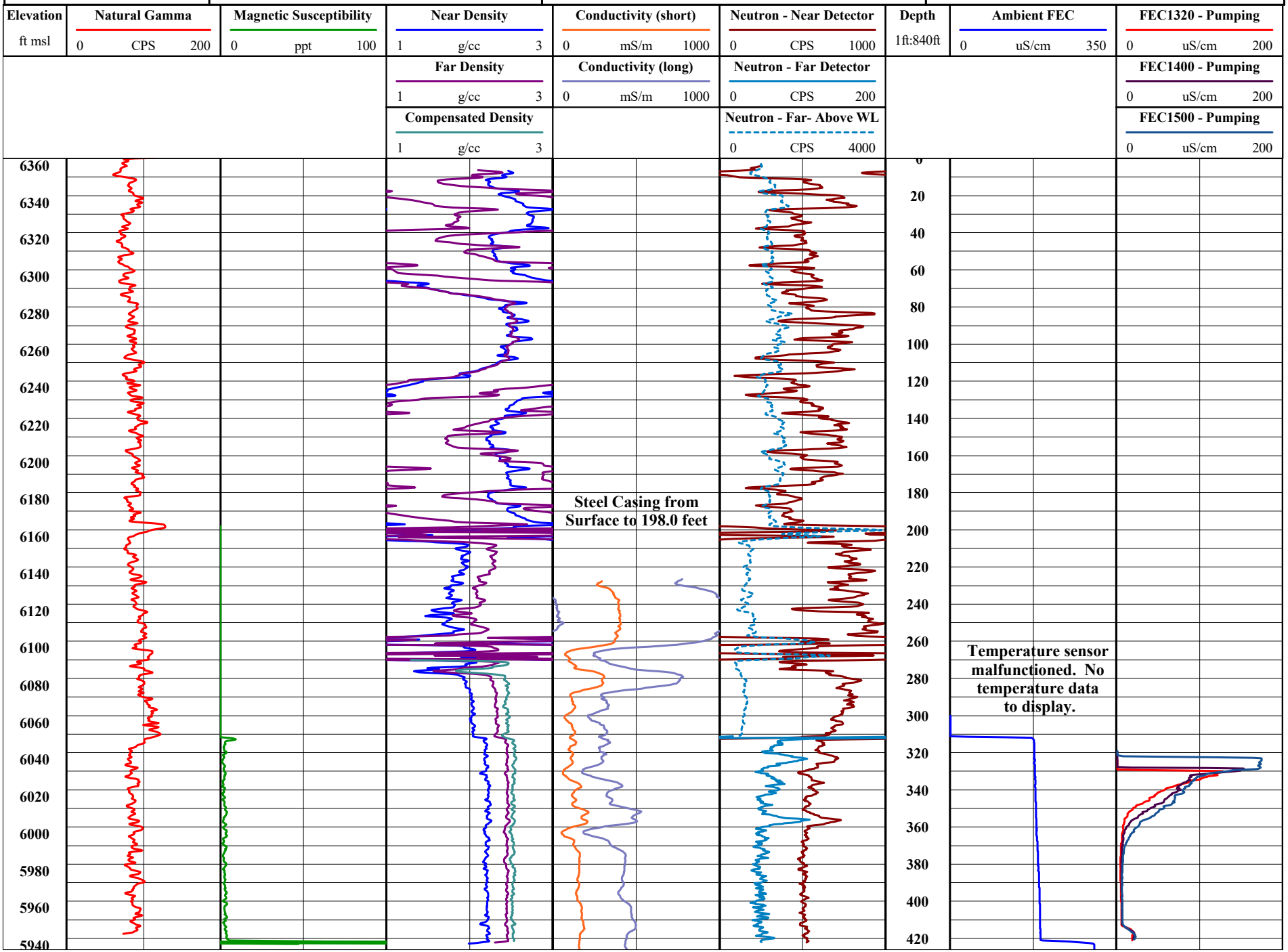


Geophysical/Hydrophysical Summary Plot

COLOG
borehole geophysics / hydrophysics

COMPANY: RMC - Consultants
PROJECT: Atlas Missile Site 4 Phase 2
DATE LOGGED: 2 October 2017
WELL: MW-97

COLOG Main Office
810 Quail Street, Suite E, Lakewood, CO 80215
Phone: (303) 279-0171, Fax: (303) 278-0135
www.colog.com



Geophysical/Hydrophysical Summary Plot

COLOG
borehole geophysics / hydrophysics

COMPANY: RMC - Consultants
PROJECT: Atlas Missile Site 4 Phase 2
DATE LOGGED: 2 October 2017
WELL: MW-97

COLOG Main Office
810 Quail Street, Suite E, Lakewood, CO 80215
Phone: (303) 279-0171, Fax: (303) 278-0135
www.colog.com

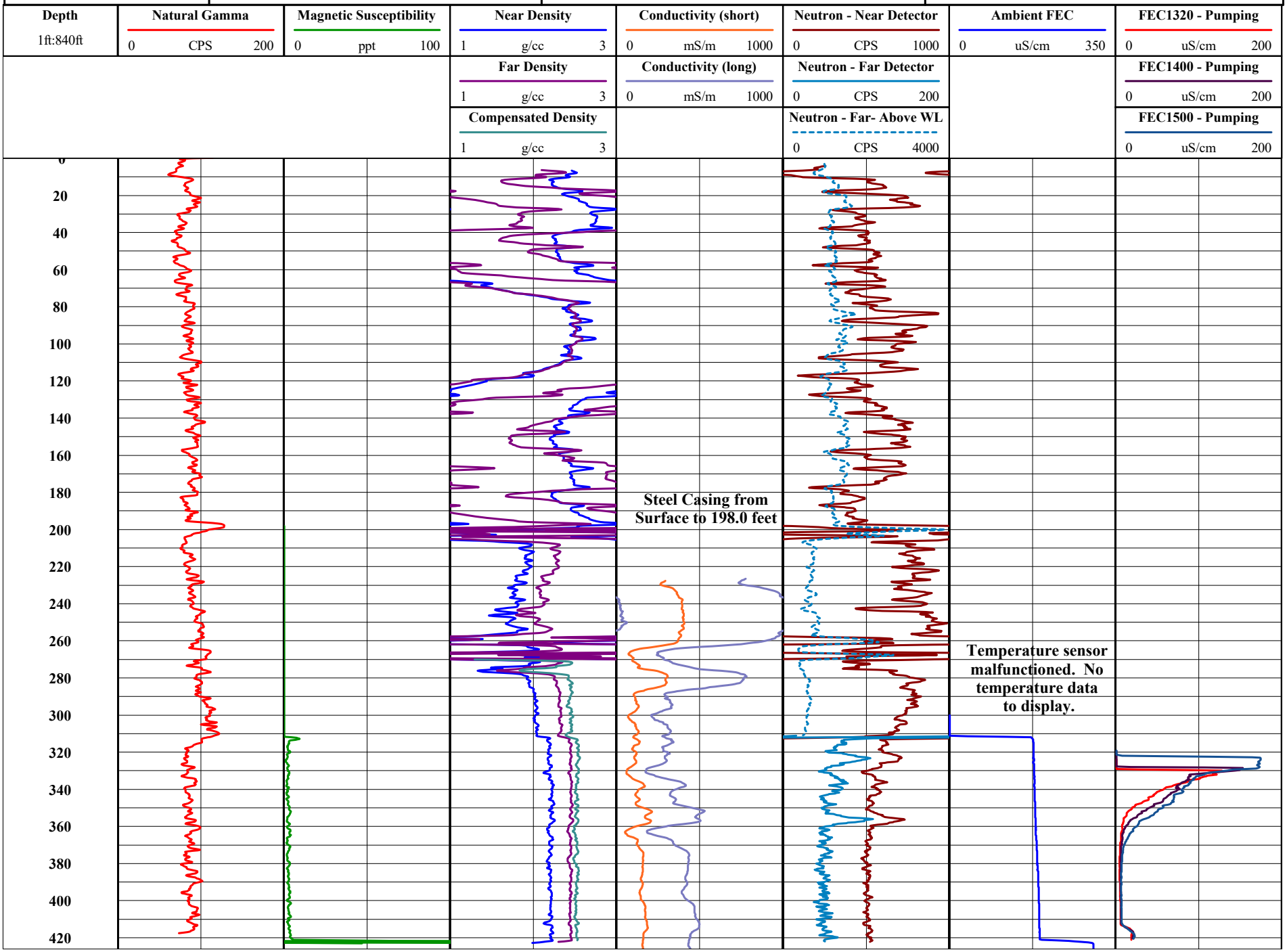


FIGURE MW-97:1. Ambient Temperature and Fluid Electrical Conductivity; RMC Consultants; Atlas Missile Site 4; Cheyenne, WY; Wellbore: MW-97

