Environmental Resources Management

748 Gaffney Road Suite 102 Fairbanks, AK 99701 (907) 458-8270 (907) 374-4777 (fax) www.ermalaska.com



14 November 2014

Ms. Rebekah Cadigan Environmental Manager Fairbanks International Airport 6450 Airport Way, Suite 1 Fairbanks, Alaska 99709

Subject: 2013 Drainage Pond Groundwater Monitoring Report-Final

Dear Ms. Cadigan:

ERM Alaska, Inc. (ERM) is providing this report under the scope of work for the Former Drainage Pond Site (the Site) at Fairbanks International Airport (FIA) as shown in Figures 1 and 2. The scope of work was performed under notice-to-proceed (NTP) No. 8 of term contract 025-0-1-46. The Alaska Department of Environmental Conservation (ADEC) file number for the Drainage Pond Site is 100.38.188. Activities included in this scope of work are four field efforts between December 2013 and June 2014 and reporting. This groundwater monitoring report presents a brief background for the Site, the regulatory status, field activities, and findings. Recommendations for future sampling efforts at the Site are provided based on the conclusions presented in this report.

BACKGROUND AND REGULATORY STATUS

The Former Drainage Pond Site is located in a vegetated area northwest of the Alaska Airlines Cargo Building at FIA (Figure 3). Characterization activities were performed at the Site in 2006 and 2010, which documented that shallow soil and groundwater at the Site are contaminated by benzene, tetrachloroethene (PCE) and its degradation products trichloroethene (TCE), 1,1-dichloroethene (DCE), 1,2-cis-dichloroethene (cDCE), 1,2-trans-dichloroethene (tDCE), and vinyl chloride (VC). A 2006 soil gas survey identified a source area of PCE east of monitoring well MW-11R (Figure 4). The groundwater in MW-29R, MW-30R, MW-39, and MW-40 is perched on a silty layer that is acting as an aquitard. The groundwater elevation in these four wells is approximately 1 foot higher than the groundwater elevation in the other monitoring wells at the Site. The silty layer was not observed in MW-11R or MW-38D, suggesting that it may pinch out between MW-11R, MW-39, and MW-40 and allow groundwater to infiltrate more readily to the unconfined groundwater aquifer in the surrounding area.

In 2010, the chlorinated ethene groundwater plume was observed to extend from MW-11R, MW-39 (upgradient) through MW-40, and TW-3.

A Draft Feasibility Study was prepared in 2009 (OASIS 2009) to evaluate remedial alternatives for the Site. For groundwater remediation the preferred alternative was substrate addition. No preferred alternative was recommended for soil remediation due to the location of the contamination below the groundwater table.

The applicable 18 Alaska Administrative Code (AAC) 75 soil cleanup levels and groundwater cleanup levels for the site contaminants of potential concern (COPC) are presented below.

Chemical of Potential Concern	Soil Cleanup Level (mg/kg)	Groundwater Cleanup Level (μ/L)
Benzene	0.025	5
PCE	0.024	5
TCE	0.020	5
cDCE	0.240	7
tDCE	0.370	100
VC	0.0085	2

TABLE 1: DRAINAGE POND COPCS AND CLEANUP LEVELS

mg/kg – milligrams per kilograms

 $\mu g/L$ -micrograms per liter

FIELD ACTIVITIES

The 2013 field activities included a well integrity survey, a professional elevation survey, datalogger deployment, groundwater sampling, and waste management. Table 2 provides a summary of the field activities conducted at each monitoring location at the Site. Field activities were recorded in a log book and are presented in Attachment 1.

Well ID	Analytical Sample ¹ (Dec 2013)	Well Integrity Survey (Dec 2013/May 2014)	Elevation Survey (May 2014)	Install Datalogger (Dec 2013)
MW-11R	Х	Х	Х	2
MW-12		Х	Х	Х
MW-29R ³		Х	Removed ²	Х
MW-30R		Х	Х	
MW-34		Х	Х	
MW-35		Х	Х	Х
MW-36		Х	Х	
MW-37		Х	Х	
MW-38S	Х	Х	Х	
MW-38D	Х	Х	Х	
MW-39		Х	Х	
MW-40	Х	Х	Х	

TABLE 2: SUMMARY OF DRAINAGE POND FIELD ACTIVITIES

 $^{\rm 1}$ Analytical sample includes benzene, PCE, TCE, cDCE, tDCE, and VC.

² MW-29R was removed in April 2014 during construction activities.

-- Field activity not conducted

Well Integrity Survey

A monitoring well integrity survey was conducted at all accessible Site wells to identify those to be recommended for decommissioning due to frost jacking. The well integrity survey was initiated during the December 2013 groundwater monitoring event. However, due to difficulty of locating and recording observations of the wells in the snow, the well integrity survey was postponed and completed in May 2014.

Hydrology Assessment

The depth to groundwater was measured at locations where groundwater samples were collected in December 2013. Groundwater levels were also measured during well integrity surveys in December 2013 and May 2014.

In addition, dataloggers were installed in MW-12, MW-29R, and MW-35 in December 2013 to obtain information about seasonal variability in groundwater gradient and flow direction at the Site and document any changes in site hydrogeology due to recent area construction. Dataloggers were retrieved and downloaded in May 2014; however, the groundwater elevation datalogger and barometric pressure datalogger deployed in MW-29R were destroyed when the well was removed by construction activities. All dataloggers were also downloaded in March 2014.

Groundwater Sampling

Groundwater sampling was performed in general accordance with the *Fairbanks International Airport Drainage Pond Work Plan* (ERM 2013). Groundwater sampling was conducted on 5 December 2013. Four monitoring wells were sampled. Monitoring wells MW-38D, MW-38S, and MW-40 were purged and sampled using low-flow methodology with a peristaltic pump and Teflon[®]-lined polyethylene tubing. MW-11R was purged using a peristaltic pump and sampled with a passive diffusion bag (PDB). Two PDBs were deployed in MW-11R to a depth of approximately 25 feet on 5 December 2013 and were retrieved on 19 December 2013. No leaks or breaks were observed in either of the PDBs. One PDB contained sufficient sample volume for all laboratory analysis. Attachment 2 contains a photo log of the PDB sampling, deployment, and retrieval.

Water quality parameters were collected at each well and included pH, temperature, conductivity, dissolved oxygen (DO), and oxidation reduction potential (ORP). The results are presented on the groundwater monitoring data sheets in Attachment 1.

Groundwater samples were collected in laboratory supplied jars and analyzed for benzene, PCE, TCE, cDCE, tDCE, and VC. Samples were submitted to SGS North America, Inc. (SGS), in Anchorage, Alaska.

Elevation Survey

A professional elevation survey was conducted by Design Alaska on 5 May 2014. Elevation survey data is presented in Attachment 3. Site monitoring wells were last professionally surveyed in 2010. Changes in elevations since 2010 ranged from 0.01 foot to 0.35 foot at the Site. Attachment 3 compares the 2010 and 2014 elevation survey results.

Waste management

Investigation derived waste consisted of purge water, decontamination water, disposable personal protective equipment (PPE), and disposable sampling materials. Purge water from the Site was placed in a 30-gallon drum. Following receipt of analytical results and confirmation that the waste was non-hazardous, arrangements were made with Emerald Alaska for transport and disposal. The waste manifest is presented in Attachment 4. Disposable PPE and sampling materials were bagged and transported to the Fairbanks North Star Borough landfill for disposal.

WORK PLAN DEVIATIONS

The following deviations from the *Fairbanks International Airport Drainage Pond Work Plan* (ERM 2013) are summarized below.

- Groundwater monitoring was expected to take place in October, but the work plan was not completed and approved until November; therefore, all field events took place later than previously scheduled.
- The well integrity survey was intended to occur during groundwater monitoring. Due to weather and field conditions, a decision was made to delay the survey to a snow-free month for ease of access and to better assess the well conditions.

• An unknown blockage was encountered in MW-30R thus a datalogger was not deployed there. MW-29R was selected as the best alternative because the geometry of MW-35 relative to MW-29R was more conducive for evaluating hydrology at the site. MW-29R was removed during April 2014 construction activities and the dataloggers destroyed. MW-29R was within an excavation area for a new building. The entire well and its surroundings were excavated. There no longer exists a conduit to the aquifer at MW-29R. Data was obtained through March 2014 at MW-29 and data was obtained through April for MW-35 and MW-12.

FINDINGS

This section discusses results from the well integrity survey, hydrology assessment, and groundwater analytical results.

Monitoring Well Integrity Survey

The well integrity survey is presented in Attachment 5 and includes photos, well details, and field observations. The well integrity survey included wells associated with the adjacent Fuel Hydrant Site. MW-29R was visited in December 2013 and March 2014. The well was removed by construction activities in late April 2014. Table 3 presents the Site wells that were found to be in poor or moderate condition. Results of the Fuel Hydrant-specific wells are discussed in the 2013 Fuel Hydrant Groundwater Monitoring Report (ERM 2014).

Well ID	Condition	Notes
MW-30R	POOR	Blockage above water table in December 2013. Evidence of frost jacking present. Casing is slanted.
MW-34	MODERATE	Well casing has frost jacked and is preventing placement of well cap.
MW-35	MODERATE	Concrete monument is frost-jacked.

TABLE 3: WELL INTEGRITY SURVEY RESULTS - DRAINAGE POND

Hydrology Assessment

Manual depth-to-water groundwater elevation data for the Site are presented in Table 4. Groundwater flow direction and gradient were estimated using triangulation with two different well groups consisting of three wells per group (Table 5). Well groupings used for triangulation included MW-12, MW-36, MW-37 and MW-34, MW-35, MW-36. Flow direction and gradient calculations were consistent among both groups, indicating a west-northwest groundwater flow direction with a gradient of approximately 0.0004 feet/foot (ft/ft) to the west in May 2014. Figure 5 shows the groundwater table elevation based on depth-to-groundwater measured on 5 May 2014. Groundwater elevation data obtained from dataloggers deployed in MW-12, MW-29R, and MW-35 are presented in Attachment 6. Due to the removal of MW-29R, elevation data was not available for MW-29R for the period between March 2014 and May 2014. Datalogger elevation data indicate a gradual decrease in groundwater elevation between December 2013 and mid-April 2014 and a rapid increase during spring break up in late April 2014.

Datalogger information indicates the monitoring well integrity survey and elevation survey conducted during the May field event corresponded with rapid groundwater elevation change due to spring break up. There were several large snow storage locations which likely contributed to focused infiltration at the site. This impairs the ability to accurately determine groundwater contours. However, groundwater flow is generally consistent with regional groundwater flow west towards the Chena River.

Groundwater elevations varied approximately 1.8 feet between December 2013 and May 2014 with the lowest elevations occurring just prior to spring break up in April and the highest elevations occurring during spring break up in early May. Groundwater elevations in MW-29R were more variable than MW-12 and MW-35 likely due to disturbances from recent construction activities. MW-29R could not be resurveyed in May 2014 because it had been removed and therefore datalogger elevations may not be as arcuate. The most recent survey at MW-29R occurred in 2010.

A prominent downward vertical gradient of 0.046 ft/ft was observed in May 2014 between MW-38S and MW-38D. However, data from continuous datalogger elevations recorded in 2010 (OASIS 2011) showed a negligible vertical gradient between MW-38S and MW-38D. The vertical gradient observed in 2014 is likely due to rapid changes in groundwater elevations during spring break up. A much smaller upward vertical gradient of 0.002 ft/ft was observed in December 2013 between MW-38S and MW-38D.

The 2010 finding of a perched water table in the in the vicinity of MW-29R, MW-30R, MW-39, and MW-40 could not be fully evaluated in May 2014 due to the lack of data at MW-29R (removed), MW-30R (frozen), and MW-39 (flooded).

Groundwater Analytical Results

Table 6 presents the 2013 groundwater analytical results which are also depicted on Figure 4. Table 7 includes current and historical groundwater analytical results. Attachment 7 contains the laboratory analytical report and Attachment 8 presents a quality assurance review and completed ADEC laboratory data checklist. The 2013 Groundwater results are summarized below.

- PCE was not detected in MW-38S, MW-38D, or MW-40. PCE was detected above the ADEC groundwater cleanup level (GCL) of 5 micrograms/Liter (μ g/L) in MW-11R at a depth of approximately 25 feet with a concentration of 14.7 μ g/L.
- TCE was not detected in any of the sampled wells in 2013.

- cDCE was not detected in MW-38D and was detected but was below the ADEC GCL in MW-38S. Two of the wells had concentrations above ADEC GCL of 70 μ g/L; MW-11R at 1,220 μ g/L and MW-40 at 872 μ g/L.
- VC was not detected in MW-11R, MW-38D, or MW38S. VC was detected above the ADEC GCL of 2 μ g/L in In MW-40 at 10.9 μ g/L.
- Benzene was not detected in MW-38D and was detected but was below the ADEC GCL in MW-40. Benzene was detected above the ADEC GCL of 5 μ g/L in MW-11R at 6.12 μ g/L and MW-38S at 12.0 μ g/L.
- The presence of PCE daughter products indicate natural biological degradation of PCE is taking place through the process of reductive dechlorination at the Site.

Table 6 and Figure 4 demonstrate that the chlorinated alkenes extend throughout MW-11R and MW-40. However, there were no chlorinated alkene detections in MW-38S. The screen of MW-38S is partially completed in an area of non-native sand and gravel fill (OASIS 2010). The area around MW-38S is more permeable and may allow infiltration and dilution in sample concentrations compared to wells with screens completed in native silts which have lower permeability such as MW-11R.

No contaminant concentrations exceeding ADEC GCLs were detected in MW-38D. Based on these results there is no evidence of contamination in the 30-35 ft below ground surface (bgs) groundwater interval. Furthermore, these results suggest that the elevated groundwater concentrations detected in the MW-11R may be the result of inwell mixing due to the long screened interval of 29.5 feet.

The DO readings in all of the monitoring wells were between 0.16 mg/L and 0.32 mg/L. These results are within the range that is most conducive for anaerobic degradation.

The ORP results were between -79.8 millivolts (mV) and -21 mV, indicating moderately reducing groundwater conditions that can be favorable for reductive dechlorination of PCE and TCE.

The groundwater temperature in MW-11R, MW-38S, and MW-40 ranged from 4.14°C to 5.28°C, while the groundwater temperature in MW-38D was 2.95°C.

The conductivity in monitoring wells MW-11R and MW-40 was 1.32 milliSiemens (mS) and 1.98 mS, respectively and was somewhat higher than the conductivity in MW-38S and MW-38D at 0.683 mS and 0.481 mS, respectively.

2010 Comparison

Table 7 presents current and historical groundwater analytical results. The Site wells were last sampled in 2010. In general, 2013 analytical results were similar to concentrations reported in 2010 with the exception of MW-11R where PCE, TCE, and VC decreased in 2013 compared to 2010 at the 25-foot depth interval. VC was detected in MW-11R above ADEC GCL during the previous five monitoring events between 2005 and 2010; however, VC was not detected in MW-11R in 2013. TCE was detected in

MW-11R above ADEC GCL during the previous four of five monitoring events; however, TCE was not detected in MW-11R in 2013. PCE was reduced slightly in MW-11R compared to 2010 but the 2013 level remained above ADEC GCLs. Although some MR-11R COPCs were reduced in 2013, the overall molar concentration did not decrease from previous events.

Concentrations at MW-38S, MW-38D, and MW-40 were similar concentrations to those observed in 2010. DO, ORP, temperature and conductivity results are generally consistent with 2010 data.

CONCLUSIONS

The Former Drainage Pond Site continues to exhibit groundwater concentrations above ADEC GCLs for benzene, PCE, cDCE, and VC. The presence of PCE daughter products indicate natural biological degradation of PCE is taking place through reductive dechlorination. 2013 MW-11R results exhibited a reduction in VC and TCE to below detectable limits. However, molar concentrations did not decrease from previous events. There were no exceedances of TCE or tDCE in any well sampled. There were no exceedances of ADEC GCLs in MW-38D, indicating no contamination in the 30-35 ft below ground surface (bgs) groundwater interval. These results suggest that the elevated groundwater concentrations detected in the deeper samples from MW-11R are likely the result of in-well mixing.

The groundwater plume boundaries have not been fully characterized. Groundwater chlorinated alkenes were present throughout most of the area sampled in 2013.

RECOMMENDATIONS

Groundwater should be monitored once every two years to continue to document reductive dechlorination processes and evaluate downgradient concentrations. Future monitoring should include MW-11R, MW-38S, MW-38D, MW-39, and MW-40, MW-34, and MW-35. MW-34 and MW-35 should be monitored to evaluate downgradient COPC concentrations. MW-11R should be sampled at only one interval (approximately 30 feet below top of casing) to coincide with the MW-38D screened interval. Samples should be analyzed for PCE and its daughter products. Groundwater sampling and hydrological evaluation should be conducted during the summer or fall prior to freeze up in future monitoring events.

The PVC casing in MW-34 and MW-35 should be cut down and repaired to allow room for a proper fitting well cap and monument cover. The monument at MW-35 should be reset and the PVC casing should be shortened to allow a flush mount monument and monument cover.

If you have any further questions or concerns, please feel free to contact Cody Black at (907) 264-4459 or Nellie Ballou at (907)-458-8270.

Sincerely,

MBall

Nellie Ballou Project Manager, 907-458-8270

cc:

Robert Burgess, ADEC Max Schwenne, Partner-in-Charge

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Tim McDougall Senior Engineer, 907-727-4880

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- 3. Well Integrity Survey Results Drainage Pond (in text)
- 4. Cumulative Groundwater Elevations
- 5. Groundwater Calculations
- 6. 2013 Groundwater Monitoring Results
- 7. Cumulative Groundwater Monitoring Results.

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- 1. Vicinity and Site Location Map
- 2. Site Plan
- 3. Monitoring Well Locations
- 4. Groundwater Analytical Results December 2013
- 5. Groundwater Elevations

Attachments:

- 1. Field Notes and Data Sheets
- 2. Photographic Log
- 3. Professional Elevation Survey
- 4. Waste Manifest
- 5. Well Integrity Survey
- 6. Datalogger Groundwater Elevations
- 7. Laboratory Analytical Report
- 8. QAR and ADEC Laboratory Data Checklist

REFERENCES

ERM 2013. Fairbanks International Airport Drainage Pond Work Plan. November.

ERM 2014. 2013 Fuel Hydrant Groundwater Monitoring Report. June

OASIS 2009. Draft Feasibility Study Former Drainage Pond, Fairbanks International Airport, Fairbanks, Alaska. February.

OASIS 2011. Additional Characterization and Groundwater Monitoring, Former Drainage Pond Site, Fairbanks International Airport. February.

