



SUBMITTED TO:
Alaska Railroad Corporation
327 West Ship Creek Avenue
Anchorage, Alaska 99501



BY:
Shannon & Wilson, Inc.
2355 Hill Road
Fairbanks, Alaska 99709
(907) 458-3123
www.shannonwilson.com

FINAL

GROUNDWATER MONITORING REPORT

Alaska Railroad Corporation

Fairbanks Rail Yard

FAIRBANKS, ALASKA



PAGE INTENTIONALLY LEFT BLANK FOR DOUBLE-SIDED PRINTING

Submitted To: Alaska Railroad Corporation
327 West Ship Creek Avenue
Anchorage, Alaska 99501
Attn: Russell Grandel

Subject: FINAL GROUNDWATER MONITORING REPORT, ALASKA RAILROAD
CORPORATION FAIRBANKS RAIL YARD, FAIRBANKS, ALASKA

Shannon & Wilson prepared this report and participated in this project as a subconsultant to Alaska Railroad Corporation. Our scope of services was specified in ARRC Contract Number 107724 Task Number 004 dated September 10, 2020.

Sincerely,

SHANNON & WILSON, INC.

Rachel Willis
Environmental Scientist

Christopher Darrah
Vice President

RLW:CBD/rlw

CONTENTS

1	Introduction	1
1.1	Project Objectives	1
1.1.1	Scope of Services.....	1
2	Background	1
2.1	Contaminants of Potential Concern.....	2
3	Field Activities.....	2
3.1	Deviations from the Work Plan.....	2
3.2	Investigation-Derived Waste.....	2
4	Analytical Results	3
4.1	Groundwater.....	3
5	Mann-Kendall Trend Analysis.....	3
5.1	Results.....	4
5.1.1	Wells Sampled in October 2020 (MW-4, MW-5, M-6, MW-7, MW-8, and MW-9).....	4
5.1.2	Trends Using Historical Data from Wells Not Sampled (MW-1, MW-2, and MW-3).....	5
6	Discussion and Recommendations.....	5
6.1	Discussion	5
7	Recommendations.....	6
8	References	6

Exhibits

Exhibit 5-1: MAROS Decision Matrix.....	4
---	---

Tables

Table 1:	Field Measurements
Table 2:	Groundwater Analytical Results
Table 3:	Historic Groundwater Results
Table 4:	Mann-Kendall Trend Test Summary

Figures

Figure 1:	Site Vicinity
Figure 2:	Groundwater Exceedances

Appendices

Appendix A: Field Forms

Appendix B: SGS Laboratory Report

Appendix C: ADEC LDRC

Appendix D: QA/QC

Appendix E: Mann-Kendall Trend Analysis

Important Information

ACRONYMS

AAC	Alaska Administrative Code
ARRC	Alaska Railroad Corporation
ADEC	Alaska Department of Administration
AST	aboveground storage tank
°C	degrees Celsius
COC	chain of custody
BTEX	benzene, toluene, ethylbenzene, xylenes
COPC	contaminant of potential concern
COV	coefficient of variance
CUL	cleanup level
DRO	diesel range organics
EPA	Environmental Protection Agency
GAC	granular activated carbon
GRO	gasoline range organics
RRO	residual range organics
LCS	laboratory control sample
LCSD	laboratory control duplicate sample
LDRC	laboratory data review checklist
LOD	limit of detection
LOQ	limit of quantification
MAROS	Monitoring and Remediation Optimization System
MS	matrix spike
MSD	matrix spike duplicate
PAH	polynuclear aromatic hydrocarbon
QA	quality assurance
QC	quality control
RPD	relative percent difference
WO	work order

1 INTRODUCTION

This report summarizes recent groundwater monitoring activities at the Alaska Railroad Corporation (ARRC) Fairbanks Rail Yard located at Phillips Field Road and Jack Lindsey Lane, Fairbanks, Alaska (Figure 1). This site is listed as an active contaminated site by the Alaska Department of Environmental Conservation (ADEC; File Number 102.38.050). Field activities in 2020 included collecting samples for laboratory analysis from the eight onsite monitoring wells. We performed our services consistent with our ARRC contract (107724) under Task Number 004, the September 2020 *Fairbanks Rail Yard Groundwater Monitoring Work Plan* (Work Plan), appropriate guidance documents, and 18 Alaska Administrative Code (AAC) 75 regulations.

1.1 Project Objectives

Our objective was to characterize groundwater quality at the ARRC Fairbanks Rail Yard.

1.1.1 Scope of Services

Our scope of services included:

- preparing a Work Plan for the Fairbanks Rail Yard Groundwater Monitoring
- inspecting monitoring wells for the presence of free product and measuring depth to groundwater;
- collecting groundwater samples from up to eight monitoring wells where no product was present; and
- preparing this summary report.

2 BACKGROUND

The Fairbanks Rail Yard is located at Jack Lindsey Lane and Phillips Field Road, ARRC Industrial Area (Section 9, Township 1 South, Range 1 West, Fairbanks Meridian) in Fairbanks, Alaska. The Fairbanks Rail Yard is a primary facility for northern ARRC operations. Site improvements include buried utilities, rail yard lighting, and multiple sets of railroad tracks, track crossings, and buildings.

Between 1949 and 1986, two 105,000-gallon aboveground storage tanks (ASTs) provided diesel for locomotives and heavy equipment. In 1986, a 7-foot test pit was excavated between the two ASTs. Petroleum contamination was discovered in the soil. In June 1988, on

behalf of ARRC, Woodward-Clyde conducted a soil gas survey to determine the extent of soil and groundwater contamination. In October and November 2003, the two ASTs and associated piping were removed.

Between 2006 to 2016, the ARRC initiated long-term groundwater monitoring and completed limited site characterization.

2.1 Contaminants of Potential Concern

Contaminants of potential concern (COPCs) associated with the site are diesel range organics (DRO), gasoline range organics (GRO), residual range organics (RRO), benzene, toluene, ethylbenzene, xylene (BTEX), and polynuclear aromatic hydrocarbons (PAHs).

To evaluate groundwater sample concentrations, we compared the analytical data to Table C of 18 AAC 75.345 *Groundwater Cleanup Levels*.

3 FIELD ACTIVITIES

Shannon & Wilson staff Rachel Willis and Justin Risley conducted field activities at the Fairbanks Rail Yard on October 6, 2020 in accordance to the Work Plan. Prior to sampling, field staff measured the depth to free product and groundwater in each well. We observed product in three wells: MW-1, MW-3, and WC-3. We collected six groundwater samples and one field duplicate from monitoring wells without product present, including MW-4, MW-5, MW-6, MW-7, MW-8, and MW-9. Groundwater sampling field measurements and sample collection logs are presented in Table 1 and Appendix A, respectively.

We requested analysis of GRO (method AK 101), DRO (method AK 102), RRO (method AK 103), BTEX (Environmental Protection Agency [EPA] method 8021B); and PAHs (EPA method 8270D-SIM) with a standard turnaround time from SGS Laboratory in Anchorage. The Laboratory Report and associated ADEC Laboratory Data Review Checklist (LDRC) are presented in Appendix B and Appendix C, respectively. A detailed assessment of our Quality Assurance and Quality Control procedures are presented in Appendix D.

3.1 Deviations from the Work Plan

We did not document any deviations from the Work Plan.

3.2 Investigation-Derived Waste

Monitoring-well purge water and decontamination fluids from reusable sampling equipment was treated using granular-activated carbon (GAC). Other IDW consisted of

disposable sampling equipment (e.g., nitrile gloves and plastic bags), which was disposed at the Fairbanks landfill.

4 ANALYTICAL RESULTS

We compared analytical results of groundwater samples to cleanup levels (CULs) listed in Alaska's 18 AAC 75.345 Table C – *Groundwater Cleanup Levels*.

A summary of analytical results is presented in Table 2. Additionally, we provide a table of historical analytical results in Table 3. The analytical laboratory reports and corresponding LDRC are included in Appendices B and C, respectively.

4.1 Groundwater

We did not observe exceedances above ADEC CULs in MW-8 and MW-9. We observed multiple exceedances in samples above ADEC CULs for the following analytes:

- DRO in samples MW-4, MW-5, MW-6, MW-7, and its field duplicate, MW-107;
- RRO was in samples MW-5, MW-6, MW-7, and MW-107;
- Benzene in sample MW-6;
- Naphthalene in samples MW-4, MW-5, MW-6, MW-7, and MW-107; and
- 1-methylnaphthalene and 2-methylnaphthalene in sample MW-4.

In addition to the analytes mentioned above, the following analytes were detected in one or more analytical samples below ADEC CULs but above laboratory LOQs, including GRO, RRO, ethylbenzene, O-xylene, P&M xylene, acenaphthene, fluorene, and phenanthrene.

5 MANN-KENDALL TREND ANALYSIS

We performed an evaluation of concentration trends for GRO, DRO, RRO, and BTEX in groundwater samples collected from the Fairbanks Yard monitoring wells using a Mann-Kendall statistical analysis of groundwater analytical data and visual assessment of the concentration graphs. We performed this analysis using Monitoring and Remediation Optimization System (MAROS) software was developed by the Air Force Center for Engineering and the Environment to evaluate concentration trends. This section presents the results of trend analysis for monitoring wells MW-4, MW-5, MW-6, MW-7, MW-8, and MW-9 including analytical results from our October 2020 sampling event.

The MAROS evaluation of concentration trends depends on the result of a Mann-Kendall trend analysis, coupled with information about the coefficient of variance (COV). A statistically significant increasing or decreasing trend will be identified by the Mann-Kendall analysis if the probability of a false-negative assessment is less than 5 percent (i.e., $p < 0.05$); MAROS refers to this condition as a “confidence in trend” above 95 percent.

MAROS discriminates between “no trend” and a “stable” contaminant concentration by evaluating the COV of a given well’s data set. The COV is defined as the ratio of a data set’s standard deviation relative to its mean. COV values less than or near one indicate that the data form a relatively close group around the mean value; values large than one indicate a degree of scatter around the mean. The MAROS decision matrix is presented in the Exhibit below:

Exhibit 5-1: MAROS Decision Matrix

Mann-Kendall Statistic (S)	Confidence in Trend	Concentration in Trend
$S > 0$	> 95 percent	Increasing
	90 – 95 percent	Probably Increasing
	< 90 percent	No Trend
$S \leq 0$	<90 percent and $COV \geq 1$	No Trend
	<90 percent and $COV < 1$	Stable
$S < 0$	90 – 95 percent	Probably decreasing
	> 95 percent	Decreasing

5.1 Results

Using the EPA’s ProUCL Version 5.1 statistics software, we conducted a Mann-Kendall Trend analysis on the GRO, DRO, RRO, and BTEX results with three or more analytical results from historic sampling at the Fairbanks Rail Yard. A summary of the results from the statistical analyses is presented in Table 4 and summarized below. Input and output tables from ProUCL are provided in Appendix E.

5.1.1 Wells Sampled in October 2020 (MW-4, MW-5, M-6, MW-7, MW-8, and MW-9)

- We observed an increasing concentration trend in RRO from historic analytical results collected from MW-5, and for DRO collected from MW-9.
- There are possible increasing concentration trends in RRO observed from historic analytical results collected from MW-4, benzene and ethylbenzene collected from MW-7, DRO collected from MW-8, and GRO collected from MW-9.

- There is a decreasing concentration trend in ethylbenzene collected from MW-4 and xylenes collected from MW-6.
- Additionally, a stable trend was observed in the following monitoring wells and analytes:
 - MW-4: xylenes;
 - MW-5: GRO, DRO, ethylbenzene, and xylenes;
 - MW-6: GRO and ethylbenzene; and
 - MW-7: GRO.

5.1.2 Trends Using Historical Data from Wells Not Sampled (MW-1, MW-2, and MW-3)

We include this discussion of concentration trends using historical data from wells MW-1, MW-2, MW-3, even though these wells have not been sampled since 2012, 2017, and 2010, respectively.

- Data previously collected from MW-3 indicates a decreasing concentration trend in DRO. This trend was inaccurately reported as a stable trend in our 2018 report.
- Additionally, a stable trend is indicated based on previously collected data from the following monitoring wells:
 - MW-1: DRO, benzene, ethylbenzene, and xylenes;
 - MW-2: GRO, RRO, toluene, and xylenes;
 - MW-3: RRO, ethylbenzene, and xylenes;

6 DISCUSSION AND RECOMMENDATIONS

6.1 Discussion

The results of analytical groundwater samples are consistent with the historical results. We observed ADEC Cleanup Level exceedances for DRO, RRO, benzene, ethylbenzene, naphthalene, 1-methylnaphthalene, and 2-methylnaphthalene in groundwater from multiple monitoring wells. Our Mann-Kendall trend test results show that some monitoring wells have increasing concentrations of few analytes, while some monitoring wells have decreasing concentration of analytes. We limit our discussion here to results of samples collected during the October 2020 groundwater monitoring event.

We observed increasing or possibly increasing concentration trends in GRO, DRO, RRO, benzene, and ethylbenzene at multiple monitoring wells downgradient from the former storage tanks, suggesting that the contamination may be migrating downgradient. The increasing concentration trends are consistent with reported historical results with exception

for the increasing concentration trend observed in GRO at MW-9. We suspect this is a falsely identified trend due to elevated laboratory reporting limits, and not changes in GRO concentrations over time, as GRO has not been detected above reporting limits for the last three sampling events.

Decreasing concentration trends were observed in ethylbenzene (MW-4) and xylenes (MW-6). MW-4 and MW-6 are downgradient from the storage tanks but are closer in proximity to the former storage tanks, suggesting the contamination is continuing to migrate downgradient.

In our 2018 Report, we discussed observing possibly decreasing concentration trends in ethylbenzene and xylenes collected from MW-5; but in our 2020 Mann-Kendall trend analysis, we observe stable concentration trend. Ethylbenzene and xylenes were not detected in the 2020 analytical sample collected from MW-5. We suspect this may be a false stable trend due to elevated laboratory reporting limits.

During field activities, we measured depth to water in each well to calculate groundwater gradient using elevation data from previous survey data. We are unable to update the groundwater gradient calculation since the calculation require precise well casing elevation measurements. The monitoring well casing elevations were last measured in 2017, and we observe significant frost jacking in the well casing.

7 RECOMMENDATIONS

The results from the October 2020 sampling event are within trend from previous years and appear to be stable. We recommend additional sampling in two years.

We observed evidence of frost jacking in multiple monitoring wells. Prior to the next sampling event, we recommend trimming the monitoring well casings, then re-surveying the new top-of-casing elevations.

8 REFERENCES

Air Force Center for Engineering and the Environment, 2012. Monitoring and Remediation Optimization System (MAROS).

Alaska Department of Environmental Conservation Spill Prevention and Response, 2017, 18 AAC 75.341 Table C, Groundwater-Cleanup Levels.

Alaska Department of Environmental Conservation (ADEC), 2019, Field Sampling Guidance: Juneau, Alaska, DEC Division of Spill Prevention and Response, Contaminated Sites Program, August, available:
http://dec.alaska.gov/spar/csp/guidance_forms/csguidance.htm.

Alaska Department of Environmental Conservation (ADEC), 2019, Minimum Quality Assurance Requirements for Sample Handling, Reports, and Laboratory Data Technical Memorandum: Juneau, Alaska, ADEC Division of Spill Prevention and Response, Contaminated Sites Program, October, available:
http://dec.alaska.gov/spar/csp/guidance_forms/csguidance.htm.

Fairbanks Rail Yard Environmental Report, 2018. Shannon & Wilson, Inc.

Groundwater Monitoring Report, Fairbanks Rail Yard, 2015. Fairbanks Environmental Services.

US Environmental Protection Agency, 2015. ProUCL 5.1.00. Available
<https://www.epa.gov/land-research/proucl-software>

Table 1 - Field Measurements

Monitoring Well	Depth to Water from Top of Casing (feet)	Depth to Product from Top of Casing (feet)	Product thickness (feet)	Temperature (°C)	Dissolved Oxygen (mg/L)	Conductivity (µS/cm)	pH	ORP (mV)
MW-1	13.44	13.42	0.02		Not sampled due to product in well			
MW-2	13.66	12.87	0.79		Not sampled due to product in well			
WC-3	13.63	13.45	0.18		Not sampled due to product in well			
MW-4	13.69	--	--	7.1	0.23	593	6.43	-50.0
MW-5	13.04	--	--	6.4	0.36	650	6.53	-3.6
MW-6	13.00	--	--	6.5	0.26	752	6.52	-36.7
MW-7	12.79	--	--	7.0	0.25	652	6.47	-29.4
MW-8	11.38	--	--	6.2	0.20	716	6.45	144.0
MW-9	11.74	--	--	4.8	0.26	982	6.37	147.6

NOTES:

-- No product present.
mg/L milligrams per liter
°C degrees celsius
mV millivolts
µS/cm microsiemens per centimeter

Table 2 - Groundwater Analytical Results

Analytical Method	Analyte	Cleanup Level	Units	MW-7						
				MW-4	MW-5	MW-6	MW-7	MW-107	MW-8	MW-9
AK101	Gasoline Range Organics	2.2	mg/L	0.155	<0.100	0.164	<0.100	<0.100	<0.100	<0.100
AK102	Diesel Range Organics	1.5	mg/L	5.89	4.43	16.3	30.8	30.0	0.566	<0.577
AK103	Residual Range Organics	1.1	mg/L	0.818	1.25	2.83	5.81	5.80	0.581	<0.481
SW8021B (BTEX)	Benzene	4.6	µg/L	<0.500	0.530	13.5	3.88	3.85	<0.500	<0.500
	Ethylbenzene	15	µg/L	4.32	<1.00	3.41	1.92	1.97	<1.00	<1.00
	o-Xylene	190	µg/L	2.85	<1.00	7.58	3.67	3.68	<1.00	<1.00
	P & M -Xylene	190	µg/L	8.81	<2.00	9.61	4.42	4.43	<2.00	<2.00
	Toluene	1100	µg/L	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00	<1.00
	Total Xylenes	190	µg/L	11.7	<3.00	17.2	8.09	8.11	<3.00	<3.00
8270D SIM LV (PAH)	1-Methylnaphthalene	11	µg/L	69.1	3.28	6.60	<0.0472 J*	1.62 JH*	<0.0481	<0.0463
	2-Methylnaphthalene	36	µg/L	49.4	0.576	3.36	<0.0472	<0.472	<0.0481	<0.0463
	Acenaphthene	530	µg/L	1.64	0.588	1.12	0.732 J*	<0.472 J*	<0.0481	<0.0463
	Acenaphthylene	260	µg/L	<0.0472	<0.0481	<0.0481	<0.0472	<0.472	<0.0481	<0.0463
	Anthracene	43	µg/L	<0.0472	<0.0481	<0.0481	<0.0472	<0.472	<0.0481	<0.0463
	Benzo(a)anthracene	0.3	µg/L	<0.0472	<0.0481	<0.0481	<0.0472	<0.0472	<0.0481	<0.0463
	Benzo(a)pyrene	0.25	µg/L	<0.0189	<0.0192	<0.0192	<0.0189	<0.0189	<0.0192	<0.0185
	Benzo(b)fluoranthene	2.5	µg/L	<0.0472	<0.0481	<0.0481	<0.0472	<0.0472	<0.0481	<0.0463
	Benzo(g,h,i)perylene	0.26	µg/L	<0.0472	<0.0481	<0.0481	<0.0472	<0.0472	<0.0481	<0.0463
	Benzo(k)fluoranthene	0.8	µg/L	<0.0472	<0.0481	<0.0481	<0.0472	<0.0472	<0.0481	<0.0463
	Chrysene	2	µg/L	<0.0472	<0.0481	<0.0481	<0.0472	<0.0472	<0.0481	<0.0463
	Dibenzo(a,h)anthracene	0.25	µg/L	<0.0189	<0.0192	<0.0192	<0.0189	<0.0189	<0.0192	<0.0185
	Fluoranthene	260	µg/L	<0.0472	<0.0481	<0.0481	<0.0472	<0.0472	<0.0481	<0.0463
	Fluorene	290	µg/L	3.77	1.18	1.37	<0.0472	<0.472	<0.0481	<0.0463
	Indeno(1,2,3-cd)pyrene	0.19	µg/L	<0.0472	<0.0481	<0.0481	<0.0472	<0.0472	<0.0481	<0.0463
	Naphthalene	1.7	µg/L	67.3	4.37	8.36	27.3	27.0 JH*	<0.0962	<0.0926
	Phenanthrene	170	µg/L	1.81	0.455	0.358	<0.0472	<0.472	<0.0481	<0.0463
	Pyrene	120	µg/L	<0.0472	<0.0481	<0.0481	<0.0472	<0.0472	<0.0481	<0.0463

Table 2 - Groundwater Analytical Results

NOTES:

Analytical results reported from SGS work order 1209732.

ADEC Groundwater-Cleanup Levels are from 18 AAC 75 Table C.

µg/L micrograms per liter

< Analyte not detected; listed as less than the limit of detection (LOQ) unless otherwise flagged due to quality-control failures.

BOLD Detected concentration exceeds the associated ADEC groundwater cleanup level.

J* Estimated concentration due to quality control failures. Flag applied by Shannon & Wilson, Inc.

JH* Estimated concentration, biased high due to quality control failures. Flag applied by Shannon & Wilson, Inc.

ADEC Alaska Department of Environmental Conservation

PAH polynuclear aromatic hydrocarbon

BTEX benzene, toluene, ethylbenzene, and xylene

Table 3 - Historical Groundwater Results

		AK101	AK102	AK103	EPA SW8021B (BTEX)				EPA 8270D SIM (PAH)				
ADEC Groundwater Cleanup Levels:		GRO 2.2 mg/L	DRO 1.5 mg/L	RRO 1.1 mg/L	Benzene 0.0046 mg/L	Toluene 1.1 mg/L	Ethylbenzene 0.15 mg/L	Total Xylenes 0.19 mg/L	Naphthalene 1.7 µg/L	1-Methylnaphthalene 11 µg/L	2-Methylnaphthalene 36 µg/L	Flourene 290 µg/L	Phenanthrene 170 µg/L
Monitoring Well	Sample Date												
MW-1	Nov 2003	not sampled due to 0.05 feet of floating product											
	Sept 2004	not sampled due to 0.02 feet of floating product											
	Sept 2006	0.88	123	4.23	0.0049	0.0015	0.0087	0.292	—	—	—	—	—
	Sept 2010	not sampled due to 0.05 feet of floating product											
	Sept 2011	0.839	99.5	—	0.00527	0.00472	0.0107	0.343	—	—	—	—	—
	Sept 2012	1.06	69.5	4.38	0.00423	0.00423	0.00815	0.288	—	—	—	—	—
	June 2013	not sampled after 2012 due to broken well casing											
	Oct 2018	not sampled due to 0.13 feet of floating product											
	Oct 2020	not sampled due to 0.02 feet of floating product											
MW-2	Nov 2003	not sampled due to 0.14 feet of floating product											
	Sept 2004	not sampled due to 0.08 feet of floating product											
	Sept 2006	not sampled due to 0.08 feet of floating product											
	Sept 2010	0.234 J	187	6.81	0.0088	0.00103 J	0.00603	0.0302 J	—	—	—	—	—
	Sept 2011	not sampled due to floating product											
	Sept 2012	0.377	19.5	2.08	0.0187	0.0004 J	0.0097	0.0449	—	—	—	—	—
	June 2013	0.384	19.9	2.11	0.0239	0.0003 J	0.00559	0.02702	—	—	—	—	—
	Aug 2014	not sampled due to 0.33 feet of floating product											
	Sept 2015	0.373 B	11.3	1.16	0.0263	0.00037 J	0.0163	0.06333	—	—	—	—	—
	Oct 2017 ^Δ	<0.180 B*	16.5	1.84	0.0138	<0.000500	0.00601	0.0236	51.7 J*	45.3 J*	50.3 J*	3.38 J*	3.02 J*
	Oct 2018	not sampled due to 0.07 feet of floating product											
	Oct 2020	not sampled due to 0.79 feet of floating product											
MW-3	Nov 2003	—	5.3	—	ND	ND	0.001	0.0071	—	—	—	—	—
	Sept 2004	ND	2.71	0.992	ND	ND	ND	ND	—	—	—	—	—
	Sept 2006	ND	0.94	0.43	ND	ND	ND	ND	—	—	—	—	—
	Sept 2010	ND	ND	ND	ND	ND	ND	ND	—	—	—	—	—
	Sept 2011	well could not be located between 2011 and 2015											
WC-3	Nov 2003	not sampled due to 0.03 feet of floating product											
	Sept 2004	not sampled due to 0.04 feet of floating product											
	Sept 2006	not sampled due to 0.02 feet of floating product											
	Sept 2010	not sampled due to 0.04 feet of floating product											
	Sept 2011	not sampled due to 0.01 feet of floating product											
	Sept 2012	not sampled due to 0.01 feet of floating product											
	June 2013	not sampled due to 0.01 feet of floating product											
	Aug 2014	not sampled due to 0.01 feet of floating product											
	Sept 2015	0.165 B	16.4	1.56	0.00482	0.00074 J	0.00308	0.305	—	—	—	—	—
	Oct 2017	<0157 B*	7.67	1.17	0.00654	0.00033 J	0.00336	0.0316	—	—	—	—	—

Table 3 - Historical Groundwater Results

		AK101	AK102	AK103	EPA SW8021B (BTEX)				EPA 8270D SIM (PAH)				
		GRO	DRO	RRO	Benzene	Toluene	Ethylbenzene	Total Xylenes	Naphthalene	1-Methylnaphthalene	2-Methylnaphthalene	Flourene	Phenanthrene
MW-4	Oct 2018	not sampled due to 0.03 feet of floating product											
	Oct 2020	not sampled due to 0.18 feet of floating product											
	Nov 2003	not sampled due to 0.03 feet of floating product											
	Sept 2004	0.354	6.07 J	ND	ND	ND	0.0073	0.0162	—	—	—	—	—
	Sept 2006	0.17	18.5	0.58	ND	ND	0.0094	0.023	—	—	—	—	—
	Sept 2010	1.48	43	0.484	ND	0.00434	0.0174	0.124 J	—	—	—	—	—
	Sept 2011	0.0854 J	3.37	—	0.00018 J	0.0005 J	0.00928	0.0271	—	—	—	—	—
	Sept 2012	0.278	3.82	0.4 J	0.00043 J	ND	0.0113	0.0339	—	—	—	—	—
	June 2013	0.244	9.39	1	0.00025 J	ND	0.00822	0.0226	—	—	—	—	—
	Aug 2014	0.251	1.8 B	ND	ND	ND	0.00635	0.0182	—	—	—	—	—
	Sept 2015	0.263 B	6.27	0.488 J	0.0005 B	ND	0.0147	0.0445	—	—	—	—	—
	Oct 2017	0.458	7.55	0.505 J	0.00018 JH*	<0.0005	0.00808 JH*	0.01973 JH*	—	—	—	—	—
	Oct 2018 ^A	0.164	4.73	<0.706 B*	<0.000250	<0.000500	0.00602	0.01707	64.9	60	65.1	3.55	1.94
	Oct 2020	0.155	5.89	0.818	<0.0005	<0.001	0.00432	0.0117	67.3	69.1	49.4	3.77	1.81
MW-5	Sept 2004	0.228	4.21	ND	ND	ND	0.0032	0.0039	—	—	—	—	—
	Sept 2006	0.06	3.44	ND	ND	ND	0.0022	0.002	—	—	—	—	—
	Sept 2010	Well could not be located in 2010 or 2011											
	Sept 2011	Well could not be located in 2010 or 2011											
	Sept 2012	0.0716	3.14	0.431 J	0.00111	ND	0.00229	0.00312	—	—	—	—	—
	June 2013	0.0459 J	1.61	0.484 J	ND	ND	ND	ND	—	—	—	—	—
	Aug 2014	ND	0.225 J,B	ND	ND	ND	ND	ND	—	—	—	—	—
	Sept 2015	0.103 B	2.6	0.351 J	0.00057 B	0.00048 J	0.00096 J	0.00223	—	—	—	—	—
	Oct 2017	<0.100 B*	3.53	0.568	0.00052	<0.0005	0.00113	0.00222	—	—	—	—	—
	Oct 2018	<0.500	2.03	<0.481 B*	<0.000250	<0.000500	<0.000500	0.000740 J	1.96 JL*	2.71 JL*	0.826 JL*	0.5 JL*	0.235 JL*
MW-6	Oct 2020	<0.100	4.43	1.25	0.00053	<0.001	<0.001	<0.003	4.37	3.28	0.576	1.18	0.455
	Sept 2006	0.3	11.2	0.9	0.0076	ND	0.0155	0.059	—	—	—	—	—
	Sept 2010	0.172 J	12.7	0.636	0.00367	0.000838 J	0.00926	0.0382 J	—	—	—	—	—
	Sept 2011	0.105	118	—	0.00418	0.00034 J	0.00418	0.0185	—	—	—	—	—
	Sept 2012	0.479	8.36	1.09	0.00951	0.00039 J	0.0233	0.105	—	—	—	—	—
	June 2013	0.225	5.46	0.813	0.00577	ND	0.00486	0.0186	—	—	—	—	—
	Aug 2014	ND	6.94	1.41	0.00434	ND	0.00403	0.0183	—	—	—	—	—
	Sept 2015	0.305 B	8.59	1.06	0.00823	0.0004 J	0.0155	0.069	—	—	—	—	—
	Oct 2017	0.2 JH*	11.2	1.39	0.00924	<0.0005	0.0084	0.0376	—	—	—	—	—
	Oct 2018	0.441	4.84	<0.777 B*	<0.000250	<0.000500	0.0382	0.00155 J	56.8	53.6	49.1	3.68	1.45
	Oct 2020	0.164	16.3	2.83	0.0135	<0.001	0.00341	0.0172	8.36	6.60	3.36	1.37	0.358
MW-7	Sept 2011	0.0854 J	19.6	—	0.00107	ND	0.00048 J	0.00352	—	—	—	—	—
	Sept 2012	0.0937	12.4	1.85	0.0012	ND	0.0005 J	0.00139 J	—	—	—	—	—
	June 2013	0.114	10.5	1.46	0.00126	0.00071 J	0.00039 J	0.0017 J	—	—	—	—	—

Table 3 - Historical Groundwater Results

		AK101	AK102	AK103	EPA SW8021B (BTEX)				EPA 8270D SIM (PAH)				
		GRO	DRO	RRO	Benzene	Toluene	Ethylbenzene	Total Xylenes	Naphthalene	1-Methylnaphthalene	2-Methylnaphthalene	Flourene	Phenanthrene
MW-7	Aug 2014	0.0508 J	6.73	1.05 Q	0.00033 J	ND	ND	ND	—	—	—	—	—
	Sept 2015	0.0696 J,B	14	2.19 Q	0.00243 B	ND	0.00052 J	0.000208 J	—	—	—	—	—
	Oct 2017	<0.100 B*	21.1	2.83	0.0014	<0.0005	0.00039 J	0.0015 J	—	—	—	—	—
	Oct 2018	0.0428 J	12	1.34 JH*	0.00186	<0.000500	0.00107	0.00357	7.03	1.44	1.15	0.201	0.133
	Oct 2020 ^Δ	<0.100	30.8	5.81	0.00388	<0.001	0.00197	0.00811	27.3 JH*	1.62 JH*	<0.472	<0.472	<0.472
MW-8	Sept 2012	ND	0.288 J	0.339 J	ND	0.00031 J	0.00035 J	ND	—	—	—	—	—
	June 2013	ND	ND	0.267 J	ND	ND	ND	ND	—	—	—	—	—
	Aug 2014	ND	ND	ND	ND	ND	ND	ND	—	—	—	—	—
	Sept 2015	0.0443 J,B	0.312 J	ND	0.00032 J,B	ND	ND	ND	—	—	—	—	—
	Oct 2017	<0.0500	0.239 J	0.195 J	<0.00025	<0.0005	<0.0005	<0.0015	—	—	—	—	—
	Oct 2018	<0.0500	<0.577 B*	<0.481B*	<0.000250	<0.000500	<0.000500	<0.00150	<0.0481	<0.024	<0.0240	<0.0240	<0.0240
	Oct 2020	<0.100	0.566	0.581	<0.0005	<0.001	<0.001	<0.003	<0.0962	<0.0481	<0.0481	<0.0481	<0.0481
MW-9	Sept 2012	ND	0.189 J	0.199 J	ND	ND	ND	ND	—	—	—	—	—
	June 2013	ND	ND	0.165 J	ND	ND	ND	ND	—	—	—	—	—
	Aug 2014	ND	ND	ND	ND	ND	ND	ND	—	—	—	—	—
	Sept 2015	0.0551 J,B	0.314 J	ND	ND	ND	ND	ND	—	—	—	—	—
	Oct 2017	<0.100 B*	<0.303	0.157 J	<0.00025	<0.0005	<0.0005	<0.0015	—	—	—	—	—
	Oct 2018	<0.0500	<0.577 B*	<0.481B*	<0.0002510	<0.000500	<0.000500	<0.00150	<0.0490	<0.0245	<0.0245	<0.0245	<0.0245
	Oct 2020	<0.100	<0.577	<0.481	<0.0005	<0.001	<0.001	<0.003	<0.0926	<0.0463	<0.0463	<0.0463	<0.0463

- NOTES:
- Sources of historical data: Hart Crowser 2004, 2005, 2006; Clarus Technologies 2010; Restoration Science & Engineering 2011; FES 2012, 2013, 2014, 2015; and Shannon & Wilson, Inc. 2017, 2018, and 2020.

