2019 Drainage Pond Groundwater Monitoring Report
ADEC File: 100.38.188
ADEC Hazard ID: 1923

Prepared for:
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Fairbanks International Airport
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ACRONYMS AND ABBREVIATIONS

µg/L	micrograms per liter
AAC	Alaska Administrative Code
ADEC	Alaska Department of Environmental Conservation
bgs	below ground surface
DCE	1,2-dichloroethylene
DOT&PF	Alaska Department of Transportation & Public Facilities
FAI	Fairbank International Airport
GCL	groundwater cleanup level
Jacobs	Jacobs Engineering Group Inc.
LOD	limit of detection
ND	nondetect
Oasis	Oasis Environmental Inc.
PCE	tetrachloroethylene
QC	quality control
SLR	SLR International Corporation
TCE	trichloroethylene

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EXECUTIVE SUMMARY

The Alaska Department of Transportation & Public Facilities (DOT&PF) requested groundwater monitoring at the Alaska Department of Environmental Conservation Fairbanks International Airport (FAI) - Drainage Pond site (File No. 100.38.188, Hazard ID 1923) located at the FAI (Figures A-1 to A-3). At the request of DOT&PF, Jacobs Engineering Group Inc. (Jacobs) conducted groundwater monitoring on 11 and 12 December 2019. During the project, six wells were visited for groundwater sampling (MW-11R, MW-34, MW-38S [shallow], MW-38D [deep], MW-39, and MW-40). The investigation analyzed these contaminants of concern: benzene, tetrachloroethylene (PCE), trichloroethylene (TCE), cis-1,2-dichloroethylene (DCE), trans-DCE, and vinyl chloride.

Similar to previous years, groundwater samples collected from MW-11R continued to have higher concentrations of chloroethenes than the other wells sampled. Those wells located within the know groundwater plume (MW-38S, MW-39, and MW-40) also showed higher levels of cis-DCE and vinyl chloride, while the well farthest downgradient was nondetect for all analytes.

1.0 INTRODUCTION

The Alaska Department of Transportation & Public Facilities (DOT&PF) contracted Jacobs Engineering Group Inc. (Jacobs) to perform groundwater monitoring activities at the Fairbanks International Airport (FAI) Drainage Pond contaminated site, Alaska Department of Conservation (ADEC) File No. 100.38.188 and Hazard ID 1923. The work was performed under the Alaska DOT&PF Term Agreement for FAI Environmental Services 2019, Notice-to-Proceed No. 1, Agreement No. 25-19-1-017.

1.1 PROJECT OBJECTIVES

The primary objectives of the 2019 groundwater monitoring project were as follows:

- Satisfy ADEC biennial monitoring requirements
- Assess groundwater contaminant of concern concentrations in relation to the 2019 ADEC groundwater cleanup levels (GCLs) (ADEC 2019a)
- Survey of monitoring wells
- Improve understanding of plume behavior and groundwater conditions at the Drainage Pond site

1.2 SITE DESCRIPTION

The DOT&PF is the owner and operator of FAI. The Drainage Pond site includes FAI property and those adjacent to it. The Drainage Pond site is located within the Fairbanks Meridian, Township 1 South, Range 2 West, Section 24. The site is located at 64.814693 degrees north and 147.876707 degrees west, World Geodetic Datum 1984. Monitoring wells MW-11R, MW-38S, MW-38D, MW-39, and MW-40 are within block 02, lot 07, and MW-34 is located within the Mail Trail Road DOT&PF right-of-way. The monitoring wells are northwest of the FAI runways in the vicinity of the Mail Trail Road and Airport Industrial Road intersection (Figure A-2); the proposed sampling at the site includes six monitoring wells closely grouped near the intersection. Monitoring wells MW-11R, MW-38S, MW-38D, MW-39, and MW-40 are installed in a low-lying area to the east of Airport Industrial Road and monitoring well MW-34 is located just west of the Airport Industrial Road. The groundwater aquifer in this area is

believed to be perched on a thin silt lens in the vicinity of wells MW-39 and MW-40 and may taper toward MW-11R in the former drainage pond area (SLR International Corporation [SLR] 2018).

1.3 SITE HISTORY

A hydrant fuel system was used to fuel aircraft on the FAI south apron in the 1980s. In 1986, it was shut down due to operational and maintenance problems. FAI began site investigations in 1993, when free product associated with the past hydrant fuel system was discovered during a sewer line installation (ADEC 2019b). A preliminary soil and groundwater investigation and evaluation of the hydrant fuel system performed from 1997 to 1998 concluded the hydrant fuel system was the source of groundwater contamination. In 1999, an initial site investigation was conducted at the present Drainage Pond site, which included installation of monitoring wells near the hydrant fuel system pump building (MW-10), crossgradient from the hydrant fuel system pump building (MW-12), upgradient (MW-29 and MW-30), and within the present day groundwater plume (MW-11) (Oasis Environmental Inc. [Oasis] 2006a). Results from this study revealed chlorinated solvents in groundwater in and around MW-11. Annual groundwater sampling continued, and monitoring wells MW-34 and MW-35 were added in 2003 and 2005, respectively. Data obtained from these investigations produced results indicative of reductive dechlorination (i.e., sequential dechlorination from tetrachloroethylene [PCE] to trichloroethylene [TCE] to 1,2-dichloroethylene [DCE] to vinyl chloride to ethylene). In 2005 monitoring well MW-11 was replaced by MW-11R with installation deeper than the original well depth (16 feet), to a depth of 34.5 feet (Oasis 2006a). In 2005, ADEC changed the site name from FAI – Hydrant Fuel System to FAI – Drainage Pond with the objective to track solvents (ADEC 2019b).

In 2006, soil gas and groundwater monitoring studies were conducted at the Drainage Pond site (Oasis 2006b). The following monitoring wells were sampled for benzene, PCE, TCE, cis-1,2- DCE, trans-DCE, and vinyl chloride: MW-10, MW-11R, MW-12, MW 29R, MW-30R, MW-34, MW-35, MW-36, and MW-37. At the time of the investigation, MW-11R was the only monitoring well from which analytical groundwater sample results exceeded the 2006 GCLs

for PCE, TCE, cis-DCE, and vinyl chloride (Oasis 2006b). During the 2006 investigation, two temporary well points (TW-1 and TW-2) were installed downgradient of the study site to better delineate the plume and determine if the contamination had migrated below the water table. These wells had only trace concentrations of DCE and cis-DCE and showed no increased contamination with depth (Oasis 2006b).

Groundwater sampling continued through 2007, 2008, and 2010; groundwater sampling was not conducted during 2009 (Oasis 2011). During the 2010 investigation, four new monitoring wells (MW-38S, MW-38D, MW-39, and MW-40) and one temporary well point (TW-3) were installed adjacent to MW-11R to characterize the magnitude and extent of chloroethene contamination in the area. Monitoring wells MW-38S and MW-38D were installed immediately adjacent to one another at total well depths of 14.55 feet and 34.24 feet, respectively, to the assess the difference in contaminant concentrations at shallow versus deeper depths along the groundwater column. In 2010, samples collected from MW-11R continued to have results exceeding the GCLs for PCE, TCE, cis-DCE, and vinyl chloride.

Sampling at MW-11R, MW-34, MW-38S, MW-38D, MW-39, and MW-40 was conducted again in 2013 and in 2017 (Environmental Resources Management 2014; SLR 2018). Chloroethenes exceeded GCLs for PCE, TCE, and cis-DCE at MW-11R in both investigations. Concentrations of cis-DCE and vinyl chloride in groundwater at MW-38S and MW-40 also exceeded GCLs. Notably, the 2014 GCLs changed in 2017; the GCL for PCE was raised from 5 to 41 micrograms per liter (µg/L), and the GCL for TCE was reduced from 5 to 2.8 µg/L (SLR 2018).

1.4 REDUCTIVE DECHLORINATION

The reductive dechlorination process has been observed to occur at this site with the reduction of PCE concentrations and the subsequent daughter products. Reductive dechlorination of chloroethenes is important for bioremediation of polluted groundwater (Wiedemeier et al. 1996). One particularly important example for public health is the organochloride respiration of PCE and TCE by naturally occurring anaerobic bacteria. During reductive dechlorination,

chlorine atoms are replaced by electrons coupled to hydrogen atoms, resulting in sequential dechlorination from PCE to TCE to DCE to vinyl chloride to ethylene. During reductive dechlorination, cis-DCE is the most commonly formed isomer of DCE (Wiedemeier et al. 1996).

2.0 FIELD ACTIVITIES

Field activities during the 2019 investigation included a well integrity survey, well gauging, groundwater sampling, and waste management. All field work was conducted by ADEC Qualified Environmental Professionals from the Jacobs Fairbanks office. Field work began on 10 December 2019 with a preliminary site visit to familiarize staff with the site, identify hazards, and locate the wells. Well integrity survey, gauging, and groundwater monitoring occurred on 11 December 2019 for MW-34, MW-38S, MW-38D, MW-39, and MW-40 and 12 December 2019 for MW-11R. All field activities were documented in the field log book and groundwater monitoring forms (Appendices C and D).

2.1 WORK PLAN DEVIATIONS

Monitoring well global positioning system and elevation survey was scheduled to occur concurrent to groundwater monitoring; however, due to the late field season and inclement weather, this has been postponed until spring 2020.

2.2 MONITORING WELL INTEGRITY AND GAUGING

While collecting groundwater samples, Jacobs field personnel inspected the monitoring well caps, cover bolts, casings, and plugs. All sampled monitoring wells were in good condition with no apparent frost jacking.

All sampled monitoring wells were gauged using a water level meter with interface probe to measure depth to product (if applicable), depth to groundwater, and total well depth. No free product was detected in the sampled monitoring wells. Monitoring well gauging information was used to calculate well volume and ultimately maximum purge volume required prior to collecting a groundwater sample from the monitoring well. A summary of monitoring well integrity, gauging, and groundwater depth data is included in Table 2-1.

Table 2-1
Status of Monitoring Wells and Depths from Wells Sampled In 2019

Well ID	Integrity	Depth to Product	Depth to Groundwater (feet bgs)	Total Well Depth (feet bgs)
MW-11R	Good	No free product	9.2	33.94
MW-34	Good	No free product	8.40	13.30
MW-38S	Good	No free product	8.66	14.55
MW-38D	Good	No free product	8.66	34.24
MW-39	Good	No free product	7.04	16.19
MW-40	Good	No free product	8.27	15.87

2.3 GROUNDWATER SAMPLING

Groundwater samples were collected at each of the six proposed monitoring wells on 11 and 12 December 2019. Sampling activities were conducted by Jacobs personnel Taylor Laiti (environmental engineer) and Jennifer Robinson (geologist). Both sampling personnel are ADEC-qualified samplers. Groundwater sampling was conducted in general accordance with *2019 Drainage Pond Groundwater Monitoring Work Plan* (DOT&PF 2019), JE-SOP-4000 *Low-Flow Groundwater Sampling* (DOT&PF 2019), and the ADEC *Field Sampling Guidance* (ADEC 2019c).

For MW-11R, a down-hole bladder pump was used to sample groundwater per ADEC's recommendation. For the remaining five wells, a peristaltic pump was utilized to collect samples. Prior to sample collection, groundwater was purged from the monitoring wells. An in-line flow through cell and multi-parameter water quality meter (YSI 556) were used to measure the following water quality parameters at 3- to 5-minute increments during well purging: temperature, pH, specific conductance, dissolved oxygen, oxidation-reduction potential. Turbidity and well drawdown height were also measured during purging using a turbidity meter and water level meter, respectively.

Analytical samples were collected once water quality parameters stabilized, or after three well volumes were purged from each monitoring well. Water quality parameters were considered

stable once three of the five parameters, excluding temperature, met the parameter-specific stability criteria for three successive readings, per the work plan (DOT&PF 2019). During the 2019 sampling event, water quality parameters reached stability prior to groundwater sample collection at each of the sampled wells. Final water quality parameters are presented in Table 2-2, and field sampling forms are presented in Appendix D.

Table 2-2
Water Quality Parameters from Wells Sampled In 2019

Well ID	Depth to Groundwater/Sample Depth (feet bgs)	Temperature (ºC)	Conductivity (µS/cm)	Dissolved Oxygen (mg/L)	pH	Oxidation-Reduction Potential (mV)	Turbidity (NTU)
MW-11R	9.20/10.20	3.46	1,047	1.86	7.08	-70.1	2.62
MW-34	8.40/9.40	4.11	1,157	1.43	6.97	35.5	4.08
MW-38S	8.66/9.66	4.37	1,259	0.77	6.86	7.5	6.31
MW-38D	8.66/9.66	3.68	185	0.37	6.93	-3.0	2.06
MW-39	7.04/8.04	2.17	1,358	1.43	7.15	-88.2	19.02
MW-40	8.27/9.27	3.50	1,769	0.78	6.99	-69.1	24.75

Notes:
Bgs = below ground surface
ºC = degrees Celsius
µS/cm = micro-Siemens per centimeter
mg/L = milligrams per liter
mV = millivolts
NTU = nephelometric turbidity units

2.4 INVESTIGATION-DERIVED WASTE

Sampling was primarily conducted using disposable sampling equipment. Reusable equipment during the 2019 groundwater sampling event included the water level meter with interface probe, the YSI 556 water quality meter, and the turbidity meter. Reusable equipment was decontaminated between monitoring wells in accordance with JE-SOP-2000 *Decontamination* (DOT&PF 2019). Investigation-derived nonhazardous waste included purge and decontamination water that was containerized in 55-gallon drums and stored at the FAI waste storage facility. Disposable personal protective equipment and sampling materials were bagged and disposed of at Fairbanks North Star Borough landfill.

3.0 PROPOSED CLEANUP LEVELS

Analytical sample results were screened against 2019 ADEC GCLs specified in Table C of the Alaska Administrative Code (AAC) Title 18, Chapter 75 (18 AAC 75) (ADEC 2019a). Table 3-1 lists the contaminants of concern along with their respective analytical methods used, GCLs, and the specified the limit of detection (LOD).