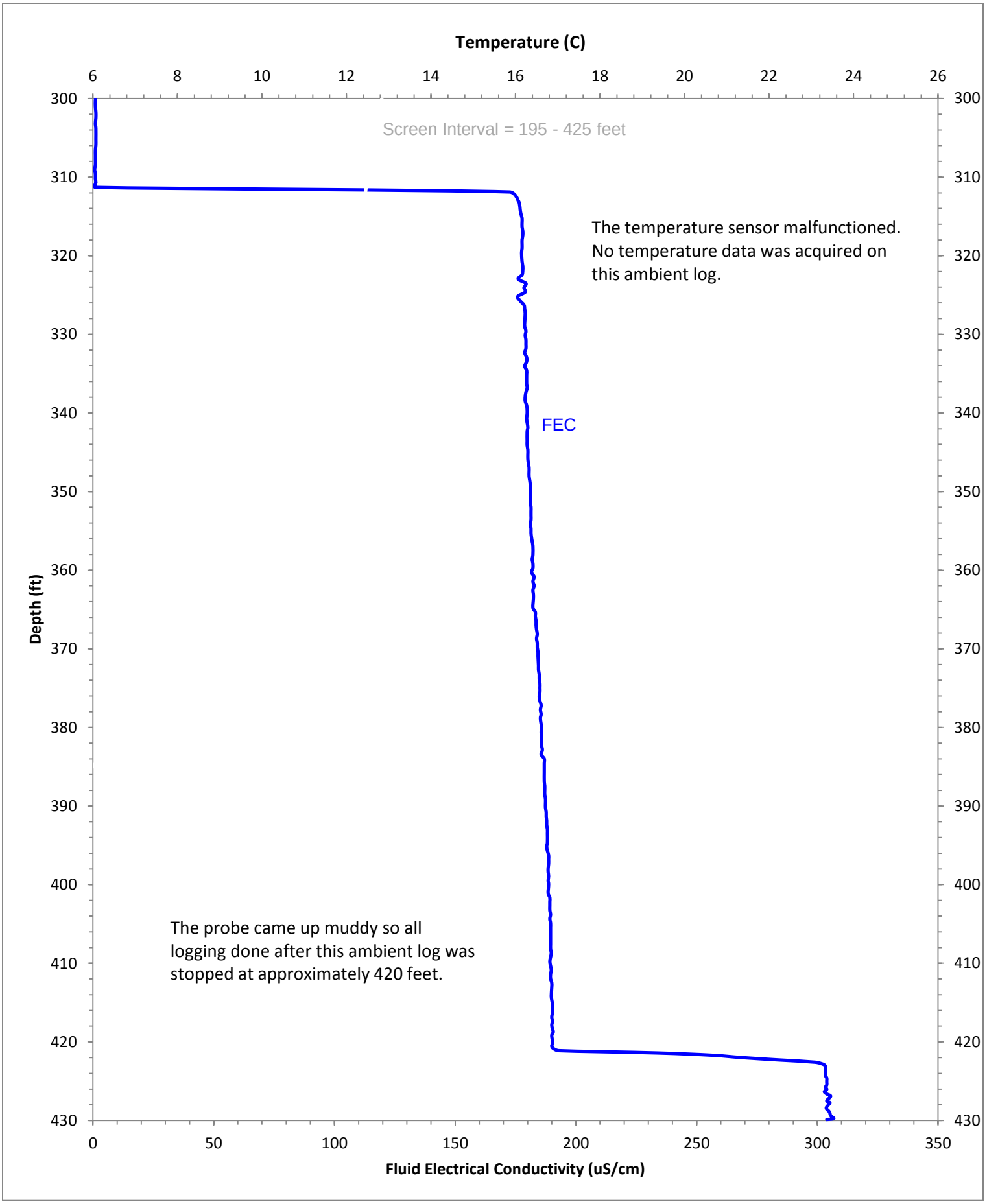


FIGURE MW-97:2. Summary of Hydrophysical Logs During Ambient Flow Characterization; RMC Consultants; Atlas Missile Site 4; Cheyenne, WY; Wellbore: MW-97

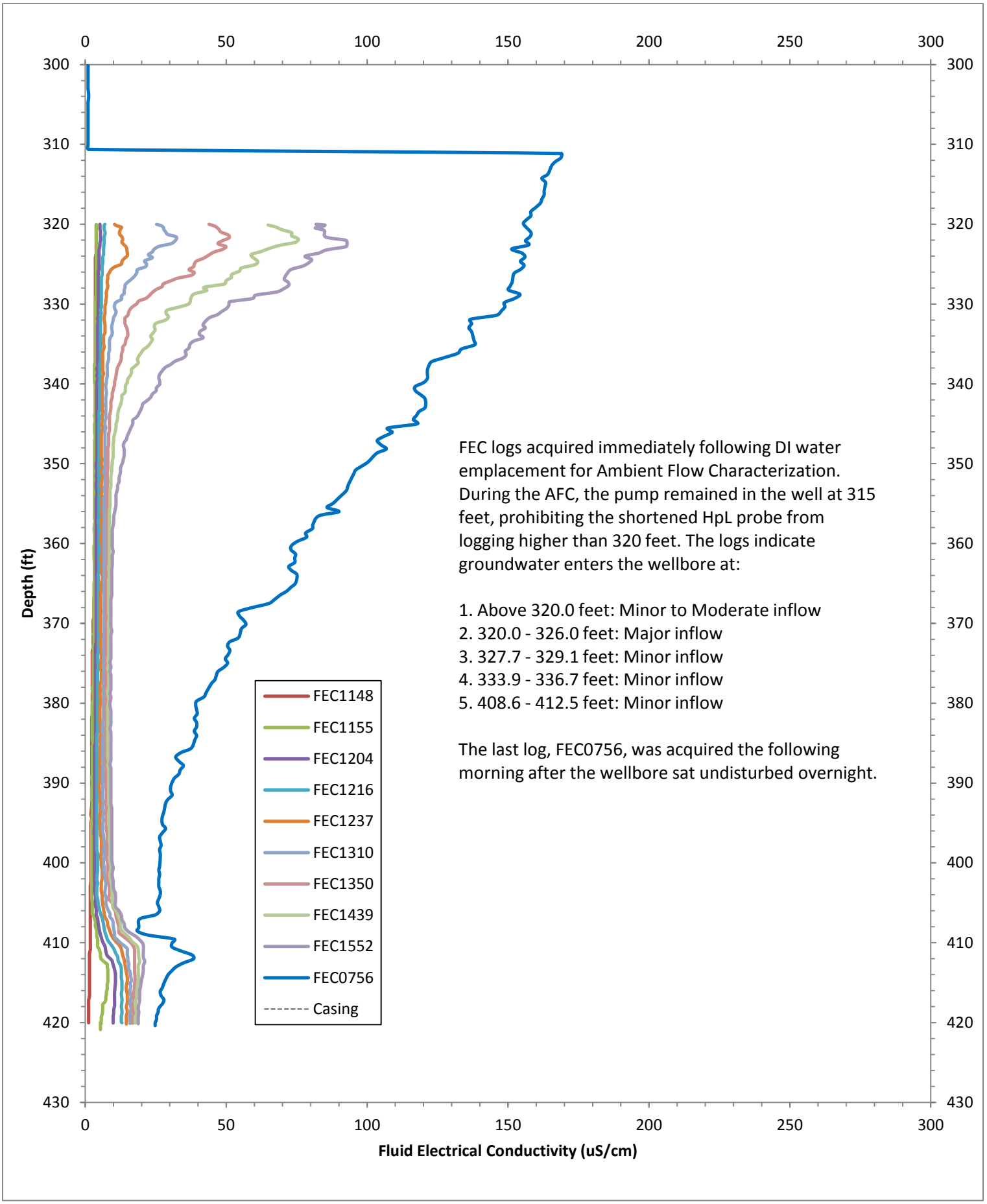


FIGURE MW-97:3. Pumping and Drawdown Data During 27-Foot Hydrophysical Slug Test; RMC Consultants; Atlas Missile Site 4; Cheyenne, WY; Wellbore: MW-97

