October 8, 2019

Mr. Scott Gestring
DSMOA Project Officer
Montana Department of Environmental Quality
LUST/Brownfields Program
1225 Cedar Street
Helena, MT 59601

RE: Final Groundwater Data Package Submittal
Petroleum Release at Missile Alert Facility (MAF) F-1 (PL507)
Augusta, Lewis & Clark County, MT
Facility ID #50-09030 Release #1332

Dear Mr. Gestring:

EMR Environmental conducted remedial activities at MAF F-1 (PL507) located near Augusta, Lewis and Clark County, Montana, Facility ID #50-09030 Release #1332, between June 8, 2015 and August 20, 2015. The remedial activities were completed to accelerate the remedial process at the site. The corrective actions included the installation of ten remediation wells at the site (Figure 1), extracting groundwater from the wells and treating the water with granular activated carbon. The treated groundwater was temporarily stored in a plastic tank and RegenOx® Part A was added. The solution was then injected into each remediation well to increase the dissolved oxygen levels in the groundwater within the contaminant plume. Upon completion of the initial injections (June 9 to June 15, 2015), ORC Advanced® socks were placed in nine of the remediation wells and seven of the existing monitoring wells. The ORC socks were removed from the wells on April 10, 2016 and discarded. Between July 7, 2015 and July 9, 2015, a solution of Oil Spill Eater (OSEII) and surface water from the nearby Sun River was pressure injected into each remediation well. No groundwater extraction was completed prior to the OSEII injections. Remediation well RW-4 was destroyed on July 15, 2015 while excavating to repair a communication line that was damaged during the installation of RW-4. Because RW-4 was a dry well, a replacement well was not installed.

EMR has since completed 6 additional injection events at MAF F-1. Injections began August 13, 2015 and ended October 27, 2015. Each event was completed over a period of two (2) days. The events were completed using a mixture of OSEII® and surface water for each well. Surface water within the 400-gallon plastic tank was aerated prior to the addition of OSEII®. Each well was filled to near the top of the casing with the solution using a sump pump and discharge tubing.

On April 17, 2016 EMR conducted the third post-remediation groundwater sampling event at MAF F-1 to evaluate the effectiveness of RegenOx and OSEII applications conducted between June and October 2015. Analytical results from groundwater samples collected indicate that VPH and EPH compounds were present at concentrations exceeding the DEQ Tier 1 Risk Based Screening Levels (Appendix A). Additionally, free product was found in MW-12.

Based on the significant contaminant concentrations increases in MW-12, EMR conducted an additional soil investigation in the area near MW-12 and MW-9 to determine if subsurface soil contamination was missed during the RI phase. EMR advanced four (4) soil borings near MW-12 and two (2) soil borings near MW-9. Soil borings were advanced using an air rotary drill rig. EMR field screened all the soil samples collected from each boring for odors, visible staining and headspace testing with a MiniRae 2000 Photo Ionization Detector (PID). Soil sampling and field screening were completed at 5-feet intervals from 10 feet below ground surface (bgs) to the termination of the soil borings (38-40 feet bgs). A handheld container was used

to collect soil samples lifted from the borehole via injected air. Soil samples were immediately transferred from the container to sealable plastic bags for PID field screening. Soil samples were collected at each boring from the interval with the most elevated PID reading and/or evidence of contamination based on visual or olfactory indications and submitted for laboratory analysis. If there was no indication of contamination, then the samples from the soil/water interface were submitted for laboratory analysis. All soil samples were submitted to Eurofins Analytical and analyzed for VPH and EPH using the 2004 Montana Modified Massachusetts Method. Soil analytical results indicated no exceedances of the Tier 1 RBSLs.

On October 23, 2017 and October 24, 2017, EMR completed remedial activities along with groundwater monitoring well installation and sampling. EMR completed a groundwater extraction event at MW-12. Groundwater monitoring wells MW-14 and MW-15 were installed to assess contamination down gradient and cross-gradient from MW-12. EMR collected groundwater samples from MW-15 and MW-12 (post extraction event). MW-14 was dry.

Groundwater and Free Product Extraction

To mitigate the residual free product observed in MW-12, EMR subcontracted Boland Construction to complete a high efficiency vacuum extraction (HVE) event to remove free product, and impacted groundwater from the well. On October 23, 2017, a vacuum trailer unit equipped with 3000 CFM was utilized for the extraction event. To conduct liquid/vapor extraction, a 1-inch diameter PVC pipe was lowered into MW-12 and set just above the water table. A Fernco fitting was installed to seal the wells to allow for vapor extraction simultaneously with liquid recovery. A clear view port was equipped to the extraction hose to allow real-time viewing of the extracted liquids. The extraction continued for approximately 3 hours and no noticeable free product was observed in the extraction hose after the first two minutes of the HVE event. The extracted liquids (300 gallons of petroleum contaminated groundwater) were held in a storage tank for later disposal. MW-12 was gauged on October 24, 2017 and no free product was detected with the interface probe or observed in a bailer.

On December 12, 2017, Emerald Services pumped the water from the storage tank and transported the waste to their disposal facility in Great Falls, Montana.

Monitoring Well Installation

New monitoring wells MW-14 and MW-15 were installed on October 24, 2017 to assess groundwater conditions down gradient and cross gradient from MW-12. The wells were constructed using hollow stem augers equipped with 2-ft split spoon samplers. Well construction consisted of 20 feet of two-inch diameter slotted PVC screen (0.01-inch) from 15 to 35 feet bgs. Solid PVC riser was extended to just below land surface. Sand was placed to two feet bgs (1 foot above the wells screen) and a one-foot thick bentonite seal was placed above the sand and hydrated. The upper 1 foot of each borehole was completed with concrete pavement. The wells were secured with 8-inch diameter steel flush manways sealed in the new concrete pavement.

EMR field screened all the soil samples collected from each boring for odors, visible staining and headspace testing with a MiniRae 2000 Photo Ionization Detector (PID). Soil sampling and field screening were completed where possible. Below 15 feet bgs, the soil turns to sandstone, and sample collection was limited. Soil samples were collected at each boring from the interval with the most elevated PID reading and/or the soil/water interface and submitted for laboratory analysis. All soil samples were submitted to Eurofins Analytical and analyzed for VPH and EPH using the 2016 Montana Method. Soil analytical results indicated no exceedances of the Tier 1 RBSLs.

On May 21 and May 22, 2018, EMR conducted a groundwater sampling event at MAF F-1 to evaluate the contaminant plume at the site. Analytical results from groundwater samples collected indicate that VPH and EPH compounds are present at concentrations exceeding the 2018 DEQ Tier 1 Risk Based Screening Levels (Appendix A).

Most Recent Groundwater Sampling Activities

On May 15, 2019, EMR conducted a groundwater sampling event at MAF F-1 to evaluate the contaminant plume at the site. Analytical results from groundwater samples collected indicate that VPH and EPH compounds are present at concentrations exceeding the 2018 DEQ Tier 1 Risk Based Screening Levels (Appendix A).

Upon arrival at the site, EMR collected groundwater level measurements (Table 1). Groundwater flow is generally to the SSE (Figure 2). Groundwater depths and the presence of groundwater in monitoring wells at the site is highly variable to significant subsurface disturbances during the installation of the MAF. The Air Force completed a simulated radius of influence study regarding the previous remedial injections. They concluded that the radius of influence for the injections was <10 feet and thus the water levels in MW-13 have not been impacted by previous injection events.

Low-flow sampling equipment included a bladder pump, a Horiba U-52 field water quality parameter measurement instrument with flow cell, and a Solinst water level meter. The Horiba U-52 was used to measure pH, oxygen reduction potential (ORP), dissolved oxygen (DO), conductivity, temperature, and turbidity (Table 2). The Solinst water level meter was used to measure water depths in each well. The bladder pump was lowered down the well to a depth below the static water level and in the upper fourth of the screened section and connected to disposable silicone tubing. A section of 0.25-inch LDPE tubing connected to the flow thru cell and the bladder pump. Water pumped from the wells was collected in 5-gallon buckets and then disposed of on the ground near the well at the completion of sampling in accordance with the DEQ Flowchart for Disposal of Hydrocarbon-Contaminated Wastewater (DEQ, 2015). Collection of groundwater samples occurred after purging and groundwater sampling parameters had stabilized in each well. The well was considered stabilized after a minimum of one well volume was purged and two consecutive readings of less than +/- 10% variance were recorded for temperature, conductivity, and consecutive pH readings were within 0.1 pH units. Groundwater sampling logs can be found in Appendix B. Water removed from the wells was discharged to the ground near the well in accordance with the DEQ Flow Chart for Discharge of Hydrocarbon-Contaminated Wastewater. Groundwater samples were collected and handled in accordance with the DEQ LUST/Brownfields sample collection, preservation, handling and shipping requirements. The samples were collected from MW-1, MW-2, MW-4, MW-5, MW-6, MW-7, MW-8, MW-9, MW-10, MW-11, MW-12, MW-13, MW-14, and MW-15. No free product was observed in MW-12.

May 2019 Groundwater Analytical Data

Groundwater samples and associated field QA/QC samples were submitted to Eurofins and analyzed for VPH and EPH using the 2018 Montana Modified Methods. This section will present the analytical data of all contaminants of concern from the May 2019 sampling event and provide a comparison to analytical data from previous sampling events. The historical VPH and EPH data is provide in Table 3. The VPH and EPH analytical data for May 2019 is depicted on Figures 3 and 4. Laboratory reports are provided in Appendix C.

Benzene

Benzene was detected above the 2018 DEQ Tier 1 Risk Based Screening Level (RBSL) of 5 micrograms per liter (µg/L) in monitoring wells MW-1 (1170 µg/L), MW-2 (1660 µg/L), MW-8 (21.7 µg/L), MW-9 (3370 µg/L), MW-10 (475 µg/L), MW-12 (459 µg/L), and MW-14 (13.1 µg/L). Benzene was not detected in downgradient wells MW-11, MW-13 or MW-15, nor in cross gradient wells MW-4, MW-6, and MW-7. Benzene was also non-detect in source area well MW-5. Detected benzene concentrations ranged from 13.1 µg/L (MW-14) to 3370 µg/L (MW-9). Benzene concentrations decreased in monitoring wells MW-1, MW-5, MW-10, MW-11, MW-14 and MW-15 and increased in MW-2, MW-8, MW-9, and MW-12 in comparison to 2018 data. While concentrations in MW-9 and MW-12 increased from 2018, they decreased from pre-remediation concentrations.

Toluene
Toluene was not detected above the 2018 DEQ Tier 1 RBSL of 1000 micrograms per liter (µg/L) in any of the monitoring wells sampled. Detected toluene concentrations ranged from 3 µg/L (MW-5) to 973 µg/L (MW-9). Toluene concentrations decreased in monitoring wells MW-5, MW-10, and MW-12 in comparison to the May 2018 data. Concentrations in MW-1, MW-2, and MW-9 increased from 2018, however, MW-1 and MW-9 decreased from pre-remediation concentrations.

Ethylbenzene
Ethylbenzene was detected above the 2018 DEQ Tier 1 RBSL of 700 micrograms per liter (µg/L) in monitoring wells MW-1 (1440 µg/L), MW-9 (1700 µg/L), and MW-12 (801 µg/L). Ethylbenzene was not detected in MW-4, MW-6, MW-7, MW-11 or MW-13. Detected ethylbenzene concentrations ranged from 3.8 µg/L (MW-8) to 1700 µg/L (MW-9). Ethylbenzene concentrations decreased in monitoring wells MW-5, MW-10, MW-12, MW-14, and MW-15, while increases were noted in MW-1, MW-2, and MW-9 in comparison to the May 2018 data. While concentrations increased from 2018, they decreased from pre-remediation concentrations in monitoring wells MW-1 and MW-12.

Xylenes
Xylenes were not detected above the 2018 DEQ Tier 1 RBSL of 10000 micrograms per liter (µg/L) in any monitoring wells. Xylenes were not detected in downgradient well MW-13, or in cross gradient wells MW-4, MW-6, MW-7, MW-8 and MW-11.

Naphthalene
Naphthalene was detected above the 2018 DEQ Tier 1 RBSL of 100 micrograms per liter (µg/L) in monitoring wells MW-1 (619 µg/L), MW-2 (226 µg/L), MW-9 (444 µg/L), MW-10 (160 µg/L), and MW-12 (463 µg/L). Naphthalene was not detected in monitoring wells MW-4, MW-5 MW-6, MW-7, MW-11, MW-13, and MW-14. Detected naphthalene concentrations ranged from 3.25 µg/L (MW-8) to 619 µg/L (MW-1). Naphthalene concentrations decreased in monitoring wells MW-5, MW-10, MW-11, MW-12, and MW-15, while monitoring wells MW-1, MW-2, and MW-9 showed increases in comparison to 2018 concentrations.

Methyl Tert-Butyl Ether (MTBE)
MTBE was not detected above the 2018 DEQ Tier 1 RBSL of 30 micrograms per liter (µg/L) in any monitoring wells. The only detection of MTBE was in MW-6 at 6.99 µg/L.

C5-C8 Aliphatic Hydrocarbons
C5-C8 Aliphatic Hydrocarbons were detected above the 2018 DEQ Tier 1 RBSL of 650 micrograms per liter (µg/L) in monitoring wells MW-1(7990 µg/L), MW-2 (2780 µg/L), MW-9 (12400 µg/L), MW-10 (1490 µg/L), MW-12 (4780 µg/L), and MW-15 (1220 µg/L). C5-C8 Aliphatics were not detected monitoring wells MW-4, MW-6, MW-7, MW-11, and MW-13. Detected C5-C8 Aliphatic concentrations ranged from 117 µg/L (MW-5) to 12400 µg/L (MW-9). C5-C8 Aliphatic Hydrocarbon concentrations decreased in MW-, MW-12, and MW-14.

C9-C12 Aliphatic Hydrocarbons
C9-C12 Aliphatic Hydrocarbons were detected above the 2018 DEQ Tier 1 RBSL of 1400 micrograms per liter (µg/L) in monitoring wells MW-1 (10100 µg/L), MW-2 (3030 µg/L), MW-9 (8450 µg/L), and MW-12 (6090 µg/L). C9-C12 Aliphatics were not detected in monitoring wells MW-4, MW-6, MW-7, MW-8, MW-11 and MW-13. Detected C9-C12 Aliphatic concentrations ranged from 57 µg/L (MW-5) to 10100 µg/L (MW-1). C5-C8 Aliphatic Hydrocarbon concentrations decreased in all monitoring wells with the exception of MW-1, MW-2, and MW-9.

C9-C10 Aromatic Hydrocarbons
C9-C10 Aromatic Hydrocarbons were detected above the 2018 DEQ Tier 1 RBSL of 1100 micrograms per liter (µg/L) in monitoring wells MW-1 (7700 µg/L), MW-2 (2010 µg/L), MW-9 (5650 µg/L), MW-10 (1480 µg/L), MW-12 (8050 µg/L), and MW-15 (1750 µg/L). C9-C10 Aromatic Hydrocarbons were not detected

in monitoring wells MW-4, MW-6, MW-7, MW-11, and MW-13. Detected C9-C10 Aromatic Hydrocarbon concentrations ranged from 76 µg/L (MW-5) to 8050 µg/L (MW-12). C9-C10 Aromatic concentrations increased in monitoring wells MW-1, MW-2, and MW-9 when compared to May 2018 data. While in comparison to May 2018 data MW-9 shows an increase in concentration, is shows a decrease in concentration when compared to pre-remediation data.

EPH Screen and Fractionation Data

TEH screening concentrations exceeded 1000 µg/L in monitoring wells MW-1, MW-2, MW-9, MW-10, MW-12, and MW-15. For wells with an EPH screening level above 1000 µg/L, fractionation of the data was completed. The results of sample fractionations indicate exceedances of the 2018 Tier 1 RBSLs only in monitoring wells MW-1 and MW-12. As with previous data, EMR cannot provide an explanation for high concentrations of C9-C18 Aliphatics and C11 to C22 Aromatics in MW-12, when they are not detected or below the Tier 1 RBSLs in upgradient monitoring wells MW-2, MW-5, MW-8, MW-9, and MW-10.

Data Verification and Validation

The analysis of groundwater samples collected during this investigation followed the proposed methodologies presented in the *Final Corrective Action and Remedial Alternative Analysis for Missile Alert Facility (MAF) F-1 (PL507) Augusta, Lewis & Clark County, Montana*, dated January 8, 2015.

All groundwater samples were analyzed in various combinations for the following:

- VPH and EPH by Montana Modified Method (2018)

All the laboratory data generated as part of the investigation conducted at MAF F-1 was validated by the project chemist. Internal laboratory quality assurance (QA)/quality control (QC) samples, including a trip blank and field duplicate were performed to document laboratory QA/QC.

The data validation report noted that the Chain of Custody record(s) from the field to the laboratory were complete, and custody was maintained as evidenced by field and laboratory personnel signatures, dates, and times of receipt. All analyses are accounted for in the data report. There is no indication of any issues associated with the sample receipt, and/or condition of the samples, that would affect the quality of the data.

None of the quality control excursions encountered during the data assessment process of this analytical data set resulted in rejected data. In terms of data quality, all data met requested validation DQOs except as noted and is therefore considered compliant and adequate for use. Information regarding the precision, accuracy, representativeness and completeness is provided in the Validation Report (Appendix D).

Data Evaluation

Overall, remedial activities completed in 2015 and 2017 (MW-12) have resulted in decreases in contaminant concentrations in all monitoring wells. In MW-5 contaminant concentrations for all compounds have been reduced by 91 to 100%, with all contaminants below the RBSLs. The contaminant reductions in this well likely correlate to successful injection of in-situ enhanced bioremediation products in RW-1 in comparison to the other remediation wells.

Overall Decreases/Increases in COCs – 2014 to 2019 (all concentrations in µg/L)

	MW-1					**Decrease/Increase**
	Mar-14	Apr-16	Apr-17	May-18	May-19	
C5-C8 Aliphatics	**7850**	**3630**	**15600**	**7720**	**7990**	+1.7%
C9-C12 Aliphatics	1140	888	**26500**	**7600**	**10100**	+786%
C9-C10 Aromatics	**10600**	**4240**	**6380**	**7260**	**7700**	-27%
Benzene	**2410**	**289**	**1860**	**1420**	**1170**	-51%
Ethylbenzene	**2030**	175	**2140**	**1340**	**1440**	-29%
Toluene	**1210**	147	**1340**	667	813	-33% (Below RBSL)
Xylenes m,p	**10000**	3230	**9430**	**7490**	6900	-31% (Below RBSL)
Xylenes, o	**2900**	1380	**3950**	**2490**	1880	-35% (Below RBSL)
MTBE	**184**	**67**	**192**	<14	<4	-100% (Below RBSL)
Naphthalene	**734**	**246**	**1050**	**596**	**619**	-16%
	MW-2					
C5-C8 Aliphatics	**3200**	**2670**	**6450**	**3280**	**2780**	-13%
C9-C12 Aliphatics	**1460**	435	**5150**	**1790**	**3030**	+107%
C9-C10 Aromatics	**2810**	1040	**1230**	**1630**	**2010**	-28 %
Benzene	**3420**	**1370**	**2500**	**1610**	**1660**	-51%
Ethylbenzene	370	293	**838**	520	664	+79% (Below RBSL)
Toluene	811	222	467	334	518	-36% (Below RBSL)
Xylenes m,p	2120	876	1800	1490	2250	+6% (Below RBSL)
Xylenes, o	590	170	439	292	562	-5% (Below RBSL)
MTBE	**163**	**80**	26	**71**	<4	-100% (Below RBSL)
Naphthalene	**242**	73	**249**	**174**	**226**	-7%
	MW-5					
C5-C8 Aliphatics	**13400**	**1150**	572	370	117	-99% (Below RBSL)
C9-C12 Aliphatics	**11000**	375	568	269	57	-99% (Below RBSL)
C9-C10 Aromatics	**14100**	**1560**	**1540**	**1310**	76	-99%
Benzene	**428**	**133**	**18**	**30**	<2	-100% (Below RBSL)
Ethylbenzene	**1070**	119	28	32	4.4	-99% (Below RBSL)
Toluene	870	202	46	58	3	-99% (Below RBSL)
Xylenes m,p	6190	698	118	173	15	-99% (Below RBSL)
Xylenes, o	1820	232	62	56	5	-99% (Below RBSL)
MTBE	ND	ND	ND	ND	ND	--- (Below RBSL)
Naphthalene	**716**	82	24	22	<3	-100% (Below RBSL)
	MW-9					
C5-C8 Aliphatics	**7770**	**13800**	**20900**	**3560**	**12400**	+60%
C9-C12 Aliphatics	**7240**	**1420**	**16000**	**3620**	**8450**	+17%
C9-C10 Aromatics	**11500**	**7480**	**3510**	**3610**	**5650**	-51%
Benzene	**5490**	**4910**	**4330**	**1170**	**3370**	-39%
Ethylbenzene	**1650**	**1940**	**1810**	642	**1700**	+3%
Toluene	**2590**	**2100**	**1170**	243	973	-62% (Below RBSL)
Xylenes m,p	7460	**7960**	5740	1930	5830	-22% (Below RBSL)
Xylenes, o	2520	**2590**	1990	606	1660	-34% (Below RBSL)
MTBE	**341**	**420**	**612**	**60**	<10	-100% (Below RBSL)
Naphthalene	**1080**	**612**	**641**	**293**	**444**	-59%

Overall Decreases/Increases in COCs – 2014 to 2019 (all concentrations in µg/L)

	MW-10					Decrease/Increase	
	Mar-14	Apr-16	Apr-17	May-18	May-19		
C5-C8 Aliphatics	**4820**	457	**1960**	**1360**	**1490**	-69%	
C9-C12 Aliphatics	**4730**	117	**1540**	1330	1130	-76%	(Below RBSL)
C9-C10 Aromatics	**6920**	370	644	**1540**	**1480**	-79%	
Benzene	**2800**	**272**	**494**	**799**	**475**	-83%	
Ethylbenzene	**997**	72	262	368	242	-75%	(Below RBSL)
Toluene	100	10	21	22	16.2	-84%	(Below RBSL)
Xylenes m,p	2140	104	252	458	367	-83%	(Below RBSL)
Xylenes, o	123	6	18	38	49.6	-60%	(Below RBSL)
MTBE	**71**	11	23	<0.2	<2	-100%	(Below RBSL)
Naphthalene	**847**	43	**162**	**249**	**160**	-81%	
	MW-12						
C5-C8 Aliphatics	**3500**	**115,000**	**3560**	**5160**	**4780**	+37	
C9-C12 Aliphatics	**2250**	**1,230,000**	**8170**	**16600**	**6090**	+171%	
C9-C10 Aromatics	**4860**	**3,400,000**	**22,700**	**19900**	**8050**	+66%	
Benzene	**1130**	**1800**	**430**	**279**	**459**	-59%	
Ethylbenzene	**1150**	**4480**	**1770**	**983**	**801**	-30%	
Toluene	121	**1200**	89	111	68.3	-44%	(Below RBSL)
Xylenes m,p	1760	**28,700**	7990	4250	1920	+9%	(Below RBSL)
Xylenes, o	401	**10,700**	2000	1220	334	-17%	(Below RBSL)
MTBE	**57**	**2000**	<29	<29	<2	-100%	(Below RBSL)
Naphthalene	**600**	**250,000**	**1220**	**1610**	**463**	-23%	
C9-C18 Aliphatics	441	**127,000**	**59,200**	**9600**	**5600**	+1170%	
C11-C22 Aromatics	157	**16,800**	<680	**4210**	**1800**	+1046%	

Note: **Exceedances of the 2018 Tier 1 RBSLs are shown in bold.**

Currently, EMR does not have an explanation for the past significant increases in contaminant concentrations reported in MW-12. MW-10, located upgradient of MW-12 and between wells MW-12 and MW-9, has historically had much lower contaminant concentrations than MW-12 and MW-9. . Groundwater collected from MW-14 and MW-15 reported VPH concentrations significantly lower than MW-12, but exceeding the 2018 Tier 1 RBSLs, indicating that the contaminant plume has not migrated much beyond MW-12. The plume is still delineated and isolated mainly to the entrance road area that was excavated to depths of up to 60 feet during the installation of the MAF; as monitoring wells MW-4, MW-5, MW-6, MW-7, MW-11 and MW-13 are not impacted.

Discussion and Recommendations

The May 2019 groundwater sampling event was the final sampling event under the current contract. Due to budget and time constraints of our AFCEC contract, the performance objective of Site Closeout will not be met. No additional activities will be conducted at TU507 (MAF F-1) during the existing contract that ends in September 2020.

If you have questions or comments, please contact me at (913) 232-7788, ext. 101.

Sincerely,

J. A. Humenik

Jeffrey A. Humenik, PG
Certified Professional Geologist #9145

cc: Robert Brown - 341 CES/CEAN, 39 78th Street North, Malmstrom AFB, MT 59402-7536
Ernesto Perez – COR

TABLES

Table 1: Groundwater Levels and Elevations MAF F-1

Well ID	Date Sampled	Well Depth (ft bgs)	Screened Interval (ft bgs)	TOC Elevation (feet above mean sea level)	Depth to Water (feet below TOC	Groundwater Elevation (feet above mean sea level)
MW-1	12/2012	49.20	29.20-49.20	4392.68	35.19	4357.49
	03/2014				33.84	4358.84
	08/25/15				34.40	4358.28
	11/10/15				35.50	4357.18
	04/17/16				37.60	4355.08
	04/24/17				35.78	4356.90
	5/21/18				27.33	4365.35
	5/15/19				30.61	4362.07
MW-2	12/2012	50.7	20.70-50.70	4390.12	41.73	4348.39
	03/2014				33.46	4356.66
	08/25/15				33.78	4356.34
	11/10/15				29.00	4361.12
	04/17/16				36.00	4354.12
	04/24/17				34.95	4355.17
	5/21/18				26.95	4363.17
	5/15/19				29.11	4361.01
MW-3	12/2012	50	30-50	4393.35	33.66	4359.69
MW-4	01/2013	45.50	25.50-45.50	4390.60	33.80	4356.80
	03/2014				34.26	4356.34
	04/24/17				34.32	4356.28
	5/21/18				27.46	4363.14
	5/15/19				28.13	4362.47
MW-5	01/2013	45.70	25.70-45.70	4392.31	32.45	4359.86
	03/2014				33.41	4358.90
	08/25/15				31.75	4360.56
	11/10/15				32.15	4360.16
	04/17/16				35.17	4357.10
	04/24/17				31.69	4360.62
	5/21/18				27.78	4364.53
	5/15/2019				29.01	4363.30

Notes: Ft feet

bgs – Below ground surface

TOC Top of casing

Table 1: Groundwater Levels and Elevations MAF F-1 Continued

Well ID	Date Sampled	Well Depth (ft bgs)	Screened Interval (ft bgs)	TOC Elevation (feet above mean sea level)	Depth to Water (feet below TOC	Groundwater Elevation (feet above mean sea level)
MW-6	01/2013	45.20	25.20-45.20	4385.60	33.56	4352.04
	03/2014				32.22	4353.38
	04/24/17				35.15	4350.45
	5/21/18				28.61	4356.99
	5/15/19				27.80	4357.80
MW-7	01/2013	45.20	25.20-45.20	4388.67	Dry	Dry
	03/2014				41.29	4343.09
	04/24/17				40.72	4343.66
	5/21/18				34.20	4354.47
	5/15/19				39.61	4349.06
MW-8	01/2013	45.55	25.55-45.55	4386.84	Dry	Dry
	03/2014				38.37	4352.11
	04/24/17				36.51	4353.97
	5/21/18				30.85	4355.99
	5/15/19				34.90	4351.94
MW-9	01/2013	45.00	25.00-45.00	4381.85	39.45	4342.40
	03/2014				39.96	4341.89
	08/25/15				39.71	4342.14
	11/10/15				39.90	4341.95
	04/17/16				40.50	4341.35
	04/24/17				40.04	4341.81
	5/21/18				30.71	4351.14
	5/15/19				34.55	4347.30
MW-10	01/2013	49.20	29.20-49.20	4377.46	39.32	4338.14
	03/2014				35.78	4341.68
	08/25/15				36.00	4341.46
	11/10/15				36.55	4340.91
	04/17/16				38.20	4339.26
	04/24/17				36.91	4340.55
	5/21/18				29.42	4348.04
	5/15/19				31.91	4345.55

Notes:

Ft feet

bgs – Below ground surface

TOC Top of casing

Table 1: Groundwater Levels and Elevations MAF F-1 Continued

Well ID	Date Sampled	Well Depth (ft bgs)	Screened Interval (ft bgs)	TOC Elevation (feet above mean sea level)	Depth to Water (feet below TOC	Groundwater Elevation (feet above mean sea level)
MW-11	03/2013	44.50	24.50-44.50	4371.70	29.66	4342.04
	03/2014				30.11	4342.09
	08/25/15				30.00	4341.70
	11/10/15				30.50	4341.20
	04/17/16				30.80	4340.90
	04/24/17				30.90	4340.80
	5/21/18				25.35	4346.35
	5/15/19				26.87	4344.83
MW-12	03/2013	40.00	20.00-40.00	4369.53	27.44	4342.09
	03/2014				28.01	4341.52
	08/25/15				27.85	4341.68
	11/10/15				28.35	4341.18
	04/17/16				DTP 29.51 DTW 29.52 0.01' Free Product	4340.01
	04/24/17				DTP 29.70 Measured DTW 29.78 Corrected DTW 29.72 0.08' Free Product	4339.81
	10/24/2017				28.90	4340.63
	5/21/18				23.61	4345.92
	5/15/19				24.85	4344.68
MW-13	03/2013	34.00	14.00-34.00	4362.97	18.92	4344.05
	03/2014				19.96	4343.01
	08/25/15				19.81	4343.16
	11/10/15				20.20	4342.77
	04/17/16				21.60	4341.37
	04/24/17				20.18	4342.79
	5/21/18				13.47	4349.5
	5/15/19				14.31	4348.66
MW-14	10/24/17	35.00	15-35	4370.09	Dry	Dry
	5/21/18				24.02	4346.07
	5/15/19				25.35	4344.74
MW-15	10/24/17	35	15-35	4366.58	33.97	4332.61
	5/21/18				20.79	4345.79
	5/15/19				21.95	4344.63

Notes: Ft – feet BGS – below ground surface TOC – Top of casing 4/24/17 groundwater elevation for MW-12 was derived using the depth to water value corrected for depression of the water table due to the presence of free product.

Table 2: Groundwater Field Parameters MAF F-1

Well ID	Date Sampled	pH	Temp (°C)	Sp. Conductivity (mS/cm)	DO (mg/L)	Turbidity (NTUs)	ORP (mV)
MW-1	03/2014	7.03	13.85	1.53	1.07	203	-77
	08/25/15	7.47	11.93	1.52	2.68	112	-54
	11/10/15	6.83	8.92	2.27	NA	230	-64
	04/17/16	6.90	13.60	1.85	0	180	21
	04/24/17	7.0	12.97	1.82	0	145	31
	5/21/18	7.0	12.76	1.55	0	76	44
	5/15/19	7.4	12.61	1.51	2.86	84	41
MW-2	03/2014	7.19	12.20	1.73	0.97	61.3	-48
	08/25/15	7.50	11.20	1.81	3.00	38	-65
	11/10/15	7.10	8.38	1.96	NA	41	-30
	04/17/16	7.80	15.30	1.14	1.0	172	-26
	04/24/17	8.09	12.66	3.18	0.40	548	-189
	5/21/18	8.29	12.76	3.38	0.43	95	-102
	5/15/19	8.09	12.56	3.12	4.50	107	-102
MW-4	04/23/17	7.04	10.66	1.01	2.38	148	52
	5/21/18	7.94	11.66	1.12	2.08	48	62
	5/15/19	7.91	11.60	1.12	7.02	30	56
MW-5	03/2014	7.43	12.97	1.03	3.94	512	-132
	08/25/15	7.81	12.97	2.23	0	1000	-122
	11/10/15	7.25	10.00	2.00	NA	342	-90
	04/17/16	7.00	15.00	0.002	1.2	152	26
	04/24/17	6.12	12.85	1.14	0.48	703	-111
	5/21/18	7.12	12.65	1.34	0.28	30	-101
	5/15/19	7.02	12.53	1.48	3.58	26	-94
MW-6	03/2014	7.88	12.23	1.31	1.26	24.2	-162
	04/24/17	8.78	10.23	0.993	1.20	48.9	-29
	5/21/18	8.48	12.21	1.08	0.21	28.4	-19
	5/15/19	8.11	11.90	0.986	4.12	15	-28
MW-7	03/2014	7.34	12.41	1.71	3.10	78.1	-51
	04/24/17	6.01	9.81	0.102	8.60	21.8	123
	5/21/18	7.02	11.67	0.082	4.60	11.8	113
	5/15/19	7.01	11.41	0.110	8.60	10	121
MW-8	03/2014	7.12	12.03	1.84	3.09	81.4	-45
	04/24/17	6.89	9.42	0.361	4.80	644	-62
	5/21/18	7.26	10.40	0.262	3.42	36.1	-80
	5/15/19	7.19	9.70	0.266	8.25	32	-70

Notes:

ORP - Oxidation Reduction Potential
µg/L - Micrograms per liter
mg/L - Milligrams per liter
NTUs - Nephelometric Turbidity Units

ºC – Degrees Celsius
DO – Dissolved Oxygen
Sp. Cond – Specific Conductivity
mS/cm – Millisiemens per centimeter

Table 2: Groundwater Field Parameters MAF F-1 continued

Well ID	Date Sampled	pH	Temp (°C)	Sp. Conductivity (mS/cm)	DO (mg/L)	Turbidity (NTUs)	ORP (mV)
MW-9	03/2014	7.13	13.31	1.58	1.35	31.3	-69
	08/25/15	7.75	11.86	1.58	0.3	163	-28
	11/10/15	7.95	9.81	1.86	NA	273	-20
	04/17/16	7.60	17.90	1.64	1.63	248	-13
	04/24/17	7.73	11.82	1.62	1.09	860	-198
	5/21/18	7.43	12.02	1.42	1.10	90	-118
	5/15/19	7.51	11.90	1.35	3.69	90	-121
MW-10	03/2014	7.34	11.60	1.46	1.72	3.00	-78
	08/25/15	7.93	12.09	1.30	14.0	44	87
	11/10/15	7.90	11.42	1.13	NA	163	70
	04/17/16	7.60	18.20	1.06	2.00	188	68
	04/24/17	7.80	10.91	1.57	0	220	69
	5/21/18	7.50	10.89	1.37	0	56	19
	5/15/19	7.25	11.54	1.53	1.23	56	14
MW-11	08/25/15	8.34	10.96	1.16	1.00	195	50
	11/10/15	8.61	10.19	1.21	NA	200	58
	04/17/16	8.20	13.30	1.29	1.7	109	54
	04/24/17	8.40	9.63	1.25	0.60	112	22
	5/22/18	8.80	10.23	1.55	0.70	82	32
	5/15/19	8.51	10.23	1.55	2.10	78	42
MW-12	03/2014	7.35	10.69	1.27	3.65	29.60	-116
	08/25/15	7.46	11.62	1.81	0	185	-102
	11/10/15	7.26	10.55	1.63	NA	222	-83
	04/17/16	7.20	15.70	1.48	0.90	197	-50
	04/24/17	Not sampled due to 0.08' of free product in well					
	5/22/18	7.90	10.92	1.41	0	105	42
	5/15/19	8.02	10.83	1.63	1.14	49	30
MW-13	08/25/15	8.45	12.67	0.52	4.30	1000	47
	11/10/15	8.58	11.17	0.62	NA	111	50
	04/17/16	7.90	13.20	0.51	0.9	78	59
	04/24/17	8.71	10.16	0.556	3.14	1000	86
	5/22/18	8.02	10.01	0.356	2.52	70	87
	5/15/19	7.99	10.02	0.370	7.60	80	87

Notes:

µg/L - Micrograms per liter
mg/L - Milligrams per liter
NTUs - Nephelometric Turbidity Units
ORP - Oxidation Reduction Potential
mV - Millivolts
DO – Dissolved Oxygen
Sp. Cond – Specific Conductivity
mS/cm – Millisiemens per centimeter
ºC – Degrees Celsius

NA – The DO sensor was not functioning during the November 2015 sampling event.

