



Pacific Air Forces Regional Support Center

Joint Base Elmendorf-Richardson, Alaska

2017 ANNUAL GROUNDWATER MONITORING REPORT

**FORMER RADIO RELAY STATION
PORT HEIDEN, ALASKA**

**Final
June 2019**

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ACRONYMS AND ABBREVIATIONS

611 CES	611 Civil Engineer Squadron
AAC	Alaska Administrative Code
ADEC	Alaska Department of Environmental Conservation
APCS	APC Services, LLC
bgs	below ground surface
BLO	Black Lagoon Outfall
CERCLA	Comprehensive Environmental Response, Compensation, and Liability Act
COC	contaminant of concern
DL	detection limit
DQA	Data Quality Assessment
DRO	diesel-range organics
DSA	Drum Storage Area
DTW	depth to water
FPC	Former Pipeline Corridor
GAC	granulated activated carbon
GLO	Gray Lagoon Outfall
GRO	gasoline-range organics
LOQ	limit of quantitation
mg/kg	milligrams per kilogram
mg/L	milligrams per liter
MNA	monitored natural attenuation
NVPH	Native Village of Port Heiden
PID	photoionization detector

POL	petroleum, oil, and lubricants
ppm	parts per million
PVC	polyvinyl chloride
RI/FS	Remedial Investigation/Feasibility Study
RRO	residual-range organics
RRS	Radio Relay Station
TCE	trichloroethene
TOC	top of casing
USACE	U.S. Army Corps of Engineers
USAF	U.S. Air Force
VOC	volatile organic compound

1. INTRODUCTION

This Annual Groundwater Monitoring Report describes the groundwater monitoring activities conducted during September and October 2017 at the former Port Heiden Radio Relay Station (RRS) and Former Pipeline Corridor (FPC) sites. APC Services, LLC (APCS) performed this work for the U.S. Air Force (USAF) 611 Civil Engineer Squadron (611 CES) under the U.S. Army Corps of Engineers (USACE) contract W911KB-15-C-0025, Tasks 5 and 6.

Activities were conducted in accordance with the plans and procedures in the *Groundwater Monitoring 2016 and 2017 Work Plan, Port Heiden Radio Relay Station, Port Heiden, Alaska* (USAF 2016, Amended April 2017). Deviations from this Work Plan are described in Section 2.0.

1.1 REPORT ORGANIZATION

This report is organized as follows:

- **Section 1.0** presents the project, the site history and background, and the scope of work.
- **Section 2.0** presents Work Plan deviations.
- **Section 3.0** presents the project execution approach.
- **Section 4.0** presents a summary of the analytical data.
- **Section 5.0** presents a summary of the historical data.
- **Section 6.0** presents a summary of the waste management activities.
- **Section 7.0** presents conclusions and recommendations.
- **Section 8.0** lists documents referenced in this report.
- **Appendix A** contains project photographs.
- **Appendix B** contains the Data Quality Assessment (DQA), which includes analytical data and laboratory documentation associated with sampling.
- **Appendix C** contains field notes.
- **Appendix D** contains a list of the key project personnel, roles, and qualifications.
- **Appendix E** presents the ADEC approval letter

1.2 SITE BACKGROUND

The former RRS site is located approximately 3.5 miles north of the village of Port Heiden on the northern coast of the Alaska Peninsula (Figure 1-1). The former RRS site was a Distant Early Warning Line radar station active until 1981. It was constructed between 1955 and 1960 over a footprint of several square miles. This area occupied a small portion of the former Fort Morrow Army installation, which housed up to 5,000 personnel during World War II.

Historical activities supporting the former RRS occurred at the Marine Terminal Area (a former petroleum tank farm and pump house where Airport Road reaches the Port Heiden Lagoon) and the FPC connecting the Marine Terminal Area to the former RRS along Airport Road and Site Road.

A Remedial Investigation/Feasibility Study (RI/FS) was conducted in 2004 on behalf of the 611 CES. The RI/FS characterized the condition of groundwater throughout Port Heiden (USAF 2006). The Native Village of Port Heiden (NVPH), under two cooperative agreements administered by the USACE, carried out subsequent groundwater monitoring events at the FPC sites in 2008/2009 and at the former RRS and the FPC sites in 2010, 2011, and 2012.

In 2008, the fuel pipeline was removed from the Marine Terminal to the former composite building located at the former RRS (NVPH 2010). Two sites contaminated by diesel-range organics (DRO) along the FPC still exist and are annually monitored. These areas are FPC-066 located near the Port Heiden School and FPC-215 located near the airport (Figure 1-1). DRO-contaminated groundwater exists at both locations. At the former RRS, historical effluent discharged via a garage floor drain in the composite building and was piped downslope and discharged into a berm-reinforced ponding area named the Black Lagoon Outfall (BLO). This area has contributed to significant soil and groundwater contamination at the BLO.

Additional areas of concern at the former RRS include the Gray Lagoon Outfall (GLO), Drum Storage Area (DSA), former underground storage tanks, septic system and septic system outfall, and various landfills and debris burial areas.

Previous investigations have identified contamination plumes in groundwater at the BLO and DSA. The plume identified at the BLO is composed of DRO and trichloroethene (TCE). A separate TCE contamination plume is located beneath the former composite building and DSA (NVPH 2013).

1.3 PROJECT OBJECTIVES

The primary project objectives for 2017 were as follows:

- Groundwater sampling and analysis to provide data for the evaluation of contamination levels
- Evaluation of monitored natural attenuation (MNA) at the former RRS site.

1.4 SCOPE OF WORK

The definable features of work for the 2016 groundwater monitoring field activities included the following:

- **Site setup, including site controls and integrated data management facilities:** Site controls were used to mitigate potential migration of COC's, and data management procedures were used to organize and protect data generated by field activities.
- **Annual groundwater monitoring:** The 2017 Scope of Work included annual groundwater monitoring of wells located at 3 areas:
 - Nineteen wells at the former RRS: GLO-MW-03, GLO-MW-04, DSA-MW-01, DSA-MW-02, DSA-MW-03; DSA-MW-04, DSA-MW-05, DSA-MW-06, DSA-MW-07, UST-MW-02, PG1-MW-01, BLO-MW-01, BLO-MW-02, BLO-MW-05, BLO-MW-06, BLO-MW-07, RRS-MW-02 (depth to water only), RRS-MW-05, RRS-MW-06;
 - Five wells at site FPC-215: 215-MW-08, 215-MW-09, 215-MW-10, 215-MW-11, 215-MW-12
 - Four wells at site FPC-066: 066-MW-04, 066-MW-05, 066-MW-6, 066-MW-07.

Field monitoring parameters included temperature, turbidity, conductivity, pH, dissolved oxygen, and oxidation-reduction potential. Water samples were submitted for laboratory analysis of DRO, gasoline-range organics (GRO), residual-range organics (RRO), volatile organic compounds (VOCs), and monitored natural attenuation (MNA) parameters at the former RRS. The MNA laboratory analytical suite included iron, manganese, alkalinity, nitrate-nitrite, total Kjeldahl nitrogen, total nitrogen, and sulfate.

- **Waste management and decontamination:** Investigation-derived wastes generated during the field activities such as tubing and other materials were managed as solid waste. Purged

groundwater was managed as contaminated wastes and treated using granular activated carbon (GAC) and discharged. Granular activated carbon will be reactivated or disposed of at an approved facility.



**Former
RRS**



FPC-215



FPC-066

Site Rd
Lower Site Rd
Airfield
Airfield
Swan Lake Rd
Pit Rd
Airport Rd
Airport Rd
Hud Rd
Village of Port Heiden
Trapper Hill Rd

0 0.2 0.4 0.8
Miles

NAD 1983 UTM Zone 4N



**PROJECT LOCATION MAP AND SITE LOCATIONS
FOR THE FORMER PORT HEIDEN RRS,
FPC-066 AND FPC-215 INVESTIGATIONS, 2017**

PORT HEIDEN, ALASKA

DATE:

23 MAY 2018

PROJECT MANAGER:

Greg DuBois

FIGURE NO.

1-1

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2. WORK PLAN DEVIATIONS

This section describes deviations from the *Groundwater Monitoring 2016 and 2017 Work Plan, Port Heiden Radio Relay Station, Port Heiden, Alaska* (USAF 2016, amended 2017) during the 2017 groundwater sampling effort:

- Consistent with the 2016 event, monitoring wells DSA-MW-03 and RRS-MW-04 were not located in 2017. The groundwater monitoring report for the 2014 sampling event (USAF 2015) also indicated those wells were not located and were assumed to have been decommissioned.
- Well 215-MW-10 was damaged and depth-to-water (DTW) measurements, and sample collection could not be completed.
- Well UST-MW-02 was not sampled because the polyvinyl chloride (PVC) pipe was bent and a pump was not able to be lowered for sample collection. The field team could measure DTW at 66.5 feet and found that there was no PVC cap.
- Well PG1-MW-01 was in the middle of an excavation, the outer protective steel casing had been removed and the PVC casing was broken below the ground surface. The well was not sampled.
- Well BLO-MW-01 had a measured product thickness of 0.04 feet (0.48 inches) and was not sampled.

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3. PROJECT EXECUTION APPROACH

In September and October 2017, groundwater monitoring was conducted at the FPC-066, FPC-215, and former RRS sites as part of the annual sampling program required by the *Record of Decision for Port Heiden Radio Relay Station, Port Heiden, Alaska* (USAF 2009). Twenty-eight monitoring wells were scheduled for sampling with results to be compared to cleanup levels from the ADEC Table C, Groundwater Cleanup Levels (hereafter referred to as “cleanup levels”), as listed under Alaska Administrative Code (AAC), Title 18, Chapter 75, Part 345 (18 AAC 75.345) (ADEC 2017). Sampling was conducted by personnel who meet the ADEC definition of a “qualified environmental professional,” as defined by 18 AAC 75.990(100). Names and resumes of onsite personnel are available upon request. Key personnel and qualifications are provided in Appendix D. Groundwater samples were analyzed for COCs that had been previously detected above cleanup levels, in addition to the COCs outlined in the Record of Decision (USAF 2009).

3.1 2017 GROUNDWATER MONITORING

The groundwater monitoring program began in the field on September 26, 2017. DTW was measured at the monitoring wells at FPC066 and at the RRS on September 27, 2017, and at site FPC215 on September 29, 2017, to estimate groundwater flow directions. In 2013, approximately 0.65 feet of petroleum, oil, and lubricants (POL) product was encountered in monitoring well BLO-MW-01 at the former RRS site. In 2014, no free product was encountered in monitoring well BLO-MW-01. In 2016, free product thickness was measured at 0.01 feet, although when bailed, free product was not observed and the well was sampled. POL product was not detected in any other monitoring wells during 2014 and 2016 field activities. In 2017 POL product in BLO-MW-01 was measured at 0.04 feet (0.48 inches) thick.

The groundwater sampling occurred September 27, 2017 through October 8, 2017. In accordance with the Work Plan (USAF 2016, amended 2017), APCS standard purge and sampling methodology included the use of bladder pumps with disposable or decontaminated Teflon bladders and Teflon-lined tubing under low-flow sampling procedures. The casing from monitoring well 215-MW-10 was at an approximate 45-degree angle (above the ground) and the DTW probe and pump could not be advanced below ground level (where the casing was bent); therefore, the well was not sampled. The protective steel well monument at monitoring well

PG1-MW-01 had been removed during soil excavation activities by another contractor and the PVC casing was broken off below the ground surface and was not sampled. Well UST-MW-02 was also bent above the surface. DTW could be measured; however, the pump could not be lowered beyond approximately 4 feet below ground surface (bgs).

Field parameters were measured during well purging using a YSI 556 multi-meter with a flow-through cell. Table 3-1 shows the field parameters that were measured and the stabilization criteria. Water quality parameters were considered stable when three successive readings, collected 3 to 5 minutes apart, were within the stabilization range.

Table 3-1. Stabilization Parameters for Groundwater Sampling

Parameter	Stabilization Range
Temperature	± 3 percent (minimum of ± 0.2 °C)
pH	± 0.1
Conductivity	± 3 percent
Redox Potential	± 10 mV
Dissolved Oxygen	± 10 percent
Turbidity	± 10 percent

Notes:

°C = degrees Celsius

mV = millivolts

Groundwater sampling data sheets, well development forms, and associated logbook notes are presented in Appendix C.

Table 3-2 summarizes the monitoring wells sampled in 2017 with their respective screened intervals, DTW measurements, TOC elevations, coordinates, and targeted analytes.

Table 3-2. Detailed Breakdown of Port Heiden Monitoring Wells

Well ID	Screened Interval (feet)	Depth to Water (feet) Oct. 2016	Depth to Water (feet) Sept 2017	TOC Elevation (feet)	Easting (meters)	Northing (meters)	Analytical Suites
Former RRS Wells¹							
GLO-MW-03	52.0 to 62.0	59.10	60.77	143.142	520997.61	6315008.07	VOCs, MNA
GLO-MW-04	35.0 to 45.0 ³	56.81	58.44	140.914	521005.26	6314937.55	VOCs, MNA
DSA-MW-01	45.0 to 58.0	53.25	54.83	137.145	520907.40	6314977.64	VOCs, MNA
DSA-MW-02	57.5 to 67.5	62.85	64.30	146.200	520937.64	6314915.38	GRO, DRO, RRO, VOCs,
DSA-MW-03	Decommissioned in 2011						
DSA-MW-04	92.0 to 97.0	67.20	67.15	146.030	520931.73	6314906.31	GRO, DRO, RRO, VOCs,
DSA-MW-05	82.0 to 87.0	58.01	58.20	137.366	520904.89	6314968.99	VOCs, MNA
DSA-MW-06	85.0 to 90.0	56.66	56.62	134.708	520898.70	6315022.41	VOCs, MNA
DSA-MW-07	45.0 to 55.0	48.60	49.85	133.763	520888.41	6315021.82	VOCs, MNA
UST-MW-02	54.5 to 69.5	64.93	66.50	148.311	520999.27	6314873.83	Unable to sample
RRS-MW-02	52.5 to 62.5	57.95	59.85	143.899	521136.69	6314793.94	Removed from the sampling program in 2014
RRS-MW-04	Decommissioned in 2011						
RRS-MW-05	46.0 to 56.0	51.28	52.20	136.851	520863.08	6314986.41	VOCs, MNA
RRS-MW-06	55.0 to 56.0	58.15	59.42	142.373	520921.19	6314769.31	VOCs, MNA
PG1-MW-01	51.9 to 61.9	N/A	N/A	142.431	520934.06	6314817.47	Damaged; Unable to sample
BLO-MW-01	40.0 to 50.0	45.87	48.36/48.40 ⁴	131.505	520759.35	6314853.20	GRO, DRO, RRO, VOCs,
BLO-MW-02	36.0 to 46.0	32.26	30.70	125.136	520642.33	6314914.04	Removed from the sampling program in 2014
BLO-MW-05	42.5 to 52.5	49.63	50.04	135.602	520821.00	6314815.05	GRO, DRO, RRO, VOCs,
BLO-MW-06	38.5 to 48.5	43.11	44.5	131.499	520757.29	6314820.13	GRO, DRO, RRO, VOCs,
BLO-MW-07	35.0 to 45.0	41.29	42.44	128.549	520753.59	6314922.47	GRO, DRO, RRO, VOCs, MNA

Table 3-2. Detailed Breakdown of Port Heiden Monitoring Wells

Well ID	Screened Interval (feet)	Depth to Water (feet) Oct. 2016	Depth to Water (feet) Sept 2017	TOC Elevation (feet)	Easting (meters)	Northing (meters)	Analytical Suites
FPC-066 Wells²							
066-MW-04	2.5 to 12.5	6.05	6.03	37.10	520576.19	6309052.99	DRO
066-MW-05	2.5 to 12.5	7.75	7.61	39.093	520576.29	6309074.67	DRO
066-MW-06	2.5 to 12.5	4.38	4.24	35.44	520595.92	6309034.14	DRO
066-MW-07	2.5 to 12.5	5.24	5.24	36.13	520617.20	6309058.55	DRO
FPC-215 Wells²							
215-MW-08	9.0 to 150.0	11.02	12.70	122.82	521937.88	6312877.23	DRO
215-MW-09	9.0 to 18.0	12.49	14.00	124.14	521910.45	6312852.43	DRO
215-MW-10	12.0 to 22.0	N/A	N/A	N/A ³	521897.05	6312848.65	DRO
215-MW-11	7.0 to 17.0	11.00	10.52	122.43	521900.01	6312871.91	DRO
215-MW-12	7.0 to 17.0	12.92	14.35	124.60	521918.96	6312830.37	DRO

Notes:

¹Wells at the RRS are constructed with 2-inch PVC.

²Wells at Sites FPC-066 and FPC-215 are 1.5-inch diameter, except wells 215-MW-11 and 215-MW -12, which are 2-inch diameter.

³This monitoring well was damaged. The top of casing elevations is no longer accurate.

⁴ 48.36/48.40 in well BLO-MW-01 are depth-to-product/depth-to-water measurements

3.2 GROUNDWATER FLOW DIRECTION

Groundwater flow direction was estimated by using the top of casing (TOC) elevation data and depth to groundwater measurements and by calculating the vertical change per foot of horizontal distance. All groundwater flow directions are approximate and represent only estimates of the site conditions (refer to Sections 4.1, 4.2, and 4.3) at the time of the measurements.

Groundwater flow at FPC-215 is estimated to have been to the west-southwest in 2016 and to the east-southeast in 2017 which does not appear to be consistent with previous flow directions. It is recommended that the wells throughout the project and the flow be re-calculated.

It is recommended that the wells at FPC-066 be resurveyed before calculating groundwater flow direction.

At the RRS, groundwater flow in September 2017, is estimated to have been towards the east-northeast consistent with the 2016, and 2014 estimated groundwater flow. There are wells that need to be repaired or decommissioned. It is recommended that the wells are re-surveyed prior to re-calculate groundwater flow.

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4. RESULTS

This section summarizes analytical results from the September and October 2017 groundwater sampling effort. Groundwater samples were successfully collected from 24 monitoring wells at FPC-066, FPC-215, and the former RRS sites.

4.1 FPC-066 SITE

In September/October 2017, groundwater samples were collected from 066-MW-04, 066-MW-05, 066-MW-06, and 066-MW-07 at FPC-066 and were analyzed for DRO. The cleanup level for DRO is 1.5 milligrams per liter (mg/L). Monitoring well 066-MW-05 contained a DRO concentration of 3.7 mg/L. The results from the other FPC-066 monitoring wells were below the cleanup level. The 2017 laboratory results for the FPC-066 site are presented in Table 4-1; well locations are displayed on Figure 4-1. The complete analytical results and laboratory data deliverables are included with the DQA (Appendix B).

Table 4-1. FPC-066 Groundwater Sample Results

Location	Sample ID	Analyte	Cleanup Level ¹ (mg/L)	Results (mg/L)
066-MW-04	FPC_066-MW-04_100317	DRO	1.5	0.055
Duplicate	FPC_066-MW-24_100317	DRO		0.05
066-MW-05	FPC_066-MW-05_100317	DRO	1.5	3.7
066-MW-06	FPC_066-MW-06_092717	DRO	1.5	0.091
066-MW-07	FPC_066-MW-07_092717	DRO	1.5	0.047

Notes:

¹18 AAC 75.345, Table C, Groundwater Cleanup Levels (ADEC 2017)

Bold = Result exceeded the ADEC Table C, Groundwater Cleanup Levels

For definitions, see the Acronyms and Abbreviations section.

4.2 FPC-215 SITE

In October 2017, groundwater samples were collected from wells 215-MW-08, 215-MW-09, 215-MW-11 and 215-MW-12. Monitoring well 215-MW-09 contained a DRO concentration of 6.8 mg/L, which exceeded the cleanup level of 1.5 mg/L. The remaining wells DRO sample results ranged from non-detect (ND) [at a LOD] of 0.13 mg/L] to 0.075 mg/L. These results were reported below the limit of quantitation (LOQ) but above the LOD. Therefore, the results were qualified with a J, and were estimated. Results for the FPC-215 site are summarized in Table 4-2; analytical exceedances are displayed on Figure 4-2.

Complete analytical results and laboratory data deliverables are included with the DQA (Appendix B).

Table 4-2. FPC-215 Groundwater Sample Results

Location	Sample ID	Analyte	Cleanup Level ¹ (mg/L)	Results (mg/L)
215-MW-08	FPC215MW-08	DRO	1.5	ND (0.13)
215-MW-09	FPC215MW-09	DRO	1.5	6.8 JS+
215-MW-11	FPC215MW-11	DRO	1.5	0.049 J
215-MW-12	FPC215MW-12	DRO	1.5	0.075J

Notes:

¹18 AAC 75.345, Table C, Groundwater Cleanup Levels (ADEC 2017)

J = The result was reported between the LOQ and the DL and should be considered as an estimated quantity.

JS+ = the detected analyte may be biased high based on the spike recovery

Bold = Result exceeded the ADEC Table C, Groundwater Cleanup Levels

For additional definitions, see the Acronyms and Abbreviations section.

4.3 FORMER RADIO RELAY STATION

Sample results at the former RRS identified five wells with contaminant constituents at or above applicable cleanup levels (Table 4-3).

Table 4-3. Former RRS Groundwater Cleanup Level Exceedances

Location	Sample ID	Analyte	Cleanup Level ¹ (mg/L)	Results (mg/L)
BLO-MW-01	NA	NA	GRO - 2.2 TCE – 0.0028	NAPL²
BLO-MW-06 Duplicate	BLO-MW-06_092917 BLO-MW-26_092917	GRO GRO	2.2	2.3 2.4
DSA-MW-01	DSA MW01	TCE	0.0028	0.0064
DSA-MW-02	DSA MW02	TCE	0.0028	0.40
DSA-MW-04	DSA MW04	TCE GRO	0.0028 2.2	0.44 2.2

Notes:

¹18 AAC 75.345, Table C, Groundwater Cleanup Levels (ADEC 2017)

²Non-aqueous phase liquid (NAPL) was measured at a thickness of 0.04' (0.48 inches) and was not sampled, but the presence of NAPL exceeds cleanup criteria

Bold results are at or exceed the cleanup level

For definitions, see the Acronyms and Abbreviations section.

Monitoring well sample BLO-MW-01 contained 0.4' of non-aqueous phase liquid (NAPL) and was not sampled. In 2016, there was a sheen (measured at 0.01') and the well was sampled.

TCE results for wells DSA-MW-01, DSA-MW-02, and DSA-MW-04 exceeded the cleanup level of 0.0028 mg/L at 0.0064 mg/L, 0.40 mg/L and 2.2 mg/L, respectively. TCE was detected in DSA-MW-05 below the cleanup level at 0.00058 mg/L. GRO was detected at or above the cleanup level for the first time in wells BLO-MW-06 and DSA-MW-04 at 2.4 mg/L and 2.2 mg/L respectively. GRO was also detected in BLO-MW-05, BLO-MW-07 and DSA-MW-02 below the cleanup level. All other contaminant target analytes at the former RRS were either detected at concentrations below cleanup levels or were reported as nondetect. The laboratory results that exceeded cleanup levels are shown in Table 4-3; estimated plumes above the cleanup levels and groundwater flow are displayed on Figure 4-3. The complete analytical results and laboratory data deliverables are included with the DQA (Appendix B).

All sampled monitoring wells at the former RRS site were sampled for MNA parameters, which included alkalinity, iron, manganese, nitrogen (as nitrate/nitrite), and sulfate. Sample results for MNA parameters are used to assess the potential for biodegradation and natural attenuation of contaminants in the groundwater, primarily PCE and TCE.

Chlorinated solvents biodegrade primarily via reductive dechlorination, which occurs under anaerobic conditions. Samples were analyzed for PCE and TCE and for degradation products in accordance with the August 2014 Five Year Review - CIS-1,2-dichloroethene, trans-1,2-dichloroethene, 1,1-dichloroethene and vinyl chloride. TCE was detected however none of the degradation products were detected at or above the LOQ. The lack of degradation products indicates that dechlorination is not occurring or is occurring at a very slow rate. The presence of nitrate/nitrite and sulfate, as well as elevated levels of dissolved oxygen, also indicate the process of natural attenuation via reductive dechlorination is most likely impeded in groundwater at the former RRS. The presence of DRO (an anthropogenic carbon source critical to the biodegradation of chlorinated solvents, such as TCE) suggests that natural attenuation may be occurring at monitoring well BLO-MW-01.

Although the potential for biodegradation exists, the data do not show a significant decreasing trend in TCE concentrations over time. According to the RI/FS, the timeframe required for TCE concentrations to fall below 0.005 mg/L was estimated at 25.7 years (i.e., in the year 2032) (USAF 2006). An additional discussion regarding contaminant concentration trends is presented in Section 5.3. Table 4-4 presents MNA results for wells at the former RRS.

Table 4-4. Former RRS Monitored Natural Attenuation Results

Sample ID	Well ID	Dissolved Oxygen (mg/L)	pH	ORP (mV)	Total Alkalinity (mg/L)	Iron (mg/L)	Manganese (mg/L)	Nitrogen, Total (mg/L)	Sulfate (mg/L)
BLO-MW-01	BLO-MW-01	N/M	NM	NM	NS	NS	NS	NS	NS
BLO-MW-05	BLO-MW-05	10.47	6.33	168.7	45	1.1	0.019	0.52	2.0
BLO-MW-06	BLO-MW-06	8.85	6.89	155.7	54	1.2	0.031	0.37	4.1
BLO-MW-26*	BLO-MW-06	8.85	6.89	155.7	52	1.7	0.024	0.40	4.2
BLO-MW-07	BLO-MW-07	8.77	6.55	207.1	45	2.0	0.036	0.0	3.4
DSA-MW-01	DSA-MW-01	10.87	6.29	150.8	79	0.068	0.0017	1.4	8.3
DSA-MW-02	DSA-MW-02	8.31	6.32	93.6	120	1.3	0.029	1.7	8.4
DSA-MW-04	DSA-MW-04	0.53	6.20	56.7	110	2.1	0.067	0.32	8.3
DSA-MW-05	DSA-MW-05	1.11	6.25	54.7	64	1.8	0.065	0.26	8.1
DSA-MW-06	DSA-MW-06	0.54	6.42	-50.4	68	2.4	0.450	0.31	5.4
DSA-MW-26*	DSA-MW-26	0.54	6.42	-50.4	52	1.7	0.024	0.40	5.2
DSA-MW-07	DSA-MW-07	8.96	5.92	115.7	89	18	0.21	0.36	4.9
GLO-MW-03	GLO-MW-03	9.46	6.41	176.1	96	2.8	0.56	0.59	5.6
GLO-MW-23*	GLO-MW-03	9.46	6.41	176.1	95	0.17	0.043	0.56	5.3
GLO-MW-04	GLO-MW-04	8.51	6.14	186.9	73	0.12	0.0032	1.5	3.4
PG-1-MW-01	PG-1-MW-01	N/M	N/M	N/M	NS	NS	NS	NS	NS
RRS-MW-02	RRS-MW-02	11.08	5.68	169.2	43	0.088	0.0019	0.44	3.0
RRS-MW-05	RRS-MW-05	10.33	6.22	195.2	52	0.32	0.062	0.54	2.9
RRS-MW-06	RRS-MW-06	9.67	6.47	208.4	130	0.18	0.002	1.1	4.2
UST-MW-02	UST-MW-02	N/M	N/M	N/M	NS	NS	NS	NS	NS

Notes:

* Field duplicate sample

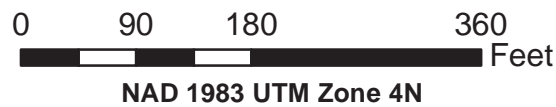
NS = not sampled

N/M = Not measured. BLO-MW-1 had free product and wells PG1-MW-01 and UST-MW-02 were damaged and not measured.

For additional definitions, see the Acronyms and Abbreviations section.



- FPC-066 Wells
- FPC-066 Well with Exceedance (MW-5)
- FPC-066 Piezometers
- Plume



Groundwater Plume Fuel Pipeline Corridor Site 066, September 2017

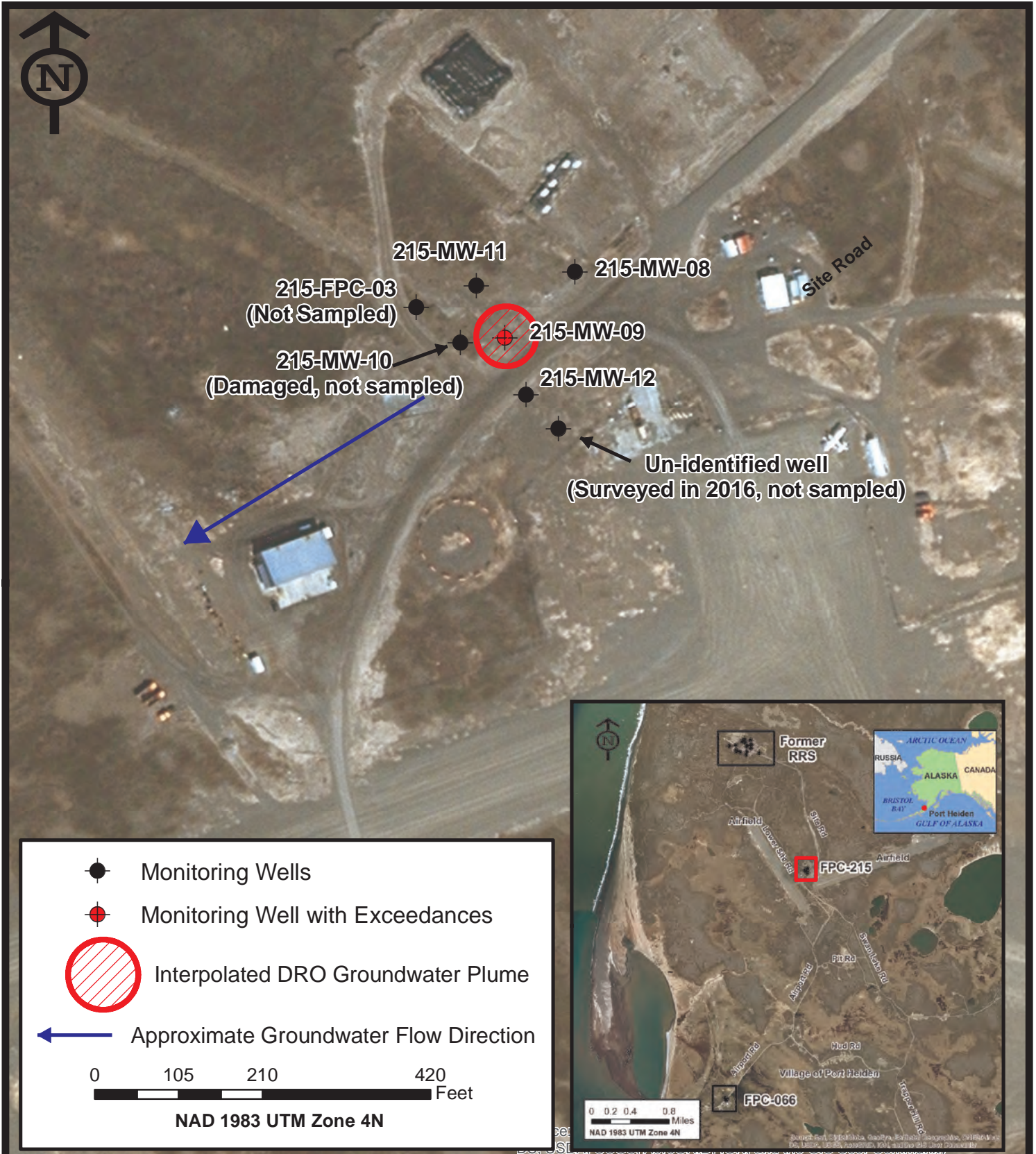
Port Heiden, Alaska

DATE:
6 APR 2019

PROJECT MANAGER:
Greg DuBois

FIGURE NO.
4-1

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- Monitoring Wells
- Monitoring Well with Exceedances
- Interpolated DRO Groundwater Plume
- Approximate Groundwater Flow Direction

0 105 210 420
 Feet

NAD 1983 UTM Zone 4N



Site Detail Map		
Fuel Pipeline Corridor Site 215, September 2017		
PORT HEIDEN, ALASKA		
DATE:	PROJECT MANAGER:	FIGURE NUMBER:
12 APR 2019	Greg DuBois	4-2

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Monitoring Well Locations
 Black Lagoon Outfall (BLO)
 Drum Storage Area (DSA)
 Gray Lagoon Outfall (GLO)
 Pad Grid (PG1)
 Radio Relay Station (RRS)
 Underground Storage Tanks (UST)



- Monitoring Well with Exceedances
- Monitoring Wells
- DRO Plume
- TCE Plume
- Estimated Groundwater Flow

0 175 350 700 Feet

NAD 1983 UTM Zone 4N

Source: Esri, DigitalGlobe, GeoEye, Earthstar Geographics, CNES/Airbus DS, USDA, USGS, AeroGRID, IGN, and the GIS User Community

Groundwater Plumes and Estimated Groundwater Flow at the Former Radio Relay Station, 2017
 PORT HEIDEN, ALASKA



DATE: 6 APR 2019	PROJECT MANAGER: Greg DuBois	FIGURE NUMBER: 4-3
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5. HISTORICAL RESULTS

This section presents a comparison between the 2017 groundwater sampling results and historical sampling data at sites FPC-066, FPC-215, and the former RRS.

5.1 FPC-066 SITE

This was the site of a fuel release that occurred in the late 1980's to early 1990's. In 2004 a surface soil sample and five soil borings were drilled and samples collected in soil and groundwater with DRO levels detected above the cleanup level. In 2008 soil was excavated at FPC-066 and in 2009 a groundwater investigation was conducted indicating that DRO was the only contaminant of concern. Table 5-1 provides a comparison of the DRO concentrations over time. Groundwater samples were collected from the four monitoring wells at the FPC-066 site in 2009, 2010, 2012, 2013, 2014, 2016 and 2017 (NVPH 2010, 2011, 2012, 2013; USAF 2015, respectively). Groundwater samples were collected from FPC-066 wells in 2011; however, the samples were not analyzed for DRO.

Table 5-1. Comparison of DRO Concentrations at FPC-066

Well ID	DRO Concentrations (mg/L)								
	2009	2010	2011	2012	2013	2014	June* 2016	2016	2017
ADEC Cleanup Level¹	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
066-MW-04	0.504 J	ND [0.851]	NS	ND [0.360]	0.018 J	NS	NS	0.32	0.055J
066-MW-05	2.25	4.5	NS	2.02	1.6	1.3	3.1	2.4	3.7
066-MW-06	ND [0.8]	ND [0.800]	NS	ND [0.360]	0.019 J	0.032 J	NS	0.063	0.091J
066-MW-07	ND [0.8]	ND [0.899]	NS	ND [0.360]	0.024 J	NS	NS	0.056	0.047J

Notes:

¹ADEC Cleanup Level based on Table C, Groundwater Cleanup Levels (ADEC 2017)

*A sample was collected from 066-MW-05 in June 2016 to determine if the DRO concentration in the well remained below the cleanup level as detected in 2014. Since it exceeded the cleanup level, monitoring was continued at the site.

J = analyte was positively identified, but associated result was less than the LOQ and greater than or equal to the DL.

ND = nondetect

NS = not sampled

Bold = Laboratory-reported concentration exceeds ADEC cleanup level.

The LOQs are provided in brackets following ND.

For additional definitions, see Acronyms and Abbreviations section.

Historically, DRO has exceeded cleanup levels in only one of the four wells at this site. In 2011, analysis for DRO was scheduled for all wells; however, laboratory samples were not collected

for this analyte. Groundwater sampling has historically been conducted in the September/October time frame with one exception in June of 2016. The concentration of DRO in monitoring well 066-MW-05 experienced a net decreasing trend from 2009–2014, with concentrations from 4.5 mg/L in 2010 to 1.3 mg/L in 2014. Based on the trend and the 2014 result below the cleanup level, a confirmation sample was collected from 066-MW-05 in June 2016 (under a different contract) to verify concentrations were below the cleanup level and to determine if the wells could be decommissioned. However, the June 2016 result for well 066-MW-05 exceeded the DRO cleanup level with a concentration of 3.1 mg/L and so all the wells at FPC-066 were included in the Port Heiden monitoring program during the fall sampling events. In October 2016 the DRO result was 2.4 mg/L and 3.7 mg/L in September 2017.

5.2 FPC-215 SITE

FPC-215 is the site of a fuel release at a junction with the former RRS fuel pipeline with a spur that went to former Reeve Aleutian Airways facilities. In 2004 an investigation included advancement of soil borings and installation of two wells. The release was observed by surface staining and the presence of absorbent pads. Contaminants included DRO and GRO in soil and groundwater. In 2008 soil was excavated from the site to the extent practicable and in September 2009 soil borings were advanced and sampled and groundwater wells were installed, developed and sampled. Well 215-MW-09 was installed within the former 2008 excavation. Since that time, sampling has occurred in the September/October time frame. DRO is currently the only COC monitored at this site. Table 5-2 provides a comparison of DRO concentrations over time. Groundwater samples were collected from three monitoring wells at the FPC-215 from 2009, through 2014 (NVPH 2010, 2011, 2012, 2013; USAF 2015). The wells were not sampled in 2015. In 2016, wells 215-MW-11 and 215-MW-12, were installed, developed, and sampled for DRO and in 2017 they were sampled for the second time. The DRO analytical results from the two new wells were below the cleanup level in 2016 and 2017. Because 215-MW-10 was damaged, it was not sampled. Sampling concentrations from 215-MW-10 have always been less than the cleanup level.

Table 5-2. Comparison of DRO Concentrations at FPC-215

Well ID	DRO Concentrations (mg/L)							
	2009	2010	2011	2012	2013	2014	2016	2017
ADEC Cleanup Level¹	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
215-MW-08	4.18	ND [0.879]	1.17	ND [0.360]	0.019 J	0.036 J	.048	ND [0.13]
215-MW-09	3.99	9.68	14	8.85	11	12	12	6.8JS+
215-MW-10	ND [0.8]	ND [0.856]	0.524 J	0.853	0.032 J	0.022 J	NS	NS
215- MW-11	NA	NA	NA	NA	NA	NA	0.11	0.049J
215-MW-12	NA	NA	NA	NA	NA	NA	0.15	0.075J

Notes:

¹ADEC Cleanup Level based on Table C, Groundwater Cleanup Levels (ADEC 2017)

J = analyte was positively identified, but associated result was less than the LOQ and greater than or equal to the DL.

JS+ = detected analyte result may be biased high based on spike recovery

ND = nondetect

NA = not applicable since the wells were not installed until 2016

Bold = laboratory reported concentration exceeds ADEC cleanup level.

The LOQs are provided in brackets following ND.

For additional definitions, see Acronyms and Abbreviations section.

DRO has been historically detected above the cleanup level in two of the three monitoring wells at the FPC-215 site. In 2009, monitoring wells 215-MW-08 and 215-MW-09 contained DRO concentrations of 4.18 mg/L and 3.99 mg/L, respectively. Since 2009, DRO has been reported below the cleanup level in monitoring well 215-MW-08. DRO concentrations in monitoring well 215- MW-09 increased significantly, from 3.99 mg/L in 2009 to 12 mg/L in 2014 and 2016 but decreased to 6.8 mg/L in 2017; the maximum detected concentration (14 mg/L) was reported in 2011. The DRO results in 2017 are lower in all the sampled wells compared to the 2016 results. Since all the sample events have been in the fall, there is insufficient data to determine if there is a seasonal effect on the analytical results.

5.3 FORMER RADIO RELAY STATION

In 2004, 2010, 2011, 2012, 2013, 2014, and 2016, samples were collected from wells located in the former RRS (USAF 2006; NVPH 2010, 2011, 2012, 2013; USAF 2015). Concentrations from the following wells that are part of the monitoring well program in 2017 have historically exceeded cleanup levels:

- BLO-MW-01

- DSA-MW-01
- DSA-MW-02
- DSA-MW-04
- DSA-MW-05
- DSA-MW-07
- PG1-MW-01 - This well was damaged and not sampled in 2016 or 2017

The 2014 ROD five-year review, identified TCE and benzene as groundwater COCs at the former RRS. However, TCE, DRO, and RRO exceeded cleanup levels in 2016 while benzene analytical results did not exceed cleanup levels. In 2014, 1,1,2,2- tetrachloroethane, TCE, DRO, and RRO were detected above cleanup levels in monitoring well BLO-MW-01.

In 2017 free product was measured at a thickness of 0.4' in well BLO-MW-01 and the well was not sampled. In the sampled wells, TCE, GRO, and DRO, exceeded cleanup levels in 2017.

5.3.1 GRO Contamination

Historically, GRO has been detected from samples at the former RRS prior to 2017, however, the 2017 analytical results for GRO were detected at or above the cleanup level of 2.2 mg/L at the RRS for the first time from wells BLO-MW-06 and DSA-MW-04.

Table 5-3. Comparison of GRO Concentrations for Wells Sampled in 2017 at Former RRS

Well ID	GRO Concentrations (mg/L)					
	2011	2012	2013	2014	2016	2017
ADEC Cleanup Level¹	2.2	2.2	2.2	2.2	2.2	2.2
BLO-MW-01	1.02	0.194	1.9	0.32	0.17	<i>NS/FP</i>
BLO-MW-02	0.0442	0.0397	NA	NA	NA	NA
BLO-MW-05	0.0468J	ND	ND [0.025]	ND	ND	1.8

Well ID	GRO Concentrations (mg/L)					
	2011	2012	2013	2014	2016	2017
BLO-MW-06	0.0465J	ND	ND [0.025]	ND	ND	2.4
BLO-MW-07		(Installed) Dry	Dry	ND	ND	1.8
DSA-MW-02	0.185	0.214	0.22	0.22	ND	1.4
DSA-MW-04		(Installed) 0.0629	NA	0.05	ND	2.2
PG-1	NA	0.0378	NA	0.026	NS	NS
UST-MW-02			ND [0.025]		NS	NS

Notes:

¹ ADEC Cleanup Level based on Table C, Groundwater Cleanup Levels (ADEC 2017)

NS/FP = Not Sampled/Free Product

NA = Not analyzed

NS = Not sampled

J = analyte was positively identified, but the associated result was less than the LOQ and greater than or equal to the DL

Bold = laboratory reported concentration exceeds ADEC cleanup level

5.3.2 DRO and RRO Contamination

Historically, DRO and RRO have exceeded cleanup levels in monitoring well BLO-MW-01. Concentrations of DRO in monitoring well BLO-MW-01 have ranged from 17 mg/L to 15,600 mg/L. Free product was detected at a thickness of 0.65 feet in 2013 (USAF 2014), 0.01 feet in 2016 (considered to be a sheen and was sampled) and 0.4 feet in 2017. RRO concentrations have ranged from 2.3 mg/L in 2004 to 1,890 mg/L in 2010. In 2016 the RRO concentration was 4.2 mg/L however the well was not sampled in 2017 due to the presence of free product. Table 5-3 provides a comparison of DRO concentrations, and Table 5-4 provides a comparison of RRO concentrations over time.

**Table 5-4. Comparison of DRO Concentrations
for Wells Sampled in 2017 at Former RRS**

Well ID	DRO Concentrations (mg/L)								
	2004	2009	2010	2011	2012	2013	2014	2016	2017
ADEC CleanupLevel¹	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5	1.5
BLO-MW-01	17	NS	15,600²	70.5	26.5	1,300²	1,600²	63	NS/FP
BLO-MW-05	2 ³	NS	ND [0.860]	0.242 J	ND [0.360]	0.075	0.032 J	0.044	0.037
BLO-MW-06	NS	NS	ND [0.889]	0.883	ND [0.360]	0.074	0.042 J	ND [0.12]	0.04
BLO-MW-07	-	-	-	-	Installed dry	Dry	0.084 J	ND [0.12]	0.077
DSA-MW02	0.086	NS	NS	0.479 J	ND [0.360]	0.031	0.031 J	0.070 JM	ND [0.12]
DSA-MW04	NS	NS	NS	NS	ND [0.360]	0.097	0.08 J	0.082 JM	ND [0.12]
UST-MW-02	NS	NS	ND [0.842]	ND [0.378]	0.213	0.093	0.22J	NS	NS

Notes:

¹ ADEC Cleanup Level based on Table C, Groundwater Cleanup Levels (ADEC 2017)

² Elevated concentration indicative of free product

³ The result was reported as total petroleum hydrocarbons.

NS/FP = Not Sampled/Free Product

J = analyte was positively identified, but the associated result was less than the LOQ and greater than or equal to the DL.

M = manual integrated compound

NS = not sampled

Bold = laboratory reported concentration exceeds ADEC cleanup level.

The LOQs are provided in brackets following ND.

For additional definitions, see Acronyms and Abbreviations section.

**Table 5-5. Comparison of RRO Concentrations
for Wells Sampled in 2017 at Former RRS**

Well ID	RRO Concentrations (mg/L)							
	2004	2010	2011	2012	2013	2014	2016	2017
ADEC Cleanup Level¹	1.1	1.1	1.1	1.1	1.1	1.1	1.1	1.1
BLO-MW-01	2.3 J	1,890	8.14	2.8	78.0 J	150 J	4.2 J	NS/FP
BLO-MW-05	NS	ND [0.860]	ND [0.306]	ND [0.3]	0.18 J	0.19 J	ND [0.13]	ND [0.13]
BLO-MW-06	NS	ND [0.889]	0.223 J	ND [0.3]	0.360 J	0.15 J	ND [0.13]	ND [0.13]
BLO-MW-07	-	-	-	Installed Dry	Dry	0.36 J	ND [0.13]	ND [0.14]
DSA-MW-02	ND [0.039]	NS	ND [0.340]	0.252	0.062 J	0.073 J	ND [0.13]	ND [0.13]
DSA-MW-04	NS	NS	NS	ND [0.31]	0.082 J	0.059 J	ND [0.13]	ND [0.13]
UST-MW-02	NS	ND [0.526]	ND [0.316]	0.372	0.140 J	0.23 J	NS	NS

Notes:

¹ADEC Cleanup Level based on Table C, Groundwater Cleanup Levels (ADEC 2017)

NS/FP = Not Sampled/Free Product

J = analyte is an estimated value.

NS = not sampled

Bold = laboratory reported concentration exceeds ADEC cleanup level

The LOQs are provided in brackets following ND.

For additional definitions, see Acronyms and Abbreviations section.

5.3.3 TCE Contamination

Four of the wells at the former RRS have historically reported TCE concentrations above the cleanup level of 0.0028 mg/L. Table 5-5 provides a comparison of TCE concentrations over time in wells at the former RRS.

The highest historical TCE concentration at this site (0.690 mg/L) was a 2004 result from monitoring well DSA-MW-02. The highest detected concentration in 2017 was 0.44 mg/L in well DSA-MW-04. BLO-MW-01 had free product and was not sampled but historically exceeds the TCE cleanup level.

In 2017, well PG1-MW-01 was not sampled because it had broken off below the ground surface; in 2016 soil had been excavated around the well (under a separate contract) and the PVC casing was sticking up approximately 8 feet out of the ground and was supported with a piece of wood and had not been repaired. TCE results from well PG1-MW-01 have historically exceeded the cleanup levels, ranging from the lowest concentration of 0.0078 mg/L in 2004 to the highest concentration of 0.0447 mg/L in 2012. All results reported between 2010 and 2014 were significantly higher than the 2004 reported concentration of 0.0078 mg/L.

Table 5-6. Comparison of TCE Concentrations for Wells Sampled in 2016 at Former RRS

Well ID	TCE Concentrations (mg/L)							2017
	2004	2010	2011	2012	2013	2014	2016	
ADEC Cleanup Level¹	0.005	0.005	0.005	0.005	0.005	0.005	0.0028	0.0028
BLO-MW-01	0.0056	ND [0.020]	0.0036 J	0.0053	0.0035	0.005	0.0031J	NS/FP
BLO-MW-02	ND [0.00021]	ND [0.001]	NS	ND [0.00062]	ND [0.0001]	NS	NS	NS
BLO-MW-05	0.00019	ND [0.001]	ND [0.00062]	ND [0.00062]	ND [0.0001]	0.00015 J	ND [0.0004]	0.00016J
BLO-MW-06	ND [0.00018]	ND [0.001]	ND [0.00062]	ND [0.00062]	0.00088	0.00014 J	ND [0.0004]	ND [0.0004]
BLO-MW-07	Installed2012	Installed2012	Installed2012	DRY	DRY	ND [0.0001]	ND [0.0004]	ND [0.0004]
DSA-MW-01	0.017	0.0117	0.479 J	0.00047	0.0062	0.0077	0.0073	0.0064
DSA-MW-02	0.690 J	0.508	0.499	0.506	0.5²	0.49	0.38	0.40
DSA-MW-04	Installed 2012	Installed 2012	Installed 2012	0.0717	0.12	0.09	0.34	0.44
DSA-MW-05	Installed 2012	Installed 2012	Installed 2012	0.00525	0.0028	0.0029	0.0022	0.00058J
DSA-MW-06	Installed 2012	Installed 2012	Installed 2012	0.00054	ND [0.0001]	0.00015 J	ND [0.0004]	ND [0.0004]
DSA-MW-07	Installed 2012	Installed 2012	Installed 2012	0.0447	ND [0.0001]	ND [0.0001]	ND [0.0004]	ND [0.0004]
GLO-MW-03	NS	NS	ND [0.00062]	ND [0.00062]	ND [0.0001]	ND [0.0001]	ND [0.0004]	ND [0.0004]
GLO-MW-04	Installed 2012	Installed 2012	Installed 2012	ND [0.00062]	ND [0.0001]	ND [0.0001]	ND [0.0004]	ND [0.0004]
PG1-MW-01	0.0078	0.0423	0.0325	0.0447	0.021	0.039	NS	NS
RRS-MW-02	NS	ND [0.001]	ND [0.00062]	ND [0.00062]	ND [0.0001]	NS	ND [0.0004]	ND [0.0004]
RRS-MW-05	NS	ND [0.001]	ND [0.00062]	ND [0.00062]	0.00011 J	ND [0.0001]	ND [0.0004]	ND [0.0004]
RRS-MW-06	NS	ND [0.001]	ND [0.00062]	ND [0.00062]	ND [0.0001]	ND [0.0001]	ND [0.0004]	ND [0.0004]
UST-MW-02	NS	ND [0.001]	ND [0.00062]	ND [0.00062]	0.00010 J	ND [0.0001]	NS	NS

Notes:

¹ ADEC Cleanup Level based on Table C, Groundwater Cleanup Levels (ADEC 2017).

² Sample collected 1 to 2 feet below groundwater interface but 23.5 to 28.5 feet above screened interval; TCE results are biased low. It should be noted that this error was corrected during the 2014 field activities; however, laboratory results were very similar between the two sampling events.

NS/FP = Not Sampled/Free Product

J = analyte is an estimated value.

NS = not sampled

Bold = laboratory reported concentration exceeds ADEC cleanup level

Italics = The LOQ exceeded ADEC cleanup levels.

The LOQs are provided in brackets following ND.

The highest historical TCE concentration at this site (0.690 mg/L) was a 2004 result from monitoring well DSA-MW-02.

For additional definitions, see Acronyms and Abbreviations section.

In monitoring well DSA-MW-01, elevated concentrations of TCE were found to be present in seven of the eight sampling events from 2004 through 2017. The maximum detected concentration (0.479 mg/L) was reported in 2011. The detected concentration of TCE from DSA-MW-01 remains above the cleanup level at 0.0064 mg/L.

Previously, TCE concentrations in monitoring well BLO-MW-01 have only slightly exceeded or were less than the former cleanup level of 0.005 mg/L. The analytical result in 2016 was 0.0031 mg/L, which is below the former cleanup level but exceeded the revised cleanup level of 0.0028 mg/L. In 2010, TCE was not detected; however, the laboratory DL exceeded the cleanup level, meaning that TCE could have been present at levels above the cleanup level, yet still not detectable during laboratory analysis. During the 2013 site inspection activities, TCE-contaminated soil was identified near this well. In 2014 approximately 3,500 cubic yards of TCE-contaminated soil was excavated adjacent to well BLO-MW-01, as stated in the *2014 Draft Black Lagoon Biopile Treatability Study Report* (USAF 2015).