Table 3-1
Project Groundwater Screening Levels

Analyte	Method	Project GCL (µg/L)	LOD
Benzene	SW8260C	4.6	0.2.
PCE	SW8260C	41	0.5
TCE	SW8260C	2.8	0.5
cis-DCE	SW8260C	36	0.5
trans-DCE	SW8260C	360	0.5
Vinyl chloride	SW8260C	0.19	0.075

Note:
For definitions, refer to the Acronyms and Abbreviations section.

4.0 QUALITY ASSURANCE ASSESSMENT

This section details the quality control (QC) and sample preservation practices employed during groundwater sample collection to ensure data quality. Analytical data packets received by the laboratory were reviewed for data quality and usability by Kari Hagen, the Jacobs project chemist. Findings of the data review are presented in Section 5.2.

4.1 QUALITY CONTROL AND SAMPLE PRESERVATION

Samples were collected using the sample containers provided by SGS Environmental Services. Sample containers were labeled with the sample identification number, date and time of collection, sampler initials, and analyses requested. Sample temperature was maintained between 0 and 6 degrees Celsius while in storage. The samples were submitted to SGS Environmental Services at the Fairbanks, Alaska office for shipment to their laboratory in Anchorage, Alaska for analytical testing. For QC, one field duplicate was collected during the sampling event and one trip blank was prepared for each cooler. The field duplicate and trip blank were submitted to the laboratory for analysis of analytes listed in Table 3-1.

4.2 DATA QUALITY

Jacobs performed this data quality review and completed the ADEC laboratory data review checklist for records associated with the analytical data (Appendix E). The Jacobs project chemist performed a completeness check to verify that data packages included all the requested information. All analytical data were reviewed, including the chain-of-custody and sample receipt records, laboratory case narratives, and laboratory data (Appendix F). Analytical data were reviewed for methodology, sample holding times, laboratory blanks, limits of quantitation, LODs, detection limits, laboratory control sample recoveries and precision. Other QC parameters (initial calibration, continuing calibration, tuning, internal standards, interference check solutions, post-digestion spikes, and serial dilutions) were reviewed by means of the laboratory case narrative (Appendix F). The overall quality of the data was acceptable. No QC issues were identified during the review.

5.0 RESULTS AND FINDINGS

This section presents analytical groundwater results and the results of the reductive dechlorination process.

5.1 ANALYTICAL RESULTS

Table 5-1 presents the 2019 groundwater analytical results; these are also depicted on Figure A-3 (Appendix A). Table B-1 (Appendix B) includes the historical and current results. Appendix E includes the ADEC Laboratory Data Review Checklist. Appendix F presents the analytical results supplied by the laboratory. The 2019 groundwater results are summarized below; comparison to historical data is also provided in the narrative. Similar to previous years, groundwater samples collected from MW-11R continued to have higher concentrations of chloroethenes than the other wells sampled. For historical comparison perspective, monitoring wells MW-38S, MW-38D, MW-39, and MW-40 are relatively new (established in 2010), whereas MW-11R data dates to 2005 and MW-34 to 2003.

Table 5-1
Groundwater Results from the 2019 Sampling Event

Analyte:		Benzene	PCE	TCE	cis-DCE	trans-DCE	Vinyl Chloride
2019 ADEC GCL[1] (µg/L):		4.6	41	2.8	36	360	0.19
Monitoring Well ID	Sample Date	Analytical Result (µg/L)					
MW-11R	12/12/2019	1.28	13.5	**7.40**	**1,770**	17.3	**4.91**
MW-34	12/11/2019	0.200 U	0.500 U	0.500 U	0.500 U	0.500 U	0.0750 U
MW-38S	12/11/2019	2.39	3.05	0.580 J	**250**	2.16	**1.86**
MW-38D	12/11/2019	0.200 U	0.500 U	0.312 J	11.6	0.500 U	0.0750 U
MW-39	12/11/2019	0.548	0.500 U	0.852 J	**64.1**	3.17	**1.74**
MW-40	12/11/2019	1.10	5.61	2.27	**863**	9.09	**2.67**
MW-40[2]	12/11/2019	1.02	6.08	2.45	**797**	8.42	**2.50**

Notes:
Bold value indicates value exceeds ADEC GCL.
[1] 18 AAC 75. Table C Groundwater Human Health Cleanup Levels
[2] Field duplicate sample collected from monitoring well MW-40.
U = Results is below the laboratory limit of detection.
J = The result is an estimated value because it is less than the limit of quantitation.
For definitions, refer to the Acronyms and Abbreviations section.

Benzene: In 2019, there were no exceedances of the GCL (4.6 µg/L), although monitoring wells MW-38D and MW-34 were the only wells where benzene was nondetect (ND). Historically, benzene has exceeded the GCL at MW-11R, MW-38S, and MW-39 but has been below those concentrations during the last two sampling events.

PCE: Monitoring well MW-11R had the greatest detected concentration (13.5 µg/L) of PCE in 2019; however, this concentration is below the current GCL. The GCL for PCE increased from 5 µg/L to 41 µg/L with the new 2017 ADEC regulations; as a result, concentrations of PCE in samples collected prior to 2017 from monitoring well MW-11R exceeded historical GCLs. Based on results of the 2019 sampling event, other wells with detectable concentrations of PCE are MW-38S and MW-40. Historically, PCE concentrations in samples collected from all other wells have been less than the 2014 threshold except at MW-40, where PCE concentrations in groundwater samples have ranged from 6.08 µg/L in 2019 to 21.2 µg/L in 2017.

TCE: The only groundwater sample result to exceed the GCL (5.0 µg/L) for TCE in 2019 was from monitoring well MW-11R, at a concentration of 7.4 µg/L. Even though the concentration of TCE in monitoring well MW-11R decreased from the 2017 to 2019, concentrations of TCE have exceeded the applicable GCL across all sample years. Other groundwater samples with low but detectable concentrations of TCE in 2019 were those collected from MW-38S and MW-40; detectable results below the GCLs at MW-38S and MW-40 are consistent with results of past sampling events, with the exception of samples collected from MW-40 in 2017, when concentrations were just above the GCL.

cis-DCE: Concentrations of cis-DCE in groundwater samples collected from four monitoring wells (MW-11R, MW-38S, MW-39, and MW-40) were in exceedance of the GCL (38 µg/L), with MW-11R having the greatest concentration, at 1,770 µg/L. Similar to results from previous years, the cis-DCE concentration in the samples collected from MW-34 was ND in 2019. Historically, analytical results of samples collected from MW-11R, MW-38S, MW-39, and MW-40 have exceeded GCLs, with the greatest historical concentration detected at MW-11R.

trans-DCE: In 2019, trans-DCE was detected in groundwater samples collected from monitoring wells MW-11R, MW-38S, MW-39, and MW-40, but no analytical sample results were in exceedance of the GCL (360 µg/L). This pattern is consistent with historical data.

Vinyl chloride: Concentrations of vinyl chloride exceeded the GCL in samples collected from monitoring wells MW-11R, MW-38S, MW-39, and MW-40, in 2019; concentrations in samples collected from the two remaining wells were ND. Although the greatest concentration was detected in the sample collected from MW-11R in 2019 and exceeded the GCL, results of vinyl chloride for this well in 2017 were ND.

5.2 REDUCTIVE DECHLORINATION

During the 2006 and 2010 Drainage Pond studies, the natural attenuation parameters were analyzed to assess the state of biodegradation of chlorinated compounds through reductive dechlorination in the groundwater plume. Based on those studies and subsequent investigations, there is evidence that reductive dechlorination of PCE is occurring in the groundwater plume (Oasis 2011). This process has likely converted a substantial fraction of dissolved TCE to cis-DCE and trans-DCE, but the follow-on conversion to vinyl chloride is generally less effective, as evidenced by the relatively static concentrations of vinyl chloride at the monitoring wells.

In order to better evaluate the reductive dechlorination process at this site, molar factions for each chloroethene were calculated; this allows direct comparison between years despite annual variability in total concentration (Table 5-2). Over the years, there is a slight downward trend in vinyl chloride concentrations and a slight increase in trans-DCE concentrations. Studies of reductive dechlorination have found that when necessary conditions for completed dechlorination of PCE or TCE to ethylene are not present, degradation stalls at DCE (Northwind Inc. 2003). Although the groundwater conditions appear favorable for reductive dichlorination based on the 2006 and 2010 studies, the stall at DCE implies the process may not reach complete dechlorination to ethylene in the near future, if ever.

Table 5-2
Chloroethene Molar Fraction Trends for Wells Sampled In 2019

Monitoring Well ID	Sample Date[1]	Total Chloroethenes[2]	Molar Fraction[3]				
		µg/L	PCE (%)	TCE (%)	cis-DCE (%)	trans-DCE (%)	Vinyl Chloride (%)
MW-11R	09/27/05	680	2.40	1.50	94.40	0.60	1.10
	11/02/06	737	0.80	0.70	96.80	1.10	0.50
	10/17/07	688	2.20	0.60	96.10	0.70	0.50
	10/21/08	2,733	0.40	0.30	98.40	0.60	0.30
	10/29/10	915	1.50	0.40	96.20	0.80	1.10
	12/05/13	1,244	0.70	--	98.50	0.80	--
	06/15/17	1,561	1.20	1.20	96.70	0.90	--
	12/12/2019	1,813	0.44	0.30	97.92	0.96	0.38
MW-34	8/27/2003	ND	--	--	--	--	--
	8/27/2004	ND	--	--	--	--	--
	9/27/2005	ND	--	--	--	--	--
	11/2/2006	ND	--	--	--	--	--
	10/7/2007	ND	--	--	--	--	--
	6/15/2017	ND	--	--	--	--	--
	12/11/2019	ND	--	--	--	--	--
MW-38S	10/29/2010	62	0.50	--	95.90	1.00	2.60
	12/5/2013	21	--	--	100	--	--
	6/15/2017	173	1.50	0.20	96.50	0.60	1.20
	12/11/2019	258	1.18	0.23	97.03	0.84	0.72
MW-38D	10/29/2010	ND	--	--	--	--	--
	12/5/2013	ND	--	--	--	--	--
	6/15/2017	4	9.80	11.10	79.10	--	--
	12/11/2019	12	--	2.62	97.38	--	--
MW-39	10/29/2010	213	0.20	0.30	93.20	2.30	4.00
	6/15/2017	7	--	6.00	89.10	4.90	--
	12/11/2019	70	--	1.22	91.75	4.54	2.49
MW-40	10/29/2010	1,102	0.10	0.10	97.60	0.70	1.60
	12/5/2013	861	--	--	97.40	0.90	1.70
	6/15/2017[4]	715	1.80	0.60	96.00	1.00	0.70
	12/11/2019[4]	883	0.64	0.26	97.77	1.03	0.30

Notes:
-- = Molar fractions not calculated for NDs.
[1]Sample data obtained from the 2017 Drainage Pond Groundwater Monitoring Report (SLR 2018)
[2]Total chloroethenes (µg/L) calculated as the sum of individual analyte concentrations
[3]Molar fraction is calculated for individual detected chloroethene congeners as the fraction of the total molar concentration
[4]Total chloroethenes calculated using the higher of the parent/duplicate concentrations for each chloroethene
For definitions, refer to the Acronyms and Abbreviations section.

6.0 CONCLUSIONS

In 2006, the Gore-Sober soil gas survey identified an unknown PCE source area east of MW-11R. There is currently no evidence of a discreet point source of contamination. The site was historically a drainage pond where contaminants could have settled out or been transported by runoff.

The addition of monitoring wells MW-38S, MW-38D, MW-39, and MW-40 in 2010 helped to fill data gaps associated with the Drainage Pond site, increased knowledge of contaminant boundaries, and provided additional information on the natural attenuation that is occurring at the site. Results from the 2019 groundwater monitoring effort indicate that chloroethenes persist in the groundwater at similar concentrations to those detected in previous studies, and reductive dechlorination may have stalled at DCE. Benzene has decreased in concentration and was not found to be in exceedance of the GCL for the past two sample events.

The 2019 sampling event is the fourth in which chloroethene concentrations were less than GCLs or ND in samples collected from MW-38D, which has a total well depth of 34.24 feet. This comparatively deep well was installed to determine whether contaminants were present below the groundwater interface, as results from samples collected from MW-11R (34 feet bgs) might suggest. Unlike MW-11R, which has a screened interval of 5.0 to 34.0 feet bgs, MW-38D is only screened at the interval from 30 to 34 feet bgs. The 2019 groundwater sample results from MW-38D suggest that contaminants are not present at depth, while contaminant concentrations detected in MW-11R are likely the result of mixing. Soil data from the 2010 site investigation support the theory that contaminants are confined to the interval extending from the ground surface to 11 feet bgs.

Although the 2019 groundwater monitoring effort provided recent data of the known chloroethene plume, it did not define plume boundaries or verify the plume is not migrating. According to hydrological assessments in 2013 and 2017, the prevailing groundwater flow direction is westerly, away from the 2006 Gore-Sober soil gas plume delineation. Based on data

from 2003 to 2019 at MW-34, and 2006 data at TW-1 and TW-2 (Figure A-3), the plume is likely confined to the east side of Airport Industrial Road.

7.0 RECOMMENDATIONS

Based on this report, the following actions are recommended for the Drainage Pond site:

- Continue biennial groundwater monitoring of wells MW-11R, MW-34, MW-38S [shallow], MW-38D [deep], MW-39, and MW-40.
- Continue the use of a down-hole bladder pump for sample collection at MW-11R.
- Reinstate the monitoring of natural attenuation parameters, including dissolved and total iron, dissolved and total manganese, total organic carbon, methane, sulfate, and nitrate-nitrite (Wiedemeier et al. 1996).
- Further delineate the contaminant plume by advancing soil borings, installation temporary groundwater well points, and installing additional groundwater monitoring wells downgradient of the 2006 Gore-Sober soil gas plume.