ADEC Groundwater-Cleanup Levels from 18 AAC 75.345, Table C.

ADEC Alaska Department of Environmental Conservation

GRO gasoline range organics

DRO diesel range organics

EPA Environmental Protection Agency

PAH polynuclear aromatic hydrocarbon

RRO residual range organics

Δ Field duplicate sample collected; highest concentration is reported.

ND Analyte was not detected. Reporting limits were not provided for non-detect results.

< Analyte not detected; listed as less than the limit of detection (LOD) unless otherwise flagged due to quality-control failures.

-- or NA Analysis of the analyte was either not requested or the result was not reported in the previous data set.

Bold Detected concentration exceeds the associated ADEC Groundwater-Cleanup Level.

J or Q Estimated concentration, detected greater than the detection limit (DL) and less than the limit of quantitation (LOQ). Flag applied by the laboratory.

B Analyte was detected in an associated blank sample. Flag applied by previous consultant.

B* Result is considered a false-positive and reported at the LOQ due to contamination identified in the corresponding method blank. Flag applied by Shannon & Wilson (*).

J* Result is considered estimated due to an analytical precision failure. Flag applied by Shannon & Wilson (*).

JL* Result is considered estimated with a low analytical bias due to a method or surrogate recovery failure. Flag applied by Shannon & Wilson (*).

JH* Result is considered estimated with a high analytical bias due to a method or surrogate recovery failure. Flag applied by Shannon & Wilson, Inc (*).

Table 4 - Mann-Kendall Trend Test Summary

Analyte	Location	Sample size (n)	MK statistic (S)	Approximate p-value	Confidence in trend	COV	Concentration Trend	Notes
GRO	MW-1	3	1	0.500	50.0%	0.127	No trend	
DRO		3	-3	0.148	85.2%	0.276	Stable	Not sampled since 2012
RRO		2	NA	NA	NA	NA	NA	Not enough data, not sampled since 2012
Benzene		3	-1	0.500	50.0%	0.110	Stable	Not sampled since 2012
Toluene		3	1	0.500	50.0%	0.498	No trend	Not sampled since 2012
Ethylbenzene		3	-1	0.500	50.0%	0.146	Stable	Not sampled since 2012
Xylenes		3	-1	0.500	50.0%	0.100	Stable	Not sampled since 2012
GRO	MW-2	5	-2	0.403	59.7%	0.330	Stable	
DRO		5	-6	0.110	89.0%	1.499	No trend	Not sampled since 2017
RRO		5	-6	0.110	89.0%	0.812	Stable	
Benzene		5	4	0.231	76.9%	0.392	No trend	Not sampled since 2017
Toluene		5	-2	0.403	59.7%	0.565	Stable	Not sampled since 2017
Ethylbenzene		5	0	0.592 [†]	NA	0.521	No trend	Not sampled since 2017
Xylenes		5	-2	0.403	59.7%	0.434	Stable	Not sampled since 2017
GRO	MW-3	3	0	NA	NA	NA	No trend	
DRO		4	-6	0.045	95.5%	0.967	Decreasing	Not sampled since 2010
RRO		3	-3	0.148	85.2%	0.694	Stable	
Benzene		4	0	0.625 [†]	NA	NA	No trend	Not sampled since 2010
Toluene		4	0	0.625 [†]	NA	NA	No trend	Not sampled since 2010
Ethylbenzene		4	-3	0.186	81.4%	0.400	Stable	Not sampled since 2010
Xylenes		4	-3	0.186	81.4%	0.966	Stable	Not sampled since 2010
GRO	MW-4	11	-11	0.218	78.2%	1.091	No trend	
DRO		11	-9	0.267	73.3%	1.175	No trend	
RRO		10	18	0.063	93.7%	0.435	Possibly increasing	
Benzene		11	10	0.219	78.1%	0.397	No trend	

Table 4 - Mann-Kendall Trend Test Summary

Analyte	Location	Sample size (n)	MK statistic (S)	Approximate p-value	Confidence in trend	COV	Concentration Trend	Notes
Toluene	MW-4	11	3	0.407	59.3%	1.288	No trend	
Ethylbenzene		11	-23	0.043	95.7%	0.416	Decreasing	
Xylenes		11	-17	0.106	89.4%	0.974	Stable	
GRO	MW-5	9	-2	0.458	54.2%	0.632	Stable	
DRO		9	-2	0.458	54.2%	0.479	Stable	
RRO		9	21	0.022	97.8%	0.651	Increasing	Most recent result is elevated over historical
Benzene		9	6	0.282	71.8%	0.650	No trend	
Toluene		9	5	0.281	71.9%	0.303	No trend	
Ethylbenzene		9	-13	0.101	89.9%	0.710	Stable	
Xylenes		9	-9	0.201	79.9%	0.431	Stable	
GRO		10	-1	0.500	50.0%	0.566	Stable	
DRO	MW-6	10	-6	0.327	67.3%	1.694	No trend	
RRO		9	12	0.126	87.4%	0.546	No trend	
Benzene		10	11	0.186	81.4%	0.567	No trend	
Toluene		10	11	0.168	83.2%	0.381	No trend	
Ethylbenzene		10	-6	0.327	67.3%	0.875	Stable	
Xylenes		10	-19	0.054	94.6%	0.816	Decreasing	
GRO		8	-8	0.193	80.7%	0.348	Stable	
DRO	MW-7	8	6	0.268	73.2%	0.480	No trend	
RRO		7	7	0.184	81.6%	0.691	No trend	
Benzene		8	14	0.054	94.6%	0.662	Possibly increasing	Most recent result is elevated over historical.
Toluene		8	5	0.255	74.5%	0.309	No trend	
Ethylbenzene		8	14	0.051	94.9%	0.752	Possibly increasing	Most recent result is elevated over historical.
Xylenes		8	7	0.227	77.3%	0.917	No trend	

Table 4 - Mann-Kendall Trend Test Summary

Analyte	Location	Sample size (n)	MK statistic (S)	Approximate p-value	Confidence in trend	COV	Concentration Trend	Notes
GRO	MW-8	7	5	0.223	77.7%	0.344	No trend	
DRO		7	10	0.086	91.4%	0.381	Possibly increasing	
RRO		7	2	0.440	56.0%	0.420	No trend	
Benzene		7	7	0.127	87.3%	0.317	No trend	
Toluene		7	11	0.029	97.1%	0.391	Increasing	Trend likely due to laboratory reporting limits
Ethylbenzene		7	11	0.029	97.1%	0.375	Increasing	Trend likely due to laboratory reporting limits
Xylenes		7	6	0.106	89.4%	0.331	No trend	
GRO	MW-9	7	10	0.063	93.7%	0.369	Possibly increasing	
DRO		7	17	0.007	99.3%	0.411	Increasing	Trend likely due to laboratory reporting limits
RRO		7	9	0.109	89.1%	0.494	No trend	
Benzene		7	6	0.106	89.4%	0.331	No trend	
Toluene		7	6	0.106	89.4%	0.331	No trend	
Ethylbenzene		7	6	0.106	89.4%	0.331	No trend	
Xylenes		7	6	0.106	89.4%	0.331	No trend	
GRO	WC-3	2	NA	NA	NA	NA	NA	Not enough data, not sampled since 2017
DRO		2	NA	NA	NA	NA	NA	Not enough data, not sampled since 2017
RRO		2	NA	NA	NA	NA	NA	Not enough data, not sampled since 2017
Benzene		2	NA	NA	NA	NA	NA	Not enough data, not sampled since 2017
Toluene		2	NA	NA	NA	NA	NA	Not enough data, not sampled since 2017
Ethylbenzene		2	NA	NA	NA	NA	NA	Not enough data, not sampled since 2017
Xylenes		2	NA	NA	NA	NA	NA	Not enough data, not sampled since 2017

NOTES:

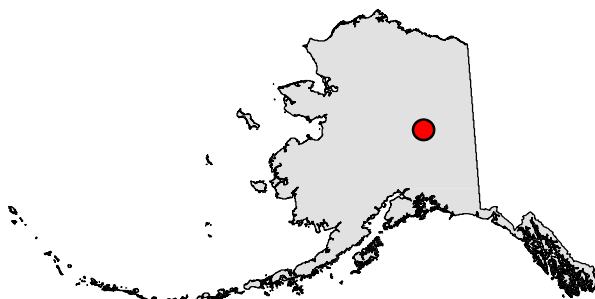
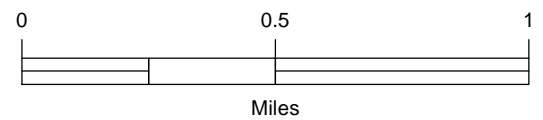
- ‡ Tabulated p value reported.
 COV coefficient of variation
 NA Not enough data to provide result.



Map adapted from aerial imagery provided by Pictometry International Corporation, 2017.

LEGEND

Project Area



Alaska Railroad Corporation
Fairbanks Rail Yard
Fairbanks, Alaska

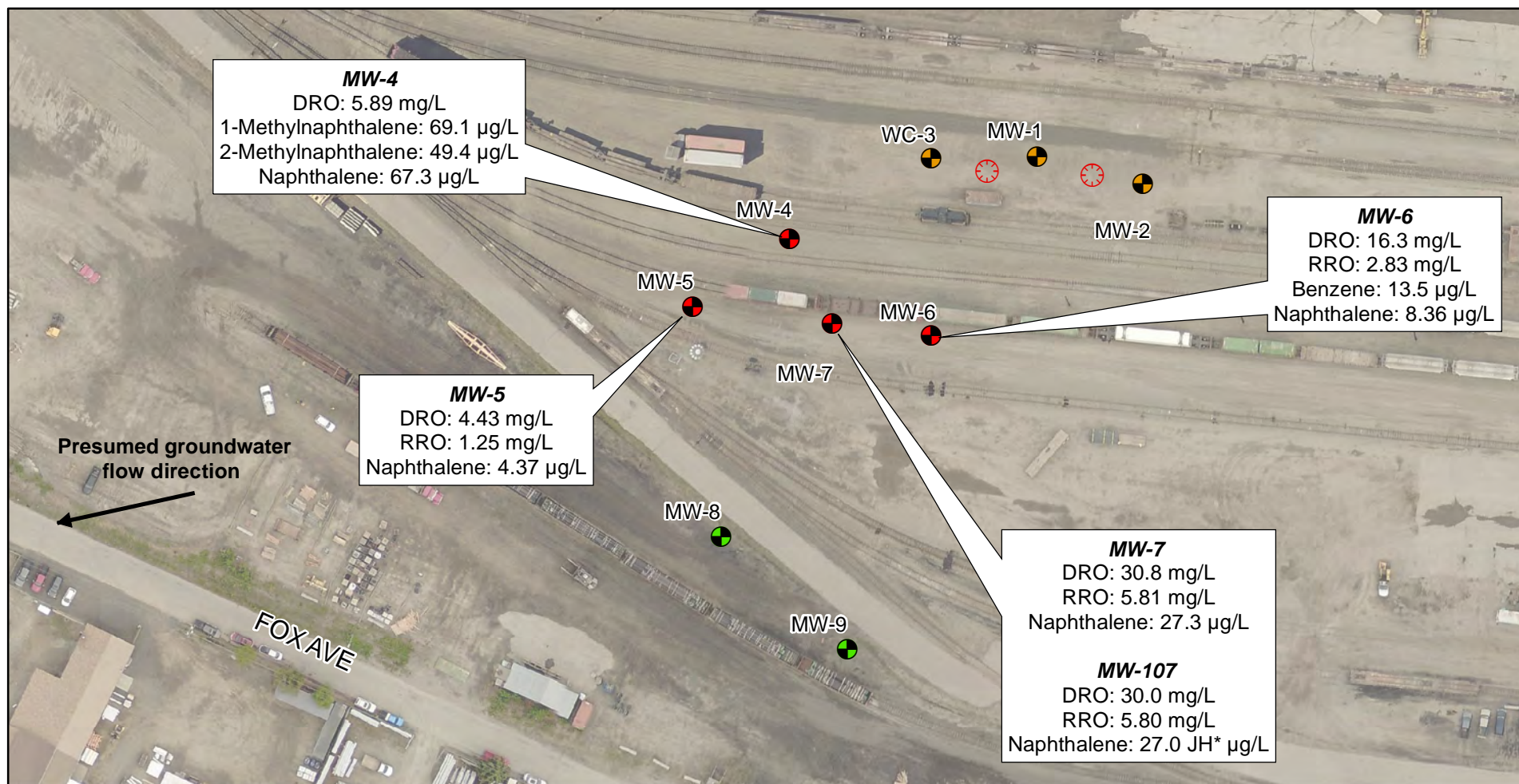
SITE VICINITY

January 2021

105990-001

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

Figure 1

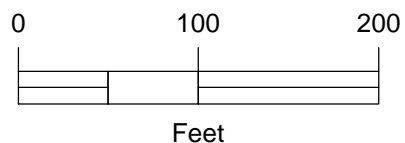


Map adapted from aerial imagery provided by Pictometry International Corporation, 2017.

LEGEND

- Analytes detected at concentrations exceeding ADEC Cleanup Levels.
- Analytes detected at concentrations below ADEC Cleanup Levels.
- Product measured in well.

Former Storage Tanks



Alaska Railroad Corporation
Fairbanks Rail Yard
Fairbanks, Alaska

GROUNDWATER EXCEEDANCES

January 2021

105990-001

SHANNON & WILSON, INC.
GEOTECHNICAL AND ENVIRONMENTAL CONSULTANTS

Figure 2

Appendix A

Field Forms

CONTENTS

- Field Activities Daily Log
- Monitoring Well Sampling Logs

FIELD ACTIVITIES DAILY LOG

FIELD ACTIVITIES DAILY LOG

Date 10/6/20

Sheet 1 of 1

Project No. 105990-001

Project Name: Fairbanks Rail Yard

Field activity subject: Groundwater sampling

Description of daily activities and events:

730 Calibrate YSI, pack truck

830 Depart office

845 Arrive onsite. Discuss Monitoring Well locations with Russel. MW-8 covered with wood piles. Meet Garret, RR flagger.

945 Locate MW-1, MW-2, + WC-3. All had product in well. WC-3 has ~ 8" diameter metal casing, Difficult to use interface meter.

1045 Begin sampling MWs. All checked for product prior to sampling.

Hurricane XL pump got stuck in bottom of MW-7

TXG onsite w/ hook + rods. ALF onsite w/ well camera.

Pump eventually unstuck.

1500 Continue MW sampling. MW-5, MW-6

1700 RR flagger Garret left site. Continue MW sampling. All MW purge water treated w/ GAC on site.

1900 Depart site

1930 Unpack, done for day.

Visitors on site: /

Changes from plans/specifications and other special orders and important decisions:

Weather conditions: 40° F Overcast, few showers.

Important telephone calls: /

Personnel on site: RLW, JKR, TXG, ALF

Signature: [Signature]

Date: 10/6/20

MONITORING WELL SAMPLING LOGS

MONITORING WELL SAMPLING LOG

Owner/Client Alaska Railroad Corporation
 Location Fairbanks Rail Yard
 Sampling Personnel RLW, JKR
 Weather Conditions overcast Air Temp. (°F) 40

Project No. 105990-001
 Date 10/6/20
 Well MW-1
 Time started 1000
 Time completed 1015

Sample No. _____ Time _____
 Duplicate _____ Time _____
 Equipment Blank Product Time _____

Pump _____
 Purging Method portable / dedicated pump
 Pumping Start _____
 Purge Rate (gal./min.) _____
 Pumping End Product
 Pump Set Depth Below MP (ft.) _____
 KuriTec Tubing (ft.) _____
 TruPoly Tubing (ft.) _____

Depth to product 13.42 ft
 Diameter and Type of Casing 2" PVC
 Approximate Total Depth of Well Below MP (ft.) _____
 Measured Total Depth of Well Below MP (ft.) _____
 Depth to Water Below MP (ft.) 13.44
 Depth to Ice (if frozen) Below MP (ft.) _____
 Feet of Water in Well _____
 Gallons per foot _____
 Gallons in Well _____
 Purge Water Volume (gal.) _____
 Purge Water Disposal _____

Monument Condition Good
 Casing Condition Good
 Wiring Condition n/a
 (dedicated pumps) _____

Measuring Point (MP) Top of Casing (TOC)

Monument type: Stickup / Flushmount
 Measurement method: Rod & level / Tape measure n/a

ground surface
 Top-of-casing to monument (ft.) 0.27
 Monument to ground surface (ft.) _____

Datalogger type n/a
 Datalogger serial # n/a
 Measured cable length (ft.) n/a

n/a Lock present and operational
n/a Well name legible on outside of well
n/a Evidence of frost-jacking none

Notes Amt of Product in well: 0.02'
Product

WELL CASING VOLUMES

Diameter of Well [ID-inches]	CMT	1 1/4	2	3	4	6	8
Gallons per lineal foot	0.000253	0.08	0.17	0.38	0.66	1.5	2.6

Well No. MW-1

MONITORING WELL SAMPLING LOG

Owner/Client Alaska Railroad Corporation
 Location Fairbanks Rail Yard
 Sampling Personnel RLW, JKR
 Weather Conditions overcast Air Temp. (°F) 40

Project No. 105990
 Date 10/6/20
 Well MW-2
 Time started 950
 Time completed 1000

Sample No. _____ Time _____
 Duplicate _____ Time _____
 Equipment Blank _____ Time _____

Pump _____
 Purging Method portable / dedicated pump
 Pumping Start _____
 Purge Rate (gal./min.) _____
 Pumping End _____
 Pump Set Depth Below MP (ft.) _____
 KuriTec Tubing (ft.) _____
 TruPoly Tubing (ft.) _____

Depth to product: 12.87 ft
 Diameter and Type of Casing 2" PVC
 Approximate Total Depth of Well Below MP (ft.) _____
 Measured Total Depth of Well Below MP (ft.) _____
 Depth to Water Below MP (ft.) 13.66
 Depth to Ice (if frozen) Below MP (ft.) _____
 Feet of Water in Well _____
 Gallons per foot _____
 Gallons in Well _____
 Purge Water Volume (gal.) _____
 Purge Water Disposal _____

Monument Condition Good
 Casing Condition Good
 Wiring Condition n/a
 (dedicated pumps) _____

Measuring Point (MP) Top of Casing (TOC)

Monument type: Stickup / Flushmount
 Measurement method: Rod & level / Tape measure n/a

Top-of-casing to monument (ft.) 0.31
 Monument to ground surface (ft.) Ground surface

Datalogger type n/a
 Datalogger serial # n/a
 Measured cable length (ft.) n/a

☒ Lock present and operational
☒ Well name legible on outside of well
☒ Evidence of frost-jacking OK

Notes 0.79' of Product
Product Present

WELL CASING VOLUMES

Diameter of Well [ID-inches]	CMT	1 1/4	2	3	4	6	8
Gallons per lineal foot	0.000253	0.08	0.17	0.38	0.66	1.5	2.6

Well No. MW-2

MONITORING WELL SAMPLING LOG

Owner/Client Alaska Railroad Corporation
 Location Fairbanks Rail Yard
 Sampling Personnel RW, JKR
 Weather Conditions Overcast Air Temp. (°F) 40

Project No. 105990-001
 Date 10/7/20
 Well WC-3
 Time started 1015
 Time completed 1030

Sample No. _____ Time _____
 Duplicate _____ Time _____
 Equipment Blank _____ Time _____

Pump _____
 Purging Method portable / dedicated pump
 Pumping Start _____
 Purge Rate (gal./min.) _____
 Pumping End _____
 Pump Set Depth Below MP (ft.) _____
 KuriTec Tubing (ft.) _____
 TruPoly Tubing (ft.) _____

Depth to product 13.45
 Diameter and Type of Casing 8.25 (ID)
 Approximate Total Depth of Well Below MP (ft.) _____
 Measured Total Depth of Well Below MP (ft.) _____
 Depth to Water Below MP (ft.) 13.63
 Depth to Ice (if frozen) Below MP (ft.) _____
 Feet of Water in Well _____
 Gallons per foot _____
 Gallons in Well _____
 Purge Water Volume (gal.) _____
 Purge Water Disposal _____

Monument Condition Good

Casing Condition Good

Wiring Condition n/a
 (dedicated pumps)

Measuring Point (MP) Top of Casing (TOC)

Monument type: Stickup / Flushmount
 Measurement method: Rod & level / Tape measure n/a

Top-of-casing to monument (ft.) _____
 Monument to ground surface (ft.) _____

Datalogger type n/a
 Datalogger serial # n/a
 Measured cable length (ft.) n/a

☒ Lock present and operational n/a
☒ Well name legible on outside of well
☒ Evidence of frost-jacking good

Notes Difficult to measure product bc metal casing interfering

0.18 ft of product

WELL CASING VOLUMES

Diameter of Well [ID-inches]	CMT	1 1/4	2	3	4	6	8
Gallons per lineal foot	0.000253	0.08	0.17	0.38	0.66	1.5	2.6

Well No. WC-3

MONITORING WELL SAMPLING LOG

Owner/Client Alaska Railroad Corporation
 Location Fairbanks Rail Yard
 Sampling Personnel RLW, JKR
 Weather Conditions Rainy Air Temp. (°F) 40

Project No. 105990-001
 Date 10/6/20
 Well MW-4
 Time started 1045
 Time completed 1215

Sample No. MW-4 Time 1150
 Duplicate - Time -
 Equipment Blank - Time -

Pump Hurricane XL
 Purging Method portable / dedicated pump
 Pumping Start 1126
 Purge Rate (gal./min.) 90 500ml/min
 Pumping End 1147
 Pump Set Depth Below MP (ft.) 12
 KuriTec Tubing (ft.) 20
 TruPoly Tubing (ft.) -

Diameter and Type of Casing 2" PVC
 Approximate Total Depth of Well Below MP (ft.) 17.25
 Measured Total Depth of Well Below MP (ft.) 17.25 + 1.27 = 18.52
 Depth to Water Below MP (ft.) 13.69
 Depth to Ice (if frozen) Below MP (ft.) -
 Feet of Water in Well 4.83
 Gallons per foot 0.17
 Gallons in Well 0.8
 Purge Water Volume (gal.) 3.5
 Purge Water Disposal Gac to ground

Monument Condition n/a
 Casing Condition Good
 Wiring Condition n/a
 (dedicated pumps)

Measuring Point (MP) Top of Casing (TOC)

Monument type: Stickup / Flushmount
 Measurement method: Rod & level / Tape measure

Top-of-casing to ^{surface} monument (ft.) 0.13
 Monument to ground surface (ft.) -

Datalogger type n/a
 Datalogger serial # n/a
 Measured cable length (ft.) n/a

☒ Lock present and operational
☒ Well name legible on outside of well
☒ Evidence of frost-jacking Yes, casing needs trim

Notes measured flow rate w/ plastic up (500ml size)
Well casing may need trimming next sample year

WELL CASING VOLUMES

Diameter of Well [ID-inches]	CMT	1 1/4	2	3	4	6	8
Gallons per lineal foot	0.000253	0.08	0.17	0.38	0.66	1.5	2.6

Well No. MW-4

MONITORING WELL SAMPLING LOG

Owner/Client Alaska Railroad Corporation
 Location Fairbanks Rail Yard
 Sampling Personnel RLW / JKR
 Weather Conditions Overcast Air Temp. (°F) 50

Project No. 105990-001
 Date 10/16/20
 Well MW-5
 Time started 1518
 Time completed 1600

Sample No. MW-5 Time 1539
 Duplicate - Time -
 Equipment Blank - Time -

Pump Hurricane XL
 Purging Method portable / dedicated pump
 Pumping Start 1519
 Purge Rate (gal./min.) 400 ml/min
 Pumping End 1536

Diameter and Type of Casing 2" PVC
 Approximate Total Depth of Well Below MP (ft.) 18
 Measured Total Depth of Well Below MP (ft.) 17.46 + 1.27 = 18.73
 Depth to Water Below MP (ft.) 13.04
 Depth to Ice (if frozen) Below MP (ft.) -
 Feet of Water in Well 5.69
 Gallons per foot 0.17
 Gallons in Well 1.0
 Purge Water Volume (gal.) 4
 Purge Water Disposal Grac. to surface

Pump Set Depth Below MP (ft.) 12
 KuriTec Tubing (ft.) 25
 TruPoly Tubing (ft.) -

Monument Condition Good

Casing Condition Good

Wiring Condition n/a
 (dedicated pumps)

Measuring Point (MP) Top of Casing (TOC)

Monument type: Stickup / Flushmount
 Measurement method: Rod & level / Tape measure

Top-of-casing to ground surface monument (ft.) 0.15
 Monument to ground surface (ft.) -

Datalogger type n/a
 Datalogger serial # n/a
 Measured cable length (ft.) n/a

n/a Lock present and operational
n/a Well name legible on outside of well
n/a Evidence of frost-jacking Yes. casing needs trim

Notes Well casing may need trimming next sample year

WELL CASING VOLUMES

Diameter of Well [ID-inches]	CMT	1 1/4	2	3	4	6	8
Gallons per lineal foot	0.000253	0.08	0.17	0.38	0.66	1.5	2.6

Well No. MW-5

MONITORING WELL SAMPLING LOG

Owner/Client Alaska Railroad Corporation
 Location Fairbanks Rail Yard
 Sampling Personnel RLW, JKR
 Weather Conditions overcast Air Temp. (°F) 50

Project No. 105990-001
 Date 10/6/20
 Well MW-6
 Time started 1600
 Time completed 1700

Sample No. MW-6 Time 1635
 Duplicate - Time -
 Equipment Blank - Time -

Pump Hurricane XL
 Purging Method portable / dedicated pump
 Pumping Start 1615
 Purge Rate (gal./min.) 500 ml/min
 Pumping End 1635
 Pump Set Depth Below MP (ft.) 12
 KuriTec Tubing (ft.) 20
 TruPoly Tubing (ft.) -

Diameter and Type of Casing 2" PVC
 Approximate Total Depth of Well Below MP (ft.) 18
 Measured Total Depth of Well Below MP (ft.) 17.01 + 1.27 = 18.28
 Depth to Water Below MP (ft.) 13.00
 Depth to Ice (if frozen) Below MP (ft.) -
 Feet of Water in Well 5.28
 Gallons per foot 0.17
 Gallons in Well 8 0.9
 Purge Water Volume (gal.) 4.5
 Purge Water Disposal Grac to surface

Monument Condition Good
 Casing Condition Good
 Wiring Condition n/a
 (dedicated pumps)

Measuring Point (MP) Top of Casing (TOC)

Monument type: Stickup / Flushmount
 Measurement method: Rod & level / Tape measure

Top-of-casing to monument (ft.) ground surface 0.14
 Monument to ground surface (ft.) -

Datalogger type n/a
 Datalogger serial # n/a
 Measured cable length (ft.) n/a

☒ Lock present and operational
☒ Well name legible on outside of well
☒ Evidence of frost-jacking

Notes Measured flow w/ cup
Well casing may need trimming next sample year

WELL CASING VOLUMES

Diameter of Well [ID-inches]	CMT	1 1/4	2	3	4	6	8
Gallons per lineal foot	0.000253	0.08	0.17	0.38	0.66	1.5	2.6