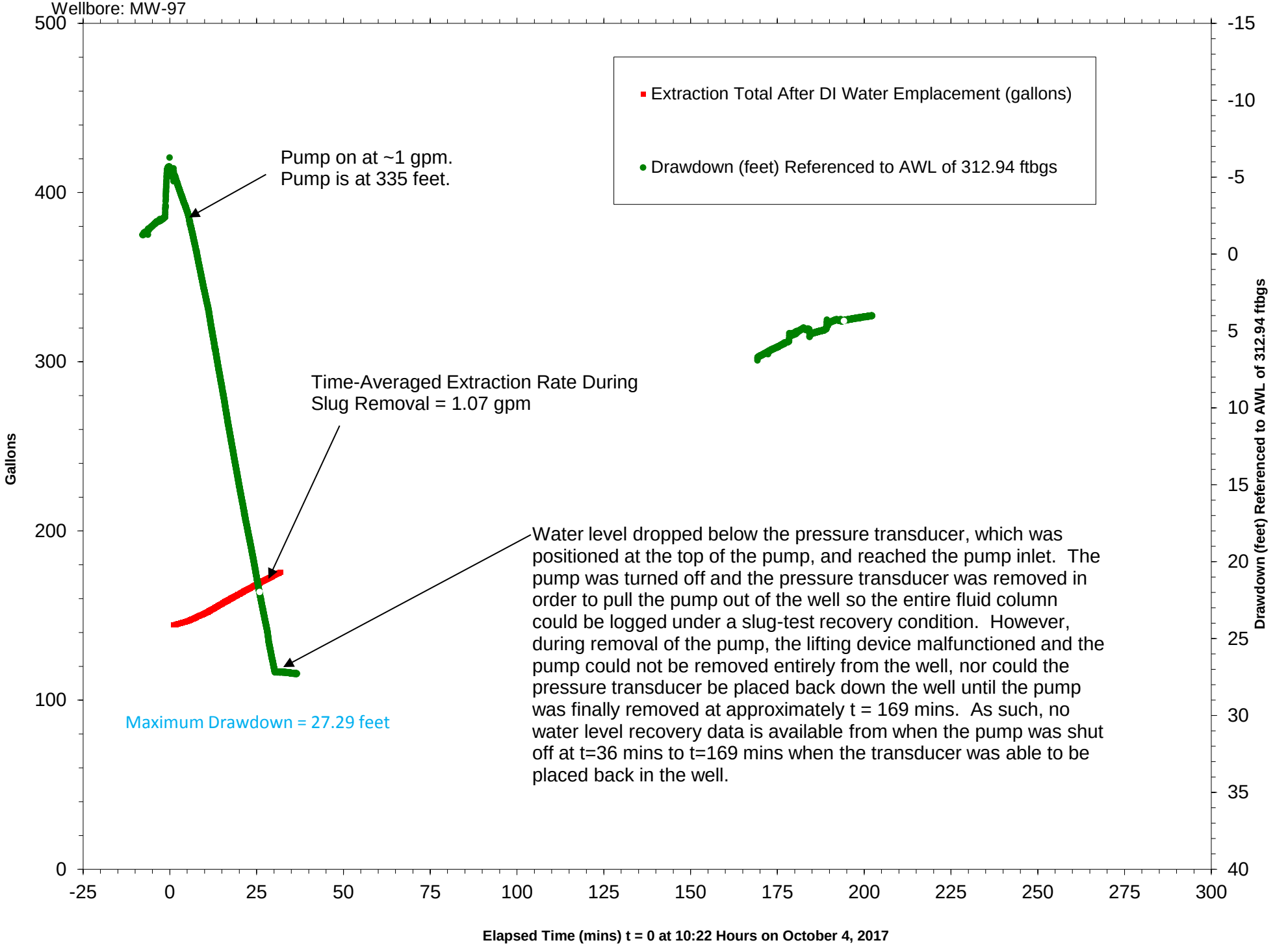


FIGURE MW-97:4. Summary of Hydrophysical Logs During 27-Foot Slug Production Test; RMC Consultants; Atlas Missile Site 4; Cheyenne, WY; Wellbore: MW-97

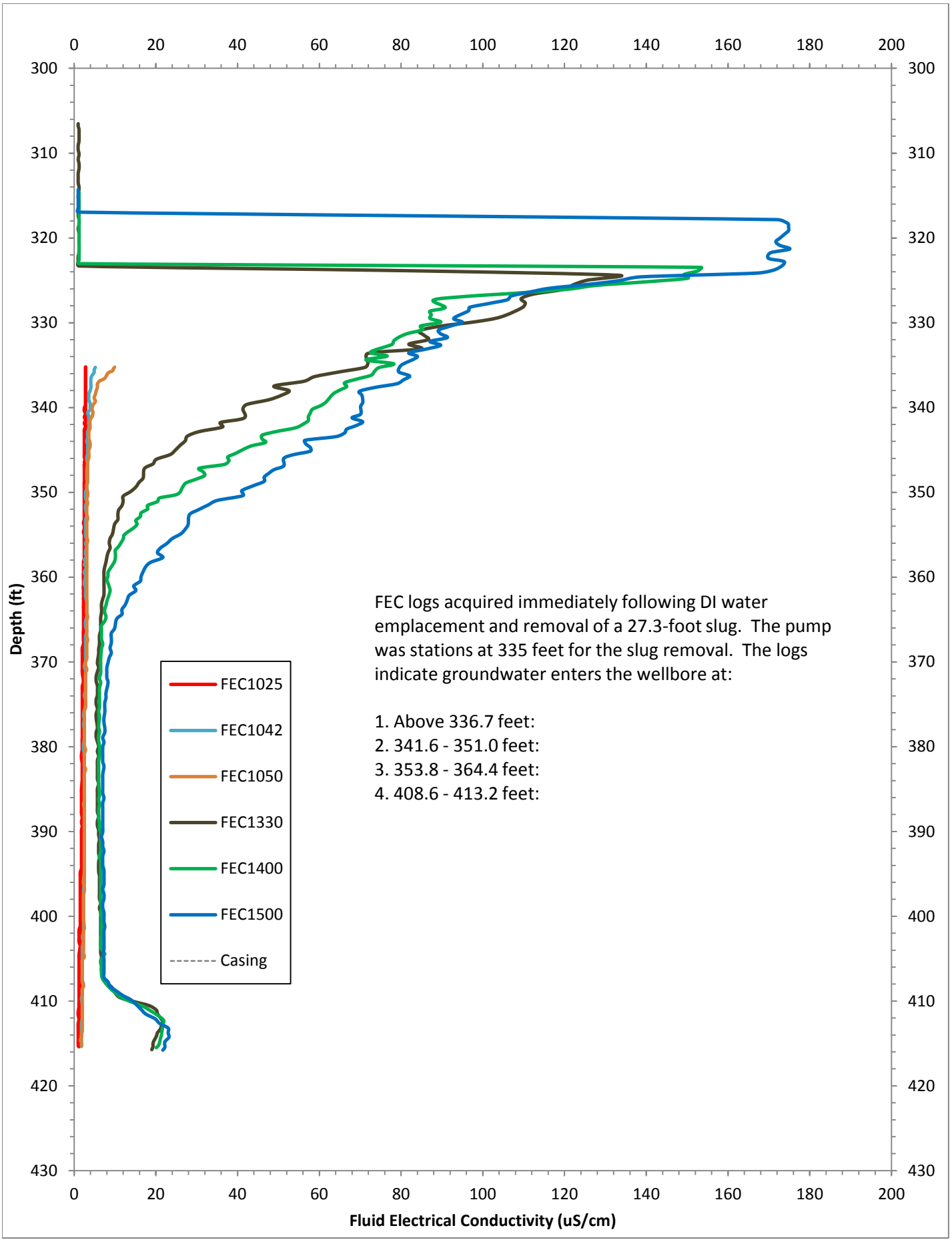


Table MW-97:1. Summary Of Hydrophysical Logging Results With Hydraulic Conductivity And Transmissivity Estimations; RMC Consultants; Atlas Missile Site 4; Cheyenne, WY; Wellbore: MW-97

Well Name	MW-97
Ambient Depth to Water (ftbtoc)	92.04
Ambient Depth to Water (ftbgs)	89.34
Screen Interval (ftbgs)	195 - 425

Diameter of Well (ft)	0.33
Maximum Drawdown (ft)	27.29
Effective Radius (ft)	100
Well Specific Capacity (gpm/ft-dd)	0.007

Hydrophysical Logging Results - MW-97

Interval No.	Top of Interval (ft)	Bottom of Interval (ft)	Length of Interval (ft)	Ambient Flow[1] (gpm)	Darcy Velocity in Aquifer[2] (ft/day)	Interval-Specific Flow Rate During Pumping (gpm)	Interval-Specific Hydraulic Conductivity[3] (ft/day)	Transmissivity (ft^2/day)	Interval-Specific Fluid Electrical Conductivity (uS/cm)
1*	312.9	326.0	13.1	0.08	NA	0.11	9.45E-02	1.24E+00	170
2	327.7	329.1	1.4	0.007	NA				
3	333.9	336.7	2.8	0.007	NA				
4	341.6	351.0	9.4	0.005	NA	0.060	4.21E-02	3.96E-01	170
5	353.8	364.4	10.6	-0.099	NA	0.009	7.33E-02	7.77E-01	170
6	408.6	413.2	4.6	0.008	0.34	0.012	6.26E-03	2.88E-02	170
Borehole Transmissivity Using Thiem Equation (ft^2/day)								**2.44E+00**	
Borehole Hydraulic Conductivity (K=T/b; b=length of borehole of 312.9'-425.0' = 112.1') (ft/day)							**2.18E-02**		

Note: Negative flow, if any, is outflow from the borehole to the aquifer, positive flow is inflow to the borehole.