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FIGURES

Field Notes and Data Sheets

Photographic Log

Professional Elevation Survey

Waste Manifest

Well Integrity Survey

Datalogger Groundwater Elevations

Laboratory Analytical Report

QAR and ADEC Laboratory Data Checklist

TABLES

TABLE 4: CUMMULATIVE GROUNDWATER ELEVATIONS FAIRBANKS INTERNATIONAL AIRPORT FORMER DRAINAGE POND CONTAMINATED SITE

Location	Date	Top of Casing Elevation (FASL)	Depth to Groundwater below TOC (feet)	Groundwater Table Elevation (FASL)
	4/6/1998	432.1	NA	416.37
	8/19/1998	432.1	NA	419.64
	3/16/1999	432.1	NA	415.54
MW-5	8/5/1999	432.1	7.12	419.88
	9/23/1999	432.1	9.60	417.4
	9/27/2005	432.24	7.95	424.29
	5/5/2014	431.57	9.33	422.24
	8/6/1999	435.15	10.28	419.77
	9/23/1999	435.15	12.20	417.85
MW-9	9/12/2000	435.15	10.07	419.98
	9/27/2005	435.21	10.83	424.38
	5/5/2014	435.11	12.91	422.2
	8/8/1999	432.03	6.00	420.93
	9/23/1999	432.03	9.40	417.53
MW-10	9/27/2005	432.02	7.87	424.15
10100 10	11/2/2010	432.06	11.26	420.8
	5/5/2014	431.88	9.82	422.06
	9/27/2005	430.9	6.76	424.14
	10/6/2007	430.9	8.28	422.62
	10/21/2008	430.9	9.18	421.72
MW-11R	11/2/2010	430.85	10.04	420.81
	12/5/2013	430.74	9.55	421.19
	5/5/2014	430.74	8.67	422.07
	8/9/1999	434.53	7.1	422.33
	9/23/1999	434.53	11.92	417.51
	9/12/2000	434.53	9.62	419.81
	9/27/2001	434.53	11.53	417.9
	8/14/2002	434.53	8.78	420.65
	8/27/2003	434.53	9.25	420.18
MW-12	8/27/2004	434.53	9.12	425.41
10100-12	9/27/2005	434.59	10.33	424.26
	10/7/2007	434.59	11.91	422.68
	10/21/2008	434.59	13.82	420.77
	11/2/2010	434.55	13.67	420.88
	12/5/2013	434.41	13.17	421.24
	3/11/2014	434.41	13.89	420.52
	5/5/2014	434.41	12.51	421.9
	10/8/2007	Not Surveyed	8.29	-
	10/20/2008	Not Surveyed	9.03	-
	11/17/2010	432.20	Not Measured	-
MW-29R	10/12/2011	432.20	Not Measured	-
	12/5/2013	Not Surveyed	10.69	421.51
	3/11/2014	Not Surveyed	10.77	421.43
	5/5/2014	W	Vell Removed Apr	ril 2014

TABLE 4: CUMMULATIVE GROUNDWATER ELEVATIONS FAIRBANKS INTERNATIONAL AIRPORT FORMER DRAINAGE POND CONTAMINATED SITE

Location	Date	Top of Casing Elevation (FASL)	Depth to Groundwater below TOC	Groundwater Table Elevation (FASL)
	10/7/2007	Not Surveyed	(feet) 9.23	
	10/20/2008	Not Surveyed	9.23	-
		Not Surveyed		- 2000 @ 11 11
	11/6/2009 10/1/2010	433.60	Well frozen @ 11.11 9.16 424.44	
	10/1/2010	433.60	10.30	424.44 423.30
	10/12/2011	433.60	9.89	423.30
MW-30R	3/21/2012	433.60	13.23	420.37
	5/21/2013	433.60		ozen @ 4.13
	6/14/2013	433.60		ozen @ 4.13
	12/3/2013	433.44		ozen @ 11.02
	3/11/2014	433.44		ozen @ 11.02
		433.44		ozen @4.25
	5/5/2014			
	10/12/2011	429.99	8.46	421.53 421.95
	10/12/2012	429.99	8.04	
	3/21/2013	429.99	9.66	420.33
MW-34	5/21/2013	429.99	8.75	421.24
	6/14/2013	429.99	6.40	423.59
	3/11/2014	430.00	9.34	420.66
	5/5/2014	430.00	8.94	421.06
	9/27/2005	429.55	5.47	424.08
	10/21/2008	429.55	8.15	421.40
	11/2/2010	430.01	9.35	420.66
MW-35	11/15/2010	429.54	Q	t down-resurveyed
	12/5/2013	429.89	8.46	421.43
	3/11/2014	429.89	9.38	420.51
	5/5/2014	429.89	8.91	420.98
	10/12/2011	430.57	8.71	421.86
	10/12/2012	430.57	8.35	422.22
	3/21/2013	430.57	10.01	420.56
MW-36	5/21/2013	430.57	9.05	421.52
	6/14/2013	430.57	6.77	423.80
	3/11/2014	430.43	9.78	420.65
	5/5/2014	430.43	8.29	422.14
MW-37	11/2/2010	429.31	8.66	420.65
	5/5/2014	429.20	7.21	421.99
	11/2/2010	430.10	9.27	420.83
MW-38D	12/5/2013	430.00	8.80	421.20
	5/5/2014	430.00	8.90	421.10
MW-38S	11/2/2010	430.04	9.23	420.81
	12/5/2013	429.93	8.78	421.15
	5/5/2014	429.93	7.85	422.08
	11/2/2010	430.34	8.42	421.92
MW-39	12/5/2013	430.26	8.15	422.11
	5/5/2014	430.26	Well flooded	-
	11/2/2010	430.70	8.73	421.97
MW-40	12/5/2013	430.58	9.24	421.34
	5/5/2014 sed on the NAV	430.58	9.18	421.40

Elevations are based on the NAVD '88 Datum.

TABLE 5: GROUNDWATER CALCULATIONSFAIRBANKS INTERNATIONAL AIRPORTFORMER DRAINAGE POND CONTAMINATED SITE

Gradient Using MW-12, MW-36 and MW-37		Gradient Using MW-34, MW-36 and MW-35			
Well	Water Table Elevation (ft. NAVD'88)	Relationship	Well	Water Table Elevation (ft. NAVD'88)	Relationship
MW-37	421.99	mid	MW-34 421.06		mid
MW-12	421.9	low	MW-35	420.98	low
MW-36	422.14	high	MW-36	422.14	high
distance	from high to low (ft)	795	distance from high to low (ft)		420
equip	potential point (ft)	496.87	equipotential point (ft)		391.03
g	radient (ft/ft)	0.0004	gradient (ft/ft)		0.0008
	direction	West @ 248	direction		West @ 268

Vertical Gradient (MW-38S to MW-38D)				
Date Distance* Elevation Change (ft) Gradient (ft/ft				
12/5/2014	21.5	0.05	0.002	
5/5/2014	21.5	0.98	0.046	

*Middle of screen to middle of screen

Elevations are based on the NAVD '88 Datum

ft = Feet

FASL = Feet Above Sea Level

TOC = Top of Well Casing

Elevations measured on May 5, 2014

TABLE 6: 2013 GROUNDWATER MONITROING RESULTSFAIRBANKS INTERNATIONAL AIRPORTFORMER DRAINAGE POND CONTAMINATED SITE

			MW-11R	MW-38D	MW-38S	M	N-40
Compound	Units	ADEC	12/19/2013	12/5/2013	12/5/2013	12/5	5/2013
		GCL	depth = 23 ft	Primary	Primary	Primary	Duplicate
Benzene	μg/L	5	6.12	ND (0.5)	12	2.8	2.78
cis-1,2-DCE	μg/L	70	1,220	ND (0.5)	20.9	872	837
trans-1,2-DCE	μg/L	100	9.4	ND (0.5)	ND (0.5)	7.85	7.63
TCE	μg/L	5	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
PCE	μg/L	5	14.7	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)
Vinyl chloride	μg/L	2	ND (0.5)	ND (0.5)	ND (0.5)	10.9	9.37
Temperature	°C	-	4.19	2.95	4.14	5	.28
pН	-	-	6.61	6.8	6.86	6	.63
Conductivity	mS/cm ^c	-	1.322	0.481	0.683	1.	982
Diss. Oxygen	mg/L	-	0.27	0.21	0.32	0	.16
ORP	mV	-	-78.6	-21	-79.8	-7	79.6

Bold value indicates value exceeds GCL

Key:

ADEC = Alaska Department of Environmental Conservation

°C = degrees Celcius

DCE= dichloroethene

GCL= groundwater cleanup level

mg/L = milligrams per liter

mS/cm^c =microsiemens per cinetmeter corrected for temperature

mV = millivolts

ND= non-detect above method detection limit

PCE= tetrachloroethene

TCE= trichloroethene

 μ g/L= micrograms per liter

TABLE 7: CUMMULATIVE GROUNDWATER MONITORING RESULTS FAIRBANKS INTERNATIONAL AIRPORT FORMER DRAINAGE POND CONTAMINATED SITE

Monitoring Well	Sample Date	Benzene (μg/L)	Vinyl Chloride (µg/L)	cis-1,2-DCE (µg/L)	trans-1,2- DCE (μg/L)	TCE (µg/L)	PCE (µg/L)	Molar Concentration of Total Chlorinated Alkenes (mol/mL)
	08/11/99	ND (1.0)	1.2	76.1	ND (1.0)	ND (1.0)	ND (1.0)	8.0E-04
	09/18/00	ND (1.0)	1.84	230	1.25	12.9	38	2.7E-03
	05/21/01	1.27	4.74	670	3.82	7.00	2.79	7.1E-03
MW-11	09/27/01	1.30	3.47	566	3.83	38.6	80.4	6.7E-03
	08/15/02	1.23	ND (1.0)	195	2.68	3.80	ND (1.0)	2.1E-03
	08/27/03	0.93	7.92	822	11.8	24.8	17.1	9.0E-03
	08/27/04	0.95	2.44	150	1.17	ND (1.0)	3.74	1.6E-03
MW-1	1 drive point w	ell replaced	with MW-11	R 2" PVC wel	l with 30' scr	een to 34.5' b	gs on Augus	t 12, 2005
	09/27/05	8.0	0.82	630	3.2	15	31	6.8E-03
	11/02/06	4.51	3.00	800	7.52	6.28	13.6	8.5E-03
MW-11R @ 15'	10/17/07	4.5	1.60	970	8.8	59	380	0.013
MW-11R @ 25'	10/21/08	2.63	6.76	4,680	30.5	62	178	0.050
	10/29/10	6.62	7.58	953	8.15	5.4	29.8	0.010
	09/27/05	9.5	5.3	630	3.8	14	27	6.9E-03
	11/02/06	4.3	2.66	709	8.28	6.84	10.5	7.6E-03
	10/17/07	5.1	2.4	650	4.6	5.5	25	7.0E-03
	10/21/08	4.99	6.14	2,680	15.8	11.2	20.1	0.028
	10/29/10	6.72	6.94	873	7.29	4.58	23.5	0.009
	12/05/13	6.12	ND (0.5)	1,220	9.4	ND (0.5)	14.7	0.013
	09/27/05	8.9	6.0	930	6.2	18	34	0.010
	11/02/06	3.44	1.95	541	5.36	4.58	7.81	5.7E-03
MW-11R @ 35	10/17/07	4.0	2.6	520	4.6	6.0	18	5.6E-03
	10/21/08	4.90	5.95	2,450	15.2	10.5	16.3	0.026
	10/29/10	6.94	7.07	810	7.26	4.62	20	8.7E-03
	08/11/99	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	2.03	1.2E-05
	09/18/00	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	2.48	1.5E-05
	05/21/01	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	1.58	9.5E-06
	09/27/01	ND (0.5)	ND (2.0)	ND (1.0)	ND (1.0)	ND (1.0)	2.29	1.4E-05
MW-12	08/15/02	ND (0.5)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	1.94	1.2E-05
10100-12	08/27/03	ND (0.4)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND
	08/27/04	ND (0.4)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	3.80	2.3E-05
	09/27/05	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND (5.0)	ND
	11/01/06	0.47	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	2.78	1.7E-05
	10/07/07	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	ND (2.0)	2.8	1.7E-05
	08/27/03	ND (0.4)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND
	08/27/04	ND (0.4)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND
MW-34	09/27/05	ND (5.0)	ND (0.5)	ND (5.0)	ND (5.0)	ND (0.5)	ND (0.5)	ND
	11/02/06	ND (0.40)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND
	10/07/07	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND

TABLE 7: CUMMULATIVE GROUNDWATER MONITORING RESULTS FAIRBANKS INTERNATIONAL AIRPORT FORMER DRAINAGE POND CONTAMINATED SITE

Monitoring Well	Sample Date	Benzene (μg/L)	Vinyl Chloride (µg/L)	cis-1,2-DCE (µg/L)	trans-1,2- DCE (μg/L)	TCE (µg/L)	PCE (µg/L)	Molar Concentration of Total Chlorinated Alkenes (mol/mL)
	09/27/05	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND
MW-35	11/02/06	0.25 J	ND (1.0)	0.33 J	ND (1.0)	ND (1.0)	ND (1.0)	3.4E-06
	10/06/07	0.77	ND (0.20)	0.46	ND (0.20)	ND (0.20)	ND (0.20)	4.7E-06
MW-36	10/29/06	ND (0.40)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND
10100-30	10/07/07	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND
MW-37	11/01/06	0.38 J	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND (1.0)	ND
10100-57	10/06/07	0.27	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND (0.20)	ND
MW-38S	10/29/10	8.92	1.16	59.7	0.6J	ND (0.62)	0.54J	0.001
10100-365	12/05/13	12.00	ND (0.5)	20.9	ND (0.5)	ND (0.5)	ND (0.5)	0.0002
MW-38D	10/29/10	ND (0.62)	ND (0.62)	ND (0.62)	ND (0.62)	ND (0.62)	ND (0.62)	ND
MW-38D	12/05/13	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND (0.5)	ND
MW-39	10/29/10	7.96	6.1	200	5.01	0.79	0.71	0.002
MW-40	10/29/10	2.7	12.9	1,080	7.38	0.88	1.14	0.011
11111-40	12/05/13	2.80	10.9	872	7.85	ND (0.5)	ND (0.5)	0.009
TW-3	10/12/10	1.10	19.3	7,130	91	10.80	17.4	0.075
ADI	EC GCL (µg/L)	5	2	70	100	5	5	
Notes:		Indicates a 2	.013 sample r	esult.				

Bold value indicates value exceeds GCL

Value in parenthesis is the laboratory reporting limit.

Key:

ADEC = Alaska Department of Environmental Conservation

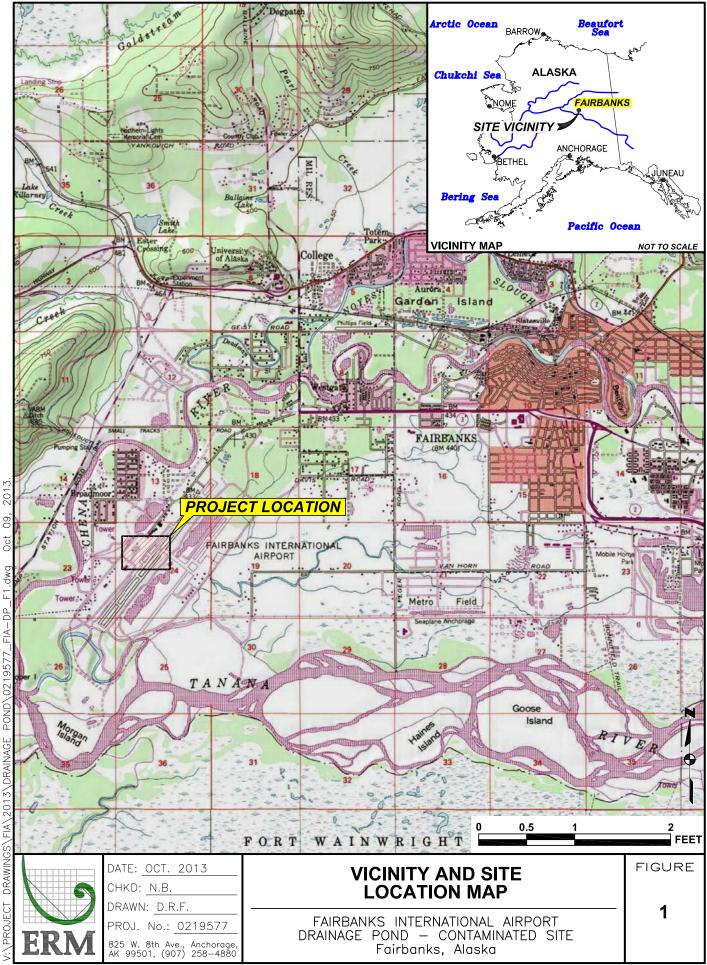
bgs = below ground surface

GCL = groundwater cleanup level

 μ g/L = micrograms per liter

mol/mL = moles per milliliter

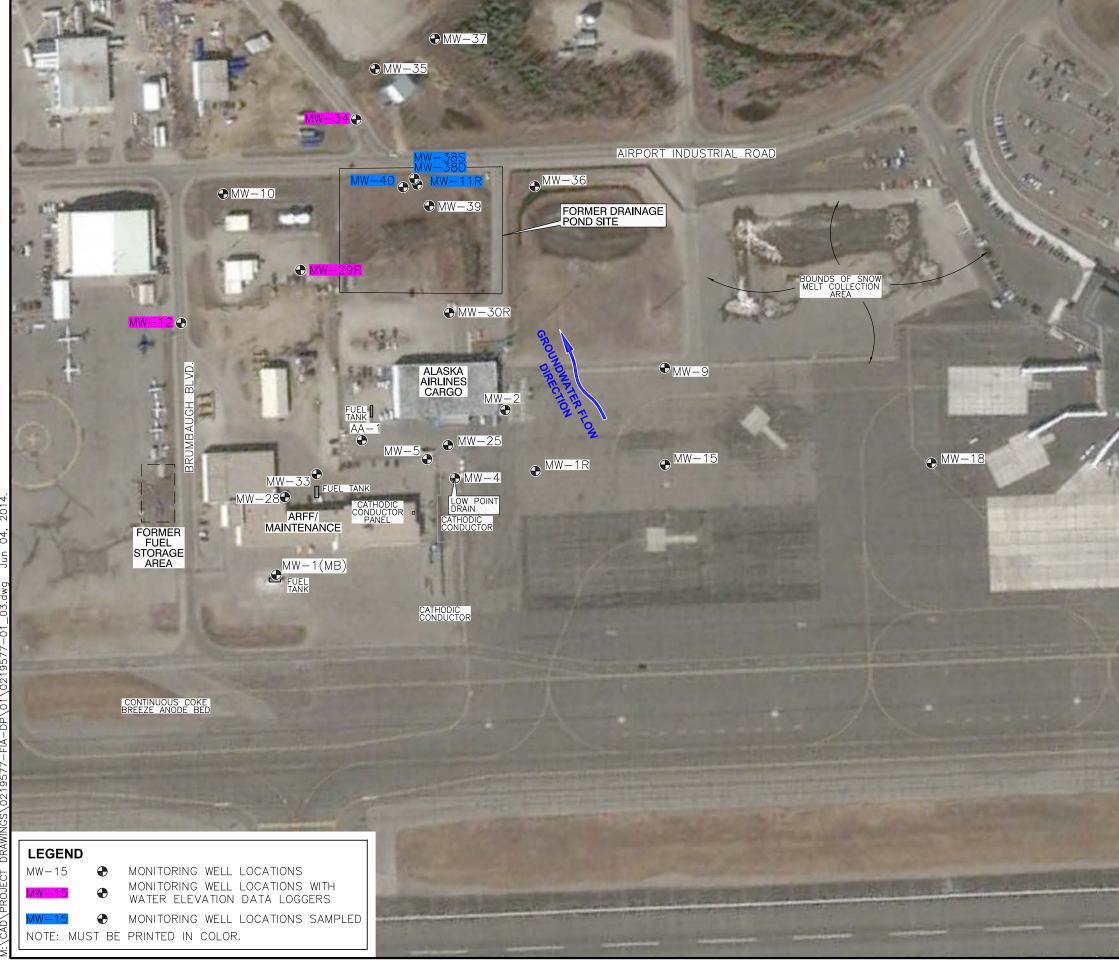
ND = non-detect DCE = dichloroethene PCE = tetrachloroethene TCE = trichloroethene **FIGURES**



SOURCE: NATIONAL GEOGRAPHIC TOPO SOFTWARE PROGRAM 2007.