Well No. MW-6

MONITORING WELL SAMPLING LOG

Owner/Client Alaska Railroad Corporation
 Location Fairbanks Rail Yard
 Sampling Personnel RLW, JKR
 Weather Conditions Overcast Air Temp. (°F) 40

Project No. 105990-001
 Date 10/6/20
 Well MW-7
 Time started 1220
 Time completed 1500

Sample No. MW-7 Time 1428
 Duplicate MW-107 Time 1418
 Equipment Blank - Time -

Pump Hurricane XL
 Purging Method portable / dedicated pump
 Pumping Start 1407
 Purge Rate (gal./min.) 500 ml/min
 Pumping End 1425

Pump Set Depth Below MP (ft.) 11
 KuriTec Tubing (ft.) 25
 TruPoly Tubing (ft.) -

Diameter and Type of Casing 2" PVC
 Approximate Total Depth of Well Below MP (ft.) 16.25 + 1.27
 Measured Total Depth of Well Below MP (ft.) 17.52
 Depth to Water Below MP (ft.) 12.79
 Depth to Ice (if frozen) Below MP (ft.) -
 Feet of Water in Well 4.23
 Gallons per foot 0.17
 Gallons in Well 0.8
 Purge Water Volume (gal.) 4
 Purge Water Disposal GAC to ground

Monument Condition Good
 Casing Condition Good
 Wiring Condition N/A
 (dedicated pumps)

Measuring Point (MP) Top of Casing (TOC)

Monument type: Stickup / Flushmount
 Measurement method: Rod & level / Tape measure

Top-of-casing to monument (ft.) Ground surface 0.41
 Monument to ground surface (ft.) -

Datalogger type n/a
 Datalogger serial # n/a
 Measured cable length (ft.) n/a

- ☒ Lock present and operational
☒ Well name legible on outside of well
☒ Evidence of frost-jacking

Notes Pump stuck in well. Used well camera + hook + rod to unlodge

WELL CASING VOLUMES

Diameter of Well [ID-inches]	CMT	1¼	2	3	4	6	8
Gallons per lineal foot	0.000253	0.08	0.17	0.38	0.66	1.5	2.6

Well No. MW-7

MONITORING WELL SAMPLING LOG

Owner/Client Alaska Railroad Corporation
 Location Fairbanks Rail Yard
 Sampling Personnel RLW, JKR
 Weather Conditions overcast Air Temp. (°F) 40

Project No. 105990-001
 Date 10/6/20
 Well MW-8
 Time started 1700
 Time completed 1755

Sample No. MW-8 Time 1741
 Duplicate - Time -
 Equipment Blank - Time -

Pump Hurricane XL
 Purging Method portable / dedicated pump
 Pumping Start 1718
 Purge Rate (gal./min.) 500 ml/min
 Pumping End 1738

Pump Set Depth Below MP (ft.) ~12
 KuriTec Tubing (ft.) 25
 TruPoly Tubing (ft.) -

Diameter and Type of Casing 2" PVC
 Approximate Total Depth of Well Below MP (ft.) 18
 Measured Total Depth of Well Below MP (ft.) 18.02 + 1.27 = 19.29
 Depth to Water Below MP (ft.) 11.38
 Depth to Ice (if frozen) Below MP (ft.) 9.94
 Feet of Water in Well 7.91
 Gallons per foot 0.17
 Gallons in Well 1.3
 Purge Water Volume (gal.) 5

Purge Water Disposal GAC to surface

Monument Condition Good

Casing Condition Good

Wiring Condition n/a
 (dedicated pumps)

Measuring Point (MP) Top of Casing (TOC)

Monument type: Stickup / Flushmount
 Measurement method: Rod & level / Tape measure

ground surface
 Top-of-casing to monument (ft.) 0.46
 Monument to ground surface (ft.) -

Datalogger type n/a
 Datalogger serial # n/a
 Measured cable length (ft.) n/a

n/a Lock present and operational
n/a Well name legible on outside of well
n/a Evidence of frost-jacking

Notes Measured flow w/ 500 ml cup

Well located under wood pile

WELL CASING VOLUMES

Diameter of Well [ID-inches]	CMT	1 1/4	2	3	4	6	8
Gallons per lineal foot	0.000253	0.08	0.17	0.38	0.66	1.5	2.6

Well No. MW-8

MONITORING WELL SAMPLING LOG

Owner/Client Alaska Railroad Corporation
 Location Fairbanks Rail Yard
 Sampling Personnel RLW JKR
 Weather Conditions overcast Air Temp. (°F) 50

Project No. 105990-001
 Date 10/6/20
 Well MW-9
 Time started 1800
 Time completed 1900

Sample No. MW-9 Time 1823
 Duplicate — Time —
 Equipment Blank — Time —

Pump Hurricane XL
 Purging Method portable / dedicated pump
 Pumping Start 6:50/8:05
 Purge Rate (gal./min.) 500 ml/min
 Pumping End 1820

Pump Set Depth Below MP (ft.) 6.5'
 KuriTec Tubing (ft.) 20
 TruPoly Tubing (ft.) —

Diameter and Type of Casing 2" PVC
 Approximate Total Depth of Well Below MP (ft.) 19
 Measured Total Depth of Well Below MP (ft.) 18.38 + 1.27 = 19.65
 Depth to Water Below MP (ft.) 11.74
 Depth to Ice (if frozen) Below MP (ft.) —
 Feet of Water in Well 7.91
 Gallons per foot 0.17
 Gallons in Well 1.34
 Purge Water Volume (gal.) 4
 Purge Water Disposal GAC to ground

Monument Condition Good

Casing Condition Good

Wiring Condition n/a
 (dedicated pumps)

Measuring Point (MP) Top of Casing (TOC)

Monument type: Stickup / Flushmount
 Measurement method: Rod & level / Tape measure

Top-of-casing to ground surface monument (ft.) 0.43
 Monument to ground surface (ft.) —

Datalogger type n/a
 Datalogger serial # n/a
 Measured cable length (ft.) n/a

☒ Lock present and operational
☒ Well name legible on outside of well
☒ Evidence of frost-jacking

Notes Measured flow w/ plastic 500 ml cup

WELL CASING VOLUMES

Diameter of Well [ID-inches]	CMT	1 1/4	2	3	4	6	8
Gallons per lineal foot	0.000253	0.08	0.17	0.38	0.66	1.5	2.6

Well No. MW-9

Appendix B

SGS Laboratory Report

CONTENTS

- WO 1209732

WO 1209732

APPENDIX B: SGS LABORATORY REPORT

Laboratory Report of Analysis

To: AK Railroad Corp (ARRC)
327 W. Ship Creek Ave
Anchorage, AK 99501
907265-2429

Report Number: **1209732**

Client Project: **105990-001 Fairbanks Rail Yard**

Dear Russell Grandel,

Enclosed are the results of the analytical services performed under the referenced project for the received samples and associated QC as applicable. The samples are certified to meet the requirements of the National Environmental Laboratory Accreditation Conference Standards. Copies of this report and supporting data will be retained in our files for a period of ten years in the event they are required for future reference. All results are intended to be used in their entirety and SGS is not responsible for use of less than the complete report. Any samples submitted to our laboratory will be retained for a maximum of fourteen (14) days from the date of this report unless other archiving requirements were included in the quote.

If there are any questions about the report or services performed during this project, please call Chuck at (907) 562-2343. We will be happy to answer any questions or concerns which you may have.

Thank you for using SGS North America Inc. for your analytical services. We look forward to working with you again on any additional analytical needs.

Sincerely,
SGS North America Inc.

Chuck Homestead
Project Manager
Charles.Homestead@sgs.com

Date

Case Narrative

SGS Client: **AK Railroad Corp (ARRC)**
 SGS Project: **1209732**
 Project Name/Site: **105990-001 Fairbanks Rail Yard**
 Project Contact: **Russell Grandel**

Refer to sample receipt form for information on sample condition.

MW-107 (1209732005) PS

8270D SIM - PAH surrogate recovery for 2-Methylnaphthalene d10 does not meet QC criteria due to matrix interference.

LCSD for HBN 1812956 [VXX/3652 (1587407) LCSD

AK101 - LCSD recovery for GRO does not meet QC criteria. This analyte was not reported above the LOQ in the associated samples.

LCSD for HBN 1812959 [VXX/3652 (1587424) LCSD

AK101 - LCSD recovery for GRO does not meet QC criteria. This analyte was not reported above the LOQ in the associated samples.

1205488001MS (1586847) MS

8270D SIM - PAH MS recovery for several analytes do not meet QC criteria. Refer to the LCS for accuracy requirements.

1205488001MSD (1586848) MSD

8270D SIM - PAH MSD recovery for several analytes do not meet QC criteria. Refer to the LCS for accuracy requirements.

8270D SIM - PAH MS/MSD RPD for several analytes do not meet QC criteria. Results for these analytes are below the LOQ in the parent sample.

Revised Report - Revision 1 - This report has been reissued in Level 2 format.

*QC comments may be associated with the field samples found in this report. When applicable, comments will be applied to associated field samples.

Print Date: 11/13/2020 12:20:06PM

Laboratory Qualifiers

Enclosed are the analytical results associated with the above work order. The results apply to the samples as received. All results are intended to be used in their entirety and SGS is not responsible for use of less than the complete report. This document is issued by the Company under its General Conditions of Service accessible at <http://www.sgs.com/en/Terms-and-Conditions.aspx>. Attention is drawn to the limitation of liability, indemnification and jurisdiction issues defined therein.

Any holder of this document is advised that information contained hereon reflects the Company's findings at the time of its intervention only and within the limits of Client's instructions, if any. The Company's sole responsibility is to its Client and this document does not exonerate parties to a transaction from exercising all their rights and obligations under the transaction documents. Any unauthorized alteration, forgery or falsification of the context or appearance of this document is unlawful and offenders may be prosecuted to the fullest extent of the law.

SGS maintains a formal Quality Assurance/Quality Control (QA/QC) program. A copy of our Quality Assurance Plan (QAP), which outlines this program, is available at your request. The laboratory certification numbers are AK00971 (DW Chemistry & Microbiology) & 17-021 (CS) for ADEC and 2944.01 for DOD ELAP/ISO17025 (RCRA methods: 1020B, 1311, 3010A, 3050B, 3520C, 3550C, 5030B, 5035A, 6020B, 7470A, 7471B, 8015C, 8021B, 8082A, 8260D, 8270D, 8270D-SIM, 9040C, 9045D, 9056A, 9060A, AK101 and AK102/103). SGS is only certified for the analytes listed on our Drinking Water Certification (DW methods: 200.8, 2130B, 2320B, 2510B, 300.0, 4500-CN-C,E, 4500-H-B, 4500-NO3-F, 4500-P-E and 524.2) and only those analytes will be reported to the State of Alaska for compliance. Except as specifically noted, all statements and data in this report are in conformance to the provisions set forth by the SGS QAP and, when applicable, other regulatory authorities.

The following descriptors or qualifiers may be found in your report:

*	The analyte has exceeded allowable regulatory or control limits.
!	Surrogate out of control limits.
B	Indicates the analyte is found in a blank associated with the sample.
CCV/CVA/CVB	Continuing Calibration Verification
CCCV/CVC/CVCA/CVCB	Closing Continuing Calibration Verification
CL	Control Limit
DF	Analytical Dilution Factor
DL	Detection Limit (i.e., maximum method detection limit)
E	The analyte result is above the calibrated range.
GT	Greater Than
IB	Instrument Blank
ICV	Initial Calibration Verification
J	The quantitation is an estimation.
LCS(D)	Laboratory Control Spike (Duplicate)
LLQC/LLIQC	Low Level Quantitation Check
LOD	Limit of Detection (i.e., 1/2 of the LOQ)
LOQ	Limit of Quantitation (i.e., reporting or practical quantitation limit)
LT	Less Than
MB	Method Blank
MS(D)	Matrix Spike (Duplicate)
ND	Indicates the analyte is not detected.
RPD	Relative Percent Difference
TNTC	Too Numerous To Count
U	Indicates the analyte was analyzed for but not detected.

Note: Sample summaries which include a result for "Total Solids" have already been adjusted for moisture content. All DRO/RRO analyses are integrated per SOP.

Sample Summary

<u>Client Sample ID</u>	<u>Lab Sample ID</u>	<u>Collected</u>	<u>Received</u>	<u>Matrix</u>
MW-4	1209732001	10/06/2020	10/08/2020	Water (Surface, Eff., Ground)
MW-5	1209732002	10/06/2020	10/08/2020	Water (Surface, Eff., Ground)
MW-6	1209732003	10/06/2020	10/08/2020	Water (Surface, Eff., Ground)
MW-7	1209732004	10/06/2020	10/08/2020	Water (Surface, Eff., Ground)
MW-107	1209732005	10/06/2020	10/08/2020	Water (Surface, Eff., Ground)
MW-8	1209732006	10/06/2020	10/08/2020	Water (Surface, Eff., Ground)
MW-9	1209732007	10/06/2020	10/08/2020	Water (Surface, Eff., Ground)
Trip Blank	1209732008	10/06/2020	10/08/2020	Water (Surface, Eff., Ground)

<u>Method</u>	<u>Method Description</u>
8270D SIM LV (PAH)	8270 PAH SIM GC/MS LV
AK101	AK101/8021 Combo.
SW8021B	AK101/8021 Combo.
AK102	DRO/RRO Low Volume Water
AK103	DRO/RRO Low Volume Water

Print Date: 11/13/2020 12:20:10PM

Detectable Results Summary

Client Sample ID: **MW-4**

Lab Sample ID: 1209732001

Polynuclear Aromatics GC/MS

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
1-Methylnaphthalene	69.1	ug/L
2-Methylnaphthalene	49.4	ug/L
Acenaphthene	1.64	ug/L
Fluorene	3.77	ug/L
Naphthalene	67.3	ug/L
Phenanthrene	1.81	ug/L
Semivolatile Organic Fuels		
Diesel Range Organics	5.89	mg/L
Residual Range Organics	0.818	mg/L
Volatile Fuels		
Ethylbenzene	4.32	ug/L
Gasoline Range Organics	0.155	mg/L
o-Xylene	2.85	ug/L
P & M -Xylene	8.81	ug/L
Xylenes (total)	11.7	ug/L

Client Sample ID: **MW-5**

Lab Sample ID: 1209732002

Polynuclear Aromatics GC/MS

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
1-Methylnaphthalene	3.28	ug/L
2-Methylnaphthalene	0.576	ug/L
Acenaphthene	0.588	ug/L
Fluorene	1.18	ug/L
Naphthalene	4.37	ug/L
Phenanthrene	0.455	ug/L
Semivolatile Organic Fuels		
Diesel Range Organics	4.43	mg/L
Residual Range Organics	1.25	mg/L
Volatile Fuels		
Benzene	0.530	ug/L

Client Sample ID: **MW-6**

Lab Sample ID: 1209732003

Polynuclear Aromatics GC/MS

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
1-Methylnaphthalene	6.60	ug/L
2-Methylnaphthalene	3.36	ug/L
Acenaphthene	1.12	ug/L
Fluorene	1.37	ug/L
Naphthalene	8.36	ug/L
Phenanthrene	0.358	ug/L
Semivolatile Organic Fuels		
Diesel Range Organics	16.3	mg/L
Residual Range Organics	2.83	mg/L
Volatile Fuels		
Benzene	13.5	ug/L
Ethylbenzene	3.41	ug/L
Gasoline Range Organics	0.164	mg/L
o-Xylene	7.58	ug/L
P & M -Xylene	9.61	ug/L
Xylenes (total)	17.2	ug/L

Print Date: 11/13/2020 12:20:12PM

SGS North America Inc.

200 West Potter Drive, Anchorage, AK 99518
t 907.562.2343 f 907.561.5301 www.us.sgs.com

Member of SGS Group

Detectable Results Summary

Client Sample ID: **MW-7**

Lab Sample ID: 1209732004

Polynuclear Aromatics GC/MS

Semivolatile Organic Fuels

Volatile Fuels

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Acenaphthene	0.732	ug/L
Naphthalene	27.3	ug/L
Diesel Range Organics	30.8	mg/L
Residual Range Organics	5.81	mg/L
Benzene	3.88	ug/L
Ethylbenzene	1.92	ug/L
o-Xylene	3.67	ug/L
P & M -Xylene	4.42	ug/L
Xylenes (total)	8.09	ug/L

Client Sample ID: **MW-107**

Lab Sample ID: 1209732005

Polynuclear Aromatics GC/MS

Semivolatile Organic Fuels

Volatile Fuels

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
1-Methylnaphthalene	1.62	ug/L
Naphthalene	27.0	ug/L
Diesel Range Organics	30.0	mg/L
Residual Range Organics	5.80	mg/L
Benzene	3.85	ug/L
Ethylbenzene	1.97	ug/L
o-Xylene	3.68	ug/L
P & M -Xylene	4.43	ug/L
Xylenes (total)	8.11	ug/L

Client Sample ID: **MW-8**

Lab Sample ID: 1209732006

Semivolatile Organic Fuels

<u>Parameter</u>	<u>Result</u>	<u>Units</u>
Diesel Range Organics	0.566	mg/L
Residual Range Organics	0.581	mg/L

Results of **MW-4**

Client Sample ID: **MW-4**
 Client Project ID: **105990-001 Fairbanks Rail Yard**
 Lab Sample ID: 1209732001
 Lab Project ID: 1209732

Collection Date: 10/06/20 11:50
 Received Date: 10/08/20 08:40
 Matrix: Water (Surface, Eff., Ground)
 Solids (%):
 Location:

Results by **Polynuclear Aromatics GC/MS**

Parameter	Result Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
1-Methylnaphthalene	69.1	2.36	0.708	ug/L	50		10/18/20 21:18
2-Methylnaphthalene	49.4	2.36	0.708	ug/L	50		10/18/20 21:18
Acenaphthene	1.64	0.0472	0.0142	ug/L	1		10/16/20 19:13
Acenaphthylene	0.0472 U	0.0472	0.0142	ug/L	1		10/16/20 19:13
Anthracene	0.0472 U	0.0472	0.0142	ug/L	1		10/16/20 19:13
Benzo(a)Anthracene	0.0472 U	0.0472	0.0142	ug/L	1		10/16/20 19:13
Benzo[a]pyrene	0.0189 U	0.0189	0.00585	ug/L	1		10/16/20 19:13
Benzo[b]Fluoranthene	0.0472 U	0.0472	0.0142	ug/L	1		10/16/20 19:13
Benzo[g,h,i]perylene	0.0472 U	0.0472	0.0142	ug/L	1		10/16/20 19:13
Benzo[k]fluoranthene	0.0472 U	0.0472	0.0142	ug/L	1		10/16/20 19:13
Chrysene	0.0472 U	0.0472	0.0142	ug/L	1		10/16/20 19:13
Dibenzo[a,h]anthracene	0.0189 U	0.0189	0.00585	ug/L	1		10/16/20 19:13
Fluoranthene	0.0472 U	0.0472	0.0142	ug/L	1		10/16/20 19:13
Fluorene	3.77	0.0472	0.0142	ug/L	1		10/16/20 19:13
Indeno[1,2,3-c,d] pyrene	0.0472 U	0.0472	0.0142	ug/L	1		10/16/20 19:13
Naphthalene	67.3	4.72	1.46	ug/L	50		10/18/20 21:18
Phenanthrene	1.81	0.0472	0.0142	ug/L	1		10/16/20 19:13
Pyrene	0.0472 U	0.0472	0.0142	ug/L	1		10/16/20 19:13

Surrogates

2-Methylnaphthalene-d10 (surr)	60.6	37-78		%	1		10/16/20 19:13
Fluoranthene-d10 (surr)	67.2	24-116		%	1		10/16/20 19:13

Batch Information

Analytical Batch: XMS12347
 Analytical Method: 8270D SIM LV (PAH)
 Analyst: DSD
 Analytical Date/Time: 10/16/20 19:13
 Container ID: 1209732001-C

Prep Batch: XXX44036
 Prep Method: SW3535A
 Prep Date/Time: 10/10/20 08:15
 Prep Initial Wt./Vol.: 265 mL
 Prep Extract Vol: 1 mL

Analytical Batch: XMS12353
 Analytical Method: 8270D SIM LV (PAH)
 Analyst: DSD
 Analytical Date/Time: 10/18/20 21:18
 Container ID: 1209732001-C

Prep Batch: XXX44036
 Prep Method: SW3535A
 Prep Date/Time: 10/10/20 08:15
 Prep Initial Wt./Vol.: 265 mL
 Prep Extract Vol: 1 mL

Print Date: 11/13/2020 12:20:13PM

Results of MW-4

Client Sample ID: **MW-4**
 Client Project ID: **105990-001 Fairbanks Rail Yard**
 Lab Sample ID: 1209732001
 Lab Project ID: 1209732

Collection Date: 10/06/20 11:50
 Received Date: 10/08/20 08:40
 Matrix: Water (Surface, Eff., Ground)
 Solids (%):
 Location:

Results by Semivolatile Organic Fuels

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Diesel Range Organics	5.89		0.577	0.173	mg/L	1		10/17/20 18:44
Surrogates								
5a Androstane (surr)	94.1		50-150		%	1		10/17/20 18:44

Batch Information

Analytical Batch: XFC15776
 Analytical Method: AK102
 Analyst: CDM
 Analytical Date/Time: 10/17/20 18:44
 Container ID: 1209732001-A

Prep Batch: XXX44069
 Prep Method: SW3520C
 Prep Date/Time: 10/15/20 15:24
 Prep Initial Wt./Vol.: 260 mL
 Prep Extract Vol: 1 mL

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Residual Range Organics	0.818		0.481	0.144	mg/L	1		10/17/20 18:44
Surrogates								
n-Triacontane-d62 (surr)	96.7		50-150		%	1		10/17/20 18:44

Batch Information

Analytical Batch: XFC15776
 Analytical Method: AK103
 Analyst: CDM
 Analytical Date/Time: 10/17/20 18:44
 Container ID: 1209732001-A

Prep Batch: XXX44069
 Prep Method: SW3520C
 Prep Date/Time: 10/15/20 15:24
 Prep Initial Wt./Vol.: 260 mL
 Prep Extract Vol: 1 mL

Results of **MW-4**

Client Sample ID: **MW-4**
Client Project ID: **105990-001 Fairbanks Rail Yard**
Lab Sample ID: 1209732001
Lab Project ID: 1209732

Collection Date: 10/06/20 11:50
Received Date: 10/08/20 08:40
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by **Volatile Fuels**

Parameter	Result Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Gasoline Range Organics	0.155	0.100	0.0310	mg/L	1		10/13/20 16:52

Surrogates

4-Bromofluorobenzene (surr)	121	50-150		%	1		10/13/20 16:52
-----------------------------	-----	--------	--	---	---	--	----------------

Batch Information

Analytical Batch: VFC15395
Analytical Method: AK101
Analyst: ALJ
Analytical Date/Time: 10/13/20 16:52
Container ID: 1209732001-F

Prep Batch: VXX36535
Prep Method: SW5030B
Prep Date/Time: 10/13/20 06:00
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL

Parameter	Result Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Benzene	0.500 U	0.500	0.150	ug/L	1		10/12/20 22:13
Ethylbenzene	4.32	1.00	0.310	ug/L	1		10/12/20 22:13
o-Xylene	2.85	1.00	0.310	ug/L	1		10/12/20 22:13
P & M -Xylene	8.81	2.00	0.620	ug/L	1		10/12/20 22:13
Toluene	1.00 U	1.00	0.310	ug/L	1		10/12/20 22:13
Xylenes (total)	11.7	3.00	0.930	ug/L	1		10/12/20 22:13

Surrogates

1,4-Difluorobenzene (surr)	86.9	77-115		%	1		10/12/20 22:13
----------------------------	------	--------	--	---	---	--	----------------

Batch Information

Analytical Batch: VFC15394
Analytical Method: SW8021B
Analyst: ALJ
Analytical Date/Time: 10/12/20 22:13
Container ID: 1209732001-E

Prep Batch: VXX36528
Prep Method: SW5030B
Prep Date/Time: 10/12/20 06:00
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL

Print Date: 11/13/2020 12:20:13PM

Results of MW-5

Client Sample ID: **MW-5**
 Client Project ID: **105990-001 Fairbanks Rail Yard**
 Lab Sample ID: 1209732002
 Lab Project ID: 1209732

Collection Date: 10/06/20 15:39
 Received Date: 10/08/20 08:40
 Matrix: Water (Surface, Eff., Ground)
 Solids (%):
 Location:

Results by Polynuclear Aromatics GC/MS

Parameter	Result Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
1-Methylnaphthalene	3.28	0.0481	0.0144	ug/L	1		10/16/20 19:35
2-Methylnaphthalene	0.576	0.0481	0.0144	ug/L	1		10/16/20 19:35
Acenaphthene	0.588	0.0481	0.0144	ug/L	1		10/16/20 19:35
Acenaphthylene	0.0481 U	0.0481	0.0144	ug/L	1		10/16/20 19:35
Anthracene	0.0481 U	0.0481	0.0144	ug/L	1		10/16/20 19:35
Benzo(a)Anthracene	0.0481 U	0.0481	0.0144	ug/L	1		10/16/20 19:35
Benzo(a)pyrene	0.0192 U	0.0192	0.00596	ug/L	1		10/16/20 19:35
Benzo(b)Fluoranthene	0.0481 U	0.0481	0.0144	ug/L	1		10/16/20 19:35
Benzo(g,h,i)perylene	0.0481 U	0.0481	0.0144	ug/L	1		10/16/20 19:35
Benzo(k)fluoranthene	0.0481 U	0.0481	0.0144	ug/L	1		10/16/20 19:35
Chrysene	0.0481 U	0.0481	0.0144	ug/L	1		10/16/20 19:35
Dibenzo(a,h)anthracene	0.0192 U	0.0192	0.00596	ug/L	1		10/16/20 19:35
Fluoranthene	0.0481 U	0.0481	0.0144	ug/L	1		10/16/20 19:35
Fluorene	1.18	0.0481	0.0144	ug/L	1		10/16/20 19:35
Indeno[1,2,3-c,d] pyrene	0.0481 U	0.0481	0.0144	ug/L	1		10/16/20 19:35
Naphthalene	4.37	0.0962	0.0298	ug/L	1		10/16/20 19:35
Phenanthrene	0.455	0.0481	0.0144	ug/L	1		10/16/20 19:35
Pyrene	0.0481 U	0.0481	0.0144	ug/L	1		10/16/20 19:35

Surrogates

2-Methylnaphthalene-d10 (surr)	62.1	37-78		%	1		10/16/20 19:35
Fluoranthene-d10 (surr)	71.2	24-116		%	1		10/16/20 19:35

Batch Information

Analytical Batch: XMS12347
 Analytical Method: 8270D SIM LV (PAH)
 Analyst: DSD
 Analytical Date/Time: 10/16/20 19:35
 Container ID: 1209732002-C

Prep Batch: XXX44036
 Prep Method: SW3535A
 Prep Date/Time: 10/10/20 08:15
 Prep Initial Wt./Vol.: 260 mL
 Prep Extract Vol: 1 mL

Print Date: 11/13/2020 12:20:13PM

Results of **MW-5**

Client Sample ID: **MW-5**
Client Project ID: **105990-001 Fairbanks Rail Yard**
Lab Sample ID: 1209732002
Lab Project ID: 1209732

Collection Date: 10/06/20 15:39
Received Date: 10/08/20 08:40
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by **Semivolatile Organic Fuels**

<u>Parameter</u>	<u>Result</u> <u>Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable</u> <u>Limits</u>	<u>Date Analyzed</u>
Diesel Range Organics	4.43	0.600	0.180	mg/L	1		10/17/20 18:54
Surrogates							
5a Androstane (surr)	92.8	50-150		%	1		10/17/20 18:54

Batch Information

Analytical Batch: XFC15776
Analytical Method: AK102
Analyst: CDM
Analytical Date/Time: 10/17/20 18:54
Container ID: 1209732002-A

Prep Batch: XXX44069
Prep Method: SW3520C
Prep Date/Time: 10/15/20 15:24
Prep Initial Wt./Vol.: 250 mL
Prep Extract Vol: 1 mL

<u>Parameter</u>	<u>Result</u> <u>Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable</u> <u>Limits</u>	<u>Date Analyzed</u>
Residual Range Organics	1.25	0.500	0.150	mg/L	1		10/17/20 18:54
Surrogates							
n-Triacontane-d62 (surr)	97.7	50-150		%	1		10/17/20 18:54

Batch Information

Analytical Batch: XFC15776
Analytical Method: AK103
Analyst: CDM
Analytical Date/Time: 10/17/20 18:54
Container ID: 1209732002-A

Prep Batch: XXX44069
Prep Method: SW3520C
Prep Date/Time: 10/15/20 15:24
Prep Initial Wt./Vol.: 250 mL
Prep Extract Vol: 1 mL

Print Date: 11/13/2020 12:20:13PM

Results of **MW-5**

Client Sample ID: **MW-5**
 Client Project ID: **105990-001 Fairbanks Rail Yard**
 Lab Sample ID: 1209732002
 Lab Project ID: 1209732

Collection Date: 10/06/20 15:39
 Received Date: 10/08/20 08:40
 Matrix: Water (Surface, Eff., Ground)
 Solids (%):
 Location:

Results by **Volatile Fuels**

Parameter	Result Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Gasoline Range Organics	0.100 U	0.100	0.0310	mg/L	1		10/12/20 22:31

Surrogates

4-Bromofluorobenzene (surr)	76.2	50-150		%	1		10/12/20 22:31
-----------------------------	------	--------	--	---	---	--	----------------

Batch Information

Analytical Batch: VFC15394
 Analytical Method: AK101
 Analyst: ALJ
 Analytical Date/Time: 10/12/20 22:31
 Container ID: 1209732002-E

Prep Batch: VXX36528
 Prep Method: SW5030B
 Prep Date/Time: 10/12/20 06:00
 Prep Initial Wt./Vol.: 5 mL
 Prep Extract Vol: 5 mL

Parameter	Result Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Benzene	0.530	0.500	0.150	ug/L	1		10/12/20 22:31
Ethylbenzene	1.00 U	1.00	0.310	ug/L	1		10/12/20 22:31
o-Xylene	1.00 U	1.00	0.310	ug/L	1		10/12/20 22:31
P & M -Xylene	2.00 U	2.00	0.620	ug/L	1		10/12/20 22:31
Toluene	1.00 U	1.00	0.310	ug/L	1		10/12/20 22:31
Xylenes (total)	3.00 U	3.00	0.930	ug/L	1		10/12/20 22:31