* The top of this interval is assumed to be AWL of 312.9 ftbgs.

[1] Downward vertical flow and horizontal flow are identified in this borehole under ambient conditions.

[2] Darcy Velocity, or Specific Discharge in aquifer, is calculated using the observed volumetric flow rate, the cross-sectional area of the flow interval in the wellbore and a wellbore convergence factor of 3.0 (Drost, 1968). The Darcy Velocity is only applicable to ambient horizontal flow.

[3] Hydraulic conductivity and transmissivity estimates are based on single well drawdown data, a porous-medium equivalent model and the Thiem equation.

NA = Not Applicable

Focused Density

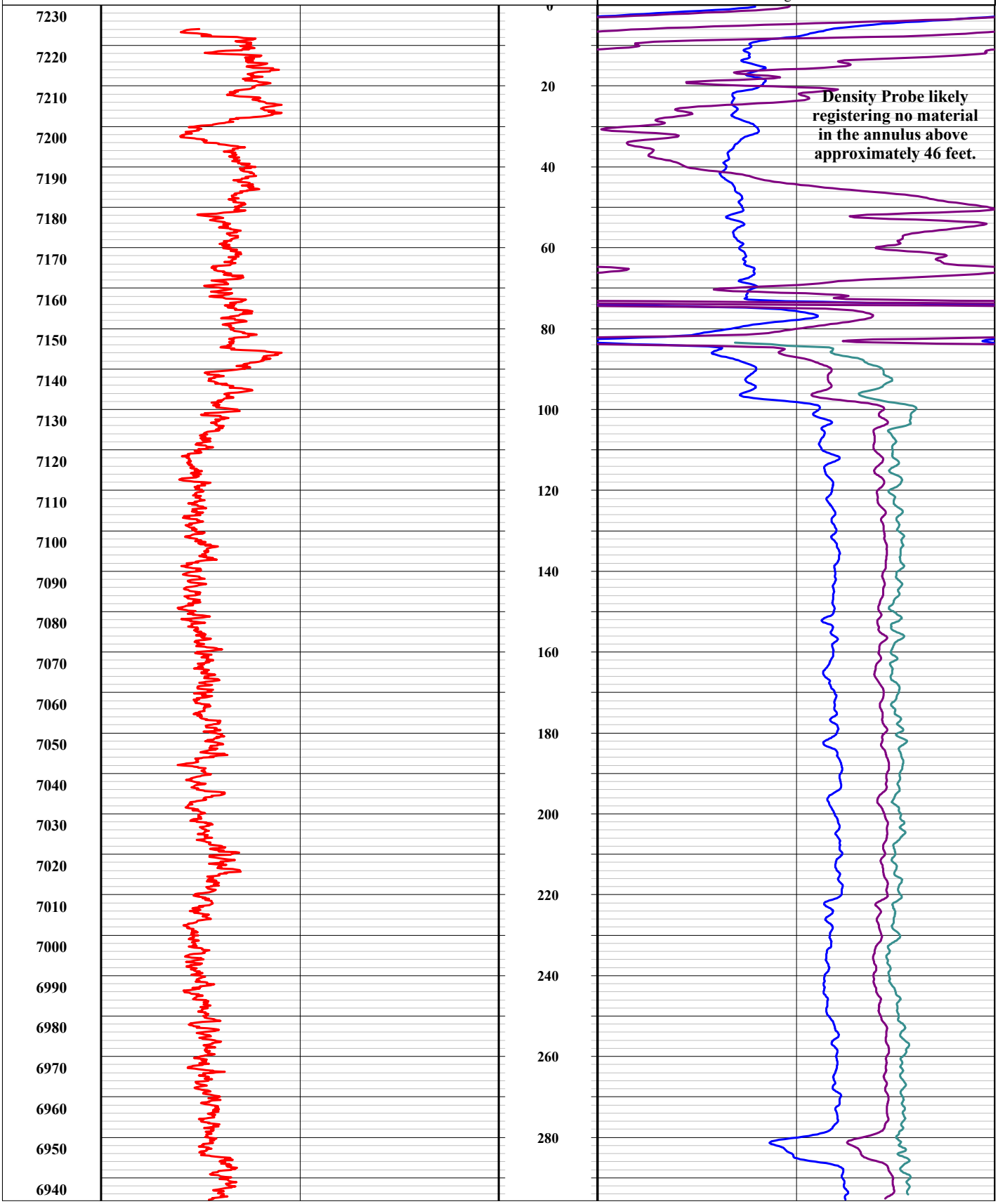
COLOG
borehole geophysics / hydrophysics

COMPANY: RMC - Consultants | PROJECT: Atlas Missile Site 4 Phase 2

DATE LOGGED: 20 Sept. 2017 | WELL: MW-101

Colog, Inc.
810 Quail Street, Suite E, Lakewood, CO 80215
Phone: (303) 279-0171, Fax: (303) 278-0135
www.colog.com

Elevation	Natural Gamma	Depth	Near Density	Far Density	Compensated Density
ft msl	0 CPS 200	1ft:400ft	1 g/cc 3	1 g/cc 3	1 g/cc 3



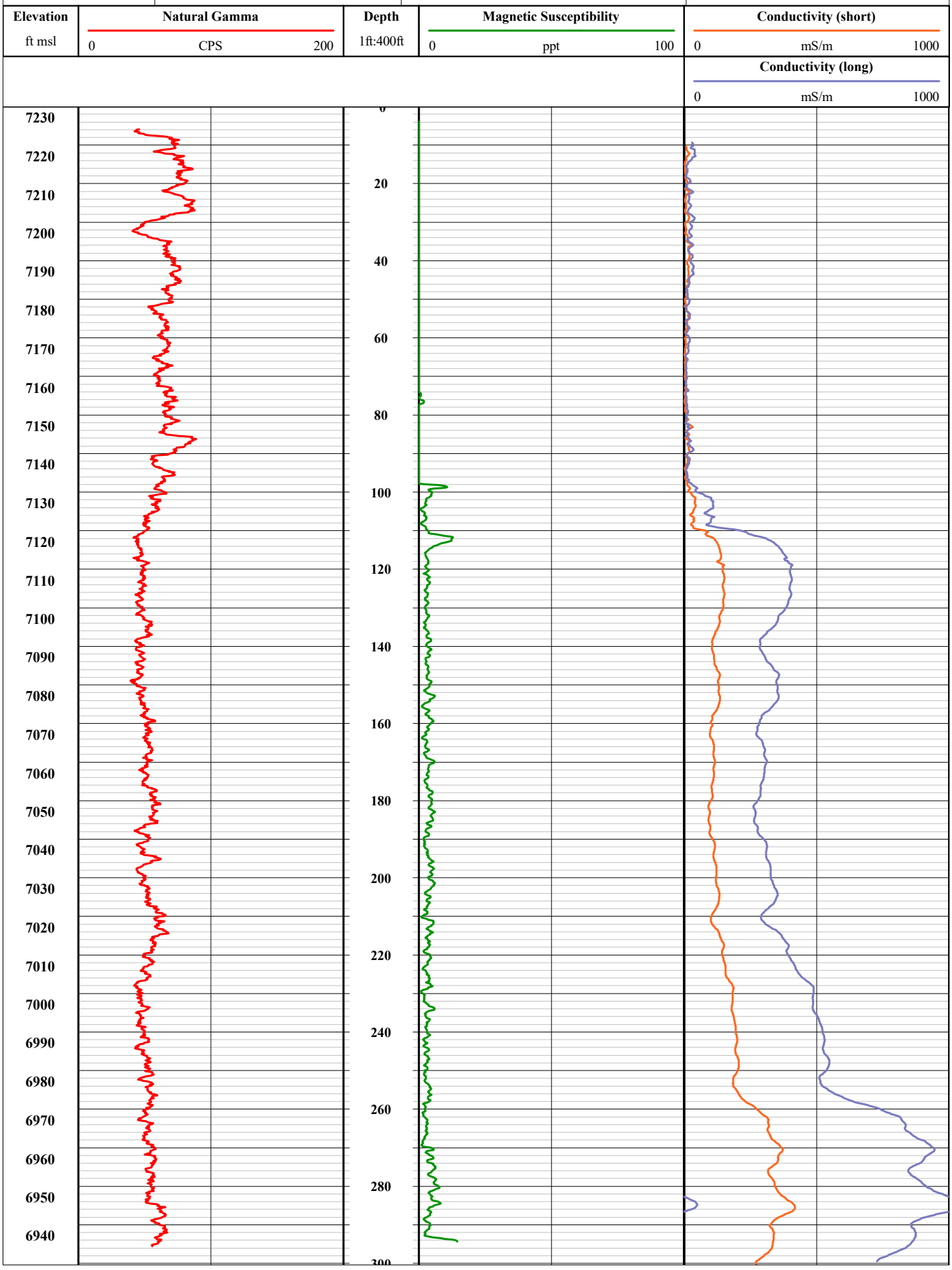
Dual Induction & Magnetic Susceptibility