8.0 REFERENCES

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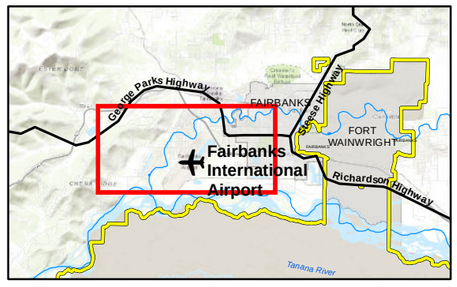
APPENDIX A
Site Figures



- Airport
- Project Location
- Existing Structure
- Water Feature

Service Layer Credits: Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community
Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community
Geospatial Features from Fairbanks North Star Borough GIS.

1 inch = 2,500 feet

0 0.5 1
Miles

WGS 1984 UTM Zone 6N Transverse Mercator

N

DOT & PF FAI DRAINAGE POND GROUNDWATER MONITORING SITE LOCATION 2019 REPORT

FAIRBANKS INTERNATIONAL AIRPORT, FAIRBANKS, ALASKA

JACOBS	DATE: 27 FEB 2020	PROJECT MANAGER: G. WADE	FIGURE NO: A-1

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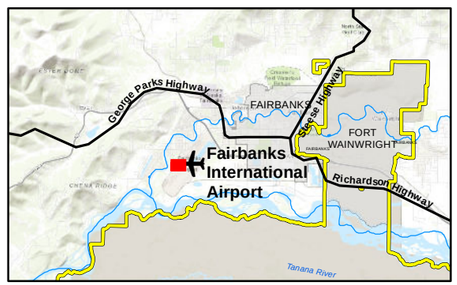

- Monitoring Well - Sampled in 2019
- Monitoring Well - Not Sampled in 2019
- Temporary Well - Not Samples
- Decommissioned Monitoring Well
- Existing Structure
- Area of Highest TCE (>5 µg) from 2006 Gore-Sorber Soil Gas Survey (Environmental Resource Management, 2013)

Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community
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Geospatial Features from Fairbanks North Star Borough GIS.

1 inch = 100 feet

0 35 70 105 140 175

Feet

WGS 1984 UTM Zone 6N Transverse Mercator

N

DOT & PF FAI DRAINAGE POND GROUNDWATER MONITORING SITE OVERVIEW 2019 REPORT

FAIRBANKS INTERNATIONAL AIRPORT, FAIRBANKS, ALASKA

JACOBS	DATE: 27 MAR 2020	PROJECT MANAGER: G. WADE	FIGURE NO: A-2

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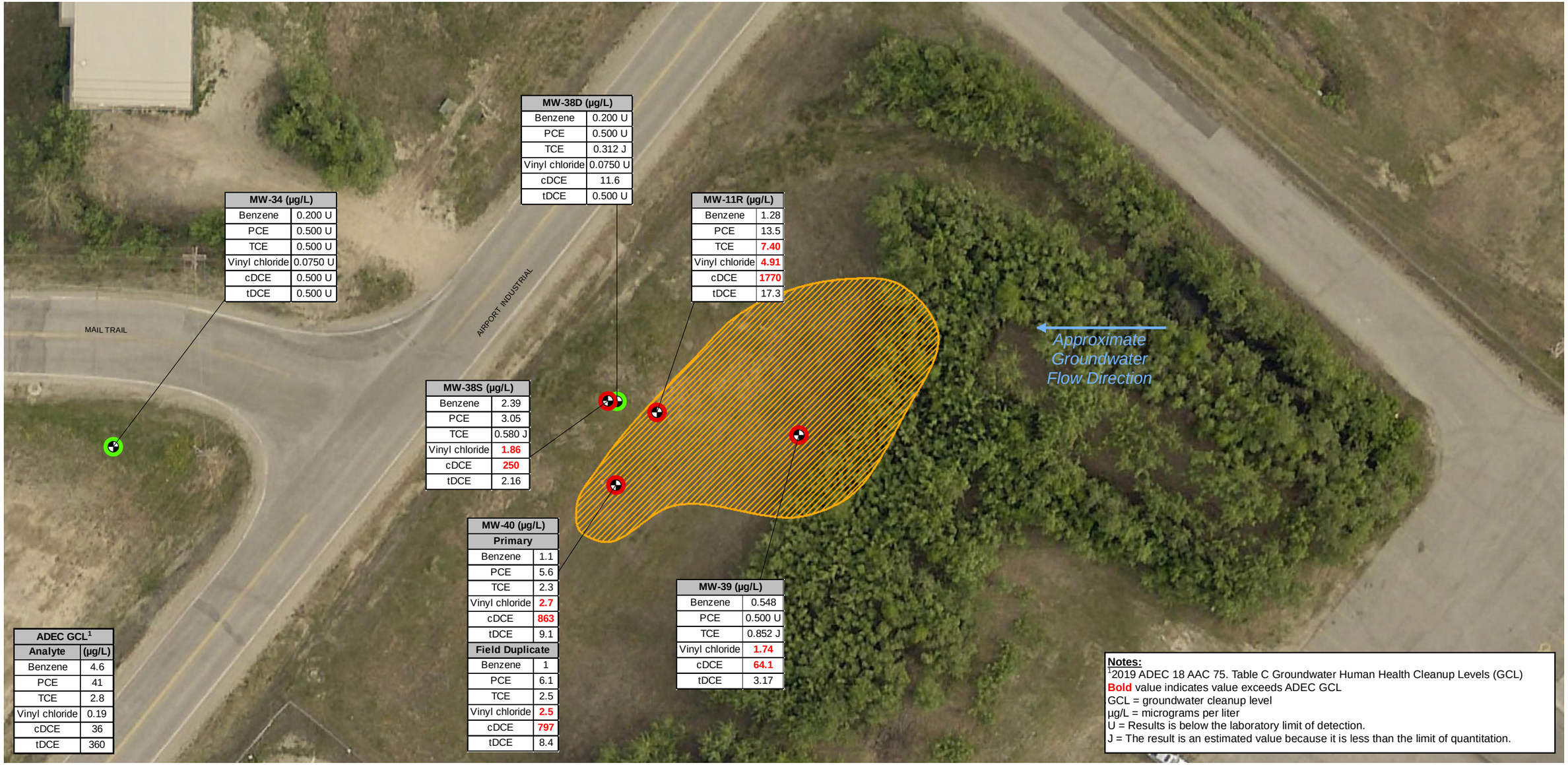


MW-34 (µg/L)	
Benzene	0.200 U
PCE	0.500 U
TCE	0.500 U
Vinyl chloride	0.0750 U
cDCE	0.500 U
tDCE	0.500 U

MW-38D (µg/L)	
Benzene	0.200 U
PCE	0.500 U
TCE	0.312 J
Vinyl chloride	0.0750 U
cDCE	11.6
tDCE	0.500 U

MW-11R (µg/L)	
Benzene	1.28
PCE	13.5
TCE	**7.40**
Vinyl chloride	**4.91**
cDCE	**1770**
tDCE	17.3

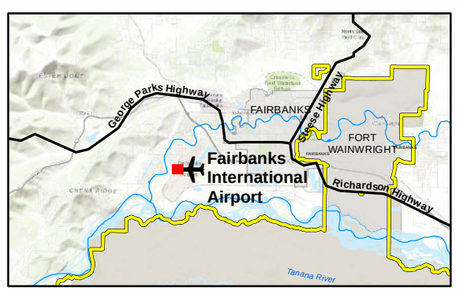
MW-38S (µg/L)	
Benzene	2.39
PCE	3.05
TCE	0.580 J
Vinyl chloride	**1.86**
cDCE	**250**
tDCE	2.16

MW-40 (µg/L)	
Primary	
Benzene	1.1
PCE	5.6
TCE	2.3
Vinyl chloride	**2.7**
cDCE	**863**
tDCE	9.1
Field Duplicate	
Benzene	1
PCE	6.1
TCE	2.5
Vinyl chloride	**2.5**
cDCE	**797**
tDCE	8.4

MW-39 (µg/L)	
Benzene	0.548
PCE	0.500 U
TCE	0.852 J
Vinyl chloride	**1.74**
cDCE	**64.1**
tDCE	3.17

ADEC GCL[1]	
Analyte	**(µg/L)**
Benzene	4.6
PCE	41
TCE	2.8
Vinyl chloride	0.19
cDCE	36
tDCE	360

Notes:
[1]2019 ADEC 18 AAC 75. Table C Groundwater Human Health Cleanup Levels (GCL)
Bold value indicates value exceeds ADEC GCL
GCL = groundwater cleanup level
µg/L = micrograms per liter
U = Results is below the laboratory limit of detection.
J = The result is an estimated value because it is less than the limit of quantitation.



Groundwater Monitoring Well, Exceedance

Groundwater Monitoring Well, No Exceedance

Existing Structure

Area of Highest TCE (>5 µg) from 2006 Gore-Sorber Soil Gas Survey (Environmental Resource Management, 2013)

Service Layer Credits: Sources: Esri, HERE, Garmin, Intermap, increment P Corp., GEBCO, USGS, FAO, NPS, NRCAN, GeoBase, IGN, Kadaster NL, Ordnance Survey, Esri Japan, METI, Esri China (Hong Kong), (c) OpenStreetMap contributors, and the GIS User Community
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Geospatial Features from Fairbanks North Star Borough GIS.

1 inch = 35 feet

0 35 70

Feet

WGS 1984 UTM Zone 6N Transverse Mercator

N

DOT & PF FAI DRAINAGE POND GROUNDWATER MONITORING MONITORING WELL LOCATIONS 2019 REPORT

FAIRBANKS INTERNATIONAL AIRPORT, FAIRBANKS, ALASKA

JACOBS	DATE: 27 FEB 2020	PROJECT MANAGER: G. WADE	FIGURE NO: A-3

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APPENDIX B
Tables

Table B-1
Comparison of Historic Groundwater Monitoring Results to 2019 Results

Analyte:		Benzene	PCE	TCE	cDCE	tDCE	Vinyl Chloride
2014 ADEC GCL[1] (µg/L):		5	5	5	70	100	2
2019 ADEC GCL[2] (µg/L):		4.6	41	2.8	36	360	0.19
Monitoring Well ID	**Sample Date[3]**	**Analytical Result (µg/L)**					
MW-11R	9/27/2005	**9.5**	**27**	**14**	**630**	3.8	**5.3**
	11/2/2006	4.3	**10.5**	**6.84**	**709**	8.28	**2.66**
	10/17/2007	**5.1**	**25**	**5.5**	**650**	4.6	**2.4**
	10/21/2008	**4.99**	**20.1**	**11.2**	**2,680**	15.8	**6.14**
	10/29/2010	**6.72**	**23.5**	4.58	**873**	7.29	**6.94**
	12/5/2013	**6.12**	**14.7**	ND (0.5)	**1,220**	9.4	ND (0.5)
	6/15/2017	1.78	32.7	**24.1**	**1,490**	14	ND (0.075)
	12/12/2019	1.28	13.5	**7.4**	**1770**	17.3	**4.91**
MW-34	8/27/2003	ND (0.4)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
	8/27/2004	ND (0.4)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
	9/27/2005	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)
	11/2/2006	ND (0.4)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)
	10/7/2007	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)	ND (0.2)
	6/15/2017	ND (0.2)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.075)
	12/11/2019	0.200 U	0.500 U	0.500 U	0.500 U	0.500 U	0.0750 U
MW-38S	10/29/2010	**8.92**	0.54J	ND (0.62)	59.7	0.6J	1.16
	12/5/2013	**12**	ND (0.5)	ND (0.5)	20.9	ND (0.5)	ND (0.5)
	6/15/2017	3.65	4.33	0.397J	**166**	1.08	**1.44**
	12/11/2019	2.39	3.05	0.580 J	**250**	2.16	**1.86**
MW-38D	10/29/2010	ND (0.62)	ND (0.62)	ND (0.62)	ND (0.62)	ND (0.62)	ND (0.62)
	12/5/2013	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)
	6/15/2017	ND (0.2)	0.557J	ND (0.5)	2.63	ND (0.5)	ND (0.075)
	12/11/2019	0.200 U	0.500 U	0.312 J	11.6	0.500 U	0.0750 U
MW-39	10/29/2010	**7.96**	0.71	0.79	**200**	5.01	**6.1**
	6/15/2017	ND (0.2)	ND (0.5)	0.593 J	6.54	0.36 J	ND (0.075)
	12/11/2019	0.548	0.500 U	0.852 J	**64.1**	3.17	**1.74**
MW-40	10/29/2010	2.7	1.14	0.88	**1,080**	7.38	**12.9**
	12/5/2013	2.8	ND (5.0)	ND (5.0)	**872**	7.85	**10.9**
	6/15/2017 (Primary)	1.02	20.9	**5.38**	**648**	7.1	**3.33**
	6/15/2017 (Duplicate)	0.998	21.2	**5.24**	**678**	7.02	**3.06**
	12/11/2019 (Primary)	1.1	5.61	2.27	**863**	9.09	**2.67**
	12/11/2019 (Duplicate)	1.02	6.08	2.45	**797**	8.42	**2.5**

Notes:
Bold value indicates value exceeds ADEC GCL
[1]2014 ADEC 18 AAC 75. Table C Groundwater Human Health Cleanup Levels
[2]2019 ADEC 18 AAC 75. Table C Groundwater Human Health Cleanup Levels
[3]Sample data obtained from the 2017 Drainage Pond Groundwater Monitoring Report (SLR 2018)
ND = Results is below the laboratory limit of detection.
U = Results is below the laboratory limit of detection.
J = The result is an estimated value because it is less than the limit of quantitation.
For additional definitions, refer to the Acronyms and Abbreviations section of the report.