Surrogates

1,4-Difluorobenzene (surr)	86.5	77-115		%	1		10/12/20 22:31
----------------------------	------	--------	--	---	---	--	----------------

Batch Information

Analytical Batch: VFC15394
 Analytical Method: SW8021B
 Analyst: ALJ
 Analytical Date/Time: 10/12/20 22:31
 Container ID: 1209732002-E

Prep Batch: VXX36528
 Prep Method: SW5030B
 Prep Date/Time: 10/12/20 06:00
 Prep Initial Wt./Vol.: 5 mL
 Prep Extract Vol: 5 mL

Print Date: 11/13/2020 12:20:13PM

Results of MW-6

Client Sample ID: **MW-6**
 Client Project ID: **105990-001 Fairbanks Rail Yard**
 Lab Sample ID: 1209732003
 Lab Project ID: 1209732

Collection Date: 10/06/20 16:35
 Received Date: 10/08/20 08:40
 Matrix: Water (Surface, Eff., Ground)
 Solids (%):
 Location:

Results by Polynuclear Aromatics GC/MS

Parameter	Result Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
1-Methylnaphthalene	6.60	0.0481	0.0144	ug/L	1		10/16/20 19:56
2-Methylnaphthalene	3.36	0.0481	0.0144	ug/L	1		10/16/20 19:56
Acenaphthene	1.12	0.0481	0.0144	ug/L	1		10/16/20 19:56
Acenaphthylene	0.0481 U	0.0481	0.0144	ug/L	1		10/16/20 19:56
Anthracene	0.0481 U	0.0481	0.0144	ug/L	1		10/16/20 19:56
Benzo(a)Anthracene	0.0481 U	0.0481	0.0144	ug/L	1		10/16/20 19:56
Benzo[a]pyrene	0.0192 U	0.0192	0.00596	ug/L	1		10/16/20 19:56
Benzo[b]Fluoranthene	0.0481 U	0.0481	0.0144	ug/L	1		10/16/20 19:56
Benzo[g,h,i]perylene	0.0481 U	0.0481	0.0144	ug/L	1		10/16/20 19:56
Benzo[k]fluoranthene	0.0481 U	0.0481	0.0144	ug/L	1		10/16/20 19:56
Chrysene	0.0481 U	0.0481	0.0144	ug/L	1		10/16/20 19:56
Dibenzo[a,h]anthracene	0.0192 U	0.0192	0.00596	ug/L	1		10/16/20 19:56
Fluoranthene	0.0481 U	0.0481	0.0144	ug/L	1		10/16/20 19:56
Fluorene	1.37	0.0481	0.0144	ug/L	1		10/16/20 19:56
Indeno[1,2,3-c,d] pyrene	0.0481 U	0.0481	0.0144	ug/L	1		10/16/20 19:56
Naphthalene	8.36	0.0962	0.0298	ug/L	1		10/16/20 19:56
Phenanthrene	0.358	0.0481	0.0144	ug/L	1		10/16/20 19:56
Pyrene	0.0481 U	0.0481	0.0144	ug/L	1		10/16/20 19:56
Surrogates							
2-Methylnaphthalene-d10 (surr)	44.8	37-78		%	1		10/16/20 19:56
Fluoranthene-d10 (surr)	65	24-116		%	1		10/16/20 19:56

Batch Information

Analytical Batch: XMS12347
 Analytical Method: 8270D SIM LV (PAH)
 Analyst: DSD
 Analytical Date/Time: 10/16/20 19:56
 Container ID: 1209732003-C

Prep Batch: XXX44036
 Prep Method: SW3535A
 Prep Date/Time: 10/10/20 08:15
 Prep Initial Wt./Vol.: 260 mL
 Prep Extract Vol: 1 mL

Print Date: 11/13/2020 12:20:13PM

Results of MW-6

Client Sample ID: **MW-6**
 Client Project ID: **105990-001 Fairbanks Rail Yard**
 Lab Sample ID: 1209732003
 Lab Project ID: 1209732

Collection Date: 10/06/20 16:35
 Received Date: 10/08/20 08:40
 Matrix: Water (Surface, Eff., Ground)
 Solids (%):
 Location:

Results by Semivolatile Organic Fuels

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Diesel Range Organics	16.3		0.556	0.167	mg/L	1		10/17/20 19:04
Surrogates								
5a Androstane (surr)	97.7		50-150		%	1		10/17/20 19:04

Batch Information

Analytical Batch: XFC15776
 Analytical Method: AK102
 Analyst: CDM
 Analytical Date/Time: 10/17/20 19:04
 Container ID: 1209732003-A

Prep Batch: XXX44069
 Prep Method: SW3520C
 Prep Date/Time: 10/15/20 15:24
 Prep Initial Wt./Vol.: 270 mL
 Prep Extract Vol: 1 mL

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Residual Range Organics	2.83		0.463	0.139	mg/L	1		10/17/20 19:04
Surrogates								
n-Triacontane-d62 (surr)	93.8		50-150		%	1		10/17/20 19:04

Batch Information

Analytical Batch: XFC15776
 Analytical Method: AK103
 Analyst: CDM
 Analytical Date/Time: 10/17/20 19:04
 Container ID: 1209732003-A

Prep Batch: XXX44069
 Prep Method: SW3520C
 Prep Date/Time: 10/15/20 15:24
 Prep Initial Wt./Vol.: 270 mL
 Prep Extract Vol: 1 mL

Print Date: 11/13/2020 12:20:13PM

Results of **MW-6**

Client Sample ID: **MW-6**
Client Project ID: **105990-001 Fairbanks Rail Yard**
Lab Sample ID: 1209732003
Lab Project ID: 1209732

Collection Date: 10/06/20 16:35
Received Date: 10/08/20 08:40
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by **Volatile Fuels**

Parameter	Result Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Gasoline Range Organics	0.164	0.100	0.0310	mg/L	1		10/13/20 17:28

Surrogates

4-Bromofluorobenzene (surr)	92.5	50-150		%	1		10/13/20 17:28
-----------------------------	------	--------	--	---	---	--	----------------

Batch Information

Analytical Batch: VFC15395
Analytical Method: AK101
Analyst: ALJ
Analytical Date/Time: 10/13/20 17:28
Container ID: 1209732003-F

Prep Batch: VXX36535
Prep Method: SW5030B
Prep Date/Time: 10/13/20 06:00
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL

Parameter	Result Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Benzene	13.5	0.500	0.150	ug/L	1		10/12/20 22:49
Ethylbenzene	3.41	1.00	0.310	ug/L	1		10/12/20 22:49
o-Xylene	7.58	1.00	0.310	ug/L	1		10/12/20 22:49
P & M -Xylene	9.61	2.00	0.620	ug/L	1		10/12/20 22:49
Toluene	1.00 U	1.00	0.310	ug/L	1		10/12/20 22:49
Xylenes (total)	17.2	3.00	0.930	ug/L	1		10/12/20 22:49

Surrogates

1,4-Difluorobenzene (surr)	85	77-115		%	1		10/12/20 22:49
----------------------------	----	--------	--	---	---	--	----------------

Batch Information

Analytical Batch: VFC15394
Analytical Method: SW8021B
Analyst: ALJ
Analytical Date/Time: 10/12/20 22:49
Container ID: 1209732003-E

Prep Batch: VXX36528
Prep Method: SW5030B
Prep Date/Time: 10/12/20 06:00
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL

Print Date: 11/13/2020 12:20:13PM

Results of MW-7

Client Sample ID: **MW-7**
 Client Project ID: **105990-001 Fairbanks Rail Yard**
 Lab Sample ID: 1209732004
 Lab Project ID: 1209732

Collection Date: 10/06/20 14:28
 Received Date: 10/08/20 08:40
 Matrix: Water (Surface, Eff., Ground)
 Solids (%):
 Location:

Results by Polynuclear Aromatics GC/MS

Parameter	Result Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
1-Methylnaphthalene	0.0472 U	0.0472	0.0142	ug/L	1		10/16/20 20:16
2-Methylnaphthalene	0.0472 U	0.0472	0.0142	ug/L	1		10/16/20 20:16
Acenaphthene	0.732	0.0472	0.0142	ug/L	1		10/16/20 20:16
Acenaphthylene	0.0472 U	0.0472	0.0142	ug/L	1		10/16/20 20:16
Anthracene	0.0472 U	0.0472	0.0142	ug/L	1		10/16/20 20:16
Benzo(a)Anthracene	0.0472 U	0.0472	0.0142	ug/L	1		10/16/20 20:16
Benzo[a]pyrene	0.0189 U	0.0189	0.00585	ug/L	1		10/16/20 20:16
Benzo[b]Fluoranthene	0.0472 U	0.0472	0.0142	ug/L	1		10/16/20 20:16
Benzo[g,h,i]perylene	0.0472 U	0.0472	0.0142	ug/L	1		10/16/20 20:16
Benzo[k]fluoranthene	0.0472 U	0.0472	0.0142	ug/L	1		10/16/20 20:16
Chrysene	0.0472 U	0.0472	0.0142	ug/L	1		10/16/20 20:16
Dibenzo[a,h]anthracene	0.0189 U	0.0189	0.00585	ug/L	1		10/16/20 20:16
Fluoranthene	0.0472 U	0.0472	0.0142	ug/L	1		10/16/20 20:16
Fluorene	0.0472 U	0.0472	0.0142	ug/L	1		10/16/20 20:16
Indeno[1,2,3-c,d] pyrene	0.0472 U	0.0472	0.0142	ug/L	1		10/16/20 20:16
Naphthalene	27.3	0.472	0.146	ug/L	5		10/18/20 21:39
Phenanthrene	0.0472 U	0.0472	0.0142	ug/L	1		10/16/20 20:16
Pyrene	0.0472 U	0.0472	0.0142	ug/L	1		10/16/20 20:16

Surrogates

2-Methylnaphthalene-d10 (surr)	61.1	37-78	%	1		10/16/20 20:16
Fluoranthene-d10 (surr)	66.5	24-116	%	1		10/16/20 20:16

Batch Information

Analytical Batch: XMS12347
 Analytical Method: 8270D SIM LV (PAH)
 Analyst: DSD
 Analytical Date/Time: 10/16/20 20:16
 Container ID: 1209732004-C

Prep Batch: XXX44036
 Prep Method: SW3535A
 Prep Date/Time: 10/10/20 08:15
 Prep Initial Wt./Vol.: 265 mL
 Prep Extract Vol: 1 mL

Analytical Batch: XMS12353
 Analytical Method: 8270D SIM LV (PAH)
 Analyst: DSD
 Analytical Date/Time: 10/18/20 21:39
 Container ID: 1209732004-C

Prep Batch: XXX44036
 Prep Method: SW3535A
 Prep Date/Time: 10/10/20 08:15
 Prep Initial Wt./Vol.: 265 mL
 Prep Extract Vol: 1 mL

Print Date: 11/13/2020 12:20:13PM

Results of **MW-7**

Client Sample ID: **MW-7**
Client Project ID: **105990-001 Fairbanks Rail Yard**
Lab Sample ID: 1209732004
Lab Project ID: 1209732

Collection Date: 10/06/20 14:28
Received Date: 10/08/20 08:40
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by **Semivolatile Organic Fuels**

<u>Parameter</u>	<u>Result</u> <u>Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable</u> <u>Limits</u>	<u>Date Analyzed</u>
Diesel Range Organics	30.8	0.588	0.176	mg/L	1		10/17/20 19:14
Surrogates							
5a Androstane (surr)	110	50-150		%	1		10/17/20 19:14

Batch Information

Analytical Batch: XFC15776
Analytical Method: AK102
Analyst: CDM
Analytical Date/Time: 10/17/20 19:14
Container ID: 1209732004-A

Prep Batch: XXX44069
Prep Method: SW3520C
Prep Date/Time: 10/15/20 15:24
Prep Initial Wt./Vol.: 255 mL
Prep Extract Vol: 1 mL

<u>Parameter</u>	<u>Result</u> <u>Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable</u> <u>Limits</u>	<u>Date Analyzed</u>
Residual Range Organics	5.81	0.490	0.147	mg/L	1		10/17/20 19:14
Surrogates							
n-Triacontane-d62 (surr)	94.3	50-150		%	1		10/17/20 19:14

Batch Information

Analytical Batch: XFC15776
Analytical Method: AK103
Analyst: CDM
Analytical Date/Time: 10/17/20 19:14
Container ID: 1209732004-A

Prep Batch: XXX44069
Prep Method: SW3520C
Prep Date/Time: 10/15/20 15:24
Prep Initial Wt./Vol.: 255 mL
Prep Extract Vol: 1 mL

Print Date: 11/13/2020 12:20:13PM

Results of **MW-7**

Client Sample ID: **MW-7**
 Client Project ID: **105990-001 Fairbanks Rail Yard**
 Lab Sample ID: 1209732004
 Lab Project ID: 1209732

Collection Date: 10/06/20 14:28
 Received Date: 10/08/20 08:40
 Matrix: Water (Surface, Eff., Ground)
 Solids (%):
 Location:

Results by **Volatile Fuels**

Parameter	Result Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Gasoline Range Organics	0.100 U	0.100	0.0310	mg/L	1		10/12/20 23:07

Surrogates

4-Bromofluorobenzene (surr)	65.9	50-150		%	1		10/12/20 23:07
-----------------------------	------	--------	--	---	---	--	----------------

Batch Information

Analytical Batch: VFC15394
 Analytical Method: AK101
 Analyst: ALJ
 Analytical Date/Time: 10/12/20 23:07
 Container ID: 1209732004-E

Prep Batch: VXX36528
 Prep Method: SW5030B
 Prep Date/Time: 10/12/20 06:00
 Prep Initial Wt./Vol.: 5 mL
 Prep Extract Vol: 5 mL

Parameter	Result Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Benzene	3.88	0.500	0.150	ug/L	1		10/12/20 23:07
Ethylbenzene	1.92	1.00	0.310	ug/L	1		10/12/20 23:07
o-Xylene	3.67	1.00	0.310	ug/L	1		10/12/20 23:07
P & M -Xylene	4.42	2.00	0.620	ug/L	1		10/12/20 23:07
Toluene	1.00 U	1.00	0.310	ug/L	1		10/12/20 23:07
Xylenes (total)	8.09	3.00	0.930	ug/L	1		10/12/20 23:07

Surrogates

1,4-Difluorobenzene (surr)	87.8	77-115		%	1		10/12/20 23:07
----------------------------	------	--------	--	---	---	--	----------------

Batch Information

Analytical Batch: VFC15394
 Analytical Method: SW8021B
 Analyst: ALJ
 Analytical Date/Time: 10/12/20 23:07
 Container ID: 1209732004-E

Prep Batch: VXX36528
 Prep Method: SW5030B
 Prep Date/Time: 10/12/20 06:00
 Prep Initial Wt./Vol.: 5 mL
 Prep Extract Vol: 5 mL

Print Date: 11/13/2020 12:20:13PM

Results of **MW-107**

Client Sample ID: **MW-107**
 Client Project ID: **105990-001 Fairbanks Rail Yard**
 Lab Sample ID: 1209732005
 Lab Project ID: 1209732

Collection Date: 10/06/20 14:18
 Received Date: 10/08/20 08:40
 Matrix: Water (Surface, Eff., Ground)
 Solids (%):
 Location:

Results by **Polynuclear Aromatics GC/MS**

Parameter	Result Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
1-Methylnaphthalene	1.62	0.472	0.142	ug/L	10		10/18/20 22:00
2-Methylnaphthalene	0.472 U	0.472	0.142	ug/L	10		10/18/20 22:00
Acenaphthene	0.472 U	0.472	0.142	ug/L	10		10/18/20 22:00
Acenaphthylene	0.472 U	0.472	0.142	ug/L	10		10/18/20 22:00
Anthracene	0.472 U	0.472	0.142	ug/L	10		10/18/20 22:00
Benzo(a)Anthracene	0.0472 U	0.0472	0.0142	ug/L	1		10/16/20 20:37
Benzo[a]pyrene	0.0189 U	0.0189	0.00585	ug/L	1		10/16/20 20:37
Benzo[b]Fluoranthene	0.0472 U	0.0472	0.0142	ug/L	1		10/16/20 20:37
Benzo[g,h,i]perylene	0.0472 U	0.0472	0.0142	ug/L	1		10/16/20 20:37
Benzo[k]fluoranthene	0.0472 U	0.0472	0.0142	ug/L	1		10/16/20 20:37
Chrysene	0.0472 U	0.0472	0.0142	ug/L	1		10/16/20 20:37
Dibenzo[a,h]anthracene	0.0189 U	0.0189	0.00585	ug/L	1		10/16/20 20:37
Fluoranthene	0.0472 U	0.0472	0.0142	ug/L	1		10/16/20 20:37
Fluorene	0.472 U	0.472	0.142	ug/L	10		10/18/20 22:00
Indeno[1,2,3-c,d] pyrene	0.0472 U	0.0472	0.0142	ug/L	1		10/16/20 20:37
Naphthalene	27.0	0.943	0.292	ug/L	10		10/18/20 22:00
Phenanthrene	0.472 U	0.472	0.142	ug/L	10		10/18/20 22:00
Pyrene	0.0472 U	0.0472	0.0142	ug/L	1		10/16/20 20:37
Surrogates							
2-Methylnaphthalene-d10 (surr)	106 *	37-78		%	10		10/18/20 22:00
Fluoranthene-d10 (surr)	64.5	24-116		%	1		10/16/20 20:37

Batch Information

Analytical Batch: XMS12347
 Analytical Method: 8270D SIM LV (PAH)
 Analyst: DSD
 Analytical Date/Time: 10/16/20 20:37
 Container ID: 1209732005-C

Prep Batch: XXX44036
 Prep Method: SW3535A
 Prep Date/Time: 10/10/20 08:15
 Prep Initial Wt./Vol.: 265 mL
 Prep Extract Vol: 1 mL

Analytical Batch: XMS12353
 Analytical Method: 8270D SIM LV (PAH)
 Analyst: DSD
 Analytical Date/Time: 10/18/20 22:00
 Container ID: 1209732005-C

Prep Batch: XXX44036
 Prep Method: SW3535A
 Prep Date/Time: 10/10/20 08:15
 Prep Initial Wt./Vol.: 265 mL
 Prep Extract Vol: 1 mL

Print Date: 11/13/2020 12:20:13PM

Results of **MW-107**

Client Sample ID: **MW-107**
Client Project ID: **105990-001 Fairbanks Rail Yard**
Lab Sample ID: 1209732005
Lab Project ID: 1209732

Collection Date: 10/06/20 14:18
Received Date: 10/08/20 08:40
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location:

Results by **Semivolatile Organic Fuels**

<u>Parameter</u>	<u>Result</u> <u>Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable</u> <u>Limits</u>	<u>Date Analyzed</u>
Diesel Range Organics	30.0	0.577	0.173	mg/L	1		10/17/20 19:24
Surrogates							
5a Androstane (surr)	104	50-150		%	1		10/17/20 19:24

Batch Information

Analytical Batch: XFC15776
Analytical Method: AK102
Analyst: CDM
Analytical Date/Time: 10/17/20 19:24
Container ID: 1209732005-A

Prep Batch: XXX44069
Prep Method: SW3520C
Prep Date/Time: 10/15/20 15:24
Prep Initial Wt./Vol.: 260 mL
Prep Extract Vol: 1 mL

<u>Parameter</u>	<u>Result</u> <u>Qual</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>	<u>DF</u>	<u>Allowable</u> <u>Limits</u>	<u>Date Analyzed</u>
Residual Range Organics	5.80	0.481	0.144	mg/L	1		10/17/20 19:24
Surrogates							
n-Triacontane-d62 (surr)	94.6	50-150		%	1		10/17/20 19:24

Batch Information

Analytical Batch: XFC15776
Analytical Method: AK103
Analyst: CDM
Analytical Date/Time: 10/17/20 19:24
Container ID: 1209732005-A

Prep Batch: XXX44069
Prep Method: SW3520C
Prep Date/Time: 10/15/20 15:24
Prep Initial Wt./Vol.: 260 mL
Prep Extract Vol: 1 mL

Print Date: 11/13/2020 12:20:13PM

Results of **MW-107**

Client Sample ID: **MW-107**
 Client Project ID: **105990-001 Fairbanks Rail Yard**
 Lab Sample ID: 1209732005
 Lab Project ID: 1209732

Collection Date: 10/06/20 14:18
 Received Date: 10/08/20 08:40
 Matrix: Water (Surface, Eff., Ground)
 Solids (%):
 Location:

Results by **Volatile Fuels**

Parameter	Result Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Gasoline Range Organics	0.100 U	0.100	0.0310	mg/L	1		10/12/20 23:24

Surrogates

4-Bromofluorobenzene (surr)	74.9	50-150		%	1		10/12/20 23:24
-----------------------------	------	--------	--	---	---	--	----------------

Batch Information

Analytical Batch: VFC15394
 Analytical Method: AK101
 Analyst: ALJ
 Analytical Date/Time: 10/12/20 23:24
 Container ID: 1209732005-E

Prep Batch: VXX36528
 Prep Method: SW5030B
 Prep Date/Time: 10/12/20 06:00
 Prep Initial Wt./Vol.: 5 mL
 Prep Extract Vol: 5 mL

Parameter	Result Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Benzene	3.85	0.500	0.150	ug/L	1		10/12/20 23:24
Ethylbenzene	1.97	1.00	0.310	ug/L	1		10/12/20 23:24
o-Xylene	3.68	1.00	0.310	ug/L	1		10/12/20 23:24
P & M -Xylene	4.43	2.00	0.620	ug/L	1		10/12/20 23:24
Toluene	1.00 U	1.00	0.310	ug/L	1		10/12/20 23:24
Xylenes (total)	8.11	3.00	0.930	ug/L	1		10/12/20 23:24

Surrogates

1,4-Difluorobenzene (surr)	86.1	77-115		%	1		10/12/20 23:24
----------------------------	------	--------	--	---	---	--	----------------

Batch Information

Analytical Batch: VFC15394
 Analytical Method: SW8021B
 Analyst: ALJ
 Analytical Date/Time: 10/12/20 23:24
 Container ID: 1209732005-E

Prep Batch: VXX36528
 Prep Method: SW5030B
 Prep Date/Time: 10/12/20 06:00
 Prep Initial Wt./Vol.: 5 mL
 Prep Extract Vol: 5 mL

Print Date: 11/13/2020 12:20:13PM

Results of **MW-8**

Client Sample ID: **MW-8**
 Client Project ID: **105990-001 Fairbanks Rail Yard**
 Lab Sample ID: 1209732006
 Lab Project ID: 1209732

Collection Date: 10/06/20 17:41
 Received Date: 10/08/20 08:40
 Matrix: Water (Surface, Eff., Ground)
 Solids (%):
 Location:

Results by **Polynuclear Aromatics GC/MS**

Parameter	Result Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
1-Methylnaphthalene	0.0481 U	0.0481	0.0144	ug/L	1		10/16/20 20:57
2-Methylnaphthalene	0.0481 U	0.0481	0.0144	ug/L	1		10/16/20 20:57
Acenaphthene	0.0481 U	0.0481	0.0144	ug/L	1		10/16/20 20:57
Acenaphthylene	0.0481 U	0.0481	0.0144	ug/L	1		10/16/20 20:57
Anthracene	0.0481 U	0.0481	0.0144	ug/L	1		10/16/20 20:57
Benzo(a)Anthracene	0.0481 U	0.0481	0.0144	ug/L	1		10/16/20 20:57
Benzo[a]pyrene	0.0192 U	0.0192	0.00596	ug/L	1		10/16/20 20:57
Benzo[b]Fluoranthene	0.0481 U	0.0481	0.0144	ug/L	1		10/16/20 20:57
Benzo[g,h,i]perylene	0.0481 U	0.0481	0.0144	ug/L	1		10/16/20 20:57
Benzo[k]fluoranthene	0.0481 U	0.0481	0.0144	ug/L	1		10/16/20 20:57
Chrysene	0.0481 U	0.0481	0.0144	ug/L	1		10/16/20 20:57
Dibenzo[a,h]anthracene	0.0192 U	0.0192	0.00596	ug/L	1		10/16/20 20:57
Fluoranthene	0.0481 U	0.0481	0.0144	ug/L	1		10/16/20 20:57
Fluorene	0.0481 U	0.0481	0.0144	ug/L	1		10/16/20 20:57
Indeno[1,2,3-c,d] pyrene	0.0481 U	0.0481	0.0144	ug/L	1		10/16/20 20:57
Naphthalene	0.0962 U	0.0962	0.0298	ug/L	1		10/16/20 20:57
Phenanthrene	0.0481 U	0.0481	0.0144	ug/L	1		10/16/20 20:57
Pyrene	0.0481 U	0.0481	0.0144	ug/L	1		10/16/20 20:57
Surrogates							
2-Methylnaphthalene-d10 (surr)	62.9	37-78		%	1		10/16/20 20:57
Fluoranthene-d10 (surr)	71.1	24-116		%	1		10/16/20 20:57

Batch Information

Analytical Batch: XMS12347
 Analytical Method: 8270D SIM LV (PAH)
 Analyst: DSD
 Analytical Date/Time: 10/16/20 20:57
 Container ID: 1209732006-C

Prep Batch: XXX44036
 Prep Method: SW3535A
 Prep Date/Time: 10/10/20 08:15
 Prep Initial Wt./Vol.: 260 mL
 Prep Extract Vol: 1 mL

Print Date: 11/13/2020 12:20:13PM

Results of MW-8

Client Sample ID: **MW-8**
 Client Project ID: **105990-001 Fairbanks Rail Yard**
 Lab Sample ID: 1209732006
 Lab Project ID: 1209732

Collection Date: 10/06/20 17:41
 Received Date: 10/08/20 08:40
 Matrix: Water (Surface, Eff., Ground)
 Solids (%):
 Location:

Results by Semivolatile Organic Fuels

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Diesel Range Organics	0.566		0.556	0.167	mg/L	1		10/17/20 19:33
Surrogates								
5a Androstane (surr)	94.2		50-150		%	1		10/17/20 19:33

Batch Information

Analytical Batch: XFC15776
 Analytical Method: AK102
 Analyst: CDM
 Analytical Date/Time: 10/17/20 19:33
 Container ID: 1209732006-A

Prep Batch: XXX44069
 Prep Method: SW3520C
 Prep Date/Time: 10/15/20 15:24
 Prep Initial Wt./Vol.: 270 mL
 Prep Extract Vol: 1 mL

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Residual Range Organics	0.581		0.463	0.139	mg/L	1		10/17/20 19:33
Surrogates								
n-Triacontane-d62 (surr)	97.7		50-150		%	1		10/17/20 19:33

Batch Information

Analytical Batch: XFC15776
 Analytical Method: AK103
 Analyst: CDM
 Analytical Date/Time: 10/17/20 19:33
 Container ID: 1209732006-A

Prep Batch: XXX44069
 Prep Method: SW3520C
 Prep Date/Time: 10/15/20 15:24
 Prep Initial Wt./Vol.: 270 mL
 Prep Extract Vol: 1 mL

Print Date: 11/13/2020 12:20:13PM

Results of **MW-8**

Client Sample ID: **MW-8**
 Client Project ID: **105990-001 Fairbanks Rail Yard**
 Lab Sample ID: 1209732006
 Lab Project ID: 1209732

Collection Date: 10/06/20 17:41
 Received Date: 10/08/20 08:40
 Matrix: Water (Surface, Eff., Ground)
 Solids (%):
 Location:

Results by **Volatile Fuels**

Parameter	Result Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Gasoline Range Organics	0.100 U	0.100	0.0310	mg/L	1		10/12/20 23:42

Surrogates

4-Bromofluorobenzene (surr)	73	50-150		%	1		10/12/20 23:42
-----------------------------	----	--------	--	---	---	--	----------------

Batch Information

Analytical Batch: VFC15394
 Analytical Method: AK101
 Analyst: ALJ
 Analytical Date/Time: 10/12/20 23:42
 Container ID: 1209732006-E

Prep Batch: VXX36528
 Prep Method: SW5030B
 Prep Date/Time: 10/12/20 06:00
 Prep Initial Wt./Vol.: 5 mL
 Prep Extract Vol: 5 mL

Parameter	Result Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Benzene	0.500 U	0.500	0.150	ug/L	1		10/12/20 23:42
Ethylbenzene	1.00 U	1.00	0.310	ug/L	1		10/12/20 23:42
o-Xylene	1.00 U	1.00	0.310	ug/L	1		10/12/20 23:42
P & M -Xylene	2.00 U	2.00	0.620	ug/L	1		10/12/20 23:42
Toluene	1.00 U	1.00	0.310	ug/L	1		10/12/20 23:42
Xylenes (total)	3.00 U	3.00	0.930	ug/L	1		10/12/20 23:42

Surrogates

1,4-Difluorobenzene (surr)	85.7	77-115		%	1		10/12/20 23:42
----------------------------	------	--------	--	---	---	--	----------------

Batch Information

Analytical Batch: VFC15394
 Analytical Method: SW8021B
 Analyst: ALJ
 Analytical Date/Time: 10/12/20 23:42
 Container ID: 1209732006-E

Prep Batch: VXX36528
 Prep Method: SW5030B
 Prep Date/Time: 10/12/20 06:00
 Prep Initial Wt./Vol.: 5 mL
 Prep Extract Vol: 5 mL

Print Date: 11/13/2020 12:20:13PM

Results of MW-9

Client Sample ID: **MW-9**
 Client Project ID: **105990-001 Fairbanks Rail Yard**
 Lab Sample ID: 1209732007
 Lab Project ID: 1209732

Collection Date: 10/06/20 18:23
 Received Date: 10/08/20 08:40
 Matrix: Water (Surface, Eff., Ground)
 Solids (%):
 Location:

Results by Polynuclear Aromatics GC/MS

Parameter	Result Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
1-Methylnaphthalene	0.0463 U	0.0463	0.0139	ug/L	1		10/16/20 21:18
2-Methylnaphthalene	0.0463 U	0.0463	0.0139	ug/L	1		10/16/20 21:18
Acenaphthene	0.0463 U	0.0463	0.0139	ug/L	1		10/16/20 21:18
Acenaphthylene	0.0463 U	0.0463	0.0139	ug/L	1		10/16/20 21:18
Anthracene	0.0463 U	0.0463	0.0139	ug/L	1		10/16/20 21:18
Benzo(a)Anthracene	0.0463 U	0.0463	0.0139	ug/L	1		10/16/20 21:18
Benzo[a]pyrene	0.0185 U	0.0185	0.00574	ug/L	1		10/16/20 21:18
Benzo[b]Fluoranthene	0.0463 U	0.0463	0.0139	ug/L	1		10/16/20 21:18
Benzo[g,h,i]perylene	0.0463 U	0.0463	0.0139	ug/L	1		10/16/20 21:18
Benzo[k]fluoranthene	0.0463 U	0.0463	0.0139	ug/L	1		10/16/20 21:18
Chrysene	0.0463 U	0.0463	0.0139	ug/L	1		10/16/20 21:18
Dibenzo[a,h]anthracene	0.0185 U	0.0185	0.00574	ug/L	1		10/16/20 21:18
Fluoranthene	0.0463 U	0.0463	0.0139	ug/L	1		10/16/20 21:18
Fluorene	0.0463 U	0.0463	0.0139	ug/L	1		10/16/20 21:18
Indeno[1,2,3-c,d] pyrene	0.0463 U	0.0463	0.0139	ug/L	1		10/16/20 21:18
Naphthalene	0.0926 U	0.0926	0.0287	ug/L	1		10/16/20 21:18
Phenanthrene	0.0463 U	0.0463	0.0139	ug/L	1		10/16/20 21:18
Pyrene	0.0463 U	0.0463	0.0139	ug/L	1		10/16/20 21:18
Surrogates							
2-Methylnaphthalene-d10 (surr)	48.6	37-78		%	1		10/16/20 21:18
Fluoranthene-d10 (surr)	56.8	24-116		%	1		10/16/20 21:18

Batch Information

Analytical Batch: XMS12347
 Analytical Method: 8270D SIM LV (PAH)
 Analyst: DSD
 Analytical Date/Time: 10/16/20 21:18
 Container ID: 1209732007-C

Prep Batch: XXX44036
 Prep Method: SW3535A
 Prep Date/Time: 10/10/20 08:15
 Prep Initial Wt./Vol.: 270 mL
 Prep Extract Vol: 1 mL

Print Date: 11/13/2020 12:20:13PM

Results of MW-9

Client Sample ID: **MW-9**
 Client Project ID: **105990-001 Fairbanks Rail Yard**
 Lab Sample ID: 1209732007
 Lab Project ID: 1209732

Collection Date: 10/06/20 18:23
 Received Date: 10/08/20 08:40
 Matrix: Water (Surface, Eff., Ground)
 Solids (%):
 Location:

Results by Semivolatile Organic Fuels

Parameter	Result Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Diesel Range Organics	0.577 U	0.577	0.173	mg/L	1		10/17/20 19:43

Surrogates

5a Androstane (surr)	93.7	50-150		%	1		10/17/20 19:43
----------------------	------	--------	--	---	---	--	----------------

Batch Information

Analytical Batch: XFC15776
 Analytical Method: AK102
 Analyst: CDM
 Analytical Date/Time: 10/17/20 19:43
 Container ID: 1209732007-A

Prep Batch: XXX44069
 Prep Method: SW3520C
 Prep Date/Time: 10/15/20 15:24
 Prep Initial Wt./Vol.: 260 mL
 Prep Extract Vol: 1 mL

Parameter	Result Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Residual Range Organics	0.481 U	0.481	0.144	mg/L	1		10/17/20 19:43

Surrogates

n-Triacontane-d62 (surr)	96.1	50-150		%	1		10/17/20 19:43
--------------------------	------	--------	--	---	---	--	----------------

Batch Information

Analytical Batch: XFC15776
 Analytical Method: AK103
 Analyst: CDM
 Analytical Date/Time: 10/17/20 19:43
 Container ID: 1209732007-A

Prep Batch: XXX44069
 Prep Method: SW3520C
 Prep Date/Time: 10/15/20 15:24
 Prep Initial Wt./Vol.: 260 mL
 Prep Extract Vol: 1 mL

Print Date: 11/13/2020 12:20:13PM

Results of **MW-9**

Client Sample ID: **MW-9**
 Client Project ID: **105990-001 Fairbanks Rail Yard**
 Lab Sample ID: 1209732007
 Lab Project ID: 1209732

Collection Date: 10/06/20 18:23
 Received Date: 10/08/20 08:40
 Matrix: Water (Surface, Eff., Ground)
 Solids (%):
 Location:

Results by **Volatile Fuels**

Parameter	Result Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Gasoline Range Organics	0.100 U	0.100	0.0310	mg/L	1		10/12/20 21:55

Surrogates

4-Bromofluorobenzene (surr)	71.3	50-150		%	1		10/12/20 21:55
-----------------------------	------	--------	--	---	---	--	----------------

Batch Information

Analytical Batch: VFC15394
 Analytical Method: AK101
 Analyst: ALJ
 Analytical Date/Time: 10/12/20 21:55
 Container ID: 1209732007-E

Prep Batch: VXX36528
 Prep Method: SW5030B
 Prep Date/Time: 10/12/20 06:00
 Prep Initial Wt./Vol.: 5 mL
 Prep Extract Vol: 5 mL

Parameter	Result Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Benzene	0.500 U	0.500	0.150	ug/L	1		10/12/20 21:55
Ethylbenzene	1.00 U	1.00	0.310	ug/L	1		10/12/20 21:55
o-Xylene	1.00 U	1.00	0.310	ug/L	1		10/12/20 21:55
P & M -Xylene	2.00 U	2.00	0.620	ug/L	1		10/12/20 21:55
Toluene	1.00 U	1.00	0.310	ug/L	1		10/12/20 21:55
Xylenes (total)	3.00 U	3.00	0.930	ug/L	1		10/12/20 21:55

Surrogates

1,4-Difluorobenzene (surr)	87.1	77-115		%	1		10/12/20 21:55
----------------------------	------	--------	--	---	---	--	----------------

Batch Information

Analytical Batch: VFC15394
 Analytical Method: SW8021B
 Analyst: ALJ
 Analytical Date/Time: 10/12/20 21:55
 Container ID: 1209732007-E

Prep Batch: VXX36528
 Prep Method: SW5030B
 Prep Date/Time: 10/12/20 06:00
 Prep Initial Wt./Vol.: 5 mL
 Prep Extract Vol: 5 mL

Print Date: 11/13/2020 12:20:13PM

Results of Trip Blank

Client Sample ID: **Trip Blank**
 Client Project ID: **105990-001 Fairbanks Rail Yard**
 Lab Sample ID: 1209732008
 Lab Project ID: 1209732

Collection Date: 10/06/20 11:50
 Received Date: 10/08/20 08:40
 Matrix: Water (Surface, Eff., Ground)
 Solids (%):
 Location:

Results by Volatile Fuels

Parameter	Result Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Gasoline Range Organics	0.100 U	0.100	0.0310	mg/L	1		10/12/20 13:03

Surrogates

4-Bromofluorobenzene (surr)	75.6	50-150		%	1		10/12/20 13:03
-----------------------------	------	--------	--	---	---	--	----------------

Batch Information

Analytical Batch: VFC15394
 Analytical Method: AK101
 Analyst: ALJ
 Analytical Date/Time: 10/12/20 13:03
 Container ID: 1209732008-A

Prep Batch: VXX36526
 Prep Method: SW5030B
 Prep Date/Time: 10/12/20 06:00
 Prep Initial Wt./Vol.: 5 mL
 Prep Extract Vol: 5 mL

Parameter	Result Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Benzene	0.500 U	0.500	0.150	ug/L	1		10/12/20 13:03
Ethylbenzene	1.00 U	1.00	0.310	ug/L	1		10/12/20 13:03
o-Xylene	1.00 U	1.00	0.310	ug/L	1		10/12/20 13:03
P & M -Xylene	2.00 U	2.00	0.620	ug/L	1		10/12/20 13:03
Toluene	1.00 U	1.00	0.310	ug/L	1		10/12/20 13:03
Xylenes (total)	3.00 U	3.00	0.930	ug/L	1		10/12/20 13:03

Surrogates

1,4-Difluorobenzene (surr)	86.3	77-115		%	1		10/12/20 13:03
----------------------------	------	--------	--	---	---	--	----------------

Batch Information

Analytical Batch: VFC15394
 Analytical Method: SW8021B
 Analyst: ALJ
 Analytical Date/Time: 10/12/20 13:03
 Container ID: 1209732008-A

Prep Batch: VXX36526
 Prep Method: SW5030B
 Prep Date/Time: 10/12/20 06:00
 Prep Initial Wt./Vol.: 5 mL
 Prep Extract Vol: 5 mL

Print Date: 11/13/2020 12:20:13PM

Method Blank

Blank ID: MB for HBN 1812956 [VXX/36526]
Blank Lab ID: 1587403

Matrix: Water (Surface, Eff., Ground)

QC for Samples:
1209732008

Results by AK101

<u>Parameter</u>	<u>Results</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>
Gasoline Range Organics	0.0500U	0.100	0.0310	mg/L
Surrogates				
4-Bromofluorobenzene (surr)	80.7	50-150		%

Batch Information

Analytical Batch: VFC15394
Analytical Method: AK101
Instrument: Agilent 7890 PID/FID
Analyst: ALJ
Analytical Date/Time: 10/12/2020 10:08:00AM

Prep Batch: VXX36526
Prep Method: SW5030B
Prep Date/Time: 10/12/2020 6:00:00AM
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL

Print Date: 11/13/2020 12:20:19PM

Blank Spike Summary

Blank Spike ID: LCS for HBN 1209732 [VXX36526]
Blank Spike Lab ID: 1587406
Date Analyzed: 10/12/2020 11:01

Spike Duplicate ID: LCSD for HBN 1209732 [VXX36526]
Spike Duplicate Lab ID: 1587407
Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1209732008

Results by AK101

Parameter	Blank Spike (mg/L)			Spike Duplicate (mg/L)			CL	RPD (%)	RPD CL
	Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Gasoline Range Organics	1.00	1.20	120	1.00	1.30	130	* (60-120)	8.60	(< 20)
Surrogates									
4-Bromofluorobenzene (surr)	0.0500	103	103	0.0500	100	100	(50-150)	2.90	

Batch Information

Analytical Batch: **VFC15394**
Analytical Method: **AK101**
Instrument: **Agilent 7890 PID/FID**
Analyst: **ALJ**

Prep Batch: **VXX36526**
Prep Method: **SW5030B**
Prep Date/Time: **10/12/2020 06:00**
Spike Init Wt./Vol.: 1.00 mg/L Extract Vol: 5 mL
Dupe Init Wt./Vol.: 1.00 mg/L Extract Vol: 5 mL

Print Date: 11/13/2020 12:20:21PM

Method Blank

Blank ID: MB for HBN 1812956 [VXX/36526]
Blank Lab ID: 1587403

Matrix: Water (Surface, Eff., Ground)

QC for Samples:
1209732008

Results by SW8021B

<u>Parameter</u>	<u>Results</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>
Benzene	0.250U	0.500	0.150	ug/L
Ethylbenzene	0.500U	1.00	0.310	ug/L
o-Xylene	0.500U	1.00	0.310	ug/L
P & M -Xylene	1.00U	2.00	0.620	ug/L
Toluene	0.500U	1.00	0.310	ug/L
Xylenes (total)	1.50U	3.00	0.930	ug/L

Surrogates

1,4-Difluorobenzene (surr)	86.5	77-115	%
----------------------------	------	--------	---

Batch Information

Analytical Batch: VFC15394
Analytical Method: SW8021B
Instrument: Agilent 7890 PID/FID
Analyst: ALJ
Analytical Date/Time: 10/12/2020 10:08:00AM

Prep Batch: VXX36526
Prep Method: SW5030B
Prep Date/Time: 10/12/2020 6:00:00AM
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL

Blank Spike Summary

Blank Spike ID: LCS for HBN 1209732 [VXX36526]
Blank Spike Lab ID: 1587404
Date Analyzed: 10/12/2020 10:44

Spike Duplicate ID: LCSD for HBN 1209732 [VXX36526]
Spike Duplicate Lab ID: 1587405
Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1209732008

Results by SW8021B

Parameter	Blank Spike (ug/L)			Spike Duplicate (ug/L)			CL	RPD (%)	RPD CL
	Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Benzene	100	116	116	100	118	118	(80-120)	1.40	(< 20)
Ethylbenzene	100	100	100	100	99.3	99	(75-125)	1.20	(< 20)
o-Xylene	100	96.5	97	100	92.6	93	(80-120)	4.10	(< 20)
P & M -Xylene	200	198	99	200	193	97	(75-130)	2.40	(< 20)
Toluene	100	106	106	100	106	106	(75-120)	0.01	(< 20)
Xylenes (total)	300	295	98	300	286	95	(79-121)	2.90	(< 20)

Surrogates

1,4-Difluorobenzene (surr)	50	102	102	50	104	104	(77-115)	1.90
----------------------------	----	-----	-----	----	-----	-----	------------	------

Batch Information

Analytical Batch: VFC15394
Analytical Method: SW8021B
Instrument: Agilent 7890 PID/FID
Analyst: ALJ

Prep Batch: VXX36526
Prep Method: SW5030B
Prep Date/Time: 10/12/2020 06:00
Spike Init Wt./Vol.: 100 ug/L Extract Vol: 5 mL
Dupe Init Wt./Vol.: 100 ug/L Extract Vol: 5 mL

Print Date: 11/13/2020 12:20:27PM

Method Blank

Blank ID: MB for HBN 1812959 [VXX/36528]
Blank Lab ID: 1587420

Matrix: Water (Surface, Eff., Ground)

QC for Samples:

1209732001, 1209732002, 1209732003, 1209732004, 1209732005, 1209732006, 1209732007

Results by AK101

<u>Parameter</u>	<u>Results</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>
Gasoline Range Organics	0.0500U	0.100	0.0310	mg/L
Surrogates				
4-Bromofluorobenzene (surr)	64.2	50-150		%

Batch Information

Analytical Batch: VFC15394
Analytical Method: AK101
Instrument: Agilent 7890 PID/FID
Analyst: ALJ
Analytical Date/Time: 10/12/2020 9:19:00PM

Prep Batch: VXX36528
Prep Method: SW5030B
Prep Date/Time: 10/12/2020 6:00:00AM
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL

Print Date: 11/13/2020 12:20:30PM

Blank Spike Summary

Blank Spike ID: LCS for HBN 1209732 [VXX36528]
 Blank Spike Lab ID: 1587423
 Date Analyzed: 10/12/2020 21:01

Spike Duplicate ID: LCSD for HBN 1209732 [VXX36528]
 Spike Duplicate Lab ID: 1587424
 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1209732001, 1209732002, 1209732003, 1209732004, 1209732005, 1209732006, 1209732007

Results by AK101

Parameter	Blank Spike (mg/L)			Spike Duplicate (mg/L)			CL	RPD (%)	RPD CL
	Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Gasoline Range Organics	1.00	1.18	118	1.00	1.22	122	* (60-120)	3.20	(< 20)
Surrogates									
4-Bromofluorobenzene (surr)	0.0500	85.2	85	0.0500	87.7	88	(50-150)	2.80	

Batch Information

Analytical Batch: VFC15394
 Analytical Method: AK101
 Instrument: Agilent 7890 PID/FID
 Analyst: ALJ

Prep Batch: VXX36528
 Prep Method: SW5030B
 Prep Date/Time: 10/12/2020 06:00
 Spike Init Wt./Vol.: 1.00 mg/L Extract Vol: 5 mL
 Dupe Init Wt./Vol.: 1.00 mg/L Extract Vol: 5 mL

Print Date: 11/13/2020 12:20:32PM

Method Blank

Blank ID: MB for HBN 1812959 [VXX/36528]
Blank Lab ID: 1587420

Matrix: Water (Surface, Eff., Ground)

QC for Samples:

1209732001, 1209732002, 1209732003, 1209732004, 1209732005, 1209732006, 1209732007

Results by SW8021B

<u>Parameter</u>	<u>Results</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>
Benzene	0.250U	0.500	0.150	ug/L
Ethylbenzene	0.500U	1.00	0.310	ug/L
o-Xylene	0.500U	1.00	0.310	ug/L
P & M -Xylene	1.00U	2.00	0.620	ug/L
Toluene	0.310J	1.00	0.310	ug/L
Xylenes (total)	1.50U	3.00	0.930	ug/L

Surrogates

1,4-Difluorobenzene (surr)	88.9	77-115	%
----------------------------	------	--------	---

Batch Information

Analytical Batch: VFC15394
Analytical Method: SW8021B
Instrument: Agilent 7890 PID/FID
Analyst: ALJ
Analytical Date/Time: 10/12/2020 9:19:00PM

Prep Batch: VXX36528
Prep Method: SW5030B
Prep Date/Time: 10/12/2020 6:00:00AM
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL

Blank Spike Summary

Blank Spike ID: LCS for HBN 1209732 [VXX36528]
Blank Spike Lab ID: 1587421
Date Analyzed: 10/12/2020 20:44

Spike Duplicate ID: LCSD for HBN 1209732 [VXX36528]
Spike Duplicate Lab ID: 1587422
Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1209732001, 1209732002, 1209732003, 1209732004, 1209732005, 1209732006, 1209732007

Results by SW8021B

Parameter	Blank Spike (ug/L)			Spike Duplicate (ug/L)			CL	RPD (%)	RPD CL
	Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Benzene	100	116	116	100	119	119	(80-120)	2.50	(< 20)
Ethylbenzene	100	93.4	93	100	98.3	98	(75-125)	5.10	(< 20)
o-Xylene	100	87.9	88	100	92.6	93	(80-120)	5.10	(< 20)
P & M -Xylene	200	183	91	200	192	96	(75-130)	4.90	(< 20)
Toluene	100	103	103	100	106	106	(75-120)	3.20	(< 20)
Xylenes (total)	300	270	90	300	284	95	(79-121)	5.00	(< 20)
Surrogates									
1,4-Difluorobenzene (surr)	50	103	103	50	98.9	99	(77-115)	4.20	

Batch Information

Analytical Batch: VFC15394
Analytical Method: SW8021B
Instrument: Agilent 7890 PID/FID
Analyst: ALJ

Prep Batch: VXX36528
Prep Method: SW5030B
Prep Date/Time: 10/12/2020 06:00
Spike Init Wt./Vol.: 100 ug/L Extract Vol: 5 mL
Dupe Init Wt./Vol.: 100 ug/L Extract Vol: 5 mL

Print Date: 11/13/2020 12:20:38PM

Method Blank

Blank ID: MB for HBN 1813009 [VXX/36535]
Blank Lab ID: 1587678

Matrix: Water (Surface, Eff., Ground)

QC for Samples:
1209732001, 1209732003

Results by AK101

<u>Parameter</u>	<u>Results</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>
Gasoline Range Organics	0.0500U	0.100	0.0310	mg/L
Surrogates				
4-Bromofluorobenzene (surr)	84.6	50-150		%

Batch Information

Analytical Batch: VFC15395
Analytical Method: AK101
Instrument: Agilent 7890A PID/FID
Analyst: ALJ
Analytical Date/Time: 10/13/2020 9:57:00AM

Prep Batch: VXX36535
Prep Method: SW5030B
Prep Date/Time: 10/13/2020 6:00:00AM
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL

Print Date: 11/13/2020 12:20:41PM

Blank Spike Summary

Blank Spike ID: LCS for HBN 1209732 [VXX36535]
 Blank Spike Lab ID: 1587681
 Date Analyzed: 10/13/2020 10:51

Spike Duplicate ID: LCSD for HBN 1209732
 [VXX36535]
 Spike Duplicate Lab ID: 1587682
 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1209732001, 1209732003

Results by AK101

Parameter	Blank Spike (mg/L)			Spike Duplicate (mg/L)			CL	RPD (%)	RPD CL
	Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Gasoline Range Organics	1.00	1.14	114	1.00	1.14	114	(60-120)	0.38	(< 20)
Surrogates									
4-Bromofluorobenzene (surr)	0.0500	92.8	93	0.0500	94.3	94	(50-150)	1.60	

Batch Information

Analytical Batch: **VFC15395**
 Analytical Method: **AK101**
 Instrument: **Agilent 7890A PID/FID**
 Analyst: **ALJ**

Prep Batch: **VXX36535**
 Prep Method: **SW5030B**
 Prep Date/Time: **10/13/2020 06:00**
 Spike Init Wt./Vol.: 1.00 mg/L Extract Vol: 5 mL
 Dupe Init Wt./Vol.: 1.00 mg/L Extract Vol: 5 mL

Print Date: 11/13/2020 12:20:43PM

Method Blank

Blank ID: MB for HBN 1812840 [XXX/44036]
Blank Lab ID: 1586844

Matrix: Water (Surface, Eff., Ground)

QC for Samples:

1209732001, 1209732002, 1209732003, 1209732004, 1209732005, 1209732006, 1209732007

Results by 8270D SIM LV (PAH)

Parameter	Results	LOQ/CL	DL	Units
1-Methylnaphthalene	0.0250U	0.0500	0.0150	ug/L
2-Methylnaphthalene	0.0250U	0.0500	0.0150	ug/L
Acenaphthene	0.0250U	0.0500	0.0150	ug/L
Acenaphthylene	0.0250U	0.0500	0.0150	ug/L
Anthracene	0.0250U	0.0500	0.0150	ug/L
Benzo(a)Anthracene	0.0250U	0.0500	0.0150	ug/L
Benzo[a]pyrene	0.0100U	0.0200	0.00620	ug/L
Benzo[b]Fluoranthene	0.0250U	0.0500	0.0150	ug/L
Benzo[g,h,i]perylene	0.0250U	0.0500	0.0150	ug/L
Benzo[k]fluoranthene	0.0250U	0.0500	0.0150	ug/L
Chrysene	0.0250U	0.0500	0.0150	ug/L
Dibenzo[a,h]anthracene	0.0100U	0.0200	0.00620	ug/L
Fluoranthene	0.0250U	0.0500	0.0150	ug/L
Fluorene	0.0250U	0.0500	0.0150	ug/L
Indeno[1,2,3-c,d] pyrene	0.0250U	0.0500	0.0150	ug/L
Naphthalene	0.0500U	0.100	0.0310	ug/L
Phenanthrene	0.0250U	0.0500	0.0150	ug/L
Pyrene	0.0250U	0.0500	0.0150	ug/L

Surrogates

2-Methylnaphthalene-d10 (surr)	60.1	37-78	%
Fluoranthene-d10 (surr)	73.7	24-116	%

Batch Information

Analytical Batch: XMS12347
Analytical Method: 8270D SIM LV (PAH)
Instrument: Agilent GC 7890B/5977A SWA
Analyst: DSD
Analytical Date/Time: 10/16/2020 3:48:00PM

Prep Batch: XXX44036
Prep Method: SW3535A
Prep Date/Time: 10/10/2020 8:15:54AM
Prep Initial Wt./Vol.: 250 mL
Prep Extract Vol: 1 mL

Print Date: 11/13/2020 12:20:45PM

Blank Spike Summary

Blank Spike ID: LCS for HBN 1209732 [XXX44036]

Blank Spike Lab ID: 1586845

Date Analyzed: 10/16/2020 16:09

Spike Duplicate ID: LCSD for HBN 1209732 [XXX44036]

Spike Duplicate Lab ID: 1586846

Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1209732001, 1209732002, 1209732003, 1209732004, 1209732005, 1209732006, 1209732007

Results by 8270D SIM LV (PAH)

Parameter	Blank Spike (ug/L)			Spike Duplicate (ug/L)			CL	RPD (%)	RPD CL
	Spike	Result	Rec (%)	Spike	Result	Rec (%)			
1-Methylnaphthalene	2	1.30	65	2	1.36	68	(41-115)	4.40	(< 20)
2-Methylnaphthalene	2	1.27	63	2	1.33	67	(39-114)	5.00	(< 20)
Acenaphthene	2	1.29	64	2	1.39	70	(48-114)	7.90	(< 20)
Acenaphthylene	2	1.35	68	2	1.44	72	(35-121)	6.50	(< 20)
Anthracene	2	1.34	67	2	1.37	69	(53-119)	2.80	(< 20)
Benzo(a)Anthracene	2	1.33	66	2	1.33	66	(59-120)	0.23	(< 20)
Benzo[a]pyrene	2	1.55	77	2	1.57	79	(53-120)	1.40	(< 20)
Benzo[b]Fluoranthene	2	1.47	74	2	1.51	76	(53-126)	2.70	(< 20)
Benzo[g,h,i]perylene	2	1.60	80	2	1.60	80	(44-128)	0.01	(< 20)
Benzo[k]fluoranthene	2	1.54	77	2	1.55	77	(54-125)	0.50	(< 20)
Chrysene	2	1.54	77	2	1.57	78	(57-120)	1.50	(< 20)
Dibenzo[a,h]anthracene	2	1.57	78	2	1.56	78	(44-131)	0.66	(< 20)
Fluoranthene	2	1.55	77	2	1.59	80	(58-120)	2.80	(< 20)
Fluorene	2	1.31	66	2	1.40	70	(50-118)	6.10	(< 20)
Indeno[1,2,3-c,d] pyrene	2	1.67	84	2	1.68	84	(48-130)	0.78	(< 20)
Naphthalene	2	1.36	68	2	1.46	73	(43-114)	6.80	(< 20)
Phenanthrene	2	1.33	67	2	1.37	68	(53-115)	2.70	(< 20)
Pyrene	2	1.51	76	2	1.56	78	(53-121)	2.60	(< 20)
Surrogates									
2-Methylnaphthalene-d10 (surr)	2	57.2	57	2	60.7	61	(37-78)	5.90	
Fluoranthene-d10 (surr)	2	70.5	71	2	73.4	73	(24-116)	4.00	

Batch Information

Analytical Batch: XMS12347

Analytical Method: 8270D SIM LV (PAH)

Instrument: Agilent GC 7890B/5977A SWA

Analyst: DSD

Prep Batch: XXX44036

Prep Method: SW3535A

Prep Date/Time: 10/10/2020 08:15

Spike Init Wt./Vol.: 2 ug/L Extract Vol: 1 mL

Dupe Init Wt./Vol.: 2 ug/L Extract Vol: 1 mL

Print Date: 11/13/2020 12:20:48PM

Matrix Spike Summary

Original Sample ID: 1205488001
MS Sample ID: 1586847 MS
MSD Sample ID: 1586848 MSD

Analysis Date: 10/16/2020 16:50
Analysis Date: 10/16/2020 17:10
Analysis Date: 10/16/2020 17:31
Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1209732001, 1209732002, 1209732003, 1209732004, 1209732005, 1209732006, 1209732007

Results by 8270D SIM LV (PAH)

Parameter	Sample	Matrix Spike (ug/L)			Spike Duplicate (ug/L)			CL	RPD (%)	RPD CL
		Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Acenaphthene	0.0521U	2.08	1.39	67	2.04	1.31	64	48-114	5.90	(< 20)
Acenaphthylene	0.0521U	2.08	1.41	68	2.04	1.33	65	35-121	6.20	(< 20)
Anthracene	0.0521U	2.08	1.17	56	2.04	0.977	48	* 53-119	18.30	(< 20)
Benzo(a)Anthracene	0.0521U	2.08	.415	20 *	2.04	0.279	14	* 59-120	39.00	* (< 20)
Benzo[a]pyrene	0.0208U	2.08	.257	12 *	2.04	0.135	7	* 53-120	62.40	* (< 20)
Benzo[b]Fluoranthene	0.0521U	2.08	.245	12 *	2.04	0.129	6	* 53-126	61.90	* (< 20)
Benzo[g,h,i]perylene	0.0521U	2.08	.158	8 *	2.04	0.0612	3	* 44-128	88.20	* (< 20)
Benzo[k]fluoranthene	0.0521U	2.08	.259	12 *	2.04	0.132	7	* 54-125	65.10	* (< 20)
Chrysene	0.0521U	2.08	.532	26 *	2.04	0.365	18	* 57-120	37.20	* (< 20)
Dibenzo[a,h]anthracene	0.0208U	2.08	.147	7 *	2.04	0.0613	3	* 44-131	82.40	* (< 20)
Fluoranthene	0.0521U	2.08	.98	47 *	2.04	0.682	33	* 58-120	35.90	* (< 20)
Fluorene	0.199	2.08	1.48	61	2.04	1.41	59	50-118	4.80	(< 20)
Indeno[1,2,3-c,d] pyrene	0.0521U	2.08	.164	8 *	2.04	0.0620	3	* 48-130	90.30	* (< 20)
Naphthalene	0.104U	2.08	1.63	79	2.04	1.50	73	43-114	8.70	(< 20)
Phenanthrene	0.189	2.08	1.31	54	2.04	1.09	44	* 53-115	18.50	(< 20)
Pyrene	0.0521U	2.08	.978	47 *	2.04	0.696	34	* 53-121	33.80	* (< 20)
Surrogates										
2-Methylnaphthalene-d10 (surr)		2.08	1.31	63	2.04	1.23	60	37-78	6.00	
Fluoranthene-d10 (surr)		2.08	.883	42	2.04	0.602	30	24-116	37.80	

Batch Information

Analytical Batch: XMS12347
Analytical Method: 8270D SIM LV (PAH)
Instrument: Agilent GC 7890B/5977A SWA
Analyst: DSD
Analytical Date/Time: 10/16/2020 5:10:00PM

Prep Batch: XXX44036
Prep Method: 3535 Solid Phase Ext for 8270 PAH SIM LV
Prep Date/Time: 10/10/2020 8:15:54AM
Prep Initial Wt./Vol.: 240.00mL
Prep Extract Vol: 1.00mL

Print Date: 11/13/2020 12:20:49PM

Method Blank

Blank ID: MB for HBN 1813054 [XXX/44069]
Blank Lab ID: 1587945

Matrix: Water (Surface, Eff., Ground)

QC for Samples:

1209732001, 1209732002, 1209732003, 1209732004, 1209732005, 1209732006, 1209732007

Results by AK102

<u>Parameter</u>	<u>Results</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>
Diesel Range Organics	0.300U	0.600	0.180	mg/L
Surrogates				
5a Androstane (surr)	95.3	60-120		%

Batch Information

Analytical Batch: XFC15776
Analytical Method: AK102
Instrument: Agilent 7890B F
Analyst: CDM
Analytical Date/Time: 10/17/2020 4:07:00PM

Prep Batch: XXX44069
Prep Method: SW3520C
Prep Date/Time: 10/15/2020 3:24:08PM
Prep Initial Wt./Vol.: 250 mL
Prep Extract Vol: 1 mL