Table 2: Groundwater Field Parameters MAF F-1 continued

Well ID	Date Sampled	pH	Temp (°C)	Sp. Conductivity (mS/cm)	DO (mg/L)	Turbidity (NTUs)	ORP (mV)
MW-14	5/22/18	8.11	10.27	1.16	0	84	43
	5/15/19	8.42	10.15	1.00	3.19	81	39
MW-15	5/22/18	7.62	11.04	1.40	0.12	45	108
	5/15/19	7.59	10.98	1.20	4.14	32	98

Notes:

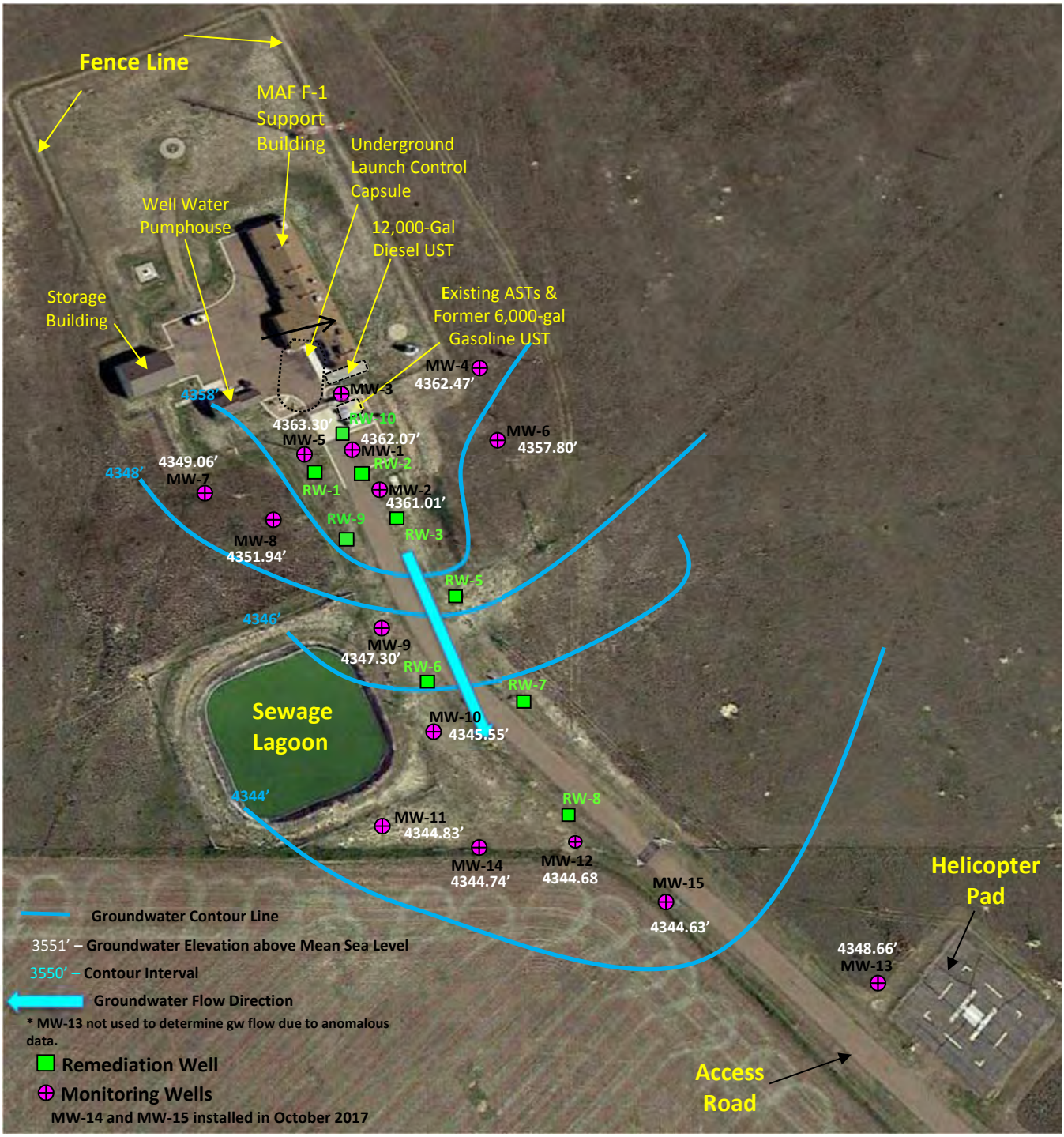
μg/L - Micrograms per liter
mg/L - Milligrams per liter
NTUs - Nephelometric Turbidity Units
ORP - Oxidation Reduction Potential
mV - Millivolts
DO – Dissolved Oxygen
Sp. Cond – Specific Conductivity
mS/cm – Millisiemens per centimeter
ºC – Degrees Celsius
NA – The DO sensor was not functioning during the November 2015 sampling event.

TABLE 3
VPH and EPH (with Fraction Data) Concentrations in Groundwater
Missile Alert Facility F-1 (TU507) Augusta , Montana
December 2012 - May 2019

Sample ID	Date Sample Taken	C5-C8 Aliphatic Hydrocarbons	C9-C12 Aliphatic Hydrocarbons	C9-C10 Aromatic Hydrocarbons	Total Purgeable Hydrocarbons	Benzene	Ethylbenzene	Methyl tert-butyl ether	Naphthalene	Toluene	m,p-Xylene	o-Xylene	Total Extractable Hydrocarbons (EPH Screen)	C9-C18 Aliphatic Hydrocarbons	C19-C36 Aliphatic Hydrocarbons	C11-C22 Aromatic Hydrocarbons	Total Petroleum Hydrocarbons (TEH - Post Fractionation)
MW-1	12/12/2012	6090	3910	7260	30900	1810	1430	<6.2 U	651	842	7340	2170	**15500 E**	1140	<35.9 U	<164 U	1180
	3/18/2014	7850	1140	10600	38300	2410	2030	184	734	1210	10000	2900	16900 CCE, TEH,	185	<73.0 U	123	308
	8/25/2015	5880	2180	5270	25300	1260	739	<8.4 U	413	1190	6340	2440	14200 TEH	423	184	71	678
	11/10/2015	4200	2060	4530	22800	1010	909	<16.9 U	277	1430	6280	2370	13200 TEH	925	<23.7 U	234	1180
	4/17/2016	3630	888	4250	14100	289	175	67.2	246	147	3230	1380	8820 TEH	1080	<23.7 U	99.2 J	1180
	4/24/2017	15600	26500	6380	51000	1860	2140	192	1050	1340	9430	3950	24300	<546	<546	1040	1230
	5/21/2018	7220	7600	7260	35500	1420	1340	<14.8	596	667	7490	2490	8120 TEH	92.9	285	388	766
	5/15/2019	7990	10100	7700	38000	1170	1440	<4	619	813	6900	1880	65000	14000	<240	1800	16000
MW-2	12/12/2013	1720	860	1290	9500	3160	393	80.8	<11.7 U	1000	106	900	**9300 E**	156	<32.9 U	161	316
	3/14/2014	3200	1460	2810	14900	3420	370	163	40.0	811	2120	590	7980 TEH	<40.9 U	<73.0 U	<63.1 U	<177 U
	8/25/2015	3930	790	1910	11700	2840	504	<4.2 U	242	189	1360	180	8700 TEH	179	242	<34.1	421
	11/10/2015	2410	834	1040	5340	381	75.5 J	25.5 J	98.2 J	94.4 J	356	125	25,400 TEH	186	379	1350	1920
	4/17/2016	2670	435	1040	7160	1370	293	80.3	73.2	222	876	170	37800 TEH, E	375	38.3 J	912	1330
	4/24/2017	6450	5150	1230	12900	2500	838	26.8	249	467	1800	439	28200	<570	<570	<570	<570
	5/21/2018	3280	1790	1630	11000	1610	520	71.8	174	334	1490	292	7750 TEH, E	<14.6	265	112	383
	5/15/2019	2780	3030	2010	13500	1660	664	<4	226	518	2250	562	22000	260	<48	240	500 J
MW-3	12/12/2012	194	34.4	61.3	353	30.2	3.9 J	<1.6 U	<1.2 U	2.0 J	20.4	6.2	310.0	194	34.4	61.3	353
MW-4	2/18/2013	46.2 J	13.4 J	9.3 J	69 J	<1.3 U	<1.4 U	<1.6 U	<1.2 U	<1.3 U	<2.8 U	<1.1 U	384	46.2 J	13.4 J	9.3 J	69 J
	4/24/2017	<100	<100	<100	<200	<5	<5	<5	<5	<5	<10	<5	<273	NA	NA	NA	NA
	5/21/2018	14.3	<25	<25	<100	<0.453	<0.420	<0.297	<0.491	<0.373	<0.819	<0.416	<109	NA	NA	NA	NA
	5/15/2019	<50	<50	<20	<100	<2	<2	<2	<3	<2	<5	<2	<300	NA	NA	NA	NA
MW-5	2/18/2013	13400	11000	14100	48800	428	1070	<77.5 U	716	870	6190	1820	**7280 E**	395	<40.5 U	283	678
	3/18/2014	640	130	614	1930	37.7	66.4	<1.68 U	41.6	40.1	320	86.2	1030 TEH	53.3 J	<73.0 U	<63.1 U	<177 U
	8/25/2015	950	786	1910	4730	82.4	73.5	<3.38 U	102	127	586	218	1030 TEH	680	<23.7 U	172	852
	11/10/2015	2340	1650	2940	9050	166.0	165.0	<16.9 U	133	248	1140	388	11500 TEH	650	88.4 J	379	1120
	4/17/2016	1150	375	1560	4470	133	119	7.79 J	82.9	202	698	232	13900 TEH	1370	<23.7 U	599	1970
	4/24/2017	572	568	298	1540	18.1	28.9	<5	24.7	46.4	118	62	3920	<546	<546	<546	<546
	5/21/2018	370	269	319	1310	30.1	32.9	<0.297	22.2	58.5	173	56	715	NA	NA	NA	NA
	5/15/2019	117 J	56.5 J	76.2 J	277	<2	4.39 J	<2	<3	3.03 J	15	5	460	NA	NA	NA	NA
MW-6	3/18/2014	70.0 J	16.4 J	61.3	151	1.84 J	<2.16 U	<1.68 U	0.474 J	<0.995 U	<4.13 U	<2.22 U	4440 TEH	70.0 J	16.4 J	61.3	151
	4/24/2017	<100	<100	<100	<200	<5	<5	11	<5	<5	<10	<5	<285	NA	NA	NA	NA
	5/21/2018	<10	<25	<25	<100	<0.453	<0.420	8.81	<0.491	<0.373	<0.819	<0.416	126	NA	NA	NA	NA
	5/15/2019	<50	<50	<20	<100	<2	<2	6.99	<3	<2	<5	<2	<300	NA	NA	NA	NA
MW-7	4/24/2017	<100	<100	<100	<200	<5	<5	<5	<5	<5	<10	<5	<300	NA	NA	NA	NA
	5/21/2018	13.2	<25	<25	<100	<0.453	0.421	<0.297	<0.491	<0.373	1.52	<0.416	126	NA	NA	NA	NA
	5/15/2019	<50	<50	<20	<100	<2	<2	<2	<3	<2	<5	<2	<300	NA	NA	NA	NA
MW-8	4/24/2017	1020	188	132.0	1340	107	30.5	12.4	12.7	6.96	<10	<5	471	NA	NA	NA	NA
	5/21/2018	20.7	<25	<25	<100	2.39	1.32	0.325	0.905	<0.373	1.18	<0.416	266	NA	NA	NA	NA
	5/15/2019	123 J	<50	47 J	230	21.7	3.8 J	<2	3.25 J	<2	<5	<2	<300	NA	NA	NA	NA
MW-9	2/18/2013	4200	7240	11500	37900	5030	1270	31.0 U	1,080	878	6450	1400	**10200 E**	<35.2 U	<33.9 U	<155 U	<147 U
	3/14/2014	7770	3770	7620	39400	5490	1850	341	886	2590	7460	2520	8640 TEH	<40.9 U	<73.0 U	150	179 J
	8/26/2015	10600	2060	5080	32800	4240	704	<16.9 U	457	1590	6260	2260	8500 TEH	1660	<23.7 U	151	1810
	11/10/2015	4190	1560	2380	14200	2060	478	99.5 J	131	878	1870	703	20700 TEH	485	333	1570	2390
	4/17/2016	13800	1420	7480	42600	4910	1940	420	612	2100	7960	2590	16700 TEH, E	2860	<23.7 U	1130	3990
	4/24/2017	20900	16000	3510	40400	4330	1810	612	641	1170	5740	1990	25900	<600 J4	<600	917	1160
	5/21/2018	3560	3620	3610	15400	1170	642	60	293	243	1930	606	7700 TEH, E	1320	<20.1	334	1650
	5/15/2019	12400	8450	5650	40000	3370	1700	<10	444	973	5830	1660	13000	660	<49	<390	660
MW-10	2/18/2013	4820	4730	6920	22600	2800	997	31.0 U	847	100	2140	123	**5770**	<34.4 U	<33.2 U	<75.8 U	<143 U
	3/14/2014	2250	1760	3450	10800	1790	560	71.2	553	51.8	881	23.2	4150 TEH	<40.9 U	<73.0 U	89.3 J	<177 U
	8/25/2015	532	196	471	1810	291	118	<1.69	75.8	14.7	175	10.3	946 TEH	NA	NA	NA	NA
	11/10/2015	1240	561	649	2520	56	<11.8 U	<8.45 U	<11.0 U	<18.1 U	<23.6 U	<11.6 U	27400 TEH	229	217	1220	1670
	4/17/2016	457	117	370	1420	272	72.2	11.4	43.1	10.1	104	6.18	28700 TEH, E	170	<23.7 U	558	728
	4/24/2017	1960	1540	644	4140	494	262	23.0	162.0	21.8	252	18.4	13800	<600 J4	<600	<600	<600
	5/21/2018	1360	1330	1540	5920	799	368	<0.297	249.0	22.4	458	38.0	5970 TEH, E	279	<20.3	223	502
	5/15/2019	1490	1130	1480	5190	475	242	<2	160.0	16.2	367	49.6	6700	110	<49	<78	110 J
MW-11	3/15/2013	44.4 J	9.54 J	28.2	85.3 J	1.3 J	<1.4 U	<1.6 U	<1.2 U	<1.3 U	<2.8 U	<1.1 U	<103 U	44.4 J	9.54 J	28.2	85.3 J
	8/26/2015	113	28.9	39.7	204.0	9.8	9.4	<0.84 U	6.5	<1.8 U	<1.1 U	<1.1 U	349	NA	NA	NA	NA
	11/10/2015	79	21.7 J	18.3 J	126.0	3.32 J	1.52 J	<0.845 U	<1.10 U	<1.81 U	<2.36 U	<1.16 U	4040 TEH	189	<23.2 U	143.0	332.0
	4/17/2016	34.8 J	<3.84 U	19.0 J	56.6 J	<1.92 U	<1.74 U	<2.29 U	<3.06 U	<1.54 U	<3.40 U	<1.64 U	848	NA	NA	NA	NA
	4/24/2017	<100	<100	<100	<200	<5	<5	<5	<5	<5	<10	<5	<300	NA	NA	NA	NA
	5/22/2018	126	403.0	352.0	1020.0	7.59	6.1	0.695	37.3	6.5	76.1	43.8	507	NA	NA	NA	NA
	5/15/2019	<50	<50	<20	<100	<2	<2	<2	<3	<2	<5	<2	<300	NA	NA	NA	NA
MW-12	3/15/2013	3010	545	4860	13000	1130	1150	<6.2 U	482	121	1760	401	4540	441	<32.2 U	157	NA
	3/14/2014	3500	2250	4200	13600	1010	1060	57.1	600	73.3	1150	252	3590 TEH	<40.9 U	<73.0 U	87.1 J	<177 U
	8/26/2015	6510	8390	21500	53000	543	2270	<33.8 U	1690	208	11100	2790	**77500 TEH**	30600	<47.3	2190	32700
	11/11/2015	11800	19900	42400	87700	558	1640	<84.5 U	2530	183 J	8790	2350	**96000 TEH**	34700 CCE, E	164	3260	38200
	4/17/2016	115000	1230000	3400000	4800000	<1920 U	4480 J	<2290 U	250000	<1540 U	28700	10700	209000 TEH, E	127000 CCE, E	<237 U	16800	143000
	4/24/2017	NOT SAMPLED - FREE PRODUCT PRESENT IN WELL															
	10/24/2017	3560	8170	22700	46800	430	1770	<29.7 U	1220	89.3	7990	2000	**21500 E**	59200 CCE	<394 U	<680 U	NA
	5/22/2018	5160	16600	19900	48600	279	983	<29.7	1610	111.0	4250	1220	**14700**	9600	37	4210	13800
	5/15/2019	4780	6090	8050	22500	459	801	<2	463	68.3	1920	334	**27000**	5600	<96	1800	7400
MW-13	3/13/2013	23.1 J	<4.22 U	9.77 J	36.0 J	<1.3 U	<1.4 U	<1.6 U	<1.2 U	<1.3 U	<2.8 U	<1.1 U	115	23.1 J	<4.22 U	9.77 J	36.0 J
	8/26/2015	35.0 J	17.9 J	5.0 J	55.8 J	<0.9 U	<1.1 U	<0.8 U	1.4 J	<1.8 U	<2.3 U	<1.1 U	231	NA	NA	NA	NA
	11/11/2015	47.5 J	14.0 J	10.8 J	73.2 J	<0.945 U	<1.18 U	<0.845 U	<1.10 U	<1.8 U	<2.36 U	<1.16 U	3420 TEH	186	<23.2 U	152	338
	4/17/2016	64.8 J	<3.84 U	20.2 J	89.5 J	<1.92 U	<1.74 U	<2.29 U	<3.06 U	<1.54 U	<3.40 U	<1.64 U	1370 TEH	155	<23.7 U	<34.1 U	184 J
	4/24/2017	<100	<100	<100	<200	<5	<5	<5	<5	<5	<10	<5	<300	NA	NA	NA	NA
	5/22/2018	<10	<25	<25	<100	<0.453	<0.420	<0.297	<0.491	<0.373	<0.819	<0.416	132	NA	NA	NA	NA
	5/15/2019	<50	<50	<20	<100	<2	<2	<2	<3	<2	<5	<2	<300	NA	NA	NA	NA
MW-14	5/22/2018	1460	734	781	3400	285	64.5	<0.297	69.7	6.53	79.7	18.3	1030	141	<20.3	163	650
	5/15/2019	662	132 J	204	1020	13.1	7.53	<2	<3	<2	<5	<2	730	NA	NA	NA	NA
MW-15	10/24/2017	1260	6050	9090	17400	<4.53 U	276.0	<2.97 U	426.0	9.03	620.0	96.0	9930 E	10100	<419 U	<722 U	NA
	5/22/2018	1070	2920	2550	6730	<9.06	48.9	<5.94	111.0	<7.46	112.0	24.3	**3350**	1460	<20.1	798	2260
	5/15/2019	1220	1110	1750	4120	<2	39.0	<2	27.0	<2	<5	3.73 J	**3100**	520	<48	380	900
DEQ Tier 1 RBSL (ug/L)		650	1400	1100	NE	5.00	700	30	100	1000	10000		NE	1400	1000	1100	NE

NE - Remediation Level not available
1004 Exceeds EPH Screen of 1000 ug/L
5.0 Exceeds RBSL
<1.3 RBSL is lower then lab MDL
CCE - Analyte concentration is flagged as estimated due to exceeding the calibration range or interferences.
TEH - Total Extractable Hydrocarbon concentraiton exceeds criteria additional analysis (fractionation) is needed.
E - This flag indicates the concentration for this analyte is an estimated alue due to exceeding the calibration range or interferences resulting in a biased final concentration.
U - Analyte included in the analysis, but not detected at or above the MDL.
J - Detected above the Method Detection Limit but below the Reporting Limit; therefore, result is an estimated concentration.
J4 - The associated batch QC was outside the established quality control range for accuracy
NA - Not Analyzed
Remedial Injections were completed between June 8, 2015 and October 27, 2015.
Data compared to the May 2018 DEQ Tier 1 RBSLs
Note: Data from the 8/25/15 sampling groundwater sampling event have been qualified as estimates (J) and biased low because the sample temperatures at time of analysis exceeded EPA recommendations.

FIGURES



0 50 100

Figure 2
May 2019 Potentiometric Map

Missile Alert Facility (MAF) F-1
Augusta, Lewis & Clark County, Montana

Project No.:	9699-507
Draft by:	KCA
Reviewed by:	JAH
Date:	01/08/2017
Reference:	

EMR INCORPORATED
INFRASTRUCTURE AND ENVIRONMENT
2110 Delaware St., Suite B
Lawrence, Kansas 66046
Phone: 785-842-9013
Fax: 785-842-3863
www.emr-inc.com

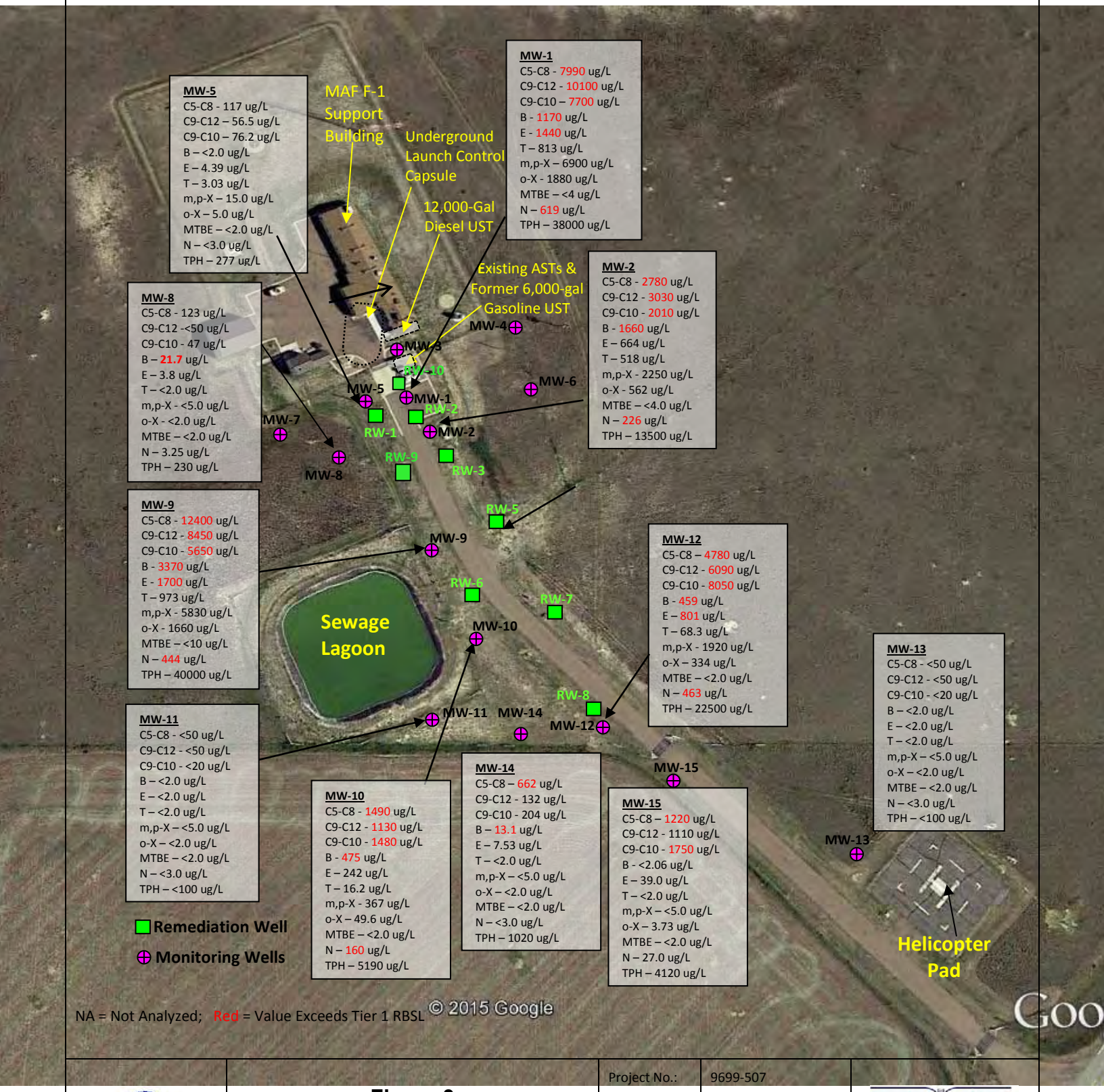


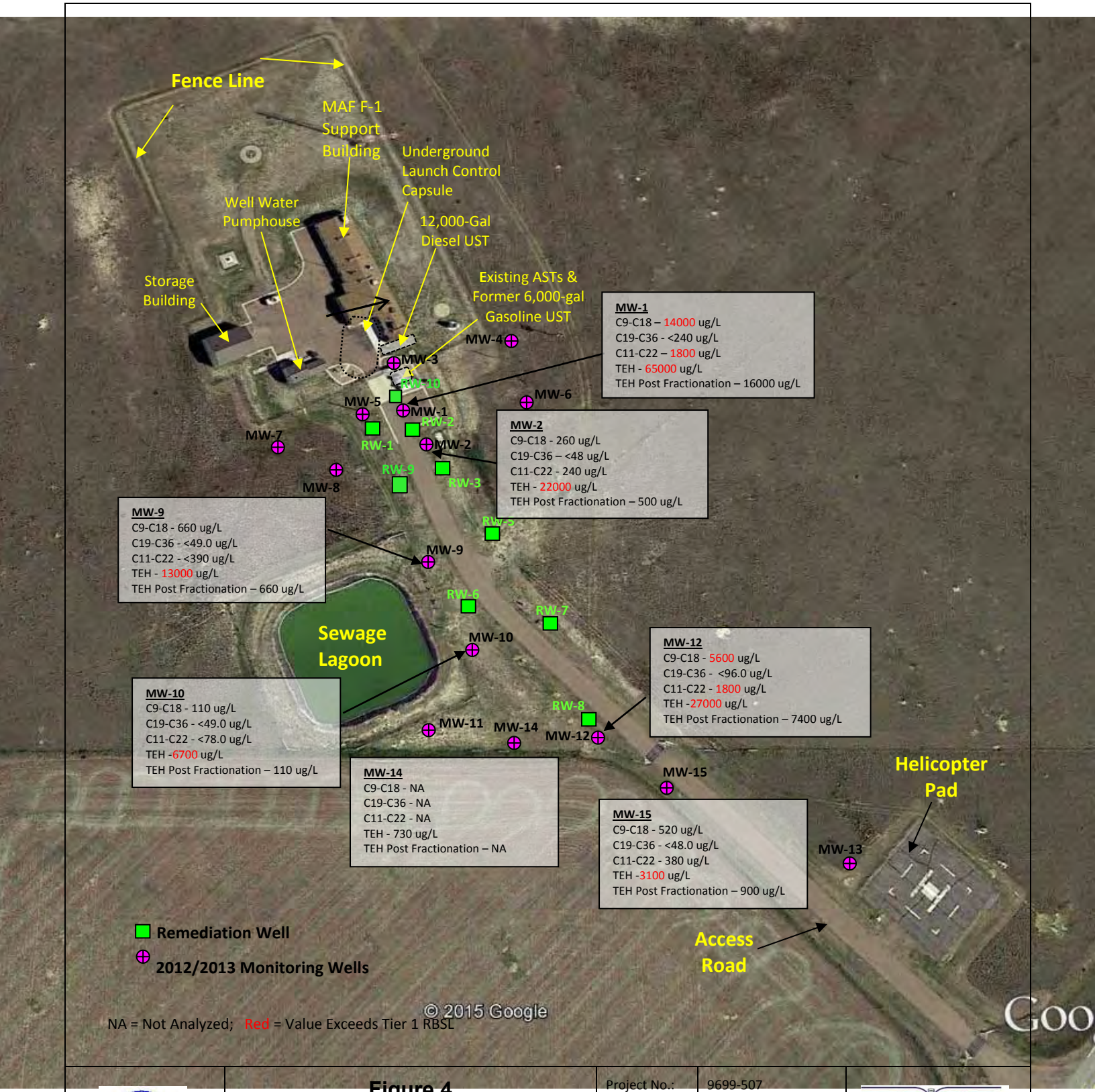
Figure 3
VPH Concentrations
May 2019

Missile Alert Facility (MAF) F-1
Augusta, Lewis & Clark County, Montana

0 50 100

Project No.:	9699-507
Draft by:	KCA
Reviewed by:	JAH
Date:	08/23/2019
Reference:	

EMR ENVIRONMENTAL
6418 College Blvd.
Overland Park, Kansas 66211
Phone: 913-232-7788
www.emrenv.com



NA = Not Analyzed; Red = Value Exceeds Tier 1 RBSL

0 50 100

Figure 4
EPH/Fractionation Concentrations in Wells
May 2019

Missile Alert Facility (MAF) F-1
Augusta, Lewis & Clark County, Montana

Project No.:	9699-507
Draft by:	KCA
Reviewed by:	JAH
Date:	8/23/2019
Reference:	

EMR ENVIRONMENTAL
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Overland Park, Kansas
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APPENDIX A

Montana DEQ RBSLs

TABLE 3
TIER 1 GROUNDWATER RBSLs AND STANDARDS

This table applies to groundwater and consists of DEQ-7 Human Health Standards (HHSs; DEQ 2012), where available. For compounds without DEQ-7 HHSs, DEQ has developed RBSLs and included them in the table. For EPH compounds, a total extractable hydrocarbon (TEH) concentration of 1,000 µg/L is used to determine if additional analysis (fractionation) is needed. Surface water impacts require a minimum of a Tier 2 evaluation.

Chemical	Effect	Basis	Groundwater Standard or RBSL (µg/l)
For Gasoline and Light Hydrocarbons measured using the Massachusetts Method for Volatile Petroleum Hydrocarbons (VPH)			
C5-C8 Aliphatics [(b)]	n	rb	650
C9-C12 Aliphatics[(b)]	n	rb	1,400
C9-C10 Aromatics[(b)]	n	rb	1,100
MTBE	n	hhs	30
Benzene	c	hhs	5
Toluene	n	hhs	1,000
Ethylbenzene	n	hhs	700
Xylenes	n	hhs	10,000
Naphthalene	c	hhs	100
Lead Scavengers			
Ethylene dibromide (EDB)	c	hhs	0.017
1,2-Dichloroethane (DCA)	c	hhs	4
For Diesel and Heavy Hydrocarbons measured using the Massachusetts Method for Extractable Petroleum Hydrocarbons (EPH)			
EPH / TEH Screen fractionation required[(a)]			1,000
C9-C18 Aliphatics[(b)]	n	rb	1,400
C19-C36 Aliphatics	n	bu	1,000
C11-C22 Aromatics[(b)]	n	rb	1,100
Acenaphthene	n	hhs	70
Anthracene	n	hhs	2,100
Benz(a)anthracene	c	hhs	0.5
Benzo(a)pyrene	c	hhs	0.05*
Benzo(b)fluoranthene	c	hhs	0.5
Benzo(k)fluoranthene	c	hhs	5
Chrysene	c	hhs	50
Dibenzo(a,h)anthracene	c	hhs	0.05*
Fluoranthene	n	hhs	20
Fluorene	n	hhs	50
Indeno(1,2,3-cd)pyrene	c	hhs	0.5
Naphthalene	c	hhs	100
Pyrene	n	hhs	20
1-Methylnaphthalene	c	rsl	11
2-Methylnaphthalene	n	rsl	36

Notes: (a) = An exceedance of the 1,000 µg/l EPH/TEH screen value indicates only that fractionation is required. If none of the fractions exceed, then the EPH/TEH value does not need to be identified as a COPC exceeding RBSLs.

(b) = The fraction surrogate (for modeling purposes) uses a representative compound with a mid range Equivalent Carbon Number (Massachusetts DEP 2002 Table 4-14). This number doesn't take into account the higher molecular weight compounds that have higher solubilities than the fraction surrogate therefore underestimating the overall solubility of the fraction.

Effect is either: n = non-carcinogenic RBSLs and RSLs are based on a hazard quotient of 1, or
c = carcinogenic RBSLs and RSLs are based on a cancer risk $1X10^{-5}$.

Basis is: rb = risk-based screening level;
hhs = DEQ-7 Human Health Standard (DEQ, October 2012. Circular DEQ-7 Montana Numeric Water Quality Standards); or
rsl = tapwater risk-based screening level based upon TR of 1E-05 and THQ of 1.0 consistent with DEQ-7
bu = adversely affects beneficial uses (foul taste or odor).
* = The best achievable practical quantitation limit (0.1 µg/L) may be greater than the human health standard; therefore, if the compound is detected, additional evaluation may be necessary.

The RBSLs for soil and water are not designed to be protective of the vapor intrusion (VI) pathway. Please refer to the Vapor Intrusion to Indoor Air Section of the Montana Risk-Based Corrective Action Guidance for Petroleum Releases.

APPENDIX B

Groundwater Sampling Logs

EMR Environmental, LLC.