Table B-2
Chloroethene Molar Fractions Trend Analysis

Monitoring Well ID	Sample Date[1]	Total Chloroethenes[2] (µg/L)	Molar Fraction[3]				
			PCE	TCE	cDCE	tDCE	Vinyl Chloride
MW-11R	9/27/2005	680	2.40%	1.50%	94.40%	0.60%	1.10%
	11/2/2006	737	0.80%	0.70%	96.80%	1.10%	0.50%
	10/17/2007	688	2.20%	0.60%	96.10%	0.70%	0.50%
	10/21/2008	2,733	0.40%	0.30%	98.40%	0.60%	0.30%
	10/29/2010	915	1.50%	0.40%	96.20%	0.80%	1.10%
	12/5/2013	1,244	0.70%	--	98.50%	0.80%	--
	6/15/2017	1,561	1.20%	1.20%	96.70%	0.90%	--
	12/12/2019	1,813	0.44%	0.30%	97.92%	0.96%	0.38%
MW-34	8/27/2003	ND	--	--	--	--	--
	8/27/2004	ND	--	--	--	--	--
	9/27/2005	ND	--	--	--	--	--
	11/2/2006	ND	--	--	--	--	--
	10/7/2007	ND	--	--	--	--	--
	6/15/2017	ND	--	--	--	--	--
	12/11/2019	ND	--	--	--	--	--
MW-38S	10/29/2010	62	0.50%	--	95.90%	1.00%	2.60%
	12/5/2013	21	--	--	100%	--	--
	6/15/2017	173	1.50%	0.20%	96.50%	0.60%	1.20%
	12/11/2019	258	1.18%	0.23%	97.03%	0.84%	0.72%
MW-38D	10/29/2010	ND	--	--	--	--	--
	12/5/2013	ND	--	--	--	--	--
	6/15/2017	4	9.80%	11.10%	79.10%	--	--
	12/11/2019	12	--	2.62%	97.38%	--	--
MW-39	10/29/2010	213	0.20%	0.30%	93.20%	2.30%	4.00%
	6/15/2017	7	--	6.00%	89.10%	4.90%	--
	12/11/2019	70	--	1.22%	91.75%	4.54%	2.49%
MW-40	10/29/2010	1,102	0.10%	0.10%	97.60%	0.70%	1.60%
	12/5/2013	861	--	--	97.40%	0.90%	1.70%
	6/15/2017[4]	715	1.80%	0.60%	96.00%	1.00%	0.70%
	12/11/2019[4]	883	0.64%	0.26%	97.77%	1.03%	0.30%

Notes:

-- Molar fraction not calculated; results below laboratory limits of detection

[1]Sample data obtained from the 2017 Drainage Pond Groundwater Monitoring Report (SLR 2018)

[2]Total chloroethenes (µg/L) calculated as the sum of individual analyte concentrations

[3]Molar fraction is calculated for individual detected chloroethene congeners as the fraction of the total molar concentration

[4]Total chloroethenes calculated using the higher of the parent/duplicate concentrations for each chloroethene

APPENDIX C
Log Book

ADOT FAI

ADOT-J07-70198-H04-[illegible]

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G. Wade

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CONTENTS

Reference Page Index

Location FAI ADOT Date 12/10/19

Project / Client Drainage Pond (DP)

Personnel: T. Laith, J. Robinson
Weather: 30°F, overcast, partly sunny
Objective: Locate MW-39, MW-40, MW-11R, MW-38D and MW-38S, MW-34

1130 Depart FBX office.
Located all wells included in sampling event. Some will need to be further dug out of soil on 12/11.
~~1240~~ Depart DP site.
1300 Arrive at FBX office.

Location FAI ADOT Date 12/11/19

Project / Client DP

Personnel: T Laith + J. Robinson
Weather: 25°F
Objective: Sample DP MWs
PPE: Mod. Level D
0700 YSI Calibration
Conf. Soln. @ 21.49°C
pH: 6.93 ✓
ORP: 235.4 ✓
Cond: 7563 ✓ cal'd w/ 1413 µS/cm soln

Cond cal: 1302 µS/cm

MultiRAE bump test w/ 100 ppm isobutylene: 96.2 ppm

Turbidimeter cal'd w/ 1000, 10, and 0.2 ppm ✓

0800 Depart office
0817 Arrive at DP site.
0820 Set up at MW-38S.
0856 Sample collected at MW-38S
3 x 40 mL VOAs for VOCs (TCE, DCE, PCE) + benzene, t-DCE + VC

Rite in the Rain

Location ADOT FAI Date 12/11/19

Project / Client DP GW Mon.

0910 Set up at MW-38D.
0940 Collect sample 19DPS-MW38D-GW
3 x 40-mL VOAs, HCl; analyze for VOCs (PCE, TCE, DCE) + benzene, VC + t-DCE.
1000 Set up at MW-40.
1040 Collect sample 19DPS-MW40-GW for analysis of VOCs (TCE, PCE, DCE). VC, t-DCE, benzene
(2) 3x 40-mL VOAs, HCl
Also collected DUP: 19DPS-MW38D-GW-A
1100 Set up at MW-39.
1115 Collect sample 19DPS-MW39-GW
3 x 40-mL VOA, HCl pres.
Analysis: VOCs (DCE, PCE, TCE)
1125 Begin set up at MW-11R.
Do not have external 12V battery for bladder pump. Moving to final peri-pump well. Will sample MW-11R on 12/12.
1200 Set up at MW-34.
1216 Collect sample ~~AW~~ 19DPS-MW34-GW for analysis of VOCs (DCE, TCE, PCE) etc.
1240 Meet w/ Jason Griswald (DOT M&O) & dup purge water.
1248 Offsite.

Jenny K

Location ADOT FAI Date 12/12/19

Project / Client DP GW Mon.

Personnel: T. Lath, J. Robinson
Weather: Clear, 10°F
Objective: Sample MW-11R w/ bladder pump
PPE: Mod. Level D

0700 YSI Cal. @ 21.44°C

Spec Cond	ORP	pH
11820 ✓	218.1 ✓	7.2 ✓

Calibrate cond. w/ standard solution - 1413 µS/cm @ 21.4°C: 1305 µS/cm
Readout = 1305 µS/cm

Rev w/ confidence solution.
Cond. = 7692 µS/cm ✓

Multi-RAE (battery changeout)
Bump test w/ 100 ppm isobutylene
Readout = 100 ppm
Zero calibration performed

Turbidimeter
Cal'd w/ 1000, 10, and 0.2 NTU Standards

Rite in the Rain

Location ADOT FAI DP Date 12/12/19

Project / Client 2019 GW Mon

0945 Depart office for site
1005 Arrive onsite. Unload equip at MW-111R
1030 Set up at MW-111R
1032 Begin purging.
1057 Collected sample 19DPS-MW11R-GW. 3 x 40 mL VOAs; sampled for benzene, VC, DCE, TCE, PCE + trans-DCE
1130 Meet M&O (J. Griswald) at drum storage to dump purge water.
1140 offsite

Jennifer Robinson

Location Date

Project / Client

APPENDIX D
Groundwater Monitoring Forms

Groundwater Sampling Data Sheet

JACOBS

Site Name	Event	Well ID	Project Number
FAT ADOT DP	ADOT DP GW Mon	MW-38S	5FGA5200
Weather Conditions	**PID Readings of Total VOCs (ppm)**	**Date**	**Sampler Initials**
overcast, 25°F	Ambient 0.0 Breathing Zone 0.0 In Well 0.0	12/11/19	TL / JK

Well Information

Well Integrity	TOC Stickup (ft ags)	Well Casing Material	Casing Diameter(in) / Gallons per linear foot(gal/ft)
(Good) Fair Poor	-0.6	(PVC) SS	1 / 0.041 (2 / 0.163) 4 / 0.653 6 / 1.469
Depth to Product (ft)	**Depth to GW (ft btoc)**	**Total Depth of Casing (ft btoc)**	**Product Thickness (ft) and Volume Recovered (mL)**
N/A	8.66	14.55 (final)	N/A

Max purge volume (3 well casing volumes) = [previous† total depth of casing (ft) – (depth to water[GW table well] or top of filter pack[submerged well] (ft))] * gallons per linear foot of casing * 3

SHOW WORK Max Purge Volume = (14.6 † ft – 8.66 ft) * 290 gal/ft * 3 = 2.90 gal * 3.785 L/gal = 11.0 L

Well Purging Information

Start Time	Finish Time	Depth of Tubing (ft btoc)	Equipment Used for Purging
0820	0856	9.66	Bailer (Peristaltic Pump) Submersible Pump

Color	Odor	Sheen	Purged Dry	Meter Used During Purging
(Clear) Cloudy Brown Other:	None Moderate (Faint) Strong	Yes (No)	Yes (No)	(YSI Multi Meter) ~~Hach Turbidimeter~~ TDW

Purging reached: (Stability) Max Vol. Purge water was (Treated) Stored Other Note:

Time (HH:mm)	Volume (Gallons or Liters)		Acceptable Range to Demonstrate Stability						
			± 0.2 °C	± 3%	± 10% or 0.2 mg/L (whichever is greater)	± 0.1	± 10 mV	± 10% or ±1 NTU	Drawdown < 0.3 ft
	Change	Total	Temperature (°C)	Conductivity (µS/cm)	DO (mg/L)	pH (std units)	ORP (mV)	Turbidity (NTU)	Water Level (feet btoc)
0836	Start purge								
0840	1.25	1.25	4.43	1378	3.56	6.73	40.4	15.05	8.72
0843	0.75	2.0	4.45	1343 ✓	1.58	6.80 ✓	30.4 ✓	20.87	8.73
0846	0.50	2.5	4.44	1317 ✓	1.18	6.82 ✓	24.5 ✓	11.43	8.72
0849	0.50	3.0	4.38	1291 ✓	0.94 ✓	6.81 ✓	18.2 ✓	9.67 ✓	8.72
0852	0.50	3.0	4.33	1270 ✓	0.81 ✓	6.83 ✓	12.4 ✓	10.51 ✓	8.72
0855	0.75	3.75	4.37	1259	0.77 ✓	6.86	7.5	6.31	8.72
0856	Sampled. parameters stable.								

Sample Collection Information

Start Time	Finish Time / Date	Depth of Tubing (ft btoc)	Equipment Used for Sampling
0856	0902 / 12/11/19	9.66	(Peristaltic Pump) Submersible Pump
SAMPLE ID: 19DPS-MW38S-GW		QC: Dup MS/MSD	Ferrous Iron (Fe^{2+}) (mg/L) = N/A

Container/Preservative	Analysis Requested	Notes
3x 40mL VOA / HCl	benzene, DCE, PCE, TCE, trans-DCE, VC	H_2S smell !!

Suggested Notation:

"—" = not measured "✓" = stable "+" = rising "-" = falling "*" = all parameters stable

Groundwater Sampling Data Sheet

JACOBS

Site Name	Event	Well ID	Project Number
ADOT FAI DP	2019 GW Monitoring	MW-38S	SFGAS200
		Date	**Sampler Initials**
		12-11-19	TL/JJZ

Time (HH:mm)	Volume (Gallons or Liters)		Acceptable Range to Demonstrate Stability						
			± 0.2 °C	± 3%	± 10% or 0.2 mg/L (whichever is greater)	± 0.1	± 10 mV	± 10% or ±1 NTU	Drawdown < 0.3 ft
	Change	Total	Temperature (°C)	Conductivity (µS/cm)	DO (mg/L)	pH (std units)	ORP (mV)	Turbidity (NTU)	Water Level (feet btoc)

Groundwater Sampling Data Sheet

JACOBS

Site Name	Event	Well ID	Project Number
ADOT FAI	DP GW Mon.	MW-38D	5FGAS200
Weather Conditions	**PID Readings of Total VOCs (ppm)**	**Date**	**Sampler Initials**
overcast, 20°F	Ambient 0.0 Breathing Zone 0.0 In Well 0.0	12/11/19	TL/JK

Well Information

Well Integrity	TOC Stickup (ft ags)	Well Casing Material	Casing Diameter(in) / Gallons per linear foot(gal/ft)
(Good) Fair Poor	-0.45	(PVC) SS	1 / 0.041 (2) / 0.163 4 / 0.653 6 / 1.469
Depth to Product (ft)	**Depth to GW (ft btoc)**	**Total Depth of Casing (ft btoc)**	**Product Thickness (ft) and Volume Recovered (mL)**
—	8.66	34.24 (final)	—

Max purge volume (3 well casing volumes) = [previous[1] total depth of casing (ft) – (depth to water[GW table well] or top of filter pack[submerged well] (ft)] * gallons per linear foot of casing * 3

SHOW WORK Max Purge Volume = (34.21[1] ft – 8.66 ft) * 0.163 gal/ft * 3 = 12.49 gal * 3.785 L/gal = 47.29 L

Well Purging Information

Start Time	Finish Time	Depth of Tubing (ft btoc)	Equipment Used for Purging
0924 ~~0919~~ ~~0921~~	0940	9.66	Bailer (Peristaltic Pump) Submersible Pump

Color	Odor	Sheen	Purged Dry	Meter Used During Purging
(Clear) Cloudy Brown Other:	(None) Moderate Faint Strong	Yes (No)	Yes (No)	(YSI Multi Meter) ~~Hach Turbidimeter~~ (TPW)

Purging reached: (Stability) Max Vol. Purge water was: Treated (Stored) Other Note:

Time (HH:mm)	Volume (Gallons or (Liters))		Acceptable Range to Demonstrate Stability						
			± 0.2 °C	± 3%	± 10% or 0.2 mg/L (whichever is greater)	± 0.1	± 10 mV	± 10% or ±1 NTU	Drawdown < 0.3 ft
	Change	Total	Temperature (°C)	Conductivity (µS/cm)	DO (mg/L)	pH (std units)	ORP (mV)	Turbidity (NTU)	Water Level (feet btoc)
0924	Start purge								
0927	1.0	1.0	2.68	212	4.20	7.15	39.3	2.69	8.78
0930	0.25	1.25	3.20	194✓	1.97	7.04✓	30.4✓	3.24✓	8.78
0933	0.50	1.75	3.52	189✓	0.81	6.98✓	16.5	3.04✓	8.78
0936	0.50	2.25	3.58	183✓	0.47	6.94✓	3.4	2.46✓	8.78
0939	0.50	3.75	3.68	185✓	0.37	6.93✓	-3.0	2.06✓	8.78
Sampled. Parameters stable.									