COLOG
borehole geophysics / hydrophysics

COMPANY: RMC - Consultants | PROJECT: Atlas Missile Site 4 Phase 2

DATE LOGGED: 20 Sept. 2017 | WELL: MW-101

Colog, Inc.
810 Quail Street, Suite E, Lakewood, CO 80215
Phone: (303) 279-0171, Fax: (303) 278-0135
www.colog.com



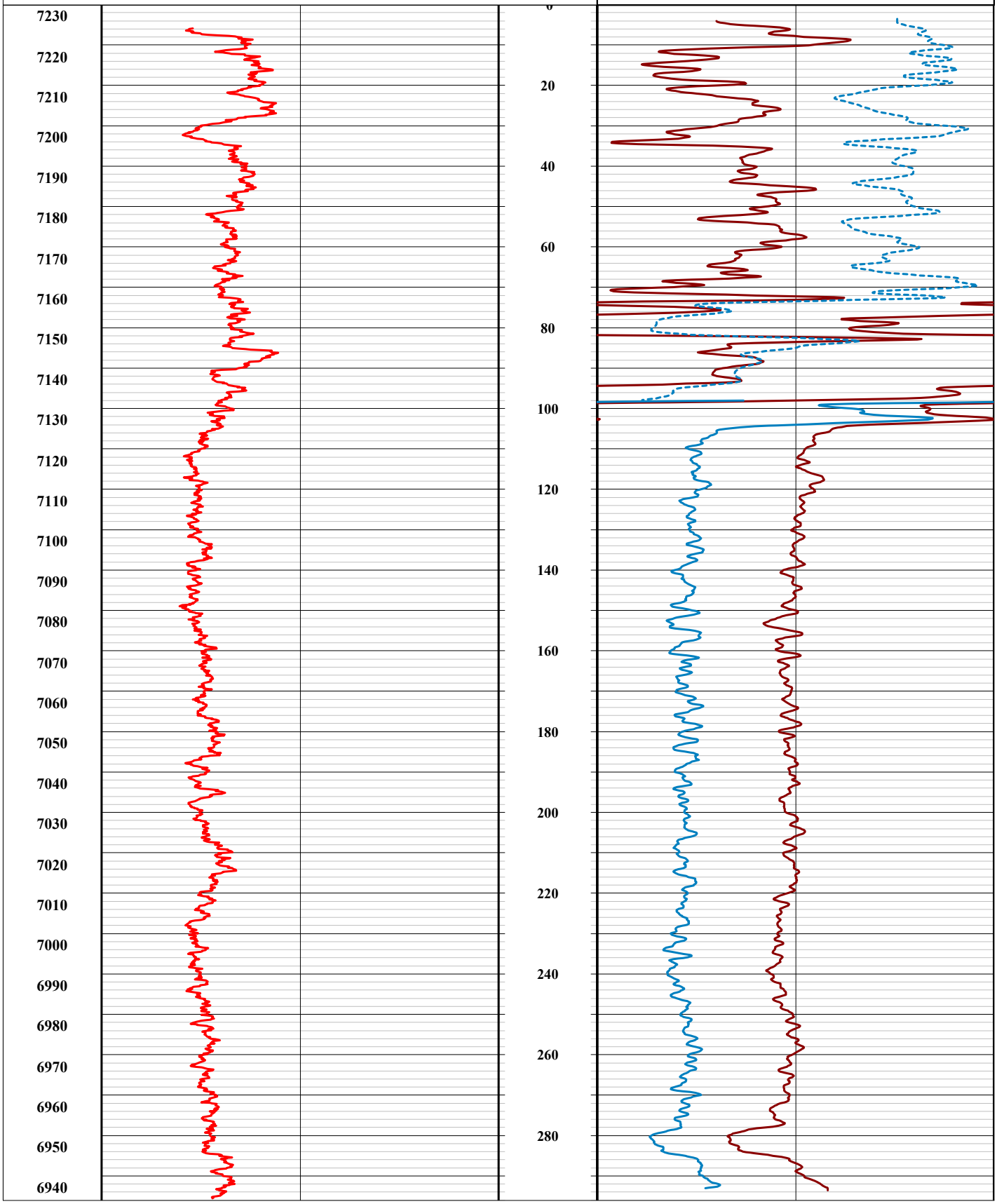
Dual Neutron

COLOG
borehole geophysics / hydrophysics

COMPANY: RMC - Consultants
PROJECT: Atlas Missile Site 4 Phase 2
DATE LOGGED: 20 Sept. 2017
WELL: MW-101

Colog, Inc.
810 Quail Street, Suite E, Lakewood, CO 80215
Phone: (303) 279-0171, Fax: (303) 278-0135
www.colog.com

Elevation	Natural Gamma	Depth	Neutron - Near Detector	Neutron - Far Detector	Neutron - Far Detector - Above WL
ft msl	0 CPS 200	1ft:400ft	0 CPS 1000	0 CPS 200	0 CPS 4000

