DEPARTMENT OF THE ARMY
INSTALLATION MANAGEMENT COMMAND
HEADQUARTERS, U.S. ARMY GARRISON, FORT WAINWRIGHT

OPERABLE UNIT 6 FORMER COMMUNICATIONS SITE 2017 ACTIVITIES AND GROUNDWATER MONITORING ANNUAL REPORT

FORT WAINWRIGHT, ALASKA

FINAL
AUGUST 2018

U.S. Army Corps of Engineers, Alaska District
Environmental Remediation Services
Contract No. W912DR-13-D-0015
Task Order No. ZJ01

Prepared by
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ACRONYMS AND ABBREVIATIONS

ADEC	Alaska Department of Environmental Conservation
bgs	below ground surface
COC	contaminant of concern
DCE	dichloroethene
DO	dissolved oxygen
DQA	data quality assessment
DRO	diesel-range organics
EPA	U.S. Environmental Protection Agency
FCS	Former Communications Site
FWA	Fort Wainwright, Alaska
HQAES	Headquarters Army Environmental System
IDW	investigation-derived waste
Jacobs	Jacobs Engineering Group Inc.
JL-	Result considered to be an estimated value biased low because laboratory control sample recovery was low.
LNAPL	light non-aqueous phase liquid
LOD	limit of detection
MAROS	Monitoring and Remediation Optimization System
mg/L	milligrams per liter
MNA	monitored natural attenuation
mV	millivolts
MW	monitoring well
NAPL	non-aqueous phase liquid
ND	nondetect
ORP	oxidation reduction potential
OU6	Operable Unit 6
PCL	project cleanup level
PVC	polyvinyl chloride
RI	remedial investigation
ROD	Record of Decision
RRO	residual-range organics
SP16	Screen Point 16
TCE	trichloroethene
TCP	1,2,3-trichloropropane
TW	temporary well
UCL95	95 percent upper confidence limit

ACRONYMS AND ABBREVIATIONS (Continued)

USACE	U.S. Army Corps of Engineers
USGS	U.S. Geological Survey
VOC	volatile organic compound

1.0 INTRODUCTION

This report describes the biannual groundwater monitoring and well decommissioning activities that took place in 2017 at the Operable Unit 6 (OU6) Former Communications Site (FCS) on Fort Wainwright, Alaska (FWA). Jacobs Engineering Group Inc. (Jacobs) performed this work for the U.S. Army under U.S. Army Corps of Engineers (USACE), Alaska District, Hazardous, Toxic and Radioactive Waste Multiple Award Task Order Contract No. W912DR-13-D-0015, Task Order No. ZJ01. The activities described in this report include the following:

- Decommission six monitoring wells.
- Collect and analyze groundwater for contaminants of concern (COCs) as presented in the OU6 Record of Decision (ROD) (USACE 2014a), previously detected contaminants (USACE 2012b), and geochemical parameters.
- Compare results with ROD-established project cleanup levels (PCLs) (USACE 2014a); the newly issued Alaska Department of Environmental Conservation (ADEC) cleanup levels (ADEC 2017) are presented for reference.
- Assess current and historical results to identify contaminant trends and predict cleanup dates.
- Review geochemical data for consistency with the selected remedy of monitored natural attenuation (MNA).
- Decontamination and waste management.

All activities were conducted in accordance with the plans and procedures outlined in the following documents:

- *Operable Unit 6 Former Communications Site Groundwater Monitoring Work Plan, Fort Wainwright, Alaska* (USACE 2017a)
- *Record of Decision, Operable Unit 6, Former Communications Site, Fort Wainwright, Alaska* (USACE 2014a)
- *Operable Unit 6, Former Communications Site, Fort Wainwright, Alaska, Remedial Design/Remedial Action Work Plan, Remedial Design/Remedial Action Work Plan* (USACE 2015a)
- *Monitoring Well Guidance* (ADEC 2013)
- *Former Communications Site Groundwater Monitoring and Vapor Intrusion Study Accident Prevention Plan* (USACE 2015b)

Site identification and historical spill numbers are presented in Table 1-1.

Table 1-1
Site Identification and Spill Numbers

Site Name	ADEC File Number	ADEC Spill Numbers	ADEC Hazard ID	Army HQAES Number
OU6 Former Communications Site (Taku Gardens)	108.38.085	05309914702 05309914703 06309911001 06309931201	4140	02871.1088

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

1.1 REPORT ORGANIZATION

This annual report is organized as follows:

- Section 1.0 introduces the project, presents an overview of the site history and background, and discusses the objectives of the project.
- Section 2.0 presents the work plan deviations.
- Section 3.0 presents the project execution approach.
- Section 4.0 presents a summary of the analytical data and statistical analysis.
- Section 5.0 presents groundwater plumes and historical trend data.
- Section 6.0 presents the conclusions and recommendations.
- Section 7.0 presents citations used to support this report.
- Appendix A presents site figures.
- Appendix B presents the data quality assessment (DQA), sample summary tables, laboratory documentation, and complete analytical data associated with spring and fall sampling events.
- Appendix C presents field notes, well decommissioning forms, and groundwater sampling forms.
- Appendix D presents a photograph log of 2017 sampling events.
- Appendix E presents waste tracking and waste sampling results.
- Appendix F presents geometric regression input used for statistical analysis.
- Appendix G presents the ADEC and U.S. Environmental Protection Agency (EPA) comment response forms.

1.2 SITE BACKGROUND

The OU6 FCS is commonly referred to as the Tanana Trails Family Housing Development, formerly known as Taku Gardens. This site is located on FWA, an active U.S. Army installation occupying a 911,604-acre military reservation east of Fairbanks, Alaska (Figure A-1) (EPA 1992).

During construction of the housing development in 2005, environmental contamination of soil and groundwater were found. Characterization and remedial activities conducted between 2005 and 2013 identified polychlorinated biphenyls, petroleum compounds, chlorinated compounds, volatile organic compounds (VOCs), semivolatile organic compounds, metals, and discarded military munitions and munitions debris. Two of the VOCs that were found to persist in groundwater plumes were trichloroethene (TCE) and 1,2,3-trichloropropane (TCP). The TCE and TCP plumes were likely related to historical salvage and waste operations at the FCS between 1942 and 1962 (USACE 2010).

Biannual groundwater monitoring activities conducted at the FCS during the 2017 field season are part of a multi-year monitoring program to assess contaminant levels, contaminant trends, and the effectiveness of the Record of Decision (ROD)-selected remedy of MNA. Groundwater monitoring at this site began in 2005, continued through the remedial investigation (RI) (USACE 2010), and continues into the present. There are no data from 2013 to 2015, either because data were not accepted or because sampling did not occur during these years. Since 2005, 95 monitoring wells have been installed at the FCS:

- Initially, 13 monitoring wells were installed during the FCS preliminary source evaluation between 2005 and 2006 (USACE 2010).
- While temporary wells were generally used to aid in determining the optimal locations for the permanent wells and were removed after sampling, one temporary well (TW6) remained on the site figures. It is unclear whether the well was decommissioned, and if so, when it was decommissioned.
- In 2007, 64 monitoring wells were installed during the RI to investigate and delineate potential groundwater contamination and to collect data for use in a risk assessment (USACE 2010).

- In 2008, five additional monitoring wells were installed to delineate the boundaries of the contaminated groundwater plumes (USACE 2010).
- In 2009, nine additional monitoring wells were installed as part of the TCP investigation and to delineate TCE and diesel-range organics (DRO) plume boundaries (USACE 2010).
- In 2010, two deep monitoring wells (sentry wells) were installed outside of the fence on the northeast boundary of the FCS to determine whether TCP contamination threatened the FWA drinking water supply wells (USACE 2012a).
- In 2012, one deep monitoring well (sentry well) was installed between the TCP plume and the FWA drinking water supply wells within the capture zone of the FWA drinking water supply wells (USACE 2013).
- In 2013, two unusable wells were decommissioned (MW12 and MW32). Two permanent monitoring wells were installed (MW12R and MW32R) to serve as replacement monitoring wells (USACE 2014b).
- In 2016, 57 monitoring wells were decommissioned or abandoned in place with the approval and guidance of ADEC (USACE 2017b).
- Six additional monitoring wells and one temporary well were targeted and planned to be decommissioned in 2016; however, the wells were delayed until 2017 due to equipment and access issues.

The remedial design/remedial action work plan (USACE 2015a) identified 25 existing wells for continued monitoring to support the ROD-selected remedy of MNA (USACE 2014a) as shown on Figure A-2 and in Table 1-2. Groundwater COCs at the FCS are TCE, TCP, DRO, and residual-range organics (RRO). Although the OU6 ROD identified TCE as a COC (USACE 2014a), TCE concentrations have been below the PCL since 2011. The historical monitoring wells that have been removed from the OU6 MNA Program in 2010 are listed in Table 1-3.

Table 1-2
Monitoring Wells Operational During the 2017 OU6 MNA Program

OU6 Monitoring Wells						
MW03	MW13	MW35	MW47	MW62	MW79	MW90
MW06A	MW28	MW37	MW48	MW64	MW80	MW91
MW08	MW32R	MW38	MW58	MW77	MW82	MW92
MW12R	MW33	MW39	MW61	MW78	MW85	MW93

Notes:
Highlighted wells were not sampled in the 2017 field effort in accordance with the work plan (USACE 2017a).
For definitions, refer to the Acronyms and Abbreviations section.

Table 1-3
Historical Monitoring Wells Removed from the OU6 MNA Program Since 2010

Decommissioned Monitoring Wells						
MW01	MW14	MW21	MW30	MW49	MW60	MW73
MW02	MW15	MW22	MW31	MW50	MW63	MW74
MW04	MW16	MW23	MW34	MW51	MW65	TW6
MW06B	MW17	MW24	MW41	MW52	MW67	
MW09	MW18	MW25	MW42	MW54	MW68	
MW10	MW19	MW27	MW44	MW55	MW71	
MW11	MW20	MW29	MW46	MW59	MW72	

Notes:
Refer to Section 3.1 for additional information on well decommissioning.
For definitions, refer to the Acronyms and Abbreviations section.

1.3 PROJECT OBJECTIVES

The primary project objectives for the 2017 work at the OU6 FCS as described in the work plan (USACE 2017a) were as follows:

- Decommission specific monitoring wells.
- Collect groundwater samples to support evaluation of the groundwater contaminant remedy of MNA and determine groundwater contaminant concentrations.
- Evaluate COCs in groundwater to determine if PCLs are achieved and if groundwater can be restored to unrestricted use/unlimited exposure.
- Provide sample results of acceptable quality to the stakeholders that can be used for site management decisions and can be included in the FCS data set.
- Evaluate MNA parameters in the area to determine the level of natural attenuation that may occur in the area in the future and what processes will likely predominate.

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2.0 WORK PLAN DEVIATIONS

Deviations to the work plan (USACE 2017a) did not significantly affect data quality or usability. Deviations are described below.

2.1 WELL DECOMMISSIONING WORK PLAN DEVIATIONS

Only one (MW81) of the seven wells identified in the work plan was decommissioned according to the process described in the work plan in 2017. Five wells were abandoned in place. This decision was made when accumulated silt, the construction of the well, or damage to the well prevented the Screen Point 16 (SP16) tooling from knocking out the end cap of the wells. These wells were abandoned by filling the polyvinyl chloride (PVC) casing of the well with sand up to groundwater level and then adding bentonite chips to a depth of 1 foot below ground surface (bgs). The wells were then topped with soil, grass seed, and water. Temporary monitoring point TW6 was not found at its known location and, therefore, was not decommissioned. The well was likely either destroyed during demolition of the former Building 50 foundation slab or decommissioned in previous years but not documented. TW6 will not be included in future well decommissioning plans.

2.2 SPRING MONITORING EVENT WORK PLAN DEVIATIONS

There were no work plan deviations reported during the spring 2017 sampling event.

2.3 FALL MONITORING EVENT WORK PLAN DEVIATIONS

There were no work plan deviations reported during the fall 2017 sampling event.

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3.0 PROJECT EXECUTION AND RESULTS

FCS 2017 field activities included monitoring well decommissioning and two rounds of groundwater sampling (spring and fall). Well decommissioning occurred between 25 May and 2 June 2017. Groundwater monitoring was conducted between 18 and 20 July 2017 for the spring event and between 27 and 29 September 2017 for the fall event.

3.1 MONITORING WELL DECOMMISSIONING

Six monitoring wells and one temporary well were scheduled to be decommissioned in 2017; however, the temporary well could not be found at its known location and is believed to have been buried, decommissioned, or destroyed during past construction activities. The location of the temporary well was in an area where approximately 10 feet of imported soil was used to raise the grade and prevent flooding, which may have buried the well if it was not previously decommissioned.

A Geoprobe 7822DT drill rig and other equipment were used to decommission the six monitoring wells during the 2017 field season. The decommissioning procedure started with removing bollards, as necessary. After all bollards were removed, the lock, J-plug/seal cap, and any tubing inside the well were removed, and the drive rod was then inserted into the 2-inch PVC casing to knock out the bottom cap/end plug of the well by hammering the tooling with the drill rig. A load-rated sling was subsequently wrapped around the protective steel outer casing and the casing was lifted by a jack. Some of the protective casings contained sand or gravel, which was collected in 5-gallon buckets and later disposed of in the Fairbanks North Star Borough Landfill. The EPA and ADEC approved landfill disposal of investigation-derived waste (IDW) since there was no groundwater contamination in the decommissioned wells.

After removing the outer steel casing, the sling was attached to the inner PVC casing, which was pulled up until approximately 2 feet of the slotted screen was exposed above ground surface. The PVC casing was then completely removed as dry bentonite chips were poured into the void to within 1 foot bgs; the bentonite chips were hydrated with approximately 1 gallon of potable water. All-purpose top soil from Great Northwest Inc. in Fairbanks, Alaska was used to level remaining well and bollard holes. Topsoil was seeded and watered.

The entire inner PVC casing removal occurred only at well MW81. At the other five monitoring wells (MW14, MW19, MW63, MW68, and MW70) silt prevented the drive rod from knocking out the end cap. In these cases, the wells were abandoned in place following the ADEC well decommissioning procedures (ADEC 2013). The communications approving this variation are presented in Appendix C (Attachment C-3). A complete description of the procedures used to decommission these wells is presented in Section 3.1.1.

Waste generated during well decommissioning activities (e.g., PVC casing, PVC screen or prepacked sand screen, and sand) was placed into 1-cubic yard capacity Super Sacks and disposed of at the Fairbanks North Star Borough Landfill. Steel outer casings, bollards, and well-locking caps were decontaminated and transported offsite. The IDW associated with well decommissioning was presumed clean and was not submitted for confirmation sampling.

The monitoring well decommissioning forms and logbooks are provided in Appendix C. Table 3-1 presents a summary of the decommissioning effort. Figure A-6 shows previously decommissioned FCS monitoring wells, wells decommissioned in 2017, and currently existing monitoring wells.

Table 3-1
2017 Monitoring Well Decommissioning Summary

Well to be Decommissioned	Fully Decommissioned	Abandoned in Place	Could Not Be Located
MW14		X	
MW19		X	
MW63		X	
MW68		X	
MW70		X	
MW81	X		
TW6			X

3.2 SPRING AND FALL GROUNDWATER MONITORING

A total of 25 out of 28 existing wells were sampled during the 2017 spring and fall events; analytical data are presented in Section 5.0. The DQA, analytical data, ADEC laboratory data review checklists, and laboratory reports associated with spring and fall sampling are included in Appendix B of this report. Figure A-2 shows the five historical groundwater contaminant plumes and a table with spring and fall results greater than PCLs. Sampling results that exceeded the PCLs are presented in Figures A-3 through A-5. Table 3-2 summarizes the 2017 analytical suite obtained from each well. The letters “S” and “F” at the end of the sample identification numbers denote when the sample was collected, spring and fall events, respectively. Groundwater samples were collected using low-flow sampling techniques with dedicated Teflon-lined tubing and a peristaltic pump, in accordance with the 2017 work plan (USACE 2017a). An electronic oil-water interface probe was used to measure depth to groundwater and determine whether non-aqueous phase liquid (NAPL) was present. Prior to sample collection, each well was purged until groundwater parameters stabilized or the volume of purge water reached a minimum of three well casing volumes. Measured field parameters were temperature, conductivity, pH, dissolved oxygen (DO), oxidation reduction potential (ORP), and turbidity. Temperature and pH were recorded, but were not used to evaluate stability during purging.

MNA data were collected during 2017 sampling efforts for 25 wells, consisting of the following parameters as described in *Technical Protocol for Evaluating Natural Attenuation of Chlorinated Solvents in Ground Water* (EPA 1988):

- pH – Conditions may become more acidic (lower pH) in areas of high biological activity due to the production of organic acids (intermediate degradation products) and the accumulation of carbon dioxide (the endpoint of oxidation, forming carbonic acid). Neutral pH is 7.
- Eh (the standard thermodynamic measure of electrochemical potential, measures approximately 235 millivolts [mV] greater than the field-measured ORP) – Conditions may become more reducing (lower Eh) in areas where microbes have consumed the available oxygen and switched to progressively less favorable electron acceptors, such as nitrate, manganese, iron, and sulfate. ORP results provide a general understanding of redox conditions but generally are a poor indicator of predominant terminal electron acceptor processes.

- DO (preferred electron acceptor) – Microbes preferentially consume oxygen before other less favorable electron acceptors, such as nitrate, manganese, iron, sulfate, and carbonate, are used.
- Nitrate – In the absence of more favorable electron acceptors, microbes producing ammonia can utilize nitrate and nitrite. Nitrogen in all forms is also an essential nutrient.
- Manganese – In the absence of more favorable electron acceptors, manganese can serve as an electron acceptor and can result in elevated concentrations of dissolved manganese in groundwater.
- Iron – In the absence of more favorable electron acceptors, virtually insoluble (at neutral pH) ferric (oxidized) iron serves as an electron acceptor and can result in elevated concentrations of dissolved ferrous iron in groundwater.
- Sulfate – In the absence of more favorable electron acceptors, sulfate can be used by microbes, leading to decreased sulfate concentrations and the production of hydrogen sulfide gas or insoluble sulfide minerals under anaerobic conditions. Indirect evidence of sulfate reduction may include decreasing concentrations of sulfate along a contaminant flow path, or sulfate concentrations lower than background levels.
- Methane – When other more favorable electron acceptors are depleted, methanogenesis (carbonate reduction) may occur, resulting in increased concentrations of methane. However, in the Fairbanks area, low methane concentrations in groundwater are often observed and may be the result of migration from upgradient sources (e.g., peat or permafrost lenses).

Table 3-2
2017 Groundwater Sampling Plan

Sampling Location	Sample ID	Plume Designation	DRO/ RRO	VOCs [1]	Low-level VOCs [2]	MNA Parameters [3]
MW03	17FWAMW03-GWS 17FWAMW03-GWF	Background	X			X
MW06A	17FWAMW06A-GWS 17FWAMW06A-GWF	DRO Plume	X			X
MW08	17FWAMW08-GWS 17FWAMW08-GWF	Upgradient TCP Plume			X	X
MW12R	17FWAMW12-GWS 17FWAMW12-GWF	DRO Plume	X			X
MW13	17FWAMW13-GWS 17FWAMW13-GWF	Background			X	X
MW28	17FWAMW28-GWS 17FWAMW28-GWF	Upgradient DRO Plume	X			X
MW32R	17FWAMW32R-GWS 17FWAMW32R-GWF	Crossgradient DRO Plume	X		X	X
MW33	17FWAMW33-GWS 17FWAMW33-GWF	DRO Plume	X			X

Table 3-2 (Continued)
2017 Groundwater Sampling

Sampling Location	Sample ID	Plume Designation	DRO/ RRO	VOCs [1]	Low-level VOCs [2]	MNA Parameters [3]
MW35	17FWAMW35-GWS 17FWAMW35-GWF	Downgradient DRO Plume	X			X
MW37	17FWAMW37-GWS 17FWAMW37-GWF	Downgradient DRO Plume	X			X
MW38	17FWAMW38-GWS 17FWAMW38-GWF	Crossgradient DRO Plume	X			X
MW39	17FWAMW39-GWS 17FWAMW39-GWF	Production Sentry Well			X	X
MW47	17FWAMW47-GWS 17FWAMW47-GWF	TCP Plume			X	X
MW48	17FWAMW48-GWS 17FWAMW48-GWF	Crossgradient TCP Plume			X	X
MW58	17FWAMW58-GWS 17FWAMW58-GWF	DRO Plume	X			X
MW61	17FWAMW61-GWS 17FWAMW61-GWF	TCE Plume		X		X
MW62	17FWAMW62-GWS 17FWAMW62-GWF	DRO Plume	X			X
MW64	17FWAMW64-GWS 17FWAMW64-GWF	Downgradient DRO Plume	X			X
MW77	17FWAMW77-GWS 17FWAMW77-GWF	Crossgradient DRO Plume	X			X
MW78	17FWAMW78-GWS 17FWAMW78-GWF	Production Sentry Well			X	X
MW79	17FWAMW79-GWS 17FWAMW79-GWF	TCP Plume			X	X
MW80	17FWAMW80-GWS 17FWAMW80-GWF	Upgradient TCE Plume		X		X
MW82	17FWAMW82-GWS 17FWAMW82-GWF	Downgradient DRO Plume	X			X
MW91	17FWAMW91-GWS 17FWAMW91-GWF	Production Sentry Well			X	
MW93	17FWAMW93-GWS 17FWAMW93-GWF	Production Sentry Well			X	

Notes:

[1] VOCs reported include 1,1-dichloroethene, 1,2,3-TCP, cis-1,2-dichloroethene, tetrachloroethene, trans-1,2-dichloroethene, TCE, and vinyl chloride.

[2] Low-level VOC analysis for 1,2,3-TCP.

[3] MNA parameters were alkalinity, ferrous iron, ammonia, nitrate, potassium, manganese, methane, and sulfate.

For definitions, refer to the Acronyms and Abbreviations section.

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4.0 STATISTICAL APPROACH FOR THE ANALYSIS OF TRENDS IN GROUNDWATER

Nonparametric Mann-Kendall trend tests and geometric (lognormal) regression plots for those wells statistically demonstrating a decreasing trend were used to quantitatively analyze attenuation of groundwater COCs.

The Mann-Kendall test is part of the Air Force Center for Engineering and the Environment's Monitoring and Remedial Optimization Software (MAROS) package (GSI Environmental 2012). This test does not make any assumptions about the statistical distribution of the data or regularity of sampling intervals; therefore, it is a general-purpose tool used to identify whether a trend is present and whether the slope of the trend is positive, zero, or negative. If the Mann-Kendall test suggests a declining trend, then geometric regression of the data is used to evaluate the rate of natural attenuation, the probable start of the attainment phase of monitoring, and the probable date of complete remediation. A Microsoft Excel workbook was programmed to perform the regression analysis (Appendix F). The geometric regression methodology is consistent with EPA guidance for evaluating completion of groundwater cleanup (EPA 2014). The EPA guidance defines the attainment phase as the period of monitoring during which contaminant concentrations are expected to have decreased to less than the PCL.

The calculated Mann-Kendall statistic is proportional to the strength of the trend, with negative values representing decreasing trends, values close to zero representing stable trends, and positive values representing increasing trends. The test also calculates a coefficient of variation, which reflects the variability of the data; values greater than or equal to one indicate excessive scatter. Finally, the test provides a trend confidence, which is the probability that the trend identified by the test statistic is real rather than arising by chance. The test results are interpreted according to the decision logic used in MAROS, as shown in Table 4-1. Output of the Microsoft Excel workbook was validated against MAROS output for a variety of input data sets (Appendix F).

Table 4-1
Decision Logic for Interpreting Mann-Kendall Test Results (from MAROS)

Mann-Kendall Statistic	Coefficient of Variation	Trend Confidence	Trend
> 0	any	> 95%	Increasing
		≤ 95% and > 90%	Probably Increasing
		≤ 90%	No Trend
< 0	any	> 95%	Decreasing
		≤ 95% and > 90%	Probably Decreasing
	< 1	≤ 90%	Stable
	≥ 1		No Trend

Geometric regression analysis is based on two assumptions about the data: 1) concentrations decline at a rate proportional to the amount of contaminant present, and 2) variations due to factors other than attenuation are approximately lognormally distributed. In general, these assumptions are a good fit for the FCS TCE and TCP data sets. They permit geometric regression to be carried out using the methodology of linear regression applied to the logarithms of the concentrations, much as the geometric mean (the nth root of the product of n values) can be calculated from the arithmetic mean of the logarithms of the values.

Functionally, the geometric regression plot is the best-fit first-order decay curve. The rate of decrease is described by a half-life, and the effects of scatter in the data are incorporated by calculating a 95 percent upper confidence limit (UCL95). The date of the intersection of the geometric regression curve with the cleanup level identifies the beginning of the attainment phase, i.e., the time at which a sample would have a 50 percent chance of being less than the cleanup level. The upper confidence limit of the mean of samples collected during the attainment phase is expected to be less than the cleanup level (EPA 2014). The date of the intersection of the UCL95 curve with the cleanup level is the predicted cleanup date (remediation complete), although additional sampling may be required to meet EPA guidance to demonstrate cleanup (EPA 2014). After this date, a sample has less than a 5 percent probability of exceeding the cleanup level due to random fluctuations.

5.0 GROUNDWATER PLUMES AND TRENDS

Data from past sampling events were combined with data presented in this report to support statistical and geochemical assessments of natural attenuation of groundwater contaminated with DRO, RRO, TCP, and TCE related to the FCS. Historical data from 2007 onward have been obtained from the 2012 groundwater summary report (USACE 2012b), the 2012 groundwater monitoring data report (USACE 2013), and the 2016 activities and groundwater monitoring report (USACE 2017b). These data were obtained using the same analytical methods as in this report (as summarized in Appendix B) and are therefore comparable.

Figure A-2 shows the current DRO, TCP, and TCE groundwater plumes and lists the PCL exceedances in the 2017 dataset. Current and historical DRO exceedances identify a main plume delineated by four monitoring wells, and two plumes identified by two separate wells. Low-level DRO contamination may exist within the depicted leading-edge plume boundary. In addition to the three DRO plumes, current and historical TCP exceedances in two wells define the TCP plume, and historical TCE exceedances in one well define the low-level (leading-edge) TCE plume.

5.1 MAIN DRO PLUME

The main DRO plume, depicted in detail on Figure A-3, originates north of Building 8 (4716 White Street) and extends approximately 500 feet to the north-northwest in the direction of groundwater flow. DRO may be detectable for an additional 500 to 800 feet downgradient. Figure A-3 also lists the current and historical DRO and RRO results for each of the four in-plume wells.

5.1.1 2017 Sample Results

Table 5-1 presents DRO and RRO 2017 results from spring and fall sampling of the four in-plume wells (MW06A, MW12R, MW33, and MW58) and seven surrounding sentry or background wells. Several DRO results were qualified JL- due to laboratory control sample recoveries outside of control limits. The laboratory re-extracted and re-analyzed these samples outside of hold time and confirmed the original results. Therefore, the JL- qualified data are considered usable for the purposes of this report. Full analytical details are presented in the DQA (Appendix B).

In-plume DRO concentrations were generally slightly greater than the PCL (1.5 mg/L) except in MW33, where DRO exceeded the PCL by an order of magnitude or more with a maximum of 35 mg/L. This well also yielded the only RRO exceedance, with a maximum of 4.0 mg/L versus the PCL of 1.1 mg/L. Background DRO and RRO concentrations were nondetect (ND) (MW03), while sentry-well DRO concentrations ranged from ND to less than 40 percent of the PCL and RRO concentrations ranged from ND to less than 20 percent of the PCL.

Table 5-1
2017 DRO/RRO Sampling Results for the Main DRO Plume

Well ID	Well Position	Event	Sample ID	DRO Result (mg/L)	RRO Result (mg/L)
			PCL[1]	**1.5**	**1.1**
MW06A	In-plume	Spring	17FWAMW06A-GWS	**3.9**	ND (0.55)
		Fall	17FWAMW06A-GWF	**5.0**	0.32
MW12R	In-plume	Spring	17FWAMW12R-GWS	0.17	ND (0.11)
		Fall	17FWAMW12R-GWF	**1.6**	0.18
MW33	In-plume	Spring	17FWAMW33-GWS	**35**	**4.0**
		Fall	17FWAMW33-GWF	**25**	ND (5.5)[2]
MW58	In-plume	Spring	17FWAMW58-GWS	**1.9**	0.11
			17FWAMW58Y-GWS	**2.0**	ND (0.22)
		Fall	17FWAMW58-GWF	**2.0**	0.26
			17FWAMW58Y-GWF	**2.1**	0.24
MW03	Background (upgradient)	Spring	17FWAMW03-GWS	ND (0.004) JL-	ND (0.11)
		Fall	17FWAMW03-GWF	ND (0.004)	ND (0.11)
MW28	Sentry (crossgradient)	Spring	17FWAMW03-GWS	0.19	ND (0.11)
		Fall	17FWAMW03-GWF	0.57	0.20
MW32R	Sentry (crossgradient)	Spring	17FWAMW32R-GWS	0.14	ND (0.11)
		Fall	17FWAMW32R-GWF	0.6	0.20
MW64	Sentry (crossgradient)	Spring	17FWAMW64-GWS	ND (0.004)	ND (0.11)
		Fall	17FWAMW64-GWF	ND (0.004) JL-	ND (0.11)
MW35	Sentry (downgradient)	Spring	17FWAMW35-GWS	ND (0.004) JL-	ND (0.11)
			17FWAMW35X-GWS	ND (0.004)	ND (0.11)
		Fall	17FWAMW35-GWF	0.19	0.14
			17FWAMW35X-GWF	0.57	0.14
MW37	Sentry (downgradient)	Spring	17FWAMW37-GWS	0.14	ND (0.11)
		Fall	17FWAMW37-GWF	0.6	0.20
MW82	Sentry (downgradient)	Spring	17FWAMW82-GWS	ND (0.004)	ND (0.11)
		Fall	17FWAMW82-GWF	0.15	0.16

Notes:
[1] PCL from the ROD (USACE 2014a). DRO and RRO are the same as the current ADEC cleanup levels (ADEC 2017).
[2] Sample was diluted for analysis, and the associated LOD is greater than the PCL.
Bold results are greater than or equal to the PCL.
( ) = LOD
For definitions, refer to the Acronyms and Abbreviations section.

In 2017, DRO concentrations in the plume ranged from 0.17 mg/L (MW12R) to 35 mg/L (MW33), while concentrations near the leading edge of the plume ranged between ND (MW82) and 0.49 mg/L (MW37). In 2017, RRO concentrations in the plume ranged between ND at several locations and 4.0 mg/L (MW33), while concentrations near the leading edge of the plume remained below the PCL at concentrations ranging between ND and 0.20 mg/L (MW37). RRO concentrations in monitoring wells MW06A and MW58 have been either ND or below the PCL since 2007. Refer to Table 5-1, Figure A-3, and the DQA (Appendix B) for main DRO plume sample results.

5.1.2 In-Plume Trend Analysis

Graphs 5-1 and 5-2 show historical and 2017 DRO and RRO concentrations, respectively, as a function of time for the four in-plume wells, and illustrate the absence of declining trends through 2017. Detailed results of the Mann-Kendall trend analysis for each well are presented in Table 5-2. The Mann-Kendall evaluation of DRO and RRO trends at the four in-plume wells of the main DRO plume indicates that concentrations are stable, have no trend (are variable) or are probably decreasing at the upgradient and downgradient margins of the plume (MW06A, MW12R, and MW58) but are either probably increasing or increasing in the well in the interior of the plume (MW33). The increasing RRO indication in MW33 results from using the LOD as a proxy for the ND result in fall 2017, when the LOD was highly elevated due to the dilution required by the accompanying DRO analysis. If this datum is omitted, the indicated RRO trend in MW33 changes from increasing to probably increasing.

With an additional year of monitoring results, trends are better defined compared to 2016 (USACE 2017b) and several trends have changed. In MW12R, the RRO trend changed from stable to probably decreasing. In MW33, the DRO trend changed from no trend to probably increasing and the RRO trend changed from probably increasing to increasing.

The probably increasing DRO trend indicated in MW33 appears to reflect local plume evolution rather than potential contaminant migration; if migration were occurring, trends downgradient of this well (MW06A and MW58) would be probably increasing rather than stable. DRO concentrations in MW33 may increase as the fuel hydrocarbons weather to more soluble organic acids over time. Because fresh diesel fuel is soluble in water up to 2.3 mg/L (Alaska Statement of Cooperation Working Group 2006), higher concentrations do not signify the presence of more fuel but instead indicate that the fuel chemistry has been altered (weathered) to a more soluble form. As weathering of residual fuel trapped as light NAPL (LNAPL) droplets at the groundwater interface becomes more pervasive, DRO concentrations would increase over time. Until natural attenuation processes lead to depletion of the residual LNAPL, contaminant concentrations will continue to be high and variable, and it will not be possible to estimate a cleanup date.

Table 5-2
Mann-Kendall Trend Analysis Results for the Main DRO Plume (DRO and RRO)

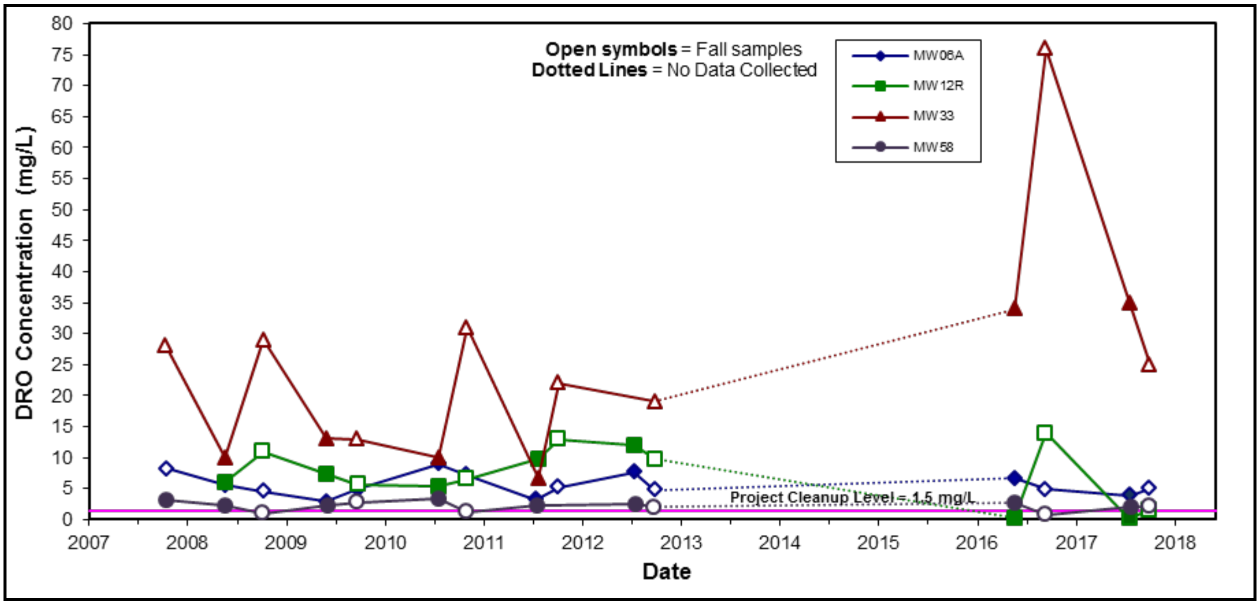
Well ID	Previous Trend[1]	Number of Data Points	Analyte	Mann-Kendall Statistic	Coefficient of Variation	Trend Confidence	Trend
MW06A	Stable	15	DRO	-13	0.32	72%	Stable
MW12R	No Trend	14	DRO	-7	0.62	63%	No Trend
	Stable		RRO	-28	0.92	93%	Probably Decreasing
MW33	No Trend	14	DRO	28	0.69	93%	Probably Increasing
	Probably Increasing		RRO	41	0.66	99%	Increasing
MW58	Stable	12	DRO	-19	0.35	84%	Stable

Notes:

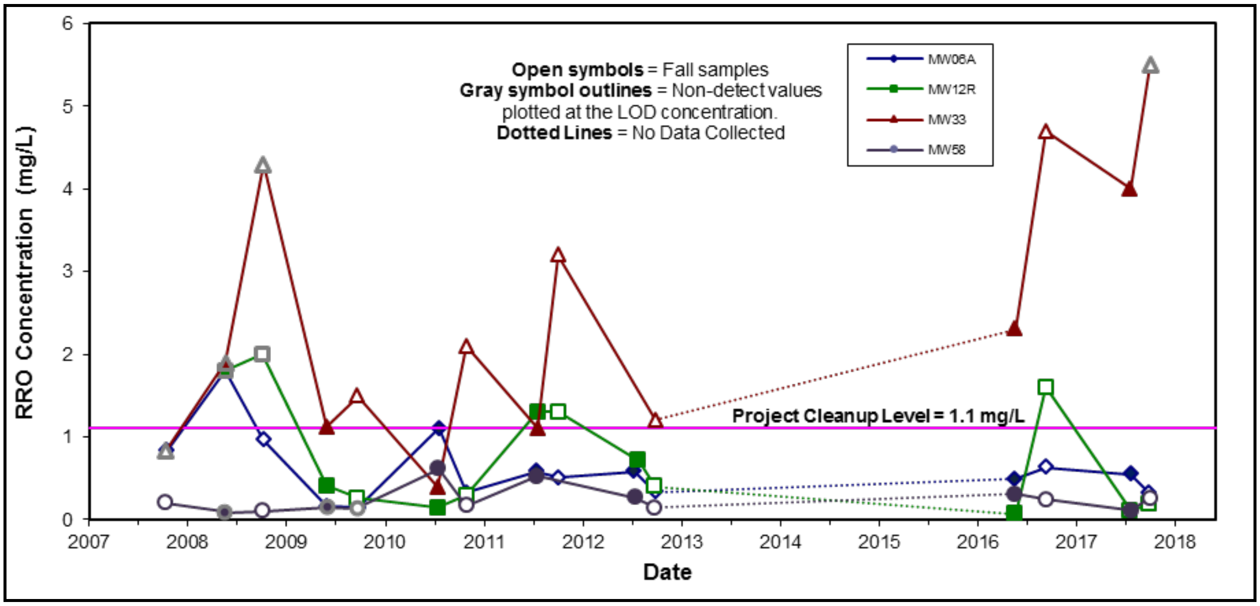
[1] 2016 FCS Groundwater Monitoring Annual Report (USACE 2017b).

For definitions, refer to the Acronyms and Abbreviations section.

On Graph 5-1, DRO concentrations show a strong seasonal effect in MW33, with four instances of the fall result exceeding the spring result by a factor of 2 or more versus two instances of similar spring and fall results. On Graph 5-2, RRO in MW33 is similarly but less consistently affected. On both graphs, strong seasonal effects are not visually apparent for the remaining in-plume wells. Mechanistically, the high concentrations in the fall at MW33 are interpreted to arise from the interaction of the typically high water table in fall with immobile residual NAPL that persists as a contaminated smear zone at the groundwater interface near this well. Although the fall 2017 contaminant concentrations were lower than the spring 2017 results, they conform to the proposed mechanism because fall 2017 (late September) water levels were lower than spring 2017 (mid-July) water levels. Contamination at the groundwater interface is smeared vertically by fluctuations of the water table. When the water table is low (spring conditions), most of the contaminated smear zone will lie above the groundwater interface, and contaminant concentrations averaged over the upper several feet of groundwater will be relatively low. When the water table is high (fall conditions), the contaminated smear zone will be submerged, and contaminant concentrations averaged over the upper several feet of groundwater will be relatively high.



Graph 5-1 Historical DRO Concentrations in the Main DRO Plume



Graph 5-2 Historical RRO Concentrations in the Main DRO Plume

5.1.3 Geochemical Conditions

Water quality and MNA parameters provide evidence of microbial degradation processes occurring in the main DRO plume. Details may be found on the field forms (Appendix C) and in the DQA (Appendix B). These geochemical data had the following characteristics and interpretations in 2017:

- pH values in all wells at the FCS were near neutral, ranging between 6.43 and 7.53, with an average of 6.88. Because in-plume pH has not been lowered, aerobic biodegradation, which produces carbonic acid, is not occurring at a rapid rate.
- Alkalinity ranged from 179 to 356 mg/L in-plume and from 249 to 527 mg/L in surrounding wells. Because in-plume alkalinity has not been increased, aerobic biodegradation is not occurring at a rapid rate (EPA 1998).
- DO concentrations ranged from 0.45 to 2.32 mg/L in-plume and from 0.24 to 8.24 mg/L in the surrounding wells. In-plume DO concentrations were generally lower in the fall and surrounding DO concentrations were generally higher in the fall. These trends suggest that aerobic biodegradation is occurring when oxygen is available and when groundwater is interacting with the contaminated smear zone.
- Potassium concentrations ranged between 3.55 and 8.80 mg/L, and concentrations at the in-plume wells were comparable to background levels. Sufficient potassium is available to support bacterial activity.
- ORP values in-plume ranged from -57.2 and 51.7 mV in the spring and from -101.4 to 2.1 mV in the fall. Surrounding ORP values ranged from -54.2 and 181.1 mV without a

seasonal influence. The generally lower in-plume ORP values are consistent with the conversion of oxygen and other electron acceptors to their reduced forms during biodegradation.

- Phosphorus, a nutrient, was higher in-plume than in surrounding wells. In-plume concentrations ranged between 0.0394 and 0.431 mg/L, while background concentrations ranged between ND and 0.139 mg/L. Sufficient phosphorus is available to support bacterial activity.

- Nitrate/nitrite, a nutrient and electron acceptor expressed as nitrogen, ranged from ND to 0.18 mg/L in in-plume wells in both the spring and fall. In surrounding wells, it ranged from ND to 3.9 mg/L in the spring and ND to 4.6 mg/L in the fall. The near-absence of nitrate/nitrite in-plume may reflect its conversion to ammonia under anaerobic conditions or the absence of a local source. In the surrounding wells, the highest levels were seen outside the plume, in MW32R, MW35, and MW37. These wells are located in comparatively lush grass, and the elevated nitrate/nitrite there may reflect over-application of fertilizer. Levels greater than 3 mg/L typically indicate an anthropogenic source (U.S. Geological Survey [USGS] 2004).

- Ammonia, a nutrient and electron donor, expressed as nitrogen, was low in all wells during both sampling events and ranged from ND to 0.48 mg/L. Its near-absence in-plume suggests that the plume does not receive nitrogen input from fertilizer nor some other anthropogenic source, unlike some of the surrounding wells. Thus, nitrogen availability may be a limiting factor for in-plume bacterial activity.

- Manganese, a soluble redox indicator produced under reducing conditions, ranged between 0.935 and 4.60 mg/L in in-plume wells and ranged between 0.0508 and 0.784 mg/L in surrounding wells without significant seasonality. Elevated manganese concentrations indicate in-plume manganese reduction likely due to biodegradation of DRO and RRO (Wiedemeier et al. 1999).

- Ferrous iron, a soluble redox indicator produced under reducing conditions, ranged between 0.5 and 5.6 mg/L in in-plume wells and ranged between ND and 2.4 mg/L in surrounding wells without significant seasonality. Elevated in-plume ferrous iron concentrations indicate iron reduction likely due to biodegradation of DRO/RRO (Wiedemeier et al. 1999), while elevated ferrous iron concentrations in some of the surrounding wells indicate iron reduction likely due to other buried organic material.

- Sulfate, an electron acceptor utilized under strongly reducing conditions, ranged in concentration between 3.8 and 36.8 mg/L in in-plume wells and ranged between 13.8 and 62.4 mg/L in surrounding wells, all without significant seasonality. Low in-plume sulfate concentrations likely reflect its conversion to sulfide during anaerobic biodegradation of DRO and RRO after consumption of the other electron acceptors (Wiedemeier et al. 1999).

- Methane, produced under strongly reducing conditions, ranged in concentration from 0.028 to 5.9 mg/L in in-plume wells and from ND to 0.052 mg/L in surrounding wells without significant seasonality. High in-plume methane concentrations indicate that all

> available electron acceptors have been utilized and that additional anaerobic biodegradation of DRO/RRO is occurring via methanogenesis (Wiedemeier et al. 1999).

Groundwater at this FCS site is naturally aerobic, with oxygen concentrations at most wells greater than 1.0 mg/L. Oxygen and nitrate/nitrite have been largely depleted in the plume. In general, if anaerobic groundwater is depleted in nitrate and sulfate, and methane concentrations exceed 0.2 mg/L, then carbon dioxide reduction (methanogenesis) is likely the predominant terminal electron-accepting process (USGS 2006). Higher concentrations of dissolved manganese and iron, lower concentrations of sulfate, and higher concentrations of methane are evidence that metal and sulfate reduction, as well as methanogenesis, are significant processes in the plume. It is not possible with these data to determine if one degradation process predominates, if these processes are concurrent, or if they are occurring in isolated, but nearby areas, at the point of sampling.

5.1.4 Main DRO Plume Summary

Contaminant trends indicate that the extent of the plume is stable but interior concentrations could be increasing, which is attributable to the greater solubility of weathered fuel compared to fresh fuel and the greater interaction of the contaminated smear zone with groundwater during periods when the water table is high (typically during the fall). Geochemical data suggests that biodegradation at the site is likely due to aerobic respiration, metal and sulfate reduction, and methanogenesis. Cleanup dates for in-plume wells cannot be estimated until residual LNAPL in the contaminated well is depleted and no longer buffers dissolved contaminant concentrations. At that time, decreasing trends should become apparent.

5.2 MW62 AND MW77 DRO PLUMES

The MW62 and MW77 DRO plumes, depicted in detail on Figure A-3, are located approximately 150 and 400 feet, respectively, north-northeast of the main DRO plume. These plumes are delineated by single wells and one crossgradient sentry well (MW38). Wells MW62 and MW82, although formally associated with the main DRO plume, are also relevant downgradient sentry wells for these plumes. Figure A-3 also lists the current and historical DRO and RRO results for the two in-plume wells.

5.2.1 2017 Sample Results

Table 5-3 presents DRO and RRO results from spring and fall sampling of the two in-plume wells (MW62 and MW77) and the sentry well (MW38) in 2017. One DRO result has been qualified JL- due to laboratory control sample recovery outside of control limits. The laboratory re-extracted and re-analyzed this sample outside of hold time and confirmed the original result. Therefore, the JL- qualified result is considered usable for the purposes of this report. Full analytical details are presented in the DQA (Appendix B).

During the 2017 sampling events, DRO and RRO concentrations at MW62 and MW77 were all below the PCLs.

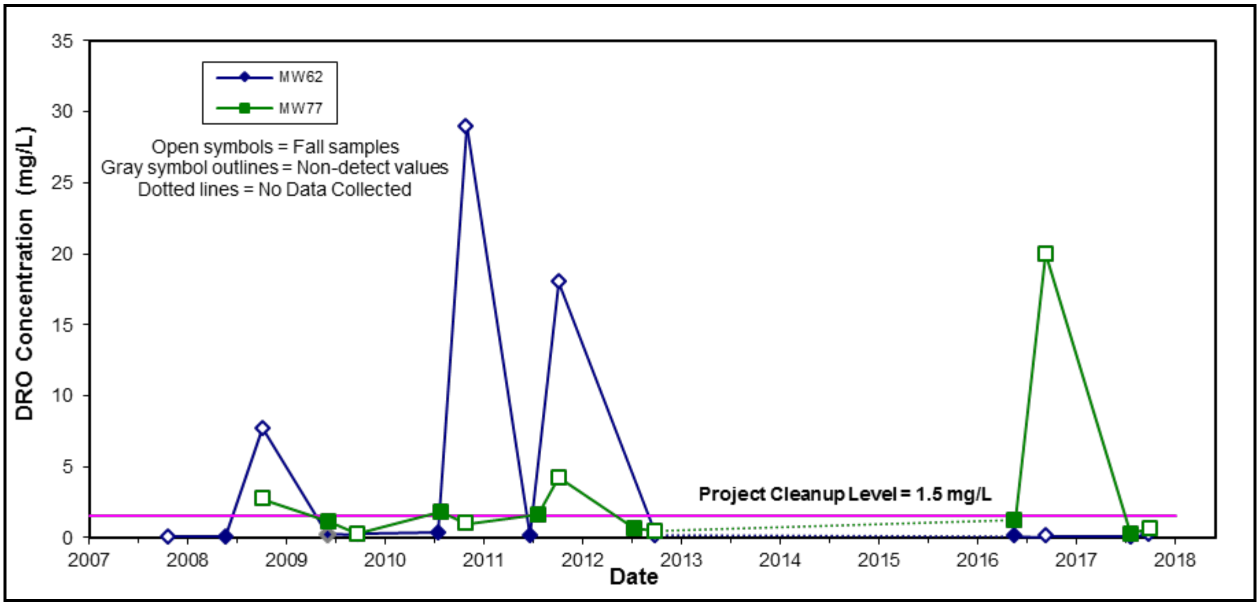
Table 5-3
2017 DRO/RRO Sampling Results for MW62 and MW77 Plumes

Well ID	Well Position	Event	Sample ID	DRO Result (mg/L)	RRO Result (mg/L)
			PCL^1:	**1.5**	**1.1**
MW62	In-plume	Spring	17FWAMW62-GWS	0.092 JL-	ND (0.11)
		Fall	17FWAMW62-GWF	0.18	0.18
MW77	In-plume	Spring	17FWAMW77-GWS	0.28	ND (0.11)
		Fall	17FWAMW77-GWF	0.64	0.24
MW38	Sentry (crossgradient)	Spring	17FWAMW38-GWS	0.088	ND (0.11)
		Fall	17FWAMW38-GWF	ND (0.04)	ND (0.11)

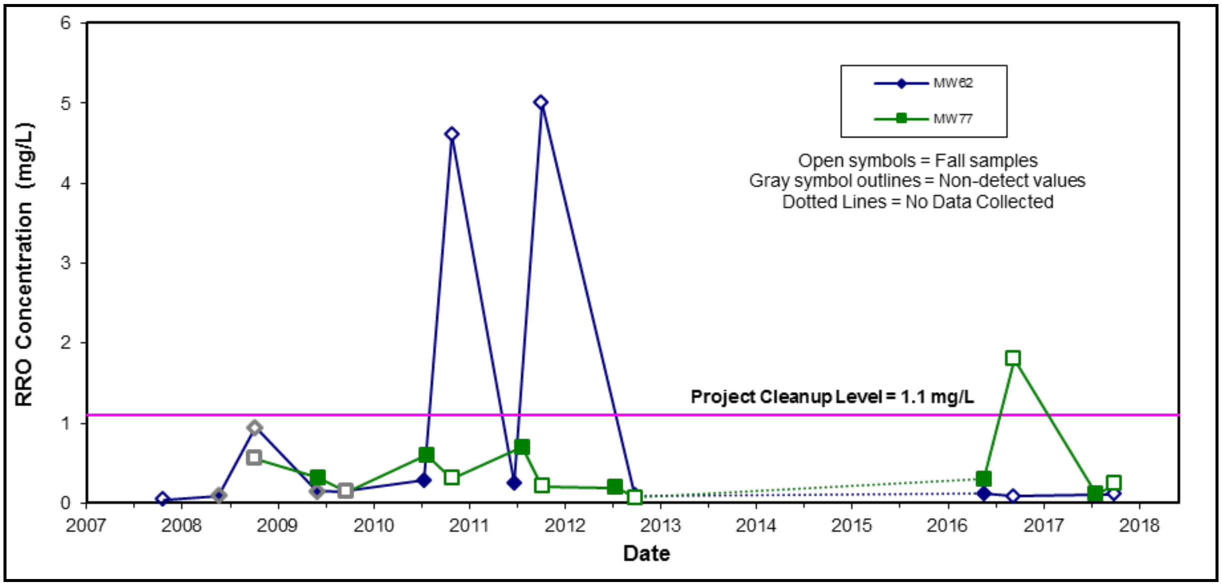
Notes:
[1] PCLs from the ROD (USACE 2014a). DRO and RRO are the same as the current ADEC cleanup levels (ADEC 2017).
( ) = LOD
For definitions, refer to the Acronyms and Abbreviations section.