SOURCE: 2008 AERIAL PHOTOGRAPHY BY GOOGLE EARTH PROFESSIONAL.



SOURCE: IMAGE FROM GOOGLE DIGITAL GLOBE, DATED 4/26/2010.

0 100 200 400			A
D FEET	DATE: JUNE 2014		FIGURE
	CHKD: N.B. DRAWN: D.R.F.	GROUNDWATER MONITORING LOCATIONS) (
ERM		FAIRBANKS INTERNATIONAL AIRPORT DRAINAGE POND - CONTAMINATED SITE Fairbanks, Alaska	>

	1 1
DRAWN: D.R.F. PROJ. No.: 0219577 FAIR	0 25 50 100 0 25 50 100 0 25 50 100 0 25 50 100 0 25 50 100 0 25 50 100 0 25 50 100 0 25 50 100 0 25 50 100 0 50 100 FEET FIGURE ANKS INTERNATIONAL AIRPORT A 4

SOURCE: 2008 ORTHOPHOTOGRAPHY PROVIDED BY FAA.



SOURCE: 2008 ORTHO PHOTOGRAPHY PROVIDED BY FAA.

ATTACHMENT 1

Field Notes and Data Sheets

10-1- , cues +14 N. Byllon Rhodes 0° overcast 12.3.13 0913 Arrive at F14-00tain 6-14-13 FIA Guel Hydramt Rub 1000 Begin locating MW-34 See data sheet For Free Kump pass from bodging office. Product Monitoring Results. Try to visit R. Cadigan in office. She was not there. 1015 Camplete MW-34, move to Meet Steve Henry. No signature Required MW-30R, 1035 Camplete MW-JOR, more 1000 Locate mw - 25 8=3 to Budging office to obtain 10: mw-25-120313 @1040 1045 Obtain Ramp pass -> head 1145 Locate MW-1R 10: MIN-12-120313 @ 1205 to Mail Trail Gate and on to Swing Tie MW-IR. (MW-36. 1100 Complete MW-36, head to AK softwar congo The Th Mw-25 1115 Complete UNW-25, head to L. 1154 (Contraction) MW-IR 1125 Complete MW-IR, head to 175 Mw-15 1135 Camplete MW-15, head to YERMWICH MW-18. 1315 Locate mw-15 1145 Complete MW-15, head to Five Dept Garage Bay to pot 10: MW-15-120313 @ 1340, MS/MSD (in the second decon water in floor draim /ows. update swing tie book. 1210 Rhodes off-Site Junan The second and the (h)

Ballou Ballar Rhodo Orainage Pond 12.5.B O'O verca of Rhodes 12.3.13 0845 On site to conduct GW 1445 Locate Mul-18 10: MW-18-120313 @ +37 1525 sampling at FIA drainage et a Ouplieute 10: MW-81-203130150 Popel. You wells are covered 1600 Locate MW- 30R. in snow. Start at MW-40 No water present, deptu 0915 Ballou off site to pick is 11'. There is a blockage. up more propane for sample or well is broken. Frost-Jacked. hut. 1025 Sample MW-40 No sample collected. 1645 Locak MW-29R For 10: MW-40-120513 \$ 1025. and the second second Duplicule 10: MW-41-120513@1105. reference. Will need ice but to 1130 Ballou Return sample. 1700 Gern off sike .-(===) 1140 Locate mw-385 10: MW-385-120513@ 1200 1215 Locale MW-380 10: MW-380-120513@ 1245 1300 Locale mw-39, conduct well integratysunary. 1310 Locate MW-11R <u>
</u> Purge and collect parameters. Nella (Appendix and a second Deploy 2 PDB@ approx. 25. PUB's will be retrieved in approximately Z weeks. neelBan Yz

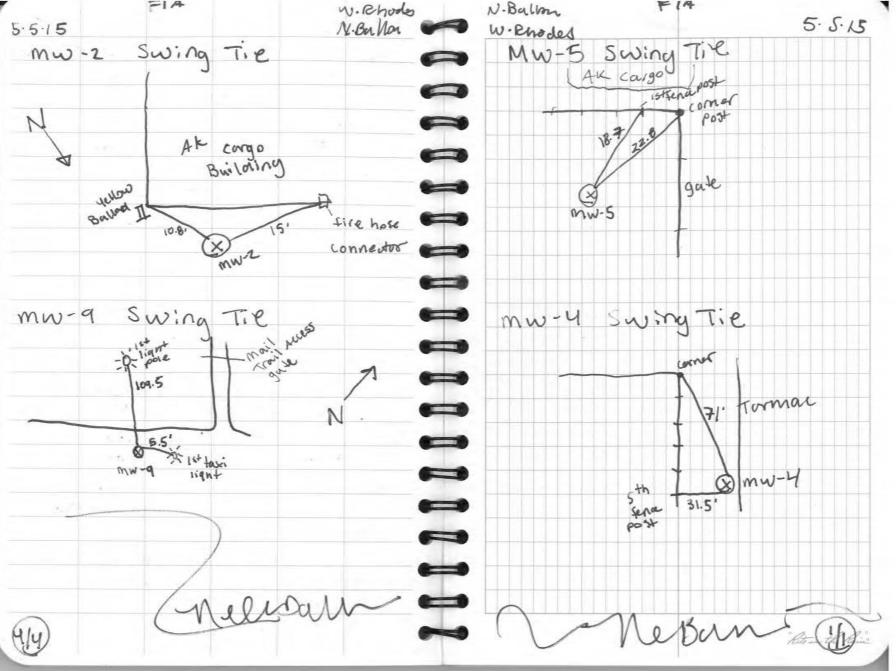
FAUP FAI DP +10°E Ballou Enocies Ballon 410° F 12.5.13 rhodes 12.5.3 Data logger information 1420 Call Cody Black (Contract Well 10 Lager s/n Time OTW Length manayer) @ FRANT to discuss MW-ZAR 34387 1630 10.09 13:33 MW-ZQR. This well was removed MW-ZARB1209187 BARROLDGHOR From the Fuel Hydrant ROD hells 21030050 1615 13.17 15.35 because it historically had low levels. Mu2-12 MW-35 33465 1715 8.46 5.40 However, if was included in the 2013 Work Plan. Cody advised (Ceremonia) us to sample mw-zak to # 1445 Coordinate Fuel Hydrant confilm results. waste (purge water disposal) 1430 Call R. Cadigan to at Maintenance shop oil-water request drum storage location separator drain. Dispose of No answer. Call M. Schnenne. No answer === = B gallons of fuel Hydrant 1500 Locale ERR- MW-Z9K site water. (full hydrant well). 725 Bring Drainage Pond Significant draw down. non-hazardous waste drun Purge dry and wait for to office because not able to make contact w/ R. Cadigan. at least 80% recharge 10: MW-29R-120513 @ 1400 Drainage Pond waste drum Prepare to deploy clatuloggers. will be stored @ ERM until Work Man stated MW-30, MW-35, results and manifest completal then delivered to Emerald mw-Up would recieve loggers. (CC) No water in mw- 30R. Alasker. 1730 FRM off sile Changed location to mw-29R. Contraction of the local division of the loc Hu) Million "Alte in the 194

privice roma FWE (/UY CAL Ballon +16° = OFF, cloudy 12-19-13 12.6.13 Bhooks Rhooles 1400 ERM on-site to collect VOC Drainage Pond Sample Summary Sumple Grow PDB deployed Sample 10/4411 Date Time Motes MW-11R. MW-40-120513 12/5/13 10:25 1430 Collect Sample From UPPer MW-41-120513 11:05 Dup of 40 of two PDB's deployed. MW-385-120513 12:00 12:45 (:11 3 VOA'S (40 mL) mw-390-12050 Simple ID: MW-11R-120513 MW-UR- - PDB-samplein All drainage Pond Samples tweeks. T.m. 1930 Date: 12-19-13 submitted for PCE, TLE, CDLE, 1445 CRM off-Site to SGS to toce, VC, benzene. Drop Sample. Fuel Mydrant Sample Summory MWSumpIO Dak Time Notes MW-25-120313 12/3/13 1040 mw-1R-120313 1205 MW-15-120313 / 1340 MS/MSO mw-18-120313 1525 mw-B1-120313 \$ 1530 Sup of 18 **A** mw- 2912-120513 12/5/3 1600 All Fuel Hydrant Submitted for BETY, GRO, DCO Well Integrety survey completed: (CES) MW-40, 41, 385, 3BD, '39, 25, 1R, 15, 18, 30R, 29R, 12, 35. A Phale 9.1

prairiage rong N. Ballon LNAPE monitoring Balloy L-Davis DL Dawnford 2.11.14 3-11-14 1330 Emerald Alaska pick up 0900 Meet FIA Badging Sccurity. Tailgale sufery 30-gui bung top blue drum of purge water from 0930 Locale MW-302 and the second MW-3012 Plugged @ 11.02 ' Ft bloc December 2013 Drainage Dord 1015 Locate MW- 34. Sampling event. I daste manifest Cup needs to be replaced #212364. Signed by Rebekah Diw= 9.34 @ 1018 -(adigan (FIA) on Feb. 4, 2014. otherwise good condition. 1/2" bolts. 1030 locate MW-35 DTW = 9.38 @ 1033 -Download datalogger - note datalogger is not daylight saving time (ie. DL reads 9:37) 1051 Locate Min-29R DTW=11.77@10:53 Download dataloger 1120 Locate mw-25 update swing ticks DTW= 12.65 0+0-1/21 no product. 1155 Locate MW-1R 07W= 13.74' @ 1158 1215 Locate MW-15 DTW= 14.26 @ 1220

LNAPL monitoring N.Ballon Elevation Survey N.Bula well Integrity survey DL Download 55.14 3.11.14 Withodes L Davis 0830 on site. Meet Design 1230 Locate MW-18 Alaska at badging office. Depth to procluct = 14.15' Depth to Water = 14.55' get Venicle permit. Tailgate 1315 Locate MW-36 safety meeting. DTW = 9.78'@ 1318 930 Begin mu interarity survey Total depth = 20' while DA gets set up. 1332 Locate MW-12 Locate mw-5. DTW = 13.89' @ 1335 1000 Attempt to locute MW-33 Download data logger Not able to locate MW-33 1400 Return to FIA Bodging office weak metal signal very return rehicle permit deep. Construction area 13-1430 ERM off Site. many cars parked in acea. 1015 Attempt to Locute MW-29. In construction/excavation onen. Construction forman said pot removed the well. 1025 MW-12 Remove duta 10ggx DTW= 10.25 Ff btoc. 1040 Enter secure area to conduct Survey in All sida Survey 36,9, 18, 15, 18, 2 No survey 4, 225 MW-25 was significantly Frost jacks

5.5.14 Well integrity survey W. Ballac W. Ballac	N. Ballan W. Rhodes	-		5.5.14
1215 leave secure area after	Well Location	Time	DTW -	
surveyors complete horizontal	MW-05	935	9.33	V
etter survey.	mw-36	1035	8.29	V
1220 Begin integrity survey out -	mw-09	1055	12.91	V
side secure area.	mw-18	1105	i ce plug	v
1225 Retrieve deuter logger from	mw-15	1115	6.82 icepu	g v
mw-35 DTW= 8.91	mw-1R	1125	ice phug	V
Continue with integrity survey =	mw-12	1025	12.51	V
Talk with construction foreman =	mw-04	1140		×
Rocky stelled that mw-29 was	mw-25	1200		×
removed during excavation, and	mw-35	1225	8.91	V
that DOT was ok with that.	MW-37	1235	7.21	V
MW-28 was located in heavy	mw-34	1255	8.94	~
construction area with trenching	mw-10	1315	9.82	~
going on. M.w-28 not located.	mw-39	1325	underwater	~~
1240 Continue with survey.	mw-40	1330	9.18	~
Open all monitoring wells	mw-385	1333		v
for surveyors.	0mw-39D	1340	8.90	V
1415 Een opp site	mw-11R	1345		V
	mw-30 R	14 00		25 4
merpan =	MW-02	1205		
Ment	Surver	1 total	= 18 wells	
	See data 51 Servey.	neets fo	r wellintn	iqty
E ~		ursa	m la.	3/4)



					er Sampling w	ith Minim	al Drawo	lown W	/orksh	eet	idea -	
Weather	Conditions:			F, Clove	ly	-	Well ID:		NW-	- 4/1	0	
Project #	:	F	A	-	/		Date:	12	5	-1	3	
Project N	lame:	PV	aines	e Pond			Start Time:	C	93:	S	· · · · · · · · · · · · · · · · · · ·	
Site:	P	TA,	5				End Time:		240	2		
ield Tea	Contraction of the local division of the loc	Rhocke		100		-						
Sample I	and the second s		0-12		_Time: 102.5	primary	dup	split	ms/msd			
Sample I		N-4	1- 120	2513	_Time: 1105	primary	dup	split	ms/msd			
Sample I	D:	_			Time:	_ primary	dup	split	ms/msd			
Depth to	Top of Prod Oil/Water In	luct (ft BT0 iterface* (f	DC):	Method (e.g. peri	staltic, bladder, si Total Volu	ume Purged:	ater (ft BTO		_	9	24	
the later of the later of the later	me as depth	CONTRACTOR OF A DESCRIPTION OF A DESCRIP			and the second second				-	10-02-00 C		
Criteria	for Stab	le Param	neters	16-								
Paramet			Working R	ange	Stability C	riteria	Notes				1000	
Tempera	ture		>0.00 °C	1 de la como	± 3%		12.2	_				
H		2. 2	0-14		± 0.1		-	_			_	-
Conducti	vity		0-999 mS/r	n	± 3%			_				
DRP	0	_	± 1999 mV		± 10 mv	-				_		
	d Oxygen		0-19.99 mg 0-800 NTU	/L	± 10%							_
urbidity	y Observ	ations	0-800 NTU			-		_	-			
Color: Odor: Sheen: Furbidity		None, Lo Present, Mone, Lo	w, Medium, Not Present w, Medium,	High, Very Stro High, Very Turt	ilky White, Other: ng, H2S, Fuel Lik <u>id, Heavy Silts</u>	e, Chemical	?, Unknown	6			_	
iistruit	ient Obse	avations	>	riow Rate	scarpa	u		-	-	-	1	-
Round	Time	Temp °C	рН	Conductivity (mS/cm°)	Conductivity (uS/cm)	DO (mg/L)	ORP (mV)	Color	Odor	Sheen	Water Level (ft BTOC)	Draw- down
1	6450										-	
2 3	0953	4.90	6137	1,629	1007	2.61	-19.9	True	None	NP	9.56	0:32
4	0957	5113	6.53	1.714	1064	0.66	-41,3		1	1	9,56	0.32
5	1005	5.18	6.53	1.378	1169	0,44	- 57.7	Auter	-		9,56	0.32
6	1009	5.20	6.60	1:942	1208	0.21	- 78,9	Amper	-		9.51	0.27
7	1013	5118	6:62	1,469	1224	0:18	- 39.3		1		9,51	6.0
8	1017	5.28	6.63	1,987	17.35	0.16	# 79.6				9,51	0.27
9	1021			111-1-	1000	PILE	110		+		1121	erce
10	1025		1	10 million (1997)	1							
11					1.							
12	-						12 2 2		-			
iotes: Dra ontinually i	measuring wat	er levels in th	0.3 feet while a well. Note the	sampling. Minimal dra at site's hydrogeology	wdown shall be achieve may make it difficult to	ed and measure achieve this sp	d by pumping a ecification.	it a low rate	(approxim	ately 0.1 to	o 0.5 liter/minute) a	and
	Anal	yses		Collected	Comments:	1			_	-		
	826	OK		6								
		-			-							

Pull

		Lo			Sampling w	ith Minim						
A NAME OF ADDRESS	Conditions:		(5	oF, Clow	24		Well ID:		nw		5	
roject # :							Date:		12.3.	B		
Project Na	me: P	raina	ge por	10	1		Start Time:	131	D			
Site:	ano.		-0 -				End Time:	141	50			
ield Tean	n Dall	an rur	and as				-114 111191			-		_
Sample ID	MALA!	-11R-	12 13	5 T	ime:	primary	dup	split	ms/msd			
Sample ID			1- 1-		ime:	primary	dup	A 196 T.C.	ms/msd			
Sample ID					ime:	primary	dup		ms/msd			
		8.1.1.1	1	STRUCTURE PLAN	1200000000			opine				
	Pur	ging and	Sampling M	lethod (e.g. perista		ubmersible): ume Purged:		0		_		_
Donth to T	op of Prod	unt /H DTC				Depth to Wa	tor /# PTOC			9	55	
	Dil/Water In					Total Depth		•).		- 2	55	
		22 (Yang Gala) (Mr)	втос)	-		Total Depth	(ILBIOC).				- 6 - 1	
	ne as depth t									-		
	for Stabl				1		1	_				_
aramete			Working Ra	inge	Stability C	riteria	Notes					
emperatu	ure		>0.00 °C		± 3%							
Н			0-14		± 0.1				_			_
Conductivi	ity	-	0-999 mS/m	1	± 3%				_			
DRP	-		± 1999 mV		± 10 mv	-	-		_			
Dissolved	Oxygen		0-19.99 mg/	L	± 10%				_	_		
urbidity			0-800 NTU									
Sensory	Observa	ations		Free Street and a	have the second	-		-			and the second	
nstrum	ent Obse		3	Flow Rate =					-			-
	1.1.1	Temp		Conductivity	Conductivity		000	~		-	Water Level	Draw
Round	Time	°C	pH	(mS/cm°)	(uS/cm)		ORP (mV)	Color	Odor	Sheen	(ft BTOC)	down
1	1317	3,97	6.62	1.287	770	6,28	-11.8		None		9.55	-
2 3	1320	4,13	6.61	1,304	787 -802	0.64	-61.5	elan a	roome	NP	9,55	-
4	1326	4.13	6,59	1.333	805	0,40	-700	- I -				-
5	1329	4.14	6.60	1,333		0.31			11	1	Ť.	-
6	1332	4.19	6.61	1.322	804	0,27	-15.2		4	1	2	
7	1226	-4.14	68.61	43-6	191	0,21	-78.6			~	11	
8		-								-		
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DRP	± 1999 mV	14 Mar 19 19 19	± 10 mv			_				_
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ATTACHMENT 2

Photographic Log



PHOTOGRAPH 1: MW-11R DEPLOYMENT OF PDB 5 DECEMBER 2013.