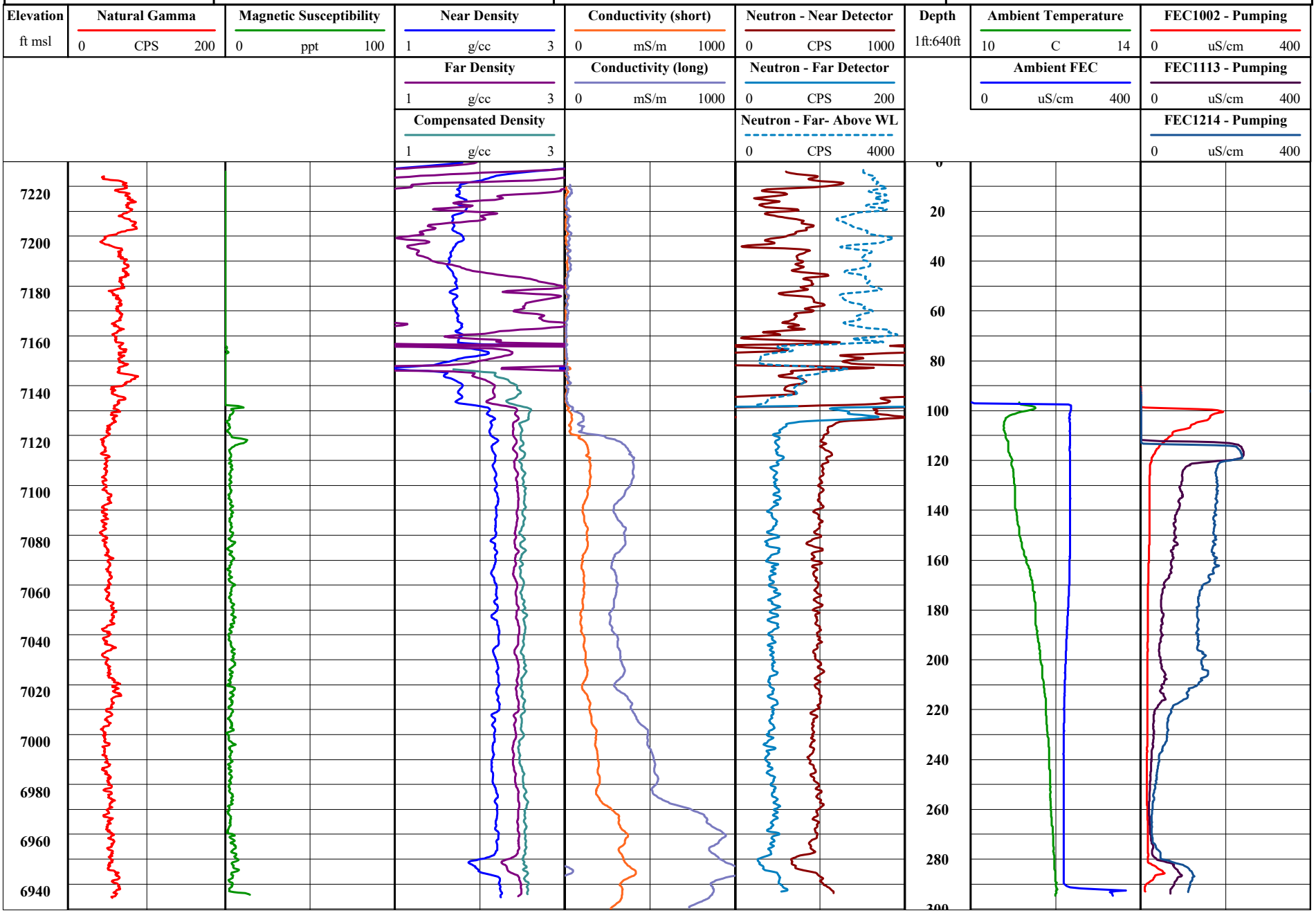


Geophysical/Hydrophysical Summary Plot

COLOG
borehole geophysics / hydrophysics

COMPANY: RMC - Consultants
PROJECT: Atlas Missile Site 4 Phase 2
DATE LOGGED: 20 September 2017
WELL: MW-101

COLOG Main Office
810 Quail Street, Suite E, Lakewood, CO 80215
Phone: (303) 279-0171, Fax: (303) 278-0135
www.colog.com



Geophysical/Hydrophysical Summary Plot

COLOG
borehole geophysics / hydrophysics

COMPANY: RMC - Consultants
PROJECT: Atlas Missile Site 4 Phase 2
DATE LOGGED: 20 September 2017
WELL: MW-101

COLOG Main Office
810 Quail Street, Suite E, Lakewood, CO 80215
Phone: (303) 279-0171, Fax: (303) 278-0135
www.colog.com

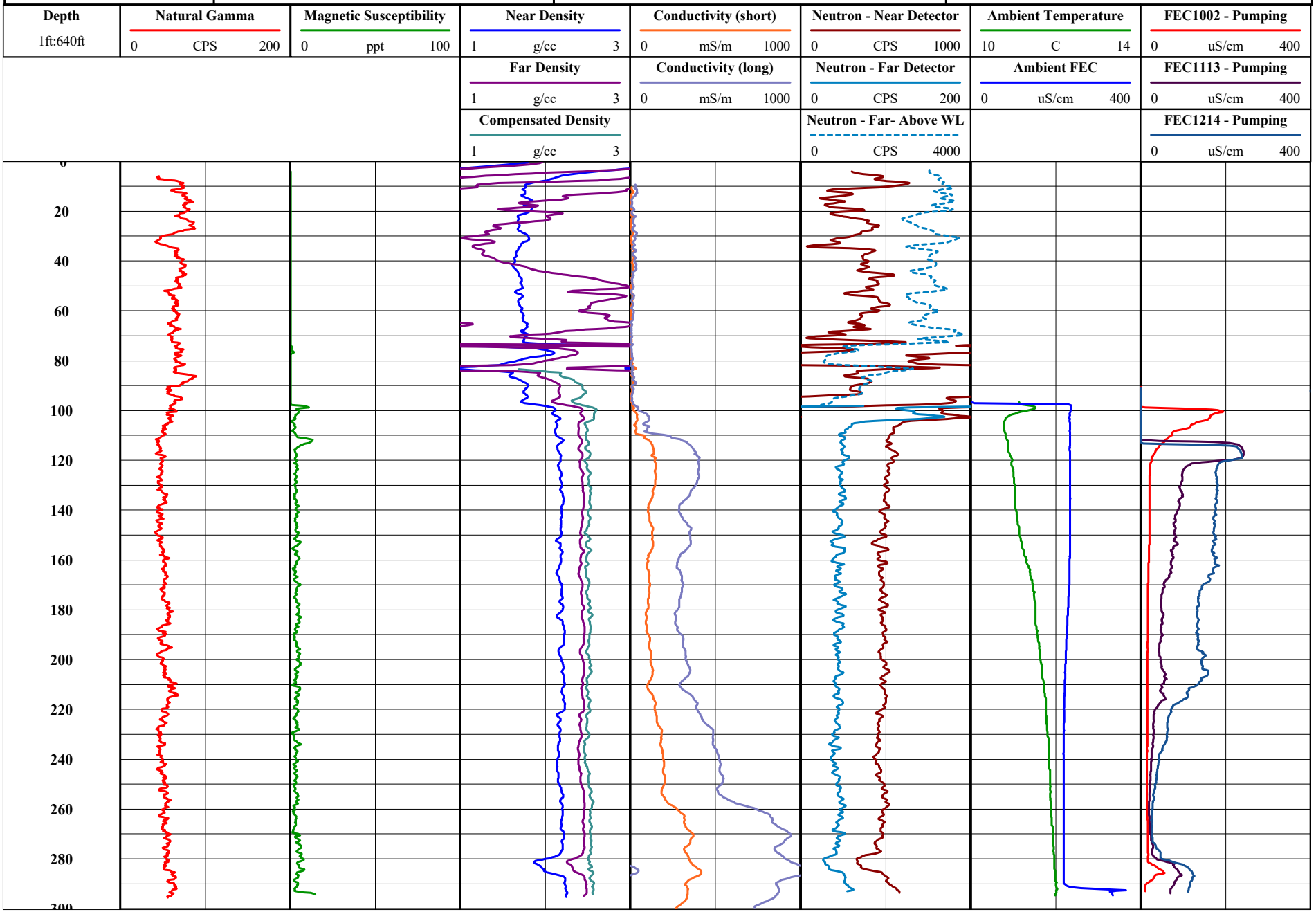


FIGURE MW-101:1. Ambient Temperature and Fluid Electrical Conductivity; RMC Consultants; Atlas Missile Site 4; Cheyenne, WY; Wellbore: MW-101