5.2.2 In-Plume Trend Analysis

Graphs 5-3 and 5-4 present historical and 2017 data collected at monitoring wells MW62 and MW77. The data are dominated by strong seasonal fluctuations in some years. In MW62, DRO and RRO exhibited very strong seasonal fluctuations in 2010 and 2011, with spring results below the PCL and fall results an order of magnitude greater than the PCL. In contrast, 2016 and 2017 results from MW62 are far less than the PCLs in both spring and fall. In MW77, seasonal fluctuation was strong only in 2016. Seasonal effects were absent in the 2017 results for both wells. Collectively, these observations suggest that immobile residual NAPL was present and may yet remain near these wells.



Graph 5-3 **Historical DRO Concentrations at MW62 and MW77**



Graph 5-4 **Historical RRO Concentrations at MW62 and MW77**

Table 5-4 provides results of the Mann-Kendall trend analysis of historical and 2017 data collected from monitoring wells MW62 and MW77. Reflecting the wide variations in concentrations, this analysis indicated no trend (variable results) for both DRO and RRO in both wells. Because neither plume exhibited a declining trend, geometric regression was not performed. Until natural attenuation processes lead to depletion of residual LNAPL and contaminant concentrations show a decreasing trend, it is not possible to estimate a cleanup date.

Table 5-4
Mann-Kendall Trend Evaluation Results for DRO Plumes MW62 and MW77
(DRO and RRO)

Well ID	Number of Data Points	Analyte	Previous Trend[1]	Mann-Kendall Statistic	Coefficient of Variation	Trend Confidence	Trend
MW62	14	DRO	No Trend	-13	2.17	74%	No Trend
		RRO	No Trend	-6	1.96	61%	No Trend
MW77	13	DRO	No Trend	-12	1.91	75%	No Trend
		RRO	No Trend	-16	1.06	82%	No Trend

Notes:
[1] *2016 FCS Groundwater Monitoring Annual Report* (USACE 2017b).
For definitions, refer to the Acronyms and Abbreviations section.

5.2.3 Geochemical Conditions

Water quality and MNA parameters provide evidence of microbial degradation processes occurring in the MW62 and MW77 DRO plumes. Details may be found on the field forms (Appendix C) and in the DQA (Appendix B). These geochemical data had the following characteristics and interpretations in 2017:

- DO concentrations in MW62 and MW77 were 4.3 and 1.3 mg/L, respectively, in the spring, and 0.32 and 9.9 mg/L, respectively, in the fall. DO concentrations in downgradient wells MW64 and MW82 were 1.03 and 2.32 mg/L, respectively, in the spring, and 8.24 and 1.2 mg/L, respectively, in the fall. Although aerobic biodegradation is likely to occur when and where DO is available, the wide variations of DO in the downgradient sentry wells suggest that background conditions are highly variable. Therefore, the in-plume availability of DO cannot be ascertained.
- Nitrate/nitrite concentrations as nitrogen in MW62 and MW77 were 4.4 and 14.6 mg/L, respectively, in the spring, and 13.3 and 12.2 mg/L, respectively, in the fall. In contrast, background concentrations of nitrate/nitrite as nitrogen at MW38 were found to be 0.13 mg/L in the spring and 0.11 mg/L in the fall. The high nitrate/nitrite levels in the in-plume wells is probably anthropogenic, but the source(s) is not apparent. MW62 is located

inside a fenced yard where fertilizer has probably been applied, but MW77 is located in a dirt lot becoming overgrown with alders and fertilization seems unlikely. Leakage from the direct-bury sewer line along Neely Road seems to be discounted by the low nitrate/nitrite values in MW38. The high in-plume nitrate/nitrite levels indicate that redox conditions are at least moderately oxidizing. Otherwise, nitrate reduction would convert all nitrogen to ammonia (Wiedemeier et al. 1999).

- Ammonia concentrations at MW62 and MW77 ranged between ND and 0.23 mg/L during 2017. The absence of significant ammonia in the presence of abundant nitrate/nitrite indicates that redox conditions are at least moderately oxidizing (Wiedemeier et al. 1999).
- Manganese concentrations at MW62 were 1.83 and 1.34 mg/L during the spring and fall, respectively. These concentrations were higher than those observed in downgradient well MW64 where concentrations were 0.447 and 0.307 mg/L in the spring and fall, respectively. At MW77 dissolved manganese concentrations were also higher in the spring, with concentrations of 0.854 and 0.792 mg/L in the spring and fall, respectively, which is higher than at downgradient well MW82 where concentrations were 0.0544 and 0.0508 mg/L in the spring and fall, respectively. Although manganese reduction to soluble manganese is not expected to occur in the presence of nitrate/nitrite, aquifer heterogeneity may allow manganese reduction in specific zones.
- Ferrous iron was not detected at MW62 and MW77 in the spring or fall sampling events. Because the production of ferrous iron requires moderately reducing redox conditions, its absence is consistent with the moderately oxidizing conditions indicated by the abundant nitrate/nitrite.
- Sulfate concentrations at MW62 were 96.9 and 40.9 mg/L in spring and fall, respectively. At MW77, sulfate concentrations were 72.4 and 64 mg/L in spring and fall, respectively. These concentrations were greater than concentrations observed at downgradient monitoring wells MW64 and MW82, where sulfate concentrations ranged between 13.8 and 27.2 mg/L in 2017. The source of the elevated in-plume sulfate is not known, and sulfate reduction requires strongly reducing redox conditions, which are incompatible with the presence of abundant nitrate/nitrite.
- Methane concentrations at MW62 ranged between 0.061 mg/L and ND in spring and fall, respectively, and methane concentrations at MW77 ranged between 0.0012 mg/L and ND in spring and fall, respectively. Methanogenesis requires extremely reducing redox conditions, which are incompatible with the presence of abundant nitrate/nitrite, and these low concentrations indicate that methanogenesis is not a significant process at MW62 and MW77.

5.2.4 MW62 and MW77 DRO Plumes Summary

MW62 and MW77 recorded DRO and RRO concentrations less than PCLs for both the spring and fall sampling events in 2017, but historically the wells have exhibited strong PCL exceedances in the fall in certain years (2010 and 2011 for MW62, 2016 for MW77). These exceedances overshadow any long-term trend, and the Mann-Kendall statistical analysis indicated no trend (variable data) was found for either contaminant in these wells. Geochemical data indicate that redox conditions are at least moderately oxidizing with abundant available nitrogen. These conditions are favorable for biodegradation of DRO and RRO via aerobic or nitrogen-reducing processes. Manganese reduction appears to be a minor contributor to DRO and RRO biodegradation.

Occasional spikes in contaminant concentrations in both wells imply the existence of nearby contaminated smear zones. Residual LNAPL droplets in those zones would interact with the groundwater system under specific conditions (i.e., high water table elevations typically seen in the fall). Cleanup dates cannot be estimated until the residual LNAPL is depleted and decreasing trends are seen. This may have occurred in MW62, for which there are no spikes in either the 2016 or 2017 data for this well, and it will meet EPA guidance for attainment of PCLs after three more rounds of sampling if the recent low levels persist (EPA 2014).

5.3 TCP PLUME

The TCP plume (Figure A-4) likely resulted from historical salvage and waste operations at the FCS between 1942 and 1962 (USACE 2010). Regular groundwater monitoring of this plume began in 2007.

5.3.1 Sample Results

During both sampling events in 2017, TCP concentrations exceeded the PCL at monitoring wells MW47 and MW79, with concentrations of 0.00019 and 0.00061 mg/L, respectively, in the spring, and 0.0003 and 0.0012 mg/L, respectively, in the fall. The 2017 sampling results for in-plume, and upgradient and downgradient sentry wells around the TCP plume are presented in Table 5-5. The results are compared with the PCL, as agreed upon in the ROD (USACE 2014a), with ADEC 2017 cleanup levels provided for reference.

Table 5-5
2017 Sampling Results for the TCP Plume

Well ID	Well Position	Event	Sample ID	TCP Result (mg/L)
			PCL[1]:	**0.00012**
MW47	In-plume	Spring	17FWAMW47-GWS	**0.00019**
		Fall	17FWAMW47-GWF	**0.0003**
MW79	In-plume	Spring	17FWAMW79-GWS	**0.00056**
			17FWAMW79Z-GWS	**0.00061**
		Fall	17FWAMW79-GWF	**0.0012**
			17FWAMW79Y-GWF	**0.001**
MW13	Background (upgradient)	Spring	17FWAMW13-GWS	ND (0.0000025)
		Fall	17FWAMW13-GWF	ND (0.0000025)
MW08	Sentry (upgradient)	Spring	17FWAMW08-GWS	0.000027
		Fall	17FWAMW08-GWF	0.000031
MW48	Sentry (crossgradient)	Spring	17FWAMW48-GWS	ND (0.0000025)
		Fall	17FWAMW48-GWF	ND (0.0000025)
MW78	Sentry (downgradient)	Spring	17FWAMW78-GWS	ND (0.0000025)
		Fall	17FWAMW78-GWF	0.0000062
MW39	Sentry (downgradient)	Spring	17FWAMW39-GWS	ND (0.0000025)
		Fall	17FWAMW39-GWF	0.0000065
MW91	Sentry (production well)	Spring	17FWAMW91-GWS	ND (0.0000025)
		Fall	17FWAMW91-GWF	ND (0.0000025)
MW93	Sentry (production well)	Spring	17FWAMW93-GWS	ND (0.0000025)
		Fall	17FWAMW93-GWF	ND (0.0000025)

Notes:

[1] PCL from the ROD (USACE 2014a). For comparison, the current ADEC cleanup level for TCP is 0.0000075 mg/L (ADEC 2017).

Bold results are greater than or equal to the PCL.

( ) = LOD

For definitions, refer to the Acronyms and Abbreviations section.

Figures A-2 and A-4 show the 2017 TCP exceedances and historical TCP exceedances, respectively. TCP concentrations at background monitoring wells MW08 and MW13 have not exceeded the PCL since 2012 and 2008, respectively; however, some of the ND results from these locations had LODs greater than the PCL (Figure A-4).

5.3.2 In-Plume Trend Analysis

Well MW47, located at the leading edge of the TCP plume, continues to exhibit decreasing TCP concentrations, whereas well MW79 in the upgradient portion of the plume exhibits variable concentrations substantially above the PCL. In MW47, the Mann-Kendall trend analysis of historical TCP data reveals a decreasing trend (with high confidence) at MW47, and no trend (with moderate confidence) at MW79 (Table 5-6). The geometric regression plot for MW47 (Graph 5-5) indicates that cleanup could be achieved by 2029 if the present trend continues.

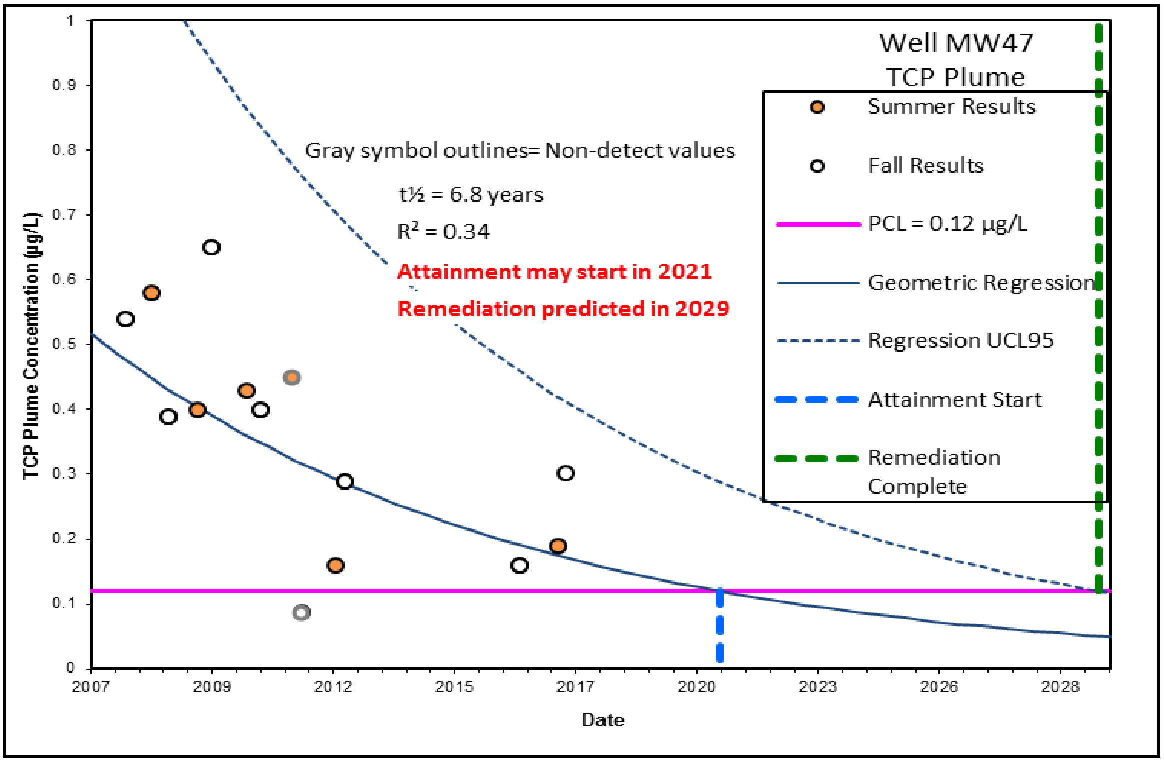
In MW79, the time-series plot (Graph 5-6) displays exceedances at every sampling event and shows moderate seasonal fluctuations with the highest results observed during the fall when groundwater elevations are typically highest. However, water levels during the 2017 spring event (conducted in mid-July) were higher than during the fall event (conducted in late September), likely due to local recharge related to summer rain. Although the water level was higher during the spring event, the TCP concentration was higher during the fall event, so this pattern is not completely dependent on water level and other factors, such as ground temperature or geochemistry, must impact plume behavior. Because the Mann-Kendall trend analysis found no trend (Table 5-6), geometric regression analysis was not performed. The high TCP concentrations observed during fall sampling events at monitoring well MW79 suggest the presence of TCP in nearby soil.

Although geochemical conditions (i.e., high DO concentrations and ORP values during both the 2016 and 2017 sampling events) suggest that groundwater redox conditions are not sufficiently reducing to support reductive dechlorination of TCP (EPA 1998), natural attenuation processes (i.e., dilution, advection, volatilization, and dispersion) appear to be active, as evidenced by the decreasing trend in TCP concentrations at monitoring well MW47.

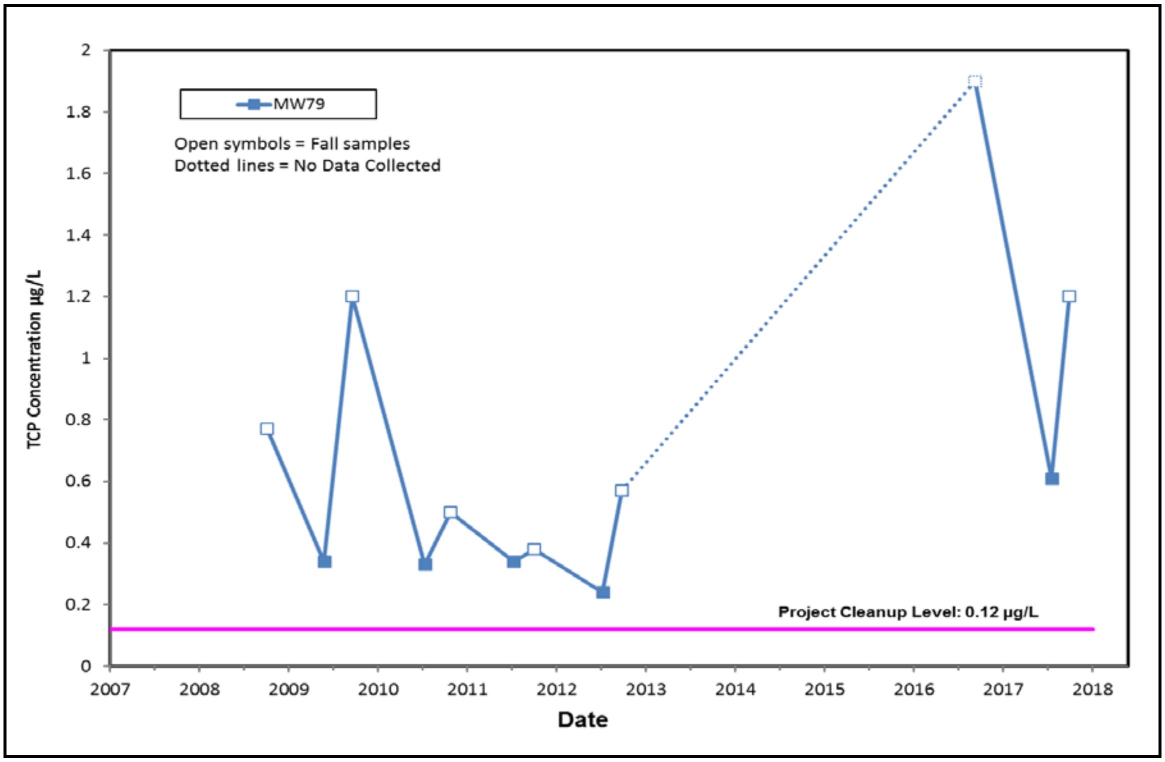
Table 5-6
Mann-Kendall Trend Evaluation Results for TCP Plumes MW47 and MW79

Well ID	Previous Trend[1]	Number of Data Points	Mann-Kendall Statistic	Coefficient of Variation	Trend Confidence	Trend
MW47	Decreasing	14	-39	0.47	98%	Decreasing
MW79	No Trend	12	14	0.71	81%	No Trend

Notes:
[1] *2016 FCS Groundwater Monitoring Annual Report* (USACE 2017b).
For definitions, refer to the Acronyms and Abbreviations section.



Graph 5-5 Geometric Regression of TCP Concentrations at MW47



Graph 5-6 Historical TCP Concentrations at MW79

Natural attenuation processes are expected to reduce concentrations in downgradient monitoring well MW47 to full remediation in 2029. In contrast, exceedances will likely continue at monitoring well MW79 until the suspected TCP soil source is depleted.

5.3.3 Geochemical Conditions

A readily available source of organic carbon is not available in the TCP plume so redox conditions in this area are comparable to those seen in background wells, including the upgradient, crossgradient, downgradient, and production sentry wells listed in Table 5-5. DO concentrations in the TCP plume ranged between 1.28 and 8.34 mg/L, indicating aerobic conditions, although dissolved manganese is present at concentrations ranging between 0.0789 and 1.34 mg/L. Nitrate/nitrite as nitrogen concentrations were comparable to background well concentrations (ND to 0.98 mg/L) and measured from 0.21 to 1.2 mg/L at MW47 and 0.18 and 0.48 mg/L at MW79. Ferrous iron was ND at MW47 and between 3.4 and 3.6 mg/L at MW79. Sulfate concentrations were comparable to background wells, with concentrations ranging between 27.9 and 65.2 mg/L. Methane concentrations were lower than background wells, ranging between 0.012 and 0.038 mg/L, which indicates that methanogenesis is not a significant process in this plume. Biotransformations of TCP include reductive dechlorination, monooxygenase-mediated cometabolism, and enzymatic hydrolysis (Samin and Janssen 2012). No microbes capable of using TCP as a carbon source for growth under aerobic conditions have been isolated, but TCP may serve as electron acceptor under anaerobic conditions. Data are limited, so it is unclear if any biological processes are contributing to the attenuation of the TCP plume. Physical processes that might lead to observed decreases in TCP concentration include advection, dispersion, and dilution.

5.3.4 TCP Plume Summary

MW47 and MW79 were both found to have TCP concentrations above the PCL during the spring and fall sampling events. A statistical analysis of the historical TCP data shows a decreasing trend at MW47 and no trend at MW79. Geochemical data suggest that biodegradation may be attributed to metal reduction and that decreases in TCP concentrations can also be attributed to advection, dispersion, and dilution. MW47 is expected to achieve remediation by 2029 due to natural attenuation but there is no estimated cleanup date for MW79.

TCP was not detected above the LOD in any of the TCP plume sentry wells (MW39, MW78, MW91, and MW93) during the 2017 spring sampling event. Although TCP was detected in two wells (MW39 and MW78) during the 2017 fall sampling event (see Table 5-5), the observed concentrations were less than the concentrations seen in 2016: in MW39 a decrease from 0.000012 mg/L and in MW78 a decrease from the LOD of 0.00004 mg/L. Comparison of the 2017 results to 2016 results indicates that the TCP plume is not spreading in the direction of the sentry wells. The detectable levels in the fall can be attributed to varying groundwater levels and site conditions between the spring and fall sampling events.

The TCP sentry wells were only analyzed for TCP, vinyl chloride, and MNA parameters according to the 2017 work plan (USACE 2017a). Vinyl chloride was not detected in any of the TCP plume sentry wells during the 2017 sampling events and MNA parameters for the plume are summarized in section 5.3.3.

Continued groundwater monitoring of the TCP plume is recommended until the U.S. Army, EPA, and ADEC agree that cleanup of TCP meets the PCL of 0.12 micrograms per liter (USACE 2014a) as described in Section 4.0.

5.4 TCE PLUME

Figure A-5 depicts the TCE plume and lists the historical and 2017 sampling results. Regular groundwater monitoring of this plume began in 2007, but the number of monitoring wells required to assess the status of this plume was reduced to two in the 2015 work plan (USACE 2015a) (Figure A-5).

5.4.1 Sample Results

The 2017 sampling results for in-plume and upgradient wells around the TCE plume are presented in Table 5-7. The results are compared with the PCL, as agreed upon in the ROD (USACE 2014a), with the ADEC 2017 cleanup levels provided for reference.

Table 5-7
2017 Sampling Results for the TCE Plume

Well ID	Well Position	Event	Sample ID	TCE Result (mg/L)
			PCL[1]	**0.005**
MW61	In-plume	Spring	17FWAMW61-GWS	0.00094
		Fall	17FWAMW61-GWF	0.0012
			17FWAMW61Z-GWF	0.0011
MW80	Upgradient	Spring	17FWAMW80-GWS	ND (0.00016)
		Fall	17FWAMW80-GWF	ND (0.00016)

Notes:
[1] PCL from the ROD (USACE 2014a). For comparison, the current ADEC cleanup level for TCE is 0.0028 mg/L (ADEC 2017).
( ) = LOD
For definitions, refer to the Acronyms and Abbreviations section.

TCE concentrations have declined steadily since 2007 in the remaining in-plume well (MW61), where concentrations have been less than the ROD-defined PCL (0.005 mg/L) since 2011. TCE concentrations at MW80, located approximately 50 feet upgradient of MW61, have been ND or less than the PCL at all sampling events since the well was installed in 2008. TCE concentrations at MW62, located approximately 275 feet northwest of MW61, have been ND or less than the PCL at all sampling events since the well was installed in 2007 but was not in the 2017 work plan to be sampled for TCE.

5.4.2 In-Plume Trend Analysis

The Mann-Kendall analysis for in-plume monitoring well MW61 shows that TCE concentrations are decreasing with 100 percent confidence (Table 5-8).

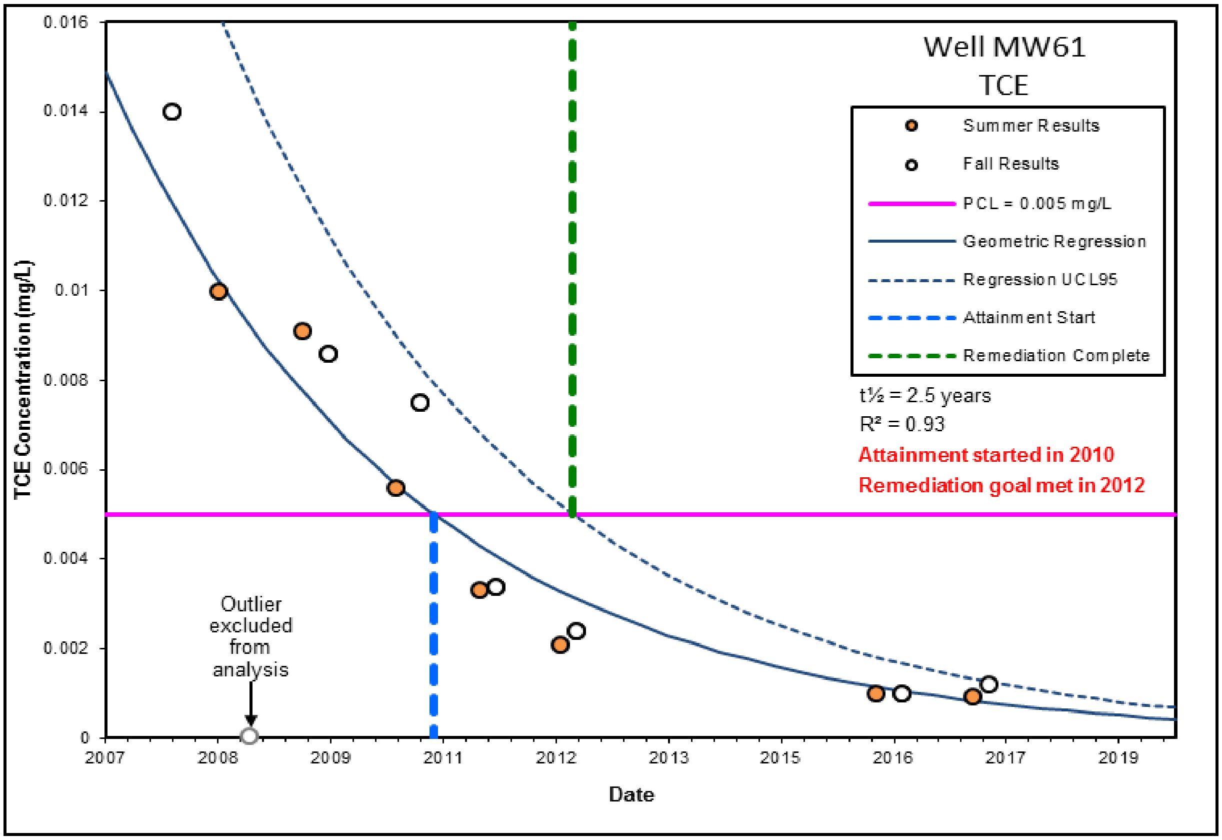
Table 5-8
Mann-Kendall Trend Evaluation Results for the TCE Plume

Well ID	Previous Trend[1]	Number of Data Points	Mann-Kendall Statistic	Coefficient of Variation	Trend Confidence	Trend
MW61	Decreasing	14	-78	0.83	100%	Decreasing

Notes:
[1] 2016 FCS Groundwater Monitoring Annual Report (USACE 2017b).
For definitions, refer to the Acronyms and Abbreviations section.

The time-series results from MW61 are reasonably described by a first-order decay regression curve with a half-life of 2.5 years (Graph 5-7). The UCL95 of the regression curve suggests that remedial goals were met in 2012 at MW61. The UCL95 of the mean of the most recent eight samples for this in-plume well is less than the PCL (0.005 mg/L) at 0.0026 mg/L and meets EPA guidance (EPA 2014) for attainment of the PCL as required by the ROD.

Trend analysis of TCE results in MW80 is included in Appendix F for completeness but the statistical tools do not give meaningful results for data sets that are mostly nondetects. Although the Mann-Kendall statistic indicates an increasing trend, this is a reflection of slight increases in the limits of detection over time rather than real changes in TCE concentration.



Graph 5-7 Geometric Regression of TCE Concentrations at MW61

5.4.3 Geochemical Conditions

An organic carbon source is not readily available in the TCE plume, so geochemical conditions in this area generally reflect background conditions at the site, including the upgradient well MW80. In this plume, pH values were near neutral, ranging between 6.81 and 7.07 in 2017. ORP measurements at MW61 were -50.3 mV in the spring and 52 mV in the fall, while at MW80, readings were -112.9 mV and 36.8 mV in the spring and fall, respectively. Alkalinities were higher in MW61 compared to upgradient wells, with concentrations of 346 to 274 mg/L, respectively; concentrations were 153 and 154 mg/L at MW80. Alkalinity measurements in this area were comparable to concentrations observed in background wells in other plumes. The DO concentrations at MW61 were 3.8 and 0.27 mg/L in the spring and fall, respectively. At MW80 the DO also decreased from spring to fall with concentrations of 2.2 and 0.4 mg/L, respectively.

Ammonia-N concentrations in the TCE plume wells varied temporally; MW61 and MW80 had concentrations of 0.13 and 0.16 mg/L in the spring, respectively, and both had ND concentrations in the fall. Nitrate/nitrite as nitrogen was not detected at either well so the source of the ammonia in the spring is unclear. Despite DO concentrations greater than 1.0 mg/L, dissolved manganese and iron were present in both wells. Manganese concentrations at MW61 were 1.8 and 1.39 mg/L in spring and fall, respectively; concentrations were 0.787 mg/L in spring and 0.769 mg/L in fall at MW80. Ferrous iron concentrations at the in-plume wells ranged between 1.2 and 3.0 mg/L. In the absence of a significant carbon source, sulfate concentrations in MW61 were comparable to the background at MW80, with concentrations at both wells ranging between 30.6 and 46.8 mg/L. Methane concentrations were low and not indicative of significant methanogenesis, with concentrations ranging between 0.02 and 0.098 mg/L.

Low levels of TCE biodegradation products cis-dichloroethene (DCE), trans-DCE, 1,1-DCE, and vinyl chloride are present at MW61, suggesting that reductive dechlorination likely occurred at some point. Actual redox processes occurring at this well are not clear; however, DO and dissolved iron and manganese are simultaneously present, indicating a system that is at disequilibrium. Regardless, the sampling data indicate that TCE has attenuated to less than the PCL.

5.4.4 TCE Plume Summary

TCE concentrations at MW61, and MW80 have been less than the PCL since 2011 and remediation goals were probably met in 2012 for this site. Partial reductive dechlorination of the TCE at this site has occurred, despite less than ideal conditions, as evidenced by TCE degradation products found at the site. A statistical analysis of the site shows a continued decreasing trend at MW61. Continued groundwater monitoring of the TCE plume is recommended until the U.S. Army, EPA, and ADEC agree that TCE has achieved the remediation requirements of the ROD (USACE 2014a).

6.0 CONCLUSIONS AND RECOMMENDATIONS

The 2017 OU6 FCS project objectives were met. These objectives included biannual sampling of 25 monitoring wells, decommissioning of six wells, and statistical analysis of available data.

Historical data define five groundwater plumes: The main DRO plume, the MW62 and MW77 DRO plumes, the TCP plume, and the TCE plume. In 2017, the conditions of these plumes were as follows:

- **Main DRO plume**
    - Higher concentrations of dissolved manganese and iron, lower concentrations of sulfate, and higher concentrations of methane are evidence that metal and sulfate reduction, as well as methanogenesis, are significant biodegradation processes in the main DRO plume.
    - DRO concentrations did not show a consistent trend throughout the plume, whereas RRO contamination had decreased to concentrations below the PCL at all in-plume wells except MW33 where the trend was increasing.
    - Natural attenuation (likely biodegradation) along the flow path limits the downgradient advection of DRO and RRO.
    - The UCL95 of the mean RRO concentrations at monitoring wells MW06A, MW12R, and MW58 are below the PCL and meet ROD-defined remedial goals.
    - DRO concentrations in the main DRO plume and RRO concentrations around monitoring wells MW06A and MW58 are expected to decrease as natural attenuation processes deplete remaining NAPL; however, a cleanup date for the main DRO plume cannot be estimated until decreasing contaminant trends are apparent. This plume will likely persist until residual NAPL is depleted.
    - Continued monitoring is recommended.
- **MW62 and MW77 DRO plumes**
    - High concentrations of nitrate/nitrite suggest that when DO concentrations are less than about 1.0 mg/L, nitrate reduction would likely predominate.
    - Elevated dissolved manganese and sulfate concentrations indicate that manganese reduction could also contribute to DRO and RRO biodegradation.
    - DRO and RRO concentrations in these plumes do not show any trends, but natural attenuation (likely biodegradation) along the flow path appears to limit significant downgradient transport, as evidenced by decreased concentrations in downgradient monitoring wells.
    - These plumes will likely persist until residual NAPL is depleted. Cleanup dates cannot be estimated until decreasing trends are apparent.
    - Continued monitoring is recommended.

- **TCP plume**
  - Aerobic to mildly reducing conditions appear to predominate when sulfate concentrations at in-plume wells are comparable to background and methane concentrations and are lower than 0.2 mg/L, indicating that no significant methanogenesis is taking place.
  - Elevated manganese and ferrous iron concentrations at MW79 indicate that metal reduction is likely a significant biodegradation process at the TCP plume.
  - Observed decreases in TCP at MW47 can also likely be attributed to advection, dispersion, and dilution. This plume has been shrinking since monitoring began in 2007.
  - TCP concentrations are decreasing at downgradient monitoring well MW47, but no trend is apparent at monitoring well MW79.
  - Higher concentrations of TCP in the plume occur in the fall, potentially related to a higher water table and/or infiltration of recharge from summer rain, and suggest a nearby residual soil source that interacts with groundwater under certain conditions.
  - Until TCP concentrations exhibit a decreasing trend at MW79, an estimated cleanup date cannot be calculated.
  - Natural attenuation processes at MW47 are expected to achieve remediation with geometric regression analysis in 2029. However, TCP concentrations at sentry wells are consistently below the detection level, indicating the ROD-selected remedy remains protective of human health.
  - Continued monitoring is recommended.

- **TCE plume**
  - Geochemical conditions in the TCE plume are not sufficiently reducing for complete reductive dechlorination of TCE to CO_2.
  - Where DO and metals are present, sulfate concentrations from in-plume wells are comparable to background well concentrations, and methane concentrations are low for methanogenesis to be occurring.
  - Although conditions are not favorable for complete reductive dechlorination, partial reductive dechlorination has occurred, either currently or at some point in the past, as is evidenced by the presence of TCE degradation products.
  - TCE concentrations have been less than the PCL in monitoring wells MW61, MW80, and MW62 (MW62 was not sampled for TCE in 2017 in accordance with the 2017 work plan [USACE 2017a]) since 2011 and meet the ROD-defined remedial goal.
  - Natural attenuation processes appear to have remediated this plume. Geometric regression analysis indicates that remedial goals were likely reached in 2012; and the most recent eight samples meet the EPA attainment criteria (decreasing trend, UCL95 less than the PCL) for demonstrating cleanup. However, continued monitoring may be appropriate while the U.S. Army, EPA, and ADEC determine the applicability of the more stringent 2017 ADEC cleanup level (ADEC 2017).

As stated in previous sections of this report, a decreasing DRO concentration trend for monitoring wells located within the main DRO plume is unlikely until the residual NAPL is depleted. RRO concentrations at MW06A, MW12R, and MW58 in the main DRO plume meet ROD-defined remedial goals; continued RRO monitoring at these locations is unnecessary. However, since RRO analysis is included in the AK102/103 method and DRO concentrations at these wells do not meet ROD-defined remedial goals, no changes in the sampling strategy are recommended. No changes are recommended to the currently approved groundwater monitoring program.

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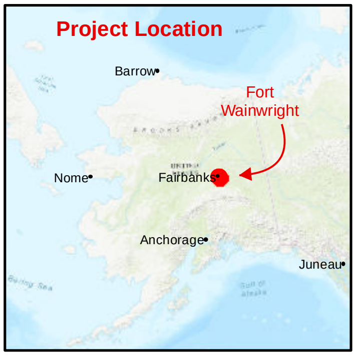
APPENDIX A
Figures

Imagery: AKFWAI12-SID-4INCH.sid



▢ Operable Unit 6 Boundary

🟦 Chena River

┼ Railroad

N

All Locations Are Approximate

0 0.25 0.5 0.75 1

Miles

WGS 1984 UTM Zone 6N

OPERABLE UNIT 6
LOCATION AND VICINITY

FORT WAINWRIGHT, ALASKA

JACOBS	DATE: 12 DEC 2017	PROJECT MANAGER: D. FLEMING	FIGURE NO: A-1

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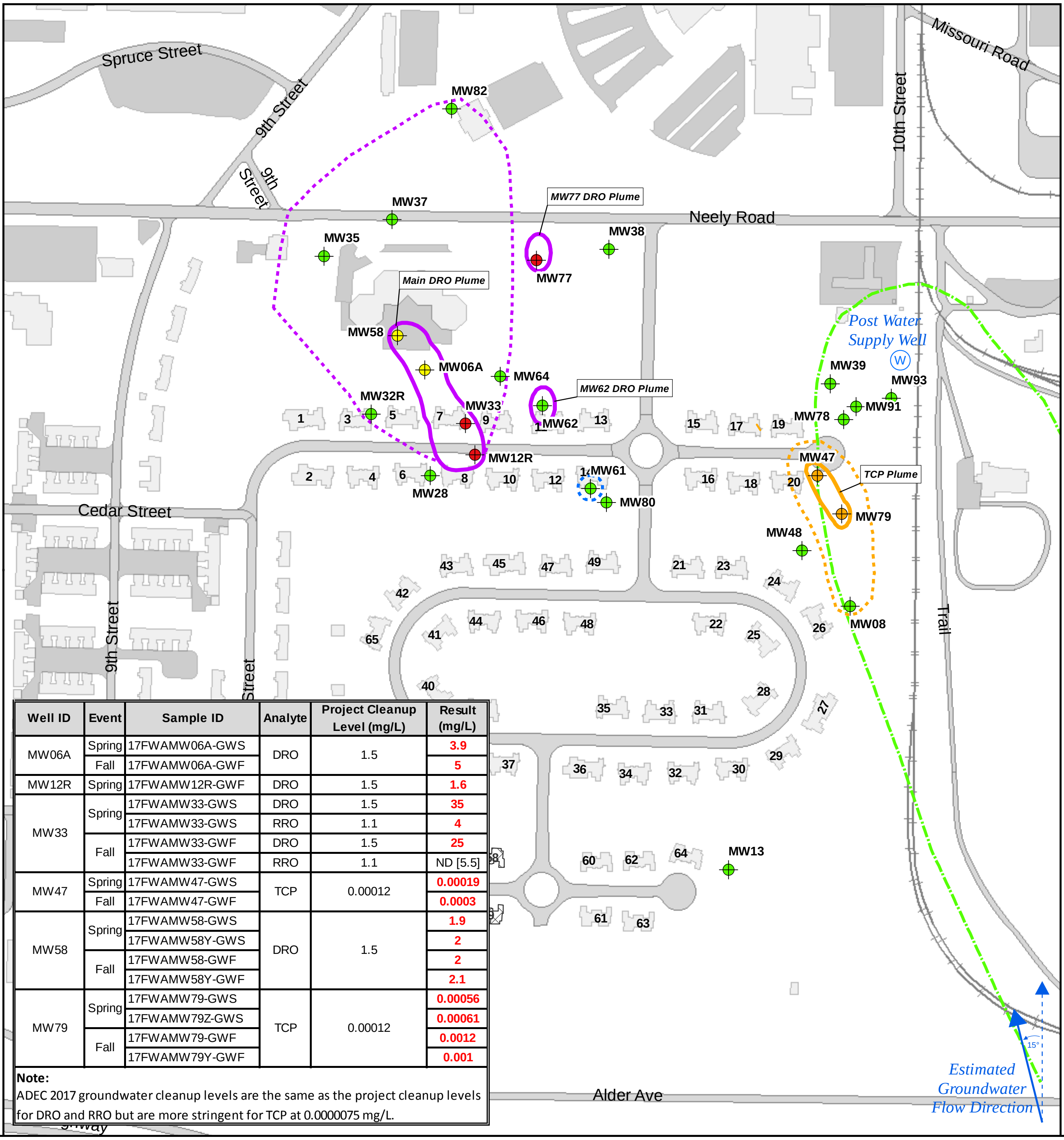

Well ID	Event	Sample ID	Analyte	Project Cleanup Level (mg/L)	Result (mg/L)
MW06A	Spring	17FWAMW06A-GWS	DRO	1.5	3.9
	Fall	17FWAMW06A-GWF			5
MW12R	Spring	17FWAMW12R-GWF	DRO	1.5	1.6
MW33	Spring	17FWAMW33-GWS	DRO	1.5	35
		17FWAMW33-GWS	RRO	1.1	4
	Fall	17FWAMW33-GWF	DRO	1.5	25
		17FWAMW33-GWF	RRO	1.1	ND [5.5]
MW47	Spring	17FWAMW47-GWS	TCP	0.00012	0.00019
	Fall	17FWAMW47-GWF			0.0003
MW58	Spring	17FWAMW58-GWS	DRO	1.5	1.9
		17FWAMW58Y-GWS			2
	Fall	17FWAMW58-GWF			2
		17FWAMW58Y-GWF			2.1
MW79	Spring	17FWAMW79-GWS	TCP	0.00012	0.00056
		17FWAMW79Z-GWS			0.00061
	Fall	17FWAMW79-GWF			0.0012
		17FWAMW79Y-GWF			0.001

Note:
ADEC 2017 groundwater cleanup levels are the same as the project cleanup levels for DRO and RRO but are more stringent for TCP at 0.0000075 mg/L.

⊕	TCP
●	DRO/RRO
⊕	DRO
⊕	No Exceedance
Ⓦ	Supply Water Well
━	TCP Plume Area
━	DRO Plume Area
┅	DRO Leading Plume Edge
┅	TCP Leading Plume Edge
┅	TCE Leading Plume Edge
─·─	Post Water Supply Well Capture Zone*
☒	Unit Not Built

Source:
USACE. 2010 (December). *Final Remedial Investigation, FWA 102 Former Communications Site, Fort Wainwright, Alaska.*

N

All Locations Are Approximate

0 100 200 300 400 500
Feet

WGS 1984 UTM Zone 6N

DRO: Diesel Range Organics
RRO: Residual Range Organics
TCP: 1,2,3-Trichloropropane
TCE: Trichloroethene
The F or S at the end of the sample ID indicates Spring or Fall sampling.
*Modeled by CH2M HILL (USACE 2010 Appendix B) for a "worst case scenario" pumping rate of 1,700 gpm. The upper end of the normal operating range is approximately 1,190 gpm.

[1] Project Cleanup Level referencing the ROD (USACE 2014)
[2] 2016 ADEC Cleanup Level referencing the current regulation
[3] No data available. Refer to section 5.3 of this report

OPERABLE UNIT 6
2016 GROUNDWATER MONITORING WELL EXCEEDANCES AND PLUME BOUNDARIES
FORT WAINWRIGHT, FAIRBANKS, ALASKA

JACOBS	DATE: 20 JUN 2018	PROJECT MANAGER: D. FLEMING	FIGURE NO: A-2

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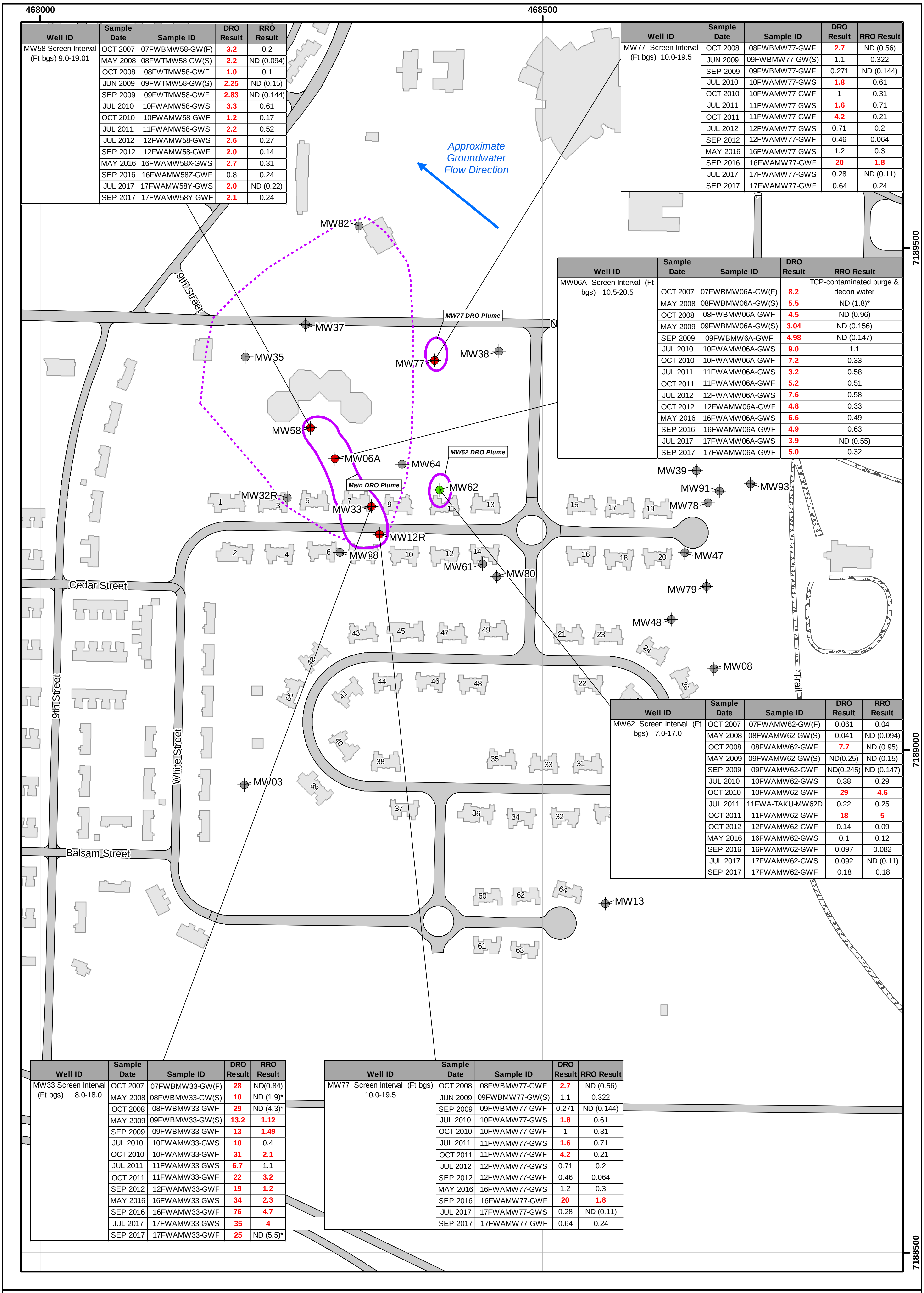


Well ID	Sample Date	Sample ID	DRO Result	RRO Result
MW58 Screen Interval (Ft bgs) 9.0-19.01	OCT 2007	07FWBMW58-GW(F)	**3.2**	0.2
	MAY 2008	08FWTMW58-GW(S)	**2.2**	ND (0.094)
	OCT 2008	08FWTMW58-GWF	**1.0**	0.1
	JUN 2009	09FWTMW58-GW(S)	**2.25**	ND (0.15)
	SEP 2009	09FWTMW58-GWF	**2.83**	ND (0.144)
	JUL 2010	10FWAMW58-GWS	**3.3**	0.61
	OCT 2010	10FWAMW58-GWF	**1.2**	0.17
	JUL 2011	11FWAMW58-GWS	**2.2**	0.52
	JUL 2012	12FWAMW58-GWS	**2.6**	0.27
	SEP 2012	12FWAMW58-GWF	**2.0**	0.14
	MAY 2016	16FWAMW58X-GWS	**2.7**	0.31
	SEP 2016	16FWAMW58Z-GWF	0.8	0.24
	JUL 2017	17FWAMW58Y-GWS	**2.0**	ND (0.22)
	SEP 2017	17FWAMW58Y-GWF	**2.1**	0.24

Well ID	Sample Date	Sample ID	DRO Result	RRO Result
MW77 Screen Interval (Ft bgs) 10.0-19.5	OCT 2008	08FWBMW77-GWF	**2.7**	ND (0.56)
	JUN 2009	09FWBMW77-GW(S)	1.1	0.322
	SEP 2009	09FWBMW77-GWF	0.271	ND (0.144)
	JUL 2010	10FWAMW77-GWS	**1.8**	0.61
	OCT 2010	10FWAMW77-GWF	1	0.31
	JUL 2011	11FWAMW77-GWS	**1.6**	0.71
	OCT 2011	11FWAMW77-GWF	**4.2**	0.21
	JUL 2012	12FWAMW77-GWS	0.71	0.2
	SEP 2012	12FWAMW77-GWF	0.46	0.064
	MAY 2016	16FWAMW77-GWS	1.2	0.3
	SEP 2016	16FWAMW77-GWF	**20**	**1.8**
	JUL 2017	17FWAMW77-GWS	0.28	ND (0.11)
	SEP 2017	17FWAMW77-GWF	0.64	0.24

Well ID	Sample Date	Sample ID	DRO Result	RRO Result
MW06A Screen Interval (Ft bgs) 10.5-20.5	OCT 2007	07FWBMW06A-GW(F)	**8.2**	TCP-contaminated purge & decon water
	MAY 2008	08FWBMW06A-GW(S)	**5.5**	ND (1.8)*
	OCT 2008	08FWBMW06A-GWF	**4.5**	ND (0.96)
	MAY 2009	09FWBMW06A-GW(S)	**3.04**	ND (0.156)
	SEP 2009	09FWBMW6A-GWF	**4.98**	ND (0.147)
	JUL 2010	10FWAMW06A-GWS	**9.0**	1.1
	OCT 2010	10FWAMW06A-GWF	**7.2**	0.33
	JUL 2011	11FWAMW06A-GWS	**3.2**	0.58
	OCT 2011	11FWAMW06A-GWF	**5.2**	0.51
	JUL 2012	12FWAMW06A-GWS	**7.6**	0.58
	OCT 2012	12FWAMW06A-GWF	**4.8**	0.33
	MAY 2016	16FWAMW06A-GWS	**6.6**	0.49
	SEP 2016	16FWAMW06A-GWF	**4.9**	0.63
	JUL 2017	17FWAMW06A-GWS	**3.9**	ND (0.55)
	SEP 2017	17FWAMW06A-GWF	**5.0**	0.32

Well ID	Sample Date	Sample ID	DRO Result	RRO Result
MW62 Screen Interval (Ft bgs) 7.0-17.0	OCT 2007	07FWAMW62-GW(F)	0.061	0.04
	MAY 2008	08FWAMW62-GW(S)	0.041	ND (0.094)
	OCT 2008	08FWAMW62-GWF	**7.7**	ND (0.95)
	MAY 2009	09FWAMW62-GW(S)	ND(0.25)	ND (0.15)
	SEP 2009	09FWAMW62-GWF	ND(0.245)	ND (0.147)
	JUL 2010	10FWAMW62-GWS	0.38	0.29
	OCT 2010	10FWAMW62-GWF	**29**	**4.6**
	JUL 2011	11FWA-TAKU-MW62D	0.22	0.25
	OCT 2011	11FWAMW62-GWF	**18**	**5**
	OCT 2012	12FWAMW62-GWF	0.14	0.09
	MAY 2016	16FWAMW62-GWS	0.1	0.12
	SEP 2016	16FWAMW62-GWF	0.097	0.082
	JUL 2017	17FWAMW62-GWS	0.092	ND (0.11)
	SEP 2017	17FWAMW62-GWF	0.18	0.18

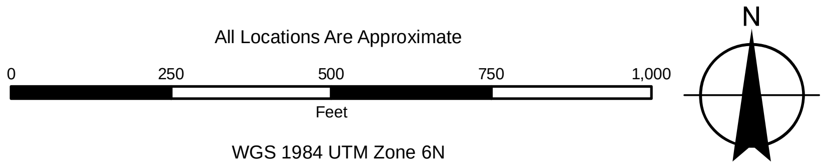
Well ID	Sample Date	Sample ID	DRO Result	RRO Result
MW33 Screen Interval (Ft bgs) 8.0-18.0	OCT 2007	07FWBMW33-GW(F)	**28**	ND(0.84)
	MAY 2008	08FWBMW33-GW(S)	**10**	ND (1.9)*
	OCT 2008	08FWBMW33-GWF	**29**	ND (4.3)*
	MAY 2009	09FWBMW33-GW(S)	**13.2**	**1.12**
	SEP 2009	09FWBMW33-GWF	**13**	**1.49**
	JUL 2010	10FWAMW33-GWS	**10**	0.4
	OCT 2010	10FWAMW33-GWF	**31**	**2.1**
	JUL 2011	11FWAMW33-GWS	**6.7**	1.1
	OCT 2011	11FWAMW33-GWF	**22**	**3.2**
	SEP 2012	12FWAMW33-GWF	**19**	**1.2**
	MAY 2016	16FWAMW33-GWS	**34**	**2.3**
	SEP 2016	16FWAMW33-GWF	**76**	**4.7**
	JUL 2017	17FWAMW33-GWS	**35**	**4**
	SEP 2017	17FWAMW33-GWF	**25**	ND (5.5)*