PHOTOGRAPH 2: MW-11R PDB RETRIEVAL 19 DECEMBER 2013.



PHOTOGRAPH 3: DECEMBER GROUNDWATER SAMPLING HUT



PHOTOGRAPH 4: MW-12 WELL INTEGRITY SURVEY AND DATALOGGER DEPLOYMENT

ATTACHMENT 3

Professional Elevation Survey



MONITOR WELL SURVEY Fairbanks International Airport Fairbanks, AK

WELL ID	<u>NORTHING</u>	EASTING	<u>PIPE ELEV.</u>
MW-1R	3956397.54	1348654.21	434.65
MW-2	3956434.55	1348506.51	435.44
MW-5	3956251.57	1348495.36	431.57
MW-9	3956751.72	1348659.70	435.11
MW-10	3956276.13	1347793.05	431.88
MW-11R	3956596.76	1348040.27	430.74
MW-12	3956035.07	1347941.06	434.41
MW-15	3956611.52	1348819.43	435.17
MW-18	3957036.17	1349176.42	435.15
MW-30R	3956474.17	1348286.87	433.44
MW-34	3956587.64	1347854.69	430.00
MW-35	3956686.01	1347799.89	429.89
MW-36	3956780.77	1348201.79	430.43
MW-37	3956821.73	1347832.76	429.20
MW-38D	3956600.06	1348026.72	430.00
MW-38S	3956601.31	1348024.43	429.93
MW-39	3956587.00	1348090.25	430.26
MW-40	3956570.78	1348025.36	430.58

Coordinates are Alaska State Plane, Zone 3, NAD83, U.S. Survey feet Elevations are NAVD88 vertical datum, feet

Wells Surveyed May 5, 2014 for ERM Alaska, Inc.

Design Alaska, Inc. Architects • Engineers • Surveyors 601 College Road Fairbanks, Alaska 99701 Phone 907-452-1241 Fax 907-456-6883 mail@designalaska.com

ATTACHMENT 2: ELEVATION SURVEY COMPARISON FAIRBANKS INTERNATIONAL AIRPORT FUEL HYDRANT SYSTEM CONTAMINATED SITE

Well ID	Northing	Easting	May 2014 Pipe Elevation (ft)	Nov. 2010 Pipe Elevation (ft)	Difference in Elevation (ft)	Frost Jacking
MW-1R	3956397.54	1348654.21	434.65	434.76	-0.11	Slight
MW-2	3956434.55	1348506.51	435.44	Not Surveyed	NA	NA
MW-5	3956251.57	1348495.36	431.57	Not Surveyed	NA	NA
MW-9	3956751.72	1348659.70	435.11	Not Surveyed	NA	NA
MW-10	3956276.13	1347793.05	431.88	432.06	-0.18	Moderate
MW-11R	3956596.76	1348040.27	430.74	430.85	-0.11	Slight
MW-12	3956035.07	1347941.06	434.41	434.55	-0.14	Slight
MW-15	3956611.52	1348819.43	435.17	435.30	-0.13	Slight
MW-18	3957036.17	1349176.42	435.15	435.26	-0.11	Slight
MW-30R	3956474.17	1348286.87	433.44	433.60	-0.16	Moderate
MW-34	3956587.64	1347854.69	430.00	429.99	0.01	Slight
MW-35	3956686.01	1347799.89	429.89	429.54	0.35	Significant
MW-36	3956780.77	1348201.79	430.43	430.57	-0.14	Slight
MW-37	3956821.73	1347832.76	429.20	429.31	-0.11	Slight
MW-38D	3956600.06	1348026.72	430.00	430.10	-0.10	Slight
MW-38S	3956601.31	1348024.43	429.93	430.04	-0.11	Slight
MW-39	3956587.00	1348090.25	430.26	430.34	-0.08	Slight
MW-40	3956570.78	1348025.36	430.58	430.70	-0.12	Slight
MW-25	3956293.58	1348495.26	Not Surveyed	433.52	NA	Significant*
MW-29R	3956296.05	1348017.91	Not Surveyed	432.20	NA	Removed

Coordinates are Alaska State Plane, Zone 3, NAD83, U.S. Survey feet

Elevations are NAVD88 vertical datum, feet

Slight = <0.15' elevation difference

Moderate = >0.15', <0.20'elevation difference

Significant = >0.20' elevation difference

* MW-25 was not re-surveyed due to visible frost jacking

This table contains wells associated with the Drainage Pond and Fuel Hydrant Sites

ATTACHMENT 4

Waste Manifest

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*** IN CASE OF EMERGENCY CALL 1-800-424-9300 Contract# 7619 *** **NON-HAZARDOUS WASTE MANIFEST**

1.1

95-919-AK21236(NM)

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ATTACHMENT 5

Well Integrity Survey

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ATTACHMENT 3 WELL INTEGRITY SURVEY - WELL DETAILS FAIRBANKS INTERNATIONAL AIRPORT FUEL HYDRANT SYSTEM CONTAMINATED SITE

Well ID	Year Installed	Screen Length (Ft)	Casing Diameter (in)	Monument Lid Diameter (in)	Bolt Size	Total Depth (ft btoc)	Casing Type	Condition	Notes
MW-02	1997	10	2	10	1/2"	19.6	PVC	GOOD	
MW-04	1997	10	4	12"		17.3	PVC	POOR	bentonite is all around the top of casing. Not a good place to take DTW. Lid is not attached to monument
MW-05	1998	10	6	12"	3/4"	17.84	PVC	GOOD	Fuel odor
MW-09	1998	4.69	2	10"	bolts broken	19.37	PVC	GOOD	
MW-10	1999	10	1.25	6"	1/2"	17.2	STEEL	GOOD	Located in new gravel pad, about 10-10" below grade. Marked with yellow carsonite.
MW-11R	2005	29.5	2	6"	1/2"	34.1	PVC	GOOD	
MW-12	1999	10.3	1.25	6"	1/2"	16.93	STEEL	GOOD	Installed datalogger 12/5/13
MW-15	1999	10	1.25	12"	bolts broken	19	STEEL	GOOD	12" diameter monument. Lid missing bolt holes
MW-18	1999	10	1.25	6"	1/2"	18.95	STEEL	GOOD	6" diameter monument. Free product present
MW-1R	2000	10	4	12"		18.87	PVC	GOOD	Monument is 12" Morrison brand
MW-25	1999	10	1.25	6"	1/2"	17.9	STEEL	POOR	Well casing has frost jacked up, lid no longer fits securely. Well still functional during Dec 2013 monitoring event
MW-28	1999	10	1.25	NA	NA	16.3	NA	NA	Unable to locate due to construction
MW-29R	2006	10	1.5	6"	1/2"	18.07	PVC	MODERATE	Near Construction area. Concrete around monument is heaving slightly. Well cap is hitting monument cover due to frost jacking. Datalogger installed 12/5/13. WELL REMOVED APRIL 2014 DURING CONSTRUCTION
MW-30R	1999	10	2	6"	1/2"	11.05	PVC	POOR	blockage above water table Dec 2013. Frost jacking present. Casing is slanted
MW-33	2001	10	2	12"	-	16	PVC	NA	Unable to locate due to construction
MW-34	2003	-	2	6"	1/2"	13.74	PVC	MODERATE	Well casing needs to be shortened, it is about to hit the lid. A cap can't fit inside the lid
MW-35	2005	10	2	6"	1/2"	10.31	PVC	MODERATE	Monument surrounded by concrete which is frost-jacked, but well itself is ok. Datalogger installed 12/5/13
MW-36	2006	10	1.5	6"	1/2"	19.5	PVC	GOOD	
MW-37	2006	10	1.5	6"	1/2"	20.53	PVC	GOOD	Marked with blue lath
MW-38D	2010	5	2	12"	15/16	34.27	PVC	GOOD	white monument lid
MW-38S	2010	10	2	8"	1/2"	14.57	PVC	GOOD	brown monument lid
MW-39	2010	10	2	8"	1/2"	16.15	PVC	GOOD	Rusty monument and lid
MW-40	2010	10	2	8"	15/16	15.91	PVC	GOOD	White lid

NOTE: THIS TABLE CONTAINS WELLS ASSOCIATED WITH THE FUEL HYDRANT AND DRAINAGE POND SITES All completions are flush mounts



PHOTOGRAPH 1: MW-1R - GOOD CONDITION



PHOTOGRAPH 2: MW-2 - GOOD CONDITION



PHOTOGRAPH 3: MW-4 – POOR CONDITION, MONUMENT LID DOES NOT ATTACH AND BENTONITE SMEARED AROUND TOP OF CASING



PHOTOGRAPH 4: MW-5 GOOD CONDITION



PHOTOGRAPH 5: MW-5 GOOD COGNITION



PHOTOGRAPH 6: MW-9 GOOD CONDITION



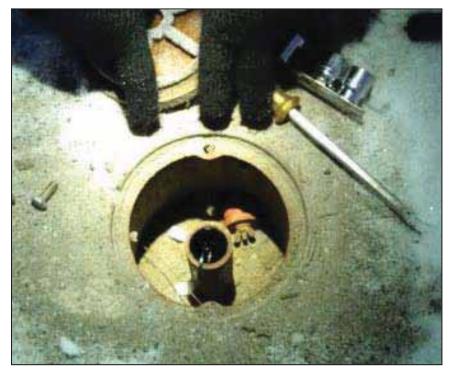
PHOTOGRAPH 7: MW-10 - BURIED 12-12 INCHES ON NEWLY PLACED GRAVEL PAD



PHOTOGRAPH 8: MW-10 GOOD CONDITION



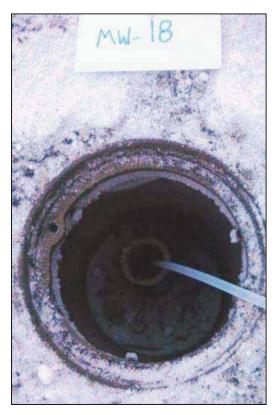
PHOTOGRAPH 9: MW-11R GOOD CONDITION



PHOTOGRAPH 10: MW-12 GOOD CONDITION



PHOTOGRAPH 11: MW-15 GOOD CONDITION



PHOTOGRAPH 12: MW-18 GOOD CONDITION



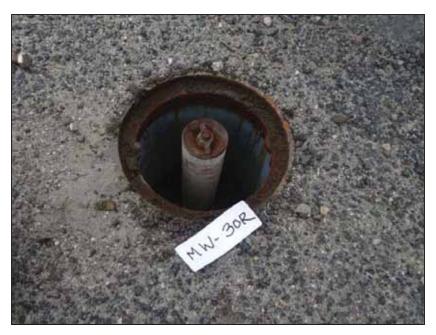
PHOTOGRAPH 13: MW-15 POOR CONDITION – MONUMENT AND CASING HAVE JACKED ABOVE GROUND. MONUMENT LID NOT ABLE TO COVER MONUMENT.



PHOTOGRAPH 14: MW-29R MODERATE CONDITION – CASING IS ALMOST TOUCHING MONUMENT LID – <u>WELL REMOVED APRIL 2014</u>



PHOTOGRAPH 15: MW-29R MODERATE CONDITION – CASING IS ALMOST TOUCHING MONUMENT LID – <u>WELL REMOVED APRIL 2014</u>



PHOTOGRAPH 16: MW-30R - MODERATE CONDITION - BLOCKAGE IN NOV. 2013 AND MINOR FROST JACKING



PHOTOGRAPH 17: MW-30R - MODERATE CONDITION - BLOCKAGE IN NOV. 2013 AND MINOR FROST JACKING



PHOTOGRAPH 18: MW-34 MODERATE CONDITION – CASING IS JACKED AND NO LONGER ABLE TO PLACE WELL CAP UNDER MONUMENT LID.



PHOTOGRAPH 19: MW-35 – MODERATE CONDITION – EVIDENCE OF FROST JACKING, CONCRETE IS NO LONGER BURIED.



PHOTOGRAPH 20: MW-36 GOOD CONDITION



PHOTOGRAPH 21: MW-37 GOOD CONDITION.



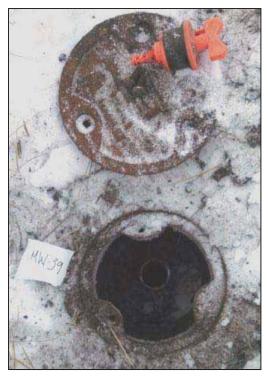
PHOTOGRAPH 22: MW-38D GOOD CONDITION



PHOTOGRAPH 23: MW-38D GOOD CONDITION



PHOTOGRAPH 24: MW-38S GOOD CONDITION



PHOTOGRAPH 25: MW-39 GOOD CONDITION



PHOTOGRAPH 26: MW-40 GOOD CONDITION.

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Finish type (circle one) Total Depth of well Depth to Water (ft btoc) Casing type Casing Diameter Component Monument Id Ground surrounding monument CWell Casing Evidence of frost Jacking?	Fuel Hylra At 12.6.13 Jush Moun Stick-up 10.3 Stick-up 10.3 Stick-up 10.3 What To Look For tracks? Evidence of frost Jacking secure? Able to keep moisture out? tracks? Evidence of frost Jacking (es: 2 No? present? Cracks?	Good	Moderate X	Poor	Condition	1 Notes	
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Ground surrounding monument	cracks? Bulging? Seal?	-	1	-	Horatto obsand - snow/ice
Well Casing	cracks? Evidence of frost Jacking		X		functional but fitted.
Evidence of frost Jacking?	Ves No?				
Well cap	present? Cracks?			X	Broken - needs to be-
Site Name Well ID Date Finish type (circle one) Total Depth of well Depth to Water (ft btoc)	Monitoring Well Integrit Huel Hud rant MW-1R 12.3.13 Flush Mound Stick-up 13.21 014	ty Surve	y Data W	orkshee	et
Casing type Casing Diameter	18.67 PV2				
					Condition
Component	What To Look For	Good	Moderate	Poor	Notes
Monument	cracks? Evidence of frost Jacking	V			Morn son
		1.2			
Monument lid	secure? Able to keep moisture out?				
Ground surrounding monument	cracks? Bulging? Seal?				
Well Casing	cracks? Evidence of frost Jacking	V			Cracked a top
Evidence of frost Jacking?	Yes?No2	5			No
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Concernant States and States	secure? Able to keep moisture out?	~				
Ground surrounding monument	cracks? Bulging? Seal?	V		-		
Well Casing	cracks? Evidence of frost Jacking	~				
Evidence of frost Jacking?	Yes? Noj	V		-		
Well cap	present? Cracks?	V				
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Flush Mount Stick-up What To Look For cracks? Evidence of frost Jacking secure? Able to keep moisture out? cracks? Bulging? Seal?	Good	Moderate	Poor	Condition	
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Date	5.5.14					
	Flush Mount Stick-up					
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Depth to Water (ft btoc)	BUL BUL	-				
Casing type	-711	-				
Casing Diameter	<i>d</i>	-				
		-		C	ondition	
Component	What To Look For	Good	Moderate F	Poor	Notes	
Monument	cracks? Evidence of frost Jacking	5				
Monument lid	secure? Able to keep moisture out?	V			1	
Ground surrounding monument	cracks? Bulging? Seal?	v				
Well Casing	cracks? Evidence of frost Jacking	P				
Evidence of frost Jacking?	Yes? No?	-	-			
Well cap	present? Cracks?	4				
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	Monitoring Well Integrit	ty Surve	y Data Wo	rksheet	
Site Name Well ID	Mw-4				
Date	5.5.14				
Finish type (circle one)	Flush Mount Stick-up	-			
Total Depth of well	Thomas Such ap				
Depth to Water (ft btoc)		-			
Casing type	PVU	2			
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Component	What To Look For	Good	Moderate	Poor	INOLES
Monument	cracks? Evidence of frost Jacking	X			1 a specked to
Monument lid	secure? Able to keep moisture out?			×	not connected to
Ground surrounding monument	cracks? Bulging? Seal?	X			
Well Casing	cracks? Evidence of frost Jacking	X			
Evidence of frost Jacking?	Yes? No?	-			
Well cap	present? Cracks?		X		
12" di bentonite	all around	top	of ca	sing	
Additional Notes.	AND A DECK				

swing Tie AK ENGO exarage comor fince # 71' mw -4 X Sth funce Post 31.5'

14 M 1 M 1	Monitoring Well Integrit	ty Survey	Data Wo	rksheet	
Site Name Well ID Date Finish type (circle one) Total Depth of well Depth to Water (ft btoc) Casing type Casing Diameter	FIA 11 W-5 5.5.14 Flush Mount Stick-up 17.84 9.33 PVL	-			
	U		-	C	ondition
Companyat	What To Look For	Good	Moderate	Poor	Notes
Component Monument	cracks? Evidence of frost Jacking	1			
Monument lid	secure? Able to keep moisture out?	V			
Ground surrounding monument	cracks? Bulging? Seal?	V			
Vell Casing	cracks? Evidence of frost Jacking	V			
Evidence of frost Jacking?	Yes? No?	V	_		
Well cap	present? Cracks?	V			/
fuel odor, s	sheen				*
Additional Notes:		ar s Iar s			-