GROUNDWATER SAMPLING LOG

SITE NAME: MAF F-1	SITE LOCATION: Augusta, MT	
WELL NO: MW-1	SAMPLE ID: MW-1	DATE: 5/15/2019

PURGING DATA

WELL DIAMETER (inches): 2	TUBING DIAMETER (inches): 3/16	WELL SCREEN INTERVAL DEPTH: 29.2 feet to 49.2 feet	STATIC DEPTH TO WATER (feet): 30.61	PURGE PUMP TYPE OR BAILER: BP

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH – STATIC DEPTH TO WATER) X WELL CAPACITY
(only fill out if applicable)
= (49.2 feet – 30.61 feet) X 0.16 gallons/foot = 2.97 gallons

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
(only fill out if applicable)
= gallons + (gallons/foot X feet) + gallons = gallons

INITIAL PUMP OR TUBING DEPTH IN WELL (feet): 38	FINAL PUMP OR TUBING DEPTH IN WELL (feet): 38	PURGING INITIATED AT: 941	PURGING ENDED AT: 1002	TOTAL VOLUME PURGED (gallons): 5.25

IME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet)	pH (standard units)	TEMP. (°C)	COND. (circle units) µmhos/cm or µS/cm	DISSOLVED OXYGEN (circle units) mg/L or % saturation	TURBIDITY (NTUs)	ORP (mV)	ODOR (describe)
953	3	3	.25	30.97	7.3	12.65	1.56	2.99	90	42	
956	.75	3.75	.25	31.0	7.2	12.64	1.50	2.84	82	43	
959	.75	4.50	.25	31.01	7.4	12.62	1.51	2.84	83	44	
1002	.75	5.25	.25	31.00	7.4	12.61	1.51	2.86	84	41	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: KAdkisson / EMR	SAMPLER(S) SIGNATURE(S): K. Adkisson	SAMPLING INITIATED AT:1002	SAMPLING ENDED AT:1004
PUMP OR TUBING DEPTH IN WELL (feet): 38	TUBING MATERIAL CODE: PE	FIELD-FILTERED: Y N Filtration Equipment Type:	FILTER SIZE: _____ µm
FIELD DECONTAMINATION: PUMP Y N	TUBING Y N (replaced)	DUPLICATE: Y N	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	SAMPLE PUMP FLOW RATE (mL per minute)
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
SEE CHAIN OF CUSTODY									
MW-1	3	AG	40ml	HCl	Prepres		VPH	BP	200
MW-1	1	AG	1L	HCl	prepres		EPH	BP	500

REMARKS:

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

GROUNDWATER SAMPLING LOG

SITE NAME: MAF F-1	SITE LOCATION: Augusta, MT	
WELL NO: MW-2	SAMPLE ID: MW-2	DATE: 5/15/2019

PURGING DATA

WELL DIAMETER (inches): 2	TUBING DIAMETER (inches): 3/16	WELL SCREEN INTERVAL DEPTH: 20.7 feet to 50.7 feet	STATIC DEPTH TO WATER (feet): 29.11	PURGE PUMP TYPE OR BAILER: BP

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH – STATIC DEPTH TO WATER) X WELL CAPACITY
(only fill out if applicable)
= (50.7 feet – 29.11 feet) X 0.16 gallons/foot = 3.45 gallons

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
(only fill out if applicable)
= gallons + (gallons/foot X feet) + gallons = gallons

INITIAL PUMP OR TUBING DEPTH IN WELL (feet): 38	FINAL PUMP OR TUBING DEPTH IN WELL (feet): 38	PURGING INITIATED AT: 1015	PURGING ENDED AT: 1036	TOTAL VOLUME PURGED (gallons): 5.25

IME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet)	pH (standard units)	TEMP. (°C)	COND. (circle units) µmhos/cm or µS/cm	DISSOLVED OXYGEN (circle units) mg/L or % saturation	TURBIDITY (NTUs)	ORP (mV)	ODOR (describe)
1027	3	3	.25	29.70	7.85	12.87	3.11	4.59	119	-120	
1030	.75	3.75	.25	29.79	8.02	12.60	3.11	4.50	116	-105	
1033	.75	4.50	.25	30.0	8.07	12.55	3.12	4.51	106	-105	
1036	.75	5.25	.25	30.01	8.09	12.56	3.12	4.50	107	-102	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: KAdkisson/EMR	SAMPLER(S) SIGNATURE(S): K. Adkisson	SAMPLING INITIATED AT:1036	SAMPLING ENDED AT:1038
PUMP OR TUBING DEPTH IN WELL (feet): 38	TUBING MATERIAL CODE: PE	FIELD-FILTERED: Y N Filtration Equipment Type:	FILTER SIZE: _____ µm
FIELD DECONTAMINATION: PUMP Y N	TUBING Y N (replaced)	DUPLICATE: Y N	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	SAMPLE PUMP FLOW RATE (mL per minute)
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
SEE CHAIN OF CUSTODY									
MW-2	3	AG	40ml	HCl	Prepres		VPH	BP	200
MW-2	1	AG	1L	HCl	prepres		EPH	BP	500

REMARKS:

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

Revision Date:

GROUNDWATER SAMPLING LOG

SITE NAME: MAF F-1	SITE LOCATION: Augusta, MT	
WELL NO: MW-4	SAMPLE ID: MW-4	DATE: 5/15/2019

PURGING DATA

WELL DIAMETER (inches): 2	TUBING DIAMETER (inches): 3/16	WELL SCREEN INTERVAL DEPTH: 25.5 feet to 45.5 feet	STATIC DEPTH TO WATER (feet): 28.13	PURGE PUMP TYPE OR BAILER: BP

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH – STATIC DEPTH TO WATER) X WELL CAPACITY
(only fill out if applicable)

= (45.5 feet – 28.13 feet) X 0.16 gallons/foot = 2.78 gallons

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
(only fill out if applicable)

= gallons + (gallons/foot X feet) + gallons = gallons

INITIAL PUMP OR TUBING DEPTH IN WELL (feet): 38	FINAL PUMP OR TUBING DEPTH IN WELL (feet): 38	PURGING INITIATED AT: 1050	PURGING ENDED AT: 1108	TOTAL VOLUME PURGED (gallons): 3.75

IME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet)	pH (standard units)	TEMP. (°C)	COND. (circle units) µmhos/cm or µS/cm	DISSOLVED OXYGEN (circle units) mg/L or % saturation	TURBIDITY (NTUs)	ORP (mV)	ODOR (describe)
1055	1.5	1.5	.25	32.21	7.89	11.60	1.11	6.97	35	54	
1102	.75	2.25	.25	32.25	7.90	11.61	1.12	7.04	33	58	
1105	.75	3	.25	32.25	7.90	11.61	1.12	7.01	30	56	
1108	.75	3.75	.25	32.25	7.91	11.60	1.12	7.02	30	56	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: KAdkisson / EMR	SAMPLER(S) SIGNATURE(S): K. Adkisson	SAMPLING INITIATED AT:1108	SAMPLING ENDED AT:1110
PUMP OR TUBING DEPTH IN WELL (feet): 38	TUBING MATERIAL CODE: PE	FIELD-FILTERED: Y N Filtration Equipment Type:	FILTER SIZE: _____ µm
FIELD DECONTAMINATION: PUMP Y N	TUBING Y N (replaced)	DUPLICATE: Y N	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	SAMPLE PUMP FLOW RATE (mL per minute)
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
SEE CHAIN OF CUSTODY									
MW-4	3	AG	40ml	HCl	Prepres		VPH	BP	200
MW-4	1	AG	1L	HCl	prepres		EPH	BP	500

REMARKS:

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

Revision Date:

GROUNDWATER SAMPLING LOG

SITE NAME: MAF F-1	SITE LOCATION: Augusta, MT	
WELL NO: MW-5	SAMPLE ID: MW-5	DATE: 5/15/2019

PURGING DATA

WELL DIAMETER (inches): 2	TUBING DIAMETER (inches): 3/16	WELL SCREEN INTERVAL DEPTH: 27 feet to 45.7 feet	STATIC DEPTH TO WATER (feet): 29.01	PURGE PUMP TYPE OR BAILER: BP

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH – STATIC DEPTH TO WATER) X WELL CAPACITY
(only fill out if applicable)

= (45.7 feet – 29.01 feet) X 0.16 gallons/foot = 2.67 gallons

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
(only fill out if applicable)

= gallons + (gallons/foot X feet) + gallons = gallons

INITIAL PUMP OR TUBING DEPTH IN WELL (feet): 35	FINAL PUMP OR TUBING DEPTH IN WELL (feet): 35	PURGING INITIATED AT: 1120	PURGING ENDED AT: 1138	TOTAL VOLUME PURGED (gallons): 4.5

IME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet)	pH (standard units)	TEMP. (°C)	COND. (circle units) µmhos/cm or µS/cm	DISSOLVED OXYGEN (circle units) mg/L or % saturation	TURBIDITY (NTUs)	ORP (mV)	ODOR (describe)
1129	2.25	2.25	.25	30.02	6.92	12.54	1.45	3.52	25	-99	
1132	.75	3	.25	30.05	7.00	12.51	1.48	3.50	22	-94	
1135	.75	3.75	.25	30.04	7.01	12.51	1.48	3.55	25	-94	
1138	.75	4.5	.25	30.04	7.02	12.53	1.48	3.58	26	-94	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: KAdkisson / EMR	SAMPLER(S) SIGNATURE(S): *K. Adkisson*	SAMPLING INITIATED AT:1138	SAMPLING ENDED AT:1142
PUMP OR TUBING DEPTH IN WELL (feet): 35	TUBING MATERIAL CODE: PE	FIELD-FILTERED: Y N Filtration Equipment Type:	FILTER SIZE: _____ µm
FIELD DECONTAMINATION: PUMP Y N	TUBING Y N (replaced)	DUPLICATE: Y N	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	SAMPLE PUMP FLOW RATE (mL per minute)
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
SEE CHAIN OF CUSTODY									
MW-5	3	AG	40ml	HCl	Prepres		VPH	BP	200
MW-5	1	AG	1L	HCl	prepres		EPH	BP	500
MW-5D	3	AG	40ml	HCl	Prepres		VPH	BP	200
MW-5D	1	AG	1L	HCl	prepres		EPH	BP	500

REMARKS:

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

Revision Date:

GROUNDWATER SAMPLING LOG

SITE NAME: MAF F-1	SITE LOCATION: Augusta, MT	
WELL NO: MW-6	SAMPLE ID: MW-6	DATE: 5/15/2019

PURGING DATA

WELL DIAMETER (inches): 2	TUBING DIAMETER (inches): 3/16	WELL SCREEN INTERVAL DEPTH: 25.2 feet to 45.2 feet	STATIC DEPTH TO WATER (feet): 27.80	PURGE PUMP TYPE OR BAILER: BP

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH – STATIC DEPTH TO WATER) X WELL CAPACITY
(only fill out if applicable)

= (45.2 feet – 27.80 feet) X 0.16 gallons/foot = 2.78 gallons

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
(only fill out if applicable)

= gallons + (gallons/foot X feet) + gallons = gallons

INITIAL PUMP OR TUBING DEPTH IN WELL (feet): 35	FINAL PUMP OR TUBING DEPTH IN WELL (feet): 35	PURGING INITIATED AT: 1155	PURGING ENDED AT: 1213	TOTAL VOLUME PURGED (gallons): 4.5

IME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet)	pH (standard units)	TEMP. (°C)	COND. (circle units) µmhos/cm or µS/cm	DISSOLVED OXYGEN (circle units) mg/L or % saturation	TURBIDITY (NTUs)	ORP (mV)	ODOR (describe)
1204	3	2.25	.25	30.25	8.05	11.98	0.988	4.21	16	-25	
1207	.75	3	.25	30.28	8.12	11.99	0.986	4.19	15	-26	
1210	.75	3.75	.25	30.27	8.11	11.94	0.986	4.14	15	-26	
1213	.75	4.5	.25	30.27	8.11	11.90	0.986	4.12	15	-28	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: KAdkisson / EMR	SAMPLER(S) SIGNATURE(S): *K. Adkisson*	SAMPLING INITIATED AT:1213	SAMPLING ENDED AT:1215
PUMP OR TUBING DEPTH IN WELL (feet): 35	TUBING MATERIAL CODE: PE	FIELD-FILTERED: Y N Filtration Equipment Type:	FILTER SIZE: _____ µm
FIELD DECONTAMINATION: PUMP Y N	TUBING Y N (replaced)	DUPLICATE: Y N	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	SAMPLE PUMP FLOW RATE (mL per minute)
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
SEE CHAIN OF CUSTODY									
MW-6	3	AG	40ml	HCl	Prepres		VPH	BP	200
MW-6	1	AG	1L	HCl	prepres		EPH	BP	500

REMARKS:

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

Revision Date:

GROUNDWATER SAMPLING LOG

SITE NAME: MAF F-1	SITE LOCATION: Augusta, MT	
WELL NO: MW-7	SAMPLE ID: MW-7	DATE: 5/15/2019

PURGING DATA

WELL DIAMETER (inches): 2	TUBING DIAMETER (inches): 3/16	WELL SCREEN INTERVAL DEPTH: 25.2 feet to 45.2 feet	STATIC DEPTH TO WATER (feet): 39.61	PURGE PUMP TYPE OR BAILER: BP

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH – STATIC DEPTH TO WATER) X WELL CAPACITY
(only fill out if applicable)

= (45.2 feet – 39.61 feet) X 0.16 gallons/foot = 0.89 gallons

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
(only fill out if applicable)

= gallons + (gallons/foot X feet) + gallons = gallons

INITIAL PUMP OR TUBING DEPTH IN WELL (feet): 43	FINAL PUMP OR TUBING DEPTH IN WELL (feet): 44	PURGING INITIATED AT: 1225	PURGING ENDED AT: 1234	TOTAL VOLUME PURGED (gallons): 2.25

IME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet)	pH (standard units)	TEMP. (°C)	COND. (circle units) µmhos/cm or µS/cm	DISSOLVED OXYGEN (circle units) mg/L or % saturation	TURBIDITY (NTUs)	ORP (mV)	ODOR (describe)
1228	.75	.75	.25	42.62	7.00	11.65	0.112	8.56	10	120	
1231	.75	1.5	.25	43.93	7.05	11.42	0.110	8.59	10	121	
1234	.75	2.25	.25	43.95	7.01	11.41	0.110	8.60	10	121	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: KAdkisson / EMR	SAMPLER(S) SIGNATURE(S): *K. Adkisson*	SAMPLING INITIATED AT:1234	SAMPLING ENDED AT:1236
PUMP OR TUBING DEPTH IN WELL (feet): 43	TUBING MATERIAL CODE: PE	FIELD-FILTERED: Y N Filtration Equipment Type:	FILTER SIZE: _____ µm
FIELD DECONTAMINATION: PUMP Y N	TUBING Y N (replaced)	DUPLICATE: Y N	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	SAMPLE PUMP FLOW RATE (mL per minute)
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
SEE CHAIN OF CUSTODY									
MW-7	3	AG	40ml	HCl	Prepres		VPH	BP	200
MW-7	1	AG	1L	HCl	prepres		EPH	BP	500

REMARKS: Well began to purge dry so EMR collected the sample prior to achieving equilibrium

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

GROUNDWATER SAMPLING LOG

SITE NAME: MAF F-1	SITE LOCATION: Augusta, MT	
WELL NO: MW-8	SAMPLE ID: MW-8	DATE: 5/15/2019

PURGING DATA

WELL DIAMETER (inches): 2	TUBING DIAMETER (inches): 3/16	WELL SCREEN INTERVAL DEPTH: 25.55 feet to 45.55 feet	STATIC DEPTH TO WATER (feet): 34.90	PURGE PUMP TYPE OR BAILER: BP

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH – STATIC DEPTH TO WATER) X WELL CAPACITY
(only fill out if applicable)

= (45.55 feet – 34.90 feet) X 0.16 gallons/foot = 1.70 gallons

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
(only fill out if applicable)

= gallons + (gallons/foot X feet) + gallons = gallons

INITIAL PUMP OR TUBING DEPTH IN WELL (feet): 40	FINAL PUMP OR TUBING DEPTH IN WELL (feet): 43	PURGING INITIATED AT: 1248	PURGING ENDED AT: 1300	TOTAL VOLUME PURGED (gallons): 3

IME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet)	pH (standard units)	TEMP. (°C)	COND. (circle units) µmhos/cm or µS/cm	DISSOLVED OXYGEN (circle units) mg/L or % saturation	TURBIDITY (NTUs)	ORP (mV)	ODOR (describe)
1254	1.5	1.5	.25	40.90	7.18	9.65	0.265	8.54	35	-75	
1257	.75	2.25	.25	41.98	7.18	9.69	0.265	8.30	33	-70	
1300	.75	3	0.25	42.99	7.19	9.70	0.266	8.25	32	-70	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: KADKISSON / EMR	SAMPLER(S) SIGNATURE(S): *K. Adkisson*	SAMPLING INITIATED AT:1300	SAMPLING ENDED AT:1302
PUMP OR TUBING DEPTH IN WELL (feet): 43	TUBING MATERIAL CODE: PE	FIELD-FILTERED: Y N Filtration Equipment Type:	FILTER SIZE: _____ µm
FIELD DECONTAMINATION: PUMP Y N	TUBING Y N (replaced)	DUPLICATE: Y N	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	SAMPLE PUMP FLOW RATE (mL per minute)
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
SEE CHAIN OF CUSTODY									
MW-8	3	AG	40ml	HCl	Prepres		VPH	BP	200
MW-8	1	AG	1L	HCl	prepres		EPH	BP	500

REMARKS: Well has very low recharge. EMR sampled prior to equilibrium to ensure well did not pump dry.

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

GROUNDWATER SAMPLING LOG

SITE NAME: MAF F-1	SITE LOCATION: Augusta, MT	
WELL NO: MW-9	SAMPLE ID: MW-9	DATE: 5/15/2019

PURGING DATA

WELL DIAMETER (inches): 2	TUBING DIAMETER (inches): 3/16	WELL SCREEN INTERVAL DEPTH: 25 feet to 45 feet	STATIC DEPTH TO WATER (feet): 34.55	PURGE PUMP TYPE OR BAILER: BP

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH – STATIC DEPTH TO WATER) X WELL CAPACITY
(only fill out if applicable)
= (45 feet – 34.55 feet) X 0.16 gallons/foot = 1.67
gallons

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
(only fill out if applicable)
= gallons + (gallons/foot X feet) + gallons = gallons

INITIAL PUMP OR TUBING DEPTH IN WELL (feet): 40	FINAL PUMP OR TUBING DEPTH IN WELL (feet): 40	PURGING INITIATED AT: 1315	PURGING ENDED AT: 1330	TOTAL VOLUME PURGED (gallons): 3.75

IME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet)	pH (standard units)	TEMP. (°C)	COND. (circle units) µmhos/cm or µS/cm	DISSOLVED OXYGEN (circle units) mg/L or % saturation	TURBIDITY (NTUs)	ORP (mV)	ODOR (describe)
1321	1.5	1.5	.25	36.78	7.50	11.65	1.32	3.65	85	-122	
1324	.75	2.25	.25	36.80	7.52	11.87	1.32	3.66	85	-121	
1327	.75	3	.25	36.81	7.52	11.89	1.35	3.70	89	-121	
1330	.75	3.75	.25	36.81	7.51	11.90	1.35	3.69	90	-121	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP** = Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: Kaitlin Adkisson	SAMPLER(S) SIGNATURE(S): K. Adkisson	SAMPLING INITIATED AT:1330	SAMPLING ENDED AT:1332
PUMP OR TUBING DEPTH IN WELL (feet): 40	TUBING MATERIAL CODE: PE	FIELD-FILTERED: Y N Filtration Equipment Type:	FILTER SIZE: _____ µm
FIELD DECONTAMINATION: PUMP Y N	TUBING Y N (replaced)	DUPLICATE: Y N	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	SAMPLE PUMP FLOW RATE (mL per minute)
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
SEE CHAIN OF CUSTODY									
MW-9	3	AG	40ml	HCl	Prepres		VPH	BP	200
MW-9	1	AG	1L	HCl	prepres		EPH	BP	500

REMARKS:

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

GROUNDWATER SAMPLING LOG

SITE NAME: MAF F-1	SITE LOCATION: Augusta, MT	
WELL NO: MW-10	SAMPLE ID: MW-10	DATE: 5/15/2019

PURGING DATA

WELL DIAMETER (inches): 2	TUBING DIAMETER (inches): 3/8	WELL SCREEN INTERVAL DEPTH: 29.2 feet to 49.2 feet	STATIC DEPTH TO WATER (feet): 31.91	PURGE PUMP TYPE OR BAILER: BP

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH – STATIC DEPTH TO WATER) X WELL CAPACITY
(only fill out if applicable)

= (49.2 feet – 31.91 feet) X 0.16 gallons/foot = 2.76 gallons

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
(only fill out if applicable)

= gallons + (gallons/foot X feet) + gallons = gallons

INITIAL PUMP OR TUBING DEPTH IN WELL (feet): 38	FINAL PUMP OR TUBING DEPTH IN WELL (feet): 38	PURGING INITIATED AT: 1345	PURGING ENDED AT: 1400	TOTAL VOLUME PURGED (gallons): 3.75

IME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet)	pH (standard units)	TEMP. (°C)	COND. (circle units) µmhos/cm or µS/cm	DISSOLVED OXYGEN (circle units) mg/L or % saturation	TURBIDITY (NTUs)	ORP (mV)	ODOR (describe)
1351	1.5	1.5	.25	33.21	7.25	11.56	1.52	1.25	55	12	
1354	.75	2.25	.25	33.22	7.22	11.54	1.55	1.22	55	13	
1357	.75	3	.25	33.25	7.22	11.54	1.52	1.23	57	14	
1400	.75	3.75	.25	33.25	7.25	11.54	1.53	1.23	56	14	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: KAdkisson / EMR	SAMPLER(S) SIGNATURE(S): K. Adkisson	SAMPLING INITIATED AT:1400	SAMPLING ENDED AT:1402
PUMP OR TUBING DEPTH IN WELL (feet): 38	TUBING MATERIAL CODE: PE	FIELD-FILTERED: Y N Filtration Equipment Type:	FILTER SIZE: _____ µm
FIELD DECONTAMINATION: PUMP Y N	TUBING Y N (replaced)	DUPLICATE: Y N	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	SAMPLE PUMP FLOW RATE (mL per minute)
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
SEE CHAIN OF CUSTODY									
MW-10	3	AG	40ml	HCl	Prepres		VPH	BP	200
MW-10	1	AG	1L	HCl	prepres		EPH	BP	500

REMARKS:

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

Revision Date:

GROUNDWATER SAMPLING LOG

SITE NAME: MAF F-1	SITE LOCATION: Augusta, MT	
WELL NO: MW-11	SAMPLE ID: MW-11	DATE: 5/15/2019

PURGING DATA

WELL DIAMETER (inches): 2	TUBING DIAMETER (inches): 3/16	WELL SCREEN INTERVAL DEPTH: 25.5 feet to 45.5 feet	STATIC DEPTH TO WATER (feet): 26.87	PURGE PUMP TYPE OR BAILER: BP

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH – STATIC DEPTH TO WATER) X WELL CAPACITY
(only fill out if applicable)

= (45.5 feet – 26.87 feet) X 0.16 gallons/foot = 2.98 gallons

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
(only fill out if applicable)

= gallons + (gallons/foot X feet) + gallons = gallons

INITIAL PUMP OR TUBING DEPTH IN WELL (feet): 35	FINAL PUMP OR TUBING DEPTH IN WELL (feet): 35	PURGING INITIATED AT: 1415	PURGING ENDED AT: 1430	TOTAL VOLUME PURGED (gallons): 3.75

IME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet)	pH (standard units)	TEMP. (°C)	COND. (circle units) µmhos/cm or µS/cm	DISSOLVED OXYGEN (circle units) mg/L or % saturation	TURBIDITY (NTUs)	ORP (mV)	ODOR (describe)
1421	1.5	1.5	.25	28.90	8.54	10.22	1.45	2.12	75	44	
1424	.75	2.25	.25	28.90	8.50	10.21	1.44	2.11	74	44	
1427	.75	3	.25	28.91	8.50	10.21	1.45	2.12	76	40	
1430	.75	3.75	.25	28.90	8.51	10.23	1.55	2.10	78	42	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: KAdkisson / EMR	SAMPLER(S) SIGNATURE(S): K. Adkisson	SAMPLING INITIATED AT:1430	SAMPLING ENDED AT:1432
PUMP OR TUBING DEPTH IN WELL (feet): 35	TUBING MATERIAL CODE: PE	FIELD-FILTERED: Y N Filtration Equipment Type:	FILTER SIZE: _____ µm
FIELD DECONTAMINATION: PUMP Y N	TUBING Y N (replaced)	DUPLICATE: Y N	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	SAMPLE PUMP FLOW RATE (mL per minute)
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
SEE CHAIN OF CUSTODY									
MW-11	3	AG	40ml	HCl	Prepres		VPH	BP	200
MW-11	1	AG	1L	HCl	prepres		EPH	BP	500

REMARKS:

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

Revision Date:

GROUNDWATER SAMPLING LOG

SITE NAME: MAF F-1	SITE LOCATION: Augusta, MT	
WELL NO: MW-12	SAMPLE ID: MW-12	DATE: 5/15/2019

PURGING DATA

WELL DIAMETER (inches): 2	TUBING DIAMETER (inches): 3/16	WELL SCREEN INTERVAL DEPTH: 20.0 feet to 39.90 feet	STATIC DEPTH TO WATER (feet): 24.85	PURGE PUMP TYPE OR BAILER: BP

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH – STATIC DEPTH TO WATER) X WELL CAPACITY
(only fill out if applicable)

= (39.90 feet – 24.85 feet) X 0.16 gallons/foot = 2.4 gallons

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
(only fill out if applicable)

= gallons + (gallons/foot X feet) + gallons = gallons

INITIAL PUMP OR TUBING DEPTH IN WELL (feet): 30	FINAL PUMP OR TUBING DEPTH IN WELL (feet): 30	PURGING INITIATED AT: 1605	PURGING ENDED AT: 1620	TOTAL VOLUME PURGED (gallons): 3.75

IME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet)	pH (standard units)	TEMP. (°C)	COND. (circle units) µmhos/cm or µS/cm	DISSOLVED OXYGEN (circle units) mg/L or % saturation	TURBIDITY (NTUs)	ORP (mV)	ODOR (describe)
1611	1.5	1.5	.25	25.74	8.05	10.68	1.66	1.25	54	30	
1614	.75	2.25	.25	25.79	8.02	10.84	1.65	1.19	50	31	
1617	.75	3	.25	25.74	8.03	10.84	1.62	1.15	49	30	
1620	.75	3.75	.25	25.74	8.02	10.83	1.63	1.14	49	30	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: KAdkisson / EMR	SAMPLER(S) SIGNATURE(S): K. Adkisson	SAMPLING INITIATED AT:1620	SAMPLING ENDED AT:1622
PUMP OR TUBING DEPTH IN WELL (feet): 30	TUBING MATERIAL CODE: PE	FIELD-FILTERED: Y N Filtration Equipment Type:	FILTER SIZE: _____ µm
FIELD DECONTAMINATION: PUMP Y N	TUBING Y N (replaced)	DUPLICATE: Y N	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	SAMPLE PUMP FLOW RATE (mL per minute)
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
SEE CHAIN OF CUSTODY									
MW-12	3	AG	40ml	HCl	Prepres		VPH	BP	200
MW-12	1	AG	1L	HCl	prepres		EPH	BP	500

REMARKS: Sheen and odor

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

GROUNDWATER SAMPLING LOG

SITE NAME: MAF F-1	SITE LOCATION: Augusta, MT	
WELL NO: MW-13	SAMPLE ID: MW-13	DATE: 5/15/2019

PURGING DATA

WELL DIAMETER (inches): 2	TUBING DIAMETER (inches): 3/16	WELL SCREEN INTERVAL DEPTH: 14 feet to 34 feet	STATIC DEPTH TO WATER (feet): 14.31	PURGE PUMP TYPE OR BAILER: BP

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH – STATIC DEPTH TO WATER) X WELL CAPACITY
(only fill out if applicable)

= (34 feet – 14.31 feet) X 0.16 gallons/foot = 3.15 gallons

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
(only fill out if applicable)

= gallons + (gallons/foot X feet) + gallons = gallons

INITIAL PUMP OR TUBING DEPTH IN WELL (feet): 20	FINAL PUMP OR TUBING DEPTH IN WELL (feet): 20	PURGING INITIATED AT: 1510	PURGING ENDED AT: 1522	TOTAL VOLUME PURGED (gallons): 3

IME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet)	pH (standard units)	TEMP. (°C)	COND. (circle units) µmhos/cm or µS/cm	DISSOLVED OXYGEN (circle units) mg/L or % saturation	TURBIDITY (NTUs)	ORP (mV)	ODOR (describe)
1513	.75	.75	.25	15.96	7.95	9.94	0.366	7.54	78	90	
1516	.75	1.5	.25	15.96	7.99	10.02	0.368	7.55	80	88	
1519	.75	2.25	.25	16.0	7.98	10.03	0.369	7.58	80	86	
1522	.75	3	.25	16.0	7.99	10.02	0.370	7.60	80	87	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: KAdkisson / EMR	SAMPLER(S) SIGNATURE(S): *K. Adkisson*	SAMPLING INITIATED AT:1522	SAMPLING ENDED AT:1524
PUMP OR TUBING DEPTH IN WELL (feet): 20	TUBING MATERIAL CODE: PE	FIELD-FILTERED: Y N Filtration Equipment Type:	FILTER SIZE: _____ µm
FIELD DECONTAMINATION: PUMP Y N	TUBING Y N (replaced)	DUPLICATE: Y N	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	SAMPLE PUMP FLOW RATE (mL per minute)
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
SEE CHAIN OF CUSTODY									
MW-13	3	AG	40ml	HCl	Prepres		VPH	BP	200
MW-13	1	AG	1L	HCl	prepres		EPH	BP	500

REMARKS:

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

Revision Date:

GROUNDWATER SAMPLING LOG

SITE NAME: MAF F-1	SITE LOCATION: Augusta, MT	
WELL NO: MW-14	SAMPLE ID: MW-14	DATE: 5/15/2019

PURGING DATA

WELL DIAMETER (inches): 2	TUBING DIAMETER (inches): 3/16	WELL SCREEN INTERVAL DEPTH: 20 feet to 35 feet	STATIC DEPTH TO WATER (feet): 25.35	PURGE PUMP TYPE OR BAILER: BP

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH – STATIC DEPTH TO WATER) X WELL CAPACITY
(only fill out if applicable)

= (35 feet – 25.35 feet) X 0.16 gallons/foot = 1.54 gallons

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
(only fill out if applicable)

= gallons + (gallons/foot X feet) + gallons = gallons

INITIAL PUMP OR TUBING DEPTH IN WELL (feet): 30	FINAL PUMP OR TUBING DEPTH IN WELL (feet): 32	PURGING INITIATED AT: 1445	PURGING ENDED AT: 1454	TOTAL VOLUME PURGED (gallons): 2.25

IME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet)	pH (standard units)	TEMP. (°C)	COND. (circle units) µmhos/cm or µS/cm	DISSOLVED OXYGEN (circle units) mg/L or % saturation	TURBIDITY (NTUs)	ORP (mV)	ODOR (describe)
1448	.75	.75	.25	29.87	9.21	10.21	1.05	3.24	85	40	
1451	.75	1.5	.25	31.25	8.45	10.20	1.02	3.20	84	46	
1454	.75	2.25	.25	31.98	8.42	10.15	1.00	3.19	81	39	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: KAdkisson / EMR	SAMPLER(S) SIGNATURE(S): *K. Adkisson*	SAMPLING INITIATED AT:1454	SAMPLING ENDED AT:1456
PUMP OR TUBING DEPTH IN WELL (feet): 30	TUBING MATERIAL CODE: PE	FIELD-FILTERED: Y N Filtration Equipment Type:	FILTER SIZE: _____ µm
FIELD DECONTAMINATION: PUMP Y N	TUBING Y N (replaced)	DUPLICATE: Y N	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	SAMPLE PUMP FLOW RATE (mL per minute)
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
SEE CHAIN OF CUSTODY									
MW-13	3	AG	40ml	HCl	Prepres		VPH	BP	200
MW-13	1	AG	1L	HCl	prepres		EPH	BP	500

REMARKS: Well was not recharging well. Sampled before well could pump dry

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

Revision Date:

GROUNDWATER SAMPLING LOG

SITE NAME: MAF F-1	SITE LOCATION: Augusta, MT	
WELL NO: MW-15	SAMPLE ID: MW-15	DATE: 5/15/2019

PURGING DATA

WELL DIAMETER (inches): 2	TUBING DIAMETER (inches): 3/16	WELL SCREEN INTERVAL DEPTH: 20 feet to 35 feet	STATIC DEPTH TO WATER (feet): 21.95	PURGE PUMP TYPE OR BAILER: BP

WELL VOLUME PURGE: 1 WELL VOLUME = (TOTAL WELL DEPTH – STATIC DEPTH TO WATER) X WELL CAPACITY
(only fill out if applicable)

= (35 feet – 21.95 feet) X 0.16 gallons/foot = 2.08 gallons

EQUIPMENT VOLUME PURGE: 1 EQUIPMENT VOL. = PUMP VOLUME + (TUBING CAPACITY X TUBING LENGTH) + FLOW CELL VOLUME
(only fill out if applicable)

= gallons + (gallons/foot X feet) + gallons = gallons

INITIAL PUMP OR TUBING DEPTH IN WELL (feet): 30	FINAL PUMP OR TUBING DEPTH IN WELL (feet): 30	PURGING INITIATED AT: 1535	PURGING ENDED AT: 1547	TOTAL VOLUME PURGED (gallons): 3

IME	VOLUME PURGED (gallons)	CUMUL. VOLUME PURGED (gallons)	PURGE RATE (gpm)	DEPTH TO WATER (feet)	pH (standard units)	TEMP. (°C)	COND. (circle units) µmhos/cm or µS/cm	DISSOLVED OXYGEN (circle units) mg/L or % saturation	TURBIDITY (NTUs)	ORP (mV)	ODOR (describe)
1538	.75	.75	0.25	23.54	7.54	10.98	1.25	4.12	40	100	
1541	.75	1.5	.25	23.58	7.60	11.02	1.24	4.15	29	98	
1544	.75	2.25	.25	23.58	7.58	10.97	1.22	4.15	32	99	
1547	.75	3	.25	23.58	7.59	10.98	1.20	4.14	32	98	

WELL CAPACITY (Gallons Per Foot): **0.75"** = 0.02; **1"** = 0.04; **1.25"** = 0.06; **2"** = 0.16; **3"** = 0.37; **4"** = 0.65; **5"** = 1.02; **6"** = 1.47; **12"** = 5.88
TUBING INSIDE DIA. CAPACITY (Gal./Ft.): **1/8"** = 0.0006; **3/16"** = 0.0014; **1/4"** = 0.0026; **5/16"** = 0.004; **3/8"** = 0.006; **1/2"** = 0.010; **5/8"** = 0.016

PURGING EQUIPMENT CODES: **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **PP =** Peristaltic Pump; **O** = Other (Specify)

SAMPLING DATA

SAMPLED BY (PRINT) / AFFILIATION: KAdkisson / EMR	SAMPLER(S) SIGNATURE(S): *K. Adkisson*	SAMPLING INITIATED AT:1547	SAMPLING ENDED AT:1549
PUMP OR TUBING DEPTH IN WELL (feet): 30	TUBING MATERIAL CODE: PE	FIELD-FILTERED: Y N Filtration Equipment Type:	FILTER SIZE: _____ µm
FIELD DECONTAMINATION: PUMP Y N	TUBING Y N (replaced)	DUPLICATE: Y N	

SAMPLE CONTAINER SPECIFICATION				SAMPLE PRESERVATION			INTENDED ANALYSIS AND/OR METHOD	SAMPLING EQUIPMENT CODE	SAMPLE PUMP FLOW RATE (mL per minute)
SAMPLE ID CODE	# CONTAINERS	MATERIAL CODE	VOLUME	PRESERVATIVE USED	TOTAL VOL ADDED IN FIELD (mL)	FINAL pH			
SEE CHAIN OF CUSTODY									
MW-13	3	AG	40ml	HCl	Prepres		VPH	BP	200
MW-13	1	AG	1L	HCl	prepres		EPH	BP	500

REMARKS:

MATERIAL CODES: **AG** = Amber Glass; **CG** = Clear Glass; **PE** = Polyethylene; **PP** = Polypropylene; **S** = Silicone; **T** = Teflon; **O** = Other (Specify)

SAMPLING EQUIPMENT CODES: **APP** = After Peristaltic Pump; **B** = Bailer; **BP** = Bladder Pump; **ESP** = Electric Submersible Pump; **RFPP** = Reverse Flow Peristaltic Pump; **SM** = Straw Method (Tubing Gravity Drain); **O** = Other (Specify)

Revision Date:

APPENDIX C

Laboratory Analytical Data

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REVISED

ANALYSIS REPORT

Prepared by:

Eurofins Lancaster Laboratories Environmental
2425 New Holland Pike
Lancaster, PA 17601

Prepared for:

EMR Environmental
6418 College Blvd
Overland Park KS 66221

Report Date: August 06, 2019 09:51

Project: MAF-F-1

Account #: 44192
Group Number: 2044467
SDG: EMR07
State of Sample Origin: MT

Electronic Copy To	EMR Environmental	Attn: Jeff Humenik
Electronic Copy To	EMR Environmental	Attn: Kaitlin Adkisson

Respectfully Submitted,

Barbara Weyandt

Barbara A. Weyandt
Specialist

(717) 556-7264

Previous versions of this report were generated on:
06/13/2019 20:12
07/11/2019 15:41

To view our laboratory's current scopes of accreditation please go to https://www.eurofinsus.com/environment-testing/laboratories/eurofins-lancaster-laboratories-environmental/certifications-and-accreditations-eurofins-lancaster-laboratories-environmental/ . Historical copies may be requested through your project manager.