Well ID	Sample Date	Sample ID	DRO Result	RRO Result
MW77 Screen Interval (Ft bgs) 10.0-19.5	OCT 2008	08FWBMW77-GWF	**2.7**	ND (0.56)
	JUN 2009	09FWBMW77-GW(S)	1.1	0.322
	SEP 2009	09FWBMW77-GWF	0.271	ND (0.144)
	JUL 2010	10FWAMW77-GWS	**1.8**	0.61
	OCT 2010	10FWAMW77-GWF	1	0.31
	JUL 2011	11FWAMW77-GWS	**1.6**	0.71
	OCT 2011	11FWAMW77-GWF	**4.2**	0.21
	JUL 2012	12FWAMW77-GWS	0.71	0.2
	SEP 2012	12FWAMW77-GWF	0.46	0.064
	MAY 2016	16FWAMW77-GWS	1.2	0.3
	SEP 2016	16FWAMW77-GWF	**20**	**1.8**
	JUL 2017	17FWAMW77-GWS	0.28	ND (0.11)
	SEP 2017	17FWAMW77-GWF	0.64	0.24

- 🔴 2017 Sample - Exceedance
- 🟢 2017 Sample - No Exceedance
- ⊕ No DRO/RRO Exceedance Since 2007
- Ⓦ Supply Water Well
- ━ DRO Plume Area
- ┅ DRO Leading Plume Edge

Notes:
DRO Project Cleanup Level: 1.5
RRO Project Cleanup Level: 1.1
Units: mg/L
Method: AK102/AK103
The F or S at the end of the sample ID indicates Spring or Fall sampling.
RED exceeded the Project Cleanup Level.
DRO: Diesel Range Organics (C10-C25)
RRO: Residual Range Organics (C25-C36)
Results presented without qualifiers.
ND = not detected
*The ND result indicates that LOD is higher than the Project Cleanup Level

All Locations Are Approximate



WGS 1984 UTM Zone 6N

OPERABLE UNIT 6
DIESEL RANGE ORGANICS & RESIDUAL RANGE ORGANICS RESULTS FOR IN-PLUME WELLS
FORT WAINWRIGHT, FAIRBANKS, ALASKA

DATE:	PROJECT MANAGER:	FIGURE NO:
22 JUN 2018	D. FLEMING	A-3

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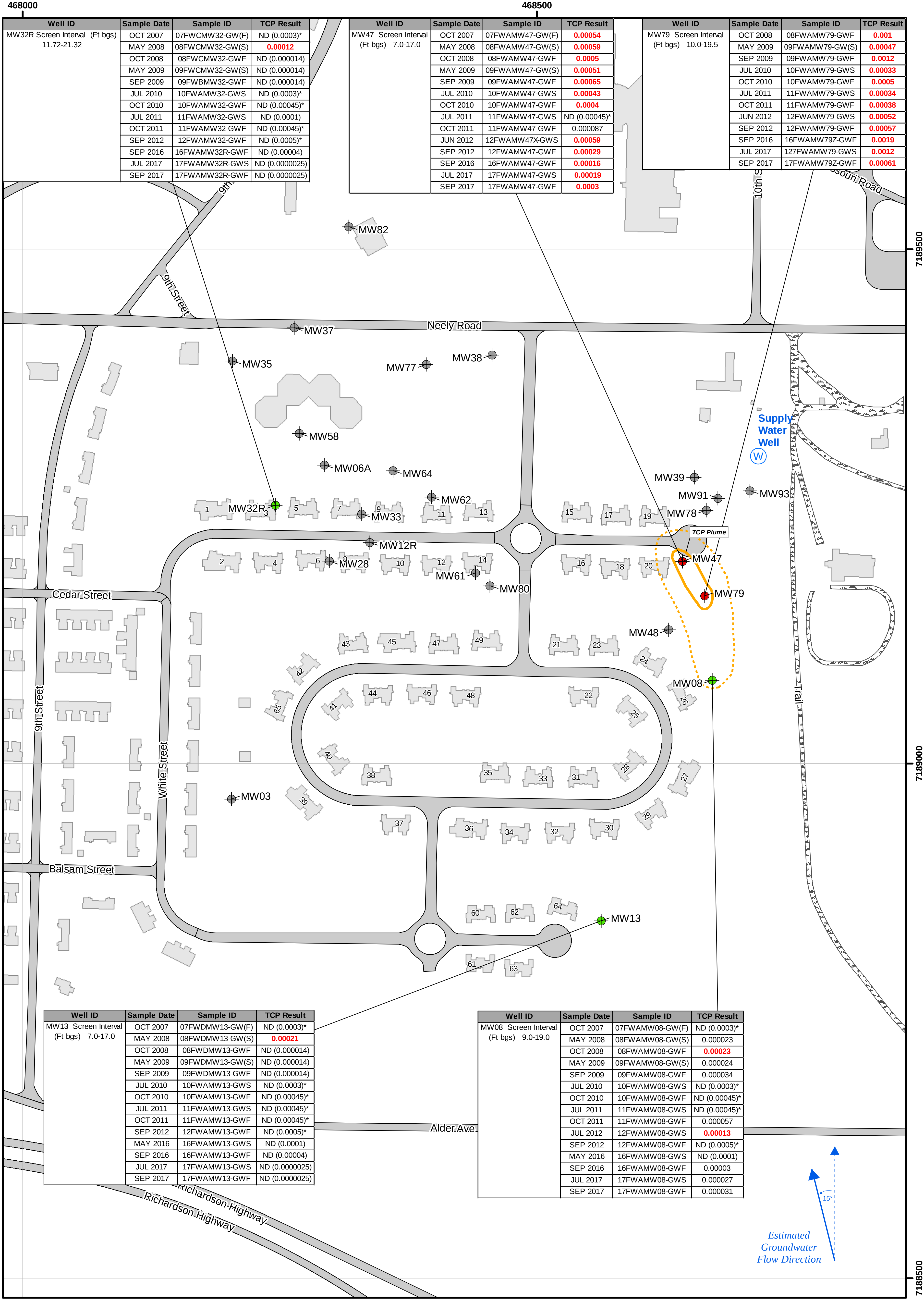

Well ID	Sample Date	Sample ID	TCP Result
MW32R Screen Interval (Ft bgs) 11.72-21.32	OCT 2007	07FWCMW32-GW(F)	ND (0.0003)*
	MAY 2008	08FWCMW32-GW(S)	**0.00012**
	OCT 2008	08FWCMW32-GWF	ND (0.000014)
	MAY 2009	09FWCMW32-GW(S)	ND (0.000014)
	SEP 2009	09FWBMW32-GWF	ND (0.000014)
	JUL 2010	10FWAMW32-GWS	ND (0.0003)*
	OCT 2010	10FWAMW32-GWF	ND (0.00045)*
	JUL 2011	11FWAMW32-GWS	ND (0.0001)
	OCT 2011	11FWAMW32-GWF	ND (0.00045)*
	SEP 2012	12FWAMW32-GWF	ND (0.0005)*
	SEP 2016	16FWAMW32R-GWF	ND (0.00004)
	JUL 2017	17FWAMW32R-GWS	ND (0.0000025)
	SEP 2017	17FWAMW32R-GWF	ND (0.0000025)

Well ID	Sample Date	Sample ID	TCP Result
MW47 Screen Interval (Ft bgs) 7.0-17.0	OCT 2007	07FWAMW47-GW(F)	**0.00054**
	MAY 2008	08FWAMW47-GW(S)	**0.00059**
	OCT 2008	08FWAMW47-GWF	**0.0005**
	MAY 2009	09FWAMW47-GW(S)	**0.00051**
	SEP 2009	09FWAMW47-GWF	**0.00065**
	JUL 2010	10FWAMW47-GWS	**0.00043**
	OCT 2010	10FWAMW47-GWF	**0.0004**
	JUL 2011	11FWAMW47-GWS	ND (0.00045)*
	OCT 2011	11FWAMW47-GWF	0.000087
	JUN 2012	12FWAMW47X-GWS	**0.00059**
	SEP 2012	12FWAMW47-GWF	**0.00029**
	SEP 2016	16FWAMW47-GWF	**0.00016**
	JUL 2017	17FWAMW47-GWS	**0.00019**
	SEP 2017	17FWAMW47-GWF	**0.0003**

Well ID	Sample Date	Sample ID	TCP Result
MW79 Screen Interval (Ft bgs) 10.0-19.5	OCT 2008	08FWAMW79-GWF	**0.001**
	MAY 2009	09FWAMW79-GW(S)	**0.00047**
	SEP 2009	09FWAMW79-GWF	**0.0012**
	JUL 2010	10FWAMW79-GWS	**0.00033**
	OCT 2010	10FWAMW79-GWF	**0.0005**
	JUL 2011	11FWAMW79-GWS	**0.00034**
	OCT 2011	11FWAMW79-GWF	**0.00038**
	JUN 2012	12FWAMW79-GWS	**0.00052**
	SEP 2012	12FWAMW79-GWF	**0.00057**
	SEP 2016	16FWAMW79Z-GWF	**0.0019**
	JUL 2017	127FWAMW79-GWS	**0.0012**
	SEP 2017	17FWAMW79Z-GWF	**0.00061**

Well ID	Sample Date	Sample ID	TCP Result
MW13 Screen Interval (Ft bgs) 7.0-17.0	OCT 2007	07FWDMW13-GW(F)	ND (0.0003)*
	MAY 2008	08FWDMW13-GW(S)	**0.00021**
	OCT 2008	08FWDMW13-GWF	ND (0.000014)
	MAY 2009	09FWDMW13-GW(S)	ND (0.000014)
	SEP 2009	09FWDMW13-GWF	ND (0.000014)
	JUL 2010	10FWAMW13-GWS	ND (0.0003)*
	OCT 2010	10FWAMW13-GWF	ND (0.00045)*
	JUL 2011	11FWAMW13-GWS	ND (0.00045)*
	OCT 2011	11FWAMW13-GWF	ND (0.00045)*
	SEP 2012	12FWAMW13-GWF	ND (0.0005)*
	MAY 2016	16FWAMW13-GWS	ND (0.0001)
	SEP 2016	16FWAMW13-GWF	ND (0.00004)
	JUL 2017	17FWAMW13-GWS	ND (0.0000025)
	SEP 2017	17FWAMW13-GWF	ND (0.0000025)

Well ID	Sample Date	Sample ID	TCP Result
MW08 Screen Interval (Ft bgs) 9.0-19.0	OCT 2007	07FWAMW08-GW(F)	ND (0.0003)*
	MAY 2008	08FWAMW08-GW(S)	0.000023
	OCT 2008	08FWAMW08-GWF	**0.00023**
	MAY 2009	09FWAMW08-GW(S)	0.000024
	SEP 2009	09FWAMW08-GWF	0.000034
	JUL 2010	10FWAMW08-GWS	ND (0.0003)*
	OCT 2010	10FWAMW08-GWF	ND (0.00045)*
	JUL 2011	11FWAMW08-GWS	ND (0.00045)*
	OCT 2011	11FWAMW08-GWF	0.000057
	JUL 2012	12FWAMW08-GWS	**0.00013**
	SEP 2012	12FWAMW08-GWF	ND (0.0005)*
	MAY 2016	16FWAMW08-GWS	ND (0.0001)
	SEP 2016	16FWAMW08-GWF	0.00003
	JUL 2017	17FWAMW08-GWS	0.000027
	SEP 2017	17FWAMW08-GWF	0.000031

- ● 2017 Sample - Exceedance
- ● 2017 Sample - No Exceedance
- ⊕ No TCP Exceedance Since 2007
- Ⓦ Supply Water Well
- ━ TCP Plume Area
- ┅ TCP Leading Plume Edge

Notes:
Project Cleanup Level: 0.00012
Units: mg/L
Method: SW8260, SW8260SIM

The F or S at the end of the
sample ID indicates
Spring or Fall sampling.

RED exceeded the
Project Cleanup Level.
TCP: 1,2,3-Trichloropropane
Results are presented without
qualifiers.
ND = not detected
*The ND result indicates that LOD
is higher than the Project Cleanup Level

All Locations Are Approximate

0 250 500 750 1,000
Feet

WGS 1984 UTM Zone 6N

N

OPERABLE UNIT 6
1,2,3-TRICHLOROPROPANE (TCP)
RESULTS FOR IN-PLUME & SURROUNDING WELLS
FORT WAINWRIGHT, FAIRBANKS, ALASKA

JACOBS

DATE:	PROJECT MANAGER:	FIGURE NO:
18 DEC 2017	D. FLEMING	A-4

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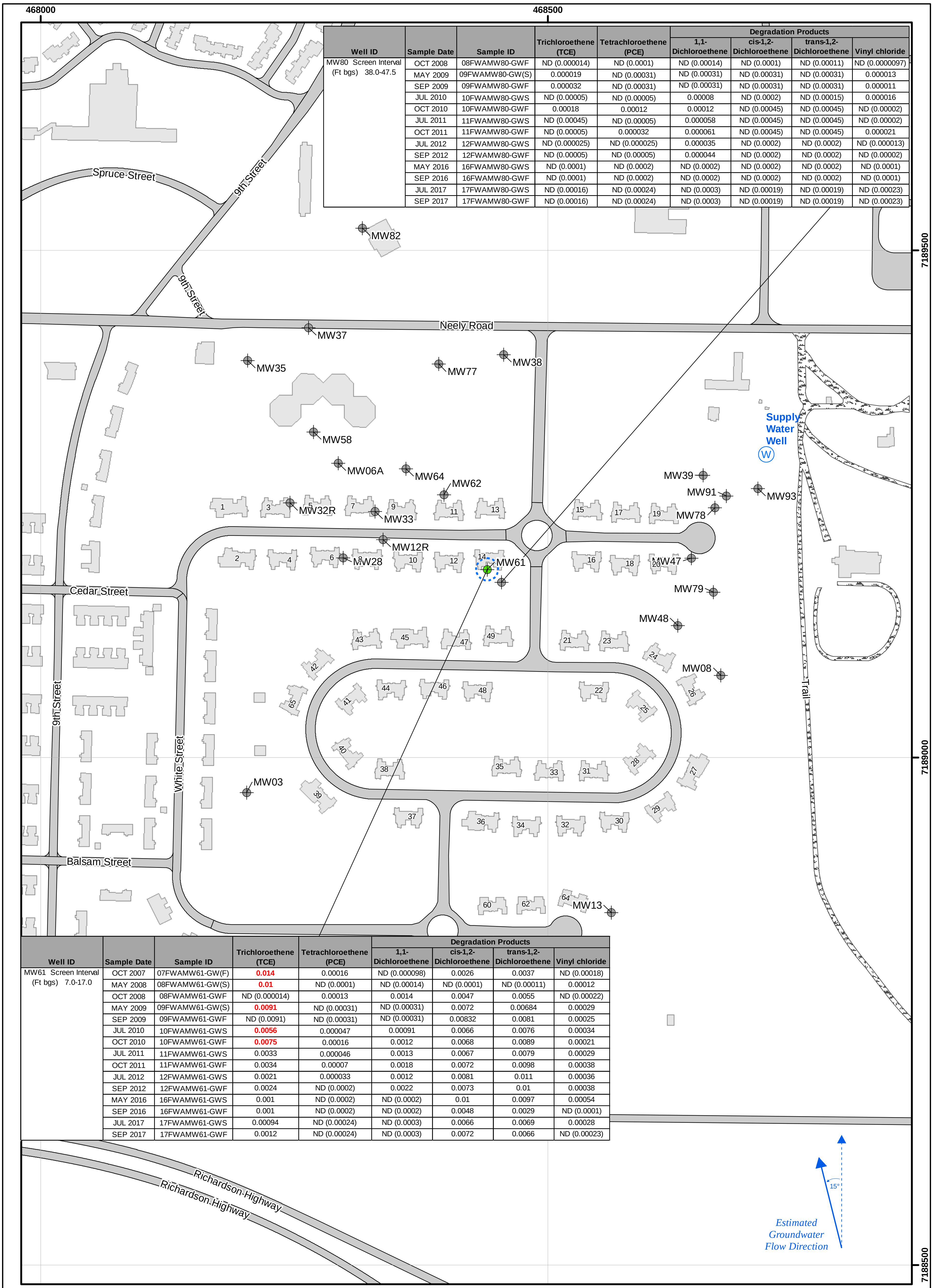

Well ID	Sample Date	Sample ID	Trichloroethene (TCE)	Tetrachloroethene (PCE)	Degradation Products 1,1-Dichloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Vinyl chloride
MW80 Screen Interval (Ft bgs) 38.0-47.5	OCT 2008	08FWAMW80-GWF	ND (0.000014)	ND (0.0001)	ND (0.00014)	ND (0.0001)	ND (0.00011)	ND (0.0000097)
	MAY 2009	09FWAMW80-GW(S)	0.000019	ND (0.00031)	ND (0.00031)	ND (0.00031)	ND (0.00031)	0.000013
	SEP 2009	09FWAMW80-GWF	0.000032	ND (0.00031)	ND (0.00031)	ND (0.00031)	ND (0.00031)	0.000011
	JUL 2010	10FWAMW80-GWS	ND (0.00005)	ND (0.00005)	0.00008	ND (0.0002)	ND (0.00015)	0.000016
	OCT 2010	10FWAMW80-GWF	0.00018	0.00012	0.00012	ND (0.00045)	ND (0.00045)	ND (0.00002)
	JUL 2011	11FWAMW80-GWS	ND (0.00045)	ND (0.00005)	0.000058	ND (0.00045)	ND (0.00045)	ND (0.00002)
	OCT 2011	11FWAMW80-GWF	ND (0.00005)	0.000032	0.000061	ND (0.00045)	ND (0.00045)	0.000021
	JUL 2012	12FWAMW80-GWS	ND (0.000025)	ND (0.000025)	0.000035	ND (0.0002)	ND (0.0002)	ND (0.000013)
	SEP 2012	12FWAMW80-GWF	ND (0.00005)	ND (0.00005)	0.000044	ND (0.0002)	ND (0.0002)	ND (0.00002)
	MAY 2016	16FWAMW80-GWS	ND (0.0001)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0001)
	SEP 2016	16FWAMW80-GWF	ND (0.0001)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0002)	ND (0.0001)
	JUL 2017	17FWAMW80-GWS	ND (0.00016)	ND (0.00024)	ND (0.0003)	ND (0.00019)	ND (0.00019)	ND (0.00023)
	SEP 2017	17FWAMW80-GWF	ND (0.00016)	ND (0.00024)	ND (0.0003)	ND (0.00019)	ND (0.00019)	ND (0.00023)

Well ID	Sample Date	Sample ID	Trichloroethene (TCE)	Tetrachloroethene (PCE)	Degradation Products 1,1-Dichloroethene	cis-1,2-Dichloroethene	trans-1,2-Dichloroethene	Vinyl chloride
MW61 Screen Interval (Ft bgs) 7.0-17.0	OCT 2007	07FWAMW61-GW(F)	**0.014**	0.00016	ND (0.000098)	0.0026	0.0037	ND (0.00018)
	MAY 2008	08FWAMW61-GW(S)	**0.01**	ND (0.0001)	ND (0.00014)	ND (0.0001)	ND (0.00011)	0.00012
	OCT 2008	08FWAMW61-GWF	ND (0.000014)	0.00013	0.0014	0.0047	0.0055	ND (0.00022)
	MAY 2009	09FWAMW61-GW(S)	**0.0091**	ND (0.00031)	ND (0.00031)	0.0072	0.00684	0.00029
	SEP 2009	09FWAMW61-GWF	ND (0.0091)	ND (0.00031)	ND (0.00031)	0.00832	0.0081	0.00025
	JUL 2010	10FWAMW61-GWS	**0.0056**	0.000047	0.00091	0.0066	0.0076	0.00034
	OCT 2010	10FWAMW61-GWF	**0.0075**	0.00016	0.0012	0.0068	0.0089	0.00021
	JUL 2011	11FWAMW61-GWS	0.0033	0.000046	0.0013	0.0067	0.0079	0.00029
	OCT 2011	11FWAMW61-GWF	0.0034	0.00007	0.0018	0.0072	0.0098	0.00038
	JUL 2012	12FWAMW61-GWS	0.0021	0.000033	0.0012	0.0081	0.011	0.00036
	SEP 2012	12FWAMW61-GWF	0.0024	ND (0.0002)	0.0022	0.0073	0.01	0.00038
	MAY 2016	16FWAMW61-GWS	0.001	ND (0.0002)	ND (0.0002)	0.01	0.0097	0.00054
	SEP 2016	16FWAMW61-GWF	0.001	ND (0.0002)	ND (0.0002)	0.0048	0.0029	ND (0.0001)
	JUL 2017	17FWAMW61-GWS	0.00094	ND (0.00024)	ND (0.0003)	0.0066	0.0069	0.00028
	SEP 2017	17FWAMW61-GWF	0.0012	ND (0.00024)	ND (0.0003)	0.0072	0.0066	ND (0.00023)

🟢 2017 Sample - No Exceedeance

● No TCE Exceedance Since 2007

Ⓦ Supply Water Well

- - - TCE Leading Plume Edge

Notes:
Units: mg/L
ND: not detected
Ft bgs: feet below ground surface
Trichloroethene (TCE) Project Cleanup Level = 0.005 mg/L
cis-1,2-Dichloroethene Project Cleanup Level = 0.07 mg/L
1,1-Dichloroethene Project Cleanup Level = 0.007 mg/L
trans-1,2-Dichloroethene Project Cleanup Level = 0.1 mg/L
Vinyl chloride Project Cleanup Level = 0.002 mg/L
Tetrachloroethene (PCE) Project Cleanup Level = 0.005 mg/L
The F or S at the end of the sample ID indicates the Spring or Fall sampling event.
(F) or (S) is appended to the sample ID where the original sample ID did not include an F or an S.
Results are presented without qualifiers.
RED exceeded the Project Cleanup Level.

All Locations Are Approximate

0 250 500 750 1,000
Feet

WGS 1984 UTM Zone 6N

N

OPERABLE UNIT 6
TRICHLOROETHENE (TCE) AND ITS DEGRADATION PRODUCTS RESULTS FOR IN-PLUME WELLS

FORT WAINWRIGHT, FAIRBANKS, ALASKA

JACOBS

DATE: 12 DEC 2017

PROJECT MANAGER: D. FLEMING

FIGURE NO: A-5

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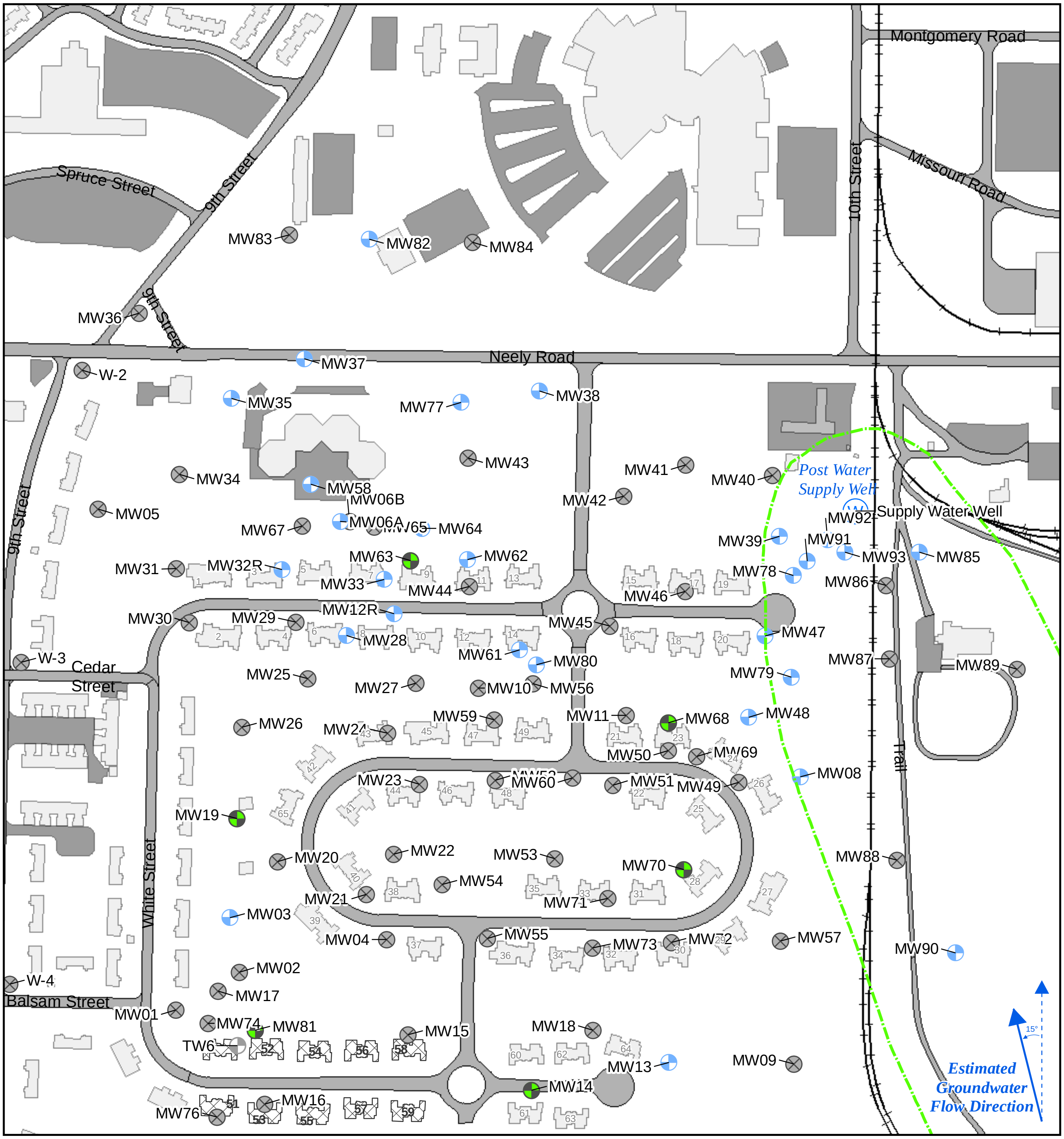

- Post Water Supply Well Capture Zone
- ● Well Decomissioned in 2017
- ⊗ Previously Decomissioned Well
- ◐ Previous Location of TW6
- ◐ Onsite Well
- Ⓦ Water Supply Well
- ☒ Unit not Built
- ☐ Unit
- + Railroad
- ■ Road or Trail

N

All Locations Are Approximate

0 100 200 300 400 500

Feet

WGS 1984 UTM Zone 6N

OPERABLE UNIT 6
MONITORING WELLS DECOMMISSIONED IN 2017

FORT WAINWRIGHT, FAIRBANKS, ALASKA

JACOBS

DATE:	PROJECT MANAGER:	FIGURE NO:
12 DEC 2017	D. FLEMING	A-6

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APPENDIX B
2017 Data Quality Assessment

DEPARTMENT OF THE ARMY
INSTALLATION MANAGEMENT COMMAND
HEADQUARTERS, U.S. ARMY GARRISON, FORT WAINWRIGHT

OPERABLE UNIT 6
FORMER COMMUNICATIONS SITE
2017 ACTIVITIES AND GROUNDWATER MONITORING ANNUAL REPORT

APPENDIX B
DATA QUALITY ASSESSMENT

FORT WAINWRIGHT, ALASKA

FINAL
AUGUST 2018

TABLE OF CONTENTS

TABLES

ATTACHMENTS

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ACRONYMS AND ABBREVIATIONS

°C	degrees Celsius
µg/L	micrograms per liter
ADEC	Alaska Department of Environmental Conservation
APPL	Agriculture & Priority Pollutants Laboratory, Inc.
CCV	continuing calibration verification
CoC	chain of custody
DERA	Defense Environmental Restoration Account
DL	detection limit
DoD	U.S. Department of Defense
DQA	data quality assessment
DQO	data quality objective
DRO	diesel-range organics
Dup	duplicate
ECC	Environmental Compliance Consultants, Inc.
EPA	U.S. Environmental Protection Agency
FCS	former communications site
FWA	Fort Wainwright, Alaska
gal	gallons
GW	groundwater
ID	identification number
Jacobs	Jacobs Engineering Group Inc.
L	liter
lbs	pounds
LCL	lower control limit
LCS	laboratory control sample
LCSD	laboratory control sample duplicate
LL	low-level
LOD	limit of detection
LOQ	limit of quantitation
MB	method blank
mg/L	milligrams per liter
ML	mid-level
mL	milliliter
MNA	monitored natural attenuation
MS	matrix spike

ACRONYMS AND ABBREVIATIONS (Continued)

MSD	matrix spike duplicate
MW	monitoring well
N/A	not applicable
ND	nondetect
POL	petroleum, oil, and lubricants
QC	quality control
QSM	Quality Systems Manual
RCRA	Resource Conservation and Recovery Act
RPD	relative percent difference
RRO	residual-range organics
SDG	sample delivery group
SIM	selective ion monitoring
TAT	turnaround time
TB	trip blank
TCE	trichloroethylene
TCP	1,2,3-trichloropropane
TCLP	Toxicity Characteristic Leaching Procedure
TSDF	treatment, storage, and disposal facility
UCL	upper control limit
USACE	U.S. Army Corps of Engineers
VOC	volatile organic compound
W	water
WPA	work plan addendum

1.0 INTRODUCTION

This data quality assessment (DQA) was performed to assess the overall quality and usability of the data collected during the spring and fall 2017 groundwater sampling events at the Former Communications Site (formally known as Taku Gardens) on Fort Wainwright, Alaska (FWA). Agriculture & Priority Pollutants Laboratory, Inc. (APPL) of Clovis, California, provided the analytical services.

This DQA includes the sample summary and analytical data tables (Attachment B-1), sample results that did not meet the project data quality objectives (DQOs) (Attachment B-2), Alaska Department of Environmental Conservation (ADEC) laboratory data review checklists for each sample delivery group (Attachment B-3), and laboratory data files (Attachment B-4).

Jacobs Engineering Group Inc. (Jacobs) performed a data review and DQA, and completed ADEC laboratory data review checklists for the records associated with the analytical data. The data review and DQA were performed in accordance with the *Underground Storage Tanks Procedures Manual* (ADEC 2017a), the *Operable Unit 6 Former Communications Site Groundwater Monitoring Work Plan* (U.S. Army Corps of Engineers [USACE] 2016) and the *Operable Unit 6 Former Communications Site Groundwater Monitoring Work Plan Addendum* (USACE 2017). Results were categorized as acceptable, estimated, or rejected, as described in Section 1.1. A completeness check of the laboratory data was performed to verify that the data packages and electronic files included all information requested.

1.1 DATA REVIEW AND QUALIFICATION

The Jacobs Project Chemist reviewed all analytical data. This evaluation consisted of a review of chain-of-custody (CoC) and sample receipt records; laboratory case narratives; and laboratory data, including analytical methodology, sample holding times, laboratory blanks, detection limits (DLs), limits of detection (LODs), limits of quantitation (LOQs), surrogate recoveries, laboratory control sample (LCS) recoveries, matrix spike (MS) recoveries, and precision. Analytical DQOs were considered met when the quality of the sample data met precision, accuracy, representativeness, completeness, comparability, and sensitivity requirements, as specified in the work plan (USACE 2016) and the work plan addendum (WPA) (USACE 2017).

Analytical results were evaluated against the DQOs listed in the OU6 Record of Decision (USACE 2014); work plan (USACE 2016); WPA (USACE 2017); U.S. Department of Defense (DoD) *Quality Systems Manual* (QSM), version 5.1 (DoD 2017); analytical methods (ADEC 2017c; U.S. Environmental Protection Agency [EPA] 2008); and laboratory limits. Table B-1 lists the quality control (QC) criteria for the 2017 samples.

Table B-1
QC Criteria – 2017 Sampling Effort

Sample Type	DRO Method AK102 [1]	RRO Method AK103 [1]	MNA Parameters Method SW6010B [2]	MNA Parameters Method SW8260B [2]	MNA Parameters Method SW8260B SIM [2]	Methane Method RSK-175	General Chemistry
LCS Recovery Limits	75 to 125%	60 to 120%	QSM, Table C-4	QSM, Table C-24	QSM, Table C-24	Method specific	Method specific
LCS RPD	20%	20%	20%	20%	20%	20%	20%
Surrogate Recovery	50 to 150%	50 to 150%	-	QSM, Table 24	QSM, Table 24	-	-
MS Recovery	75 to 125%	60 to 120%	QSM, Table C-4	QSM, Table C-24	QSM, Table C-24	Laboratory determined	Laboratory determined
MS Recovery RPD	20%	20%	20%	20%	20%	20%	20%

Notes:
[1] Criteria from Alaska Test Methods (ADEC 2017c).
[2] Criteria from the DoD QSM v.5.1 (DoD 2017).
For definitions, refer to the Acronyms and Abbreviations section.

Qualification was not required in the following circumstances:

- Surrogate or MS recoveries were outside QC limits and the sample was diluted by a factor of 5 or greater.
- MS recoveries were outside QC limits and the spiked concentration was less than twice that of the parent sample.
- An analyte was detected in the method blank (MB), but there was no detection in the sample.

- MS or LCS recoveries exceeded upper control limits (UCLs) and there was no detection in the sample(s).
- Continuing calibration verification (CCV) recoveries exceeded UCLs and there was no detection in the sample(s).
- Field duplicate relative percent difference (RPD) results exceeded 30 percent and the values were less than the LOD.

Qualifiers applied to the analytical data set, where appropriate, were as follows:

J	The analyte was an estimated value. The associated result was greater than the LOD and less than the LOQ.
B	The analyte was detected in the MB and/or the trip blank (TB) and the concentration in the sample did not exceed the blank concentration by a factor of 10.
+	The result was biased high because the QC recovery was greater than the UCL.
–	The result was biased low because the QC recovery was less than the lower control limit (LCL).
JL(±)	The result was an estimated value because the analyte failed recovery criteria in the LCS or LCS duplicate (LCSD) sample or both. Qualifications based on LCS and/or LCSD outliers apply to all samples in that extraction or digestion batch.
JM(±)	The result was an estimated value because the analyte failed recovery criteria in the MS or MS duplicate (MSD) sample or both. The MS sample recoveries were only evaluated if the spike concentration exceeded the native sample concentration by a factor of 2 or greater. Qualification of results based on MS and/or MSD outliers were only applied to the parent sample.
JS(±)	The result was an estimated value because at least one surrogate failed recovery criteria for that sample.
D	The result was qualified because the field duplicate RPD value was out of compliance and at least one of the results was greater than the LOD. If one field duplicate result was detected and the other was not detected, the LOD value was used in the RPD calculation for the nondetect (ND) result.
JDM	The result was qualified because the MS/MSD RPD value was greater than 20 percent (15 percent for anions).
E	The result was ND and the LOD exceeded the project cleanup level.

Data may be rejected on the following grounds:

- Initial calibration (per compound) criteria were not met
- Continuing calibration (per compound) was not verified
- Samples that were not detected where the continuing calibration recovery was less than control limits
- Any compound where the LCS recovery was less than 10 percent
- Sample holding time greater than two times the method-specified holding time
- Surrogate recovery of less than 10 percent and a dilution factor of 5 or less

Completeness is a quantitative evaluation indicating the percentage of the data that was considered usable (not rejected) for the intent of the project. The completeness goal was considered met when 95 percent of sample data was not rejected. No data were rejected; therefore, the completeness goal of 95 percent for all parameters was met.

2.0 DATA QUALITY SUMMARY

A review of the analytical results and associated QC samples found the overall quality of the project data to be acceptable. These data are considered usable with the limitations discussed in this DQA and the ADEC checklists (Attachment B-3). Sample results that did not meet project DQOs are qualified as described in Section 1.1. Attachment B-2 presents all qualified results; Attachment B-3 presents all laboratory data review checklists.

2.1 FIELD QC SAMPLE COLLECTION

The collection frequency for field QC samples of one field duplicate per 10 field samples and one MS/MSD pair (or MS/sample duplicate) per 20 field samples, as outlined in the work plan (USACE 2016) and the WPA (USACE 2017), were met. Table B-2 lists the analytical methods and associated field QC sample frequency for the 2017 spring and fall sampling events.

Table B-2
Field Quality Control Sample Quantities

Analyte	DRO/ RRO	VOCs LL	VOCs ML	Metals	Sulfate	Nitrate/ Nitrite	Alkalinity	Ammonia	Methane
Spring 2017									
Primary	14	12	3	23	23	23	23	23	23
Field duplicate	2	2	1	3	3	3	3	3	3
MS	1	1	1	2	2	3	2	2	2
MSD	1	1	1	2	2	3	2	2	2
TB	N/A	2	1	N/A	N/A	N/A	N/A	N/A	N/A
Fall 2017									
Primary	14	10	4	23	23	23	23	24	23
Field duplicate	2	1	1	4	4	4	4	4	4
MS	1	1	1	2	0	0	0	0	2
MSD	1	1	1	2	0	0	0	0	2
TB	N/A	2	2	N/A	N/A	N/A	N/A	N/A	N/A

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

2.2 SAMPLE HANDLING

Eleven coolers were submitted over the course of the spring 2017 groundwater monitoring sampling event (July 2017) and nine coolers were submitted over the course of the fall 2017 groundwater monitoring sampling event (September 2017). Sample temperatures of 0 to 6 degrees Celsius (°C) were considered acceptable. All coolers were received intact with temperatures between 0 and 6°C. The laboratory did not identify any frozen samples in any of the coolers received and no results were qualified.

2.3 HOLDING TIMES

The samples were analyzed within their method-specified holding times; qualifications were not required.

2.4 METHOD BLANKS AND TRIP BLANKS

There were no TB detections during the spring and fall sampling events. The following analyte was detected in the MBs, which resulted in the qualification of sample results:

- Method RSK175: methane
  - Sample results that were within 10 times of the concentration detected in the MB were flagged B. Results that were qualified B may be false positives or biased high. All methane results qualified B were used for monitored natural attenuation (MNA) calculations; therefore, the effects were likely minimal.

Table B-2-1 (Attachment B-2) summarizes the sample results that were qualified due to MB contamination. The tables also provide concentrations that were detected in the associated blanks.

2.5 CALIBRATION VERIFICATIONS

All CCV recoveries were in control; qualifications were not required.

2.6 LABORATORY CONTROL SAMPLE RECOVERY

All LCS and LCSD recoveries were evaluated. If the recoveries were greater than the UCL but no analytes were detected, qualifications were not applied. If the recoveries were less than the LCL, then all associated results were qualified as estimated with a possible low bias.

If any LCS and/or LCSD recoveries for methane were greater than the upper control limit, then the affected sample results were qualified JL+ to indicate the results may be biased high. The methane results were used for MNA calculations; therefore, the effects were minimal.

If the LCS and/or LCSD recoveries for diesel-range organics (DRO) were less than the lower control limit, then the affected results were qualified JL- to indicate the result may be biased low. The laboratory re-extracted and re-analyzed the affected samples outside of hold time to confirm the results and reported the values that were within hold time. The DRO results were either significantly less than or greater than the project cleanup level; therefore, the impacts were minimal.

Table B-2-2 (Attachment B-2) provides a summary of the LCS and/or LCSD recovery outliers and the affected sample results.

2.7 LABORATORY CONTROL SAMPLE PRECISION

All RPDs between the LCS and LCSD were within control limits; qualifications were not required.

2.8 SURROGATE RECOVERY

Surrogate recoveries were evaluated for all samples analyzed at a dilution factor of less than 5. If surrogate recoveries were greater than the UCL but no analytes were detected, qualifications were not applied. Laboratory control limits were used for SW8260SIM surrogates as there are no defined limits in the QSM v.5.1 (DoD 2017). All surrogate recoveries were within applicable control limits; qualifications were not necessary.

2.9 MS/MSD RECOVERIES

MS and MSD recoveries were evaluated for all samples analyzed at a dilution factor of less than 5 and were qualified only if the spike concentration was greater than two times the parent sample concentration.

The MS and MSD were recovered low for DRO in samples 17FWAMW35-GWS and 17FWAMW35-GWF. The associated DRO results were significantly less than the project cleanup level; therefore, the impacts were minimal.

The MS and MSD recovered high for sulfate in sample 17WAMW61-GWS. The associated sulfate result was qualified JM+ to indicate a possible high bias; however, the result is similar to the fall result, indicating the effect on the data usability is minimal.

The MS recovered low for methane in sample 17WAMW61-GWF. The associated result was qualified JM- to indicate a possible low bias; however, the result is similar to the spring result, indicating the effect on the data usability is minimal.

Table B-2-3 (Attachment B-2) provides a summary of the MS/MSD recovery outliers and the affected sample results.

2.10 MS/MSD RECOVERY PRECISION

The MS/MSD RPD values were evaluated within the required limit of 20 percent (anions 15 percent).

The RPD between the MS/MSD for vinyl chloride in sample 17FWAMW79-GWS was 40 percent. The sample was qualified JDM to indicate the result had poor MS/MSD precision and should be considered an estimate. The sample result was ND; therefore, the effects were minimal.

The RPD between the MS/MSD for vinyl chloride in sample 17FWAMW61-GWF was 27 percent. The sample was qualified JDM to indicate the result had poor MS/MSD precision and should be considered an estimate. The sample result was ND; therefore, the effects were minimal.

The RPD between the MS/MSD for methane in sample 17FWAMW61-GWF was 45 percent. The sample was qualified JDM to indicate the result had poor MS/MSD precision and should be considered an estimate. The methane results were used for MNA calculations; therefore, the effects were minimal.

Table B-2-4 (Attachment B-2) provides a summary of sample results qualified due to failed MS/MSD RPDs.

2.11 FIELD DUPLICATE PRECISION

Field duplicate precision was evaluated against the recommended RPD limit of 30 percent for aqueous samples, as stated in ADEC's *Field Sampling Guidance* (ADEC 2017b). In cases where an analyte was ND in one sample, the RPD was calculated using the LOD for the analyte.

Table B-2-5 (Attachment B-2) provides a summary of detected results and associated failed RPD values for all field duplicate sample pairs. Results with RPD failures were qualified JD due to poor duplicate precision. All results with failed RPDs were used for MNA calculations; therefore, the effects were minimal.

2.12 REPORTING LIMIT ASSESSMENT

Laboratory LODs for ND samples were evaluated against the corresponding project cleanup levels. The LODs for several TCP samples, analyzed by method SW8260C mid-level (ML), were greater than the project cleanup level (0.00012 milligrams per liter [mg/L]). These results were qualified E and are summarized in Table B-2-6 (Attachment B-2). TCP was not a contaminant of concern in the affected wells; therefore, the effects were minimal. All wells where TCP was a contaminant of concern were analyzed by method SW8260 low-level (LL) to meet the TCP project cleanup levels.

Table B-2-6 (Attachment B-2) provides ND results with LODs greater than the project cleanup levels. The LOD was greater than the project cleanup level for residual-range organics (RRO) in sample 17FWAMW33-GWF due to sample dilution at the laboratory. The RRO result was ND and the LOD was 5.5 mg/L. Historically, this well has exceeded the project cleanup level of 1.1 mg/L and also exceeded the cleanup levels during the 2017 spring sampling event (4.0 mg/L). Although the sample result was ND, the result was not reliable. The affected sample results were qualified E.

3.0 CONCLUSION

In general, the overall quality of project data was acceptable. The completeness goal of 95 percent for all parameters was met; no sample results were rejected. The following data quality issues should be considered before decisions are made:

- The RRO result in sample 17FWAMW33-GWF had an LOD greater than the project cleanup level. The RRO result was ND and the LOD was 5.5 mg/L. Historically, MW33 has exceeded the project cleanup level of 1.1 mg/L and did exceed during the 2017 spring sampling event (4.0 mg/L). The ND sample result was not reliable.

All reported data were considered usable with a few limitations, discussed in this DQA as well as in the ADEC laboratory data review checklists (Attachment B-3).

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4.0 REFERENCES

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ATTACHMENT B-1

Sample Summary and Analytical Data Tables

2017 Former Communications Site Groundwater Monitoring Fort Wainwright, Alaska
Table B-1-1 Sample Summary Table

Laboratory ID	SDG	Cooler Name	COC Number	Sample ID	Location ID	Collection Date	Collection Time	Sampler	Quantity	Container Type	Container Volume	Preservation	Matrix	Analytical Methods Requested	QC Type	TAT	Notes
APPL	83363	Egg Yolk Yellow	2017FCS-01	17FWAMW03-GWS	MW03	7/18/2017	1045	DW/MH/PS	2	Amber	1L	4°C; HCl	GW	AK102/103		14	DRO/RRO
APPL	83363	Egg Yolk Yellow	2017FCS-01	17FWAMW03-GWS	MW03	7/18/2017	1045	DW/MH/PS	1	Poly	500mL	4°C	GW	E300.0, E310.1		14	Sulfate, Alkalinity
APPL	83363	Egg Yolk Yellow	2017FCS-01	17FWAMW03-GWS	MW03	7/18/2017	1045	DW/MH/PS	1	Poly	500mL	4°C; HNO3	GW	SW6010		14	K,Mn,P
APPL	83363	Egg Yolk Yellow	2017FCS-01	17FWAMW03-GWS	MW03	7/18/2017	1045	DW/MH/PS	1	Poly	500mL	4°C; H2SO4	GW	E353.2, E350.1		14	NO2/NO3, Ammonia
APPL	83363	Tan Pancake	2017FCS-03	17FWAMW03-GWS	MW03	7/18/2017	1045	DW/MH/PS	3	VOA	40mL	4°C, HCl	GW	RSK 175		14	Methane
APPL	83363	Tan Pancake	2017FCS-03	17FWAMW39-GWS	MW39	7/18/2017	1138	DW/MH/PS	6	VOA	40mL	4°C, HCl	GW	SW8260SIM		14	VOC-LL
APPL	83363	Cherry Red	2017FCS-02	17FWAMW39-GWS	MW39	7/18/2017	1138	DW/MH/PS	1	Poly	500mL	4°C	GW	E300.0, E310.1		14	Sulfate, Alkalinity
APPL	83363	Cherry Red	2017FCS-02	17FWAMW39-GWS	MW39	7/18/2017	1138	DW/MH/PS	1	Poly	500mL	4°C; HNO3	GW	SW6010		14	K,Mn,P
APPL	83363	Cherry Red	2017FCS-02	17FWAMW39-GWS	MW39	7/18/2017	1138	DW/MH/PS	1	Poly	500mL	4°C; H2SO4	GW	E353.2, E350.1		14	NO2/NO3, Ammonia
APPL	83363	Tan Pancake	2017FCS-03	17FWAMW39-GWS	MW39	7/18/2017	1138	DW/MH/PS	3	VOA	40mL	4°C, HCl	GW	RSK 175		14	Methane
APPL	83363	Tan Pancake	2017FCS-03	17FWAMW47-GWS	MW47	7/18/2017	1710	DW/MH/PS	6	VOA	40mL	4°C, HCl	GW	SW8260SIM		14	VOC-LL
APPL	83363	Cherry Red	2017FCS-02	17FWAMW47-GWS	MW47	7/18/2017	1710	DW/MH/PS	1	Poly	500mL	4°C	GW	E300.0, E310.1		14	Sulfate, Alkalinity
APPL	83363	Cherry Red	2017FCS-02	17FWAMW47-GWS	MW47	7/18/2017	1710	DW/MH/PS	1	Poly	500mL	4°C; HNO3	GW	SW6010		14	K,Mn,P
APPL	83363	Cherry Red	2017FCS-02	17FWAMW47-GWS	MW47	7/18/2017	1710	DW/MH/PS	1	Poly	500mL	4°C; H2SO4	GW	E353.2, E350.1		14	NO2/NO3, Ammonia
APPL	83363	Tan Pancake	2017FCS-03	17FWAMW47-GWS	MW47	7/18/2017	1710	DW/MH/PS	3	VOA	40mL	4°C, HCl	GW	RSK 175		14	Methane
APPL	83363	Egg Yolk Yellow	2017FCS-01	17FWAMW62-GWS	MW62	7/18/2017	1638	DW/MH/PS	2	Amber	1L	4°C; HCl	GW	AK102/103		14	DRO/RRO
APPL	83363	Egg Yolk Yellow	2017FCS-01	17FWAMW62-GWS	MW62	7/18/2017	1638	DW/MH/PS	1	Poly	500mL	4°C	GW	E300.0, E310.1		14	Sulfate, Alkalinity
APPL	83363	Egg Yolk Yellow	2017FCS-01	17FWAMW62-GWS	MW62	7/18/2017	1638	DW/MH/PS	1	Poly	500mL	4°C; HNO3	GW	SW6010		14	K,Mn,P
APPL	83363	Egg Yolk Yellow	2017FCS-01	17FWAMW62-GWS	MW62	7/18/2017	1638	DW/MH/PS	1	Poly	500mL	4°C; H2SO4	GW	E353.2, E350.1		14	NO2/NO3, Ammonia
APPL	83363	Tan Pancake	2017FCS-03	17FWAMW62-GWS	MW62	7/18/2017	1638	DW/MH/PS	3	VOA	40mL	4°C, HCl	GW	RSK 175		14	Methane
APPL	83363	Egg Yolk Yellow	2017FCS-01	17FWAMW62Y-GWS	MW62	7/18/2017	1638	DW/MH/PS	1	Poly	500mL	4°C	GW	E300.0, E310.1	Dup	14	Sulfate, Alkalinity
APPL	83363	Egg Yolk Yellow	2017FCS-01	17FWAMW62Y-GWS	MW62	7/18/2017	1638	DW/MH/PS	1	Poly	500mL	4°C; HNO3	GW	SW6010	Dup	14	K,Mn,P
APPL	83363	Egg Yolk Yellow	2017FCS-01	17FWAMW62Y-GWS	MW62	7/18/2017	1638	DW/MH/PS	1	Poly	500mL	4°C; H2SO4	GW	E353.2, E350.1	Dup	14	NO2/NO3, Ammonia
APPL	83363	Tan Pancake	2017FCS-03	17FWAMW62Y-GWS	MW62	7/18/2017	1638	DW/MH/PS	3	VOA	40mL	4°C, HCl	GW	RSK 175	Dup	14	Methane
APPL	83363	Tan Pancake	2017FCS-03	17FWAMW61-GWS	MW61	7/18/2017	1440	DW/MH/PS	9	VOA	40mL	4°C, HCl	GW	SW8260	MS/MSD	14	VOC-Mid
APPL	83363	Cherry Red	2017FCS-02	17FWAMW61-GWS	MW61	7/18/2017	1440	DW/MH/PS	1	Poly	500mL	4°C	GW	E300.0, E310.1		14	Sulfate, Alkalinity
APPL	83363	Cherry Red	2017FCS-02	17FWAMW61-GWS	MW61	7/18/2017	1440	DW/MH/PS	1	Poly	500mL	4°C; HNO3	GW	SW6010	MS/MSD	14	K,Mn,P
APPL	83363	Cherry Red	2017FCS-02	17FWAMW61-GWS	MW61	7/18/2017	1440	DW/MH/PS	1	Poly	500mL	4°C; H2SO4	GW	E353.2, E350.1	MS/MSD	14	NO2/NO3, Ammonia
APPL	83363	Tan Pancake	2017FCS-03	17FWAMW61-GWS	MW61	7/18/2017	1440	DW/MH/PS	3	VOA	40mL	4°C, HCl	GW	RSK 175	MS/MSD	14	Methane
APPL	83385	Tan Pancake	2017FCS-03	17FWAMW61X-GWS	MW61	7/18/2017	1440	DW/MH/PS	3	VOA	40mL	4°C, HCl	GW	SW8260SIM	Dup	14	VOC-LL
~~APPL~~	~~Cancelled~~	~~Cancelled~~	~~Cancelled~~	~~17FWAMW78-GWS~~	~~MW78~~	~~7/18/2017~~	~~1500~~	~~DW/MH/PS~~	~~6~~	~~VOA~~	~~40mL~~	~~4°C, HCl~~	~~GW~~	~~SW8260SIM~~		~~14~~	~~VOC-LL~~
~~APPL~~	~~Cancelled~~	~~Cherry Red~~	~~2017FCS-02~~	~~17FWAMW78-GWS~~	~~MW78~~	~~7/18/2017~~	~~1500~~	~~DW/MH/PS~~	~~1~~	~~Poly~~	~~500mL~~	~~4°C~~	~~GW~~	~~E300.0, E310.1~~		~~14~~	~~Sulfate, Alkalinity~~
~~APPL~~	~~Cancelled~~	~~Cherry Red~~	~~2017FCS-02~~	~~17FWAMW78-GWS~~	~~MW78~~	~~7/18/2017~~	~~1500~~	~~DW/MH/PS~~	~~1~~	~~Poly~~	~~500mL~~	~~4°C; HNO3~~	~~GW~~	~~SW6010~~		~~14~~	~~K,Mn,P~~
~~APPL~~	~~Cancelled~~	~~Cherry Red~~	~~2017FCS-02~~	~~17FWAMW78-GWS~~	~~MW78~~	~~7/18/2017~~	~~1500~~	~~DW/MH/PS~~	~~1~~	~~Poly~~	~~500mL~~	~~4°C; H2SO4~~	~~GW~~	~~E353.2, E350.1~~		~~14~~	~~NO2/NO3, Ammonia~~
~~APPL~~	~~Cancelled~~	~~Cancelled~~	~~Cancelled~~	~~17FWAMW78-GWS~~	~~MW78~~	~~7/18/2017~~	~~1500~~	~~DW/MH/PS~~	~~3~~	~~VOA~~	~~40mL~~	~~4°C, HCl~~	~~GW~~	~~RSK 175~~		~~14~~	~~Methane~~
APPL	83363	Tan Pancake	2017FCS-03	17FWAMW80-GWS	MW80	7/18/2017	1319	DW/MH/PS	3	VOA	40mL	4°C, HCl	GW	SW8260		14	VOC-Mid
APPL	83363	Cherry Red	2017FCS-02	17FWAMW80-GWS	MW80	7/18/2017	1319	DW/MH/PS	1	Poly	500mL	4°C	GW	E300.0, E310.1		14	Sulfate, Alkalinity
APPL	83363	Cherry Red	2017FCS-02	17FWAMW80-GWS	MW80	7/18/2017	1319	DW/MH/PS	1	Poly	500mL	4°C; HNO3	GW	SW6010		14	K,Mn,P
APPL	83363	Cherry Red	2017FCS-02	17FWAMW80-GWS	MW80	7/18/2017	1319	DW/MH/PS	1	Poly	500mL	4°C; H2SO4	GW	E353.2, E350.1		14	NO2/NO3, Ammonia
APPL	83363	Tan Pancake	2017FCS-03	17FWAMW80-GWS	MW80	7/18/2017	1319	DW/MH/PS	3	VOA	40mL	4°C, HCl	GW	RSK 175		14	Methane
APPL	83385	Tan Pancake	2017FCS-03	17FWAMW91-GWS	MW91	7/18/2017	1551	DW/MH/PS	6	VOA	40mL	4°C, HCl	GW	SW8260SIM		14	VOC-LL
APPL	83385	Tan Pancake	2017FCS-03	17FWAFCS-TB01	TB01	7/18/2017	0800	DW/MH/PS	6	VOA	40mL	4°C, HCl	GW	SW8260SIM		14	VOC-LL
APPL	83385	Tan Pancake	2017FCS-03	17FWAFCS-TB01	TB01	7/18/2017	0800	DW/MH/PS	3	VOA	40mL	4°C, HCl	GW	SW8260		14	VOC-Mid
APPL	83391	Rainbow Waffle	2017FCS-10	17FWAMW08-GWS	MW08	7/19/2017	1228	DW/MH/GS	6	VOA	40mL	4°C, HCl	GW	SW8260SIM		14	VOC-LL
APPL	83385	Blueberry Muffin	2017FCS-05	17FWAMW08-GWS	MW08	7/19/2017	1228	DW/MH/GS	1	Poly	500mL	4°C	GW	E300.0, E310.1		14	Sulfate, Alkalinity
APPL	83385	Blueberry Muffin	2017FCS-05	17FWAMW08-GWS	MW08	7/19/2017	1228	DW/MH/GS	1	Poly	500mL	4°C; HNO3	GW	SW6010		14	K,Mn,P
APPL	83385	Blueberry Muffin	2017FCS-05	17FWAMW08-GWS	MW08	7/19/2017	1228	DW/MH/GS	1	Poly	500mL	4°C; H2SO4	GW	E353.2, E350.1		14	NO2/NO3, Ammonia
APPL	83391	Rainbow Waffle	2017FCS-10	17FWAMW08-GWS	MW08	7/19/2017	1228	DW/MH/GS	3	VOA	40mL	4°C, HCl	GW	RSK 175		14	Methane
APPL	83385	Red Bacon	2017FCS-04	17FWAMW12R-GWS	MW12R	7/19/2017	1145	DW/MH/GS	2	Amber	1L	4°C; HCl	GW	AK102/103		14	DRO/RRO
APPL	83385	Blueberry Muffin	2017FCS-05	17FWAMW12R-GWS	MW12R	7/19/2017	1145	DW/MH/GS	1	Poly	500mL	4°C	GW	E300.0, E310.1		14	Sulfate, Alkalinity
APPL	83385	Blueberry Muffin	2017FCS-05	17FWAMW12R-GWS	MW12R	7/19/2017	1145	DW/MH/GS	1	Poly	500mL	4°C; HNO3	GW	SW6010		14	K,Mn,P
APPL	83385	Blueberry Muffin	2017FCS-05	17FWAMW12R-GWS	MW12R	7/19/2017	1145	DW/MH/GS	1	Poly	500mL	4°C; H2SO4	GW	E353.2, E350.1		14	NO2/NO3, Ammonia
APPL	83385	Tan Pancake	2017FCS-03	17FWAMW12R-GWS	MW12R	7/19/2017	1145	DW/MH/GS	3	VOA	40mL	4°C, HCl	GW	RSK 175, SW8260		14	Methane, VOCs
APPL	83391	Rainbow Waffle	2017FCS-10	17FWAMW13-GWS	MW13	7/19/2017	0940	DW/MH/GS	6	VOA	40mL	4°C, HCl	GW	SW8260SIM		14	VOC-LL
APPL	83385	Blueberry Muffin	2017FCS-05	17FWAMW13-GWS	MW13	7/19/2017	0940	DW/MH/GS	1	Poly	500mL	4°C	GW	E300.0, E310.1		14	Sulfate, Alkalinity
APPL	83385	Blueberry Muffin	2017FCS-05	17FWAMW13-GWS	MW13	7/19/2017	0940	DW/MH/GS	1	Poly	500mL	4°C; HNO3	GW	SW6010		14	K,Mn,P
APPL	83385	Blueberry Muffin	2017FCS-05	17FWAMW13-GWS	MW13	7/19/2017	0940	DW/MH/GS	1	Poly	500mL	4°C; H2SO4	GW	E353.2, E350.1		14	NO2/NO3, Ammonia
APPL	83391	Rainbow Waffle	2017FCS-10	17FWAMW13-GWS	MW13	7/19/2017	0940	DW/MH/GS	3	VOA	40mL	4°C, HCl	GW	RSK 175		14	Methane
APPL	83385	Red Bacon	2017FCS-04	17FWAMW28-GWS	MW28	7/19/2017	0953	DW/MH/GS	2	Amber	1L	4°C; HCl	GW	AK102/103		14	DRO/RRO
APPL	83385	Blueberry Muffin	2017FCS-05	17FWAMW28-GWS	MW28	7/19/2017	0953	DW/MH/GS	1	Poly	500mL	4°C	GW	E300.0, E310.1		14	Sulfate, Alkalinity