12" monument painted orange

2 x 3/11" bolts AL CONGO post post 6.3 133.9 inate sence

22.8 18.7

	Monitoring Well Integrit	Surve	v Data Wo	orkshee	t			
Site Name	Monitoring wen integra	ly Surve	y Data We	/i Ronee				
Well ID	10w -9	•						
Date		5. (é)						
Finish type (circle one)								
Total Depth of well	Flush Mount Stick-up							
Depth to Water (ft btoc)	12.9 @ 10.55	-						
Casing type	PVC							
Casing Diameter	2"							
					Condition			
Component	What To Look For	Good	Moderate	Poor	al. Set	Notes	1 . 1	
Monument	cracks? Evidence of frost Jacking	V			skirt	pinchec	abit	
Monument lid	secure? Able to keep moisture out?	V						
Ground surrounding monument	cracks? Bulging? Seal?	5						
Well Casing	cracks? Evidence of frost Jacking	5						
Evidence of frost Jacking?	Yes? No?	-	1					
Well cap	present? Cracks?	V						
Additional Notes:		~						
	109,6		25% 1 18th 40	Jourd	Gate	5.4	0" f	rom lavé rom igntpo
			A 18th He	avei liq	nt			

	Monitoring Well Integri	ty Surve	y Data Wo	orksheet	0	
Site Name Well ID	MW-10 FIA	_				
Date	5.5.14					
Finish type (circle one)	Flush Mounty Stick-up					
Total Depth of well	17.20					
Depth to Water (ft btoc)	9.82					
Casing type	Stept					
Casing Diameter	1.5" 1.25"					
		- Condition				
Component	What To Look For	Good	Moderate		Notes	
Monument	cracks? Evidence of frost Jacking	~			A	
Monument lid	secure? Able to keep moisture out?	~				
Ground surrounding monument	cracks? Bulging? Seal?	ビ			New Fill	
Well Casing	cracks? Evidence of frost Jacking	~				
Evidence of frost Jacking?	Yes? No?	Barrier .				
Well cap	present? Cracks?	5		X		
6" monu Vz bolts	ment		en ca	φ (3	twisted	
Additional Notes:	(1) A Carola Alexal	drall	1 61	1 00	ha	
marked w/ y	w grade. New I ellow lath	June			100	

	Monitoring Well Integri	ty Survey	y Data Wo	orksheet		
Site Name	FIA					
Well ID	IR	_				
Date	5.5.14	<u> </u>				
Finish type (circle one)	Flush Mount Stick-up	-				
Total Depth of well	34.15					
Depth to Water (ft btoc)	8.67 1345	-				
Casing type	PVL					
Casing Diameter	2."	-				
casing Diameter		-				
		Condition				
Component	What To Look For	Good	Moderate	Poor	Notes	
Monument	cracks? Evidence of frost Jacking	V	1.1.1.1			
Monument lid	secure? Able to keep moisture out?	V				
Ground surrounding monument	cracks? Bulging? Seal?	V	1.1			
Well Casing	cracks? Evidence of frost Jacking	V				
Evidence of frost Jacking?	Yes? No?)				
Well cap	present? Cracks?	11			2	
	L					
Additional Notes:	monument			×		

	Monitoring Well Integri	ty Surve	y Data Wo	orksheet		
Site Name	MW-34	-				
Well ID	5.5.15	-				
Date	Flush Mount Stick-up	-				
Finish type (circle one) (13.74					
Total Depth of well	-8.97 0 1250	- O				
Depth to Water (ft btoc)	- BATCICO	= 0.94	6 15	もつ		
Casing type	- Ze PVC	-				
Casing Diameter		-				
					Condition	
Component	What To Look For	Good	Moderate	Poor	Notes	
Monument	cracks? Evidence of frost Jacking	V				
Monument lid	secure? Able to keep moisture out?	V				
Ground surrounding monument	cracks? Bulging? Seal?	~		10.00	Charles and the second s	
Well Casing	cracks? Evidence of frost Jacking	174		1		
Evidence of frost Jacking?	kes2No?					
Well cap	present? Cracks?			-	Not present	
6" mon 1/2" bo	iument Its	m n bc	2-34 - sho	casi	ed.	
Additional Notes:		-		1		
Casiny Mo room	needs to be n for licl	e c	uf	c/0 0	wn	

	Monitoring Well Integrit	ty Surve	y Data Wo	rksheet		
Site Name Well ID Date Finish type (circle one) Total Depth of well Depth to Water (ft btoc) Casing type Casing Diameter	FIA MW - 36 5.5.14 Elush Mount Stick-up 19:5 8.29 @ 10:3 PVU					
			Condition			
Component	What To Look For	Good	Moderate	Poor	Notes	
Monument	cracks? Evidence of frost Jacking					
Monument lid	secure? Able to keep moisture out?	V				
Ground surrounding monument	cracks? Bulging? Seal?	V				
Well Casing	cracks? Evidence of frost Jacking	V				
	Yes? No?					
Evidence of frost Jacking?	100.110.					

Additional Notes:

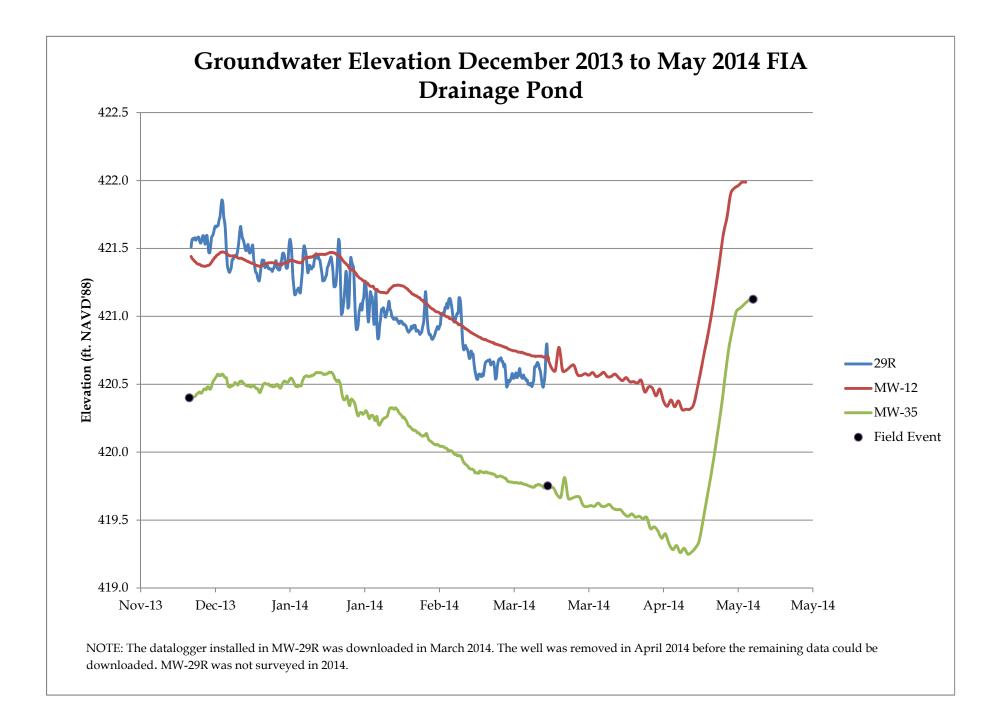
Fairbanks International Airport Work Plan

	Monitoring Well Integrit	y Surve	y Data Wo	rksheet	
Site Name Well ID Date	MW-37 5.5.19	-: }			
Finish type (circle one)	(Flush Mount) Stick-up	-01			
Total Depth of well	7.21				
Depth to Water (ft btoc)	20.53	8.10			
Casing type	1. 5"				
Casing Diameter	PVL	-			
					Condition
Component	What To Look For	Good	Moderate	Poor	Notes
Monument	cracks? Evidence of frost Jacking	V			
Monument lid	secure? Able to keep moisture out?	V			
Ground surrounding monument	cracks? Bulging? Seal?	V			· · · · · · · · · · · · · · · · · · ·
Well Casing	cracks? Evidence of frost Jacking	V		A	
Evidence of frost Jacking?	Yes? No?				
Well cap	present? Cracks?	V			
6" mor	bo Hs				
Additional Notes:					

ATTACHMENT 6

Datalogger Groundwater Elevations

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ATTACHMENT 7

Laboratory Analytical Report

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Laboratory Report of Analysis

To: Oasis Env/ERM-West, Inc. 825 W. 8th Avenue Anchorage, AK 99501 (907)458-8276

Report Number: 1138787

Client Project: 0219577-2 Fairbanks Intl Ap

Dear Nellie Ballou,

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 five years in the event they are required for future reference. All results are intended to be used in their entirety and SGS is not responsible for use of less than the complete report. Any samples submitted to our laboratory will be retained for a maximum of fourteen (14) days from the date of this report unless other archiving requirements were included in the quote.

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

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

Sincerely, SGS North America Inc.

Homestea

Chuck Homestead Project Manager Charles.Homestead@sgs.com

Charles Homestead 2014.01.03 15:35:30 -09'00'

Date

Print Date: 01/03/2014 3:01:21PM

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: Oasis Env/ERM-West, Inc. SGS Project: 1138787 Project Name/Site: 0219577-2 Fairbanks Intl Ap Project Contact: Nellie Ballou

Refer to sample receipt form for information on sample condition.

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

Print Date: 01/03/2014 3:01:22PM

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Laboratory Qualifiers

Enclosed are the analytical results associated with the above work order. All results are intended to be used in their entirety and SGS is not responsible for use of less than the complete report. If you have any questions regarding this report, or if we can be of any other assistance, please contact your SGS Project Manager at 907-562-2343. All work is provided under SGS general terms and conditions (http://www.sgs.com/terms_and_conditions.htm), unless other written agreements have been accepted by both parties.

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) & UST-005 (CS) for ADEC and 2944.01 for DOD ELAP/ISO17025 (RCRA methods: 1020A, 1311, 3010A, 3050B, 3520C, 3550C, 5030B, 5035B, 6020, 7470A, 7471B, 8021B, 8082A, 8260B, 8270D, 8270D-SIM, 9040B, 9045C, 9056A, 9060A, AK101 and AK102/103). 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 Continuing Calibration Verification
- CL Control Limit
- D The analyte concentration is the result of a dilution.
- DF Dilution Factor
- DL Detection Limit (i.e., maximum method detection limit)
- E The analyte result is above the calibrated range.
- F Indicates value that is greater than or equal to the DL
- GT Greater Than
- IB Instrument Blank
- ICV Initial Calibration Verification
- J The quantitation is an estimation.
- JL The analyte was positively identified, but the quantitation is a low estimation.
- LCS(D) Laboratory Control Spike (Duplicate)
- 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
- M A matrix effect was present.
- MB Method Blank
- MS(D) Matrix Spike (Duplicate)
- ND Indicates the analyte is not detected.
- Q QC parameter out of acceptance range.
- R Rejected
- 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.



Sample Summary							
Client Sample ID	Lab Sample ID	Collected	Received	Matrix			
MW-38S-120513	1138787001	12/05/2013	12/07/2013	Water (Surface, Eff., Ground)			
MW-38D-120513	1138787002	12/05/2013	12/07/2013	Water (Surface, Eff., Ground)			
MW-40-120513	1138787003	12/05/2013	12/07/2013	Water (Surface, Eff., Ground)			
MW-41-120513	1138787004	12/05/2013	12/07/2013	Water (Surface, Eff., Ground)			
Trip Blank	1138787005	12/05/2013	12/07/2013	Water (Surface, Eff., Ground)			
MW-11R-120513	1138787006	12/19/2013	12/20/2013	Water (Surface, Eff., Ground)			

<u>Method</u> SW8260B Method Description

Volatile Organic Compounds (W) FULL



Detectable Results Summary Client Sample ID: MW-38S-120513 Lab Sample ID: 1138787001 Parameter Result Units Volatile GC/MS Benzene 0.0120 mg/L cis-1,2-Dichloroethene 0.0209 mg/L Client Sample ID: MW-40-120513 Lab Sample ID: 1138787003 Parameter Result Units 0.00280 Volatile GC/MS Benzene mg/L cis-1,2-Dichloroethene 0.872 mg/L trans-1,2-Dichloroethene 0.00785 mg/L Vinyl chloride 0.0109 mg/L Client Sample ID: MW-41-120513 Lab Sample ID: 1138787004 Parameter Result Units 0.00278 Volatile GC/MS Benzene mg/L cis-1,2-Dichloroethene 0.837 mg/L trans-1,2-Dichloroethene 0.00763 mg/L 0.00937 Vinyl chloride mg/L Client Sample ID: MW-11R-120513 Lab Sample ID: 1138787006 Parameter Result Units Volatile GC/MS Benzene 0.00612 mg/L cis-1,2-Dichloroethene 1.22 mg/L Tetrachloroethene 0.0147 mg/L trans-1,2-Dichloroethene 0.00940 mg/L



Results of MW-38S-120513

Client Sample ID: **MW-38S-120513** Client Project ID: **0219577-2 Fairbanks Intl Ap** Lab Sample ID: 1138787001 Lab Project ID: 1138787 Collection Date: 12/05/13 12:00 Received Date: 12/07/13 11:30 Matrix: Water (Surface, Eff., Ground) Solids (%): Location:

Results by Volatile GC/MS

						Allowable	
Parameter	Result Qual	LOQ/CL	DL	<u>Units</u>	DF	<u>Limits</u>	Date Analyzed
Benzene	0.0120	0.000400	0.000120	mg/L	1		12/09/13 14:00
cis-1,2-Dichloroethene	0.0209	0.00100	0.000310	mg/L	1		12/09/13 14:00
Tetrachloroethene	0.000500 U	0.00100	0.000310	mg/L	1		12/09/13 14:00
trans-1,2-Dichloroethene	0.000500 U	0.00100	0.000310	mg/L	1		12/09/13 14:00
Trichloroethene	0.000500 U	0.00100	0.000310	mg/L	1		12/09/13 14:00
Vinyl chloride	0.000500 U	0.00100	0.000310	mg/L	1		12/09/13 14:00
Surrogates							
1,2-Dichloroethane-D4	107	70-120		%	1		12/09/13 14:00
4-Bromofluorobenzene	103	75-120		%	1		12/09/13 14:00
Toluene-d8	99.7	85-120		%	1		12/09/13 14:00

Batch Information

Analytical Batch: VMS13943 Analytical Method: SW8260B Analyst: HM Analytical Date/Time: 12/09/13 14:00 Container ID: 1138787001-A Prep Batch: VXX25525 Prep Method: SW5030B Prep Date/Time: 12/09/13 08:00 Prep Initial Wt./Vol.: 5 mL Prep Extract Vol: 5 mL



Results of MW-38D-120513

Client Sample ID: **MW-38D-120513** Client Project ID: **0219577-2 Fairbanks Intl Ap** Lab Sample ID: 1138787002 Lab Project ID: 1138787 Collection Date: 12/05/13 12:45 Received Date: 12/07/13 11:30 Matrix: Water (Surface, Eff., Ground) Solids (%): Location:

Results by Volatile GC/MS

						Allowable	
Parameter	Result Qual	LOQ/CL	DL	<u>Units</u>	DF	<u>Limits</u>	Date Analyzed
Benzene	0.000200 U	0.000400	0.000120	mg/L	1		12/09/13 14:24
cis-1,2-Dichloroethene	0.000500 U	0.00100	0.000310	mg/L	1		12/09/13 14:24
Tetrachloroethene	0.000500 U	0.00100	0.000310	mg/L	1		12/09/13 14:24
trans-1,2-Dichloroethene	0.000500 U	0.00100	0.000310	mg/L	1		12/09/13 14:24
Trichloroethene	0.000500 U	0.00100	0.000310	mg/L	1		12/09/13 14:24
Vinyl chloride	0.000500 U	0.00100	0.000310	mg/L	1		12/09/13 14:24
Surrogates							
1,2-Dichloroethane-D4	97.8	70-120		%	1		12/09/13 14:24
4-Bromofluorobenzene	101	75-120		%	1		12/09/13 14:24
Toluene-d8	99.6	85-120		%	1		12/09/13 14:24

Batch Information

Analytical Batch: VMS13943 Analytical Method: SW8260B Analyst: HM Analytical Date/Time: 12/09/13 14:24 Container ID: 1138787002-A Prep Batch: VXX25525 Prep Method: SW5030B Prep Date/Time: 12/09/13 08:00 Prep Initial Wt./Vol.: 5 mL Prep Extract Vol: 5 mL

Print Date: 01/03/2014 3:01:24PM

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Results of MW-40-120513

Client Sample ID: **MW-40-120513** Client Project ID: **0219577-2 Fairbanks Intl Ap** Lab Sample ID: 1138787003 Lab Project ID: 1138787

Collection Date: 12/05/13 10:25 Received Date: 12/07/13 11:30 Matrix: Water (Surface, Eff., Ground) Solids (%): Location:

Results by Volatile GC/MS

						Allowable	
Parameter	Result Qual	LOQ/CL	DL	<u>Units</u>	DF	<u>Limits</u>	Date Analyzed
Benzene	0.00280	0.000400	0.000120	mg/L	1		12/09/13 14:48
cis-1,2-Dichloroethene	0.872	0.100	0.0310	mg/L	100		12/09/13 19:32
Tetrachloroethene	0.000500 U	0.00100	0.000310	mg/L	1		12/09/13 14:48
trans-1,2-Dichloroethene	0.00785	0.00100	0.000310	mg/L	1		12/09/13 14:48
Trichloroethene	0.000500 U	0.00100	0.000310	mg/L	1		12/09/13 14:48
Vinyl chloride	0.0109	0.00100	0.000310	mg/L	1		12/09/13 14:48
Surrogates							
1,2-Dichloroethane-D4	114	70-120		%	1		12/09/13 14:48
4-Bromofluorobenzene	98.2	75-120		%	1		12/09/13 14:48
Toluene-d8	99.9	85-120		%	1		12/09/13 14:48

Batch Information

Analytical Batch: VMS13943 Analytical Method: SW8260B Analyst: HM Analytical Date/Time: 12/09/13 14:48 Container ID: 1138787003-A Prep Batch: VXX25525 Prep Method: SW5030B Prep Date/Time: 12/09/13 08:00 Prep Initial Wt./Vol.: 5 mL Prep Extract Vol: 5 mL

SGS

Results of MW-41-120513

Client Sample ID: **MW-41-120513** Client Project ID: **0219577-2 Fairbanks Intl Ap** Lab Sample ID: 1138787004 Lab Project ID: 1138787 Collection Date: 12/05/13 11:05 Received Date: 12/07/13 11:30 Matrix: Water (Surface, Eff., Ground) Solids (%): Location:

Results by Volatile GC/MS

						Allowable	
Parameter	Result Qual	LOQ/CL	DL	Units	DF	<u>Limits</u>	Date Analyzed
Benzene	0.00278	0.000400	0.000120	mg/L	1		12/09/13 15:11
cis-1,2-Dichloroethene	0.837	0.100	0.0310	mg/L	100		12/09/13 19:55
Tetrachloroethene	0.000500 U	0.00100	0.000310	mg/L	1		12/09/13 15:11
trans-1,2-Dichloroethene	0.00763	0.00100	0.000310	mg/L	1		12/09/13 15:11
Trichloroethene	0.000500 U	0.00100	0.000310	mg/L	1		12/09/13 15:11
Vinyl chloride	0.00937	0.00100	0.000310	mg/L	1		12/09/13 15:11
Surrogates							
1,2-Dichloroethane-D4	95	70-120		%	1		12/09/13 15:11
4-Bromofluorobenzene	99.1	75-120		%	1		12/09/13 15:11
Toluene-d8	100	85-120		%	1		12/09/13 15:11

Batch Information

Analytical Batch: VMS13943 Analytical Method: SW8260B Analyst: HM Analytical Date/Time: 12/09/13 15:11 Container ID: 1138787004-A Prep Batch: VXX25525 Prep Method: SW5030B Prep Date/Time: 12/09/13 08:00 Prep Initial Wt./Vol.: 5 mL Prep Extract Vol: 5 mL

Results of Trip Blank

SG

Client Sample ID: **Trip Blank** Client Project ID: **0219577-2 Fairbanks Intl Ap** Lab Sample ID: 1138787005 Lab Project ID: 1138787

Collection Date: 12/05/13 08:00 Received Date: 12/07/13 11:30 Matrix: Water (Surface, Eff., Ground) Solids (%): Location:

Results by Volatile GC/MS

						Allowable	
Parameter	Result Qual	LOQ/CL	DL	<u>Units</u>	DF	Limits	Date Analyzed
Benzene	0.000200 U	0.000400	0.000120	mg/L	1		12/09/13 12:26
cis-1,2-Dichloroethene	0.000500 U	0.00100	0.000310	mg/L	1		12/09/13 12:26
Tetrachloroethene	0.000500 U	0.00100	0.000310	mg/L	1		12/09/13 12:26
trans-1,2-Dichloroethene	0.000500 U	0.00100	0.000310	mg/L	1		12/09/13 12:26
Trichloroethene	0.000500 U	0.00100	0.000310	mg/L	1		12/09/13 12:26
Vinyl chloride	0.000500 U	0.00100	0.000310	mg/L	1		12/09/13 12:26
Surrogates							
1,2-Dichloroethane-D4	99.2	70-120		%	1		12/09/13 12:26
4-Bromofluorobenzene	96.5	75-120		%	1		12/09/13 12:26
Toluene-d8	98.8	85-120		%	1		12/09/13 12:26

Batch Information

Analytical Batch: VMS13943 Analytical Method: SW8260B Analyst: HM Analytical Date/Time: 12/09/13 12:26 Container ID: 1138787005-A Prep Batch: VXX25525 Prep Method: SW5030B Prep Date/Time: 12/09/13 08:00 Prep Initial Wt./Vol.: 5 mL Prep Extract Vol: 5 mL



Results of MW-11R-120513

Client Sample ID: MW-11R-120513 Client Project ID: 0219577-2 Fairbanks Intl Ap Lab Sample ID: 1138787006 Lab Project ID: 1138787 Collection Date: 12/19/13 14:30 Received Date: 12/20/13 08:01 Matrix: Water (Surface, Eff., Ground) Solids (%): Location:

Results by Volatile GC/MS

						Allowable	
Parameter	Result Qual	LOQ/CL	DL	<u>Units</u>	DF	<u>Limits</u>	Date Analyzed
Benzene	0.00612	0.000400	0.000120	mg/L	1		12/23/13 16:07
cis-1,2-Dichloroethene	1.22	0.100	0.0310	mg/L	100		12/26/13 18:26
Tetrachloroethene	0.0147	0.00100	0.000310	mg/L	1		12/23/13 16:07
trans-1,2-Dichloroethene	0.00940	0.00100	0.000310	mg/L	1		12/23/13 16:07
Trichloroethene	0.000500 U	0.00100	0.000310	mg/L	1		12/23/13 16:07
Vinyl chloride	0.000500 U	0.00100	0.000310	mg/L	1		12/23/13 16:07
Surrogates							
1,2-Dichloroethane-D4	107	70-120		%	1		12/23/13 16:07
4-Bromofluorobenzene	101	75-120		%	1		12/23/13 16:07
Toluene-d8	90.7	85-120		%	1		12/23/13 16:07

Batch Information

Analytical Batch: VMS13960 Analytical Method: SW8260B Analyst: HM Analytical Date/Time: 12/23/13 16:07 Container ID: 1138787006-A

Analytical Batch: VMS13966 Analytical Method: SW8260B Analyst: NRB Analytical Date/Time: 12/26/13 18:26 Container ID: 1138787006-B Prep Batch: VXX25551 Prep Method: SW5030B Prep Date/Time: 12/23/13 08:00 Prep Initial Wt./Vol.: 5 mL Prep Extract Vol: 5 mL

Prep Batch: VXX25560 Prep Method: SW5030B Prep Date/Time: 12/26/13 00:00 Prep Initial Wt./Vol.: 5 mL Prep Extract Vol: 5 mL

Print Date: 01/03/2014 3:01:24PM

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Method Blank

SG

Blank ID: MB for HBN 1495261 [VXX/25525] Blank Lab ID: 1193765 Matrix: Water (Surface, Eff., Ground)

QC for Samples:

1138787001, 1138787002, 1138787003, 1138787004, 1138787005

Results by SW8260B

Parameter	Results	LOQ/CL	DL	<u>Units</u>
Benzene	0.000200U	0.000400	0.000120	mg/L
cis-1,2-Dichloroethene	0.000500U	0.00100	0.000310	mg/L
Tetrachloroethene	0.000500U	0.00100	0.000310	mg/L
trans-1,2-Dichloroethene	0.000500U	0.00100	0.000310	mg/L
Trichloroethene	0.000500U	0.00100	0.000310	mg/L
Vinyl chloride	0.000500U	0.00100	0.000310	mg/L
Surrogates				
1,2-Dichloroethane-D4	104	70-120		%
4-Bromofluorobenzene	105	75-120		%
Toluene-d8	99.4	85-120		%

Batch Information

Analytical Batch: VMS13943 Analytical Method: SW8260B Instrument: HP 5890 Series II MS1 VJA Analyst: HM Analytical Date/Time: 12/9/2013 8:59:01AM Prep Batch: VXX25525 Prep Method: SW5030B Prep Date/Time: 12/9/2013 8:00:00AM Prep Initial Wt./Vol.: 5 mL Prep Extract Vol: 5 mL



Blank Spike Summary

Blank Spike ID: LCS for HBN 1138787 [VXX25525] Blank Spike Lab ID: 1193766 Date Analyzed: 12/09/2013 09:45 Spike Duplicate ID: LCSD for HBN 1138787 [VXX25525] Spike Duplicate Lab ID: 1193767 Matrix: Water (Surface, Eff., Ground)

QC for Samples: 1138787001, 1138787002, 1138787003, 1138787004, 1138787005

Results by SW8260B

	E	Blank Spike	(mg/L)	S	pike Duplic	ate (mg/L)			
<u>Parameter</u>	Spike	Result	<u>Rec (%)</u>	<u>Spike</u>	Result	<u>Rec (%)</u>	CL	<u>RPD (%)</u>	RPD CL
Benzene	0.0300	0.0317	106	0.0300	0.0326	109	(80-120)	2.90	(< 20)
cis-1,2-Dichloroethene	0.0300	0.0286	95	0.0300	0.0301	100	(70-125)	5.10	(< 20)
Tetrachloroethene	0.0300	0.0309	103	0.0300	0.0341	114	(45-150)	9.90	(< 20)
trans-1,2-Dichloroethene	0.0300	0.0282	94	0.0300	0.0279	93	(60-140)	1.20	(< 20)
Trichloroethene	0.0300	0.0290	97	0.0300	0.0311	104	(70-125)	7.10	(< 20)
Vinyl chloride	0.0300	0.0278	93	0.0300	0.0289	96	(50-145)	3.80	(< 20)
Surrogates									
1,2-Dichloroethane-D4	0.0300	92.8	93	0.0300	93.8	94	(70-120)	1.10	
4-Bromofluorobenzene	0.0300	101	101	0.0300	101	101	(75-120)	0.40	
Toluene-d8	0.0300	94.1	94	0.0300	100	100	(85-120)	6.40	

Batch Information

Analytical Batch: VMS13943 Analytical Method: SW8260B Instrument: HP 5890 Series II MS1 VJA Analyst: HM Prep Batch: VXX25525 Prep Method: SW5030B Prep Date/Time: 12/09/2013 08:00 Spike Init Wt./Vol.: 0.0300 mg/L Extract Vol: 5 mL Dupe Init Wt./Vol.: 0.0300 mg/L Extract Vol: 5 mL

SGS

Method Blank

Blank ID: MB for HBN 1495261 [VXX/] LLL1b Blank 3a7 ID: 119L1QQ

CS for map els8: 110Q5Q5226

Rs8(1,87y SW8260B

Parap s,sr	<u>Rs8(1,8</u>	<u>30C/S3</u>	<u>D3</u>	<u>Unt,8</u>
Bsnzsns	2.222] 22U	2.222422	2.2221] 2	p g/3
- s,rauhloros,hsns	2.222L22U	2.22122	2.222012	p g/3
,ran8T1d TDtuhloros,hsns	2.222L22U	2.22122	2.222012	p g/3
- rtuhloros,hsns	2.222L22U	2.22122	2.222012	p g/3
Vtnyl uhlortds	2.222L22U	2.22122	2.222012	p g/3
Surrogates				
1d TDtuhloros, hans TD4	124	52T1] 2		%
41Brop ofl(oro7snzsns	99.L	5LT1] 2		%
-ol(snsTdQ	122	QLT1]2		%

Batch Information

Analy,tual Ba,uh: VMm10962 Analy,tual Ms,hod: mx Q 62B In8,r(p sn,: HP LQ92 msrts8 II Mm1 VJA Analy8,: HM Analy,tual Da,s/- tp s: 1] /] 0/] 210 Q4L:21AM Prse Ba,uh: VXX] LLL1 Prse Ms,hod: mx L202B Prse Da,s/- tp s: 1] /] 0/] 210 Q22:22AM Prse Int,tal x ,./Vol.: L p 3 Prse Ei ,rau, Vol: L p 3

Ma,rti: x a,sr Wh/(rfauscEff.cGro(nd)

Prtn, Da,s: 21/20/] 214 0:21:] 5PM



Blank Spike Summary

Blank Spike ID: LCS for HBN 1138787 [VXX25551] Blank Spike Lab ID: 1195189 Date t nalAyez: 12d23d2/13 / 9:/ 8 Spike D0pli4a@ ID: LCSD for HBN 1138787 [VXX25551] Spike D0pli4a@ Lab ID: 119519/ Ra@is: Ma@er xS0rfa4eW(ff,WEro0nz.

%C for Sa) plec: 1138787//g

u ec0l6c bA SW8260B

	I	Blank Spike	ex)mdL.	S	Spike D0pli4	la6ex)mdL.			
<u>Gara) eter</u>	Spike	<u>u ec0l6</u>	ue4xP.	Spike	<u>u ec0l6</u>	<u>u e4 xP.</u>	CL	<u>u GD xP .</u>	<u>u GD CL</u>
Benyene	/ ,/ 3/ /	/ ,/ 31/	1/ 3	/ ,/ 3/ /	/ ,/ 321	1/7	x8/Q12/.	3,8/	x- 2/ .
<e&a4hloroe&hene< td=""><td>/ ,/ 3/ /</td><td>/ ,/ 311</td><td>1/ T</td><td>/ ,/ 3/ /</td><td>/ ,/ 315</td><td>1/ 5</td><td>xT5Q15/.</td><td>1,1/</td><td>x- 2/ .</td></e&a4hloroe&hene<>	/ ,/ 3/ /	/ ,/ 311	1/ T	/ ,/ 3/ /	/ ,/ 315	1/ 5	xT5Q15/.	1,1/	x- 2/ .
&ancQ\2/20Di4hloroe&nene	/ ,/ 3/ /	/ ,/ 335	112	/ ,/ 3/ /	/ ,/ 3T2	11T	xg/CIT/.	2,2/	× 2/ .
<ri4hloroe6hene< td=""><td>/ ,/ 3/ /</td><td>/ ,/ 3/ 5</td><td>1/ 2</td><td>/ ,/ 3/ /</td><td>/ ,/ 3/ 2</td><td>1/ 1</td><td>x7/Cl25.</td><td>1,3/</td><td>× 2/ .</td></ri4hloroe6hene<>	/ ,/ 3/ /	/ ,/ 3/ 5	1/ 2	/ ,/ 3/ /	/ ,/ 3/ 2	1/ 1	x7/Cl25.	1,3/	× 2/ .
VinAl 4hlorize	/ ,/ 3/ /	/ ,/ 315	1/ 5	/ ,/ 3/ /	/ ,/ 328	1/ 9	x5/QT5.	T,1/	x- 2/ .
Surrogates									
1\@@0i4hloroe&hane@T	/ ,/ 3/ /	99,T	99	/ ,/ 3/ /	1/ T	1/ T	x7/C12/.	T,5/	
T®ro) ofl0orobenyene	/ ,/ 3/ /	91,T	91	/ ,/ 3/ /	98,1	98	x75Q12/.	7,//	
<ol0ene@8< td=""><td>/ ,/ 3/ /</td><td>9T,8</td><td>95</td><td>/ ,/ 3/ /</td><td>95,T</td><td>95</td><td>x85C[2/.</td><td>/ ,g7</td><td></td></ol0ene@8<>	/ ,/ 3/ /	9T,8	95	/ ,/ 3/ /	95,T	95	x85C[2/.	/ ,g7	

Batch Information

t nalA64al Ba64h: VMS13960 t nalA64al Re6hoz: SW8260B Inc60) en6 HP 5890 Series II MS1 VJA t nalAc6 HM

Grep Ba64h: VXX25551 Grep Re6hoz: SW5030B Grep Da6ed<i) e: 12/23/2013 08:00 Spike Ini6M6d/ol,: / ,/ 3/ /) md (s6ra46Vol: 5) L D0pe Ini6M6d/ol,: / ,/ 3/ /) md (s6ra46Vol: 5) L

Grin6Date: / 1d 3d2/ 1T 3:/ 1:27GR

SGS

Method Blank

Blank ID: MB for HBN 1495262 [VXX/] 226Lb Blank 3a7 ID: 11926L2

QC for Samples: 1180505LL6

Res(I,s 7y SW8260B

Parame,er	Res(I,s	<u>30Q/C3</u> D3	
utsz1d zDtugloroe,gene	L.LLL2LLU	L.LL1LL L.L	LL81L m-/3
Surrogates			
1d zDtugloroe,ganezD4	115	5Lz1] L	h
4zBromofl(oro7enTene	1L4	52z1] L	h
‰l(enezd0	90.4	02z1] L	h

Batch Information

Analy,tual Ba,ug: VMS18966 Analy,tual Me,god: Sx 0] 6LB Ins,r(men,: HP 209L Sertes II MS1 VJA Analys,: NRB Analy,tual Da,e/%tme: 1] /] 6/] L18 1] :85:LLPM Prep Ba,ug: VXX] 226L Prep Me,god: Sx 2L8LB Prep Da,e/%tme: 1] /] 6/] L18 1] :LL:LLAM Prep Int,tal x ,./Vol.: 2 m3 Prep Ei ,rau, Vol: 2 m3

Ma,rti : x a,er \\$ (rfauecEff.cGro(nd)

Prtn, Da,e: L1/L8/] L14 8:L1:] 0PM



Blank Spike Summary

Blank Spike ID: LCS for HBN 1138787 [VXX255] b9 Blank Spike La6 ID: 11t 5] b] Da/e y nalzde/: 1202] 02b13 13:bb Spike D4pliua& ID: LCSD for HBN 1138787 [VXX255] b9 Spike D4pliua& La6 ID: 11t 5] b7 s aAiM x aAer W34rfaue(, fftf. ro4n/G

g C for SaP pleR 1138787bb]

c eR4IAR6z SW8260B

	E	Blank Spike	W¶?%0LG	S	pike D4pliu	aAeWP%0LG			
<u>) araPeAer</u>	Spike	<u>c eR4IA</u>	<u>ceuWh</u> G	<u>Spike</u>	<u>c eR4IA</u>	<u>ceuWh</u> G	CL	<u>c)DWm</u> G	<u>c) D CL</u>
uiRCI (20Diu- IoroeA ene	b⊞3bb	bæ28t	t]	b £ 3bb	b⊞27]	t 2	₩bQ125 G	hE5b	₩ 2b G
Surrogates									
1(2@iu- loroeA ane@h	bÐ3bb	1b]	1b]	bæ3bb	11b	11b	₩ød[2b G	h₿b	
h@sroP ofl4oro6endene	bÐ3bb	1b3	1b3	bæ3bb	1b3	1b3	₩75Q12b G	b⊟]	
Tol4eneQ8	bÐ3bb	t 2B	t 2	bt53bb	88B	8t	W85C12bG	3Bb	

Batch Information

y nalzAual BaA⊢: VMS13966 y nalzAual s eA o/: SW8260B InRA4P enA HP 5890 Series II MS1 VJA y nalzRA NRB) rep BaAu-: VXX25560) rep s eA o/: SW5030B) rep DaAe0TiP e: 12/26/2013 00:00 Spike IniAx AB2/oIE bE33bb P%L , MARauAVoI: 5 P L D4pe IniAx AB2/oIE bE53bb P%L , MARauAVoI: 5 P L