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REVISED

SAMPLE INFORMATION

Client Sample Description	Sample Collection Date/Time	ELLE#
TB Water	05/15/2019	1059979
MW-1 Grab Groundwater	05/15/2019 10:04	1059980
MW-2 Grab Groundwater	05/15/2019 10:38	1059981
MW-4 Grab Groundwater	05/15/2019 11:10	1059982
MW-5 Grab Groundwater	05/15/2019 11:42	1059983
MW-5D Grab Groundwater	05/15/2019 11:42	1059984
MW-6 Grab Groundwater	05/15/2019 12:15	1059985
MW-7 Grab Groundwater	05/15/2019 12:36	1059986
MW-8 Grab Groundwater	05/15/2019 13:02	1059987
MW-9 Grab Groundwater	05/15/2019 13:39	1059988
MW-10 Grab Groundwater	05/15/2019 14:02	1059989
MW-11 Grab Groundwater	05/15/2019 14:32	1059990
MW-14 Grab Groundwater	05/15/2019 14:56	1059991
MW-13 Grab Groundwater	05/15/2019 15:24	1059992
MW-15 Grab Groundwater	05/15/2019 15:49	1059993
MW-12 Grab Groundwater	05/15/2019 16:22	1059994

The specific methodologies used in obtaining the enclosed analytical results are indicated on the Laboratory Sample Analysis Record.

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Project Name: MAF-F-1
ELLE Group #: 2044467

General Comments:

All analyses have been performed in accordance with DOD QSM Version 5.1.1 unless otherwise noted below.

See the Laboratory Sample Analysis Record section of the Analysis Report for the method references.

All QC met criteria unless otherwise noted in an Analysis Specific Comment below.
Refer to the QC Summary for specific values and acceptance criteria.

Project specific QC samples are not included in this data set.

Matrix QC may not be reported if site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

Surrogate recoveries (if applicable) which are outside of the QC window are confirmed unless attributed to a dilution or otherwise noted in an Analysis Specific Comment below.

The samples were received at the appropriate temperature and in accordance with the chain of custody unless otherwise noted.

Analysis Specific Comments:

MA DEP VPH, Rev. 2.1 2/2018, GC Petroleum Hydrocarbons

Sample #s: 1059988, 1059989, 1059994

The recovery for a target analyte(s) in the Laboratory Control Spike(s) is outside the QC acceptance limits as noted on the QC Summary. Sufficient sample was not available to repeat the analysis.

Sample #s: 1059991

The recovery for a target analyte(s) in the Laboratory Control Spike(s) is outside the QC acceptance limits as noted on the QC Summary. Sufficient sample was not available to repeat the analysis.

The recovery for the sample surrogate(s) is outside the QC acceptance limits as noted on the QC Summary. Sufficient sample was not available to repeat the analysis.

Sample #s: 1059993

The recovery for a target analyte(s) in the Laboratory Control Spike(s) is outside the QC acceptance limits as noted on the QC Summary. Sufficient sample was not available to repeat the analysis.

The recovery for the sample surrogate(s) is outside the QC acceptance limits as noted on the QC Summary. Sufficient sample was not available to repeat the analysis.

Sample #s: 1059983, 1059984, 1059987

The recovery for a target analyte(s) in the Laboratory Control

Spike(s) is outside the QC acceptance limits as noted on the QC Summary. The client was contacted and the data reported.

Batch #: 19142B08A (Sample number(s): 1059979-1059982)

The recovery(ies) for one or more surrogates exceeded the acceptance window indicating a positive bias for sample(s) 1059980, 1059980DL, 1059981

Batch #: 19143B08A (Sample number(s): 1059983-1059984, 1059987-1059989, 1059991, 1059993-1059994)

The recovery(ies) for the following analyte(s) in the LCS and/or LCSD were below the acceptance window: C9-C12 Aliphatic Hydrocarbons

The recovery(ies) for one or more surrogates exceeded the acceptance window indicating a positive bias for sample(s) 1059988, 1059989, 1059991, 1059993, 1059994, 1059994DL

MA EPH 5/04, GC Petroleum Hydrocarbons

Sample #s: 1059980, 1059981, 1059988, 1059989, 1059994

The recovery for a target analyte(s)and surrogate(s) in the Laboratory Control Spike(s) is outside the QC acceptance limits as noted on the QC Summary. Sufficient sample was not available to repeat the analysis.

Sample #s: 1059993

The recovery for a target analyte(s)and surrogate(s) in the Laboratory Control Spike(s) is outside the QC acceptance limits as noted on the QC Summary. Sufficient sample was not available to repeat the analysis.

The following analytes were manually integrated:
C11 to C22 Aromatics, Unadjusted C11 - C22 Aromatics

Batch #: 191510004A (Sample number(s): 1059980-1059981, 1059988-1059989, 1059993-1059994)

The recovery(ies) for the following analyte(s) in the LCS and/or LCSD were below the acceptance window: Naphthalene, Acenaphthylene, Acenaphthene, Fluorene, Phenanthrene, Anthracene, Fluoranthene, Benzo(a)anthracene, Chrysene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Indeno(1,2,3-cd)pyrene, Dibenzo(a,h)anthracene, Benzo(g,h,i)perylene, 2-Methylnaphthalene, C9 to C18 Aliphatics, Unadjusted C11 - C22 Aromatics

The relative percent difference(s) for the following analyte(s) in the LCS/LCSD were outside acceptance windows: Naphthalene, Acenaphthylene, Acenaphthene, Fluorene, Phenanthrene, Anthracene, Fluoranthene, Pyrene, Benzo(a)anthracene, Chrysene, Benzo(b)fluoranthene, Benzo(k)fluoranthene, Benzo(a)pyrene, Indeno(1,2,3-cd)pyrene, Dibenzo(a,h)anthracene, Benzo(g,h,i)perylene, 2-Methylnaphthalene, C9 to C18 Aliphatics, C19 to C36 Aliphatics, Unadjusted C11 - C22 Aromatics

The recovery(ies) for one or more surrogates were below the acceptance window for sample(s) LCS

MT DEQ, GC Petroleum Hydrocarbons

Sample #s: 1059981, 1059982, 1059983, 1059984, 1059985

The following analytes were manually integrated:
MTEPH Screen Water

Sample #s: 1059986

The recovery for the sample surrogate(s) is outside the QC acceptance limits as noted on the QC Summary.

Sample #s: 1059987, 1059990, 1059991, 1059992, 1059993

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The response for a target analyte(s) in the continuing calibration verification standard is outside the QC acceptance limits high. The following action was taken:
The analysis was repeated and the continuing calibration verification standard bracketing the sample on the second trial is also outside the acceptance limits high. This effect is attributed to the sample matrix and the data is reported.

Sample #s: 1059980, 1059988, 1059989, 1059994

The response for a target analyte(s) in the continuing calibration verification standard is outside the QC acceptance limits high. The following action was taken:
The analysis was repeated and the continuing calibration verification standard bracketing the sample on the second trial is also outside the acceptance limits high. This effect is attributed to the sample matrix and the data is reported.

The following analytes were manually integrated:
MTEPH Screen Water

Batch #: 191420017A (Sample number(s): 1059980-1059994)

The recovery(ies) for one or more surrogates exceeded the acceptance window indicating a positive bias for sample(s) LCS, LCSD

The recovery(ies) for one or more surrogates were below the acceptance window for sample(s) 1059986

REVISED

Sample Description: **TB Water**
MAF F-1

Project Name: **MAF-F-1**

Submittal Date/Time: 05/17/2019 10:20
Collection Date/Time: 05/15/2019
SDG#: EMR07-01TB

EMR Environmental
ELLE Sample #: **GW 1059979**
ELLE Group #: **2044467**
Matrix: Water

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	Action Limit	DF
GC Petroleum Hydrocarbons	**MA DEP VPH, Rev. 2.1 2/2018**		**ug/l**	**ug/l**	**ug/l**	**ug/l**	**ug/l**	
14079	Benzene	71-43-2	N.D.	2.00	4.00	5.00		1
14079	C5-C8 Aliphatic Hydrocarbons	n.a.	N.D.	50.0	100	200		1
14079	Unadjusted C5-C8 Aliphatics	n.a.	N.D.	50.0	100	200		1
14079	C9-C10 Aromatic Hydrocarbons	n.a.	N.D.	20.0	40.0	200		1
14079	C9-C12 Aliphatic Hydrocarbons	n.a.	N.D.	50.0	100	200		1
14079	Unadjusted C9-C12 Aliphatics	n.a.	N.D.	50.0	100	200		1
14079	Ethylbenzene	100-41-4	N.D.	2.00	4.00	5.00		1
14079	Methyl t-butyl ether	1634-04-4	N.D.	2.00	4.00	5.00		1
14079	Naphthalene	91-20-3	N.D.	3.00	6.00	10.0		1
14079	Total Purgeable Hydrocarbons	n.a.	N.D.	100	100	200		1
14079	Toluene	108-88-3	N.D.	2.00	4.00	5.00		1
14079	o-Xylene	95-47-6	N.D.	2.00	4.00	5.00		1
14079	m,p-Xylenes	179601-23-1	N.D.	5.00	10.0	10.0		1

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14079	MA-VPH Water DOD	MA DEP VPH, Rev. 2.1 2/2018	1	19142B08A	05/23/2019 05:26	Mark Makowiecki	1

*=This limit was used in the evaluation of the final result
Shaded result = The results or reporting limit exceeded the client-provided Action Limit.

REVISED

Sample Description: **MW-1 Grab Groundwater**
MAF F-1

Project Name: **MAF-F-1**

Submittal Date/Time: 05/17/2019 10:20
Collection Date/Time: 05/15/2019 10:04
SDG#: EMR07-02

EMR Environmental
ELLE Sample #: GW 1059980
ELLE Group #: 2044467
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	Action Limit	DF
GC Petroleum Hydrocarbons	**MA DEP VPH, Rev. 2.1 2/2018**		**ug/l**	**ug/l**	**ug/l**	**ug/l**	**ug/l**	
14079	Benzene	71-43-2	1,430 E	4.00	8.00	10.0		2
14079	C5-C8 Aliphatic Hydrocarbons	n.a.	12,600 E	100	200	400		2
14079	Unadjusted C5-C8 Aliphatics	n.a.	15,000 E	100	200	400		2
14079	C9-C10 Aromatic Hydrocarbons	n.a.	9,380 E	40.0	80.0	400		2
14079	C9-C12 Aliphatic Hydrocarbons	n.a.	19,900 E	100	200	400		2
14079	Unadjusted C9-C12 Aliphatics	n.a.	36,500 E	100	200	400		2
14079	Ethylbenzene	100-41-4	1,770 E	4.00	8.00	10.0		2
14079	Methyl t-butyl ether	1634-04-4	N.D.	4.00	8.00	10.0		2
14079	Naphthalene	91-20-3	635 E	6.00	12.0	20.0		2
14079	Total Purgeable Hydrocarbons	n.a.	51,500 E	200	200	400		2
14079	Toluene	108-88-3	1,030 E	4.00	8.00	10.0		2
14079	o-Xylene	95-47-6	2,230 E	4.00	8.00	10.0		2
14079	m,p-Xylenes	179601-23-1	3,180 E	10.0	20.0	20.0		2
Trial ID: DL								
14079	Benzene	71-43-2	1,170	40.0	80.0	100		20
14079	C5-C8 Aliphatic Hydrocarbons	n.a.	7,990	1.000	2.000	4.000		20
14079	Unadjusted C5-C8 Aliphatics	n.a.	9,970	1.000	2.000	4.000		20
14079	C9-C10 Aromatic Hydrocarbons	n.a.	7,700	400	800	4.000		20
14079	C9-C12 Aliphatic Hydrocarbons	n.a.	10,100	1.000	2.000	4.000		20
14079	Unadjusted C9-C12 Aliphatics	n.a.	28,000	1.000	2.000	4.000		20
14079	Ethylbenzene	100-41-4	1,440	40.0	80.0	100		20
14079	Methyl t-butyl ether	1634-04-4	N.D.	40.0	80.0	100		20
14079	Naphthalene	91-20-3	619	60.0	120	200		20
14079	Total Purgeable Hydrocarbons	n.a.	38,000	2.000	2.000	4.000		20
14079	Toluene	108-88-3	813	40.0	80.0	100		20
14079	o-Xylene	95-47-6	1,880	40.0	80.0	100		20
14079	m,p-Xylenes	179601-23-1	6,900	100	200	200		20
GC Petroleum Hydrocarbons	**MA EPH 5/04**		**ug/l**	**ug/l**	**ug/l**	**ug/l**	**ug/l**	
05331	Acenaphthene	83-32-9	N.D.	12	23	38		20
05331	Acenaphthylene	208-96-8	N.D.	13	27	38		20
05331	Anthracene	120-12-7	N.D.	12	23	38		20
05331	Benzo(a)anthracene	56-55-3	N.D.	13	27	38		20
05331	Benzo(a)pyrene	50-32-8	N.D.	12	23	38		20
05331	Benzo(b)fluoranthene	205-99-2	N.D.	12	23	38		20
05331	Benzo(g,h,i)perylene	191-24-2	N.D.	12	23	38		20
05331	Benzo(k)fluoranthene	207-08-9	N.D.	29	58	77		20
05331	Unadjusted C11 - C22 Aromatics	n.a.	2,900	770	770	1.500		20
05331	C11 to C22 Aromatics	n.a.	1,800	770	770	1.500		20

*=This limit was used in the evaluation of the final result
Shaded result = The results or reporting limit exceeded the client-provided Action Limit.

REVISED

Sample Description: **MW-1 Grab Groundwater**
MAF F-1

Project Name: **MAF-F-1**

Submittal Date/Time: 05/17/2019 10:20
Collection Date/Time: 05/15/2019 10:04
SDG#: EMR07-02

EMR Environmental
ELLE Sample #: GW 1059980
ELLE Group #: 2044467
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	Action Limit	DF
GC Petroleum Hydrocarbons	**MA EPH 5/04**		**ug/l**	**ug/l**	**ug/l**	**ug/l**	**ug/l**	
05331	C19 to C36 Aliphatics	n.a.	N.D.	240	240	380		5
05331	C9 to C18 Aliphatics	n.a.	14,000	140	140	290		5
05331	Chrysene	218-01-9	N.D.	9.6	19	38		20
05331	Dibenzo(a,h)anthracene	53-70-3	64	9.6	19	38		20
05331	Fluoranthene	206-44-0	N.D.	9.6	19	38		20
05331	Fluorene	86-73-7	N.D.	12	23	38		20
05331	Indeno(1,2,3-cd)pyrene	193-39-5	N.D.	12	23	38		20
05331	2-Methylnaphthalene	91-57-6	410	12	23	38		20
05331	Naphthalene	91-20-3	580	12	23	38		20
05331	Total Petroleum Hydrocarbons	n.a.	16,000	1,000	1,000	2,000		20
05331	Phenanthrene	85-01-8	N.D.	12	23	38		20
05331	Pyrene	129-00-0	N.D.	96	190	230		20

The recovery for a target analyte(s)and surrogate(s) in the Laboratory Control Spike(s) is outside the QC acceptance limits as noted on the QC Summary. Sufficient sample was not available to repeat the analysis.

GC Petroleum Hydrocarbons	**MT DEQ**		**ug/l**	**ug/l**	**ug/l**	**ug/l**	**ug/l**	
05968	MTEPH Screen Water	n.a.	65,000 E	300	300	300	1000	1

The response for a target analyte(s) in the continuing calibration verification standard is outside the QC acceptance limits high. The following action was taken:
The analysis was repeated and the continuing calibration verification standard bracketing the sample on the second trial is also outside the acceptance limits high. This effect is attributed to the sample matrix and the data is reported.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14079	MA-VPH Water DOD	MA DEP VPH, Rev. 2.1 2/2018	1	19142B08A	05/23/2019 06:08	Mark Makowiecki	2
14079	MA-VPH Water DOD	MA DEP VPH, Rev. 2.1 2/2018	1-1ST	19142B08A	05/23/2019 06:08	Mark Makowiecki	2
14079	MA-VPH Water DOD	MA DEP VPH, Rev. 2.1 2/2018	2-DL	19142B08A	05/23/2019 06:49	Mark Makowiecki	20
05331	MA-EPH Water DOD	MA EPH 5/04	1	191510004A	06/06/2019 22:35	Heather E Williams	20
05331	MA-EPH Water DOD	MA EPH 5/04	1	191510004A	06/06/2019 23:14	Heather E Williams	5
05331	MA-EPH Water DOD	MA EPH 5/04	1-1ST	191510004A	06/06/2019 22:35	Heather E Williams	20
05968	MTEPH Screen Water	MT DEQ	1	191420017A	05/24/2019 13:52	Timothy M Emrick	1
07326	EPH Water Extraction	MA DEP EPH 5/04	1	191510004A	05/23/2019 01:45	Sherry L Morrow	1
11174	MT EPH Waters Extraction	MT DEQ MA EPH	1	191420017A	05/23/2019 01:45	Sherry L Morrow	1

*=This limit was used in the evaluation of the final result
Shaded result = The results or reporting limit exceeded the client-provided Action Limit.

REVISED

Sample Description: **MW-1 Grab Groundwater**
MAF F-1

Project Name: **MAF-F-1**

Submittal Date/Time: 05/17/2019 10:20
Collection Date/Time: 05/15/2019 10:04
SDG#: EMR07-02

EMR Environmental
ELLE Sample #: GW 1059980
ELLE Group #: 2044467
Matrix: Groundwater

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
00497	Silica Gel Fractionation	SW-846 3630C modified	1	191510004A	06/02/2019 12:48	Christine E Gleim	1

*=This limit was used in the evaluation of the final result
Shaded result = The results or reporting limit exceeded the client-provided Action Limit.

REVISED

Sample Description: **MW-2 Grab Groundwater MAF F-1**

Project Name: **MAF-F-1**

Submittal Date/Time: 05/17/2019 10:20
Collection Date/Time: 05/15/2019 10:38
SDG#: EMR07-03

EMR Environmental
ELLE Sample #: GW 1059981
ELLE Group #: 2044467
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result		Detection Limit*	Limit of Detection	Limit of Quantitation	Action Limit	DF
GC Petroleum Hydrocarbons	**MA DEP VPH, Rev. 2.1 2/2018**		**ug/l**		**ug/l**	**ug/l**	**ug/l**	**ug/l**	
14079	Benzene	71-43-2	2,010	E	4.00	8.00	10.0		2
14079	C5-C8 Aliphatic Hydrocarbons	n.a.	3,860	E	100	200	400		2
14079	Unadjusted C5-C8 Aliphatics	n.a.	6,510	E	100	200	400		2
14079	C9-C10 Aromatic Hydrocarbons	n.a.	2,550	E	40.0	80.0	400		2
14079	C9-C12 Aliphatic Hydrocarbons	n.a.	4,210	E	100	200	400		2
14079	Unadjusted C9-C12 Aliphatics	n.a.	10,900	E	100	200	400		2
14079	Ethylbenzene	100-41-4	821	E	4.00	8.00	10.0		2
14079	Methyl t-butyl ether	1634-04-4	N.D.		4.00	8.00	10.0		2
14079	Naphthalene	91-20-3	226		6.00	12.0	20.0		2
14079	Total Purgeable Hydrocarbons	n.a.	17,400	E	200	200	400		2
14079	Toluene	108-88-3	640	E	4.00	8.00	10.0		2
14079	o-Xylene	95-47-6	661	E	4.00	8.00	10.0		2
14079	m,p-Xylenes	179601-23-1	2,670	E	10.0	20.0	20.0		2
Trial ID: DL									
14079	Benzene	71-43-2	1,660		40.0	80.0	100		20
14079	C5-C8 Aliphatic Hydrocarbons	n.a.	2,780	J	1.000	2.000	4.000		20
14079	Unadjusted C5-C8 Aliphatics	n.a.	4,950		1.000	2.000	4.000		20
14079	C9-C10 Aromatic Hydrocarbons	n.a.	2,010	J	400	800	4.000		20
14079	C9-C12 Aliphatic Hydrocarbons	n.a.	3,030	J	1.000	2.000	4.000		20
14079	Unadjusted C9-C12 Aliphatics	n.a.	8,520		1.000	2.000	4.000		20
14079	Ethylbenzene	100-41-4	664		40.0	80.0	100		20
14079	Methyl t-butyl ether	1634-04-4	N.D.		40.0	80.0	100		20
14079	Naphthalene	91-20-3	211		60.0	120	200		20
14079	Total Purgeable Hydrocarbons	n.a.	13,500		2.000	2.000	4.000		20
14079	Toluene	108-88-3	518		40.0	80.0	100		20
14079	o-Xylene	95-47-6	562		40.0	80.0	100		20
14079	m,p-Xylenes	179601-23-1	2,250		100	200	200		20
GC Petroleum Hydrocarbons	**MA EPH 5/04**		**ug/l**		**ug/l**	**ug/l**	**ug/l**	**ug/l**	
05331	Acenaphthene	83-32-9	N.D.		2.9	5.7	9.6		5
05331	Acenaphthylene	208-96-8	N.D.		3.4	6.7	9.6		5
05331	Anthracene	120-12-7	N.D.		2.9	5.7	9.6		5
05331	Benzo(a)anthracene	56-55-3	N.D.		3.4	6.7	9.6		5
05331	Benzo(a)pyrene	50-32-8	N.D.		2.9	5.7	9.6		5
05331	Benzo(b)fluoranthene	205-99-2	N.D.		2.9	5.7	9.6		5
05331	Benzo(g,h,i)perylene	191-24-2	N.D.		2.9	5.7	9.6		5
05331	Benzo(k)fluoranthene	207-08-9	N.D.		7.2	14	19		5
05331	Unadjusted C11 - C22 Aromatics	n.a.	470		190	190	380		5
05331	C11 to C22 Aromatics	n.a.	240	J	190	190	380		5

*=This limit was used in the evaluation of the final result
Shaded result = The results or reporting limit exceeded the client-provided Action Limit.

REVISED

Sample Description: **MW-2 Grab Groundwater**
MAF F-1

Project Name: **MAF-F-1**

Submittal Date/Time: 05/17/2019 10:20
Collection Date/Time: 05/15/2019 10:38
SDG#: EMR07-03

EMR Environmental
ELLE Sample #: GW 1059981
ELLE Group #: 2044467
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result		Detection Limit*	Limit of Detection	Limit of Quantitation	Action Limit	DF
GC Petroleum Hydrocarbons	**MA EPH 5/04**		**ug/l**		**ug/l**	**ug/l**	**ug/l**	**ug/l**	
05331	C19 to C36 Aliphatics	n.a.	N.D.		48	48	77		1
05331	C9 to C18 Aliphatics	n.a.	260		29	29	57		1
05331	Chrysene	218-01-9	N.D.		2.4	4.8	9.6		5
05331	Dibenzo(a,h)anthracene	53-70-3	N.D.		2.4	4.8	9.6		5
05331	Fluoranthene	206-44-0	N.D.		2.4	4.8	9.6		5
05331	Fluorene	86-73-7	N.D.		2.9	5.7	9.6		5
05331	Indeno(1,2,3-cd)pyrene	193-39-5	N.D.		2.9	5.7	9.6		5
05331	2-Methylnaphthalene	91-57-6	45		2.9	5.7	9.6		5
05331	Naphthalene	91-20-3	190		2.9	5.7	9.6		5
05331	Total Petroleum Hydrocarbons	n.a.	500	J	250	250	500		5
05331	Phenanthrene	85-01-8	N.D.		2.9	5.7	9.6		5
05331	Pyrene	129-00-0	N.D.		24	48	57		5

The recovery for a target analyte(s)and surrogate(s) in the Laboratory Control Spike(s) is outside the QC acceptance limits as noted on the QC Summary. Sufficient sample was not available to repeat the analysis.

GC Petroleum Hydrocarbons	**MT DEQ**		**ug/l**		**ug/l**	**ug/l**	**ug/l**	**ug/l**	
05968	MTEPH Screen Water	n.a.	22,000		300	300	300	1000	1
05968	MTEPH Screen Water	n.a.	22,000	E	300	300	300	1000	1

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14079	MA-VPH Water DOD	MA DEP VPH, Rev. 2.1 2/2018	1	19142B08A	05/23/2019 07:30	Mark Makowiecki	2
14079	MA-VPH Water DOD	MA DEP VPH, Rev. 2.1 2/2018	1-1ST	19142B08A	05/23/2019 07:30	Mark Makowiecki	2
14079	MA-VPH Water DOD	MA DEP VPH, Rev. 2.1 2/2018	2-DL	19142B08A	05/23/2019 08:12	Mark Makowiecki	20
05331	MA-EPH Water DOD	MA EPH 5/04	1	191510004A	06/06/2019 13:31	Heather E Williams	1
05331	MA-EPH Water DOD	MA EPH 5/04	1	191510004A	06/06/2019 23:54	Heather E Williams	5
05331	MA-EPH Water DOD	MA EPH 5/04	1-1ST	191510004A	06/06/2019 23:54	Heather E Williams	5
05968	MTEPH Screen Water	MT DEQ	1	191420017A	05/23/2019 23:09	Timothy M Emrick	1
05968	MTEPH Screen Water	MT DEQ	2	191420017A	05/23/2019 23:09	Timothy M Emrick	1
07326	EPH Water Extraction	MA DEP EPH 5/04	1	191510004A	05/23/2019 01:45	Sherry L Morrow	1
11174	MT EPH Waters Extraction	MT DEQ MA EPH	1	191420017A	05/23/2019 01:45	Sherry L Morrow	1
00497	Silica Gel Fractionation	SW-846 3630C modified	1	191510004A	06/02/2019 12:48	Christine E Gleim	1

*=This limit was used in the evaluation of the final result
Shaded result = The results or reporting limit exceeded the client-provided Action Limit.

REVISED

Sample Description: **MW-4 Grab Groundwater MAF F-1**

Project Name: **MAF-F-1**

Submittal Date/Time: 05/17/2019 10:20
Collection Date/Time: 05/15/2019 11:10
SDG#: EMR07-04

EMR Environmental
ELLE Sample #: GW 1059982
ELLE Group #: 2044467
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	Action Limit	DF
GC Petroleum Hydrocarbons	**MA DEP VPH, Rev. 2.1 2/2018**		**ug/l**	**ug/l**	**ug/l**	**ug/l**	**ug/l**	
14079	Benzene	71-43-2	N.D.	2.00	4.00	5.00		1
14079	C5-C8 Aliphatic Hydrocarbons	n.a.	N.D.	50.0	100	200		1
14079	Unadjusted C5-C8 Aliphatics	n.a.	N.D.	50.0	100	200		1
14079	C9-C10 Aromatic Hydrocarbons	n.a.	N.D.	20.0	40.0	200		1
14079	C9-C12 Aliphatic Hydrocarbons	n.a.	N.D.	50.0	100	200		1
14079	Unadjusted C9-C12 Aliphatics	n.a.	N.D.	50.0	100	200		1
14079	Ethylbenzene	100-41-4	N.D.	2.00	4.00	5.00		1
14079	Methyl t-butyl ether	1634-04-4	N.D.	2.00	4.00	5.00		1
14079	Naphthalene	91-20-3	N.D.	3.00	6.00	10.0		1
14079	Total Purgeable Hydrocarbons	n.a.	N.D.	100	100	200		1
14079	Toluene	108-88-3	N.D.	2.00	4.00	5.00		1
14079	o-Xylene	95-47-6	N.D.	2.00	4.00	5.00		1
14079	m,p-Xylenes	179601-23-1	N.D.	5.00	10.0	10.0		1
GC Petroleum Hydrocarbons	**MT DEQ**		**ug/l**	**ug/l**	**ug/l**	**ug/l**	**ug/l**	
05968	MTEPH Screen Water	n.a.	N.D.	300	300	300	1000	1
05968	MTEPH Screen Water	n.a.	N.D.	300	300	300	1000	1

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14079	MA-VPH Water DOD	MA DEP VPH, Rev. 2.1 2/2018	1	19142B08A	05/23/2019 08:53	Mark Makowiecki	1
14079	MA-VPH Water DOD	MA DEP VPH, Rev. 2.1 2/2018	1-1ST	19142B08A	05/23/2019 08:53	Mark Makowiecki	1
05968	MTEPH Screen Water	MT DEQ	1	191420017A	05/23/2019 23:30	Timothy M Emrick	1
05968	MTEPH Screen Water	MT DEQ	2	191420017A	05/23/2019 23:30	Timothy M Emrick	1
11174	MT EPH Waters Extraction	MT DEQ MA EPH	1	191420017A	05/23/2019 01:45	Sherry L Morrow	1

*=This limit was used in the evaluation of the final result
Shaded result = The results or reporting limit exceeded the client-provided Action Limit.

REVISED

Sample Description: **MW-5 Grab Groundwater MAF F-1**

Project Name: **MAF-F-1**

Submittal Date/Time: 05/17/2019 10:20
Collection Date/Time: 05/15/2019 11:42
SDG#: EMR07-05

EMR Environmental
ELLE Sample #: GW 1059983
ELLE Group #: 2044467
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result		Detection Limit*	Limit of Detection	Limit of Quantitation	Action Limit	DF
GC Petroleum Hydrocarbons	**MA DEP VPH, Rev. 2.1 2/2018**		**ug/l**		**ug/l**	**ug/l**	**ug/l**	**ug/l**	
14079	Benzene	71-43-2	N.D.		2.00	4.00	5.00		1
14079	C5-C8 Aliphatic Hydrocarbons	n.a.	117	J	50.0	100	200		1
14079	Unadjusted C5-C8 Aliphatics	n.a.	120	J	50.0	100	200		1
14079	C9-C10 Aromatic Hydrocarbons	n.a.	76.2	J	20.0	40.0	200		1
14079	C9-C12 Aliphatic Hydrocarbons	n.a.	56.5	J	50.0	100	200		1
14079	Unadjusted C9-C12 Aliphatics	n.a.	158	J	50.0	100	200		1
14079	Ethylbenzene	100-41-4	4.39	J	2.00	4.00	5.00		1
14079	Methyl t-butyl ether	1634-04-4	N.D.		2.00	4.00	5.00		1
14079	Naphthalene	91-20-3	N.D.		3.00	6.00	10.0		1
14079	Total Purgeable Hydrocarbons	n.a.	277		100	100	200		1
14079	Toluene	108-88-3	3.03	J	2.00	4.00	5.00		1
14079	o-Xylene	95-47-6	5.27		2.00	4.00	5.00		1
14079	m,p-Xylenes	179601-23-1	15.2		5.00	10.0	10.0		1

The recovery for a target analyte(s) in the Laboratory Control Spike(s) is outside the QC acceptance limits as noted on the QC Summary. The client was contacted and the data reported.

GC Petroleum Hydrocarbons	**MT DEQ**		**ug/l**		**ug/l**	**ug/l**	**ug/l**	**ug/l**	
05968	MTEPH Screen Water	n.a.	460		300	300	300	1000	1
05968	MTEPH Screen Water	n.a.	460		300	300	300	1000	1

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14079	MA-VPH Water DOD	MA DEP VPH, Rev. 2.1 2/2018	1	19143B08A	05/23/2019 20:47	Mark Makowiecki	1
14079	MA-VPH Water DOD	MA DEP VPH, Rev. 2.1 2/2018	1-1ST	19143B08A	05/23/2019 20:47	Mark Makowiecki	1
05968	MTEPH Screen Water	MT DEQ	1	191420017A	05/23/2019 23:51	Timothy M Emrick	1
05968	MTEPH Screen Water	MT DEQ	2	191420017A	05/23/2019 23:51	Timothy M Emrick	1
11174	MT EPH Waters Extraction	MT DEQ MA EPH	1	191420017A	05/23/2019 01:45	Sherry L Morrow	1

*=This limit was used in the evaluation of the final result
Shaded result = The results or reporting limit exceeded the client-provided Action Limit.

REVISED

Sample Description: **MW-5D Grab Groundwater**
MAF F-1

Project Name: **MAF-F-1**

Submittal Date/Time: 05/17/2019 10:20
Collection Date/Time: 05/15/2019 11:42
SDG#: EMR07-06FD

EMR Environmental
ELLE Sample #: GW 1059984
ELLE Group #: 2044467
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result		Detection Limit*	Limit of Detection	Limit of Quantitation	Action Limit	DF
GC Petroleum Hydrocarbons	**MA DEP VPH, Rev. 2.1 2/2018**		**ug/l**		**ug/l**	**ug/l**	**ug/l**	**ug/l**	
14079	Benzene	71-43-2	2.20	J	2.00	4.00	5.00		1
14079	C5-C8 Aliphatic Hydrocarbons	n.a.	109	J	50.0	100	200		1
14079	Unadjusted C5-C8 Aliphatics	n.a.	114	J	50.0	100	200		1
14079	C9-C10 Aromatic Hydrocarbons	n.a.	85.7	J	20.0	40.0	200		1
14079	C9-C12 Aliphatic Hydrocarbons	n.a.	62.1	J	50.0	100	200		1
14079	Unadjusted C9-C12 Aliphatics	n.a.	177	J	50.0	100	200		1
14079	Ethylbenzene	100-41-4	4.88	J	2.00	4.00	5.00		1
14079	Methyl t-butyl ether	1634-04-4	N.D.		2.00	4.00	5.00		1
14079	Naphthalene	91-20-3	N.D.		3.00	6.00	10.0		1
14079	Total Purgeable Hydrocarbons	n.a.	291		100	100	200		1
14079	Toluene	108-88-3	3.43	J	2.00	4.00	5.00		1
14079	o-Xylene	95-47-6	6.08		2.00	4.00	5.00		1
14079	m,p-Xylenes	179601-23-1	17.7		5.00	10.0	10.0		1

The recovery for a target analyte(s) in the Laboratory Control Spike(s) is outside the QC acceptance limits as noted on the QC Summary. The client was contacted and the data reported.