2017 Former Communications Site Groundwater Monitoring Fort Wainwright, Alaska
Table B-1-1 Sample Summary Table

Laboratory ID	SDG	Cooler Name	COC Number	Sample ID	Location ID	Collection Date	Collection Time	Sampler	Quantity	Container Type	Container Volume	Preservation	Matrix	Analytical Methods Requested	QC Type	TAT	Notes
APPL	83385	Blueberry Muffin	2017FCS-05	17FWAMW28-GWS	MW28	7/19/2017	0953	DW/MH/GS	1	Poly	500mL	4°C; HNO3	GW	SW6010		14	K,Mn,P
APPL	83385	Blueberry Muffin	2017FCS-05	17FWAMW28-GWS	MW28	7/19/2017	0953	DW/MH/GS	1	Poly	500mL	4°C; H2SO4	GW	E353.2, E350.1		14	NO2/NO3, Ammonia
APPL	83385	Tan Pancake	2017FCS-03	17FWAMW28-GWS	MW28	7/19/2017	0953	DW/MH/GS	3	VOA	40mL	4°C, HCl	GW	RSK 175		14	Methane
APPL	83385	Red Bacon	2017FCS-04	17FWAMW32R-GWS	MW32R	7/19/2017	1638	DW/MH/GS	2	Amber	1L	4°C; HCl	GW	AK102/103		14	DRO/RRO
APPL	83391	Rainbow Waffle	2017FCS-10	17FWAMW32R-GWS	MW32R	7/19/2017	1638	DW/MH/GS	6	VOA	40mL	4°C, HCl	GW	SW8260SIM		14	VOC-LL
APPL	83385	Blueberry Muffin	2017FCS-05	17FWAMW32R-GWS	MW32R	7/19/2017	1638	DW/MH/GS	1	Poly	500mL	4°C	GW	E300.0, E310.1		14	Sulfate, Alkalinity
APPL	83385	Blueberry Muffin	2017FCS-05	17FWAMW32R-GWS	MW32R	7/19/2017	1638	DW/MH/GS	1	Poly	500mL	4°C; HNO3	GW	SW6010		14	K,Mn,P
APPL	83385	Blueberry Muffin	2017FCS-05	17FWAMW32R-GWS	MW32R	7/19/2017	1638	DW/MH/GS	1	Poly	500mL	4°C; H2SO4	GW	E353.2, E350.1		14	NO2/NO3, Ammonia
APPL	83391	Rainbow Waffle	2017FCS-10	17FWAMW32R-GWS	MW32R	7/19/2017	1638	DW/MH/GS	3	VOA	40mL	4°C, HCl	GW	RSK 175		14	Methane
APPL	83385	Red Bacon	2017FCS-04	17FWAMW33-GWS	MW33	7/19/2017	1435	DW/MH/GS	2	Amber	1L	4°C; HCl	GW	AK102/103		14	DRO/RRO
APPL	83385	Blueberry Muffin	2017FCS-05	17FWAMW33-GWS	MW33	7/19/2017	1435	DW/MH/GS	1	Poly	500mL	4°C	GW	E300.0, E310.1		14	Sulfate, Alkalinity
APPL	83385	Blueberry Muffin	2017FCS-05	17FWAMW33-GWS	MW33	7/19/2017	1435	DW/MH/GS	1	Poly	500mL	4°C; HNO3	GW	SW6010		14	K,Mn,P
APPL	83385	Blueberry Muffin	2017FCS-05	17FWAMW33-GWS	MW33	7/19/2017	1435	DW/MH/GS	1	Poly	500mL	4°C; H2SO4	GW	E353.2, E350.1		14	NO2/NO3, Ammonia
APPL	83385	Tan Pancake	2017FCS-03	17FWAMW33-GWS	MW33	7/19/2017	1435	DW/MH/GS	3	VOA	40mL	4°C, HCl	GW	RSK 175, SW8260		14	Methane, VOCs
APPL	83363	Tan Pancake	2017FCS-03	17FWAMW48-GWS	MW48	7/19/2017	1717	DW/MH/GS	6	VOA	40mL	4°C, HCl	GW	SW8260SIM		14	VOC-LL
APPL	83385	Blueberry Muffin	2017FCS-05	17FWAMW48-GWS	MW48	7/19/2017	1717	DW/MH/GS	1	Poly	500mL	4°C	GW	E300.0, E310.1		14	Sulfate, Alkalinity
APPL	83385	Blueberry Muffin	2017FCS-05	17FWAMW48-GWS	MW48	7/19/2017	1717	DW/MH/GS	1	Poly	500mL	4°C; HNO3	GW	SW6010		14	K,Mn,P
APPL	83385	Blueberry Muffin	2017FCS-05	17FWAMW48-GWS	MW48	7/19/2017	1717	DW/MH/GS	1	Poly	500mL	4°C; H2SO4	GW	E353.2, E350.1		14	NO2/NO3, Ammonia
APPL	83385	Tan Pancake	2017FCS-03	17FWAMW48-GWS	MW48	7/19/2017	1717	DW/MH/GS	3	VOA	40mL	4°C, HCl	GW	RSK 175		14	Methane
APPL	83385	Tan Pancake	2017FCS-03	17FWAMW78-GWS	MW78	7/19/2017	1540	DW/MH/GS	6	VOA	40mL	4°C, HCl	GW	SW8260SIM		14	VOC-LL
APPL	83385	Blueberry Muffin	2017FCS-05	17FWAMW78-GWS	MW78	7/19/2017	1540	DW/MH/GS	1	Poly	500mL	4°C	GW	E300.0, E310.1		14	Sulfate, Alkalinity
APPL	83385	Blueberry Muffin	2017FCS-05	17FWAMW78-GWS	MW78	7/19/2017	1540	DW/MH/GS	1	Poly	500mL	4°C; HNO3	GW	SW6010		14	K,Mn,P
APPL	83385	Blueberry Muffin	2017FCS-05	17FWAMW78-GWS	MW78	7/19/2017	1540	DW/MH/GS	1	Poly	500mL	4°C; H2SO4	GW	E353.2, E350.1		14	NO2/NO3, Ammonia
APPL	83385	Tan Pancake	2017FCS-03	17FWAMW78-GWS	MW78	7/19/2017	1540	DW/MH/GS	3	VOA	40mL	4°C, HCl	GW	RSK 175		14	Methane
APPL	83391	Rainbow Waffle	2017FCS-10	17FWAMW79-GWS	MW79	7/19/2017	1532	DW/MH/GS	12	VOA	40mL	4°C, HCl	GW	SW8260SIM	MS/MSD	14	VOC-LL (Limited Quantity)
APPL	83385	Blueberry Muffin	2017FCS-05	17FWAMW79-GWS	MW79	7/19/2017	1532	DW/MH/GS	1	Poly	500mL	4°C	GW	E300.0, E310.1		14	Sulfate, Alkalinity
APPL	83385	Blueberry Muffin	2017FCS-05	17FWAMW79-GWS	MW79	7/19/2017	1532	DW/MH/GS	1	Poly	500mL	4°C; HNO3	GW	SW6010		14	K,Mn,P
APPL	83385	Blueberry Muffin	2017FCS-05	17FWAMW79-GWS	MW79	7/19/2017	1532	DW/MH/GS	1	Poly	500mL	4°C; H2SO4	GW	E353.2, E350.1		14	NO2/NO3, Ammonia
APPL	83391	Rainbow Waffle	2017FCS-10	17FWAMW79-GWS	MW79	7/19/2017	1532	DW/MH/GS	2	VOA	40mL	4°C, HCl	GW	RSK 175	MS/MSD	14	Methane (Limited Quantity)
APPL	83391	Rainbow Waffle	2017FCS-10	17FWAMW79Z-GWS	MW79	7/19/2017	1532	DW/MH/GS	2	VOA	40mL	4°C, HCl	GW	SW8260SIM	Dup	14	VOC-LL (Limited Quantity)
APPL	83385	Blueberry Muffin	2017FCS-05	17FWAMW79Z-GWS	MW79	7/19/2017	1532	DW/MH/GS	1	Poly	500mL	4°C	GW	E300.0, E310.1	Dup	14	Sulfate, Alkalinity
APPL	83385	Blueberry Muffin	2017FCS-05	17FWAMW79Z-GWS	MW79	7/19/2017	1532	DW/MH/GS	1	Poly	500mL	4°C; HNO3	GW	SW6010	Dup	14	K,Mn,P
APPL	83385	Blueberry Muffin	2017FCS-05	17FWAMW79Z-GWS	MW79	7/19/2017	1532	DW/MH/GS	1	Poly	500mL	4°C; H2SO4	GW	E353.2, E350.1	Dup,MS/MSD	14	NO2/NO3, Ammonia
APPL	83391	Rainbow Waffle	2017FCS-10	17FWAMW79Z-GWS	MW79	7/19/2017	1532	DW/MH/GS	2	VOA	40mL	4°C, HCl	GW	RSK 175	Dup	14	Methane (Limited Quantity)
APPL	83385	Tan Pancake	2017FCS-03	17FWAMW93-GWS	MW93	7/19/2017	1110	DW/MH/GS	6	VOA	40mL	4°C, HCl	GW	SW8260SIM		14	VOC-LL
APPL	83391	Colorful Cheerios	2017FCS-06	17FWAMW64-GWS	MW64	7/20/2017	0945	DW/MH/GS	2	Amber	1L	4°C; HCl	GW	AK102/103		14	DRO/RRO
APPL	83391	Pink Doughnut	2017FCS-09	17FWAMW64-GWS	MW64	7/20/2017	0945	DW/MH/GS	1	Poly	500mL	4°C	GW	E300.0, E310.1		14	Sulfate, Alkalinity
APPL	83391	Pink Doughnut	2017FCS-09	17FWAMW64-GWS	MW64	7/20/2017	0945	DW/MH/GS	1	Poly	500mL	4°C; HNO3	GW	SW6010		14	K,Mn,P
APPL	83391	Pink Doughnut	2017FCS-09	17FWAMW64-GWS	MW64	7/20/2017	0945	DW/MH/GS	1	Poly	500mL	4°C; H2SO4	GW	E353.2, E350.1		14	NO2/NO3, Ammonia
APPL	83391	Rainbow Waffle	2017FCS-10	17FWAMW64-GWS	MW64	7/20/2017	0945	DW/MH/GS	3	VOA	40mL	4°C, HCl	GW	RSK 175		14	Methane
APPL	83391	Colorful Cheerios	2017FCS-06	17FWAMW35-GWS	MW35	7/20/2017	0945	DW/MH/GS	6	Amber	1L	4°C; HCl	GW	AK102/103	MS/MSD	14	DRO/RRO
APPL	83391	Pink Doughnut	2017FCS-09	17FWAMW35-GWS	MW35	7/20/2017	0945	DW/MH/GS	1	Poly	500mL	4°C	GW	E300.0, E310.1		14	Sulfate, Alkalinity
APPL	83391	Pink Doughnut	2017FCS-09	17FWAMW35-GWS	MW35	7/20/2017	0945	DW/MH/GS	1	Poly	500mL	4°C; HNO3	GW	SW6010	MS/MSD	14	K,Mn,P
APPL	83391	Pink Doughnut	2017FCS-09	17FWAMW35-GWS	MW35	7/20/2017	0945	DW/MH/GS	1	Poly	500mL	4°C; H2SO4	GW	E353.2, E350.1	MS/MSD	14	NO2/NO3, Ammonia
APPL	83391	Rainbow Waffle	2017FCS-10	17FWAMW35-GWS	MW35	7/20/2017	0945	DW/MH/GS	3	VOA	40mL	4°C, HCl	GW	RSK 175		14	Methane
APPL	83391	Orange Juice	2017FCS-07	17FWAMW35X-GWS	MW35	7/20/2017	0945	DW/MH/GS	2	Amber	1L	4°C; HCl	GW	AK102/103	Dup	14	DRO/RRO
APPL	83391	Pink Doughnut	2017FCS-09	17FWAMW35X-GWS	MW35	7/20/2017	0945	DW/MH/GS	1	Poly	500mL	4°C	GW	E300.0, E310.1	Dup	14	Sulfate, Alkalinity
APPL	83391	Pink Doughnut	2017FCS-09	17FWAMW35X-GWS	MW35	7/20/2017	0945	DW/MH/GS	1	Poly	500mL	4°C; HNO3	GW	SW6010	Dup	14	K,Mn,P
APPL	83391	Pink Doughnut	2017FCS-09	17FWAMW35X-GWS	MW35	7/20/2017	0945	DW/MH/GS	1	Poly	500mL	4°C; H2SO4	GW	E353.2, E350.1	Dup	14	NO2/NO3, Ammonia
APPL	83391	Rainbow Waffle	2017FCS-10	17FWAMW35X-GWS	MW35	7/20/2017	0945	DW/MH/GS	3	VOA	40mL	4°C, HCl	GW	RSK 175	Dup	14	Methane
APPL	83391	Orange Juice	2017FCS-07	17FWAMW77-GWS	MW77	7/20/2017	1010	DW/MH/GS	2	Amber	1L	4°C; HCl	GW	AK102/103		14	DRO/RRO
APPL	83391	Pink Doughnut	2017FCS-09	17FWAMW77-GWS	MW77	7/20/2017	1010	DW/MH/GS	1	Poly	500mL	4°C	GW	E300.0, E310.1		14	Sulfate, Alkalinity
APPL	83391	Pink Doughnut	2017FCS-09	17FWAMW77-GWS	MW77	7/20/2017	1010	DW/MH/GS	1	Poly	500mL	4°C; HNO3	GW	SW6010		14	K,Mn,P
APPL	83391	Pink Doughnut	2017FCS-09	17FWAMW77-GWS	MW77	7/20/2017	1010	DW/MH/GS	1	Poly	500mL	4°C; H2SO4	GW	E353.2, E350.1		14	NO2/NO3, Ammonia
APPL	83391	Rainbow Waffle	2017FCS-10	17FWAMW77-GWS	MW77	7/20/2017	1010	DW/MH/GS	3	VOA	40mL	4°C, HCl	GW	RSK 175		14	Methane
APPL	83391	Orange Juice	2017FCS-07	17FWAMW06A-GWS	MW06A	7/20/2017	1115	DW/MH/GS	2	Amber	1L	4°C; HCl	GW	AK102/103		14	DRO/RRO
APPL	83391	Pink Doughnut	2017FCS-09	17FWAMW06A-GWS	MW06A	7/20/2017	1115	DW/MH/GS	1	Poly	500mL	4°C	GW	E300.0, E310.1		14	Sulfate, Alkalinity
APPL	83391	Pink Doughnut	2017FCS-09	17FWAMW06A-GWS	MW06A	7/20/2017	1115	DW/MH/GS	1	Poly	500mL	4°C; HNO3	GW	SW6010		14	K,Mn,P
APPL	83391	Pink Doughnut	2017FCS-09	17FWAMW06A-GWS	MW06A	7/20/2017	1115	DW/MH/GS	1	Poly	500mL	4°C; H2SO4	GW	E353.2, E350.1		14	NO2/NO3, Ammonia
APPL	83391	Rainbow Waffle	2017FCS-10	17FWAMW06A-GWS	MW06A	7/20/2017	1115	DW/MH/GS	3	VOA	40mL	4°C, HCl	GW	RSK 175		14	Methane

2017 Former Communications Site Groundwater Monitoring Fort Wainwright, Alaska
Table B-1-1 Sample Summary Table

Laboratory ID	SDG	Cooler Name	COC Number	Sample ID	Location ID	Collection Date	Collection Time	Sampler	Quantity	Container Type	Container Volume	Preservation	Matrix	Analytical Methods Requested	QC Type	TAT	Notes
APPL	83391	Orange Juice	2017FCS-07	17FWAMW37-GWS	MW37	7/20/2017	1225	DW/MH/GS	2	Amber	1L	4°C; HCl	GW	AK102/103		14	DRO/RRO
APPL	83391	Pink Doughnut	2017FCS-09	17FWAMW37-GWS	MW37	7/20/2017	1225	DW/MH/GS	1	Poly	500mL	4°C	GW	E300.0, E310.1		14	Sulfate, Alkalinity
APPL	83391	Pink Doughnut	2017FCS-09	17FWAMW37-GWS	MW37	7/20/2017	1225	DW/MH/GS	1	Poly	500mL	4°C; HNO3	GW	SW6010		14	K,Mn,P
APPL	83391	Pink Doughnut	2017FCS-09	17FWAMW37-GWS	MW37	7/20/2017	1225	DW/MH/GS	1	Poly	500mL	4°C; H2SO4	GW	E353.2, E350.1		14	NO2/NO3, Ammonia
APPL	83391	Rainbow Waffle	2017FCS-10	17FWAMW37-GWS	MW37	7/20/2017	1225	DW/MH/GS	3	VOA	40mL	4°C, HCl	GW	RSK 175		14	Methane
APPL	83391	Brown Cheese	2017FCS-08	17FWAMW38-GWS	MW38	7/20/2017	1310	DW/MH/GS	2	Amber	1L	4°C; HCl	GW	AK102/103		14	DRO/RRO
APPL	83391	Pink Doughnut	2017FCS-09	17FWAMW38-GWS	MW38	7/20/2017	1310	DW/MH/GS	1	Poly	500mL	4°C	GW	E300.0, E310.1		14	Sulfate, Alkalinity
APPL	83391	Pink Doughnut	2017FCS-09	17FWAMW38-GWS	MW38	7/20/2017	1310	DW/MH/GS	1	Poly	500mL	4°C; HNO3	GW	SW6010		14	K,Mn,P
APPL	83391	Pink Doughnut	2017FCS-09	17FWAMW38-GWS	MW38	7/20/2017	1310	DW/MH/GS	1	Poly	500mL	4°C; H2SO4	GW	E353.2, E350.1		14	NO2/NO3, Ammonia
APPL	83391	Rainbow Waffle	2017FCS-10	17FWAMW38-GWS	MW38	7/20/2017	1310	DW/MH/GS	3	VOA	40mL	4°C, HCl	GW	RSK 175		14	Methane
APPL	83391	Brown Cheese	2017FCS-08	17FWAMW58-GWS	MW58	7/20/2017	1410	DW/MH/GS	2	Amber	1L	4°C; HCl	GW	AK102/103		14	DRO/RRO
APPL	83391	Pink Doughnut	2017FCS-09	17FWAMW58-GWS	MW58	7/20/2017	1410	DW/MH/GS	1	Poly	500mL	4°C	GW	E300.0, E310.1		14	Sulfate, Alkalinity
APPL	83391	Pink Doughnut	2017FCS-09	17FWAMW58-GWS	MW58	7/20/2017	1410	DW/MH/GS	1	Poly	500mL	4°C; HNO3	GW	SW6010		14	K,Mn,P
APPL	83391	Pink Doughnut	2017FCS-09	17FWAMW58-GWS	MW58	7/20/2017	1410	DW/MH/GS	1	Poly	500mL	4°C; H2SO4	GW	E353.2, E350.1		14	NO2/NO3, Ammonia
APPL	83391	Rainbow Waffle	2017FCS-10	17FWAMW58-GWS	MW58	7/20/2017	1410	DW/MH/GS	3	VOA	40mL	4°C, HCl	GW	RSK 175		14	Methane
APPL	83391	Brown Cheese	2017FCS-08	17FWAMW58Y-GWS	MW58	7/20/2017	1410	DW/MH/GS	2	Amber	1L	4°C; HCl	GW	AK102/103	Dup	14	DRO/RRO
APPL	83391	Brown Cheese	2017FCS-08	17FWAMW82-GWS	MW82	7/20/2017	1501	DW/MH/GS	2	Amber	1L	4°C; HCl	GW	AK102/103		14	DRO/RRO
APPL	83391	Pink Doughnut	2017FCS-09	17FWAMW82-GWS	MW82	7/20/2017	1501	DW/MH/GS	1	Poly	500mL	4°C	GW	E300.0, E310.1		14	Sulfate, Alkalinity
APPL	83391	Pink Doughnut	2017FCS-09	17FWAMW82-GWS	MW82	7/20/2017	1501	DW/MH/GS	1	Poly	500mL	4°C; HNO3	GW	SW6010		14	K,Mn,P
APPL	83391	Pink Doughnut	2017FCS-09	17FWAMW82-GWS	MW82	7/20/2017	1501	DW/MH/GS	1	Poly	500mL	4°C; H2SO4	GW	E353.2, E350.1		14	NO2/NO3, Ammonia
APPL	83391	Rainbow Waffle	2017FCS-10	17FWAMW82-GWS	MW82	7/20/2017	1501	DW/MH/GS	3	VOA	40mL	4°C, HCl	GW	RSK 175		14	Methane
APPL	83391	Rainbow Waffle	2017FCS-10	17FWAFCS-TB02	TB02	7/19/2017	0800	DW/MH/GS	6	VOA	40mL	4°C, HCl	GW	SW8260SIM	TB	14	VOC-LL
APPL	83893	Green Olive	2017FCS-13	17FWAMW78-GWF	MW78	9/27/2017	1544	DW/TL/GS	1	Poly	500mL	4°C	GW	E300.0, E310.1		14	Sulfate, Alkalinity
APPL	83893	Green Olive	2017FCS-13	17FWAMW78-GWF	MW78	9/27/2017	1544	DW/TL/GS	1	Poly	500mL	4°C; H2SO4	GW	E353.2, E350.1		14	NO2/NO3, Ammonia
APPL	83893	Pepto Bismal Pink	2017FCS-12	17FWAMW78-GWF	MW78	9/27/2017	1544	DW/TL/GS	6	VOA	40mL	4°C, HCl	GW	SW8260SIM		14	VOC-LL
APPL	83893	Green Olive	2017FCS-13	17FWAMW78-GWF	MW78	9/27/2017	1544	DW/TL/GS	1	Poly	500mL	4°C; HNO3	GW	SW6010		14	K,Mn,P
APPL	83893	Pepto Bismal Pink	2017FCS-12	17FWAMW78-GWF	MW78	9/27/2017	1544	DW/TL/GS	3	VOA	40mL	4°C, HCl	GW	RSK 175		14	Methane
APPL	83893	Green Olive	2017FCS-13	17FWAMW62-GWF	MW62	9/27/2017	1525	DW/TL/GS	1	Poly	500mL	4°C; H2SO4	GW	E353.2, E350.1		14	NO2/NO3, Ammonia
APPL	83893	Green Olive	2017FCS-13	17FWAMW62-GWF	MW62	9/27/2017	1525	DW/TL/GS	1	Poly	500mL	4°C	GW	E300.0, E310.1		14	Sulfate, Alkalinity
APPL	83893	Green Olive	2017FCS-13	17FWAMW62-GWF	MW78	9/27/2017	1525	DW/TL/GS	1	Poly	500mL	4°C; HNO3	GW	SW6010		14	K,Mn,P
APPL	83893	Pepto Bismal Pink	2017FCS-12	17FWAMW62-GWF	MW78	9/27/2017	1525	DW/TL/GS	3	VOA	40mL	4°C, HCl	GW	RSK 175		14	Methane
APPL	83893	Burnt Sienna	2017FCS-11	17FWAMW62-GWF	MW82	9/27/2017	1525	DW/MH/GS	2	Amber	1L	4°C; HCl	GW	AK102/103		14	DRO/RRO
APPL	83893	Green Olive	2017FCS-13	17FWAMW62Y-GWF	MW62	9/27/2017	1525	DW/TL/GS	1	Poly	500mL	4°C; H2SO4	GW	E353.2, E350.1	Dup	14	NO2/NO3, Ammonia
APPL	83893	Green Olive	2017FCS-13	17FWAMW62Y-GWF	MW62	9/27/2017	1525	DW/TL/GS	1	Poly	500mL	4°C	GW	E300.0, E310.1	Dup	14	Sulfate, Alkalinity
APPL	83893	Green Olive	2017FCS-13	17FWAMW62Y-GWF	MW78	9/27/2017	1525	DW/TL/GS	1	Poly	500mL	4°C; HNO3	GW	SW6010	Dup	14	K,Mn,P
APPL	83893	Pepto Bismal Pink	2017FCS-12	17FWAMW62Y-GWF	MW78	9/27/2017	1525	DW/TL/GS	3	VOA	40mL	4°C, HCl	GW	RSK 175	Dup	14	Methane
APPL	83893	Green Olive	2017FCS-13	17FWAMW13-GWF	MW13	9/27/2017	1334	DW/TL/GS	1	Poly	500mL	4°C	GW	E300.0, E310.1		14	Sulfate, Alkalinity
APPL	83893	Green Olive	2017FCS-13	17FWAMW13-GWF	MW13	9/27/2017	1334	DW/TL/GS	1	Poly	500mL	4°C; H2SO4	GW	E353.2, E350.1		14	NO2/NO3, Ammonia
APPL	83893	Pepto Bismal Pink	2017FCS-12	17FWAMW13-GWF	MW13	9/27/2017	1334	DW/TL/GS	6	VOA	40mL	4°C, HCl	GW	SW8260SIM		14	VOC-LL
APPL	83893	Green Olive	2017FCS-13	17FWAMW13-GWF	MW13	9/27/2017	1334	DW/TL/GS	1	Poly	500mL	4°C; HNO3	GW	SW6010		14	K,Mn,P
APPL	83893	Pepto Bismal Pink	2017FCS-12	17FWAMW13-GWF	MW13	9/27/2017	1334	DW/TL/GS	3	VOA	40mL	4°C, HCl	GW	RSK 175		14	Methane
APPL	83893	Green Olive	2017FCS-13	17FWAMW39-GWF	MW39	9/27/2017	1558	DW/TL/GS	1	Poly	500mL	4°C	GW	E300.0, E310.1		14	Sulfate, Alkalinity
APPL	83893	Green Olive	2017FCS-13	17FWAMW39-GWF	MW39	9/27/2017	1558	DW/TL/GS	1	Poly	500mL	4°C; H2SO4	GW	E353.2, E350.1		14	NO2/NO3, Ammonia
APPL	83893	Pepto Bismal Pink	2017FCS-12	17FWAMW39-GWF	MW39	9/27/2017	1558	DW/TL/GS	6	VOA	40mL	4°C, HCl	GW	SW8260SIM		14	VOC-LL
APPL	83893	Green Olive	2017FCS-13	17FWAMW39-GWF	MW39	9/27/2017	1558	DW/TL/GS	1	Poly	500mL	4°C; HNO3	GW	SW6010		14	K,Mn,P
APPL	83893	Pepto Bismal Pink	2017FCS-12	17FWAMW39-GWF	MW39	9/27/2017	1558	DW/TL/GS	3	VOA	40mL	4°C, HCl	GW	RSK 175		14	Methane
APPL	83893	Burnt Sienna	2017FCS-11	17FWAMW03-GWF	MW03	9/28/2017	1052	DW/GS/TL/IP	2	Amber	1L	4°C; HCl	GW	AK102/103		14	DRO/RRO
APPL	83893	Green Olive	2017FCS-13	17FWAMW03-GWF	MW03	9/28/2017	1052	DW/GS/TL/IP	1	Poly	500mL	4°C	GW	E300.0, E310.1		14	Sulfate, Alkalinity
APPL	83893	Green Olive	2017FCS-13	17FWAMW03-GWF	MW03	9/28/2017	1052	DW/GS/TL/IP	1	Poly	500mL	4°C; HNO3	GW	SW6010		14	K,Mn,P
APPL	83893	Green Olive	2017FCS-13	17FWAMW03-GWF	MW03	9/28/2017	1052	DW/GS/TL/IP	1	Poly	500mL	4°C; H2SO4	GW	E353.2, E350.1		14	NO2/NO3, Ammonia
APPL	83893	Pepto Bismal Pink	2017FCS-12	17FWAMW03-GWF	MW03	9/28/2017	1052	DW/GS/TL/IP	3	VOA	40mL	4°C, HCl	GW	RSK 175		14	Methane
APPL	83893	Pepto Bismal Pink	2017FCS-12	17FWAMW61-GWF	MW61	9/28/2017	1237	DW/GS/TL/IP	9	VOA	40mL	4°C, HCl	GW	SW8260	MS/MSD	14	VOC-Mid
APPL	83893	White Chocolate	2017FCS-14	17FWAMW61-GWF	MW61	9/28/2017	1237	DW/GS/TL/IP	1	Poly	500mL	4°C	GW	E300.0, E310.1		14	Sulfate, Alkalinity
APPL	83893	White Chocolate	2017FCS-14	17FWAMW61-GWF	MW61	9/28/2017	1237	DW/GS/TL/IP	1	Poly	500mL	4°C; HNO3	GW	SW6010		14	K,Mn,P
APPL	83893	White Chocolate	2017FCS-14	17FWAMW61-GWF	MW61	9/28/2017	1237	DW/GS/TL/IP	1	Poly	500mL	4°C; H2SO4	GW	E353.2, E350.1		14	NO2/NO3, Ammonia
APPL	83893	Pepto Bismal Pink	2017FCS-12	17FWAMW61-GWF	MW61	9/28/2017	1237	DW/GS/TL/IP	3	VOA	40mL	4°C, HCl	GW	RSK 175	MS/MSD	14	Methane
APPL	83893	Pepto Bismal Pink	2017FCS-12	17FWAMW61Z-GWF	MW61	9/28/2017	1237	DW/GS/TL/IP	3	VOA	40mL	4°C, HCl	GW	SW8260	Dup	14	VOC-Mid
APPL	83893	White Chocolate	2017FCS-14	17FWAMW61Z-GWF	MW61	9/28/2017	1237	DW/GS/TL/IP	1	Poly	500mL	4°C	GW	E300.0, E310.1	Dup	14	Sulfate, Alkalinity
APPL	83893	White Chocolate	2017FCS-14	17FWAMW61Z-GWF	MW61	9/28/2017	1237	DW/GS/TL/IP	1	Poly	500mL	4°C; HNO3	GW	SW6010	Dup	14	K,Mn,P
APPL	83893	White Chocolate	2017FCS-14	17FWAMW61Z-GWF	MW61	9/28/2017	1237	DW/GS/TL/IP	1	Poly	500mL	4°C; H2SO4	GW	E353.2, E350.1	Dup	14	NO2/NO3, Ammonia

2017 Former Communications Site Groundwater Monitoring Fort Wainwright, Alaska
Table B-1-1 Sample Summary Table

Laboratory ID	SDG	Cooler Name	COC Number	Sample ID	Location ID	Collection Date	Collection Time	Sampler	Quantity	Container Type	Container Volume	Preservation	Matrix	Analytical Methods Requested	QC Type	TAT	Notes
APPL	83893	Pepto Bismal Pink	2017FCS-12	17FWAMW61Z-GWF	MW61	9/28/2017	1237	DW/GS/TL/IP	3	VOA	40mL	4°C, HCl	GW	RSK 175	Dup	14	Methane
APPL	83893	Pepto Bismal Pink	2017FCS-12	17FWAMW80-GWF	MW80	9/28/2017	1354	DW/GS/TL/IP	3	VOA	40mL	4°C, HCl	GW	SW8260		14	VOC-Mid
APPL	83893	White Chocolate	2017FCS-14	17FWAMW80-GWF	MW80	9/28/2017	1354	DW/GS/TL/IP	1	Poly	500mL	4°C	GW	E300.0, E310.1		14	Sulfate, Alkalinity
APPL	83893	White Chocolate	2017FCS-14	17FWAMW80-GWF	MW80	9/28/2017	1354	DW/GS/TL/IP	1	Poly	500mL	4°C; HNO3	GW	SW6010		14	K,Mn,P
APPL	83893	White Chocolate	2017FCS-14	17FWAMW80-GWF	MW80	9/28/2017	1354	DW/GS/TL/IP	1	Poly	500mL	4°C; H2SO4	GW	E353.2, E350.1		14	NO2/NO3, Ammonia
APPL	83893	Pepto Bismal Pink	2017FCS-12	17FWAMW80-GWF	MW80	9/28/2017	1354	DW/GS/TL/IP	3	VOA	40mL	4°C, HCl	GW	RSK 175		14	Methane
APPL	83893	Pepto Bismal Pink	2017FCS-12	17FWAMW91-GWF	MW91	9/28/2017	1544	DW/GS/TL/IP	6	VOA	40mL	4°C, HCl	GW	SW8260SIM		14	VOC-LL
APPL	83893	Pepto Bismal Pink	2017FCS-12	17FWAMW47-GWF	MW47	9/28/2017	1037	DW/GS/TL/IP	6	VOA	40mL	4°C, HCl	GW	SW8260SIM		14	VOC-LL
APPL	83893	White Chocolate	2017FCS-14	17FWAMW47-GWF	MW47	9/28/2017	1037	DW/GS/TL/IP	1	Poly	500mL	4°C	GW	E300.0, E310.1		14	Sulfate, Alkalinity
APPL	83893	White Chocolate	2017FCS-14	17FWAMW47-GWF	MW47	9/28/2017	1037	DW/GS/TL/IP	1	Poly	500mL	4°C; HNO3	GW	SW6010		14	K,Mn,P
APPL	83893	White Chocolate	2017FCS-14	17FWAMW47-GWF	MW47	9/28/2017	1037	DW/GS/TL/IP	1	Poly	500mL	4°C; H2SO4	GW	E353.2, E350.1		14	NO2/NO3, Ammonia
APPL	83893	Pepto Bismal Pink	2017FCS-12	17FWAMW47-GWF	MW47	9/28/2017	1037	DW/GS/TL/IP	3	VOA	40mL	4°C, HCl	GW	RSK 175		14	Methane
APPL	83893	Burnt Sienna	2017FCS-11	17FWAMW64-GWF	MW64	9/28/2017	1251	DW/GPS/TL/IP	2	Amber	1L	4°C; HCl	GW	AK102/103		14	DRO/RRO
APPL	83893	White Chocolate	2017FCS-14	17FWAMW64-GWF	MW64	9/28/2017	1251	DW/GS/TL/IP	1	Poly	500mL	4°C	GW	E300.0, E310.1		14	Sulfate, Alkalinity
APPL	83893	White Chocolate	2017FCS-14	17FWAMW64-GWF	MW64	9/28/2017	1251	DW/GS/TL/IP	1	Poly	500mL	4°C; HNO3	GW	SW6010		14	K,Mn,P
APPL	83893	White Chocolate	2017FCS-14	17FWAMW64-GWF	MW64	9/28/2017	1251	DW/GS/TL/IP	1	Poly	500mL	4°C; H2SO4	GW	E353.2, E350.1		14	NO2/NO3, Ammonia
APPL	83893	Pepto Bismal Pink	2017FCS-12	17FWAMW64-GWF	MW64	9/28/2017	1251	DW/GS/TL/IP	3	VOA	40mL	4°C, HCl	GW	RSK 175		14	Methane
APPL	83893	Burnt Sienna	2017FCS-11	17FWAMW06A-GWF	MW06A	9/28/2017	1446	DW/GPS/TL/IP	2	Amber	1L	4°C; HCl	GW	AK102/103		14	DRO/RRO
APPL	83893	White Chocolate	2017FCS-14	17FWAMW06A-GWF	MW06A	9/28/2017	1446	DW/GS/TL/IP	1	Poly	500mL	4°C	GW	E300.0, E310.1		14	Sulfate, Alkalinity
APPL	83893	White Chocolate	2017FCS-14	17FWAMW06A-GWF	MW06A	9/28/2017	1446	DW/GS/TL/IP	1	Poly	500mL	4°C; HNO3	GW	SW6010		14	K,Mn,P
APPL	83893	White Chocolate	2017FCS-14	17FWAMW06A-GWF	MW06A	9/28/2017	1446	DW/GS/TL/IP	1	Poly	500mL	4°C; H2SO4	GW	E353.2, E350.1		14	NO2/NO3, Ammonia
APPL	83893	Pepto Bismal Pink	2017FCS-12	17FWAMW06A-GWF	MW06A	9/28/2017	1446	DW/GS/TL/IP	3	VOA	40mL	4°C, HCl	GW	RSK 175		14	Methane
APPL	83893	Burnt Sienna	2017FCS-11	17FWAMW38-GWF	MW38	9/28/2017	1626	DW/GPS/TL/IP	2	Amber	1L	4°C; HCl	GW	AK102/103		14	DRO/RRO
APPL	83893	Blue Jean Blue	2017FCS-15	17FWAMW38-GWF	MW38	9/28/2017	1626	DW/GS/TL/IP	1	Poly	500mL	4°C	GW	E300.0, E310.1		14	Sulfate, Alkalinity
APPL	83893	Blue Jean Blue	2017FCS-15	17FWAMW38-GWF	MW38	9/28/2017	1626	DW/GS/TL/IP	1	Poly	500mL	4°C; HNO3	GW	SW6010		14	K,Mn,P
APPL	83893	Blue Jean Blue	2017FCS-15	17FWAMW38-GWF	MW38	9/28/2017	1626	DW/GS/TL/IP	1	Poly	500mL	4°C; H2SO4	GW	E353.2, E350.1		14	NO2/NO3, Ammonia
APPL	83893	Pepto Bismal Pink	2017FCS-12	17FWAMW38-GWF	MW38	9/28/2017	1626	DW/GS/TL/IP	3	VOA	40mL	4°C, HCl	GW	RSK 175		14	Methane
APPL	83893	Pepto Bismal Pink	2017FCS-12	17FWAMW08-GWF	MW08	9/28/2017	1618	DW/GS/TL/IP	6	VOA	40mL	4°C, HCl	GW	SW8260SIM		14	VOC-LL
APPL	83893	Blue Jean Blue	2017FCS-15	17FWAMW08-GWF	MW08	9/28/2017	1618	DW/GS/TL/IP	1	Poly	500mL	4°C	GW	E300.0, E310.1		14	Sulfate, Alkalinity
APPL	83893	Blue Jean Blue	2017FCS-15	17FWAMW08-GWF	MW08	9/28/2017	1618	DW/GS/TL/IP	1	Poly	500mL	4°C; HNO3	GW	SW6010		14	K,Mn,P
APPL	83893	Blue Jean Blue	2017FCS-15	17FWAMW08-GWF	MW08	9/28/2017	1618	DW/GS/TL/IP	1	Poly	500mL	4°C; H2SO4	GW	E353.2, E350.1		14	NO2/NO3, Ammonia
APPL	83893	Pepto Bismal Pink	2017FCS-12	17FWAMW08-GWF	MW08	9/28/2017	1618	DW/GS/TL/IP	3	VOA	40mL	4°C, HCl	GW	RSK 175		14	Methane
APPL	83893	Pepto Bismal Pink	2017FCS-12	17FWAMW12R-GWF	MW12R	9/28/2017	1440	DW/GS/TL/IP	3	VOA	40mL	4°C, HCl	GW	SW8260		14	VOC-Mid
APPL	83893	Green Olive	2017FCS-13	17FWAMW12R-GWF	MW12R	9/28/2017	1440	DW/GPS/TL/IP	2	Amber	1L	4°C; HCl	GW	AK102/103		14	DRO/RRO
APPL	83893	Blue Jean Blue	2017FCS-15	17FWAMW12R-GWF	MW12R	9/28/2017	1440	DW/GS/TL/IP	1	Poly	500mL	4°C	GW	E300.0, E310.1		14	Sulfate, Alkalinity
APPL	83893	Blue Jean Blue	2017FCS-15	17FWAMW12R-GWF	MW12R	9/28/2017	1440	DW/GS/TL/IP	1	Poly	500mL	4°C; HNO3	GW	SW6010		14	K,Mn,P
APPL	83893	Blue Jean Blue	2017FCS-15	17FWAMW12R-GWF	MW12R	9/28/2017	1440	DW/GS/TL/IP	1	Poly	500mL	4°C; H2SO4	GW	E353.2, E350.1		14	NO2/NO3, Ammonia
APPL	83893	Pepto Bismal Pink	2017FCS-12	17FWAMW12R-GWF	MW12R	9/28/2017	1440	DW/GS/TL/IP	3	VOA	40mL	4°C, HCl	GW	RSK 175		14	Methane
APPL	83893	Pepto Bismal Pink	2017FCS-12	17FWAMW48-GWF	MW48	9/28/2017	1235	DW/GS/TL/IP	6	VOA	40mL	4°C, HCl	GW	SW8260SIM		14	VOC-LL
APPL	83893	Blue Jean Blue	2017FCS-15	17FWAMW48-GWF	MW48	9/28/2017	1235	DW/GS/TL/IP	1	Poly	500mL	4°C	GW	E300.0, E310.1		14	Sulfate, Alkalinity
APPL	83893	Blue Jean Blue	2017FCS-15	17FWAMW48-GWF	MW48	9/28/2017	1235	DW/GS/TL/IP	1	Poly	500mL	4°C; HNO3	GW	SW6010		14	K,Mn,P
APPL	83893	Blue Jean Blue	2017FCS-15	17FWAMW48-GWF	MW48	9/28/2017	1235	DW/GS/TL/IP	1	Poly	500mL	4°C; H2SO4	GW	E353.2, E350.1		14	NO2/NO3, Ammonia
APPL	83893	Pepto Bismal Pink	2017FCS-12	17FWAMW48-GWF	MW48	9/28/2017	1235	DW/GS/TL/IP	3	VOA	40mL	4°C, HCl	GW	RSK 175		14	Methane
APPL	83893	Pepto Bismal Pink	2017FCS-12	17FWAMW79-GWF	MW79	9/28/2017	1028	DW/GS/TL/IP	18	VOA	40mL	4°C, HCl	GW	SW8260SIM	MS/MSD	14	VOC-LL
APPL	83893	Blue Jean Blue	2017FCS-15	17FWAMW79-GWF	MW79	9/28/2017	1028	DW/GS/TL/IP	1	Poly	500mL	4°C	GW	E300.0, E310.1		14	Sulfate, Alkalinity
APPL	83893	Blue Jean Blue	2017FCS-15	17FWAMW79-GWF	MW79	9/28/2017	1028	DW/GS/TL/IP	1	Poly	500mL	4°C; HNO3	GW	SW6010		14	K,Mn,P
APPL	83893	Blue Jean Blue	2017FCS-15	17FWAMW79-GWF	MW79	9/28/2017	1028	DW/GS/TL/IP	1	Poly	500mL	4°C; H2SO4	GW	E353.2, E350.1		14	NO2/NO3, Ammonia
APPL	83893	Pepto Bismal Pink	2017FCS-12	17FWAMW79-GWF	MW79	9/28/2017	1028	DW/GS/TL/IP	3	VOA	40mL	4°C, HCl	GW	RSK 175	MS/MSD	14	Methane
APPL	83893	Pepto Bismal Pink	2017FCS-12	17FWAMW79Y-GWF	MW79	9/28/2017	1028	DW/GS/TL/IP	6	VOA	40mL	4°C, HCl	GW	SW8260SIM	Dup	14	VOC-LL
APPL	83893	Blue Jean Blue	2017FCS-15	17FWAMW79Y-GWF	MW79	9/28/2017	1028	DW/GS/TL/IP	1	Poly	500mL	4°C	GW	E300.0, E310.1	Dup	14	Sulfate, Alkalinity
APPL	83893	Blue Jean Blue	2017FCS-15	17FWAMW79Y-GWF	MW79	9/28/2017	1028	DW/GS/TL/IP	1	Poly	500mL	4°C; HNO3	GW	SW6010	Dup	14	K,Mn,P
APPL	83893	Blue Jean Blue	2017FCS-15	17FWAMW79Y-GWF	MW79	9/28/2017	1028	DW/GS/TL/IP	1	Poly	500mL	4°C; H2SO4	GW	E353.2, E350.1	Dup	14	NO2/NO3, Ammonia
APPL	83893	Pepto Bismal Pink	2017FCS-12	17FWAMW79Y-GWF	MW79	9/28/2017	1028	DW/GS/TL/IP	3	VOA	40mL	4°C, HCl	GW	RSK 175	Dup	14	Methane
APPL	83893	Pepto Bismal Pink	2017FCS-12	17FWAFCS-TB03	TB03	9/27/2017	0800	DW/GS/TL/IP	6	VOA	40mL	4°C, HCl	GW	SW8260SIM	TB	14	VOC-LL
APPL	83893	Pepto Bismal Pink	2017FCS-12	17FWAFCS-TB04	TB04	9/28/2017	0800	DW/GS/TL/IP	3	VOA	40mL	4°C, HCl	GW	SW8260	TB	14	VOC-Mid
APPL	83906	Bluegrass Green	2017FCS-18	17FWAMW93-GWF	MW93	9/29/2017	1229	DW/GS/TL/IP	6	VOA	40mL	4°C, HCl	GW	SW8260SIM		14	VOC-LL
APPL	83906	Pitch Black	2017FCS-16	17FWAMW35-GWF	MW35	9/29/2017	1002	DW/GS/TL/IP	6	Amber	1L	4°C; HCl	GW	AK102/103	MS/MSD	14	DRO/RRO
APPL	83906	Blood Orange	2017FCS-19	17FWAMW35-GWF	MW35	9/29/2017	1002	DW/GS/TL/IP	1	Poly	500mL	4°C	GW	E300.0, E310.1		14	Sulfate, Alkalinity
APPL	83906	Blood Orange	2017FCS-19	17FWAMW35-GWF	MW35	9/29/2017	1002	DW/GS/TL/IP	1	Poly	500mL	4°C; HNO3	GW	SW6010		14	K,Mn,P
APPL	83906	Blood Orange	2017FCS-19	17FWAMW35-GWF	MW35	9/29/2017	1002	DW/GS/TL/IP	1	Poly	500mL	4°C; H2SO4	GW	E353.2, E350.1		14	NO2/NO3, Ammonia