) rinADaAe: b10b302b1h 3:b1:2t) s

Locations Nationwide Alaska Maryland New Jersey New York North Carolina Indiana West Virgina Kentucky	www.us.sgs.com	5 must be filled out.	nalysis. Page1_ of 1					REMARKS/ LOC ID					To be submitted in 2 week S	11000101			Data Deliverable Requirements:	Standard EDD Level II (NOT Equis)	<pre>tequested Turnaround Time and-or Special Instructions: Standard TAT. MW-11-120513 will be submitted in 2 weeks. Please keep SDG</pre>	open	Chain of Custody Seal: (Circle)	11 - 11 - 1 - 1 - 1	t Form) (See attached Sample Receipt Form)	conditions.htm
SGS North America Inc. CHAIN OF CUSTODY RECORD insert 1206131430		Instructions: Sections 1 - 5 must be	Omissions may delay the onset of analysis	5	TYPE	lo.301	GRAB MI = MIHi	e the second se	3G X	3G X	3G X	3 G X	NA G 1	2 G X			12-6-13 DOD Project? YES (10)	2 1000 Cooler ID:	Requested Turnaround Time and-or Special Instructions: Standard TAT. MW-11-120513 will be submitted in 2 week		Temp Blank °C: 2.5		(See attached Sample Receipt Form)	1557 http://www.sgs.com/terms and conditions.htm
SGS Nort CHAIN OF CU insert 1			907-458-8276	0219577-2		@ERM.COM		TIME MATRIX/ MATRIX HH:MM CODE	1200 W	1245 W	1025 W	1105 W	W	800 W		_	Received By:	N 1	Received By:	Received By:		Received For Laboratory By:		:343 Fax: (907) 561-53 -1903 Fax: (910) 350-1
38787		ERM ALASKA	:ON	PROJECT/ PWSID/ PERMIT#:	E-MAIL:	NELLIE.BALLOU@ERM.COM	.0.#:	DATE mm/dd/yy	12/5/2013	12/5/2013	12/5/2013	12/5/2013	1	12/5/2013				12.6.3 14.	Date Time	Date Time		Date Time	< <u>.</u> .	99518 Tel: (907) 562-2 2 28405 Tel: (910) 350
5		ц Т	NELLIE BALLOU PI	airbanksInternational Airport		NELLIE.BALLOU@ERM.COM NE	ERMWESTACCOUNTSPAYABLE@ERM.COM P.O.#:	SAMPLE IDENTIFICATION	MW-38S-120513	MW-38D-120513	MW-40-120513	MW-41-120513	MW-11-120513	Trip Blank			ied By: (1)	1 X SUN	(d Byr(2)	d By:+(3)		id By: (4)] 200 W. Potter Drive Anchorage, AK 99518 Tel: (907) 562-2343 Fax: (907) 561-5304-] 5500 Business Drive Wilmington, NC 28405 Tel: (910) 350-1903 Fax: (910) 350-1557
		CLIENT:	CONTACT:	PROJECT NAME:	REPORTS TO:	NELLIE	ERMWESTAC	RESERVED for lab use	AAC AC	D AC	3 A-C	C A.C	N	© A-C			Relinquished By: (1)	010	Relinquished	Relinquished By: (3)		Relinquished By: (4)		[] 200 W. F [] 5500 Bu

F083-Kit_Request_and_COC_Templates-Blank Revised 06-13-2012



1138787

SAMPLE RECEIPT FORM

D	0 111	
Review Criteria:	Condition:	Comments/Action Taken:
stody seals intact? Note # & location, if applicable.	Yes No N/A	
companied samples?	(Yes No N/A	
erature blank compliant* (i.e., 0-6°C after CF)?	Yes No N/A	
2: Exemption permitted for chilled samples collected less than 8 hours ago.		
ler ID: @ _5.5_ w/ Therm.ID: _ 203		
oler ID: @ w/ Therm.ID:		
ooler ID: @ w/ Therm.ID:		
cooler ID: @ w/ Therm.ID:		
Cooler ID: @ w/ Therm.ID:		
Note: If non-compliant, use form FS-0029 to document affected samples/analyses.		
If samples are received without a temperature blank, the "cooler		
temperature" will be documented in lieu of the temperature blank &		
"COOLER TEMP" will be noted to the right. In cases where neither a		
temp blank <u>nor</u> cooler temp can be obtained, note "ambient" or "chilled."	V V G	
If temperature(s) <0°C, were all sample containers-ice free?	Yes No APA	
Delivery method (specify all that apply):	Note ABN/	
USPS Alert Courier C&D Delivery AK Air	tracking #	
Lynden Carlile ERA PenAir	Can Attached	
FedEx UPS NAC Other:	See Attached	
\rightarrow For WO# with airbills, was the WO# & airbill	or N/A	
info recorded in the Front Counter eLog?	Yes No NA	10-4-07
\rightarrow For samples received with payment, note amount (\$) and		circle one) or note:
→ For samples received in FBKS, ANCH staff will verify all criteri		SRF Initiated by: N/A
Were samples received within hold time?	(Yes) No N/A	ord induce of. Of Thirt
Note: Refer to form F-083 "Sample Guide" for hold time information.	UCS NO NA	
Do samples match COC * (i.e., sample IDs, dates/times collected)?	Yes No N/A	
* Note: Exemption permitted if times differ <1hr; in that case, use times on COC.		
Were analyses requested unambiguous?	Ges No N/A	
Were samples in good condition (no leaks/cracks/breakage)?	Yes No N/A	
Packing material used (specify all that apply): Bubble Wrap		
Separate plastic bags Vermiculite Other:		
Were all VOA vials free of headspace (i.e., bubbles ≤6 mm)?	Yes No N/A	
Were all soil VOAs field extracted with MeOH+BFB?		
	Yes No NA	Contraction and the contract of the contract o
Were proper containers (type/mass/volume/preservative*) used?	Yes No N/A	
* Note: Exemption permitted for waters to be analyzed for metals. Were Trip Blanks (i.e., VOAs, LL-Hg) in cooler with samples?		
	(Yes No N/A	
For special handling (e.g., "MI" or foreign soils, lab filter, limited	Yes No NA	
volume, Ref Lab), were bottles/paperwork flagged (e.g., sticker)?		
For preserved waters (other than VOA vials, LL-Mercury or	Yes No (1/A	
microbiological analyses), was pH verified and compliant?	6	
If pH was adjusted, were bottles flagged (i.e., stickers)?	Yes No N/A	
For RUSH/SHORT Hold Time, were COC/Bottles flagged	Yes No (N/A)	
accordingly? Was Rush/Short HT email sent, if applicable?		
For SITE-SPECIFIC QC, e.g. BMS/BMSD/BDUP, were	Yes No NA	
containers / paperwork flagged accordingly?		
For any question answered "No," has the PM been notified and	Yes No MA	SRF Completed by: SLC 12/7/13
the problem resolved (or paperwork put in their bin)?		PM = N/A
Was PEER REVIEW of sample numbering/labeling completed?	Yes No N/A	Peer Reviewed by: N/A
Additional notes (if applicable):		
	ales THO	
* Keep WO open for about 2 we	Leks SAAV	

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



SGS WO#

1138787

SAMPLE RECEIPT FORM FOR TRANSFERS

Note: This form is to be completed by Anchorage Sample Receiving staff for all shipments received at SGS-Anchorage from SGS-Fairbanks.

Were samples received numbered with all criteria on Sample Receipt Form F0004 documented by Fairbanks Sample Receiving staff? If "No," Anchorage Sample Receiving staff must complete the receiving process & document pH verification, sample condition, etc. on the SRF initiated by Fairbanks staff (attached).	Yes (No) N/A	Use space below for additional notes
	÷	
Review Criteria:	Condition:	Comments/Action Taken:
Were custody seals intact?	Yes No N/A	IFIB
Note # & location:	\bigcirc	
COC accompanied samples?	(es) No N/A	
Temperature blank compliant (i.e., 0-6°C after correction factor)?	Ves No N/A	
Cooler ID: $\underline{\qquad} @ \underline{\qquad} . \underline{\qquad} w/ \text{Therm.ID: } \underline{\qquad} U$	0	*
Cooler ID: @ À. 1 w/ Therm.ID: QMD Cooler ID: @ w/ Therm.ID:	0	~
Cooler ID: @ w/ Therm.ID: Cooler ID: @ w/ Therm.ID:	0	~
Cooler ID: @ w/ Therm.ID: Cooler ID: @ w/ Therm.ID: Cooler ID: @ w/ Therm.ID:	0	~
Cooler ID: @ w/ Therm.ID:		~
Cooler ID: @ w/ Therm.ID: Note: If non-compliant, use form FS-0029 to document affected samples/analyses.		~
Cooler ID: @ w/ Therm.ID: If non-compliant, use form FS-0029 to document affected samples/analyses. If samples are received without a temperature blank, the "cooler		κ.
Cooler ID: @ w/ Therm.ID: If non-compliant, use form FS-0029 to document affected samples/analyses. If samples are received without a temperature blank, the "cooler temperature" will be documented in lieu of the temperature blank & "COOLER TEMP will be noted to the right. In cases where neither a		~
Cooler ID: @ w/ Therm.ID: Note: If non-compliant, use form FS-0029 to document affected samples/analyses. If samples are received without a temperature blank, the "cooler temperature" will be documented in lieu of the temperature blank & "COOLER TEMP will be noted to the right. In cases where neither a temp blank nor cooler temp can be obtained, note "ambient" or "chilled."		~
Cooler ID: @ w/ Therm.ID: Note: If non-compliant, use form FS-0029 to document affected samples/analyses. If samples are received without a temperature blank, the "cooler temperature" will be documented in lieu of the temperature blank & "COOLER TEMP will be noted to the right. In cases where neither a temp blank nor cooler temp can be obtained, note "ambient" or "chilled." If temperature(s) <0°C, were all containers ice free?	Yes No (N/A)	κ.
Cooler ID: @ w/ Therm.ID: Note: If non-compliant, use form FS-0029 to document affected samples/analyses. If samples are received without a temperature blank, the "cooler temperature" will be documented in lieu of the temperature blank & "COOLER TEMP will be noted to the right. In cases where neither a temp blank nor cooler temp can be obtained, note "ambient" or "chilled." If temperature(s) <0°C, were all containers ice free?		с.
Cooler ID: @ w/ Therm.ID: Note: If non-compliant, use form FS-0029 to document affected samples/analyses. If samples are received without a temperature blank, the "cooler temperature" will be documented in lieu of the temperature blank & "COOLER TEMP will be noted to the right. In cases where neither a temp blank nor cooler temp can be obtained, note "ambient" or "chilled." If temperature(s) <0°C, were all containers ice free?		с.
Cooler ID: @ w/ Therm.ID: Note: If non-compliant, use form FS-0029 to document affected samples/analyses. If samples are received without a temperature blank, the "cooler temperature" will be documented in lieu of the temperature blank & "COOLER TEMP will be noted to the right. In cases where neither a temp blank nor cooler temp can be obtained, note "ambient" or "chilled." If temperature(s) <0°C, were all containers ice free?		с.

Locations Nationwide Alaska Maryland New Jersey New York North Carolina Indiana West Virgina Kentucky	5 must be filled out.	nalysis. Page _1_of 1					REMARKS/ LOC ID							Data Deliverable Requirements:	Standard EDD Level II (NOT Equis)	nd-or Special Instructions:	I HIS SAMPLE IS PART OF WORK URDER	11307.01	Chain of Custody Seal: (Circle)	INTACT BROKEN ABSENT t Form) (See attached Sample Receipt Form)	conditions.htm
	Sections 1 - 5 must be	Omissions may delay the onset of analysis.												DOD Project? YES NO	Cooler ID:	Requested Turnaround Time and-or Special Instructions:			Temp Blank °C: 1 . (or Ambient [] (See attached Sample Receipt Form)	http://www.sgs.com/terms and conditions.htm
SGS North America Inc. HAIN OF CUSTODY RECORD insert 1206131430	Instructions: Se	Omissions may	# Preserv-3 ative c Used: AC	505	ЗЭТ,			3G X						× 124913	122 1500	5				Received For Laboratory By:	-5301 50-1557
SGS NG HAIN OF inser		3-8276	577-2	M.COM	60		MATRIX/ MATRIX CODE	3						Received By:	1 shall	Received By:		Received by:		Received Fo	Fax: (907) 561 Fax: (910) 35
287		907-458-8276	021957	: NELLIE.BALLOU@ERM.COM	10909		TIME HH:MM	1430			-			Time	1500	Time	(100)	IIIIe		Time G.A.S	7) 562-2343 10) 350-1903
3878	ERM ALASKA	PHONE NO:	PROJECT/ PWSID/ PERMIT#:	E-MAIL: NELLIE.B	UOTE #:	P.O. #:	DATE mm/dd/yy	12/19/13	•					Date	12/19/13	Date	1414	Date		Date 12-20-13	9518 Tel: (907
		NELLIE BALLOU PI	FR FairbanksInternational _{PW} Airport PE	ALLOU@FRM COM	VELLIE.BALLOU@ERM.CONQUOTE #:	ERMWESTACCOUNTSPAYABLE@ERM.COM P.	SAMPLE IDENTIFICATION	-C_MW-11R-120513						ed By: (1)	Rline	id By: (2)	(L C	ed by: (3)		id By: (4)	× 200 W. Potter Drive Anchorage, AK 99518 Tel: (907) 562-2343 Fax: (907) 561-5301 5500 Business Drive Wilmington, NC 28405 Tel: (910) 350-1903 Fax: (910) 350-1557
		CONTACT:	PROJECT NAME:	REPORTS TO: NFLLIF BU	INVOICE TO:	ERMWESTA	RESERVED for lab use	(C)A-C)					Relinquished By: (1)	Renal	Relinquished By: (2)	litra	Kellinguished by: (3)		Relinquished By: (4)	1 5500 Bt

F083-Kit_Request_and_COC_Templates-Blank Revised 06-13-2012





SAMPLE RECEIPT FORM

Review Criteria:	Condition:	Comments/Action Taken:
Were custody seals intact? Note # & location, if applicable.	Yes No N/A	1.
COC accompanied samples?	(Yes No N/A	1 –
Temperature blank compliant* (i.e., 0-6°C after CF)?	(Yes No N/A	
* Note: Exemption permitted for chilled samples collected less than 8 hours ago.		
Cooler ID: @ @ W Therm.ID: _205		
Cooler ID: @ w/ Therm.ID:		
Cooler ID: @ w/ Therm.ID:		
Cooler ID: @		
Cooler ID: @ w/ Therm.ID:		
Note: If non-compliant, use form FS-0029 to document affected samples/analyses.		
If samples are received <u>without</u> a temperature blank, the "cooler		
temperature" will be documented in lieu of the temperature blank &		
"COOLER TEMP" will be noted to the right. In cases where neither a		
temp blank nor cooler temp can be obtained, note "ambient" or "chilled."		
If temperature(s) <0°C, were all sample containers ice free?	Yes No MA	
Delivery method (specify all that apply):	Note ABN/	
USPS Alert Courier C&D Delivery AK Air	tracking #	
Lynden Carlile ERA PenAir	0	
FedEx UPS NAC Other:	See Attached	
\rightarrow For WO# with airbills, was the WO# & airbill	or N/A	
info recorded in the Front Counter eLog?	Yes No NA	
\rightarrow For samples received with payment, note amount (\$) and		(circle one) or note:
\rightarrow For samples received in FBKS, ANCH staff will verify all criter		SRF Initiated by: $\int V N/A$
Were samples received within hold time?	(Yes) No N/A	
Note: Refer to form F-083 "Sample Guide" for hold time information.		
Do samples match COC* (i.e., sample IDs, dates/times collected)?	(Yes) No N/A	
* Note: Exemption permitted if times differ <1hr; in that case, use times on COC.		
Were analyses requested unambiguous?	(Yes) No N/A	
Were samples in good condition (no leaks/cracks/breakage)?	Yes No N/A	
Packing material used (specify all that apply): Bubble Wrap		
Separate plastic bags Vermiculite Other:		
Were all VOA vials free of headspace (i.e., bubbles ≤6 mm)?	(Yes)No N/A	
Were all soil VOAs field extracted with MeOH+BFB?	Yes No NTA	
Were proper containers (type/mass/volume/preservative*) used? (Yes No N/A	
* Note: Exemption permitted for waters to be analyzed for metals.	-	
Were Trip Blanks (i.e., VOAs, LL-Hg) in cooler with samples?	Yes No N/A	client did not want a
For special handling (e.g., "MI" or foreign soils, lab filter, limited	Yes No (N/A)	Client did not want a TB with sample, -JABD-
volume, Ref Lab), were bottles/paperwork flagged (e.g., sticker)?		
For preserved waters (other than VOA vials, LL-Mercury or	Yes No MA	
microbiological analyses), was pH verified and compliant?	P	
If pH was adjusted, were bottles flagged (i.e., stickers)?	Yes No N/A	
For RUSH/SHORT Hold Time, were COC/Bottles flagged	Yes No NA	
accordingly? Was Rush/Short HT email sent, if applicable?		
For SITE-SPECIFIC QC, e.g. BMS/BMSD/BDUP, were	Yes No NA	
containers / paperwork flagged accordingly?		
For any question answered "No," has the PM been notified and	Yes No NA	SRF Completed by: SLC 12-20-13
the problem resolved (or paperwork put in their bin)?	100 110 (111)	PM = N/A
Was PEER REVIEW of <i>sample numbering/labeling completed?</i>	Yes No N/A	Peer Reviewed by: N/A
Additional notes (if applicable):	100 110 117	

Additional notes (if applicable):

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





SAMPLE RECEIPT FORM FOR TRANSFERS

Note: This form is to be completed by Anchorage Sample Receiving staff for all shipments received at SGS-Anchorage from SGS-Fairbanks.

Were samples received numbered with all criteria on Sample Receipt Form F0004 documented by Fairbanks Sample Receiving staff? If "No," Anchorage Sample Receiving staff must complete the receiving process & document pH verification, sample condition, etc. on the SRF initiated by Fairbanks staff (attached).	Yes No N/A	Use space below for additional notes
Review Criteria:	Condition:	Comments/Action Taken:
Were custody seals intact?	(Yes) No N/A	IFIB
Note # & location:		
COC accompanied samples?	(Yes) No N/A	
Temperature blank compliant (i.e., 0-6°C after correction factor)?	Ves No N/A	
Cooler ID: @ w/ Therm.ID:		
Cooler ID: (a) (b) (c) (c)		
Cooler ID: @ w/ Therm.ID:		
Cooler ID: @ w/ Therm.ID:		
Tiole. If non-compliant, use joint 1 b out to use anticit affection out press and press		
If samples are received without a temperature blank, the "cooler		
temperature" will be documented in lieu of the temperature blank &		
"COOLER TEMP will be noted to the right. In cases where neither a		
temp blank <u>nor</u> cooler temp can be obtained, note "ambient" or "chilled."	Yes No (N/A)	
If temperature(s) <0°C, were all containers ice free?		
Delivery method: Lynden> Other:		
Completed by:		
T		

Container Id	Preservative	Container Condition	Container Id
1138787001-A	HCL to pH < 2	OK	
1138787001-B	HCL to pH < 2	OK	
1138787001-C	HCL to pH < 2	OK	
1138787002-A	HCL to pH < 2	ОК	
1138787002-B	HCL to pH < 2	OK	
1138787002-C	HCL to pH < 2	ОК	
1138787003-A	HCL to pH < 2	ОК	
1138787003-B	HCL to pH < 2	OK	
1138787003-C	HCL to pH < 2	ОК	
1138787004-A	HCL to pH < 2	ОК	
1138787004-B	HCL to pH < 2	ОК	
1138787004-C	HCL to pH < 2	ОК	
1138787005-A	HCL to pH < 2	ОК	
1138787005-B	HCL to pH < 2	ОК	
1138787005-C	HCL to pH < 2	ОК	
1138787006-A	HCL to pH < 2	ОК	
1138787006-B	HCL to pH < 2	OK	
1138787006-C	HCL to pH < 2	ОК	

Container Condition

Preservative

Container Condition Glossary

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

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.