CAT No.	Analysis Name	CAS Number	Result		Detection Limit*	Limit of Detection	Limit of Quantitation	Action Limit	DF
GC Petroleum Hydrocarbons	**MT DEQ**		**ug/l**		**ug/l**	**ug/l**	**ug/l**	**ug/l**	
05968	MTEPH Screen Water	n.a.	430		300	300	300	1000	1
05968	MTEPH Screen Water	n.a.	430		300	300	300	1000	1

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14079	MA-VPH Water DOD	MA DEP VPH, Rev. 2.1 2/2018	1	19143B08A	05/23/2019 21:29	Mark Makowiecki	1
14079	MA-VPH Water DOD	MA DEP VPH, Rev. 2.1 2/2018	1-1ST	19143B08A	05/23/2019 21:29	Mark Makowiecki	1
05968	MTEPH Screen Water	MT DEQ	1	191420017A	05/24/2019 00:12	Timothy M Emrick	1
05968	MTEPH Screen Water	MT DEQ	2	191420017A	05/24/2019 00:12	Timothy M Emrick	1
11174	MT EPH Waters Extraction	MT DEQ MA EPH	1	191420017A	05/23/2019 01:45	Sherry L Morrow	1

*=This limit was used in the evaluation of the final result
Shaded result = The results or reporting limit exceeded the client-provided Action Limit.

REVISED

Sample Description: **MW-6 Grab Groundwater MAF F-1**

Project Name: **MAF-F-1**

Submittal Date/Time: 05/17/2019 10:20
Collection Date/Time: 05/15/2019 12:15
SDG#: EMR07-07

EMR Environmental
ELLE Sample #: GW 1059985
ELLE Group #: 2044467
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	Action Limit	DF
GC Petroleum Hydrocarbons	**MA DEP VPH, Rev. 2.1 2/2018**		**ug/l**	**ug/l**	**ug/l**	**ug/l**	**ug/l**	
14079	Benzene	71-43-2	N.D.	2.00	4.00	5.00		1
14079	C5-C8 Aliphatic Hydrocarbons	n.a.	N.D.	50.0	100	200		1
14079	Unadjusted C5-C8 Aliphatics	n.a.	N.D.	50.0	100	200		1
14079	C9-C10 Aromatic Hydrocarbons	n.a.	N.D.	20.0	40.0	200		1
14079	C9-C12 Aliphatic Hydrocarbons	n.a.	N.D.	50.0	100	200		1
14079	Unadjusted C9-C12 Aliphatics	n.a.	N.D.	50.0	100	200		1
14079	Ethylbenzene	100-41-4	N.D.	2.00	4.00	5.00		1
14079	Methyl t-butyl ether	1634-04-4	6.99	2.00	4.00	5.00		1
14079	Naphthalene	91-20-3	N.D.	3.00	6.00	10.0		1
14079	Total Purgeable Hydrocarbons	n.a.	N.D.	100	100	200		1
14079	Toluene	108-88-3	N.D.	2.00	4.00	5.00		1
14079	o-Xylene	95-47-6	N.D.	2.00	4.00	5.00		1
14079	m,p-Xylenes	179601-23-1	N.D.	5.00	10.0	10.0		1
GC Petroleum Hydrocarbons	**MT DEQ**		**ug/l**	**ug/l**	**ug/l**	**ug/l**	**ug/l**	
05968	MTEPH Screen Water	n.a.	N.D.	300	300	300	1000	1
05968	MTEPH Screen Water	n.a.	N.D.	300	300	300	1000	1

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14079	MA-VPH Water DOD	MA DEP VPH, Rev. 2.1 2/2018	1	19148B08A	05/28/2019 18:11	Mark Makowiecki	1
14079	MA-VPH Water DOD	MA DEP VPH, Rev. 2.1 2/2018	1-1ST	19148B08A	05/28/2019 18:11	Mark Makowiecki	1
05968	MTEPH Screen Water	MT DEQ	1	191420017A	05/24/2019 00:33	Timothy M Emrick	1
05968	MTEPH Screen Water	MT DEQ	2	191420017A	05/24/2019 00:33	Timothy M Emrick	1
11174	MT EPH Waters Extraction	MT DEQ MA EPH	1	191420017A	05/23/2019 01:45	Sherry L Morrow	1

*=This limit was used in the evaluation of the final result
Shaded result = The results or reporting limit exceeded the client-provided Action Limit.

REVISED

Sample Description: **MW-7 Grab Groundwater MAF F-1**

Project Name: **MAF-F-1**

Submittal Date/Time: 05/17/2019 10:20
Collection Date/Time: 05/15/2019 12:36
SDG#: EMR07-08

EMR Environmental
ELLE Sample #: GW 1059986
ELLE Group #: 2044467
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	Action Limit	DF
GC Petroleum Hydrocarbons	**MA DEP VPH, Rev. 2.1 2/2018**		**ug/l**	**ug/l**	**ug/l**	**ug/l**	**ug/l**	
14079	Benzene	71-43-2	N.D.	2.00	4.00	5.00		1
14079	C5-C8 Aliphatic Hydrocarbons	n.a.	N.D.	50.0	100	200		1
14079	Unadjusted C5-C8 Aliphatics	n.a.	N.D.	50.0	100	200		1
14079	C9-C10 Aromatic Hydrocarbons	n.a.	N.D.	20.0	40.0	200		1
14079	C9-C12 Aliphatic Hydrocarbons	n.a.	N.D.	50.0	100	200		1
14079	Unadjusted C9-C12 Aliphatics	n.a.	N.D.	50.0	100	200		1
14079	Ethylbenzene	100-41-4	N.D.	2.00	4.00	5.00		1
14079	Methyl t-butyl ether	1634-04-4	N.D.	2.00	4.00	5.00		1
14079	Naphthalene	91-20-3	N.D.	3.00	6.00	10.0		1
14079	Total Purgeable Hydrocarbons	n.a.	N.D.	100	100	200		1
14079	Toluene	108-88-3	N.D.	2.00	4.00	5.00		1
14079	o-Xylene	95-47-6	N.D.	2.00	4.00	5.00		1
14079	m,p-Xylenes	179601-23-1	N.D.	5.00	10.0	10.0		1
GC Petroleum Hydrocarbons	**MT DEQ**		**ug/l**	**ug/l**	**ug/l**	**ug/l**	**ug/l**	
05968	MTEPH Screen Water	n.a.	N.D.	300	300	300	1000	1

The recovery for the sample surrogate(s) is outside the QC acceptance limits as noted on the QC Summary.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14079	MA-VPH Water DOD	MA DEP VPH, Rev. 2.1 2/2018	1	19148B08A	05/28/2019 18:52	Mark Makowiecki	1
14079	MA-VPH Water DOD	MA DEP VPH, Rev. 2.1 2/2018	1-1ST	19148B08A	05/28/2019 18:52	Mark Makowiecki	1
05968	MTEPH Screen Water	MT DEQ	1	191420017A	05/24/2019 00:54	Timothy M Emrick	1
11174	MT EPH Waters Extraction	MT DEQ MA EPH	1	191420017A	05/23/2019 01:45	Sherry L Morrow	1

*=This limit was used in the evaluation of the final result
Shaded result = The results or reporting limit exceeded the client-provided Action Limit.

REVISED

Sample Description: **MW-8 Grab Groundwater**
MAF F-1

Project Name: **MAF-F-1**

Submittal Date/Time: 05/17/2019 10:20
Collection Date/Time: 05/15/2019 13:02
SDG#: EMR07-09

EMR Environmental
ELLE Sample #: GW 1059987
ELLE Group #: 2044467
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result		Detection Limit*	Limit of Detection	Limit of Quantitation	Action Limit	DF
GC Petroleum Hydrocarbons	**MA DEP VPH, Rev. 2.1 2/2018**		**ug/l**		**ug/l**	**ug/l**	**ug/l**	**ug/l**	
14079	Benzene	71-43-2	21.7		2.00	4.00	5.00		1
14079	C5-C8 Aliphatic Hydrocarbons	n.a.	123	J	50.0	100	200		1
14079	Unadjusted C5-C8 Aliphatics	n.a.	145	J	50.0	100	200		1
14079	C9-C10 Aromatic Hydrocarbons	n.a.	47.0	J	20.0	40.0	200		1
14079	C9-C12 Aliphatic Hydrocarbons	n.a.	N.D.		50.0	100	200		1
14079	Unadjusted C9-C12 Aliphatics	n.a.	85.3	J	50.0	100	200		1
14079	Ethylbenzene	100-41-4	3.80	J	2.00	4.00	5.00		1
14079	Methyl t-butyl ether	1634-04-4	N.D.		2.00	4.00	5.00		1
14079	Naphthalene	91-20-3	3.25	J	3.00	6.00	10.0		1
14079	Total Purgeable Hydrocarbons	n.a.	230		100	100	200		1
14079	Toluene	108-88-3	N.D.		2.00	4.00	5.00		1
14079	o-Xylene	95-47-6	N.D.		2.00	4.00	5.00		1
14079	m,p-Xylenes	179601-23-1	N.D.		5.00	10.0	10.0		1

The recovery for a target analyte(s) in the Laboratory Control Spike(s) is outside the QC acceptance limits as noted on the QC Summary. The client was contacted and the data reported.

GC Petroleum Hydrocarbons	**MT DEQ**		**ug/l**		**ug/l**	**ug/l**	**ug/l**	**ug/l**	
05968	MTEPH Screen Water	n.a.	N.D.		300	300	300	1000	1

The response for a target analyte(s) in the continuing calibration verification standard is outside the QC acceptance limits high. The following action was taken:
The analysis was repeated and the continuing calibration verification standard bracketing the sample on the second trial is also outside the acceptance limits high. This effect is attributed to the sample matrix and the data is reported.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14079	MA-VPH Water DOD	MA DEP VPH, Rev. 2.1 2/2018	1	19143B08A	05/23/2019 23:34	Mark Makowiecki	1
14079	MA-VPH Water DOD	MA DEP VPH, Rev. 2.1 2/2018	1-1ST	19143B08A	05/23/2019 23:34	Mark Makowiecki	1
05968	MTEPH Screen Water	MT DEQ	1	191420017A	05/24/2019 11:00	Timothy M Emrick	1
11174	MT EPH Waters Extraction	MT DEQ MA EPH	1	191420017A	05/23/2019 01:45	Sherry L Morrow	1

*=This limit was used in the evaluation of the final result
Shaded result = The results or reporting limit exceeded the client-provided Action Limit.

REVISED

Sample Description: **MW-9 Grab Groundwater**
MAF F-1

Project Name: **MAF-F-1**

Submittal Date/Time: 05/17/2019 10:20
Collection Date/Time: 05/15/2019 13:39
SDG#: EMR07-10

EMR Environmental
ELLE Sample #: GW 1059988
ELLE Group #: 2044467
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	Action Limit	DF
GC Petroleum Hydrocarbons	**MA DEP VPH, Rev. 2.1 2/2018**		**ug/l**	**ug/l**	**ug/l**	**ug/l**	**ug/l**	
14079	Benzene	71-43-2	3,270 E	10.0	20.0	25.0		5
14079	C5-C8 Aliphatic Hydrocarbons	n.a.	12,300 E	250	500	1.000		5
14079	Unadjusted C5-C8 Aliphatics	n.a.	16,500 E	250	500	1.000		5
14079	C9-C10 Aromatic Hydrocarbons	n.a.	5,510 E	100	200	1.000		5
14079	C9-C12 Aliphatic Hydrocarbons	n.a.	8,930 E	250	500	1.000		5
14079	Unadjusted C9-C12 Aliphatics	n.a.	23,200 E	250	500	1.000		5
14079	Ethylbenzene	100-41-4	1,670 E	10.0	20.0	25.0		5
14079	Methyl t-butyl ether	1634-04-4	N.D.	10.0	20.0	25.0		5
14079	Naphthalene	91-20-3	444	15.0	30.0	50.0		5
14079	Total Purgeable Hydrocarbons	n.a.	39,800 E	500	500	1.000		5
14079	Toluene	108-88-3	933 E	10.0	20.0	25.0		5
14079	o-Xylene	95-47-6	1,570 E	10.0	20.0	25.0		5
14079	m,p-Xylenes	179601-23-1	5,550 E	25.0	50.0	50.0		5
Trial ID: DL								
14079	Benzene	71-43-2	3,370	50.0	100	125		25
14079	C5-C8 Aliphatic Hydrocarbons	n.a.	12,400	1.250	2.500	5.000		25
14079	Unadjusted C5-C8 Aliphatics	n.a.	16,700	1.250	2.500	5.000		25
14079	C9-C10 Aromatic Hydrocarbons	n.a.	5,650	500	1.000	5.000		25
14079	C9-C12 Aliphatic Hydrocarbons	n.a.	8,450	1.250	2.500	5.000		25
14079	Unadjusted C9-C12 Aliphatics	n.a.	23,300	1.250	2.500	5.000		25
14079	Ethylbenzene	100-41-4	1,700	50.0	100	125		25
14079	Methyl t-butyl ether	1634-04-4	N.D.	50.0	100	125		25
14079	Naphthalene	91-20-3	425	75.0	150	250		25
14079	Total Purgeable Hydrocarbons	n.a.	40,000	2.500	2.500	5.000		25
14079	Toluene	108-88-3	973	50.0	100	125		25
14079	o-Xylene	95-47-6	1,660	50.0	100	125		25
14079	m,p-Xylenes	179601-23-1	5,830	125	250	250		25

The recovery for a target analyte(s) in the Laboratory Control Spike(s) is outside the QC acceptance limits as noted on the QC Summary. Sufficient sample was not available to repeat the analysis.

GC Petroleum Hydrocarbons	**MA EPH 5/04**		**ug/l**	**ug/l**	**ug/l**	**ug/l**	**ug/l**	
05331	Acenaphthene	83-32-9	N.D.	5.8	12	19		10
05331	Acenaphthylene	208-96-8	N.D.	6.8	14	19		10
05331	Anthracene	120-12-7	N.D.	5.8	12	19		10
05331	Benzo(a)anthracene	56-55-3	N.D.	6.8	14	19		10
05331	Benzo(a)pyrene	50-32-8	N.D.	5.8	12	19		10
05331	Benzo(b)fluoranthene	205-99-2	N.D.	5.8	12	19		10
05331	Benzo(g,h,i)perylene	191-24-2	N.D.	5.8	12	19		10

*=This limit was used in the evaluation of the final result
Shaded result = The results or reporting limit exceeded the client-provided Action Limit.

REVISED

Sample Description: **MW-9 Grab Groundwater**
MAF F-1

Project Name: **MAF-F-1**

Submittal Date/Time: 05/17/2019 10:20
Collection Date/Time: 05/15/2019 13:39
SDG#: EMR07-10

EMR Environmental
ELLE Sample #: GW 1059988
ELLE Group #: 2044467
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result		Detection Limit*	Limit of Detection	Limit of Quantitation	Action Limit	DF
GC Petroleum Hydrocarbons	**MA EPH 5/04**		**ug/l**		**ug/l**	**ug/l**	**ug/l**	**ug/l**	
05331	Benzo(k)fluoranthene	207-08-9	N.D.		15	29	39		10
05331	Unadjusted C11 - C22 Aromatics	n.a.	480	J	390	390	780		10
05331	C11 to C22 Aromatics	n.a.	N.D.		390	390	780		10
05331	C19 to C36 Aliphatics	n.a.	N.D.		49	49	78		1
05331	C9 to C18 Aliphatics	n.a.	660		29	29	58		1
05331	Chrysene	218-01-9	N.D.		4.9	9.7	19		10
05331	Dibenzo(a,h)anthracene	53-70-3	N.D.		4.9	9.7	19		10
05331	Fluoranthene	206-44-0	N.D.		4.9	9.7	19		10
05331	Fluorene	86-73-7	N.D.		5.8	12	19		10
05331	Indeno(1,2,3-cd)pyrene	193-39-5	N.D.		5.8	12	19		10
05331	2-Methylnaphthalene	91-57-6	60		5.8	12	19		10
05331	Naphthalene	91-20-3	230		5.8	12	19		10
05331	Total Petroleum Hydrocarbons	n.a.	660		50	50	100		1
05331	Phenanthrene	85-01-8	N.D.		5.8	12	19		10
05331	Pyrene	129-00-0	N.D.		49	97	120		10

The recovery for a target analyte(s)and surrogate(s) in the Laboratory Control Spike(s) is outside the QC acceptance limits as noted on the QC Summary. Sufficient sample was not available to repeat the analysis.

CAT No.	Analysis Name	CAS Number	Result		Detection Limit*	Limit of Detection	Limit of Quantitation	Action Limit	DF
GC Petroleum Hydrocarbons	**MT DEQ**		**ug/l**		**ug/l**	**ug/l**	**ug/l**	**ug/l**	
05968	MTEPH Screen Water	n.a.	13,000	E	300	300	300	1000	1

The response for a target analyte(s) in the continuing calibration verification standard is outside the QC acceptance limits high. The following action was taken:
The analysis was repeated and the continuing calibration verification standard bracketing the sample on the second trial is also outside the acceptance limits high. This effect is attributed to the sample matrix and the data is reported.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14079	MA-VPH Water DOD	MA DEP VPH, Rev. 2.1 2/2018	1	19143B08A	05/24/2019 00:15	Mark Makowiecki	5
14079	MA-VPH Water DOD	MA DEP VPH, Rev. 2.1 2/2018	1-1ST	19143B08A	05/24/2019 00:15	Mark Makowiecki	5
14079	MA-VPH Water DOD	MA DEP VPH, Rev. 2.1 2/2018	2-DL	19143B08A	05/24/2019 09:28	Mark Makowiecki	25
05331	MA-EPH Water DOD	MA EPH 5/04	1	191510004A	06/06/2019 16:13	Heather E Williams	1
05331	MA-EPH Water DOD	MA EPH 5/04	1	191510004A	06/07/2019 00:34	Heather E Williams	10
05331	MA-EPH Water DOD	MA EPH 5/04	1-1ST	191510004A	06/07/2019 00:34	Heather E Williams	1

*=This limit was used in the evaluation of the final result
Shaded result = The results or reporting limit exceeded the client-provided Action Limit.

REVISED

Sample Description: **MW-9 Grab Groundwater MAF F-1**

Project Name: **MAF-F-1**

Submittal Date/Time: 05/17/2019 10:20
Collection Date/Time: 05/15/2019 13:39
SDG#: EMR07-10

EMR Environmental
ELLE Sample #: GW 1059988
ELLE Group #: 2044467
Matrix: Groundwater

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
05968	MTEPH Screen Water	MT DEQ	1	191420017A	05/24/2019 13:09	Timothy M Emrick	1
07326	EPH Water Extraction	MA DEP EPH 5/04	1	191510004A	05/23/2019 01:45	Sherry L Morrow	1
11174	MT EPH Waters Extraction	MT DEQ MA EPH	1	191420017A	05/23/2019 01:45	Sherry L Morrow	1
00497	Silica Gel Fractionation	SW-846 3630C modified	1	191510004A	06/02/2019 12:48	Christine E Gleim	1

*=This limit was used in the evaluation of the final result
Shaded result = The results or reporting limit exceeded the client-provided Action Limit.

REVISED

Sample Description: **MW-10 Grab Groundwater MAF F-1**

Project Name: **MAF-F-1**

Submittal Date/Time: 05/17/2019 10:20
Collection Date/Time: 05/15/2019 14:02
SDG#: EMR07-11

EMR Environmental
ELLE Sample #: GW 1059989
ELLE Group #: 2044467
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	Action Limit	DF
GC Petroleum Hydrocarbons	**MA DEP VPH, Rev. 2.1 2/2018**		**ug/l**	**ug/l**	**ug/l**	**ug/l**	**ug/l**	
14079	Benzene	71-43-2	501 E	2.00	4.00	5.00		1
14079	C5-C8 Aliphatic Hydrocarbons	n.a.	1,730 E	50.0	100	200		1
14079	Unadjusted C5-C8 Aliphatics	n.a.	2,250 E	50.0	100	200		1
14079	C9-C10 Aromatic Hydrocarbons	n.a.	1,740 E	20.0	40.0	200		1
14079	C9-C12 Aliphatic Hydrocarbons	n.a.	1,410 E	50.0	100	200		1
14079	Unadjusted C9-C12 Aliphatics	n.a.	3,840 E	50.0	100	200		1
14079	Ethylbenzene	100-41-4	274 E	2.00	4.00	5.00		1
14079	Methyl t-butyl ether	1634-04-4	N.D.	2.00	4.00	5.00		1
14079	Naphthalene	91-20-3	160	3.00	6.00	10.0		1
14079	Total Purgeable Hydrocarbons	n.a.	6,090 E	100	100	200		1
14079	Toluene	108-88-3	16.2	2.00	4.00	5.00		1
14079	o-Xylene	95-47-6	49.6	2.00	4.00	5.00		1
14079	m,p-Xylenes	179601-23-1	367	5.00	10.0	10.0		1
Trial ID: DL								
14079	Benzene	71-43-2	475	10.0	20.0	25.0		5
14079	C5-C8 Aliphatic Hydrocarbons	n.a.	1,490	250	500	1,000		5
14079	Unadjusted C5-C8 Aliphatics	n.a.	1,980	250	500	1,000		5
14079	C9-C10 Aromatic Hydrocarbons	n.a.	1,480	100	200	1,000		5
14079	C9-C12 Aliphatic Hydrocarbons	n.a.	1,130	250	500	1,000		5
14079	Unadjusted C9-C12 Aliphatics	n.a.	3,210	250	500	1,000		5
14079	Ethylbenzene	100-41-4	242	10.0	20.0	25.0		5
14079	Methyl t-butyl ether	1634-04-4	N.D.	10.0	20.0	25.0		5
14079	Naphthalene	91-20-3	146	15.0	30.0	50.0		5
14079	Total Purgeable Hydrocarbons	n.a.	5,190	500	500	1,000		5
14079	Toluene	108-88-3	15.3 J	10.0	20.0	25.0		5
14079	o-Xylene	95-47-6	49.2	10.0	20.0	25.0		5
14079	m,p-Xylenes	179601-23-1	320	25.0	50.0	50.0		5

The recovery for a target analyte(s) in the Laboratory Control Spike(s) is outside the QC acceptance limits as noted on the QC Summary. Sufficient sample was not available to repeat the analysis.

GC Petroleum Hydrocarbons	**MA EPH 5/04**		**ug/l**	**ug/l**	**ug/l**	**ug/l**	**ug/l**	
05331	Acenaphthene	83-32-9	N.D.	1.2	2.3	3.9		2
05331	Acenaphthylene	208-96-8	N.D.	1.4	2.7	3.9		2
05331	Anthracene	120-12-7	N.D.	1.2	2.3	3.9		2
05331	Benzo(a)anthracene	56-55-3	N.D.	1.4	2.7	3.9		2
05331	Benzo(a)pyrene	50-32-8	N.D.	1.2	2.3	3.9		2
05331	Benzo(b)fluoranthene	205-99-2	N.D.	1.2	2.3	3.9		2
05331	Benzo(g,h,i)perylene	191-24-2	N.D.	1.2	2.3	3.9		2

*=This limit was used in the evaluation of the final result
Shaded result = The results or reporting limit exceeded the client-provided Action Limit.

REVISED

Sample Description: **MW-10 Grab Groundwater**
MAF F-1

Project Name: **MAF-F-1**

Submittal Date/Time: 05/17/2019 10:20
Collection Date/Time: 05/15/2019 14:02
SDG#: EMR07-11

EMR Environmental
ELLE Sample #: GW 1059989
ELLE Group #: 2044467
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result		Detection Limit*	Limit of Detection	Limit of Quantitation	Action Limit	DF
GC Petroleum Hydrocarbons	**MA EPH 5/04**		**ug/l**		**ug/l**	**ug/l**	**ug/l**	**ug/l**	
05331	Benzo(k)fluoranthene	207-08-9	N.D.		2.9	5.8	7.8		2
05331	Unadjusted C11 - C22 Aromatics	n.a.	150	J	78	78	160		2
05331	C11 to C22 Aromatics	n.a.	N.D.		78	78	160		2
05331	C19 to C36 Aliphatics	n.a.	N.D.		49	49	78		1
05331	C9 to C18 Aliphatics	n.a.	110		29	29	58		1
05331	Chrysene	218-01-9	N.D.		0.97	1.9	3.9		2
05331	Dibenzo(a,h)anthracene	53-70-3	N.D.		0.97	1.9	3.9		2
05331	Fluoranthene	206-44-0	N.D.		0.97	1.9	3.9		2
05331	Fluorene	86-73-7	N.D.		1.2	2.3	3.9		2
05331	Indeno(1,2,3-cd)pyrene	193-39-5	N.D.		1.2	2.3	3.9		2
05331	2-Methylnaphthalene	91-57-6	20		1.2	2.3	3.9		2
05331	Naphthalene	91-20-3	65		1.2	2.3	3.9		2
05331	Total Petroleum Hydrocarbons	n.a.	110	J	100	100	200		2
05331	Phenanthrene	85-01-8	N.D.		1.2	2.3	3.9		2
05331	Pyrene	129-00-0	N.D.		9.7	19	23		2

The recovery for a target analyte(s)and surrogate(s) in the Laboratory Control Spike(s) is outside the QC acceptance limits as noted on the QC Summary. Sufficient sample was not available to repeat the analysis.

GC Petroleum Hydrocarbons	**MT DEQ**		**ug/l**		**ug/l**	**ug/l**	**ug/l**	**ug/l**	
05968	MTEPH Screen Water	n.a.	6,700	E	300	300	300	1000	1

The response for a target analyte(s) in the continuing calibration verification standard is outside the QC acceptance limits high. The following action was taken:
The analysis was repeated and the continuing calibration verification standard bracketing the sample on the second trial is also outside the acceptance limits high. This effect is attributed to the sample matrix and the data is reported.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14079	MA-VPH Water DOD	MA DEP VPH, Rev. 2.1 2/2018	1	19143B08A	05/24/2019 01:38	Mark Makowiecki	1
14079	MA-VPH Water DOD	MA DEP VPH, Rev. 2.1 2/2018	1-1ST	19143B08A	05/24/2019 01:38	Mark Makowiecki	1
14079	MA-VPH Water DOD	MA DEP VPH, Rev. 2.1 2/2018	2-DL	19143B08A	05/24/2019 02:20	Mark Makowiecki	5
05331	MA-EPH Water DOD	MA EPH 5/04	1	191510004A	06/06/2019 17:33	Heather E Williams	1
05331	MA-EPH Water DOD	MA EPH 5/04	1	191510004A	06/07/2019 01:13	Heather E Williams	2
05331	MA-EPH Water DOD	MA EPH 5/04	1-1ST	191510004A	06/07/2019 01:13	Heather E Williams	2

*=This limit was used in the evaluation of the final result
Shaded result = The results or reporting limit exceeded the client-provided Action Limit.

REVISED

Sample Description: **MW-10 Grab Groundwater MAF F-1**

Project Name: **MAF-F-1**

Submittal Date/Time: 05/17/2019 10:20
Collection Date/Time: 05/15/2019 14:02
SDG#: EMR07-11

EMR Environmental
ELLE Sample #: GW 1059989
ELLE Group #: 2044467
Matrix: Groundwater

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
05968	MTEPH Screen Water	MT DEQ	1	191420017A	05/24/2019 12:48	Timothy M Emrick	1
07326	EPH Water Extraction	MA DEP EPH 5/04	1	191510004A	05/23/2019 01:45	Sherry L Morrow	1
11174	MT EPH Waters Extraction	MT DEQ MA EPH	1	191420017A	05/23/2019 01:45	Sherry L Morrow	1
00497	Silica Gel Fractionation	SW-846 3630C modified	1	191510004A	06/02/2019 12:48	Christine E Gleim	1

*=This limit was used in the evaluation of the final result
Shaded result = The results or reporting limit exceeded the client-provided Action Limit.

REVISED

Sample Description: **MW-11 Grab Groundwater MAF F-1**

Project Name: **MAF-F-1**

Submittal Date/Time: 05/17/2019 10:20
Collection Date/Time: 05/15/2019 14:32
SDG#: EMR07-12

EMR Environmental
ELLE Sample #: GW 1059990
ELLE Group #: 2044467
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	Action Limit	DF
GC Petroleum Hydrocarbons	**MA DEP VPH, Rev. 2.1 2/2018**		**ug/l**	**ug/l**	**ug/l**	**ug/l**	**ug/l**	
14079	Benzene	71-43-2	N.D.	2.00	4.00	5.00		1
14079	C5-C8 Aliphatic Hydrocarbons	n.a.	N.D.	50.0	100	200		1
14079	Unadjusted C5-C8 Aliphatics	n.a.	N.D.	50.0	100	200		1
14079	C9-C10 Aromatic Hydrocarbons	n.a.	N.D.	20.0	40.0	200		1
14079	C9-C12 Aliphatic Hydrocarbons	n.a.	N.D.	50.0	100	200		1
14079	Unadjusted C9-C12 Aliphatics	n.a.	N.D.	50.0	100	200		1
14079	Ethylbenzene	100-41-4	N.D.	2.00	4.00	5.00		1
14079	Methyl t-butyl ether	1634-04-4	N.D.	2.00	4.00	5.00		1
14079	Naphthalene	91-20-3	N.D.	3.00	6.00	10.0		1
14079	Total Purgeable Hydrocarbons	n.a.	N.D.	100	100	200		1
14079	Toluene	108-88-3	N.D.	2.00	4.00	5.00		1
14079	o-Xylene	95-47-6	N.D.	2.00	4.00	5.00		1
14079	m,p-Xylenes	179601-23-1	N.D.	5.00	10.0	10.0		1
GC Petroleum Hydrocarbons	**MT DEQ**		**ug/l**	**ug/l**	**ug/l**	**ug/l**	**ug/l**	
05968	MTEPH Screen Water	n.a.	N.D.	300	300	300	1000	1

The response for a target analyte(s) in the continuing calibration verification standard is outside the QC acceptance limits high. The following action was taken:
The analysis was repeated and the continuing calibration verification standard bracketing the sample on the second trial is also outside the acceptance limits high. This effect is attributed to the sample matrix and the data is reported.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14079	MA-VPH Water DOD	MA DEP VPH, Rev. 2.1 2/2018	1	19148B08A	05/28/2019 20:16	Mark Makowiecki	1
14079	MA-VPH Water DOD	MA DEP VPH, Rev. 2.1 2/2018	1-1ST	19148B08A	05/28/2019 20:16	Mark Makowiecki	1
05968	MTEPH Screen Water	MT DEQ	1	191420017A	05/24/2019 11:22	Timothy M Emrick	1
11174	MT EPH Waters Extraction	MT DEQ MA EPH	1	191420017A	05/23/2019 01:45	Sherry L Morrow	1

*=This limit was used in the evaluation of the final result
Shaded result = The results or reporting limit exceeded the client-provided Action Limit.

REVISED

Sample Description: **MW-14 Grab Groundwater MAF F-1**

Project Name: **MAF-F-1**

Submittal Date/Time: 05/17/2019 10:20
Collection Date/Time: 05/15/2019 14:56
SDG#: EMR07-13

EMR Environmental
ELLE Sample #: GW 1059991
ELLE Group #: 2044467
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result		Detection Limit*	Limit of Detection	Limit of Quantitation	Action Limit	DF
GC Petroleum Hydrocarbons	**MA DEP VPH, Rev. 2.1 2/2018**		**ug/l**		**ug/l**	**ug/l**	**ug/l**	**ug/l**	
14079	Benzene	71-43-2	13.1		2.00	4.00	5.00		1
14079	C5-C8 Aliphatic Hydrocarbons	n.a.	662		50.0	100	200		1
14079	Unadjusted C5-C8 Aliphatics	n.a.	675		50.0	100	200		1
14079	C9-C10 Aromatic Hydrocarbons	n.a.	204		20.0	40.0	200		1
14079	C9-C12 Aliphatic Hydrocarbons	n.a.	132	J	50.0	100	200		1
14079	Unadjusted C9-C12 Aliphatics	n.a.	343		50.0	100	200		1
14079	Ethylbenzene	100-41-4	7.53		2.00	4.00	5.00		1
14079	Methyl t-butyl ether	1634-04-4	N.D.		2.00	4.00	5.00		1
14079	Naphthalene	91-20-3	N.D.		3.00	6.00	10.0		1
14079	Total Purgeable Hydrocarbons	n.a.	1,020		100	100	200		1
14079	Toluene	108-88-3	N.D.		2.00	4.00	5.00		1
14079	o-Xylene	95-47-6	N.D.		2.00	4.00	5.00		1
14079	m,p-Xylenes	179601-23-1	N.D.		5.00	10.0	10.0		1

The recovery for a target analyte(s) in the Laboratory Control Spike(s) is outside the QC acceptance limits as noted on the QC Summary. Sufficient sample was not available to repeat the analysis.

The recovery for the sample surrogate(s) is outside the QC acceptance limits as noted on the QC Summary. Sufficient sample was not available to repeat the analysis.

GC Petroleum Hydrocarbons	**MT DEQ**		**ug/l**		**ug/l**	**ug/l**	**ug/l**	**ug/l**	
05968	MTEPH Screen Water	n.a.	730		300	300	300	1000	1

The response for a target analyte(s) in the continuing calibration verification standard is outside the QC acceptance limits high. The following action was taken:
The analysis was repeated and the continuing calibration verification standard bracketing the sample on the second trial is also outside the acceptance limits high. This effect is attributed to the sample matrix and the data is reported.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14079	MA-VPH Water DOD	MA DEP VPH, Rev. 2.1 2/2018	1	19143B08A	05/24/2019 03:43	Mark Makowiecki	1
14079	MA-VPH Water DOD	MA DEP VPH, Rev. 2.1 2/2018	1-1ST	19143B08A	05/24/2019 03:43	Mark Makowiecki	1
05968	MTEPH Screen Water	MT DEQ	1	191420017A	05/24/2019 12:05	Timothy M Emrick	1
11174	MT EPH Waters Extraction	MT DEQ MA EPH	1	191420017A	05/23/2019 01:45	Sherry L Morrow	1

*=This limit was used in the evaluation of the final result
Shaded result = The results or reporting limit exceeded the client-provided Action Limit.