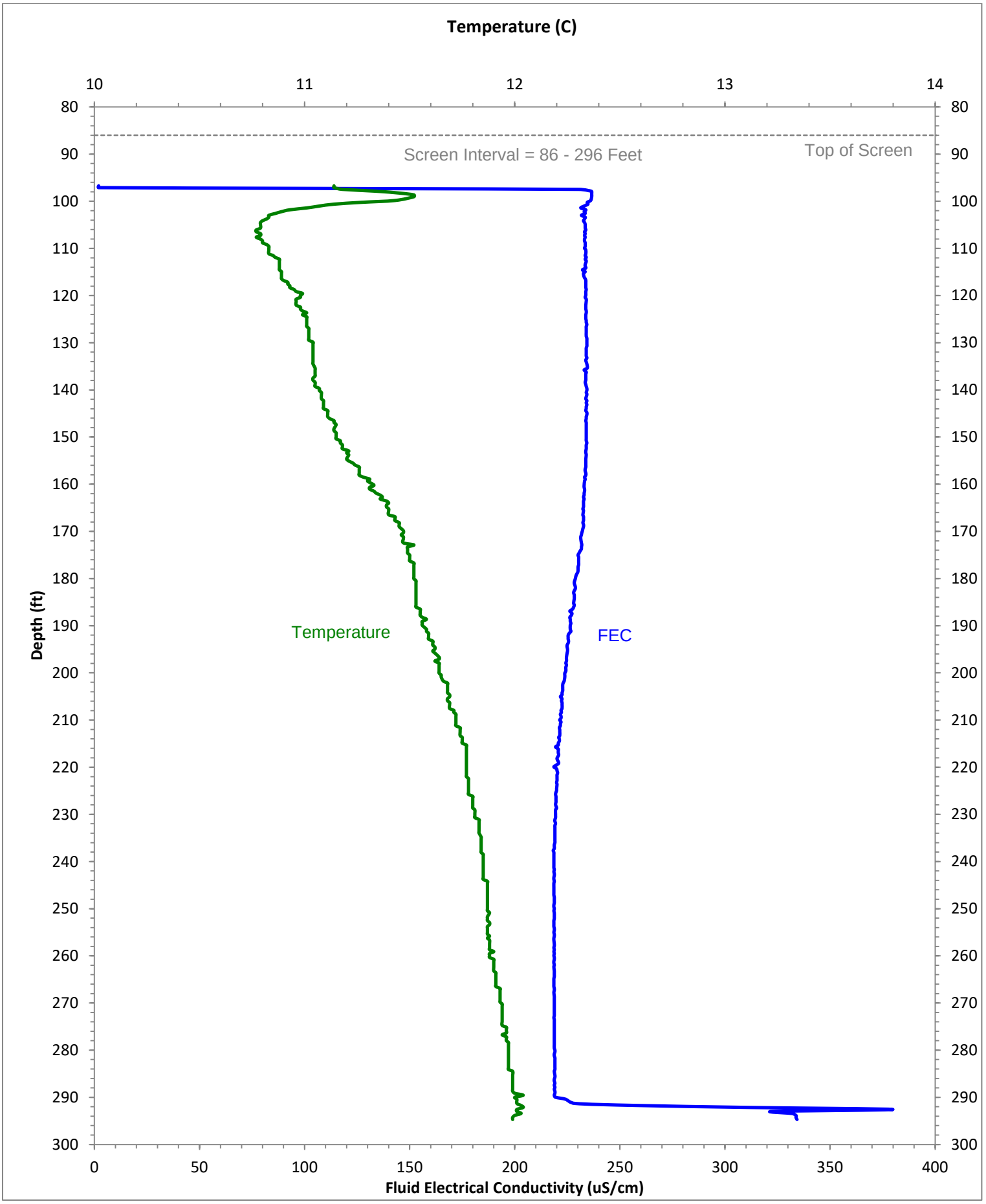


FIGURE MW-101:2. Summary of Hydrophysical Logs During Ambient Flow Characterization; RMC Consultants; Atlas Missile Site 4; Cheyenne, WY; Wellbore: MW-101

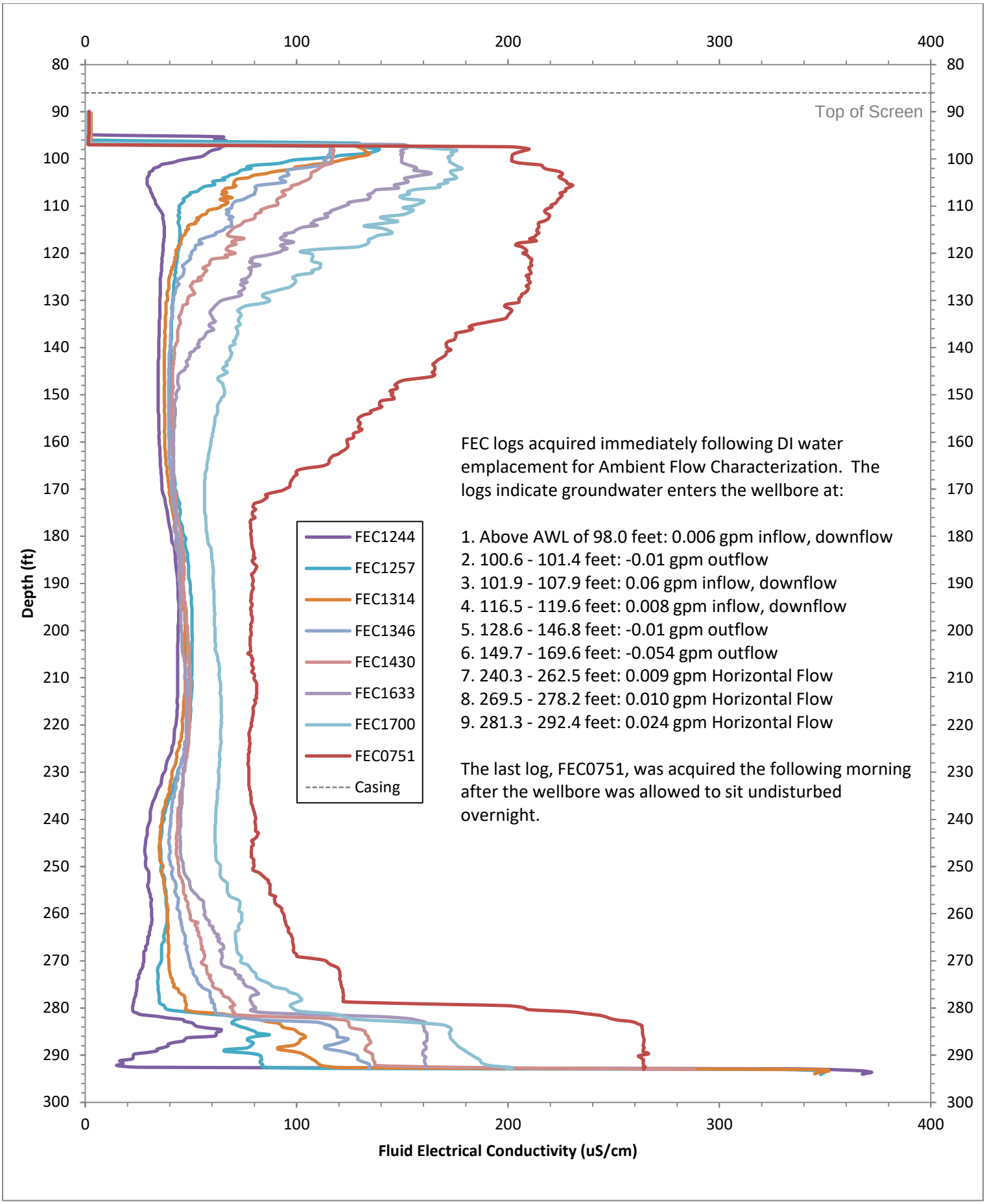


FIGURE MW-101:3. Pumping and Drawdown Data During Low-Rate Pumping at 1 GPM After DI Water Emplacement; RMC Consultants; Atlas Missile Site 4; Cheyenne, WY; Wellbore: MW-101