Print Date: 11/13/2020 12:20:51PM

Blank Spike Summary

Blank Spike ID: LCS for HBN 1209732 [XXX44069]
 Blank Spike Lab ID: 1587946
 Date Analyzed: 10/17/2020 16:17

Spike Duplicate ID: LCSD for HBN 1209732 [XXX44069]
 Spike Duplicate Lab ID: 1587947
 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1209732001, 1209732002, 1209732003, 1209732004, 1209732005, 1209732006, 1209732007

Results by AK102

Parameter	Blank Spike (mg/L)			Spike Duplicate (mg/L)			CL	RPD (%)	RPD CL
	Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Diesel Range Organics	20	19.4	97	20	18.9	95	(75-125)	2.80	(< 20)
Surrogates									
5a Androstane (surr)	0.4	99.8	100	0.4	99.3	99	(60-120)	0.45	

Batch Information

Analytical Batch: **XFC15776**
 Analytical Method: **AK102**
 Instrument: **Agilent 7890B F**
 Analyst: **CDM**

Prep Batch: **XXX44069**
 Prep Method: **SW3520C**
 Prep Date/Time: **10/15/2020 15:24**
 Spike Init Wt./Vol.: 20 mg/L Extract Vol: 1 mL
 Dupe Init Wt./Vol.: 20 mg/L Extract Vol: 1 mL

Print Date: 11/13/2020 12:20:53PM

Method Blank

Blank ID: MB for HBN 1813054 [XXX/44069]
Blank Lab ID: 1587945

Matrix: Water (Surface, Eff., Ground)

QC for Samples:

1209732001, 1209732002, 1209732003, 1209732004, 1209732005, 1209732006, 1209732007

Results by AK103

<u>Parameter</u>	<u>Results</u>	<u>LOQ/CL</u>	<u>DL</u>	<u>Units</u>
Residual Range Organics	0.250U	0.500	0.150	mg/L
Surrogates				
n-Triacontane-d62 (surr)	102	60-120		%

Batch Information

Analytical Batch: XFC15776
Analytical Method: AK103
Instrument: Agilent 7890B F
Analyst: CDM
Analytical Date/Time: 10/17/2020 4:07:00PM

Prep Batch: XXX44069
Prep Method: SW3520C
Prep Date/Time: 10/15/2020 3:24:08PM
Prep Initial Wt./Vol.: 250 mL
Prep Extract Vol: 1 mL

Print Date: 11/13/2020 12:20:56PM

Blank Spike Summary

Blank Spike ID: LCS for HBN 1209732 [XXX44069]
 Blank Spike Lab ID: 1587946
 Date Analyzed: 10/17/2020 16:17

Spike Duplicate ID: LCSD for HBN 1209732 [XXX44069]
 Spike Duplicate Lab ID: 1587947
 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1209732001, 1209732002, 1209732003, 1209732004, 1209732005, 1209732006, 1209732007

Results by AK103

Parameter	Blank Spike (mg/L)			Spike Duplicate (mg/L)			CL	RPD (%)	RPD CL
	Spike	Result	Rec (%)	Spike	Result	Rec (%)			
Residual Range Organics	20	20.7	103	20	20.2	101	(60-120)	2.50	(< 20)
Surrogates									
n-Triacontane-d62 (surr)	0.4	100	100	0.4	102	102	(60-120)	1.40	

Batch Information

Analytical Batch: **XFC15776**
 Analytical Method: **AK103**
 Instrument: **Agilent 7890B F**
 Analyst: **CDM**

Prep Batch: **XXX44069**
 Prep Method: **SW3520C**
 Prep Date/Time: **10/15/2020 15:24**
 Spike Init Wt./Vol.: 20 mg/L Extract Vol: 1 mL
 Dupe Init Wt./Vol.: 20 mg/L Extract Vol: 1 mL

Print Date: 11/13/2020 12:20:59PM

1209732



2355 Hill Road
Fairbanks, AK 99709
(907) 479-0600
www.shannonwilson.com

CHAIN-C

ECORD



Laboratory SGS Page 1 of 1
Attn: _____

Analytical Methods (include preservative if used)

Quote No: _____

Turn Around Time: ☒ Normal ☐ Rush

J-Flags: ☒ Yes ☐ No

Sample Identity	Lab No.	Time	Date Sampled	GRD (AK10) / BTEX (AK10) / PHH (B2700-31M)	PHH (AK10) / BTEX (AK10) / PHH (B2700-31M)	Total Number of Containers	Remarks/Matrix Composition/Grab? Sample Containers
-----------------	---------	------	--------------	--	--	----------------------------	--

MW-4	1AG	1150	10/6/20	X	X	7	Groundwater
MW-5	2AG	1539				7	
MW-6	3AG	1635				7	
MW-7	4AG	1428				7	
MW-107	5AG	1418				7	
MW-8	6AG	1741				7	
MW-9	7AG	1823				7	
Trip Blank	8AG			X			Lab Provided

Project Information

Number: 105990-001

Name: Fairbanks Rail Yard

Contact: RLW, CBP, TXG

Ongoing Project? Yes ☐ No ☒

Sampler: RLW, JKR

Sample Receipt

Total No. of Containers: _____

COC Seals/Intact? Y/N/NA _____

Received Good Cond./Cold _____

Temp: 29.3.0

Delivery Method: _____

Notes:

* BILL TO ARRC (Alaska Railroad)

* Results to S+W

Trip Blank w/ Samples at all times

Distribution: White - w/shipment - returned to Shannon & Wilson w/ laboratory report
Yellow - w/shipment - for consignee files
Pink - Shannon & Wilson - job file

Relinquished By: 1	Relinquished By: 2	Relinquished By: 3
Signature: <u>Shannon & Wilson</u> Printed Name: <u>Shannon & Wilson</u> Company: <u>SGS</u>	Signature: <u>Michelle Albornoz</u> Printed Name: <u>Michelle Albornoz</u> Company: <u>SGS</u>	Signature: <u>Michelle Albornoz</u> Printed Name: <u>Michelle Albornoz</u> Company: <u>SGS</u>
Time: 11:30 Date: 10-7-20	Time: 1400 Date: 10-7-20	Time: 0840 Date: 10/8/20

Revised Report - Revision 1

PH-358866-00 Need New PH-227915 (per C&H)

No. 411509



SGS Workorder #:

1209732

1209732

Review Criteria		Condition (Yes, No, N/A)		Exceptions Noted below	
Chain of Custody / Temperature Requirements		Yes		Exemption permitted if sampler hand carries/delivers.	
Were Custody Seals intact? Note # & location		N/A			
COC accompanied samples?		Yes			
DOD: Were samples received in COC corresponding coolers?		N/A			
<input type="checkbox"/> **Exemption permitted if chilled & collected <8 hours ago, or for samples where chilling is not required					
Temperature blank compliant* (i.e., 0-6 °C after CF)?		Yes		Cooler ID:	1 @ 2.9 °C Therm. ID: D60
		Yes		Cooler ID:	2 @ 3.0 °C Therm. ID: D63
If samples received without a temperature blank, the "cooler temperature" will be documented instead & "COOLER TEMP" will be noted to the right. "ambient" or "chilled" will be noted if neither is available.				Cooler ID:	@ °C Therm. ID:
				Cooler ID:	@ °C Therm. ID:
				Cooler ID:	@ °C Therm. ID:
*If >6°C, were samples collected <8 hours ago?					
If <0°C, were sample containers ice free?					
Note: Identify containers received at non-compliant temperature . Use form FS-0029 if more space is needed.					
Holding Time / Documentation / Sample Condition Requirements		Note: Refer to form F-083 "Sample Guide" for specific holding times.			
Do samples match COC** (i.e., sample IDs, dates/times collected)?		N/C			
**Note: If times differ <1hr, record details & login per COC.					
***Note: If sample information on containers differs from COC, SGS will default to COC information					
Were samples in good condition (no leaks/cracks/breakage)?		Yes			
Were analytical requests clear? (i.e., method is specified for analyses with multiple option for analysis (Ex: BTEX, Metals))		Yes			
Were Trip Blanks (i.e., VOAs, LL-Hg) in cooler with samples?		Yes			
Were all water VOA vials free of headspace (i.e., bubbles ≤ 6mm)?		N/C			
Were all soil VOAs field extracted with MeOH+BFB?		N/A			
For Rush/Short Hold Time, was RUSH/Short HT email sent?		N/A			
Note to Client: Any "No", answer above indicates non-compliance with standard procedures and may impact data quality.					
Additional notes (if applicable):					
SGS Profile #				0	

Sample Containers and Preservatives

<u>Container Id</u>	<u>Preservative</u>	<u>Container Condition</u>	<u>Container Id</u>	<u>Preservative</u>	<u>Container Condition</u>
1209732001-A	HCL to pH < 2	OK	1209732008-B	HCL to pH < 2	OK
1209732001-B	HCL to pH < 2	OK	1209732008-C	HCL to pH < 2	OK
1209732001-C	No Preservative Required	OK			
1209732001-D	No Preservative Required	OK			
1209732001-E	HCL to pH < 2	OK			
1209732001-F	HCL to pH < 2	OK			
1209732001-G	HCL to pH < 2	OK			
1209732002-A	HCL to pH < 2	OK			
1209732002-B	HCL to pH < 2	OK			
1209732002-C	No Preservative Required	OK			
1209732002-D	No Preservative Required	OK			
1209732002-E	HCL to pH < 2	OK			
1209732002-F	HCL to pH < 2	OK			
1209732002-G	HCL to pH < 2	OK			
1209732003-A	HCL to pH < 2	OK			
1209732003-B	HCL to pH < 2	OK			
1209732003-C	No Preservative Required	OK			
1209732003-D	No Preservative Required	OK			
1209732003-E	HCL to pH < 2	OK			
1209732003-F	HCL to pH < 2	OK			
1209732003-G	HCL to pH < 2	OK			
1209732004-A	HCL to pH < 2	OK			
1209732004-B	HCL to pH < 2	OK			
1209732004-C	No Preservative Required	OK			
1209732004-D	No Preservative Required	OK			
1209732004-E	HCL to pH < 2	OK			
1209732004-F	HCL to pH < 2	OK			
1209732004-G	HCL to pH < 2	OK			
1209732005-A	HCL to pH < 2	OK			
1209732005-B	HCL to pH < 2	OK			
1209732005-C	No Preservative Required	OK			
1209732005-D	No Preservative Required	OK			
1209732005-E	HCL to pH < 2	OK			
1209732005-F	HCL to pH < 2	OK			
1209732005-G	HCL to pH < 2	OK			
1209732006-A	HCL to pH < 2	OK			
1209732006-B	HCL to pH < 2	OK			
1209732006-C	No Preservative Required	OK			
1209732006-D	No Preservative Required	OK			
1209732006-E	HCL to pH < 2	OK			
1209732006-F	HCL to pH < 2	OK			
1209732006-G	HCL to pH < 2	OK			
1209732007-A	HCL to pH < 2	OK			
1209732007-B	HCL to pH < 2	OK			
1209732007-C	No Preservative Required	OK			
1209732007-D	No Preservative Required	OK			
1209732007-E	HCL to pH < 2	OK			
1209732007-F	HCL to pH < 2	OK			
1209732007-G	HCL to pH < 2	OK			
1209732008-A	HCL to pH < 2	OK			

Container Condition Glossary

Containers for bacteriological, low level mercury and VOA vials are not opened prior to analysis and will be assigned condition code OK unless evidence indicates than an inappropriate container was submitted.

OK - The container was received at an acceptable pH for the analysis requested.

BU - The container was received with headspace greater than 6mm.

DM - The container was received damaged.

FR - The container was received frozen and not usable for Bacteria or BOD analyses.

IC - The container provided for microbiology analysis was not a laboratory-supplied, pre-sterilized container and therefore was not suitable for analysis.

NC- The container provided was not preserved or was under-preserved. The method does not allow for additional preservative added after collection.

PA - The container was received outside of the acceptable pH for the analysis requested. Preservative was added upon receipt and the container is now at the correct pH. See the Sample Receipt Form for details on the amount and lot # of the preservative added.

PH - The container was received outside of the acceptable pH for the analysis requested. Preservative was added upon receipt, but was insufficient to bring the container to the correct pH for the analysis requested. See the Sample Receipt Form for details on the amount and lot # of the preservative added.

QN - Insufficient sample quantity provided.

Appendix C

ADEC LDRC

ADEC Laboratory Data Review Checklist

CONTENTS

- LDRC for SGS WO 1209732

LDRC

APPENDIX C: ADEC LDRC

Laboratory Data Review Checklist

Completed By:

Rachel Willis

Title:

Environmental Scientist

Date:

November 13, 2020

Consultant Firm:

Shannon & Wilson, Inc.

Laboratory Name:

SGS

Laboratory Report Number:

1209732

Laboratory Report Date:

11/13/20

CS Site Name:

ARRC Fairbanks Rail Yard

ADEC File Number:

102.38.050

Hazard Identification Number:

327

1209732

Laboratory Report Date:

11/13/20

CS Site Name:

ARRC Fairbanks Rail Yard

Note: Any N/A or No box checked must have an explanation in the comments box.

1. Laboratory

- a. Did an ADEC CS approved laboratory receive and perform all of the submitted sample analyses?

Yes ☒ No ☐ N/A ☐ Comments:

- b. If the samples were transferred to another “network” laboratory or sub-contracted to an alternate laboratory, was the laboratory performing the analyses ADEC CS approved?

Yes ☐ No ☐ N/A ☒ Comments:

The samples were analyzed at the SGS laboratory in Anchorage, Alaska.

2. Chain of Custody (CoC)

- a. CoC information completed, signed, and dated (including released/received by)?

Yes ☒ No ☐ N/A ☐ Comments:

- b. Correct analyses requested?

Yes ☒ No ☐ N/A ☐ Comments:

3. Laboratory Sample Receipt Documentation

- a. Sample/cooler temperature documented and within range at receipt (0° to 6° C)?

Yes ☒ No ☐ N/A ☐ Comments:

- b. Sample preservation acceptable – acidified waters, Methanol preserved VOC soil (GRO, BTEX, Volatile Chlorinated Solvents, etc.)?

Yes ☒ No ☐ N/A ☐ Comments:

1209732

Laboratory Report Date:

11/13/20

CS Site Name:

ARRC Fairbanks Rail Yard

c. Sample condition documented – broken, leaking (Methanol), zero headspace (VOC vials)?

Yes ☒ No ☐ N/A ☐ Comments:

The sample receipt form notes that the samples arrived in good condition.

d. If there were any discrepancies, were they documented? For example, incorrect sample containers/preservation, sample temperature outside of acceptable range, insufficient or missing samples, etc.?

Yes ☐ No ☐ N/A ☒ Comments:

There were no discrepancies noted in the sample receipt documentation.

e. Data quality or usability affected?

Comments:

Data quality and/or usability are not affected.

4. Case Narrative

a. Present and understandable?

Yes ☒ No ☐ N/A ☐ Comments:

b. Discrepancies, errors, or QC failures identified by the lab?

Yes ☒ No ☐ N/A ☐ Comments:

The recovery of the method SW8270D SIM surrogate 2-methylnaphthalene-d10 was outside of acceptable limits in sample *MW-107*. The laboratory attributes this recovery failure to matrix interference.

The recovery of gasoline range organics (GRO) was outside of acceptable limits in the laboratory control sample duplicates (LCSD) associated with preparation batches VXX3652 and VXX36528. The case narrative notes that GRO was not detected in the associated field samples.

The analytical accuracy and precision demonstrated by the method SW8270D SIM matrix spike (MS) and MS duplicate (MSD) samples associated with preparation batch XXX44036 did not meet acceptance criteria for several polynuclear aromatic hydrocarbons (PAHs).

1209732

Laboratory Report Date:

11/13/20

CS Site Name:

ARRC Fairbanks Rail Yard

c. Were all corrective actions documented?

Yes ☐ No ☒ N/A ☐ Comments:

The case narrative does not describe any corrective actions.

d. What is the effect on data quality/usability according to the case narrative?

Comments:

The case narrative does not specify an effect on data quality. See section 6 for further assessment.

5. Samples Results

a. Correct analyses performed/reported as requested on COC?

Yes ☒ No ☐ N/A ☐ Comments:

b. All applicable holding times met?

Yes ☒ No ☐ N/A ☐ Comments:

c. All soils reported on a dry weight basis?

Yes ☐ No ☐ N/A ☒ Comments:

Soil samples were not included in this work order.

d. Are the reported LOQs less than the Cleanup Level or the minimum required detection level for the project?

Yes ☒ No ☐ N/A ☐ Comments:

e. Data quality or usability affected?

Data quality and/or usability are not affected.

1209732

Laboratory Report Date:

11/13/20

CS Site Name:

ARRC Fairbanks Rail Yard

6. QC Samples

a. Method Blank

- i. One method blank reported per matrix, analysis and 20 samples?

Yes ☒ No ☐ N/A ☐ Comments:

- ii. All method blank results less than limit of quantitation (LOQ) or project specified objectives?

Yes ☐ No ☒ N/A ☐ Comments:

Target analytes were not detected in the method blank samples except for toluene in preparatory batch VXX36528; where the analyte was detected below the LOQ.

- iii. If above LOQ or project specified objectives, what samples are affected?

Comments:

No samples are affected; the associated field samples do not contain detectable concentrations of toluene.

- iv. Do the affected sample(s) have data flags? If so, are the data flags clearly defined?

Yes ☐ No ☐ N/A ☒ Comments:

Qualification was not required; see above.

- v. Data quality or usability affected?

Comments:

Data quality and/or usability are not affected.

b. Laboratory Control Sample/Duplicate (LCS/LCSD)

- i. Organics – One LCS/LCSD reported per matrix, analysis and 20 samples? (LCS/LCSD required per AK methods, LCS required per SW846)

Yes ☒ No ☐ N/A ☐ Comments:

An LCS/LCSD was reported for each preparatory batch in all analytical methods specified on the COC.

- ii. Metals/Inorganics – one LCS and one sample duplicate reported per matrix, analysis and 20 samples?

Yes ☐ No ☐ N/A ☒ Comments:

Metals/Inorganics were not included in this work order.

1209732

Laboratory Report Date:

11/13/20

CS Site Name:

ARRC Fairbanks Rail Yard

- iii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits and project specified objectives, if applicable? (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

Yes ☐ No ☒ N/A ☐ Comments:

Percent recoveries were within laboratory limits, with the exception for GRO in the method AK101 LCSDs associated with preparatory batches VXX36526 and VXX36528; where GRO was recovered above the laboratory's control limit.

- iv. Precision – All relative percent differences (RPD) reported and less than method or laboratory limits and project specified objectives, if applicable? RPD reported from LCS/LCSD, and or sample/sample duplicate. (AK Petroleum methods 20%; all other analyses see the laboratory QC pages)

Yes ☒ No ☐ N/A ☐ Comments:

- v. If %R or RPD is outside of acceptable limits, what samples are affected?

Comments:

GRO was not detected in the field samples associated with preparation batches VXX36526 and VXX36528. The non-detect results are therefore unaffected by the elevated method recovery.

- vi. Do the affected sample(s) have data flags? If so, are the data flags clearly defined?

Yes ☐ No ☐ N/A ☒ Comments:

Qualification was not required; see above.

- vii. Data quality or usability affected? (Use comment box to explain.)

Comments:

Data quality and/or usability are not affected.

- c. Matrix Spike/Matrix Spike Duplicate (MS/MSD)

Note: Leave blank if not required for project

- i. Organics – One MS/MSD reported per matrix, analysis and 20 samples?

Yes ☒ No ☐ N/A ☐ Comments:

An MS/MSD was reported for method SW8270D SIM in conjunction with preparatory batch XXX44036.

1209732

Laboratory Report Date:

11/13/20

CS Site Name:

ARRC Fairbanks Rail Yard

ii. Metals/Inorganics – one MS and one MSD reported per matrix, analysis and 20 samples?

Yes ☐ No ☐ N/A ☒ Comments:

Metals/Inorganics were not included in this work order.

iii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits and project specified objectives, if applicable? (AK Petroleum methods: AK101 60%-120%, AK102 75%-125%, AK103 60%-120%; all other analyses see the laboratory QC pages)

Yes ☐ No ☒ N/A ☐ Comments:

The recoveries of the PAH analytes anthracene, benzo(a)anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[g,h,i]perylene, benzo[k]fluoranthene, chrysene, dibenzo[a,h]anthracene, fluoranthene, indeno[1,2,3-c,d] pyrene, phenanthrene, and pyrene were below their lower control limits in the MS and/or MSD samples associated with preparation batch XXX44036.

iv. Precision – All relative percent differences (RPD) reported and less than method or laboratory limits and project specified objectives, if applicable? RPD reported from MS/MSD, and or sample/sample duplicate. (AK Petroleum methods 20%; all other analyses see the laboratory QC pages)

Yes ☐ No ☒ N/A ☐ Comments:

The relative precision demonstrated between the MS/MSD recoveries of the PAH analytes benzo(a)anthracene, benzo[a]pyrene, benzo[b]fluoranthene, benzo[g,h,i]perylene, benzo[k]fluoranthene, chrysene, dibenzo[a,h]anthracene, fluoranthene, indeno[1,2,3-c,d] pyrene, and pyrene did not meet acceptance criteria.

v. If %R or RPD is outside of acceptable limits, what samples are affected?

Comments:

The parent sample from which the MS/MSD was spiked is not included with this work order. Additionally, method accuracy and precision were demonstrated by the associated LCS/LCSD.

vi. Do the affected sample(s) have data flags? If so, are the data flags clearly defined?

Yes ☐ No ☐ N/A ☒ Comments:

Qualification was not required; see above.

1209732

Laboratory Report Date:

11/13/20

CS Site Name:

ARRC Fairbanks Rail Yard

vii. Data quality or usability affected? (Use comment box to explain.)

Comments:

Data quality and/or usability are not affected.

d. Surrogates – Organics Only or Isotope Dilution Analytes (IDA) – Isotope Dilution Methods Only

i. Are surrogate/IDA recoveries reported for organic analyses – field, QC and laboratory samples?

Yes ☒ No ☐ N/A ☐

Comments:

ii. Accuracy – All percent recoveries (%R) reported and within method or laboratory limits and project specified objectives, if applicable? (AK Petroleum methods 50-150 %R; all other analyses see the laboratory report pages)

Yes ☐ No ☒ N/A ☐

Comments:

Surrogate recovery was within laboratory limits for project and QC samples included in this work order with exception of 2-methylnaphthalene-d10 in project sample *MW-107*; where the surrogate was recovered at a concentration higher than the laboratory limit.

iii. Do the sample results with failed surrogate/IDA recoveries have data flags? If so, are the data flags clearly defined?

Yes ☒ No ☐ N/A ☐

Comments:

Associated analytes with 2-methylnaphthalene-d10 include 1-methylnaphthalene, 2-methylnaphthalene, acenaphthene, acenaphthylene, anthracene, fluorene, naphthalene, and phenanthrene.

The affected project sample *MW-107* did not have detections for acenaphthene, acenaphthylene, anthracene, fluorene, and phenanthrene; no flags are required on these analytes. However, 1-methylnaphthalene and naphthalene were detected in *MW-107*, and these results are flagged with a *JH** to denote the high analytical bias.

iv. Data quality or usability affected?

Comments:

The data quality is affected; see above.

1209732

Laboratory Report Date:

11/13/20

CS Site Name:

ARRC Fairbanks Rail Yard

e. Trip Blanks

- i. One trip blank reported per matrix, analysis and for each cooler containing volatile samples?
(If not, enter explanation below.)

Yes ☒ No ☐ N/A ☐ Comments:

- ii. Is the cooler used to transport the trip blank and VOA samples clearly indicated on the COC?
(If not, a comment explaining why must be entered below)

Yes ☒ No ☐ N/A ☐ Comments:

- iii. All results less than LOQ and project specified objectives?

Yes ☒ No ☐ N/A ☐ Comments:

- iv. If above LOQ or project specified objectives, what samples are affected?

Comments:

None; target analytes were not detected in the trip blank.

- v. Data quality or usability affected?

Comments:

Data quality and/or usability are not affected.

f. Field Duplicate

- i. One field duplicate submitted per matrix, analysis and 10 project samples?

Yes ☒ No ☐ N/A ☐ Comments:

- ii. Submitted blind to lab?

Yes ☒ No ☐ N/A ☐ Comments:

Sample MW-107 is a field duplicate of sample MW-7.

1209732

Laboratory Report Date:

11/13/20

CS Site Name:

ARRC Fairbanks Rail Yard

- iii. Precision – All relative percent differences (RPD) less than specified project objectives?
(Recommended: 30% water, 50% soil)

$$\text{RPD (\%)} = \text{Absolute value of: } \frac{(R_1 - R_2)}{((R_1 + R_2)/2)} \times 100$$

Where R_1 = Sample Concentration

R_2 = Field Duplicate Concentration

Yes ☒ No ☐ N/A ☐ Comments:

The relative precision demonstrated between the detected results of the field duplicate samples met project DQOs, where calculable. We are unable to calculate precision for acenaphthene and 1-methylnaphthalene due to these analytes only being detected in one of the two duplicate samples. The 1-methylnaphthalene and acenaphthene results for the field duplicate samples are considered estimated and flagged J*, unless already qualified.

- iv. Data quality or usability affected? (Use the comment box to explain why or why not.)

Comments:

Data quality is affected; see above.

- g. Decontamination or Equipment Blank (If not applicable, a comment stating why must be entered below)?

Yes ☐ No ☐ N/A ☒ Comments:

Equipment blanks were not included in this work order but are submitted at the appropriate frequency for the project.

- i. All results less than LOQ and project specified objectives?

Yes ☐ No ☐ N/A ☒ Comments:

Equipment blanks were not included; see above.

- ii. If above LOQ or project specified objectives, what samples are affected?

Comments:

No samples are affected.

- iii. Data quality or usability affected?

Comments:

Data quality and/or usability are not affected.

1209732

Laboratory Report Date:

11/13/20

CS Site Name:

ARRC Fairbanks Rail Yard

7. Other Data Flags/Qualifiers (ACOE, AFCEE, Lab Specific, etc.)

a. Defined and appropriate?

Yes ☐ No ☐ N/A ☒ Comments:

Additional flags and qualifiers are not required.

Appendix D

Quality Assurance and Quality Control Summary

QA/QC

Quality Assurance/Quality Control (QA/QC) procedures assist in producing data of acceptable quality and reliability. We reviewed the analytical results provided by SGS for laboratory QC samples and conducted our own QA assessment for this project. We reviewed chain-of custody (COC) records and laboratory sample-receipt forms to check we followed proper custody procedures, met sample holding times, and kept water samples properly chilled (between 0 degrees Celsius [°C] and 6°C) until analysis. Our QA review procedures allow us to document accuracy and precision of the analytical data and to check that analyses were sufficiently sensitive to detect analytes below regulatory standards.

We reviewed the groundwater data report for SGS work order (WO) 1209732. The laboratory report includes a case narrative and sample-receipt forms (Appendix B). Our review of the laboratory reports is included in the LDRC in Appendix C. Details regarding our QA analysis are presented below.

SAMPLE HANDLING

We hand-delivered the cooler containing water samples to the SGS Fairbanks facility on October 7, 2020. SGS shipped the samples to their Anchorage laboratory to perform analyses noted on the COC. The cooler with water samples contained a temperature blank to measure whether samples were kept appropriately cold. SGS personnel measured the temperature blank at the time the samples arrived at each of their facilities; the temperature blank was within the proper temperature range upon arrival at the laboratory. Additionally, a laboratory-provided trip blank for volatile analysis accompanied the cooler containing water samples and remained with the cooler until being relinquished.

Our review of COC records and laboratory sample-receipt documents did not reveal sample-handling anomalies that would affect the quality or usability of the data, and the samples were processed within the appropriate method holding times.

ANALYTICAL SENSITIVITY

We compared groundwater-sample limits of detection (LODs) to the ADEC regulatory levels. For groundwater data, LODs were less than ADEC-established CULs, where applicable.

We submitted a trip blank with our water samples to determine if cross contamination among samples or contamination from an outside source may have occurred during shipment or storage. There were no analytes detected in the trip blank.

The laboratory runs a method blank with each sample batch to detect analyte carryover during analysis. Toluene was detected below the LOQ. Project samples included in the preparatory batch with the method blank detection had no detections for toluene. Results are considered not affected by the method blank detection.

ACCURACY

The laboratory assessed the accuracy of its analytical procedures by analyzing laboratory control samples (LCS) and LCS duplicate samples (LCSD). LCS/LCSD analysis allows the laboratory to evaluate their ability to recover analytes added to clean aqueous matrices. LCS/LCSD samples were reported for GRO, DRO, RRO, BTEX, and PAH analysis. Laboratory accuracy was also measured for each sample by assessing the recovery of analyte surrogates added to individual project samples.

The LCS/LCSD were within laboratory control limits, with exception for GRO. GRO was not detected in project samples associated with the method recovery failure.

Accuracy of surrogate analytes were also within laboratory acceptance criteria, with exception for 2-methylnaphthalene-d10 in project sample *MW-107*, where the surrogate was recovered at a concentration higher than the laboratory limit. A 'JH*' was added to the results of 1-methylnaphthalene and naphthalene to denote the high analytical bias.

We also evaluated accuracy using the matrix spike (MS) and matrix spike duplicate (MSD) pair. MS/MSDs are spikes of known analyte concentrations added to field samples with a similar matrix to assess matrix interference. The laboratory MS/MSD for PAH analyses were within laboratory acceptance criteria, with a few exceptions that did not affect data quality. Refer to the LDRC for details.

PRECISION

We submitted one field duplicate sample in our WO. To evaluate data precision and reproducibility of our sampling techniques, we calculated the relative percent difference (RPD) between the sample and its duplicate. We can only evaluate RPDs if the results of the analysis for both the sample and its duplicate are greater than the LOQs for a given analyte. The field-duplicate RPDs for detected analytes were within the project-specified data quality objective of 30% for groundwater. We were unable to calculate an RPD for acenaphthene and 1-methylnaphthalene in the field-duplicate pair *MW-7* and *MW-107*, as it

was not detected in one of the sample pairs. We added qualified the results for acenaphthene and 1-methylnaphthalene with a J* to denote the imprecision in sample MW-7 and MW-107.