REVISED

Sample Description: **MW-13 Grab Groundwater MAF F-1**

Project Name: **MAF-F-1**

Submittal Date/Time: 05/17/2019 10:20
Collection Date/Time: 05/15/2019 15:24
SDG#: EMR07-14

EMR Environmental
ELLE Sample #: GW 1059992
ELLE Group #: 2044467
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	Action Limit	DF
GC Petroleum Hydrocarbons	**MA DEP VPH, Rev. 2.1 2/2018**		**ug/l**	**ug/l**	**ug/l**	**ug/l**	**ug/l**	
14079	Benzene	71-43-2	N.D.	2.00	4.00	5.00		1
14079	C5-C8 Aliphatic Hydrocarbons	n.a.	N.D.	50.0	100	200		1
14079	Unadjusted C5-C8 Aliphatics	n.a.	N.D.	50.0	100	200		1
14079	C9-C10 Aromatic Hydrocarbons	n.a.	N.D.	20.0	40.0	200		1
14079	C9-C12 Aliphatic Hydrocarbons	n.a.	N.D.	50.0	100	200		1
14079	Unadjusted C9-C12 Aliphatics	n.a.	N.D.	50.0	100	200		1
14079	Ethylbenzene	100-41-4	N.D.	2.00	4.00	5.00		1
14079	Methyl t-butyl ether	1634-04-4	N.D.	2.00	4.00	5.00		1
14079	Naphthalene	91-20-3	N.D.	3.00	6.00	10.0		1
14079	Total Purgeable Hydrocarbons	n.a.	N.D.	100	100	200		1
14079	Toluene	108-88-3	N.D.	2.00	4.00	5.00		1
14079	o-Xylene	95-47-6	N.D.	2.00	4.00	5.00		1
14079	m,p-Xylenes	179601-23-1	N.D.	5.00	10.0	10.0		1
GC Petroleum Hydrocarbons	**MT DEQ**		**ug/l**	**ug/l**	**ug/l**	**ug/l**	**ug/l**	
05968	MTEPH Screen Water	n.a.	N.D.	300	300	300	1000	1

The response for a target analyte(s) in the continuing calibration verification standard is outside the QC acceptance limits high. The following action was taken:
The analysis was repeated and the continuing calibration verification standard bracketing the sample on the second trial is also outside the acceptance limits high. This effect is attributed to the sample matrix and the data is reported.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14079	MA-VPH Water DOD	MA DEP VPH, Rev. 2.1 2/2018	1	19148B08A	05/28/2019 20:58	Mark Makowiecki	1
14079	MA-VPH Water DOD	MA DEP VPH, Rev. 2.1 2/2018	1-1ST	19148B08A	05/28/2019 20:58	Mark Makowiecki	1
05968	MTEPH Screen Water	MT DEQ	1	191420017A	05/24/2019 11:43	Timothy M Emrick	1
11174	MT EPH Waters Extraction	MT DEQ MA EPH	1	191420017A	05/23/2019 01:45	Sherry L Morrow	1

*=This limit was used in the evaluation of the final result
Shaded result = The results or reporting limit exceeded the client-provided Action Limit.

REVISED

Sample Description: **MW-15 Grab Groundwater**
MAF F-1

Project Name: **MAF-F-1**

Submittal Date/Time: 05/17/2019 10:20
Collection Date/Time: 05/15/2019 15:49
SDG#: EMR07-15

EMR Environmental
ELLE Sample #: GW 1059993
ELLE Group #: 2044467
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	Action Limit	DF
GC Petroleum Hydrocarbons	**MA DEP VPH, Rev. 2.1 2/2018**		**ug/l**	**ug/l**	**ug/l**	**ug/l**	**ug/l**	
14079	Benzene	71-43-2	N.D.	2.00	4.00	5.00		1
14079	C5-C8 Aliphatic Hydrocarbons	n.a.	1,220	50.0	100	200		1
14079	Unadjusted C5-C8 Aliphatics	n.a.	1,220	50.0	100	200		1
14079	C9-C10 Aromatic Hydrocarbons	n.a.	1,750	20.0	40.0	200		1
14079	C9-C12 Aliphatic Hydrocarbons	n.a.	1,110	50.0	100	200		1
14079	Unadjusted C9-C12 Aliphatics	n.a.	2,900	50.0	100	200		1
14079	Ethylbenzene	100-41-4	39.0	2.00	4.00	5.00		1
14079	Methyl t-butyl ether	1634-04-4	N.D.	2.00	4.00	5.00		1
14079	Naphthalene	91-20-3	27.0	3.00	6.00	10.0		1
14079	Total Purgeable Hydrocarbons	n.a.	4,120	100	100	200		1
14079	Toluene	108-88-3	N.D.	2.00	4.00	5.00		1
14079	o-Xylene	95-47-6	3.73 J	2.00	4.00	5.00		1
14079	m,p-Xylenes	179601-23-1	N.D.	5.00	10.0	10.0		1

The recovery for a target analyte(s) in the Laboratory Control Spike(s) is outside the QC acceptance limits as noted on the QC Summary. Sufficient sample was not available to repeat the analysis.

The recovery for the sample surrogate(s) is outside the QC acceptance limits as noted on the QC Summary. Sufficient sample was not available to repeat the analysis.

GC Petroleum Hydrocarbons	**MA EPH 5/04**		**ug/l**	**ug/l**	**ug/l**	**ug/l**	**ug/l**	
05331	Acenaphthene	83-32-9	N.D.	0.58	1.2	1.9		1
05331	Acenaphthylene	208-96-8	N.D.	0.67	1.3	1.9		1
05331	Anthracene	120-12-7	N.D.	0.58	1.2	1.9		1
05331	Benzo(a)anthracene	56-55-3	N.D.	0.67	1.3	1.9		1
05331	Benzo(a)pyrene	50-32-8	N.D.	0.58	1.2	1.9		1
05331	Benzo(b)fluoranthene	205-99-2	N.D.	0.58	1.2	1.9		1
05331	Benzo(g,h,i)perylene	191-24-2	N.D.	0.58	1.2	1.9		1
05331	Benzo(k)fluoranthene	207-08-9	N.D.	1.4	2.9	3.8		1
05331	Unadjusted C11 - C22 Aromatics	n.a.	440	38	38	77		1
05331	C11 to C22 Aromatics	n.a.	380	38	38	77		1
05331	C19 to C36 Aliphatics	n.a.	N.D.	48	48	77		1
05331	C9 to C18 Aliphatics	n.a.	520	29	29	58		1
05331	Chrysene	218-01-9	N.D.	0.48	0.96	1.9		1
05331	Dibenzo(a,h)anthracene	53-70-3	N.D.	0.48	0.96	1.9		1
05331	Fluoranthene	206-44-0	N.D.	0.48	0.96	1.9		1
05331	Fluorene	86-73-7	N.D.	0.58	1.2	1.9		1
05331	Indeno(1,2,3-cd)pyrene	193-39-5	N.D.	0.58	1.2	1.9		1
05331	2-Methylnaphthalene	91-57-6	34	0.58	1.2	1.9		1

*=This limit was used in the evaluation of the final result
Shaded result = The results or reporting limit exceeded the client-provided Action Limit.

REVISED

Sample Description: **MW-15 Grab Groundwater MAF F-1**

Project Name: **MAF-F-1**

Submittal Date/Time: 05/17/2019 10:20
Collection Date/Time: 05/15/2019 15:49
SDG#: EMR07-15

EMR Environmental
ELLE Sample #: GW 1059993
ELLE Group #: 2044467
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	Action Limit	DF
GC Petroleum Hydrocarbons	**MA EPH 5/04**		**ug/l**	**ug/l**	**ug/l**	**ug/l**	**ug/l**	
05331	Naphthalene	91-20-3	21	0.58	1.2	1.9		1
05331	Total Petroleum Hydrocarbons	n.a.	900	50	50	100		1
05331	Phenanthrene	85-01-8	N.D.	0.58	1.2	1.9		1
05331	Pyrene	129-00-0	N.D.	4.8	9.6	12		1

The recovery for a target analyte(s)and surrogate(s) in the Laboratory Control Spike(s) is outside the QC acceptance limits as noted on the QC Summary. Sufficient sample was not available to repeat the analysis.

GC Petroleum Hydrocarbons	**MT DEQ**		**ug/l**	**ug/l**	**ug/l**	**ug/l**	**ug/l**	
05968	MTEPH Screen Water	n.a.	3,100	300	300	300	1000	1

The response for a target analyte(s) in the continuing calibration verification standard is outside the QC acceptance limits high. The following action was taken:
The analysis was repeated and the continuing calibration verification standard bracketing the sample on the second trial is also outside the acceptance limits high. This effect is attributed to the sample matrix and the data is reported.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14079	MA-VPH Water DOD	MA DEP VPH, Rev. 2.1 2/2018	1	19143B08A	05/24/2019 05:06	Mark Makowiecki	1
14079	MA-VPH Water DOD	MA DEP VPH, Rev. 2.1 2/2018	1-1ST	19143B08A	05/24/2019 05:06	Mark Makowiecki	1
05331	MA-EPH Water DOD	MA EPH 5/04	1	191510004A	06/06/2019 18:12	Heather E Williams	1
05331	MA-EPH Water DOD	MA EPH 5/04	1	191510004A	06/06/2019 18:52	Heather E Williams	1
05331	MA-EPH Water DOD	MA EPH 5/04	1-1ST	191510004A	06/06/2019 18:12	Heather E Williams	1
05968	MTEPH Screen Water	MT DEQ	1	191420017A	05/24/2019 12:26	Timothy M Emrick	1
07326	EPH Water Extraction	MA DEP EPH 5/04	1	191510004A	05/23/2019 01:45	Sherry L Morrow	1
11174	MT EPH Waters Extraction	MT DEQ MA EPH	1	191420017A	05/23/2019 01:45	Sherry L Morrow	1
00497	Silica Gel Fractionation	SW-846 3630C modified	1	191510004A	06/02/2019 12:48	Christine E Gleim	1

*=This limit was used in the evaluation of the final result
Shaded result = The results or reporting limit exceeded the client-provided Action Limit.

REVISED

Sample Description: **MW-12 Grab Groundwater MAF F-1**

Project Name: **MAF-F-1**

Submittal Date/Time: 05/17/2019 10:20
Collection Date/Time: 05/15/2019 16:22
SDG#: EMR07-16

EMR Environmental
ELLE Sample #: GW 1059994
ELLE Group #: 2044467
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	Action Limit	DF
GC Petroleum Hydrocarbons	**MA DEP VPH, Rev. 2.1 2/2018**		**ug/l**	**ug/l**	**ug/l**	**ug/l**	**ug/l**	
14079	Benzene	71-43-2	518 E	2.00	4.00	5.00		1
14079	C5-C8 Aliphatic Hydrocarbons	n.a.	5,830 E	50.0	100	200		1
14079	Unadjusted C5-C8 Aliphatics	n.a.	6,420 E	50.0	100	200		1
14079	C9-C10 Aromatic Hydrocarbons	n.a.	7,930 E	20.0	40.0	200		1
14079	C9-C12 Aliphatic Hydrocarbons	n.a.	7,400 E	50.0	100	200		1
14079	Unadjusted C9-C12 Aliphatics	n.a.	18,500 E	50.0	100	200		1
14079	Ethylbenzene	100-41-4	886 E	2.00	4.00	5.00		1
14079	Methyl t-butyl ether	1634-04-4	N.D.	2.00	4.00	5.00		1
14079	Naphthalene	91-20-3	442 E	3.00	6.00	10.0		1
14079	Total Purgeable Hydrocarbons	n.a.	25,000 E	100	100	200		1
14079	Toluene	108-88-3	68.3	2.00	4.00	5.00		1
14079	o-Xylene	95-47-6	346 E	2.00	4.00	5.00		1
14079	m,p-Xylenes	179601-23-1	1,980 E	5.00	10.0	10.0		1
Trial ID: DL								
14079	Benzene	71-43-2	459	20.0	40.0	50.0		10
14079	C5-C8 Aliphatic Hydrocarbons	n.a.	4,780	500	1,000	2,000		10
14079	Unadjusted C5-C8 Aliphatics	n.a.	5,300	500	1,000	2,000		10
14079	C9-C10 Aromatic Hydrocarbons	n.a.	8,050	200	400	2,000		10
14079	C9-C12 Aliphatic Hydrocarbons	n.a.	6,090	500	1,000	2,000		10
14079	Unadjusted C9-C12 Aliphatics	n.a.	17,200	500	1,000	2,000		10
14079	Ethylbenzene	100-41-4	801	20.0	40.0	50.0		10
14079	Methyl t-butyl ether	1634-04-4	N.D.	20.0	40.0	50.0		10
14079	Naphthalene	91-20-3	463	30.0	60.0	100		10
14079	Total Purgeable Hydrocarbons	n.a.	22,500	1,000	1,000	2,000		10
14079	Toluene	108-88-3	59.9	20.0	40.0	50.0		10
14079	o-Xylene	95-47-6	334	20.0	40.0	50.0		10
14079	m,p-Xylenes	179601-23-1	1,920	50.0	100	100		10

The recovery for a target analyte(s) in the Laboratory Control Spike(s) is outside the QC acceptance limits as noted on the QC Summary. Sufficient sample was not available to repeat the analysis.

GC Petroleum Hydrocarbons	**MA EPH 5/04**		**ug/l**	**ug/l**	**ug/l**	**ug/l**	**ug/l**	
05331	Acenaphthene	83-32-9	N.D.	11	23	38		20
05331	Acenaphthylene	208-96-8	N.D.	13	27	38		20
05331	Anthracene	120-12-7	N.D.	11	23	38		20
05331	Benzo(a)anthracene	56-55-3	N.D.	13	27	38		20
05331	Benzo(a)pyrene	50-32-8	N.D.	11	23	38		20
05331	Benzo(b)fluoranthene	205-99-2	N.D.	11	23	38		20
05331	Benzo(g,h,i)perylene	191-24-2	N.D.	11	23	38		20

*=This limit was used in the evaluation of the final result
Shaded result = The results or reporting limit exceeded the client-provided Action Limit.

REVISED

Sample Description: **MW-12 Grab Groundwater**
MAF F-1

Project Name: **MAF-F-1**

Submittal Date/Time: 05/17/2019 10:20
Collection Date/Time: 05/15/2019 16:22
SDG#: EMR07-16

EMR Environmental
ELLE Sample #: GW 1059994
ELLE Group #: 2044467
Matrix: Groundwater

CAT No.	Analysis Name	CAS Number	Result	Detection Limit*	Limit of Detection	Limit of Quantitation	Action Limit	DF
GC Petroleum Hydrocarbons	**MA EPH 5/04**		**ug/l**	**ug/l**	**ug/l**	**ug/l**	**ug/l**	
05331	Benzo(k)fluoranthene	207-08-9	N.D.	29	57	77		20
05331	Unadjusted C11 - C22 Aromatics	n.a.	2,500	770	770	1,500		20
05331	C11 to C22 Aromatics	n.a.	1,800	770	770	1,500		20
05331	C19 to C36 Aliphatics	n.a.	N.D.	96	96	150		2
05331	C9 to C18 Aliphatics	n.a.	5,600	57	57	110		2
05331	Chrysene	218-01-9	N.D.	9.6	19	38		20
05331	Dibenzo(a,h)anthracene	53-70-3	N.D.	9.6	19	38		20
05331	Fluoranthene	206-44-0	N.D.	9.6	19	38		20
05331	Fluorene	86-73-7	N.D.	11	23	38		20
05331	Indeno(1,2,3-cd)pyrene	193-39-5	N.D.	11	23	38		20
05331	2-Methylnaphthalene	91-57-6	340	11	23	38		20
05331	Naphthalene	91-20-3	330	11	23	38		20
05331	Total Petroleum Hydrocarbons	n.a.	7,400	1,000	1,000	2,000		20
05331	Phenanthrene	85-01-8	N.D.	11	23	38		20
05331	Pyrene	129-00-0	N.D.	96	190	230		20

The recovery for a target analyte(s)and surrogate(s) in the Laboratory Control Spike(s) is outside the QC acceptance limits as noted on the QC Summary. Sufficient sample was not available to repeat the analysis.

GC Petroleum Hydrocarbons	**MT DEQ**		**ug/l**	**ug/l**	**ug/l**	**ug/l**	**ug/l**	
05968	MTEPH Screen Water	n.a.	27,000 E	300	300	300	1000	1

The response for a target analyte(s) in the continuing calibration verification standard is outside the QC acceptance limits high. The following action was taken:
The analysis was repeated and the continuing calibration verification standard bracketing the sample on the second trial is also outside the acceptance limits high. This effect is attributed to the sample matrix and the data is reported.

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
14079	MA-VPH Water DOD	MA DEP VPH, Rev. 2.1 2/2018	1	19143B08A	05/24/2019 06:29	Mark Makowiecki	1
14079	MA-VPH Water DOD	MA DEP VPH, Rev. 2.1 2/2018	1-1ST	19143B08A	05/24/2019 06:29	Mark Makowiecki	1
14079	MA-VPH Water DOD	MA DEP VPH, Rev. 2.1 2/2018	2-DL	19143B08A	05/24/2019 07:10	Mark Makowiecki	10
05331	MA-EPH Water DOD	MA EPH 5/04	1	191510004A	06/07/2019 01:53	Heather E Williams	20
05331	MA-EPH Water DOD	MA EPH 5/04	1	191510004A	06/07/2019 02:33	Heather E Williams	2
05331	MA-EPH Water DOD	MA EPH 5/04	1-1ST	191510004A	06/07/2019 01:53	Heather E Williams	20

*=This limit was used in the evaluation of the final result
Shaded result = The results or reporting limit exceeded the client-provided Action Limit.

REVISED

Sample Description: **MW-12 Grab Groundwater MAF F-1**

Project Name: **MAF-F-1**

Submittal Date/Time: 05/17/2019 10:20
Collection Date/Time: 05/15/2019 16:22
SDG#: EMR07-16

EMR Environmental
ELLE Sample #: GW 1059994
ELLE Group #: 2044467
Matrix: Groundwater

Laboratory Sample Analysis Record

CAT No.	Analysis Name	Method	Trial#	Batch#	Analysis Date and Time	Analyst	Dilution Factor
05968	MTEPH Screen Water	MT DEQ	1	191420017A	05/24/2019 13:31	Timothy M Emrick	1
07326	EPH Water Extraction	MA DEP EPH 5/04	1	191510004A	05/23/2019 01:45	Sherry L Morrow	1
11174	MT EPH Waters Extraction	MT DEQ MA EPH	1	191420017A	05/23/2019 01:45	Sherry L Morrow	1
00497	Silica Gel Fractionation	SW-846 3630C modified	1	191510004A	06/02/2019 12:48	Christine E Gleim	1

*=This limit was used in the evaluation of the final result
Shaded result = The results or reporting limit exceeded the client-provided Action Limit.

REVISED

Quality Control Summary

Client Name: EMR Environmental
Reported: 08/06/2019 09:51

Group Number: 2044467

Matrix QC may not be reported if insufficient sample or site-specific QC samples were not submitted. In these situations, to demonstrate precision and accuracy at a batch level, a LCS/LCSD was performed, unless otherwise specified in the method.

All Inorganic Initial Calibration and Continuing Calibration Blanks met acceptable method criteria unless otherwise noted on the Analysis Report.

Method Blank

Analysis Name	Result	DL**	LOD	LOQ
	ug/l	ug/l	ug/l	ug/l
Batch number: 191420017A	Sample number(s): 1059980-1059994			
MTEPH Screen Water	N.D.	300	300	300
Batch number: 19142B08A	Sample number(s): 1059979-1059982			
Benzene	N.D.	2.00	4.00	5.00
C5-C8 Aliphatic Hydrocarbons	N.D.	50.0	100	100
Unadjusted C5-C8 Aliphatics	N.D.	50.0	100	100
C9-C10 Aromatic Hydrocarbons	N.D.	20.0	40.0	100
C9-C12 Aliphatic Hydrocarbons	N.D.	50.0	100	100
Unadjusted C9-C12 Aliphatics	N.D.	50.0	100	100
Ethylbenzene	N.D.	2.00	4.00	5.00
Methyl t-butyl ether	N.D.	2.00	4.00	5.00
Naphthalene	N.D.	3.00	6.00	6.00
Total Purgeable Hydrocarbons	N.D.	50.0	100	100
Toluene	N.D.	2.00	4.00	5.00
o-Xylene	N.D.	2.00	4.00	5.00
m,p-Xylenes	N.D.	5.00	10.0	10.0
Batch number: 19143B08A	Sample number(s): 1059983-1059984,1059987-1059989,1059991,1059993-1059994			
Benzene	N.D.	2.00	4.00	5.00
C5-C8 Aliphatic Hydrocarbons	N.D.	50.0	100	100
Unadjusted C5-C8 Aliphatics	N.D.	50.0	100	100
C9-C10 Aromatic Hydrocarbons	N.D.	20.0	40.0	100
C9-C12 Aliphatic Hydrocarbons	N.D.	50.0	100	100
Unadjusted C9-C12 Aliphatics	N.D.	50.0	100	100
Ethylbenzene	N.D.	2.00	4.00	5.00
Methyl t-butyl ether	N.D.	2.00	4.00	5.00
Naphthalene	N.D.	3.00	6.00	6.00
Total Purgeable Hydrocarbons	N.D.	50.0	100	100
Toluene	N.D.	2.00	4.00	5.00
o-Xylene	N.D.	2.00	4.00	5.00
m,p-Xylenes	N.D.	5.00	10.0	10.0
Batch number: 19148B08A	Sample number(s): 1059985-1059986,1059990,1059992			
Benzene	N.D.	2.00	4.00	5.00
C5-C8 Aliphatic Hydrocarbons	313	50.0	100	100
Unadjusted C5-C8 Aliphatics	313	50.0	100	100
C9-C10 Aromatic Hydrocarbons	N.D.	20.0	40.0	100
C9-C12 Aliphatic Hydrocarbons	N.D.	50.0	100	100
Unadjusted C9-C12 Aliphatics	N.D.	50.0	100	100
Ethylbenzene	N.D.	2.00	4.00	5.00

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.
(3) The surrogate spike amount was less than the LOD.

REVISED

Quality Control Summary

Client Name: EMR Environmental
Reported: 08/06/2019 09:51

Group Number: 2044467

Method Blank (continued)

Analysis Name	Result	DL**	LOD	LOQ
	ug/l	ug/l	ug/l	ug/l
Methyl t-butyl ether	N.D.	2.00	4.00	5.00
Naphthalene	N.D.	3.00	6.00	6.00
Total Purgeable Hydrocarbons	313	50.0	100	100
Toluene	N.D.	2.00	4.00	5.00
o-Xylene	N.D.	2.00	4.00	5.00
m,p-Xylenes	N.D.	5.00	10.0	10.0
Batch number: 191510004A	Sample number(s): 1059980-1059981,1059988-1059989,1059993-1059994			
Acenaphthene	N.D.	0.60	1.2	2.0
Acenaphthylene	N.D.	0.70	1.4	2.0
Anthracene	N.D.	0.60	1.2	2.0
Benzo(a)anthracene	N.D.	0.70	1.4	2.0
Benzo(a)pyrene	N.D.	0.60	1.2	2.0
Benzo(b)fluoranthene	N.D.	0.60	1.2	2.0
Benzo(g,h,i)perylene	N.D.	0.60	1.2	2.0
Benzo(k)fluoranthene	N.D.	1.5	3.0	4.0
Unadjusted C11 - C22 Aromatics	N.D.	40	40	40
C11 to C22 Aromatics	N.D.	40	40	40
C19 to C36 Aliphatics	N.D.	50	50	50
C9 to C18 Aliphatics	N.D.	30	30	30
Chrysene	N.D.	0.50	1.0	2.0
Dibenzo(a,h)anthracene	N.D.	0.50	1.0	2.0
Fluoranthene	N.D.	0.50	1.0	2.0
Fluorene	N.D.	0.60	1.2	2.0
Indeno(1,2,3-cd)pyrene	N.D.	0.60	1.2	2.0
2-Methylnaphthalene	N.D.	0.60	1.2	2.0
Naphthalene	N.D.	0.60	1.2	2.0
Total Petroleum Hydrocarbons	N.D.	50	50	100
Phenanthrene	N.D.	0.60	1.2	2.0
Pyrene	N.D.	5.0	10	12

LCS/LCSD

Analysis Name	LCS Spike Added ug/l	LCS Conc ug/l	LCSD Spike Added ug/l	LCSD Conc ug/l	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Batch number: 191420017A	Sample number(s): 1059980-1059994								
MTEPH Screen Water	1243.55	899.62	1243.55	1179.66	72	95	40-140	27	50
Batch number: 19142B08A	Sample number(s): 1059979-1059982								
Benzene	50.19	49.9	50.19	49.46	99	99	70-130	1	25
C5-C8 Aliphatic Hydrocarbons	150.78	159.45	150.78	159.02	106	105	70-130	0	25
Unadjusted C5-C8 Aliphatics	301.31	307.23	301.31	305.7	102	101	70-130	0	25

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.
(3) The surrogate spike amount was less than the LOD.

REVISED

Quality Control Summary

Client Name: EMR Environmental
Reported: 08/06/2019 09:51

Group Number: 2044467

LCS/LCSD (continued)

Analysis Name	LCS Spike Added ug/l	LCS Conc ug/l	LCSD Spike Added ug/l	LCSD Conc ug/l	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
C9-C10 Aromatic Hydrocarbons	50.07	49.28	50.07	48.95	98	98	70-130	1	25
C9-C12 Aliphatic Hydrocarbons	150.53	132.2	150.53	133.5	88	89	70-130	1	25
Unadjusted C9-C12 Aliphatics	401.21	375.05	401.21	375.06	93	93	70-130	0	25
Ethylbenzene	50.18	49.38	50.18	49.03	98	98	70-130	1	25
Methyl t-butyl ether	50.03	48.19	50.03	48.08	96	96	70-130	0	25
Naphthalene	50.16	45.36	50.16	45.95	90	92	70-130	1	25
Toluene	50.3	49.68	50.3	49.14	99	98	70-130	1	25
o-Xylene	50	47.57	50	47.35	95	95	70-130	0	25
m,p-Xylenes	100.43	96.62	100.43	96.23	96	96	70-130	0	25
Batch number: 19143B08A	Sample number(s): 1059983-1059984,1059987-1059989,1059991,1059993-1059994								
Benzene	50.19	38.66	50.19	38.57	77	77	70-130	0	25
C5-C8 Aliphatic Hydrocarbons	150.78	123.05	150.78	121.5	82	81	70-130	1	25
Unadjusted C5-C8 Aliphatics	301.31	238.08	301.31	236.19	79	78	70-130	1	25
C9-C10 Aromatic Hydrocarbons	50.07	38.56	50.07	38.39	77	77	70-130	0	25
C9-C12 Aliphatic Hydrocarbons	150.53	99.54	150.53	98.09	66*	65*	70-130	1	25
Unadjusted C9-C12 Aliphatics	401.21	289.46	401.21	287.64	72	72	70-130	1	25
Ethylbenzene	50.18	38.49	50.18	38.38	77	76	70-130	0	25
Methyl t-butyl ether	50.03	37.94	50.03	37.57	76	75	70-130	1	25
Naphthalene	50.16	35.47	50.16	35.47	71	71	70-130	0	25
Toluene	50.3	38.43	50.3	38.55	76	77	70-130	0	25
o-Xylene	50	37.28	50	37.1	75	74	70-130	0	25
m,p-Xylenes	100.43	75.59	100.43	75.67	75	75	70-130	0	25
Batch number: 19148B08A	Sample number(s): 1059985-1059986,1059990,1059992								
Benzene	50.19	46.29	50.19	46.47	92	93	70-130	0	25
C5-C8 Aliphatic Hydrocarbons	150.78	159.81	150.78	160.8	106	107	70-130	1	25
Unadjusted C5-C8 Aliphatics	301.31	300.45	301.31	302.14	100	100	70-130	1	25
C9-C10 Aromatic Hydrocarbons	50.07	45.95	50.07	46.04	92	92	70-130	0	25
C9-C12 Aliphatic Hydrocarbons	150.53	139.68	150.53	140.96	93	94	70-130	1	25
Unadjusted C9-C12 Aliphatics	401.21	365.63	401.21	368.49	91	92	70-130	1	25
Ethylbenzene	50.18	45.81	50.18	46.08	91	92	70-130	1	25
Methyl t-butyl ether	50.03	48.13	50.03	48.3	96	97	70-130	0	25
Naphthalene	50.16	51.4	50.16	51.74	102	103	70-130	1	25
Toluene	50.3	46.23	50.3	46.57	92	93	70-130	1	25
o-Xylene	50	44.12	50	44.46	88	89	70-130	1	25
m,p-Xylenes	100.43	90.07	100.43	90.94	90	91	70-130	1	25
Batch number: 191510004A	Sample number(s): 1059980-1059981,1059988-1059989,1059993-1059994								
Acenaphthene	40.08	13.23	40.08	22.42	33*	56	40-140	52*	25
Acenaphthylene	40.08	13.5	40.08	22.75	34*	57	40-140	51*	25
Anthracene	40.12	14.77	40.12	24.83	37*	62	40-140	51*	25
Benzo(a)anthracene	40.16	15.21	40.16	25.52	38*	64	40-140	51*	25
Benzo(a)pyrene	40.12	14.3	40.12	23.59	36*	59	40-140	49*	25
Benzo(b)fluoranthene	40.12	15.45	40.12	26.18	39*	65	40-140	52*	25

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.
(3) The surrogate spike amount was less than the LOD.

REVISED

Quality Control Summary

Client Name: EMR Environmental
Reported: 08/06/2019 09:51

Group Number: 2044467

LCS/LCSD (continued)

Analysis Name	LCS Spike Added ug/l	LCS Conc ug/l	LCSD Spike Added ug/l	LCSD Conc ug/l	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Benzo(g,h,i)perylene	40.04	15.08	40.04	25.28	38*	63	40-140	51*	25
Benzo(k)fluoranthene	40.08	14.72	40.08	24.21	37*	60	40-140	49*	25
Unadjusted C11 - C22 Aromatics	681.15	249.51	681.15	416.55	37*	61	40-140	50*	25
C19 to C36 Aliphatics	321.36	147.16	321.36	270.99	46	84	40-140	59*	25
C9 to C18 Aliphatics	241.04	76.87	241.04	131.23	32*	54	40-140	52*	25
Chrysene	40.08	15.27	40.08	24.33	38*	61	40-140	46*	25
Dibenzo(a,h)anthracene	39.87	14.74	39.87	24.3	37*	61	40-140	49*	25
Fluoranthene	40.04	15.15	40.04	25.62	38*	64	40-140	51*	25
Fluorene	40.08	14.12	40.08	24.02	35*	60	40-140	52*	25
Indeno(1,2,3-cd)pyrene	40.04	15.06	40.04	25.41	38*	63	40-140	51*	25
2-Methylnaphthalene	40.04	11.91	40.04	19.76	30*	49	40-140	50*	25
Naphthalene	40.16	12.09	40.16	19.77	30*	49	40-140	48*	25
Phenanthrene	40	14.59	40	24.77	36*	62	40-140	52*	25
Pyrene	40.04	16.7	40.04	28.49	42	71	40-140	52*	25

Surrogate Quality Control

Surrogate recoveries which are outside of the QC window are confirmed unless attributed to dilution or otherwise noted on the Analysis Report.

Analysis Name: MTEPH Screen Water
Batch number: 191420017A

	Orthoterphenyl %Rec	LOD (ug/l)	1-chlorooctadecane %Rec	LOD (ug/l)
1059980	78	2.0	55	2.0
1059981	78	2.0	53	2.0
1059982	62	2.0	46	2.0
1059983	93	2.0	89	2.0
1059984	91	2.0	88	2.0
1059985	103	2.0	85	2.0
1059986	31*	2.0	25*	2.0
1059987	101	2.0	76	2.0
1059988	103	2.0	77	2.0
1059989	87	2.0	66	2.0
1059990	88	2.0	57	2.0
1059991	94	2.0	92	2.0
1059992	112	2.0	75	2.0
1059993	101	2.0	89	2.0
1059994	102	2.0	80	2.0
Blank	104	2.0	107	2.0
LCS	220*	2.0	73	2.0

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.
(3) The surrogate spike amount was less than the LOD.

REVISED

Quality Control Summary

Client Name: EMR Environmental
Reported: 08/06/2019 09:51

Group Number: 2044467

Surrogate Quality Control

Surrogate recoveries which are outside of the QC window are confirmed unless attributed to dilution or otherwise noted on the Analysis Report.

Analysis Name: MTEPH Screen Water
Batch number: 191420017A

	Orthoterphenyl %Rec	LOD (ug/l)	1-chlorooctadecane %Rec	LOD (ug/l)
LCSD	288*	2.0	96	2.0
Limits:	40-140		40-140	

Analysis Name: MA-VPH Water DOD
Batch number: 19142B08A

	Trifluorotoluene-P %Rec	LOD (ug/l)	Trifluorotoluene-F %Rec	LOD (ug/l)
1059979	102	3.00	103	3.00
1059980	394*	6.00	635*	6.00
1059980DL	119	60.0	136*	60.0
1059981	154*	6.00	164*	6.00
1059981DL	105	60.0	106	60.0
1059982	102	3.00	103	3.00
Blank	103	3.00	103	3.00
LCS	105	3.00	103	3.00
LCSD	104	3.00	103	3.00
Limits:	70-130		70-130	

Analysis Name: MA-VPH Water DOD
Batch number: 19143B08A

	Trifluorotoluene-P %Rec	LOD (ug/l)	Trifluorotoluene-F %Rec	LOD (ug/l)
1059983	107	3.00	115	3.00
1059984	108	3.00	117	3.00
1059987	106	3.00	115	3.00
1059988	149*	15.0	213*	15.0
1059988DL	108	75.0	120	75.0
1059989	192*	3.00	294*	3.00
1059989DL	112	15.0	130	15.0
1059991	170*	3.00	258*	3.00
1059993	190*	3.00	312*	3.00
1059994	563*	3.00	1097*	3.00
1059994DL	135*	30.0	183*	30.0
Blank	101	3.00	102	3.00
LCS	102	3.00	103	3.00
LCSD	100	3.00	101	3.00

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.
(3) The surrogate spike amount was less than the LOD.

REVISED

Quality Control Summary

Client Name: EMR Environmental
Reported: 08/06/2019 09:51

Group Number: 2044467

Surrogate Quality Control (continued)

Surrogate recoveries which are outside of the QC window are confirmed unless attributed to dilution or otherwise noted on the Analysis Report.

Analysis Name: MA-VPH Water DOD
Batch number: 19143B08A

Limits:	70-130	70-130

Analysis Name: MA-VPH Water DOD
Batch number: 19148B08A

	Trifluorotoluene-P		Trifluorotoluene-F	
	%Rec	LOD (ug/l)	%Rec	LOD (ug/l)
1059985	96	3.00	102	3.00
1059986	96	3.00	102	3.00
1059990	96	3.00	103	3.00
1059992	95	3.00	103	3.00
Blank	97	3.00	104	3.00
LCS	98	3.00	104	3.00
LCSD	98	3.00	103	3.00
Limits:	70-130		70-130	

Analysis Name: MA-EPH Water DOD
Batch number: 191510004A

	1-Chloro-octadecane		Orthoterphenyl		2-Fluorobiphenyl	
	%Rec	LOD (ug/l)	%Rec	LOD (ug/l)	%Rec	LOD (ug/l)
1059980	61	0.0096	51	0.038	88	0.038
1059981	60	0.0019	72	0.0096	94	0.0096
1059988	45	0.0019	66	0.019	76	0.019
1059989	45	0.0019	42	0.0039	62	0.0039
1059993	44	0.0019	78	0.0019	94	0.0019
1059994	45	0.0038	55	0.038	94	0.038
Blank	61	0.0020	45	0.0020	54	0.0020
LCS	33*	0.0020	37*	0.0020	59	0.0020
LCSD	59	0.0020	63	0.0020	72	0.0020
Limits:	40-140		40-140		40-140	

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.
(3) The surrogate spike amount was less than the LOD.