Sample Collection Information

Start Time	Finish Time / Date	Depth of Tubing (ft btoc)	Equipment Used for Sampling
0940	0947 / 12-11-19	9.66	(Peristaltic Pump) Submersible Pump
SAMPLE ID: 19DPS-MW38D-GW		QC: Dup MS/MSD	Ferrous Iron (Fe^{2+}) (mg/L) = —

Container/Preservative	Analysis Requested	Notes
3x 40mL VOA / HCl	Benzene, VC, DCE, trans-DCE, PCE, TCE	

Suggested Notation:

"—" = not measured "✓"= stable "+" = rising "-" = falling "*" = all parameters stable

Groundwater Sampling Data Sheet

JACOBS

Site Name	Event	Well ID	Project Number
ADOT FAI DP	2019 GW Monitoring	MW-38D	5FGA5200
		Date	**Sampler Initials**
		12-11-19	TL/JR

Time (HH:mm)	Volume (Gallons or Liters)		Acceptable Range to Demonstrate Stability						
			± 0.2 °C	± 3%	± 10% or 0.2 mg/L (whichever is greater)	± 0.1	± 10 mV	± 10% or ±1 NTU	Drawdown < 0.3 ft
	Change	Total	Temperature (°C)	Conductivity (µS/cm)	DO (mg/L)	pH (std units)	ORP (mV)	Turbidity (NTU)	Water Level (feet btoc)

Groundwater Sampling Data Sheet

JACOBS

Site Name	Event	Well ID	Project Number
ADOT FAI DP	GW Monitoring 2019	MW-46	SFGAS20
Weather Conditions	**PID Readings of Total VOCs (ppm)**	**Date**	**Sampler Initials**
Overcast	Ambient 0.0 Breathing Zone 0.0 In Well 0.0	12-11-19	TL / JR

Well Information

Well Integrity	TOC Stickup (ft ags)	Well Casing Material	Casing Diameter(in) / Gallons per linear foot(gal/ft)
(Good) Fair Poor	-0.40	(PVC) SS	1 / 0.041 (2 / 0.163) 4 / 0.653 6 / 1.469
Depth to Product (ft)	**Depth to GW (ft btoc)**	**Total Depth of Casing (ft btoc)**	**Product Thickness (ft) and Volume Recovered (mL)**
N/A	8.27	15.87 (final)	N/A

Max purge volume (3 well casing volumes) = [previous† total depth of casing (ft) – (depth to water[GW table well] or top of filter pack[submerged well] (ft))] * gallons per linear foot of casing * 3

SHOW WORK Max Purge Volume = (15.71 † ft – 8.27 ft) * 0.163 gal/ft * 3 = 3.44 gal * 3.785 L/gal = 13.77 L

Well Purging Information

Start Time	Finish Time	Depth of Tubing (ft btoc)	Equipment Used for Purging
1015	1040	9.27	Bailer (Peristaltic Pump) Submersible Pump

Color	Odor	Sheen	Purged Dry	Meter Used During Purging
(Clear) Cloudy Brown Other: Yellow tint	(None) Moderate Faint Strong	Yes (No)	Yes (No)	(YSI Multi Meter) (Hach Turbidimeter)

Purging reached: (Stability) Max Vol. Purge water was: Treated (Stored) Other Note:

Time (HH:mm)	Volume (Gallons or Liters)		Acceptable Range to Demonstrate Stability						
			± 0.2 °C	± 3%	± 10% or 0.2 mg/L (whichever is greater)	± 0.1	± 10 mV	± 10% or ±1 NTU	Drawdown < 0.3 ft
	Change	Total	Temperature (°C)	Conductivity (µS/cm)	DO (mg/L)	pH (std units)	ORP (mV)	Turbidity (NTU)	Water Level (feet btoc)
1018	Start purge								
1023	2.48	1.0	9.0	1569	3.00	6.85	-25.5	97.42	9.2
1026	2.74	0.5	1.5	1630✓	1.40	6.90✓	-41.9	80.15	9.21
1029	2.79	0.5	2.0	1660✓	0.98	6.93✓	-52.0	57.55	9.23
1032	3.04	0.5	2.5	1717✓	0.72✓	6.96✓	-61.7	34.5✓	9.21
1035	3.30	0.5	3.0	1748✓	0.72✓	6.97✓	-66.5	35.94	9.21
1038	3.30	0.5	3.5	1769✓	0.78✓	6.99	-69.1✓	24.75	9.21
Sampled. Parameters Stable									

Sample Collection Information

Start Time	Finish Time / Date	Depth of Tubing (ft btoc)	Equipment Used for Sampling
1040	1045 / 12-11-19	9.27	(Peristaltic Pump) Submersible Pump
SAMPLE ID: 19DPS-MW40-GW/GWA		QC: (Dup) MS/MSD	Ferrous Iron (Fe^{2+}) (mg/L) = N/A

Container/Preservative	Analysis Requested	Notes
(2) 3 x 40 mL VOA/HCl	Benzene, DCE, trans-DCE, PCE, TCE, VC	

Suggested Notation:

"____" = not measured "✓"= stable "+" = rising "-" = falling "*" = all parameters stable

Groundwater Sampling Data Sheet

JACOBS

Site Name	Event	Well ID	Project Number
ADOT FAI DP	2019 GW Monitoring	MW-40	SF6AS200
		Date	**Sampler Initials**
		12-11-19	TL/JR

Time (HH:mm)	Volume (Gallons or Liters)		Acceptable Range to Demonstrate Stability						
			± 0.2 °C	± 3%	± 10% or 0.2 mg/L (whichever is greater)	± 0.1	± 10 mV	± 10% or ±1 NTU	Drawdown < 0.3 ft
	Change	Total	Temperature (°C)	Conductivity (µS/cm)	DO (mg/L)	pH (std units)	ORP (mV)	Turbidity (NTU)	Water Level (feet btoc)

Groundwater Sampling Data Sheet

JACOBS

Site Name	Event	Well ID	Project Number
ADOT FAI DP	2019 GW Mon	MW-39	~~MW39~~
Weather Conditions	**PID Readings of Total VOCs (ppm)**	**Date**	**Sampler Initials**
Overcast, ~20°F	Ambient 0.0 Breathing Zone 0.0 In Well 0.0	12/11/19	TL/JK

Well Information

Well Integrity	TOC Stickup (ft ags)	Well Casing Material	Casing Diameter(in) / Gallons per linear foot(gal/ft)
(Good) Fair Poor	-0.58	(PVC) SS	1 / 0.041 (2 / 0.163) 4 / 0.653 6 / 1.469
Depth to Product (ft)	**Depth to GW (ft btoc)**	**Total Depth of Casing (ft btoc)**	**Product Thickness (ft) and Volume Recovered (mL)**
—	7.04	16.19 (final)	—

Max purge volume (3 well casing volumes) = [previous† total depth of casing (ft) – (depth to water[GW table well] or top of filter pack[submerged well] (ft))] * gallons per linear foot of casing * 3

SHOW WORK Max Purge Volume = (16.50 † ft – 7.04 ft) * 0.163 gal/ft * 3 = 4.62 gal * 3.785 L/gal = 17.5 L

Well Purging Information

Start Time	Finish Time	Depth of Tubing (ft btoc)	Equipment Used for Purging
~~1059~~ 1104	1115	8.04	Bailer (Peristaltic Pump) Submersible Pump

Color	Odor	Sheen	Purged Dry	Meter Used During Purging
(Clear) Cloudy Brown Other:	None Moderate (Faint) Strong	Yes (No)	Yes No	(YSI Multi Meter) (TDW Hach Turbidimeter)

Purging reached: (Stability) Max Vol. Purge water was (Treated) Stored Other Note:

Time (HH:mm)	Volume (Gallons or Liters)		Acceptable Range to Demonstrate Stability						
			± 0.2 °C	± 3%	± 10% or 0.2 mg/L (whichever is greater)	± 0.1	± 10 mV	± 10% or ±1 NTU	Drawdown < 0.3 ft
	Change	Total	Temperature (°C)	Conductivity (µS/cm)	DO (mg/L)	pH (std units)	ORP (mV)	Turbidity (NTU)	Water Level (feet btoc)
1104 ~~1059~~	Start								
1107	1.25	1.25	2.20	1331	1.22	7.16 ✓	-81.2 ✓	~~24.33~~	8.41
1110	0.25	1.50	2.40	1358 ✓	1.25	7.15 ✓	-85.6 ✓	10.51	8.77
1113	0.50	2.0	2.17	1358 ✓	1.43	7.15 ✓	-88.2 ✓	19.02	9.18
Sampled. Parameters stable									

Sample Collection Information

Start Time	Finish Time / Date	Depth of Tubing (ft btoc)	Equipment Used for Sampling
1115	1120 / 12-11-19	10.10	(Peristaltic Pump) Submersible Pump
SAMPLE ID: 19DPS-MW39-GW		QC: Dup MS/MSD	Ferrous Iron (Fe^{2+}) (mg/L) = N/A

Container/Preservative	Analysis Requested	Notes
3 x 40 mL VOA/HCl	Benzene, VC, DCE, trans-DCE, PCE, TCE	

Suggested Notation:

"—" = not measured "✓"= stable "+" = rising "-" = falling "*" = all parameters stable

Groundwater Sampling Data Sheet

JACOBS

Site Name	Event	Well ID	Project Number
ADOT FAI DP	2019 GW Monitoring	MW-39	SF0AS200
		Date	Sampler Initials
		12/11/19	TL/OR

Time (HH:mm)	Volume (Gallons or Liters)		Acceptable Range to Demonstrate Stability						
			± 0.2 °C	± 3%	± 10% or 0.2 mg/L (whichever is greater)	± 0.1	± 10 mV	± 10% or ±1 NTU	Drawdown < 0.3 ft
	Change	Total	Temperature (°C)	Conductivity (µS/cm)	DO (mg/L)	pH (std units)	ORP (mV)	Turbidity (NTU)	Water Level (feet btoc)

Groundwater Sampling Data Sheet

JACOBS

Site Name	Event	Well ID	Project Number
ADOT FAI DP	2019 GW Mon	MW-34	5FGA5200
Weather Conditions	**PID Readings of Total VOCs (ppm)**	**Date**	**Sampler Initials**
overcast, ~20°F	Ambient 0.0 Breathing Zone 0.0 In Well 0.0	12/11/19	TL/JK

Well Information

Well Integrity	TOC Stickup (ft ags)	Well Casing Material	Casing Diameter(in) / Gallons per linear foot(gal/ft)
Good Fair Poor	-0.30	PVC SS	1 / 0.041 2 / 0.163 4 / 0.653 6 / 1.469
Depth to Product (ft)	**Depth to GW (ft btoc)**	**Total Depth of Casing (ft btoc)**	**Product Thickness (ft) and Volume Recovered (mL)**
N/A	8.40	13.30 (final)	N/A

Max purge volume (3 well casing volumes) = [previous[1] total depth of casing (ft) – (depth to water[GW table well] or top of filter pack[submerged well] (ft))] * gallons per linear foot of casing * 3

SHOW WORK Max Purge Volume = (13.72 ft – 8.40 ft) * 0.163 gal/ft * 3 = 2.60 gal * 3.785 L/gal = 9.85 L

Well Purging Information

Start Time	Finish Time	Depth of Tubing (ft btoc)		Equipment Used for Purging
1203	1216	9.40		Bailer Peristaltic Pump Submersible Pump
Color	**Odor**	**Sheen**	**Purged Dry**	**Meter Used During Purging**
Clear Cloudy Brown Other:	None Moderate Faint Strong	Yes No	Yes No	YSI Multi Meter Hach Turbidimeter

Purging reached: Stability Max Vol. Purge water was: Treated Stored Other Note:

Time (HH:mm)	Volume (Gallons or Liters)		Acceptable Range to Demonstrate Stability						
			± 0.2 °C	± 3%	± 10% or 0.2 mg/L (whichever is greater)	± 0.1	± 10 mV	± 10% or ±1 NTU	Drawdown < 0.3 ft
	Change	Total	Temperature (°C)	Conductivity (µS/cm)	DO (mg/L)	pH (std units)	ORP (mV)	Turbidity (NTU)	Water Level (feet btoc)
1203	Start purge								
1206	1.25	1.25	3.69	1137 ✓	2.23	7.04	14.3	24.80	8.56
1209	0.50	1.75	3.91	1148 ✓	1.38 ✓	7.00 ✓	22.3 ✓	12.01	8.55
1212	0.50	2.25	4.03	1154 ✓	1.34 ✓	6.98 ✓	29.9 ✓	6.83	8.56
1215	0.50	2.75	4.11	1157 ✓	1.43 ✓	6.97 ✓	35.5	4.08	8.56
Sampled	Parameters		Stable						

Sample Collection Information

Start Time	Finish Time / Date	Depth of Tubing (ft btoc)	Equipment Used for Sampling
1216	1219 / 12-11-19	9.40	Peristaltic Pump Submersible Pump
SAMPLE ID: 19DPS-MW34-GW		QC: Dup MS/MSD	Ferrous Iron (Fe^{2+}) (mg/L) = N/A

Container/Preservative	Analysis Requested	Notes
3x 40mL VOA / HCl	Benzene, VC, DCE, trans-DCE, PCE, TCE	

Suggested Notation:

"——" = not measured "✓"= stable "+" = rising "-" = falling "*" = all parameters stable

Groundwater Sampling Data Sheet

JACOBS

Site Name	Event	Well ID	Project Number
ADOT FAI DP	2019 GW Monitoring	MW-34	5FGA5200
		Date	Sampler Initials
		12/11/19	TL/DJR

Time (HH:mm)	Volume (Gallons or Liters)		Acceptable Range to Demonstrate Stability						
			± 0.2 °C	± 3%	± 10% or 0.2 mg/L (whichever is greater)	± 0.1	± 10 mV	± 10% or ±1 NTU	Drawdown < 0.3 ft
	Change	Total	Temperature (°C)	Conductivity (µS/cm)	DO (mg/L)	pH (std units)	ORP (mV)	Turbidity (NTU)	Water Level (feet btoc)