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Table B-1-1 Sample Summary Table

Laboratory ID	SDG	Cooler Name	COC Number	Sample ID	Location ID	Collection Date	Collection Time	Sampler	Quantity	Container Type	Container Volume	Preservation	Matrix	Analytical Methods Requested	QC Type	TAT	Notes
APPL	83906	Bluegrass Green	2017FCS-18	17FWAMW35-GWF	MW35	9/29/2017	1002	DW/GS/TL/IP	3	VOA	40mL	4°C, HCl	GW	RSK 175		14	Methane
APPL	83906	Pitch Black	2017FCS-16	17FWAMW35X-GWF	MW35	9/29/2017	1002	DW/GS/TL/IP	2	Amber	1L	4°C; HCl	GW	AK102/103	Dup	14	DRO/RRO
APPL	83906	Blood Orange	2017FCS-19	17FWAMW35X-GWF	MW35	9/29/2017	1002	DW/GS/TL/IP	1	Poly	500mL	4°C	GW	E300.0, E310.1	Dup	14	Sulfate, Alkalinity
APPL	83906	Blood Orange	2017FCS-19	17FWAMW35X-GWF	MW35	9/29/2017	1002	DW/GS/TL/IP	1	Poly	500mL	4°C; HNO3	GW	SW6010	Dup	14	K,Mn,P
APPL	83906	Blood Orange	2017FCS-19	17FWAMW35X-GWF	MW35	9/29/2017	1002	DW/GS/TL/IP	1	Poly	500mL	4°C; H2SO4	GW	E353.2, E350.1	Dup	14	NO2/NO3, Ammonia
APPL	83906	Bluegrass Green	2017FCS-18	17FWAMW35X-GWF	MW35	9/29/2017	1002	DW/GS/TL/IP	3	VOA	40mL	4°C, HCl	GW	RSK 175	Dup	14	Methane
APPL	83906	Pitch Black	2017FCS-16	17FWAMW82-GWF	MW82	9/29/2017	1354	DW/GS/TL/IP	2	Amber	1L	4°C; HCl	GW	AK102/103		14	DRO/RRO
APPL	83906	Blood Orange	2017FCS-19	17FWAMW82-GWF	MW82	9/29/2017	1354	DW/GS/TL/IP	1	Poly	500mL	4°C	GW	E300.0, E310.1		14	Sulfate, Alkalinity
APPL	83906	Blood Orange	2017FCS-19	17FWAMW82-GWF	MW82	9/29/2017	1354	DW/GS/TL/IP	1	Poly	500mL	4°C; HNO3	GW	SW6010		14	K,Mn,P
APPL	83906	Blood Orange	2017FCS-19	17FWAMW82-GWF	MW82	9/29/2017	1354	DW/GS/TL/IP	1	Poly	500mL	4°C; H2SO4	GW	E353.2, E350.1		14	NO2/NO3, Ammonia
APPL	83906	Bluegrass Green	2017FCS-18	17FWAMW82-GWF	MW82	9/29/2017	1354	DW/GS/TL/IP	3	VOA	40mL	4°C, HCl	GW	RSK 175		14	Methane
APPL	83906	Silver Fox	2017FCS-17	17FWAMW28-GWF	MW28	9/29/2017	1235	DW/GS/TL/IP	2	Amber	1L	4°C; HCl	GW	AK102/103		14	DRO/RRO
APPL	83906	Blood Orange	2017FCS-19	17FWAMW28-GWF	MW28	9/29/2017	1235	DW/GS/TL/IP	1	Poly	500mL	4°C	GW	E300.0, E310.1		14	Sulfate, Alkalinity
APPL	83906	Blood Orange	2017FCS-19	17FWAMW28-GWF	MW28	9/29/2017	1235	DW/GS/TL/IP	1	Poly	500mL	4°C; HNO3	GW	SW6010		14	K,Mn,P
APPL	83906	Blood Orange	2017FCS-19	17FWAMW28-GWF	MW28	9/29/2017	1235	DW/GS/TL/IP	1	Poly	500mL	4°C; H2SO4	GW	E353.2, E350.1		14	NO2/NO3, Ammonia
APPL	83906	Bluegrass Green	2017FCS-18	17FWAMW28-GWF	MW28	9/29/2017	1235	DW/GS/TL/IP	3	VOA	40mL	4°C, HCl	GW	RSK 175		14	Methane
APPL	83906	Silver Fox	2017FCS-17	17FWAMW32R-GWF	MW32R	9/29/2017	1408	DW/GS/TL/IP	2	Amber	1L	4°C; HCl	GW	AK102/103		14	DRO/RRO
APPL	83906	Bluegrass Green	2017FCS-18	17FWAMW32R-GWF	MW32R	9/29/2017	1408	DW/GS/TL/IP	6	VOA	40mL	4°C, HCl	GW	SW8260SIM		14	VOC-LL
APPL	83906	Blood Orange	2017FCS-19	17FWAMW32R-GWF	MW32R	9/29/2017	1408	DW/GS/TL/IP	1	Poly	500mL	4°C	GW	E300.0, E310.1		14	Sulfate, Alkalinity
APPL	83906	Blood Orange	2017FCS-19	17FWAMW32R-GWF	MW32R	9/29/2017	1408	DW/GS/TL/IP	1	Poly	500mL	4°C; HNO3	GW	SW6010		14	K,Mn,P
APPL	83906	Blood Orange	2017FCS-19	17FWAMW32R-GWF	MW32R	9/29/2017	1408	DW/GS/TL/IP	1	Poly	500mL	4°C; H2SO4	GW	E353.2, E350.1		14	NO2/NO3, Ammonia
APPL	83906	Bluegrass Green	2017FCS-18	17FWAMW32R-GWF	MW32R	9/29/2017	1408	DW/GS/TL/IP	3	VOA	40mL	4°C, HCl	GW	RSK 175		14	Methane
APPL	83906	Silver Fox	2017FCS-17	17FWAMW33-GWF	MW33	9/29/2017	1052	DW/GS/TL/IP	2	Amber	1L	4°C; HCl	GW	AK102/103		14	DRO/RRO
APPL	83906	Bluegrass Green	2017FCS-18	17FWAMW33-GWF	MW33	9/29/2017	1052	DW/GS/TL/IP	3	VOA	40mL	4°C; HCl	GW	SW8260		14	VOC-Mid
APPL	83906	Blood Orange	2017FCS-19	17FWAMW33-GWF	MW33	9/29/2017	1052	DW/GS/TL/IP	1	Poly	500mL	4°C	GW	E300.0, E310.1		14	Sulfate, Alkalinity
APPL	83906	Blood Orange	2017FCS-19	17FWAMW33-GWF	MW33	9/29/2017	1052	DW/GS/TL/IP	1	Poly	500mL	4°C; HNO3	GW	SW6010		14	K,Mn,P
APPL	83906	Blood Orange	2017FCS-19	17FWAMW33-GWF	MW33	9/29/2017	1052	DW/GS/TL/IP	1	Poly	500mL	4°C; H2SO4	GW	E353.2, E350.1		14	NO2/NO3, Ammonia
APPL	83906	Bluegrass Green	2017FCS-18	17FWAMW33-GWF	MW33	9/29/2017	1052	DW/GS/TL/IP	3	VOA	40mL	4°C, HCl	GW	RSK 175		14	Methane
APPL	83906	Silver Fox	2017FCS-17	17FWAMW77-GWF	MW77	9/29/2017	1353	DW/GS/TL/IP	2	Amber	1L	4°C; HCl	GW	AK102/103		14	DRO/RRO
APPL	83906	Bluegrass Green	2017FCS-18	17FWAMW77-GWF	MW77	9/29/2017	1353	DW/GS/TL/IP	1	Poly	500mL	4°C	GW	E300.0, E310.1		14	Sulfate, Alkalinity
APPL	83906	Bluegrass Green	2017FCS-18	17FWAMW77-GWF	MW77	9/29/2017	1353	DW/GS/TL/IP	1	Poly	500mL	4°C; HNO3	GW	SW6010		14	K,Mn,P
APPL	83906	Bluegrass Green	2017FCS-18	17FWAMW77-GWF	MW77	9/29/2017	1353	DW/GS/TL/IP	1	Poly	500mL	4°C; H2SO4	GW	E353.2, E350.1		14	NO2/NO3, Ammonia
APPL	83906	Bluegrass Green	2017FCS-18	17FWAMW77-GWF	MW77	9/29/2017	1353	DW/GS/TL/IP	3	VOA	40mL	4°C, HCl	GW	RSK 175		14	Methane
APPL	83906	Silver Fox	2017FCS-17	17FWAMW37-GWF	MW37	9/29/2017	1520	DW/GS/TL/IP	2	Amber	1L	4°C; HCl	GW	AK102/103		14	DRO/RRO
APPL	83906	Bluegrass Green	2017FCS-18	17FWAMW37-GWF	MW37	9/29/2017	1520	DW/GS/TL/IP	1	Poly	500mL	4°C	GW	E300.0, E310.1		14	Sulfate, Alkalinity
APPL	83906	Bluegrass Green	2017FCS-18	17FWAMW37-GWF	MW37	9/29/2017	1520	DW/GS/TL/IP	1	Poly	500mL	4°C; HNO3	GW	SW6010		14	K,Mn,P
APPL	83906	Bluegrass Green	2017FCS-18	17FWAMW37-GWF	MW37	9/29/2017	1520	DW/GS/TL/IP	1	Poly	500mL	4°C; H2SO4	GW	E353.2, E350.1		14	NO2/NO3, Ammonia
APPL	83906	Bluegrass Green	2017FCS-18	17FWAMW37-GWF	MW37	9/29/2017	1520	DW/GS/TL/IP	3	VOA	40mL	4°C, HCl	GW	RSK 175		14	Methane
APPL	83906	Bluegrass Green	2017FCS-18	17FWAMW58-GWF	MW58	9/29/2017	1046	DW/GS/TL/IP	2	Amber	1L	4°C; HCl	GW	AK102/103		14	DRO/RRO
APPL	83906	Bluegrass Green	2017FCS-18	17FWAMW58-GWF	MW58	9/29/2017	1046	DW/GS/TL/IP	1	Poly	500mL	4°C	GW	E300.0, E310.1		14	Sulfate, Alkalinity
APPL	83906	Bluegrass Green	2017FCS-18	17FWAMW58-GWF	MW58	9/29/2017	1046	DW/GS/TL/IP	1	Poly	500mL	4°C; HNO3	GW	SW6010		14	K,Mn,P
APPL	83906	Bluegrass Green	2017FCS-18	17FWAMW58-GWF	MW58	9/29/2017	1046	DW/GS/TL/IP	1	Poly	500mL	4°C; H2SO4	GW	E353.2, E350.1		14	NO2/NO3, Ammonia
APPL	83906	Bluegrass Green	2017FCS-18	17FWAMW58-GWF	MW58	9/29/2017	1046	DW/GS/TL/IP	3	VOA	40mL	4°C, HCl	GW	RSK 175		14	Methane
APPL	83906	Bluegrass Green	2017FCS-18	17FWAMW58Y-GWF	MW58	9/29/2017	1046	DW/GS/TL/IP	2	Amber	1L	4°C; HCl	GW	AK102/103	Dup	14	DRO/RRO
APPL	83906	Bluegrass Green	2017FCS-18	17FWAFCS-TB05	TB05	9/29/2017	0800	DW/GS/TL/IP	6	VOA	40mL	4°C, HCl	GW	SW8260SIM	TB	14	VOC-LL
APPL	83906	Bluegrass Green	2017FCS-18	17FWAFCS-TB06	TB06	9/29/2017	0800	DW/GS/TL/IP	3	VOA	40mL	4°C, HCl	GW	SW8260	TB	14	VOC-Mid

Notes:

For definitions, refer to the Acronyms and Abbreviations section of the DQA.

~~Strikethrough~~ = sample cancelled

2017 Former Communications Site Groundwater Monitoring Fort Wainwright, Alaska
Table B-1-2 Analytical Data - Spring

				Location ID:	**MW03**	**MW06A**	**MW08**	**MW12R**
				Sample ID:	**17FWAMW03-GWS**	**17FWAMW06A-GWS**	**17FWAMW08-GWS**	**17FWAMW12R-GWS**
				Lab SDG:	**83363**	**83391**	**83385/83391**	**83385**
				Matrix:	**W**	**W**	**W**	**W**
				Sample Date/Time:	**7/18/2017 1045**	**7/20/2017 1115**	**7/19/2017 1228**	**7/19/2017 1145**
				Laboratory:	**APPL**	**APPL**	**APPL**	**APPL**
				QA/QC:	**Primary**	**Primary**	**Primary**	**Primary**
Method	**CAS Number**	**Analyte**	**Units**	**Project Cleanup Levels[1]**				
AK102	-	**Diesel Range Organics**	mg/L	1.5	ND [0.04] JL-	**3.9 [0.2]**	-	0.17 [0.04] JL-
AK103	-	**Residual Range Organics**	mg/L	1.1	ND [0.11]	ND [0.55]	-	ND [0.11]
A2320B	-	Alkalinity as CaCO3	mg/L	-	252 [0.85]	278 [0.85]	284 [0.85]	179 [0.85]
E300.0	14808-79-8	Sulfate	mg/L	-	48 [0.18]	14.1 [0.09]	27.5 [0.09]	36.8 [0.09]
E350.1	7664-41-7	Nitrogen, Ammonia (as N)	mg/L	-	ND [0.12]	0.17 [0.12]	ND [0.12]	0.25 [0.12]
E353.2	14797-55-8	Nitrogen, Nitrate (as N)	mg/L	-	ND [0.028]	0.059 [0.028]	0.24 [0.028]	ND [0.028]
RSK175	74-82-8	Methane	ug/L	-	31 [0.25] JL+	930 [0.5]	0.97 [0.25] B	52 [0.25] JL+
SW6010C	7439-96-5	Manganese	ug/L	-	784 [1.23]	1370 [1.23]	ND [1.23]	935 [1.23]
SW6010C	7723-14-0	Phosphorus, Total (as P)	ug/L	-	139 [8.1]	141 [8.1]	ND [8.1]	107 [8.1]
SW6010C	7440-09-7	Potassium	ug/L	-	4240 [220]	4780 [220]	4280 [220]	3900 [220]
SW8260C	75-35-4	1,1-Dichloroethene	ug/L	7	-	-	-	ND [0.3]
SW8260C	96-18-4	**1,2,3-Trichloropropane**	ug/L	0.12	-	-	0.027 [0.0025] JS-	*ND [0.39] E*
SW8260C	156-59-2	cis-1,2-Dichloroethene	ug/L	70	-	-	-	ND [0.19]
SW8260C	127-18-4	Tetrachloroethene (PCE)	ug/L	5	-	-	-	ND [0.24]
SW8260C	156-60-5	trans-1,2-Dichloroethene	ug/L	100	-	-	-	ND [0.19]
SW8260C	79-01-6	Trichloroethene (TCE)	ug/L	5	-	-	-	ND [0.16]
SW8260C	75-01-4	Vinyl chloride	ug/L	2	-	-	ND [0.01] JS-	ND [0.23]

Notes:

[1] OU6 Record of Decision, Table 2 Project Cleanup Levels (USACE 2014).

Bold = Exceeds ROD cleanup level

[ ] = Limit of Detection (LOD)

For definitions and data qualifiers, refer to the Acronyms and Abbreviations and 1.1 sections of the DQA.

2017 Former Communications Site Groundwater Monitoring Fort Wainwright, Alaska

Table B-1-2 Analytical Data - Spring

				Location ID:	MW13	MW28	MW32R	MW33
				Sample ID:	17FWAMW13-GWS	17FWAMW28-GWS	17FWAMW32R-GWS	17FWAMW33-GWS
				Lab SDG:	83385/83391	83385	83385/83391	83385
				Matrix:	W	W	W	W
				Sample Date/Time:	7/19/2017 0940	7/19/2017 0953	7/19/2017 1638	7/19/2017 1435
				Laboratory:	APPL	APPL	APPL	APPL
				QA/QC:	Primary	Primary	Primary	Primary
Method	**CAS Number**	**Analyte**	**Units**	**Project Cleanup Levels[1]**				
AK102	-	**Diesel Range Organics**	mg/L	1.5	-	0.19 [0.04] JL-	0.14 [0.04] JL-	**35 [2] JL-**
AK103	-	**Residual Range Organics**	mg/L	1.1	-	ND [0.11]	ND [0.11]	**4 [0.55]**
A2320B	-	Alkalinity as CaCO3	mg/L	-	453 [0.85]	297 [0.85]	440 [0.85]	348 [0.85]
E300.0	14808-79-8	Sulfate	mg/L	-	56.1 [0.18]	62.4 [0.18]	47.5 [0.18]	3.8 [0.09]
E350.1	7664-41-7	Nitrogen, Ammonia (as N)	mg/L	-	ND [0.12]	ND [0.12]	ND [0.12]	0.48 [0.12]
E353.2	14797-55-8	Nitrogen, Nitrate (as N)	mg/L	-	0.043 [0.028]	0.92 [0.028]	3.5 [0.028]	0.18 [0.028]
RSK175	74-82-8	Methane	ug/L	-	9.5 [0.25]	24 [0.25] JL+	0.75 [0.25] B	1300 [0.5] JL+
SW6010C	7439-96-5	Manganese	ug/L	-	464 [1.23]	770 [1.23]	23.1 [1.23]	4600 [25]
SW6010C	7723-14-0	Phosphorus, Total (as P)	ug/L	-	ND [8.1]	ND [8.1]	ND [8.1]	431 [8.1]
SW6010C	7440-09-7	Potassium	ug/L	-	4570 [220]	5600 [220]	6140 [220]	5420 [220]
SW8260C	75-35-4	1,1-Dichloroethene	ug/L	7	-	-	-	ND [0.3]
SW8260C	96-18-4	**1,2,3-Trichloropropane**	ug/L	0.12	ND [0.0025] JS-	-	ND [0.0025] JS-	*ND [0.39] E*
SW8260C	156-59-2	cis-1,2-Dichloroethene	ug/L	70	-	-	-	ND [0.19]
SW8260C	127-18-4	Tetrachloroethene (PCE)	ug/L	5	-	-	-	ND [0.24]
SW8260C	156-60-5	trans-1,2-Dichloroethene	ug/L	100	-	-	-	ND [0.19]
SW8260C	79-01-6	Trichloroethene (TCE)	ug/L	5	-	-	-	ND [0.16]
SW8260C	75-01-4	Vinyl chloride	ug/L	2	ND [0.01] JS-	-	ND [0.01] JS-	ND [0.23]

Notes:

[1] OU6 Record of Decision, Table 2 Project Cleanup Levels (USACE 2014).

Bold = Exceeds ROD cleanup level

[ ] = Limit of Detection (LOD)

For definitions and data qualifiers, refer to the Acronyms and Abbreviations and 1.1 sections of the DQA.

2017 Former Communications Site Groundwater Monitoring Fort Wainwright, Alaska

Table B-1-2 Analytical Data - Spring

				Location ID:	**MW35**	**MW35**	**MW37**	**MW38**
				Sample ID:	**17FWAMW35-GWS**	**17FWAMW35X-GWS**	**17FWAMW37-GWS**	**17FWAMW38-GWS**
				Lab SDG:	**83391**	**83391**	**83391**	**83391**
				Matrix:	**W**	**W**	**W**	**W**
				Sample Date/Time:	**7/20/2017 0945**	**7/20/2017 0945**	**7/20/2017 1225**	**7/20/2017 1310**
				Laboratory:	**APPL**	**APPL**	**APPL**	**APPL**
				QA/QC:	**Primary**	**Field Duplicate**	**Primary**	**Primary**
Method	**CAS Number**	**Analyte**	**Units**	**Project Cleanup Levels[1]**				
AK102	-	**Diesel Range Organics**	mg/L	1.5	0.1 [0.04] JM-	0.082 [0.04]	0.49 [0.04]	0.088 [0.04]
AK103	-	**Residual Range Organics**	mg/L	1.1	ND [0.11]	ND [0.11]	ND [0.11]	ND [0.11]
A2320B	-	Alkalinity as CaCO3	mg/L	-	438 [0.85]	446 [0.85]	300 [0.85]	361 [0.85]
E300.0	14808-79-8	Sulfate	mg/L	-	47.9 [0.18]	48.3 [0.18]	31.8 [0.09]	48.4 [0.09]
E350.1	7664-41-7	Nitrogen, Ammonia (as N)	mg/L	-	ND [0.12]	ND [0.12]	ND [0.12]	0.16 [0.12]
E353.2	14797-55-8	Nitrogen, Nitrate (as N)	mg/L	-	3.9 [0.028]	3.6 [0.028]	2.8 [0.028]	0.13 [0.028]
RSK175	74-82-8	Methane	ug/L	-	1.1 [0.25] B	1.1 [0.25] B	34 [0.25]	30 [0.25]
SW6010C	7439-96-5	Manganese	ug/L	-	208 [1.23]	230 [1.23]	633 [1.23]	1230 [1.23]
SW6010C	7723-14-0	Phosphorus, Total (as P)	ug/L	-	ND [8.1]	ND [8.1]	ND [8.1]	ND [8.1]
SW6010C	7440-09-7	Potassium	ug/L	-	6940 [220]	6850 [220]	7380 [220]	6240 [220]
SW8260C	75-35-4	1,1-Dichloroethene	ug/L	7	-	-	-	-
SW8260C	96-18-4	**1,2,3-Trichloropropane**	ug/L	0.12	-	-	-	-
SW8260C	156-59-2	cis-1,2-Dichloroethene	ug/L	70	-	-	-	-
SW8260C	127-18-4	Tetrachloroethene (PCE)	ug/L	5	-	-	-	-
SW8260C	156-60-5	trans-1,2-Dichloroethene	ug/L	100	-	-	-	-
SW8260C	79-01-6	Trichloroethene (TCE)	ug/L	5	-	-	-	-
SW8260C	75-01-4	Vinyl chloride	ug/L	2	-	-	-	-

Notes:

[1] OU6 Record of Decision, Table 2 Project Cleanup Levels (USACE 2014).

Bold = Exceeds ROD cleanup level

[ ] = Limit of Detection (LOD)

For definitions and data qualifiers, refer to the Acronyms and Abbreviations and 1.1 sections of the DQA.

2017 Former Communications Site Groundwater Monitoring Fort Wainwright, Alaska
Table B-1-2 Analytical Data - Spring

				Location ID:	MW39	MW47	MW48	MW58
				Sample ID:	17FWAMW39-GWS	17FWAMW47-GWS	17FWAMW48-GWS	17FWAMW58-GWS
				Lab SDG:	83363	83363	83385	83391
				Matrix:	W	W	W	W
				Sample Date/Time:	7/18/2017 1138	7/18/2017 1710	7/19/2017 1717	7/20/2017 1410
				Laboratory:	APPL	APPL	APPL	APPL
				QA/QC:	Primary	Primary	Primary	Primary
Method	**CAS Number**	**Analyte**	**Units**	**Project Cleanup Levels[1]**				
AK102	-	**Diesel Range Organics**	mg/L	1.5	-	-	-	**1.9 [0.04]**
AK103	-	**Residual Range Organics**	mg/L	1.1	-	-	-	0.11 [0.11]
A2320B	-	Alkalinity as CaCO3	mg/L	-	240 [0.85]	255 [0.85]	335 [0.85]	238 [0.85]
E300.0	14808-79-8	Sulfate	mg/L	-	21.7 [0.09]	27.9 [0.09]	51 [0.18]	17.8 [0.09]
E350.1	7664-41-7	Nitrogen, Ammonia (as N)	mg/L	-	0.19 [0.12]	ND [0.12]	ND [0.12]	0.16 [0.12]
E353.2	14797-55-8	Nitrogen, Nitrate (as N)	mg/L	-	ND [0.028]	0.21 [0.028]	0.98 [0.028]	ND [0.028]
RSK175	74-82-8	Methane	ug/L	-	91 [0.25] JL+	23 [0.25] JL+	5.3 [0.25] JL+	550 [0.25]
SW6010C	7439-96-5	Manganese	ug/L	-	860 [1.23]	78.9 [1.23]	59.9 [1.23]	1230 [1.23]
SW6010C	7723-14-0	Phosphorus, Total (as P)	ug/L	-	141 [8.1]	ND [8.1]	ND [8.1]	39.4 [8.1]
SW6010C	7440-09-7	Potassium	ug/L	-	5120 [220]	4590 [220]	4990 [220]	4260 [220]
SW8260C	75-35-4	1,1-Dichloroethene	ug/L	7	-	-	-	-
SW8260C	96-18-4	**1,2,3-Trichloropropane**	ug/L	0.12	ND [0.0025] JS-	**0.19 [0.0025] JS-**	ND [0.0025] JS-	-
SW8260C	156-59-2	cis-1,2-Dichloroethene	ug/L	70	-	-	-	-
SW8260C	127-18-4	Tetrachloroethene (PCE)	ug/L	5	-	-	-	-
SW8260C	156-60-5	trans-1,2-Dichloroethene	ug/L	100	-	-	-	-
SW8260C	79-01-6	Trichloroethene (TCE)	ug/L	5	-	-	-	-
SW8260C	75-01-4	Vinyl chloride	ug/L	2	ND [0.01] JS-	ND [0.01] JS-	ND [0.01] JS-	-

Notes:

[1] OU6 Record of Decision, Table 2 Project Cleanup Levels (USACE 2014).

Bold = Exceeds ROD cleanup level

[ ] = Limit of Detection (LOD)

For definitions and data qualifiers, refer to the Acronyms and Abbreviations and 1.1 sections of the DQA.

2017 Former Communications Site Groundwater Monitoring Fort Wainwright, Alaska

Table B-1-2 Analytical Data - Spring

				Location ID:	**MW58**	**MW61**	**MW61**	**MW62**
				Sample ID:	**17FWAMW58Y-GWS**	**17FWAMW61-GWS**	**17FWAMW61X-GWS**	**17FWAMW62-GWS**
				Lab SDG:	**83391**	**83363**	**83385**	**83363**
				Matrix:	**W**	**W**	**W**	**W**
				Sample Date/Time:	**7/20/2017 1410**	**7/18/2017 1440**	**7/18/2017 1440**	**7/18/2017 1638**
				Laboratory:	**APPL**	**APPL**	**APPL**	**APPL**
				QA/QC:	**Field Duplicate**	**Primary**	**Field Duplicate**	**Primary**
Method	**CAS Number**	**Analyte**	**Units**	**Project Cleanup Levels[1]**				
AK102	-	**Diesel Range Organics**	mg/L	1.5	**2 [0.08]**	-	-	0.092 [0.04] JL-
AK103	-	**Residual Range Organics**	mg/L	1.1	ND [0.22]	-	-	ND [0.11]
A2320B	-	Alkalinity as CaCO3	mg/L	-	-	346 [0.85]	-	450 [0.85]
E300.0	14808-79-8	Sulfate	mg/L	-	-	46.8 [0.09] JM+	-	97.7 [0.45]
E350.1	7664-41-7	Nitrogen, Ammonia (as N)	mg/L	-	-	0.13 [0.12]	-	ND [0.12]
E353.2	14797-55-8	Nitrogen, Nitrate (as N)	mg/L	-	-	ND [0.028]	-	4.3 [0.028]
RSK175	74-82-8	Methane	ug/L	-	-	98 [0.25] JL+	-	61 [0.25] JL+
SW6010C	7439-96-5	Manganese	ug/L	-	-	1800 [1.23]	-	1830 [1.23]
SW6010C	7723-14-0	Phosphorus, Total (as P)	ug/L	-	-	33.7 [8.1]	-	ND [8.1]
SW6010C	7440-09-7	Potassium	ug/L	-	-	5290 [220]	-	7870 [220]
SW8260C	75-35-4	1,1-Dichloroethene	ug/L	7	-	ND [0.3]	-	-
SW8260C	96-18-4	**1,2,3-Trichloropropane**	ug/L	0.12	-	*ND [0.39] E*	ND [0.0025] JS-	-
SW8260C	156-59-2	cis-1,2-Dichloroethene	ug/L	70	-	6.6 [0.19]	-	-
SW8260C	127-18-4	Tetrachloroethene (PCE)	ug/L	5	-	ND [0.24] JDM	-	-
SW8260C	156-60-5	trans-1,2-Dichloroethene	ug/L	100	-	6.9 [0.19]	-	-
SW8260C	79-01-6	Trichloroethene (TCE)	ug/L	5	-	0.94 [0.16]	-	-
SW8260C	75-01-4	Vinyl chloride	ug/L	2	-	0.28 [0.23]	0.35 [0.01] JS-	-

Notes:

[1] OU6 Record of Decision, Table 2 Project Cleanup Levels (USACE 2014).

Bold = Exceeds ROD cleanup level

[ ] = Limit of Detection (LOD)

For definitions and data qualifiers, refer to the Acronyms and Abbreviations and 1.1 sections of the DQA.

2017 Former Communications Site Groundwater Monitoring Fort Wainwright, Alaska
Table B-1-2 Analytical Data - Spring

				Location ID:	MW62	MW64	MW77	MW78
				Sample ID:	17FWAMW62Y-GWS	17FWAMW64-GWS	17FWAMW77-GWS	17FWAMW78-GWS
				Lab SDG:	83363	83391	83391	83385
				Matrix:	W	W	W	W
				Sample Date/Time:	7/18/2017 1638	7/20/2017 0945	7/20/2017 1010	7/19/2017 1540
				Laboratory:	APPL	APPL	APPL	APPL
				QA/QC:	Field Duplicate	Primary	Primary	Primary
Method	**CAS Number**	**Analyte**	**Units**	**Project Cleanup Levels**[1]				
AK102	-	**Diesel Range Organics**	mg/L	1.5	-	ND [0.04]	0.28 [0.04]	-
AK103	-	**Residual Range Organics**	mg/L	1.1	-	ND [0.11]	ND [0.11]	-
A2320B	-	Alkalinity as CaCO3	mg/L	-	447 [0.85]	267 [0.85]	432 [0.85]	219 [0.85]
E300.0	14808-79-8	Sulfate	mg/L	-	96.9 [0.45]	13.8 [0.09]	72.4 [0.18]	26.7 [0.09]
E350.1	7664-41-7	Nitrogen, Ammonia (as N)	mg/L	-	ND [0.12]	ND [0.12]	ND [0.12]	0.93 [0.12]
E353.2	14797-55-8	Nitrogen, Nitrate (as N)	mg/L	-	4.4 [0.028]	ND [0.028]	14.6 [0.28]	ND [0.028]
RSK175	74-82-8	Methane	ug/L	-	51 [0.25] JL+	24 [0.25]	1.2 [0.25] B	29 [0.25] JL+
SW6010C	7439-96-5	Manganese	ug/L	-	1680 [1.23]	447 [1.23]	854 [1.23]	725 [1.23]
SW6010C	7723-14-0	Phosphorus, Total (as P)	ug/L	-	ND [8.1]	ND [8.1]	9.3 [8.1]	98.7 [8.1]
SW6010C	7440-09-7	Potassium	ug/L	-	7240 [220]	4390 [220]	8800 [220]	4780 [220]
SW8260C	75-35-4	1,1-Dichloroethene	ug/L	7	-	-	-	-
SW8260C	96-18-4	**1,2,3-Trichloropropane**	ug/L	0.12	-	-	-	ND [0.0025] JS-
SW8260C	156-59-2	cis-1,2-Dichloroethene	ug/L	70	-	-	-	-
SW8260C	127-18-4	Tetrachloroethene (PCE)	ug/L	5	-	-	-	-
SW8260C	156-60-5	trans-1,2-Dichloroethene	ug/L	100	-	-	-	-
SW8260C	79-01-6	Trichloroethene (TCE)	ug/L	5	-	-	-	-
SW8260C	75-01-4	Vinyl chloride	ug/L	2	-	-	-	ND [0.01] JS-

Notes:

[1] OU6 Record of Decision, Table 2 Project Cleanup Levels (USACE 2014).

Bold = Exceeds ROD cleanup level

[ ] = Limit of Detection (LOD)

For definitions and data qualifiers, refer to the Acronyms and Abbreviations and 1.1 sections of the DQA.

2017 Former Communications Site Groundwater Monitoring Fort Wainwright, Alaska
Table B-1-2 Analytical Data - Spring

				Location ID:	MW79	MW79	MW80	MW82
				Sample ID:	**17FWAMW79-GWS**	**17FWAMW79Z-GWS**	**17FWAMW80-GWS**	**17FWAMW82-GWS**
				Lab SDG:	**83385/83391**	**83385/83391**	**83363**	**83391**
				Matrix:	**W**	**W**	**W**	**W**
				Sample Date/Time:	**7/19/2017 1532**	**7/19/2017 1532**	**7/18/2017 1319**	**7/20/2017 1501**
				Laboratory:	**APPL**	**APPL**	**APPL**	**APPL**
				QA/QC:	**Primary**	**Field Duplicate**	**Primary**	**Primary**
Method	**CAS Number**	**Analyte**	**Units**	**Project Cleanup Levels[1]**				
AK102	-	**Diesel Range Organics**	mg/L	1.5	-	-	-	ND [0.04]
AK103	-	**Residual Range Organics**	mg/L	1.1	-	-	-	ND [0.11]
A2320B	-	Alkalinity as CaCO3	mg/L	-	382 [0.85]	382 [0.85]	153 [0.85]	527 [0.85]
E300.0	14808-79-8	Sulfate	mg/L	-	65.2 [0.18]	65.7 [0.18]	35.2 [0.09]	26.1 [0.09]
E350.1	7664-41-7	Nitrogen, Ammonia (as N)	mg/L	-	0.12 [0.12]	0.13 [0.12]	0.16 [0.12]	ND [0.12]
E353.2	14797-55-8	Nitrogen, Nitrate (as N)	mg/L	-	0.3 [0.028] JD	0.48 [0.028] JD	ND [0.028]	2.9 [0.028]
RSK175	74-82-8	Methane	ug/L	-	21 [0.25]	26 [0.25]	20 [0.25] JL+	6.1 [0.25]
SW6010C	7439-96-5	Manganese	ug/L	-	1340 [1.23]	1280 [1.23]	787 [1.23]	54.4 [1.23]
SW6010C	7723-14-0	Phosphorus, Total (as P)	ug/L	-	27.6 [8.1]	26.2 [8.1]	139 [8.1]	ND [8.1]
SW6010C	7440-09-7	Potassium	ug/L	-	5690 [220]	5450 [220]	3550 [220]	6290 [220]
SW8260C	75-35-4	1,1-Dichloroethene	ug/L	7	-	-	ND [0.3]	-
SW8260C	96-18-4	**1,2,3-Trichloropropane**	ug/L	0.12	**0.56 [0.0025] JS-**	**0.61 [0.0025] JS-**	*ND [0.39] E*	-
SW8260C	156-59-2	cis-1,2-Dichloroethene	ug/L	70	-	-	ND [0.19]	-
SW8260C	127-18-4	Tetrachloroethene (PCE)	ug/L	5	-	-	ND [0.24]	-
SW8260C	156-60-5	trans-1,2-Dichloroethene	ug/L	100	-	-	ND [0.19]	-
SW8260C	79-01-6	Trichloroethene (TCE)	ug/L	5	-	-	ND [0.16]	-
SW8260C	75-01-4	Vinyl chloride	ug/L	2	ND [0.01] JS-,JDM	ND [0.01] JS-	ND [0.23]	-

Notes:

[1] OU6 Record of Decision, Table 2 Project Cleanup Levels (USACE 2014).

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For definitions and data qualifiers, refer to the Acronyms and Abbreviations and 1.1 sections of the DQA.

2017 Former Communications Site Groundwater Monitoring Fort Wainwright, Alaska
Table B-1-2 Analytical Data - Spring

				Location ID:	MW91	MW93	TB01	TB01	TB02
				Sample ID:	17FWAMW91-GWS	17FWAMW93-GWS	17FWAFCS-TB01	17FWAFCS-TB01-LL	17FWAFCS-TB02
				Lab SDG:	83385	83385	83385	83385	83391
				Matrix:	W	W	W	W	W
				Sample Date/Time:	7/18/2017 1551	7/19/2017 1110	7/18/2017 0800	7/18/2017 0800	7/19/2017 0800
				Laboratory:	APPL	APPL	APPL	APPL	APPL
				QA/QC:	Primary	Primary	Trip Blank	Trip Blank	Trip Blank
Method	**CAS Number**	**Analyte**	**Units**	**Project Cleanup Levels[1]**					
AK102	-	**Diesel Range Organics**	mg/L	1.5	-	-	-	-	-
AK103	-	**Residual Range Organics**	mg/L	1.1	-	-	-	-	-
A2320B	-	Alkalinity as CaCO3	mg/L	-	-	-	-	-	-
E300.0	14808-79-8	Sulfate	mg/L	-	-	-	-	-	-
E350.1	7664-41-7	Nitrogen, Ammonia (as N)	mg/L	-	-	-	-	-	-
E353.2	14797-55-8	Nitrogen, Nitrate (as N)	mg/L	-	-	-	-	-	-
RSK175	74-82-8	Methane	ug/L	-	-	-	-	-	-
SW6010C	7439-96-5	Manganese	ug/L	-	-	-	-	-	-
SW6010C	7723-14-0	Phosphorus, Total (as P)	ug/L	-	-	-	-	-	-
SW6010C	7440-09-7	Potassium	ug/L	-	-	-	-	-	-
SW8260C	75-35-4	1,1-Dichloroethene	ug/L	7	-	-	ND [0.3]	-	-
SW8260C	96-18-4	**1,2,3-Trichloropropane**	ug/L	0.12	ND [0.0025] JS-	ND [0.0025] JS-	*ND [0.39] E*	ND [0.0025]JS-	ND [0.0025] JS-
SW8260C	156-59-2	cis-1,2-Dichloroethene	ug/L	70	-	-	ND [0.19]	-	-
SW8260C	127-18-4	Tetrachloroethene (PCE)	ug/L	5	-	-	ND [0.24]	-	-
SW8260C	156-60-5	trans-1,2-Dichloroethene	ug/L	100	-	-	ND [0.19]	-	-
SW8260C	79-01-6	Trichloroethene (TCE)	ug/L	5	-	-	ND [0.16]	-	-
SW8260C	75-01-4	Vinyl chloride	ug/L	2	ND [0.01] JS-	ND [0.01] JS-	ND [0.23]	ND [0.01] JS-	ND [0.01] JS-

Notes:

[1] OU6 Record of Decision, Table 2 Project Cleanup Levels (USACE 2014).

Bold = Exceeds ROD cleanup level

[ ] = Limit of Detection (LOD)

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2017 Former Communications Site Groundwater Monitoring Fort Wainwright, Alaska
Table B-1-3 Analytical Data - Fall

				Location ID:	MW03	MW06A	MW08	MW12R	MW13
				Sample ID:	17FWAMW03-GWF	17FWAMW06A-GWF	17FWAMW08-GWF	17FWAMW12R-GWF	17FWAMW13-GWF
				Lab SDG:	83893	83893	83893	83893	83893
				Matrix:	W	W	W	W	W
				Sample Date/Time:	9/28/2017 1052	9/28/2017 1446	9/28/2017 1618	9/28/2017 1440	9/27/2017 1334
				Laboratory:	APPL	APPL	APPL	APPL	APPL
				QA/QC:	Primary	Primary	Primary	Primary	Primary
Method	**CAS Number**	**Analyte**	**Units**	**Project Cleanup Levels[1]**					
AK102	-	**Diesel Range Organics**	mg/L	1.5	ND [0.04]	**5 [0.2]**	-	**1.6 [0.04]**	-
AK103	-	Residual Range Organics	mg/L	1.1	ND [0.11]	0.32 [0.11]	-	0.18 [0.11]	-
A2320B	-	Alkalinity as CaCO3	mg/L	-	249 [0.85]	294 [0.85]	298 [0.85]	197 [0.85]	342 [0.85]
E300.0	14808-79-8	Sulfate	mg/L	-	39.7 [0.45]	8.8 [0.45]	24.3 [0.45]	24.4 [0.45]	42.2 [0.45]
E350.1	7664-41-7	Nitrogen, Ammonia (as N)	mg/L	-	ND [0.12]	0.23 [0.12]	ND [0.12]	0.15 [0.12]	ND [0.12]
E353.2	14797-55-8	Nitrogen, Nitrate (as N)	mg/L	-	ND [0.028]	ND [0.028]	0.12 [0.028]	ND [0.028]	0.042 [0.028]
RSK175	74-82-8	Methane	ug/L	-	42 [0.25]	5900 [2.5]	ND [0.25]	710 [0.25]	50 [0.25]
SW6010C	7439-96-5	Manganese	ug/L	-	764 [1.23]	1240 [2.5]	2.8 [1.23]	953 [2.5]	296 [1.23]
SW6010C	7723-14-0	Phosphorus, Total (as P)	ug/L	-	117 [8.1]	159 [8.1]	ND [8.1]	56.3 [8.1]	ND [8.1]
SW6010C	7440-09-7	Potassium	ug/L	-	4460 [220]	4690 [220]	4840 [220]	4250 [220]	4120 [220]
SW8260C	75-35-4	1,1-Dichloroethene	ug/L	7	-	-	-	ND [0.3]	-
SW8260C	96-18-4	**1,2,3-Trichloropropane**	ug/L	0.12	-	-	0.031 [0.0025]	*ND [0.39] E*	ND [0.0025]
SW8260C	156-59-2	cis-1,2-Dichloroethene	ug/L	70	-	-	-	ND [0.19]	-
SW8260C	127-18-4	Tetrachloroethene (PCE)	ug/L	5	-	-	-	ND [0.24]	-
SW8260C	156-60-5	trans-1,2-Dichloroethene	ug/L	100	-	-	-	ND [0.19]	-
SW8260C	79-01-6	Trichloroethene (TCE)	ug/L	5	-	-	-	ND [0.16]	-
SW8260C	75-01-4	Vinyl chloride	ug/L	2	-	-	ND [0.01]	ND [0.23]	ND [0.01]

Notes:

[1] OU6 Record of Decision, Table 2 Project Cleanup Levels (USACE 2014).

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[ ] = Limit of Detection (LOD)

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2017 Former Communications Site Groundwater Monitoring Fort Wainwright, Alaska

Table B-1-3 Analytical Data - Fall

				Location ID:	MW28	MW32R	MW33	MW35	MW35
				Sample ID:	17FWAMW28-GWF	17FWAMW32R-GWF	17FWAMW33-GWF	17FWAMW35-GWF	17FWAMW35X-GWF
				Lab SDG:	83906	83906	83906	83906	83906
				Matrix:	W	W	W	W	W
				Sample Date/Time:	9/29/2017 1235	9/29/2017 1408	9/29/2017 1052	9/29/2017 1002	9/29/2017 1002
				Laboratory:	APPL	APPL	APPL	APPL	APPL
				QA/QC:	Primary	Primary	Primary	Primary	Field Duplicate
Method	**CAS Number**	**Analyte**	**Units**	**Project Cleanup Levels[1]**					
AK102	-	**Diesel Range Organics**	mg/L	1.5	0.57 [0.04]	0.6 [0.04]	**25 [2]**	0.18 [0.04]	0.15 [0.04] JM-
AK103	-	Residual Range Organics	mg/L	1.1	0.2 [0.11]	0.2 [0.11]	*ND [5.5] E*	0.14 [0.11]	0.14 [0.11]
A2320B	-	Alkalinity as CaCO3	mg/L	-	315 [0.85]	392 [0.85]	356 [0.85]	455 [0.85]	451 [0.85]
E300.0	14808-79-8	Sulfate	mg/L	-	55.5 [0.45]	45.1 [0.45]	5.4 [0.45]	34.3 [0.45]	35 [0.45]
E350.1	7664-41-7	Nitrogen, Ammonia (as N)	mg/L	-	ND [0.12]	ND [0.12]	0.36 [0.12]	ND [0.12]	ND [0.12]
E353.2	14797-55-8	Nitrogen, Nitrate (as N)	mg/L	-	2.4 [0.028]	4.6 [0.028]	ND [0.028]	3.8 [0.028]	4.1 [0.028]
RSK175	74-82-8	Methane	ug/L	-	4.3 [0.25]	0.49 [0.25]	510 [0.25]	ND [0.25]	ND [0.25]
SW6010C	7439-96-5	Manganese	ug/L	-	681 [1.23]	16.1 [1.23]	3680 [6.2]	176 [1.23]	184 [1.23]
SW6010C	7723-14-0	Phosphorus, Total (as P)	ug/L	-	ND [8.1]	72.1 [8.1]	527 [8.1]	22.4 [8.1] JD	16.3 [8.1] JD
SW6010C	7440-09-7	Potassium	ug/L	-	5450 [220]	5940 [220]	5260 [220]	6610 [220]	6730 [220]
SW8260C	75-35-4	1,1-Dichloroethene	ug/L	7	-	-	ND [0.3]	-	-
SW8260C	96-18-4	**1,2,3-Trichloropropane**	ug/L	0.12	-	ND [0.0025]	*ND [0.39] E*	-	-
SW8260C	156-59-2	cis-1,2-Dichloroethene	ug/L	70	-	-	ND [0.19]	-	-
SW8260C	127-18-4	Tetrachloroethene (PCE)	ug/L	5	-	-	ND [0.24]	-	-
SW8260C	156-60-5	trans-1,2-Dichloroethene	ug/L	100	-	-	ND [0.19]	-	-
SW8260C	79-01-6	Trichloroethene (TCE)	ug/L	5	-	-	ND [0.16]	-	-
SW8260C	75-01-4	Vinyl chloride	ug/L	2	-	ND [0.01]	ND [0.23]	-	-

Notes:

[1] OU6 Record of Decision, Table 2 Project Cleanup Levels (USACE 2014).

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2017 Former Communications Site Groundwater Monitoring Fort Wainwright, Alaska
Table B-1-3 Analytical Data - Fall

				Location ID:	MW37	MW38	MW39	MW47	MW48
				Sample ID:	17FWAMW37-GWF	17FWAMW38-GWF	17FWAMW39-GWF	17FWAMW47-GWF	17FWAMW48-GWF
				Lab SDG:	83906	83893	83893	83893	83893
				Matrix:	W	W	W	W	W
				Sample Date/Time:	9/29/2017 1520	9/28/2017 1626	9/27/2017 1558	9/28/2017 1037	9/28/2017 1235
				Laboratory:	APPL	APPL	APPL	APPL	APPL
				QA/QC:	Primary	Primary	Primary	Primary	Primary
Method	**CAS Number**	**Analyte**	**Units**	**Project Cleanup Levels[1]**					
AK102	-	**Diesel Range Organics**	mg/L	1.5	0.45 [0.04]	ND [0.04]	-	-	-
AK103	-	Residual Range Organics	mg/L	1.1	0.2 [0.11]	ND [0.11]	-	-	-
A2320B	-	Alkalinity as CaCO3	mg/L	-	295 [0.85]	356 [0.85]	234 [0.85]	276 [0.85]	274 [0.85]
E300.0	14808-79-8	Sulfate	mg/L	-	29.2 [0.45]	37.9 [0.45]	21.6 [0.45]	28.3 [0.45]	37.4 [0.45]
E350.1	7664-41-7	Nitrogen, Ammonia (as N)	mg/L	-	ND [0.12]	0.12 [0.12]	0.41 [0.12]	ND [0.12]	ND [0.12]
E353.2	14797-55-8	Nitrogen, Nitrate (as N)	mg/L	-	3.8 [0.028]	0.11 [0.028]	ND [0.028]	1.2 [0.028]	0.42 [0.028]
RSK175	74-82-8	Methane	ug/L	-	ND [0.25]	24 [0.25]	120 [0.25]	12 [0.25]	11 [0.25]
SW6010C	7439-96-5	Manganese	ug/L	-	658 [1.23]	1120 [2.5]	720 [1.23]	102 [1.23]	68.1 [1.23]
SW6010C	7723-14-0	Phosphorus, Total (as P)	ug/L	-	40.9 [8.1]	ND [8.1]	184 [8.1]	ND [8.1]	15 [8.1]
SW6010C	7440-09-7	Potassium	ug/L	-	6070 [220]	6050 [220]	4500 [220]	4750 [220]	4790 [220]
SW8260C	75-35-4	1,1-Dichloroethene	ug/L	7	-	-	-	-	-
SW8260C	96-18-4	**1,2,3-Trichloropropane**	ug/L	0.12	-	-	0.0065 [0.0025]	**0.3 [0.0025]**	ND [0.0025]
SW8260C	156-59-2	cis-1,2-Dichloroethene	ug/L	70	-	-	-	-	-
SW8260C	127-18-4	Tetrachloroethene (PCE)	ug/L	5	-	-	-	-	-
SW8260C	156-60-5	trans-1,2-Dichloroethene	ug/L	100	-	-	-	-	-
SW8260C	79-01-6	Trichloroethene (TCE)	ug/L	5	-	-	-	-	-
SW8260C	75-01-4	Vinyl chloride	ug/L	2	-	-	ND [0.01]	ND [0.01]	ND [0.01]

Notes:

[1] OU6 Record of Decision, Table 2 Project Cleanup Levels (USACE 2014).

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[ ] = Limit of Detection (LOD)

For definitions and data qualifiers, refer to the Acronyms and Abbreviations and 1.1 sections of the DQA.

2017 Former Communications Site Groundwater Monitoring Fort Wainwright, Alaska
Table B-1-3 Analytical Data - Fall

				Location ID:	MW58	MW58	MW61	MW61	MW62
				Sample ID:	17FWAMW58-GWF	17FWAMW58Y-GWF	17FWAMW61-GWF	17FWAMW61Z-GWF	17FWAMW62-GWF
				Lab SDG:	83906	83906	83893	83893	83893
				Matrix:	W	W	W	W	W
				Sample Date/Time:	9/29/2017 1046	9/29/2017 1046	9/28/2017 1237	9/28/2017 1237	9/27/2017 1525
				Laboratory:	APPL	APPL	APPL	APPL	APPL
				QA/QC:	Primary	Field Duplicate	Primary	Field Duplicate	Primary
Method	**CAS Number**	**Analyte**	**Units**	**Project Cleanup Levels[1]**					
AK102	-	**Diesel Range Organics**	mg/L	1.5	**2 [0.04]**	**2.1 [0.08]**	-	-	ND [0.04] JL-
AK103	-	Residual Range Organics	mg/L	1.1	0.26 [0.11]	0.24 [0.22]	-	-	ND [0.11]
A2320B	-	Alkalinity as CaCO3	mg/L	-	252 [0.85]	-	274 [0.85]	274 [0.85]	266 [0.85]
E300.0	14808-79-8	Sulfate	mg/L	-	16.2 [0.45]	-	38.4 [0.45]	38.6 [0.45]	14.7 [0.45]
E350.1	7664-41-7	Nitrogen, Ammonia (as N)	mg/L	-	ND [0.12]	-	ND [0.12]	ND [0.12]	ND [0.12]
E353.2	14797-55-8	Nitrogen, Nitrate (as N)	mg/L	-	0.18 [0.028]	-	ND [0.028]	ND [0.028]	0.061 [0.028]
RSK175	74-82-8	Methane	ug/L	-	280 [0.25]	-	70 [0.25] JM-, JDM	84 [0.25]	ND [0.25]
SW6010C	7439-96-5	Manganese	ug/L	-	1140 [2.5]	-	1390 [2.5]	1320 [2.5]	307 [1.23]
SW6010C	7723-14-0	Phosphorus, Total (as P)	ug/L	-	96.5 [8.1]	-	49.1 [8.1] JD	27 [8.1] JD	18.7 [8.1]
SW6010C	7440-09-7	Potassium	ug/L	-	4320 [220]	-	5120 [220]	5300 [220]	4460 [220]
SW8260C	75-35-4	1,1-Dichloroethene	ug/L	7	-	-	ND [0.3]	ND [0.3]	-
SW8260C	96-18-4	**1,2,3-Trichloropropane**	ug/L	0.12	-	-	*ND [0.39] E*	*ND [0.39] E*	-
SW8260C	156-59-2	cis-1,2-Dichloroethene	ug/L	70	-	-	7.2 [0.19]	7.1 [0.19]	-
SW8260C	127-18-4	Tetrachloroethene (PCE)	ug/L	5	-	-	ND [0.24]	ND [0.24]	-
SW8260C	156-60-5	trans-1,2-Dichloroethene	ug/L	100	-	-	6.6 [0.19]	6.6 [0.19]	-
SW8260C	79-01-6	Trichloroethene (TCE)	ug/L	5	-	-	1.2 [0.16]	1.1 [0.16]	-
SW8260C	75-01-4	Vinyl chloride	ug/L	2	-	-	ND [0.23]	ND [0.23]	-

Notes:

[1] OU6 Record of Decision, Table 2 Project Cleanup Levels (USACE 2014).