The following six wells presented in Table 5-5 were installed in 2012:

- GLO-MW-04
- DSA-MW-04
- DSA-MW-05
- DSA-MW-06
- DSA-MW-07
- BLO-MW-07

Between 2012 and 2016, the TCE concentrations in monitoring well DSA-MW-04 have remained above cleanup levels. The 2017 result of 0.44 mg/L is the highest detected analytical result to date. This well is close to monitoring well DSA-MW-02, which has exhibited the greatest TCE concentration at this site. For the other wells installed in 2012, TCE concentrations appear to be decreasing.

Based on the available data, TCE concentrations are not naturally attenuating at a rate that will likely achieve the proposed RI/FS timeframe of 25.7 years (USAF 2006) in the areas surrounding monitoring wells DSA-MW-01, DSA-MW-02, DSA-MW-04, and PG1-MW-01. In

wells containing lower TCE concentrations, such as BLO-MW-01, natural attenuation may be successful in reducing concentrations to below the cleanup level within the proposed timeframe. The lack of detected degradation products indicates that natural attenuation is not occurring or is not occurring at a detectable level.

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6. WASTE MANAGEMENT

Purged well water was treated using granular activated carbon. Solid waste such as spent tubing was placed into the Port Heiden landfill with approval from the NVPH.

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7. CONCLUSIONS AND RECOMMENDATIONS

This section provides conclusions and recommendations that support the primary objectives from both the 2014 annual groundwater sampling effort and the Record of Decision (USAF 2009).

7.1 FPC-066 SITE

DRO is the only COC currently monitored at the FPC-066 site. During the 2014 monitoring event, both monitoring wells sampled at FPC-066 contained DRO at concentrations below the cleanup level of 1.5 mg/L, which marked the first sampling event in which the concentrations were below cleanup levels in monitoring well 066-MW-05. However, a concentration from a confirmation sample collected from well 066-MW-05 in the summer of 2016 exceeded the cleanup level and four wells at FPC-066 were added back into the monitoring program. The 2017 analytical result from well 066-MW-05 also exceeded the cleanup level; therefore, monitoring of the four wells will continue.

7.2 FPC-215 SITE

The only COC currently monitored at the FPC-215 site is DRO. The DRO concentration at well 215-MW-09 appears to have been increasing the past few years and there was concern that the plume may be migrating or have an additional source in a previously undetected direction. Two new wells—FPC-215-MW11 and FPC-215-MW12—were installed in 2016 in locations around 215-MW-09 to assess the potential for a larger source or migration of the contaminant plume. The 2017 result from well 215-MW-09 was 6.8 mg/L, which is about half of the 2016 concentration but still above the cleanup level. The other wells, had concentrations well below the cleanup level. Monitoring well 215-MW-10 has had DRO detections in the past but was damaged and not sampled in 2016 or 2017. Consideration should be given to repair or decommissioning of well 215-MW-10.

7.3 FORMER RADIO RELAY STATION

Three contaminant plumes are present at the former RRS site above cleanup levels: DRO and GRO contamination plumes in the BLO and DSA areas and a TCE plume near the former DSA, BLO, and surrounding areas. Three wells contained concentrations of COCs above cleanup levels in 2017 and NAPL was measured at 0.4 feet thick in well BLO-MW-01. Historically, seven wells have exhibited concentrations of COCs above the cleanup levels. Of these wells, DSA-MW-05 and DSA-MW-07 are the only two that have had concentrations below cleanup

levels during the previous two sampling events. Based on the 2014, 2016, and 2017 concentrations of TCE, DRO, GRO and presence of NAPL, and lack of historical natural attenuation, MNA may not meet the timeframe proposed in the RI/FS (USAF 2006).

Nine monitoring wells at the RRS have exhibited reported concentrations of COCs below ADEC cleanup levels in all previous sampling events:

- BLO-MW-05
- BLO-MW-06
- BLO-MW-07
- DSA-MW-06
- GLO-MW-03
- GLO-MW-04
- UST-MW-02
- RRS-MW-05
- RRS-MW-06

The 2017 results are consistent with the previous results in these wells. Reducing the sampling frequency of long-term monitoring at these nine monitoring wells to once every five years to coincide with the Comprehensive Environmental Response, Compensation, and Liability Act (CERCLA) five-year reviews, should be considered.

8. REFERENCES

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Appendix A Photograph Log

Port Heiden Groundwater Monitoring 2017 Photographic Log



Photograph 1. Monitoring well PG-1. In 2016, another contractor excavated PCB contaminated soil from around the well. The steel casing was removed and the pvc casing was left with approximately 8 feet sticking up above the ground supported by a wood plank. In 2017 the pvc casing had broken off. View to the north-northeast. September 27, 2017.



Photograph 2. FPC215-MW-10. View to the north-northeast. September 29, 2017

Port Heiden Groundwater Monitoring 2017 Photographic Log



Photograph 3. GLO-MW-03. The well is in good condition, however, the ground around the well is eroding away. View to the north-northeast. September 30, 2017.



Photograph 4. BLO-MW-01, top of well. Petroleum residue on probe. This well had been damaged and repaired by another contractor in the summer of 2017. September 27, 2017.

Appendix B

Data Quality Assessment



Pacific Air Forces Regional Support Center

Joint Base Elmendorf-Richardson, Alaska

2017 ANNUAL GROUNDWATER MONITORING REPORT

**FORMER RADIO RELAY STATION
PORT HEIDEN, ALASKA**

Appendix B Data Quality Assessment

**Final
June 2019**

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TABLES

Table B-1	Field Quality Control Sample Quantities, Groundwater Samples	B-1
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ATTACHMENTS

Attachment B-1	Sample Summary Table
Attachment B-2	Qualified Sample Results Tables
Attachment B-3	Data Validation Reports and ADEC Laboratory Data Review Checklists
Attachment B-4	Laboratory Deliverables (available on CD)

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ACRONYMS AND ABBREVIATIONS

ADEC	Alaska Department of Environmental Conservation
APCS	APC Services, LLC
BTEX	benzene, toluene, ethylbenzene, and xylenes
COC	chain-of-custody
DL	detection limit
DoD	U.S. Department of Defense
DQA	Data Quality Assessment
DQO	data quality objective
DRO	diesel range organics
EPA	U.S. Environmental Protection Agency
GRO	gasoline range organics
HCL	hydrochloric acid
ID	identification
LOD	limit of detection
MDL	method detection limit
MS	matrix spike
MSD	matrix spike duplicate
MNA	monitored natural attenuation
PQL	practical quantitation limit
QC	quality control
RL	reporting limit
RPD	relative percent difference
RRO	residual range organics

TB	trip blank
USAF	U.S. States Air Force
Versar	Versar, Inc.
VOC	volatile organic compound

1. INTRODUCTION

The purpose of this Data Quality Assessment (DQA) and attached Alaska Department of Environmental Conservation (ADEC) Laboratory Data Review Checklists is to assess the overall quality and usability of data from the 2017 annual groundwater monitoring at Port Heiden, Alaska.

Twenty-two (22) groundwater monitoring wells were sampled in 2017. Table 3-2 in the report Section 3.1 lists details of each well and the analyses. Well samples were submitted to the analytical laboratory, TestAmerica in Denver, Colorado (TAD), for analysis. Analyses and field quality control sample quantities are summarized in Table B-1; the specific list of methods/analytes for each well is provided in Table 3-2 of the report.

Table B-1. Field Quality Control Sample Quantities, Groundwater Samples

Method	Analyte(s)	Primary Samples	Field Duplicates	MS/MSD	Trip Blanks
AK101	GRO	4	1	2	-
AK102	DRO	11	2	2	-
AK103	RRO	5	1	2	-
SW8260C	VOC	13	2	2	2
ASTM2320B, E200.7, E300.0, E351.2, E353.2, SW6010C	For MNA: total iron, total manganese, total sulfate, alkalinity, total nitrogen as nitrate-nitrite, and Kjeldahl nitrogen	14	2	2	-

Note:

For definitions, see Acronyms and Abbreviations section.

The attachments to this DQA contain the sample summary table (Attachment B-1); qualified sample results tables (Attachment B-2); data validation reports and ADEC Laboratory Data Review Checklists (Attachment B-3); and the complete laboratory deliverables (Attachment B-4, available on CD).

1.1 QUALITY CONTROL CRITERIA

APC Services, LLC (APCS) subcontracted Versar, Inc. (Versar) to conduct the DQA and complete the ADEC Laboratory Data Review Checklists for the records associated with the 2016 and 2017 annual groundwater monitoring event, in accordance with the *Groundwater*

Monitoring Work Plan, Port Heiden Radio Relay Station, Port Heiden, Alaska (U.S. Air Force [USAF] 2016 amended, April 2017). Data quality was evaluated against the following requirements: *Quality Systems Manual for Environmental Laboratories* (U.S. Department of Defense [DoD] 2013); *U.S. EPA National Functional Guidelines for Superfund Inorganic Methods Data Review* (U.S. Environmental Protection Agency [EPA] 2016a); *U.S. EPA National Functional Guidelines for Superfund Organic Methods Data Review* (EPA 2016b); and the project-specific Quality Assurance Project Plan (USAF 2016, amended in 2017), prepared in accordance with the *Uniform Federal Policy for Quality Assurance Project Plans* (EPA, DoD, and U.S. Department of Energy, 2012). The method-specific criteria set forth in the compendium of analytical methods found in the *Test Methods for Evaluation Solid Waste* (SW-846; EPA 2008) were also evaluated during the validation process.

The project chemist performed a completeness check of the laboratory deliverables to verify that data packages and electronic files included all requested information. All analytical data were reviewed, including the chain-of-custody (COC) and sample receipt records, laboratory case narratives, and laboratory data. Analytical data were reviewed for the following information:

- Methodology
- Sample holding times
- Laboratory blanks and trip blanks
- Limit of quantitation, limit of detection, and detection limits (DLs)
- Surrogate recoveries, laboratory control sample recoveries, and laboratory control sample duplicate recoveries
- Matrix spike (MS) and matrix spike duplicate (MSD) recoveries and precision

Analytical data quality objectives were considered to have been met when the quality of the sample data met precision, accuracy, representativeness, completeness, comparability, and sensitivity requirements. Qualified data are considered usable but estimated for the purposes of this monitoring event.

There are five levels of analytical data verification and validation:

- Level One (I) – validation based ONLY on completeness and compliance checks of sample receipt conditions.
- Level Two (II) – validation based on completeness and compliance checks of sample receipt conditions and ONLY sample-related quality control (QC) results.
- Level Two (b) (IIB) – validation based on completeness and compliance checks of sample receipt conditions, both sample- and instrument-related QC results, AND recalculation of a representative portion of the QC checks/calibration based on the information provided in the summary forms.
- Level Three (III) – validation based on completeness and compliance checks of sample receipt conditions, both sample- and instrument-related QC results, AND recalculation of a representative portion of the QC checks/calibration based on the information provided in the summary forms.
- Level Four (IV) – validation based on completeness and compliance checks of sample receipt conditions, both sample- and instrument-related QC results, recalculations of a representative portion of the QC checks/calibration based on the information provided in the summary forms, AND the review of actual instrument outputs/raw data.

The following data qualifiers are applicable for the 2017 groundwater monitoring analytical data:

- J The analyte was positively identified; the quantitation is an estimation.
- + The quantitation is an estimation and the result may be biased high.
- The quantitation is an estimation and the result may be biased low.
- JM The analyte was positively identified; the quantitation is an estimation and the result may be biased low based on a low MS or MSD recovery.
- B The analyte was detected in the method blank or trip blank as well as the sample.
- F The analyte was positively identified, but the associated numerical value is below the reporting limit.
- M Manual integrated compound

- Q One or more QC criteria failed. The usability of this data point should be carefully evaluated.
- U The analyte was analyzed for, but not detected. The associated numerical value is at or below the method detection limit (MDL).
- UJ Values “U” and “J” combined.

2. DATA QUALITY SUMMARY

A review of the analytical results and associated QC samples determined that the overall quality of the project data is acceptable for the purposes of this monitoring event. The data are considered usable within the limitations discussed in this DQA and the ADEC checklists (Attachment B-3). The details of the data evaluation are presented in Sections 2.1 to 2.5. Sample results that did not meet project data quality objectives (DQOs) are qualified according to Section 1.1. All qualified results can be found in the tables of Attachment B-2; all associated data validation reports and ADEC checklists can be found in Attachment B-3.

2.1 SAMPLE HOLDING TIME

All sample holding times were met.

2.2 CONTINUING CALIBRATION

All criteria for continuing calibration verification were met. All data are usable.

2.3 MATRIX SPIKES

MS/MSD analyses were performed on sample BLO-MW-06_092917 for VOCs, GRO and DRO and on sample DSA-MW-05_093017 for VOCs. Method accuracy and precision for RRO were evaluated based on the LCS/LCSD results. The GRO MSD recover of 52% in the MSD resulted in an RPD of 39% and the parent sample results was qualified as estimated (J). The DRO recovery was below the control limits and qualified as estimated with a potential negative bias (JM-). All other recoveries were within the control limits of the DoD QSM.

MS/MSD analyses were performed on samples DSA-MW-07-092817 and GLO-MW-04_100117 for TKN, and on samples BLO-MW—06_092917 and DSA-MW-05_093017 for sulfate and Method 6010C. The MSD for SW6010C for iron was low at 79% and the sample result was qualified with a JM-.

MS/MSD were analyzed for sample FPC-066-MW-04_100317 for DRO and recoveries were within control limits. MS/MSD were also performed on sample RRS-MW-02_100417 for TKN and the MS was less than the lower QC limit of 90%. The sample was qualified with a JM-.

Table B-2-2 (Attachment B-2) provides a summary of the qualified sample results.

2.4 FIELD DUPLICATES

Field duplicates were collected at a rate of at least 10% for each analyte.

BLO-MW-26 was a duplicate of sample BLO-MW-06 and GLO-MW-23_093017 was a duplicate of GLO-MW-03_093017. The duplicate results were within the relative percent difference (RPD) acceptance criteria for VOC, GRO, DRO and RRO but outside for iron for both sample-duplicate pairs, and outside of acceptance criteria for manganese for the GLO-MW-03/GLO-MW-23 pair. The associated sample results outside of acceptance criteria were flagged “J.” The data were not affected and are considered usable.

Sample FPC_066-MW-24 was a duplicate of FPC_066-MW004 for DRO. The results for both samples were detected below the LOQ and considered estimated at 0.055 and 0.05 mg/L. The RPD between the estimated results was within acceptance criteria.

2.5 DETECTION LIMIT ASSESSMENT

All practical quantitation limits (PQLs) were less than the cleanup level or the minimum required detection level for the project. Therefore, the data are usable.

2.6 METHOD BLANKS/TRIP BLANKS

Trip blanks were used for volatile organic compounds (VOCs), and all results were less than the PQLs. Data are not affected and are accepted.

The Method Blank result associated with sample DSA-MW-02_100417 had a detection less than 5 times the method blank concentration and was qualified with a “B”. The laboratory qualified it with a J flag.

TKN was reported above the LOD and less than the LOQ in calibration blanks associated with site samples. Associated detected results less than 5 times the calibration blank concentration were qualified with a “B” as blank contamination. The laboratory qualified it with a J flag.

Sample detects for GRO less than 5 times the method blank concentration in samples BLO-MW-07-092917 and BLO-MW-05_093017 were qualified as method blank contamination (B).

TKN and sulfate were reported above the LOD and less than the LOQ in calibration blanks. Associated detected results that were less than 5 times the calibration blank concentration were qualified as blank contamination (B).

Trip blanks were analyzed for VOCs and did not have detected analytes above the control limit of one-half the LOQ or one-tenth the amount of any sample detect. No flags were applied.

3. CONCLUSION

The overall quality of project data was acceptable. The completeness goal of 95 percent for all parameters was met. No sample results were rejected. All reported data were considered usable for the 2017 Annual Groundwater Monitoring at Port Heiden; any qualifications applied during data validation did not adversely affect data usability. Limitations are discussed in this DQA and in the data validation reports and ADEC Laboratory Data Review Checklists (Attachment B-3).

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**Attachment B-1
Sample Summary Table**

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Table B-1-1. 2017 Port Heiden Groundwater Monitoring Sample Summary

COC Sample ID	Location ID	Collection Date	Collection Time	Sampler	Qty	Container Type	Container Volume	Preservative	Matrix	Analytical Method Requested	QC Type	TAT	Notes	Lab	SDG
FPC_215-MW-08_100817	215-MW-08	08-Oct-2017	1330	SW/LS	2	Amber	1 L	HCL, 4C	GW	AK102		30 days		TAD	280-102019
FPC_215-MW09_100817	215-MW-09	08-Oct-2017	1730	SW/LS	2	Amber	1 L	HCL, 4C	GW	AK102		30 days		TAD	280-102019
FPC_215-MW11_100717	215-MW-11	07-Oct-2017	1810	SW/LS	2	Amber	1 L	HCL, 4C	GW	AK102		30 days		TAD	280-102019
FPC_215-MW-12_100217	215-MW-12	02-Oct-2017	1505	SW/LS	2	Amber	1 L	HCL 4C	GW	AK102		30 days		TAD	280-102019
FPC_066-MW-04_100317	066-MW-04	03-Oct-2017	1725	SW/LS	2	Amber	1 L	HCL, 4C	GW	AK102		30 days		TAD	280-102019
FPC_066-MW-24_100317	066-MW-04	03-Oct-2017	1855	SW/LS	2	Amber	1L	HCL, 4C	GW	AK102	Dup	30 days		TAD	280-102019
FPC_066-MW-05_100717	066-MW-05	07-Oct-2017	1145	SW/LS	2	Amber	1 L	HCL, 4C	GW	AK102		30 days		TAD	280-102019
FPC_066-MW-06_092717	066-MW-06	27-Sep-2017	1335	SW/LS	2	Amber	1 L	HCL, 4C	GW	AK102		30 days		TAD	280-102019
FPC_066-MW-07_092717	066-MW-07	27-Sep-2017	1545	SW/LS	2	Amber	1 L	HCL 4C	GW	AK102		30 days		TAD	280-102019
RRS-MW-06_100217	RRS-MW-06	02-Oct-2017	1355	SW/LS	3	VOA Vial	40 mL	HCL, 4C	GW	SW8260b		30 days		TAD	280-102019
RRS-MW-06_100217	RRS-MW-06	02-Oct-2017	1355	SW/LS	1	Poly	500 mL	HNO3, 4C	GW	EPA 0610C		30 days		TAD	280-102019
RRS-MW-06_100217	RRS-MW-06	02-Oct-2017	1355	SW/LS	1	Poly	250 mL	4C	GW	EPA 300.0, SM21 2320B		30 days		TAD	280-102019
RRS-MW-06_100217	RRS-MW-06	02-Oct-2017	1355	SW/LS	1	Amber	500 mL	H2SO4, 4C	GW	EPA 353.2		30 days		TAD	280-102019
DSA-MW-06_092817	DSA-MW-06	28-Sep-2017	1400	SW/LS	3	VOA Vial	40 mL	HCL, 4C	GW	SW8260b		30 days		TAD	280-102019
DSA-MW-06_092817	DSA-MW-06	28-Sep-2017	1400	SW/LS	1	Poly	500 mL	HNO3, 4C	GW	EPA 6010C		30 days		TAD	280-102019
DSA-MW-06_092817	DSA-MW-06	28-Sep-2017	1400	SW/LS	1	Poly	250 mL	4C	GW	EPA 300.0, SM21 2320B		30 days		TAD	280-102019
DSA-MW-06_092817	DSA-MW-06	28-Sep-2017	1400	SW/LS	1	Amber	500 mL	H2SO4, 4C	GW	EPA 353.2		30 days		TAD	280-102019
DSA-MW-07_092817	DSA-MW-07	28-Sep-2017	1615	SW/LS	3	VOA Vial	40 mL	HCL, 4C	GW	SW8260b		30 days		TAD	280-102019
DSA-MW-07_092817	DSA-MW-07	28-Sep-2017	1615	SW/LS	1	Poly	500 mL	HNO3, 4C	GW	EPA 6010C		30 days		TAD	280-102019
DSA-MW-07_092817	DSA-MW-07	28-Sep-2017	1615	SW/LS	1	Poly	250 mL	4C	GW	EPA 300.0, SM21 2320B		30 days		TAD	280-102019
DSA-MW-07_092817	DSA-MW-07	28-Sep-2017	1615	SW/LS	1	Amber	500 mL	H2SO4, 4C	GW	EPA 353.2		30 days		TAD	280-102019
RRS-MW-05_100117	RRS-MW-05	01-Oct-2017	1720	SW/LS	3	VOA Vial	40 mL	HCL, 4C	GW	SW8260b		30 days		TAD	280-102019
RRS-MW-05_100117	RRS-MW-05	01-Oct-2017	1720	SW/LS	1	Poly	500 mL	HNO3, 4C	GW	EPA 6010C		30 days		TAD	280-102019
RRS-MW-05_100117	RRS-MW-05	01-Oct-2017	1720	SW/LS	1	Poly	250 mL	4C	GW	EPA 300.0, SM21 2320B		30 days		TAD	280-102019
RRS-MW-05_100117	RRS-MW-05	01-Oct-2017	1720	SW/LS	1	Amber	500 mL	H2SO4, 4C	GW	EPA 353.2		30 days		TAD	280-102019
RRS-MW-02_100317	RRS-MW-02	03-Oct-2017	1445	SW/LS	3	VOA Vials	40 mL	HCL, 4C	GW	SW8260b		30 days		TAD	280-102198
RRS-MW-02_100317	RRS-MW-02	03-Oct-2017	1445	SW/LS	1	Poly	500 mL	HNO3, 4C	GW	EPA 6010C		30 days		TAD	280-102198
RRS-MW-02_100317	RRS-MW-02	03-Oct-2017	1445	SW/LS	1	Poly	250 mL	4C	GW	EPA 300.0, 351.2 2320B		30 days		TAD	280-102198
RRS-MW-02_100317	RRS-MW-02	03-Oct-2017	1445	SW/LS	1	Amber	500 mL	H2SO4, 4C	GW	EPA 353.2		30 days		TAD	280-102198
DSA-MW-05_093017	DSA-MW-05	30-Sep-2017	2025	SW/LS	3	VOA Vial	40 mL	HCL, 4C	GW	SW8260b		30 days		ALS	280-102019
DSA-MW-05_093017	DSA-MW-05	30-Sep-2017	2025	SW/LS	1	Poly	500 mL	HNO3, 4C	GW	EPA 6010C		30 days		ALS	280-102019
DSA-MW-05_093017	DSA-MW-05	30-Sep-2017	2025	SW/LS	1	Poly	250 mL	4C	GW	EPA 300.0, SM21 2320B		30 days		ALS	280-102019
DSA-MW-05_093017	DSA-MW-05	30-Sep-2017	2025	SW/LS	1	Amber	500 mL	H2SO4, 4C	GW	EPA 353.2		30 days		ALS	280-102019
DSA-MW-01_100417	DSA-MW-01	04-Oct-2017	1205	SW/LS	3	VOA Vial	40 mL	HCL, 4C	GW	SW8260b		30 days		TAD	280-102198
DSA-MW-01_100417	DSA-MW-01	04-Oct-2017	1205	SW/LS	1	Poly	500 mL	HNO3, 4C	GW	EPA 6010C		30 days		TAD	280-102198
DSA-MW-01_100417	DSA-MW-01	04-Oct-2017	1205	SW/LS	1	Poly	250 mL	4C	GW	EPA 300.0, SM21 2320B		30 days		TAD	280-102198
DSA-MW-01_100417	DSA-MW-01	04-Oct-2017	1205	SW/LS	1	Amber	500 mL	H2SO4, 4C	GW	EPA 353.2		30 days		TAD	280-102198
DSA-MW-02_100417	DSA-MW-02	04-Oct-2017	1640	SW/LS	3	VOA Vial	40 mL	HCL, 4C	GW	SW8260b		30 days		TAD	280-102198

COC Sample ID	Location ID	Collection Date	Collection Time	Sampler	Qty	Container Type	Container Volume	Preservative	Matrix	Analytical Method Requested	QC Type	TAT	Notes	Lab	SDG
DSA-MW-02_100417	DSA-MW-02	04-Oct-2017	1640	SW/LS	3	VOA vial	40 mL	HCL, 4C	GW	AK101		30 days		TAD	280-102198
DSA-MW-02_100417	DSA-MW-02	04-Oct-2017	1640	SW/LS	1	Poly	500 mL	HNO3, 4C	GW	6010C		30 days		TAD	280-102198
DSA-MW-02_100417	DSA-MW-02	04-Oct-2017	1640	SW/LS	1	Poly	250 mL	4C	GW	EPA 300.0, 351.2 2320B		30 days		TAD	280-102198
DSA-MW-02_100417	DSA-MW-02	04-Oct-2017	1640	SW/LS	1	Amber	500 mL	H2SO4, 4C	GW	EPA 353.2		30 days		TAD	280-102198
DSA-MW-02_100417	DSA-MW-02	04-Oct-2017	1640	SW/LS	2	Amber	1 L	HCL,	GW	AK102/AK103		30 days		TAD	280-102198
GLO-MW-03_093017	GLO-MW-03	30-Sep-2017	1805	SW/LS	3	VOA Vials	40 mL	HCL, 4C	GW	SW8260b		30 days		TAD	280-102019
GLO-MW-03_093017	GLO-MW-03	30-Sep-2017	1805	SW/LS	1	Poly	500 mL	HNO3, 4C	GW	EPA 6010C		30 days		TAD	280-102019
GLO-MW-03_093017	GLO-MW-03	30-Sep-2017	1805	SW/LS	1	Poly	250 mL	4C	GW	EPA 300.0, SM21 2320B		30 days		TAD	280-102019
GLO-MW-03_093017	GLO-MW-03	30-Sep-2017	1805	SW/LS	1	Amber	500 mL	H2SO4, 4C	GW	EPA 353.2		30 days		TAD	280-102019
GLO-MW-23_093017	GLO-MW-03	30-Sep-2017	1835	SW/LS	3	VOA Vials	40 mL	HCL, 4C	GW	SW8260b	Dup	30 days		TAD	280-102019
GLO-MW-23_093017	GLO-MW-03	30-Sep-2017	1835	SW/LS	1	Poly	500 mL	HNO3, 4C	GW	EPA 6010C	Dup	30 days		TAD	280-102019
GLO-MW-23_093017	GLO-MW-03	30-Sep-2017	1835	SW/LS	1	Poly	250 mL	4C	GW	EPA 300.0, SM21 2320B	Dup	30 days		TAD	280-102019
GLO-MW-23_093017	GLO-MW-03	30-Sep-2017	1835	SW/LS	1	Amber	500 mL	H2SO4, 4C	GW	EPA 353.2	Dup	30 days		TAD	280-102019
DSA-MW-04_100417	DSA-MW-04	04-Oct-2017	1325	SW/LS	3	VOA Vial	40 mL	HCL, 4C	GW	SW8260b		30 days		TAD	280-102198
DSA-MW-04_100417	DSA-MW-04	04-Oct-2017	1325	SW/LS	3	VOA Vial	40 mL	HCL, 4C	GW	AK101		30 days		TAD	280-102198
DSA-MW-04_100417	DSA-MW-04	04-Oct-2017	1325	SW/LS	2	Amber	1 L	HCL, 4C	GW	AK102/103		30 days		TAD	280-102198
DSA-MW-04_100417	DSA-MW-04	04-Oct-2017	1325	SW/LS	1	Poly	500 mL	HNO3, 4C	GW	6010C		30 days		TAD	280-102198
DSA-MW-04_100417	DSA-MW-04	04-Oct-2017	1325	SW/LS	1	Poly	250 mL	4C	GW	EPA 300.0, SM21 2320B		30 days		TAD	280-102198
DSA-MW-04_100417	DSA-MW-04	04-Oct-2017	1325	SW/LS	1	Amber	500 mL	H2SO4, 4C	GW	EPA 353.2		30 days		TAD	280-102198
GLO-MW-04_100117	GLO-MW-04	25-Oct-2017	1245	SW/LS	3	VOA Vials	40 mL	HCL, 4C	GW	SW8260b		30 days		TAD	280-102019
GLO-MW-04_100117	GLO-MW-04	25-Oct-2017	1245	SW/LS	1	Poly	500 mL	HNO3, 4C	GW	EPA 6010C		30 days		TAD	280-102019
GLO-MW-04_100117	GLO-MW-04	25-Oct-2017	1245	SW/LS	1	Poly	250 mL	4C	GW	EPA 300.0, SM21 2320B		30 days		TAD	280-102019
GLO-MW-04_100117	GLO-MW-04	25-Oct-2017	1245	SW/LS	1	Amber	500 mL	H2SO4, 4C	GW	EPA 353.2		30 days		TAD	280-102019
BLO-MW-07_092917	BLO-MW-07	29-Sep-2017	1540	SW/LS	3	VOA Vial	40 mL	HCL, 4C	GW	AK101		30 days		TAD	280-102019
BLO-MW-07_092917	BLO-MW-07	29-Sep-2017	1540	SW/LS	3	VOA Vial	40 mL	HCL, 4C	GW	SW8260b		30 days		TAD	280-102019
BLO-MW-07_092917	BLO-MW-07	29-Sep-2017	1540	SW/LS	2	Amber	1 L	HCL, 4C	GW	AK102/103		30 days		TAD	280-102019
BLO-MW-07_092917	BLO-MW-07	29-Sep-2017	1540	SW/LS	1	Poly	500 mL	HNO3, 4C	GW	EPA 6010C		30 days		TAD	280-102019
BLO-MW-07_092917	BLO-MW-07	29-Sep-2017	1540	SW/LS	0	Poly	250 mL	4C	GW	EPA 300.0, SM21 2320B		30 days		TAD	280-102019
BLO-MW-07_092917	BLO-MW-07	29-Sep-2017	1540	SW/LS	1	Amber	500 mL	H2SO4, 4C	GW	EPA 353.2		30 days		TAD	280-102019
BLO-MW-06_092917	BLO-MW-06	29-Sep-2017	1810	SW/LS	6	VOA Vials	40 mL	HCL, 4C	GW	AK101	Includes MS/MSD	30 days		TAD	280-102019
BLO-MW-06_092917	BLO-MW-06	29-Sep-2017	1810	SW/LS	6	VOA Vials	40 mL	HCL, 4C	GW	SW8260b	Includes MS/MSD	30 days		TAD	280-102019
BLO-MW-06_092917	BLO-MW-06	29-Sep-2017	1810	SW/LS	6	Amber	1 L	HCL, 4C	GW	AK102/103	Includes MS/MSD	30 days		TAD	280-102019
BLO-MW-06_092917	BLO-MW-06	29-Sep-2017	1810	SW/LS	3	Poly	500 mL	HNO3, 4C	GW	EPA 6010C	Includes MS/MSD	30 days		TAD	280-102019
BLO-MW-06_092917	BLO-MW-06	29-Sep-2017	1810	SW/LS	3	Poly	250 mL	4C	GW	EPA 300.0, SM21 2320B	Includes MS/MSD	30 days		TAD	280-102019
BLO-MW-06_092917	BLO-MW-06	29-Sep-2017	1810	SW/LS	3	Amber	500 mL	H2SO4, 4C	GW	EPA 353.2	Includes MS/MSD	30 days		TAD	280-102019
BLO-MW-26_092917	BLO-MW-06	29-Sep-2017	1810	SW/LS	3	VOA Vials	40 mL	HCL, 4C	GW	AK101	dup	30 days		TAD	280-102019
BLO-MW-26_092917	BLO-MW-06	29-Sep-2017	1810	SW/LS	3	VOA Vials	40 mL	HCL, 4C	GW	SW8260b	dup	30 days		TAD	280-102019
BLO-MW-26_092917	BLO-MW-06	29-Sep-2017	1810	SW/LS	2	Amber	1 L	HCL, 4C	GW	AK102/103	dup	30 days		TAD	280-102019
BLO-MW-26_092917	BLO-MW-06	29-Sep-2017	1810	SW/LS	1	Poly	500 mL	HNO3, 4C	GW	EPA 6010C	dup	30 days		TAD	280-102019
BLO-MW-26_092917	BLO-MW-06	29-Sep-2017	1810	SW/LS	1	Poly	250 mL	4C	GW	EPA 300.0, SM21 2320B	dup	30 days		TAD	280-102019

COC Sample ID	Location ID	Collection Date	Collection Time	Sampler	Qty	Container Type	Container Volume	Preservative	Matrix	Analytical Method Requested	QC Type	TAT	Notes	Lab	SDG
BLO-MW-26_092917	BLO-MW-06	29-Sep-2017	1810	SW/LS	1	Amber	500 mL	H2SO4, 4C	GW	EPA 353.2	dup	30 days		TAD	280-102019
BLO-MW-05_093017	BLO-MW-05	30-Sep-2017	1515	SW/LS	3	VOA Vials	40 mL	HCL, 4C	GW	SW8260		30 days		TAD	280-102019
BLO-MW-05_093017	BLO-MW-05	30-Sep-2017	1515	SW/LS	3	VOA Vials	40 mL	HCL, 4C	GW	AK101		30 days		TAD	280-102019
BLO-MW-05_093017	BLO-MW-05	30-Sep-2017	1515	SW/LS	2	Amber	1 L	HCL, 4C	GW	AK102/103		30 days		TAD	280-102019
BLO-MW-05_093017	BLO-MW-05	30-Sep-2017	1515	SW/LS	1	Poly	500 mL	HNO3, 4C	GW	EPA 6010C		30 days		TAD	280-102019
BLO-MW-05_093017	BLO-MW-05	30-Sep-2017	1515	SW/LS	1	Poly	250 mL	4C	GW	EPA 300.0, SM21 2320B		30 days		TAD	280-102019
BLO-MW-05_093017	BLO-MW-05	30-Sep-2017	1515	SW/LS	1	Amber	500 mL	H2SO4, 4C	GW	EPA 353.2		30 days		TAD	280-102019
TAD-100317-TB002		03-Oct-2017	0900	SW/LS	3	Amber	40 mL	HCL, 4C	TB	SW8260b		30 days		TAD	280-102198
Trip Blank		02-Oct-2017	0900	GD/SW	3	Amber	40 mL	HCL, 4C	TB	SW8260b		30 days		TAD	280-102019

Acronyms and abbreviations:

AK = Alaska

C = degrees Centigrade

dup = duplicate

EPA = U.S. Environmental Protection Agency

GW = groundwater

H2SO4 = sulfuric acid

HCL = hydrochloric acid

HNO3 = nitric acid

ID = identification

L = liter

mL = milliliter

QC = quality control

S = soil

SDG = sample delivery group

TAD = TestAmerica in Denver, Colorado

TB = trip blank

VOA = volatile organic analysis

Attachment B-2
Qualified Sample Results Tables

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Table B-2-1. 2017 Port Heiden Groundwater Monitoring Program Validated Groundwater Sample Results – SDG 280-102019

Field Sample ID	Lab Sample ID	SDG	Lab Method	Parameter Name	Report Result	MDL	RL	Units	Lab Qualifier	Validation Qualifier	Validation Reason Codes
BLO-MW-05_093017	280-102019-8	280-102019	A2320B	ALKALINITY, TOTAL (AS CaCO3)	45		0	MG/L			
BLO-MW-05_093017	280-102019-8	280-102019	SW8260B	BENZENE	0	0.4	1.0	UG/L	U	U	
BLO-MW-05_093017	280-102019-8	280-102019	SW8260B	TOLUENE	0.17	0.17	1.0	UG/L	J	J	TR
BLO-MW-05_093017	280-102019-8	280-102019	SW8260B	1,1-DICHLOROETHENE	0	0.8	1.0	UG/L	U	U	
BLO-MW-05_093017	280-102019-8	280-102019	SW8260B	CIS-1,2-DICHLOROETHYLENE	0	0.4	1.0	UG/L	U	U	
BLO-MW-05_093017	280-102019-8	280-102019	SW8260B	TRANS-1,2-DICHLOROETHENE	0	0.4	1.0	UG/L	U	U	
BLO-MW-05_093017	280-102019-8	280-102019	SW8260B	ETHYLBENZENE	0.16	0.4	1.0	UG/L	U	U	
BLO-MW-05_093017	280-102019-8	280-102019	SW6010C	IRON	1100	22.0	100.0	UG/L		JM-	MSL
BLO-MW-05_093017	280-102019-8	280-102019	E351.2	NITROGEN, KJELDAHL, TOTAL	0.31	0.18	1.0	MG/L	J	B	CBL
BLO-MW-05_093017	280-102019-8	280-102019	SW6010C	MANGANESE	19	0.26	10.0	UG/L			
BLO-MW-05_093017	280-102019-8	280-102019	AK103	MOTOR OILS	0	0.13	0.53	MG/L	U MQ	UJ	LCD
BLO-MW-05_093017	280-102019-8	280-102019	E353.2	NITROGEN, NITRATE-NITRITE	0.33	0.019	0.1	MG/L			
BLO-MW-05_093017	280-102019-8	280-102019	SW8260B	TETRACHLOROETHYLENE(PCE)	0	0.4	1.0	UG/L	U	U	
BLO-MW-05_093017	280-102019-8	280-102019	AK102	C10-C25 DIESEL RANGE ORGANICS	0.037	0.034	0.26	MG/L	J M	J	TR
BLO-MW-05_093017	280-102019-8	280-102019	AK101	PETROLEUM HYDROCARBONS C6-C10	1.8	0.025	1.3	MG/L	M	B	LBL
BLO-MW-05_093017	280-102019-8	280-102019	E300	SULFATE (AS SO4)	2.0	0.23	5.0	MG/L	JM	J	TR
BLO-MW-05_093017	280-102019-8	280-102019	SW8260B	TRICHLOROETHYLENE (TCE)	0.16	0.16	1.0	UG/L	J	J	TR
BLO-MW-05_093017	280-102019-8	280-102019		TOTAL NITROGEN	0.52		0	MG/L			
BLO-MW-05_093017	280-102019-8	280-102019	SW8260B	TOTAL NITROGEN, ALL FORMS, CALCULATED							
BLO-MW-05_093017	280-102019-8	280-102019	SW8260B	VINYL CHLORIDE	0	0.2	1.5	UG/L	U	U	
BLO-MW-05_093017	280-102019-8	280-102019	SW8260B	XYLENES, TOTAL	0	0.8	2.0	UG/L	U	U	
BLO-MW-05_093017	280-102019-8	280-102019	SW8260B	M,P-XYLENE (SUM OF ISOMERS)	0	0.8	2.0	UG/L	U	U	
BLO-MW-05_093017	280-102019-8	280-102019	SW8260B	O-XYLENE (1,2-DIMETHYLBENZENE)	0	0.4	1.0	UG/L	U	U	
BLO-MW-06_092917	280-102019-6	280-102019	A2320B	ALKALINITY, TOTAL (AS CaCO3)	54			MG/L			
BLO-MW-06_092917	280-102019-6	280-102019	SW8260B	BENZENE	0	0.4	1.0	UG/L	U	U	
BLO-MW-06_092917	280-102019-6	280-102019	SW8260B	TOLUENE	0	0.4	1.0	UG/L	U	U	
BLO-MW-06_092917	280-102019-6	280-102019	SW8260B	1,1-DICHLOROETHENE	0	0.8	1.0	UG/L	U	U	
BLO-MW-06_092917	280-102019-6	280-102019	SW8260B	CIS-1,2-DICHLOROETHYLENE	0	0.4	1.0	UG/L	U	U	
BLO-MW-06_092917	280-102019-6	280-102019	SW8260B	TRANS-1,2-DICHLOROETHENE	0	0.4	1.0	UG/L	U	U	
BLO-MW-06_092917	280-102019-6	280-102019	SW8260B	ETHYLBENZENE	0	0.4	1.0	UG/L	U	U	
BLO-MW-06_092917	280-102019-6	280-102019	SW6010C	IRON	1200	22.0	100.0	UG/L		JM-	MSL
BLO-MW-06_092917	280-102019-6	280-102019	E351.2	NITROGEN, KJELDAHL, TOTAL	0.31	0.18	1.0	MG/L	J	B	CBL
BLO-MW-06_092917	280-102019-6	280-102019	SW6010C	MANGANESE	65	0.26	10.0	UG/L			
BLO-MW-06_092917	280-102019-6	280-102019	AK103	Motor Oils	0.13	0.057	0.51	MG/L	UMQ	UJ	CBL
BLO-MW-06_092917	280-102019-6	280-102019	E353.2	NITROGEN, NITRATE-NITRITE	0.055	0.019	0.1	MG/L	J	J	TR
BLO-MW-06_092917	280-102019-6	280-102019	SW8260B	TETRACHLOROETHYLENE(PCE)	0	0.4	1.0	UG/L	U	U	
BLO-MW-06_092917	280-102019-6	280-102019	AK102	DRO	0.037	0.033	0.25	MG/L	MJ	J	TR
BLO-MW-06_092917	280-102019-6	280-102019	AK101	GRO	2.4	0.25	1.3	MG/L	M		
BLO-MW-06_092917	280-102019-6	280-102019	E300	SULFATE (AS SO4)	4.1	0.23	5.0	MG/L	MJ	M	
BLO-MW-06_092917	280-102019-6	280-102019	SW8260B	TRICHLOROETHYLENE (TCE)	0	0.16	1.0	UG/L	J	J	TR
BLO-MW-06_092917	280-102019-6	280-102019	CALC	TOTAL NITROGEN, ALL FORMS,CALCULATED	0.37			MG/L			
BLO-MW-06_092917	280-102019-6	280-102019	SW8260B	VINYL CHLORIDE	0	0.2	1.5	UG/L	U	U	
BLO-MW-06_092917	280-102019-6	280-102019	SW8260B	XYLENES, TOTAL	0	0.8	2.0	UG/L	U	U	

Field Sample ID	Lab Sample ID	SDG	Lab Method	Parameter Name	Report Result	MDL	RL	Units	Lab Qualifier	Validation Qualifier	Validation Reason Codes
BLO-MW-06_092917	280-102019-6	280-102019	SW8260B	M,P-XYLENE (SUM OF ISOMERS)	0	0.8	2.0	UG/L	U	U	
BLO-MW-06_092917	280-102019-6	280-102019	SW8260B	O-XYLENE (1,2-DIMETHYLBENZENE)	0	0.4	1.0	UG/L	U	U	
BLO-MW-26_092917	280-102019-7	280-102019	A2320B	ALKALINITY, TOTAL (AS CaCO3)	52			MG/L			
BLO-MW-26_092917	280-102019-7	280-102019	SW8260B	BENZENE	0	0.4	1.0	UG/L	U	U	
BLO-MW-26_092917	280-102019-7	280-102019	SW8260B	TOLUENE	0	0.4	1.0	UG/L	U	U	
BLO-MW-26_092917	280-102019-7	280-102019	SW8260B	1,1-DICHLOROETHENE	0	0.8	1.0	UG/L	U	U	
BLO-MW-26_092917	280-102019-7	280-102019	SW8260B	CIS-1,2-DICHLOROETHYLENE	0	0.4	1.0	UG/L	U	U	
BLO-MW-26_092917	280-102019-7	280-102019	SW8260B	TRANS-1,2-DICHLOROETHENE	0	0.4	1.0	UG/L	U	U	
BLO-MW-26_092917	280-102019-7	280-102019	SW8260B	ETHYLBENZENE	0	0.4	1.0	UG/L	U	U	
BLO-MW-26_092917	280-102019-7	280-102019	SW6010C	IRON	1700	22.0	100.0	UG/L		JM-	MSL
BLO-MW-26_092917	280-102019-7	280-102019	E351.2	NITROGEN, KJELDAHL, TOTAL	0.33	0.18	1.0	MG/L	J	B	CBL
BLO-MW-26_092917	280-102019-7	280-102019	SW6010C	MANGANESE	24	0.26	10.0	UG/L			
BLO-MW-26_092917	280-102019-7	280-102019	AK103	Motor Oils	0.13	0.059	0.52	MG/L	UMQ	UJ	CBL
BLO-MW-26_092917	280-102019-7	280-102019	E353.2	NITROGEN, NITRATE-NITRITE	0.066	0.019	0.1	MG/L	J	J	TR
BLO-MW-26_092917	280-102019-7	280-102019	SW8260B	TETRACHLOROETHYLENE(PCE)	0	0.4	1.0	UG/L	U	U	
BLO-MW-26_092917	280-102019-7	280-102019	AK102	DRO	0.04	0.034	0.26	MG/L	MJ	J	TR
BLO-MW-26_092917	280-102019-7	280-102019	AK101	GRO	2.3	0.25	1.3	MG/L	M		
BLO-MW-26_092917	280-102019-7	280-102019	E300	SULFATE (AS SO4)	5.2	0.23	5.0	MG/L	MJ	M	
BLO-MW-26_092917	280-102019-7	280-102019	SW8260B	TRICHLOROETHYLENE (TCE)	0	0.16	1.0	UG/L	J	J	TR
BLO-MW-26_092917	280-102019-7	280-102019	CALC	TOTAL NITROGEN, ALL FORMS,CALCULATED	0.4			MG/L			
BLO-MW-26_092917	280-102019-7	280-102019	SW8260B	VINYL CHLORIDE	0	0.1	1.5	UG/L	U	U	
BLO-MW-26_092917	280-102019-7	280-102019	SW8260B	XYLENES, TOTAL	0	0.19	2.0	UG/L	U	U	
BLO-MW-26_092917	280-102019-7	280-102019	SW8260B	M,P-XYLENE (SUM OF ISOMERS)	0	0.8	2.0	UG/L	U	U	
BLO-MW-26_092917	280-102019-7	280-102019	SW8260B	O-XYLENE (1,2-DIMETHYLBENZENE)	0	0.4	1.0	UG/L	U	U	
BLO-MW-07_092917	280-102019-5	280-102019	A2320B	ALKALINITY, TOTAL (AS CaCO3)	45			MG/L			
BLO-MW-07_092917	280-102019-5	280-102019	SW8260B	BENZENE	0	0.4	1.0	UG/L	U	U	
BLO-MW-07_092917	280-102019-5	280-102019	SW8260B	TOLUENE	0	0.4	1.0	UG/L	U	U	
BLO-MW-07_092917	280-102019-5	280-102019	SW8260B	1,1-DICHLOROETHENE	0	0.8	1.0	UG/L	U	U	
BLO-MW-07_092917	280-102019-5	280-102019	SW8260B	CIS-1,2-DICHLOROETHYLENE	0	0.4	1.0	UG/L	U	U	
BLO-MW-07_092917	280-102019-5	280-102019	SW8260B	TRANS-1,2-DICHLOROETHENE	0	0.4	1.0	UG/L	U	U	
BLO-MW-07_092917	280-102019-5	280-102019	SW8260B	ETHYLBENZENE	0	0.4	1.0	UG/L	U	U	
BLO-MW-07_092917	280-102019-5	280-102019	SW6010C	IRON	2000	22.0	100.0	UG/L		JM-	MSL
BLO-MW-07_092917	280-102019-5	280-102019	E351.2	NITROGEN, KJELDAHL, TOTAL	0	0.18	1.0	MG/L	U	U	
BLO-MW-07_092917	280-102019-5	280-102019	SW6010C	MANGANESE	36	0.26	10.0	UG/L			
BLO-MW-07_092917	280-102019-5	280-102019	AK103	Motor Oils	0.14	0.057	0.51	MG/L	UMQ	UJ	CBL
BLO-MW-07_092917	280-102019-5	280-102019	E353.2	NITROGEN, NITRATE-NITRITE	0.068	0.019	0.1	MG/L	J	J	TR
BLO-MW-07_092917	280-102019-5	280-102019	SW8260B	TETRACHLOROETHYLENE(PCE)	0	0.4	1.0	UG/L	U	U	
BLO-MW-07_092917	280-102019-5	280-102019	AK102	DRO	0.077	0.035	0.27	MG/L	MJ	J	TR
BLO-MW-07_092917	280-102019-5	280-102019	AK101	GRO	1.8	0.25	1.3	MG/L	M		
BLO-MW-07_092917	280-102019-5	280-102019	E300	SULFATE (AS SO4)	3.4	0.23	5.0	MG/L	MJ	M	
BLO-MW-07_092917	280-102019-5	280-102019	SW8260B	TRICHLOROETHYLENE (TCE)	0	0.16	1.0	UG/L	J	J	TR
BLO-MW-07_092917	280-102019-5	280-102019	CALC	TOTAL NITROGEN, ALL FORMS,CALCULATED	0			MG/L			
BLO-MW-07_092917	280-102019-5	280-102019	SW8260B	VINYL CHLORIDE	0	0.2	1.5	UG/L	U	U	
BLO-MW-07_092917	280-102019-5	280-102019	SW8260B	XYLENES, TOTAL	0	0.8	2.0	UG/L	U	U	