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

ATTACHMENT 8

QAR and ADEC Laboratory Data Checklist

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Laboratory Data Review Checklist

Comp	leted by:	Melissa Pike									
Title:		Environmental	Scientist		Date:	Jan 7, 2014					
CS Re	port Name:	Fairbanks Airp	ort – Drainage P	ond Report	Report Date:	January 2014					
Consu	ltant Firm:	ERM Alaska, I	nc.								
Labora	atory Name:	SGS North Am	erica	Laboratory Report Number: 1138787							
ADEC	File Number:			ADEC RecKey N	Number:						
1. L	aboratory										
	-	ADEC CS appro	oved laboratory r	eceive and perform	all of the submitted	sample analyses?					
	• Yes	\bigcirc No	○ NA (Plea	-	Comments:	1 2					
		*		er "network" laborate g the analyses ADE	ory or sub-contracted C CS approved?	d to an alternate					
	• Yes	\bigcirc No	○NA (Pleas	e explain)	Comments:						
5	Samples were the	ransferred from	SGS Fairbanks t	o SGS Anchorage.							
2. <u>Ch</u>	ain of Custody	<u>(COC)</u>									
	a. COC infor	mation complete	ed, signed, and d	ated (including rele	ased/received by)?						
_	• Yes	⊖ No	○NA (Pleas	se explain)	Comments:						
	h Correct ar	alyses requested	19								
	• Yes	○ No		ase explain)	Comments:						
3. <u>La</u>	boratory Sampl	e Receipt Docur	mentation								
	a. Sample/co	oler temperature	e documented an	d within range at rea	ceipt $(4^\circ \pm 2^\circ C)$?						
	• Yes	○ No	⊖NA (Ple	ease explain)	Comments:						
	Sample coolers	were received a	t 5.5°C, 3.6°C ai	nd 1.6°C. No qualifi	cations due to tempe	erature.					

b. Sample preservation acceptable - aci	lified waters, Methar	nol preserved VOC	soil (GRO, BTEX,
Volatile Chlorinated Solvents, etc.)?			

• Yes	\bigcirc No	○NA (Please explain)	Comments:
c. Sample co	ndition docume	ented - broken, leaking (Methanol),	zero headspace (VOC vials)?
• Yes	⊖ No	○NA (Please explain)	Comments:
Samples arrived	in good condit	ion.	
	• 1	•	or example, incorrect sample containers/ insufficient or missing samples, etc.?
○ Yes	\bigcirc No	•NA (Please explain)	Comments:
There were no di	screpancies.		
e. Data qualit	ty or usability a	ffected? (Please explain)	
			Comments:
Data quality and	l usability was i	not affected with respect to the labo	pratory sample receipt documentation.
Case Narrative			
	l understandabl	ວໃ	
• Yes	○ No	○NA (Please explain)	Comments:
b. Discrepand	cies, errors or Q	C failures identified by the lab?	
• Yes	⊖ No	○NA (Please explain)	Comments:
c. Were all co	orrective action	s documented?	
\bigcirc Yes	\bigcirc No	• NA (Please explain)	Comments:
There were no c	orrective actior	18.	
d. What is the	e effect on data	quality/usability according to the c	case narrative? Comments:

Data quality and usability is not affected with respect to the case narrative.

4.

5. Samples Results

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

• Yes	⊖ No	○NA (Please explain)	Comments:
b. All applicat	ble holding tim	nes met?	
• Yes	\bigcirc No	○NA (Please explain)	Comments:
c. All soils rep	orted on a dry	weight basis?	
⊖ Yes	⊖ No	• NA (Please explain)	Comments:
There were no so	il samples sub	mitted.	
d. Are the repo project?	orted PQLs les	ss than the Cleanup Level or the min	imum required detection level for the
• Yes	\bigcirc No	○NA (Please explain)	Comments:
Lab report uses I	LOQ terminolo	ogy. All PQLs/LOQs were less than	or equal to cleanup levels.
	1 *1*,		
e. Data quality	or usability a	ffected? (Please explain)	Comments:
Data quality and	usability is no	t affected with respect to the reporte	d sample results.
OC Samples			
a. Method Blan	ık		
i. One me	thod blank rep	ported per matrix, analysis and 20 sa	mples?
• Yes	s O No	○ NA (Please explain)	Comments:
		Its less than PQL?	Commenter
• Ye	s 🔿 No	○NA (Please explain)	Comments:
iii If abov	o DOL what a	amples are affected?	Comments:
NA. All results a	-		connents.

6.

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

\bigcirc Yes	⊖ No	• NA (Please explain)	Comments:	
NA. All results a	are <pql.< th=""><td></td><td></td><td></td></pql.<>			
	1. 1.1	iter offerster 19 (Discourse and isin)		

v. Data quality of usability affected?	(Please explain)	Comments:
Data quality and usability is 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 ○ NA (Please explain) Comments:

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

 \bigcirc Yes \bigcirc No \bigcirc NA (Please explain) Comments:

There are no inorganic or metal analysis.

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

$\bullet Yes \qquad \bigcirc No \qquad \bigcirc NA (Please explain)$	Comments:
--	-----------

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

• Yes	\bigcirc No	○NA (Please explain)	Comments:	

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

Comments:

NA, all LCS/LCSD %R and RPDs were within limits.

vi. Do the affected sam	ples(s) have da	ta flags? If so, a	re the data flags	clearly defined?

\bigcirc Yes	⊖ No	• NA (Please explain)	Comments:
NA, all LCS/LO	CSD %R and R	RPDs were within limits.	
vii. Data o	quality or usab	ility affected? (Please explain)	Comments:
Data quality an	d usability is n	not affected.	
-	- Organics On		
	e	es reported for organic analyses - fi	
• Yes	○ No	ONA (Please explain)	Comments:
project sp	• •	if applicable. (AK Petroleum meth	hin method or laboratory limits? And ods 50-150 %R; all other analyses see
• Yes	\bigcirc No	○NA (Please explain)	Comments:
	-	s with failed surrogate recoveries ha	ave data flags? If so, are the data flags
iii. Do the clearly de ○ Yes	-	s with failed surrogate recoveries ha	ave data flags? If so, are the data flags Comments:
clearly de	fined?	• NA (Please explain)	
clearly de C Yes IA. All %R wer	fined? No re within limits	• NA (Please explain)	Comments:
clearly de O Yes IA. All %R wer iv. Data q	fined? No re within limits uality or usabi	• NA (Please explain)	Comments: x to explain.). Comments:
clearly de O Yes IA. All %R wer iv. Data q Data quality and d. Trip Blank <u>Soil</u> i. One trip	fined? No re within limits uality or usabi l usability is no - Volatile ana	 NA (Please explain) S. lity affected? (Use the comment box of affected with respect to the report lyses only (GRO, BTEX, Volatile C d per matrix, analysis and for each of 	Comments: x to explain.). Comments:
clearly de O Yes IA. All %R wer iv. Data q Data quality and d. Trip Blank <u>Soil</u> i. One trip	fined? No re within limits uality or usabi l usability is no - Volatile ana b blank reporte	 NA (Please explain) S. lity affected? (Use the comment box of affected with respect to the report lyses only (GRO, BTEX, Volatile C d per matrix, analysis and for each of 	Comments: x to explain.). Comments: ted surrogate results. Chlorinated Solvents, etc.): <u>Water and</u>
clearly de O Yes IA. All %R wer iv. Data q Data quality and d. Trip Blank <u>Soil</u> i. One trip (If not, en • Yes ii. Is the c	fined? No re within limits uality or usabi usability is no - Volatile anal blank reportenter explanation No cooler used to t	 NA (Please explain) S. lity affected? (Use the comment boot affected with respect to the reported of the reported o	Comments: x to explain.). Comments: ted surrogate results. Chlorinated Solvents, etc.): Water and cooler containing volatile samples? Comments:

iii. All resu	ilts less than H	PQL?			
• Yes	○ No	○ NA (Please explain.)	Comments:		
iv. If abox	e POL what	samples are affected?			
11. 11 4001	c I QL, what	samples are affected.			
			Comments:		
NA. All trip blan	k results were	e less than PQL.			
v. Data qu	ality or usabil	ity affected? (Please explain.)			
			Comments:		
Data quality and	usability wer	e not affected.			
e. Field Duplic	ate				
-		omitted per matrix, analysis and 10) project samples?		
• Yes	\bigcirc No	○NA (Please explain)	Comments:		
primary MW-40	-120513 with	duplicate MW-41-200513			
ii. Submit	ted blind to la	b?			
• Yes	⊖ No	○ NA (Please explain.)	Comments:		
		ve percent differences (RPD) less t 6 water, 50% soil)	than specified DQOs?		
	I	RPD (%) = Absolute Value of: $(R_1$.	$- R_2$ x 100		
		((R ₁₊ I			
	$_1$ = Sample Co				
R_2 = Field Duplicate Concentration					
• Yes	⊖ No	○NA (Please explain)	Comments:		
iv. Data q	uality or usabi	lity affected? (Use the comment be	ox to explain why or why not.)		
⊖ Yes	• No	○NA (Please explain)	Comments:		
Data quality and	usability is no	ot affected with respect to the repo	rted field duplicate results.		

f. 1	f. Decontamination or Equipment Blank (if applicable)						
	⊖ Yes	\bigcirc No	• NA (Please explain)	Comments:			
Deco	Decontamination or Equipment blanks were not required. All sampling equipment was disposable.						
	i. All results less than PQL?						
	○ Yes	⊖ No	• NA (Please explain)	Comments:			
Deco	ntamination	or Equipment	blanks were not required. All sat	mpling equipment was disposable.			
	ii. If above PQL, what samples are affected? Comments:						
NA. I	Decontamina	tion or Equip	ment blanks were not required. A	ll sampling equipment was disposable.			
	iii. Data quality or usability affected? (Please explain.) Comments:						
NA.	NA. Decontamination or Equipment blanks were not required. All sampling equipment was disposable.						
	Other Data Flags/Qualifiers (ACOE, AFCEE, Lab Specific, etc.)						
a	a. Defined and appropriate?						
	• Yes	⊖ No	○NA (Please explain)	Comments:			
Refe	Refer to laboratory data qualifiers section.						

Reset Form

1. QUALITY ASSURANCE REVIEW

Laboratory QA/QC data associated with the analysis of project samples has been reviewed to evaluate the integrity of the analytical data generated during the December 2013 water sampling events at the Fairbanks International Airport Drainage Pond Site, Fairbanks, Alaska. Samples were collected, reported, and shipped in general accordance with the ADEC-approved work plan (ERM 2013).

All data were reviewed in accordance with appropriate EPA procedural guidance documents (EPA 2009) and ADEC regulatory guidance documents (ADEC 2009; 2012). An ADEC laboratory checklist was performed (ADEC 2010). This data review focuses on criteria for the following QA/QC parameters and their effect on the quality of data and usability: sample handling and chain-of-custody (CoC) documentation; holding time compliance; field QA/QC (trip blanks, field duplicate) results; laboratory QA/QC (method blanks, laboratory control samples, surrogates, matrix spike duplicate [MS/MSD]); results and analytical methods; method reporting limits; precision and accuracy; and completeness.

The details of this review and qualification of the data are summarized in the following sections

1.1. Sample Handling and Chain of Custody

Water samples were delivered to SGS in Fairbanks, Alaska and transferred to SGS in Anchorage, Alaska for analysis. Samples were analyzed for volatile organic compounds (VOC) by EPA Method 8260B.

SGS analytical results were reported in one sample delivery group (SDG), 1138787.

All sample coolers were shipped with custody seals intact. CoC forms, laboratory sample receipt forms, and case narratives were reviewed to evaluate the integrity of the samples and the quality of the associated data.

All sample containers in the sample coolers were received at the laboratory intact and within the specified temperature range of $4^{\circ}C$ +/- $2^{\circ}C$, with the following exception. Sample MW-11R-1201513 collected on 12/19/2013 was received by SGS in Fairbanks at 1.6°C. No results were qualified due to temperature.

1.2. Holding Time Compliance

All samples were extracted, digested and analyzed within the holding time criteria for the applicable analytical methods and in accordance with work plan specifications.

1.3. Field QA/QC

Field QA/QC protocols are designed to measure for potential sample bias as a result of sampling procedures and possible contamination during collection and transport of samples. Collection and analysis of field duplicates facilitates an evaluation of precision that takes into account potential variables associated with sampling procedures, site

heterogeneity and laboratory analyses. Trip blanks are used to monitor sample containers and possible cross-contamination of samples. For this project, both trip blanks and field duplicates were submitted.

1.3.1. Trip Blanks

Trip blanks were prepared by the laboratory, shipped to the site with the empty sample bottles/containers, stored with sample containers during the field event, and transported with the collected samples back to the laboratory for analysis.

Trip blanks were placed in the cooler with associated matrix-specific volatile organics samples. All analytes detected in the trip blanks were below the detection limit (DL) for all analytes.

1.3.2. Field Duplicates

Out of a total of 4 primary water samples submitted, there was 1 field duplicate sample submitted – primary MW-40-120513 with duplicate MW-41-200513.

When analytes were detected in both duplicate pairs above the RL, the relative percent differences (RPDs) between the analytes were calculated. All RPDs between primary and duplicate met the ADEC recommended limit of RPDs <30% for water samples.

1.4. Laboratory QA/QC

1.4.1. Laboratory Blanks

Laboratory/ Method blanks were analyzed concurrent with an analytical batch of 20 or fewer primary samples for each of the analytical methods performed on project samples. Target analytes were not detected (U) in any laboratory blanks.

1.4.2. Surrogates

System Monitoring Compounds (surrogates) are specified for organic chromatographic analytical procedures. Surrogates are compounds similar to target analytes and are added to each sample prior to collection or extraction. Subsequent surrogate recovery indicates overall method performance. Surrogate recoveries were within prescribed control limits for all primary samples, method blanks, LCS/LCSD, MS/MSD and other QA/QC samples.

1.4.3. Laboratory Control Samples

The laboratory monitors internal precision and accuracy for each analytical batch with a set of laboratory control samples and laboratory control sample duplicate (LCS/LCSD). Two sample aliquots of the same sample are taken in the analytical laboratory and analyzed separately with identical procedures. Analyses of the sample and duplicate give a measure of the precision associated with laboratory procedures but not with sample collection, preservation or storage procedures. A known quantity of target analytes are added to blank laboratory control samples prior to extraction and analysis and recoveries are calculated. Acceptable recovery criteria vary with each analytical

method and matrix. All LCS/LCSD samples met laboratory and project QC goals for target analytes in all SDGs.

1.4.4. Matrix Spikes

Matrix spike/matrix spike duplicate (MS/MSD) analyses were performed. Matrix spikes have a known quantity of target analytes added (spiked) to field samples. Spike recoveries are calculated and are used to evaluate both site conditions and laboratory quality control. Matrix spikes met recovery percentages (%R) and relative percent difference (RPD) limits.

1.4.5. Detection Limits (Sensitivity)

Sample results that were between the DL and the Limit of Quanitation (LOQ) were qualified as estimated (J). Sample results that were below the DL were qualified as not detected (ND) at the Limit of Detection (LOD), which is one half the LOQ. The laboratory established DL were below the ADEC cleanup levels.

1.5. Precision and Accuracy

Precision criteria monitor analytical reproducibility. Accuracy criteria monitor agreement of measured results with "true values" established by spiking applicable samples with a known quantity of analyte or surrogate. Precision and accuracy were evaluated by comparing LCS/LCSDs MS/MSDs and field duplicate pairs for this project. Field duplicates and MS/MSD samples were collected in accordance with work plan specifications. Field duplicate RPDs met applicable control limits. Recoveries and RPDs for all LCS/LSCD and MS/MSD samples were within required limits except as noted in Laboratory QC section.

1.5.1. Completeness

Data completeness is defined as the percentage of usable data (usable data divided by the total possible data). The overall project completeness goal is 90%:

% completeness = <u>number of valid (i.e., non-R flagged) results</u> number of possible results

All requested analyses were performed in accordance with Work Plan specifications. No samples were qualified as unusable (i.e., "R"). Completeness for this project is 100.0%.

1.5.2. Representativeness

Data representativeness expresses the degree to which sample data accurately and precisely represent a characteristic of a population, parameter variations at a sampling point, or environmental condition. The number and selection of samples were specified in the work plan and verified in the field to account accurately for site variations and sample matrices. The data quality objective (DQO) for representativeness was met.

1.5.3. Comparability

Comparability is a qualitative parameter expressing the confidence with which one data set can be compared to another. Data produced for this project followed applicable field sampling techniques and specific analytical methodology. The DQO for comparability was met.

1.6. Data Summary

In general, the overall quality of the data was acceptable. The data quality was determined as acceptable or estimated. Acceptable data are associated with QC data that meet all QC criteria or with QC samples that did not meet QC criteria but data quality objectives were not affected. Estimated J results are considered inaccurate or estimated QC acceptance criteria which were not met. No results were rejected. The EPA National Functional Guidelines (EPA 2008) were used to evaluate the acceptability of the data.

Data quality meets established DQO established for this project. With the exceptions noted above, all data are suitable for their intended use.

2. REFERENCES

- ADEC. 2009. Technical Memorandum: Environmental Laboratory Data and Quality Assurance Requirements. March.
- ADEC. 2010. Laboratory Data Review Checklist. Version 2.7. January.
- ADEC. 2012. Technical Memorandum: Guidelines for Data Reporting, Data Reduction, and Treatment of Non-detect Values. June.
- EPA. 2008. Contract Laboratory Program National Functional Guidelines for Organic Data Review (EPA 540/R-94/012). June.
- ERM. 2013. Fairbanks International Airport Fuel Hydrant Work Plan, Fairbanks, Alaska. ADEC File No. 100.38.128. October.

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