Bold = Exceeds ROD cleanup level

[ ] = Limit of Detection (LOD)

For definitions and data qualifiers, refer to the Acronyms and Abbreviations and 1.1 sections of the DQA.

2017 Former Communications Site Groundwater Monitoring Fort Wainwright, Alaska
Table B-1-3 Analytical Data - Fall

				Location ID:	MW62	MW64	MW77	MW78	MW79
				Sample ID:	17FWAMW62Y-GWF	17FWAMW64-GWF	17FWAMW77-GWF	17FWAMW78-GWF	17FWAMW79-GWF
				Lab SDG:	83893	83893	83906	83893	83893
				Matrix:	W	W	W	W	W
				Sample Date/Time:	9/27/2017 1525	9/28/2017 1251	9/29/2017 1353	9/27/2017 1544	9/28/2017 1028
				Laboratory:	APPL	APPL	APPL	APPL	APPL
				QA/QC:	Field Duplicate	Primary	Primary	Primary	Primary
Method	**CAS Number**	**Analyte**	**Units**	**Project Cleanup Levels[1]**					
AK102	-	**Diesel Range Organics**	mg/L	1.5	0.64 [0.04]	0.18 [0.04]	-	-	-
AK103	-	Residual Range Organics	mg/L	1.1	0.24 [0.11]	0.18 [0.11]	-	-	-
A2320B	-	Alkalinity as CaCO3	mg/L	-	476 [0.85]	594 [0.85]	592 [0.85]	214 [0.85]	341 [0.85]
E300.0	14808-79-8	Sulfate	mg/L	-	64 [0.45]	40.9 [0.45]	40 [0.45]	22.6 [0.45]	38.7 [0.45]
E350.1	7664-41-7	Nitrogen, Ammonia (as N)	mg/L	-	ND [0.12]	0.23 [0.12] JD	ND [0.12] JD	ND [0.12]	0.13 [0.12]
E353.2	14797-55-8	Nitrogen, Nitrate (as N)	mg/L	-	12.2 [0.28]	12.5 [0.28]	13.3 [0.28]	ND [0.028]	0.18 [0.028]
RSK175	74-82-8	Methane	ug/L	-	ND [0.25]	ND [0.25]	ND [0.25]	39 [0.25]	38 [0.25]
SW6010C	7439-96-5	Manganese	ug/L	-	792 [1.23]	1340 [1.23]	1280 [1.23]	645 [1.23]	906 [1.23]
SW6010C	7723-14-0	Phosphorus, Total (as P)	ug/L	-	33.8 [8.1]	55.7 [8.1] JD	40.6 [8.1] JD	151 [8.1]	70.9 [8.1]
SW6010C	7440-09-7	Potassium	ug/L	-	8480 [220]	9580 [220]	9400 [220]	4400 [220]	5390 [220]
SW8260C	75-35-4	1,1-Dichloroethene	ug/L	7	-	-	-	-	-
SW8260C	96-18-4	**1,2,3-Trichloropropane**	ug/L	0.12	-	-	-	0.0062 [0.0025]	**1.2 [0.0025]**
SW8260C	156-59-2	cis-1,2-Dichloroethene	ug/L	70	-	-	-	-	-
SW8260C	127-18-4	Tetrachloroethene (PCE)	ug/L	5	-	-	-	-	-
SW8260C	156-60-5	trans-1,2-Dichloroethene	ug/L	100	-	-	-	-	-
SW8260C	79-01-6	Trichloroethene (TCE)	ug/L	5	-	-	-	-	-
SW8260C	75-01-4	Vinyl chloride	ug/L	2	-	-	-	ND [0.01]	ND [0.01]

Notes:

[1] OU6 Record of Decision, Table 2 Project Cleanup Levels (USACE 2014).

Bold = Exceeds ROD cleanup level

[ ] = Limit of Detection (LOD)

For definitions and data qualifiers, refer to the Acronyms and Abbreviations and 1.1 sections of the DQA.

2017 Former Communications Site Groundwater Monitoring Fort Wainwright, Alaska
Table B-1-3 Analytical Data - Fall

				Location ID:	**MW79**	**MW80**	**MW82**	**MW91**	**MW93**
				Sample ID:	**17FWAMW79Y-GWF**	**17FWAMW80-GWF**	**17FWAMW82-GWF**	**17FWAMW91-GWF**	**17FWAMW93-GWF**
				Lab SDG:	**83893**	**83893**	**83906**	**83893**	**83906**
				Matrix:	**W**	**W**	**W**	**W**	**W**
				Sample Date/Time:	**9/28/2017 1028**	**9/28/2017 1354**	**9/29/2017 1354**	**9/28/2017 1544**	**9/29/2017 1229**
				Laboratory:	**APPL**	**APPL**	**APPL**	**APPL**	**APPL**
				QA/QC:	**Field Duplicate**	**Primary**	**Primary**	**Primary**	**Primary**
Method	**CAS Number**	**Analyte**	**Units**	**Project Cleanup Levels[1]**					
AK102	-	**Diesel Range Organics**	mg/L	1.5	-	-	0.15 [0.04]	-	-
AK103	-	Residual Range Organics	mg/L	1.1	-	-	0.16 [0.11]	-	-
A2320B	-	Alkalinity as CaCO3	mg/L	-	340 [0.85]	154 [0.85]	519 [0.85]	-	-
E300.0	14808-79-8	Sulfate	mg/L	-	38.6 [0.45]	30.6 [0.45]	27.2 [0.45]	-	-
E350.1	7664-41-7	Nitrogen, Ammonia (as N)	mg/L	-	ND [0.12]	ND [0.12]	ND [0.12]	-	-
E353.2	14797-55-8	Nitrogen, Nitrate (as N)	mg/L	-	0.21 [0.028]	ND [0.028]	3.2 [0.028]	-	-
RSK175	74-82-8	Methane	ug/L	-	33 [0.25]	31 [0.25]	ND [0.25]	-	-
SW6010C	7439-96-5	Manganese	ug/L	-	815 [1.23]	769 [1.23]	50.8 [1.23]	-	-
SW6010C	7723-14-0	Phosphorus, Total (as P)	ug/L	-	59.1 [8.1]	107 [8.1]	46.5 [8.1]	-	-
SW6010C	7440-09-7	Potassium	ug/L	-	4890 [220]	3590 [220]	6240 [220]	-	-
SW8260C	75-35-4	1,1-Dichloroethene	ug/L	7	-	ND [0.3]	-	-	-
SW8260C	96-18-4	**1,2,3-Trichloropropane**	ug/L	0.12	**1 [0.005]**	*ND [0.39] E*	-	ND [0.0025]	ND [0.0025]
SW8260C	156-59-2	cis-1,2-Dichloroethene	ug/L	70	-	ND [0.19]	-	-	-
SW8260C	127-18-4	Tetrachloroethene (PCE)	ug/L	5	-	ND [0.24]	-	-	-
SW8260C	156-60-5	trans-1,2-Dichloroethene	ug/L	100	-	ND [0.19]	-	-	-
SW8260C	79-01-6	Trichloroethene (TCE)	ug/L	5	-	ND [0.16]	-	-	-
SW8260C	75-01-4	Vinyl chloride	ug/L	2	ND [0.02]	ND [0.23]	-	ND [0.01]	ND [0.01]

Notes:

[1] OU6 Record of Decision, Table 2 Project Cleanup Levels (USACE 2014).

Bold = Exceeds ROD cleanup level

[ ] = Limit of Detection (LOD)

For definitions and data qualifiers, refer to the Acronyms and Abbreviations and 1.1 sections of the DQA.

2017 Former Communications Site Groundwater Monitoring Fort Wainwright, Alaska
Table B-1-3 Analytical Data - Fall

				Location ID:	**TB03**	**TB04**	**TB05**	**TB06**
				Sample ID:	**17FWAFCS-TB03**	**17FWAFCS-TB04**	**17FWAFCS-TB05**	**17FWAFCS-TB06**
				Lab SDG:	**83893**	**83893**	**83906**	**83906**
				Matrix:	**W**	**W**	**W**	**W**
				Sample Date/Time:	**9/27/2017 0800**	**9/28/2017 0800**	**9/29/2017 0800**	**9/29/2017 0800**
				Laboratory:	**APPL**	**APPL**	**APPL**	**APPL**
				QA/QC:	**Trip Blank**	**Trip Blank**	**Trip Blank**	**Trip Blank**
Method	**CAS Number**	**Analyte**	**Units**	**Project Cleanup Levels[1]**				
AK102	-	**Diesel Range Organics**	mg/L	1.5	-	-	-	-
AK103	-	Residual Range Organics	mg/L	1.1	-	-	-	-
A2320B	-	Alkalinity as CaCO3	mg/L	-	-	-	-	-
E300.0	14808-79-8	Sulfate	mg/L	-	-	-	-	-
E350.1	7664-41-7	Nitrogen, Ammonia (as N)	mg/L	-	-	-	-	-
E353.2	14797-55-8	Nitrogen, Nitrate (as N)	mg/L	-	-	-	-	-
RSK175	74-82-8	Methane	ug/L	-	-	-	-	-
SW6010C	7439-96-5	Manganese	ug/L	-	-	-	-	-
SW6010C	7723-14-0	Phosphorus, Total (as P)	ug/L	-	-	-	-	-
SW6010C	7440-09-7	Potassium	ug/L	-	-	-	-	-
SW8260C	75-35-4	1,1-Dichloroethene	ug/L	7	-	ND [0.3]	-	ND [0.3]
SW8260C	96-18-4	**1,2,3-Trichloropropane**	ug/L	0.12	ND [0.0025]	*ND [0.39] E*	ND [0.0025]	*ND [0.39] E*
SW8260C	156-59-2	cis-1,2-Dichloroethene	ug/L	70	-	ND [0.19]	-	ND [0.19]
SW8260C	127-18-4	Tetrachloroethene (PCE)	ug/L	5	-	ND [0.24]	-	ND [0.24]
SW8260C	156-60-5	trans-1,2-Dichloroethene	ug/L	100	-	ND [0.19]	-	ND [0.19]
SW8260C	79-01-6	Trichloroethene (TCE)	ug/L	5	-	ND [0.16]	-	ND [0.16]
SW8260C	75-01-4	Vinyl chloride	ug/L	2	ND [0.01]	ND [0.23]	ND [0.01]	ND [0.23]

Notes:

[1] OU6 Record of Decision, Table 2 Project Cleanup Levels (USACE 2014).

Bold = Exceeds ROD cleanup level

[ ] = Limit of Detection (LOD)

For definitions and data qualifiers, refer to the Acronyms and Abbreviations and 1.1 sections of the DQA.

ATTACHMENT B-2
Qualified Data Tables

2017 Former Communications Site Groundwater Monitoring Fort Wainwright, Alaska

Table B-2-1 - Samples Affected by Method Blank Contamination

Sample ID	Laboratory Sample ID	Laboratory SDG	Method	Analyte	Result	LOD	LOQ	Units	Qualifier
Method Blank	LB-R170728BW	QC83391	RSK175	Methane	0.25	0.25	5	ug/L	-
17FWAMW08-GWS	AZ58667	83391	RSK175	Methane	0.97	0.25	5	ug/L	J,B
17FWAMW32R-GWS	AZ58669	83391	RSK175	Methane	0.75	0.25	5	ug/L	J,B
17FWAMW35-GWS	AZ58673	83391	RSK175	Methane	1.1	0.25	5	ug/L	J,B
17FWAMW35X-GWS	AZ58674	83391	RSK175	Methane	1.1	0.25	5	ug/L	J,B
17FWAMW77-GWS	AZ58675	83391	RSK175	Methane	1.2	0.25	5	ug/L	J,B

Note:

For definitions and data qualifiers, refer to the Acronyms and Abbreviations and 1.1 sections of the DQA.

2017 Former Communications Site Groundwater Monitoring Fort Wainwright, Alaska
Table B-2-2 - Samples Affected by Laboratory Control Spike Outliers

Sample ID	Laboratory Sample ID	Laboratory SDG	Laboratory Batch Number	Method	Analyte	Result	LCS percent Recovery	DoD QSM LCL	DoD QSM UCL	Laboratory LCL	Laboratory UCL	Units	Qualifier
LCSD	BD-R170728AW	QC83363	221038	RSK175	Methane	113	135.4916	73	125	73	125	ug/L	-
17FWAMW03-GWS	AZ58539	83363	221038	RSK175	Methane	31	-	-	-	-	-	ug/L	JL+
17FWAMW39-GWS	AZ58543	83363	221038	RSK175	Methane	91	-	-	-	-	-	ug/L	JL+
17FWAMW47-GWS	AZ58544	83363	221038	RSK175	Methane	23	-	-	-	-	-	ug/L	JL+
17FWAMW61-GWS	AZ58542	83363	221038	RSK175	Methane	98	-	-	-	-	-	ug/L	JL+
17FWAMW62-GWS	AZ58540	83363	221038	RSK175	Methane	61	-	-	-	-	-	ug/L	JL+
17FWAMW62Y-GWS	AZ58541	83363	221038	RSK175	Methane	51	-	-	-	-	-	ug/L	JL+
17FWAMW80-GWS	AZ58545	83363	221038	RSK175	Methane	20	-	-	-	-	-	ug/L	JL+
LCS	BD-R170728AW	QC83385	221038	RSK175	Methane	113	135.4916	72	125	72	125	ug/L	-
17FWAMW12R-GWS	AZ58615	83385	221038	RSK175	Methane	52	-	-	-	-	-	ug/L	JL+
17FWAMW28-GWS	AZ58616	83385	221038	RSK175	Methane	24	-	-	-	-	-	ug/L	JL+
17FWAMW33-GWS	AZ58617	83385	221038	RSK175	Methane	1300	-	-	-	-	-	ug/L	JL+
17FWAMW48-GWS	AZ58618	83385	221038	RSK175	Methane	5.3	-	-	-	-	-	ug/L	JL+
17FWAMW78-GWS	AZ58619	83385	221038	RSK175	Methane	29	-	-	-	-	-	ug/L	JL+
LCS	BS-A170726A1	QC83363	221098	AK102	DRO	0.698	69.8	-	-	75	125	mg/L	-
LCSD	BD-A170726A1	QC83363	221098	AK102	DRO	0.604	60.4	-	-	75	125	mg/L	-
17FWAMW03-GWS	AZ58539	83363	221098	AK102	DRO	ND	-	-	-	-	-	mg/L	JL-
17FWAMW62-GWS	AZ58540	83363	221098	AK102	DRO	0.092	-	-	-	-	-	mg/L	J,JL-
LCS	BS-A170726A1	QC83385	221098	AK102	DRO	0.698	69.8	-	-	75	125	mg/L	-
LCSD	BD-A170726A1	QC83385	221098	AK102	DRO	0.604	60.4	-	-	75	125	mg/L	-
17FWAMW12R-GWS	AZ58615	83385	221098	AK102	DRO	0.17	-	-	-	-	-	mg/L	JL-
17FWAMW28-GWS	AZ58616	83385	221098	AK102	DRO	0.19	-	-	-	-	-	mg/L	JL-
17FWAMW32R-GWS	AZ58624	83385	221098	AK102	DRO	0.14	-	-	-	-	-	mg/L	JL-
17FWAMW33-GWS	AZ58617	83385	221098	AK102	DRO	35	-	-	-	-	-	mg/L	JL-
LCS	BS-A171004A1	QC83893	222846	AK102	DRO	0.544	54.4	-	-	75	125	mg/L	-
LCSD	BD-A171004A1	QC83893	222846	AK102	DRO	0.627	62.7	-	-	75	125	mg/L	-
17FWAMW64-GWF	AZ61896	83893	222846	AK102	DRO	ND	-	-	-	-	-	mg/L	JL-

Note:

For definitions and data qualifiers, refer to the Acronyms and Abbreviations and 1.1 sections of the DQA.

2017 Former Communications Site Groundwater Monitoring Fort Wainwright, Alaska
Table B-2-3 - Samples Affected by Matrix Spike Outliers

Sample ID	Laboratory Sample ID	Laboratory SDG	Laboratory Batch Number	Method	Analyte	Result	MS/MSD percent Recovery	DoD QSM LCL	DoD QSM UCL	Laboratory LCL	Laboratory UCL	Unit	Qualifiers
MS	AZ58673MS	QC83391	221140	AK102	DRO	0.811	71.1	-	-	75	125	mg/L	-
MSD	AZ58673MSD	QC83391	221140	AK102	DRO	0.681	58.1	-	-	75	125	mg/L	-
17FWAMW35-GWS	AZ58673	83391	221140	AK102	DRO	0.1	-	-	-	-	-	mg/L	JM-
MS	AZ62051MS	QC83906	222984	AK102	DRO	0.689	50.9	-	-	75	125	mg/L	-
MSD	AZ62051MSD	QC83906	222984	AK102	DRO	0.658	47.8	-	-	75	125	mg/L	-
17FWAMW35-GWF	AZ62051	83906	222984	AK102	DRO	0.18	-	-	-	-	-	mg/L	JM-
MS	AZ58542MS	QC83363	221038	E300.0	Sulfate	73.6	134	-	-	87	112	MG/L	-
MSD	AZ58542MSD	QC83363	221038	E300.0	Sulfate	73.4	133	-	-	87	112	MG/L	-
17FWAMW61-GWS	AZ58542	83363	221038	E300.0	Sulfate	46.8	-	-	-	-	-	MG/L	JM+
MS	AZ61891MS	QC83893	222688	RSK175	Methane	109	47	-	-	72	125	UG/L	-
17FWAMW61-GWF	AZ61891	83893	222688	RSK175	Methane	70	-	-	-	-	-	UG/L	JM-, JDM

Note:

For definitions and data qualifiers, refer to the Acronyms and Abbreviations and 1.1 sections of the DQA.

2017 Former Communications Site Groundwater Monitoring Fort Wainwright, Alaska
Table B-2-4 - Matrix Spike and Matrix Spike Duplicates that Exceed RPD Criteria

Sample ID	Laboratory Sample ID	Laboratory SDG	Method	Analyte	Sample Result	MS Result	MSD Result	Unit	Dilution Factor	Qualifier	RPD Limit (%)	RPD (%)
17FWAMW79-GWS	AZ58670	83391	SW8260SIM	Vinyl chloride	ND	0.305	0.204	ug/L	1	JDM	20	40
17FWAMW61-GWF	AZ61891	83893	RSK175	Methane	70	109	173	ug/L	1	JDM	20	45
17FWAMW61-GWS	AZ58542	83363	SW8260C	Tetrachloroethene (PCE)	ND	16	12.2	ug/L	1	JDM	20	27

Note:

For definitions and data qualifiers, refer to the Acronyms and Abbreviations and 1.1 sections of the DQA.

2017 Former Communications Site Groundwater Monitoring Fort Wainwright, Alaska
Table B-2-5 - Field Duplicates that Exceed RPD Criteria

Sample ID	Laboratory Sample ID	Laboratory SDG	QC Type	Method	Analyte	Result	LOD	LOQ	Unit	Dilution Factor	Qualifier	RPD (%)
17FWAMW62-GWF	AZ61886	83893	Primary	E350.1	Nitrogen, Ammonia (as N)	0.23	0.12	0.5	mg/L	1	J,JD	63
17FWAMW62Y-GWF	AZ61887		Field Duplicate			ND	0.12	0.5		1	JD	
17FWAMW79-GWS	AZ58625	83385	Primary	E353.2	Nitrogen, Nitrate (as N)	0.3	0.028	0.1	mg/L	1	JD	46
17FWAMW79Z-GWS	AZ58626		Field Duplicate			0.48	0.028	0.1		1	JD	
17FWAMW35-GWF	AZ62051	83906	Primary	SW6010C	Phosphorus, Total (as P)	22.4	8.1	50	ug/L	1	J,JD	32
17FWAMW35X-GWF	AZ62052		Field Duplicate			16.3	8.1	50		1	J,JD	
17FWAMW61-GWF	AZ61891	83893	Primary	SW6010C	Phosphorus, Total (as P)	49.1	8.1	50	ug/L	1	J,JD	58
17FWAMW61Z-GWF	AZ61892		Field Duplicate			27	8.1	50		1	J,JD	
17FWAMW62-GWF	AZ61886	83893	Primary	SW6010C	Phosphorus, Total (as P)	55.7	8.1	50	ug/L	1	JD	31
17FWAMW62Y-GWF	AZ61887		Field Duplicate			40.6	8.1	50		1	J,JD	

Note:

For definitions and data qualifiers, refer to the Acronyms and Abbreviations and 1.1 sections of the DQA.

2017 Former Communications Site Groundwater Monitoring Fort Wainwright, Alaska

Table B-2-6 - Nondetect Results with LODs Greater than the Project Cleanup Level

Sample ID	Laboratory Sample ID	Laboratory SDG	Method	Analyte	Project Cleanup Levels[1]	Sample Result	LOD	LOQ	Units	Dilution Factor	Qualifier
17FWAMW61-GWS	AZ58542	83363	SW8260C	1,2,3-Trichloropropane	0.12	ND	0.39	2	ug/L	1	E
17FWAMW80-GWS	AZ58545	83363	SW8260C	1,2,3-Trichloropropane	0.12	ND	0.39	2	ug/L	1	E
17FWAFCS-TB01	AZ58614	83385	SW8260C	1,2,3-Trichloropropane	0.12	ND	0.39	2	ug/L	1	E
17FWAMW12R-GWS	AZ58615	83385	SW8260C	1,2,3-Trichloropropane	0.12	ND	0.39	2	ug/L	1	E
17FWAMW33-GWS	AZ58617	83385	SW8260C	1,2,3-Trichloropropane	0.12	ND	0.39	2	ug/L	1	E
17FWAMW80-GWF	AZ61893	83893	SW8260C	1,2,3-Trichloropropane	0.12	ND	0.39	2	ug/L	1	E
17FWAFCS-TB04	AZ61905	83893	SW8260C	1,2,3-Trichloropropane	0.12	ND	0.39	2	ug/L	1	E
17FWAMW12R-GWF	AZ61900	83893	SW8260C	1,2,3-Trichloropropane	0.12	ND	0.39	2	ug/L	1	E
17FWAMW61-GWF	AZ61891	83893	SW8260C	1,2,3-Trichloropropane	0.12	ND	0.39	2	ug/L	1	E
17FWAMW61Z-GWF	AZ61892	83893	SW8260C	1,2,3-Trichloropropane	0.12	ND	0.39	2	ug/L	1	E
17FWAMW33-GWF	AZ62056	83906	AK103	Residual Range Organics	1.1	ND	5.5	25	mg/L	50	E
17FWAMW33-GWF	AZ62056	83906	SW8260C	1,2,3-Trichloropropane	0.12	ND	0.39	2	ug/L	1	E
17FWAFCS-TB06	AZ62061	83906	SW8260C	1,2,3-Trichloropropane	0.12	ND	0.39	2	ug/L	1	E

Note:

For definitions and data qualifiers, refer to the Acronyms and Abbreviations and 1.1 sections of the DQA.

2017 Former Communications Site Groundwater Monitoring Fort Wainwright, Alaska
Table B-2-7 - Samples Affected by Surrogate Outliers

Sample ID	Lab Sample ID	Lab SDG	Lab Batch Number	Method	Analyte	Result	Surrogate Percent Recovery	DoD QSM LCL	DoD QSM UCL	Lab LCL	Lab UCL	LOD	LOQ	Units	Dilution Factor	Qualifier
17FWAMW39-GWS	AZ58543	83363	220991	SW8260C	4-Bromofluorobenzene	78.6	78.6	85	114	85	114	-	-	Percent	1	-
17FWAMW39-GWS	AZ58543	83363	220991	SW8260C	1,2,3-Trichloropropane	ND	-	-	-	-	-	0.0025	0.007	ug/L	1	JS-
17FWAMW39-GWS	AZ58543	83363	220991	SW8260C	Vinyl chloride	ND	-	-	-	-	-	0.01	0.02	ug/L	1	JS-
17FWAMW47-GWS	AZ58544	83363	220991	SW8260C	4-Bromofluorobenzene	77.2	77.2	85	114	85	114	-	-	Percent	1	-
17FWAMW47-GWS	AZ58544	83363	220991	SW8260C	1,2,3-Trichloropropane	0.19	-	-	-	-	-	0.0025	0.007	ug/L	1	JS-
17FWAMW47-GWS	AZ58544	83363	220991	SW8260C	Vinyl chloride	ND	-	-	-	-	-	0.01	0.02	ug/L	1	JS-
17FWAFCS-TB01-LL	AZ58614-LL	83385	220991	SW8260C	4-Bromofluorobenzene	82.4	82.4	85	114	85	114	-	-	Percent	1	-
17FWAFCS-TB01-LL	AZ58614-LL	83385	220991	SW8260C	1,2,3-Trichloropropane	ND	-	-	-	-	-	0.0025	0.007	ug/L	1	JS-
17FWAFCS-TB01-LL	AZ58614-LL	83385	220991	SW8260C	Vinyl chloride	ND	-	-	-	-	-	0.01	0.02	ug/L	1	JS-
17FWAMW48-GWS	AZ58618	83385	220991	SW8260C	4-Bromofluorobenzene	78.6	78.6	85	114	85	114	-	-	Percent	1	-
17FWAMW48-GWS	AZ58618	83385	220991	SW8260C	1,2,3-Trichloropropane	ND	-	-	-	-	-	0.0025	0.007	ug/L	1	JS-
17FWAMW48-GWS	AZ58618	83385	220991	SW8260C	Vinyl chloride	ND	-	-	-	-	-	0.01	0.02	ug/L	1	JS-
17FWAMW61X-GWS	AZ58612	83385	220991	SW8260C	4-Bromofluorobenzene	77.8	77.8	85	114	85	114	-	-	Percent	1	-
17FWAMW61X-GWS	AZ58612	83385	220991	SW8260C	1,2,3-Trichloropropane	ND	-	-	-	-	-	0.0025	0.007	ug/L	1	JS-
17FWAMW61X-GWS	AZ58612	83385	220991	SW8260C	Vinyl chloride	0.35	-	-	-	-	-	0.01	0.02	ug/L	1	JS-
17FWAMW78-GWS	AZ58619	83385	220991	SW8260C	4-Bromofluorobenzene	75.8	75.8	85	114	85	114	-	-	Percent	1	-
17FWAMW78-GWS	AZ58619	83385	220991	SW8260C	1,2,3-Trichloropropane	ND	-	-	-	-	-	0.0025	0.007	ug/L	1	JS-
17FWAMW78-GWS	AZ58619	83385	220991	SW8260C	Vinyl chloride	ND	-	-	-	-	-	0.01	0.02	ug/L	1	JS-
17FWAMW91-GWS	AZ58613	83385	220991	SW8260C	4-Bromofluorobenzene	74.4	74.4	85	114	85	114	-	-	Percent	1	-
17FWAMW91-GWS	AZ58613	83385	220991	SW8260C	1,2,3-Trichloropropane	ND	-	-	-	-	-	0.0025	0.007	ug/L	1	JS-
17FWAMW91-GWS	AZ58613	83385	220991	SW8260C	Vinyl chloride	ND	-	-	-	-	-	0.01	0.02	ug/L	1	JS-
17FWAMW93-GWS	AZ58620	83385	220991	SW8260C	4-Bromofluorobenzene	80.2	80.2	85	114	85	114	-	-	Percent	1	-
17FWAMW93-GWS	AZ58620	83385	220991	SW8260C	1,2,3-Trichloropropane	ND	-	-	-	-	-	0.0025	0.007	ug/L	1	JS-
17FWAMW93-GWS	AZ58620	83385	220991	SW8260C	Vinyl chloride	ND	-	-	-	-	-	0.01	0.02	ug/L	1	JS-
17FWAMW13-GWS	AZ58668	83391	220991	SW8260C	4-Bromofluorobenzene	78	78	85	114	70	130	-	-	Percent	1	-
17FWAMW13-GWS	AZ58668	83391	220991	SW8260C	1,2,3-Trichloropropane	ND	-	-	-	-	-	0.0025	0.007	ug/L	1	JS-
17FWAMW13-GWS	AZ58668	83391	220991	SW8260C	Vinyl chloride	ND	-	-	-	-	-	0.01	0.02	ug/L	1	JS-
17FWAMW32R-GWS	AZ58669	83391	220991	SW8260C	4-Bromofluorobenzene	74.2	74.2	85	114	70	130	-	-	Percent	1	-
17FWAMW32R-GWS	AZ58669	83391	220991	SW8260C	1,2,3-Trichloropropane	ND	-	-	-	-	-	0.0025	0.007	ug/L	1	JS-
17FWAMW32R-GWS	AZ58669	83391	220991	SW8260C	Vinyl chloride	ND	-	-	-	-	-	0.01	0.02	ug/L	1	JS-
17FWAMW79-GWS	AZ58670	83391	220991	SW8260C	4-Bromofluorobenzene	70.8	70.8	85	114	70	130	-	-	Percent	1	-
17FWAMW79-GWS	AZ58670	83391	220991	SW8260C	1,2,3-Trichloropropane	0.56	-	-	-	-	-	0.0025	0.007	ug/L	1	JS-
17FWAMW79-GWS	AZ58670	83391	220991	SW8260C	Vinyl chloride	ND	-	-	-	-	-	0.01	0.02	ug/L	1	JS-
17FWAMW79Z-GWS	AZ58671	83391	220991	SW8260C	4-Bromofluorobenzene	71.4	71.4	85	114	70	130	-	-	Percent	1	-
17FWAMW79Z-GWS	AZ58671	83391	220991	SW8260C	1,2,3-Trichloropropane	0.61	-	-	-	-	-	0.0025	0.007	ug/L	1	JS-
17FWAMW79Z-GWS	AZ58671	83391	220991	SW8260C	Vinyl chloride	ND	-	-	-	-		0.01	0.02	ug/L	1	JS-

Notes:

For qualifier defintions, refer to the Data Qualifier Definitions

For additional definitions, refer to the Acronyms and Abbreviations section

ATTACHMENT B-3
Alaska Department of Conservation Laboratory Data Review Checklists

Laboratory Data Review Checklist

Completed by:

Kari Hagen

Title:

Project Chemist

Date:

12/04/2017

CS Report Name:

2017 Former Communications Site Groundwater Monitoring Fort Wainwright, Alaska

Report Date:

8/15/2017

Consultant Firm:

Jacobs Engineering

Laboratory Name:

APPL Inc.-Clovis, CA

Laboratory Report Number:

83363

ADEC File Number:

108.38.085

Hazard Identification Number:

1. Laboratory

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

● Yes ○ No Comments:

All sample were received and analyzed by APPL Inc. in Clovis, CA.

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

● Yes ○ No Comments:

All sample were received and analyzed by APPL Inc. in Clovis, CA.

2. Chain of Custody (CoC)

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

● Yes ○ No Comments:

b. Correct analyses requested?

● Yes ○ No Comments:

3. Laboratory Sample Receipt Documentation

a. Sample/cooler temperature documented and within range at receipt (4° ± 2° C)?

● Yes ○ No Comments:

Cooler “Egg Yolk Yellow” temp blank = 5.0° C, cooler temp = 2.7° C
Cooler “Cherry Red” temp blank = 5.0° C, cooler temp = 2.8° C

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

● Yes ○ No Comments:

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

● Yes ○ No Comments:

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

○ Yes ○ No Comments:

No discrepancies were noted.

e. Data quality or usability affected? Explain.

Comments:

The data quality and usability were not affected.

4. <u>Case Narrative</u>

a. Present and understandable?

● Yes ○ No Comments:

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

● Yes ○ No Comments:

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

c. Were all corrective actions documented?

○ Yes ○ No Comments:

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

Comments:

5. <u>Samples Results</u>

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

● Yes ○ No Comments:

b. All applicable holding times met?

● Yes ○ No Comments:

c. All soils reported on a dry weight basis?

○ Yes ○ No Comments:

Soil samples were not submitted with this project.

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

○ Yes ● No Comments:

The cleanup levels were evaluated and qualified if the LODs were greater than the ADEC cleanup levels.

SW8260C - The LOD was greater than the ADEC cleanup level for TCP in samples 17FWAMW61-GWS and 17FWAMW80-GWS.

SW8260C - The LOD was greater than the ADEC cleanup level for vinyl chloride in sample 17FWAMW80-GWS.

e. Data quality or usability affected? Explain.

Comments:

SW8260C - TCP and vinyl chloride were not contaminants of concern in the affected wells.

Affected sample results are italicized and qualified `E' and are summarized in Attachment B-2, Table B-2-6.

6. QC Samples

a. Method Blank

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

● Yes ○ No Comments:

ii. All method blank results less than PQL?

● Yes ○ No Comments:

All method blank results were less than the LOQ (PQL), however all method blanks and samples were evaluated if an analyte was detected. Sample results were qualified if the sample result was within 10 times the method blank concentration.

RSK175 - Methane was detected in the method blank at 0.53 ug/L.

iii. If above PQL, what samples are affected?

Comments:

The methane concentration in all associated samples were 10 times or greater than the method blank concentration. No samples were affected due to method blank contamination.

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

○ Yes ○ No Comments:

The methane concentration in all associated samples were 10 times or greater than the method blank concentration. No samples required qualification due to method blank contamination.

v. Data quality or usability affected? Explain.

Comments:

The methane concentration in all associated samples were 10 times or greater than the method blank concentration. No samples were affected or required qualification due to 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 Comments:

LCS/LCSDs and MS/MSDs were analyzed per QSM 5.1 requirements except an MS/MSD was not analyzed in the AK102 batches 221098 and 221207 and AK103 batch 221099. See SDGs 83391 and 83906 for DRO/RRO MS/MSD results. An LCS/LCSD was analyzed in the batches to show precision.

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

○ Yes ● No Comments:

SW6010 - A laboratory duplicate was not analyzed in the batch, however a primary/field duplicate, LCS/LCSD and MS/MSD were analyzed in the batch.

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 Comments:

LCS/LCSD %R:
RSK175 - Methane was recovered high in the LCSD (135%).

AK102 - Diesel range organics was recovered low in the LCS (70%) and LCSD (60%).

MS/MSD %R:
SW6020 - The MS (88%) for batch 220876 was below QC limits (90-114%) for Manganese, however the spiked amount was less than the parent concentration, therefore no qualification was necessary.

SW8260 - The MS (160%) for batch 220935 was above QC limits (74-129%) for Tetrachloroethene

(PCE), however the parent sample was nondetect for PCE, therefore no qualification was necessary.

RSK175 - The MS (48%) and MSD (32%) for batch 221038 were below QC limits (72-125%) for Methane, however the spiked amount was less than the parent concentration, therefore no qualification was necessary.

RSK175 - Methane was recovered low in the MS (48%) and MSD (32%), however the spiked concentration was less than the parent concentration, therefore no qualification was necessary.

E300.0 - The MS (134%) and MSD (133%) for batch 220778 exceeded QC limits (87-112%) for sulfate.

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/MSD, and or sample/sample duplicate. (AK Petroleum methods 20%; all other analyses see the laboratory QC pages)

○ Yes ● No Comments:

MS/MSD RPD:
SW8260 - The MS/MSD RPD (27%) for PCE in batch 220935 had poor precision and was greater than QC limits.

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

Comments:

LCS/LCSD %R:
RSK175 - Methane was recovered high in the LCSD (135%) affecting samples 17FWAMW03-GWS, 17FWAMW39-GWS, 17FWAMW47-GWS, 17FWAMW61-GWS, 17FWAMW62-GWS, 17FWAMW62Y-GWS and 17FWAMW80-GWS.

AK102 - Diesel range organics was recovered low in the LCS (70%) and LCSD (60%) affecting samples 17FWAMW03-GWS and 17FWAMW62-GWS.

MS/MSD %R:
E300.0 - The MS (134%) and MSD (133%) for batch 220778 exceeded QC limits (87-112%) for sulfate in sample 17FWAMW61-GWS.

MS/MSD RPD:
SW8260 - The PCE result for 17FWAMW61-GWS was nondetect, but has an unknown bias due to poor precision in the MS/MSD.

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

● Yes ○ No Comments:

LCS/LCSD %R:
RSK175 - Methane was recovered high in the LCSD (135%) affecting samples 17FWAMW03-GWS,

17FWAMW39-GWS, 17FWAMW47-GWS, 17FWAMW61-GWS, 17FWAMW62-GWS, 17FWAMW62Y-GWS and 17FWAMW80-GWS. The sample results were qualified 'JL+' to indicate the results may be biased high.

AK102 - Diesel range organics was recovered low in the LCS (70%) and LCSD (60%) affecting samples 17FWAMW03-GWS and 17FWAMW62-GWS. The sample results were qualified 'JL-' to indicate the results may be biased low.

MS/MSD %R:
E300.0:
17FWAMW61-GWS was qualified JM+ to indicate a possible high bias for sulfate.

MS/MSD RPD:
SW8260 - The PCE result for 17FWAMW61-GWS was qualified 'JDM' to indicate an unknown bias.

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

Comments:

LCS/LCSD %R:
RSK175 - Methane was recovered high in the LCSD (135%) affecting samples 17FWAMW03-GWS, 17FWAMW39-GWS, 17FWAMW47-GWS, 17FWAMW61-GWS, 17FWAMW62-GWS, 17FWAMW62Y-GWS and 17FWAMW80-GWS. The sample results were qualified 'JL+' to indicate the results may be biased high. The methane results were used for monitored natural attenuation (MNA) calculations; therefore the effects were minimal.

AK102 - Diesel range organics (DRO) was recovered low in the LCS (70%) and LCSD (60%) affecting samples 17FWAMW03-GWS and 17FWAMW62-GWS. The sample results were qualified 'JL-' to indicate the results may be biased low. The DRO results or LODs were significantly less than the ADEC cleanup level; therefore the effects were minimal.

Sample results qualified due to failed LCS/LCSD recoveries were summarized in Attachment B-2, Table B-2-2.

MS/MSD %R:
E300.0:
17FWAMW61-GWS was qualified JM+ to indicate a possible high bias for sulfate. The sulfate results were used for monitored natural attenuation (MNA) calculations; therefore the effects were minimal.

MS/MSD RPD:
SW8260 - The PCE result for 17FWAMW61-GWS has an unknown bias. The results are minimally affected.

c. Surrogates - Organics Only

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

● Yes ○ No 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 Comments:

SW8260 - Surrogate, 4-Bromofluorobenzene was recovered low in samples 17FWAMW39-GWS and 17FWAMW47-GWS.

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

● Yes ○ No Comments:

SW8260 - Surrogate, 4-Bromofluorobenzene was recovered low in samples 17FWAMW39-GWS and 17FWAMW47-GWS. The results were qualified 'JS-' to indicate the result may be biased low.

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

○ Yes ○ No Comments:

SW8260 - Surrogate, 4-Bromofluorobenzene was recovered low in samples 17FWAMW39-GWS and 17FWAMW47-GWS. Sample 17FWAMW39-GWS was nondetect with an LOD 3 times less than the ADEC cleanup level; therefore the effects were likely minimal. Sample 17FWAMW47-GWS was greater than the ADEC cleanup level; therefore the effects were minimal. The results should be considered an estimate.

Sample results qualified due to failed surrogate recoveries were summarized in Attachment B-2, Table B-2-3.

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

i. One trip blank reported per matrix, analysis and cooler?

● Yes ○ No Comments:

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

● Yes ○ No Comments:

Volatile samples and the trip blank were shipped in cooler 'Tan Pancake', however the laboratory logged in the samples under two SDGs, 83363 and 83385. The trip blank, 17FWAFCS-TB01 associated with the samples reported in SDG 83363 was logged in and reported under SDG 83385.

iii. All results less than PQL?

● Yes ○ No Comments:

iv. If above PQL, what samples are affected?

Comments:

All trip blank results were less than the LOD and LOQ (PQL).

v. Data quality or usability affected? Explain.

Comments:

e. Field Duplicate

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

○ Yes ● No Comments:

Samples 17FWAMW61-GWS and 17FWAMW61X-GWS were submitted as a field duplicate pair. The samples were logged in and reported under two SDGs. Sample 17FWAMW61-GWS was logged in under SDG 83363 and the field duplicate, 17FWAMW61X-GWS was logged in under SDG 83385.

Field duplicate pair, 17FWAMW61-GWS/17FWAMW61X-GWS was supposed to be submitted for method SW8260, however method SW8260SIM was inadvertently requested on the field duplicate sample, 17FWAMW61X-GWS. For method SW8260, the 10 percent field duplicate frequency was not met.

ii. Submitted blind to lab?

● Yes ○ No Comments:

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

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

Where: R_1 = Sample Concentration
R_2 = Field Duplicate Concentration (R_1-R_2)

● Yes ○ No Comments:

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

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

○ Yes ○ No Comments:

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

○ Yes ○ No Comments:

Disposable sampling equipment was used.

i. All results less than PQL?

○ Yes ○ No Comments:

Disposable sampling equipment was used.

ii. If above PQL, what samples are affected?

Comments:

iii. Data quality or usability affected? Explain.

Comments:

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

a. Defined and appropriate?

○ Yes ○ No Comments:

Laboratory Data Review Checklist

Completed by:

Kari Hagen

Title:

Project Chemist

Date:

12/04/2017

CS Report Name:

2017 Former Communications Site Groundwater Monitoring Fort Wainwright, Alaska

Report Date:

8/15/2017

Consultant Firm:

Jacobs Engineering

Laboratory Name:

APPL Inc.-Clovis, CA

Laboratory Report Number:

83385

ADEC File Number:

108.38.085

Hazard Identification Number:

1. Laboratory

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

● Yes ○ No Comments:

All sample were received and analyzed by APPL Inc. in Clovis, CA.

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

● Yes ○ No Comments:

All sample were received and analyzed by APPL Inc. in Clovis, CA.

2. Chain of Custody (CoC)

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

● Yes ○ No Comments:

b. Correct analyses requested?

● Yes ○ No Comments:

3. Laboratory Sample Receipt Documentation

a. Sample/cooler temperature documented and within range at receipt (4° ± 2° C)?

● Yes ○ No Comments:

Cooler “Tan Pancake” temp blank = 6.0° C, cooler temp = 4.5° C
Cooler “Blueberry Muffin” temp blank = 4.5° C, cooler temp = 1.0° C
Cooler “Red Bacon” temp blank = 2.5° C, cooler temp = 1.5° C

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

● Yes ○ No Comments:

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

● Yes ○ No Comments:

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

○ Yes ○ No Comments:

No discrepancies were noted.

e. Data quality or usability affected? Explain.

Comments:

The data quality and usability were not affected.

4. Case Narrative

a. Present and understandable?

● Yes ○ No Comments:

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

● Yes ○ No Comments:

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

c. Were all corrective actions documented?

○ Yes ○ No Comments:

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

Comments:

5. Samples Results

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

● Yes ○ No Comments:

b. All applicable holding times met?

● Yes ○ No Comments:

c. All soils reported on a dry weight basis?

○ Yes ○ No Comments:

Soil samples were not submitted with this project.

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

○ Yes ● No Comments:

The cleanup levels were evaluated and qualified if the LODs were greater than the ADEC cleanup levels.

SW8260C - The LOD was greater than the ADEC cleanup level for TCP and vinyl chloride in samples 17FWAMW12R-GWS, 17FWAMW33-GWS and 17FWAFCS-TB01.

e. Data quality or usability affected? Explain.

Comments:

SW8260C - TCP and vinyl chloride were not contaminants of concern in the affected wells.

Affected sample results are italicized and qualified `E' and are summarized in Attachment B-2, Table B-2-6.

6. QC Samples

a. Method Blank

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

● Yes ○ No Comments:

ii. All method blank results less than PQL?

● Yes ○ No 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 Comments:

No samples were affected by method blank contamination.

v. Data quality or usability affected? Explain.

Comments:

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 Comments:

LCS/LCSDs and MS/MSDs were analyzed per QSM 5.1 requirements. See SDG 83391.

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

○ Yes ● No Comments:

SW6010 - A laboratory duplicate was not analyzed in the batch, however a primary/field duplicate and LCS/LCSD were analyzed in the batch.

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 Comments:

LCS/LCSD %R:
RSK175 - Methane was recovered high in the LCSD (135%).

AK102 - Diesel range organics was recovered low in the LCS (70%) and LCSD (60%).

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/MSD, and or sample/sample duplicate. (AK Petroleum methods 20%; all other analyses see the laboratory QC pages)

● Yes ○ No Comments:

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

Comments:

LCS/LCSD %R:
RSK175 - Methane was recovered high in the LCSD (135%) affecting samples 17FWAMW12R-GWS, 17FWAMW28-GWS, 17FWAMW33-GWS, 17FWAMW48-GWS and 17FWAMW78-GWS.

AK102 - Diesel range organics was recovered low in the LCS (70%) and LCSD (60%) affecting samples 17FWAMW12R-GWS, 17FWAMW28-GWS, 17FWAMW32R-GWS and 17FWAMW33-GWS.

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

● Yes ○ No Comments:

LCS/LCSD %R:
RSK175 - Methane was recovered high in the LCSD (135%) affecting samples 17FWAMW12R-GWS, 17FWAMW28-GWS, 17FWAMW33-GWS, 17FWAMW48-GWS and 17FWAMW78-GWS. The sample results were qualified 'JL+' to indicate the results may be biased high.

AK102 - Diesel range organics was recovered low in the LCS (70%) and LCSD (60%) affecting samples 17FWAMW12R-GWS, 17FWAMW28-GWS, 17FWAMW32R-GWS and 17FWAMW33-GWS. The sample results were qualified 'JL-' to indicate the results may be biased low.

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

Comments:

LCS/LCSD %R:
RSK175 - Methane was recovered high in the LCSD (135%) affecting samples 17FWAMW12R-GWS, 17FWAMW28-GWS, 17FWAMW33-GWS, 17FWAMW48-GWS and 17FWAMW78-GWS. The sample results were qualified 'JL+' to indicate the results may be biased high. The sample results were qualified 'JL+' to indicate the results may be biased high. The methane results were used for monitored natural attenuation (MNA) calculations; therefore the effects were minimal.

AK102 - Diesel range organics was recovered low in the LCS (70%) and LCSD (60%) affecting samples 17FWAMW12R-GWS, 17FWAMW28-GWS, 17FWAMW32R-GWS and 17FWAMW33-GWS. The sample results were qualified 'JL-' to indicate the results may be biased low. With the exception of sample 17FWAMW33-GWS, all results were significantly less than the ADEC cleanup level. The result of sample 17FWAMW33-GWS was significantly greater than the ADEC cleanup level; therefore the effects were minimal.

Sample results qualified due to failed LCS/LCSD recoveries were summarized in Attachment B-2, Table B-2-2.

c. Surrogates - Organics Only

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

● Yes ○ No 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 Comments:

SW8260 - Surrogate, 4-Bromofluorobenzene was recovered low in samples 17FWAMW48-GWS, 17FWAMW61X-GWS, 17FWAMW78-GWS, 17FWAMW91-GWS, 17FWAMW93-GWS and 17FWAFCS-TB01-LL.

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

● Yes ○ No Comments:

SW8260 - Surrogate, 4-Bromofluorobenzene was recovered low in samples 17FWAMW48-GWS, 17FWAMW61X-GWS, 17FWAMW78-GWS, 17FWAMW91-GWS, 17FWAMW93-GWS and 17FWAFCS-TB01-LL. The results were qualified 'JS-' to indicate the result may be biased low.

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

○ Yes ○ No Comments:

SW8260 - Surrogate, 4-Bromofluorobenzene was recovered low in samples 17FWAMW48-GWS, 17FWAMW61X-GWS, 17FWAMW78-GWS, 17FWAMW91-GWS, 17FWAMW93-GWS and 17FWAFCS-TB01-LL. All sample results were nondetect with LODs 3 times less than the ADEC cleanup level with the exception of sample 17FWAMW61X-GWS. TCP and vinyl chloride were not contaminants of concern in sample 17FWAMW61X-GWS; therefore the effects were likely minimal. The results should be considered an estimate.

Sample results qualified due to failed surrogate recoveries were summarized in Attachment B-2, Table B-2-3.

d. Trip blank - Volatile analyses only (GRO, BTEX, Volatile Chlorinated Solvents, etc.): <u>Water and Soil</u>

i. One trip blank reported per matrix, analysis and cooler?

● Yes ○ No Comments:

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

● Yes ○ No Comments:

iii. All results less than PQL?

● Yes ○ No Comments:

iv. If above PQL, what samples are affected?

Comments:

All trip blank results were less than the LOD and LOQ (PQL).

v. Data quality or usability affected? Explain.

Comments:

e. Field Duplicate

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

○ Yes ● No Comments:

Samples 17FWAMW61-GWS and 17FWAMW61X-GWS were submitted as a field duplicate pair. The samples were logged in and reported under two SDGs. Sample 17FWAMW61-GWS was logged in under SDG 83363 and the field duplicate, 17FWAMW61X-GWS was logged in under SDG 83385.

Field duplicate pair, 17FWAMW61-GWS/17FWAMW61X-GWS was supposed to be submitted for method SW8260, however method SW8260SIM was inadvertently requested on the field duplicate sample, 17FWAMW61X-GWS. For method SW8260, the 10 percent field duplicate frequency was not met.

Field duplicate pair, 17FWAMW79-GWS/17FWAMW79Z-GWS was submitted for monitored natural attenuation (MNA) parameters.

ii. Submitted blind to lab?

● Yes ○ No Comments:

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

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

Where: R_1 = Sample Concentration

R_2 = Field Duplicate Concentration (R_1-R_2)

○ Yes ● No Comments:

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

E353.2 - Field duplicate pair, 17FWAMW79-GWS/17FWAMW79Z-GWS had poor duplicate precision for nitrate (46%). The results were qualified 'JD.'

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

○ Yes ○ No Comments:

E353.2 - Field duplicate pair, 17FWAMW79-GWS/17FWAMW79Z-GWS had poor duplicate precision for nitrate (46%). The results were qualified 'JD' and should be considered an estimate. The nitrate results were used for MNA calculations; therefore the effects were minimal.

Sample results qualified due to poor field duplicate precision were summarized in Attachment B-2, Table B-2-5.

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

○ Yes ○ No Comments:

Disposable sampling equipment was used.

i. All results less than PQL?

○ Yes ○ No Comments:

Disposable sampling equipment was used.

ii. If above PQL, what samples are affected?

Comments:

iii. Data quality or usability affected? Explain.

Comments:

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

a. Defined and appropriate?

○ Yes ○ No Comments:

Alaska Department of Environmental Conservation • Spill Prevention and Response Division • Contaminated Sites Program

Laboratory Data Review Checklist

Completed by:

Kari Hagen

Title:

Project Chemist

Date:

12/04/2017

CS Report Name:

2017 Former Communications Site Groundwater Monitoring Fort Wainwright, Alaska

Report Date:

8/15/2017

Consultant Firm:

Jacobs Engineering

Laboratory Name:

APPL Inc.-Clovis, CA

Laboratory Report Number:

83391

ADEC File Number:

108.38.085

Hazard Identification Number:

1. Laboratory

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

● Yes ○ No Comments:

All sample were received and analyzed by APPL Inc. in Clovis, CA.