Field Sample ID	Lab Sample ID	SDG	Lab Method	Parameter Name	Report Result	MDL	RL	Units	Lab Qualifier	Validation Qualifier	Validation Reason Codes
BLO-MW-07_092917	280-102019-5	280-102019	SW8260B	M,P-XYLENE (SUM OF ISOMERS)	0	0.8	2.0	UG/L	U	U	
BLO-MW-07_092917	280-102019-5	280-102019	SW8260B	O-XYLENE (1,2-DIMETHYLBENZENE)	0	0.4	1.0	UG/L	U	U	
DSA-MW-05_093017	280-102019-9	280-102019	A2320B	ALKALINITY, TOTAL (AS CaCO3)	64			MG/L			
DSA-MW-05_093017	280-102019-9	280-102019	SW8260B	BENZENE	0	0.4	1.0	UG/L	U	U	
DSA-MW-05_093017	280-102019-9	280-102019	SW8260B	TOLUENE	0	0.4	1.0	UG/L	U	U	
DSA-MW-05_093017	280-102019-9	280-102019	SW8260B	1,1-DICHLOROETHENE	0	0.8	1.0	UG/L	U	U	
DSA-MW-05_093017	280-102019-9	280-102019	SW8260B	CIS-1,2-DICHLOROETHYLENE	0	0.4	1.0	UG/L	U	U	
DSA-MW-05_093017	280-102019-9	280-102019	SW8260B	TRANS-1,2-DICHLOROETHENE	0	0.4	1.0	UG/L	U	U	
DSA-MW-05_093017	280-102019-9	280-102019	SW8260B	ETHYLBENZENE	0	0.4	1.0	UG/L	U	U	
DSA-MW-05_093017	280-102019-9	280-102019	SW6010C	IRON	1800	22.0	100.0	UG/L	J	JM-	MSL
DSA-MW-05_093017	280-102019-9	280-102019	E351.2	NITROGEN, KJELDAHL, TOTAL	0.26	0.18	1.0	MG/L	J	B	CBL
DSA-MW-05_093017	280-102019-9	280-102019	SW6010C	MANGANESE	65	0.26	10.0	UG/L			
DSA-MW-05_093017	280-102019-9	280-102019	E353.2	NITROGEN, NITRATE-NITRITE	0	0.05	0.1	MG/L	U	U	
DSA-MW-05_093017	280-102019-9	280-102019	SW8260B	TETRACHLOROETHYLENE(PCE)	0	0.4	1.0	UG/L	U	U	
DSA-MW-05_093017	280-102019-9	280-102019	E300	SULFATE (AS SO4)	8.1	0.23	5.0	MG/L	M		
DSA-MW-05_093017	280-102019-9	280-102019	SW8260B	TRICHLOROETHYLENE (TCE)	0.58	0.16	1.0	UG/L	J	J	TR
DSA-MW-05_093017	280-102019-9	280-102019	CALC	TOTAL NITROGEN, ALL FORMS,CALCULATED	0.26			MG/L			
DSA-MW-05_093017	280-102019-9	280-102019	SW8260B	VINYL CHLORIDE	0	0.2	1.5	UG/L	U	U	
DSA-MW-05_093017	280-102019-9	280-102019	SW8260B	XYLENES, TOTAL	0	0.8	2.0	UG/L	U	U	
DSA-MW-05_093017	280-102019-9	280-102019	SW8260B	M,P-XYLENE (SUM OF ISOMERS)	0	0.8	2.0	UG/L	U	U	
DSA-MW-05_093017	280-102019-9	280-102019	SW8260B	O-XYLENE (1,2-DIMETHYLBENZENE)	0	0.4	1.0	UG/L	U	U	
DSA-MW-06_092817	280-102019-1	280-102019	SW8260B	BENZENE	0	0.4	1.0	UG/L	U	U	
DSA-MW-06_092817	280-102019-1	280-102019	SW8260B	TOLUENE	0	0.4	1.0	UG/L	U	U	
DSA-MW-06_092817	280-102019-1	280-102019	SW8260B	1,1-DICHLOROETHENE	0	0.8	1.0	UG/L	U	U	
DSA-MW-06_092817	280-102019-1	280-102019	SW8260B	CIS-1,2-DICHLOROETHYLENE	0	0.4	1.0	UG/L	U	U	
DSA-MW-06_092817	280-102019-1	280-102019	SW8260B	TRANS-1,2-DICHLOROETHENE	0	0.4	1.0	UG/L	U	U	
DSA-MW-06_092817	280-102019-1	280-102019	SW8260B	ETHYLBENZENE	0	0.4	1.0	UG/L	U	U	
DSA-MW-06_092817	280-102019-1	280-102019	SW6010C	IRON	2400	22.0	100.0	UG/L		JM-	MSL
DSA-MW-06_092817	280-102019-1	280-102019	E351.2	NITROGEN, KJELDAHL, TOTAL	0.31	0.18	1.0	MG/L	J	B	CBL
DSA-MW-06_092817	280-102019-1	280-102019	SW6010C	MANGANESE	450	0.26	10.0	UG/L			
DSA-MW-06_092817	280-102019-1	280-102019	E353.2	NITROGEN, NITRATE-NITRITE	0	0.05	0.1	MG/L	U	U	
DSA-MW-06_092817	280-102019-1	280-102019	SW8260B	TETRACHLOROETHYLENE(PCE)	0	0.4	1.0	UG/L	U	U	
DSA-MW-06_092817	280-102019-1	280-102019	E300	SULFATE (AS SO4)	5.4	0.23	5.0	MG/L	M		
DSA-MW-06_092817	280-102019-1	280-102019	SW8260B	TRICHLOROETHYLENE (TCE)	0	0.4	1.0	UG/L	U	U	
DSA-MW-06_092817	280-102019-1	280-102019	TOTAL NITROGEN	TOTAL NITROGEN, ALL FORMS, CALCULATED	0.31			MG/L			
DSA-MW-06_092817	280-102019-1	280-102019	SW8260B	VINYL CHLORIDE	0	0.2	1.5	UG/L	U	U	
DSA-MW-06_092817	280-102019-1	280-102019	SW8260B	XYLENES, TOTAL	0	0.8	2.0	UG/L	U	U	
DSA-MW-06_092817	280-102019-1	280-102019	SW8260B	M,P-XYLENE (SUM OF ISOMERS)	0	0.8	2.0	UG/L	U	U	
DSA-MW-06_092817	280-102019-1	280-102019	SW8260B	O-XYLENE (1,2-DIMETHYLBENZENE)	0	0.4	1.0	UG/L	U	U	
DSA-MW-07_092817	280-102019-2	280-102019	A2320B	ALKALINITY, TOTAL (AS CaCO3)	89		0	MG/L	B	B	
DSA-MW-07_092817	280-102019-2	280-102019	SW8260B	BENZENE	0	0.4	1.0	UG/L	U	U	
DSA-MW-07_092817	280-102019-2	280-102019	SW8260B	TOLUENE	0	0.4	1.0	UG/L	U	U	
DSA-MW-07_092817	280-102019-2	280-102019	SW8260B	1,1-DICHLOROETHENE	0	0.8	1.0	UG/L	U	U	
DSA-MW-07_092817	280-102019-2	280-102019	SW8260B	CIS-1,2-DICHLOROETHYLENE	0	0.4	1.0	UG/L	U	U	

Field Sample ID	Lab Sample ID	SDG	Lab Method	Parameter Name	Report Result	MDL	RL	Units	Lab Qualifier	Validation Qualifier	Validation Reason Codes
DSA-MW-07_092817	280-102019-2	280-102019	SW8260B	TRANS-1,2-DICHLOROETHENE	0	0.4	1.0	UG/L	U	U	
DSA-MW-07_092817	280-102019-2	280-102019	SW8260B	ETHYLBENZENE	0	0.4	1.0	UG/L	U	U	
DSA-MW-07_092817	280-102019-2	280-102019	SW6010C	IRON	18000	22.0	100.0	UG/L		JM-	MSL
DSA-MW-07_092817	280-102019-2	280-102019	E351.2	NITROGEN, KJELDAHL, TOTAL	0.29	0.18	1.0	MG/L	J	B	CBL
DSA-MW-07_092817	280-102019-2	280-102019	SW6010C	MANGANESE	210	0.26	10.0	UG/L			
DSA-MW-07_092817	280-102019-2	280-102019	E353.2	NITROGEN, NITRATE-NITRITE	0.07	0.019	0.1	MG/L	J	J	TR
DSA-MW-07_092817	280-102019-2	280-102019	SW8260B	TETRACHLOROETHYLENE(PCE)	0	0.4	1.0	UG/L	U	U	
DSA-MW-07_092817	280-102019-2	280-102019	E300	SULFATE (AS SO4)	4.9	0.23	5.0	MG/L	JM	J	TR
DSA-MW-07_092817	280-102019-2	280-102019	SW8260B	TRICHLOROETHYLENE (TCE)	0	0.4	1.0	UG/L	U	U	
DSA-MW-07_092817	280-102019-2	280-102019	TOTAL NITROGEN	TOTAL NITROGEN, ALL FORMS, CALCULATED	0.36		0	MG/L			
DSA-MW-07_092817	280-102019-2	280-102019	SW8260B	VINYL CHLORIDE	0	0.2	1.5	UG/L	U	U	
DSA-MW-07_092817	280-102019-2	280-102019	SW8260B	XYLENES, TOTAL	0	0.8	2.0	UG/L	U	U	
DSA-MW-07_092817	280-102019-2	280-102019	SW8260B	M,P-XYLENE (SUM OF ISOMERS)	0	0.8	2.0	UG/L	U	U	
DSA-MW-07_092817	280-102019-2	280-102019	SW8260B	O-XYLENE (1,2-DIMETHYLBENZENE)	0	0.4	1.0	UG/L	U	U	
GLO-MW-03_093017	280-102019-10	280-102019	A2320B	ALKALINITY, TOTAL (AS CaCO3)	96		0	MG/L			
GLO-MW-03_093017	280-102019-10	280-102019	SW8260B	BENZENE	0	0.4	1.0	UG/L	U	U	
GLO-MW-03_093017	280-102019-10	280-102019	SW8260B	TOLUENE	0	0.4	1.0	UG/L	U	U	
GLO-MW-03_093017	280-102019-10	280-102019	SW8260B	1,1-DICHLOROETHENE	0	0.8	1.0	UG/L	U	U	
GLO-MW-03_093017	280-102019-10	280-102019	SW8260B	CIS-1,2-DICHLOROETHYLENE	0	0.4	1.0	UG/L	U	U	
GLO-MW-03_093017	280-102019-10	280-102019	SW8260B	TRANS-1,2-DICHLOROETHENE	0	0.4	1.0	UG/L	U	U	
GLO-MW-03_093017	280-102019-10	280-102019	SW8260B	ETHYLBENZENE	0	0.4	1.0	UG/L	U	U	
GLO-MW-03_093017	280-102019-10	280-102019	SW6010C	IRON	2800	22.0	100.0	UG/L		JM-	MSL
GLO-MW-03_093017	280-102019-10	280-102019	E351.2	NITROGEN, KJELDAHL, TOTAL	0.37	0.18	1.0	MG/L	J	B	CBL
GLO-MW-03_093017	280-102019-10	280-102019	SW6010C	MANGANESE	560	0.26	10.0	UG/L		J	FDD
GLO-MW-03_093017	280-102019-10	280-102019	E353.2	NITROGEN, NITRATE-NITRITE	0.22	0.019	0.1	MG/L	M		
GLO-MW-03_093017	280-102019-10	280-102019	SW8260B	TETRACHLOROETHYLENE(PCE)	0	0.4	1.0	UG/L	U	U	
GLO-MW-03_093017	280-102019-10	280-102019	E300	SULFATE (AS SO4)	5.6	0.23	5.0	MG/L	M		
GLO-MW-03_093017	280-102019-10	280-102019	SW8260B	TRICHLOROETHYLENE (TCE)	0	0.4	1.0	UG/L	U	U	
GLO-MW-03_093017	280-102019-10	280-102019	CALC	TOTAL NITROGEN, ALL FORMS, CALCULATED	0.59		0	MG/L			
GLO-MW-03_093017	280-102019-10	280-102019	SW8260B	VINYL CHLORIDE	0	0.2	1.5	UG/L	U	U	
GLO-MW-03_093017	280-102019-10	280-102019	SW8260B	XYLENES, TOTAL	0	0.8	2.0	UG/L	U	U	
GLO-MW-03_093017	280-102019-10	280-102019	SW8260B	M,P-XYLENE (SUM OF ISOMERS)	0	0.8	2.0	UG/L	U	U	
GLO-MW-03_093017	280-102019-10	280-102019	SW8260B	O-XYLENE (1,2-DIMETHYLBENZENE)	0	0.4	1.0	UG/L	U	U	
GLO-MW-23_093017	280-102019-11	280-102019	A2320B	ALKALINITY, TOTAL (AS CaCO3)	95		0	MG/L			
GLO-MW-23_093017	280-102019-11	280-102019	SW8260B	BENZENE	0	0.4	1.0	UG/L	U	U	
GLO-MW-23_093017	280-102019-11	280-102019	SW8260B	TOLUENE	0	0.4	1.0	UG/L	U	U	
GLO-MW-23_093017	280-102019-11	280-102019	SW8260B	1,1-DICHLOROETHENE	0	0.8	1.0	UG/L	U	U	
GLO-MW-23_093017	280-102019-11	280-102019	SW8260B	CIS-1,2-DICHLOROETHYLENE	0	0.4	1.0	UG/L	U	U	
GLO-MW-23_093017	280-102019-11	280-102019	SW8260B	TRANS-1,2-DICHLOROETHENE	0	0.4	1.0	UG/L	U	U	
GLO-MW-23_093017	280-102019-11	280-102019	SW8260B	ETHYLBENZENE	0	0.4	1.0	UG/L	U	U	
GLO-MW-23_093017	280-102019-11	280-102019	SW6010C	IRON	170	22.0	100.0	UG/L		JM-	MSL
GLO-MW-23_093017	280-102019-11	280-102019	E351.2	NITROGEN, KJELDAHL, TOTAL	0.35	0.18	1.0	MG/L	J	B	CBL
GLO-MW-23_093017	280-102019-11	280-102019	SW6010C	MANGANESE	4.3	0.26	10.0	UG/L	J	J	FDD
GLO-MW-23_093017	280-102019-11	280-102019	E353.2	NITROGEN, NITRATE-NITRITE	0.21	0.019	0.1	MG/L			

Field Sample ID	Lab Sample ID	SDG	Lab Method	Parameter Name	Report Result	MDL	RL	Units	Lab Qualifier	Validation Qualifier	Validation Reason Codes
GLO-MW-23_093017	280-102019-11	280-102019	SW8260B	TETRACHLOROETHYLENE(PCE)	0	0.4	1.0	UG/L	U	U	
GLO-MW-23_093017	280-102019-11	280-102019	E300	SULFATE (AS SO4)	5.3	0.23	5.0	MG/L	M		
GLO-MW-23_093017	280-102019-11	280-102019	SW8260B	TRICHLOROETHYLENE (TCE)	0	0.4	1.0	UG/L	U	U	
GLO-MW-23_093017	280-102019-11	280-102019	CALC	TOTAL NITROGEN, ALL FORMS, CALCULATED	0.56		0	MG/L			
GLO-MW-23_093017	280-102019-11	280-102019	SW8260B	VINYL CHLORIDE	0	0.2	1.5	UG/L	U	U	
GLO-MW-23_093017	280-102019-11	280-102019	SW8260B	XYLENES, TOTAL	0	0.8	2.0	UG/L	U	U	
GLO-MW-23_093017	280-102019-11	280-102019	SW8260B	M,P-XYLENE (SUM OF ISOMERS)	0	0.8	2.0	UG/L	U	U	
GLO-MW-23_093017	280-102019-11	280-102019	SW8260B	O-XYLENE (1,2-DIMETHYLBENZENE)	0	0.4	1.0	UG/L	U	U	
FPC_MW-06_092717	280-102019-3	280-102019	AK102	DRO	0.091	0.031	0.24	MG/L	JM		
FPC_MW-07_092717	280-102019-4	280-102019	AK102	DRO	0.047	0.034	0.26	MG/L	JM		
FPC_215-MW-12_100217	280-102019-14	280-102019	AK102	DRO	0.075	0.034	0.26	MG/L			
GLO-MW-04_100117	280-102019-12	280-102019	A2320B	ALKALINITY, TOTAL (AS CaCO3)	73		0	MG/L			
GLO-MW-04_100117	280-102019-12	280-102019	SW8260B	BENZENE	0	0.4	1.0	UG/L	U	U	
GLO-MW-04_100117	280-102019-12	280-102019	SW8260B	TOLUENE	0	0.4	1.0	UG/L	U	U	
GLO-MW-04_100117	280-102019-12	280-102019	SW8260B	1,1-DICHLOROETHENE	0	0.8	1.0	UG/L	U	U	
GLO-MW-04_100117	280-102019-12	280-102019	SW8260B	CIS-1,2-DICHLOROETHYLENE	0	0.4	1.0	UG/L	U	U	
GLO-MW-04_100117	280-102019-12	280-102019	SW8260B	TRANS-1,2-DICHLOROETHENE	0	0.4	1.0	UG/L	U	U	
GLO-MW-04_100117	280-102019-12	280-102019	SW8260B	ETHYLBENZENE	0	0.4	1.0	UG/L	U	U	
GLO-MW-04_100117	280-102019-12	280-102019	SW6010C	IRON	120	22.0	100.0	UG/L		JM-	MSL
GLO-MW-04_100117	280-102019-12	280-102019	E351.2	NITROGEN, KJELDAHL, TOTAL	1.3	0.18	1.0	MG/L	J	B	CBL
GLO-MW-04_100117	280-102019-12	280-102019	SW6010C	MANGANESE	3.2	0.26	10.0	UG/L	J	J	TR
GLO-MW-04_100117	280-102019-12	280-102019	E353.2	NITROGEN, NITRATE-NITRITE	0.19	0.019	0.1	MG/L	J	J	TR
GLO-MW-04_100117	280-102019-12	280-102019	SW8260B	TETRACHLOROETHYLENE(PCE)	0	0.4	1.0	UG/L	U	U	
GLO-MW-04_100117	280-102019-12	280-102019	E300	SULFATE (AS SO4)	3.4	0.23	5.0	MG/L	J	J	TR
GLO-MW-04_100117	280-102019-12	280-102019	SW8260B	TRICHLOROETHYLENE (TCE)	0	0.4	1.0	UG/L	U	U	
GLO-MW-04_100117	280-102019-12	280-102019	CALC	TOTAL NITROGEN, ALL FORMS, CALCULATED	1.5		0	MG/L			
GLO-MW-04_100117	280-102019-12	280-102019	SW8260B	VINYL CHLORIDE	0	0.2	1.5	UG/L	U	U	
GLO-MW-04_100117	280-102019-12	280-102019	SW8260B	XYLENES, TOTAL	0	0.8	2.0	UG/L	U	U	
GLO-MW-04_100117	280-102019-12	280-102019	SW8260B	M,P-XYLENE (SUM OF ISOMERS)	0	0.8	2.0	UG/L	U	U	
GLO-MW-04_100117	280-102019-12	280-102019	SW8260B	O-XYLENE (1,2-DIMETHYLBENZENE)	0	0.4	1.0	UG/L	U	U	
RRS-MW-05_100117	280-102019-13	280-102019	A2320B	ALKALINITY, TOTAL (AS CaCO3)	52		0	MG/L			
RRS-MW-05_100117	280-102019-13	280-102019	SW8260B	BENZENE	0	0.4	1.0	UG/L	U	U	
RRS-MW-05_100117	280-102019-13	280-102019	SW8260B	TOLUENE	0	0.4	1.0	UG/L	U	U	
RRS-MW-05_100117	280-102019-13	280-102019	SW8260B	1,1-DICHLOROETHENE	0	0.8	1.0	UG/L	U	U	
RRS-MW-05_100117	280-102019-13	280-102019	SW8260B	CIS-1,2-DICHLOROETHYLENE	0	0.4	1.0	UG/L	U	U	
RRS-MW-05_100117	280-102019-13	280-102019	SW8260B	TRANS-1,2-DICHLOROETHENE	0	0.4	1.0	UG/L	U	U	
RRS-MW-05_100117	280-102019-13	280-102019	SW8260B	ETHYLBENZENE	0	0.4	1.0	UG/L	U	U	
RRS-MW-05_100117	280-102019-13	280-102019	SW6010C	IRON	320	22.0	100.0	UG/L		JM-	MSL
RRS-MW-05_100117	280-102019-13	280-102019	E351.2	NITROGEN, KJELDAHL, TOTAL	0.45	0.18	1.0	MG/L	J	B	CBL
RRS-MW-05_100117	280-102019-13	280-102019	SW6010C	MANGANESE	6.2	0.26	10.0	UG/L	J	J	TR
RRS-MW-05_100117	280-102019-13	280-102019	E353.2	NITROGEN, NITRATE-NITRITE	0.093	0.019	0.1	MG/L	J	J	TR
RRS-MW-05_100117	280-102019-13	280-102019	SW8260B	TETRACHLOROETHYLENE(PCE)	0	0.4	1.0	UG/L	U	U	
RRS-MW-05_100117	280-102019-13	280-102019	E300	SULFATE (AS SO4)	2.9	0.23	5.0	MG/L	JM	B	CBL

Field Sample ID	Lab Sample ID	SDG	Lab Method	Parameter Name	Report Result	MDL	RL	Units	Lab Qualifier	Validation Qualifier	Validation Reason Codes
RRS-MW-05_100117	280-102019-13	280-102019	SW8260B	TRICHLOROETHYLENE (TCE)	0	0.4	1.0	UG/L	U	U	
RRS-MW-05_100117	280-102019-13	280-102019	CALC	TOTAL NITROGEN, ALL FORMS, CALCULATED	0.54		0	MG/L			
RRS-MW-05_100117	280-102019-13	280-102019	SW8260B	VINYL CHLORIDE	0	0.2	1.5	UG/L	U	U	
RRS-MW-05_100117	280-102019-13	280-102019	SW8260B	XYLENES, TOTAL	0	0.8	2.0	UG/L	U	U	
RRS-MW-05_100117	280-102019-13	280-102019	SW8260B	M,P-XYLENE (SUM OF ISOMERS)	0	0.8	2.0	UG/L	U	U	
RRS-MW-05_100117	280-102019-13	280-102019	SW8260B	O-XYLENE (1,2-DIMETHYLBENZENE)	0	0.4	1.0	UG/L	U	U	
RRS-MW-06_100217	280-102019-15	280-102019	A2320B	ALKALINITY, TOTAL (AS CaCO3)	130		0	MG/L			
RRS-MW-06_100217	280-102019-15	280-102019	SW8260B	BENZENE	0	0.4	1.0	UG/L	U	U	
RRS-MW-06_100217	280-102019-15	280-102019	SW8260B	TOLUENE	0	0.4	1.0	UG/L	U	U	
RRS-MW-06_100217	280-102019-15	280-102019	SW8260B	1,1-DICHLOROETHENE	0	0.8	1.0	UG/L	U	U	
RRS-MW-06_100217	280-102019-15	280-102019	SW8260B	CIS-1,2-DICHLOROETHYLENE	0	0.4	1.0	UG/L	U	U	
RRS-MW-06_100217	280-102019-15	280-102019	SW8260B	TRANS-1,2-DICHLOROETHENE	0	0.4	1.0	UG/L	U	U	
RRS-MW-06_100217	280-102019-15	280-102019	SW8260B	ETHYLBENZENE	0	0.4	1.0	UG/L	U	U	
RRS-MW-06_100217	280-102019-15	280-102019	SW6010C	IRON	180	22.0	100.0	UG/L		JM-	MSL
RRS-MW-06_100217	280-102019-15	280-102019	E351.2	NITROGEN, KJELDAHL, TOTAL	0.32	0.18	1.0	MG/L	J	B	CBL
RRS-MW-06_100217	280-102019-15	280-102019	SW6010C	MANGANESE	2	0.26	10.0	UG/L	J	J	TR
RRS-MW-06_100217	280-102019-15	280-102019	E353.2	NITROGEN, NITRATE-NITRITE	0.77	0.019	0.1	MG/L			
RRS-MW-06_100217	280-102019-15	280-102019	SW8260B	TETRACHLOROETHYLENE(PCE)	0	0.4	1.0	UG/L	U	U	
RRS-MW-06_100217	280-102019-15	280-102019	E300	SULFATE (AS SO4)	4.2	0.23	5.0	MG/L	JM	J	TR
RRS-MW-06_100217	280-102019-15	280-102019	SW8260B	TRICHLOROETHYLENE (TCE)	0	0.4	1.0	UG/L	U	U	
RRS-MW-06_100217	280-102019-15	280-102019	CALC	TOTAL NITROGEN, ALL FORMS, CALCULATED	1.1		0	MG/L			
RRS-MW-06_100217	280-102019-15	280-102019	SW8260B	VINYL CHLORIDE	0	0.2	1.5	UG/L	U	U	
RRS-MW-06_100217	280-102019-15	280-102019	SW8260B	XYLENES, TOTAL	0	0.8	2.0	UG/L	U	U	
RRS-MW-06_100217	280-102019-15	280-102019	SW8260B	M,P-XYLENE (SUM OF ISOMERS)	0	0.8	2.0	UG/L	U	U	
RRS-MW-06_100217	280-102019-15	280-102019	SW8260B	O-XYLENE (1,2-DIMETHYLBENZENE)	0	0.4	1.0	UG/L	U	U	
TRIPBLANK	280-102019-16	280-102019	SW8260B	BENZENE	0	0.4	1.0	UG/L	U	U	
TRIPBLANK	280-102019-16	280-102019	SW8260B	TOLUENE	0	0.4	1.0	UG/L	U	U	
TRIPBLANK	280-102019-16	280-102019	SW8260B	1,1-DICHLOROETHENE	0	0.8	1.0	UG/L	U	U	
TRIPBLANK	280-102019-16	280-102019	SW8260B	CIS-1,2-DICHLOROETHYLENE	0	0.4	1.0	UG/L	U	U	
TRIPBLANK	280-102019-16	280-102019	SW8260B	TRANS-1,2-DICHLOROETHENE	0	0.4	1.0	UG/L	U	U	
TRIPBLANK	280-102019-16	280-102019	SW8260B	ETHYLBENZENE	0	0.4	1.0	UG/L	U	U	
TRIPBLANK	280-102019-16	280-102019	SW8260B	TETRACHLOROETHYLENE(PCE)	0	0.4	1.0	UG/L	U	U	
TRIPBLANK	280-102019-16	280-102019	SW8260B	TRICHLOROETHYLENE (TCE)	0	0.4	1.0	UG/L	U	U	
TRIPBLANK	280-102019-16	280-102019	SW8260B	VINYL CHLORIDE	0	0.2	1.5	UG/L	U	U	
TRIPBLANK	280-102019-16	280-102019	SW8260B	XYLENES, TOTAL	0	0.8	2.0	UG/L	U	U	
TRIPBLANK	280-102019-16	280-102019	SW8260B	M,P-XYLENE (SUM OF ISOMERS)	0	0.8	2.0	UG/L	U	U	
TRIPBLANK	280-102019-16	280-102019	SW8260B	O-XYLENE (1,2-DIMETHYLBENZENE)	0	0.4	1.0	UG/L	U	U	

Notes:

Laboratory Data Qualifiers are laboratory-specific and are defined in the laboratory report provided by the laboratory

Acronyms:

MDL = method detection limit

MG/L = milligrams per liter

RL = reporting limit

SDG = sample delivery group

UG/L = micrograms per liter

Methods:

AK101 = Alaska Department of Environmental Conservation Method 101,
AK102/AK103 = Alaska Department of Environmental Conservation Method 102/103;
E300.0 = Environmental Protection Agency Method 300.0
E351.2 = Environmental Protection Agency Method 351.2
E353.2 = Environmental Protection Agency Method 353.2
SM2320B = Standard Method 2320B
SW8260B = Solid Waste Method 8260B

Qualifiers:

B = The analyte was detected in the method blank or the trip blank above the LOD, and the concentration in the sample did not exceed the blank concentration by a factor of 5 (factor of 10 for common laboratory contaminants acetone and methylene chloride).

J = estimated value

JM(\pm) = The result was an estimated value because the analyte failed recovery criteria in the MS or MSD sample, or both . The MS sample recoveries were only evaluated if the spike concentration exceeded the native sample concentration.

M = Manual integrated compound

U = nondetect; result less than the MDL

Q = One or more quality control criteria failed.

Validation Reason Codes:

CBL = Blank: Continuing calibration blank concentration less than the reporting limit

FDD = Duplicates: Field duplicate RPD criteria exceeded

MSL = Matrix: Matrix spike recovery less than the lower control limit

TR = result between the MDL and RL

Table B-2-2. 2017 Port Heiden Groundwater Monitoring Program Validated Groundwater Sample Results – SDG 280-102198

Field Sample ID	Lab Sample ID	SDG	Lab Method	Parameter Name	Report Result	MDL	RL	Report Units	Lab Qualifier	Validation Qualifier	Validation Reason Codes
DSA-MW-01_100417	280-102198-8	280-102198	A2320B	ALKALINITY, TOTAL (AS CaCO3)	79		0	MG/L			
DSA-MW-01_100417	280-102198-8	280-102198	SW8260B	BENZENE	0	0.4	1.0	UG/L	U	U	
DSA-MW-01_100417	280-102198-8	280-102198	SW8260B	TOLUENE	0	0.4	1.0	UG/L	U	U	
DSA-MW-01_100417	280-102198-8	280-102198	SW8260B	1,1-DICHLOROETHENE	0	0.8	1.0	UG/L	U	U	
DSA-MW-01_100417	280-102198-8	280-102198	SW8260B	CIS-1,2-DICHLOROETHYLENE	0	0.4	1.0	UG/L	U	U	
DSA-MW-01_100417	280-102198-8	280-102198	SW8260B	TRANS-1,2-DICHLOROETHENE	0	0.4	1.0	UG/L	U	U	
DSA-MW-01_100417	280-102198-8	280-102198	SW8260B	ETHYLBENZENE	0	0.4	1.0	UG/L	U	U	
DSA-MW-01_100417	280-102198-8	280-102198	SW6010C	IRON	68	22.0	100.0	UG/L	J	J	TR
DSA-MW-01_100417	280-102198-8	280-102198	E351.2	NITROGEN, KJELDAHL, TOTAL	0.3	0.18	1.0	MG/L	J	J	TR
DSA-MW-01_100417	280-102198-8	280-102198	SW6010C	MANGANESE	1.7	0.25	10.0	UG/L	J	J	TR
DSA-MW-01_100417	280-102198-8	280-102198	E353.2	NITROGEN, NITRATE-NITRITE	1.1	0.019	0.1	MG/L			
DSA-MW-01_100417	280-102198-8	280-102198	SW8260B	TETRACHLOROETHYLENE(PCE)	0	0.4	1.0	UG/L	U	U	
DSA-MW-01_100417	280-102198-8	280-102198	E300	SULFATE (AS SO4)	8.3	0.23	5.0	MG/L			
DSA-MW-01_100417	280-102198-8	280-102198	SW8260B	TRICHLOROETHYLENE (TCE)	6.4	0.16	1.0	UG/L			
DSA-MW-01_100417	280-102198-8	280-102198	CALC	TOTAL NITROGEN, ALL FORMS,CALCULATED	1.4		0	MG/L			
DSA-MW-01_100417	280-102198-8	280-102198	SW8260B	VINYL CHLORIDE	0	0.2	1.5	UG/L	U	U	
DSA-MW-01_100417	280-102198-8	280-102198	SW8260B	XYLENES, TOTAL	0	0.8	2.0	UG/L	U	U	
DSA-MW-01_100417	280-102198-8	280-102198	SW8260B	M,P-XYLENE (SUM OF ISOMERS)	0	0.8	2.0	UG/L	U	U	
DSA-MW-01_100417	280-102198-8	280-102198	SW8260B	O-XYLENE (1,2-DIMETHYLBENZENE)	0	0.4	1.0	UG/L	U	U	
DSA-MW-02_100417	280-102198-9	280-102198	A2320B	ALKALINITY, TOTAL (AS CaCO3)	120		0	MG/L			
DSA-MW-02_100417	280-102198-9	280-102198	SW8260B	BENZENE	0	0.8	2.0	UG/L	U	U	
DSA-MW-02_100417	280-102198-9	280-102198	SW8260B	TOLUENE	0	0.8	2.0	UG/L	U	U	
DSA-MW-02_100417	280-102198-9	280-102198	SW8260B	1,1-DICHLOROETHENE	0	1.6	2.0	UG/L	U	U	
DSA-MW-02_100417	280-102198-9	280-102198	SW8260B	CIS-1,2-DICHLOROETHYLENE	0	0.8	2.0	UG/L	U	U	
DSA-MW-02_100417	280-102198-9	280-102198	SW8260B	TRANS-1,2-DICHLOROETHENE	0	0.8	2.0	UG/L	U	U	
DSA-MW-02_100417	280-102198-9	280-102198	SW8260B	ETHYLBENZENE	0	0.8	2.0	UG/L	U	U	
DSA-MW-02_100417	280-102198-9	280-102198	SW6010C	IRON	2300	22.0	100.0	UG/L	J	J	TR
DSA-MW-02_100417	280-102198-9	280-102198	E351.2	NITROGEN, KJELDAHL, TOTAL	0.43	0.18	1.0	MG/L	J	B	CBL
DSA-MW-02_100417	280-102198-9	280-102198	SW6010C	MANGANESE	29	0.26	10.0	UG/L			
DSA-MW-02_100417	280-102198-9	280-102198	AK103	RRO							
DSA-MW-02_100417	280-102198-9	280-102198	E353.2	NITROGEN, NITRATE-NITRITE	1.3	0.019	0.1	MG/L			
DSA-MW-02_100417	280-102198-9	280-102198	SW8260B	TETRACHLOROETHYLENE(PCE)	0	0.8	2.0	UG/L	U	U	
DSA-MW-02_100417	280-102198-9	280-102198	AK102	DRO							
DSA-MW-02_100417	280-102198-9	280-102198	AK101	GRO							
DSA-MW-02_100417	280-102198-9	280-102198	E300	SULFATE (AS SO4)	8.4	0.23	5.0	MG/L			
DSA-MW-02_100417	280-102198-9	280-102198	SW8260B	TRICHLOROETHYLENE (TCE)	400	3.2	20.0	UG/L			
DSA-MW-02_100417	280-102198-9	280-102198	CALC	TOTAL NITROGEN, ALL FORMS,CALCULATED	1.7		0	MG/L			
DSA-MW-02_100417	280-102198-9	280-102198	SW8260B	VINYL CHLORIDE	0	0.4	3.0	UG/L	U	U	
DSA-MW-02_100417	280-102198-9	280-102198	SW8260B	XYLENES, TOTAL	0	1.6	4.0	UG/L	U	U	
DSA-MW-02_100417	280-102198-9	280-102198	SW8260B	M,P-XYLENE (SUM OF ISOMERS)	0	1.6	4.0	UG/L	U	U	
DSA-MW-02_100417	280-102198-9	280-102198	SW8260B	O-XYLENE (1,2-DIMETHYLBENZENE)	0	0.8	2.0	UG/L	U	U	
DSA-MW-04_100417	280-102198-10	280-102198	A2320B	ALKALINITY, TOTAL (AS CaCO3)	110		0	MG/L			
DSA-MW-04_100417	280-102198-10	280-102198	SW8260B	BENZENE	0	0.8	2.0	UG/L	U	U	

Field Sample ID	Lab Sample ID	SDG	Lab Method	Parameter Name	Report Result	MDL	RL	Report Units	Lab Qualifier	Validation Qualifier	Validation Reason Codes
DSA-MW-04_100417	280-102198-10	280-102198	SW8260B	TOLUENE	0	0.8	2.0	UG/L	U	U	
DSA-MW-04_100417	280-102198-10	280-102198	SW8260B	1,1-DICHLOROETHENE	0	1.6	2.0	UG/L	U	U	
DSA-MW-04_100417	280-102198-10	280-102198	SW8260B	CIS-1,2-DICHLOROETHYLENE	0	0.8	2.0	UG/L	U	U	
DSA-MW-04_100417	280-102198-10	280-102198	SW8260B	TRANS-1,2-DICHLOROETHENE	0	0.8	2.0	UG/L	U	U	
DSA-MW-04_100417	280-102198-10	280-102198	SW8260B	ETHYLBENZENE	0	0.8	2.0	UG/L	U	U	
DSA-MW-04_100417	280-102198-10	280-102198	SW6010C	IRON	2100	22.0	100.0	UG/L			
DSA-MW-04_100417	280-102198-10	280-102198	E351.2	NITROGEN, KJELDAHL, TOTAL	0.32	0.18	1.0	MG/L	J	B	CBL
DSA-MW-04_100417	280-102198-10	280-102198	SW6010C	MANGANESE	67	0.26	10.0	UG/L			
DSA-MW-04_100417	280-102198-10	280-102198	AK103	RRO	0	0.13	0.51	MG/L	U	U	
DSA-MW-04_100417	280-102198-10	280-102198	E353.2	NITROGEN, NITRATE-NITRITE	0	0.05	0.1	MG/L	U	U	
DSA-MW-04_100417	280-102198-10	280-102198	SW8260B	TETRACHLOROETHYLENE(PCE)	0	0.8	2.0	UG/L	U	U	
DSA-MW-04_100417	280-102198-10	280-102198	AK102	DRO	0	0.25	0.12	MG/L	U	U	
DSA-MW-04_100417	280-102198-10	280-102198	AK101	GRO	2.2	1.3	0.25	MG/L	MQ		
DSA-MW-04_100417	280-102198-10	280-102198	E300	SULFATE (AS SO4)	8.3	0.23	5.0	MG/L			
DSA-MW-04_100417	280-102198-10	280-102198	SW8260B	TRICHLOROETHYLENE (TCE)	440	3.2	20.0	UG/L			
DSA-MW-04_100417	280-102198-10	280-102198	CALC	TOTAL NITROGEN, ALL FORMS,CALCULATED	0.32		0	MG/L			
DSA-MW-04_100417	280-102198-10	280-102198	SW8260B	VINYL CHLORIDE	0	0.4	3.0	UG/L	U	U	
DSA-MW-04_100417	280-102198-10	280-102198	SW8260B	XYLENES, TOTAL	0	1.6	4.0	UG/L	U	U	
DSA-MW-04_100417	280-102198-10	280-102198	SW8260B	M,P-XYLENE (SUM OF ISOMERS)	0	1.6	4.0	UG/L	U	U	
DSA-MW-04_100417	280-102198-10	280-102198	SW8260B	O-XYLENE (1,2-DIMETHYLBENZENE)	0	0.8	2.0	UG/L	U	U	
FPC_066-MW-04_100317	280-102198-1	280-102198	AK102	DRO	0.055	0.034	0.26	MG/L	JM	J	TR
FPC_066-MW-24_100317	280-102198-2	280-102198	AK102	DRO	0.050	0.033	0.25	MG/L	JM	J	TR
FPC_066-MW-05_100717	280-102198-6	280-102198	AK102	DRO	3.7	0.033	0.25	MG/L	M		
FPC_215-MW-08_100817	280-102198-4	280-102198	AK102	DRO	0	0.13	0.26	MG/L	UM	U	
FPC_215-MW-09_100817	280-102198-5	280-102198	AK102	DRO	6.8	0.035	0.27	MG/L	MQ	JS+	SGH
FPC_215-MW-11_100717	280-102198-3	280-102198	AK102	DRO	0.049	0.033	0.25	MG/L	JM	J	TR
RRS-MW-02_100317	280-102198-7	280-102198	A2320B	ALKALINITY, TOTAL (AS CaCO3)	43		0	MG/L			
RRS-MW-02_100317	280-102198-7	280-102198	SW8260B	BENZENE	0	0.4	1.0	UG/L	U	U	
RRS-MW-02_100317	280-102198-7	280-102198	SW8260B	TOLUENE	0	0.4	1.0	UG/L	U	U	
RRS-MW-02_100317	280-102198-7	280-102198	SW8260B	1,1-DICHLOROETHENE	0	0.8	1.0	UG/L	U	U	
RRS-MW-02_100317	280-102198-7	280-102198	SW8260B	CIS-1,2-DICHLOROETHYLENE	0	0.4	1.0	UG/L	U	U	
RRS-MW-02_100317	280-102198-7	280-102198	SW8260B	TRANS-1,2-DICHLOROETHENE	0	0.4	1.0	UG/L	U	U	
RRS-MW-02_100317	280-102198-7	280-102198	SW8260B	ETHYLBENZENE	0	0.4	1.0	UG/L	U	U	
RRS-MW-02_100317	280-102198-7	280-102198	SW6010C	IRON	88	22.0	100.0	UG/L		JM-	MSL
RRS-MW-02_100317	280-102198-7	280-102198	E351.2	NITROGEN, KJELDAHL, TOTAL	0.33	0.18	1.0	MG/L	J	B	CBL
RRS-MW-02_100317	280-102198-7	280-102198	SW6010C	MANGANESE	1.9	0.26	10.0	UG/L	J	J	TR
RRS-MW-02_100317	280-102198-7	280-102198	E353.2	NITROGEN, NITRATE-NITRITE	0.11	0.019	0.1	MG/L	J	J	TR
RRS-MW-02_100317	280-102198-7	280-102198	SW8260B	TETRACHLOROETHYLENE(PCE)	0	0.4	1.0	UG/L	U	U	
RRS-MW-02_100317	280-102198-7	280-102198	E300	SULFATE (AS SO4)	3	0.23	5.0	MG/L	J	J	TR
RRS-MW-02_100317	280-102198-7	280-102198	SW8260B	TRICHLOROETHYLENE (TCE)	0	0.4	1.0	UG/L	U	U	

Field Sample ID	Lab Sample ID	SDG	Lab Method	Parameter Name	Report Result	MDL	RL	Report Units	Lab Qualifier	Validation Qualifier	Validation Reason Codes
RRS-MW-02_100317	280-102198-7	280-102198	CALC	TOTAL NITROGEN, ALL FORMS, CALCULATED	0.44		0	MG/L			
RRS-MW-02_100317	280-102198-7	280-102198	SW8260B	VINYL CHLORIDE	0	0.2	1.5	UG/L	U	U	
RRS-MW-02_100317	280-102198-7	280-102198	SW8260B	XYLENES, TOTAL	0	0.8	2.0	UG/L	U	U	
RRS-MW-02_100317	280-102198-7	280-102198	SW8260B	M,P-XYLENE (SUM OF ISOMERS)	0	0.8	2.0	UG/L	U	U	
RRS-MW-02_100317	280-102198-7	280-102198	SW8260B	O-XYLENE (1,2-DIMETHYLBENZENE)	0	0.4	1.0	UG/L	U	U	
TAD-100317-TB002	280-102198-11	280-102198	SW8260B	BENZENE	0	0.4	1.0	UG/L	U	U	
TAD-100317-TB002	280-102198-11	280-102198	SW8260B	TOLUENE	0	0.4	1.0	UG/L	U	U	
TAD-100317-TB002	280-102198-11	280-102198	SW8260B	1,1-DICHLOROETHENE	0	0.8	1.0	UG/L	U	U	
TAD-100317-TB002	280-102198-11	280-102198	SW8260B	CIS-1,2-DICHLOROETHYLENE	0	0.4	1.0	UG/L	U	U	
TAD-100317-TB002	280-102198-11	280-102198	SW8260B	TRANS-1,2-DICHLOROETHENE	0	0.4	1.0	UG/L	U	U	
TAD-100317-TB002	280-102198-11	280-102198	SW8260B	ETHYLBENZENE	0	0.4	1.0	UG/L	U	U	
TAD-100317-TB002	280-102198-11	280-102198	SW8260B	TETRACHLOROETHYLENE(PCE)	0	0.4	1.0	UG/L	U	U	
TAD-100317-TB002	280-102198-11	280-102198	SW8260B	TRICHLOROETHYLENE (TCE)	0	0.4	1.0	UG/L	U	U	
TAD-100317-TB002	280-102198-11	280-102198	SW8260B	VINYL CHLORIDE	0	0.2	1.5	UG/L	U	U	
TAD-100317-TB002	280-102198-11	280-102198	SW8260B	XYLENES, TOTAL	0	0.8	2.0	UG/L	U	U	
TAD-100317-TB002	280-102198-11	280-102198	SW8260B	M,P-XYLENE (SUM OF ISOMERS)	0	0.8	2.0	UG/L	U	U	
TAD-100317-TB002	280-102198-11	280-102198	SW8260B	O-XYLENE (1,2-DIMETHYLBENZENE)	0	0.4	1.0	UG/L	U	U	

Notes:

Reason codes are defined in the Qualification Code Reference Table at the end of the report.

Laboratory Data Qualifiers are laboratory-specific and are defined in the laboratory report provided by the laboratory

Acronyms:

MDL = method detection limit

MG/L = milligrams per liter

RL = reporting limit

RPD = relative percent difference

SDG = sample delivery group

UG/L = micrograms per liter

Methods:

AK101 = Alaska Department of Environmental Conservation Method 101; gasoline range organics (GRO)

AK102/AK103 = Alaska Department of Environmental Conservation Method 102/103; diesel range organics (DRO)/residual range organics (RRO)

E300.0 = Environmental Protection Agency Method 300.0

E351.2 = Environmental Protection Agency Method 351.2

E353.2 = Environmental Protection Agency Method 353.2

SM2320B = Standard Method 2320B

SW6010C = Solid Waste Method 6010C

SW8260B = Solid Waste Method 8260B

Qualifiers:

B = The analyte was detected in the method blank or the trip blank above the LOD, and the concentration in the sample did not exceed the blank concentration by a factor of 5 (factor of 10 for common laboratory contaminants acetone and methylene chloride).

+ = The result is biased high.

- = The result is biased low.

J = estimated value

JM(±) = The result was an estimated value because the analyte failed recovery criteria in the MS or MSD sample, or both. The MS sample recoveries were only evaluated if the spike concentration exceeded the native sample concentration.

JS(±) = The result was an estimate value because at least one surrogate failed recovery criteria for that sample.

LCD = Laboratory control sample: LCS RPD criteria exceeded

M = Manual integrated compound

Q = One or more quality control criteria failed.
U = non-detect; result less than the MDL

Validation Reason Codes:

CBL = Blank: Continuing calibration blank concentration less than the lower control limit

MSL = Matrix: Matrix spike recovery less than the lower control limit

SGH = Surrogate recovery: recovery exceeds upper control limit

TR = result between the MDL and RL

Attachment B-3
Data Validation Reports and ADEC Checklists

DATA REVIEW REPORT

Port Heiden RRS Groundwater Monitoring

SAMPLE DELIVERY GROUP: 280-102019-1

Prepared for
Versar, Inc.

14 December 2017

MEC^x, Inc.
8864 Interchange Drive
Houston, Texas 77054

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- 1 – Sample Identification
- 2 – Data Qualifier Reference
- 3 - Reason Code Reference



I. INTRODUCTION

Task Order Title: Port Heiden RRS Groundwater Monitoring

MECX Project No.: 1408.004H.00

Sample Delivery Group: 280-102019-1

Project Manager: Erin Madison

Matrix: water

QC Level: Stage 2B/4

No. of Samples: 16

No. of Reanalyses/Dilutions: 0

Laboratory: TestAmerica – Denver

TABLE 1 - SAMPLE IDENTIFICATION

Sample Name	Lab Sample Name	Matrix	Collection	Review Stage	Method
DSA-MW-06_092817	280-102019-1	Water	28-Sep-17	Verified	A2320B, CALC, E300, E351.2, E353.2, SW6010C, SW8260B
DSA-MW-07_092817	280-102019-2	Water	28-Sep-17	Verified	A2320B, CALC, E300, E351.2, E353.2, SW6010C, SW8260B
BLO-MW-07_092917	280-102019-5	Water	29-Sep-17	Verified	A2320B, AK101, AK102, CALC, E300, E351.2, E353.2, SW6010C, SW8260B
BLO-MW-06_092917	280-102019-6	Water	29-Sep-17	Validated	A2320B, AK101, AK102, CALC, E300, E351.2, E353.2, SW6010C, SW8260B
BLO-MW-26_092917	280-102019-7	Water	29-Sep-17	Verified	A2320B, AK101, AK102, CALC, E300, E351.2, E353.2, SW6010C, SW8260B
BLO-MW-05_093017	280-102019-8	Water	30-Sep-17	Verified	A2320B, AK101, AK102, CALC, E300, E351.2, E353.2, SW6010C, SW8260B
DSA-MW-05_093017	280-102019-9	Water	30-Sep-17	Verified	A2320B, CALC, E300, E351.2, E353.2, SW6010C, SW8260B
GLO-MW-03_093017	280-102019-10	Water	30-Sep-17	Verified	A2320B, CALC, E300, E351.2, E353.2, SW6010C, SW8260B



GLO-MW-23_093017	280-102019-11	Water	30-Sep-17	Verified	A2320B, CALC, E300, E351.2, E353.2, SW6010C, SW8260B
GLO-MW-04_100117	280-102019-12	Water	1-Oct-17	Verified	A2320B, CALC, E300, E351.2, E353.2, SW6010C, SW8260B
RRS-MW-05_100117	280-102019-13	Water	1-Oct-17	Verified	A2320B, CALC, E300, E351.2, E353.2, SW6010C, SW8260B
RRS-MW-06_100217	280-102019-15	Water	2-Oct-17	Validated	A2320B, CALC, E300, E351.2, E353.2, SW6010C, SW8260B
TRIP BLANK	280-102019-16	Water	2-Oct-17	Verified	SW8260B
FPC_066-MW-06_092717	280-102019-3	Water	27-Sep-17	Verified	AK102
FPC_066-MW-07_092717	280-102019-4	Water	27-Sep-17	Verified	AK102
FPC_215-MW-12_100217	280-102019-14	Water	2-Oct-17	Verified	AK102



II. SAMPLE MANAGEMENT

According to the case narrative, login sample receipt checklist, and the chain-of-custody (COC) provided by the laboratory for sample delivery group (SDG) 280-102019-1:

- The laboratory received samples in this SDG on ice and within the temperature limits of ≤ 6 degrees Celsius ($^{\circ}\text{C}$) and $> 0^{\circ}\text{C}$.
- The laboratory received the sample containers intact and properly preserved, as applicable.
- Field and laboratory personnel signed and dated the COC.
- Custody seals were present and intact on the coolers.
- One of three vials for sample BLO-MW-26_092917 was received empty. Sufficient volume remained for the requested analyses.
- No volume was received for GRO/DRO/RRO analyses of sample DSA-MW-05_093017. Analysis for these methods was cancelled.
- The labels for sample RRS-MW-06_100217 listed an incorrect sample collection time. The sample was logged per the COC.
- The trip blank (sample TRIP BLANK) was not listed on the COC. The sample was logged for Method 8260B.
- The COC and labels did not match for sample FPC-066-MW-06_092717. The sample was logged per the COC, through process of elimination.

MEC^x noted anomalies regarding sample management identified below.

- Minor corrections on the COC were not initialed and dated.
- The first page of the COC listed Methods 361.2 and 363.2; however, the correct Methods; 351.2 and 353.2, were analyzed for appropriate samples.



Data Qualifier Reference Table*

Qualifier	
J	The reported result is an estimated value. The <i>definition was changed from the WP to the standard data qualifiers definition listed in the DOD QSM 5.0, as the qualifiers in the WP did not account for data qualifiers for precision issues (e.g. MS/MSD and field duplicate issues).</i>
E	The analyte was nondetect but the limit of detection (LOD) exceeded the project action limit.
B	The analyte was detected in the method blank or the trip blank above the LOD, and the concentration in the sample did not exceed the blank concentration by a factor of 5 (factor of 10 for common laboratory contaminants acetone and methylene chloride).
+	The result is biased high.
-	The result is biased low.
JL(±)	The result was an estimated value because the analyte failed recovery criteria in the LCS or LCSD sample or both. The result was either biased low because the LCS and LCSD recovery was less than the lower control limit, or the result was biased high because the recovery exceeded the upper control limit.
JM(±)	The result was an estimated value because the analyte failed recovery criteria in the MS or MSD sample, or both. The MS sample recoveries were only evaluated if the spike concentration exceeded the native sample concentration.
JS(±)	The result was an estimated value because at least one surrogate failed recovery criteria for that sample.
JH	The numerical result was considered an estimate because the analysis was performed at greater than the method holding time and less than twice the method holding time.
JI(±)	The numerical result was considered an estimate because the internal standard failed QC limits. The result was either biased low because the internal standard failed high or the result was biased high because the recovery failed low.
JP	The result was considered an estimated value because incorrect or inadequate preservation methods were used.
JC(±)	The result was an estimated value because the analyte failed recovery criteria in the continuing calibration verification (CCV). The result was either biased low because the CCV recovery was less than the lower control limit or biased high because the recovery exceeded the upper control limit.
R	The result was rejected. A rejected result was not usable and therefore was deleted from the report.
U	The analyte was analyzed for, but not detected. The associated numerical value is the LOD.
UJ	Values "U" and "J" combined.