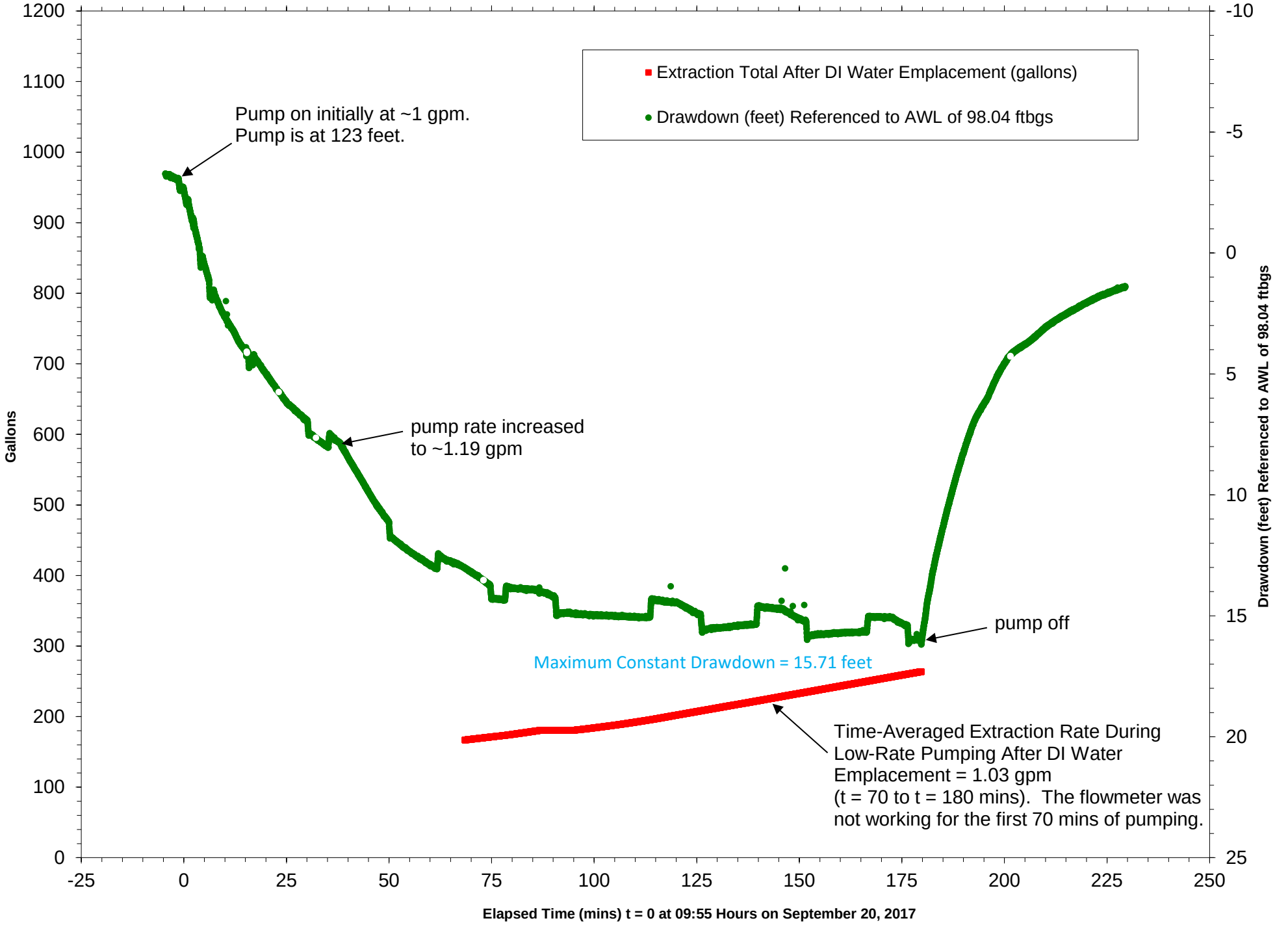


FIGURE MW-101:4. Summary of Hydrophysical Logs During Low-Rate Pumping at 1 GPM After DI Water Emplacement; RMC Consultants; Atlas Missile Site 4; Cheyenne, WY; Wellbore: MW-101

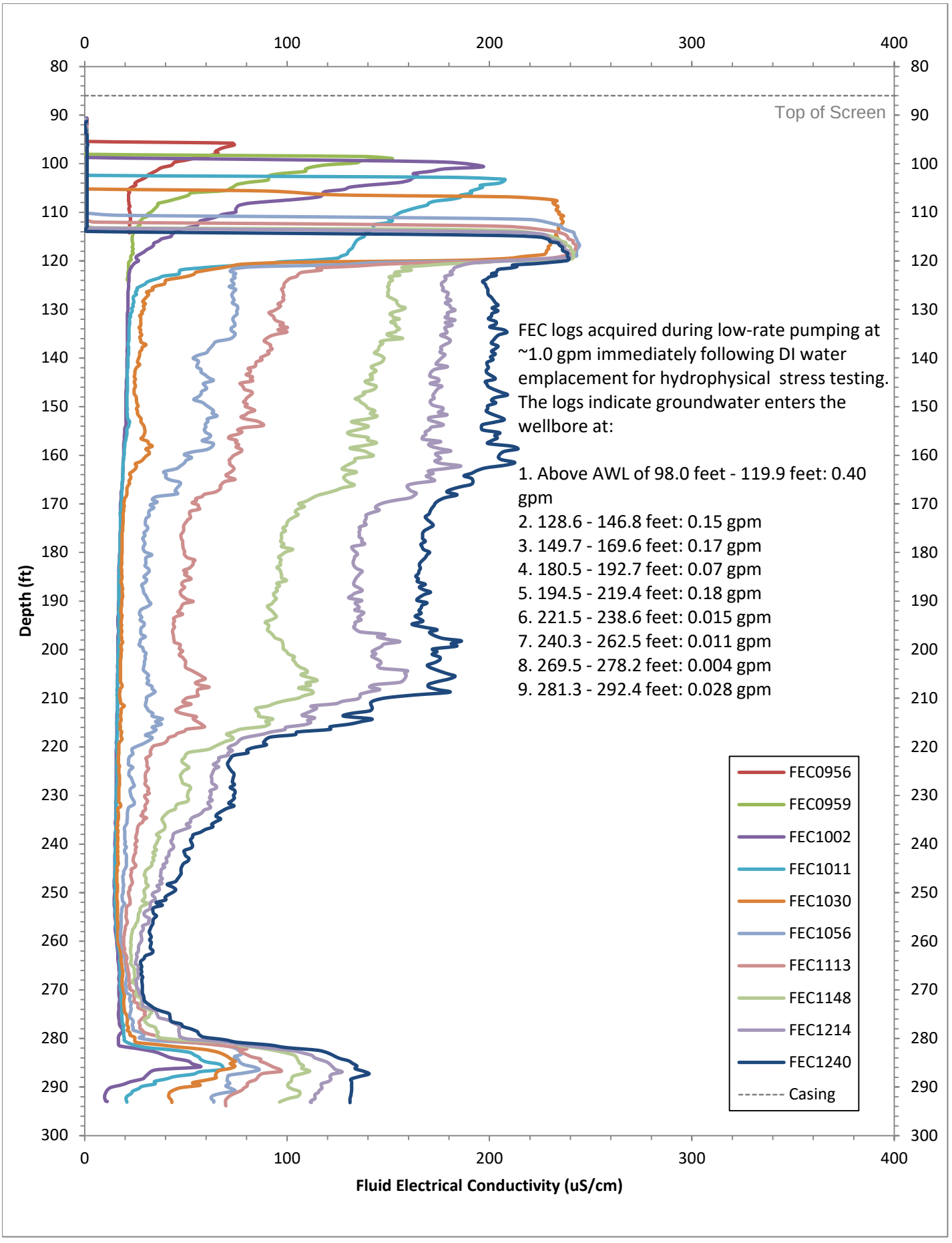


Table MW-101:1. Summary Of Hydrophysical Logging Results With Hydraulic Conductivity And Transmissivity Estimations; RMC Consultants; Atlas Missile Site 4; Cheyenne, WY; Wellbore: MW-101

Well Name	MW-101
Ambient Depth to Water (ftbtoc)	99.74
Ambient Depth to Water (ftbgs)	98.04
Screen Interval (ftbgs)	86 - 296

Diameter of Well (ft)	0.33
Maximum Drawdown (ft)	15.71
Effective Radius (ft)	100
Well Specific Capacity (gpm/ft-dd)	0.065

Hydrophysical Logging Results - MW-101									
Interval No.	**Top of Interval (ft)**	**Bottom of Interval (ft)**	**Length of Interval (ft)**	**Ambient Flow[1] (gpm)**	**Darcy Velocity in Aquifer[2] (ft/day)**	**Interval-Specific Flow Rate During Higher-Rate Pumping (gpm)**	**Interval-Specific Hydraulic Conductivity[3] (ft/day)**	**Transmissivity (ft^2/day)**	**Interval-Specific Fluid Electrical Conductivity (uS/cm)**
1*	86.0	98.0	12.0	0.006	NA	0.40	4.10E-01	4.93E+00	233
2	100.6	101.4	0.8	-0.010	NA				
3	101.9	107.9	6.0	0.060	NA				
4	116.5	119.9	3.4	0.008	NA				
5	128.6	146.8	18.2	-0.010	NA	0.15	1.10E-01	2.00E+00	233
6	149.7	169.6	19.9	-0.054	NA	0.17	1.41E-01	2.80E+00	233
7	180.5	192.7	12.2	0.000	NA	0.07	7.17E-02	8.75E-01	228
8	194.5	219.4	24.9	0.000	NA	0.18	9.04E-02	2.25E+00	220
9	221.5	238.6	17.1	0.000	NA	0.015	1.10E-02	1.88E-01	220
10	240.3	262.5	22.2	0.009	0.08	0.011	1.13E-03	2.50E-02	220
11	269.5	278.2	8.7	0.010	0.22	0.004	NA	NA	220
12	281.3	292.4	11.1	0.024	0.42	0.028	4.51E-03	5.00E-02	264
Borehole Transmissivity Using Thiem Equation (ft^2/day)								**1.31E+01**	
Borehole Hydraulic Conductivity (K=T/b; b=length of borehole of 86.0'-296.0' = 210.0') (ft/day)							**6.25E-02**		

Note: Negative flow, if any, is outflow from the borehole to the aquifer, positive flow is inflow to the borehole.
Additional note: Interval #11 exhibits greater flow during the ambient test than during stress testing. This is unexpected. As such, no permeability value can be derive

* The bottom of this interval is AWL of 98.04 ftbgs. Inflow appears to be originating from above AWL.

[1] Downward and horizontal flow are identified in this borehole under ambient conditions.

[2] Darcy Velocity, or Specific Discharge in aquifer, is calculated using the observed volumetric flow rate, the cross-sectional area of the flow interval in the wellbore and a wellbore convergence factor of 3.0 (Drost, 1968). The Darcy Velocity is only applicable to ambient horizontal flow.

[3] Hydraulic conductivity and transmissivity estimates are based on single well drawdown data, a porous-medium equivalent model and the Thiem equation.

NA = Not Applicable