Groundwater Sampling Data Sheet

JACOBS

Site Name	Event	Well ID	Project Number
ADOT FAI DP	2019 GW Monitoring	MW-11R	5FGA5200
Weather Conditions	**PID Readings of Total VOCs (ppm)**	**Date**	**Sampler Initials**
clear, dark, ~10°F	Ambient 0.0 Breathing Zone 0.0 In Well 0.0	12/12/19	TL/JR

Well Information

Well Integrity	TOC Stickup (ft ags)	Well Casing Material	Casing Diameter(in) / Gallons per linear foot(gal/ft)
(Good) Fair Poor	-0.40	(PVC) SS	1 / 0.041 (2 / 0.163) 4 / 0.653 6 / 1.469
Depth to Product (ft)	**Depth to GW (ft btoc)**	**Total Depth of Casing (ft btoc)**	**Product Thickness (ft) and Volume Recovered (mL)**
N/A	9.2	33.94 (final)	N/A

Max purge volume (3 well casing volumes) = [previous[1] total depth of casing (ft) – (depth to water[GW table well] or top of filter pack[submerged well] (ft)] * gallons per linear foot of casing * 3

SHOW WORK Max Purge Volume = (34.15 [1] ft – 9.2 ft) * 0.163 gal/ft * 3 = 12.20 gal * 3.785 L/gal = 46.18 L

Well Purging Information

Start Time	Finish Time	Depth of Tubing (ft btoc)	Equipment Used for Purging
1032	1057	10.2	Bailer Peristaltic Pump (Submersible Pump) Bladder pump

Color	Odor	Sheen	Purged Dry	Meter Used During Purging
(Clear) Cloudy Brown Other:	None Moderate (Faint) Strong	Yes (No)	Yes (No)	(YSI Multi Meter) ~~Hach~~ (Turbidimeter)

Purging reached: (Stability) Max Vol. Purge water was: Treated (Stored) Other Note:

Time (HH:mm)	Volume (Gallons or Liters)		Acceptable Range to Demonstrate Stability						
			± 0.2 °C	± 3%	± 10% or 0.2 mg/L (whichever is greater)	± 0.1	± 10 mV	± 10% or ±1 NTU	Drawdown < 0.3 ft
	Change	Total	Temperature (°C)	Conductivity (µS/cm)	DO (mg/L)	pH (std units)	ORP (mV)	Turbidity (NTU)	Water Level (feet btoc)
1035	0.5	0.5	1.77	944 ✓	3.61	6.97 ✓	10.0	32.2	9.22
1038	0.50	~~1.00~~	2.02	980 ✓	3.75	6.98 ✓	-23.1	40.24	9.24
1041	0.50	1.5	2.67	1007 ✓	2.77 ✓	7.0 ✓	-38.6	22.87	9.20
1044	0.50	2.0	3.07	1032 ✓	2.33 ✗	7.0 ✓	-48.9 ✓	17.79	9.23
1047	0.75	2.75	3.36	1049 ✓	1.87 ✓	7.01 ✓	-58.6 ✓	13.22	9.24
1050	0.5	3.25	3.44	1054 ✓	1.68 ✓	7.03 ✓	-65.4 ✓	8.36	9.22
1053	0.75	4.0	3.49	1055 ✓	1.84 ✗	7.05 ✓	-68.7 ✓	6.10	9.23
1056	0.5	4.5	3.46	1047 ✓	1.86 ✓	7.08 ✓	-70.1 ✓	2.62	9.22
Parameters			Stable						

Sample Collection Information

Start Time	Finish Time / Date	Depth of Tubing (ft btoc)	Equipment Used for Sampling
1057	1105 ~~1100~~ / 12-12-19	10.2	Peristaltic Pump (Submersible Pump) Bladder pump
SAMPLE ID: 19DPS-MW11R-GW		QC Dup MS/MSD	Ferrous Iron (Fe^{2+}) (mg/L) = N/A

Container/Preservative	Analysis Requested	Notes
3 x 40 mL VOA / HCl	Benzene, VC, PCE, TCE, DCE, trans-DCE	

Suggested Notation:

"____" = not measured "✓"= stable "+" = rising "-" = falling "*" = all parameters stable

Groundwater Sampling Data Sheet

JACOBS

Site Name	Event	Well ID	Project Number
ADOT FAI DP	2019 GW Monitoring	MW-11R	5F6A5200
		Date	**Sampler Initials**
		12/12/19	TL/JR

Time (HH:mm)	Volume (Gallons or Liters)		Acceptable Range to Demonstrate Stability						
			± 0.2 °C	± 3%	± 10% or 0.2 mg/L (whichever is greater)	± 0.1	± 10 mV	± 10% or ±1 NTU	Drawdown < 0.3 ft
	Change	Total	Temperature (°C)	Conductivity (µS/cm)	DO (mg/L)	pH (std units)	ORP (mV)	Turbidity (NTU)	Water Level (feet btoc)

APPENDIX E
ADEC Checklist

Laboratory Data Review Checklist

Completed By:

Kari Hagen

Title:

Chemist

Date:

2/04/2019

Consultant Firm:

Jacobs

Laboratory Name:

SGS

Laboratory Report Number:

1199994

Laboratory Report Date:

12/19/2019

CS Site Name:

2019 Drainage Pond Groundwater Monitoring

ADEC File Number:

100.38.188

Hazard Identification Number:

1923

1199994

Laboratory Report Date:

12/19/2019

CS Site Name:

2019 Drainage Pond Groundwater Monitoring

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:

   SGS of Anchorage, AK performed all of the analyses.

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:

   Fairbanks temperature was 1.0°C
   Anchorage temperature was 1.5°C

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

   Yes☒ No☐ N/A☐ Comments:

1199994

Laboratory Report Date:

12/19/2019

CS Site Name:

2019 Drainage Pond Groundwater Monitoring

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

Yes☒ No☐ N/A☐ Comments:

No discrepancies were noted on the cooler receipt form.

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:

No discrepancies were noted on the cooler receipt form.

e. Data quality or usability affected?

Comments:

The data quality and usability were 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:

QC failures are discussed in the relevant sections of this checklist.

c. Were all corrective actions documented?

Yes☐ No☐ N/A☒ Comments:

Corrective actions were not necessary.

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

Comments:

The data quality and usability were not affected.

1199994

Laboratory Report Date:

12/19/2019

CS Site Name:

2019 Drainage Pond Groundwater Monitoring

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 submitted with this project.

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?

The data quality and usability were not affected.

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:

1199994

Laboratory Report Date:

12/19/2019

CS Site Name:

2019 Drainage Pond Groundwater Monitoring

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

Comments:

No results were affected.

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

Yes☐ No☐ N/A☒ Comments:

No results were affected.

v. Data quality or usability affected?

Comments:

The data quality and usability were 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:

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 requested.

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:

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:

1199994

Laboratory Report Date:

12/19/2019

CS Site Name:

2019 Drainage Pond Groundwater Monitoring

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

Comments:

No samples were affected.

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

Yes☐ No☐ N/A☒ Comments:

No samples were affected.

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

Comments:

The data quality and usability were 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:

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

Yes☐ No☐ N/A☐ Comments:

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:

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12/19/2019

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2019 Drainage Pond Groundwater Monitoring

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:

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

Comments:

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

Yes☐ No☐ N/A☐ Comments:

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

Comments:

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:

SW8260: Surrogate, 1,2-Dichloroethane-D4 was recovered high in sample 19DPS-MW34-GW.

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:

The associated sample results were not qualified because they were nondetect.

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iv. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

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:

All TB results were nondetect.

v. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

f. Field Duplicate

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

Yes☒ No☐ N/A☐ Comments:

One field duplicate was submitted with 6 primary samples.

1199994

Laboratory Report Date:

12/19/2019

CS Site Name:

2019 Drainage Pond Groundwater Monitoring

ii. Submitted blind to lab?

Yes☒ No☐ N/A☐ Comments:

The following field duplicate was submitted with this SDG:
Primary/Duplicate ID:
19DPS-MW40-GW/19DPS-MW40-GWA

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:

RPDs were only evaluated if at least one result in the duplicate pair was greater than the LOD. If one result was non-detect, the LOD value was used to calculate the RPD.

All RPDs were less than 30 percent.

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

Comments:

Data quality and usability were not affected.

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

Yes☐ No☒ N/A☐ Comments:

Only disposable sampling equipment or lab glassware were used for sample collection.

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

Yes☐ No☐ N/A☒ Comments:

N/A

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

Comments:

N/A

1199994

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12/19/2019

CS Site Name:

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iii. Data quality or usability affected?

Comments:

The data quality and usability were not affected.

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

a. Defined and appropriate?

Yes☒ No☐ N/A☐ Comments:

APPENDIX F
Lab Report

Laboratory Report of Analysis

To: Jacobs Technology Inc.
794 University Ave #201
Fairbanks, AK 99709

Report Number: **1199994**

Client Project: **ADOT FAI Drainage Pond SiteGWM**

Dear Kari Hagen,

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 Justin 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.

Justin Nelson
2019.12.19
17:13:23 -09'00'

Justin Nelson Date
Project Manager
Justin.Nelson@sgs.com

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

Case Narrative

SGS Client: **Jacobs Technology Inc.**
SGS Project: **1199994**
Project Name/Site: **ADOT FAI Drainage Pond SiteGWM**
Project Contact: **Kari Hagen**

Refer to sample receipt form for information on sample condition.

19DPS-MW34-GW (1199994006) PS

8260C - Surrogate recovery for 1,2-dichloroethane-d4 does not meet QC criteria. The analytes associated with this surrogate were not reported above the LOQ.

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

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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, indenmification 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, 6020A, 7470A, 7471B, 8015C, 8021B, 8082A, 8260C, 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
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.

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Sample Summary

Client Sample ID	Lab Sample ID	Collected	Received	Matrix
19DPS-MW38S-GW	1199994001	12/11/2019	12/13/2019	Water (Surface, Eff., Ground)
19DPS-MW38D-GW	1199994002	12/11/2019	12/13/2019	Water (Surface, Eff., Ground)
19DPS-MW40-GW	1199994003	12/11/2019	12/13/2019	Water (Surface, Eff., Ground)
19DPS-MW40-GWA	1199994004	12/11/2019	12/13/2019	Water (Surface, Eff., Ground)
19DPS-MW39-GW	1199994005	12/11/2019	12/13/2019	Water (Surface, Eff., Ground)
19DPS-MW34-GW	1199994006	12/11/2019	12/13/2019	Water (Surface, Eff., Ground)
19DPS-MW11R-GW	1199994007	12/12/2019	12/13/2019	Water (Surface, Eff., Ground)
19DPS-TB01	1199994008	12/11/2019	12/13/2019	Water (Surface, Eff., Ground)

Method	Method Description
SW8260C	Volatile Organic Compounds(W)Custom List

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Detectable Results Summary

Client Sample ID: **19DPS-MW38S-GW**
Lab Sample ID: 1199994001
Volatile GC/MS

Parameter	Result	Units
Benzene	2.39	ug/L
cis-1,2-Dichloroethene	250	ug/L
Tetrachloroethene	3.05	ug/L
trans-1,2-Dichloroethene	2.16	ug/L
Trichloroethene	0.580J	ug/L
Vinyl chloride	1.86	ug/L

Client Sample ID: **19DPS-MW38D-GW**
Lab Sample ID: 1199994002
Volatile GC/MS

Parameter	Result	Units
cis-1,2-Dichloroethene	11.6	ug/L
Trichloroethene	0.312J	ug/L

Client Sample ID: **19DPS-MW40-GW**
Lab Sample ID: 1199994003
Volatile GC/MS

Parameter	Result	Units
Benzene	1.10	ug/L
cis-1,2-Dichloroethene	863	ug/L
Tetrachloroethene	5.61	ug/L
trans-1,2-Dichloroethene	9.09	ug/L
Trichloroethene	2.27	ug/L
Vinyl chloride	2.67	ug/L

Client Sample ID: **19DPS-MW40-GWA**
Lab Sample ID: 1199994004
Volatile GC/MS

Parameter	Result	Units
Benzene	1.02	ug/L
cis-1,2-Dichloroethene	797	ug/L
Tetrachloroethene	6.08	ug/L
trans-1,2-Dichloroethene	8.42	ug/L
Trichloroethene	2.45	ug/L
Vinyl chloride	2.50	ug/L

Client Sample ID: **19DPS-MW39-GW**
Lab Sample ID: 1199994005
Volatile GC/MS

Parameter	Result	Units
Benzene	0.548	ug/L
cis-1,2-Dichloroethene	64.1	ug/L
trans-1,2-Dichloroethene	3.17	ug/L
Trichloroethene	0.852J	ug/L
Vinyl chloride	1.74	ug/L

Client Sample ID: **19DPS-MW11R-GW**
Lab Sample ID: 1199994007
Volatile GC/MS

Parameter	Result	Units
Benzene	1.28	ug/L
cis-1,2-Dichloroethene	1770	ug/L
Tetrachloroethene	13.5	ug/L
trans-1,2-Dichloroethene	17.3	ug/L
Trichloroethene	7.40	ug/L
Vinyl chloride	4.91	ug/L

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Results of **19DPS-MW38S-GW**

Client Sample ID: **19DPS-MW38S-GW**
Client Project ID: **ADOT FAI Drainage Pond SiteGWM**
Lab Sample ID: 1199994001
Lab Project ID: 1199994

Collection Date: 12/11/19 08:56
Received Date: 12/13/19 08:58
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location: MW-38S

Results by **Volatile GC/MS**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Benzene	2.39		0.400	0.120	ug/L	1		12/18/19 18:07
cis-1,2-Dichloroethene	250		10.0	3.10	ug/L	10		12/18/19 19:52
Tetrachloroethene	3.05		1.00	0.310	ug/L	1		12/18/19 18:07
trans-1,2-Dichloroethene	2.16		1.00	0.310	ug/L	1		12/18/19 18:07
Trichloroethene	0.580	J	1.00	0.310	ug/L	1		12/18/19 18:07
Vinyl chloride	1.86		0.150	0.0500	ug/L	1		12/18/19 18:07
Surrogates								
1,2-Dichloroethane-D4 (surr)	106		81-118		%	1		12/18/19 18:07
4-Bromofluorobenzene (surr)	98		85-114		%	1		12/18/19 18:07
Toluene-d8 (surr)	96		89-112		%	1		12/18/19 18:07