Environmental Analysis Request/Chain of Custody

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Acct. # 441192 Group # 2044467 Sample # 459979-94

Client: EMR ENV			
Project Name/#: MAP F-1	Site ID #:		
Project Manager: Jeff Hunerik	P.O. #:		
Sampler: KADickisson	PWSID #:		
Phone #: 760 672 2188	Quote #:		
State where samples were collected: MT	For Compliance: Yes ☐ No ☐		

Sample Identification	Collection Date	Collection Time	Grab	Composite	Matrix: Soil ☐ Sediment ☐ Tissue ☐ / Water: Potable ☐ Ground ☒ Surface ☐ NPDES ☐ / Other:	Total # of Containers	Analyses Requested: VPH	Analyses Requested: EPH	Remarks
TB						2	X		Free
MW-1	5/15	1004	X		GW	4	X	X	if over
MW-2	5/15	1038	X		GW	4	X	X	1000ug/L
MW-4	5/15	1110	X		GW	4	X	X	Surrogate
MW-5	5/15	1142	X		GW	4	X	X	
MW-5D	5/15	1142	X		GW	4	X	X	
MW-6	5/15	1215	X		GW	4	X	X	
MW-7	5/15	1236	X		GW	4	X	X	
MW-8	5/15	1302	X		GW	4	X	X	
MW-9	5/15	1339	X		GW	4	X	X	

For Lab Use Only: SF #: _____ SCR #: _____

Preservation Codes: H = HCl; T = Thiosulfate; N = HNO_3; B = NaOH; S = H_2SO_4; P = H_3PO_4; F = Field Filtered; O = Other

Turnaround Time Requested (TAT) (please check): Standard ☒ Rush ☐

(Rush TAT is subject to laboratory approval and surcharges.)

Date results are needed:

Rush results requested by (please check): E-Mail ☒ Phone ☐

E-mail Address: KADICKISSON@EMRENV.com

Phone:

Data Package Options (please check if required)

Type I (Validation/non-CLP)	☐	MA MCP	☐
Type III (Reduced non-CLP)	☐	CT RCP	☐
Type VI (Raw Data Only)	☐	TX TRRP-13	☐
NJ DKQP	☐	NYSDEC Category	☐ A or ☐ B

EDD Required? Yes ☒ No ☐ If yes, format: _____

Relinquished by:	Date	Time	Received by:	Date	Time
KADickisson	5/16	1558			
			Received by:	5/17/19	1020

Relinquished by Commercial Carrier: UPS _____ FedEx -X Other _____

Temperature upon receipt 0.4-3.3 °C

Environmental Analysis Request/Chain of Custody

eurofins | Lancaster Laboratories Environmental

Acct. # 4492 Group # 2044467 Sample # 1059979-94

Client: EMR Env	
Project Name/#: MIAF F-1	Site ID #:
Project Manager:	P.O. #:
Sampler: KAckisson	PWSID #:
Phone #:	Quote #:
State where samples were collected: MT	For Compliance: Yes ☐ No ☐

Matrix: Soil ☐ Sediment ☐ Tissue ☐; Water: Potable ☐ NPDES ☐; Ground ☒ Surface ☐; Other:

Analyses Requested / Preservation and Filtration Codes: VPH, EPH

Sample Identification	Date	Time	Grab	Composite	Soil	Water	Other	Total # of Containers	VPH	EPH									Remarks
MW-10	5/15	1402	X			GW		4	X	X									
MW-11	5/15	1432	X			GW		4	X	X									
MW-14	5/15	1456	X			GW		4	X	X									
MW-13	5/15	1524	X			GW		4	X	X									
MW-15	5/15	1549	X			GW		4	X	X									
MW-12	5/15	1622	X			GW		4	X	X									

For Lab Use Only
SF #:
SCR #:

Preservation Codes
H = HCl T = Thiosulfate
N = HNO_3 B = NaOH
S = H_2SO_4 P = H_3PO_4
F = Field Filtered O = Other

Turnaround Time Requested (TAT) (please check): Standard ☒ Rush ☐
(Rush TAT is subject to laboratory approval and surcharges.)

Date results are needed:
Rush results requested by (please check): E-Mail ☐ Phone ☐
E-mail Address: See Pg. 1
Phone:

Data Package Options (please check if required)

Type I (Validation/non-CLP)	☐	MA MCP	☐
Type III (Reduced non-CLP)	☐	CT RCP	☐
Type VI (Raw Data Only)	☐	TX TRRP-13	☐
NJ DKQP	☐	NYSDEC Category	☐ A or ☐ B

EDD Required? Yes ☐ No ☒ If yes, format:

Relinquished by:	Date	Time	Received by:	Date	Time
Kackisson	5/16	1530			
			[signature]	5/17/19	1020

Relinquished by Commercial Carrier:
UPS ____ FedEx X Other ____

Temperature upon receipt 0.4-3.3 °C

Eurofins Lancaster Laboratories Environmental, LLC • 2425 New Holland Pike, Lancaster, PA 17601 • 717-656-2300

7045 0717

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Sample Administration Receipt Documentation Log

Doc Log ID: 249332

Group Number(s): 2444467

Client: EMR Env.

Delivery and Receipt Information

Delivery Method:	Fed Ex	Arrival Timestamp:	05/17/2019 10:20
Number of Packages:	3	Number of Projects:	1
State/Province of Origin:	MT		

Arrival Condition Summary

Shipping Container Sealed:	Yes	Sample IDs on COC match Containers:	Yes
Custody Seal Present:	Yes	Sample Date/Times match COC:	Yes
Custody Seal Intact:	Yes	VOA Vial Headspace ≥ 6mm:	Yes
Samples Chilled:	Yes	VOA IDs (≥ 6mm):	See Below
Paperwork Enclosed:	Yes	Total Trip Blank Qty:	2
Samples Intact:	Yes	Trip Blank Type:	HCl
Missing Samples:	No	Air Quality Samples Present:	No
Extra Samples:	No		
Discrepancy in Container Qty on COC:	No		

VOA Vial IDs (Headspace ≥ 6mm): MW-10: 1 vial

Unpacked by Simon Nies (25112) at 16:01 on 05/17/2019

Samples Chilled Details

Thermometer Types: DT = Digital (Temp. Bottle) IR = Infrared (Surface Temp) All Temperatures in °C.

Cooler #	Thermometer ID	Corrected Temp	Therm. Type	Ice Type	Ice Present?	Ice Container	Elevated Temp?
1	DT131	0.4	DT	Wet	Y	Bagged	N
2	DT131	3.3	DT	Wet	Y	Bagged	N
3	DT131	1.6	DT	Wet	Y	Bagged	N

2425 New Holland Pike
Lancaster, PA 17605-2425

T : 717-656-2300
F : 717-656-2681
www.LancasterLabs.cor

Explanation of Symbols and Abbreviations

The following defines common symbols and abbreviations used in reporting technical data:

BMQL	Below Minimum Quantitation Level	**mL**	milliliter(s)
C	degrees Celsius	**MPN**	Most Probable Number
cfu	colony forming units	**N.D.**	non-detect
CP Units	cobalt-chloroplatinate units	**ng**	nanogram(s)
F	degrees Fahrenheit	**NTU**	nephelometric turbidity units
g	gram(s)	**pg/L**	picogram/liter
IU	International Units	**RL**	Reporting Limit
kg	kilogram(s)	**TNTC**	Too Numerous To Count
L	liter(s)	**µg**	microgram(s)
lb.	pound(s)	**µL**	microliter(s)
m3	cubic meter(s)	**umhos/cm**	micromhos/cm
meq	milliequivalents	**MCL**	Maximum Contamination Limit
mg	milligram(s)		

<	less than
>	greater than
ppm	parts per million - One ppm is equivalent to one milligram per kilogram (mg/kg) or one gram per million grams. For aqueous liquids, ppm is usually taken to be equivalent to milligrams per liter (mg/l), because one liter of water has a weight very close to a kilogram. For gases or vapors, one ppm is equivalent to one microliter per liter of gas.
ppb	parts per billion
Dry weight basis	Results printed under this heading have been adjusted for moisture content. This increases the analyte weight concentration to approximate the value present in a similar sample without moisture. All other results are reported on an as-received basis.

Analytical test results meet all requirements of the associated regulatory program (i.e., NELAC (TNI), DoD, and ISO 17025) unless otherwise noted under the individual analysis.

Measurement uncertainty values, as applicable, are available upon request.

Tests results relate only to the sample tested. Clients should be aware that a critical step in a chemical or microbiological analysis is the collection of the sample. Unless the sample analyzed is truly representative of the bulk of material involved, the test results will be meaningless. If you have questions regarding the proper techniques of collecting samples, please contact us. We cannot be held responsible for sample integrity, however, unless sampling has been performed by a member of our staff.

Times are local to the area of activity. Parameters listed in the 40 CFR Part 136 Table II as “analyze immediately” are not performed within 15 minutes.

WARRANTY AND LIMITS OF LIABILITY - In accepting analytical work, we warrant the accuracy of test results for the sample as submitted. THE FOREGOING EXPRESS WARRANTY IS EXCLUSIVE AND IS GIVEN IN LIEU OF ALL OTHER WARRANTIES, EXPRESSED OR IMPLIED. WE DISCLAIM ANY OTHER WARRANTIES, EXPRESSED OR IMPLIED, INCLUDING A WARRANTY OF FITNESS FOR PARTICULAR PURPOSE AND WARRANTY OF MERCHANTABILITY. IN NO EVENT SHALL EUROFINS LANCASTER LABORATORIES ENVIRONMENTAL, LLC BE LIABLE FOR INDIRECT, SPECIAL, CONSEQUENTIAL, OR INCIDENTAL DAMAGES INCLUDING, BUT NOT LIMITED TO, DAMAGES FOR LOSS OF PROFIT OR GOODWILL REGARDLESS OF (A) THE NEGLIGENCE (EITHER SOLE OR CONCURRENT) OF EUROFINS LANCASTER LABORATORIES ENVIRONMENTAL AND (B) WHETHER EUROFINS LANCASTER LABORATORIES ENVIRONMENTAL HAS BEEN INFORMED OF THE POSSIBILITY OF SUCH DAMAGES. We accept no legal responsibility for the purposes for which the client uses the test results. No purchase order or other order for work shall be accepted by Eurofins Lancaster Laboratories Environmental which includes any conditions that vary from the Standard Terms and Conditions, and Eurofins Lancaster Laboratories Environmental hereby objects to any conflicting terms contained in any acceptance or order submitted by client.

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Data Qualifiers

Qualifier	Definition
C	Result confirmed by reanalysis
D1	Indicates for dual column analyses that the result is reported from column 1
D2	Indicates for dual column analyses that the result is reported from column 2
E	Concentration exceeds the calibration range
K1	Initial Calibration Blank is above the QC limit and the sample result is ND
K2	Continuing Calibration Blank is above the QC limit and the sample result is ND
K3	Initial Calibration Verification is above the QC limit and the sample result is ND
K4	Continuing Calibration Verification is above the QC limit and the sample result is ND
J (or G, I, X)	Estimated value >= the Method Detection Limit (MDL or DL) and < the Limit of Quantitation (LOQ or RL)
P	Concentration difference between the primary and confirmation column >40%. The lower result is reported.
P^	Concentration difference between the primary and confirmation column > 40%. The higher result is reported.
U	Analyte was not detected at the value indicated
V	Concentration difference between the primary and confirmation column >100%. The reporting limit is raised due to this disparity and evident interference.
W	The dissolved oxygen uptake for the unseeded blank is greater than 0.20 mg/L.
Z	Laboratory Defined - see analysis report

Additional Organic and Inorganic CLP qualifiers may be used with Form 1 reports as defined by the CLP methods.
Qualifiers specific to Dioxin/Furans and PCB Congeners are detailed on the individual Analysis Report.

APPENDIX D

Validation Report

LABORATORY DATA CONSULTANTS, INC.
2701 Loker Ave. West, Suite 220, Carlsbad, CA 92010 Bus: 760-827-1100 Fax: 760-827-1099

EMR Inc.
6418 College Blvd.
Overland Park, KS 66211
ATTN: Ms. Kaitlin Adkisson
Kadkisson@emr-inc.com

July 12, 2019

SUBJECT: Malmstrom AFB, Data Validation

Dear Ms. Adkisson

Enclosed are the final validation reports for the fractions listed below. This SDG was received on June 17, 2019. Attachment 1 is a summary of the samples that were reviewed for each analysis.

LDC Project #45300:

SDG #	Fraction
EMR07/2044467	Volatile Petroleum Hydrocarbons, Extractable Petroleum Hydrocarbons

The data validation was performed under Level II guidelines. The analyses were validated using the following documents, as applicable to each method:

- Uniform Federal Policy Quality Assurance Project Plan for Remedial Investigation Corrective Action Plan, Malmstrom Air Force Base Petroleum Site: TU1082, TU455, TU465, TU469, and LF D-04, Malmstrom Air Force Base, Montana; September 2017
- USEPA National Functional Guidelines for Organic Superfund Methods Data Review; January 2017
- EPA SW 846, Third Edition, Test Methods for Evaluating Solid Waste, update 1, July 1992; update IIA, August 1993; update II, September 1994; update IIB, January 1995; update III, December 1996; update IIIA, April 1998; IIIB, November 2004; update IV, February 2007; update V, July 2014

Please feel free to contact us if you have any questions.

Sincerely,

Christina Rink

Christina Rink
crink@lab-data.com
Project Manager/Senior Chemist

ERPIMS Level II/III

LDC #45300 (EMR, Inc. - Overland Park, KS / Malmstrom AFB)

LDC	SDG#	DATE REC'D	(3) DATE DUE	VPH (MADEP VPH)		EPH (MADEP EPH)		EPH (MTEPH Screen)																									
Matrix:	Water/Soil			W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S	W	S
A	EMR07/2044467	06/17/19	07/09/19	16	0	6	0	15	0																								
Total	J/CR			16	0	6	0	15	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	0	37

Shaded cells indicate Level III validation (all other cells are Level II validation). These sample counts do not include MS/MSD, and DUPs

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Malmstrom AFB

LDC Report Date: July 1, 2019

Parameters: Volatile Petroleum Hydrocarbons

Validation Level: Level II

Laboratory: Eurofins

Sample Delivery Group (SDG): EMR07/2044467

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
TB	1059979	Water	05/15/19
MW-1	1059980	Water	05/15/19
MW-2	1059981	Water	05/15/19
MW-4	1059982	Water	05/15/19
MW-5	1059983	Water	05/15/19
MW-5D	1059984	Water	05/15/19
MW-6	1059985	Water	05/15/19
MW-7	1059986	Water	05/15/19
MW-8	1059987	Water	05/15/19
MW-9	1059988	Water	05/15/19
MW-10	1059989	Water	05/15/19
MW-11	1059990	Water	05/15/19
MW-14	1059991	Water	05/15/19
MW-13	1059992	Water	05/15/19
MW-15	1059993	Water	05/15/19
MW-12	1059994	Water	05/15/19

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Uniform Federal Policy Quality Assurance Project Plan for Remedial Investigation Corrective Action Plan, Malmstrom Air Force Base Petroleum Sites: TU1082, TU455, TU465, TU469, and LF D-04, Malmstrom Air Force Base, Montana (September 2017) and a modified outline of the USEPA National Functional Guidelines (NFG) for Organic Superfund Methods Data Review (January 2017). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Volatile Petroleum Hydrocarbons (VPH) by MA VPH

All sample results were subjected to Level II data validation, which comprises an evaluation of quality control (QC) summary results.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered not detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements were met.

II. Initial Calibration and Initial Calibration Verification

Initial calibration data were not reviewed for Level II validation.

III. Continuing Calibration

Continuing calibration data were not reviewed for Level II validation.

IV. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks with the following exceptions:

Blank ID	Analysis Date	Compound	Concentration	Associated Samples
19148B08A-MB	05/28/19	C5-C8 Aliphatic hydrocarbons Unadjusted C5-C8 aliphatics	313 ug/L 313 ug/L	MW-6 MW-7 MW-11 MW-13

Sample concentrations were compared to concentrations detected in the laboratory blanks. The sample concentrations were either not detected or were significantly greater (>5X blank contaminants) than the concentrations found in the associated laboratory blanks.

V. Field Blanks

Sample TB was identified as a trip blank. No contaminants were found.

VI. Surrogates

Surrogates were added to all samples as required by the method. All surrogate recoveries (%R) were within QC limits with the following exceptions:

Sample	Surrogate	%R (Limits)	Affected Compound	Flag	A or P
MW-1	Trifluorotoluene-P Trifluorotoluene-F	394 (70-130) 635 (70-130)	Methyl-tert-butyl ether	NA	-

Sample	Surrogate	%R (Limits)	Affected Compound	Flag	A or P
MW-2	Trifluorotoluene-P Trifluorotoluene-F	154 (70-130) 164 (70-130)	Methyl-tert-butyl ether	NA	-
MW-2	Trifluorotoluene-P Trifluorotoluene-F	154 (70-130) 164 (70-130)	Naphthalene	J (all detects)	A
MW-9	Trifluorotoluene-P Trifluorotoluene-F	149 (70-130) 213 (70-130)	Methyl-tert-butyl ether	NA	-
MW-9	Trifluorotoluene-P Trifluorotoluene-F	149 (70-130) 213 (70-130)	Naphthalene	J (all detects)	A
MW-10	Trifluorotoluene-P Trifluorotoluene-F	192 (70-130) 294 (70-130)	Methyl-tert-butyl ether	NA	-
MW-10	Trifluorotoluene-P Trifluorotoluene-F	192 (70-130) 294 (70-130)	Naphthalene Toluene o-Xylene m,p-Xylene	J (all detects) J (all detects) J (all detects) J (all detects)	A
MW-14	Trifluorotoluene-P Trifluorotoluene-F	170 (70-130) 258 (70-130)	All compounds	J (all detects)	P
MW-15	Trifluorotoluene-P Trifluorotoluene-F	190 (70-130) 312 (70-130)	All compounds	J (all detects)	P
MW-12	Trifluorotoluene-P Trifluorotoluene-F	563 (70-130) 1097 (70-130)	Methyl-tert-butyl ether	NA	-
MW-12	Trifluorotoluene-P Trifluorotoluene-F	563 (70-130) 1097 (70-130)	Toluene	J (all detects)	A
MW-1	Trifluorotoluene-F	136 (70-130)	Ethylbenzene Naphthalene Toluene o-Xylene m,p-Xylene C5-C8 Aliphatic hydrocarbons Unadjusted C5-C8 aliphatics C9-C10 Aromatic hydrocarbons C9-C12 Aliphatic hydrocarbons Unadjusted C9-C12 aliphatics	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	A
MW-12	Trifluorotoluene-P Trifluorotoluene-F	135 (70-130) 183 (70-130)	Ethylbenzene Naphthalene o-Xylene m,p-Xylene C5-C8 Aliphatic hydrocarbons Unadjusted C5-C8 aliphatics C9-C10 Aromatic hydrocarbons C9-C12 Aliphatic hydrocarbons Unadjusted C9-C12 aliphatics	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	A

VII. Matrix Spike/Matrix Spike Duplicates

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

VIII. Laboratory Control Samples

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits with the following exceptions:

LCS ID (Associated Samples)	Compound	LCS %R (Limits)	LCSD %R (Limits)	Flag	A or P
19143B08A-LCS/D (MW-5 MW-5D MW-8 MW-9 MW-10 MW-14 MW-15 MW-12)	C9-C12 aliphatic hydrocarbons	66 (70-130)	65 (70-130)	J (all detects) UJ (all non-detects)	P

Relative percent differences (RPD) were within QC limits.

IX. Field Duplicates

Samples MW-5 and MW-5D were identified as field duplicates. No results were detected in any of the samples with the following exceptions:

Compound	Concentration (ug/L)		RPD (Limits)	Flag	A or P
	MW-1R	MW-1RD			
C5-C8 Aliphatic hydrocarbons	117	109	7 (≤20)	-	-
Unadjusted C5-C8 aliphatics	120	114	5 (≤20)	-	-
C9-C10 Aromatic hydrocarbons	76.2	85.7	12 (≤20)	-	-
C9-C12 Aliphatic hydrocarbons	56.5	62.1	9 (≤20)	-	-
Unadjusted C9-C12 aliphatics	158	177	11 (≤20)	-	-
Ethylbenzene	4.39	4.88	11 (≤20)	-	-
Toluene	3.03	3.43	12 (≤20)	-	-
o-Xylene	5.27	6.08	14 (≤20)	-	-

Compound	Concentration (ug/L)		RPD (Limits)	Flag	A or P
	MW-1R	MW-1RD			
m,p-Xylene	15.2	17.7	15 (≤20)	-	-
Benzene	4.00U	2.20	58 (≤20)	NQ	-

NQ = One or both results were less than the limit of quantitation (LOQ), therefore no data were qualified.

X. Compound Quantitation

Raw data were not reviewed for Level II validation.

XI. Target Compound Identifications

Raw data were not reviewed for Level II validation.

XII. Overall Assessment of Data

The analysis was conducted within all specifications of the method.

Due to surrogate %R and LCS/LCSD %R, data were qualified as estimated in ten samples.

No results were rejected in this SDG.

Malmstrom AFB
Volatile Petroleum Hydrocarbons - Data Qualification Summary - SDG EMR07/2044467

Sample	Compound	Flag	A or P	Reason
MW-2 MW-9	Naphthalene	J (all detects)	A	Surrogates (%R)
MW-10	Naphthalene Toluene o-Xylene m,p-Xylene	J (all detects) J (all detects) J (all detects) J (all detects)	A	Surrogates (%R)
MW-14 MW-15	All compounds	J (all detects)	P	Surrogates (%R)
MW-12	Toluene Ethylbenzene Naphthalene o-Xylene m,p-Xylene C5-C8 Aliphatic hydrocarbons Unadjusted C5-C8 aliphatics C9-C10 Aromatic hydrocarbons C9-C12 Aliphatic hydrocarbons Unadjusted C9-C12 aliphatics	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	A	Surrogates (%R)
MW-1	Ethylbenzene Naphthalene Toluene o-Xylene m,p-Xylene C5-C8 Aliphatic hydrocarbons Unadjusted C5-C8 aliphatics C9-C10 Aromatic hydrocarbons C9-C12 Aliphatic hydrocarbons Unadjusted C9-C12 aliphatics	J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects) J (all detects)	A	Surrogates (%R)
MW-5 MW-5D MW-8 MW-9 MW-10 MW-14 MW-15 MW-12	C9-C12 aliphatic hydrocarbons	J (all detects) UJ (all non-detects)	P	Laboratory control samples (%R)

Malmstrom AFB
Volatile Petroleum Hydrocarbons - Laboratory Blank Data Qualification Summary - SDG EMR07/2044467

No Sample Data Qualified in this SDG

Malmstrom AFB
Volatile Petroleum Hydrocarbons - Field Blank Data Qualification Summary - SDG EMR07/2044467

No Sample Data Qualified in this SDG

LDC #: 45300A7
SDG #: EMR07/2044467
Laboratory: Eurofins

VALIDATION COMPLETENESS WORKSHEET
Level II

Date: 06/28/19
Page: 1 of 2
Reviewer: LT
2nd Reviewer:

METHOD: GC Volatile Petroleum Hydrocarbons (MA VPH)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A, A	
II.	Initial calibration/ICV	N/N	
III.	Continuing calibration	N	
IV.	Laboratory Blanks	SW	
V.	Field blanks	ND	TB = 1
VI.	Surrogate spikes	SW	
VII.	Matrix spike/Matrix spike duplicates	N	
VIII.	Laboratory control samples	SW	LCS/D
IX.	Field duplicates	SW	D = 5+6
X.	Compound quantitation RL/LOQ/LODs	~~SW~~ N	
XI.	Target compound identification	N	
XII.	Overall assessment of data	A	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = No compounds detected; R = Rinsate; FB = Field blank; D = Duplicate; TB = Trip blank; EB = Equipment blank; SB=Source blank; OTHER:

	Client ID	Lab ID	Matrix	Date
1	TB	1059979	Water	05/15/19
2	MW-1	1059980	Water	05/15/19
3	MW-2	1059981	Water	05/15/19
4	MW-4	1059982	Water	05/15/19
5	MW-5	1059983	Water	05/15/19
6	MW-5D	1059984	Water	05/15/19
7	MW-6	1059985	Water	05/15/19
8	MW-7	1059986	Water	05/15/19
9	MW-8	1059987	Water	05/15/19
10	MW-9	1059988	Water	05/15/19
11	MW-10	1059989	Water	05/15/19
12	MW-11	1059990	Water	05/15/19
13	MW-14	1059991	Water	05/15/19
14	MW-13	1059992	Water	05/15/19
15	MW-15	1059993	Water	05/15/19
16	MW-12	1059994	Water	05/15/19
17				

LDC #: 45300A7 **VALIDATION COMPLETENESS WORKSHEET** Date: 06/28/14
SDG #: EMR07/2044467 Level II Page: 2 of 2
Laboratory: Eurofins Reviewer: CT
2nd Reviewer:

METHOD: GC Volatile Petroleum Hydrocarbons (MA VPH)

18				
19				

Notes:

1	19142B08A						
2	19143B08A						
3	19148B08A						

TARGET COMPOUND WORKSHEET

METHOD: VOA

A. Chloromethane	AA. Tetrachloroethene	AAA. 1,3,5-Trimethylbenzene	AAAA. Ethyl tert-butyl ether	A1. 1,3-Butadiene
B. Bromomethane	BB. 1,1,2,2-Tetrachloroethane	BBB. 4-Chlorotoluene	BBBB. tert-Amyl methyl ether	B1. Hexane
C. Vinyl choride	CC. Toluene	CCC. tert-Butylbenzene	CCCC. 1-Chlorohexane	C1. Heptane
D. Chloroethane	DD. Chlorobenzene	DDD. 1,2,4-Trimethylbenzene	DDDD. Isopropyl alcohol	D1. Propylene
E. Methylene chloride	EE. Ethylbenzene	EEE. sec-Butylbenzene	EEEE. Acetonitrile	E1. Freon 11
F. Acetone	FF. Styrene	FFF. 1,3-Dichlorobenzene	FFFF. Acrolein	F1. Freon 12
G. Carbon disulfide	GG. Xylenes, total	GGG. p-Isopropyltoluene	GGGG. Acrylonitrile	G1. Freon 113
H. 1,1-Dichloroethene	HH. Vinyl acetate	HHH. 1,4-Dichlorobenzene	HHHH. 1,4-Dioxane	H1. Freon 114
I. 1,1-Dichloroethane	II. 2-Chloroethylvinyl ether	III. n-Butylbenzene	IIII. Isobutyl alcohol	I1. 2-Nitropropane
J. 1,2-Dichloroethene, total	JJ. Dichlorodifluoromethane	JJJ. 1,2-Dichlorobenzene	JJJJ. Methacrylonitrile	J1. Dimethyl disulfide
K. Chloroform	KK. Trichlorofluoromethane	KKK. 1,2,4-Trichlorobenzene	KKKK. Propionitrile	K1. 2,3-Dimethyl pentane
L. 1,2-Dichloroethane	LL. Methyl-tert-butyl ether	LLL. Hexachlorobutadiene	LLLL. Ethyl ether	L1. 2,4-Dimethyl pentane
M. 2-Butanone	MM. 1,2-Dibromo-3-chloropropane	MMM. Naphthalene	MMMM. Benzyl chloride	M1. 3,3-Dimethyl pentane
N. 1,1,1-Trichloroethane	NN. Methyl ethyl ketone	NNN. 1,2,3-Trichlorobenzene	NNNN. Iodomethane	N1. 2-Methylpentane
O. Carbon tetrachloride	OO. 2,2-Dichloropropane	OOO. 1,3,5-Trichlorobenzene	OOOO.1,1-Difluoroethane	O1. 3-Methylpentane
P. Bromodichloromethane	PP. Bromochloromethane	PPP. trans-1,2-Dichloroethene	PPPP. Tetrahydrofuran	P1. 3-Ethylpentane
Q. 1,2-Dichloropropane	QQ. 1,1-Dichloropropene	QQQ. cis-1,2-Dichloroethene	QQQQ. Methyl acetate	Q1. 2,2-Dimethylpentane
R. cis-1,3-Dichloropropene	RR. Dibromomethane	RRR. m,p-Xylenes	RRRR. Ethyl acetate	R1. 2,2,3- Trimethylbutane
S. Trichloroethene	SS. 1,3-Dichloropropane	SSS. o-Xylene	SSSS. Cyclohexane	S1. 2,2,4-Trimethylpentane
T. Dibromochloromethane	TT. 1,2-Dibromoethane	TTT. 1,1,2-Trichloro-1,2,2-trifluoroethane	TTTT. Methylcyclohexane	T1. 2-Methylhexane
U. 1,1,2-Trichloroethane	UU. 1,1,1,2-Tetrachloroethane	UUU. 1,2-Dichlorotetrafluoroethane	UUUU. Allyl chloride	U1. Nonanal
V. Benzene	VV. Isopropylbenzene	VVV. 4-Ethyltoluene	VVVV. Methyl methacrylate	V1. 2-Methylnaphthalene
W. trans-1,3-Dichloropropene	WW. Bromobenzene	WWW. Ethanol	WWWW. Ethyl methacrylate	W1. Methanol
X. Bromoform	XX. 1,2,3-Trichloropropane	XXX. Di-isopropyl ether	XXXX. cis-1,4-Dichloro-2-butene	X1. 1,2,3-Trimethylbenzene
Y. 4-Methyl-2-pentanone	YY. n-Propylbenzene	YYY. tert-Butanol	YYYY. trans-1,4-Dichloro-2-butene	Y1. 2-Propanol
Z. 2-Hexanone	ZZ. 2-Chlorotoluene	ZZZ. tert-Butyl alcohol	ZZZZ. Pentachloroethane	Z1.

LDC #: 45304A7

VALIDATION FINDINGS WORKSHEET
Blanks

Reviewer: LT
2nd Reviewer: [illegible]

METHOD: ✓ GC ___ HPLC

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Y N N/A Were all samples associated with a given method blank?
Y N N/A Was a method blank performed for each matrix and whenever a sample extraction procedure was performed?
Y N N/A Was a method blank performed with each extraction batch?
Y N N/A Were any contaminants found in the method blanks? If yes, please see findings below.

Level IV/D Only

Y N N/A (Gasoline and aromatics only)Was a method blank analyzed with each 24 hour batch?
Y N N/A Was a method blank analyzed for each analytical / extraction batch of ≤20 samples?

Blank extraction date: - **Blank analysis date:** 05/28/19 **Associated samples:** 7, 8, 12, 14 (ND)
Conc. units: ug/L

Compound	Blank ID	Sample Identification						
	19148B084-MB							
C5-C8 Aliphatic Hydrocarbons	313							
Unadjusted C5-C8 Aliphatics	313							

Blank extraction date: _____ **Blank analysis date:** _____ **Associated samples:** _____
Conc. units: _____

Compound	Blank ID	Sample Identification						

ALL CIRCLED RESULTS WERE NOT QUALIFIED. ALL RESULTS NOT CIRCLED WERE QUALIFIED BY THE FOLLOWING STATEMENT:
All contaminants within five times the method blank concentration were qualified as not detected, "U".

LDC #: 45300A7

VALIDATION FINDINGS WORKSHEET
Surrogate Recovery

Reviewer: LT
2nd Reviewer:

METHOD: ✓ GC __ HPLC

Are surrogates required by the method? Yes ✓ or No____.

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

(Y) N N/A Were surrogates spiked into all samples and blanks?

Y (N) N/A Did all surrogate recoveries (%R) meet the QC limits?

#	Sample ID	Detector/ Column	Surrogate Compound		%R (Limits)	Qualifications
	2 (ND)		Trifluorotoluene	-P	394 (70-130)	J/A Dets LL only
				-F	635 ( )	↓
	3				( )	
	3 (ND/Det)			-P	154 ( )	J/A Dets (ND) LL and (Det) MMM only
				-F	164 ( )	↓
					( )	
	10 (ND/Det)			-P	149 ( )	J/A Dets (ND) LL and (Det) MMM only
				-F	213 ( )	
					( )	
	11 (ND/Det)			-P	192 ( )	J/A Dets * LL, MMM, CC, SSS, RRR only
				-F	294 ( )	
					( )	
	13 (ND/Det)			-P	170 ( )	J/P Dets
				-F	258 ( )	
					( )	
	15 (ND/Det)			-P	190 ( )	
				-F	312 ( )	↓
					( )	
	16 (ND/Det)			-P	563 ( )	J/A Dets (ND) LL and (Det) CC only
			↓	-F	1097 (✓)	↓
					( )	

	Surrogate Compound		Surrogate Compound		Surrogate Compound		Surrogate Compound		Surrogate Compound
A	Chlorobenzene (CBZ)	G	Octacosane	M	Benzo(e)Pyrene	S	1-Chloro-3-Nitrobenzene	Y	Tetrachloro-m- xylene
B	4-Bromofluorobenzene (BFB)	H	Ortho-Terphenyl	N	Terphenyl-D14	T	3,4-Dinitrotoluene	Z	1,2-Dinitrobenzene
C	a,a,a-Trifluorotoluene	I	Fluorobenzene (FBZ)	O	Decachlorobiphenyl (DCB)	U	Tripentyltin		
D	Bromochlorobenene	J	n-Triacontane	P	1-methylnaphthalene	V	Tri-n-propyltin		
E	1,4-Dichlorobutane	K	Hexacosane	Q	Dichlorophenyl Acetic Acid (DCAA)	W	Tributyl Phosphate		
F	1,4-Difluorobenzene (DFB)	L	Bromobenzene	R	4-Nitrophenol	X	Triphenyl Phosphate		

* LL (ND), the rest (Det)

LDC #: 45304A7

VALIDATION FINDINGS WORKSHEET
Surrogate Recovery

Reviewer: LT
2nd Reviewer: CR

METHOD: ✓ **GC** __ **HPLC**
Are surrogates required by the method? Yes ✓ or No____.
Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".
Y N N/A Were surrogates spiked into all samples and blanks?
Y N N/A Did all surrogate recoveries (%R) meet the QC limits?