*Data Qualifiers adapted from Amended Final Groundwater Monitoring 2016 and 2017 Work Plan, Port Heiden Radio Relay Station, Alaska



Qualification Code Reference Table*

<i>Qualifier</i>	<i>Description</i>
ABG	Blank: Ambient blank concentration greater than the reporting limit
ABL	Blank: Ambient blank concentration less than the reporting limit
CBH	Calibration: Continuing calibration blank concentration greater than the reporting limit
CBL	Blank: Continuing calibration blank concentration less than the reporting limit
CCA	Miscellaneous: Compounds were reported combined on one column
CCL	Calibration: Continuing calibration recovery less than the lower control limit
CF	Confirmation: Confirmation result
CFD	Confirmation: Confirmation precision exceeded
CFHD	Confirmation: Confirmation result RPD greater than the upper control limit
CLS	Calibration: No calibration analyzed in the analytical batch
CRL	Calibration: Result below the calibration range
CRR	Calibration: Lab R flag removed - calibration range exceeded
CVES	Calibration: Calibration verification ending standard exceeded %D criteria
CVHL	Calibration: Continuing calibration recovery greater than the upper control limit
D	Duplicates: Duplicate run
DL	Dilution: Dilution
DS	Serial dilution %D exceeded control limit
EBG	Blank: Equipment blank concentration greater than the reporting limit
EBL	Blank: Equipment blank concentration less than the reporting limit
EMPC	Matrix: Estimated maximum possible concentration
EXC	Miscellaneous: Data not used; another value is appropriate or data was not requested
FBG	Blank: Field blank concentration greater than the reporting limit
FBL	Blank: Field blank concentration less than the reporting limit
FDD	Duplicates: Field duplicate RPD criteria exceeded
HHL	Holding time: Holding time exceeded
IC2	Calibration: Exceeds RSD criteria and initial calibration exceeded the r^2 for first order regression
ICD	Calibration: Initial calibration RSD exceeded
ICE	Calibration: Result greater than linear calibration range
ICL	Calibration: Initial calibration low standard greater than the reporting limit
ICP	Calibration: Initial calibration RSD exceeded for confirmation column
ICR2	Calibration: Initial calibration exceeded the r^2 for first order regression
ICS	ICSA/B recovery outside control limits
IMPR	Improper sample preservation/handling/collection



<i>Qualifier</i>	<i>Description</i>
IRF	Calibration: Initial calibration relative response factor below the lower control limit
ISH	Internal standard: Internal standard response greater than the upper control limit
ISL	Internal standard: Internal standard response less than the lower control limit
IVD	Calibration: Exceeds ICVS %D criteria
IVS	Calibration: Initial calibration verification standard was not analyzed
LBG	Blank: Laboratory blank contamination greater than the reporting limit
LBL	Blank: Laboratory blank contamination less than the reporting limit
LBM	Blank: Laboratory blank contamination greater than the method detection limit
LCD	Laboratory control sample: LCS RPD criteria exceeded
LCH	Laboratory control sample: LCS recovery greater than the upper control limit
LCL	Laboratory control sample: LCS recovery less than the lower control limit
LCS	Laboratory control sample: no LCS in the analytical batch
LDD	Duplicates: Laboratory duplicate RPD criteria exceeded
LDH	Laboratory control sample: LCS/LCSD RPD criteria exceeded
LDS	Laboratory control sample: LCSD not required - no flags applied
LRL	RL: Result less than the reporting limit
MIF	Matrix: Matrix inappropriately flagged
MS	Matrix: Global matrix spike flagging
MSD	Matrix: Matrix spike RPD criteria exceeded
MSH	Matrix: Matrix spike recovery greater than the upper control limit
MSL	Matrix: Matrix spike recovery less than the lower control limit
RE	Re-analysis: Re-extraction and/or reanalysis
RFJ	Miscellaneous: Lab F flag replaced with J - flagging not valid
RFL	Laboratory control sample: Lab R flag removed - recovery within lab control limits
RHT	Holding time: Lab R flag removed - holding time exceeded by less than 24 hours
RIS	Internal standard: Lab R flag removed - reanalysis confirmed matrix effect on IS
RLM	RL: Reporting limit less than the method detection limit
RML	Matrix: Lab M flag removed - recovery within lab control limits
RMQ	Matrix: Lab M flag removed – MS/MSD not requested in this analytical batch
RPE	Holding time: Lab R flag removed - PE sample
RRA	Blank: Lab B flag removed - analyte not detected in sample
RSG	Surrogate recovery: Lab R flag removed - reanalysis confirmed matrix effect on surrogate
RSGQ	Surrogate recovery: Lab R flag removed - surrogate not monitored in QAPP
RTO	Confirmation: Result is outside the method specified retention time window
RXL	Lab control limits: Lab R flag removed - recovery within lab control limits



<i>Qualifier</i>	<i>Description</i>
SCN	Screening: Screening method
SDH	Matrix: Matrix spike duplicate recovery criteria greater than the upper control limit
SDL	Matrix: Matrix spike duplicate recovery criteria less than the lower control limit
SGH	Surrogate recovery: Surrogate recovery greater than the upper control limit
SGL	Surrogate recovery: Surrogate recovery less than the lower control limit
SPRF	Calibration: SPCC exceeds RF > 0.300 criteria
SVHL	Calibration: Second source verification standard %R greater than the upper control limit
SVLL	Calibration: Second source verification standard %R less than the lower control limit
TB	Blank: Trip blank
TBG	Blank: Trip blank concentration greater than the reporting limit
TBL	Blank: Trip blank concentration less than the reporting limit
TH	The chromatogram of this sample indicates the presence of high boiling petroleum hydrocarbons not consistent with the qualitative standards employed for this method
TH8	Blank: Temperature blank > 8 degrees c
TIC	Tentatively identified compound: Tentatively identified compound
TL	The chromatogram of this sample indicates the presence of low boiling petroleum hydrocarbons not consistent with the qualitative standards employed for this method
TR	RL: Result between the method detection limit and reporting limit

* Qualification Codes obtained from ERPTool X 5.0.8.0-AFCEE Valid Value List for Result Reason Codes.



ACRONYMS AND ABBREVIATIONS

BFB	Bromofluorobenzene
°C	Degrees Celsius
CCB	Continuing Calibration Blank
CCC	Calibration Check Compounds
CCV	Continuing Calibration Verification
%D	Percent Difference
DFTPP	Decafluorotriphenylphosphine
DL	Detection Limit
DoD	Department of Defense
EDD	Electronic Data Deliverable
EIM	Environmental Information Management
GC/MS	Gas Chromatography/Mass Spectrometry
ICSA	Interference Check Sample A
ICSAB	Interference Check Sample AB
ICV	Initial Calibration Verification
ICP	Inductively Coupled Plasma
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
Locus	Locus Technologies, Inc.
LOD	Limit of Detection
LOQ	Limit of Quantitation
MEC ^x	MEC ^x , Inc.
MRL	Method Reporting Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PAH	Polynuclear Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
QSM	Quality Systems Manual
RI	Remedial Investigation
RPD	Relative Percent Difference
RRF	Relative Response Factor
RSD	Relative Standard Deviation
SAP	Sampling and Analysis Plan
SDG	Sample Delivery Group
SI	Site Investigation
SOP	Standard Operating Procedure
SPCC	System Performance Check Compound
SVOC	Semivolatile Organic Compound



USEPA	United State Environmental Protection Agency
Versar	Versar, Inc.
VOC	Volatile Organic Compound



III. ANALYTICAL REVIEW

III.1. HOLDING TIME

Extraction and analytical holding times for waters, as listed below, were met.

Analytical Method	Preparation Holding Time (days)	Analysis Holding Time (days)
AK101 (GRO)	N/A	14
AK102/103 (DRO/RRO)	14	40
SW6010C	N/A	180
300.0	N/A	28
SW8260B	N/A	14
351.2	N/A	28
353.2	N/A	28
SM2320B	N/A	14

III.2. GC/MS TUNING

The VOC BFB tunes met the method abundance criteria. Samples were analyzed within 12 hours of the injection times.

III.1. CALIBRATION

Calibration criteria were met for all methods.

VOC initial calibration average RRFs and ICV and CCV RRFs were within the control limits of ≥ 0.30 for chlorobenzene and 1,1,2,2-tetrachloroethane, and ≥ 0.10 for chloromethane, bromoform, and 1,1-dichloroethane. All initial calibration %RSDs were within the control limits of $\leq 30\%$ for CCCs and $\leq 15\%$ for remaining compounds, or coefficient of determination r^2 values ≥ 0.990 . All second source initial calibration verification standard recoveries affecting sample data were within the control limit of $\pm 20\%$ of the true value and continuing calibration %Ds were within the control limit of $\leq 20\%$ for beginning CCVs and $\leq 50\%$ for ending CCVs.

GRO, DRO, and RRO initial calibration %RSDs were within the control limit of $\leq 25\%$. ICV results were within the control limit of $\pm 25\%$ of the true value and continuing calibration %Ds were within the control limit of $\leq 25\%$.

ICP calibration criteria were met. Initial (ICV) and continuing (CCV) calibration verification standard recoveries were within 90-110%. Low level calibration verification recoveries were within 80-120%. ICSAB concentrations were within $\pm 20\%$ of true value. ICSA concentrations for non-spiked analytes were less than $\frac{1}{2}$ LOQ.

Instrument calibration criteria were met for Methods 351.2, 353.2 and 300.0. All ICV and CCV recoveries were within 90-110%.



III.2. BLANKS

Except as noted in the table below, method blanks for the organic methods had no reported detects. GRO C6-C10 was reported in the method blank below the LOQ. Sample detects for GRO C6-C10 <5× the method blank concentration in samples BLO-MW-07_092917 and BLO-MW-05_093017 were qualified as method blank contamination (B).

TKN and sulfate were detected in method blanks at greater than one-tenth the amount of sample detects; however, associated sample results were qualified due to calibration blank detections (see below) and were not further qualified for method blank detections.

Metals, TKN, nitrate/nitrate as N, total nitrogen, sulfate and alkalinity were not detected above the LOD in the calibration blanks bracketing the site samples with the following exceptions. Manganese was reported in a calibration blank at greater than the LOD and less than the LOQ; however, the associated sample result was >5× the calibration blank concentration and was not qualified. TKN was reported at greater than LOD and less than LOQ in the initial calibration blank. Sulfate was reported at greater than the LOD and less than LOQ in calibration blanks associated with site samples. Associated detected results that were <5× the calibration blank concentration were qualified as blank contamination (B).

Analytical Method	Parameter Name	Blank Result	Lab Qualifier	Units	Blank LOQ
AK101 (GRO)	Petroleum Hydrocarbons C6-C10	0.381	J	mg/L	1.3
351.2	TKN	0.269	J	mg/L	1
300.0	sulfate	0.341 0.710	J	mg/L	5

III.3. BLANK SPIKES AND LABORATORY CONTROL SAMPLES

VOC, GRO, and DRO LCS/LCSD recoveries were within the control limits listed in DoD QSM Appendix C Tables, and RPDs were within the control limit of ≤20%. The LCS recovery of 200% above the control limits of 60-120% for RRO in the LCS only of the LCS/LCSD pair resulted in an RPD of 64%, above the control limit of ≤20%. Nondetects for Residual Range Organics (RRO) were qualified as estimated (UJ) for the RPD outlier.

The LCS recoveries for Method 6010C were within the control limits listed in DoD QSM Appendix C Tables. The LCS/LCSD RPDs were within the control limit of ≤20% for Method 6010C.

The LCS and LCSD (as appropriate) recoveries and RPDs were within the laboratory control limits for Methods 351.2, 353.2, 300.0 and SM2320B.

III.1. SURROGATE RECOVERY

Surrogate recoveries were within the control limits listed in DoD QSM Appendix C Tables.

III.2. LABORATORY DUPLICATES

Laboratory duplicate analyses were performed on samples BLO-MW—06_092917 and DSA-MW-05_093017 for sulfate, and on sample RRS-MW-05_100117 for alkalinity. The RPDs were within the laboratory control limits. Laboratory duplicate analyses were not performed on a sample in this SDG for the remaining methods.

III.3. MATRIX SPIKE/MATRIX SPIKE DUPLICATE

MS/MSD analyses are performed per batch of 20 samples or less for methods appropriate for MS analyses. MS/MSD analyses performed on the site samples are utilized in the evaluation of accuracy and precision for site samples. In the event that there is insufficient volume for MS/MSD analysis, the LCS/LCSD will be utilized to evaluate accuracy and precision for the site samples.

MS/MSD analyses were performed on sample BLO-MW-06_092917 for VOCs, GRO, and DRO, and also on sample DSA-MW-05_093017 for VOCs. Method accuracy and precision for RRO were evaluated based on the LCS/LCSD results. Results in the parent sample were not qualified for single recovery outliers not present in both the MS and MSD, or for RPD outliers not detected in the parent sample. Except as noted below in text or table, recoveries were within the control limits listed in DoD QSM Appendix C Tables and RPDs were $\leq 20\%$. The GRO MSD recovery of 52% in the MSD only resulted in an RPD of 39%, above the control limit of $\leq 20\%$; therefore, the parent sample result was qualified as estimated (J). The parent sample result for the DRO recoveries below the control limits listed in the table below was qualified as estimated with a potential negative bias (JM-).

MS/MSD analyses were performed on samples DSA-MW-07-092817 and GLO-MW-04_100117 for TKN, and on samples BLO-MW—06_092917 and DSA-MW-05_093017 for sulfate and Method 6010C. When the parent sample results were $<4x$ the matrix spike concentration, MS/MSD recoveries were within the control limits listed in DoD QSM Appendix C Tables for Method 6010C and RPDs were $\leq 20\%$, except as noted in the table below. MS/MSD recoveries and RPDs met laboratory control limits for Methods 351.2 and 300.0. Results were not qualified for samples which had acceptable recoveries and RPDs. Results for site samples associated with MS/MSDs with low recoveries were qualified as estimated with low bias (JM-). MS/MSD analyses were not performed on a sample in this SDG for the remaining analyses. Method accuracy was evaluated based on LCS results.

Analytical Method	Parameter	MS % Recovery	MSD % Recovery	Lower QC Limit	Upper QC Limit
AK102 (DRO)	C10-C25	<1%	<1%	60%	120%
SW6010C	iron	83%	79%	87%	115%

The laboratory performed post digestion spike analysis on samples BLO-MW—06_092917 and DSA-MW-05_093017 for Method 6010C. The recoveries were within the control limits of 80-120% when analyte concentrations were $<50x$ LOD.

The laboratory performed serial dilution analysis on sample BLO-MW—06_092917 for Method 6010C. The percent difference between the parent sample and the serial dilution results met the control limit of $\leq 10\%$ for results $>50x$ LOQ.

III.4. FIELD QC SAMPLES

Field QC samples were evaluated, and if necessary, qualified based on method blanks and other laboratory QC results affecting the usability of the field QC data. Any remaining detects were used to evaluate the associated site samples.

III.4.1. TRIP BLANKS

Sample TRIP BLANK was identified as the trip blank associated with the site samples in this SDG. The trip blank had no VOC target compound detects above the control limit of one-half the LOQ or one-tenth the amount of any sample detect. The sample was not analyzed for GRO.

III.4.2. FIELD BLANKS AND EQUIPMENT BLANKS

No samples were identified as field or equipment blanks.

III.4.3. FIELD DUPLICATES

Samples BLO-MW-06_092917 / BLO-MW-26_092917 and samples GLO-MW-03_093017 / GLO-MW-23_093017 were identified as field duplicate pairs. RPDs for the VOC, GRO, DRO, and RRO pairs were within the control limits listed in Work Plan control limit of $\leq 30\%$, or within the reasonable control limit of $\pm \text{LOQ}$ for detects below the LOQ or nondetects.

RPDs were within the Work Plan control limit of $\leq 30\%$, or within the reasonable control limit of $\pm \text{LOQ}$ for detects below the LOQ or nondetects, for Methods 6010C, 300.0, 351.2, 353.2 and SM2320, except as noted in the table below. Associated results for the field duplicate pairs were qualified as estimated (J).

Analytical Method	Field Duplicate Pair	Parameter Name	Field Duplicate RPD/ $\pm \text{LOQ}$
SW6010C	BLO-MW-06_092917/BLO-MW-26_092917	iron	34%
	GLO-MW-03_093017 / GLO-MW-23_093017	iron	177%
		manganese	$> \pm \text{LOQ}$

III.5. INTERNAL STANDARDS PERFORMANCE

The VOC internal standard retention times and area counts were within the control limits established by the midpoint initial calibration standard: ± 30 seconds for retention times and $-50\% / +100\%$ for internal standard areas.

III.6. COMPOUND IDENTIFICATION

Compound identification was verified for the samples reviewed at Stage IV validation level. Review of the raw data, chromatograms, retention times, and spectra indicated no issues with compound identification.

III.7. COMPOUND QUANTIFICATION AND REPORTED DETECTION LIMITS

Compound quantification was verified for the samples reviewed at Stage IV validation level. The LOQs were supported by the low point of the initial calibrations and the laboratory LOD. Results reported



between the LOD and the LOQ were qualified as estimated (J). Reported nondetects are valid to the LOD; however, the LOQ is reported on the sample result form and in the EDD.

III.8. MANUAL INTEGRATIONS

Manual integrations were evaluated for the samples reviewed at Stage IV validation level and associated calibration and QC samples. Reviewed manual integrations were considered appropriate.

III.9. TENTATIVELY IDENTIFIED COMPOUNDS

TICs were not reported by the laboratory for this SDG.

III.10. SYSTEM PERFORMANCE

System performance was considered acceptable.



IV. REFERENCES

- Groundwater Monitoring 2016 and 2017 Work Plan, Port Heiden Radio Relay Station, Alaska. April 2017.
- DoD Quality Systems Manual for Environmental Laboratories, Version 5.0. 2013.
- DoD Quality Systems Manual for Environmental Laboratories, Version 5.1. 2017.
- Method 6010C. Test Methods for Evaluating Solid Waste (SW-846) November 2000.
- Method AK101. For the Determination of Gasoline Range Organics, Version 04/08/02.
- Method AK102. For the Determination of Diesel Range Organics, Version 04/08/02.
- Method AK103. For the Determination of Residual Range Organics, Version 04/08/02.
- Method SW8260B. Test Methods for Evaluating Solid Waste (SW-846), Revision 2. December 1996.
- Method 351.2. EPA Methods for Chemical Analysis of Water and Wastes, Revision 2. August 1993
- Method 353.2. EPA Methods for Chemical Analysis of Water and Wastes, Revision 2. August 1993
- Method 300.0. EPA Methods for Chemical Analysis of Water and Wastes, Revision 2. August 1993
- Method 2320B. Standard Methods for the Examination of Water and Wastewater, 21st Edition. 2005.

Validated Sample Result Forms: 280-102019-1

Analysis Method *A2320B*

Sample Name	BLO-MW-05_093017	Lab Sample Name:	280-102019-8				
Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
Analysis Date:	10-Oct-17						
Dilution Factor:	1						

ALKALINITY, TOTAL (AS CaCO3)	N	45	0	MG/L			
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Sample Name	BLO-MW-06_092917	Lab Sample Name:	280-102019-6				
Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
Analysis Date:	10-Oct-17						
Dilution Factor:	1						

ALKALINITY, TOTAL (AS CaCO3)	N	54	0	MG/L			
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Sample Name	BLO-MW-07_092917	Lab Sample Name:	280-102019-5				
Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
Analysis Date:	10-Oct-17						
Dilution Factor:	1						

ALKALINITY, TOTAL (AS CaCO3)	N	45	0	MG/L			
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Sample Name	BLO-MW-26_092917	Lab Sample Name:	280-102019-7				
Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
Analysis Date:	10-Oct-17						
Dilution Factor:	1						

ALKALINITY, TOTAL (AS CaCO3)	N	52	0	MG/L			
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Sample Name	DSA-MW-05_093017	Lab Sample Name:	280-102019-9				
Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
Analysis Date:	10-Oct-17						
Dilution Factor:	1						

ALKALINITY, TOTAL (AS CaCO3)	N	64	0	MG/L			
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Sample Name	DSA-MW-06_092817	Lab Sample Name:	280-102019-1				
Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
Analysis Date:	10-Oct-17						
Dilution Factor:	1						

ALKALINITY, TOTAL (AS CaCO3)	N	68	0	MG/L			
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Analysis Method *A2320B*

Sample Name DSA-MW-07_092817 **Lab Sample Name:** 280-102019-2

Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
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Analysis Date: 10-Oct-17

Dilution Factor: 1

ALKALINITY, TOTAL (AS CaCO3) N 89 0 MG/L

Sample Name GLO-MW-03_093017 **Lab Sample Name:** 280-102019-10

Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
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Analysis Date: 10-Oct-17

Dilution Factor: 1

ALKALINITY, TOTAL (AS CaCO3) N 96 0 MG/L

Sample Name GLO-MW-04_100117 **Lab Sample Name:** 280-102019-12

Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
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Analysis Date: 10-Oct-17

Dilution Factor: 1

ALKALINITY, TOTAL (AS CaCO3) N 73 0 MG/L

Sample Name GLO-MW-23_093017 **Lab Sample Name:** 280-102019-11

Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
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Analysis Date: 10-Oct-17

Dilution Factor: 1

ALKALINITY, TOTAL (AS CaCO3) N 95 0 MG/L

Sample Name RRS-MW-05_100117 **Lab Sample Name:** 280-102019-13

Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
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Analysis Date: 10-Oct-17

Dilution Factor: 1

ALKALINITY, TOTAL (AS CaCO3) N 52 0 MG/L

Sample Name RRS-MW-06_100217 **Lab Sample Name:** 280-102019-15

Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
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Analysis Date: 10-Oct-17

Dilution Factor: 1

ALKALINITY, TOTAL (AS CaCO3) N 130 0 MG/L

Analysis Method AK101

Sample Name	BLO-MW-05_093017			Lab Sample Name:	280-102019-8		
Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
Analysis Date:	12-Oct-17						
Dilution Factor:	1						
PETROLEUM HYDROCARBONS C6-C10	N	1.8	1.3	MG/L	M	B	LBL

Sample Name	BLO-MW-06_092917			Lab Sample Name:	280-102019-6		
Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
Analysis Date:	12-Oct-17						
Dilution Factor:	1						
PETROLEUM HYDROCARBONS C6-C10	N	2.4	1.3	MG/L	M J	J	MSD

Sample Name	BLO-MW-07_092917			Lab Sample Name:	280-102019-5		
Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
Analysis Date:	12-Oct-17						
Dilution Factor:	1						
PETROLEUM HYDROCARBONS C6-C10	N	1.8	1.3	MG/L	M	B	LBL

Sample Name	BLO-MW-26_092917			Lab Sample Name:	280-102019-7		
Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
Analysis Date:	12-Oct-17						
Dilution Factor:	1						
PETROLEUM HYDROCARBONS C6-C10	N	2.3	1.3	MG/L	M		

Analysis Method AK102

Sample Name	BLO-MW-05_093017			Lab Sample Name:	280-102019-8		
Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
Analysis Date:	3-Nov-17						
Dilution Factor:	1						
C10-C25 DIESEL RANGE ORGANICS	N	0.037	0.26	MG/L	J M	J	TR
MOTOR OILS	N	0	0.53	MG/L	U M Q	UJ	LCD

Sample Name	BLO-MW-06_092917			Lab Sample Name:	280-102019-6		
Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
Analysis Date:	3-Nov-17						
Dilution Factor:	1						
C10-C25 DIESEL RANGE ORGANICS	N	0.037	0.25	MG/L	M J	JM-	MSL
MOTOR OILS	N	0	0.51	MG/L	U M Q	UJ	LCD

Analysis Method *AK102*

Sample Name BLO-MW-07_092917 **Lab Sample Name:** 280-102019-5

Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
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Analysis Date: 3-Nov-17

Dilution Factor: 1

C10-C25 DIESEL RANGE ORGANICS	N	0.077	0.27	MG/L	J M	J	TR
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MOTOR OILS	N	0	0.54	MG/L	U M Q	UJ	LCD
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Sample Name BLO-MW-26_092917 **Lab Sample Name:** 280-102019-7

Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
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Analysis Date: 3-Nov-17

Dilution Factor: 1

C10-C25 DIESEL RANGE ORGANICS	N	0.04	0.26	MG/L	J M	J	TR
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MOTOR OILS	N	0	0.52	MG/L	U M Q	UJ	LCD
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Sample Name FPC_066-MW-06_092717 **Lab Sample Name:** 280-102019-3

Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
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Analysis Date: 3-Nov-17

Dilution Factor: 1

C10-C25 DIESEL RANGE ORGANICS	N	0.091	0.24	MG/L	J M	J	TR
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Sample Name FPC_066-MW-07_092717 **Lab Sample Name:** 280-102019-4

Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
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Analysis Date: 3-Nov-17

Dilution Factor: 1

C10-C25 DIESEL RANGE ORGANICS	N	0.047	0.26	MG/L	J M	J	TR
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Sample Name FPC_215-MW-12_100217 **Lab Sample Name:** 280-102019-14

Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
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Analysis Date: 2-Nov-17

Dilution Factor: 1

C10-C25 DIESEL RANGE ORGANICS	N	0.075	0.26	MG/L	J M	J	TR
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Analysis Method *CALC*

Sample Name BLO-MW-05_093017 **Lab Sample Name:** 280-102019-8

Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
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Analysis Date: 23-Oct-17

Dilution Factor: 1

TOTAL NITROGEN, ALL FORMS,CALCULATED	N	0.52	0	MG/L			
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Analysis Method *CALC*

Sample Name BLO-MW-06_092917 **Lab Sample Name:** 280-102019-6

Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
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Analysis Date: 23-Oct-17

Dilution Factor: 1

TOTAL NITROGEN, ALL FORMS,CALCULATED	N	0.37	0	MG/L			
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Sample Name BLO-MW-07_092917 **Lab Sample Name:** 280-102019-5

Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
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Analysis Date: 23-Oct-17

Dilution Factor: 1

TOTAL NITROGEN, ALL FORMS,CALCULATED	N	0	0	MG/L	U	U	
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Sample Name BLO-MW-26_092917 **Lab Sample Name:** 280-102019-7

Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
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Analysis Date: 23-Oct-17

Dilution Factor: 1

TOTAL NITROGEN, ALL FORMS,CALCULATED	N	0.4	0	MG/L			
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Sample Name DSA-MW-05_093017 **Lab Sample Name:** 280-102019-9

Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
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Analysis Date: 23-Oct-17

Dilution Factor: 1

TOTAL NITROGEN, ALL FORMS,CALCULATED	N	0.26	0	MG/L			
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Sample Name DSA-MW-06_092817 **Lab Sample Name:** 280-102019-1

Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
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Analysis Date: 23-Oct-17

Dilution Factor: 1

TOTAL NITROGEN, ALL FORMS,CALCULATED	N	0.31	0	MG/L			
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Sample Name DSA-MW-07_092817 **Lab Sample Name:** 280-102019-2

Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
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Analysis Date: 23-Oct-17

Dilution Factor: 1

TOTAL NITROGEN, ALL FORMS,CALCULATED	N	0.36	0	MG/L			
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Analysis Method *CALC*

Sample Name GLO-MW-03_093017 **Lab Sample Name:** 280-102019-10

Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
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Analysis Date: 23-Oct-17

Dilution Factor: 1

TOTAL NITROGEN, ALL FORMS,CALCULATED	N	0.59	0	MG/L			
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Sample Name GLO-MW-04_100117 **Lab Sample Name:** 280-102019-12

Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
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Analysis Date: 23-Oct-17

Dilution Factor: 1

TOTAL NITROGEN, ALL FORMS,CALCULATED	N	1.5	0	MG/L			
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Sample Name GLO-MW-23_093017 **Lab Sample Name:** 280-102019-11

Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
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Analysis Date: 23-Oct-17

Dilution Factor: 1

TOTAL NITROGEN, ALL FORMS,CALCULATED	N	0.56	0	MG/L			
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Sample Name RRS-MW-05_100117 **Lab Sample Name:** 280-102019-13

Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
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Analysis Date: 23-Oct-17

Dilution Factor: 1

TOTAL NITROGEN, ALL FORMS,CALCULATED	N	0.54	0	MG/L			
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Sample Name RRS-MW-06_100217 **Lab Sample Name:** 280-102019-15

Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
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Analysis Date: 23-Oct-17

Dilution Factor: 1

TOTAL NITROGEN, ALL FORMS,CALCULATED	N	1.1	0	MG/L			
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Analysis Method *E300*

Sample Name BLO-MW-05_093017 **Lab Sample Name:** 280-102019-8

Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
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Analysis Date: 10-Oct-17

Dilution Factor: 1

SULFATE (AS SO4)	N	2	5	MG/L	JM	J	TR
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Analysis Method E300

Sample Name	BLO-MW-06_092917			Lab Sample Name:	280-102019-6		
Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
Analysis Date:	10-Oct-17						
Dilution Factor:	1						
SULFATE (AS SO4)	N	4.1	5	MG/L	JM	J	TR

Sample Name	BLO-MW-07_092917			Lab Sample Name:	280-102019-5		
Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
Analysis Date:	10-Oct-17						
Dilution Factor:	1						
SULFATE (AS SO4)	N	3.4	5	MG/L	JM	J	TR

Sample Name	BLO-MW-26_092917			Lab Sample Name:	280-102019-7		
Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
Analysis Date:	10-Oct-17						
Dilution Factor:	1						
SULFATE (AS SO4)	N	5.2	5	MG/L	M		

Sample Name	DSA-MW-05_093017			Lab Sample Name:	280-102019-9		
Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
Analysis Date:	10-Oct-17						
Dilution Factor:	1						
SULFATE (AS SO4)	N	8.1	5	MG/L	M		

Sample Name	DSA-MW-06_092817			Lab Sample Name:	280-102019-1		
Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
Analysis Date:	10-Oct-17						
Dilution Factor:	1						
SULFATE (AS SO4)	N	5.4	5	MG/L	M		

Sample Name	DSA-MW-07_092817			Lab Sample Name:	280-102019-2		
Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
Analysis Date:	10-Oct-17						
Dilution Factor:	1						
SULFATE (AS SO4)	N	4.9	5	MG/L	JM	J	TR

Sample Name	GLO-MW-03_093017			Lab Sample Name:	280-102019-10		
Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
Analysis Date:	11-Oct-17						
Dilution Factor:	1						
SULFATE (AS SO4)	N	5.6	5	MG/L	M		

Analysis Method E300

Sample Name	GLO-MW-04_100117		Lab Sample Name:	280-102019-12			
Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
Analysis Date:	11-Oct-17						
Dilution Factor:	1						
SULFATE (AS SO4)	N	3.4	5	MG/L	JM	B	CBL

Sample Name	GLO-MW-23_093017		Lab Sample Name:	280-102019-11			
Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
Analysis Date:	11-Oct-17						
Dilution Factor:	1						
SULFATE (AS SO4)	N	5.3	5	MG/L	M		

Sample Name	RRS-MW-05_100117		Lab Sample Name:	280-102019-13			
Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
Analysis Date:	11-Oct-17						
Dilution Factor:	1						
SULFATE (AS SO4)	N	2.9	5	MG/L	JM	B	CBL

Sample Name	RRS-MW-06_100217		Lab Sample Name:	280-102019-15			
Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
Analysis Date:	11-Oct-17						
Dilution Factor:	1						
SULFATE (AS SO4)	N	4.2	5	MG/L	JM	J	TR

Analysis Method E351.2

Sample Name	BLO-MW-05_093017		Lab Sample Name:	280-102019-8			
Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
Analysis Date:	20-Oct-17						
Dilution Factor:	1						
NITROGEN, KJELDAHL, TOTAL	N	0.31	1	MG/L	J	B	CBL

Sample Name	BLO-MW-06_092917		Lab Sample Name:	280-102019-6			
Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
Analysis Date:	20-Oct-17						
Dilution Factor:	1						
NITROGEN, KJELDAHL, TOTAL	N	0.31	1	MG/L	J	B	CBL

Analysis Method E351.2

Sample Name BLO-MW-07_092917 **Lab Sample Name:** 280-102019-5

Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
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Analysis Date: 20-Oct-17

Dilution Factor: 1

NITROGEN, KJELDAHL, TOTAL	N	0	1	MG/L	U	U	
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Sample Name BLO-MW-26_092917 **Lab Sample Name:** 280-102019-7

Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
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Analysis Date: 20-Oct-17

Dilution Factor: 1

NITROGEN, KJELDAHL, TOTAL	N	0.33	1	MG/L	J	B	CBL
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Sample Name DSA-MW-05_093017 **Lab Sample Name:** 280-102019-9

Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
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Analysis Date: 20-Oct-17

Dilution Factor: 1

NITROGEN, KJELDAHL, TOTAL	N	0.26	1	MG/L	J	B	CBL
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Sample Name DSA-MW-06_092817 **Lab Sample Name:** 280-102019-1

Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
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Analysis Date: 20-Oct-17

Dilution Factor: 1

NITROGEN, KJELDAHL, TOTAL	N	0.31	1	MG/L	J	B	CBL
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Sample Name DSA-MW-07_092817 **Lab Sample Name:** 280-102019-2

Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
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Analysis Date: 20-Oct-17

Dilution Factor: 1

NITROGEN, KJELDAHL, TOTAL	N	0.29	1	MG/L	J	B	CBL
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Sample Name GLO-MW-03_093017 **Lab Sample Name:** 280-102019-10

Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
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Analysis Date: 20-Oct-17

Dilution Factor: 1

NITROGEN, KJELDAHL, TOTAL	N	0.37	1	MG/L	J	B	CBL
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Sample Name GLO-MW-04_100117 **Lab Sample Name:** 280-102019-12

Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
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Analysis Date: 20-Oct-17

Dilution Factor: 1

NITROGEN, KJELDAHL, TOTAL	N	1.3	1	MG/L	J	B	CBL
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Analysis Method E351.2

Sample Name	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
GLO-MW-23_093017							
Lab Sample Name: 280-102019-11							
Analysis Date: 20-Oct-17							
Dilution Factor: 1							
NITROGEN, KJELDAHL, TOTAL	N	0.35	1	MG/L	J	B	CBL

Sample Name	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
RRS-MW-05_100117							
Lab Sample Name: 280-102019-13							
Analysis Date: 20-Oct-17							
Dilution Factor: 1							
NITROGEN, KJELDAHL, TOTAL	N	0.45	1	MG/L	J	B	CBL

Sample Name	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
RRS-MW-06_100217							
Lab Sample Name: 280-102019-15							
Analysis Date: 20-Oct-17							
Dilution Factor: 1							
NITROGEN, KJELDAHL, TOTAL	N	0.32	1	MG/L	J	B	CBL

Analysis Method E353.2

Sample Name	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
BLO-MW-05_093017							
Lab Sample Name: 280-102019-8							
Analysis Date: 6-Oct-17							
Dilution Factor: 1							
NITROGEN, NITRATE-NITRITE	N	0.21	0.1	MG/L			

Sample Name	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
BLO-MW-06_092917							
Lab Sample Name: 280-102019-6							
Analysis Date: 6-Oct-17							
Dilution Factor: 1							
NITROGEN, NITRATE-NITRITE	N	0.055	0.1	MG/L	J	J	TR

Sample Name	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
BLO-MW-07_092917							
Lab Sample Name: 280-102019-5							
Analysis Date: 6-Oct-17							
Dilution Factor: 1							
NITROGEN, NITRATE-NITRITE	N	0.068	0.1	MG/L	J	J	TR

Analysis Method E353.2

Sample Name	BLO-MW-26_092917			Lab Sample Name:	280-102019-7		
Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
Analysis Date:	6-Oct-17						
Dilution Factor:	1						
NITROGEN, NITRATE-NITRITE	N	0.066	0.1	MG/L	J	J	TR

Sample Name	DSA-MW-05_093017			Lab Sample Name:	280-102019-9		
Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
Analysis Date:	6-Oct-17						
Dilution Factor:	1						
NITROGEN, NITRATE-NITRITE	N	0	0.1	MG/L	U	U	

Sample Name	DSA-MW-06_092817			Lab Sample Name:	280-102019-1		
Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
Analysis Date:	6-Oct-17						
Dilution Factor:	1						
NITROGEN, NITRATE-NITRITE	N	0	0.1	MG/L	U	U	

Sample Name	DSA-MW-07_092817			Lab Sample Name:	280-102019-2		
Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
Analysis Date:	6-Oct-17						
Dilution Factor:	1						
NITROGEN, NITRATE-NITRITE	N	0.07	0.1	MG/L	J	J	TR

Sample Name	GLO-MW-03_093017			Lab Sample Name:	280-102019-10		
Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
Analysis Date:	6-Oct-17						
Dilution Factor:	1						
NITROGEN, NITRATE-NITRITE	N	0.22	0.1	MG/L			

Sample Name	GLO-MW-04_100117			Lab Sample Name:	280-102019-12		
Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
Analysis Date:	6-Oct-17						
Dilution Factor:	1						
NITROGEN, NITRATE-NITRITE	N	0.19	0.1	MG/L			

Sample Name	GLO-MW-23_093017			Lab Sample Name:	280-102019-11		
Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
Analysis Date:	6-Oct-17						
Dilution Factor:	1						
NITROGEN, NITRATE-NITRITE	N	0.21	0.1	MG/L			

Analysis Method E353.2

Sample Name	RRS-MW-05_100117		Lab Sample Name:	280-102019-13			
Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
Analysis Date:		6-Oct-17					
Dilution Factor:		1					
NITROGEN, NITRATE-NITRITE	N	0.093	0.1	MG/L	J	J	TR

Sample Name	RRS-MW-06_100217		Lab Sample Name:	280-102019-15			
Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
Analysis Date:		6-Oct-17					
Dilution Factor:		1					
NITROGEN, NITRATE-NITRITE	N	0.77	0.1	MG/L			

Analysis Method SW6010C

Sample Name	BLO-MW-05_093017		Lab Sample Name:	280-102019-8			
Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
Analysis Date:		12-Oct-17					
Dilution Factor:		1					
IRON	N	1100	100	UG/L		JM-	MSL
MANGANESE	N	19	10	UG/L			

Sample Name	BLO-MW-06_092917		Lab Sample Name:	280-102019-6			
Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
Analysis Date:		12-Oct-17					
Dilution Factor:		1					
IRON	N	1200	100	UG/L		J	FDD
MANGANESE	N	23	10	UG/L			

Sample Name	BLO-MW-07_092917		Lab Sample Name:	280-102019-5			
Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
Analysis Date:		12-Oct-17					
Dilution Factor:		1					
IRON	N	2000	100	UG/L		JM-	MSL
MANGANESE	N	36	10	UG/L			

Sample Name	BLO-MW-26_092917		Lab Sample Name:	280-102019-7			
Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
Analysis Date:		12-Oct-17					
Dilution Factor:		1					
IRON	N	1700	100	UG/L		JM-	MSL
MANGANESE	N	24	10	UG/L			

Analysis Method SW6010C

Sample Name	DSA-MW-05_093017			Lab Sample Name:	280-102019-9			
Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code	
Analysis Date:	13-Oct-17							
Dilution Factor:	1							
IRON	N	1800	100	UG/L	J	JM-	MSL	
MANGANESE	N	65	10	UG/L				

Sample Name	DSA-MW-06_092817			Lab Sample Name:	280-102019-1			
Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code	
Analysis Date:	11-Oct-17							
Dilution Factor:	1							
IRON	N	2400	100	UG/L		JM-	MSL	
MANGANESE	N	450	10	UG/L				

Sample Name	DSA-MW-07_092817			Lab Sample Name:	280-102019-2			
Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code	
Analysis Date:	11-Oct-17							
Dilution Factor:	1							
IRON	N	18000	100	UG/L		JM-	MSL	
MANGANESE	N	210	10	UG/L				

Sample Name	GLO-MW-03_093017			Lab Sample Name:	280-102019-10			
Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code	
Analysis Date:	12-Oct-17							
Dilution Factor:	1							
IRON	N	2800	100	UG/L		JM-	MSL	
MANGANESE	N	560	10	UG/L		J	FDD	

Sample Name	GLO-MW-04_100117			Lab Sample Name:	280-102019-12			
Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code	
Analysis Date:	12-Oct-17							
Dilution Factor:	1							
IRON	N	120	100	UG/L		JM-	MSL	
MANGANESE	N	3.2	10	UG/L	J	J	TR	

Sample Name	GLO-MW-23_093017			Lab Sample Name:	280-102019-11			
Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code	
Analysis Date:	12-Oct-17							
Dilution Factor:	1							
IRON	N	170	100	UG/L		JM-	MSL	
MANGANESE	N	4.3	10	UG/L	J	J	FDD	

Analysis Method SW6010C

Sample Name	RRS-MW-05_100117	Lab Sample Name:	280-102019-13				
Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
Analysis Date:		12-Oct-17					
Dilution Factor:		1					
IRON	N	320	100	UG/L		JM-	MSL
MANGANESE	N	6.2	10	UG/L	J	J	TR

Sample Name	RRS-MW-06_100217	Lab Sample Name:	280-102019-15				
Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
Analysis Date:		12-Oct-17					
Dilution Factor:		1					
IRON	N	180	100	UG/L		JM-	MSL
MANGANESE	N	2	10	UG/L	J	J	TR

Analysis Method SW8260B

Sample Name	BLO-MW-05_093017	Lab Sample Name:	280-102019-8				
Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
Analysis Date:		12-Oct-17					
Dilution Factor:		1					
1,1-DICHLOROETHENE	N	0	1	UG/L	U	U	
BENZENE	N	0	1	UG/L	U	U	
CIS-1,2-DICHLOROETHYLENE	N	0	1	UG/L	U	U	
ETHYLBENZENE	N	0	1	UG/L	U	U	
M,P-XYLENE (SUM OF ISOMERS)	N	0	2	UG/L	U	U	
O-XYLENE (1,2-DIMETHYLBENZENE)	N	0	1	UG/L	U	U	
TETRACHLOROETHYLENE(PCE)	N	0	1	UG/L	U	U	
TOLUENE	N	0.17	1	UG/L	J	J	TR
TRANS-1,2-DICHLOROETHENE	N	0	1	UG/L	U	U	
TRICHLOROETHYLENE (TCE)	N	0.16	1	UG/L	J	J	TR
VINYL CHLORIDE	N	0	1.5	UG/L	U	U	
XYLENES, TOTAL	N	0	2	UG/L	U	U	

Sample Name	BLO-MW-06_092917	Lab Sample Name:	280-102019-6				
Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
Analysis Date:		11-Oct-17					
Dilution Factor:		1					
1,1-DICHLOROETHENE	N	0	1	UG/L	U	U	
BENZENE	N	0	1	UG/L	U	U	
CIS-1,2-DICHLOROETHYLENE	N	0	1	UG/L	U	U	
ETHYLBENZENE	N	0	1	UG/L	U	U	
M,P-XYLENE (SUM OF ISOMERS)	N	0	2	UG/L	U	U	

Analysis Method *SW8260B*

O-XYLENE (1,2-DIMETHYLBENZENE)	N	0	1	UG/L	U	U
TETRACHLOROETHYLENE(PCE)	N	0	1	UG/L	U	U
TOLUENE	N	0	1	UG/L	U	U
TRANS-1,2-DICHLOROETHENE	N	0	1	UG/L	U	U
TRICHLOROETHYLENE (TCE)	N	0	1	UG/L	U	U
VINYL CHLORIDE	N	0	1.5	UG/L	U	U
XYLENES, TOTAL	N	0	2	UG/L	U	U

Sample Name BLO-MW-07_092917 **Lab Sample Name:** 280-102019-5

Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
Analysis Date:		12-Oct-17					
Dilution Factor:		1					
I,1-DICHLOROETHENE	N	0	1	UG/L	U	U	
BENZENE	N	0	1	UG/L	U	U	
CIS-1,2-DICHLOROETHYLENE	N	0	1	UG/L	U	U	
ETHYLBENZENE	N	0	1	UG/L	U	U	
M,P-XYLENE (SUM OF ISOMERS)	N	0	2	UG/L	U	U	
O-XYLENE (1,2-DIMETHYLBENZENE)	N	0	1	UG/L	U	U	
TETRACHLOROETHYLENE(PCE)	N	0	1	UG/L	U	U	
TOLUENE	N	0	1	UG/L	U	U	
TRANS-1,2-DICHLOROETHENE	N	0	1	UG/L	U	U	
TRICHLOROETHYLENE (TCE)	N	0	1	UG/L	U	U	
VINYL CHLORIDE	N	0	1.5	UG/L	U	U	
XYLENES, TOTAL	N	0	2	UG/L	U	U	

Sample Name BLO-MW-26_092917 **Lab Sample Name:** 280-102019-7

Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
Analysis Date:		12-Oct-17					
Dilution Factor:		1					
I,1-DICHLOROETHENE	N	0	1	UG/L	U	U	
BENZENE	N	0	1	UG/L	U	U	
CIS-1,2-DICHLOROETHYLENE	N	0	1	UG/L	U	U	
ETHYLBENZENE	N	0	1	UG/L	U	U	
M,P-XYLENE (SUM OF ISOMERS)	N	0	2	UG/L	U	U	
O-XYLENE (1,2-DIMETHYLBENZENE)	N	0	1	UG/L	U	U	
TETRACHLOROETHYLENE(PCE)	N	0	1	UG/L	U	U	
TOLUENE	N	0	1	UG/L	U	U	
TRANS-1,2-DICHLOROETHENE	N	0	1	UG/L	U	U	
TRICHLOROETHYLENE (TCE)	N	0	1	UG/L	U	U	
VINYL CHLORIDE	N	0	1.5	UG/L	U	U	
XYLENES, TOTAL	N	0	2	UG/L	U	U	

Analysis Method SW8260B

Sample Name DSA-MW-05_093017 Lab Sample Name: 280-102019-9

Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
Analysis Date:		11-Oct-17					
Dilution Factor:		1					
1,1-DICHLOROETHENE	N	0	1	UG/L	U	U	
BENZENE	N	0	1	UG/L	U	U	
CIS-1,2-DICHLOROETHYLENE	N	0	1	UG/L	U	U	
ETHYLBENZENE	N	0	1	UG/L	U	U	
M,P-XYLENE (SUM OF ISOMERS)	N	0	2	UG/L	U	U	
O-XYLENE (1,2-DIMETHYLBENZENE)	N	0	1	UG/L	U	U	
TETRACHLOROETHYLENE(PCE)	N	0	1	UG/L	U	U	
TOLUENE	N	0	1	UG/L	U	U	
TRANS-1,2-DICHLOROETHENE	N	0	1	UG/L	U	U	
TRICHLOROETHYLENE (TCE)	N	0.58	1	UG/L	J	J	TR
VINYL CHLORIDE	N	0	1.5	UG/L	U	U	
XYLENES, TOTAL	N	0	2	UG/L	U	U	

Sample Name DSA-MW-06_092817 Lab Sample Name: 280-102019-1

Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
Analysis Date:		11-Oct-17					
Dilution Factor:		1					
1,1-DICHLOROETHENE	N	0	1	UG/L	U	U	
BENZENE	N	0	1	UG/L	U	U	
CIS-1,2-DICHLOROETHYLENE	N	0	1	UG/L	U	U	
ETHYLBENZENE	N	0	1	UG/L	U	U	
M,P-XYLENE (SUM OF ISOMERS)	N	0	2	UG/L	U	U	
O-XYLENE (1,2-DIMETHYLBENZENE)	N	0	1	UG/L	U	U	
TETRACHLOROETHYLENE(PCE)	N	0	1	UG/L	U	U	
TOLUENE	N	0	1	UG/L	U	U	
TRANS-1,2-DICHLOROETHENE	N	0	1	UG/L	U	U	
TRICHLOROETHYLENE (TCE)	N	0	1	UG/L	U	U	
VINYL CHLORIDE	N	0	1.5	UG/L	U	U	
XYLENES, TOTAL	N	0	2	UG/L	U	U	

Sample Name DSA-MW-07_092817 Lab Sample Name: 280-102019-2

Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
Analysis Date:		11-Oct-17					
Dilution Factor:		1					
1,1-DICHLOROETHENE	N	0	1	UG/L	U	U	
BENZENE	N	0	1	UG/L	U	U	
CIS-1,2-DICHLOROETHYLENE	N	0	1	UG/L	U	U	

Analysis Method *SW8260B*

ETHYLBENZENE	N	0	1	UG/L	U	U
M,P-XYLENE (SUM OF ISOMERS)	N	0	2	UG/L	U	U
O-XYLENE (1,2-DIMETHYLBENZENE)	N	0	1	UG/L	U	U
TETRACHLOROETHYLENE(PCE)	N	0	1	UG/L	U	U
TOLUENE	N	0	1	UG/L	U	U
TRANS-1,2-DICHLOROETHENE	N	0	1	UG/L	U	U
TRICHLOROETHYLENE (TCE)	N	0	1	UG/L	U	U
VINYL CHLORIDE	N	0	1.5	UG/L	U	U
XYLENES, TOTAL	N	0	2	UG/L	U	U

Sample Name GLO-MW-03_093017 **Lab Sample Name:** 280-102019-10

Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
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Analysis Date: 11-Oct-17

Dilution Factor: 1

I,1-DICHLOROETHENE	N	0	1	UG/L	U	U
BENZENE	N	0	1	UG/L	U	U
CIS-1,2-DICHLOROETHYLENE	N	0	1	UG/L	U	U
ETHYLBENZENE	N	0	1	UG/L	U	U
M,P-XYLENE (SUM OF ISOMERS)	N	0	2	UG/L	U	U
O-XYLENE (1,2-DIMETHYLBENZENE)	N	0	1	UG/L	U	U
TETRACHLOROETHYLENE(PCE)	N	0	1	UG/L	U	U
TOLUENE	N	0	1	UG/L	U	U
TRANS-1,2-DICHLOROETHENE	N	0	1	UG/L	U	U
TRICHLOROETHYLENE (TCE)	N	0	1	UG/L	U	U
VINYL CHLORIDE	N	0	1.5	UG/L	U	U
XYLENES, TOTAL	N	0	2	UG/L	U	U

Sample Name GLO-MW-04_100117 **Lab Sample Name:** 280-102019-12

Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
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Analysis Date: 11-Oct-17

Dilution Factor: 1

I,1-DICHLOROETHENE	N	0	1	UG/L	U	U
BENZENE	N	0	1	UG/L	U	U
CIS-1,2-DICHLOROETHYLENE	N	0	1	UG/L	U	U
ETHYLBENZENE	N	0	1	UG/L	U	U
M,P-XYLENE (SUM OF ISOMERS)	N	0	2	UG/L	U	U
O-XYLENE (1,2-DIMETHYLBENZENE)	N	0	1	UG/L	U	U
TETRACHLOROETHYLENE(PCE)	N	0	1	UG/L	U	U
TOLUENE	N	0	1	UG/L	U	U
TRANS-1,2-DICHLOROETHENE	N	0	1	UG/L	U	U
TRICHLOROETHYLENE (TCE)	N	0	1	UG/L	U	U
VINYL CHLORIDE	N	0	1.5	UG/L	U	U

Analysis Method *SW8260B*

XYLENES, TOTAL	N	0	2	UG/L	U	U
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Sample Name GLO-MW-23_093017 **Lab Sample Name:** 280-102019-11

Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
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Analysis Date: 11-Oct-17

Dilution Factor: 1

I,1-DICHLOROETHENE	N	0	1	UG/L	U	U
BENZENE	N	0	1	UG/L	U	U
CIS-1,2-DICHLOROETHYLENE	N	0	1	UG/L	U	U
ETHYLBENZENE	N	0	1	UG/L	U	U
M,P-XYLENE (SUM OF ISOMERS)	N	0	2	UG/L	U	U
O-XYLENE (1,2-DIMETHYLBENZENE)	N	0	1	UG/L	U	U
TETRACHLOROETHYLENE(PCE)	N	0	1	UG/L	U	U
TOLUENE	N	0	1	UG/L	U	U
TRANS-1,2-DICHLOROETHENE	N	0	1	UG/L	U	U
TRICHLOROETHYLENE (TCE)	N	0	1	UG/L	U	U
VINYL CHLORIDE	N	0	1.5	UG/L	U	U
XYLENES, TOTAL	N	0	2	UG/L	U	U

Sample Name RRS-MW-05_100117 **Lab Sample Name:** 280-102019-13

Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
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Analysis Date: 11-Oct-17

Dilution Factor: 1

I,1-DICHLOROETHENE	N	0	1	UG/L	U	U
BENZENE	N	0	1	UG/L	U	U
CIS-1,2-DICHLOROETHYLENE	N	0	1	UG/L	U	U
ETHYLBENZENE	N	0	1	UG/L	U	U
M,P-XYLENE (SUM OF ISOMERS)	N	0	2	UG/L	U	U
O-XYLENE (1,2-DIMETHYLBENZENE)	N	0	1	UG/L	U	U
TETRACHLOROETHYLENE(PCE)	N	0	1	UG/L	U	U
TOLUENE	N	0	1	UG/L	U	U
TRANS-1,2-DICHLOROETHENE	N	0	1	UG/L	U	U
TRICHLOROETHYLENE (TCE)	N	0	1	UG/L	U	U
VINYL CHLORIDE	N	0	1.5	UG/L	U	U
XYLENES, TOTAL	N	0	2	UG/L	U	U

Sample Name RRS-MW-06_100217 **Lab Sample Name:** 280-102019-15

Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
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Analysis Date: 11-Oct-17

Dilution Factor: 1

I,1-DICHLOROETHENE	N	0	1	UG/L	U	U
BENZENE	N	0	1	UG/L	U	U

Analysis Method SW8260B

CIS-1,2-DICHLOROETHYLENE	N	0	1	UG/L	U	U
ETHYLBENZENE	N	0	1	UG/L	U	U
M,P-XYLENE (SUM OF ISOMERS)	N	0	2	UG/L	U	U
O-XYLENE (1,2-DIMETHYLBENZENE)	N	0	1	UG/L	U	U
TETRACHLOROETHYLENE(PCE)	N	0	1	UG/L	U	U
TOLUENE	N	0	1	UG/L	U	U
TRANS-1,2-DICHLOROETHENE	N	0	1	UG/L	U	U
TRICHLOROETHYLENE (TCE)	N	0	1	UG/L	U	U
VINYL CHLORIDE	N	0	1.5	UG/L	U	U
XYLENES, TOTAL	N	0	2	UG/L	U	U

Sample Name TRIP BLANK **Lab Sample Name:** 280-102019-16

Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
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Analysis Date: 11-Oct-17

Dilution Factor: 1

1,1-DICHLOROETHENE	N	0	1	UG/L	U	U
BENZENE	N	0	1	UG/L	U	U
CIS-1,2-DICHLOROETHYLENE	N	0	1	UG/L	U	U
ETHYLBENZENE	N	0	1	UG/L	U	U
M,P-XYLENE (SUM OF ISOMERS)	N	0	2	UG/L	U	U
O-XYLENE (1,2-DIMETHYLBENZENE)	N	0	1	UG/L	U	U
TETRACHLOROETHYLENE(PCE)	N	0	1	UG/L	U	U
TOLUENE	N	0	1	UG/L	U	U
TRANS-1,2-DICHLOROETHENE	N	0	1	UG/L	U	U
TRICHLOROETHYLENE (TCE)	N	0	1	UG/L	U	U
VINYL CHLORIDE	N	0	1.5	UG/L	U	U
XYLENES, TOTAL	N	0	2	UG/L	U	U

Laboratory Data Review Checklist

Completed by:	L. S. Calvin		
Title:	Environmental Scientist	Date:	2/2/2018
CS Report Name:	Port Heiden RRS Groundwater Monitoring, Sample Delivery Group: 280-102019-1	Report Date:	Dec 14, 2017
Consultant Firm:	MECx		
Laboratory Name:	TestAmerica-Denver	Laboratory Report Number:	280-102019-1
ADEC File Number:	N/A	ADEC RecKey Number:	N/A

1. Laboratory

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

Yes No NA (Please explain.) Comments:

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

Yes No NA (Please explain) Comments:

Samples were not transferred.