Batch Information

Analytical Batch: VMS19727
Analytical Method: SW8260C
Analyst: NRB
Analytical Date/Time: 12/18/19 18:07
Container ID: 1199994001-B

Prep Batch: VXX35329
Prep Method: SW5030B
Prep Date/Time: 12/18/19 06:00
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL

Analytical Batch: VMS19727
Analytical Method: SW8260C
Analyst: NRB
Analytical Date/Time: 12/18/19 19:52
Container ID: 1199994001-B

Prep Batch: VXX35329
Prep Method: SW5030B
Prep Date/Time: 12/18/19 06:00
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL

Results of **19DPS-MW38D-GW**

Client Sample ID: **19DPS-MW38D-GW**
Client Project ID: **ADOT FAI Drainage Pond SiteGWM**
Lab Sample ID: 1199994002
Lab Project ID: 1199994

Collection Date: 12/11/19 09:40
Received Date: 12/13/19 08:58
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location: MW-38D

Results by **Volatile GC/MS**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Benzene	0.200	U	0.400	0.120	ug/L	1		12/16/19 19:47
cis-1,2-Dichloroethene	11.6		1.00	0.310	ug/L	1		12/16/19 19:47
Tetrachloroethene	0.500	U	1.00	0.310	ug/L	1		12/16/19 19:47
trans-1,2-Dichloroethene	0.500	U	1.00	0.310	ug/L	1		12/16/19 19:47
Trichloroethene	0.312	J	1.00	0.310	ug/L	1		12/16/19 19:47
Vinyl chloride	0.0750	U	0.150	0.0500	ug/L	1		12/16/19 19:47
Surrogates								
1,2-Dichloroethane-D4 (surr)	116		81-118		%	1		12/16/19 19:47
4-Bromofluorobenzene (surr)	98.5		85-114		%	1		12/16/19 19:47
Toluene-d8 (surr)	97.8		89-112		%	1		12/16/19 19:47

Batch Information

Analytical Batch: VMS19724
Analytical Method: SW8260C
Analyst: NRB
Analytical Date/Time: 12/16/19 19:47
Container ID: 1199994002-A

Prep Batch: VXX35325
Prep Method: SW5030B
Prep Date/Time: 12/16/19 06:00
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL

Results of **19DPS-MW40-GW**

Client Sample ID: **19DPS-MW40-GW**
Client Project ID: **ADOT FAI Drainage Pond SiteGWM**
Lab Sample ID: 1199994003
Lab Project ID: 1199994

Collection Date: 12/11/19 10:40
Received Date: 12/13/19 08:58
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location: MW-40

Results by **Volatile GC/MS**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Benzene	1.10		0.400	0.120	ug/L	1		12/16/19 20:02
cis-1,2-Dichloroethene	863		20.0	6.20	ug/L	20		12/18/19 20:07
Tetrachloroethene	5.61		1.00	0.310	ug/L	1		12/16/19 20:02
trans-1,2-Dichloroethene	9.09		1.00	0.310	ug/L	1		12/16/19 20:02
Trichloroethene	2.27		1.00	0.310	ug/L	1		12/16/19 20:02
Vinyl chloride	2.67		0.150	0.0500	ug/L	1		12/16/19 20:02
Surrogates								
1,2-Dichloroethane-D4 (surr)	109		81-118		%	1		12/16/19 20:02
4-Bromofluorobenzene (surr)	97.6		85-114		%	1		12/16/19 20:02
Toluene-d8 (surr)	98.8		89-112		%	1		12/16/19 20:02

Batch Information

Analytical Batch: VMS19724
Analytical Method: SW8260C
Analyst: NRB
Analytical Date/Time: 12/16/19 20:02
Container ID: 1199994003-A

Prep Batch: VXX35325
Prep Method: SW5030B
Prep Date/Time: 12/16/19 06:00
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL

Analytical Batch: VMS19727
Analytical Method: SW8260C
Analyst: NRB
Analytical Date/Time: 12/18/19 20:07
Container ID: 1199994003-B

Prep Batch: VXX35329
Prep Method: SW5030B
Prep Date/Time: 12/18/19 06:00
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL

Results of **19DPS-MW40-GWA**

Client Sample ID: **19DPS-MW40-GWA**
Client Project ID: **ADOT FAI Drainage Pond SiteGWM**
Lab Sample ID: 1199994004
Lab Project ID: 1199994

Collection Date: 12/11/19 10:40
Received Date: 12/13/19 08:58
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location: MW-40

Results by **Volatile GC/MS**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Benzene	1.02		0.400	0.120	ug/L	1		12/16/19 20:16
cis-1,2-Dichloroethene	797		20.0	6.20	ug/L	20		12/18/19 20:22
Tetrachloroethene	6.08		1.00	0.310	ug/L	1		12/16/19 20:16
trans-1,2-Dichloroethene	8.42		1.00	0.310	ug/L	1		12/16/19 20:16
Trichloroethene	2.45		1.00	0.310	ug/L	1		12/16/19 20:16
Vinyl chloride	2.50		0.150	0.0500	ug/L	1		12/16/19 20:16
Surrogates								
1,2-Dichloroethane-D4 (surr)	106		81-118		%	1		12/16/19 20:16
4-Bromofluorobenzene (surr)	98.6		85-114		%	1		12/16/19 20:16
Toluene-d8 (surr)	98.8		89-112		%	1		12/16/19 20:16

Batch Information

Analytical Batch: VMS19724
Analytical Method: SW8260C
Analyst: NRB
Analytical Date/Time: 12/16/19 20:16
Container ID: 1199994004-A

Prep Batch: VXX35325
Prep Method: SW5030B
Prep Date/Time: 12/16/19 06:00
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL

Analytical Batch: VMS19727
Analytical Method: SW8260C
Analyst: NRB
Analytical Date/Time: 12/18/19 20:22
Container ID: 1199994004-B

Prep Batch: VXX35329
Prep Method: SW5030B
Prep Date/Time: 12/18/19 06:00
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL

Results of **19DPS-MW39-GW**

Client Sample ID: **19DPS-MW39-GW**
Client Project ID: **ADOT FAI Drainage Pond SiteGWM**
Lab Sample ID: 1199994005
Lab Project ID: 1199994

Collection Date: 12/11/19 11:15
Received Date: 12/13/19 08:58
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location: MW-39

Results by **Volatile GC/MS**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Benzene	0.548		0.400	0.120	ug/L	1		12/16/19 20:31
cis-1,2-Dichloroethene	64.1		1.00	0.310	ug/L	1		12/16/19 20:31
Tetrachloroethene	0.500	U	1.00	0.310	ug/L	1		12/16/19 20:31
trans-1,2-Dichloroethene	3.17		1.00	0.310	ug/L	1		12/16/19 20:31
Trichloroethene	0.852	J	1.00	0.310	ug/L	1		12/16/19 20:31
Vinyl chloride	1.74		0.150	0.0500	ug/L	1		12/16/19 20:31
Surrogates								
1,2-Dichloroethane-D4 (surr)	95.7		81-118		%	1		12/16/19 20:31
4-Bromofluorobenzene (surr)	97.2		85-114		%	1		12/16/19 20:31
Toluene-d8 (surr)	102		89-112		%	1		12/16/19 20:31

Batch Information

Analytical Batch: VMS19724
Analytical Method: SW8260C
Analyst: NRB
Analytical Date/Time: 12/16/19 20:31
Container ID: 1199994005-A

Prep Batch: VXX35325
Prep Method: SW5030B
Prep Date/Time: 12/16/19 06:00
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL

Results of **19DPS-MW34-GW**

Client Sample ID: **19DPS-MW34-GW**
Client Project ID: **ADOT FAI Drainage Pond SiteGWM**
Lab Sample ID: 1199994006
Lab Project ID: 1199994

Collection Date: 12/11/19 12:16
Received Date: 12/13/19 08:58
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location: MW-34

Results by **Volatile GC/MS**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Benzene	0.200 U		0.400	0.120	ug/L	1		12/16/19 20:46
cis-1,2-Dichloroethene	0.500 U		1.00	0.310	ug/L	1		12/16/19 20:46
Tetrachloroethene	0.500 U		1.00	0.310	ug/L	1		12/16/19 20:46
trans-1,2-Dichloroethene	0.500 U		1.00	0.310	ug/L	1		12/16/19 20:46
Trichloroethene	0.500 U		1.00	0.310	ug/L	1		12/16/19 20:46
Vinyl chloride	0.0750 U		0.150	0.0500	ug/L	1		12/16/19 20:46
Surrogates								
1,2-Dichloroethane-D4 (surr)	119	*	81-118		%	1		12/16/19 20:46
4-Bromofluorobenzene (surr)	97		85-114		%	1		12/16/19 20:46
Toluene-d8 (surr)	98.5		89-112		%	1		12/16/19 20:46

Batch Information

Analytical Batch: VMS19724
Analytical Method: SW8260C
Analyst: NRB
Analytical Date/Time: 12/16/19 20:46
Container ID: 1199994006-A

Prep Batch: VXX35325
Prep Method: SW5030B
Prep Date/Time: 12/16/19 06:00
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL

Results of **19DPS-MW11R-GW**

Client Sample ID: **19DPS-MW11R-GW**
Client Project ID: **ADOT FAI Drainage Pond SiteGWM**
Lab Sample ID: 1199994007
Lab Project ID: 1199994

Collection Date: 12/12/19 10:57
Received Date: 12/13/19 08:58
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location: MW-11R

Results by **Volatile GC/MS**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Benzene	1.28		0.400	0.120	ug/L	1		12/16/19 21:01
cis-1,2-Dichloroethene	1770		20.0	6.20	ug/L	20		12/18/19 20:37
Tetrachloroethene	13.5		1.00	0.310	ug/L	1		12/16/19 21:01
trans-1,2-Dichloroethene	17.3		1.00	0.310	ug/L	1		12/16/19 21:01
Trichloroethene	7.40		1.00	0.310	ug/L	1		12/16/19 21:01
Vinyl chloride	4.91		0.150	0.0500	ug/L	1		12/16/19 21:01
Surrogates								
1,2-Dichloroethane-D4 (surr)	114		81-118		%	1		12/16/19 21:01
4-Bromofluorobenzene (surr)	97.6		85-114		%	1		12/16/19 21:01
Toluene-d8 (surr)	97.2		89-112		%	1		12/16/19 21:01

Batch Information

Analytical Batch: VMS19727
Analytical Method: SW8260C
Analyst: NRB
Analytical Date/Time: 12/18/19 20:37
Container ID: 1199994007-B

Prep Batch: VXX35329
Prep Method: SW5030B
Prep Date/Time: 12/18/19 06:00
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL

Analytical Batch: VMS19724
Analytical Method: SW8260C
Analyst: NRB
Analytical Date/Time: 12/16/19 21:01
Container ID: 1199994007-A

Prep Batch: VXX35325
Prep Method: SW5030B
Prep Date/Time: 12/16/19 06:00
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL

Results of **19DPS-TB01**

Client Sample ID: **19DPS-TB01**
Client Project ID: **ADOT FAI Drainage Pond SiteGWM**
Lab Sample ID: 1199994008
Lab Project ID: 1199994

Collection Date: 12/11/19 08:00
Received Date: 12/13/19 08:58
Matrix: Water (Surface, Eff., Ground)
Solids (%):
Location: 19DPS-TB01

Results by **Volatile GC/MS**

Parameter	Result	Qual	LOQ/CL	DL	Units	DF	Allowable Limits	Date Analyzed
Benzene	0.200 U		0.400	0.120	ug/L	1		12/16/19 19:02
cis-1,2-Dichloroethene	0.500 U		1.00	0.310	ug/L	1		12/16/19 19:02
Tetrachloroethene	0.500 U		1.00	0.310	ug/L	1		12/16/19 19:02
trans-1,2-Dichloroethene	0.500 U		1.00	0.310	ug/L	1		12/16/19 19:02
Trichloroethene	0.500 U		1.00	0.310	ug/L	1		12/16/19 19:02
Vinyl chloride	0.0750 U		0.150	0.0500	ug/L	1		12/16/19 19:02
Surrogates								
1,2-Dichloroethane-D4 (surr)	118		81-118		%	1		12/16/19 19:02
4-Bromofluorobenzene (surr)	97.4		85-114		%	1		12/16/19 19:02
Toluene-d8 (surr)	96.6		89-112		%	1		12/16/19 19:02

Batch Information

Analytical Batch: VMS19724
Analytical Method: SW8260C
Analyst: NRB
Analytical Date/Time: 12/16/19 19:02
Container ID: 1199994008-A

Prep Batch: VXX35325
Prep Method: SW5030B
Prep Date/Time: 12/16/19 06:00
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL

Method Blank

Blank ID: MB for HBN 1803163 [VXX/35325]
Blank Lab ID: 1547060

Matrix: Water (Surface, Eff., Ground)

QC for Samples:
1199994002, 1199994003, 1199994004, 1199994005, 1199994006, 1199994007, 1199994008

Results by **SW8260C**

Parameter	Results	LOQ/CL	DL	Units
Benzene	0.200U	0.400	0.120	ug/L
cis-1,2-Dichloroethene	0.500U	1.00	0.310	ug/L
Tetrachloroethene	0.500U	1.00	0.310	ug/L
trans-1,2-Dichloroethene	0.500U	1.00	0.310	ug/L
Trichloroethene	0.500U	1.00	0.310	ug/L
Vinyl chloride	0.0750U	0.150	0.0500	ug/L
Surrogates				
1,2-Dichloroethane-D4 (surr)	103	81-118		%
4-Bromofluorobenzene (surr)	99.5	85-114		%
Toluene-d8 (surr)	95.9	89-112		%