We also evaluated laboratory analytical precision using RPD calculations. The LCS/LCSDs provide information regarding the reproducibility of laboratory procedures and are therefore a measure of the laboratory's analytical precision. The RPD results for the LCS/LCSD were within acceptable laboratory QC limits. Laboratory precision for the MS/MSD samples were within acceptable laboratory QC limits, with a few exceptions that did not affect data quality. See the LDRC for details.

DATA QUALITY SUMMARY

By working in accordance with our proposed scope of services, we consider the samples we collected to be representative of site conditions at the locations and times they were obtained. The quality of the analytical data for this project does not appear to have been compromised, and those results affected by QC anomalies were qualified with appropriate flags. For additional details on individual analyte flags, see the LDRC in Appendix C.

Appendix E

Mann-Kendall Trend Analysis

CONTENTS

- ProUCL Output Summary
- Input Table

	Mann-Kendall Trend Test Analysis		
User Selected Options			
Date/Time of Computation	ProUCL 5.111/19/2020 4:10:37 PM		
From File	historical results input file.xls		
Full Precision	OFF		
Confidence Coefficient	0.95		
Level of Significance	0.05		
GRO-mw-1			
General Statistics			
Number or Reported Events Not Used	0		
Number of Generated Events	3		
Number Values Reported (n)	3		
Minimum	0.839		
Maximum	1.06		
Mean	0.926		
Geometric Mean	0.922		
Median	0.88		
Standard Deviation	0.118		
Coefficient of Variation	0.127		
Mann-Kendall Test			
M-K Test Value (S)	1		
Tabulated p-value	N/A		
Standard Deviation of S	1.915		
Standardized Value of S	0		
Approximate p-value	0.5		
Insufficient evidence to identify a significant trend at the specified level of significance.			

GRO-mw-2				
General Statistics				
Number or Reported Events Not Used	0			
Number of Generated Events	5			
Number Values Reported (n)	5			
Minimum	0.164			
Maximum	0.384			
Mean	0.306			
Geometric Mean	0.291			
Median	0.373			
Standard Deviation	0.101			
Coefficient of Variation	0.33			
Mann-Kendall Test				
M-K Test Value (S)	-2			
Tabulated p-value	0.408			
Standard Deviation of S	4.082			
Standardized Value of S	-0.245			
Approximate p-value	0.403			
Insufficient evidence to identify a significant trend at the specified level of significance.				
GRO-mw-3				
General Statistics				
Number or Reported Events Not Used	0			
Number of Generated Events	3			
Number Values Reported (n)	4			
Number Values Missing	1			
Number Values Used	3			
Minimum	0.05			
Maximum	0.05			
Mean	0.05			
Geometric Mean	0.05			
Median	0.05			
Standard Deviation	8.498E-18			
Coefficient of Variation	N/A			
Mann-Kendall Test				
M-K Test Value (S)	0			
Tabulated p-value	N/A			
Standard Deviation of S	0			
Standardized Value of S	N/A			
Approximate p-value	N/A			
Insufficient evidence to identify a significant trend at the specified level of significance.				

GRO-mw-4				
General Statistics				
Number or Reported Events Not Used	0			
Number of Generated Events	11			
Number Values Reported (n)	11			
Minimum	0.0854			
Maximum	1.48			
Mean	0.355			
Geometric Mean	0.262			
Median	0.251			
Standard Deviation	0.387			
Coefficient of Variation	1.091			
Mann-Kendall Test				
M-K Test Value (S)	-11			
Tabulated p-value	0.223			
Standard Deviation of S	12.85			
Standardized Value of S	-0.778			
Approximate p-value	0.218			
Insufficient evidence to identify a significant trend at the specified level of significance.				
GRO-mw-5				
General Statistics				
Number or Reported Events Not Used	0			
Number of Generated Events	9			
Number Values Reported (n)	9			
Minimum	0.0459			
Maximum	0.228			
Mean	0.0898			
Geometric Mean	0.0787			
Median	0.0716			
Standard Deviation	0.0568			
Coefficient of Variation	0.632			
Mann-Kendall Test				
M-K Test Value (S)	-2			
Tabulated p-value	0.46			
Standard Deviation of S	9.487			
Standardized Value of S	-0.105			
Approximate p-value	0.458			
Insufficient evidence to identify a significant trend at the specified level of significance.				

GRO-mw-6				
General Statistics				
Number or Reported Events Not Used	0			
Number of Generated Events	10			
Number Values Reported (n)	10			
Minimum	0.05			
Maximum	0.479			
Mean	0.244			
Geometric Mean	0.205			
Median	0.213			
Standard Deviation	0.138			
Coefficient of Variation	0.566			
Mann-Kendall Test				
M-K Test Value (S)	-1			
Tabulated p-value	0.5			
Standard Deviation of S	11.18			
Standardized Value of S	0			
Approximate p-value	0.5			
Insufficient evidence to identify a significant trend at the specified level of significance.				
GRO-mw-7				
General Statistics				
Number or Reported Events Not Used	0			
Number of Generated Events	8			
Number Values Reported (n)	8			
Minimum	0.0428			
Maximum	0.114			
Mean	0.0758			
Geometric Mean	0.0716			
Median	0.0775			
Standard Deviation	0.0264			
Coefficient of Variation	0.348			
Mann-Kendall Test				
M-K Test Value (S)	-8			
Tabulated p-value	0.119			
Standard Deviation of S	8.083			
Standardized Value of S	-0.866			
Approximate p-value	0.193			
Insufficient evidence to identify a significant trend at the specified level of significance.				

GRO-mw-8				
General Statistics				
Number or Reported Events Not Used	0			
Number of Generated Events	7			
Number Values Reported (n)	7			
Minimum	0.0443			
Maximum	0.1			
Mean	0.0563			
Geometric Mean	0.0543			
Median	0.05			
Standard Deviation	0.0194			
Coefficient of Variation	0.344			
Mann-Kendall Test				
M-K Test Value (S)	5			
Tabulated p-value	0.281			
Standard Deviation of S	5.26			
Standardized Value of S	0.76			
Approximate p-value	0.223			
Insufficient evidence to identify a significant trend at the specified level of significance.				
GRO-mw-9				
General Statistics				
Number or Reported Events Not Used	0			
Number of Generated Events	7			
Number Values Reported (n)	7			
Minimum	0.05			
Maximum	0.1			
Mean	0.065			
Geometric Mean	0.0618			
Median	0.05			
Standard Deviation	0.024			
Coefficient of Variation	0.369			
Mann-Kendall Test				
M-K Test Value (S)	10			
Tabulated p-value	0.068			
Standard Deviation of S	5.888			
Standardized Value of S	1.529			
Approximate p-value	0.0632			
Insufficient evidence to identify a significant trend at the specified level of significance.				

GRO-wc-3				
General Statistics				
Number or Reported Events Not Used	0			
Number of Generated Events	2			
Number Values Reported (n)	2			
Minimum	0.157			
Maximum	0.165			
Mean	0.161			
Geometric Mean	0.161			
Median	0.161			
Standard Deviation	0.00566			
Coefficient of Variation	0.0351			
Not enough reported values (n) to provide Mann-Kendall Statistics!				

		Mann-Kendall Trend Test Analysis			
User Selected Options					
Date/Time of Computation		ProUCL 5.111/19/2020 4:11:58 PM			
From File		historical results input file.xls			
Full Precision		OFF			
Confidence Coefficient		0.95			
Level of Significance		0.05			
DRO-mw-1					
General Statistics					
Number or Reported Events Not Used	0				
Number of Generated Events	3				
Number Values Reported (n)	3				
Minimum	69.5				
Maximum	123				
Mean	97.33				
Geometric Mean	94.75				
Median	99.5				
Standard Deviation	26.82				
Coefficient of Variation	0.276				
Mann-Kendall Test					
M-K Test Value (S)	-3				
Tabulated p-value	N/A				
Standard Deviation of S	1.915				
Standardized Value of S	-1.044				
Approximate p-value	0.148				
Insufficient evidence to identify a significant trend at the specified level of significance.					

DRO-mw-2					
General Statistics					
Number or Reported Events Not Used	0				
Number of Generated Events	5				
Number Values Reported (n)	5				
Minimum	11.3				
Maximum	187				
Mean	50.84				
Geometric Mean	26.68				
Median	19.5				
Standard Deviation	76.19				
Coefficient of Variation	1.499				
Mann-Kendall Test					
M-K Test Value (S)	-6				
Tabulated p-value	0.117				
Standard Deviation of S	4.082				
Standardized Value of S	-1.225				
Approximate p-value	0.11				
Insufficient evidence to identify a significant trend at the specified level of significance.					
DRO-mw-3					
General Statistics					
Number or Reported Events Not Used	0				
Number of Generated Events	4				
Number Values Reported (n)	4				
Minimum	0.3				
Maximum	5.3				
Mean	2.313				
Geometric Mean	1.419				
Median	1.825				
Standard Deviation	2.237				
Coefficient of Variation	0.967				
Mann-Kendall Test					
M-K Test Value (S)	-6				
Tabulated p-value	0.042				
Standard Deviation of S	2.944				
Standardized Value of S	-1.698				
Approximate p-value	0.0447				
Statistically significant evidence of a decreasing trend at the specified level of significance.					

DRO-mw-4					
General Statistics					
Number or Reported Events Not Used	0				
Number of Generated Events	11				
Number Values Reported (n)	11				
Minimum	1.8				
Maximum	43				
Mean	10.04				
Geometric Mean	6.777				
Median	6.07				
Standard Deviation	11.79				
Coefficient of Variation	1.175				
Mann-Kendall Test					
M-K Test Value (S)	-9				
Tabulated p-value	0.271				
Standard Deviation of S	12.85				
Standardized Value of S	-0.623				
Approximate p-value	0.267				
Insufficient evidence to identify a significant trend at the specified level of significance.					
DRO-mw-5					
General Statistics					
Number or Reported Events Not Used	0				
Number of Generated Events	9				
Number Values Reported (n)	9				
Minimum	0.225				
Maximum	4.43				
Mean	2.802				
Geometric Mean	2.229				
Median	3.14				
Standard Deviation	1.341				
Coefficient of Variation	0.479				
Mann-Kendall Test					
M-K Test Value (S)	-2				
Tabulated p-value	0.46				
Standard Deviation of S	9.592				
Standardized Value of S	-0.104				
Approximate p-value	0.458				
Insufficient evidence to identify a significant trend at the specified level of significance.					

DRO-mw-6					
General Statistics					
Number or Reported Events Not Used	0				
Number of Generated Events	10				
Number Values Reported (n)	10				
Minimum	4.84				
Maximum	118				
Mean	20.36				
Geometric Mean	11.5				
Median	9.895				
Standard Deviation	34.48				
Coefficient of Variation	1.694				
Mann-Kendall Test					
M-K Test Value (S)	-6				
Tabulated p-value	0.3				
Standard Deviation of S	11.14				
Standardized Value of S	-0.449				
Approximate p-value	0.327				
Insufficient evidence to identify a significant trend at the specified level of significance.					
DRO-mw-7					
General Statistics					
Number or Reported Events Not Used	0				
Number of Generated Events	8				
Number Values Reported (n)	8				
Minimum	6.73				
Maximum	30.8				
Mean	15.89				
Geometric Mean	14.43				
Median	13.2				
Standard Deviation	7.626				
Coefficient of Variation	0.48				
Mann-Kendall Test					
M-K Test Value (S)	6				
Tabulated p-value	0.274				
Standard Deviation of S	8.083				
Standardized Value of S	0.619				
Approximate p-value	0.268				
Insufficient evidence to identify a significant trend at the specified level of significance.					

DRO-mw-8					
General Statistics					
Number or Reported Events Not Used	0				
Number of Generated Events	7				
Number Values Reported (n)	7				
Minimum	0.239				
Maximum	0.577				
Mean	0.369				
Geometric Mean	0.349				
Median	0.3				
Standard Deviation	0.14				
Coefficient of Variation	0.381				
Mann-Kendall Test					
M-K Test Value (S)	10				
Tabulated p-value	0.068				
Standard Deviation of S	6.583				
Standardized Value of S	1.367				
Approximate p-value	0.0858				
Insufficient evidence to identify a significant trend at the specified level of significance.					
DRO-mw-9					
General Statistics					
Number or Reported Events Not Used	0				
Number of Generated Events	7				
Number Values Reported (n)	7				
Minimum	0.189				
Maximum	0.577				
Mean	0.366				
Geometric Mean	0.341				
Median	0.303				
Standard Deviation	0.15				
Coefficient of Variation	0.411				
Mann-Kendall Test					
M-K Test Value (S)	17				
Tabulated p-value	0.005				
Standard Deviation of S	6.506				
Standardized Value of S	2.459				
Approximate p-value	0.00696				
Statistically significant evidence of an increasing trend at the specified level of significance.					

DRO-wc-3					
General Statistics					
Number or Reported Events Not Used	0				
Number of Generated Events	2				
Number Values Reported (n)	2				
Minimum	7.67				
Maximum	16.4				
Mean	12.04				
Geometric Mean	11.22				
Median	12.04				
Standard Deviation	6.173				
Coefficient of Variation	0.513				
Not enough reported values (n) to provide Mann-Kendall Statistics!					

		Mann-Kendall Trend Test Analysis			
User Selected Options					
Date/Time of Computation		ProUCL 5.111/19/2020 4:13:37 PM			
From File		historical results input file.xls			
Full Precision		OFF			
Confidence Coefficient		0.95			
Level of Significance		0.05			
RRO-mw-1					
General Statistics					
Number or Reported Events Not Used	0				
Number of Generated Events	2				
Number Values Reported (n)	3				
Number Values Missing	1				
Number Values Used	2				
Minimum	4.23				
Maximum	4.38				
Mean	4.305				
Geometric Mean	4.304				
Median	4.305				
Standard Deviation	0.106				
Coefficient of Variation	0.0246				
Not enough reported values (n) to provide Mann-Kendall Statistics!					

RRO-mw-2					
General Statistics					
Number or Reported Events Not Used	0				
Number of Generated Events	5				
Number Values Reported (n)	5				
Minimum	1.16				
Maximum	6.81				
Mean	2.8				
Geometric Mean	2.296				
Median	2.08				
Standard Deviation	2.274				
Coefficient of Variation	0.812				
Mann-Kendall Test					
M-K Test Value (S)	-6				
Tabulated p-value	0.117				
Standard Deviation of S	4.082				
Standardized Value of S	-1.225				
Approximate p-value	0.11				
Insufficient evidence to identify a significant trend at the specified level of significance.					
RRO-mw-3					
General Statistics					
Number or Reported Events Not Used	0				
Number of Generated Events	3				
Number Values Reported (n)	4				
Number Values Missing	1				
Number Values Used	3				
Minimum	0.25				
Maximum	0.992				
Mean	0.557				
Geometric Mean	0.474				
Median	0.43				
Standard Deviation	0.387				
Coefficient of Variation	0.694				
Mann-Kendall Test					
M-K Test Value (S)	-3				
Tabulated p-value	N/A				
Standard Deviation of S	1.915				
Standardized Value of S	-1.044				
Approximate p-value	0.148				
Insufficient evidence to identify a significant trend at the specified level of significance.					

RRO-mw-4					
General Statistics					
Number or Reported Events Not Used	0				
Number of Generated Events	10				
Number Values Reported (n)	11				
Number Values Missing	1				
Number Values Used	10				
Minimum	0.25				
Maximum	1				
Mean	0.548				
Geometric Mean	0.501				
Median	0.497				
Standard Deviation	0.239				
Coefficient of Variation	0.435				
Mann-Kendall Test					
M-K Test Value (S)	18				
Tabulated p-value	0.054				
Standard Deviation of S	11.14				
Standardized Value of S	1.527				
Approximate p-value	0.0634				
Insufficient evidence to identify a significant trend at the specified level of significance.					
RRO-mw-5					
General Statistics					
Number or Reported Events Not Used	0				
Number of Generated Events	9				
Number Values Reported (n)	9				
Minimum	0.25				
Maximum	1.25				
Mean	0.479				
Geometric Mean	0.418				
Median	0.431				
Standard Deviation	0.312				
Coefficient of Variation	0.651				
Mann-Kendall Test					
M-K Test Value (S)	21				
Tabulated p-value	0.022				
Standard Deviation of S	9.399				
Standardized Value of S	2.128				
Approximate p-value	0.0167				
Statistically significant evidence of an increasing trend at the specified level of significance.					

RRO-mw-6					
General Statistics					
Number or Reported Events Not Used	0				
Number of Generated Events	9				
Number Values Reported (n)	10				
Number Values Missing	1				
Number Values Used	9				
Minimum	0.636				
Maximum	2.83				
Mean	1.212				
Geometric Mean	1.098				
Median	1.06				
Standard Deviation	0.662				
Coefficient of Variation	0.546				
Mann-Kendall Test					
M-K Test Value (S)	12				
Tabulated p-value	0.13				
Standard Deviation of S	9.592				
Standardized Value of S	1.147				
Approximate p-value	0.126				
Insufficient evidence to identify a significant trend at the specified level of significance.					
RRO-mw-7					
General Statistics					
Number or Reported Events Not Used	0				
Number of Generated Events	7				
Number Values Reported (n)	8				
Number Values Missing	1				
Number Values Used	7				
Minimum	1.05				
Maximum	5.81				
Mean	2.361				
Geometric Mean	2.019				
Median	1.85				
Standard Deviation	1.632				
Coefficient of Variation	0.691				
Mann-Kendall Test					
M-K Test Value (S)	7				
Tabulated p-value	0.191				
Standard Deviation of S	6.658				
Standardized Value of S	0.901				
Approximate p-value	0.184				
Insufficient evidence to identify a significant trend at the specified level of significance.					

RRO-mw-8					
General Statistics					
Number or Reported Events Not Used	0				
Number of Generated Events	7				
Number Values Reported (n)	7				
Minimum	0.195				
Maximum	0.581				
Mean	0.338				
Geometric Mean	0.315				
Median	0.267				
Standard Deviation	0.142				
Coefficient of Variation	0.42				
Mann-Kendall Test					
M-K Test Value (S)	2				
Tabulated p-value	0.386				
Standard Deviation of S	6.583				
Standardized Value of S	0.152				
Approximate p-value	0.44				
Insufficient evidence to identify a significant trend at the specified level of significance.					
RRO-mw-9					
General Statistics					
Number or Reported Events Not Used	0				
Number of Generated Events	7				
Number Values Reported (n)	7				
Minimum	0.157				
Maximum	0.481				
Mean	0.283				
Geometric Mean	0.257				
Median	0.25				
Standard Deviation	0.14				
Coefficient of Variation	0.494				
Mann-Kendall Test					
M-K Test Value (S)	9				
Tabulated p-value	0.119				
Standard Deviation of S	6.506				
Standardized Value of S	1.23				
Approximate p-value	0.109				
Insufficient evidence to identify a significant trend at the specified level of significance.					

RRO-wc-3					
General Statistics					
Number or Reported Events Not Used	0				
Number of Generated Events	2				
Number Values Reported (n)	2				
Minimum	1.17				
Maximum	1.56				
Mean	1.365				
Geometric Mean	1.351				
Median	1.365				
Standard Deviation	0.276				
Coefficient of Variation	0.202				
Not enough reported values (n) to provide Mann-Kendall Statistics!					

	Mann-Kendall Trend Test Analysis				
User Selected Options					
Date/Time of Computation	ProUCL 5.111/19/2020 4:14:02 PM				
From File	historical results input file.xls				
Full Precision	OFF				
Confidence Coefficient	0.95				
Level of Significance	0.05				
Benzene-mw-1					
General Statistics					
Number or Reported Events Not Used	0				
Number of Generated Events	3				
Number Values Reported (n)	3				
Minimum	0.00423				
Maximum	0.00527				
Mean	0.0048				
Geometric Mean	0.00478				
Median	0.0049				
Standard Deviation	5.2716E-4				
Coefficient of Variation	0.11				
Mann-Kendall Test					
M-K Test Value (S)	-1				
Tabulated p-value	N/A				
Standard Deviation of S	1.915				
Standardized Value of S	0				
Approximate p-value	0.5				
Insufficient evidence to identify a significant trend at the specified level of significance.					

Benzene-mw-2					
General Statistics					
Number or Reported Events Not Used	0				
Number of Generated Events	5				
Number Values Reported (n)	5				
Minimum	0.0088				
Maximum	0.0263				
Mean	0.0183				
Geometric Mean	0.017				
Median	0.0187				
Standard Deviation	0.00718				
Coefficient of Variation	0.392				
Mann-Kendall Test					
M-K Test Value (S)	4				
Tabulated p-value	0.242				
Standard Deviation of S	4.082				
Standardized Value of S	0.735				
Approximate p-value	0.231				
Insufficient evidence to identify a significant trend at the specified level of significance.					
Benzene-mw-3					
General Statistics					
Number or Reported Events Not Used	0				
Number of Generated Events	4				
Number Values Reported (n)	4				
Minimum	2.5000E-4				
Maximum	2.5000E-4				
Mean	2.5000E-4				
Geometric Mean	2.5000E-4				
Median	2.5000E-4				
Standard Deviation	0				
Coefficient of Variation	N/A				
Mann-Kendall Test					
M-K Test Value (S)	0				
Tabulated p-value	0.625				
Standard Deviation of S	0				
Standardized Value of S	N/A				
Approximate p-value	N/A				
Insufficient evidence to identify a significant trend at the specified level of significance.					

Benzene-mw-4					
General Statistics					
Number or Reported Events Not Used	0				
Number of Generated Events	11				
Number Values Reported (n)	11				
Minimum	1.8000E-4				
Maximum	5.0000E-4				
Mean	2.9909E-4				
Geometric Mean	2.8064E-4				
Median	2.5000E-4				
Standard Deviation	1.1861E-4				
Coefficient of Variation	0.397				
Mann-Kendall Test					
M-K Test Value (S)	10				
Tabulated p-value	0.223				
Standard Deviation of S	11.6				
Standardized Value of S	0.776				
Approximate p-value	0.219				
Insufficient evidence to identify a significant trend at the specified level of significance.					
Benzene-mw-5					
General Statistics					
Number or Reported Events Not Used	0				
Number of Generated Events	9				
Number Values Reported (n)	9				
Minimum	2.5000E-4				
Maximum	0.00111				
Mean	4.4222E-4				
Geometric Mean	3.8128E-4				
Median	2.5000E-4				
Standard Deviation	2.8739E-4				
Coefficient of Variation	0.65				
Mann-Kendall Test					
M-K Test Value (S)	6				
Tabulated p-value	0.306				
Standard Deviation of S	8.679				
Standardized Value of S	0.576				
Approximate p-value	0.282				
Insufficient evidence to identify a significant trend at the specified level of significance.					

Benzene-mw-6					
General Statistics					
Number or Reported Events Not Used	0				
Number of Generated Events	10				
Number Values Reported (n)	10				
Minimum	2.5000E-4				
Maximum	0.0135				
Mean	0.00663				
Geometric Mean	0.00484				
Median	0.00669				
Standard Deviation	0.00376				
Coefficient of Variation	0.567				
Mann-Kendall Test					
M-K Test Value (S)	11				
Tabulated p-value	0.19				
Standard Deviation of S	11.18				
Standardized Value of S	0.894				
Approximate p-value	0.186				
Insufficient evidence to identify a significant trend at the specified level of significance.					
Benzene-mw-7					
General Statistics					
Number or Reported Events Not Used	0				
Number of Generated Events	8				
Number Values Reported (n)	8				
Minimum	3.3000E-4				
Maximum	0.00388				
Mean	0.00165				
Geometric Mean	0.00134				
Median	0.00123				
Standard Deviation	0.00109				
Coefficient of Variation	0.662				
Mann-Kendall Test					
M-K Test Value (S)	14				
Tabulated p-value	0.054				
Standard Deviation of S	8.083				
Standardized Value of S	1.608				
Approximate p-value	0.0539				
Insufficient evidence to identify a significant trend at the specified level of significance.					

Benzene-mw-8					
General Statistics					
Number or Reported Events Not Used	0				
Number of Generated Events	7				
Number Values Reported (n)	7				
Minimum	2.5000E-4				
Maximum	5.0000E-4				
Mean	2.9571E-4				
Geometric Mean	2.8593E-4				
Median	2.5000E-4				
Standard Deviation	9.3783E-5				
Coefficient of Variation	0.317				
Mann-Kendall Test					
M-K Test Value (S)	7				
Tabulated p-value	0.191				
Standard Deviation of S	5.26				
Standardized Value of S	1.141				
Approximate p-value	0.127				
Insufficient evidence to identify a significant trend at the specified level of significance.					
Benzene-mw-9					
General Statistics					
Number or Reported Events Not Used	0				
Number of Generated Events	7				
Number Values Reported (n)	7				
Minimum	2.5000E-4				
Maximum	5.0000E-4				
Mean	2.8571E-4				
Geometric Mean	2.7602E-4				
Median	2.5000E-4				
Standard Deviation	9.4491E-5				
Coefficient of Variation	0.331				
Mann-Kendall Test					
M-K Test Value (S)	6				
Tabulated p-value	0.191				
Standard Deviation of S	4				
Standardized Value of S	1.25				
Approximate p-value	0.106				
Insufficient evidence to identify a significant trend at the specified level of significance.					

Benzene-wc-3					
General Statistics					
Number or Reported Events Not Used	0				
Number of Generated Events	2				
Number Values Reported (n)	2				
Minimum	0.00482				
Maximum	0.00654				
Mean	0.00568				
Geometric Mean	0.00561				
Median	0.00568				
Standard Deviation	0.00122				
Coefficient of Variation	0.214				
Not enough reported values (n) to provide Mann-Kendall Statistics!					

	Mann-Kendall Trend Test Analysis				
User Selected Options					
Date/Time of Computation	ProUCL 5.111/19/2020 4:14:24 PM				
From File	historical results input file.xls				
Full Precision	OFF				
Confidence Coefficient	0.95				
Level of Significance	0.05				
Toluene-mw-1					
General Statistics					
Number or Reported Events Not Used	0				
Number of Generated Events	3				
Number Values Reported (n)	3				
Minimum	0.0015				
Maximum	0.00472				
Mean	0.00348				
Geometric Mean	0.00311				
Median	0.00423				
Standard Deviation	0.00174				
Coefficient of Variation	0.498				
Mann-Kendall Test					
M-K Test Value (S)	1				
Tabulated p-value	N/A				
Standard Deviation of S	1.915				
Standardized Value of S	0				
Approximate p-value	0.5				
Insufficient evidence to identify a significant trend at the specified level of significance.					

Toluene-mw-2					
General Statistics					
Number or Reported Events Not Used	0				
Number of Generated Events	5				
Number Values Reported (n)	5				
Minimum	3.0000E-4				
Maximum	0.00103				
Mean	5.2000E-4				
Geometric Mean	4.6972E-4				
Median	4.0000E-4				
Standard Deviation	2.9402E-4				
Coefficient of Variation	0.565				
Mann-Kendall Test					
M-K Test Value (S)	-2				
Tabulated p-value	0.408				
Standard Deviation of S	4.082				
Standardized Value of S	-0.245				
Approximate p-value	0.403				
Insufficient evidence to identify a significant trend at the specified level of significance.					
Toluene-mw-3					
General Statistics					
Number or Reported Events Not Used	0				
Number of Generated Events	4				
Number Values Reported (n)	4				
Minimum	5.0000E-4				
Maximum	5.0000E-4				
Mean	5.0000E-4				
Geometric Mean	5.0000E-4				
Median	5.0000E-4				
Standard Deviation	0				
Coefficient of Variation	N/A				
Mann-Kendall Test					
M-K Test Value (S)	0				
Tabulated p-value	0.625				
Standard Deviation of S	0				
Standardized Value of S	N/A				
Approximate p-value	N/A				
Insufficient evidence to identify a significant trend at the specified level of significance.					

Toluene-mw-4					
General Statistics					
Number or Reported Events Not Used	0				
Number of Generated Events	11				
Number Values Reported (n)	11				
Minimum	5.0000E-4				
Maximum	0.00434				
Mean	8.9455E-4				
Geometric Mean	6.4812E-4				
Median	5.0000E-4				
Standard Deviation	0.00115				
Coefficient of Variation	1.288				
Mann-Kendall Test					
M-K Test Value (S)	3				
Tabulated p-value	0.44				
Standard Deviation of S	8.544				
Standardized Value of S	0.234				
Approximate p-value	0.407				
Insufficient evidence to identify a significant trend at the specified level of significance.					
Toluene-mw-5					
General Statistics					
Number or Reported Events Not Used	0				
Number of Generated Events	9				
Number Values Reported (n)	9				
Minimum	4.8000E-4				
Maximum	0.001				
Mean	5.5333E-4				
Geometric Mean	5.3759E-4				
Median	5.0000E-4				
Standard Deviation	1.6763E-4				
Coefficient of Variation	0.303				
Mann-Kendall Test					
M-K Test Value (S)	5				
Tabulated p-value	0.381				
Standard Deviation of S	6.904				
Standardized Value of S	0.579				
Approximate p-value	0.281				
Insufficient evidence to identify a significant trend at the specified level of significance.					

Toluene-mw-6					
General Statistics					
Number or Reported Events Not Used	0				
Number of Generated Events	10				
Number Values Reported (n)	10				
Minimum	3.4000E-4				
Maximum	0.001				
Mean	5.4680E-4				
Geometric Mean	5.1793E-4				
Median	5.0000E-4				
Standard Deviation	2.0818E-4				
Coefficient of Variation	0.381				
Mann-Kendall Test					
M-K Test Value (S)	11				
Tabulated p-value	0.19				
Standard Deviation of S	10.41				
Standardized Value of S	0.961				
Approximate p-value	0.168				
Insufficient evidence to identify a significant trend at the specified level of significance.					
Toluene-mw-7					
General Statistics					
Number or Reported Events Not Used	0				
Number of Generated Events	8				
Number Values Reported (n)	8				
Minimum	5.0000E-4				
Maximum	0.001				
Mean	5.8875E-4				
Geometric Mean	5.6969E-4				
Median	5.0000E-4				
Standard Deviation	1.8169E-4				
Coefficient of Variation	0.309				
Mann-Kendall Test					
M-K Test Value (S)	5				
Tabulated p-value	0.36				
Standard Deviation of S	6.083				
Standardized Value of S	0.658				
Approximate p-value	0.255				
Insufficient evidence to identify a significant trend at the specified level of significance.					