2. Chain of Custody (COC)

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

Yes No NA (Please explain) Comments:

b. Correct analyses requested?

Yes No NA (Please explain) Comments:

• The first page of the COC listed Methods 361.2 and 363.2; however, the correct Methods, 351.2 and 353.2, were analyzed for appropriate samples.

3. Laboratory Sample Receipt Documentation

a. Sample/cooler temperature documented and within range at receipt ($4^{\circ} \pm 2^{\circ}$ C)?

Yes No NA (Please explain) Comments:

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

Yes No NA (Please explain) Comments:

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

Yes No NA (Please explain) Comments:

• One of three vials for sample BLO-MW-26_092917 was received empty. Sufficient volume remained for the requested analysis.

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

Yes No NA (Please explain) Comments:

- No volume was received for GRO/DRO/RRO analyses of sample DSA-MW-05_093017. Analyses for these methods were cancelled.
- The labels for sample RRS-MW-06_100217 listed an incorrect sample collection time. The sample was logged per the COC.
- The trip blank (sample TRIP BLANK) was not listed on the COC. The sample was logged for Method 8260B.
- The COC and labels did not match for sample FPC-066-MW-06_092717. The sample was logged per the COC, through process of elimination.

e. Data quality or usability affected? (Please explain)

Comments:

Other than missing volume and cancellation of GRO/DRO/RRO analyses of sample DSA-MW-05_093017, none of the above issues affected data quality or usability.

4. Case Narrative

a. Present and understandable?

Yes No NA (Please explain) Comments:

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

Yes No NA (Please explain) Comments:

c. Were all corrective actions documented?

Yes No NA (Please explain) Comments:

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

Comments:

QC outliers documented in the case narrative resulted in estimation qualification of the data and identification of method blank contamination. Data quality was acceptable and all data are usable.

5. Samples Results

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

Yes No NA (Please explain)

Comments:

b. All applicable holding times met?

Yes No NA (Please explain)

Comments:

c. All soils reported on a dry weight basis?

Yes No NA (Please explain)

Comments:

Water samples.

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

Yes No NA (Please explain)

Comments:

e. Data quality or usability affected? (Please explain)

Comments:

Data quality was acceptable and all data are usable.

6. QC Samples

a. Method Blank

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

Yes No NA (Please explain)

Comments:

ii. All method blank results less than PQL?

Yes No NA (Please explain)

Comments:

iii. If above PQL, what samples are affected?

Comments:

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

Yes No NA (Please explain)

Comments:

v. Data quality or usability affected? (Please explain)

Comments:

Data quality is not affected, and data are usable as qualified for method blank contamination.

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?

Yes No NA (Please explain)

Comments:

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)

Yes No NA (Please explain)

Comments:

DRO MS/MSD of sample BLO-MW-06_092917 recoveries of <1%/parent sample qualified as estimated (J-). Iron in all samples except BLO-MW-06_092917 qualified for iron recoveries below control limits.

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 No NA (Please explain)

Comments:

LCS/LCSD RPD for RRO (Residual Range Organics) resulted in estimation of nondetects. MS/MSD of BLO-MW-06_092917 RPD outlier for GRO/estimated in the parent sample.

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

Comments:

(RRO)BLO-MW-07_092917, BLO-MW-06_092917, BLO-MW-26_092917, BLO-MW-05_093017;
(GRO) BLO-MW-06_092917

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

Yes No NA (Please explain)

Comments:

vii. Data quality or usability affected? (Please explain)

Comments:

Data quality is not affected, and data are usable as qualified.

c. Surrogates - Organics Only

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

Yes No NA (Please explain)

Comments:

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

Yes No NA (Please explain)

Comments:

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

Yes No NA (Please explain)

Comments:

No surrogate outliers.

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

Comments:

Data quality is not affected, and data are usable.

d. Trip Blank - Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.): Water and Soil

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

Yes No NA (Please explain.)

Comments:

Trip blank analyzed for 8260B only (no GRO analysis).

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

Yes No NA (Please explain.) Comments:

iii. All results less than PQL?

Yes No NA (Please explain.) Comments:

iv. If above PQL, what samples are affected?

Comments:

v. Data quality or usability affected? (Please explain.)

Comments:

Data quality is not affected, and data are usable.

e. Field Duplicate

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

Yes No NA (Please explain.) Comments:

ii. Submitted blind to lab?

Yes No NA (Please explain.) Comments:

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

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

Where R_1 = Sample Concentration

R_2 = Field Duplicate Concentration

Yes No NA (Please explain) Comments:

RPDs exceeded 30% for iron in both field duplicate pairs (BLO-MW-06_092917/BLO-MW-26_092917 and GLO-MW-03_093017 / GLO-MW-23_093017) and $\geq \pm$ LOQ for manganese (GLO-MW-03_093017 / GLO-MW-23_093017)

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

Yes No NA (Please explain) Comments:

Data quality is not affected, and data are usable as qualified.

f. Decontamination or Equipment Blank (if applicable)

Yes No NA (Please explain) Comments:

No equipment blank submitted for analysis.

i. All results less than PQL?

Yes No NA (Please explain) Comments:

No equipment blank submitted for analysis.

ii. If above PQL, what samples are affected?

Comments:

iii. Data quality or usability affected? (Please explain.)

Comments:

Data quality is not affected, and data are usable.

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

a. Defined and appropriate?

Yes No NA (Please explain) Comments:

Versar valid value qualifiers used--no other data qualifiers.

DATA REVIEW REPORT

Port Heiden RRS Groundwater Monitoring

SAMPLE DELIVERY GROUP: 280-102198-1

Prepared for
Versar, Inc.

15 December 2017

MEC^x, Inc.
8864 Interchange Drive
Houston, Texas 77054

www.mecx.net





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TABLES

- 1 – Sample Identification
- 2 – Data Qualifier Reference
- 3 - Reason Code Reference



I. INTRODUCTION

Task Order Title: Port Heiden RRS Groundwater Monitoring

MEC^x Project No.: 1408.004H.00

Sample Delivery Group: 280-102198-1

Project Manager: Erin Madison

Matrix: water

QC Level: Stage 2B/4

No. of Samples: 11

No. of Reanalyses/Dilutions: 0

Laboratory: TestAmerica – Arvada. Co

TABLE 1 - SAMPLE IDENTIFICATION

Sample Name	Lab Sample Name	Matrix	Collection	Review Stage	Method
FPC_066-MW-04_100317	280-102198-1	Water	3-Oct-17	Verified	AK102
FPC_066-MW-24_100317	280-102198-2	Water	3-Oct-17	Verified	AK102
FPC_215-MW-11_100717	280-102198-3	Water	7-Oct-17	Verified	AK102
FPC_215-MW-08_100817	280-102198-4	Water	8-Oct-17	Validated	AK102
FPC_215-MW-09_100817	280-102198-5	Water	8-Oct-17	Verified	AK102
FPC_066-MW-05_100717	280-102198-6	Water	7-Oct-17	Verified	AK102
DSA-MW-02_100417	280-102198-9	Water	4-Oct-17	Validated	A2320B, AK101, CALC, E300, E351.2, E353.2, SW6010C, SW8260B
DSA-MW-04_100417	280-102198-10	Water	4-Oct-17	Verified	A2320B, AK101, CALC, E300, E351.2, E353.2, SW6010C, SW8260B
RRS-MW-02_100317	280-102198-7	Water	3-Oct-17	Verified	A2320B, CALC, E300, E351.2, E353.2, SW6010C, SW8260B
DSA-MW-01_100417	280-102198-8	Water	4-Oct-17	Verified	A2320B, CALC, E300, E351.2, E353.2, SW6010C, SW8260B
TAD-100317-TB002	280-102198-11	Water	3-Oct-17	Verified	SW8260B



II. SAMPLE MANAGEMENT

According to the case narrative, login sample receipt checklist, and the chain-of-custody (COC) provided by the laboratory for sample delivery group (SDG) 280-102198-1:

- The laboratory received samples in this sample delivery group (SDG) on ice and within the temperature limits of ≤ 6 degrees Celsius ($^{\circ}\text{C}$) and $> 0^{\circ}\text{C}$.
- The laboratory received the sample containers intact and properly preserved, as applicable.
- Field and laboratory personnel signed and dated the COC.
- Custody seals were present and intact on the cooler.
- All samples on the COC were received with volume labeled for AK 101 GRO analysis, but this analysis was not requested on the COC for any sample. The client was notified. Two samples were analyzed for AK 101 (samples DSA-MW-02_100417 and DSA-MW-04_100417).
- One of three containers for GRO analysis was received frozen for sample DSA-MW-04_100417. Sufficient volume remained for performance of this analysis.
- No analyses were requested for sample TAD-100317-TB-002 on the COC. The sample was logged for Method 8260B.



Data Qualifier Reference Table*

Qualifier	
J	The reported result is an estimated value. <i>The definition was changed from the WP to the standard data qualifiers definition listed in the DOD QSM 5.0, as the qualifiers in the WP did not account for data qualifiers for precision issues (e.g. MS/MSD and field duplicate issues).</i>
E	The analyte was nondetect but the limit of detection (LOD) exceeded the project action limit.
B	The analyte was detected in the method blank or the trip blank above the LOD, and the concentration in the sample did not exceed the blank concentration by a factor of 5 (factor of 10 for common laboratory contaminants acetone and methylene chloride).
+	The result is biased high.
-	The result is biased low.
JL(±)	The result was an estimated value because the analyte failed recovery criteria in the LCS or LCSD sample or both. The result was either biased low because the LCS and LCSD recovery was less than the lower control limit, or the result was biased high because the recovery exceeded the upper control limit.
JM(±)	The result was an estimated value because the analyte failed recovery criteria in the MS or MSD sample, or both. The MS sample recoveries were only evaluated if the spike concentration exceeded the native sample concentration.
JS(±)	The result was an estimated value because at least one surrogate failed recovery criteria for that sample.
JH	The numerical result was considered an estimate because the analysis was performed at greater than the method holding time and less than twice the method holding time.
JI(±)	The numerical result was considered an estimate because the internal standard failed QC limits. The result was either biased low because the internal standard failed high or the result was biased high because the recovery failed low.
JP	The result was considered an estimated value because incorrect or inadequate preservation methods were used.
JC(±)	The result was an estimated value because the analyte failed recovery criteria in the continuing calibration verification (CCV). The result was either biased low because the CCV recovery was less than the lower control limit or biased high because the recovery exceeded the upper control limit.
R	The result was rejected. A rejected result was not usable and therefore was deleted from the report.
U	The analyte was analyzed for, but not detected. The associated numerical value is the LOD.
UJ	Values "U" and "J" combined.

*Data Qualifiers adapted from Amended Final Groundwater Monitoring 2016 and 2017 Work Plan, Port Heiden Radio Relay Station, Alaska.



Qualification Code Reference Table*

<i>Qualifier</i>	<i>Description</i>
ABG	Blank: Ambient blank concentration greater than the reporting limit
ABL	Blank: Ambient blank concentration less than the reporting limit
CBH	Calibration: Continuing calibration blank concentration greater than the reporting limit
CBL	Blank: Continuing calibration blank concentration less than the reporting limit
CCA	Miscellaneous: Compounds were reported combined on one column
CCL	Calibration: Continuing calibration recovery less than the lower control limit
CF	Confirmation: Confirmation result
CFD	Confirmation: Confirmation precision exceeded
CFHD	Confirmation: Confirmation result RPD greater than the upper control limit
CLS	Calibration: No calibration analyzed in the analytical batch
CRL	Calibration: Result below the calibration range
CRR	Calibration: Lab R flag removed - calibration range exceeded
CVES	Calibration: Calibration verification ending standard exceeded %D criteria
CVHL	Calibration: Continuing calibration recovery greater than the upper control limit
D	Duplicates: Duplicate run
DL	Dilution: Dilution
DS	Serial dilution %D exceeded control limit
EBG	Blank: Equipment blank concentration greater than the reporting limit
EBL	Blank: Equipment blank concentration less than the reporting limit
EMPC	Matrix: Estimated maximum possible concentration
EXC	Miscellaneous: Data not used; another value is appropriate or data was not requested
FBG	Blank: Field blank concentration greater than the reporting limit
FBL	Blank: Field blank concentration less than the reporting limit
FDD	Duplicates: Field duplicate RPD criteria exceeded
HHL	Holding time: Holding time exceeded
IC2	Calibration: Exceeds RSD criteria and initial calibration exceeded the r^2 for first order regression
ICD	Calibration: Initial calibration RSD exceeded
ICE	Calibration: Result greater than linear calibration range
ICL	Calibration: Initial calibration low standard greater than the reporting limit
ICP	Calibration: Initial calibration RSD exceeded for confirmation column



<i>Qualifier</i>	<i>Description</i>
ICR2	Calibration: Initial calibration exceeded the r^2 for first order regression
ICS	ICSA/B recovery outside control limits
IMPR	Improper sample preservation/handling/collection
IRF	Calibration: Initial calibration relative response factor below the lower control limit
ISH	Internal standard: Internal standard response greater than the upper control limit
ISL	Internal standard: Internal standard response less than the lower control limit
IVD	Calibration: Exceeds ICVS %D criteria
IVS	Calibration: Initial calibration verification standard was not analyzed
LBG	Blank: Laboratory blank contamination greater than the reporting limit
LBL	Blank: Laboratory blank contamination less than the reporting limit
LBM	Blank: Laboratory blank contamination greater than the method detection limit
LCD	Laboratory control sample: LCS RPD criteria exceeded
LCH	Laboratory control sample: LCS recovery greater than the upper control limit
LCL	Laboratory control sample: LCS recovery less than the lower control limit
LCS	Laboratory control sample: no LCS in the analytical batch
LDD	Duplicates: Laboratory duplicate RPD criteria exceeded
LDH	Laboratory control sample: LCS/LCSD RPD criteria exceeded
LDS	Laboratory control sample: LCSD not required - no flags applied
LRL	RL: Result less than the reporting limit
MIF	Matrix: Matrix inappropriately flagged
MS	Matrix: Global matrix spike flagging
MSD	Matrix: Matrix spike RPD criteria exceeded
MSH	Matrix: Matrix spike recovery greater than the upper control limit
MSL	Matrix: Matrix spike recovery less than the lower control limit
RE	Re-analysis: Re-extraction and/or reanalysis
RFJ	Miscellaneous: Lab F flag replaced with J - flagging not valid
RFL	Laboratory control sample: Lab R flag removed - recovery within lab control limits
RHT	Holding time: Lab R flag removed - holding time exceeded by less than 24 hours
RIS	Internal standard: Lab R flag removed - reanalysis confirmed matrix effect on IS
RLM	RL: Reporting limit less than the method detection limit
RML	Matrix: Lab M flag removed - recovery within lab control limits
RMQ	Matrix: Lab M flag removed – MS/MSD not requested in this analytical batch
RPE	Holding time: Lab R flag removed - PE sample
RRA	Blank: Lab B flag removed - analyte not detected in sample
RSG	Surrogate recovery: Lab R flag removed - reanalysis confirmed matrix effect on surrogate



<i>Qualifier</i>	<i>Description</i>
RSGQ	Surrogate recovery: Lab R flag removed - surrogate not monitored in QAPP
RTO	Confirmation: Result is outside the method specified retention time window
RXL	Lab control limits: Lab R flag removed - recovery within lab control limits
SCN	Screening: Screening method
SDH	Matrix: Matrix spike duplicate recovery criteria greater than the upper control limit
SDL	Matrix: Matrix spike duplicate recovery criteria less than the lower control limit
SGH	Surrogate recovery: Surrogate recovery greater than the upper control limit
SGL	Surrogate recovery: Surrogate recovery less than the lower control limit
SPRF	Calibration: SPCC exceeds RF > 0.300 criteria
SVHL	Calibration: Second source verification standard %R greater than the upper control limit
SVLL	Calibration: Second source verification standard %R less than the lower control limit
TB	Blank: Trip blank
TBG	Blank: Trip blank concentration greater than the reporting limit
TBL	Blank: Trip blank concentration less than the reporting limit
TH	The chromatogram of this sample indicates the presence of high boiling petroleum hydrocarbons not consistent with the qualitative standards employed for this method
TH8	Blank: Temperature blank > 8 degrees c
TIC	Tentatively identified compound: Tentatively identified compound
TL	The chromatogram of this sample indicates the presence of low boiling petroleum hydrocarbons not consistent with the qualitative standards employed for this method
TR	RL: Result between the method detection limit and reporting limit

* Qualification Codes obtained from ERPTool X 5.0.8.0-AFCEE Valid Value List for Result Reason Codes.



ACRONYMS AND ABBREVIATIONS

BFB	Bromofluorobenzene
°C	Degrees Celsius
CCB	Continuing Calibration Blank
CCC	Calibration Check Compounds
CCV	Continuing Calibration Verification
%D	Percent Difference
DFTPP	Decafluorotriphenylphosphine
DL	Detection Limit
DoD	Department of Defense
EDD	Electronic Data Deliverable
EIM	Environmental Information Management
GC/MS	Gas Chromatography/Mass Spectrometry
ICSA	Interference Check Sample A
ICSAB	Interference Check Sample AB
ICV	Initial Calibration Verification
ICP	Inductively Coupled Plasma
LCS	Laboratory Control Sample
LCSD	Laboratory Control Sample Duplicate
Locus	Locus Technologies, Inc.
LOD	Limit of Detection
LOQ	Limit of Quantitation
MEC ^x	MEC ^x , Inc.
MRL	Method Reporting Limit
MS	Matrix Spike
MSD	Matrix Spike Duplicate
PAH	Polynuclear Aromatic Hydrocarbon
PCB	Polychlorinated Biphenyl
QA	Quality Assurance
QAPP	Quality Assurance Project Plan
QC	Quality Control
QSM	Quality Systems Manual
RI	Remedial Investigation
RPD	Relative Percent Difference
RRF	Relative Response Factor
RSD	Relative Standard Deviation
SAP	Sampling and Analysis Plan
SDG	Sample Delivery Group
SI	Site Investigation
SOP	Standard Operating Procedure
SPCC	System Performance Check Compound
SVOC	Semivolatile Organic Compound



USEPA	United State Environmental Protection Agency
Versar	Versar, Inc.
VOC	Volatile Organic Compound

III. ANALYTICAL REVIEW

III.1. HOLDING TIME

Extraction and analytical holding times for waters, as listed below, were met.

Analytical Method	Preparation Holding Time (days)	Analysis Holding Time (days)
AK101 (GRO)	N/A	14
AK102/103 (DRO/RRO)	14	40
SW6010C	N/A	180
SW8260B	N/A	14
300.0	N/A	28
351.2	N/A	28
353.2	N/A	28
SM2320B	N/A	14

III.2. GC/MS TUNING

The VOC BFB tunes met the method abundance criteria. Samples were analyzed within 12 hours of the injection times.

Calibration criteria were met for all methods.

VOC initial calibration average RRFs and ICV and CCV RRFs were within the control limits of ≥ 0.30 for chlorobenzene and 1,1,2,2-tetrachloroethane, and ≥ 0.10 for chloromethane, bromoform, and 1,1-dichloroethane. All initial calibration %RSDs were within the control limits of $\leq 30\%$ for CCCs and $\leq 15\%$ for remaining compounds, or coefficient of determination r^2 values ≥ 0.990 . All second source initial calibration verification standard recoveries affecting sample data were within the control limit of $\pm 20\%$ of the true value and continuing calibration %Ds were within the control limit of $\leq 20\%$ for beginning CCVs and $\leq 50\%$ for ending CCVs.

GRO and DRO/RRO initial calibration %RSDs were within the control limit of $\leq 25\%$. ICV results were within the control limit of $\pm 25\%$ of the true value and continuing calibration %Ds were within the control limit of $\leq 25\%$.

ICP calibration criteria were met. Initial (ICV) and continuing (CCV) calibration verification standard recoveries were within 90-110%. Low level calibration verification recoveries were within 80-120%. ICSAB concentrations were within $\pm 20\%$ of true value. ICSA concentrations for non-spiked analytes were less than $\frac{1}{2}$ LOQ.

Instrument calibration criteria were met for Methods 351.2, 353.2 and 300.0. All ICV and CCV recoveries were within 90-110%.

III.3. BLANKS

Except as noted in the table below, method blanks for the organic methods had no reported detects. GRO C6-C10 was reported in the method blank below the LOQ. The sample detect for GRO C6-C10



<5x the method blank concentration in sample DSA-MW-02_100417 was qualified as method blank contamination (B).

Metals, TKN, nitrate/nitrate as N, total nitrogen, sulfate and alkalinity were not detected above the LOD in the calibration blanks bracketing the site samples with the following exception. TKN was reported at greater than the LOD and less than LOQ in calibration blanks associated with site samples. Associated detected results that were <5x the calibration blank concentration were qualified as blank contamination (B).

Analytical Method	Parameter Name	Blank Result	Lab Qualifier	Units	Blank LOQ
AK101 (GRO)	Petroleum Hydrocarbons C6-C10	0.381	J	mg/L	1.3
351.2	TKN	0.217 0.246	J	mg/L	1

III.4. BLANK SPIKES AND LABORATORY CONTROL SAMPLES

VOC, GRO, DRO, and RRO LCS/LCSD recoveries were within the control limits listed in DoD QSM Appendix C Tables, and RPDs were within the control limit of ≤20%.

The LCS recoveries for Method 6010C were within the control limits listed in DoD QSM Appendix C Tables. The LCS/LCSD RPDs were within the control limit of ≤20% for Method 6010C.

The LCS and LCSD (as appropriate) recoveries and RPDs were within the laboratory control limits for Methods 351.2, 353.2, 300.0 and SM2320B.

III.1. SURROGATE RECOVERY

Surrogate recoveries were within the control limits listed in DoD QSM Appendix C Tables, with exceptions noted below. The GRO results were previously qualified as method blank contamination and were not further qualified for the surrogate outliers. The DRO result was qualified as estimated (JS+) in the affected sample.

Analytical Method	Sample ID	Surrogate	% Recovery	Lower QC Limit	Upper QC Limit
AK101 (GRO)	DSA-MW-02_100417 DSA-MW-04_100417	1,1,1-trifluorotoluene	451% 502%	60%	120%
AK102 (DRO)	FPC_215-MW-09_100817	o-terphenyl	123%	60%	120%

III.2. LABORATORY DUPLICATE

Laboratory duplicate analysis was performed on sample DSA-MW-01_100417 for alkalinity. The RPD was within the laboratory control limits. Laboratory duplicate analyses were not performed on a sample in this SDG for the remaining methods.

III.3. MATRIX SPIKE/MATRIX SPIKE DUPLICATE

MS/MSD analyses are performed per batch of 20 samples or less for methods appropriate for MS analyses. MS/MSD analyses performed on the site samples are utilized in the evaluation of accuracy and precision for site samples. In the event that there is insufficient volume for MS/MSD analysis, the LCS/LCSD will be utilized to evaluate accuracy and precision for the site samples.

MS/MSD analyses were performed on sample FPC_066-MW-04_100317 for DRO. Recoveries were within the control limits listed in DoD QSM Appendix C Tables and RPDs were $\leq 20\%$. Method accuracy and precision for the remaining organic methods (VOCs, GRO, and RRO) were evaluated based on the respective LCS/LCSD results.

MS/MSD analyses were performed on sample RRS-MW-02_100417 for TKN. As noted in the table below the MS recovery was below the QC limits. Results for site samples associated with MS with low recovery were qualified as estimated with low bias (JM-). MS/MSD analyses were not performed on a sample in this SDG in the remaining analyses and preparation batches. Method accuracy was evaluated based on LCS results.

Analytical Method	Parameter	MS % Recovery	MSD % Recovery	Lower QC Limit	Upper QC Limit
351.2	TKN	86%	92%	90%	110%

The laboratory did not perform post digestion spike or serial dilution analyses.

III.4. FIELD QC SAMPLES

Field QC samples were evaluated, and if necessary, qualified based on method blanks and other laboratory QC results affecting the usability of the field QC data. Any remaining detects were used to evaluate the associated site samples.

III.4.1. TRIP BLANKS

Sample TAD-100317-TB002 was identified as the trip blank associated with the site samples in this SDG. The trip blank had no VOC target compound detects above the control limit of one-half the LOQ or one-tenth the amount of any sample detect. The sample was not analyzed for GRO.

III.4.2. FIELD BLANKS AND EQUIPMENT BLANKS

No samples were identified as field or equipment blanks.

III.4.3. FIELD DUPLICATES

This SDG had no identified field duplicate samples.

III.5. INTERNAL STANDARDS PERFORMANCE

The VOC internal standard retention times and area counts were within the control limits established by the midpoint initial calibration standard: ± 30 seconds for retention times and -50% / $+100\%$ for internal standard areas.



III.6. COMPOUND IDENTIFICATION

Compound identification was verified for the samples reviewed at Stage IV validation level. Review of the raw data, chromatograms, retention times, and spectra indicated no issues with compound identification.

III.1. COMPOUND QUANTIFICATION AND REPORTED DETECTION LIMITS

Compound quantification was verified for the samples reviewed at Stage IV validation level. The LOQs were supported by the low point of the initial calibrations and the laboratory LOD. Results reported between the LOD and the LOQ were qualified as estimated (J). Reported nondetects are valid to the LOD.; however, the sample result forms and EDD only show the LOQ.

III.2. MANUAL INTEGRATIONS

Manual integrations were evaluated for the samples reviewed at Stage IV validation level and associated calibration and QC samples. Reviewed manual integrations were considered appropriate.

III.3. TENTATIVELY IDENTIFIED COMPOUNDS

TICs were not reported by the laboratory for this SDG.

III.4. SYSTEM PERFORMANCE

System performance was considered acceptable.



IV. REFERENCES

- Groundwater Monitoring 2016 and 2017 Work Plan, Port Heiden Radio Relay Station, Alaska. April 2017.
- DoD Quality Systems Manual for Environmental Laboratories, Version 5.0. 2013.
- DoD Quality Systems Manual for Environmental Laboratories, Version 5.1. 2017.
- Method 6010C. Test Methods for Evaluating Solid Waste (SW-846) November 2000.
- Method AK101. For the Determination of Gasoline Range Organics, Version 04/08/02.
- Method AK102. For the Determination of Diesel Range Organics, Version 04/08/02.
- Method AK103. For the Determination of Residual Range Organics, Version 04/08/02.
- Method SW8260B. Test Methods for Evaluating Solid Waste (SW-846), Revision 2. December 1996.
- Method 351.2. EPA Methods for Chemical Analysis of Water and Wastes, Revision 2. August 1993
- Method 353.2. EPA Methods for Chemical Analysis of Water and Wastes, Revision 2. August 1993
- Method 300.0. EPA Methods for Chemical Analysis of Water and Wastes, Revision 2. August 1993
- Method 2320B. Standard Methods for the Examination of Water and Wastewater, 21st Edition. 2005.

Validated Sample Result Forms: 280-102198-1

Analysis Method *A2320B*

Sample Name	DSA-MW-01_100417	Lab Sample Name:	280-102198-8				
Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
Analysis Date:	10/12/2017						
Dilution Factor:	1						
ALKALINITY, TOTAL (AS CaCO3)	N	79	0	MG/L			

Sample Name	DSA-MW-02_100417	Lab Sample Name:	280-102198-9				
Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
Analysis Date:	10/12/2017						
Dilution Factor:	1						
ALKALINITY, TOTAL (AS CaCO3)	N	120	0	MG/L			

Sample Name	DSA-MW-04_100417	Lab Sample Name:	280-102198-10				
Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
Analysis Date:	10/12/2017						
Dilution Factor:	1						
ALKALINITY, TOTAL (AS CaCO3)	N	110	0	MG/L			

Sample Name	RRS-MW-02_100317	Lab Sample Name:	280-102198-7				
Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
Analysis Date:	10/12/2017						
Dilution Factor:	1						
ALKALINITY, TOTAL (AS CaCO3)	N	43	0	MG/L	B		

Analysis Method *AK101*

Sample Name	DSA-MW-02_100417	Lab Sample Name:	280-102198-9				
Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
Analysis Date:	10/12/2017						
Dilution Factor:	1						
PETROLEUM HYDROCARBONS C6-C10	N	1.4	1.3	MG/L	M Q	B	LBL

Sample Name	DSA-MW-04_100417	Lab Sample Name:	280-102198-10				
Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
Analysis Date:	10/12/2017						
Dilution Factor:	1						
PETROLEUM HYDROCARBONS C6-C10	N	2.2	1.3	MG/L	M Q		

Analysis Method *AK102*

Sample Name DSA-MW-02_100417 **Lab Sample Name:** 280-102198-9

Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
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Analysis Date: 11/3/2017

Dilution Factor: 1

C10-C25 DIESEL RANGE ORGANICS	N	0	0.26	MG/L	U	U	
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MOTOR OILS	N	0	0.51	MG/L	U	U	
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Sample Name DSA-MW-04_100417 **Lab Sample Name:** 280-102198-10

Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
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Analysis Date: 11/3/2017

Dilution Factor: 1

C10-C25 DIESEL RANGE ORGANICS	N	0	0.25	MG/L	U	U	
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MOTOR OILS	N	0	0.51	MG/L	U	U	
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Sample Name FPC_066-MW-04_100317 **Lab Sample Name:** 280-102198-1

Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
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Analysis Date: 11/2/2017

Dilution Factor: 1

C10-C25 DIESEL RANGE ORGANICS	N	0.055	0.26	MG/L	J M	J	TR
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Sample Name FPC_066-MW-05_100717 **Lab Sample Name:** 280-102198-6

Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
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Analysis Date: 11/2/2017

Dilution Factor: 1

C10-C25 DIESEL RANGE ORGANICS	N	3.7	0.25	MG/L	M		
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Sample Name FPC_066-MW-24_100317 **Lab Sample Name:** 280-102198-2

Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
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Analysis Date: 11/2/2017

Dilution Factor: 1

C10-C25 DIESEL RANGE ORGANICS	N	0.05	0.25	MG/L	J M	J	TR
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Sample Name FPC_215-MW-08_100817 **Lab Sample Name:** 280-102198-4

Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
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Analysis Date: 11/2/2017

Dilution Factor: 1

C10-C25 DIESEL RANGE ORGANICS	N	0	0.26	MG/L	U M	U	
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Analysis Method AK102

Sample Name	FPC_215-MW-09_100817	Lab Sample Name:	280-102198-5				
Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
Analysis Date:		11/2/2017					
Dilution Factor:		1					
C10-C25 DIESEL RANGE ORGANICS	N	6.8	0.27	MG/L	M Q	JS+	SGH

Sample Name	FPC_215-MW-11_100717	Lab Sample Name:	280-102198-3				
Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
Analysis Date:		11/2/2017					
Dilution Factor:		1					
C10-C25 DIESEL RANGE ORGANICS	N	0.049	0.25	MG/L	J M	J	TR

Analysis Method CALC

Sample Name	DSA-MW-01_100417	Lab Sample Name:	280-102198-8				
Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
Analysis Date:		10/30/2017					
Dilution Factor:		1					
TOTAL NITROGEN, ALL FORMS,CALCULATED	N	1.4	0	MG/L			

Sample Name	DSA-MW-02_100417	Lab Sample Name:	280-102198-9				
Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
Analysis Date:		10/30/2017					
Dilution Factor:		1					
TOTAL NITROGEN, ALL FORMS,CALCULATED	N	1.7	0	MG/L			

Sample Name	DSA-MW-04_100417	Lab Sample Name:	280-102198-10				
Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
Analysis Date:		10/30/2017					
Dilution Factor:		1					
TOTAL NITROGEN, ALL FORMS,CALCULATED	N	0.32	0	MG/L			

Sample Name	RRS-MW-02_100317	Lab Sample Name:	280-102198-7				
Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
Analysis Date:		10/30/2017					
Dilution Factor:		1					
TOTAL NITROGEN, ALL FORMS,CALCULATED	N	0.44	0	MG/L			

Analysis Method E300

Sample Name DSA-MW-01_100417 **Lab Sample Name:** 280-102198-8

Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
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Analysis Date: 10/21/2017

Dilution Factor: 1

SULFATE (AS SO4)	N	8.3	5	MG/L			
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Sample Name DSA-MW-02_100417 **Lab Sample Name:** 280-102198-9

Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
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Analysis Date: 10/21/2017

Dilution Factor: 1

SULFATE (AS SO4)	N	8.4	5	MG/L			
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Sample Name DSA-MW-04_100417 **Lab Sample Name:** 280-102198-10

Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
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Analysis Date: 10/21/2017

Dilution Factor: 1

SULFATE (AS SO4)	N	8.3	5	MG/L			
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Sample Name RRS-MW-02_100317 **Lab Sample Name:** 280-102198-7

Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
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Analysis Date: 10/21/2017

Dilution Factor: 1

SULFATE (AS SO4)	N	3	5	MG/L	J	J	TR
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Analysis Method E351.2

Sample Name DSA-MW-01_100417 **Lab Sample Name:** 280-102198-8

Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
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Analysis Date: 10/27/2017

Dilution Factor: 1

NITROGEN, KJELDAHL, TOTAL	N	0.3	1	MG/L	J	B	CBL
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Sample Name DSA-MW-02_100417 **Lab Sample Name:** 280-102198-9

Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
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Analysis Date: 10/27/2017

Dilution Factor: 1

NITROGEN, KJELDAHL, TOTAL	N	0.43	1	MG/L	J	B	CBL
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Analysis Method E351.2

Sample Name	DSA-MW-04_100417	Lab Sample Name:	280-102198-10				
Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
Analysis Date:		10/27/2017					
Dilution Factor:		1					
NITROGEN, KJELDAHL, TOTAL	N	0.32	1	MG/L	J	B	CBL

Sample Name	RRS-MW-02_100317	Lab Sample Name:	280-102198-7				
Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
Analysis Date:		10/27/2017					
Dilution Factor:		1					
NITROGEN, KJELDAHL, TOTAL	N	0.33	1	MG/L	J	B	CBL

Analysis Method E353.2

Sample Name	DSA-MW-01_100417	Lab Sample Name:	280-102198-8				
Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
Analysis Date:		10/17/2017					
Dilution Factor:		1					
NITROGEN, NITRATE-NITRITE	N	1.1	0.1	MG/L			

Sample Name	DSA-MW-02_100417	Lab Sample Name:	280-102198-9				
Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
Analysis Date:		10/17/2017					
Dilution Factor:		1					
NITROGEN, NITRATE-NITRITE	N	1.3	0.1	MG/L			

Sample Name	DSA-MW-04_100417	Lab Sample Name:	280-102198-10				
Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
Analysis Date:		10/17/2017					
Dilution Factor:		1					
NITROGEN, NITRATE-NITRITE	N	0	0.1	MG/L	U	U	

Sample Name	RRS-MW-02_100317	Lab Sample Name:	280-102198-7				
Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
Analysis Date:		10/17/2017					
Dilution Factor:		1					
NITROGEN, NITRATE-NITRITE	N	0.11	0.1	MG/L			

Analysis Method SW6010C

Sample Name	DSA-MW-01_100417	Lab Sample Name:	280-102198-8				
Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
Analysis Date:		10/17/2017					
Dilution Factor:		1					
IRON	N	68	100	UG/L	J	J	TR
MANGANESE	N	1.7	10	UG/L	J	J	TR

Sample Name	DSA-MW-02_100417	Lab Sample Name:	280-102198-9				
Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
Analysis Date:		10/17/2017					
Dilution Factor:		1					
IRON	N	2300	100	UG/L			
MANGANESE	N	29	10	UG/L			

Sample Name	DSA-MW-04_100417	Lab Sample Name:	280-102198-10				
Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
Analysis Date:		10/17/2017					
Dilution Factor:		1					
IRON	N	2100	100	UG/L			
MANGANESE	N	67	10	UG/L			

Sample Name	RRS-MW-02_100317	Lab Sample Name:	280-102198-7				
Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
Analysis Date:		10/17/2017					
Dilution Factor:		1					
IRON	N	88	100	UG/L	J	J	TR
MANGANESE	N	1.9	10	UG/L	J	J	TR

Analysis Method SW8260B

Sample Name	DSA-MW-01_100417	Lab Sample Name:	280-102198-8				
Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
Analysis Date:		10/15/2017					
Dilution Factor:		1					
1,1-DICHLOROETHENE	N	0	1	UG/L	U	U	
BENZENE	N	0	1	UG/L	U	U	
CIS-1,2-DICHLOROETHYLENE	N	0	1	UG/L	U	U	
ETHYLBENZENE	N	0	1	UG/L	U	U	
M,P-XYLENE (SUM OF ISOMERS)	N	0	2	UG/L	U	U	
O-XYLENE (1,2-DIMETHYLBENZENE)	N	0	1	UG/L	U	U	
TETRACHLOROETHYLENE(PCE)	N	0	1	UG/L	U	U	
TOLUENE	N	0	1	UG/L	U	U	

Analysis Method *SW8260B*

TRANS-1,2-DICHLOROETHENE	N	0	1	UG/L	U	U
TRICHLOROETHYLENE (TCE)	N	6.4	1	UG/L		
VINYL CHLORIDE	N	0	1.5	UG/L	U	U
XYLENES, TOTAL	N	0	2	UG/L	U	U

Sample Name DSA-MW-02_100417 **Lab Sample Name:** 280-102198-9

Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
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Analysis Date: 10/15/2017

Dilution Factor: 2

1,1-DICHLOROETHENE	N	0	2	UG/L	U	U
BENZENE	N	0	2	UG/L	U	U
CIS-1,2-DICHLOROETHYLENE	N	0	2	UG/L	U	U
ETHYLBENZENE	N	0	2	UG/L	U	U
M,P-XYLENE (SUM OF ISOMERS)	N	0	4	UG/L	U	U
O-XYLENE (1,2-DIMETHYLBENZENE)	N	0	2	UG/L	U	U
TETRACHLOROETHYLENE(PCE)	N	0	2	UG/L	U	U
TOLUENE	N	0	2	UG/L	U	U
TRANS-1,2-DICHLOROETHENE	N	0	2	UG/L	U	U
TRICHLOROETHYLENE (TCE)	N	400	20	UG/L	D	
VINYL CHLORIDE	N	0	3	UG/L	U	U
XYLENES, TOTAL	N	0	4	UG/L	U	U

Sample Name DSA-MW-04_100417 **Lab Sample Name:** 280-102198-10

Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
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Analysis Date: 10/15/2017

Dilution Factor: 2

1,1-DICHLOROETHENE	N	0	2	UG/L	U	U
BENZENE	N	0	2	UG/L	U	U
CIS-1,2-DICHLOROETHYLENE	N	0	2	UG/L	U	U
ETHYLBENZENE	N	0	2	UG/L	U	U
M,P-XYLENE (SUM OF ISOMERS)	N	0	4	UG/L	U	U
O-XYLENE (1,2-DIMETHYLBENZENE)	N	0	2	UG/L	U	U
TETRACHLOROETHYLENE(PCE)	N	0	2	UG/L	U	U
TOLUENE	N	0	2	UG/L	U	U
TRANS-1,2-DICHLOROETHENE	N	0	2	UG/L	U	U
TRICHLOROETHYLENE (TCE)	N	440	20	UG/L	D	
VINYL CHLORIDE	N	0	3	UG/L	U	U
XYLENES, TOTAL	N	0	4	UG/L	U	U

Analysis Method SW8260B

Sample Name RRS-MW-02_100317 Lab Sample Name: 280-102198-7

Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
Analysis Date:		10/15/2017					
Dilution Factor:		1					
1,1-DICHLOROETHENE	N	0	1	UG/L	U	U	
BENZENE	N	0	1	UG/L	U	U	
CIS-1,2-DICHLOROETHYLENE	N	0	1	UG/L	U	U	
ETHYLBENZENE	N	0	1	UG/L	U	U	
M,P-XYLENE (SUM OF ISOMERS)	N	0	2	UG/L	U	U	
O-XYLENE (1,2-DIMETHYLBENZENE)	N	0	1	UG/L	U	U	
TETRACHLOROETHYLENE(PCE)	N	0	1	UG/L	U	U	
TOLUENE	N	0	1	UG/L	U	U	
TRANS-1,2-DICHLOROETHENE	N	0	1	UG/L	U	U	
TRICHLOROETHYLENE (TCE)	N	0	1	UG/L	U	U	
VINYL CHLORIDE	N	0	1.5	UG/L	U	U	
XYLENES, TOTAL	N	0	2	UG/L	U	U	

Sample Name TAD-100317-TB002 Lab Sample Name: 280-102198-11

Analyte	Filtered	Result Value	LOQ	Result Units	Lab Qualifier	Validation Qualifier	Reason Code
Analysis Date:		10/15/2017					
Dilution Factor:		1					
1,1-DICHLOROETHENE	N	0	1	UG/L	U	U	
BENZENE	N	0	1	UG/L	U	U	
CIS-1,2-DICHLOROETHYLENE	N	0	1	UG/L	U	U	
ETHYLBENZENE	N	0	1	UG/L	U	U	
M,P-XYLENE (SUM OF ISOMERS)	N	0	2	UG/L	U	U	
O-XYLENE (1,2-DIMETHYLBENZENE)	N	0	1	UG/L	U	U	
TETRACHLOROETHYLENE(PCE)	N	0	1	UG/L	U	U	
TOLUENE	N	0	1	UG/L	U	U	
TRANS-1,2-DICHLOROETHENE	N	0	1	UG/L	U	U	
TRICHLOROETHYLENE (TCE)	N	0	1	UG/L	U	U	
VINYL CHLORIDE	N	0	1.5	UG/L	U	U	
XYLENES, TOTAL	N	0	2	UG/L	U	U	

Laboratory Data Review Checklist

Completed by:	L. S. Calvin		
Title:	Environmental Scientist	Date:	2/2/2018
CS Report Name:	Port Heiden RRS Groundwater Monitoring, Sample Delivery Group: 280-102198-1	Report Date:	Dec 15, 2017
Consultant Firm:	MECx		
Laboratory Name:	TestAmerica-Denver	Laboratory Report Number:	280-102198-1
ADEC File Number:	N/A	ADEC RecKey Number:	N/A

1. Laboratory

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

Yes No NA (Please explain.) Comments:

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

Yes No NA (Please explain) Comments:

Samples were not transferred.

2. Chain of Custody (COC)

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

Yes No NA (Please explain) Comments:

b. Correct analyses requested?

Yes No NA (Please explain) Comments:

- All samples on the COC were received with volume labeled for AK 101 GRO analysis, but this analysis was not requested on the COC for any sample. The client was notified. Two samples were analyzed for AK 101 (samples DSA-MW-02_100417 and DSA-MW-04_100417).
- No analyses were requested for sample TAD-100317-TB-002 on the COC. The sample was logged for Method 8260B.

3. Laboratory Sample Receipt Documentation

a. Sample/cooler temperature documented and within range at receipt ($4^{\circ} \pm 2^{\circ} \text{C}$)?

Yes No NA (Please explain) Comments:

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

Yes No NA (Please explain) Comments:

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

Yes No NA (Please explain) Comments:

• One of three containers for GRO analysis was received frozen for sample DSA-MW-04_100417. Sufficient volume remained for performance of this analysis.

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

Yes No NA (Please explain) Comments:

e. Data quality or usability affected? (Please explain)

Comments:

None of the above issues affected data quality or usability.

4. Case Narrative

a. Present and understandable?

Yes No NA (Please explain) Comments:

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

Yes No NA (Please explain) Comments:

c. Were all corrective actions documented?

Yes No NA (Please explain) Comments:

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

Comments:

QC outliers documented in the case narrative resulted in estimation qualification of the data and identification of method blank contamination. Data quality was acceptable and all data are usable.

5. Samples Results

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

Yes No NA (Please explain)

Comments:

b. All applicable holding times met?

Yes No NA (Please explain)

Comments:

c. All soils reported on a dry weight basis?

Yes No NA (Please explain)

Comments:

Water samples.

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

Yes No NA (Please explain)

Comments:

e. Data quality or usability affected? (Please explain)

Comments:

Data quality was acceptable and all data are usable.

6. QC Samples

a. Method Blank

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

Yes No NA (Please explain)

Comments:

ii. All method blank results less than PQL?

Yes No NA (Please explain)

Comments:

iii. If above PQL, what samples are affected?

Comments:

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

Yes No NA (Please explain)

Comments:

v. Data quality or usability affected? (Please explain)

Comments:

Data quality is not affected, and data are usable as qualified for method blank contamination.

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?

Yes No NA (Please explain)

Comments:

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)

Yes No NA (Please explain)

Comments:

TKN MS of RRS-MW-02_100417 below control limits/site samples qualified as estimated (JM-)

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 No NA (Please explain)

Comments:

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

Comments:

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

Yes No NA (Please explain) Comments:

vii. Data quality or usability affected? (Please explain)

Comments:

Data quality is not affected, and data are usable as qualified.

c. Surrogates - Organics Only

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

Yes No NA (Please explain) Comments:

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

Yes No NA (Please explain) Comments:

FPC_215-MW-09_100817 DRO result estimated (JS+) for recovery above control limits.

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

Yes No NA (Please explain) Comments:

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

Comments:

Data quality is not affected, and data are usable as qualified.

d. Trip Blank - Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.): Water and Soil

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

Yes No NA (Please explain.) Comments:

Trip blank analyzed for 8260B only (no GRO analysis).

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

Yes No NA (Please explain.) Comments:

iii. All results less than PQL?

Yes No NA (Please explain.) Comments:

iv. If above PQL, what samples are affected?

Comments:

v. Data quality or usability affected? (Please explain.)

Comments:

Data quality is not affected, and data are usable.

e. Field Duplicate

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

Yes No NA (Please explain.) Comments:

No identified field duplicate samples in this SDG.

ii. Submitted blind to lab?

Yes No NA (Please explain.) Comments:

No identified field duplicate samples in this SDG.

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

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

Where R_1 = Sample Concentration

R_2 = Field Duplicate Concentration

Yes No NA (Please explain.) Comments:

No identified field duplicate samples in this SDG.

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

Yes No NA (Please explain) Comments:

Data quality is not affected, and data are usable.

f. Decontamination or Equipment Blank (if applicable)

Yes No NA (Please explain) Comments:

No equipment blank submitted for analysis.

i. All results less than PQL?

Yes No NA (Please explain) Comments:

No equipment blank submitted for analysis.

ii. If above PQL, what samples are affected?

Comments:

iii. Data quality or usability affected? (Please explain.)

Comments:

Data quality is not affected, and data are usable.

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

a. Defined and appropriate?

Yes No NA (Please explain) Comments:

Versar valid value qualifiers used--no other data qualifiers.

Reset Form

(intentionally blank)

**Attachment B-4
Laboratory Deliverables**

(Available separately on CD)

(intentionally blank)

Appendix C Field Notes

(113)

9/26/17

0800 - Arrive at Lake Clark Air
Lynn Spencer
On weather hold due
to Fog

SLW
~~28~~

1200 - Finally able to take off
from ANC to Port A.

~1300 - Arrive in Port A.
switched planes. Then
plane had mechanical
issues.

~1530 - Depart Port A. for
Port Heiden.

~1700 - Arrive in PTH, get red
building key, drop
equipment/gear @
red building.
Organized gear/equipment

~1815 Done @ red building

(114)

~2000 Look over workplan,
bottle order.

~2100 Done for Day

Sheryl
Waszulli

(115)

9/27/17

0800

Depart to red building
see if we have enough
bottles, $\text{K}_2\text{Cr}_2\text{O}_7$ calibration,
organizing, get sample
bottles ready, pumps
decont.

1115 - Arrive @ FPC-066 well

Well

DTW

FPC-066-MWS - 7.61

FPC-066-MW04 - 6.03

FPC 066 MW 07 - 5.24

FPC 066 MW 06 - 4.24

~1200 ~~set~~ up ⁵⁰⁰

FPC-066-MW-06

1215 Start purging.

pH was low in the beginning
@ 1.27 but climbed to
5.77.

1335 collect sample for
FPC-066-MW-06

(116)

1445 FPC-066-MW-07

1455 Begin purging
pH start 6.00

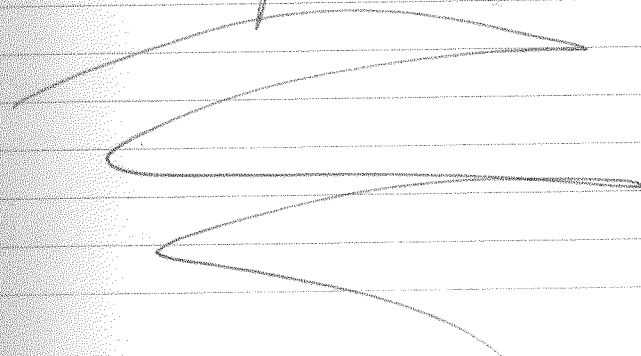
154 collect sample for
FPC-066-MW-07

1945 Back to red building
unload gear

2000 Done for the day



Sheryl W. Miller



117

9/27/17

Well ID

RRS MW 02
RRS MW 06
BLO MW 05
BLO MW 01

DTW

59.85
59.42
~~50.40~~^{scw} 50.04
~~48.32~~^{scw} 48.35
~~48.03~~^{scw} 48.40^{scw}

48.36 to Product
48.40 to water

BLO MW 06 44.5
BLO MW 07 42.44
BLO MW 02 30.70
DSA MW 07 ~~48.85~~^{scw} 49.85
DSA - MW 06 56.62
RRS - MW - 05 52.2
BFA - MW - 01 54.83
DSA - MW - 05 58.2
GLO - MW - 03 60.77
GLO MW 04 58.41
DSA MW 02 64.3
DSA MW 04 67.15
VST MW 02 66.5

118

9/28/17

0815 Download figure +
check email.

0930 Depart to red building.
Vsi calibration, decon pumps,
gather sample bottles,
sets

1030 Depart to DSA MW 06
+ set up.

1100 Start purging. Air bubbles
were present. Pulled pump
out. Switched pumps. ~~RRS~~^{scw}
~~Air bubbles~~^{scw} ~~met~~^{scw}

~1130 Met LCA for more sup/was

1230 Restart purging w/new
pump. No air bubbles
present.

1400 collect sample for
DSA - MW - 06

~1430 Move to DSA - MW ~~06~~^{scw} 07

(119)

9/28/17

1445 Purge start time.
Air bubbles present.
Switched out bladders.
There was ~~still~~^{still} air bubbles present, still, so we waited till all the air from switching pumps to push through.

collected DSA-MW-07

~1730 Return to red building
Decon pumps
Repair YSI flow chamber

1900 Back to B+B

Shepherd Wassillie

9/29/17

(120)

0900 leave to red building
~~calibrate~~^{calibrate} meters
sample sets ready

1000
~1030^{sw} arrive @ BLO-MW-07
set up, but do not
start purging.