Batch Information

Analytical Batch: VMS19724
Analytical Method: SW8260C
Instrument: VPA 780/5975 GC/MS
Analyst: NRB
Analytical Date/Time: 12/16/2019 3:58:00PM

Prep Batch: VXX35325
Prep Method: SW5030B
Prep Date/Time: 12/16/2019 6:00:00AM
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL

SGS North America Inc.
200 West Potter Drive Anchorage, AK 95518
t 907.562.2343 f 907.561.5301 www.us.sgs.com

Anti-Foam Blank

Blank ID: AFB for HBN 1803163 [VXX/35325
Blank Lab ID: 1547063

Matrix: Water (Surface, Eff., Ground)

QC for Samples:
1199994002, 1199994003, 1199994004, 1199994005, 1199994006, 1199994007, 1199994008

Results by **SW8260C**

Parameter	Results	LOQ/CL	DL	Units
Benzene	0.200U	0.400	0.120	ug/L
cis-1,2-Dichloroethene	0.500U	1.00	0.310	ug/L
Tetrachloroethene	0.500U	1.00	0.310	ug/L
trans-1,2-Dichloroethene	0.500U	1.00	0.310	ug/L
Trichloroethene	0.500U	1.00	0.310	ug/L
Vinyl chloride	0.0750U	0.150	0.0500	ug/L

Batch Information

Analytical Batch: VMS19724
Analytical Method: SW8260C
Instrument: VPA 780/5975 GC/MS
Analyst: NRB
Analytical Date/Time: 12/16/2019 11:01:00PM

Prep Batch: VXX35325
Prep Method: SW5030B
Prep Date/Time: 12/16/2019 6:00:00AM
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL

SGS North America Inc.
200 West Potter Drive Anchorage, AK 95518
t 907.562.2343 f 907.561.5301 www.us.sgs.com

Blank Spike Summary

Blank Spike ID: LCS for HBN 1199994 [VXX35325]
Blank Spike Lab ID: 1547061
Date Analyzed: 12/16/2019 16:14

Spike Duplicate ID: LCSD for HBN 1199994 [VXX35325]
Spike Duplicate Lab ID: 1547062
Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1199994002, 1199994003, 1199994004, 1199994005, 1199994006, 1199994007, 1199994008

Results by **SW8260C**

	Blank Spike (ug/L)			Spike Duplicate (ug/L)					
Parameter	Spike	Result	Rec (%)	Spike	Result	Rec (%)	CL	RPD (%)	RPD CL
Benzene	30	28.1	94	30	28.4	95	(79-120)	0.80	(< 20)
cis-1,2-Dichloroethene	30	24.5	82	30	25.7	86	(78-123)	5.00	(< 20)
Tetrachloroethene	30	27.8	93	30	27.9	93	(74-129)	0.46	(< 20)
trans-1,2-Dichloroethene	30	25.5	85	30	25.6	86	(75-124)	0.56	(< 20)
Trichloroethene	30	28.8	96	30	28.8	96	(79-123)	0.03	(< 20)
Vinyl chloride	30	25.0	83	30	25.1	84	(58-137)	0.44	(< 20)
Surrogates									
1,2-Dichloroethane-D4 (surr)	30	104	104	30	102	102	(81-118)	2.70	
4-Bromofluorobenzene (surr)	30	103	103	30	103	103	(85-114)	0.08	
Toluene-d8 (surr)	30	101	101	30	101	101	(89-112)	0.03	

Batch Information

Analytical Batch: **VMS19724**
Analytical Method: **SW8260C**
Instrument: **VPA 780/5975 GC/MS**
Analyst: **NRB**

Prep Batch: **VXX35325**
Prep Method: **SW5030B**
Prep Date/Time: **12/16/2019 06:00**
Spike Init Wt./Vol.: 30 ug/L Extract Vol: 5 mL
Dupe Init Wt./Vol.: 30 ug/L Extract Vol: 5 mL

SGS North America Inc.
200 West Potter Drive Anchorage, AK 95518
t 907.562.2343 f 907.561.5301 www.us.sgs.com

Method Blank

Blank ID: MB for HBN 1803221 [VXX/35329]
Blank Lab ID: 1547296

Matrix: Water (Surface, Eff., Ground)

QC for Samples:
1199994001, 1199994003, 1199994004, 1199994007

Results by **SW8260C**

Parameter	Results	LOQ/CL	DL	Units
Benzene	0.200U	0.400	0.120	ug/L
cis-1,2-Dichloroethene	0.500U	1.00	0.310	ug/L
Tetrachloroethene	0.500U	1.00	0.310	ug/L
trans-1,2-Dichloroethene	0.500U	1.00	0.310	ug/L
Trichloroethene	0.500U	1.00	0.310	ug/L
Vinyl chloride	0.0750U	0.150	0.0500	ug/L
Surrogates				
1,2-Dichloroethane-D4 (surr)	105	81-118		%
4-Bromofluorobenzene (surr)	99.6	85-114		%
Toluene-d8 (surr)	94.4	89-112		%

Batch Information

Analytical Batch: VMS19727
Analytical Method: SW8260C
Instrument: VPA 780/5975 GC/MS
Analyst: NRB
Analytical Date/Time: 12/18/2019 2:52:00PM

Prep Batch: VXX35329
Prep Method: SW5030B
Prep Date/Time: 12/18/2019 6:00:00AM
Prep Initial Wt./Vol.: 5 mL
Prep Extract Vol: 5 mL

SGS North America Inc.
200 West Potter Drive Anchorage, AK 95518
t 907.562.2343 **f** 907.561.5301 www.us.sgs.com

Blank Spike Summary

Blank Spike ID: LCS for HBN 1199994 [VXX35329]
Blank Spike Lab ID: 1547297
Da0e 6nalt Aey: 12z1dz2/ 19 15:/ 7

Spike Duplica0e ID: LCSD for HBN 1199994 [VXX35329]
Spike Duplica0e Lab ID: 154729d
Ma0rix: Wa0er (Surface, Eff., Grouny)

QC for Samples: 1199994/ / 1, 1199994/ / 3, 1199994/ / 4, 1199994/ / 7

Resul0s bt **SW8260C**

	Blank Spike (ugzL)			Spike Duplica0e (ugzL)					
Parame0er	Spike	Resul0	Rec (%)	Spike	Resul0	Rec (%)	CL	RPD (%)	RPD CL
BenAene	3/	32./	1/ 7	3/	31.5	1/ 5	(79812/)	1.7/	(- 2/)
cis81,28Dic<loroe0<ene	3/	3/ .2	1/ 1	3/	29.5	9d	(7d8123)	2.4/	(- 2/)
he0rac<loroe0<ene	3/	3/ .4	1/ 1	3/	29.5	9d	(748129)	2.9/	(- 2/)
0rans81,28Dic<loroe0<ene	3/	3/ .d	1/ 3	3/	3/ .3	1/ 1	(758124)	1.d/	(- 2/)
hric<loroe0<ene	3/	31.1	1/ 4	3/	3/ .5	1/ 2	(798123)	2./ /	(- 2/)
Vint l c<loriye	3/	25.4	d5	3/	25./	d3	(5d8137)	1.7/	(- 2/)
Surrogates									
1,28Dic<loroe0<ane8D4 (surr)	3/	9d.2	9d	3/	9T	9T	(d1811d)	2.2/	
48BromofluorobenAene (surr)	3/	1/ 1	1/ 1	3/	1/ 3	1/ 3	(d58114)	1.d/	
holuene8yd (surr)	3/	1/ 1	1/ 1	3/	99.9	1/ /	(d98112)	/ .97	

Batch Information

6nalt 0cal Ba0c<: **VMS19727**
6nalt 0cal Me0<oy: **SW8260C**
Ins0rumen0 **VPA 780/5975 GC/MS**
6nalt s0 **NRB**

Prep Ba0c<: **VXX35329**
Prep Me0<oy: **SW5030B**
Prep Da0ezhime: **12/18/2019 06:00**
Spike Ini0W0zVol.: 3/ ugzL Ex0rac0Vol: 5 mL
Dupe Ini0W0zVol.: 3/ ugzL Ex0rac0Vol: 5 mL

Chain-of-Custody Report

Collection Organization: Jacobs | **Chain-of-Custody:** 19ADOT-DP01 | **Cooler ID:** Rolling In the Deep | **NPDL Number:** NA
Project Number: ADOT FAI Drainage Pond Site GWM | **Laboratory:** SGS | **Bill To:** Jacobs | **Report To:** Jacobs

COC Sample ID	Loc ID	Collection Date	Collection Time	Sampler	Quantity	Container Type	Volume	Preservative	Matrix	Analyses Requested Group	QC	TAT (days)	Notes:
19DPS-MW38S-GW	MW-38S	12/11/2019	0856	TL/JR	3	VOA	40mL	4°C, HCl	WG	SW8260B	(1) AC	14 Day	Benzene, PCE, TCE, DCE, trans-DCE, and Vinyl Chloride
19DPS-MW38D-GW	MW-38D	12/11/2019	0940	TL/JR	3	VOA	40mL	4°C, HCl	WG	SW8260B	(2) AC	14 Day	Benzene, PCE, TCE, DCE, trans-DCE, and Vinyl Chloride
19DPS-MW40-GW	MW-40	12/11/2019	1040	TL/JR	3	VOA	40mL	4°C, HCl	WG	SW8260B	(3) AC	14 Day	Benzene, PCE, TCE, DCE, trans-DCE, and Vinyl Chloride
19DPS-MW40-GWA	MW-40	12/11/2019	1040	TL/JR	3	VOA	40mL	4°C, HCl	WG	SW8260B	(4) AC	14 Day	Benzene, PCE, TCE, DCE, trans-DCE, and Vinyl Chloride
19DPS-MW39-GW	MW-39	12/11/2019	1115	TL/JR	3	VOA	40mL	4°C, HCl	WG	SW8260B	(5) AC	14 Day	Benzene, PCE, TCE, DCE, trans-DCE, and Vinyl Chloride
19DPS-MW34-GW	MW-34	12/11/2019	1216	TL/JR	3	VOA	40mL	4°C, HCl	WG	SW8260B	(6) AC	14 Day	Benzene, PCE, TCE, DCE, trans-DCE, and Vinyl Chloride
19DPS-MW11R-GW	MW-11R	12/12/2019	1057	TL/JR	3	VOA	40mL	4°C, HCl	WG	SW8260B	(7) AC	14 Day	Benzene, PCE, TCE, DCE, trans-DCE, and Vinyl Chloride
19DPS-TB01	19DPS-TB01	12/11/2019	0800	TL/JR	3	VOA	40mL	4°C, HCl	WG	SW8260B	(8) AC TB	14 Day	Benzene, PCE, TCE, DCE, trans-DCE, and Vinyl Chloride

Special Instructions:

Relinquish By: Signature/Printed Name /Kari Hagen Date/Time 12/12/2019 1630 — Relinquish By: Signature/Printed Name Castillejo Kurs Date/Time 12/12/19 15:30

Received By: Signature/Printed Name Castillejo Kurs Date/Time 12/12/19 1630 1430 — Received By: Signature/Printed Name Date/Time 12/13/19 09:58

IFIB 1.5°C D 52

temp = 1.0°

Profile: 365105

1199994

e-Sample Receipt Form

SGS Workorder #: 1199994

Review Criteria	Condition (Yes, No, N/A)	Exceptions Noted below
Chain of Custody / Temperature Requirements		N/A Exemption permitted if sampler hand carries/delivers.
Were Custody Seals intact? Note # & location	Yes	1F 1B
COC accompanied samples?	Yes	
DOD: Were samples received in COC corresponding coolers?	N/A	
N/A **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: Rolling in the Deep @ 1.5 °C Therm. ID: D52
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:
		Cooler ID: @ °C Therm. ID:
*If >6°C, were samples collected <8 hours ago?	N/A	
If <0°C, were sample containers ice free?	N/A	
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.
Were samples received within holding time?	Yes	
Do samples **match COC**** (i.e.,sample IDs,dates/times collected)?	Yes	
**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 analytical requests clear? (i.e., method is specified for analyses with multiple option for analysis (Ex: BTEX, Metals)	Yes	
		N/A ***Exemption permitted for metals (e.g,200.8/6020A).
Were proper containers (type/mass/volume/preservative***)used?	Yes	
Volatile / LL-Hg Requirements		
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)?	Yes	
Were all soil VOAs field extracted with MeOH+BFB?	N/A	

Note to Client: Any "No", answer above indicates non-compliance with standard procedures and may impact data quality.

Additional notes (if applicable):

e-Sample Receipt Form FBK

SGS Workorder #:	1199994	1199994

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?	Yes	
☐ **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: Rolling In the Deep @ 1.0 °C Therm. ID: D65
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 #	365105	365105

Sample Containers and Preservatives

Container Id	Preservative	Container Condition	Container Id	Preservative	Container Condition
1199994001-A	HCL to pH < 2	OK			
1199994001-B	HCL to pH < 2	OK			
1199994001-C	HCL to pH < 2	OK			
1199994002-A	HCL to pH < 2	OK			
1199994002-B	HCL to pH < 2	OK			
1199994002-C	HCL to pH < 2	OK			
1199994003-A	HCL to pH < 2	OK			
1199994003-B	HCL to pH < 2	OK			
1199994003-C	HCL to pH < 2	OK			
1199994004-A	HCL to pH < 2	OK			
1199994004-B	HCL to pH < 2	OK			
1199994004-C	HCL to pH < 2	OK			
1199994005-A	HCL to pH < 2	OK			
1199994005-B	HCL to pH < 2	OK			
1199994005-C	HCL to pH < 2	OK			
1199994006-A	HCL to pH < 2	OK			
1199994006-B	HCL to pH < 2	OK			
1199994006-C	HCL to pH < 2	OK			
1199994007-A	HCL to pH < 2	OK			
1199994007-B	HCL to pH < 2	OK			
1199994007-C	HCL to pH < 2	OK			
1199994008-A	HCL to pH < 2	OK			
1199994008-B	HCL to pH < 2	OK			
1199994008-C	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.