Toluene-mw-8					
General Statistics					
Number or Reported Events Not Used	0				
Number of Generated Events	7				
Number Values Reported (n)	7				
Minimum	3.1000E-4				
Maximum	0.001				
Mean	5.4429E-4				
Geometric Mean	5.1560E-4				
Median	5.0000E-4				
Standard Deviation	2.1306E-4				
Coefficient of Variation	0.391				
Mann-Kendall Test					
M-K Test Value (S)	11				
Tabulated p-value	0.068				
Standard Deviation of S	5.26				
Standardized Value of S	1.901				
Approximate p-value	0.0286				
Insufficient evidence to identify a significant trend at the specified level of significance.					
Toluene-mw-9					
General Statistics					
Number or Reported Events Not Used	0				
Number of Generated Events	7				
Number Values Reported (n)	7				
Minimum	5.0000E-4				
Maximum	0.001				
Mean	5.7143E-4				
Geometric Mean	5.5204E-4				
Median	5.0000E-4				
Standard Deviation	1.8898E-4				
Coefficient of Variation	0.331				
Mann-Kendall Test					
M-K Test Value (S)	6				
Tabulated p-value	0.191				
Standard Deviation of S	4				
Standardized Value of S	1.25				
Approximate p-value	0.106				
Insufficient evidence to identify a significant trend at the specified level of significance.					

Toluene-wc-3					
General Statistics					
Number or Reported Events Not Used	0				
Number of Generated Events	2				
Number Values Reported (n)	2				
Minimum	3.3000E-4				
Maximum	7.4000E-4				
Mean	5.3500E-4				
Geometric Mean	4.9417E-4				
Median	5.3500E-4				
Standard Deviation	2.8991E-4				
Coefficient of Variation	0.542				
Not enough reported values (n) to provide Mann-Kendall Statistics!					

		Mann-Kendall Trend Test Analysis			
User Selected Options					
Date/Time of Computation		ProUCL 5.111/19/2020 4:14:53 PM			
From File		historical results input file.xls			
Full Precision		OFF			
Confidence Coefficient		0.95			
Level of Significance		0.05			
Ethylbenzene-mw-1					
General Statistics					
Number or Reported Events Not Used	0				
Number of Generated Events	3				
Number Values Reported (n)	3				
Minimum	0.00815				
Maximum	0.0107				
Mean	0.00918				
Geometric Mean	0.00912				
Median	0.0087				
Standard Deviation	0.00134				
Coefficient of Variation	0.146				
Mann-Kendall Test					
M-K Test Value (S)	-1				
Tabulated p-value	N/A				
Standard Deviation of S	1.915				
Standardized Value of S	0				
Approximate p-value	0.5				
Insufficient evidence to identify a significant					
trend at the specified level of significance.					

Ethylbenzene-mw-2					
General Statistics					
Number or Reported Events Not Used	0				
Number of Generated Events	5				
Number Values Reported (n)	5				
Minimum	0.00559				
Maximum	0.0163				
Mean	0.00873				
Geometric Mean	0.00796				
Median	0.00603				
Standard Deviation	0.00455				
Coefficient of Variation	0.521				
Mann-Kendall Test					
M-K Test Value (S)	0				
Tabulated p-value	0.592				
Standard Deviation of S	4.082				
Standardized Value of S	N/A				
Approximate p-value	N/A				
Insufficient evidence to identify a significant trend at the specified level of significance.					
Ethylbenzene-mw-3					
General Statistics					
Number or Reported Events Not Used	0				
Number of Generated Events	4				
Number Values Reported (n)	4				
Minimum	5.0000E-4				
Maximum	0.001				
Mean	6.2500E-4				
Geometric Mean	5.9460E-4				
Median	5.0000E-4				
Standard Deviation	2.5000E-4				
Coefficient of Variation	0.4				
Mann-Kendall Test					
M-K Test Value (S)	-3				
Tabulated p-value	0.375				
Standard Deviation of S	2.236				
Standardized Value of S	-0.894				
Approximate p-value	0.186				
Insufficient evidence to identify a significant trend at the specified level of significance.					

Ethylbenzene-mw-4					
General Statistics					
Number or Reported Events Not Used	0				
Number of Generated Events	11				
Number Values Reported (n)	11				
Minimum	0.00432				
Maximum	0.0174				
Mean	0.00931				
Geometric Mean	0.00865				
Median	0.00822				
Standard Deviation	0.00387				
Coefficient of Variation	0.416				
Mann-Kendall Test					
M-K Test Value (S)	-23				
Tabulated p-value	0.043				
Standard Deviation of S	12.85				
Standardized Value of S	-1.713				
Approximate p-value	0.0434				
Statistically significant evidence of a decreasing trend at the specified level of significance.					
Ethylbenzene-mw-5					
General Statistics					
Number or Reported Events Not Used	0				
Number of Generated Events	9				
Number Values Reported (n)	9				
Minimum	5.0000E-4				
Maximum	0.0032				
Mean	0.00136				
Geometric Mean	0.00109				
Median	0.001				
Standard Deviation	9.6936E-4				
Coefficient of Variation	0.71				
Mann-Kendall Test					
M-K Test Value (S)	-13				
Tabulated p-value	0.13				
Standard Deviation of S	9.399				
Standardized Value of S	-1.277				
Approximate p-value	0.101				
Insufficient evidence to identify a significant trend at the specified level of significance.					

Ethylbenzene-mw-6					
General Statistics					
Number or Reported Events Not Used	0				
Number of Generated Events	10				
Number Values Reported (n)	10				
Minimum	0.00341				
Maximum	0.0382				
Mean	0.0127				
Geometric Mean	0.00926				
Median	0.00883				
Standard Deviation	0.0111				
Coefficient of Variation	0.875				
Mann-Kendall Test					
M-K Test Value (S)	-6				
Tabulated p-value	0.3				
Standard Deviation of S	11.14				
Standardized Value of S	-0.449				
Approximate p-value	0.327				
Insufficient evidence to identify a significant trend at the specified level of significance.					
Ethylbenzene-mw-7					
General Statistics					
Number or Reported Events Not Used	0				
Number of Generated Events	8				
Number Values Reported (n)	8				
Minimum	3.9000E-4				
Maximum	0.00197				
Mean	7.2750E-4				
Geometric Mean	6.1326E-4				
Median	5.0000E-4				
Standard Deviation	5.4730E-4				
Coefficient of Variation	0.752				
Mann-Kendall Test					
M-K Test Value (S)	14				
Tabulated p-value	0.054				
Standard Deviation of S	7.958				
Standardized Value of S	1.634				
Approximate p-value	0.0512				
Insufficient evidence to identify a significant trend at the specified level of significance.					

Ethylbenzene-mw-8					
General Statistics					
Number or Reported Events Not Used	0				
Number of Generated Events	7				
Number Values Reported (n)	7				
Minimum	3.5000E-4				
Maximum	0.001				
Mean	5.5000E-4				
Geometric Mean	5.2462E-4				
Median	5.0000E-4				
Standard Deviation	2.0616E-4				
Coefficient of Variation	0.375				
Mann-Kendall Test					
M-K Test Value (S)	11				
Tabulated p-value	0.068				
Standard Deviation of S	5.26				
Standardized Value of S	1.901				
Approximate p-value	0.0286				
Insufficient evidence to identify a significant trend at the specified level of significance.					
Ethylbenzene-mw-9					
General Statistics					
Number or Reported Events Not Used	0				
Number of Generated Events	7				
Number Values Reported (n)	7				
Minimum	5.0000E-4				
Maximum	0.001				
Mean	5.7143E-4				
Geometric Mean	5.5204E-4				
Median	5.0000E-4				
Standard Deviation	1.8898E-4				
Coefficient of Variation	0.331				
Mann-Kendall Test					
M-K Test Value (S)	6				
Tabulated p-value	0.191				
Standard Deviation of S	4				
Standardized Value of S	1.25				
Approximate p-value	0.106				
Insufficient evidence to identify a significant trend at the specified level of significance.					

Ethylbenzene-wc-3					
General Statistics					
Number or Reported Events Not Used	0				
Number of Generated Events	2				
Number Values Reported (n)	2				
Minimum	0.00308				
Maximum	0.00336				
Mean	0.00322				
Geometric Mean	0.00322				
Median	0.00322				
Standard Deviation	1.9799E-4				
Coefficient of Variation	0.0615				
Not enough reported values (n) to provide Mann-Kendall Statistics!					

	Mann-Kendall Trend Test Analysis				
User Selected Options					
Date/Time of Computation	ProUCL 5.111/19/2020 4:15:14 PM				
From File	historical results input file.xls				
Full Precision	OFF				
Confidence Coefficient	0.95				
Level of Significance	0.05				
Xylenes-mw-1					
General Statistics					
Number or Reported Events Not Used	0				
Number of Generated Events	3				
Number Values Reported (n)	3				
Minimum	0.288				
Maximum	0.343				
Mean	0.308				
Geometric Mean	0.307				
Median	0.292				
Standard Deviation	0.0307				
Coefficient of Variation	0.0997				
Mann-Kendall Test					
M-K Test Value (S)	-1				
Tabulated p-value	N/A				
Standard Deviation of S	1.915				
Standardized Value of S	0				
Approximate p-value	0.5				
Insufficient evidence to identify a significant trend at the specified level of significance.					

Xylenes-mw-2					
General Statistics					
Number or Reported Events Not Used	0				
Number of Generated Events	5				
Number Values Reported (n)	5				
Minimum	0.0236				
Maximum	0.0633				
Mean	0.0378				
Geometric Mean	0.0353				
Median	0.0302				
Standard Deviation	0.0164				
Coefficient of Variation	0.434				
Mann-Kendall Test					
M-K Test Value (S)	-2				
Tabulated p-value	0.408				
Standard Deviation of S	4.082				
Standardized Value of S	-0.245				
Approximate p-value	0.403				
Insufficient evidence to identify a significant trend at the specified level of significance.					
Xylenes-mw-3					
General Statistics					
Number or Reported Events Not Used	0				
Number of Generated Events	4				
Number Values Reported (n)	4				
Minimum	0.0015				
Maximum	0.0071				
Mean	0.0029				
Geometric Mean	0.00221				
Median	0.0015				
Standard Deviation	0.0028				
Coefficient of Variation	0.966				
Mann-Kendall Test					
M-K Test Value (S)	-3				
Tabulated p-value	0.375				
Standard Deviation of S	2.236				
Standardized Value of S	-0.894				
Approximate p-value	0.186				
Insufficient evidence to identify a significant trend at the specified level of significance.					

Xylenes-mw-4					
General Statistics					
Number or Reported Events Not Used	0				
Number of Generated Events	11				
Number Values Reported (n)	11				
Minimum	0.0117				
Maximum	0.124				
Mean	0.0325				
Geometric Mean	0.0256				
Median	0.0226				
Standard Deviation	0.0317				
Coefficient of Variation	0.974				
Mann-Kendall Test					
M-K Test Value (S)	-17				
Tabulated p-value	0.109				
Standard Deviation of S	12.85				
Standardized Value of S	-1.246				
Approximate p-value	0.106				
Insufficient evidence to identify a significant trend at the specified level of significance.					
Xylenes-mw-5					
General Statistics					
Number or Reported Events Not Used	0				
Number of Generated Events	9				
Number Values Reported (n)	9				
Minimum	7.4000E-4				
Maximum	0.0039				
Mean	0.00225				
Geometric Mean	0.00204				
Median	0.00222				
Standard Deviation	9.6893E-4				
Coefficient of Variation	0.431				
Mann-Kendall Test					
M-K Test Value (S)	-9				
Tabulated p-value	0.238				
Standard Deviation of S	9.539				
Standardized Value of S	-0.839				
Approximate p-value	0.201				
Insufficient evidence to identify a significant trend at the specified level of significance.					

Xylenes-mw-6					
General Statistics					
Number or Reported Events Not Used	0				
Number of Generated Events	10				
Number Values Reported (n)	10				
Minimum	0.00155				
Maximum	0.105				
Mean	0.0383				
Geometric Mean	0.0252				
Median	0.0281				
Standard Deviation	0.0313				
Coefficient of Variation	0.816				
Mann-Kendall Test					
M-K Test Value (S)	-19				
Tabulated p-value	0.054				
Standard Deviation of S	11.18				
Standardized Value of S	-1.61				
Approximate p-value	0.0537				
Insufficient evidence to identify a significant trend at the specified level of significance.					
Xylenes-mw-7					
General Statistics					
Number or Reported Events Not Used	0				
Number of Generated Events	8				
Number Values Reported (n)	8				
Minimum	2.0800E-4				
Maximum	0.00811				
Mean	0.00269				
Geometric Mean	0.00181				
Median	0.0016				
Standard Deviation	0.00246				
Coefficient of Variation	0.917				
Mann-Kendall Test					
M-K Test Value (S)	7				
Tabulated p-value	0.274				
Standard Deviation of S	8.021				
Standardized Value of S	0.748				
Approximate p-value	0.227				
Insufficient evidence to identify a significant trend at the specified level of significance.					

Xylenes-mw-8					
General Statistics					
Number or Reported Events Not Used	0				
Number of Generated Events	7				
Number Values Reported (n)	7				
Minimum	0.0015				
Maximum	0.003				
Mean	0.00171				
Geometric Mean	0.00166				
Median	0.0015				
Standard Deviation	5.6695E-4				
Coefficient of Variation	0.331				
Mann-Kendall Test					
M-K Test Value (S)	6				
Tabulated p-value	0.191				
Standard Deviation of S	4				
Standardized Value of S	1.25				
Approximate p-value	0.106				
Insufficient evidence to identify a significant trend at the specified level of significance.					
Xylenes-mw-9					
General Statistics					
Number or Reported Events Not Used	0				
Number of Generated Events	7				
Number Values Reported (n)	7				
Minimum	0.0015				
Maximum	0.003				
Mean	0.00171				
Geometric Mean	0.00166				
Median	0.0015				
Standard Deviation	5.6695E-4				
Coefficient of Variation	0.331				
Mann-Kendall Test					
M-K Test Value (S)	6				
Tabulated p-value	0.191				
Standard Deviation of S	4				
Standardized Value of S	1.25				
Approximate p-value	0.106				
Insufficient evidence to identify a significant trend at the specified level of significance.					

Xylenes-wc-3					
General Statistics					
Number or Reported Events Not Used	0				
Number of Generated Events	2				
Number Values Reported (n)	2				
Minimum	0.0316				
Maximum	0.305				
Mean	0.168				
Geometric Mean	0.0982				
Median	0.168				
Standard Deviation	0.193				
Coefficient of Variation	1.149				
Not enough reported values (n) to provide Mann-Kendall Statistics!					

Table 1 - Input for ProUCL Statistical Analyses

Monitoring Well	Sample Date	GRO	D_GRO	DRO	D_DRO	RRO	D_RRO	Benzene	D_Benzene	Toluene	D_Toluene	Ethylbenzene	D_Ethylbenzene	Xylenes	D_Xylenes
MW-1	Sep-06	0.88	1	123	1	4.23	1	0.0049	1	0.0015	1	0.0087	1	0.292	1
MW-1	Sep-11	0.839	1	99.5	1			0.00527	1	0.00472	1	0.0107	1	0.343	1
MW-1	Sep-12	1.06	1	69.5	1	4.38	1	0.00423	1	0.00423	1	0.00815	1	0.288	1
MW-2	Sep-10	0.234	1	187	1	6.81	1	0.0088	1	0.00103	1	0.00603	1	0.0302	1
MW-2	Sep-12	0.377	1	19.5	1	2.08	1	0.0187	1	0.0004	1	0.0097	1	0.0449	1
MW-2	Jun-13	0.384	1	19.9	1	2.11	1	0.0239	1	0.0003	1	0.00559	1	0.02702	1
MW-2	Sep-15	0.373	1	11.3	1	1.16	1	0.0263	1	0.00037	1	0.0163	1	0.06333	1
MW-2	Oct-17	0.164	0	16.5	1	1.84	1	0.0138	1	0.0005	0	0.00601	1	0.0236	1
MW-3	Nov-03			5.3	1			0.00025	0	0.0005	0	0.001	1	0.0071	1
MW-3	Sep-04	0.05	0	2.71	1	0.992	1	0.00025	0	0.0005	0	0.0005	0	0.0015	0
MW-3	Sep-06	0.05	0	0.94	1	0.43	1	0.00025	0	0.0005	0	0.0005	0	0.0015	0
MW-3	Sep-10	0.05	0	0.3	0	0.25	0	0.00025	0	0.0005	0	0.0005	0	0.0015	0
MW-4	Sep-04	0.354	1	6.07	1	0.25	0	0.00025	0	0.0005	0	0.0073	1	0.0162	1
MW-4	Sep-06	0.17	1	18.5	1	0.58	1	0.00025	0	0.0005	0	0.0094	1	0.023	1
MW-4	Sep-10	1.48	1	43	1	0.484	1	0.00025	0	0.00434	1	0.0174	1	0.124	1
MW-4	Sep-11	0.0854	1	3.37	1			0.00018	1	0.0005	1	0.00928	1	0.0271	1
MW-4	Sep-12	0.278	1	3.82	1	0.4	1	0.00043	1	0.0005	0	0.0113	1	0.0339	1
MW-4	Jun-13	0.244	1	9.39	1	1	1	0.00025	1	0.0005	0	0.00822	1	0.0226	1
MW-4	Aug-14	0.251	1	1.8	1	0.25	0	0.00025	0	0.0005	0	0.00635	1	0.0182	1
MW-4	Sep-15	0.263	1	6.27	1	0.488	1	0.0005	1	0.0005	0	0.0147	1	0.0445	1
MW-4	Oct-17	0.458	1	7.55	1	0.505	1	0.00018	1	0.0005	0	0.00808	1	0.01973	1
MW-4	Oct-18	0.164	1	4.73	1	0.706	0	0.00025	0	0.0005	0	0.00602	1	0.017	1
MW-4	Oct-20	0.155	1	5.89	1	0.818	1	0.0005	0	0.001	0	0.00432	1	0.0117	1
MW-5	Sep-04	0.228	1	4.21	1	0.25	0	0.00025	0	0.0005	0	0.0032	1	0.0039	1
MW-5	Sep-06	0.06	1	3.44	1	0.25	0	0.00025	0	0.0005	0	0.0022	1	0.002	1

Table 1 - Input for ProUCL Statistical Analyses

Monitoring Well	Sample Date	GRO	D_GRO	DRO	D_DRO	RRO	D_RRO	Benzene	D_Benzene	Toluene	D_Toluene	Ethylbenzene	D_Ethylbenzene	Xylenes	D_Xylenes
MW-5	Sep-12	0.0716	1	3.14	1	0.431	1	0.00111	1	0.0005	0	0.00229	1	0.00312	1
MW-5	Jun-13	0.0459	1	1.61	1	0.484	1	0.00025	0	0.0005	0	0.0005	0	0.0015	0
MW-5	Aug-14	0.05	0	0.225	1	0.25	0	0.00025	0	0.0005	0	0.0005	0	0.0015	0
MW-5	Sep-15	0.103	1	2.6	1	0.351	1	0.00057	1	0.00048	1	0.00096	1	0.00223	1
MW-5	Oct-17	0.1	0	3.53	1	0.568	1	0.00052	1	0.0005	0	0.00113	1	0.00222	1
MW-5	Oct-18	0.05	0	2.03	1	0.481	0	0.00025	0	0.0005	0	0.0005	0	0.00074	1
MW-5	Oct-20	0.1	0	4.43	1	1.25	1	0.00053	1	0.001	0	0.001	0	0.003	0
MW-6	Sep-06	0.3	1	11.2	1	0.9	1	0.0076	1	0.0005	0	0.0155	1	0.059	1
MW-6	Sep-10	0.172	1	12.7	1	0.636	1	0.00367	1	0.00084	1	0.00926	1	0.0382	1
MW-6	Sep-11	0.105	1	118	1			0.00418	1	0.00034	1	0.00418	1	0.0185	1
MW-6	Sep-12	0.479	1	8.36	1	1.09	1	0.00951	1	0.00039	1	0.0233	1	0.105	1
MW-6	Jun-13	0.225	1	5.46	1	0.813	1	0.00577	1	0.0005	0	0.00486	1	0.0186	1
MW-6	Aug-14	0.05	0	6.94	1	1.41	1	0.00434	1	0.0005	0	0.00403	1	0.0183	1
MW-6	Sep-15	0.305	1	8.59	1	1.06	1	0.00823	1	0.0004	1	0.0155	1	0.069	1
MW-6	Oct-17	0.2	1	11.2	1	1.39	1	0.00924	1	0.0005	0	0.0084	1	0.0376	1
MW-6	Oct-18	0.441	1	4.84	1	0.777	0	0.00025	0	0.0005	0	0.0382	1	0.00155	1
MW-6	Oct-20	0.164	1	16.3	1	2.83	1	0.0135	1	0.001	0	0.00341	1	0.0172	1
MW-7	Sep-11	0.0854	1	19.6	1			0.00107	1	0.0005	0	0.00048	1	0.00352	1
MW-7	Sep-12	0.0937	1	12.4	1	1.85	1	0.0012	1	0.0005	0	0.0005	1	0.00139	1
MW-7	Jun-13	0.114	1	10.5	1	1.46	1	0.00126	1	0.00071	1	0.00039	1	0.0017	1
MW-7	Aug-14	0.0508	1	6.73	1	1.05	1	0.00033	1	0.0005	0	0.0005	0	0.0015	0
MW-7	Sep-15	0.0696	1	14	1	2.19	1	0.00243	1	0.0005	0	0.00052	1	0.00021	1
MW-7	Oct-17	0.05	0	21.1	1	2.83	1	0.00114	1	0.0005	0	0.00039	1	0.0015	1
MW-7	Oct-18	0.0428	1	12	1	1.34	1	0.00186	1	0.0005	0	0.00107	1	0.00357	1
MW-7	Oct-20	0.1	0	30.8	1	5.81	1	0.00388	1	0.001	0	0.00197	1	0.00811	1

Table 1 - Input for ProUCL Statistical Analyses

Monitoring Well	Sample Date	GRO	D_GRO	DRO	D_DRO	RRO	D_RRO	Benzene	D_Benzene	Toluene	D_Toluene	Ethylbenzene	D_Ethylbenzene	Xylenes	D_Xylenes
MW-8	Sep-12	0.05	0	0.288	1	0.339	1	0.00025	0	0.00031	1	0.00035	1	0.0015	0
MW-8	Jun-13	0.05	0	0.3	0	0.267	1	0.00025	0	0.0005	0	0.0005	0	0.0015	0
MW-8	Aug-14	0.05	0	0.3	0	0.25	0	0.00025	0	0.0005	0	0.0005	0	0.0015	0
MW-8	Sep-15	0.0443	1	0.312	1	0.25	0	0.00032	1	0.0005	0	0.0005	0	0.0015	0
MW-8	Oct-17	0.05	0	0.239	1	0.195	1	0.00025	0	0.0005	0	0.0005	0	0.0015	0
MW-8	Oct-18	0.05	0	0.577	0	0.481	0	0.00025	0	0.0005	0	0.0005	0	0.0015	0
MW-8	Oct-20	0.1	0	0.566	1	0.581	1	0.0005	0	0.001	0	0.001	0	0.003	0
MW-9	Sep-12	0.05	0	0.189	1	0.199	1	0.00025	0	0.0005	0	0.0005	0	0.0015	0
MW-9	Jun-13	0.05	0	0.3	0	0.165	1	0.00025	0	0.0005	0	0.0005	0	0.0015	0
MW-9	Aug-14	0.05	0	0.3	0	0.25	0	0.00025	0	0.0005	0	0.0005	0	0.0015	0
MW-9	Sep-15	0.0551	1	0.314	1	0.25	0	0.00025	0	0.0005	0	0.0005	0	0.0015	0
MW-9	Oct-17	0.1	0	0.303	0	0.157	1	0.00025	0	0.0005	0	0.0005	0	0.0015	0
MW-9	Oct-18	0.05	0	0.577	0	0.481	0	0.00025	0	0.0005	0	0.0005	0	0.0015	0
MW-9	Oct-20	0.1	0	0.577	0	0.481	0	0.0005	0	0.001	0	0.001	0	0.003	0
WC-3	Sep-15	0.165	1	16.4	1	1.56	1	0.00482	1	0.00074	1	0.00308	1	0.305	1
WC-3	Oct-17	0.157	0	7.67	1	1.17	1	0.00654	1	0.00033	1	0.00336	1	0.0316	1

Important Information

About Your Environmental Report

CONSULTING SERVICES ARE PERFORMED FOR SPECIFIC PURPOSES AND FOR SPECIFIC CLIENTS.

Consultants prepare reports to meet the specific needs of specific individuals. A report prepared for a civil engineer may not be adequate for a construction contractor or even another civil engineer. Unless indicated otherwise, your consultant prepared your report expressly for you and expressly for the purposes you indicated. No one other than you should apply this report for its intended purpose without first conferring with the consultant. No party should apply this report for any purpose other than that originally contemplated without first conferring with the consultant.

THE CONSULTANT'S REPORT IS BASED ON PROJECT-SPECIFIC FACTORS.

A geotechnical/environmental report is based on a subsurface exploration plan designed to consider a unique set of project-specific factors. Depending on the project, these may include the general nature of the structure and property involved; its size and configuration; its historical use and practice; the location of the structure on the site and its orientation; other improvements such as access roads, parking lots, and underground utilities; and the additional risk created by scope-of-service limitations imposed by the client. To help avoid costly problems, ask the consultant to evaluate how any factors that change subsequent to the date of the report may affect the recommendations. Unless your consultant indicates otherwise, your report should not be used (1) when the nature of the proposed project is changed (for example, if an office building will be erected instead of a parking garage, or if a refrigerated warehouse will be built instead of an unrefrigerated one, or chemicals are discovered on or near the site); (2) when the size, elevation, or configuration of the proposed project is altered; (3) when the location or orientation of the proposed project is modified; (4) when there is a change of ownership; or (5) for application to an adjacent site. Consultants cannot accept responsibility for problems that may occur if they are not consulted after factors that were considered in the development of the report have changed.

SUBSURFACE CONDITIONS CAN CHANGE.

Subsurface conditions may be affected as a result of natural processes or human activity. Because a geotechnical/environmental report is based on conditions that existed at the time of subsurface exploration, construction decisions should not be based on a report whose adequacy may have been affected by time. Ask the consultant to advise if additional tests are desirable before construction starts; for example, groundwater conditions commonly vary seasonally.

Construction operations at or adjacent to the site and natural events such as floods, earthquakes, or groundwater fluctuations may also affect subsurface conditions and, thus, the continuing adequacy of a geotechnical/environmental report. The consultant should be kept apprised of any such events and should be consulted to determine if additional tests are necessary.

MOST RECOMMENDATIONS ARE PROFESSIONAL JUDGMENTS.

Site exploration and testing identifies actual surface and subsurface conditions only at those points where samples are taken. The data were extrapolated by your consultant, who then applied judgment to render an opinion about overall subsurface conditions. The actual interface between materials may be far more gradual or abrupt than your report indicates. Actual conditions in areas not sampled may differ from those predicted in your report. While nothing can be done to prevent such situations, you and your consultant can work together to help reduce their impacts. Retaining

your consultant to observe subsurface construction operations can be particularly beneficial in this respect.

A REPORT'S CONCLUSIONS ARE PRELIMINARY.

The conclusions contained in your consultant's report are preliminary, because they must be based on the assumption that conditions revealed through selective exploratory sampling are indicative of actual conditions throughout a site. Actual subsurface conditions can be discerned only during earthwork; therefore, you should retain your consultant to observe actual conditions and to provide conclusions. Only the consultant who prepared the report is fully familiar with the background information needed to determine whether or not the report's recommendations based on those conclusions are valid and whether or not the contractor is abiding by applicable recommendations. The consultant who developed your report cannot assume responsibility or liability for the adequacy of the report's recommendations if another party is retained to observe construction.

THE CONSULTANT'S REPORT IS SUBJECT TO MISINTERPRETATION.

Costly problems can occur when other design professionals develop their plans based on misinterpretation of a geotechnical/environmental report. To help avoid these problems, the consultant should be retained to work with other project design professionals to explain relevant geotechnical, geological, hydrogeological, and environmental findings, and to review the adequacy of their plans and specifications relative to these issues.

BORING LOGS AND/OR MONITORING WELL DATA SHOULD NOT BE SEPARATED FROM THE REPORT.

Final boring logs developed by the consultant are based upon interpretation of field logs (assembled by site personnel), field test results, and laboratory and/or office evaluation of field samples and data. Only final boring logs and data are customarily included in geotechnical/environmental reports. These final logs should not, under any circumstances, be redrawn for inclusion in architectural or other design drawings, because drafters may commit errors or omissions in the transfer process.

To reduce the likelihood of boring log or monitoring well misinterpretation, contractors should be given ready access to the complete geotechnical engineering/environmental report prepared or authorized for their use. If access is provided only to the report prepared for you, you should advise contractors of the report's limitations, assuming that a contractor was not one of the specific persons for whom the report was prepared, and that developing construction cost estimates was not one of the specific purposes for which it was prepared. While a contractor may gain important knowledge from a report prepared for another party, the contractor should discuss the report with your consultant and perform the additional or alternative work believed necessary to obtain the data specifically appropriate for construction cost estimating purposes. Some clients hold the mistaken impression that simply disclaiming responsibility for the accuracy of subsurface information always insulates them from attendant liability. Providing the best available information to contractors helps prevent costly construction problems and the adversarial attitudes that aggravate them to a disproportionate scale.

READ RESPONSIBILITY CLAUSES CLOSELY.

Because geotechnical/environmental engineering is based extensively on judgment and opinion, it is far less exact than other design disciplines. This situation has resulted in wholly unwarranted claims

being lodged against consultants. To help prevent this problem, consultants have developed a number of clauses for use in their contracts, reports, and other documents. These responsibility clauses are not exculpatory clauses designed to transfer the consultant's liabilities to other parties; rather, they are definitive clauses that identify where the consultant's responsibilities begin and end. Their use helps all parties involved recognize their individual responsibilities and take appropriate action. Some of these definitive clauses are likely to appear in your report, and you are encouraged to read them closely. Your consultant will be pleased to give full and frank answers to your questions.

The preceding paragraphs are based on information provided by the ASFE/Association of Engineering Firms Practicing in the Geosciences, Silver Spring, Maryland