~1030 move to BLO-MW-06
set up

1100 start purging.

~1130 Lynn was monitoring
BLO-MW-07.
Tried to start purging
but controller would
not cycle. Replaced
batteries & still not
cycling. Decided to leave
BLO-MW-07 set up to
wait for controller being
used @ BLO-MW-06.

1335 Field parameters stable but
slow flow, let recharge.
Back to BLO-MW-07

(21)

9/29/17

1340

Purg start time @
BLO-MW-071540³⁵_{low}

Field parameters stable
~~but low flow left to~~
~~recharge overnight. Left~~
~~SW pump in well. Demob~~
~~other equipment.~~

collect partial sample.
 water in well was
 extremely low. made
 decision to let well
 recharge overnight
~~to~~ will return 9/30/17 AM
 to collect the rest of
 sample.

1700

Return to red building
 pick up adapter for GAC
 system.

1730

DTW @ FPC 215 wells

9/29/17

(22)

Well	DTW
FPC-215-MW-08	12.70
FPC-215-MW-09	14.00
FPC-215-MW-10	N/A
FPC-215-MW-11	Marker 10.52
	Notch 10.49
FPC-215-MW-12	14.35
	14.34

1800 Return to BLO-MW-06.

1810 collect ^{primary} sample @
BLO-MW-06 +
 collect duplicate.
BLO-MW-26

2040

Demob BLO-MW-06
 to red building.
 Drop equipment out of

2100

Done For Day

Sheryl Wasille

123

9/30/17

0845 Tour

0945 Red building to prepare for day. YSI calibration sample sets.

1100 mobilize to BLO-MW-06 to get MS/MSD w/out getting parameters stable

^{SW}
~~1230~~ 11 collect BLO-MW-06 MS/MSD

1230 Move to BLO-MW-07 to collect rest of sample w/out getting parameters stable.

collect rest of BLO-MW-07

[~]
1430 Move to BLO-MW-05

1445 start purging
Water level dropped a lot & fast started @ 49.54 & dropped to 49.75 @ 1450

9/30/17

124

1515 collect BLO-MW-05

~~1650~~ move to GLO-MW-03

Before purging went to red building to grab more sample bottles & battery

1700 Begin purging GLO-MW-03.

^{SW}
~~1800~~ a slow purge rate

1805 collect primary sample for GLO-MW-03

1835 collect duplicate @ GLO-MW-03

[~]
1900 Move to DSA-MW-05

1920 Purge starts very fast flow/purge rate.

2025 collect primary @ DSA-MW-05

(125)

9/30/17

collect MS/MSD @
DSA MW 05

Demob to red building
drop gear off plug
battery in VSI meters
in pH.

Done for the day

Sheryl Wassile

(126)

10/1/17

Leave B+B to
red building. Decon
pumps, calibrate VSI,
sample sets ready.
No rain or ^{high} winds yet.

mobilize to GLO-MW-04

1050 start purging. slow
flow rate + slow
purge. Fast recharge
rate.

1245 collect sample @
GLO-MW-04

1330 GAC purge water

~1430 return to red building
to Decon pump +
pick up battery + other
equipment

~1530 mobilize to
RRS MW 05

(127)

10/1/17

1550 start purging @
RRS - MW - 05
^{sw}
fast purge/flow rates
was adequate.
windy & raining.

1720 collect sample @
RRS - MW - 05

1830 demob, return to
red building, drop
equipment off, samples
to fridge

1900 Done for Day

Sheryl [Signature]

[Signature]

10/2/17

(128)

0900 Timesheet issues,
coordinating soil sampling,
& filling issues. Call
LCA to send samples out.
weather forecast said more wind & rain.

~1030 Leave to red building.
Found electricity not
working. Brought electric
card to Ray to add
to card. Got electricity
back up. Decon pump
& calibration sample
sets ready for the day.

~1200 mobilized to
RRS - MW - 06

1225 Begin purging. ^{sw}
very good flow, ~~fast~~

1255 collect sample @
RRS - MW - 06
GAC purge. water ^{sw}

~1345 move to ~~FPC-RIS-MW-12~~
FPC-RIS-MW-12 T2

(129)

10/2/17

1400 Purge start @
FPC-215-MW-12
very ^{very} slow purge / flow
rate.

1505 collect FPC-215-MW-02
sample. Lynn working on
COC + getting samples ready to send
tomorrow.

1600 1 liter amber finally
filled + switched to
2nd liter amber

1700 2nd liter amber filled
demob. return to
red building. unload
equipment, decon pumps,
clean building. Finish
COC + samples ready
to send tomorrow.

1830 Done for the day

Sheryl
Wasselle

10/3/17

(130)

0900 Deal w/ timesheet
issue

~ 0930 Leave B + B to
red building. Get
coolers ready to send
samples today. YSI
calibration. Trouble
shooting controller but
no wck.

~ 1215 Get samples on
Lake Clark. 4 coolers
sent.

~ 1300 Mobilize to RRS-MW02

1318 Begin purging @
RRS-MW-02

1445 collect RRS-MW-02
sample.

1500 Break

(31)

10/3/17

1600 Return to red building. Decon both pumps. more sample sets ready.

~ 1630 mobilize to FPC-066-MW-04.

1650 Begin purging. adequate flow + good recharge rate.

1725 collect FPC-066-MW-04

1810 collect duplicate @ FPC-066-MW-04

~ 1900 collect MS/MSD @ FPC-066-MW-04

2000 Return to red building drop gear off + set samples in fridge. Done for day.

Shenold Wassler

10/4/17

(132)

Leave B+B to red building. Decon pumps. 1/81 calibration. Sample sets ready.

~ 1015 mobilize to DSA-MW-01

1040 begin purging @ DSA-MW-01 very good flow/purge rate.

1205 collect sample @ DSA-MW-01

~ 1230 move to DSA-MW-04

1245 begin purging. Fast flow + adequate recharge rate.

1325 collect DSA-MW-04 sample.

(133)

10/4/17

~1415 Break

~1515 mobilize to
DSA - MW-02
decon a pump.

1550 begin purging.

1640 collect DSA-MW-02
sample.
wind picked up
& started raining.
GAC purg water
return to red
building. Drop
gear off & samples
to fridge.

Done for day

Sheryl Wassilli

10/5/17

(134)

0900 weather is not
favorable to
sample today &
is forecast to
get worse.
wind @ 30 MPH
gusts to 50 +
MPH. w/ rain.

Deemed today
rest / catch up /
clean up day.

~1200 go to Ray's to
coordinate demob
of some drums.

-bhn

~1230 go to red building.
clean, decon.
sample sets ready.

Done for the day

Sheryl Wassilli

135

10/6/17

0830 weather is still unfavorable.

Wind 30 MPH
Gust 50 MPH
light rain.

Forecast says it will improve by evening.

[Handwritten signature]

136

10/7/17

0900 leave to Red building. Calibrate VSI. Look through soil sample sets.

~1000 mobilize to FPC-066-MW-05

105 Begin purging air bubbles in VSI chamber. switched out pump. Air bubbles cleared

1040 first reading done. very slow purg/flow rate. <.5.
last years notes state oily appearance + odor. This year no oily appearance + odor.

1145 collect FPC-066-MW-05 sample.

~1300 Return to B+B

137

10/7/17

~1300 High wind + rain.
40 MPH
50 MPH Gusts

1600 return to red building
Decon pumps.

~1630 mobilize to FPC-215-MW-11

1645 Purge start
VERY slow purge/flow
rate.

1810 collect FPC-215-MW-11
sample.

~1900 Return to red
building. Drop
equipment + sample
off. Decon pump

~1945 Done for day

Shuff/Wassili

10/8/17

138

0830 Go through soil sampling
info.

~1015 Leave B+B to
red building.
mobilize for last
Two wells. YSI
calibration.
Windy. ~25 MPH
30+ gusts.

~1050 Arrive to FPC-215-MW-08

1105 Purge start.
Very slow purge/flow
rate.

1330 collect FPC-215-MW-08

1500 Break

1600 mobilize to FPC-215-MW-09

1605 Purge start time
slow purge/flow rate.

(139)

10/8/17

1730

collect FPC.215.MW.09

~1900

Return to red building. Get sample rattles ready to send next day. Inventory sample sets for correct labeling/complete ones.

QC'd field forms. saw ~~done for the day~~ ^{sw}

1945 Read ~~POD manual for soil sampling~~ watched YouTube videos.

1945^{sw}
~~2015~~

Done for r day

Sheryl Wazilli

(140)

10/9/17

0900

Leave B+B to red building.

Get ready to send samples last.

- Coors filled (at/copes @ ^{rayd})
- Bottles packaged.
- Lake Clark said pick up @ 1215.

- Clean up red building.

~~sw~~
~~Asses~~

Precor Land Farms for size & depth to determine ~~size & #~~ ^{SLP}

1215

wait for Lake Clark @ Airport. They didn't come on time.

~1345

They (Lake Clark) finally arrive & they couldn't take coolers bc of too much weight in plane

(141)

10/9/17

1400 Recon land farms
for size & depth
to determine grid
#s.

1430 Break

1530 Lake Clark arrive
& can take coaters.

1545 Conferenced w/ Greg
& Andrew from
Test America to figure
out analytical methods
required for sampling
soils

1630 Went back to
USA's & measured
w/ tape for more
accurate dimensions.
Found out over estimated
perimeters.

1830 Return to red building

10/9/17

(142)

1830 Assess bottles &
equipment for soils.
~~Be~~

1930 Leave red building
to B & B.
Read PID manual &
watched youtube
videos

2000 Done for the day.

Sheryl
Wassille

(143)

10/10/17

0800

Planning w/ Greg
calculating volume
of soil, sizes of
grid. calculations.
Working w/ equipment
getting tools & fuel.

1200 Break

1300

Arrived on site to

LSA 1

collected screen baggie
test. collected about
half.

1930

Return to red building
Dropped dirt off.
Tried to do PID
reading but they werent
warm.
checked all seals
of ziplocks.

2000

Done for day

Sheryl Wassell

10/10/17

(144)

145

10/11/17

146

0900 Aeds calculations
based on actual
depths.

1000 leave to red
building. flat equipment
go to store for
more paint.

1030 Arrive @ LSA 1

1300 finished LSA 1

1300 Break

1400 move LSA 5

1900 Done @ LSA 5 +
to red building
Dropped soil off.
checked seals. Laid
them out to heat
up.

2000 Back to B+B. Done
for day.

Shyl Wasselle

(147)

10/12/17

0900 Bottle^{sw} Labelling
sample bottle labels.
Figuring out grid issue)

1000 off to red building
Pick up supplies

1030 mobilize to LSAS
to finish digging
holes

1400 Break

1500 Back to LSAS +
finish last couple
of rows.

1730 Return to red building
PID readings +
packing up. Land
farm forms.

2100 Done for the day

Sheryl Wayall

10/13/17

(148)

0800 Finish Labelling
Labels for
samples

0900 off to red
building Finish
PID readings.
Determine which
ones have the
highest readings
& which wells
to sample. Sample
bottles ready

~1300 mobilize to
LSA 7 to
sample.

1900 Finish sampling
Grab drums from
LSA 7 area. GACed
~~back to red building.~~
sw Grab rest of
one drum of water.
Back to red building
grabbed rest of

(149)

10/13/17

~~1935~~^{sw} trash + off to
1945 the landfill.

2000 Back to red building
drop equipment off.
Done for the day

Sheryl
&
Wassilie

10/14/17

(150)

Sheryl Wassilie &
Lynn Spencer returned
to Anchorage, AK on
Lake Clark Air.

3/20/18

153

1.5/MSD = 2 1 liter Amber
6 vva vials

158

Cal'b Log

Confidence Sol'n 16HCl

Ex date: 8/23/18

Open: 8/27/17

9/29/17 Meter #3

Meter

°C

Cond msl°

pH

ORP

17.53

7109

6.98

243

sp. cond recal

#3 1394 → 1413

#1 1392 → 1413

recal', meter #1 for
3 point pH

WELL PURGING AND SAMPLING FIELD CONTROL LOG



Date: 100817 Well ID: FPC 215 MW-08
 Northings: 6312877.23
 Eastings: 521937.88

Project: Port Heiden Ground Water Sampling
 Samplers: L. Spencer S. Wassilje

Depth of pump (ft, bgs): _____ Screened Interval (ft, bgs): 9.0' → 19.0'
 Depth of well (ft, TOC): _____ Stickup Height (ft, ags): _____
 Depth to water (ft, TOC): (previous) 11.20 (current) 14.00 ^{with SW} WL meter: APCS GNL2
 Photo of Well: _____
 Filter Lot Number: NA

Field Meter Check
 YSI Meter SN #: 1
 Battery Level: _____

Criteria for Calibration Check: Confidence solution ranges or pH ±0.1; Sp Cond ± 10%

Purge Start Time: 1400 ^{SLW} Purge End Time: 1328 Trip Blank: _____

Field Instrument Readings Criteria for Stable Parameters: pH ±0.1; Temp ± 3% (min ± 0.2 °C); Sp Cond ± 3%;
 DO ± 10% (0.3 mg/L); Turbidity ± 10%

	Time	WL (ft, ftop)	Flow (lpm)	Volume (gal)	Temp (deg C)	Cond (uS/cm)	DO (mg/L)	pH	ORP (mV)	Turbidity (ntu)
1	1155	12.30	.3	.25	6.93	59	14.48	6.04	133.4	2.50
2	1200	12.30	.3	.30	6.79	59	14.37	5.94	142.2	3.83
3	1205	12.30	.3	.35	6.76	59	14.17	6.20	129.4	2.76
4	1210	12.30	.3	.40	6.78	59	14.34	6.43	119.1	2.67
5	1215	12.30	.3	.45	7.26	100	14.16	6.68	106.2	2.51
6	1220	12.30	.3	.45	7.83	62	13.93	6.96	93.3	2.65
7	1225	12.30	.3	.45	7.92	62	13.54	7.00	93.7	2.66
8	1230	12.30	.3	.48	8.05	63	13.43	7.04	95.1	2.62
9	1235	12.30	.3	.50	8.31	65	13.52	7.01	96.0	2.52
10	1240	12.30	.3	.55	8.61	67	13.12	6.99	95.3	2.11
11	1245	12.30	.3	.60	8.90	68	12.67	7.00	95.4	2.29
12	1250	12.30	.3	.65	9.04	70	12.47	7.01	95.5	2.26
13	1255	12.29	.3	.70	8.62	73	12.00	7.02	99.8	1.62
14	1300	12.29	.3	.75	8.51	74	11.84	7.00	101.2	1.68
15	1305	12.30	.3	.75	8.16	75	11.80	6.96	104.3	1.37
16	1310	12.30	.3	.75	8.08	76	11.44	6.93	106.3	1.57
17	1315	12.30	.3	.80	7.99	77	11.22	6.89	109.1	1.27
18	1320	12.30	.3	.85	8.06	79	10.76	6.87	111.4	1.25
19	1325	12.31	.3	.85	8.11	80	10.67	6.92	108.1	1.18

Field Parameters Stable: yes, no _____ Continued on Page 2: yes, no _____ Purged Dry: yes, no _____
 Total Actual Volume: .85

Sample ID:

Root	Primary	MS/MSD
<u>FPC-215-MW-08-100817</u>	<u>X</u>	

Sample Date/Time: 100817, 1330 Pump: bladder
 Sample Notes: very slow purge/flow rate.

Color: clear, amber, tan, brown, grey, milky white, other _____
 Odor: none, low, medium, high, very strong, hydrogen sulfide, petroleum, chemical?, unknown _____
 Turbidity: none, low, medium, high, very turbid, heavy silts _____

Field QC and date: Spencer QC2 and date: 11/20/17

WELL PURGING AND SAMPLING FIELD CONTROL LOG

Bottle Inventory:	8260B VOCs HCL 3 x 40 ml Glass extra 6 X 40 ml 1	AK101 GRO HCL 3 X 40 ml Glass extra 6 X 40 ml 2	AK102/103 DRO/RRO HCL 2 X 1L Glass extra 6 X 1L 3	6010C Tot Iron/Mn HNO3 1 X 500ml Poly no 1 X 500 ml 4	353.2/351.2 NO3/NO2 TRN H2SO4 1 X 500 ml Glass extra 3 X 500 ml 5	2320B/300 Alk/Sulf None 1 X 250 ml Poly no 1 X 250 ml 6	7	8	9
MS/MSD Volume:									
TAm Volume:									
Sample Order:									
Bottle Count:									

Casing Diameter (inches)	Schedule 40		Schedule 80	
	(gal/ft casing)	(liters/ft casing)	(gal/ft casing)	(liters/ft casing)
1.5	0.092	0.348	0.086	0.327
2	0.163	0.617	0.153	0.579
4	0.656	2.483	0.597	2.26

Casing Diameter 2 inches:

Length of Casing (ft)	Sch 40	Sch 80	Sch 40	Sch 80	Length of Casing (ft)	Sch 40	Sch 80	Sch 40	Sch 80
	(gal)	(gal)	(L)	(L)		(gal)	(gal)	(L)	(L)
1	0.16	0.15	0.62	0.58	16	2.61	2.45	9.87	9.27
2	0.33	0.31	1.23	1.16	17	2.77	2.60	10.49	9.84
3	0.49	0.46	1.85	1.74	18	2.93	2.75	11.11	10.42
4	0.65	0.61	2.47	2.32	19	3.10	2.91	11.72	11.00
5	0.82	0.77	3.08	2.90	20	3.26	3.06	12.34	11.58
6	0.98	0.92	3.70	3.47	21	3.42	3.21	12.96	12.16
7	1.14	1.07	4.32	4.05	22	3.59	3.37	13.57	12.74
8	1.30	1.22	4.94	4.63	23	3.75	3.52	14.19	13.32
9	1.47	1.38	5.55	5.21	24	3.91	3.67	14.81	13.90
10	1.63	1.53	6.17	5.79	25	4.08	3.83	15.42	14.48
11	1.79	1.68	6.79	6.37	26	4.24	3.98	16.04	15.06
12	1.96	1.84	7.40	6.95	27	4.40	4.13	16.66	15.64
13	2.12	1.99	8.02	7.53	28	4.56	4.28	17.27	16.21
14	2.28	2.14	8.64	8.11	29	4.73	4.44	17.89	16.79
15	2.45	2.30	9.25	8.69	30	4.89	4.59	18.51	17.37

	Time	WL (ft. fop)	Flow (lpm)	Volume (gal)	pH	ORP (mV)	Temp (deg C)	Cond (mS/cm)	DO (mg/L)	Turbidity
20	1328	12.31	.3	.85	6.95	107.0	8.25	81	10.60	1.31
21										
22										
23										
24										
25										
26										
27										
28										

Water Parameter Meter Calibration Log (if necessary)

Parameter	Standard	True Value	Lot #	Date Opened	Expiration Date	Pre-Calibration Reading	Post-Calibration Reading	Calibration Acceptance Criteria
pH	4.00							± 0.10
	7.00							± 0.10
	10.00							± 0.10
Sp Cond (mS/cm)								± 10%
								± 10%
ORP (mV)								-----

WELL PURGING AND SAMPLING FIELD CONTROL LOG



Date: 9/29/17 Well ID: BLO-MW-06
 Northings: 16314820.13
 Eastings: 520157.29

Project: Port Heiden Ground Water Sampling
 Samplers: L. Spencer, S. Wassellie

Depth of pump (ft, bgs): _____ Screened Interval (ft, bgs): 38.5 - 48.5
 Depth of well (ft, TOC): _____ Stickup Height (ft, ags): _____
 Depth to water (ft, TOC): (previous) 44.24 WL meter: APCS GWL 2
 (current) 44.44 Photo of Well: _____
 Filter Lot Number: NA

Field Meter Check YSI Meter SN #: # 1
 Battery Level: _____

Criteria for Calibration Check: Confidence solution ranges or pH ± 0.1 ; Sp Cond $\pm 10\%$

Purge Start Time: 1100 Purge End Time: 1335 Trip Blank: _____

Field Instrument Readings Criteria for Stable Parameters: pH ± 0.1 ; Temp $\pm 3\%$ (min ± 0.2 °C); Sp Cond $\pm 3\%$;
 DO $\pm 10\%$ (0.3 mg/L); Turbidity $\pm 10\%$

	Time	WL (ft, ftop)	Flow (lpm)	Volume (gal)	Temp (deg C)	Cond (uS/cm)	DO (mg/L)	pH	ORP (mV)	Turbidity (ntu)
1	1120	45.40	1.0	1.10	7.25	129	3.80	2.67	423.8	9.37
2	1125	45.65	1.0	1.20	7.32	121	3.59	3.76	353.4	6.62
3	1130	45.85	1.0	1.30	7.25	117	3.71	4.39	306.5	5.91
4	1135	46.05	1.0	1.40	7.40	118	2.93	4.99	262.1	6.11
5	1140	46.25	1.0	1.50	7.78	119	2.17	5.68	230.0	6.14
6	1145	46.55	1.0	1.60	7.67	118	3.20	5.95	214.2	5.66
7	1150	46.80	1.0	1.70	7.44	114	4.70	5.98	248.7	5.42
8	1155	47.06	1.0	1.75	7.48	112	6.02	6.01	215.9	5.32
9	1200	47.24	1.0	1.80	7.56	111	8.00	6.23	202.2	5.08
10	1205	47.46	1.0	1.85	7.73	111	7.27	6.37	196.7	6.00
11	1210	47.72	1.0	1.9	8.03	111	7.90	6.52	191.0	7.33
12	1215	47.84	1.0	1.95	8.54	116	7.89	6.59	181.7	10.06
13	1220	47.87	0.5	1.0	9.12	118	7.31	6.64	160.1	17.6
14	1225	47.96	0.5	1.1	9.44	119	6.43	6.73	131.4	115
15	1230	48.03	0.5	1.2	9.62	120	6.89	6.76	124.8	448
16	1235	48.12	0.5	1.25	9.85	120	6.94	6.80	117.5	494
17	1240	48.26	0.5	1.25	9.89	120	6.89	6.85	117.2	355
18	1245	48.44	0.5	1.30	10.20	120	7.37	6.87	122.3	218
19	1250	48.53	0.5	1.35	10.31	121	7.64	6.87	127.6	112

Field Parameters Stable: (yes, no) Continued on Page 2: (yes, no) Purged Dry: yes, (no) - but very low left to recharge

Sample ID: BLO-MW-26-092917 (Dup)

Root	Primary	MS/MSD
<u>BLO-MW-06-092917</u>	<u>X</u>	

Sample Date/Time: 092917, 1810 Pump: bladder

Sample Notes: Color started clear flow strong - reduced by 1/2 and turbidity went way up. Got stable readings @ 1335 - WL of 49.26. Left well to recharge - very little water left.

Color: clear, amber, tan, brown, grey, milky white, other
 Odor: none, low, medium, high, very strong, hydrogen sulfide, petroleum, chemical?, unknown
 Turbidity: none, low, medium, high, very turbid, heavy silts

Field QC and date 092917 L. Spencer QC2 and date 11/20/17 [Signature]

WELL PURGING AND SAMPLING FIELD CONTROL LOG

Bottle Inventory:	8260B VOCs HCL 3 X 40 ml Glass extra	AK101 GRO HCL 3 X 40 ml Glass extra	AK102/103 DRO/RRO HCL 2 X 1L Glass extra	6010C Tot Iron/Mn HNO3 1 X 500ml Poly no	353.2/351.2 NO3/NO2 TKN H2SO4 1 X 500 ml Glass extra	2320B/300 Alk/Sulf None 1 X 250 ml Poly no			
MS/MSD Volume:	6 X 40 ml	6 X 40 ml	6 X 1L	1 X 500 ml	3 X 500 ml	1 X 250 ml			
TAm Volume:									
Sample Order:	1	2	3	4	5	6	7	8	9
Bottle Count:									

Casing Diameter (Inches)	Schedule 40		Schedule 80	
	(gal/ft casing)	(liters/ft casing)	(gal/ft casing)	(liters/ft casing)
1.5	0.092	0.348	0.086	0.327
2	0.163	0.617	0.153	0.579
4	0.656	2.483	0.597	2.26

Casing Diameter 2 inches:

Length of Casing (ft)	Sch 40	Sch 80	Sch 40	Sch 80	Length of Casing (ft)	Sch 40	Sch 80	Sch 40	Sch 80
	(gal)	(gal)	(L)	(L)		(gal)	(gal)	(L)	(L)
1	0.16	0.15	0.62	0.58	16	2.61	2.45	9.87	9.27
2	0.33	0.31	1.23	1.16	17	2.77	2.60	10.49	9.84
3	0.49	0.46	1.85	1.74	18	2.93	2.75	11.11	10.42
4	0.65	0.61	2.47	2.32	19	3.10	2.91	11.72	11.00
5	0.82	0.77	3.08	2.90	20	3.26	3.06	12.34	11.58
6	0.98	0.92	3.70	3.47	21	3.42	3.21	12.96	12.16
7	1.14	1.07	4.32	4.05	22	3.59	3.37	13.57	12.74
8	1.30	1.22	4.94	4.63	23	3.75	3.52	14.19	13.32
9	1.47	1.38	5.55	5.21	24	3.91	3.67	14.81	13.90
10	1.63	1.53	6.17	5.79	25	4.08	3.83	15.42	14.48
11	1.79	1.68	6.79	6.37	26	4.24	3.98	16.04	15.06
12	1.96	1.84	7.40	6.95	27	4.40	4.13	16.66	15.64
13	2.12	1.99	8.02	7.53	28	4.56	4.28	17.27	16.21
14	2.28	2.14	8.64	8.11	29	4.73	4.44	17.89	16.79
15	2.45	2.30	9.25	8.69	30	4.89	4.59	18.51	17.37

	Time	WL (ft. fop)	Flow (lpm)	Volume (gal)	pH	ORP (mV)	Temp (deg C)	Cond (mS/cm)	DO (mg/L)	Turbidity
20	1255	48.16	.5	1.13	6.89	131.3	10.3	121	8.11	89.7
21	1300	48.92	.5	1.35	6.89	125.5	10.38	121	8.34	105.1
22	1305	48.79	.5	1.40	6.88	138.9	10.46	121	8.80	42.7
23	1310	48.89	.5	1.95	6.88	143.4	10.45	122	8.70	37.3
24	1315	48.97	.5	1.50	6.88	147.1	10.73	122	8.70	34.5
25	1320	49.02	.5	1.55	6.87	149.2	10.70	123	9.05	30.4
26	1325	49.12	.5	1.60	6.88	152.5	11.26	124	8.87	27.1
27	1330	49.20	.5	1.62	6.88	154.3	11.51	125	8.77	26.7
28	1335	49.26	.5	1.63	6.89	155.7	11.72	126	8.85	24.5

Water Parameter Meter Calibration Log (if necessary)

Parameter	Standard	True Value	Lot #	Date Opened	Expiration Date	Pre-Calibration Reading	Post-Calibration Reading	Calibration Acceptance Criteria
pH	4.00							± 0.10
	7.00							± 0.10
	10.00							± 0.10
Sp Cond (mS/cm)								± 10%
								± 10%
ORP (mV)								-----

WELL PURGING AND SAMPLING FIELD CONTROL LOG

95
 88
 8392
 2517
 1083
 52
 36
 3600 ft
 1203
 36x100



Date: 100817 Well ID: FPC-215-MW-09
 Northings: 6312852.43
 Eastings: 521910.45

Project: Port Heiden Ground Water Sampling
 Samplers: L. Salchner S. Wassillie

Depth of pump (ft, bgs): _____
 Depth of well (ft, TOC): _____
 Depth to water (ft, TOC): (previous) 12.92
 (current) 14.64

Screened Interval (ft, bgs): 9' → 18'
 Stickup Height (ft, ags): _____
 WL meter: APCS GWL 2
 Photo of Well: _____
 Filter Lot Number: NA

Field Meter Check YSI Meter SN #: 1
 Battery Level: _____

Criteria for Calibration Check: Confidence solution ranges or pH ±0.1; Sp Cond ± 10%

Purge Start Time: 1605 Purge End Time: 1730 Trip Blank: _____

Field Instrument Readings Criteria for Stable Parameters: pH ±0.1; Temp ± 3% (min ± 0.2 °C); Sp Cond ± 3%;
 DO ± 10% (0.3 mg/L); Turbidity ± 10%

	Time	WL (ft, ftop)	Flow (lpm)	Volume (gal)	Temp (deg C)	Cond (uS/cm)	DO (mg/L)	pH	ORP (mV)	Turbidity (ntu)
1	1635	13.65	.2	.09	8.75	181	2.81	6.07	111.9	3.41
2	1638	13.67	.2	.02	8.67	187	2.66	6.21	94.5	2.90
3	1641	13.67	.2	.03	8.57	194	2.49	6.22	93.7	2.44
4	1645	13.68	.2	.05	8.57	205	2.30	6.35	85.0	2.44
5	1650	13.66	.2	.10	8.67	220	2.11	6.58	67.0	2.83
6	1655	13.67	.2	.15	8.66	231	1.94	6.67	55.2	2.67
7	1700	13.68	.2	.20	8.57	237	1.81	6.69	50.7	2.64
8	1705	13.68	.2	.25	8.43	240	1.69	6.65	44.2	2.15
9	1710	13.68	.2	.30	8.49	242	1.66	6.73	36.0	2.15
10	1715	13.67	.2	.40	8.55	244	1.65	6.79	30.8	2.18
11	1720	13.67	.2	.43	8.58	245	1.63	6.81	28.1	2.15
12	1725	13.67	.2	.44	8.56	245	1.64	6.80	28.0	2.17
13										
14										
15										
16										
17										
18										
19										

1.5 x
 36 100
 1040
 3357
 4397
 1/36
 2
 36
 4
 1644

Field Parameters Stable: yes, no Continued on Page 2: yes, no Purged Dry: yes, no

Total Actual Volume: 0.45

75,525
 (182.25)
 285x (100)
 Pump: Bladder 265
 32550 1/15 x 210 #8

Sample ID:

Root	Primary	MS/MSD
<u>FPC-215-MW-09-100817-X</u>		

Sample Date/Time: 100817; 1730

Sample Notes: _____

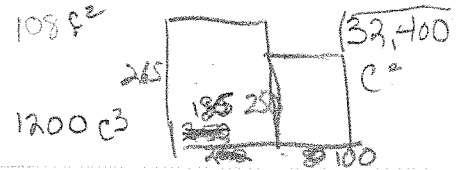
419.2
 178.6
 592.9
 108.025

Color: clear, amber, tan, brown, grey, milky white, other
 Odor: none, low, medium, high, very strong, hydrogen sulfide, petroleum, chemical?, unknown
 Turbidity: none, low, medium, high, very turbid, heavy silts

406.00
 108,000

79,000
 25,000
 75,000

Field QC and date: [Signature] 100817 QC2 and date: [Signature] 11/20/17



WELL PURGING AND SAMPLING FIELD CONTROL LOG

Bottle Inventory:	8260B VOCs HCL 3 X 40 ml Glass	AK101 GRO HCL 3 X 40 ml Glass	AK102/103 DRO/RRO HCL 2 X 1L Glass	6010C Tot Iron/Mn HNO3 1 X 500ml Poly	353.2/351.2 NO3/NO2 TrN H2SO4 1 X 500 ml Glass	2320B/300 Alk/Sulf None 1 X 250 ml Poly			
MS/MSD Volume:	extra	extra	extra	no	extra	no			
TAm Volume:	6 X 40 ml	6 X 40 ml	6 X 1L	1 X 500 ml	3 X 500 ml	1 X 250 ml			
Sample Order:	1	2	3	4	5	6	7	8	9
Bottle Count:									

Casing Diameter (inches)	Schedule 40		Schedule 80	
	(gal/ft casing)	(liters/ft casing)	(gal/ft casing)	(liters/ft casing)
1.5	0.092	0.348	0.086	0.327
2	0.163	0.617	0.153	0.579
4	0.656	2.483	0.597	2.26

Casing Diameter 2 inches:

Length of Casing (ft)	Sch 40	Sch 80	Sch 40	Sch 80	Length of Casing (ft)	Sch 40	Sch 80	Sch 40	Sch 80
	(gal)	(gal)	(L)	(L)		(ft)	(gal)	(gal)	(L)
1	0.16	0.15	0.62	0.58	16	2.61	2.45	9.87	9.27
2	0.33	0.31	1.23	1.16	17	2.77	2.60	10.49	9.84
3	0.49	0.46	1.85	1.74	18	2.93	2.75	11.11	10.42
4	0.65	0.61	2.47	2.32	19	3.10	2.91	11.72	11.00
5	0.82	0.77	3.08	2.90	20	3.26	3.06	12.34	11.58
6	0.98	0.92	3.70	3.47	21	3.42	3.21	12.96	12.16
7	1.14	1.07	4.32	4.05	22	3.59	3.37	13.57	12.74
8	1.30	1.22	4.94	4.63	23	3.75	3.52	14.19	13.32
9	1.47	1.38	5.55	5.21	24	3.91	3.67	14.81	13.90
10	1.63	1.53	6.17	5.79	25	4.08	3.83	15.42	14.48
11	1.79	1.68	6.79	6.37	26	4.24	3.98	16.04	15.06
12	1.96	1.84	7.40	6.95	27	4.40	4.13	16.66	15.64
13	2.12	1.99	8.02	7.53	28	4.56	4.28	17.27	16.21
14	2.28	2.14	8.64	8.11	29	4.73	4.44	17.89	16.79
15	2.45	2.30	9.25	8.69	30	4.89	4.59	18.51	17.37

	Time	WL (ft. ftop)	Flow (lpm)	Volume (gal)	pH	ORP (mV)	Temp (deg C)	Cond (mS/cm)	DO (mg/L)	Turbidity
20										
21										
22										
23										
24										
25										
26										
27										
28										

Water Parameter Meter Calibration Log (if necessary)

Parameter	Standard	True Value	Lot #	Date Opened	Expiration Date	Pre-Calibration Reading	Post-Calibration Reading	Calibration Acceptance Criteria
pH	4.00							± 0.10
	7.00							± 0.10
	10.00							± 0.10
Sp Cond (mS/cm)								± 10%
								± 10%
ORP (mV)								-----

WELL PURGING AND SAMPLING FIELD CONTROL LOG



Date: 100717 Well ID: FPC 215 MW 11
 Northings: 6312871.91
 Eastings: 521900.01

Project Port Heiden Ground Water Sampling

Samplers: Lynn Spencer + Sheryl Massillie

Depth of pump (ft, bgs): _____ Screened Interval (ft, bgs): 7' → 17'
 Depth of well (ft, TOC): _____ Stickup Height (ft, ags): _____
 Depth to water (ft, TOC): (previous) 11.00 (notch) WL meter: APCS GWL 2
 (current) 11.81 Photo of Well: _____
 Filter Lot Number: NA

Field Meter Check YSI Meter SN #: 1
 Battery Level: _____

Criteria for Calibration Check: Confidence solution ranges or pH ±0.1; Sp Cond ± 10%

Purge Start Time: 1645 Purge End Time: 1805 Trip Blank: _____

Field Instrument Readings Criteria for Stable Parameters: pH ±0.1; Temp ± 3% (min ± 0.2 °C); Sp Cond ± 3%;
 DO ± 10% (0.3 mg/L); Turbidity ± 10%

	Time	WL (ft, ftop)	Flow (lpm)	Volume (gal)	Temp (deg C)	Cond (uS/cm)	DO (mg/L)	pH	ORP (mV)	Turbidity (ntu)
1	1720	11.95	.30	.1	9.77	69	10.51	6.92	70.0	13.0
2	1725	11.95	.30	.15	9.63	68.0	11.02	6.85	74.8	13.8
3	1730	11.95	.30	.20	9.60	68.0	10.52	6.77	78.7	16.1
4	1735	11.95	.30	.25	9.69	68.0	10.68	6.69	84.2	15.7
5	1740	11.95	.30	.30	9.85	69	10.70	6.72	89.6	16.6
6	1745	11.95	.30	.35	10.01	69	10.87	6.76	96.7	16.9
7	1750	11.95	.30	.40	10.07	69	10.79	6.77	102.3	16.8
8	1755	11.95	.30	.45	9.91	69	10.60	6.74	109.0	16.9
9	1800	11.95	.30	.50	9.98	69	10.75	6.74	112.9	16.6
10	1805	11.95	.30	.55	10.00	69	10.73	6.74	116.7	17.2
11										
12										
13										
14										
15										
16										
17										
18										
19										

Field Parameters Stable: yes, no Continued on Page 2: yes, no Purged Dry: yes, no
 Total Actual Volume: .55 gal

Sample ID:

Root	Primary	MS/MSD
<u>FPC-215-MW-11-100717</u>	<u>X</u>	

Sample Date/Time: FPC-215-MW-11-100717 Pump: bladder
 Sample Notes: 100717, 1810

Color: clear, amber, tan, brown, grey, milky white, other
 Odor: none, low, medium, high, very strong, hydrogen sulfide, petroleum, chemical?, unknown
 Turbidity: none, low, medium, high, very turbid, heavy silts

Field QC and date Spencer 10/20/17 QC2 and date [Signature] 11/20/17

WELL PURGING AND SAMPLING FIELD CONTROL LOG

Bottle Inventory:	8260B VOCs HCL 3 X 40 ml Glass extra	AK101 GRO HCL 3 X 40 ml Glass extra	AK102/103 DRO/RRO HCL 2 X 1L Glass extra	6010C Tot Iron/Mn HNO3 1 X 500ml Poly no	353.2/351.2 NO3/NO2 TKN H2SO4 1 X 500 ml Glass extra	2320B/300 Alk/Sulf None 1 X 250 ml Poly no			
MS/MSD Volume:	6 X 40 ml	6 X 40 ml	6 X 1L	1 X 500 ml	3 X 500 ml	1 X 250 ml			
TAm Volume:									
Sample Order:	1	2	3	4	5	6	7	8	9
Bottle Count:									

Casing Diameter (inches)	Schedule 40		Schedule 80	
	(gal/ft casing)	(liters/ft casing)	(gal/ft casing)	liters/ft casing)
1.5	0.092	0.348	0.086	0.327
2	0.163	0.617	0.153	0.579
4	0.656	2.483	0.597	2.26

Casing Diameter 2 inches:

Length of Casing (ft)	Sch 40	Sch 80	Sch 40	Sch 80	Length of Casing (ft)	Sch 40	Sch 80	Sch 40	Sch 80
	(gal)	(gal)	(L)	(L)		(ft)	(gal)	(gal)	(L)
1	0.16	0.15	0.62	0.58	16	2.61	2.45	9.87	9.27
2	0.33	0.31	1.23	1.16	17	2.77	2.60	10.49	9.84
3	0.49	0.46	1.85	1.74	18	2.93	2.75	11.11	10.42
4	0.65	0.61	2.47	2.32	19	3.10	2.91	11.72	11.00
5	0.82	0.77	3.08	2.90	20	3.26	3.06	12.34	11.58
6	0.98	0.92	3.70	3.47	21	3.42	3.21	12.96	12.16
7	1.14	1.07	4.32	4.05	22	3.59	3.37	13.57	12.74
8	1.30	1.22	4.94	4.63	23	3.75	3.52	14.19	13.32
9	1.47	1.38	5.55	5.21	24	3.91	3.67	14.81	13.90
10	1.63	1.53	6.17	5.79	25	4.08	3.83	15.42	14.48
11	1.79	1.68	6.79	6.37	26	4.24	3.98	16.04	15.06
12	1.96	1.84	7.40	6.95	27	4.40	4.13	16.66	15.64
13	2.12	1.99	8.02	7.53	28	4.56	4.28	17.27	16.21
14	2.28	2.14	8.64	8.11	29	4.73	4.44	17.89	16.79
15	2.45	2.30	9.25	8.69	30	4.89	4.59	18.51	17.37

	Time	WL (ft. flop)	Flow (lpm)	Volume (gal)	pH	ORP (mV)	Temp (deg C)	Cond (mS/cm)	DO (mg/L)	Turbidity
20										
21										
22										
23										
24										
25										
26										
27										
28										

Water Parameter Meter Calibration Log (if necessary)

Parameter	Standard	True Value	Lot #	Date Opened	Expiration Date	Pre-Calibration Reading	Post-Calibration Reading	Calibration Acceptance Criteria
pH	4.00							± 0.10
	7.00							± 0.10
	10.00							± 0.10
Sp Cond (mS/cm)								± 10%
								± 10%
ORP (mV)								-----

WELL PURGING AND SAMPLING FIELD CONTROL LOG



Date: 100717 Well ID: FPC 066 MW-5
 Northings: 6309075
 Eastings: 570573

Project Port Heiden Ground Water Sampling

Samplers: Lynn Spencer Sheryl Wassilic

Depth of pump (ft, bgs): _____
 Depth of well (ft, TOC): _____
 Depth to water (ft, TOC): (previous) 7.78
 (current) 7.76

Screened Interval (ft, bgs): 2-12.5
 Stickup Height (ft, ags): _____
 WL meter: APCS GWL 2
 Photo of Well: _____
 Filter Lot Number: NA

Field Meter Check

YSI Meter SN #: 1
 Battery Level: _____

Criteria for Calibration Check: Confidence solution ranges or pH ±0.1; Sp Cond ± 10%

Purge Start Time: 1015 Purge End Time: 1140 Trip Blank: _____

Field Instrument Readings

Criteria for Stable Parameters: pH ±0.1; Temp ± 3% (min ± 0.2 °C); Sp Cond ± 3%;
 DO ± 10% (0.3 mg/L); Turbidity ± 10%

	Time	WL (ft, ftop)	Flow (lpm)	Volume (gal)	Temp (deg C)	Cond (uS/cm)	DO (mg/L)	pH	ORP (mV)	Turbidity (ntu)
1	1040	7.77	<.5	0.01	6.91	121	8.14	3.88	180.1	23.2
2	1045	7.77	<.5	0.10	6.89	121	6.32	4.39	154.6	19.7
3	1050	7.77	<.5	0.15	6.77	121	4.90	4.91	125.7	20.5
4	1055	7.77	<.5	0.20	6.70	121	3.80	5.21	106.7	17.4
5	1100	7.78	<.5	0.25	6.70	121	3.20	5.54	87.2	15.9
6	1105	7.78	<.5	0.30	6.72	122	2.76	5.95	62.3	16.6
7	1110	7.79	<.5	0.35	6.73	122	2.53	6.17	49.1	14.3
8	1115	7.79	<.5	0.40	6.66	122	2.27	6.29	41.4	13.2
9	1120	7.79	<.5	0.45	6.65	123	2.12	6.34	36.5	14.2
10	1125	7.79	<.5	0.50	6.68	123	1.98	6.45	29.9	11.8
11	1130	7.78	<.5	0.55	6.74	123	1.86	6.53	22.7	8.97
12	1135	7.79	<.5	0.60	6.75	123	1.76	6.57	18.3	8.18
13	1140	7.78	<.5	0.65	6.81	123	1.72	6.61	14.9	8.44
14										
15										
16										
17										
18										
19										

Field Parameters Stable: yes, no Continued on Page 2: yes, no Purged Dry: yes, no
 Total Actual Volume: 0.65g

Sample ID:

Root	Primary	MS/MSD
<u>FPC 066 MW 05 100717</u>	<u>X</u>	

Sample Date/Time: 100717; 1045

Pump: bladder

Sample Notes: _____

Color: clear, amber, tan, brown, grey, milky white, other
 Odor: none (low), medium, high, very strong, hydrogen sulfide, petroleum chemical?, unknown
 Turbidity: none (low), medium, high, very turbid, heavy silts

Field QC and date: Spencer 100717 QC2 and date: Sheryl Wassilic 11/20/17

WELL PURGING AND SAMPLING FIELD CONTROL LOG

Bottle Inventory:

	8260B VOCs HCL 3 x 40 ml Glass extra 6 X 40 ml 1	AK101 GRO HCL 3 X 40 ml Glass extra 6 X 40 ml 2	AK102/103 DRO/RRO HCL 2 X 1L Glass extra 6 X 1L 3	6010C Tot Iron/Mn HNO3 1 X 500ml Poly no 1 X 500 ml 4	353.2/351.2 NO3/NO2 TrN H2SO4 1 X 500 ml Glass extra 3 X 500 ml 5	2320B/300 Alk/Sulf None 1 X 250 ml Poly no 1 X 250 ml 6			
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MS/MSD Volume:

TAm Volume:

Sample Order:

Bottle Count:

Casing Diameter (inches)	Schedule 40		Schedule 80	
	(gal/ft casing)	(liters/ft casing)	(gal/ft casing)	(liters/ft casing)
1.5	0.092	0.348	0.086	0.327
2	0.163	0.617	0.153	0.579
4	0.656	2.483	0.597	2.26

Casing Diameter 2 inches:

Length of Casing (ft)	Sch 40	Sch 80	Sch 40	Sch 80	Length of Casing (ft)	Sch 40	Sch 80	Sch 40	Sch 80
	(gal)	(gal)	(L)	(L)		(gal)	(gal)	(L)	(L)
1	0.16	0.15	0.62	0.58	16	2.61	2.45	9.87	9.27
2	0.33	0.31	1.23	1.16	17	2.77	2.60	10.49	9.84
3	0.49	0.46	1.85	1.74	18	2.93	2.75	11.11	10.42
4	0.65	0.61	2.47	2.32	19	3.10	2.91	11.72	11.00
5	0.82	0.77	3.08	2.90	20	3.26	3.06	12.34	11.58
6	0.98	0.92	3.70	3.47	21	3.42	3.21	12.96	12.16
7	1.14	1.07	4.32	4.05	22	3.59	3.37	13.57	12.74
8	1.30	1.22	4.94	4.63	23	3.75	3.52	14.19	13.32
9	1.47	1.38	5.55	5.21	24	3.91	3.67	14.81	13.90
10	1.63	1.53	6.17	5.79	25	4.08	3.83	15.42	14.48
11	1.79	1.68	6.79	6.37	26	4.24	3.98	16.04	15.06
12	1.96	1.84	7.40	6.95	27	4.40	4.13	16.66	15.64
13	2.12	1.99	8.02	7.53	28	4.56	4.28	17.27	16.21
14	2.28	2.14	8.64	8.11	29	4.73	4.44	17.89	16.79
15	2.45	2.30	9.25	8.69	30	4.89	4.59	18.51	17.37

	Time	WL (ft, ftop)	Flow (lpm)	Volume (gal)	pH	ORP (mV)	Temp (deg C)	Cond (mS/cm)	DO (mg/L)	Turbidity
20										
21										
22										
23										
24										
25										
26										
27										
28										

Water Parameter Meter Calibration Log (if necessary)

Parameter	Standard	True Value	Lot #	Date Opened	Expiration Date	Pre-Calibration Reading	Post-Calibration Reading	Calibration Acceptance Criteria
pH	4.00							± 0.10
	7.00							± 0.10
	10.00							± 0.10
Sp Cond (mS/cm)								± 10%
								± 10%
ORP (mV)								-----

WELL PURGING AND SAMPLING FIELD CONTROL LOG



Date: 100417 Well ID: DSA-MW-04
 Northings: 6314906.31
 Eastings: 520931.73

Project: Port Heiden Ground Water Sampling

Samplers: Lynn Spencer + Sheryl Wassillie

Depth of pump (ft, bgs): _____
 Depth of well (ft, TOC): _____
 Depth to water (ft, TOC): (previous) 67.20
 (current) 66.98

Screened Interval (ft, bgs): 92' → 97'
 Stickup Height (ft, ags): _____
 WL meter: APCS GMM 2
 Photo of Well: yes
 Filter Lot Number: NA

Field Meter Check

YSI Meter SN #: 2
 Battery Level: _____

Criteria for Calibration Check: Confidence solution ranges or pH ±0.1; Sp Cond ± 10%

Purge Start Time: 1245 Purge End Time: 1320 Trip Blank: _____

Field Instrument Readings

Criteria for Stable Parameters: pH ±0.1; Temp ± 3% (min ± 0.2 °C); Sp Cond ± 3%;
 DO ± 10% (0.3 mg/L); Turbidity ± 10%

	Time	WL (ft, ftop)	Flow (lpm)	Volume (gal)	Temp (deg C)	Cond (uS/cm)	DO (mg/L)	pH	ORP (mV)	Turbidity (ntu)
1	1250	67.04	>1.5	7.09	5.44	144	1.44	5.74	109.9	2.96
2	1255	67.06	>1.5	1.45	4.94	142	1.84	5.11	123.0	0.91
3	1300	66.99	>1.5	1.65	4.90	142	1.68	5.51	97.1	0.72
4	1305	66.97	>1.5	1.80	4.91	142	1.62	5.82	77.1	0.63
5	1310	67.00	>1.5	1.12	4.95	142	1.63	6.10	61.8	0.72
6	1315	66.99	>1.5	1.40	4.94	142	1.57	6.18	57.5	0.72
7	1320	66.99	>1.5	1.60	4.95	142	1.53	6.20	56.7	0.75
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										

Field Parameters Stable: yes, no Continued on Page 2: yes, no Purged Dry: yes, no
 Total Actual Volume: 1.60

Sample ID:

Root	Primary	MS/MSD
DSA-MW-04-100417	X	

Sample Date/Time: 100417; 1325 Pump: bladder

Sample Notes: Very noisy fast flow

Color: clear, amber, tan, brown, grey, milky white, other
 Odor: none, low, medium, high, very strong, hydrogen sulfide, petroleum, chemical?, unknown
 Turbidity: none, low, medium, high, very turbid, heavy silts

Field QC and date: Spencer 10/4/17 QC2 and date: [Signature]

WELL PURGING AND SAMPLING FIELD CONTROL LOG

Bottle Inventory:	8260B VOCs HCL 3 x 40 ml Glass extra	AK101 GRO HCL 3 X 40 ml Glass extra	AK102/103 DRO/RRO HCL 2 X 1L Glass extra	6010C Tot Iron/Mn HNO3 1 X 500ml Poly no	353.2/351.2 NO3/NO2 TKN H2SO4 1 X 500 ml Glass extra	2320B/300 Alk/Sulf None 1 X 250 ml Poly no			
MS/MSD Volume:									
TAm Volume:									
Sample Order:									
Bottle Count:	1	2	3	4	5	6	7	8	9

Casing Diameter (inches)	Schedule 40		Schedule 80	
	(gal/ft casing)	(liters/ft casing)	(gal/ft casing)	liters/ft casing)
1.5	0.092	0.348	0.086	0.327
2	0.163	0.617	0.153	0.579
4	0.656	2.483	0.597	2.26

Casing Diameter 2 inches:

Length of Casing (ft)	Sch 40	Sch 80	Sch 40	Sch 80	Length of Casing (ft)	Sch 40	Sch 80	Sch 40	Sch 80
	(gal)	(gal)	(L)	(L)		(ft)	(gal)	(gal)	(L)
1	0.16	0.15	0.62	0.58	16	2.61	2.45	9.87	9.27
2	0.33	0.31	1.23	1.16	17	2.77	2.60	10.49	9.84
3	0.49	0.46	1.85	1.74	18	2.93	2.75	11.11	10.42
4	0.65	0.61	2.47	2.32	19	3.10	2.91	11.72	11.00
5	0.82	0.77	3.08	2.90	20	3.26	3.06	12.34	11.58
6	0.98	0.92	3.70	3.47	21	3.42	3.21	12.96	12.16
7	1.14	1.07	4.32	4.05	22	3.59	3.37	13.57	12.74
8	1.30	1.22	4.94	4.63	23	3.75	3.52	14.19	13.32
9	1.47	1.38	5.55	5.21	24	3.91	3.67	14.81	13.90
10	1.63	1.53	6.17	5.79	25	4.08	3.83	15.42	14.48
11	1.79	1.68	6.79	6.37	26	4.24	3.98	16.04	15.06
12	1.96	1.84	7.40	6.95	27	4.40	4.13	16.66	15.64
13	2.12	1.99	8.02	7.53	28	4.56	4.28	17.27	16.21
14	2.28	2.14	8.64	8.11	29	4.73	4.44	17.89	16.79
15	2.45	2.30	9.25	8.69	30	4.89	4.59	18.51	17.37

	Time	WL (ft, ftop)	Flow (lpm)	Volume (gal)	pH	ORP (mV)	Temp (deg C)	Cond (mS/cm)	DO (mg/L)	Turbidity
20										
21										
22										
23										
24										
25										
26										
27										
28										

Water Parameter Meter Calibration Log (if necessary)

Parameter	Standard	True Value	Lot #	Date Opened	Expiration Date	Pre-Calibration Reading	Post-Calibration Reading	Calibration Acceptance Criteria
pH	4.00							± 0.10
	7.00							± 0.10
	10.00							± 0.10
Sp Cond (mS/cm)								± 10%
								± 10%
ORP (mV)								-----

WELL PURGING AND SAMPLING FIELD CONTROL LOG



Date: 100417 Well ID: DSA-MW-02
 Northings: 6314977.64
 Eastings: 520907.4

Project Port Heiden Ground Water Sampling
 Samplers: Leopold & S. Wossilize

Depth of pump (ft, bgs): _____
 Depth of well (ft, TOC): _____
 Depth to water (ft, TOC): (previous) 53.32
 (current) 54.70

Screened Interval (ft, bgs): 45' → 58'
 Stickup Height (ft, ags): _____
 WL meter: RACS GNL-2
 Photo of Well: yes
 Filter Lot Number: NA

Field Meter Check YSI Meter SN #: 7
 Battery Level: _____

Criteria for Calibration Check: Confidence solution ranges or pH ±0.1; Sp Cond ± 10%

Purge Start Time: 1040 Purge End Time: 1260 Trip Blank: _____

Field Instrument Readings Criteria for Stable Parameters: pH ±0.1; Temp ± 3% (min ± 0.2 °C); Sp Cond ± 3%;
 DO ± 10% (0.3 mg/L); Turbidity ± 10%

	Time	WL (ft, ftop)	Flow (lpm)	Volume (gal)	Temp (deg C)	Cond (uS/cm)	DO (mg/L)	pH	ORP (mV)	Turbidity (ntu)
1	1100	54.78	~1.0	.1	6.79	167	11.09	2.30	382.0	2.64
2	1105	54.80	~1.0	.2	6.42	157	10.79	2.89	342.3	2.68
3	1110	54.80	~1.0	.3	6.27	154	11.04	3.28	317.0	2.66
4	1115	54.79	~1.0	.35	6.18	152	10.64	3.71	290.0	1.78
5	1120	54.79	~1.0	.40	6.23	151	10.91	4.28	259.0	1.50
6	1125	54.78	~1.0	.50	6.25	151	10.99	4.97	221.0	1.82
7	1130	54.78	~1.0	.55	6.24	151	10.85	5.23	206.0	1.67
8	1135	54.77	~1.0	.60	6.25	151	10.94	5.54	190.1	1.37
9	1140	54.77	~1.0	.65	6.29	151	10.83	5.83	174.1	1.39
10	1145	54.76	~1.0	.70	6.30	151	10.82	6.03	163.6	1.11
11	1150	54.76	~1.0	.76	6.33	151	10.91	6.21	153.8	1.00
12	1155	54.76	~1.0	.80	6.31	151	10.88	6.25	151.7	.97
13	1200	54.77	~1.0	.85	6.30	151	10.87	6.29	150.8	
14										
15										
16										
17										
18										
19										

Field Parameters Stable: yes, no Continued on Page 2: yes, no Purged Dry: yes, no
 Total Actual Volume: .85

Sample ID:

Root	Primary	MS/MSD
<u>DSA-MW-02-100417</u>	<u>X</u>	

Sample Date/Time: 100417; 1205 Pump: bladder

Sample Notes: _____

Color: clear, amber, tan, brown, grey, milky white, other
 Odor: none, low, medium, high, very strong, hydrogen sulfide, petroleum, chemical?, unknown
 Turbidity: none, low, medium, high, very turbid, heavy silts

Field QC and date Leopold QC2 and date 11/20/17

WELL PURGING AND SAMPLING FIELD CONTROL LOG

Bottle Inventory:	8260B VOCs HCL 3 x 40 ml Glass extra	AK101 GRO HCL 3 X 40 ml Glass extra	AK102/103 DRO/RRO HCL 2 X 1L Glass extra	6010C Tot Iron/Mn HNO3 Poly no 1 X 500ml	353.2/351.2 NO3/NO2 TKN H2SO4 Glass extra 3 X 500 ml	2320B/300 Alk/Sulf None Poly no 1 X 250 ml			
MS/MSD Volume:									
TAm Volume:									
Sample Order:	1	2	3	4	5	6	7	8	9
Bottle Count:									

Casing Diameter (inches)	Schedule 40		Schedule 80	
	(gal/ft casing)	(liters/ft casing)	(gal/ft casing)	(liters/ft casing)
1.5	0.092	0.348	0.086	0.327
2	0.163	0.617	0.153	0.579
4	0.656	2.483	0.597	2.26

Casing Diameter 2 inches:

Length of Casing (ft)	Sch 40	Sch 80	Sch 40	Sch 80	Length of Casing (ft)	Sch 40	Sch 80	Sch 40	Sch 80
	(gal)	(gal)	(L)	(L)		(ft)	(gal)	(gal)	(L)
1	0.16	0.15	0.62	0.58	16	2.61	2.45	9.87	9.27
2	0.33	0.31	1.23	1.16	17	2.77	2.60	10.49	9.84
3	0.49	0.46	1.85	1.74	18	2.93	2.75	11.11	10.42
4	0.65	0.61	2.47	2.32	19	3.10	2.91	11.72	11.00
5	0.82	0.77	3.08	2.90	20	3.26	3.06	12.34	11.58
6	0.98	0.92	3.70	3.47	21	3.42	3.21	12.96	12.16
7	1.14	1.07	4.32	4.05	22	3.59	3.37	13.57	12.74
8	1.30	1.22	4.94	4.63	23	3.75	3.52	14.19	13.32
9	1.47	1.38	5.55	5.21	24	3.91	3.67	14.81	13.90
10	1.63	1.53	6.17	5.79	25	4.08	3.83	15.42	14.48
11	1.79	1.68	6.79	6.37	26	4.24	3.98	16.04	15.06
12	1.96	1.84	7.40	6.95	27	4.40	4.13	16.66	15.64
13	2.12	1.99	8.02	7.53	28	4.56	4.28	17.27	16.21
14	2.28	2.14	8.64	8.11	29	4.73	4.44	17.89	16.79
15	2.45	2.30	9.25	8.69	30	4.89	4.59	18.51	17.37

	Time	WL (ft, top)	Flow (lpm)	Volume (gal)	pH	ORP (mV)	Temp (deg C)	Cond (mS/cm)	DO (mg/L)	Turbidity
20										
21										
22										
23										
24										
25										
26										
27										
28										

Water Parameter Meter Calibration Log (if necessary)

Parameter	Standard	True Value	Lot #	Date Opened	Expiration Date	Pre-Calibration Reading	Post-Calibration Reading	Calibration Acceptance Criteria
pH	4.00							± 0.10
	7.00							± 0.10
	10.00							± 0.10
Sp Cond (mS/cm)								± 10%
ORP (mV)								-----

WELL PURGING AND SAMPLING FIELD CONTROL LOG



Date: 1004/17 Well ID: DSA-MW-02
 Northings: 631491538
 Eastings: 520937.64

Project Port Heiden Ground Water Sampling

Samplers: L Spencer S. Nassir

Depth of pump (ft, bgs): _____
 Depth of well (ft, TOC): _____
 Depth to water (ft, TOC): (previous) 62.88
 (current) 64.06

Screened Interval (ft, bgs): 57.5' -> 67.5'
 Stickup Height (ft, ags): _____
 WL meter: APCS GWL 2
 Photo of Well: yes
 Filter Lot Number: NA

Field Meter Check

YSI Meter SN #: 1

Battery Level: _____

Criteria for Calibration Check: Confidence solution ranges or pH ±0.1; Sp Cond ± 10%

Purge Start Time: 1550 Purge End Time: 1635 Trip Blank: _____

Field Instrument Readings

Criteria for Stable Parameters: pH ±0.1; Temp ± 3% (min ± 0.2 °C); Sp Cond ± 3%;
 DO ± 10% (0.3 mg/L); Turbidity ± 10%

	Time	WL (ft, ftop)	Flow (lpm)	Volume (gal)	Temp (deg C)	Cond (uS/cm)	DO (mg/L)	pH	ORP (mV)	Turbidity (ntu)
1	1625	64.65	2.5	.35	7.78	2.14	8.34	6.24	96.8	22.7
2	1630	64.64	2.5	.40	7.75	2.14	8.36	6.31	93.9	23.5
3	1635	64.71	7.5	.50	7.77	2.13	8.31	6.32	93.6	22.5
4										
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										

Field Parameters Stable: yes/no Continued on Page 2: yes/no Purged Dry: yes/no
 Total Actual Volume: .50

Sample ID:	Root	Primary	MS/MSD
	DSA-MW-02-100417	X	

Sample Date/Time: 100417; 1640
 Sample Notes: _____

Pump: bladder

Color: clear, amber, tan, brown, grey, milky white, other
 Odor: none, low, medium, high, very strong, hydrogen sulfide, petroleum, chemical?, unknown
 Turbidity: none, low, medium, high, very turbid, heavy silts

Field QC and date: Spencer 100417 QC2 and date: [Signature] 11/20/17

WELL PURGING AND SAMPLING FIELD CONTROL LOG

Bottle Inventory:

8260B VOCs HCL 3 x 40 ml Glass extra 6 X 40 ml 1	AK101 GRO HCL 3 X 40 ml Glass extra 6 X 40 ml 2	AK102/103 DRO/RRO HCL 2 X 1L Glass extra 6 X 1L 3	6010C Tot Iron/Mn HNO3 1 X 500ml Poly no 1 X 500 ml 4	353.2/351.2 NO3/NO2 TKN H2SO4 1 X 500 ml Glass extra 3 X 500 ml 5	2320B/300 Alk/Sulf None 1 X 250 ml Poly no 1 X 250 ml 6	7	8	9
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MS/MSD Volume:

TAm Volume:

Sample Order:

Bottle Count:

Casing Diameter (inches)	Schedule 40		Schedule 80	
	(gal/ft casing)	(liters/ft casing)	(gal/ft casing)	liters/ft casing)
1.5	0.092	0.348	0.086	0.327
2	0.163	0.617	0.153	0.579
4	0.656	2.483	0.597	2.26

Casing Diameter 2 inches:

Length of Casing (ft)	Sch 40	Sch 80	Sch 40	Sch 80	Length of Casing (ft)	Sch 40	Sch 80	Sch 40	Sch 80
	(gal)	(gal)	(L)	(L)		(ft)	(gal)	(gal)	(L)
1	0.16	0.15	0.62	0.58	16	2.61	2.45	9.87	9.27
2	0.33	0.31	1.23	1.16	17	2.77	2.60	10.49	9.84
3	0.49	0.46	1.85	1.74	18	2.93	2.75	11.11	10.42
4	0.65	0.61	2.47	2.32	19	3.10	2.91	11.72	11.00
5	0.82	0.77	3.08	2.90	20	3.26	3.06	12.34	11.58
6	0.98	0.92	3.70	3.47	21	3.42	3.21	12.96	12.16
7	1.14	1.07	4.32	4.05	22	3.59	3.37	13.57	12.74
8	1.30	1.22	4.94	4.63	23	3.75	3.52	14.19	13.32
9	1.47	1.38	5.55	5.21	24	3.91	3.67	14.81	13.90
10	1.63	1.53	6.17	5.79	25	4.08	3.83	15.42	14.48
11	1.79	1.68	6.79	6.37	26	4.24	3.98	16.04	15.06
12	1.96	1.84	7.40	6.95	27	4.40	4.13	16.66	15.64
13	2.12	1.99	8.02	7.53	28	4.56	4.28	17.27	16.21
14	2.28	2.14	8.64	8.11	29	4.73	4.44	17.89	16.79
15	2.45	2.30	9.25	8.69	30	4.89	4.59	18.51	17.37

Time	WL (ft, ftop)	Flow (lpm)	Volume (gal)	pH	ORP (mV)	Temp (deg C)	Cond (mS/cm)	DO (mg/L)	Turbidity
20									
21									
22									
23									
24									
25									
26									
27									
28									

Water Parameter Meter Calibration Log (if necessary)

Parameter	Standard	True Value	Lot #	Date Opened	Expiration Date	Pre-Calibration Reading	Post-Calibration Reading	Calibration Acceptance Criteria
pH	4.00							± 0.10
	7.00							± 0.10
	10.00							± 0.10
Sp Cond (mS/cm)								± 10%
								± 10%
ORP (mV)								-----

WELL PURGING AND SAMPLING FIELD CONTROL LOG



APC SERVICES LLC
A Subsidiary of Alaska Peninsula Corporation

Date: 100317 Well ID: RRS-MW-02
Northings: 6314793.94
Eastings: 521136.69

Project Port Heiden Ground Water Sampling

Samplers: L Spencer & Jerry Massillie

Depth of pump (ft, bgs): _____
Depth of well (ft, TOC): 65
Depth to water (ft, TOC): (previous) 57.97
(current) 59.710

Screened Interval (ft, bgs): 52.5 - 62.5
Stickup Height (ft, ags): _____
WL meter: APCS GWL 2
Photo of Well: yes
Filter Lot Number: NA

Field Meter Check YSI Meter SN #: 3
Battery Level: _____

Criteria for Calibration Check: Confidence solution ranges or pH ± 0.1 ; Sp Cond $\pm 10\%$

Purge Start Time: 1318 Purge End Time: 1440 Trip Blank: _____

Field Instrument Readings Criteria for Stable Parameters: pH ± 0.1 ; Temp $\pm 3\%$ (min ± 0.2 °C); Sp Cond $\pm 3\%$;
DO $\pm 10\%$ (0.3 mg/L); Turbidity $\pm 10\%$

	Time	WL (ft, ftop)	Flow (lpm)	Volume (gal)	Temp (deg C)	Cond (uS/cm)	DO (mg/L)	pH	ORP (mV)	Turbidity (ntu)
1	1340	59.88	.75	0.1	6.47	104	11.00	1.84	373.6	20.4
2	1345	59.80	1.0	.2	6.37	94	10.92	3.18	296.5	3.04
3	1350	59.79	1.0	.4	6.09	91	11.09	3.57	2733	3.15
4	1355	59.79	1.0	.5	5.88	89	11.15	3.69	266.2	2.57
5	1400	59.79	1.0	.51	5.76	88	11.16	4.22	236.6	2.33
6	1405	59.79	1.0	.52	5.77	88	11.16	4.52	222.1	1.99
7	1410	59.79	1.0	.70	5.76	88	11.15	5.03	194.4	1.73
8	1415	59.77	1.0	1.0	5.73	88	11.04	5.44	174.8	1.74
9	1420	59.79	1.0	1.15	5.61	88	11.16	5.64	165.3	1.44
10	1430	59.79	1.0	1.25	5.60	88	11.05	5.63	161.6	1.47
11	1435	59.79	1.0	1.30	5.61	88	11.05	5.65	165.6	1.42
12	1440	59.79	1.0	1.40	5.61	88	11.08	5.68	169.2	1.47
13										
14										
15										
16										
17										
18										
19										

Field Parameters Stable: (yes) no Continued on Page 2: yes, no () Purged Dry: yes, no ()
Total Actual Volume: 1.40

Sample ID:	Root	Primary	MS/MSD
	<u>RRS-MW-02-100317</u>	<u>X</u>	<u>N</u>

Sample Date/Time: 100317; 1445 Pump: bladder

Sample Notes

Color: clear, amber, tan, brown, grey, milky white, other
Odor: none, low, medium, high, very strong, hydrogen sulfide, petroleum, chemical?, unknown
Turbidity: none, low, medium, high, very turbid, heavy silts

Field QC and date Spencer 100317 QC2 and date Greg Dupuis 11/20/17

WELL PURGING AND SAMPLING FIELD CONTROL LOG

Bottle Inventory:	8260B VOCs HCL 3 x 40 ml Glass extra 6 X 40 ml 1	AK101 GRO HCL 3 X 40 ml Glass extra 6 X 40 ml 2	AK102/103 DRO/RRO HCL 2 X 1L Glass extra 6 X 1L 3	6010C Tot Iron/Mn HNO3 1 X 500ml Poly no 1 X 500 ml 4	353.2/351.2 NO3/NO2 TrN H2SO4 1 X 500 ml Glass extra 3 X 500 ml 5	2320B/300 Alk/Sulf None 1 X 250 ml Poly no 1 X 250 ml 6	7	8	9
MS/MSD Volume:									
TAm Volume:									
Sample Order:									
Bottle Count:									

Casing Diameter (inches)	Schedule 40		Schedule 80	
	(gal/ft casing)	(liters/ft casing)	(gal/ft casing)	(liters/ft casing)
1.5	0.092	0.348	0.086	0.327
2	0.163	0.617	0.153	0.579
4	0.656	2.483	0.597	2.26

Casing Diameter 2 inches:

Length of Casing (ft)	Casing Diameter 2 inches				Length of Casing (ft)	Casing Diameter 2 inches			
	Sch 40 (gal)	Sch 80 (gal)	Sch 40 (L)	Sch 80 (L)		Sch 40 (gal)	Sch 80 (gal)	Sch 40 (L)	Sch 80 (L)
1	0.16	0.15	0.62	0.58	16	2.61	2.45	9.87	9.27
2	0.33	0.31	1.23	1.16	17	2.77	2.60	10.49	9.84
3	0.49	0.46	1.85	1.74	18	2.93	2.75	11.11	10.42
4	0.65	0.61	2.47	2.32	19	3.10	2.91	11.72	11.00
5	0.82	0.77	3.08	2.90	20	3.26	3.06	12.34	11.58
6	0.98	0.92	3.70	3.47	21	3.42	3.21	12.96	12.16
7	1.14	1.07	4.32	4.05	22	3.59	3.37	13.57	12.74
8	1.30	1.22	4.94	4.63	23	3.75	3.52	14.19	13.32
9	1.47	1.38	5.55	5.21	24	3.91	3.67	14.81	13.90
10	1.63	1.53	6.17	5.79	25	4.08	3.83	15.42	14.48
11	1.79	1.68	6.79	6.37	26	4.24	3.98	16.04	15.06
12	1.96	1.84	7.40	6.95	27	4.40	4.13	16.66	15.64
13	2.12	1.99	8.02	7.53	28	4.56	4.28	17.27	16.21
14	2.28	2.14	8.64	8.11	29	4.73	4.44	17.89	16.79
15	2.45	2.30	9.25	8.69	30	4.89	4.59	18.51	17.37

	Time	WL (ft, ftop)	Flow (lpm)	Volume (gal)	pH	ORP (mV)	Temp (deg C)	Cond (mS/cm)	DO (mg/L)	Turbidity
20										
21										
22										
23										
24										
25										
26										
27										
28										

Water Parameter Meter Calibration Log (if necessary)

Parameter	Standard	True Value	Lot #	Date Opened	Expiration Date	Pre-Calibration Reading	Post-Calibration Reading	Calibration Acceptance Criteria
pH	4.00							± 0.10
	7.00							± 0.10
	10.00							± 0.10
Sp Cond (mS/cm)								± 10%
								± 10%
ORP (mV)								-----

WELL PURGING AND SAMPLING FIELD CONTROL LOG



Date: 10/03/17 Well ID: FPC 066 NW 04
 Northings: 6309057
 Eastings: 520584

Project: Port Heiden Ground Water Sampling

Samplers: Lynn Spencer + Slava Wassilie

Depth of pump (ft, bgs): 0
 Depth of well (ft, TOC): _____
 Depth to water (ft, TOC): (previous) 6.09
 (current) 6.12

Screened Interval (ft, bgs): 2' - 12.5'
 Stickup Height (ft, ags): _____
 WL meter: APCS GWH.2
 Photo of Well: yes
 Filter Lot Number: NA

Field Meter Check

YSI Meter SN #: 1

Battery Level: _____

Criteria for Calibration Check: Confidence solution ranges or pH ± 0.1 ; Sp Cond $\pm 10\%$

Purge Start Time: 1650 Purge End Time: 1720 Trip Blank: _____

Field Instrument Readings

Criteria for Stable Parameters: pH ± 0.1 ; Temp $\pm 3\%$ (min ± 0.2 °C); Sp Cond $\pm 3\%$;
 DO $\pm 10\%$ (0.3 mg/L); Turbidity $\pm 10\%$

	Time	WL (ft, ftop)	Flow (lpm)	Volume (gal)	Temp (deg C)	Cond (uS/cm)	DO (mg/L)	pH	ORP (mV)	Turbidity (ntu)
1	1705	6.14	<.5	0	8.22	81	7.12	6.43	105.8	12.5
2	1710	6.14	<.5	.08	8.23	80	6.98	6.44	105.3	13.4
3	1715	6.12	<.5	.15	8.18	79	6.73	6.42	106.9	13.3
4	1720	6.13	<.5	.20	8.14	79	6.85	6.41	107.3	14.2
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										

Field Parameters Stable: yes, no Continued on Page 2: yes, no Purged Dry: yes, no

Total Actual Volume: .20

Sample ID: FPC-066-MW-24-100317-1810 (Dup)

Root	Primary	MS/MSD
<u>FPC-066-MW04-100317</u>	<u>X</u>	<u>X</u>

Sample Date/Time: 100317; 1725 Pump: bladder

Sample Notes: MSMSD taken + duplicate

Color: clear, amber, tan, brown, grey, milky white, other

Odor: none, low, medium, high, very strong, hydrogen sulfide, petroleum, chemical?, unknown

Turbidity: none, low, medium, high, very turbid, heavy silts

Field QC and date L. Spencer 100317 QC2 and date [Signature] 11/20/17

WELL PURGING AND SAMPLING FIELD CONTROL LOG

Bottle Inventory:	8260B VOCs HCL 3 x 40 ml Glass extra 6 X 40 ml 1	AK101 GRO HCL 3 X 40 ml Glass extra 6 X 40 ml 2	AK102/103 DRO/RRO HCL 2 X 1L Glass extra 6 X 1L 3	6010C Tot Iron/Mn HNO3 Poly no 1 X 500 ml 4	353.2/351.2 NO3/NO2 TKN H2SO4 Glass extra 3 X 500 ml 5	2320B/300 Alk/Sulf None Poly no 1 X 250 ml 6	7	8	9
MS/MSD Volume:									
TAm Volume:									
Sample Order:									
Bottle Count:									

Casing Diameter (inches)	Schedule 40		Schedule 80	
	(gal/ft casing)	(liters/ft casing)	(gal/ft casing)	liters/ft casing)
1.5	0.092	0.348	0.086	0.327
2	0.163	0.617	0.153	0.579
4	0.656	2.483	0.597	2.26

Casing Diameter 2 inches: _____

Length of Casing (ft)	Sch 40	Sch 80	Sch 40	Sch 80	Length of Casing (ft)	Sch 40	Sch 80	Sch 40	Sch 80
	(gal)	(gal)	(L)	(L)		(gal)	(gal)	(L)	(L)
1	0.16	0.15	0.62	0.58	16	2.61	2.45	9.87	9.27
2	0.33	0.31	1.23	1.16	17	2.77	2.60	10.49	9.84
3	0.49	0.46	1.85	1.74	18	2.93	2.75	11.11	10.42
4	0.65	0.61	2.47	2.32	19	3.10	2.91	11.72	11.00
5	0.82	0.77	3.08	2.90	20	3.26	3.06	12.34	11.58
6	0.98	0.92	3.70	3.47	21	3.42	3.21	12.96	12.16
7	1.14	1.07	4.32	4.05	22	3.59	3.37	13.57	12.74
8	1.30	1.22	4.94	4.63	23	3.75	3.52	14.19	13.32
9	1.47	1.38	5.55	5.21	24	3.91	3.67	14.81	13.90
10	1.63	1.53	6.17	5.79	25	4.08	3.83	15.42	14.48
11	1.79	1.68	6.79	6.37	26	4.24	3.98	16.04	15.06
12	1.96	1.84	7.40	6.95	27	4.40	4.13	16.66	15.64
13	2.12	1.99	8.02	7.53	28	4.56	4.28	17.27	16.21
14	2.28	2.14	8.64	8.11	29	4.73	4.44	17.89	16.79
15	2.45	2.30	9.25	8.69	30	4.89	4.59	18.51	17.37

Time	WL (ft. top)	Flow (lpm)	Volume (gal)	pH	ORP (mV)	Temp (deg C)	Cond (mS/cm)	DO (mg/L)	Turbidity
20									
21									
22									
23									
24									
25									
26									
27									
28									

Water Parameter Meter Calibration Log (if necessary)

Parameter	Standard	True Value	Lot #	Date Opened	Expiration Date	Pre-Calibration Reading	Post-Calibration Reading	Calibration Acceptance Criteria
pH	4.00							± 0.10
	7.00							± 0.10
	10.00							± 0.10
Sp Cond (mS/cm)								± 10%
								± 10%
ORP (mV)								-----

WELL PURGING AND SAMPLING FIELD CONTROL LOG



Date: 100217 Well ID: RRS-MW-06
 Northings: 6314769.31
 Eastings: 520921.19

Project Port Heiden Ground Water Sampling

Samplers: L. Spencer, S. W. Jassillie

Depth of pump (ft, bgs): _____
 Depth of well (ft, TOC): _____
 Depth to water (ft, TOC): (previous) 58.15
 (current) 59.34

Screened Interval (ft, bgs): 55' - 65'
 Stickup Height (ft, ags): _____
 WL meter: APCS GWL 2
 Photo of Well: _____
 Filter Lot Number: NA

Field Meter Check YSI Meter SN #: 3
 Battery Level: _____

Criteria for Calibration Check: Confidence solution ranges or pH ± 0.1 ; Sp Cond $\pm 10\%$

Purge Start Time: 1225 Purge End Time: 1250 Trip Blank: _____

Field Instrument Readings Criteria for Stable Parameters: pH ± 0.1 ; Temp $\pm 3\%$ (min ± 0.2 °C); Sp Cond $\pm 3\%$;
 DO $\pm 10\%$ (0.3 mg/L); Turbidity $\pm 10\%$

	Time	WL (ft, ftop)	Flow (lpm)	Volume (gal)	Temp (deg C)	Cond (uS/cm)	DO (mg/L)	pH	ORP (mV)	Turbidity (ntu)
1	1235	59.53	71.0	.01	6.24	224	10.75	6.27	230.6	3.2
2	1240	59.56	71.0	.37	6.50	204	9.80	6.44	218.3	2.23
3	1245	59.56	71.0	.50	6.46	201	9.74	6.46	213.5	2.162
4	1250	59.57	71.0	.65	6.48	200	9.67	6.47	208.4	2.91
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										

Field Parameters Stable: yes, no Continued on Page 2: yes, no Purged Dry: yes, no

Total Actual Volume: 1250 25
1659

Sample ID:

Root	Primary	MS/MSD
RRS-MW-06-100217	X	

Sample Date/Time: 100217 1255 Pump: bladder

Sample Notes: very fast purge rate / flow

Color: clear, amber, tan, brown, grey, milky white, other
 Odor: none, low, medium, high, very strong, hydrogen sulfide, petroleum, chemical?, unknown
 Turbidity: none, low, medium, high, very turbid, heavy silts

Field QC and date Spencer 100217 QC2 and date Greg Dubois 11/20/17

WELL PURGING AND SAMPLING FIELD CONTROL LOG

Bottle Inventory:	8260B VOCs HCL 3 x 40 ml Glass extra 6 X 40 ml 1	AK101 GRO HCL 3 X 40 ml Glass extra 6 X 40 ml 2	AK102/103 DRO/RRO HCL 2 X 1L Glass extra 6 X 1L 3	6010C Tot Iron/Mn HNO3 1 X 500ml Poly no 1 X 500 ml 4	353.2/351.2 NO3/NO2 TRN H2SO4 1 X 500 ml Glass extra 3 X 500 ml 5	2320B/300 Alk/Sulf None 1 X 250 ml Poly no 1 X 250 ml 6	7	8	9
MS/MSD Volume:									
TAm Volume:									
Sample Order:									
Bottle Count:									

Casing Diameter (inches)	Schedule 40		Schedule 80	
	(gal/ft casing)	(liters/ft casing)	(gal/ft casing)	(liters/ft casing)
1.5	0.092	0.348	0.086	0.327
2	0.163	0.617	0.153	0.579
4	0.656	2.483	0.597	2.26

Casing Diameter 2 inches: _____

Length of Casing (ft)	Sch 40	Sch 80	Sch 40	Sch 80	Length of Casing (ft)	Sch 40	Sch 80	Sch 40	Sch 80
	(gal)	(gal)	(L)	(L)		(ft)	(gal)	(gal)	(L)
1	0.16	0.15	0.62	0.58	16	2.61	2.45	9.87	9.27
2	0.33	0.31	1.23	1.16	17	2.77	2.60	10.49	9.84
3	0.49	0.46	1.85	1.74	18	2.93	2.75	11.11	10.42
4	0.65	0.61	2.47	2.32	19	3.10	2.91	11.72	11.00
5	0.82	0.77	3.08	2.90	20	3.26	3.06	12.34	11.58
6	0.98	0.92	3.70	3.47	21	3.42	3.21	12.96	12.16
7	1.14	1.07	4.32	4.05	22	3.59	3.37	13.57	12.74
8	1.30	1.22	4.94	4.63	23	3.75	3.52	14.19	13.32
9	1.47	1.38	5.55	5.21	24	3.91	3.67	14.81	13.90
10	1.63	1.53	6.17	5.79	25	4.08	3.83	15.42	14.48
11	1.79	1.68	6.79	6.37	26	4.24	3.98	16.04	15.06
12	1.96	1.84	7.40	6.95	27	4.40	4.13	16.66	15.64
13	2.12	1.99	8.02	7.53	28	4.56	4.28	17.27	16.21
14	2.28	2.14	8.64	8.11	29	4.73	4.44	17.89	16.79
15	2.45	2.30	9.25	8.69	30	4.89	4.59	18.51	17.37

	Time	WL (ft. ftop)	Flow (lpm)	Volume (gal)	pH	ORP (mV)	Temp (deg C)	Cond (mS/cm)	DO (mg/L)	Turbidity
20										
21										
22										
23										
24										
25										
26										
27										
28										

Water Parameter Meter Calibration Log (if necessary)

Parameter	Standard	True Value	Lot #	Date Opened	Expiration Date	Pre-Calibration Reading	Post-Calibration Reading	Calibration Acceptance Criteria
pH	4.00							± 0.10
	7.00							± 0.10
	10.00							± 0.10
Sp Cond (mS/cm)								± 10%
								± 10%
ORP (mV)								-----

WELL PURGING AND SAMPLING FIELD CONTROL LOG



Date: 100217 Well ID: FPC 215 MW 12
 Northings: 6312830.37
 Eastings: 521918.96

Project Port Heiden Ground Water Sampling

Samplers: L Spencer S Wassilie

Depth of pump (ft, bgs): _____ Screened Interval (ft, bgs): 7' → 17'
 Depth of well (ft, TOC): _____ Stickup Height (ft, ags): _____
 Depth to water (ft, TOC): (previous) 12.78 (notch) WL meter: APCS GWL 2
 (current) 14.42 (notch) Photo of Well: _____
14.43 (notch) Filter Lot Number: NA
 YSI Meter SN #: _____
 Battery Level: _____

Field Meter Check

Criteria for Calibration Check: Confidence solution ranges or pH ±0.1; Sp Cond ± 10%

Purge Start Time: 1400 Purge End Time: 1500 Trip Blank: _____

Field Instrument Readings Criteria for Stable Parameters: pH ±0.1; Temp ± 3% (min ± 0.2 °C); Sp Cond ± 3%;
 DO ± 10% (0.3 mg/L); Turbidity ± 10%

	Time	WL (ft, ftop)	Flow (lpm)	Volume (gal)	Temp (deg C)	Cond (uS/cm)	DO (mg/L)	pH	ORP (mV)	Turbidity (ntu)
1	1425	14.61	<.2	0	10.24	116	4.30	6.77	182.1	5.64
2	1430	14.66	<.2	.01	10.41	116	4.38	6.77	179.4	3.75
3	1435	14.69	<.2	.08	10.63	118	4.31	6.76	177.3	5.52
4	1440	14.70	<.2	.10	10.66	120	3.78	6.74	175.5	3.79
5	1445	14.72	<.2	.12	10.69	121	3.44	6.73	176.0	3.82
6	1450	14.76	<.2	.14	10.80	122	3.21	6.72	175.8	3.84
7	1455	14.78	<.2	.16	10.86	122	3.05	6.72	175.1	3.54
8	1500	14.80	<.2	.20	10.91	121	3.12	6.71	175.1	3.59
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										

Field Parameters Stable: yes, no _____ Continued on Page 2: yes, no _____ Purged Dry: yes, no _____
 Total Actual Volume: .20

Sample ID:

Root	Primary	MS/MSD
<u>FPC-215-MW12-100217</u>	<u>X</u>	

Sample Date/Time: 100217 1505 Pump: bladder

Sample Notes: Very slow purge rate
1600 - 1 liter Amber filled, 1700 2nd liter filled

Color: clear, amber, tan, brown, grey, milky white, other _____
 Odor: none, low, medium, high, very strong, hydrogen sulfide, petroleum, chemical?, unknown _____
 Turbidity: none, low, medium, high, very turbid, heavy silts _____

Field QC and date Spencer 100217 QC2 and date Greg Dupuis 11/20/17

WELL PURGING AND SAMPLING FIELD CONTROL LOG

Bottle Inventory:

	8260B VOCs HCL 3 X 40 ml Glass extra 6 X 40 ml 1	AK101 GRO HCL 3 X 40 ml Glass extra 6 X 40 ml 2	AK102/103 DRO/RRO HCL 2 X 1L Glass extra 6 X 1L 3	6010C Tot Iron/Mn HNO3 Poly no 1 X 500 ml 4	353.2/351.2 NO3/NO2 TKN H2SO4 Glass extra 3 X 500 ml 5	2320B/300 Alk/Sulf None Poly no 1 X 250 ml 6	7	8	9
--	---	--	--	---	--	--	---	---	---

MS/MSD Volume:
TAm Volume:
Sample Order:
Bottle Count:

Casing Diameter (inches)	Schedule 40		Schedule 80	
	(gal/ft casing)	(liters/ft casing)	(gal/ft casing)	(liters/ft casing)
1.5	0.092	0.348	0.086	0.327
2	0.163	0.617	0.153	0.579
4	0.656	2.483	0.597	2.26

Casing Diameter 2 inches:

Length of Casing (ft)	Sch 40	Sch 80	Sch 40	Sch 80	Length of Casing (ft)	Sch 40	Sch 80	Sch 40	Sch 80
	(gal)	(gal)	(L)	(L)		(ft)	(gal)	(gal)	(L)
1	0.16	0.15	0.62	0.58	16	2.61	2.45	9.87	9.27
2	0.33	0.31	1.23	1.16	17	2.77	2.60	10.49	9.84
3	0.49	0.46	1.85	1.74	18	2.93	2.75	11.11	10.42
4	0.65	0.61	2.47	2.32	19	3.10	2.91	11.72	11.00
5	0.82	0.77	3.08	2.90	20	3.26	3.06	12.34	11.58
6	0.98	0.92	3.70	3.47	21	3.42	3.21	12.96	12.16
7	1.14	1.07	4.32	4.05	22	3.59	3.37	13.57	12.74
8	1.30	1.22	4.94	4.63	23	3.75	3.52	14.19	13.32
9	1.47	1.38	5.55	5.21	24	3.91	3.67	14.81	13.90
10	1.63	1.53	6.17	5.79	25	4.08	3.83	15.42	14.48
11	1.79	1.68	6.79	6.37	26	4.24	3.98	16.04	15.06
12	1.96	1.84	7.40	6.95	27	4.40	4.13	16.66	15.64
13	2.12	1.99	8.02	7.53	28	4.56	4.28	17.27	16.21
14	2.28	2.14	8.64	8.11	29	4.73	4.44	17.89	16.79
15	2.45	2.30	9.25	8.69	30	4.89	4.59	18.51	17.37

Time	WL (ft. ftop)	Flow (lpm)	Volume (gal)	pH	ORP (mV)	Temp (deg C)	Cond (mS/cm)	DO (mg/L)	Turbidity
20									
21									
22									
23									
24									
25									
26									
27									
28									

Water Parameter Meter Calibration Log (if necessary)

Parameter	Standard	True Value	Lot #	Date Opened	Expiration Date	Pre-Calibration Reading	Post-Calibration Reading	Calibration Acceptance Criteria
pH	4.00							± 0.10
	7.00							± 0.10
	10.00							± 0.10
Sp Cond (mS/cm)								± 10%
								± 10%
ORP (mV)								-----

WELL PURGING AND SAMPLING FIELD CONTROL LOG



Date: 093017 Well ID: DSA-MW-05
 Northings: 6314968.99
 Eastings: 520904.89
 Project Port: Hidden Ground Water Sampling
 Samplers: L. Spencer, S. Wassilie
 Depth of pump (ft, bgs): _____
 Depth of well (ft, TOC): _____
 Depth to water (ft, TOC): (previous) 58.51
 (current) 58.50
 Screened Interval (ft, bgs): 82' → 87'
 Stickup Height (ft, ags): _____
 WL meter: APCS GWL 2
 Photo of Well: _____
 Filter Lot Number: NA

Field Meter Check YSI Meter SN #: 1
 Battery Level: _____
 Criteria for Calibration Check: Confidence solution ranges or pH ±0.1; Sp Cond ± 10%
 Purge Start Time: 1920 Purge End Time: 2020 Trip Blank: _____

Field Instrument Readings Criteria for Stable Parameters: pH ±0.1; Temp ± 3% (min ± 0.2 °C); Sp Cond ± 3%;
 DO ± 10% (0.3 mg/L); Turbidity ± 10%

	Time	WL (ft, ftop)	Flow (lpm)	Volume (gal)	Temp (deg C)	Cond (uS/cm)	DO (mg/L)	pH	ORP (mV)	Turbidity (ntu)
1	1935	59.31	1.5	.05	5.31	119	3.27	6.09	131.	1.78
2	1940	60.05	1.5	.20	4.87	117	1.62	6.08	110.8	1.19
3	1945	60.20	1.5	.35	4.83	116	1.61	6.20	93.1	1.19
4	1930	60.24	1.5	.45	4.84	116	1.40	6.30	82.4	0.74
5	1955	60.26	1.5	.55	4.77	116	1.49	6.31	83.3	0.75
6	2000	60.26	1.5	.65	4.64	116	1.20	6.33	67.1	.94
7	2005	60.26	1.5	.75	4.45	115	1.60	6.29	59.8	.52
8	2010	60.26	1.5	.85	4.29	115	1.30	6.27	55.7	.65
9	2015	60.24	1.5	.95	4.17	114	1.04	6.26	55.0	.59
10	2020	60.24	1.5	1.10	4.10	114	1.11	6.25	54.7	.52
11										
12										
13										
14										
15										
16										
17										
18										
19										

Field Parameters Stable: yes, no Continued on Page 2: yes, no Purged Dry: yes, no
 Total Actual Volume: 1.10

Sample ID:

Root	Primary	MS/MSD
<u>DSA-MW-05-093017</u>	<u>X</u>	<u>X</u>

Sample Date/Time: 093017; 2025 Pump: bladder
 Sample Notes: very fast flow

Color: clear, amber, tan, brown, grey, milky white, other
 Odor: none, low, medium, high, very strong, hydrogen sulfide, petroleum, chemical?, unknown
 Turbidity: none, low, medium, high, very turbid, heavy silts

Field QC and date: L. Spencer 093017 QC2 and date: [Signature] 11/20/17

WELL PURGING AND SAMPLING FIELD CONTROL LOG

Bottle Inventory:	8260B VOCs HCL 3 x 40 ml Glass extra 6 X 40 ml 1	AK101 GRO HCL 3 X 40 ml Glass extra 6 X 40 ml 2	AK102/103 DRO/RRO HCL 2 X 1L Glass extra 6 X 1L 3	6010C Tot Iron/Mn HNO3 Poly no 1 X 500 ml 4	353.2/351.2 NO3/NO2 TKN H2SO4 Glass extra 3 X 500 ml 5	2320B/300 Alk/Sulf None Poly no 1 X 250 ml 6			
MS/MSD Volume:									
TAm Volume:									
Sample Order:									
Bottle Count:									

Casing Diameter (inches)	Schedule 40		Schedule 80	
	(gal/ft casing)	(liters/ft casing)	(gal/ft casing)	(liters/ft casing)
1.5	0.092	0.348	0.086	0.327
2	0.163	0.617	0.153	0.579
4	0.656	2.483	0.597	2.26

Casing Diameter 2 inches: _____

Length of Casing (ft)	Sch 40	Sch 80	Sch 40	Sch 80	Length of Casing (ft)	Sch 40	Sch 80	Sch 40	Sch 80
	(gal)	(gal)	(L)	(L)		(gal)	(gal)	(L)	(L)
1	0.16	0.15	0.62	0.58	16	2.61	2.45	9.87	9.27
2	0.33	0.31	1.23	1.16	17	2.77	2.60	10.49	9.84
3	0.49	0.46	1.85	1.74	18	2.93	2.75	11.11	10.42
4	0.65	0.61	2.47	2.32	19	3.10	2.91	11.72	11.00
5	0.82	0.77	3.08	2.90	20	3.26	3.06	12.34	11.58
6	0.98	0.92	3.70	3.47	21	3.42	3.21	12.96	12.16
7	1.14	1.07	4.32	4.05	22	3.59	3.37	13.57	12.74
8	1.30	1.22	4.94	4.63	23	3.75	3.52	14.19	13.32
9	1.47	1.38	5.55	5.21	24	3.91	3.67	14.81	13.90
10	1.63	1.53	6.17	5.79	25	4.08	3.83	15.42	14.48
11	1.79	1.68	6.79	6.37	26	4.24	3.98	16.04	15.06
12	1.96	1.84	7.40	6.95	27	4.40	4.13	16.66	15.64
13	2.12	1.99	8.02	7.53	28	4.56	4.28	17.27	16.21
14	2.28	2.14	8.64	8.11	29	4.73	4.44	17.89	16.79
15	2.45	2.30	9.25	8.69	30	4.89	4.59	18.51	17.37

	Time	WL (ft. ftop)	Flow (lpm)	Volume (gal)	pH	ORP (mV)	Temp (deg C)	Cond (mS/cm)	DO (mg/L)	Turbidity
20										
21										
22										
23										
24										
25										
26										
27										
28										

Water Parameter Meter Calibration Log (if necessary)

Parameter	Standard	True Value	Lot #	Date Opened	Expiration Date	Pre-Calibration Reading	Post-Calibration Reading	Calibration Acceptance Criteria
pH	4.00							± 0.10
	7.00							± 0.10
	10.00							± 0.10
Sp Cond (mS/cm)								± 10%
								± 10%
ORP (mV)								-----

WELL PURGING AND SAMPLING FIELD CONTROL LOG



Date: 093017 Well ID: GLO-MW-03
 Northings: 6315008.07
 Eastings: 520997.61

Project Port Heiden Ground Water Sampling
 Samplers: S. Wassillie, L. Spencer

Depth of pump (ft, bgs): _____
 Depth of well (ft, TOC): _____
 Depth to water (ft, TOC): (previous) 64.7
 (current) 60.7

Screened Interval (ft, bgs): 52-76
 Stickup Height (ft, ags): _____
 WL meter: APCS GWL 2
 Photo of Well: _____
 Filter Lot Number: NA

Field Meter Check YSI Meter SN #: #1
 Battery Level: _____

Criteria for Calibration Check: Confidence solution ranges or pH ± 0.1 ; Sp Cond $\pm 10\%$

Purge Start Time: 1700 Purge End Time: 1805 Trip Blank: _____

Field Instrument Readings Criteria for Stable Parameters: pH ± 0.1 ; Temp $\pm 3\%$ (min ± 0.2 °C); Sp Cond $\pm 3\%$;
 DO $\pm 10\%$ (0.3 mg/L); Turbidity $\pm 10\%$

	Time	WL (ft, ftop)	Flow (lpm)	Volume (gal)	Temp (deg C)	Cond (uS/cm)	DO (mg/L)	pH	ORP (mV)	Turbidity (ntu)
1	1725	60.88	.5	.01	11.06	174	10.01	6.63	171.2	7.39
2	1730	60.88	.5	.1	9.99	169	9.92	6.65	174.1	7.64
3	1735	60.88	.5	.2	9.56	167	9.59	6.51	175.6	5.88
4	1740	60.89	.5	.25	9.46	166	9.37	6.48	176.1	3.49
5	1745	60.89	.5	.3	9.21	166	9.49	6.47	176.0	2.73
6	1750	60.90	.5	.35	8.98	164	9.55	6.43	178.1	2.20
7	1755	60.87	.5	.358	8.99	164	9.40	6.42	179.5	1.86
8	1800	60.87	.5	.4	9.20	166	9.41	6.41	174.1	1.79
9	1805	60.9	.5	.45	8.99	165	9.46	6.41	176.1	1.81
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										

Field Parameters Stable: yes / no Continued on Page 2: yes / no Purged Dry: yes / no

Total Actual Volume: .45 gal

GLO-MW-23-093017 @ 1835

Sample ID:

Root	Primary	MS/MSD
<u>GLO-MW-03-093017</u>	<u>X</u>	

Sample Date/Time: 093017; 1805 Pump: _____

Sample Notes
Purged to stable in 40 mins
took primary sample @ 1805
took duplicate sample at 1835
very low turbidity

Color: clear, amber, tan, brown, grey, milky white, other
 Odor: none, low, medium, high, very strong, hydrogen sulfide, petroleum, chemical?, unknown
 Turbidity: none, low, medium, high, very turbid, heavy silts

Field QC and date L. Spencer 93017 QC2 and date Greg Durbin 11/20/17

WELL PURGING AND SAMPLING FIELD CONTROL LOG

Bottle Inventory:	8260B VOCs HCL 3 x 40 ml Glass extra 6 X 40 ml 1	AK101 GRO HCL 3 X 40 ml Glass extra 6 X 40 ml 2	AK102/103 DRO/RRO HCL 2 X 1L Glass extra 6 X 1L 3	6010C Tot Iron/Mn HNO3 Poly no 1 X 500 ml 4	353.2/351.2 NO3/NO2 TRN H2SO4 Glass extra 3 X 500 ml 5	2320B/300 Alk/Sulf None Poly no 1 X 250 ml 6	7	8	9
MS/MSD Volume:									
TAm Volume:									
Sample Order:									
Bottle Count:									

Casing Diameter (inches)	Schedule 40		Schedule 80	
	(gal/ft casing)	(liters/ft casing)	(gal/ft casing)	(liters/ft casing)
1.5	0.092	0.348	0.086	0.327
2	0.163	0.617	0.153	0.579
4	0.656	2.483	0.597	2.26

Casing Diameter 2 inches: _____

Length of Casing (ft)	Sch 40	Sch 80	Sch 40	Sch 80	Length of Casing (ft)	Sch 40	Sch 80	Sch 40	Sch 80
	(gal)	(gal)	(L)	(L)		(ft)	(gal)	(gal)	(L)
1	0.16	0.15	0.62	0.58	16	2.61	2.45	9.87	9.27
2	0.33	0.31	1.23	1.16	17	2.77	2.60	10.49	9.84
3	0.49	0.46	1.85	1.74	18	2.93	2.75	11.11	10.42
4	0.65	0.61	2.47	2.32	19	3.10	2.91	11.72	11.00
5	0.82	0.77	3.08	2.90	20	3.26	3.06	12.34	11.58
6	0.98	0.92	3.70	3.47	21	3.42	3.21	12.96	12.16
7	1.14	1.07	4.32	4.05	22	3.59	3.37	13.57	12.74
8	1.30	1.22	4.94	4.63	23	3.75	3.52	14.19	13.32
9	1.47	1.38	5.55	5.21	24	3.91	3.67	14.81	13.90
10	1.63	1.53	6.17	5.79	25	4.08	3.83	15.42	14.48
11	1.79	1.68	6.79	6.37	26	4.24	3.98	16.04	15.06
12	1.96	1.84	7.40	6.95	27	4.40	4.13	16.66	15.64
13	2.12	1.99	8.02	7.53	28	4.56	4.28	17.27	16.21
14	2.28	2.14	8.64	8.11	29	4.73	4.44	17.89	16.79
15	2.45	2.30	9.25	8.69	30	4.89	4.59	18.51	17.37

	Time	WL (ft, ftop)	Flow (lpm)	Volume (gal)	pH	ORP (mV)	Temp (deg C)	Cond (mS/cm)	DO (mg/L)	Turbidity
20										
21										
22										
23										
24										
25										
26										
27										
28										

Water Parameter Meter Calibration Log (if necessary)

Parameter	Standard	True Value	Lot #	Date Opened	Expiration Date	Pre-Calibration Reading	Post-Calibration Reading	Calibration Acceptance Criteria
pH	4.00							± 0.10
	7.00							± 0.10
	10.00							± 0.10
Sp Cond (mS/cm)								± 10%
								± 10%
ORP (mV)								-----

WELL PURGING AND SAMPLING FIELD CONTROL LOG



Date: 10/17 Well ID: RRS-MW-05
 Northings: 6314986.41
 Eastings: 520863.08

Project: Port Heiden Ground Water Sampling
 Samplers: Lynn Spencer S. Wassillie

Depth of pump (ft, bgs): _____
 Depth of well (ft, TOC): 58.50
 Depth to water (ft, TOC): (previous) 51.49
 (current) 52.00

Screened Interval (ft, bgs): 46' - 56'
 Stickup Height (ft, ags): _____
 WL meter: APCS GWL 2
 Photo of Well: _____
 Filter Lot Number: NA

Field Meter Check YSI Meter SN #: 1
 Battery Level: _____

Criteria for Calibration Check: Confidence solution ranges or pH ± 0.1 ; Sp Cond $\pm 10\%$

Purge Start Time: 1550 Purge End Time: 1710 Trip Blank: _____

Field Instrument Readings Criteria for Stable Parameters: pH ± 0.1 ; Temp $\pm 3\%$ (min ± 0.2 °C); Sp Cond $\pm 3\%$;
 DO $\pm 10\%$ (0.3 mg/L); Turbidity $\pm 10\%$