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

● Yes ○ No Comments:

All sample were received and analyzed by APPL Inc. in Clovis, CA.

2. Chain of Custody (CoC)

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

● Yes ○ No Comments:

b. Correct analyses requested?

● Yes ○ No Comments:

3. Laboratory Sample Receipt Documentation

a. Sample/cooler temperature documented and within range at receipt (4° ± 2° C)?

● Yes ○ No Comments:

Cooler “Rainbow Waffle” temp blank = 4.0° C, cooler temp = not measured
Cooler “Orange Juice” temp blank = 4.0° C, cooler temp = not measured
Cooler “Brown Cheese” temp blank = 4.0° C, cooler temp = not measured
Cooler “Pink Doughnut” temp blank = 4.0° C, cooler temp = not measured
Cooler “Colorful Cheerios” temp blank = 4.0° C, cooler temp = not measured

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

● Yes ○ No Comments:

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

● Yes ○ No Comments:

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

○ Yes ○ No Comments:

No discrepancies were noted.

e. Data quality or usability affected? Explain.

Comments:

The data quality and usability were not affected.

4. Case Narrative

a. Present and understandable?

● Yes ○ No Comments:

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

● Yes ○ No Comments:

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

c. Were all corrective actions documented?

○ Yes ○ No Comments:

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

Comments:

5. Samples Results

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

● Yes ○ No Comments:

b. All applicable holding times met?

● Yes ○ No Comments:

c. All soils reported on a dry weight basis?

○ Yes ○ No Comments:

Soil samples were not submitted with this project.

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

● Yes ○ No Comments:

e. Data quality or usability affected? Explain.

Comments:

6. QC Samples

a. Method Blank

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

● Yes ○ No Comments:

ii. All method blank results less than PQL?

● Yes ○ No Comments:

All method blank results were less than the LOD and LOQ (PQL), however all method blanks and samples were evaluated if an analyte was detected.

RSK175 - Methane was detected in the method blank.

iii. If above PQL, what samples are affected?

Comments:

RSK175 - Methane was detected in the method blank affecting samples 17FWAMW08-GWS, 17FWAMW32R-GWS, 17FWAMW35-GWS, 17FWAMW0835X-GWS and 17FWAMW77-GWS.

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

● Yes ○ No Comments:

Sample concentrations within ten times the method blank concentration were qualified 'B' to indicate the result may be biased high. The following samples were qualified 'B.'

RSK175 - Methane was detected in the method blank affecting samples 17FWAMW08-GWS, 17FWAMW32R-GWS, 17FWAMW35-GWS, 17FWAMW0835X-GWS and 17FWAMW77-GWS.

v. Data quality or usability affected? Explain.

Comments:

All affected methane results had low concentrations. The methane results were used for MNA calculations; therefore the effects were minimal.

Sample results qualified due to method blank detections were summarized in Attachment B-2, Table B-2-1.

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 Comments:

LCS/LCSDs and MS/MSDs were analyzed per QSM 5.1 requirements.

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

○ Yes ● No Comments:

SW6010 - A laboratory duplicate was not analyzed in the batch, however a primary/field duplicate, LCS/LCSD and MS/MSD were analyzed in the batch.

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 Comments:

MS/MSD %R:
AK102: The MS (68%) and the MSD (53%) in batch 221140 recovered outside QC limits (75-125%) for DRO.

SW8260 SIM: The MS (390%) and the MSD (252%) in batch 220991 recovered outside QC limits (73-122%) for 1,2,3-Tricloropropane. The spike concentration was less than the parent sample concentration, therefore no qualification was required.

The MS (153%) in batch 220991 recovered outside QC limits (58-137%) for Vinyl Chloride. The parent sample was nondetect, therefore no qualification was required.

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/MSD, and or sample/sample duplicate. (AK Petroleum methods 20%; all other analyses see the laboratory QC pages)

○ Yes ● No Comments:

MS/MSD RPD:
SW8260 SIM: The MS/MSD RPD (40%) in batch 220991 was outside QC limits for Vinyl Chloride.

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

Comments:

17FWAMW79-GWS

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

● Yes ○ No Comments:

SW8260 SIM:
17FWAMW79-GWS was qualified JDM to indicate an unknown bias due to MS/MSD RPD for Vinyl Chloride.

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

Comments:

The data was minimally affected.

c. Surrogates - Organics Only

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

● Yes ○ No 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 Comments:

SW8260 - Surrogate, 4-Bromofluorobenzene was recovered low in samples 17FWAMW13-GWS, 17FWAMW32R-GWS, 17FWAMW79-GWS and 17FWAMW79Z-GWS.

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

● Yes ○ No Comments:

SW8260 - Surrogate, 4-Bromofluorobenzene was recovered low in samples 17FWAMW13-GWS, 17FWAMW32R-GWS, 17FWAMW79-GWS and 17FWAMW79Z-GWS. The results were qualified 'JS-' to indicate the result may be biased low.

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

○ Yes ○ No Comments:

SW8260 - Surrogate, 4-Bromofluorobenzene was recovered low in samples 17FWAMW13-GWS, 17FWAMW32R-GWS, 17FWAMW79-GWS and 17FWAMW79Z-GWS.

All vinyl chloride results were nondetect and the LODs were significantly less than the ADEC cleanup level; therefore the effects were minimal.

TCP results in samples 17FWAMW13-GWS and 17FWAMW32R-GWS were nondetect with LODs 3 times less than the ADEC cleanup level; therefore the effects were minimal.

TCP results in samples 17FWAMW79-GWS and 17FWAMW79Z-GWS exceeded the ADEC cleanup level; therefore the effects were minimal.

Sample results qualified due to failed surrogate recoveries were summarized in Attachment B-2, Table B-2-3.

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

i. One trip blank reported per matrix, analysis and cooler?

● Yes ○ No Comments:

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

● Yes ○ No Comments:

iii. All results less than PQL?

● Yes ○ No Comments:

iv. If above PQL, what samples are affected?

Comments:

All trip blank results were less than the LOD and LOQ (PQL).

v. Data quality or usability affected? Explain.

Comments:

e. Field Duplicate

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

● Yes ○ No Comments:

Field duplicate pairs, 17FWAMW35-GWS/17FWAMW35X-GWS was submitted for monitored natural attenuation (MNA) parameters and 17FWAMW79-GWS/17FWAMW79Z-GWS was submitted for SW8260SIM analyses.

ii. Submitted blind to lab?

● Yes ○ No Comments:

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

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

Where: R_1 = Sample Concentration
R_2 = Field Duplicate Concentration (R_1-R_2)

● Yes ○ No Comments:

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

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

○ Yes ○ No Comments:

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

○ Yes ○ No Comments:

Disposable sampling equipment was used.

i. All results less than PQL?

○ Yes ○ No Comments:

Disposable sampling equipment was used.

ii. If above PQL, what samples are affected?

Comments:

iii. Data quality or usability affected? Explain.

Comments:

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

a. Defined and appropriate?

○ Yes ○ No Comments:

Laboratory Data Review Checklist

Completed by:

Kari Hagen

Title:

Project Chemist

Date:

12/04/2017

CS Report Name:

2017 Former Communications Site Groundwater Monitoring Fort Wainwright, Alaska

Report Date:

10/31/2017

Consultant Firm:

Jacobs Engineering

Laboratory Name:

APPL Inc.-Clovis, CA

Laboratory Report Number:

83893

ADEC File Number:

108.38.085

Hazard Identification Number:

1. Laboratory

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

● Yes ○ No Comments:

All sample were received and analyzed by APPL Inc. in Clovis, CA.

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

● Yes ○ No Comments:

All sample were received and analyzed by APPL Inc. in Clovis, CA.

2. Chain of Custody (CoC)

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

● Yes ○ No Comments:

b. Correct analyses requested?

● Yes ○ No Comments:

3. Laboratory Sample Receipt Documentation

a. Sample/cooler temperature documented and within range at receipt (4° ± 2° C)?

● Yes ○ No Comments:

Cooler “Pepto Bismal Pink” temp blank = 6.0° C, cooler temp = 5.8° C
Cooler “White Chocolate” temp blank = 5.0° C, cooler temp = 5.7° C
Cooler “Vlue Jean Blue” temp blank = 5.0° C, cooler temp = 5.6° C
Cooler “Burnt Sienna” temp blank = 4.0° C, cooler temp = 4.6° C
Cooler “Green Olive” temp blank = 4.0° C, cooler temp = 4.4° C

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

● Yes ○ No Comments:

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

● Yes ○ No Comments:

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

○ Yes ○ No Comments:

No discrepancies were noted.

e. Data quality or usability affected? Explain.

Comments:

The data quality and usability were not affected.

4. <u>Case Narrative</u>

a. Present and understandable?

● Yes ○ No Comments:

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

● Yes ○ No Comments:

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

c. Were all corrective actions documented?

○ Yes ○ No Comments:

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

Comments:

5. <u>Samples Results</u>

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

● Yes ○ No Comments:

b. All applicable holding times met?

● Yes ○ No Comments:

c. All soils reported on a dry weight basis?

○ Yes ○ No Comments:

Soil samples were not submitted with this project.

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

○ Yes ● No Comments:

The cleanup levels were evaluated and qualified if the LODs were greater than the ADEC cleanup levels.

SW8260C - The LOD was greater than the ADEC cleanup level for TCP and vinyl chloride in samples 17FWAMW12R-GWF, 17FWAMW61-GWF, 17FWAMW61Z-GWF, 17FWAMW80-GWF and 17FWAFCS-TB04.

e. Data quality or usability affected? Explain.

Comments:

SW8260C - TCP and vinyl chloride were not contaminants of concern in the affected wells.

Affected sample results are italicized and qualified `E' and are summarized in Attachment B-2, Table B-2-6.

6. QC Samples

a. Method Blank

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

● Yes ○ No Comments:

ii. All method blank results less than PQL?

● Yes ○ No 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 Comments:

No samples were affected by method blank contamination.

v. Data quality or usability affected? Explain.

Comments:

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 Comments:

LCS/LCSDs and MS/MSDs were analyzed per QSM 5.1 requirements.

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

○ Yes ● No Comments:

SW6010 - A laboratory duplicate was not analyzed in the batch, however a primary/field duplicate, LCS/LCSD and MS/MSD were analyzed in the batch.

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 Comments:

LCS/LCSD %R:
RSK175 - Methane was recovered high in the LCSD (135%).

AK102 - Diesel range organics was recovered low in the LCS (70%) and LCSD (60%).

MS/MSD %R:
SW8260 - The MS (124%) in batch 222617 recovered outside QC limits (73-122%) for 1,2,3-Trichloropropane. The parent sample was nondetect for 1,2,3-TCP, thus the result did not need to be qualified.

SW8260 SIM- The MS (-30%) and MSD (-30%) in batch 223010 recovered outside QC limits (73-122%) for 1,2,3-Trichloropropane. The spike concentration was significantly less than the parent sample concentration for 1,2,3-TCP, thus the result did not require qualification.

RSK175 - The MS (47%) in batch 2226888 recovered outside QC limits (72-125%) for Methane.

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/MSD, and or sample/sample duplicate. (AK Petroleum methods 20%; all other analyses see the laboratory QC pages)

● Yes ○ No Comments:

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

Comments:

LCS/LCSD %R:
RSK175 - Methane was recovered high in the LCSD (135%) affecting samples 17FWAMW03-GWS, 17FWAMW39-GWS, 17FWAMW47-GWS, 17FWAMW61-GWS, 17FWAMW62-GWS, 17FWAMW62Y-GWS and 17FWAMW80-GWS.

AK102 - Diesel range organics was recovered low in the LCS (70%) and LCSD (60%) affecting samples 17FWAMW03-GWS and 17FWAMW62-GWS.

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

● Yes ○ No

Comments:

LCS/LCSD %R:
RSK175 - Methane was recovered high in the LCSD (135%) affecting samples 17FWAMW03-GWS, 17FWAMW39-GWS, 17FWAMW47-GWS, 17FWAMW61-GWS, 17FWAMW62-GWS, 17FWAMW62Y-GWS and 17FWAMW80-GWS. The sample results were qualified 'JL+' to indicate the results may be biased high.

AK102 - Diesel range organics was recovered low in the LCS (70%) and LCSD (60%) affecting samples 17FWAMW03-GWS and 17FWAMW62-GWS. The sample results were qualified 'JL-' to indicate the results may be biased low.

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

Comments:

LCS/LCSD %R:
RSK175 - Methane was recovered high in the LCSD (135%) affecting samples 17FWAMW03-GWS, 17FWAMW39-GWS, 17FWAMW47-GWS, 17FWAMW61-GWS, 17FWAMW62-GWS, 17FWAMW62Y-GWS and 17FWAMW80-GWS. The sample results were qualified 'JL+' to indicate the results may be biased high. The methane results were used for monitored natural attenuation (MNA) calculations; therefore the effects were minimal.

AK102 - Diesel range organics (DRO) was recovered low in the LCS (70%) and LCSD (60%) affecting samples 17FWAMW03-GWS and 17FWAMW62-GWS. The sample results were qualified 'JL-' to indicate the results may be biased low. The DRO results or LODs were significantly less than the ADEC cleanup level; therefore the effects were minimal.

MS/MSD %R:
RSK175 - The methane result in sample 17FWAMW61-GWF was qualified JM- to indicate a possible low bias due to a low MS recovery. The methane results were used for monitored natural attenuation (MNA) calculations; therefore the effects were minimal.

MS/MSD RPD:
RSK175 - 17FWAMW61-GWF was qualified JD to indicate an unknown bias due to MS/MSD RPD outside of QC limits. The methane results were used for monitored natural attenuation (MNA) calculations; therefore the effects were minimal.

Sample results qualified due to failed LCS/LCSD recoveries were summarized in Attachment B-2, Table B-2-2.

c. Surrogates - Organics Only

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

● Yes ○ No 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 Comments:

SW8260 - Surrogate, 4-Bromofluorobenzene was recovered low in samples 17FWAMW39-GWS and 17FWAMW47-GWS.

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

● Yes ○ No Comments:

SW8260 - Surrogate, 4-Bromofluorobenzene was recovered low in samples 17FWAMW39-GWS and 17FWAMW47-GWS. The results were qualified 'JS-' to indicate the result may be biased low.

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

○ Yes ○ No Comments:

SW8260 - Surrogate, 4-Bromofluorobenzene was recovered low in samples 17FWAMW39-GWS and 17FWAMW47-GWS. Sample 17FWAMW39-GWS was nondetect with an LOD 3 times less than the ADEC cleanup level; therefore the effects were likely minimal. Sample 17FWAMW47-GWS was greater than the ADEC cleanup level; therefore the effects were minimal. The results should be considered an estimate.

Sample results qualified due to failed surrogate recoveries were summarized in Attachment B-2, Table B-2-3.

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

i. One trip blank reported per matrix, analysis and cooler?

● Yes ○ No Comments:

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

● Yes ○ No Comments:

iii. All results less than PQL?

● Yes ○ No Comments:

iv. If above PQL, what samples are affected?

Comments:

All trip blank results were less than the LOD and LOQ (PQL).

v. Data quality or usability affected? Explain.

Comments:

e. Field Duplicate

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

● Yes ○ No Comments:

Field duplicate pair, 17FWAMW62-GWS/17FWAMW62Y-GWS was submitted for MNA parameters and 17FWAMW61-GWS/17FWAMW61X-GWS was submitted for SW8260SIM-LL.

ii. Submitted blind to lab?

● Yes ○ No Comments:

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

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

Where: R_1 = Sample Concentration
R_2 = Field Duplicate Concentration (R_1-R_2)

○ Yes ● No Comments:

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

E350.1 - Field duplicate pair, 17FWAMW62-GWS/17FWAMW62Y-GWS had poor duplicate precision for ammonia (63%). The results were qualified 'JD.'

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

○ Yes ○ No Comments:

E350.1 - Field duplicate pair, 17FWAMW62-GWS/17FWAMW62Y-GWS had poor duplicate precision for ammonia (63%). The results were qualified 'JD' and should be considered an estimate. The ammonia results were used for MNA calculations; therefore the effects were minimal.

Sample results qualified due to poor field duplicate precision were summarized in Attachment B-2, Table B-2-5.

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

○ Yes ○ No Comments:

Disposable sampling equipment was used.

i. All results less than PQL?

○ Yes ○ No Comments:

Disposable sampling equipment was used.

ii. If above PQL, what samples are affected?

Comments:

iii. Data quality or usability affected? Explain.

Comments:

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

a. Defined and appropriate?

○ Yes ○ No Comments:

Laboratory Data Review Checklist

Completed by:

Kari Hagen

Title:

Project Chemist

Date:

12/04/2017

CS Report Name:

2017 Former Communications Site Groundwater Monitoring Fort Wainwright, Alaska

Report Date:

10/31/2017

Consultant Firm:

Jacobs Engineering

Laboratory Name:

APPL Inc.-Clovis, CA

Laboratory Report Number:

83906

ADEC File Number:

108.38.085

Hazard Identification Number:

1. Laboratory

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

● Yes ○ No Comments:

All sample were received and analyzed by APPL Inc. in Clovis, CA.

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

● Yes ○ No Comments:

All sample were received and analyzed by APPL Inc. in Clovis, CA.

2. Chain of Custody (CoC)

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

● Yes ○ No Comments:

b. Correct analyses requested?

● Yes ○ No Comments:

3. Laboratory Sample Receipt Documentation

a. Sample/cooler temperature documented and within range at receipt (4° ± 2° C)?

● Yes ○ No Comments:

Cooler “Bluegrass Green” temp blank = 4.5° C, cooler temp = 2.8° C
Cooler “Pitch Black” temp blank = 5.0° C, cooler temp = 2.6° C
Cooler “Silver Fox” temp blank = 3.0° C, cooler temp = 1.8° C
Cooler “Blood Orange” temp blank = 5.0° C, cooler temp = 3.8° C

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

● Yes ○ No Comments:

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

● Yes ○ No Comments:

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

○ Yes ○ No Comments:

No discrepancies were noted.

e. Data quality or usability affected? Explain.

Comments:

The data quality and usability were not affected.

4. Case Narrative

a. Present and understandable?

● Yes ○ No Comments:

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

● Yes ○ No Comments:

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

c. Were all corrective actions documented?

○ Yes ○ No Comments:

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

Comments:

5. Samples Results

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

● Yes ○ No Comments:

b. All applicable holding times met?

● Yes ○ No Comments:

c. All soils reported on a dry weight basis?

○ Yes ○ No Comments:

Soil samples were not submitted with this project.

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

○ Yes ● No Comments:

For nondetect results, LODs were evaluated against the project cleanup levels.

AK103 - The LOD was greater than the project cleanup level for residual range organics (RRO) in sample 17FWAMW33-GWF.

SW8260C - The LOD was greater than the project cleanup level for 1,2,3-trichloropropane (TCP) in samples 17FWAMW33-GWF and 17FWAFCS-TB06.

e. Data quality or usability affected? Explain.

Comments:

AK103 - The LOD was greater than the project cleanup level for RRO in sample 17FWAMW33-GWF. The RRO result was nondetect and the LOD was 5.5 mg/L. Historically this well has exceeded the project cleanup level of 1.1 mg/L and did exceed during the 2017 spring sampling event. Although the sample result was nondetect, the result was not reliable.

SW8260C - TCP was not a contaminant of concern in the affected well.

Affected sample results are italicized and qualified `E' and are summarized in Attachment B-2, Table B-2-6.

6. QC Samples

a. Method Blank

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

● Yes ○ No Comments:

ii. All method blank results less than PQL?

● Yes ○ No 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 Comments:

No samples were affected by method blank contamination.

v. Data quality or usability affected? Explain.

Comments:

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 Comments:

LCS/LCSDs and MS/MSDs were analyzed per QSM 5.1 requirements.

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

○ Yes ● No Comments:

SW6010 - A laboratory duplicate was not analyzed in the batch, however a primary/field duplicate and LCS/LCSD were analyzed in the batch.

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 Comments:

MS/MSD %R:
AK102 - Diesel range organics was recovered low in the MS (51%) and MSD (48%).

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/MSD, and or sample/sample duplicate. (AK Petroleum methods 20%; all other analyses see the laboratory QC pages)

● Yes ○ No Comments:

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

Comments:

MS/MSD %R:
AK102 - Diesel range organics was recovered low in the MS (51%) and MSD (48%) affecting sample 17FWAMW35-

GWF.

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

● Yes ○ No Comments:

MS/MSD %R:
AK102 - Diesel range organics was recovered low in the MS (51%) and MSD (48%) affecting sample 17FWAMW35-GWF. The sample result was qualified 'JM-' to indicated the result may be biased low.

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

Comments:

MS/MSD %R:
AK102 - Diesel range organics was recovered low in the MS (51%) and MSD (48%) affecting sample 17FWAMW35-GWF. The sample result was qualified 'JM-' to indicated the result may be biased low. The sample result was significantly less than the project cleanup level, therefore the effects were minimal.

c. Surrogates - Organics Only

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

● Yes ○ No 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 Comments:

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

● Yes ○ No Comments:

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

○ Yes ○ No Comments:

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

i. One trip blank reported per matrix, analysis and cooler?

● Yes ○ No Comments:

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

● Yes ○ No Comments:

iii. All results less than PQL?

● Yes ○ No Comments:

iv. If above PQL, what samples are affected?

Comments:

All trip blank results were less than the LOD and LOQ (PQL).

v. Data quality or usability affected? Explain.

Comments:

e. Field Duplicate

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

○ Yes ● No Comments:

Two Field duplicate pairs were submitted with this SDG. Duplicate pair, 17FWAMW35-GWF/17FWAMW35X-GWF was submitted for monitored natural attenuation (MNA) parameters and 17FWAMW58-GWF/17FWAMW58Y-GWF was submitted for DRO/RRO.

ii. Submitted blind to lab?

● Yes ○ No Comments:

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

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

Where: R_1 = Sample Concentration
R_2 = Field Duplicate Concentration (R_1-R_2)

○ Yes ● No Comments:

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

E353.2 - Field duplicate pair, 17FWAMW35-GWF/17FWAMW35X-GWF had poor duplicate precision for phosphorus (32%). The results were qualified 'JD.'

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

○ Yes ○ No Comments:

E353.2 - Field duplicate pair, 17FWAMW35-GWF/17FWAMW35X-GWF had poor duplicate precision for phosphorus (32%). The results were qualified 'JD' and should be considered an estimate. The phosphorus results were used for MNA calculations; therefore the effects were minimal.

Sample results qualified due to poor field duplicate precision were summarized in Attachment B-2, Table B-2-5.

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

○ Yes ○ No Comments:

Disposable sampling equipment was used.

i. All results less than PQL?

○ Yes ○ No Comments:

Disposable sampling equipment was used.

ii. If above PQL, what samples are affected?

Comments:

iii. Data quality or usability affected? Explain.

Comments:

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

a. Defined and appropriate?

○ Yes ○ No Comments:

ATTACHMENT B-4
Laboratory Deliverables

(Provided separately on CD)

APPENDIX C
Field Notes and Forms

ATTACHMENT C-1

2017 Groundwater Logbooks

nvironmental Poly - 4 3/4 in x 7 1/2 in
32281 55011 2
SBN 978-1-932149-36-4

05M33101 Tanana Trails Groundwater Sampling

FORT WAINWRIGHT, AK
05M33101
USACE

11/4/15
to

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ALL-WEATHER
ENVIRONMENTAL FIELD BOOK
№ 550

TOZJ01
Tanana Trails (OU6)
Groundwater Sampling
AUTHORS:
Ida Petersen
Priyam Sharma
Dave Ward

HTRW-J07-05M33101-H04-0002

Location FTW, OU6 Date 7/18/17

Project / Client 05M33101/USACE

Tanana Trails Spring GW sampling

Weather: Sunny, calm, ~60°F

PPE: Modified Level D

Personnel: Dave Ward (Site Lead)
Matt Heiser (SSHO)
No post pass ~~Priyam Sharma~~ } Sampler
Patrik Sartz

Equipment: Peristaltic pump, YSI, interface probe, vehicles, wagons

0725 Calibration of YSIs, PIDs, loading vehicles.

Plan: Dave + Patrik: MW78+MW91, MW39+MW93, MW47+MW79, MW48, MW08, MW13
Matt: MW03, MW80, MW61, MW62

0820 Leaving FBX office

0850 Loaded drums + buckets at the Chip Barn.

0925 Dave, Patrik, + Matt at Tanana Tr to sample.

Dave, Patrik ~~on~~ on MW39 + MW91
Matt on MW03

Location FTW, OU6 Date 7/18/17

Project / Client 05M33101/ USACE

~1200 MW39 done
- mw91 - added 1/4" tubing inside the 1/2" tubing already in the well (the 1/4" tubing would not slide past 30' bgs on its own)
- Matt on MW80

Lunch

~1245 Dave + Patrik at DERA bldg but don't have the key (in Dave's cooler at MW91)

1315 - Patrik on ~~MW~~ MW78, Dave back to DERA bldg.
- Matt on MW61

1430 Dave leaving DERA bldg. Three drums labeled (see photos). MW03 + MW39 purge water in drum 01.

1500 Dave on MW91
1600 Matt on MW62
1615 Patrik on MW~~38~~47
1700 Dave finished MW91

DBW

Location FTW OU6 Tanana Trails Date 7/19/17
Wed
Project / Client 05M3301 - USACE

Spring Groundwater Sampling

0$\overset{7}{8}$00 Fbx office - PID, YSI calibration

0800 Head to site. Dave stopped at AIH

0830 Tailgate - Dave W, Matt H, Patrik S.
- Sunny, low 60s, calm

Goals: ~~Matt~~ Patrik: MW13, working N
Dave: MW93, then work S.
Matt: Wells off White St.

1230 Matt finishing lunch, Dave starting lunch, Patrik on MW08
Progress: Dave - MW93
Matt - MW28R, MW12R
Patrik - MW13

1300 Dave to DERA bldg, Patrik to lunch

1415 Dave on MW78 resample (the first time, it was sampled through the flow-through cell. Sharon said definitely resample (this is compliance, not investigation, and EPA is looking for any excuse to reject data)
Patrik on MW79.
Matt on MW33, then MW32R.

Location Tanana Tr Spr GW Date 7/19/17
contd
Project / Client

1630 Dave on MW48

1745 All sampling done

1800 Dave at DERA bldg; Matt + Patrik to office.

1850 Dave at office
- Coolers prepped for tomorrow
- Sampling sheets reviewed.

1930 Done for the day.

DBW

Location Tanana Trails Spring Date 7/20/17

Project / Client Groundwater Sampling (Thur)

0700 Fbx office - calibration, cooler loading

0815 On site; Dave Ward, Matt Heiser, Patrik Sartz

Weather: Overcast, low 60s, calm

Goals: Wells remaining:

MW35 (Dup/MS/MSD) - Dave
MW77 + MW38 - Patrik
MW37 + MW82
MW06A, MW58, MW64 - Matt

0845 Everyone sampling

1045 Dave moving to MW37.

1315 Lunch break for Dave. Patrik on MW38 (has had lunch), Matt on his 3rd well (has had lunch)

1355 DERA bldg to drop off purge water.

1430 Patrik on MW82 (last well)

1540 Dave to DERA bldg; Matt + Patrik to Fbx office

1610 Dave at Chip Barn connexes. G 6-gal purge water buckets placed in the

Location Tanana Tr Spr GW Date 7/20/17 contd

Project / Client

left-most connex. Traffic cones also put there, along with a wagon.

1640 Back at Fbx office

- Sample summary updated (Patrik + Matt)
- Samples stored
- Trucks emptied

1700 Done!

DBW

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Item No. 351FX
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2017 OU6 FALL GROUNDWATER
SAMPLING EVENT

LOGBOOK #1

Rite in the Rain
ALL-WEATHER
FIELD
Nº 351FX

9/27/2017 -

CONTRIBUTOR(S): PATRIK SARTZ

HTRW-J07-05M33101-H04-0008

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CONTENTS

PAGE	REFERENCE	DATE

Project name: 05M33101

Site ID: OU6 FCS Fall GW Sampling

Client: USACE

Date: September 27, 2017

Weather: Partly cloudy; 50°F; 5-10 mph
wind from SW

Personnel: Dave Ward (DW)
Taylor Laiti (TL)
Patrik Sartz (PS)
} Jacobs

PPE: Modified Level D

Daily objectives: Sample MW13 together, then split up and sample at least one well each.

0900 Meeting/orientation at Fbks field office; went over SPAs, plans for sampling effort; tailgate safety forms.

1030 Packed/loaded gear in to vehicles, drove to FTW

1215 Arrived MW13
Sampled well as a team

1415 Departed for MW62

1420 Arrived at MW62; checked in w/ resident about access to back yard. Approved

1450 Started purging well

1520 Finished purging, met stability

1525 Started sampling

1600 Finished sampling

1630 At MW39, helping DW to pack up/decon equipment

1650 Departed FTW

1710 Arrived Jacobs Fbks field office; unloaded equipment

Daily summary: MW62 = (2) primary DRO/RRO
Primary + dup MNA parameters

9/27/2017

Project ID: 05M33101
Site ID: OU6 FCS Fall 2017 GW Sampling
Client: USACE
Date: 9/28/2017

Weather: Rainy; 45°F; no wind

Personnel: Dave Ward (DW)
Ida Petersen (IP)
Taylor Laiti (TL) Jacob
Patrik Sartz (GPS)

PPE: Modified Level D

Daily objectives: Sample MW79, MW08, MW48, MW12R

0730 - Tailgate at FWAs field office
- Calibrated sampling equipment

8:30 Loaded gear into vehicles; departed for FTW

09:30 Arrived at FTW / MW79
10:01 Start purging
See Groundwater Sampling data Sheet for well information

1019 Finish purging
1028 Start Sampling
17FWAMW79-GWF
17FWAMW79Y-GWF
1105 Finish sampling

1140 Set up at MW48
1201 Start purging
See Groundwater Sampling Data Sheet for well information
1225 Finish purging
1225 Start sampling
17FWAMW48-GWF
1250 Finish sampling

1315 Set up at MW12R
1403 Start purging
See Groundwater Sampling Data Sheet for well information
1436 Finish purging
1440 Start sampling
17FWAMW12R-GWF

1456 Finish sampling

1525 Set up at MW08

1554 Start purging

See Groundwater sampling Data Sheet for well information

1615 Finish purging

1618 Start sampling 17FWAMW08-GWF

1631 Finish sampling

1650 Depart FTW

1710 Arrive Jacobs Fbks field office; unload gear

1835 End of activities

Daily summary: sampled MW79, MW4B, MW12R, and MW08 (all primary)

9/28/2017

Project ID: 05M33101

Site ID: OU6 FCS Fall GW Sampling

Client: USACE

Date: 9/29/2017

Weather: Cloudy; 36-45°F; no wind

Personnel: Dave Ward (DW)
Ida Petersen (IP)
Patrik Sartz (PS)
Taylor Laiti (TL)
} Jacobs

PPE: Modified Level D

Daily objectives: Finish sampling (nine wells remaining); return rental equipment

0730 Met at Fbks field office; calibrated equipment

0830 Morning tailgate safety meeting

0845 Packed/loaded everything in to vehicles

0900-0930 Did work not related to project

0930 Departed Fbks field office

0945 Set up at MW33

1015 Start purging

See Groundwater Sampling Data Sheet for well information

1048 Finish purging

1052 Start sampling

17FWAMW33-GWF

1115 Finish sampling

1145 Set up at MW28

1213 Start purging

See Groundwater Sampling Data Sheet for well information

1231 Finish purging

1235 Start Sampling

17FWA MW 28-GWF

1255 Finish sampling

1310 Set up at MW32R

1322 Start purging

See Groundwater Sampling Data Sheet for well information

1407 Finish purging

1408 Start sampling

17FWAMW32R-GWF

1424 Finish sampling

1450 Measure stickup height at MW28

1500 Pick up socket + wrench from DW, bolt tightening at MW32R

1510 Drop off equipment for TTT w/ TL

1515 Depart FTW

1540 Arrive Fbks field office

1550 Unload and unpack sampling/field equipment; place samples in to fridge

1700 Prepare daily sitrep for DW review

End of activities

Daily summary; sampled MW33, MW28, & MW32R: all primary, no duplicates or MS/MSD.

9/29/2017

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Tanana Trails Groundwater Sampling

9/27/17 –

LOGBOOK #2

Rite in the Rain

ALL-WEATHER

FIELD

Nº 351FX

Authors: David Ward

HTRW - J07 - 05M 33101 - H04 - 0009

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CONTENTS

9/27/17 (Wed) Day 1 Fall GW Sampling

0900 Fairbanks office - R-E Woods, Patrik Sartz, Taylor Laiti, Angus King, me, Kevin Maher
- Safety discussion, SFA reviews
- GW sampling SOP review,
- Load trucks

1145 Heading to post

1230 Angus couldn't get a pass. Some database showed he was born in NZ, so they asked if he was US citizen...
- Taylor + I got passes (1 wk)
- Patrik already had a pass

1240 Taylor + I met Patrik at MW13 to sample it as a group

1400 Finished at MW13, took photo.
- Needs to be trimmed (previously cut with a Sawzall).

1430 Patrik - MW62 Taylor - MW78 me - MW39

9/27/17 contd

1650 Everyone done w/ wells.
- Photos of MW78, MW39
- Patrik, Taylor returning to office
- Beautiful weather: Sunny, calm, 58°F.

1710 DERA bldg to drop off waste water.

1735 ~~Hed~~ Heading to the office.

DBW

Thursday
9/28/17 Day 2 Fall GW Sampling

0730 - Office - calibration; collect equipment, glassware, forms
- Today's team: me, Paatrik Sartz, Taylor Laiti, Ida Petersen

0830 Tailgate
0920 Heading to site
- AIH errand

Weather: steady rain, calm, 38°F

Planned work:
Patrik - MW08, MW48, MW79; MW12R?
Taylor - MW64, MW58, MW06A; MW47?
Ida - MW03, MW080, MW061; MW91?
me - well maintenance, waste water management.

0935 helped Ida set up at MW03

1020 MW03 maintenance
- Trimmed 0.07' w/ square cut
- Stickup = 2.97'
- Need scissors to trim sampling tubing

9/28/17 contd

1045 MW03 (Ida)

1103 MW~~48~~ 47 (Taylor) + MW79 (Patrik)
- picked up waste water

1120 MW03 - picked up Ida's water

1135 PX - restroom

1155 DERA bldg - dropped off water

1220 Chip Barn for more buckets (but key is needed to open connexes).

1245 Taylor at MWG4. Neither ~~he~~ he nor I could find MW58. Under a car tire?

1300 Patrik finishing MW48. Peri pump cable is intermittent.

1330 Picked up spare cable from TTI.

1400 Patrick at MW72R. Gave him spare cable.

1410 R-E to bring more sample containers —
3 500 ml poly (HCl, HNO_3, unp) +
3 40 ml VOAs.

1420 Texted R-E — we need more DI water.

1500 Rounded up waste water

1510 DERA bldg

1545 MW91 w/ Ida — 3/8" outer tubing fell down well, couldn't be retrieved ⇒ pulled 1/4" tubing, will try replacing w/ HDPE.

9/28/17 contd

1620 MW13 — trimmed tubing so that the plug would fit. Set up w/ short silicone.

1630 MW79 - ~~ct~~ cut off 0.23'
- stickup = 2.75'
- Needs plastic plug (has metal)
- Needs pea gravel
- Drill chuck came loose + cutter fell down well. Fish w/ a ~~mg~~ magnet?

1700 DBW ~~1500~~ Collected waste water from Patrik (MW08) and Taylor (~~MW58~~) DBW (MW58).

1715 DERA bldg to drop off waste water.

1730 Returning to the office.

DBW

9/29/17 Friday. Day 3 Fall GW Sampling

0730 Office

0820 Safety meeting: me, Patrik, Taylor, Ada.

0900 Leaving office
Weather: overcast calm 40°F

0910 - 1030 Errands - AIH, Targa (internal cutter), Home Depot (pea gravel)

1040 On site; checked on everyone.

1100 MW~~47~~79 - fished out cutter, replaced metal plug w/ plastic

1125 Helped Ada set up at MW93

1145 MW79 topped off w/ pea gravel; label refreshed.
Collected water from everyone

1230 DERA bldg.

1245 PX for lunch

1315 Leaving PX
- Buckets to Ada, Taylor

1330 MW79 - refreshed white label on outer casing.

1340 MW78 - can't ~~do~~ trim because internal ~~ed~~ cutter is defective.
- Added pea gravel (1.3 bags) but another 0.75 bags needed.

1350 Heading to Targa

1430 Back on site

9/29/17 cont'd

1445 MW77 w/ Taylor. Pump needs a shim to work here.

1500 MW78 again. Trimmed 0.24'
- Stickup = 3.13'
- Tubing is down ~1', needs to be fished.
- Added plug w/ tie-off on bottom
- Refreshed label

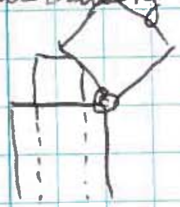
1520 MW39 - Riser is okay.
- Swapped plugs for a flam one
- Re-labeled.

1525 MW91 Relabeled.

1530 MW47 Relabeled, lock lubed.

1555 MW48 Relabeled.

1540 MW08 - It is Sch 80. Internal cutter won't fit, but it could be cut w/ a saw because outer casing is hinged 3" down.



- Refreshed label

MW80 - Refreshed label.
- Needs pea gravel in outer casing

cont'd on p. 15 →

Waste Log

Drum 17FWA-FCSGWF-01 (55 gal)

Date	Well	Vol (gal)	ΣV (gal)
9/27/17	MW13	4	
↓	MW62	3.5	
	MW78	5	
	MW39	6	22.5
9/28/17	MW03	3.5	
↓	MW47	3	29

↑ Should have gone into the TCP drum (#02)

Date	Well	Vol (gal)	ΣV (gal)
9/29/17	MW3[illegible]7 DEW	3	
↓	MW77	3	
	MW33	1.5	
	MW32R	3.5	
	MW82	2.5	42.5

Waste Log (cont'd)

Drum 17FWA-FCSGWF-02 (15 gal)

Date	Well	Vol (gal)	ΣV (gal)
9/28/17	MW79	4	4

Drum 17FWA-FCSGWF-03 (55 gal)

Date	Well	Vol (gal)	ΣVol (g)
9/28/17	~~MW03~~ DEW	4	
	MW48	3.5	
	MW12R	5	
	MW64	3	
	MW80	3	

↑ Should have gone in TCE drum

(also MW61 should have gone in TCE drum)

Date	Well	Vol (gal)	ΣVol (g)
↓	MW06A	3.5	
	MW91	2.5	
	MW08	3	
	MW38	3	30.5
9/29/17	MW35	2	
↓	MW58	3.5	
	MW33	4.5	
	MW32R	3	
	MW28	3.5	
	MW93	3.5	50.5 full

Well Label Refresh Punch List

~~MW03~~
~~M06A~~
~~MW08~~
~~MW12R~~
~~MW13~~
~~MW28~~
~~MW32R~~
~~MW33~~
~~MW35~~
~~MW37~~
~~MW38~~
~~MW39~~
~~MW47~~
~~MW48~~
~~MW58~~
~~MW61~~
~~MW62~~
~~MW64~~
~~MW77~~
~~MW78~~
~~MW79~~
~~MW80~~
~~MW82~~
~~MW91~~
~~MW93~~

Well Maintenance Punch List

Well	Task (lined through when done)
~~MW08~~	○ ~~Trim riser with saw.~~
	○ ~~Add sand/pea gravel to protective casing.~~ ○ ~~Trim tubing, [illegible].~~
~~MW35~~	~~Re-label~~
~~MW39~~	~~Re-label~~
	~~[illegible]~~ DBW ~~← not needed~~
~~MW~~~~28~~ 77 DBW	~~Fish out cutter from well~~
	~~Add sand/pea gravel to protective casing.~~
~~MW78~~	~~Trim riser.~~
	~~Fill burrows with pea gravel/sand.~~
MW91	Fish 62' of 1/2" poly tubing (optional)
	~~Insta~~ Install 1/4" HDPE to 62.5' btoc.
MW93	Install 1/4" HDPE to 62.7' btoc.
All	Re-label as needed.
~~MW78~~	~~Fish tubing~~
	~~Finish adding gravel to outer casing.~~
~~MW93~~	~~Replace plug w/ tie-off style.~~
~~MW80~~	~~Add pea gravel to outer casing.~~
~~MW63~~	~~" " " " " "~~
MW58	Replace bolts, chase threads ($\frac{5}{16}$ NC)

DBW

9/29/17 cont'd (from p. 9)

1610 MW61 Refreshed label.

1615 DERA bldg to drop off waste water

1700 Heading to the office.

DBW

9/30/17 Well Maintenance (Saturday)

Supplies needed: saw

✓ pea gravel (4 bags)
✓ well plugs (4)
✓ well plugs w/ tie off (2)
✓ pin flag for fishing
✓ saw

0830 Office
0850 Home Depot
0915 On site! Ida is virtual buddy.
- Safety mtg form
- SPA for well maintenance created.

Weather: overcast, ~~calm~~ W7 DBW, 34° F.

0930-0945 MW78 - fished tubing and tied it off.
- finished filling outer casing w/ pea gravel.

0950-1025 MW08 - Trimmed 0.14'. Stickup = 2.42'
- filled outer casing w/ pea gravel.
- Re-worked tubing

1030-1100 MW80 - filled outer casing w/ pea gravel
- Re-worked tubing

1105-1115 MW03 - filled outer casing w/ pea gravel.
- label is good.

1120 MW13 - Refreshed labels

1125-1140 ~~MW62~~ DBW MW64, WW33 - Refreshed labels

9/30/17 cont'd
- Reworked tubing.

1140-1150 MW~~#~~12R - Refreshed label

1155-1205 MW93 - Changed plug to tie-off style
- Tied off tubing w/ seine twine instead of survey flagging.
- Refreshed label

1215 MW62 - label is good.

1220-1225 MW28 - Refreshed label
- Re-worked tubing

1225- MW~~#~~32R - Refreshed label

1240 - scooped out extra sand from vault.

1240- MWOCA - Trimmed 0.06'. Stickup = 2.64'

1315 - filled outer casing w/ pea gravel
- Refreshed label

1320-1350 PX for restroom lunch.

1355 MW35 - Refreshed label

1400 MW37 - Refreshed label

1405-1430 MW58 - Refreshed label
- Reworked tubing.
- South bolt won't tighten all the way

1435-1450 MW77 Trimmed 0.07'. Stickup = 3.46'

9/30/17 cont'd

-> Reworked tubing
- Refreshed label.
- Replaced metal plug with plastic
- filled outer casing w/ pea gravel

1450 - 1455 MW38 - Refreshed label
- Reworked tubing

1500 - 1505 MW82 Refreshed label.

1530 Back at the office; I let Ida know.

DBW

Item No. 351FX
ISBN: 978-1-60134-186-6

Made in the USA
US Pat No. 6,863,940

6 32281 35119 1

2017 OU6 FALL GROUNDWATER
SAMPLING EVENT
9/27/2017 -
LOGBOOK #3

Author: T. Laiti

HTRW-J07-05M33101-H04-0010

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CONTENTS

PAGE	REFERENCE	DATE

Taku GW Sampling Fall 9/27/17

Weather: Sunny, windy, 50°F

PPE: Modified level D.

Personnel: Dave Ward
Patrick Sartz
Taylor Laiti

Daily objectives: Sample MW13 as a group.
Sample 1-2 more wells per person.

1230: Arrive at MW13 for groupwell

1400: Leaving MW13

1415: Arrive at MW78. Well is missing PVC cap. Small whole has formed along side concrete base, fairly deep

1640: Leaving MW78 and leaving base for the day.

9/27/17

9/28/17
~~9/27/17~~ TL 9/29

2017 Taku GW Sampling Fall

Location: Fort Wainwright,

PPE: Modified level D

Personnel: Dave Ward
Patrik Sartz
Ida Petersen
Taylor Laiti

Daily Objectives: Sample wells MW06A, MW47, MW58, and MW64 depending on time

Weather: Rain, about 50°

0940: Arrive on base at MW47

1130: Leaving MW47

1140: Arrive at MW64

1330: Leaving MW64

1340: Arrive at MW06A

1520: leaving MW06A

1540: Arrive at MW38, couldn't find MW58 will sample it tomorrow

1710: Leaving MW38. Offsite for day.

9/28/17

2017 Taku GW Sampling Fall 9/29/17

Location: Fort Wainwright, Taku Gardens

Weather: 30°-41°F, cloudy

PPE: Modified Level D

Personnel: Dave Ward
Ida Petersen
Patrik Sartz
Taylor Lait.

Daily Objectives: Sample wells MW58, MW37, and MW77

0935: Arrive on base at MW58.

1125: Leaving MW58

1145: Arrive at MW 37

1245: Could not get water to pump at MW37 left and will return later

1255: Arrive at MW77

1440: Leaving MW77

1445: Arrive at MW37

1600: Leaving MW37 and leaving base.

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USACE

9/28/17
to

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ALL-WEATHER
FIELD
Nº 351FX

Former Communications Site
05M33101
OU6 Fall
Groundwater Sampling Event
2017
LOGBOOK #4

Authors:
1. Petersen

HTRW-J07-05M33101-H04-0011

INCH
1
2
3
4
5
6

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USACE

FCS - Fall 2017 GW Sampling 9/28/17

0730 Morning Safety tailgate

PERSONNEL

Dave Ward (SM), (Glen) Patrik Sartz, Taylor Laiti, [illegible]

Ida Petersen (samplers)

PPE: Level D mod + raingear & warm layers

WEATHER 35°F forecast to low 40s°F, rain

EQUIPMENT (for IP)

- ▷ YSI 556 MPS # 13E103099
- ▷ Solinst interface probe # 57928
- ▷ HF Sci. MicroTPW turbidimeter 20000 # 201403321
- ▷ MiniRAE 3000 PID # 914824
- ▷ TT Peristaltic pump # PERI-101398

For calibrations & cal checks, see individual Cal. Sheets

For well, purging, and sampling info, see individual Groundwater Sampling Data Sheets.

0900 Go to Fort Wainwright, need current insurance & registration.

USACE

FCS - Fall 2017 GW Sampling 9/28/17

0950 Arrive at MW03

1006 Begin purge

1051 Finish

1052 Begin Sample

1108 Finish

1150 IP Arrives at MW61

1202 Begin purge

1237 Finish

1237 Begin Sample

1259 Finish

1315 IP Arrives at MW80

1327 Begin purge

1352 Finish

1354 [illegible] 9/28 ~~1354~~ Begin sample

1403 Finish

1500 IP Arrives at MW91

1512 Begin Purge

1542 Finish

1544 Begin Sample

1547 Finish

1615 IP departs site.

USACE 05M33101 35°F

OU6 FCS - Fall GW Sampling 9/29/17

0730 Meet at Fairbanks office. Calibrate &
check calibrations of equipment
See individual calibration sheets.

0830 Morning safety tailgate

PERSONNEL: DW, GPS, TL, IP (see pg 4)

WEATHER: mid 30s to 41°F, cloudy

PPE: Level D mod

EQUIPMENT:

- ▷ YSI 556 MPS # 13E103091
- ▷ Solinst interface probe # 100-15, 3649-1
- ▷ HF Sci. MicroTPW turbidimeter 20000 # 201106174
- ▷ Mini RAE 3000 PID (10.6 eV) #
- ▷ TTT Peristaltic pump # 101398

For well, Purging, and Sampling info, see individual sheets.

0924 IP arrives at MW35
0935 Begin purge
1000 Finish
1002 Begin Sample
~1040 Finish

USACE 05M33101 37°F

OU6 FCS - Fall GW Sampling 9/29/17

1125 IP arrives at MW93
1136 Begin purge
1226 Finish
1229 Begin ~~purg~~ IP 9/29 sample
1232 Finish

1300 IP arrives at MW82
1318 Begin purge
1353 Finish
1354 Begin Sample
1410 Finish

1445 IP leaves site

9/29

ATTACHMENT C-2

2017 Well Decommissioning Logbook

05M33101

FORT WAINWRIGHT, AK
05M33101 T02J01
Baltimore AE
GW Well Decommissioning

start date:
6/23/16

Rite in the Rain®
ALL-WEATHER
FIELD BOOK
№ 350NF

AUTHORS:
Mike Pelka
Priyam Sharma

HTRW-J07-05M33101-H04-0003

FTW, AK 05/25/2017

05M33101 USACE

WEATHER: CLOUDY 50's

PPE: MOD LEVEL D

PERSONNEL: BUCK UNSDERFER

LEVI MAINARD

EQUIPMENT: GEOPROBE 7822 DT, HANDYMAN JACK,
HAND TOOLS (SHOVEL, DIG BAR)

OBJECTIVES: DECOMMISSION WELLS

0900 SAFETY TAILGATE MEETING

1030 ARRIVE @ EIELSON AFB TO
PROCURE HAND TOOLS

1115 ARRIVE @ FT WAINWRIGHT TO
GET ADDRESSES OF RESIDENTIAL
PROPERTIES THAT NEED TO BE
NOTIFIED OF WELL DECOMMISSIONING

1145 ARRIVE @ BUILDING 3015 TO
PROCURE FINAL SIGNATURES
FOR DIG PERMIT

FTW, AK 05/25/2017

05M33101 USACE

1300 ARRIVE @ MW 81 TO START
HAND DIGGING AROUND WELL +
BOLLARDS

1405 ARRIVE @ CHIP BARN TO PICK UP
GEOPROBE

1420 ARRIVE BACK @ MW81 TO PULL
BOLLARDS + OUTER CASING

2 + 3 ⓑⓤ

1430 PULLED BOLLARDS ~~1 + 2~~ (1 BOLLARD
WAS REMOVED 6/28/16)

1435 REMOVED OUTER CASING (3.7' STICKUP)
PVC PIPE + PRE PACKED SCREEN
WAS REMOVED WITH OUTER CASING

1445 FILLED HOLE WITH BENTONITE
+ HYDRATED BENTONITE TO
2' BGS THEN TO GRADE WITH
SAND (1 BAG BENTONITE / ½ BAG
SAND)

1455 LEFT MW81 TO B1420 TO
PUT UP FENCING PER
REQUEST FROM SHARON RICHMOND
MW81 DECOMMISSIONED

1600 ARRIVE BACK @ MW81

1630 LEFT MW81 TO TAKE WASTE CASING/
BOLLARDS TO CHIP BARN... WILL
OBTAIN 1 CUBIC YARD OF TOP SOIL
TO FILL REMAINING VOLUME OF
HAND DUG AREA

1650 LEAVE CHIP BARN

DAILY SUMMARY

* DECOMMISSIONED 1 WELL
MW81

WASTE GENERATED

* 2 BOLLARDS
1 6.5" OUTER CASING
PVC PIPE + SCREEN

END OF DAY
BU

WEATHER: CLOUDY 50'S LIGHT RAIN (MORNING)
PPE: MOD LEVEL D
PERSONNEL: BUCK UNDDERKER
LEVI MAINARD
EQUIPMENT: GEOPROBE 7822DT, HANDYMAN
JACK, HAND TOOLS
OBJECTIVES: DECOMMISSION WELLS

0730 SAFETY TAILGATE MEETING

0830 ARRIVE @ CHIP BARN TO
GET TRAILER FOR TOPSOIL TO
FILL MW81

0915 ARRIVE @ GREAT NORTHWEST INC.
TO PROCURE TOPSOIL (1 CUBIC YARD)

1010 ARRIVE @ MW81 LOCATION TO FILL
WITH TOPSOIL + COVER WITH
GRASS SEED

1045 GRASS SEED + TOPSOIL APPLIED
@ MW81 MW81 FINISHED
(LANDSCAPED)

1110 ARRIVE @ MW14 (FLUSH MOUNT)

1125 ATTEMPTED TO KNOCK OUT BOTTOM OF SCREEN WITH DRILL RIG TOOLING. SCREEN IS FILLED WITH SAND TO 15.8' BGS. DECISION WAS MADE TO ABANDON WELL IN PLACE AS WE WERE UNABLE TO KNOCK OUT BOTTOM OF SCREEN.