#	Sample ID	Detector/ Column	Surrogate Compound	%R (Limits)	Qualifications
	2 (Dup)		Trifluorotoluene-P	136 (70-130)	J/A Dups only: EE, MMM, CC, SSS,
				( )	PRR, C5-C8 Aliphatic Hydrocarbons,
				( )	Unadjusted C5-C8 Aliphatics ~~Hydrocarbons~~,
				( )	C9-C10 Aromatic Hydrocarbons, C9-C12 Aliphatic Hydrocarbo
				( )	Unadjusted C9-C12 Aliphatics
				( )	
	16 (Dup)		-P	135 ( )	J/A Dups only: EE, MMM, SSS, PRR,
			-F	183 ( )	C5-C8 Aliphatic Hydrocarbons, Unadjusted
				( )	C5-C8 Aliphatics, C9-C10 Aromatic Hydrocarbons,
				( )	C9-C12 Aliphatic Hydrocarbons, Unadjusted
				( )	C9-C12 Aliphatics
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	

	Surrogate Compound		Surrogate Compound		Surrogate Compound		Surrogate Compound		Surrogate Compound
A	Chlorobenzene (CBZ)	G	Octacosane	M	Benzo(e)Pyrene	S	1-Chloro-3-Nitrobenzene	Y	Tetrachloro-m- xylene
B	4-Bromofluorobenzene (BFB)	H	Ortho-Terphenyl	N	Terphenyl-D14	T	3,4-Dinitrotoluene	Z	1,2-Dinitrobenzene
C	a,a,a-Trifluorotoluene	I	Fluorobenzene (FBZ)	O	Decachlorobiphenyl (DCB)	U	Tripentyltin		
D	Bromochlorobenene	J	n-Triacontane	P	1-methylnaphthalene	V	Tri-n-propyltin		
E	1,4-Dichlorobutane	K	Hexacosane	Q	Dichlorophenyl Acetic Acid (DCAA)	W	Tributyl Phosphate		
F	1,4-Difluorobenzene (DFB)	L	Bromobenzene	R	4-Nitrophenol	X	Triphenyl Phosphate		

LDC #: 45310A7

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

Page: 1 of 1
Reviewer: Gr
2nd Reviewer:

METHOD: [✓ GC] __ HPLC

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

[✓ Y] N N/A Were a laboratory control samples (LCS) and laboratory control sample duplicate (LCSD) analyzed for each matrix in this SDG?

Y [✓ N] N/A Were the LCS percent recoveries (%R) and relative percent differences (RPD) within the QC limits?

Level IV/D Only

Y N N/A Was an LCS analyzed every 20 samples for each matrix or whenever a sample extraction was performed?

#	LCS/LCSD ID	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
	19143B08A-LCS/D	C9-C12 Aliphatic Hydrocarbons	66 (70-130)	65 (70-130)	( )	5, 6, 10, 11, 13, 15, 16 (Det)	J/UJ/P
			( )	( )	( )	9 (ND)	
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
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			( )	( )	( )		
			( )	( )	( )		

LDC#:_45300A7_ **VALIDATION FINDINGS WORKSHEET** Page: 1 of 1
Field Duplicates Reviewer: LT
2nd Reviewer:

METHOD: GC Volatile Petroleum Hydrocarbons (MADEP VPH)

Compound	Concentration (ug/L)		RPD (≤ 20)	Qual (< LOQ)
	4	5		
C5-C8 Aliphatic Hydrocarbons	117	109	7	
Unadjusted C5-C8 Aliphatics	120	114	5	
C9-C10 Aromatic Hydrocarbons	76.2	85.7	12	
C9-C12 Aliphatic Hydrocarbons	56.5	62.1	9	
Unadjusted C9-C12 Aliphatics	158	177	11	
EE	4.39	4.88	11	
CC	3.03	3.43	12	
SSS	5.27	6.08	14	
RRR	15.2	17.7	15	
V	4.00U	2.20	58	NQ

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Malmstrom AFB

LDC Report Date: July 1, 2019

Parameters: Extractable Petroleum Hydrocarbons

Validation Level: Level II

Laboratory: Eurofins

Sample Delivery Group (SDG): EMR07/2044467

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
MW-1	1059980	Water	05/15/19
MW-2	1059981	Water	05/15/19
MW-9	1059988	Water	05/15/19
MW-10	1059989	Water	05/15/19
MW-15	1059993	Water	05/15/19
MW-12	1059994	Water	05/15/19

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Uniform Federal Policy Quality Assurance Project Plan for Remedial Investigation Corrective Action Plan, Malmstrom Air Force Base Petroleum Sites: TU1082, TU455, TU465, TU469, and LF D-04, Malmstrom Air Force Base, Montana (September 2017) and a modified outline of the USEPA National Functional Guidelines (NFG) for Organic Superfund Methods Data Review (January 2017). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Extractable Petroleum Hydrocarbons by MA EPH

All sample results were subjected to Level II data validation, which comprises an evaluation of quality control (QC) summary results.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered not detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements were met.

II. Initial Calibration and Initial Calibration Verification

Initial calibration data were not reviewed for Level II validation.

III. Continuing Calibration

Continuing calibration data were not reviewed for Level II validation.

IV. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

V. Field Blanks

No field blanks were identified in this SDG.

VI. Surrogates

Surrogates were added to all samples as required by the method. All surrogate recoveries (%R) were within QC limits.

VII. Matrix Spike/Matrix Spike Duplicates

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

VIII. Laboratory Control Samples

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits with the following exceptions:

LCS ID (Associated Samples)	Compound	LCS %R (Limits)	LCSD %R (Limits)	Flag	A or P
191510004A-LCS/D (MW-1 MW-2 MW-9 MW-10 MW-15 MW-12)	Acenaphthene	33 (40-140)	-	J (all detects) UJ (all non-detects)	P
	Acenaphthylene	34 (40-140)	-		
	Anthracene	37 (40-140)	-		
	Benzo(a)anthracene	38 (40-140)	-		
	Benzo(a)pyrene	36 (40-140)	-		
	Benzo(b)fluoranthene	39 (40-140)	-		
	Benzo(g,h,i)perylene	38 (40-140)	-		
	Benzo(k)fluoranthene	37 (40-140)	-		
	Unadjusted C11-C22 aromatics	37 (40-140)	-		
	C9-C18 aliphatics	32 (40-140)	-		
	Chrysene	38 (40-140)	-		
	Dibenzo(a,h)anthracene	37 (40-140)	-		
	Fluoranthene	38 (40-140)	-		
	Fluorene	35 (40-140)	-		
	Indeno(1,2,3-cd)pyrene	38 (40-140)	-		
	2-Methylnaphthalene	30 (40-140)	-		
	Naphthalene	30 (40-140)	-		
	Phenanthrene	36 (40-140)	-		

Relative percent differences (RPD) were within QC limits with the following exceptions:

LCS ID (Associated Samples)	Compound	RPD (Limits)	Flag	A or P
191510004A-LCS/D (MW-1 MW-2 MW-9 MW-10 MW-15 MW-12)	Acenaphthene	52 (≤25)	J (all detects) UJ (all non-detects)	P
	Acenaphthylene	51 (≤25)		
	Anthracene	51 (≤25)		
	Benzo(a)anthracene	51 (≤25)		
	Benzo(a)pyrene	49 (≤25)		
	Benzo(b)fluoranthene	52 (≤25)		
	Benzo(g,h,i)perylene	51 (≤25)		
	Benzo(k)fluoranthene	49 (≤25)		
	Unadjusted C11-C22 aromatics	50 (≤25)		
	C19-C36 aliphatics	59 (≤25)		
	C9-C18 aliphatics	52 (≤25)		
	Chrysene	46 (≤25)		
	Dibenzo(a,h)anthracene	49 (≤25)		
	Fluoranthene	51 (≤25)		
	Fluorene	52 (≤25)		
	Indeno(1,2,3-cd)pyrene	51 (≤25)		
	2-Methylnaphthalene	50 (≤25)		
	Naphthalene	48 (≤25)		
	Phenanthrene	52 (≤25)		
	Pyrene	52 (≤25)		

IX. Field Duplicates

No field duplicates were identified in this SDG.

X. Compound Quantitation

Raw data were not reviewed for Level II validation.

XI. Target Compound Identifications

Raw data were not reviewed for Level II validation.

XII. Overall Assessment of Data

The analysis was conducted within all specifications of the method.

Due to LCS/LCSD %R and RPD, data were qualified as estimated in six samples.

No results were rejected in this SDG.

Malmstrom AFB
Extractable Petroleum Hydrocarbons - Data Qualification Summary - SDG EMR07/2044467

Sample	Compound	Flag	A or P	Reason
MW-1 MW-2 MW-9 MW-10 MW-15 MW-12	Acenaphthene Acenaphthylene Anthracene Benzo(a)anthracene Benzo(a)pyrene Benzo(b)fluoranthene Benzo(g,h,i)perylene Benzo(k)fluoranthene Unadjusted C11-C22 aromatics C9-C18 aliphatics Chrysene Dibenzo(a,h)anthracene Fluoranthene Fluorene Indeno(1,2,3-cd)pyrene 2-Methylnaphthalene Naphthalene Phenanthrene	J (all detects) UJ (all non-detects)	P	Laboratory control samples (%R)
MW-1 MW-2 MW-9 MW-10 MW-15 MW-12	Acenaphthene Acenaphthylene Anthracene Benzo(a)anthracene Benzo(a)pyrene Benzo(b)fluoranthene Benzo(g,h,i)perylene Benzo(k)fluoranthene Unadjusted C11-C22 aromatics C19-C36 aliphatics C9-C18 aliphatics Chrysene Dibenzo(a,h)anthracene Fluoranthene Fluorene Indeno(1,2,3-cd)pyrene 2-Methylnaphthalene Naphthalene Phenanthrene Pyrene	J (all detects) UJ (all non-detects)	P	Laboratory control samples (RPD)

Malmstrom AFB
Extractable Petroleum Hydrocarbons - Laboratory Blank Data Qualification Summary - SDG EMR07/2044467

No Sample Data Qualified in this SDG

Malmstrom AFB
Extractable Petroleum Hydrocarbons - Field Blank Data Qualification Summary - SDG EMR07/2044467

No Sample Data Qualified in this SDG

LDC #: 45300A8a
SDG #: EMR07/2044467
Laboratory: Eurofins

VALIDATION COMPLETENESS WORKSHEET
Level II

Date: 06/28/19
Page: 1 of 1
Reviewer: LT
2nd Reviewer:

METHOD: GC Extractable Petroleum Hydrocarbons (MA EPH)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A / A	
II.	Initial calibration/ICV	N/N	
III.	Continuing calibration	N	
IV.	Laboratory Blanks	A	
V.	Field blanks	N	
VI.	Surrogate spikes	A	
VII.	Matrix spike/Matrix spike duplicates	N	
VIII.	Laboratory control samples	SW	LCS/D
IX.	Field duplicates	N	
X.	Compound quantitation RL/LOQ/LODs	N	
XI.	Target compound identification	N	
XII.	Overall assessment of data	A	

Note: A = Acceptable; N = Not provided/applicable; SW = See worksheet; ND = No compounds detected; R = Rinsate; FB = Field blank; D = Duplicate; TB = Trip blank; EB = Equipment blank; SB=Source blank; OTHER:

	Client ID	Lab ID	Matrix	Date
1	MW-1	1059980	Water	05/15/19
2	MW-2	1059981	Water	05/15/19
3	MW-9	1059988	Water	05/15/19
4	MW-10	1059989	Water	05/15/19
5	MW-15	1059993	Water	05/15/19
6	MW-12	1059994	Water	05/15/19
7				
8				
9				
10				

Notes:

1	191510004A						

VALIDATION FINDINGS WORKSHEET

METHOD: GC/MS SVOA

A. Phenol	CC. Dimethylphthalate	EEE. Bis(2-ethylhexyl)phthalate	GGGG. C30-Hopane	I1. Methyl methanesulfonate
B. Bis (2-chloroethyl) ether	DD. Acenaphthylene	FFF. Di-n-octylphthalate	HHHH. 1-Methylphenanthrene	J1. Ethyl methanesulfonate
C. 2-Chlorophenol	EE. 2,6-Dinitrotoluene	GGG. Benzo(b)fluoranthene	IIII. 1,4-Dioxane	K1. o,o',o"-Triethylphosphorothioate
D. 1,3-Dichlorobenzene	FF. 3-Nitroaniline	HHH. Benzo(k)fluoranthene	JJJJ. Acetophenone	L1. n-Phenylene diamine
E. 1,4-Dichlorobenzene	GG. Acenaphthene	III. Benzo(a)pyrene	KKKK. Atrazine	M1. 1,4-Naphthoquinone
F. 1,2-Dichlorobenzene	HH. 2,4-Dinitrophenol	JJJ. Indeno(1,2,3-cd)pyrene	LLLL. Benzaldehyde	N1. N-Nitro-o-toluidine
G. 2-Methylphenol	II. 4-Nitrophenol	KKK. Dibenz(a,h)anthracene	MMMM. Caprolactam	O1. 1,3,5-Trinitrobenzene
H. 2,2'-Oxybis(1-chloropropane)	JJ. Dibenzofuran	LLL. Benzo(g,h,i)perylene	NNNN. 2,6-Dichlorophenol	P1. Pentachlorobenzene
I. 4-Methylphenol	KK. 2,4-Dinitrotoluene	MMM. Bis(2-Chloroisopropyl)ether	OOOO. 1,2-Diphenylhydrazine	Q1. 4-Aminobiphenyl
J. N-Nitroso-di-n-propylamine	LL. Diethylphthalate	NNN. Aniline	PPPP. 3-Methylphenol	R1. 2-Naphthylamine
K. Hexachloroethane	MM. 4-Chlorophenyl-phenyl ether	OOO. N-Nitrosodimethylamine	QQQQ. 3&4-Methylphenol	S1. Triphenylene
L. Nitrobenzene	NN. Fluorene	PPP. Benzoic Acid	RRRR. 4-Dimethyldibenzothiophene (4MDT)	T1. Octachlorostyrene
M. Isophorone	OO. 4-Nitroaniline	QQQ. Benzyl alcohol	SSSS. 2/3-Dimethyldibenzothiophene (4MDT)	U1. Famphur
N. 2-Nitrophenol	PP. 4,6-Dinitro-2-methylphenol	RRR. Pyridine	TTTT. 1-Methyldibenzothiophene (1MDT)	V1. 1,4-phenylenediamine
O. 2,4-Dimethylphenol	QQ. N-Nitrosodiphenylamine	SSS. Benzidine	UUUU.. 2,3,4,6-Tetrachlorophenol	W1. Methapyrilene
P. Bis(2-chloroethoxy)methane	RR. 4-Bromophenyl-phenylether	TTT. 1-Methylnaphthalene	VVVV. 1,2,4,5-Tetrachlorobenzene	X1. Pentachloroethane
Q. 2,4-Dichlorophenol	SS. Hexachlorobenzene	UUU.Benzo(b)thiophene	WWWW.. 2-Picoline	Y1. 3,3'-Dimethylbenzidine
R. 1,2,4-Trichlorobenzene	TT. Pentachlorophenol	VVV.Benzonaphthothiophene	XXXX. 3-Methylcholanthrene	Z1. o-Toluidine
S. Naphthalene	UU. Phenanthrene	WWW.Benzo(e)pyrene	YYYY. a,a-Dimethylphenethylamine	A2. 1-Naphthylamine
T. 4-Chloroaniline	VV. Anthracene	XXX. 2,6-Dimethylnaphthalene	ZZZZ. Hexachloropropene	B2. 4-Aminobiphenyl
U. Hexachlorobutadiene	WW. Carbazole	YYY. 2,3,5-Trimethylnaphthalene	A1. N-Nitrosodiethylamine	C2. 4-Nitroquinoline-1-oxide
V. 4-Chloro-3-methylphenol	XX. Di-n-butylphthalate	ZZZ. Perylene	B1. N-Nitrosodi-n-butylamine	D2. Hexachloropene
W. 2-Methylnaphthalene	YY. Fluoranthene	AAAA. Dibenzothiophene	C1. N-Nitrosomethylethylamine	E2. Bis (2-chloro-1-methylethyl) ether
X. Hexachlorocyclopentadiene	ZZ. Pyrene	BBBB. Benzo(a)fluoranthene	D1. N-Nitrosomorpholine	F2. Bifenthrin
Y. 2,4,6-Trichlorophenol	AAA. Butylbenzylphthalate	CCCC. Benzo(b)fluorene	E1. N-Nitrosopyrrolidine	G2. Cyfluthrin
Z. 2,4,5-Trichlorophenol	BBB. 3,3'-Dichlorobenzidine	DDDD. cis/trans-Decalin	F1. Phenacetin	H2. Cypermethrin
AA. 2-Chloronaphthalene	CCC. Benzo(a)anthracene	EEEE. Biphenyl	G1. 2-Acetylaminofluorene	I2. Permethrin (cis/trans)
BB. 2-Nitroaniline	DDD. Chrysene	FFFF. Retene	H1. Pronamide	J2. 5-Nitro-o-toluidine

LDC #: 45300A8a

VALIDATION FINDINGS WORKSHEET
Laboratory Control Samples (LCS)

Page: 1 of 1
Reviewer: LT
2nd Reviewer:

METHOD: ✓ **GC** __ **HPLC**

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

[✓ Y] N N/A Were a laboratory control samples (LCS) and laboratory control sample duplicate (LCSD) analyzed for each matrix in this SDG?

Y [✓ N] N/A Were the LCS percent recoveries (%R) and relative percent differences (RPD) within the QC limits?

Level IV/D Only

Y N N/A Was an LCS analyzed every 20 samples for each matrix or whenever a sample extraction was performed?

#	LCS/LCSD ID	Compound	LCS %R (Limits)	LCSD %R (Limits)	RPD (Limits)	Associated Samples	Qualifications
	191510004A LCS/D	SEE	WORKSHEET (	ATTACHED	)		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
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			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		
			( )	( )	( )		

Quality Control Summary

Client Name: EMR Environmental
Reported: 06/13/2019 20:08

Group Number: 2044467

LCS/LCSD (continued)

Analysis Name	LCS Spike Added ug/l	LCS Conc ug/l	LCSD Spike Added ug/l	LCSD Conc ug/l	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
Methyl t-butyl ether	50.03	48.19	50.03	48.08	96	96	70-130	0	25
Naphthalene	50.16	45.36	50.16	45.95	90	92	70-130	1	25
Toluene	50.3	49.68	50.3	49.14	99	98	70-130	1	25
o-Xylene	50	47.57	50	47.35	95	95	70-130	0	25
m,p-Xylenes	100.43	96.62	100.43	96.23	96	96	70-130	0	25
Batch number: 19143B08A	Sample number(s): 1059983-1059984,1059987-1059989,1059991,1059993-1059994								
Benzene	50.19	38.66	50.19	38.57	77	77	70-130	0	25
C5-C8 Aliphatic Hydrocarbons	150.78	123.05	150.78	121.5	82	81	70-130	1	25
Unadjusted C5-C8 Aliphatics	301.31	238.08	301.31	236.19	79	78	70-130	1	25
C9-C10 Aromatic Hydrocarbons	50.07	38.56	50.07	38.39	77	77	70-130	0	25
C9-C12 Aliphatic Hydrocarbons	150.53	99.54	150.53	98.09	66*	65*	70-130	1	25
Unadjusted C9-C12 Aliphatics	401.21	289.46	401.21	287.64	72	72	70-130	1	25
Ethylbenzene	50.18	38.49	50.18	38.38	77	76	70-130	0	25
Methyl t-butyl ether	50.03	37.94	50.03	37.57	76	75	70-130	1	25
Naphthalene	50.16	35.47	50.16	35.47	71	71	70-130	0	25
Toluene	50.3	38.43	50.3	38.55	76	77	70-130	0	25
o-Xylene	50	37.28	50	37.1	75	74	70-130	0	25
m,p-Xylenes	100.43	75.59	100.43	75.67	75	75	70-130	0	25
Batch number: 19148B08A	Sample number(s): 1059985-1059986,1059990,1059992								
Benzene	50.19	46.29	50.19	46.47	92	93	70-130	0	25
C5-C8 Aliphatic Hydrocarbons	150.78	159.81	150.78	160.8	106	107	70-130	1	25
Unadjusted C5-C8 Aliphatics	301.31	300.45	301.31	302.14	100	100	70-130	1	25
C9-C10 Aromatic Hydrocarbons	50.07	45.95	50.07	46.04	92	92	70-130	0	25
C9-C12 Aliphatic Hydrocarbons	150.53	139.68	150.53	140.96	93	94	70-130	1	25
Unadjusted C9-C12 Aliphatics	401.21	365.63	401.21	368.49	91	92	70-130	1	25
Ethylbenzene	50.18	45.81	50.18	46.08	91	92	70-130	1	25
Methyl t-butyl ether	50.03	48.13	50.03	48.3	96	97	70-130	0	25
Naphthalene	50.16	51.4	50.16	51.74	102	103	70-130	1	25
Toluene	50.3	46.23	50.3	46.57	92	93	70-130	1	25
o-Xylene	50	44.12	50	44.46	88	89	70-130	1	25
m,p-Xylenes	100.43	90.07	100.43	90.94	90	91	70-130	1	25
Batch number: 191510004A	Sample number(s): 1059980-1059981,1059988-1059989,1059993-1059994								
GG Acenaphthene	40.08	13.23	40.08	22.42	33*	56	40-140	52*	25
DD Acenaphthylene	40.08	13.5	40.08	22.75	34*	57	40-140	51*	25
VV Anthracene	40.12	14.77	40.12	24.83	37*	62	40-140	51*	25
CCC Benzo(a)anthracene	40.16	15.21	40.16	25.52	38*	64	40-140	51*	25
III Benzo(a)pyrene	40.12	14.3	40.12	23.59	36*	59	40-140	49*	25
GGG Benzo(b)fluoranthene	40.12	15.45	40.12	26.18	39*	65	40-140	52*	25
LLL Benzo(g,h,i)perylene	40.04	15.08	40.04	25.28	38*	63	40-140	51*	25
HHH Benzo(k)fluoranthene	40.08	14.72	40.08	24.21	37*	60	40-140	49*	25
Unadjusted C11 - C22 Aromatics	681.15	249.51	681.15	416.55	37*	61	40-140	50*	25
C19 to C36 Aliphatics	321.36	147.16	321.36	270.99	46	84	40-140	59*	25

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.
(3) The surrogate spike amount was less than the LOD.

All LCSs + RPDs J/UJ/P 1-6 (ND/Det)

Quality Control Summary

Client Name: EMR Environmental
Reported: 06/13/2019 20:08

Group Number: 2044467

LCS/LCSD (continued)

Analysis Name	LCS Spike Added ug/l	LCS Conc ug/l	LCSD Spike Added ug/l	LCSD Conc ug/l	LCS %REC	LCSD %REC	LCS/LCSD Limits	RPD	RPD Max
C9 to C18 Aliphatics	241.04	76.87	241.04	131.23	32*	54	40-140	52*	25
DDD Chrysene	40.08	15.27	40.08	24.33	38*	61	40-140	46*	25
KKK Dibenzo(a,h)anthracene	39.87	14.74	39.87	24.3	37*	61	40-140	49*	25
YY Fluoranthene	40.04	15.15	40.04	25.62	38*	64	40-140	51*	25
NN Fluorene	40.08	14.12	40.08	24.02	35*	60	40-140	52*	25
JJJ Indeno(1,2,3-cd)pyrene	40.04	15.06	40.04	25.41	38*	63	40-140	51*	25
W 2-Methylnaphthalene	40.04	11.91	40.04	19.76	30*	49	40-140	50*	25
C Naphthalene	40.16	12.09	40.16	19.77	30*	49	40-140	48*	25
UU Phenanthrene	40	14.59	40	24.77	36*	62	40-140	52*	25
ZZ Pyrene	40.04	16.7	40.04	28.49	42	71	40-140	52*	25

Surrogate Quality Control

Surrogate recoveries which are outside of the QC window are confirmed unless attributed to dilution or otherwise noted on the Analysis Report.

Analysis Name: MTEPH Screen Water
Batch number: 191420017A

	Orthoterphenyl %Rec	LOD (ug/l)	1-chlorooctadecane %Rec	LOD (ug/l)
1059980	78	2.0	55	2.0
1059981	78	2.0	53	2.0
1059982	62	2.0	46	2.0
1059983	93	2.0	89	2.0
1059984	91	2.0	88	2.0
1059985	103	2.0	85	2.0
1059986	31*	2.0	25*	2.0
1059987	101	2.0	76	2.0
1059988	103	2.0	77	2.0
1059989	87	2.0	66	2.0
1059990	88	2.0	57	2.0
1059991	94	2.0	92	2.0
1059992	112	2.0	75	2.0
1059993	101	2.0	89	2.0
1059994	102	2.0	80	2.0
Blank	104	2.0	107	2.0
LCS	220*	2.0	73	2.0
LCSD	288*	2.0	96	2.0
Limits:	40-140		40-140	

*- Outside of specification
**-This limit was used in the evaluation of the final result for the blank
(1) The result for one or both determinations was less than five times the LOQ.
(2) The unspiked result was more than four times the spike added.
(3) The surrogate spike amount was less than the LOD.

Laboratory Data Consultants, Inc.
Data Validation Report

Project/Site Name: Malmstrom AFB

LDC Report Date: July 1, 2019

Parameters: Extractable Petroleum Hydrocarbons

Validation Level: Level II

Laboratory: Eurofins

Sample Delivery Group (SDG): EMR07/2044467

Sample Identification	Laboratory Sample Identification	Matrix	Collection Date
MW-1	1059980	Water	05/15/19
MW-2	1059981	Water	05/15/19
MW-4	1059982	Water	05/15/19
MW-5	1059983	Water	05/15/19
MW-5D	1059984	Water	05/15/19
MW-6	1059985	Water	05/15/19
MW-7	1059986	Water	05/15/19
MW-8	1059987	Water	05/15/19
MW-9	1059988	Water	05/15/19
MW-10	1059989	Water	05/15/19
MW-11	1059990	Water	05/15/19
MW-14	1059991	Water	05/15/19
MW-13	1059992	Water	05/15/19
MW-15	1059993	Water	05/15/19
MW-12	1059994	Water	05/15/19

Introduction

This Data Validation Report (DVR) presents data validation findings and results for the associated samples listed on the cover page. Data validation was performed in accordance with the Uniform Federal Policy Quality Assurance Project Plan for Remedial Investigation Corrective Action Plan, Malmstrom Air Force Base Petroleum Sites: TU1082, TU455, TU465, TU469, and LF D-04, Malmstrom Air Force Base, Montana (September 2017) and a modified outline of the USEPA National Functional Guidelines (NFG) for Organic Superfund Methods Data Review (January 2017). Where specific guidance was not available, the data has been evaluated in a conservative manner consistent with industry standards using professional experience.

The analyses were performed by the following method:

Extractable Petroleum Hydrocarbons by MTEPH Screen

All sample results were subjected to Level II data validation, which comprises an evaluation of quality control (QC) summary results.

The following are definitions of the data qualifiers utilized during data validation:

J (Estimated): The compound or analyte was analyzed for and positively identified by the laboratory; however the reported concentration is estimated due to non-conformances discovered during data validation.

U (Non-detected): The compound or analyte was analyzed for and positively identified by the laboratory; however the compound or analyte should be considered not detected at the reported concentration due to the presence of contaminants detected in the associated blank(s).

UJ (Non-detected estimated): The compound or analyte was reported as not detected by the laboratory; however the reported quantitation/detection limit is estimated due to non-conformances discovered during data validation.

R (Rejected): The sample results were rejected due to gross non-conformances discovered during data validation. Data qualified as rejected is not usable.

NA (Not Applicable): The non-conformance discovered during data validation demonstrates a high bias, while the affected compound or analyte in the associated sample(s) was reported as not detected by the laboratory and did not warrant the qualification of the data.

A qualification summary table is provided at the end of this report if data has been qualified. Flags are classified as P (protocol) or A (advisory) to indicate whether the flag is due to a laboratory deviation from a specified protocol or is of technical advisory nature.

I. Sample Receipt and Technical Holding Times

All samples were received in good condition and cooler temperatures upon receipt met validation criteria.

All technical holding time requirements were met.

II. Initial Calibration and Initial Calibration Verification

Initial calibration data were not reviewed for Level II validation.

III. Continuing Calibration

Continuing calibration data were not reviewed for Level II validation.

IV. Laboratory Blanks

Laboratory blanks were analyzed as required by the method. No contaminants were found in the laboratory blanks.

V. Field Blanks

No field blanks were identified in this SDG.

VI. Surrogates

Surrogates were added to all samples as required by the method. All surrogate recoveries (%R) were within QC limits with the following exceptions:

Sample	Surrogate	%R (Limits)	Affected Compound	Flag	A or P
MW-7	Ortho-terphenyl 1-chloro-octadecane	31 (40-140) 25 (40-140)	MTEPH screen water	J (all detects) UJ (all non-detects)	P

VII. Matrix Spike/Matrix Spike Duplicates

The laboratory has indicated that there were no matrix spike (MS) and matrix spike duplicate (MSD) analyses specified for the samples in this SDG, and therefore matrix spike and matrix spike duplicate analyses were not performed for this SDG.

VIII. Laboratory Control Samples

Laboratory control samples (LCS) and laboratory control samples duplicates (LCSD) were analyzed as required by the method. Percent recoveries (%R) were within QC limits. Relative percent differences (RPD) were within QC limits.

IX. Field Duplicates

Samples MW-5 and MW-5D were identified as field duplicates. No results were detected in any of the samples with the following exceptions:

Compound	Concentration (ug/L)		RPD (Limits)	Flag	A or P
	MW-5	MW-5D			
MTEPH screen water	460	430	7 (≤20)	-	-

X. Compound Quantitation

All compound quantitations met validation criteria with the following exceptions:

Sample	Compound	Finding	Criteria	Flag	A or P
MW-1 MW-2 MW-9 MW-10 MW-12	MTEPH screen water	Sample result exceeded calibration range.	Reported result should be within calibration range.	J (all detects)	A

Raw data were not reviewed for Level II validation.

XI. Target Compound Identifications

Raw data were not reviewed for Level II validation.

XII. Overall Assessment of Data

The analysis was conducted within all specifications of the method.

Due to surrogate %R and results exceeding calibration range, data were qualified as estimated in six samples.

No results were rejected in this SDG.

Malmstrom AFB
Extractable Petroleum Hydrocarbons - Data Qualification Summary - SDG EMR07/2044467

Sample	Compound	Flag	A or P	Reason
MW-7	MTEPH screen water	J (all detects) UJ (all non-detects)	P	Surrogates (%R)
MW-1 MW-2 MW-9 MW-10 MW-12	MTEPH screen water	J (all detects)	A	Compound quantitation (exceeded range)

Malmstrom AFB
Extractable Petroleum Hydrocarbons - Laboratory Blank Data Qualification Summary - SDG EMR07/2044467

No Sample Data Qualified in this SDG

Malmstrom AFB
Extractable Petroleum Hydrocarbons - Field Blank Data Qualification Summary - SDG EMR07/2044467

No Sample Data Qualified in this SDG

LDC #: 45300A8b
SDG #: EMR07/2044467
Laboratory: Eurofins

VALIDATION COMPLETENESS WORKSHEET
Level II

Date: 06/28/19
Page: 1 of 2
Reviewer: LT
2nd Reviewer:

METHOD: GC Extractable Petroleum Hydrocarbons (MTEPH Screen)

The samples listed below were reviewed for each of the following validation areas. Validation findings are noted in attached validation findings worksheets.

	Validation Area		Comments
I.	Sample receipt/Technical holding times	A/A	
II.	Initial calibration/ICV	N/N	
III.	Continuing calibration	N	
IV.	Laboratory Blanks	A	
V.	Field blanks	N	
VI.	Surrogate spikes	SW	
VII.	Matrix spike/Matrix spike duplicates	N	
VIII.	Laboratory control samples	A	LCS/D
IX.	Field duplicates	SW	D = 4+5
X.	Compound quantitation RL/LOQ/LODs	SW	
XI.	Target compound identification	N	
XII.	Overall assessment of data	A	

Note: A = Acceptable
N = Not provided/applicable
SW = See worksheet
ND = No compounds detected
R = Rinsate
FB = Field blank
D = Duplicate
TB = Trip blank
EB = Equipment blank
SB=Source blank
OTHER:

	Client ID	Lab ID	Matrix	Date
1	MW-1	1059980	Water	05/15/19
2	MW-2	1059981	Water	05/15/19
3	MW-4	1059982	Water	05/15/19
4	MW-5	1059983	Water	05/15/19
5	MW-5D	1059984	Water	05/15/19
6	MW-6	1059985	Water	05/15/19
7	MW-7	1059986	Water	05/15/19
8	MW-8	1059987	Water	05/15/19
9	MW-9	1059988	Water	05/15/19
10	MW-10	1059989	Water	05/15/19
11	MW-11	1059990	Water	05/15/19
12	MW-14	1059991	Water	05/15/19
13	MW-13	1059992	Water	05/15/19
14	MW-15	1059993	Water	05/15/19
15	MW-12	1059994	Water	05/15/19
16				
17				

LDC #: 45300A8b

SDG #: EMR07/2044467

Laboratory: Eurofins

VALIDATION COMPLETENESS WORKSHEET

Level II

Date: 06/28/19

Page: 2 of 2

Reviewer: LT

2nd Reviewer:

METHOD: GC Extractable Petroleum Hydrocarbons (MTEPH Screen)

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Notes:

1	191426017A						

LDC #: 45300A8D

VALIDATION FINDINGS WORKSHEET
Surrogate Recovery

Page: 1 of 1
Reviewer: LT
2nd Reviewer:

METHOD: ✓ **GC** __ **HPLC**

Are surrogates required by the method? Yes ✓ or No ____.

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

(Y) N N/A Were surrogates spiked into all samples and blanks?

Y (N) N/A Did all surrogate recoveries (%R) meet the QC limits?

#	Sample ID	Detector/ Column	Surrogate Compound	%R (Limits)	Qualifications
	7		H	31 (40-140)	J/UJ/AP
			1-chloro-octadecane	25 (↓)	↓
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	
				( )	

	Surrogate Compound		Surrogate Compound		Surrogate Compound		Surrogate Compound		Surrogate Compound
A	Chlorobenzene (CBZ)	G	Octacosane	M	Benzo(e)Pyrene	S	1-Chloro-3-Nitrobenzene	Y	Tetrachloro-m- xylene
B	4-Bromofluorobenzene (BFB)	(H)	Ortho-Terphenyl	N	Terphenyl-D14	T	3,4-Dinitrotoluene	Z	1,2-Dinitrobenzene
C	a,a,a-Trifluorotoluene	I	Fluorobenzene (FBZ)	O	Decachlorobiphenyl (DCB)	U	Tripentyltin		
D	Bromochlorobenene	J	n-Triacontane	P	1-methylnaphthalene	V	Tri-n-propyltin		
E	1,4-Dichlorobutane	K	Hexacosane	Q	Dichlorophenyl Acetic Acid (DCAA)	W	Tributyl Phosphate		
F	1,4-Difluorobenzene (DFB)	L	Bromobenzene	R	4-Nitrophenol	X	Triphenyl Phosphate		

LDC#:_45300A8b_ **VALIDATION FINDINGS WORKSHEET** Page: 1 of 1
Field Duplicates Reviewer: LT
2nd Reviewer:

METHOD: GC Extractable Petroleum Hydrocarbons (MTEPH Screen)

Compound	Concentration (ug/L)		RPD (≤ 20)
	4	5	
MTEPH Screen Water	460	430	7

LDC #: 45360A86

VALIDATION FINDINGS WORKSHEET
Compound Quantitation and Reported CRQLs

Reviewer: LT
2nd Reviewer:

METHOD: ✓ **GC** __ **HPLC**

Please see qualifications below for all questions answered "N". Not applicable questions are identified as "N/A".

Level IV/D Only

Y N N/A Were CRQLs adjusted for sample dilutions, dry weight factors, etc.?

Y N N/A Did the reported results for detected target compounds agree within 10.0% of the recalculated results?

#	Compound Name	Finding	Associated Samples	Qualifications
	~~MTPH~~ MTBE Screen Water	id cal range	1	J/A Dets
			2	
			9	
			10	
			15	

Comments: See sample calculation verification worksheet for recalculations