	Time	WL (ft, ftop)	Flow (lpm)	Volume (gal)	Temp (deg C)	Cond (uS/cm)	DO (mg/L)	pH	ORP (mV)	Turbidity (ntu)
1	16:05	52.25	1.0	0	5.79	117	26.21	3.93	301.9	18.5
2	16:10	52.33	1.0	.15	5.57	105	11.25	3.73	321.6	13.4
3	16:15	52.38	1.0	.25	5.49	102	10.87	4.07	305.4	12.4
4	16:20	52.43	1.0	.35	5.41	99	10.70	4.70	274.5	15.5
5	16:25	52.49	1.0	.45	5.37	98	10.70	5.09	255.1	13.8
6	16:30	52.57	1.0	.55	5.35	98	10.73	5.41	238.7	12.9
7	16:35	52.60	1.0	.65	5.34	98	10.82	5.60	228.7	11.5
8	16:40	52.63	1.0	.70	5.34	97	10.90	5.70	219.8	10.6
9	16:45	52.69	1.0	.80	5.34	97	10.73	5.90	213.6	9.23
10	16:50	52.70	1.0	.90	5.37	97	10.61	5.99	208.6	8.50
11	16:55	52.74	1.0	.95	5.41	98	10.59	6.07	204.0	7.34
12	17:00	52.78	<1.0	1.10	5.44	98	10.42	6.13	200.7	6.71
13	17:05	52.81	<1.0	1.25	5.47	98	10.33	6.17	198.0	5.25
14	17:10	52.84	<1.0	1.40	5.49	98	10.33	6.20	197.2	4.90
15	17:15	52.85	<1.0	1.50	5.50	98	10.30	6.21	196.2	4.35
16	17:20	52.87	<1.0	1.60	5.53	98	10.33	6.22	195.2	3.99
17										
18										
19										

Field Parameters Stable: yes, no _____ Continued on Page 2: yes, no _____ Purged Dry: yes, no _____
 Total Actual Volume: 1.60

Sample ID:

Root	Primary	MS/MSD
RRS-MW-05-100117	X	

Sample Date/Time: 100117; 1720
 Sample Notes: Flow was adequate

Pump: bladder

Color: clear, amber, tan, brown, grey, milky white, other _____
 Odor: none, low, medium, high, very strong, hydrogen sulfide, petroleum, chemical?, unknown _____
 Turbidity: none, low, medium, high, very turbid, heavy silts _____

Field QC and date: Spencer 100117 QC2 and date: Tracy W. Davis 11/20/17

WELL PURGING AND SAMPLING FIELD CONTROL LOG

Bottle Inventory:	8260B VOCs HCL 3 x 40 ml Glass extra 6 X 40 ml 1	AK101 GRO HCL 3 X 40 ml Glass extra 6 X 40 ml 2	AK102/103 DRO/RRO HCL 2 X 1L Glass extra 6 X 1L 3	6010C Tot Iron/Mn HNO3 1 X 500ml Poly no 1 X 500 ml 4	353.2/351.2 NO3/NO2 TKN H2SO4 1 X 500 ml Glass extra 3 X 500 ml 5	2320B/300 Alk/Sulf None 1 X 250 ml Poly no 1 X 250 ml 6			
MS/MSD Volume:									
TAm Volume:									
Sample Order:									
Bottle Count:									

Casing Diameter (inches)	Schedule 40		Schedule 80	
	(gal/ft casing)	(liters/ft casing)	(gal/ft casing)	(liters/ft casing)
1.5	0.092	0.348	0.086	0.327
2	0.163	0.617	0.153	0.579
4	0.656	2.483	0.597	2.26

Casing Diameter 2 inches:

Length of Casing (ft)	Sch 40 (gal)	Sch 80 (gal)	Sch 40 (L)	Sch 80 (L)	Length of Casing (ft)	Sch 40 (gal)	Sch 80 (gal)	Sch 40 (L)	Sch 80 (L)
	1	0.16	0.15	0.62		0.58	16	2.61	2.45
2	0.33	0.31	1.23	1.16	17	2.77	2.60	10.49	9.84
3	0.49	0.46	1.85	1.74	18	2.93	2.75	11.11	10.42
4	0.65	0.61	2.47	2.32	19	3.10	2.91	11.72	11.00
5	0.82	0.77	3.08	2.90	20	3.26	3.06	12.34	11.58
6	0.98	0.92	3.70	3.47	21	3.42	3.21	12.96	12.16
7	1.14	1.07	4.32	4.05	22	3.59	3.37	13.57	12.74
8	1.30	1.22	4.94	4.63	23	3.75	3.52	14.19	13.32
9	1.47	1.38	5.55	5.21	24	3.91	3.67	14.81	13.90
10	1.63	1.53	6.17	5.79	25	4.08	3.83	15.42	14.48
11	1.79	1.68	6.79	6.37	26	4.24	3.98	16.04	15.06
12	1.96	1.84	7.40	6.95	27	4.40	4.13	16.66	15.64
13	2.12	1.99	8.02	7.53	28	4.56	4.28	17.27	16.21
14	2.28	2.14	8.64	8.11	29	4.73	4.44	17.89	16.79
15	2.45	2.30	9.25	8.69	30	4.89	4.59	18.51	17.37

	Time	WL (ft. top)	Flow (lpm)	Volume (gal)	pH	ORP (mV)	Temp (deg C)	Cond (mS/cm)	DO (mg/L)	Turbidity
20										
21										
22										
23										
24										
25										
26										
27										
28										

Water Parameter Meter Calibration Log (if necessary)

Parameter	Standard	True Value	Lot #	Date Opened	Expiration Date	Pre-Calibration Reading	Post-Calibration Reading	Calibration Acceptance Criteria
pH	4.00							± 0.10
	7.00							± 0.10
	10.00							± 0.10
Sp Cond (mS/cm)								± 10%
								± 10%
ORP (mV)								-----

WELL PURGING AND SAMPLING FIELD CONTROL LOG



Date: 10/1/17 Well ID: GLO-MW-04
 Northings: 6314937.55
 Eastings: 521005.26

Project Port Heiden Ground Water Sampling
 Samplers: L. Spencer S. Wassilie

Depth of pump (ft, bgs): _____
 Depth of well (ft, TOC): 61.42
 Depth to water (ft, TOC): (previous) 56.84
 (current) 58.42

Screened Interval (ft, bgs): 35' -> 45'
 Stickup Height (ft, ags): _____
 WL meter: APCS GML2
 Photo of Well: _____
 Filter Lot Number: NA

Field Meter Check YSI Meter SN #: 1
 Battery Level: _____

Criteria for Calibration Check: Confidence solution ranges or pH ± 0.1 ; Sp Cond $\pm 10\%$

Purge Start Time: 1050 Purge End Time: 1240 Trip Blank: _____

Field Instrument Readings Criteria for Stable Parameters: pH ± 0.1 ; Temp $\pm 3\%$ (min ± 0.2 °C); Sp Cond $\pm 3\%$;
 DO $\pm 10\%$ (0.3 mg/L); Turbidity $\pm 10\%$

	Time	WL (ft, ftop)	Flow (lpm)	Volume (gal)	Temp (deg C)	Cond (uS/cm)	DO (mg/L)	pH	ORP (mV)	Turbidity (ntu)
1	1120	58.40	<.5	.01	7.39	146	8.53	2.99	356.4	99.4
2	1125	58.40	<.5	.01	7.35	142	8.44	3.51	329.1	80.2
3	1130	58.41	<.5	.15	7.38	140	8.86	4.28	286.3	56.5
4	1135	58.41	<.5	.20	7.45	139	8.49	4.89	254.6	43.6
5	1140	58.42	<.5	.25	7.61	139	8.82	5.37	229.8	32.6
6	1145	58.42	<.5	.30	7.72	139	8.86	5.54	214.6	30.6
7	1150	58.42	<.5	.35	7.74	139	8.70	5.79	207.9	22.5
8	1205	58.42	<.5	.35	7.92	140	8.67	6.07	191.2	15.0
9	1210	58.42	<.5	.35	7.97	140	8.71	6.08	190.9	10.7
10	1215	58.44	<.5	.40	8.03	141	8.51	6.10	189.1	7.99
11	1220	58.47	<.5	.45	8.05	140	8.58	6.12	188.1	6.66
12	1225	58.42	<.5	.45	7.99	140	8.63	6.13	187.1	5.26
13	1230	58.42	<.5	.50	8.04	140	8.54	6.16	185.6	3.62
14	1235	58.42	<.5	.51	7.98	140	8.59	6.14	186.1	3.38
15	1240	58.42	<.5	.52	7.89	139	8.51	6.14	186.9	3.33
16										
17										
18										
19										

Field Parameters Stable: yes, no Continued on Page 2: yes, no Purged Dry: yes, no
 Total Actual Volume: .53

Sample ID:

Root	Primary	MS/MSD
<u>GLO-MW-04-100117</u>	<u>X</u>	

Sample Date/Time: 100117; 1245 Pump: bladder
 Sample Notes: slow @ low rate + slow purge; Fast recharge rate

Color: clear, amber, tan, brown, grey, milky white, other
 Odor: none, low, medium, high, very strong, hydrogen sulfide, petroleum, chemical?, unknown
 Turbidity: none, low, medium, high, very turbid, heavy silts

Field QC and date L. Spencer 100117 QC2 and date Greg [Signature] 11/20/17

WELL PURGING AND SAMPLING FIELD CONTROL LOG

Bottle Inventory:	8260B VOCs HCL 3 x 40 ml Glass extra 6 X 40 ml	AK101 GRO HCL 3 X 40 ml Glass extra 6 X 40 ml	AK102/103 DRO/RRO HCL 2 X 1L Glass extra 6 X 1L	6010C Tot Iron/Mn HNO3 1 X 500ml Poly no 1 X 500 ml	353.2/351.2 NO3/NO2 TRN H2SO4 1 X 500 ml Glass extra 3 X 500 ml	2320B/300 Alk/Sulf None Poly no 1 X 250 ml			
MS/MSD Volume:									
TAm Volume:									
Sample Order:									
Bottle Count:	1	2	3	4	5	6	7	8	9

Casing Diameter (inches)	Schedule 40		Schedule 80	
	(gal/ft casing)	(liters/ft casing)	(gal/ft casing)	liters/ft casing)
1.5	0.092	0.348	0.086	0.327
2	0.163	0.617	0.153	0.579
4	0.656	2.483	0.597	2.26

Casing Diameter 2 inches:

Length of Casing (ft)	Sch 40	Sch 80	Sch 40	Sch 80	Length of Casing (ft)	Sch 40	Sch 80	Sch 40	Sch 80
	(gal)	(gal)	(L)	(L)		(gal)	(gal)	(L)	(L)
1	0.16	0.15	0.62	0.58	16	2.61	2.45	9.87	9.27
2	0.33	0.31	1.23	1.16	17	2.77	2.60	10.49	9.84
3	0.49	0.46	1.85	1.74	18	2.93	2.75	11.11	10.42
4	0.65	0.61	2.47	2.32	19	3.10	2.91	11.72	11.00
5	0.82	0.77	3.08	2.90	20	3.26	3.06	12.34	11.58
6	0.98	0.92	3.70	3.47	21	3.42	3.21	12.96	12.16
7	1.14	1.07	4.32	4.05	22	3.59	3.37	13.57	12.74
8	1.30	1.22	4.94	4.63	23	3.75	3.52	14.19	13.32
9	1.47	1.38	5.55	5.21	24	3.91	3.67	14.81	13.90
10	1.63	1.53	6.17	5.79	25	4.08	3.83	15.42	14.48
11	1.79	1.68	6.79	6.37	26	4.24	3.98	16.04	15.06
12	1.96	1.84	7.40	6.95	27	4.40	4.13	16.66	15.64
13	2.12	1.99	8.02	7.53	28	4.56	4.28	17.27	16.21
14	2.28	2.14	8.64	8.11	29	4.73	4.44	17.89	16.79
15	2.45	2.30	9.25	8.69	30	4.89	4.59	18.51	17.37

	Time	WL (ft. ftop)	Flow (lpm)	Volume (gal)	pH	ORP (mV)	Temp (deg C)	Cond (mS/cm)	DO (mg/L)	Turbidity
20										
21										
22										
23										
24										
25										
26										
27										
28										

Water Parameter Meter Calibration Log (if necessary)

Parameter	Standard	True Value	Lot #	Date Opened	Expiration Date	Pre-Calibration Reading	Post-Calibration Reading	Calibration Acceptance Criteria
pH	4.00							± 0.10
	7.00							± 0.10
	10.00							± 0.10
Sp Cond (mS/cm)								± 10%
								± 10%
ORP (mV)								-----

WELL PURGING AND SAMPLING FIELD CONTROL LOG



Date: 9/29/17 Well ID: BLO-MW-07
 Northings: 6314922.47
 Eastings: 520753.59

Project Port Heiden Ground Water Sampling

Samplers: Lynn Spencer + Sheryl Wassilie

Depth of pump (ft, bgs): _____
 Depth of well (ft, TOC): _____
 Depth to water (ft, TOC): (previous) 46.86
 (current) 42.44

Screened Interval (ft, bgs): 35 - 45
 Stickup Height (ft, ags): _____
 WL meter: APCS GWL 2
 Photo of Well: _____
 Filter Lot Number: NA

Field Meter Check

YSI Meter SN #: 4
 Battery Level: _____

Criteria for Calibration Check: Confidence solution ranges or pH ±0.1; Sp Cond ±10%

Purge Start Time: 1340 Purge End Time: 1535 Trip Blank: _____

Field Instrument Readings

Criteria for Stable Parameters: pH ±0.1; Temp ± 3% (min ± 0.2 °C); Sp Cond ± 3%;
 DO ± 10% (0.3 mg/L); Turbidity ± 10%

	Time	WL (ft, ftop)	Flow (lpm)	Volume (gal)	Temp (deg C)	Cond (uS/cm)	DO (mg/L)	pH	ORP (mV)	Turbidity (ntu)
1	1430	42.54	7.25	.05	14.41	756	9.57	6.58	198.7	19.3
2	1435	42.59	7.25	.10	13.70	121	9.79	6.58	197.8	10.5
3	1440	42.69	7.25	.15	13.22	119	9.85	6.59	195.1	9.64
4	1445	42.72	7.25	.20	12.91	117	9.75	6.57	196.0	10.0
5	1450	42.78	7.25	.25	13.00	115	9.35	6.57	196.7	11.8
6	1455	42.88	7.25	.30	12.52	115	9.52	6.57	194.7	9.19
7	1500	42.92	7.25	.35	11.92	113	9.73	6.57	194.6	8.11
8	1505	43.01	.33	.40	11.41	111	9.72	6.55	196.6	8.98
9	1510	43.09	.33	.45	11.17	110	9.66	6.55	198.1	11.8
10	1515	43.17	.33	.455	11.01	110	9.33	6.54	201.3	17.9
11	1520	43.22	.30	.460	10.93	109	9.21	6.53	202.1	25.1
12	1525	43.30	.30	.470	10.98	109	8.93	6.53	205.0	35.1
13	1530	43.38	.30	.489	11.03	109	8.86	6.54	205.9	36.1
14	1535	43.46	.30	.499	11.08	109	8.77	6.55	207.1	32.7
15	1540									
16										
17										
18										
19										

32.7
36
36.3

Field Parameters Stable: (yes) no Continued on Page 2: yes, (no) Purged Dry: yes, (no)
 Total Actual Volume: .5

stable @ 10%

Sample ID:

Root	Primary	MS/MSD
<u>BLO-MW-07-093017</u>	<u>X</u>	

Sample Date/Time: 093017, 1540

Pump: bladder

Sample Notes: very slow purge rate + slow recovery rate

Color: clear, amber, tan, brown, grey, milky white, other
 Odor: none, low, medium, high, very strong, hydrogen sulfide, petroleum, chemical?, unknown
 Turbidity: none, low, medium, high, very turbid, heavy silts

Field QC and date Spencer 093017

QC2 and date Sheryl Wassilie 11/20/17

WELL PURGING AND SAMPLING FIELD CONTROL LOG

Bottle Inventory:	8260B VOCs HCL 3 x 40 ml Glass extra 6 X 40 ml 1	AK101 GRO HCL 3 X 40 ml Glass extra 6 X 40 ml 2	AK102/103 DRO/RRO HCL 2 X 1L Glass extra 6 X 1L 3	6010C Tot Iron/Mn HNO3 Poly no 1 X 500 ml 4	353.2/351.2 NO3/NO2 TKN H2SO4 Glass extra 3 X 500 ml 5	2320B/300 Alk/Sulf None Poly no 1 X 250 ml 6	7	8	9
MS/MSD Volume:									
TAm Volume:									
Sample Order:									
Bottle Count:									

Casing Diameter (inches)	Schedule 40		Schedule 80	
	(gal/ft casing)	(liters/ft casing)	(gal/ft casing)	(liters/ft casing)
1.5	0.092	0.348	0.086	0.327
2	0.163	0.617	0.153	0.579
4	0.656	2.483	0.597	2.26

Casing Diameter 2 inches: _____

Length of Casing (ft)	Sch 40	Sch 80	Sch 40	Sch 80	Length of Casing (ft)	Sch 40	Sch 80	Sch 40	Sch 80
	(gal)	(gal)	(L)	(L)		(gal)	(gal)	(L)	(L)
1	0.16	0.15	0.62	0.58	16	2.61	2.45	9.87	9.27
2	0.33	0.31	1.23	1.16	17	2.77	2.60	10.49	9.84
3	0.49	0.46	1.85	1.74	18	2.93	2.75	11.11	10.42
4	0.65	0.61	2.47	2.32	19	3.10	2.91	11.72	11.00
5	0.82	0.77	3.08	2.90	20	3.26	3.06	12.34	11.58
6	0.98	0.92	3.70	3.47	21	3.42	3.21	12.96	12.16
7	1.14	1.07	4.32	4.05	22	3.59	3.37	13.57	12.74
8	1.30	1.22	4.94	4.63	23	3.75	3.52	14.19	13.32
9	1.47	1.38	5.55	5.21	24	3.91	3.67	14.81	13.90
10	1.63	1.53	6.17	5.79	25	4.08	3.83	15.42	14.48
11	1.79	1.68	6.79	6.37	26	4.24	3.98	16.04	15.06
12	1.96	1.84	7.40	6.95	27	4.40	4.13	16.66	15.64
13	2.12	1.99	8.02	7.53	28	4.56	4.28	17.27	16.21
14	2.28	2.14	8.64	8.11	29	4.73	4.44	17.89	16.79
15	2.45	2.30	9.25	8.69	30	4.89	4.59	18.51	17.37

Time	WL (ft. ftop)	Flow (lpm)	Volume (gal)	pH	ORP (mV)	Temp (deg C)	Cond (mS/cm)	DO (mg/L)	Turbidity
20									
21									
22									
23									
24									
25									
26									
27									
28									

Water Parameter Meter Calibration Log (if necessary)

Parameter	Standard	True Value	Lot #	Date Opened	Expiration Date	Pre-Calibration Reading	Post-Calibration Reading	Calibration Acceptance Criteria
pH	4.00							± 0.10
	7.00							± 0.10
	10.00							± 0.10
Sp Cond (mS/cm)								± 10%
								± 10%
ORP (mV)								-----

WELL PURGING AND SAMPLING FIELD CONTROL LOG



Date: 9/28/17 Well ID: DSA-MW-07
 Northings: 10315021.82
 Eastings: 520888 41
 Project: Port Heiden Ground Water Sampling
 Samplers: Sheryl Wassillie & Lynn Spencer
 Depth of pump (ft, bgs): _____ Screened Interval (ft, bgs): 45' - 755'
 Depth of well (ft, TOC): _____ Stickup Height (ft, ags): _____
 Depth to water (ft, TOC): (previous) 48.90 WL meter: APCS GWL 1
 (current) 50.02 Photo of Well: _____
 Filter Lot Number: NA

Field Meter Check YSI Meter SN #: 1
 Battery Level: _____

Criteria for Calibration Check: Confidence solution ranges or pH ±0.1; Sp Cond ± 10%

Purge Start Time: 1445 Purge End Time: 1610 Trip Blank: _____

Field Instrument Readings Criteria for Stable Parameters: pH ±0.1; Temp ± 3% (min ± 0.2 °C); Sp Cond ± 3%;
 DO ± 10% (0.3 mg/L); Turbidity ± 10%

	Time	WL (ft, ftop)	Flow (lpm)	Volume (gal)	Temp (deg C)	Cond (uS/cm)	DO (mg/L)	pH	ORP (mV)	Turbidity (ntu)
1	1555	51.92	.5	.25	7.02	146	9.21	5.33	121.6	613
2	1600	52.12	.5	.30	7.21	147	9.01	5.88	115.4	615
3	1605	52.24	.5	.35	7.29	147	8.98	5.90	115.7	597
4	1610	52.32	.5	.40	7.29	147	8.96	5.92	115.7	590
5										
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										

Field Parameters Stable: yes no Continued on Page 2: yes no Purged Dry: yes no
 Total Actual Volume: .40

Sample ID:

Root	Primary	MS/MSD
<u>DSA-MW-07-092817</u>	<u>X</u>	

Sample Date/Time: 092817 1615 Pump: bladder
 Sample Notes: _____

Color: clear, amber, tan, brown, grey, milky white, other
 Odor: none, low, medium, high, very strong, hydrogen sulfide, petroleum, chemical?, unknown
 Turbidity: none, low, medium, high, very turbid, heavy silts

Field QC and date: Spencer 092817 QC2 and date: Lynn Spencer

WELL PURGING AND SAMPLING FIELD CONTROL LOG

Bottle Inventory:	8260B VOCs HCL 3 x 40 ml Glass extra 6 X 40 ml 1	AK101 GRO HCL 3 X 40 ml Glass extra 6 X 40 ml 2	AK102/103 DRO/RRO HCL 2 X 1L Glass extra 6 X 1L 3	6010C Tot Iron/Mn HNO3 Poly no 1 X 500 ml 4	353.2/351.2 NO3/NO2 TrN H2SO4 Glass extra 3 X 500 ml 5	2320B/300 Alk/Sulf None Poly no 1 X 250 ml 6	7	8	9
MS/MSD Volume:									
TAm Volume:									
Sample Order:									
Bottle Count:									

Casing Diameter (inches)	Schedule 40		Schedule 80	
	(gal/ft casing)	(liters/ft casing)	(gal/ft casing)	(liters/ft casing)
1.5	0.092	0.348	0.086	0.327
2	0.163	0.617	0.153	0.579
4	0.656	2.483	0.597	2.26

Casing Diameter 2 inches: _____

Length of Casing (ft)	Sch 40	Sch 80	Sch 40	Sch 80	Length of Casing (ft)	Sch 40	Sch 80	Sch 40	Sch 80
	(gal)	(gal)	(L)	(L)		(ft)	(gal)	(gal)	(L)
1	0.16	0.15	0.62	0.58	16	2.61	2.45	9.87	9.27
2	0.33	0.31	1.23	1.16	17	2.77	2.60	10.49	9.84
3	0.49	0.46	1.85	1.74	18	2.93	2.75	11.11	10.42
4	0.65	0.61	2.47	2.32	19	3.10	2.91	11.72	11.00
5	0.82	0.77	3.08	2.90	20	3.26	3.06	12.34	11.58
6	0.98	0.92	3.70	3.47	21	3.42	3.21	12.96	12.16
7	1.14	1.07	4.32	4.05	22	3.59	3.37	13.57	12.74
8	1.30	1.22	4.94	4.63	23	3.75	3.52	14.19	13.32
9	1.47	1.38	5.55	5.21	24	3.91	3.67	14.81	13.90
10	1.63	1.53	6.17	5.79	25	4.08	3.83	15.42	14.48
11	1.79	1.68	6.79	6.37	26	4.24	3.98	16.04	15.06
12	1.96	1.84	7.40	6.95	27	4.40	4.13	16.66	15.64
13	2.12	1.99	8.02	7.53	28	4.56	4.28	17.27	16.21
14	2.28	2.14	8.64	8.11	29	4.73	4.44	17.89	16.79
15	2.45	2.30	9.25	8.69	30	4.89	4.59	18.51	17.37

	Time	WL (ft. ftop)	Flow (lpm)	Volume (gal)	pH	ORP (mV)	Temp (deg.C)	Cond (mS/cm)	DO (mg/L)	Turbidity
20										
21										
22										
23										
24										
25										
26										
27										
28										

Water Parameter Meter Calibration Log (if necessary)

Parameter	Standard	True Value	Lot #	Date Opened	Expiration Date	Pre-Calibration Reading	Post-Calibration Reading	Calibration Acceptance Criteria
pH	4.00							± 0.10
	7.00							± 0.10
	10.00							± 0.10
Sp Cond (mS/cm)								± 10%
								± 10%
ORP (mV)								-----

WELL PURGING AND SAMPLING FIELD CONTROL LOG



Date: 9/30/17 Well ID: BLO-MW-05
 Northings: 6314815-05
 Eastings: 520822

Project Port Heiden Ground Water Sampling
 Samplers: Lynn Spencer + Sheryl Wassilie

Depth of pump (ft, bgs): _____
 Depth of well (ft, TOC): 56.40
 Depth to water (ft, TOC): (previous) 49.72
 (current) 49.54

Screened Interval (ft, bgs): 42.5 - 52.5
 Stickup Height (ft, ags): _____
 WL meter: APC GWL 2
 Photo of Well: _____
 Filter Lot Number: NA

Field Meter Check YSI Meter SN #: 1
 Battery Level: _____

Criteria for Calibration Check: Confidence solution ranges or pH ± 0.1 ; Sp Cond $\pm 10\%$

Purge Start Time: 1445 Purge End Time: 1515 Trip Blank: _____

Field Instrument Readings Criteria for Stable Parameters: pH ± 0.1 ; Temp $\pm 3\%$ (min ± 0.2 °C); Sp Cond $\pm 3\%$;
 DO $\pm 10\%$ (0.3 mg/L); Turbidity $\pm 10\%$

	Time	WL (ft, ftop)	Flow (lpm)	Volume (gal)	Temp (deg C)	Cond (uS/cm)	DO (mg/L)	pH	ORP (mV)	Turbidity (ntu)
1	<u>1500</u>	<u>50.40</u>	<u>.5</u>	<u>.05</u>	<u>8.69</u>	<u>104</u>	<u>10.71</u>	<u>6.38</u>	<u>170.1</u>	<u>11.8</u>
2	<u>1503</u>	<u>50.35</u>	<u>.5</u>	<u>.15</u>	<u>8.42</u>	<u>103</u>	<u>10.44</u>	<u>6.33</u>	<u>173.3</u>	<u>8.4</u>
3	<u>1506</u>	<u>50.50</u>	<u>.5</u>	<u>.20</u>	<u>8.42</u>	<u>102</u>	<u>10.33</u>	<u>6.33</u>	<u>170.1</u>	<u>7.53</u>
4	<u>1509</u>	<u>50.59</u>	<u>.5</u>	<u>.25</u>	<u>8.37</u>	<u>102</u>	<u>10.21</u>	<u>6.34</u>	<u>169.5</u>	<u>7.61</u>
5	<u>1512</u>	<u>50.68</u>	<u>.5</u>	<u>.30</u>	<u>8.43</u>	<u>102</u>	<u>10.47</u>	<u>6.33</u>	<u>168.7</u>	<u>7.03</u>
6										
7										
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										

Field Parameters Stable: (yes) no Continued on Page 2: yes (no) Purged Dry: yes (no)
 Total Actual Volume: .3

Sample ID:

Root	Primary	MS/MSD
<u>BLO-MW-05-093017</u>	<u>X</u>	

Sample Date/Time: 093017 1515 Pump: bladder
 Sample Notes: 1450 - 49.75 ft. water level dropped

Color: clear, amber, tan, brown, grey, milky white, other
 Odor: none, low, medium, high, very strong, hydrogen sulfide, petroleum, chemical?, unknown
 Turbidity: none, low, medium, high, very turbid, heavy silts

Field QC and date L. Spencer 093017 QC2 and date Sheryl Wassilie 11/20/17

WELL PURGING AND SAMPLING FIELD CONTROL LOG

Bottle Inventory:	8260B VOCs HCL 3 x 40 ml Glass extra 6 X 40 ml 1	AK101 GRO HCL 3 X 40 ml Glass extra 6 X 40 ml 2	AK102/103 DRO/RRO HCL 2 X 1L Glass extra 6 X 1L 3	6010C Tot Iron/Mn HNO3 Poly no 1 X 500 ml 4	353.2/351.2 NO3/NO2 TKN H2SO4 Glass extra 3 X 500 ml 5	2320B/300 Alk/Sulf None Poly no 1 X 250 ml 6			
MS/MSD Volume:									
TAm Volume:									
Sample Order:									
Bottle Count:									

Casing Diameter (inches)	Schedule 40		Schedule 80	
	(gal/ft casing)	(liters/ft casing)	(gal/ft casing)	(liters/ft casing)
1.5	0.092	0.348	0.086	0.327
2	0.163	0.617	0.153	0.579
4	0.656	2.483	0.597	2.26

Casing Diameter 2 inches:

Length of Casing (ft)	Sch 40 (gal)	Sch 80 (gal)	Sch 40 (L)	Sch 80 (L)	Length of Casing (ft)	Sch 40 (gal)	Sch 80 (gal)	Sch 40 (L)	Sch 80 (L)
	1	0.16	0.15	0.62		0.58	16	2.61	2.45
2	0.33	0.31	1.23	1.16	17	2.77	2.60	10.49	9.84
3	0.49	0.46	1.85	1.74	18	2.93	2.75	11.11	10.42
4	0.65	0.61	2.47	2.32	19	3.10	2.91	11.72	11.00
5	0.82	0.77	3.08	2.90	20	3.26	3.06	12.34	11.58
6	0.98	0.92	3.70	3.47	21	3.42	3.21	12.96	12.16
7	1.14	1.07	4.32	4.05	22	3.59	3.37	13.57	12.74
8	1.30	1.22	4.94	4.63	23	3.75	3.52	14.19	13.32
9	1.47	1.38	5.55	5.21	24	3.91	3.67	14.81	13.90
10	1.63	1.53	6.17	5.79	25	4.08	3.83	15.42	14.48
11	1.79	1.68	6.79	6.37	26	4.24	3.98	16.04	15.06
12	1.96	1.84	7.40	6.95	27	4.40	4.13	16.66	15.64
13	2.12	1.99	8.02	7.53	28	4.56	4.28	17.27	16.21
14	2.28	2.14	8.64	8.11	29	4.73	4.44	17.89	16.79
15	2.45	2.30	9.25	8.69	30	4.89	4.59	18.51	17.37

	Time	WL (ft, fop)	Flow (lpm)	Volume (gal)	pH	ORP (mV)	Temp (deg C)	Cond (mS/cm)	DO (mg/L)	Turbidity
20										
21										
22										
23										
24										
25										
26										
27										
28										

Water Parameter Meter Calibration Log (if necessary)

Parameter	Standard	True Value	Lot #	Date Opened	Expiration Date	Pre-Calibration Reading	Post-Calibration Reading	Calibration Acceptance Criteria
pH	4.00							± 0.10
	7.00							± 0.10
	10.00							± 0.10
Sp Cond (mS/cm)								± 10%
								± 10%
ORP (mV)								-----

WELL PURGING AND SAMPLING FIELD CONTROL LOG



Date: 9/27/17 Well ID: FPC 066 MW 07
 Northings: 6209089
 Eastings: 520635

Project: Port Heiden Ground Water Sampling
 Samplers: Lynn Spencer + Sheryl Wassilic

Depth of pump (ft, bgs): _____ Screened Interval (ft, bgs): 2.5 → 12.5
 Depth of well (ft, TOC): _____ Stickup Height (ft, ags): _____
 Depth to water (ft, TOC): (previous) 5.24 WL meter: APCS GWL 2
 (current) 5.23 Photo of Well: _____
 Filter Lot Number: NA

Field Meter Check YSI Meter SN #: 1
 Battery Level: _____

Criteria for Calibration Check: Confidence solution ranges or pH ±0.1; Sp Cond ± 10%

Purge Start Time: 1455 Purge End Time: 1540 Trip Blank: _____

Field Instrument Readings Criteria for Stable Parameters: pH ±0.1; Temp ± 3% (min ± 0.2 °C); Sp Cond ± 3%;
 DO ± 10% (0.3 mg/L); Turbidity ± 10%

	Time	WL (ft, ftop)	Flow (lpm)	Volume (gal)	Temp (deg C)	Cond (uS/cm)	DO (mg/L)	pH	ORP (mV)	Turbidity (ntu)
1	1510	5.23	<1.0	.05	9.16	.119	7.88	6.29	148.3	11.3
2	1515	5.23	<1.0	.18	9.05	.117	8.23	6.37	150.5	8.57
3	1520	5.23	<1.0	.25	8.97	.116	8.44	6.39	153.9	7.78
4	1525	5.23	<1.0	.35	8.91	.116	8.57	6.41	155.8	8.14
5	1530	5.24	.5	.40	8.84	.116	8.50	6.42	159.8	7.89
6	1535	5.24	.5	.45	8.82	.115	8.77	6.43	162.3	7.80
7	1540	5.24	.5	.50	8.84	.115	8.77	6.44	163.4	7.26
8										
9										
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										

Field Parameters Stable: yes, no Continued on Page 2: yes, no Purged Dry: yes, no
 Total Actual Volume: .50

Sample ID:

Root	Primary	MS/MSD
17PH-FPC-006-MW-07	x	

Sample Date/Time: 9/27/17
 Sample Notes: pH start 6:00

bladder

Pump: well wizard QED
Druck Model 3020

Color: clear, amber, tan, brown, grey, milky white, other
 Odor: none, low, medium, high, very strong, hydrogen sulfide, petroleum, chemical?, unknown
 Turbidity: none, low, medium, high, very turbid, heavy silts

Field QC and date Spencer 09/27/17 QC2 and date Sheryl Wassilic 11/20/17

WELL PURGING AND SAMPLING FIELD CONTROL LOG

Bottle Inventory:	8260B VOCs HCL 3 x 40 ml Glass extra	AK101 GRO HCL 3 X 40 ml Glass extra	AK102/103 DRO/RRO HCL 2 X 1L Glass extra	6010C Tot Iron/Mn HNO3 Poly no 1 X 500 ml	353.2/351.2 NO3/NO2 TRN H2SO4 Glass extra 3 X 500 ml	2320B/300 Alk/Sulf None Poly no 1 X 250 ml			
MS/MSD Volume:									
TAm Volume:									
Sample Order:	1	2	3	4	5	6	7	8	9
Bottle Count:									

Casing Diameter (inches)	Schedule 40		Schedule 80	
	(gal/ft casing)	(liters/ft casing)	(gal/ft casing)	(liters/ft casing)
1.5	0.092	0.348	0.086	0.327
2	0.163	0.617	0.153	0.579
4	0.656	2.483	0.597	2.26

Casing Diameter 2 inches:

Length of Casing (ft)	Sch 40	Sch 80	Sch 40	Sch 80	Length of Casing (ft)	Sch 40	Sch 80	Sch 40	Sch 80
	(gal)	(gal)	(L)	(L)		(gal)	(gal)	(L)	(L)
1	0.16	0.15	0.62	0.58	16	2.61	2.45	9.87	9.27
2	0.33	0.31	1.23	1.16	17	2.77	2.60	10.49	9.84
3	0.49	0.46	1.85	1.74	18	2.93	2.75	11.11	10.42
4	0.65	0.61	2.47	2.32	19	3.10	2.91	11.72	11.00
5	0.82	0.77	3.08	2.90	20	3.26	3.06	12.34	11.58
6	0.98	0.92	3.70	3.47	21	3.42	3.21	12.96	12.16
7	1.14	1.07	4.32	4.05	22	3.59	3.37	13.57	12.74
8	1.30	1.22	4.94	4.63	23	3.75	3.52	14.19	13.32
9	1.47	1.38	5.55	5.21	24	3.91	3.67	14.81	13.90
10	1.63	1.53	6.17	5.79	25	4.08	3.83	15.42	14.48
11	1.79	1.68	6.79	6.37	26	4.24	3.98	16.04	15.06
12	1.96	1.84	7.40	6.95	27	4.40	4.13	16.66	15.64
13	2.12	1.99	8.02	7.53	28	4.56	4.28	17.27	16.21
14	2.28	2.14	8.64	8.11	29	4.73	4.44	17.89	16.79
15	2.45	2.30	9.25	8.69	30	4.89	4.59	18.51	17.37

	Time	WL (ft, ftop)	Flow (lpm)	Volume (gal)	pH	ORP (mV)	Temp (deg C)	Cond (mS/cm)	DO (mg/L)	Turbidity
20										
21										
22										
23										
24										
25										
26										
27										
28										

Water Parameter Meter Calibration Log (if necessary)

Parameter	Standard	True Value	Lot #	Date Opened	Expiration Date	Pre-Calibration Reading	Post-Calibration Reading	Calibration Acceptance Criteria
pH	4.00							± 0.10
	7.00							± 0.10
	10.00							± 0.10
Sp Cond (mS/cm)								± 10%
								± 10%
ORP (mV)								-----

WELL PURGING AND SAMPLING FIELD CONTROL LOG



Date: 9/27/17 Well ID: FPC 066-MW-06
 Northings: 10309034
 Eastings: 520593

Project Port Heiden Ground Water Sampling

Samplers: Lynn Spencer + Cheryl Wasillie

Depth of pump (ft, bgs): _____
 Depth of well (ft, TOC): _____
 Depth to water (ft, TOC): (previous) 4.38
 (current) 4.24

Screened Interval (ft, bgs): 2-12.5
 Stickup Height (ft, ags): _____
 WL meter: APCS GWL 2
 Photo of Well: yes
 Filter Lot Number: NA

Field Meter Check

YSI Meter SN #: # 1

Battery Level: _____

Criteria for Calibration Check: Confidence solution ranges or pH ± 0.1 ; Sp Cond $\pm 10\%$

Purge Start Time: 1215 Purge End Time: 1330 Trip Blank: FATB 00192577 NA

Field Instrument Readings

Criteria for Stable Parameters: pH ± 0.1 ; Temp $\pm 3\%$ (min ± 0.2 °C); Sp Cond $\pm 3\%$;
 DO $\pm 10\%$ (0.3 mg/L); Turbidity $\pm 10\%$

	Time	WL (ft, ftop)	Flow (lpm)	Volume (gal)	Temp (deg C)	Cond (uS/cm)	DO (mg/L)	pH	ORP (mV)	Turbidity (ntu)
1	1250	4.210	2.5	1.25	8.30	0.125	3.25	4.35	222.7	15.0
2	1255	4.210	2.5	1.30	8.27	0.122	3.19	4.97	189.7	15.2
3	1300	4.210	2.5	1.35	8.26	0.122	3.03	5.27	170.6	15.4
4	1305	4.25	2.5	1.40	8.33	0.121	2.95	5.48	160.0	15.4
5	1310	4.25	2.5	1.45	8.28	0.120	2.95	5.55	156.2	15.6
6	1315	4.25	2.5	1.50	8.29	0.120	2.95	5.63	152.8	15.6
7	1320	4.25	2.5	1.55	8.30	0.120	2.94	5.70	150.3	15.5
8	1325	4.26	2.5	1.60	8.27	0.120	2.82	5.74	148.2	15.2
9	1330	4.25	2.5	1.65	8.28	0.120	2.74	5.77	147.0	14.9
10										
11										
12										
13										
14										
15										
16										
17										
18										
19										

Field Parameters Stable: yes, no _____ Continued on Page 2: yes, no _____ Purged Dry: yes, no _____

Total Actual Volume: 1.65

Sample ID:

Root	Primary	MS/MSD
<u>17PH-FPC-066-MW-06</u>	<u>X1</u>	

BLO-MW-01-092717

Sample Date/Time: 9/27/17 @ 1335

Pump: Bladder Pump

Sample Notes: pH low at beginning @ 1.27 climbing to 5.77

Color: clear, amber, tan, brown, grey, milky white, other _____

Odor: none, low, medium, high, very strong, hydrogen sulfide, petroleum, chemical?, unknown _____

Turbidi none, low, medium, high, very turbid, heavy silts _____

Field QC and date WS 9/27/17

QC2 and date

Cheryl Wasillie 11/20/17

WELL PURGING AND SAMPLING FIELD CONTROL LOG

Bottle Inventory:	8260B VOCs HCL 3 x 40 ml Glass extra 6 X 40 ml 1	AK101 GRO HCL 3 X 40 ml Glass extra 6 X 40 ml 2	AK102/103 DRO/RRO HCL 2 X 1L Glass extra 6 X 1L 3	6010C Tot Iron/Mn HNO3 Poly no 1 X 500 ml 4	353.2/351.2 NO3/NO2 TKN H2SO4 Glass extra 3 X 500 ml 5	2320B/300 Alk/Sulf None 1 X 250 ml Poly no 1 X 250 ml 6			
MS/MSD Volume:									
TAm Volume:									
Sample Order:									
Bottle Count:									

Casing Diameter (inches)	Schedule 40		Schedule 80	
	(gal/ft casing)	(liters/ft casing)	(gal/ft casing)	(liters/ft casing)
1.5	0.092	0.348	0.086	0.327
2	0.163	0.617	0.153	0.579
4	0.656	2.483	0.597	2.26

Casing Diameter 2 inches: _____

Length of Casing (ft)	Sch 40	Sch 80	Sch 40	Sch 80	Length of Casing (ft)	Sch 40	Sch 80	Sch 40	Sch 80
	(gal)	(gal)	(L)	(L)		(ft)	(gal)	(gal)	(L)
1	0.16	0.15	0.62	0.58	16	2.61	2.45	9.87	9.27
2	0.33	0.31	1.23	1.16	17	2.77	2.60	10.49	9.84
3	0.49	0.46	1.85	1.74	18	2.93	2.75	11.11	10.42
4	0.65	0.61	2.47	2.32	19	3.10	2.91	11.72	11.00
5	0.82	0.77	3.08	2.90	20	3.26	3.06	12.34	11.58
6	0.98	0.92	3.70	3.47	21	3.42	3.21	12.96	12.16
7	1.14	1.07	4.32	4.05	22	3.59	3.37	13.57	12.74
8	1.30	1.22	4.94	4.63	23	3.75	3.52	14.19	13.32
9	1.47	1.38	5.55	5.21	24	3.91	3.67	14.81	13.90
10	1.63	1.53	6.17	5.79	25	4.08	3.83	15.42	14.48
11	1.79	1.68	6.79	6.37	26	4.24	3.98	16.04	15.06
12	1.96	1.84	7.40	6.95	27	4.40	4.13	16.66	15.64
13	2.12	1.99	8.02	7.53	28	4.56	4.28	17.27	16.21
14	2.28	2.14	8.64	8.11	29	4.73	4.44	17.89	16.79
15	2.45	2.30	9.25	8.69	30	4.89	4.59	18.51	17.37

	Time	WL (ft, ftop)	Flow (lpm)	Volume (gal)	pH	ORP (mV)	Temp (deg C)	Cond (mS/cm)	DO (mg/L)	Turbidity
20										
21										
22										
23										
24										
25										
26										
27										
28										

Water Parameter Meter Calibration Log (if necessary)

Parameter	Standard	True Value	Lot #	Date Opened	Expiration Date	Pre-Calibration Reading	Post-Calibration Reading	Calibration Acceptance Criteria
pH	4.00							± 0.10
	7.00							± 0.10
	10.00							± 0.10
Sp Cond (mS/cm)								± 10%
								± 10%
ORP (mV)								-----

WELL PURGING AND SAMPLING FIELD CONTROL LOG



Date: 9/28/17 Well ID: DSA-MW-06
 Northings: 6315022.41
 Eastings: 570898.7

Project: Port Heiden Ground Water Sampling
 Samplers: Lynn Spencer, Sheryl Wassellie

Depth of pump (ft, bgs): _____
 Depth of well (ft, TOC): 92.48 (S)
 Depth to water (ft, TOC): (previous) 54.56
 (current) 56.68

Screened Interval (ft, bgs): 85' → 90'
 Stickup Height (ft, ags): _____
 WL meter: GWL APC GWL 2
 Photo of Well: yes
 Filter Lot Number: NA

Field Meter Check YSI Meter SN #: 1
 Battery Level: _____
 Criteria for Calibration Check: Confidence solution ranges or pH ±0.1; Sp Cond ± 10%

Purge Start Time: 1230 Purge End Time: 1400 Trip Blank: _____

Field Instrument Readings Criteria for Stable Parameters: pH ±0.1; Temp ± 3% (min ± 0.2 °C); Sp Cond ± 3%;
 DO ± 10% (0.3 mg/L); Turbidity ± 10%

	Time	WL (ft, ftop)	Flow (lpm)	Volume (gal)	Temp (deg C)	Cond (uS/cm)	DO (mg/L)	pH	ORP (mV)	Turbidity (ntu)
1	1240	56.7	21.5	2.55	6.07	107	1.07	5.24	22.6	1.75
2	1245	56.7	21.5	0.70	10.23	1108	0.80	5.97	-25.5	1.74
3	1250	56.67	21.5	0.85	5.68	1167	0.71	5.13	12.4	2.02
4	1255	56.67	21.5	1.15	5.38	1167	0.70	5.23	3.3	2.29
5	1300	56.67	21.5	1.25	5.36	1167	0.68	5.27	2.7	1.80
6	1305	56.68	21.5	1.40	5.25	1167	0.67	5.74	-19.1	1.68
7	1310	56.7	21.5	1.70	5.24	1169	0.66	5.86	-26.6	1.71
8	1315	56.68	21.5	1.9	5.19	1172	0.62	5.95	-31.1	1.30
9	1325	56.67	21.5	2.00	5.12	1193	0.62	6.21	-38.4	1.18
10	1330	56.67	21.5	2.40	5.05	1197	0.60	6.17	-35.1	0.80
11	1335	56.67	21.5	2.65	4.97	1199	0.57	6.21	-39.4	0.82
12	1340	56.68	21.5	2.80	4.96	1199	0.58	6.27	-46.4	0.54
13	1345	56.68	21.5	3.0	5.06	1200	0.56	6.42	-51.9	0.64
14	1350	56.68	21.5	3.25	4.99	124	0.58	6.46	-53.3	0.56
15	1355	56.66	21.5	3.50	4.88	124	0.54	6.42	-50.4	0.36
16										
17										
18										
19										

Field Parameters Stable: yes, no Continued on Page 2: yes, no Purged Dry: yes, no
 Total Actual Volume: 3.5 gal

Sample ID:

Root	Primary	MS/MSD
DSA-MW-06-092817	X	ND

Sample Date/Time: 9/28/17 ; 1400 Pump: bladder low flow

Sample Notes: Started purging and were drawing air due to holes in bladder. CA brought in new bladders for pump - resumed new pumping effort @ 1230

Color: clear, amber, tan, brown, grey, milky white, other _____
 Odor: none, low, medium, high, very strong, hydrogen sulfide, petroleum, chemical?, unknown _____
 Turbidity: none, low, medium, high, very turbid, heavy silts _____

Field QC and date LS 9/28/17 QC2 and date Sheryl Wassellie 11/20/17

WELL PURGING AND SAMPLING FIELD CONTROL LOG

Bottle Inventory:	8260B VOCs HCL 3 x 40 ml Glass extra 6 X 40 ml 1	AK101 GRO HCL 3 X 40 ml Glass extra 6 X 40 ml 2	AK102/103 DRO/RRO HCL 2 X 1L Glass extra 6 X 1L 3	6010C Tot Iron/Mn HNO3 1 X 500ml Poly no 1 X 500 ml 4	353.2/351.2 NO3/NO2 TKN H2SO4 1 X 500 ml Glass extra 3 X 500 ml 5	2320B/300 Alk/Sulf None 1 X 250 ml Poly no 1 X 250 ml 6	7	8	9
MS/MSD Volume:									
TAm Volume:									
Sample Order:									
Bottle Count:									

Casing Diameter (inches)	Schedule 40		Schedule 80	
	(gal/ft casing)	(liters/ft casing)	(gal/ft casing)	(liters/ft casing)
1.5	0.092	0.348	0.086	0.327
2	0.163	0.617	0.153	0.579
4	0.656	2.483	0.597	2.26

Casing Diameter 2 inches:

Length of Casing (ft)	Sch 40	Sch 80	Sch 40	Sch 80	Length of Casing (ft)	Sch 40	Sch 80	Sch 40	Sch 80
	(gal)	(gal)	(L)	(L)		(gal)	(gal)	(L)	(L)
1	0.16	0.15	0.62	0.58	16	2.61	2.45	9.87	9.27
2	0.33	0.31	1.23	1.16	17	2.77	2.60	10.49	9.84
3	0.49	0.46	1.85	1.74	18	2.93	2.75	11.11	10.42
4	0.65	0.61	2.47	2.32	19	3.10	2.91	11.72	11.00
5	0.82	0.77	3.08	2.90	20	3.26	3.06	12.34	11.58
6	0.98	0.92	3.70	3.47	21	3.42	3.21	12.96	12.16
7	1.14	1.07	4.32	4.05	22	3.59	3.37	13.57	12.74
8	1.30	1.22	4.94	4.63	23	3.75	3.52	14.19	13.32
9	1.47	1.38	5.55	5.21	24	3.91	3.67	14.81	13.90
10	1.63	1.53	6.17	5.79	25	4.08	3.83	15.42	14.48
11	1.79	1.68	6.79	6.37	26	4.24	3.98	16.04	15.06
12	1.96	1.84	7.40	6.95	27	4.40	4.13	16.66	15.64
13	2.12	1.99	8.02	7.53	28	4.56	4.28	17.27	16.21
14	2.28	2.14	8.64	8.11	29	4.73	4.44	17.89	16.79
15	2.45	2.30	9.25	8.69	30	4.89	4.59	18.51	17.37

	Time	WL (ft, ftop)	Flow (lpm)	Volume (gal)	pH	ORP (mV)	Temp (deg C)	Cond (mS/cm)	DO (mg/L)	Turbidity
20										
21										
22										
23										
24										
25										
26										
27										
28										

Water Parameter Meter Calibration Log (if necessary)

Parameter	Standard	True Value	Lot #	Date Opened	Expiration Date	Pre-Calibration Reading	Post-Calibration Reading	Calibration Acceptance Criteria
pH	4.00							± 0.10
	7.00							± 0.10
	10.00							± 0.10
Sp Cond (mS/cm)								± 10%
								± 10%
ORP (mV)								-----

Appendix D
Port Heiden Key Personnel and Qualifications

TO05 PORT HEIDEN SITE INSPECTION KEY PERSONNEL RESPONSIBILITIES AND QUALIFICATIONS

The following table identifies project personnel associated with each organization, contractor, and subcontractor participating in responsible roles.

Name	Organization Affiliation	Title	Responsibilities	Education and Experience Qualifications
Julie Sharp-Dahl	USACE	Project Manager	Project Management for contracting agency	On file with agency
Richard Mauser	USA Air Force	Project manager	Project Management for Responsible Party	On File with agency
Aldone Graham	USACE	Contracting Officer	Contract Management	On file with agency
Greg DuBois	APCS	Project Manager/Project Scientist	Management and coordination of project activities including field operations, subcontractor coordination, and health and safety oversight.	B.S. Earth Science – 1982 PMP #1842366; CQM #784 34 years of AK geologic experience 26 years environmental project
Craig Scola	USACE	Technical Lead	Technical lead for contracting agency	Certified Professional Geologist
Emily Underwood	Versar	Chemistry Manager	Laboratory coordination	On file with agency
Louis Howard	ADEC	Regulatory Manager	Regulatory oversight	On file with agency
Greg DuBois Sheryl Wassillie	APC Services, LLC	ADEC Qualified People On-site	Supervise or perform onsite monitoring tasks.	All persons meet ADEC Qualified Person criteria under 18 AAC 75.900 (100).

Appendix E
ADEC Approval Letter



THE STATE
of **ALASKA**
GOVERNOR MICHAEL J. DUNLEAVY

Department of Environmental Conservation

DIVISION OF SPILL PREVENTION AND RESPONSE
Contaminated Sites Program

555 Cordova Street
Anchorage, AK 99501-2617
Phone: 907.269.7503
Fax: 907.269.7687

File No: 2637.38.002.05

June 25, 2019

Robert Johnston
AFCEC/CZOP
10471 - 20th Street, Suite 347
JBER, AK 99506-2201

Re: **Draft Final 2017 Annual Groundwater Report for Port Heiden RRS at Port Heiden, Alaska dated April 2019**

Dear Mr. Johnston:

The Alaska Department of Environmental Conservation (ADEC) has received the above document for review and comment. ADEC has no comments on the 2017 Groundwater Monitoring Report and will approve the report as submitted, please finalize the document.

Sincerely,

A handwritten signature in blue ink that reads "Louis Howard".

Louis Howard
Environmental Program Specialist