1145 FILLED REMAINING SCREEN WITH SILICA SAND + FILLED CASING WITH HYDRATED BENTONITE (1/2 BAG SAND/1/2 BAG BENTONITE)

1200 PULLED OUT FLUSH MOUNT CASING AND FILLED HOLE WITH FAST SETTING CONCRETE. CONES PLACED ON ALL FOUR CORNERS OF CONCRETE PAD TO ALERT RESIDENTS OF WET CONCRETE

1205 MW14 DECOMMISSIONED

1300 ARRIVE @ MW19 (FLUSH MOUNT)

1315 ATTEMPTED TO KNOCK OUT BOTTOM OF SCREEN WITH DRILL RIG TOOLING. SCREEN IS FILLED WITH SAND TO 16.6' BGS. DECISION WAS MADE TO ABANDON WELL IN PLACE AS WE WERE UNABLE TO KNOCK OUT BOTTOM OF SCREEN.

1330 FILLED REMAINING EXPOSED SCREEN WITH SILICA SAND + FILLED CASING WITH HYDRATED BENTONITE (1/2 BAG SAND/1/2 BAG BENTONITE)

1350 PULLED OUT FLUSH MOUNT CASING AND FILLED HOLE WITH FAST SETTING CONCRETE. THREE CONES PLACED AROUND CONCRETE PAD TO ALERT RESIDENTS OF WET CONCRETE.

FTW 05/26/2017
05M33101 USACE

1400 MW19 DECOMMISSIONED

1415 ARRIVE @ CHIP BARN TO
DROP OFF WASTE CASINGS

1439 LEAVE FT. WAINWRIGHT TO
TRANSFER STATION TO
DUMP PERSONAL WASTE/TRASH

DAILY SUMMARY
* DECOMMISSIONED 2 WELLS
MW14 + MW19

* WASTE GENERATED
* 2 FLUSH MOUNT CASINGS

END OF DAY
BU

FTW 06/02/2017
05M33101 USACE

WEATHER: SUNNY MID 60'S
PPE: MOD LEVEL D
PERSONNEL: IDA PETERSEN LEVI MAINARD
BUCK UNSDERFER ANTHONY FLETES
EQUIPMENT: GEOPROBE TOOLING,
HANDYMAN JACK, HAND TOOLS
OBJECTIVES: DECOMMISSIONING WELLS

0815 SAFETY TAILGATE MEETING

1340 ARRIVE @ MW70 (STICKUP)
CASING STICK UP 2.45'
WEATHER: 70°F a few clouds & a light
breeze

1500 managd to pull outer casing out
partialy, but had to cut the PVC
well

1510 ATTEMPTED TO KNOCK OUT
BOTTOM OF SCREEN WITH
DRILL RIG TOOLING. SCREEN S
FILLED WITH SAND TO 19.83'
BGS. DECISION WAS MADE
TO ABANDON WELL IN PLACE

FTW 06/02/2017

05M33101 USACE

1520 FILLED REMAINING EXPOSED SCREEN WITH SILICA + FILLED PVC CASING WITH HYDRATED BENTONITE (1/2 BAG SAND / 1/2 BAG BENTONITE)
PVC PIPE CUT 1.5' BGS

1525 COVERED MW70 AREA WITH TOPSOIL + GRASS SEED

1530 MW70 DECOMMISSIONED

1540 ARRIVE @ MW 68
STICK UP CASING 2.7 FT

1555 EJ ~~MEAD~~ PULLED OUT OUTER CASING WITH HANDYMAN JACK

1600 ATTEMPED TO KNOCK OUT BOTTOM OF SCREEN WITH DRILL RIG TOOLING. SCREEN IS FILLED WITH SAND TO 19' BGS. DECISION WAS MADE TO ABANDON WELL IN PLACE.

FTW 06/02/2017

05M33101 USACE

1605 FILLED REMAINING EXPOSED SCREEN WITH SILICA SAND AFTER CUTTING PVC PIPE 1.5' BGS. FILLED CASING WITH HYDRATED BENTONITE (1/2 BAG SAND / 2/3 BAG BENTONITE

1615 COVERED MW 68 AREA WITH TOPSOIL + GRASS SEED

1620 MW68 DECOMMISSIONED

1647 ARRIVE @ MW 63
STICK UP CASING 2.9'

1655 PULLED OUT OUTER CASING WITH HANDYMAN JACK

1700 ATTEMPTED TO KNOCK OUT BOTTOM OF SCREEN WITH DRILL RIG TOOLING. SCREEN WAS FILLED WITH SAND TO 16.6 BGS. DECISION WAS MADE TO ABANDON WELL IN PLACE.

FTW 06/02/2017

05M33101 USACE

1710 FILLED REMAINING EXPOSED SCREEN WITH SILICA SAND AFTER CUTTING PVC PIPE TO 2' BGS. FILLED PVC CASING WITH HYDRATED BENTONITE (1/4 SAND / 1/2 BAG BENTONITE)

1715 COVERED MW63 WITH TOPSOIL + GRASS SEED

1720 MW 63 DECOMMISSIONED

1730 ARRIVE @ CHIP BARN TO DISPOSE OF WASTE

CREATE SUPERSACK 17FCS-MW81-9501 WITH MONITORING WELL WASTE

1750 LEAVE FT. WAINWRIGHT

FTW 06/02/2017

05M33101 USACE

* DAILY SUMMARY

- DECOMMISSIONED 3 WELLS MW 63, MW 68, + MW 70

* WASTE GENERATED

3 6.5 INCH OUTER CASINGS

~5 FEET 2 INCH PVC PIPE

END OF DAY

BU

ATTACHMENT C-3

ADEC Well Abandonment Directives

From: Richmond, Sharon
To: Sharma, Priyam
Subject: FW: Well decommissioning at OU6
Date: Thursday, June 23, 2016 6:02:18 PM

From: Richmond, Sharon
Sent: Thursday, June 23, 2016 5:51 PM
To: dennis.shepard@alaska.gov; 'Hazlett, Bob C POA'
Cc: USACE - Brock, Bob; Fleming, Daniel; Heikkila, Terry
Subject: Well decommissioning at OU6

Hi all,

This email documents a phone discussion between me and Dennis Shepard (ADEC). While decommissioning wells, our field crew discovered that the bottom of one well had silted in so much that they were unable to knock out the bottom before pulling up the pvc casing. After the pvc casing was removed, most of the boring collapsed in on itself, leaving an open hole approximately 2 feet deep. This hole was filled with bentonite, covered with topsoil, and then re-seeded. Dennis indicated that if this happens at other wells, he preferred that the wells be abandoned in place by cutting the pvc riser pipe about 1.5 feet below ground surface, filling the casing with bentonite, hydrating the bentonite, filling the hole with topsoil, and then reseeding.

I will be out of the office between June 24 and July 4. Please contact Dan Fleming if you have any questions about monitoring well decommissioning while I am out.

Thank you.

Sharon

Sharon Richmond, PhD | **JACOBS** | Environmental Project Manager, Federal Operations | 907.451.0550 | 907.451.0551 fax |
sharon.richmond@jacobs.com

From: Shepard, Dennis (DEC)
To: Richmond, Sharon
Cc: USACE - Hazlett, Bob; Sharma, Priyam; Smith, Kristina A CIV USARMY IMCOM PACIFIC (US) (kristina.a.smith14.civ@mail.mil); Cheryl Churchman (cheryl.m.churchman.civ@mail.mil); Heather Moncrief (heather.h.moncrief.civ@mail.mil); brian.adams3@us.army.mil
Subject: RE: phone recap
Date: Thursday, July 07, 2016 12:54:15 PM

Hi Sharon,

Yes. Please abandon in place/ decommission the well in accordance with the ADEC Monitoring Well Guidance (September 2013).

Thanks, Dennis

From: Richmond, Sharon [mailto:Sharon.Richmond@jacobs.com]
Sent: Thursday, July 7, 2016 12:37 PM
To: Shepard, Dennis (DEC) <dennis.shepard@alaska.gov>
Cc: USACE - Hazlett, Bob <Bob.C.Hazlett@usace.army.mil>; Sharma, Priyam <Priyam.Sharma@jacobs.com>; Smith, Kristina A CIV USARMY IMCOM PACIFIC (US) (kristina.a.smith14.civ@mail.mil) <kristina.a.smith14.civ@mail.mil>; Cheryl Churchman (cheryl.m.churchman.civ@mail.mil) <cheryl.m.churchman.civ@mail.mil>; Heather Moncrief (heather.h.moncrief.civ@mail.mil) <heather.h.moncrief.civ@mail.mil>; brian.adams3@us.army.mil <brian.m.adams18.civ@mail.mil>
Subject: phone recap

Hi Dennis,

Just want to recap our phone discussion today. The Geoprobe tooling will not fit into the 1" well casing to knock out the bottom of MW06B so it will be abandoned in place. Although we didn't discuss this as I believe it was assumed, abandonment procedures will follow ADEC guidance. As discussed, abandonment procedures will be discussed in the report.

Thank you for the quick response.

Sharon

Sharon Richmond, PhD | **JACOBS** | Environmental Project Manager, Federal Operations | 907.451.0550 | 907.451.0551 fax |
sharon.richmond@jacobs.com

ATTACHMENT C-4

2017 Well Decommissioning Forms

Well Decommissioning Report

JACOBS

Well ID, Date, Location

Well ID MW14	Well Owner U.S. Army Garrison Fort Wainwright, AK	Project Number 05M33101	Date of Work 5/26/17
Site Name OU6/Former Communication Site	Location (e.g., city, state) Fort Wainwright, AK	Geographical Coordinates 468452.312 east / long 7188828.877 north / lat 447.236 (ft) system, units	

Rationale, Contractors

Reason for Decommissioning Removal from groundwater monitoring network	Decommissioning Oversight Jacobs Engineering 4300 B St, Suite 600 Anchorage, AK 99503 907-563-3322 Field Lead: Buck Unsderfor	Drilling Subcontractor → Same

Well Dimensions

Type of Construction	Stickup (ft ags)	Total Depth As Built (ft btoc)	Total Depth As-Is (ft btoc)	Depth to Water (ft btoc)
2 in. PVC Pipe 6 in. outer casing leveled to ground surface	flush			

Decommissioning Details

Decommissioning Procedure	Decommissioning Notes
1125: Attempted to knock out bottom of screen with drill rig tooling, screen is filled with sand to 14.8' bgs, Decision was mad to abandon well in place 1145: filled screen with silica sand, filled casing with hydrated bentonite 1200: Pulled flushmount casing and filled with fast setting concrete	

Qty of Sand	Type of Sand	Qty of Bentonite	Type of Bentonite
1/2 bag	Silica	1/2 bag	3/8" coarse

Waste Handling

Waste Generated	Waste Disposition
Poly tube outer casing PVC pipe sand	Super sack at chip barn

Well Decommissioning Report

JACOBS

Well ID, Date, Location

Well ID	Well Owner	Project Number	Date of Work
MW19	U.S. Army Garrison Fort Wainwright, AK	05M33101	/ /

Site Name	Location (e.g., city, state)	Geographical Coordinates
OU6/Former Communication Site	Fort Wainwright, AK	____ east / long ____ north / lat ____ system, units

Rationale, Contractors

Reason for Decommissioning	Decommissioning Oversight	Drilling Subcontractor
Removal from groundwater monitoring network	Jacobs Engineering 4300 B St, Suite 600 Anchorage, AK 99503 907-563-3322 Field Lead: Buck Ausdorfer	TD Samp

Well Dimensions

Type of Construction	Stickup (ft ags)	Total Depth As Built (ft btoc)	Total Depth As-Is (ft btoc)	Depth to Water (ft btoc)
2 in pvc casing 6in outer casing leveled to ground surface	flush			

Decommissioning Details

Decommissioning Procedure	Decommissioning Notes
1315: Attempted to knock out bottom of screen with drilling tooling, screen is filled with sand to 16.6' bgs. Decision made to abandon well in place 1330: filled remaining exposed screen with silica sand and filled casing with hydrated bentonite 1350: pulled out flush mount casing and filled hole with fast setting concrete	

Qty of Sand	Type of Sand	Qty of Bentonite	Type of Bentonite
1/2 bag	silica	1/2 bag	coars 3/8"

Waste Handling

Waste Generated	Waste Disposition
Poly tubing outer casing PVC pipe Sand	Super-sack at chip barn

Well Decommissioning Report

JACOBS

Well ID, Date, Location

Well ID	Well Owner	Project Number	Date of Work
MW63	U.S. Army Garrison Fort Wainwright, AK	05M33101	6/12/17

Site Name	Location (e.g., city, state)	Geographical Coordinates
OU6/Former Communication Site	Fort Wainwright, AK	________ east / long ________ north / lat ________ system, units

Rationale, Contractors

Reason for Decommissioning	Decommissioning Oversight	Drilling Subcontractor
Removal from groundwater monitoring network	Jacobs Engineering 4300 B St, Suite 600 Anchorage, AK 99503 907-563-3322 Field Lead: Buck vanderfeer	→ same

Well Dimensions

Type of Construction	Stickup (ft ags)	Total Depth As Built (ft btoc)	Total Depth As-Is (ft btoc)	Depth to Water (ft btoc)
2 in PVC pipe 6 inc outer casing	2.4'			

Decommissioning Details

Decommissioning Procedure | Decommissioning Notes

1655: Pulled outer casing with handy man Jack

1700: Attempted to knock out bottom of screen with drill rig tooling screen was
filled with sand to 16.6' bgs decision was made to abandon well in place

1710: filled exposed screen with sand after cutting PVC pipe to 2', filled with
hydrated bentonite

1715: topped with topsoil and seed.

Qty of Sand	Type of Sand	Qty of Bentonite	Type of Bentonite
1/4	silica	1/2	coarse 3/8"

Waste Handling

Waste Generated	Waste Disposition
Poly tube PVC pipe outer casing sand	super sack at chip barn

Well Decommissioning Report

Well ID, Date, Location

Well ID	Well Owner	Project Number	Date of Work
MW68	U.S. Army Garrison Fort Wainwright, AK	05M33101	6 /12 /17

Site Name	Location (e.g., city, state)	Geographical Coordinates
OU6/Former Communication Site	Fort Wainwright, AK	__________ east / long __________ north / lat __________ system, units

Rationale, Contractors

Reason for Decommissioning	Decommissioning Oversight	Drilling Subcontractor
Removal from groundwater monitoring network	Jacobs Engineering 4300 B St, Suite 600 Anchorage, AK 99503 907-563-3322 Field Lead: Buck Ungdafer	Same

Well Dimensions

Type of Construction	Stickup (ft ags)	Total Depth As Built (ft btoc)	Total Depth As-Is (ft btoc)	Depth to Water (ft btoc)
2 in PVC pipe 6 in outer casing	2.7'			

Decommissioning Details

Decommissioning Procedure	Decommissioning Notes
1555: Pulled outer casing 1600: Attempted to knock out bottom of screen with drill rig tooling. Screen is filled with sand to 19' bgs. Decision made to abandon well in place 1605: Filled remaining screen with sand after cutting PVC pipe, filled casing with hydrated bentonite 1615: covered with top soil and seed	

Qty of Sand	Type of Sand	Qty of Bentonite	Type of Bentonite
1/2 bag	Silica	2/3 bag	coarse 3/8"

Waste Handling

Waste Generated	Waste Disposition
Poly tubing PVC pipe Outer casing Sand	Super sack at chip barn

Well Decommissioning Report

Well ID, Date, Location

Well ID	Well Owner	Project Number	Date of Work
MW 70	U.S. Army Garrison Fort Wainwright, AK	05M33101	6/2/17

Site Name	Location (e.g., city, state)	Geographical Coordinates
OU6/Former Communication Site	Fort Wainwright, AK	468579.511 east / long 7189006.124 north / lat 451.190 (ft) system, units

Rationale, Contractors

Reason for Decommissioning	Decommissioning Oversight	Drilling Subcontractor
Removal from groundwater monitoring network	Jacobs Engineering 4300 B St, Suite 600 Anchorage, AK 99503 907-563-3322 Field Lead: Buck Unsderfer	→ Same

Well Dimensions

Type of Construction	Stickup (ft ags)	Total Depth As Built (ft btoc)	Total Depth As-Is (ft btoc)	Depth to Water (ft btoc)
2 in PVC pipe 6 in outer casing	2.45		Not measured	

Decommissioning Details

Decommissioning Procedure	Decommissioning Notes
1340: Arrive at MW70 1400: Managed to pull outer casing out partially but had to cut PVC well 1510: Attempted to knock out bottom of screen with drill rig tooling, screen is filled with sand to 19.83' bgs. Abandoned well in place 1520: filled exposed screen with silica and filled PVC casing with bentonite, hydrate 1525: Covered with soil and seed	

Qty of Sand	Type of Sand	Qty of Bentonite	Type of Bentonite
1/2 bag	Silica	1/2 bag	Coarse 3/8"

Waste Handling

Waste Generated	Waste Disposition
Poly tube Sand outer casing PVC pipe	Supersack at chip barn

Well Decommissioning Report

JACOBS

Well ID, Date, Location

Well ID	Well Owner	Project Number	Date of Work
MW81	U.S. Army Garrison Fort Wainwright, AK	05M33101	5/25/17

Site Name	Location (e.g., city, state)	Geographical Coordinates
OU6/Former Communication Site	Fort Wainwright, AK	468222.197(ft) east / long 7188873.892(ft) north / lat 451.253 (ft) system, units

Rationale, Contractors

Reason for Decommissioning	Decommissioning Oversight	Drilling Subcontractor
Removal from groundwater monitoring network	Jacobs Engineering 4300 B St, Suite 600 Anchorage, AK 99503 907-563-3322 Field Lead: Buck Ungderfor	→ Same

Well Dimensions

Type of Construction	Stickup (ft ags)	Total Depth As Built (ft btoc)	Total Depth As-Is (ft btoc)	Depth to Water (ft btoc)
2 in PVC pipe 3 bollards 6 in outer casing	3.7'			

Decommissioning Details

Decommissioning Procedure	Decommissioning Notes
1430: Pulled Bollards 1435: Removed outer casing, PVC pipe, and pre packed screen 1445: Filled hole with bentonite and hydrated bentonite, topped off 2' with sand 1630: filled remainder of hand dug hole with top soil	

Qty of Sand	Type of Sand	Qty of Bentonite	Type of Bentonite
1/2 bag	silica	1 bag	coarse 3/8"

Waste Handling

Waste Generated	Waste Disposition
Polytubing Outercasing PVC pipe bollards sand	Super sack at chip barn

ATTACHMENT C-5

2017 Spring & Fall Groundwater Sampling Data Sheets

Groundwater Sampling Data Sheet

JACOBS

Site Name	Event	Well ID	Project Number
Former Communications Site	Spring Ground Water Sampling	MW03	05M33101
Weather Conditions	PID Readings of Total VOCs (ppm)	Date	Sampler Initials
70°F, Sunny	Ambient 0.0 Breathing Zone 0.0 In Well 0.0	7/18/17	MH

Well Information

Well Integrity	TOC Stickup (ft ags)	Well Casing Material	Casing Diameter(in) / Gallons per linear foot(gal/ft)
[✓ Good] Fair Poor.	1.84	[✓ PVC] SS	1 / 0.041 [✓ 2/ 0.163] 4 / 0.653 6 / 1.469

Description of Damage (if present)	Photo Taken
None present 2230' BTOC final depth	[✓ Yes] No

Depth to Product (ft)	Depth to GW (ft btoc)	Total Depth of Casing (ft btoc)	Product Thickness (ft) and Volume Recovered (mL)
—	15.07	21.34 previous ~~(final)~~	—

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

SHOW WORK Max Purge Volume = (21.34 † ft – 15.07 ft) ∗ 0.163 gal/ft ∗ 3 = 3.07 gal ∗ 3.785 L/gal = 11.6 L

Well Purging Information

Start Time	Finish Time	Depth of Tubing (ft btoc)	Equipment Used for Purging
1004	1044	16.07	Bailer [✓ Peristaltic Pump] ~~Submersible Pump~~ MH 7/18/17

Color	Odor	Sheen	Purged Dry	Meter Used During Purging
Clear Cloudy [✓ Brown] Other:	[✓ None] Moderate Faint Strong	Yes [✓ No]	Yes [✓ No]	[✓ YSI Multi Meter] [✓ HF Scientific Turbidimeter]

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

Time (HH:mm)	Volume (Gallons or [✓ Liters])		Acceptable Range to Demonstrate Stability						
			not applicable	± 3%	± 10% or 0.2 mg/L (whichever is greater)	not applicable	± 10 mV	± 10% or ±1 NTU or less than 5 NTU	Drawdown < 0.3 ft
	Change	Total	Temperature (°C)	Conductivity (µS/cm)	DO ~~(mg/L)~~ %	pH (std units)	ORP (mV)	Turbidity (NTU)	Water Level (feet btoc)
1004	–	0	—	—	—	—	—	—	15.08
1009	125	125	755	391	10 7	6.72	-17 9	105.7	15.08
1014	15	2.75	7 01	388	5 3	6.78	-45.8	56.26	15.08
1019	175	4.5	701	389	4 1	6.81	-50.0	32.17	15.07
1024	1.5	6.0	6.98	388 ✓	3.3 ↓	6.81	-56.3 ↓	19.71 ↓	15.08
1029	1.75	7.75	6.87	388 ✓	3.1 ↓	6.82	-58.4 ↓	15.16 ↓	15.08
1034	1.5	9.25	6.86	386 ✓	2.6 ↓	6.82	-65.1 ✓	11.32 ↓	15.07
1039	1.75	11.00	6.67	384 ✓	2.3 ↓	6.86	-50.0 ↓	9.81 ↓	15.08
1044	1.75	12.75	6.61	385 ✓	2.1 ↓	6.84	-54.2 ↑	6.84 ↓	15.07

Sample Collection Information

Start Time	Finish Time / Date	Depth of Tubing (ft btoc)	Equipment Used for Sampling
1045	1104	16.07	[✓ Peristaltic Pump] Submersible Pump

SAMPLE ID: 17FWAMW03-GWS QC: ~~Dup~~ ~~MS/MSD~~ Ferrous Iron (Fe^{2+}) (mg/L) = 3.6

Container/Preservative	Analysis Requested	Notes
(2) 1 L amber/4C	DRO/RRO	Previous Bottom of well 19.5' bgs
(1) 500 mL poly/H2SO4	Nitrate/ Nitrite/ Ammonia	used peristaltic pump for purging
(1) 500 mL poly/4C	Sulfate/ Alkalinity	+ Sampling.
(1) 500 mL poly/HNO3	Potassium/Manganese/Phosphorus	
(3) 40 mL/HCl	Methane	Sample time = 1045

Groundwater Sampling Data Sheet

JACOBS

Site Name	Event	Well ID	Project Number
Former Communications Site	Spring Ground Water Sampling	MW06A	05M33101
Weather Conditions	PID Readings of Total VOCs (ppm)	Date	Sampler Initials
70°F, Sunny	Ambient 0.0 Breathing Zone 0.0 In Well 3.7	7/20/17	MH

Well Information

Well Integrity	TOC Stickup (ft ags)	Well Casing Material	Casing Diameter(in) / Gallons per linear foot(gal/ft)
[✓ Good] Fair Poor	2.66'	[✓ PVC] SS	1 / 0.041 [✓ 2/ 0.163] 4 / 0.653 6 / 1.469

Description of Damage (if present)	Photo Taken
—	[✓ Yes] No

Depth to Product (ft)	Depth to GW (ft btoc)	Total Depth of Casing (ft btoc)	Product Thickness (ft) and Volume Recovered (mL)
—	15.60	22.71 (final)	—

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

SHOW WORK Max Purge Volume = (22.88 † ft – 15.60 ft) ∗ 0.163 gal/ft ∗ 3 = 3.56 gal ∗ 3.785 L/gal = 13.5 L

Well Purging Information

Start Time	Finish Time	Depth of Tubing (ft btoc)	Equipment Used for Purging
1045	1113	17.00	Bailer [✓ Peristaltic Pump] ~~[✓ Submersible Pump]~~ MH

Color	Odor	Sheen	Purged Dry	Meter Used During Purging
[✓ Clear] Cloudy [✓ Brown] Other:	None Moderate [✓ Faint] Strong	[✓ Yes] ~~[✓ No]~~ MH	Yes [✓ No]	[✓ YSI Multi Meter] [✓ HF Scientific Turbidimeter]

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

Time (HH:mm)	Volume (Gallons or ~~Liters~~)		Acceptable Range to Demonstrate Stability						
			not applicable	± 3%	± 10% or 0 2 mg/L (whichever is greater)	not applicable	± 10 mV	± 10% or ±1 NTU or less than 5 NTU	Drawdown < 0.3 ft
	Change	Total	Temperature (°C)	Conductivity (µS/cm)	DO (mg/L)	pH (std units)	ORP (mV)	Turbidity (NTU)	Water Level (feet btoc)
1045	—	0							15.61
1050	1.25	1.25	5.66	403	1.46	6.61	71.6	19.71	15.61
1055	1.25	2.5	5.79	397	1.13	6.68	63.0	7.10	15.61
1100	1.5	4.0	5.24	389↓	0.89↓	6.72	58.6↓	4.46↓	15.61
1105	1.25	5.25	5.30	383↓	0.84↓	6.76	54.7✓	1.72↓	15.62
1110	1.5	6.75	5.29	382✓	0.77✓	6.78	51.7✓	1.35✓	15.61

Sample Collection Information

Start Time	Finish Time / Date	Depth of Tubing (ft btoc)	Equipment Used for Sampling
1115	1135	17.00	[✓ Peristaltic Pump] Submersible Pump

SAMPLE ID: 17FWAMW06A-GWS QC: ~~Dup MS/MSD~~ Ferrous Iron (Fe^{2+}) (mg/L) = 5.6

Container/Preservative	Analysis Requested	Notes
(2) 1 L amber/4C	DRO/RRO	Previous Bottom of well 20.5' bgs
(1) 500 mL poly/H2SO4	Nitrate/ Nitrite/ Ammonia	Sample time = 1115
(1) 500 mL poly/4C	Sulfate/ Alkalinity	Sheen Appeared After 2 L of purging
(1) 500 mL poly/HNO3	Potassium/Manganese/Phosphorus	
(3) 40 mL/HCl	Methane	

Groundwater Sampling Data Sheet

JACOBS

Site Name	Event	Well ID	Project Number
Former Communications Site	**Spring Ground Water Sampling**	**MW08**	**05M33101**
Weather Conditions	PID Readings of Total VOCs (ppm)	Date	Sampler Initials
70°F; Sunny	Ambient 0.0 Breathing Zone 0.0 In Well 0.1	7/19/2017	P.S.

Well Information

Well Integrity	TOC Stickup (ft ags)	Well Casing Material	Casing Diameter(in) / Gallons per linear foot(gal/ft)
Good [✓ Fair] Poor	2.53	[✓ PVC] SS	1 / 0.041 [✓ 2/ 0.163] 4 / 0.653 6 / 1.469

Description of Damage (if present)	Photo Taken
No sand in protective casing; barely able to open cap of protective casing; frost jacking?	[✓ Yes] No

Depth to Product (ft)	Depth to GW (ft btoc)	Total Depth of Casing (ft btoc)	Product Thickness (ft) and Volume Recovered (mL)
N/A	17.80	22.28 (final)	N/A

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

=4.48 =0.73

SHOW WORK Max Purge Volume = (22.28 ft – 17.8 ft) * 0.163 gal/ft * 3 = 2.19 gal * 3.785 L/gal = 8.29 L

Well Purging Information

Start Time	Finish Time	Depth of Tubing (ft btoc)	Equipment Used for Purging
11:47	12:16	19.0	Bailer [✓ Peristaltic Pump] ~~Submersible Pump~~ P.S.

Color	Odor	Sheen	Purged Dry	Meter Used During Purging
[✓ Clear] Cloudy Brown Other:	[✓ None] Moderate Faint Strong	Yes [✓ No]	Yes [✓ No]	[✓ YSI Multi Meter] [✓ HF Scientific Turbidimeter]

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

Time (HH:mm)	Volume (Gallons or Liters)		Acceptable Range to Demonstrate Stability						
			not applicable	± 3%	± 10% or 0.2 mg/L (whichever is greater)	not applicable	± 10 mV	± 10% or ±1 NTU or less than 5 NTU	Drawdown < 0.3 ft
	Change	Total	Temperature (°C)	Sp. Conductivity (µS/cm)	DO (mg/L)	pH (std units)	ORP (mV)	Turbidity (NTU)	Water Level (feet btoc)
11:52	2.0	2.0	5.06	599	6.68	6.44	117.0 ✓	0.11 ✓	17.91 ✓
11:57	1.75	3.75	4.78	577 ✓	5.04 –	6.51	118.3 ✓	0.01 ✓	17.91 ✓
12:02	1.75	5.50	5.05	576 ✓	4.34 –	6.54	120.4 ✓	0.00 ✓	17.91 ✓
12:07	1.5	7.00	4.79	577 ✓	3.98 –	6.55	122.3 ✓	0.00 ✓	17.91 ✓
12:12	1.75	~~8.75~~	4.64	577	3.78 –	6.56	123.6	0.01	17.91
12:16	1.00	9.75							
		→ max purge volume							

Sample Collection Information

Start Time	Finish Time / Date	Depth of Tubing (ft btoc)	Equipment Used for Sampling
12:28	12:45 / 7/19/17	19.0	[✓ Peristaltic Pump] Submersible Pump
SAMPLE ID: 17FWAMW08-GWS		QC: ~~Dup MS/MSD~~	Ferrous Iron (Fe^{2+}) (mg/L) = 0.0

Container/Preservative	Analysis Requested	Notes
6 ~~(3)~~ 40 mL VOA/HCl	SW8260SIM	Previous Bottom of well 19' bgs
(1) 500 mL poly/H2SO4	Nitrate/ Nitrite/ Ammonia	
(1) 500 mL poly/4C	Sulfate/ Alkalinity	
(1) 500 mL poly/HNO3	Potassium/Manganese/Phosphorus	
(3) 40 mL VOA/HCl	Methane	

Groundwater Sampling Data Sheet

JACOBS

Site Name	Event	Well ID	Project Number
Former Communications Site	**Spring Ground Water Sampling**	**MW12R**	**05M33101**

Weather Conditions	PID Readings of Total VOCs (ppm)	Date	Sampler Initials
70°F, Sunny	Ambient 0.0 Breathing Zone 0.0 In Well 198.6	7/19/17	MH

Well Information

Well Integrity	TOC Stickup (ft ags)	Well Casing Material	Casing Diameter(in) / Gallons per linear foot(gal/ft)
[✓ Good] Fair Poor	-0.21	[✓ PVC] SS	1 / 0.041 [✓ 2/ 0.163] 4 / 0.653 6 / 1.469

Description of Damage (if present)	Photo Taken
NONE	[✓ Yes] No

Depth to Product (ft)	Depth to GW (ft btoc)	Total Depth of Casing (ft btoc)	Product Thickness (ft) and Volume Recovered (mL)
—	12.31	22.49 (final)	—

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

SHOW WORK Max Purge Volume = (22.51 † ft – 12.31 ft) ∗ 0.163 gal/ft ∗ 3 = 4.98 gal ∗ 3.785 L/gal = 18.9 L

Well Purging Information

Start Time	Finish Time	Depth of Tubing (ft btoc)	Equipment Used for Purging
1115	1143	14.00	Bailer [✓ Peristaltic Pump] ~~Submersible Pump~~ MH

Color	Odor	Sheen	Purged Dry	Meter Used During Purging
[✓ Clear] Cloudy Brown Other:	[✓ None] Moderate Faint Strong	Yes [✓ No]	Yes [✓ No]	[✓ YSI Multi Meter] [✓ HF Scientific Turbidimeter]

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

Time (HH:mm)	Volume (Gallons or [✓ Liters])		Acceptable Range to Demonstrate Stability						
			not applicable	± 3%	± 10% or 0.2 mg/L (whichever is greater)	not applicable	± 10 mV	± 10% or ±1 NTU or less than 5 NTU	Drawdown < 0.3 ft
	Change	Total	Temperature (°C)	Conductivity (µS/cm)	DO (mg/L)	pH (std units)	ORP (mV)	Turbidity (NTU)	Water Level (feet btoc)
1115	—	0	—	—	—	—	—	—	12.31
1120	2	2	5.98	289	1.57	6.86	-66.4	1.23	12.32
1125	2	4	6.03	278	1.32	6.95	-65.3	0.12	12.33
1130	2	6	6.32	274↓	1.05↓	7.00	-61.8✓	0.05✓	12.34
1135	2	8	6.14	272✓	1.00↓	7.03	-69.4✓	0.15✓	12.34
1140	2	10	6.13	271✓	0.94✓	7.03	-66.0✓	0.00✓	12.34

Sample Collection Information

Start Time	Finish Time / Date	Depth of Tubing (ft btoc)	Equipment Used for Sampling
1145	1200	14.00	[✓ Peristaltic Pump] Submersible Pump

SAMPLE ID: 17FWAMW12R-GWS QC: ~~Dup~~ ~~MS/MSD~~ Ferrous Iron (Fe^{2+}) (mg/L) = 3.2

Container/Preservative	Analysis Requested	Notes
(2) 1 L amber/4C	DRO/RRO	Previous Bottom of well 20.62' bgs
(1) 500 mL poly/H2SO4	Nitrate/ Nitrite/ Ammonia	sample time: 1145
(1) 500 mL poly/4C	Sulfate/ Alkalinity	
(1) 500 mL poly/HNO3	Potassium/Manganese/Phosphorus	
(3) 40 mL VOA/HCl	Methane	

Groundwater Sampling Data Sheet

JACOBS

Site Name	Event	Well ID	Project Number
Former Communications Site	**Spring Ground Water Sampling**	**MW13**	**05M33101**

Weather Conditions	PID Readings of Total VOCs (ppm)	Date	Sampler Initials
Sunny; 65°F	Ambient 0.0 Breathing Zone 0.0 In Well 0.0	7/19/2017	PS.

Well Information

P.S. Well Integrity	TOC Stickup (ft ags)	Well Casing Material	Casing Diameter(in) / Gallons per linear foot(gal/ft)
~~Good~~ [✓ Fair] Poor	3.10	[✓ PVC] SS	1 / 0.041 [✓ 2/ 0.163] 4 / 0.653 6 / 1.469

Description of Damage (if present)	Photo Taken
Casing cut by Matt in 2016? ~~None~~ P.S. Might be frostjacking: barely able to close protective casing lid	[✓ Yes] No

Depth to Product (ft) P.S.	Depth to GW (ft btoc)	Total Depth of Casing (ft btoc)	Product Thickness (ft) and Volume Recovered (mL)
~~15.68 (btoc)~~ N/A	15.68	19.25 (final)	N/A

Max purge volume (3 well casing volumes) = [previous† total depth of casing (ft) – (depth to water[GW table well] or top of filter pack[submerged well] (ft)] * gallons per linear foot of casing * 3 =3.94 =0.64

SHOW WORK Max Purge Volume = (19.62 † ft – 15.68 ft) * 0.163 gal/ft * 3 = 1.93 gal * 3.785 L/gal = 7.29 L

Well Purging Information

Start Time	Finish Time	Depth of Tubing (ft btoc)	Equipment Used for Purging P.S.
09:14	09:39	17.0	Bailer [✓ Peristaltic Pump] ~~Submersible Pump~~

Color	Odor	Sheen	Purged Dry	~~Meter Used During Purging~~
[✓ Clear] Cloudy Brown Other:	[✓ None] Moderate Faint Strong	Yes [✓ No]	Yes [✓ No]	[✓ YSI Multi Meter] [✓ HF Scientific Turbidimeter]

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

Time (HH:mm)	Volume (Gallons or Liters)		Acceptable Range to Demonstrate Stability						
			not applicable	± 3%	± 10% or 0.2 mg/L (whichever is greater)	not applicable	± 10 mV	± 10% or ±1 NTU or less than 5 NTU	Drawdown < 0.3 ft
	Change	Total	Temperature (°C)	Sp. Conductivity (µS/cm)	DO (mg/L)	pH (std units)	ORP (mV)	Turbidity (NTU)	Water Level (feet btoc)
09:19	2.5	2.5	3.36	923 ✓	2.08	6.49	94.7	4.39 ✓	15.78 ✓
09:24	2.0	4.5	3.05	922 ✓	1.78 ✓	6.50	81.3 -	2.45 ✓	15.78 ✓
09:29	2.5	7.0	3.03	918 ✓	1.84 ✓	6.52	71.6 -	1.11 ✓	15.78 ✓
09:34	2.0	9.0	3.20	913	1.53	6.52	67.0 -	0.91 ✓	15.78 ✓
09:39	1.5	10.5							
		↑	→ max	purge	volume				

Sample Collection Information

Start Time	Finish Time / Date	Depth of Tubing (ft btoc)	Equipment Used for Sampling
09.40	09:59	17.0	[✓ Peristaltic Pump] Submersible Pump

SAMPLE ID: 17FWAMW13-GWS QC: ~~Dup — MS/MSD~~ Ferrous Iron (Fe^{2+}) (mg/L) = 1.8

Container/Preservative	Analysis Requested	Notes
6 ~~(3)~~ 40 mL VOA/HCl	SW8260SIM	Previous Bottom of well 17' bgs
(1) 500 mL poly/H2SO4	Nitrate/ Nitrite/ Ammonia	
(1) 500 mL poly/4C	Sulfate/ Alkalinity	
(1) 500 mL poly/HNO3	Potassium/Manganese/Phosphorus	
(3) 40 mL VOA/HCl	Methane	

Groundwater Sampling Data Sheet

JACOBS

Site Name	Event	Well ID	Project Number
Former Communications Site	**Spring Ground Water Sampling**	**MW28**	**05M33101**
Weather Conditions	PID Readings of Total VOCs (ppm)	Date	Sampler Initials
65°F, sunny	Ambient 0.0 Breathing Zone 0.0 In Well 0.0	7/19/17	MH

Well Information

Well Integrity	TOC Stickup (ft ags)	Well Casing Material	Casing Diameter(in) / Gallons per linear foot(gal/ft)
[✓ Good] Fair Poor	2.21	[✓ PVC] SS	1 / 0.041 [✓ 2/ 0.163] 4 / 0.653 6 / 1.469

Description of Damage (if present)	Photo Taken
NONE	[✓ Yes] No

Depth to Product (ft)	Depth to GW (ft btoc)	Total Depth of Casing (ft btoc)	Product Thickness (ft) and Volume Recovered (mL)
—	16.91	19.07 (final)	—

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

SHOW WORK Max Purge Volume = (19.1 † ft – 16.91 ft) * 0.163 gal/ft * 3 = 1.07 gal * 3.785 L/gal = 4.05 L

Well Purging Information

Start Time	Finish Time	Depth of Tubing (ft btoc)	Equipment Used for Purging
0930	0951	18.00	Bailer [✓ Peristaltic Pump] Submersible Pump MH

Color	Odor	Sheen	Purged Dry	Meter Used During Purging
[✓ Clear] Cloudy Brown Other:	[✓ None] Moderate Faint Strong	Yes [✓ No]	Yes [✓ No]	[✓ YSI Multi Meter] [✓ HF Scientific Turbidimeter]

Purging reached: Stability [✓ Max Vol] | Purge water was: Treated [✓ Stored] Other Note:

Time (HH:mm)	Volume (Gallons or Liters)		Acceptable Range to Demonstrate Stability						
			not applicable	± 3%	± 10% or 0.2 mg/L (whichever is greater)	not applicable	± 10 mV	± 10% or ±1 NTU or less than 5 NTU	Drawdown < 0.3 ft
	Change	Total	Temperature (°C)	Conductivity (µS/cm)	DO (mg/L)	pH (std units)	ORP (mV)	Turbidity (NTU)	Water Level (feet btoc)
0930	—	0	—						16.95
0935	1.5	1.5	8.79	447	2.41	6.65	153.0	5.45	16.95
0940	1.5	3.0	8.87	453	1.66	6.71	150.5	2.74	16.94
0945	1.5	4.5	8.93	458✓	1.30↓	6.74	149.5✓	1.65↓	16.95
0950	1.5	6.0	8.74	459✓	1.21↓	6.76	149.1✓	0.70✓	16.95

Sample Collection Information

Start Time	Finish Time / Date	Depth of Tubing (ft btoc)	Equipment Used for Sampling
0953	1009	18.00	[✓ Peristaltic Pump] Submersible Pump
SAMPLE ID: 17FWAMW28-GWS		QC: ~~Dup MS/MSD~~	Ferrous Iron (Fe^{2+}) (mg/L) = 0.0

Container/Preservative	Analysis Requested	Notes
(2) 1 L amber/4C	DRO/RRO	Previous Bottom of well 18.5' bgs
(1) 500 mL poly/H2SO4	Nitrate/ Nitrite/ Ammonia	sample time = 0953
(1) 500 mL poly/4C	Sulfate/ Alkalinity	
(1) 500 mL poly/HNO3	Potassium/Manganese/Phosphorus	
(3) 40 mL VOA/HCl	Methane	

Groundwater Sampling Data Sheet

JACOBS

Site Name	Event	Well ID	Project Number
Former Communications Site	Spring Ground Water Sampling	MW32R	05M33101
Weather Conditions	PID Readings of Total VOCs (ppm)	Date	Sampler Initials
80°F, Sunny	Ambient 0.0 Breathing Zone 0.0 In Well 5.6	7/19/17	MH

Well Information

Well Integrity	TOC Stickup (ft ags)	Well Casing Material	Casing Diameter(in) / Gallons per linear foot(gal/ft)
[✓ Good] Fair Poor	−0.28	[✓ PVC] SS	1 / 0.041 [✓ 2/ 0.163] 4 / 0.653 6 / 1.469

Description of Damage (if present)	Photo Taken
—	[✓ Yes] No

Depth to Product (ft)	Depth to GW (ft btoc)	Total Depth of Casing (ft btoc)	Product Thickness (ft) and Volume Recovered (mL)
—	13.87	22.90 (final)	—

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

SHOW WORK Max Purge Volume = (22.91 † ft – 13.87 ft) ∗ 0.163 gal/ft ∗ 3 = 4.42 gal ∗ 3.785 L/gal = 16.7 L

Well Purging Information

Start Time	Finish Time	Depth of Tubing (ft btoc)	Equipment Used for Purging
1600	1636	15.00	Bailer ~~Peristaltic Pump~~ [✓ Submersible Pump] MH

Color	Odor	Sheen	Purged Dry	Meter Used During Purging
[✓ Clear] Cloudy Brown Other:	[✓ None] Moderate Faint Strong	Yes [✓ No]	Yes [✓ No]	[✓ YSI Multi Meter] [✓ HF Scientific Turbidimeter]

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

Time (HH:mm)	Volume (Gallons or Liters)		Acceptable Range to Demonstrate Stability						
			not applicable	± 3%	± 10% or 0.2 mg/L (whichever is greater)	not applicable	± 10 mV	± 10% or ±1 NTU or less than 5 NTU	Drawdown < 0.3 ft
	Change	Total	Temperature (°C)	Conductivity (µS/cm)	DO (mg/L)	pH (std units)	ORP (mV)	Turbidity (NTU)	Water Level (feet btoc)
1600	—	0	—	—	—	—	—	—	1388
1605	1.5	15	7.51	626	4.15	6 47	131 7	13.29	13.89
1610	1.5	30	7.98	627	3.81	6.51	131 6	5.39	13.90
1615	1 5	4 5	7.56	623✓	3.84✓	6.53	131 7✓	4 64↓	13.90
1620	1.5	6.0	7 67	614✓	3.51✓	6.53	131.9✓	7.31↑	13.89
1625	1.5	7.5	7.18	612✓	3.61✓	6.55	133.9✓	4.34↓	13.89
1630	1.5	90	7.39	605✓	3.37✓	6.56	134.6✓	2.86↓	13.89
1635	1.75	10.75	6.95	598✓	3 34✓	6.56	136.6✓	2.27✓	13.89

Sample Collection Information

Start Time	Finish Time / Date	Depth of Tubing (ft btoc)	Equipment Used for Sampling
1638	1700	15.00	[✓ Peristaltic Pump] Submersible Pump

SAMPLE ID: 17FWAMW32R-GWS QC: ~~Dup MS/MSD~~ Ferrous Iron (Fe^{2+}) (mg/L) = 0.0

Container/Preservative	Analysis Requested	Notes
(2) 1 L amber/4C	DRO/RRO	
6 ~~(3)~~ 40 mL VOA/HCl	SW8260SIM	Previous Bottom of well 21.32' bgs
(1) 500 mL poly/H2SO4	Nitrate/ Nitrite/ Ammonia	Sample Time = 1638
(1) 500 mL poly/4C	Sulfate/ Alkalinity	
(1) 500 mL poly/HNO3	Potassium/Manganese/Phosphorus	
(3) 40 mL VOA/HCl	Methane	

Groundwater Sampling Data Sheet

JACOBS

Site Name	Event	Well ID	Project Number
Former Communications Site	Spring Ground Water Sampling	MW33	05M33101

Weather Conditions	PID Readings of Total VOCs (ppm)	Date	Sampler Initials
75°F, Sunny	Ambient 0.0 Breathing Zone 0.2 In Well 23.4	7/19/17	MH

Well Information

Well Integrity	TOC Stickup (ft ags)	Well Casing Material	Casing Diameter(in) / Gallons per linear foot(gal/ft)
[✓ Good] Fair Poor	2.35	[✓ PVC] SS	1 / 0.041 [✓ 2/ 0.163] 4 / 0.653 6 / 1.469

Description of Damage (if present)	Photo Taken
—	[✓ Yes] No

Depth to Product (ft)	Depth to GW (ft btoc)	Total Depth of Casing (ft btoc)	Product Thickness (ft) and Volume Recovered (mL)
—	15.24	MH ~~16.50~~ 20.90' (final)	—

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

SHOW WORK Max Purge Volume = (20.91 † ft – 15.24 ft) ∗ 0.163 gal/ft ∗ 3 = 2.77 gal ∗ 3.785 L/gal = 10.5 L

Well Purging Information

Start Time	Finish Time	Depth of Tubing (ft btoc)	Equipment Used for Purging
1350	1432	16:50	Bailer [✓ Peristaltic Pump] ~~[✓ Submersible Pump]~~ MH

Color	Odor	Sheen	Purged Dry	Meter Used During Purging
[✓ Clear] Cloudy [✓ Brown] Other:	None Moderate [✓ Faint] Strong	[✓ Yes] ~~[✓ No]~~ MH	Yes [✓ No]	[✓ YSI Multi Meter] [✓ HF Scientific Turbidimeter]

Purging reached: Stability [✓ Max Vol] | Purge water was: Treated [✓ Stored] Other Note:

Time (HH:mm)	Volume (Gallons or [✓ Liters])		Acceptable Range to Demonstrate Stability						
			not applicable	± 3%	± 10% or 0.2 mg/L (whichever is greater)	not applicable	± 10 mV	± 10% or ±1 NTU or less than 5 NTU	Drawdown < 0.3 ft
	Change	Total	Temperature (°C)	Conductivity (µS/cm)	DO (mg/L)	pH (std units)	ORP (mV)	Turbidity (NTU)	Water Level (feet btoc)
1350	–	0	—	—	—	—	—	—	15.48
1355	1.5	1.5	7.15	610	1.62	6.50	-59.7	20.46	15.48
1400	1.5	3.0	6.72	575	1.32	6.59	-44.5	23.98	15.48
1405	1.5	4.5	6.56	555↓	1.14↓	6.66	-72.8↓	24.50↑	15.48
1410	1.5	6.0	6.67	549↓	1.04↓	6.70	-61.0↑	25.78↑	15.49
1415	1.5	7.5	6.46	540✓	0.94✓	6.72	-57.6↑	26.62 ✓ MH	15.51
1420	1.5	9.0	6.52	537✓	0.90✓	6.73	-73.5↓	26.74✓	15.51
1425	1.5	10.5	6.51	531✓	0.88✓	6.75	-70.9↑	23.80↓	15.51
1430	1.5	12.0	5.96	523✓	0.86✓	6.76	-57.2↑	24.04↑	15.51

Sample Collection Information

Start Time	Finish Time / Date	Depth of Tubing (ft btoc)	Equipment Used for Sampling
1435	1455	16.50	[✓ Peristaltic Pump] Submersible Pump

SAMPLE ID: 17FWAMW33-GWS | QC: ~~Dup MS/MSD~~ | Ferrous Iron (Fe^{2+}) (mg/L) = 1.6

Container/Preservative	Analysis Requested
(2) 1 L amber/4C	DRO/RRO
(1) 500 mL poly/H2SO4	Nitrate/ Nitrite/ Ammonia
(1) 500 mL poly/4C	Sulfate/ Alkalinity
(1) 500 mL poly/HNO3	Potassium/Manganese/Phosphorus
(3) 40 mL VOA/HCl	Methane

Notes sample time = 1435

Previous Bottom of well 18.0' bgs

- PID on well was 93.4 ppm Once pursing was started
- A sheen was observed After pumping 2L.

Groundwater Sampling Data Sheet

JACOBS

Site Name	Event	Well ID	Project Number
Former Communications Site	**Spring Ground Water Sampling**	**MW35**	**05M33101**
Weather Conditions	PID Readings of Total VOCs (ppm)	Date	Sampler Initials
Overcast, low 60s, E 0-2 mph	Ambient 0.0 Breathing Zone 0.0 In Well 0.0	7/20/17	DW

Well Information

Well Integrity	TOC Stickup (ft ags)	Well Casing Material	Casing Diameter(in) / Gallons per linear foot(gal/ft)
[✓ Good] Fair Poor	2.63	[✓ PVC] SS	1 / 0.041 [✓ 2/ 0.163] 4 / 0.653 6 / 1.469

Description of Damage (if present)	Photo Taken
No label; labeled w/ Sharpie + paint marker.	[✓ Yes] No

Depth to Product (ft)	Depth to GW (ft btoc)	Total Depth of Casing (ft btoc)	Product Thickness (ft) and Volume Recovered (mL)
—	13.77	19.11 (firm)(final)	—

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

SHOW WORK Max Purge Volume = (19.11 † ft – 13.77 ft) ∗ 0.163 gal/ft ∗ 3 = 2.61 gal ∗ 3.785 L/gal = 9.9 L

Well Purging Information

Start Time	Finish Time	Depth of Tubing (ft btoc)	Equipment Used for Purging
09:15		14.8	Bailer [✓ Peristaltic Pump] ~~Submersible Pump~~ DW

Color	Odor	Sheen	Purged Dry	Meter Used During Purging
[✓ Clear] Cloudy Brown Other: sl. effervescence	[✓ None] Moderate Faint Strong	Yes [✓ No]	Yes [✓ No]	[✓ YSI Multi Meter] [✓ HF Scientific Turbidimeter]

Purging reached: Stability [✓ Max Vol.] | Purge water was: Treated [✓ Stored] Other Note:

Time (HH:mm)	Volume (Gallons or Liters)		Acceptable Range to Demonstrate Stability						
			not applicable	± 3%	± 10% or 0.2 mg/L (whichever is greater)	not applicable	± 10 mV	± 10% or ±1 NTU or less than 5 NTU	Drawdown < 0.3 ft
	Change	Total	Temperature (°C)	SP Conductivity (µS/cm)	DO (mg/L)	pH (std units)	ORP (mV)	Turbidity (NTU)	Water Level (feet btoc)
0920	2.0	2.0	5.01	902	5.24	6.61	189.9	0.97 ✓	13.88
0925	2.4	4.4	4.71	907 ✓	4.57 –	6.64	184.5 ✓	1.08 ✓	13.87
0930	2.5	6.9	4.70	908 ✓	4.04 # ✓	6.66	182.9 ✓	0.31 ✓	13.87
0935	2.5	9.4	4.70	907 ✓	4.06 ✓	6.67	181.7 ✓	0.00 ✓	13.87
0940	2.5	11.9	4.60	905 ✓	3.28 –	6.67	181.1 ✓	0.41 ✓	13.87
		max vol.			^ dropped in final reading				

Sample Collection Information

Start Time	Finish Time / Date	Depth of Tubing (ft btoc)	Equipment Used for Sampling
0945	1025	14.8	[✓ Peristaltic Pump] Submersible Pump
SAMPLE ID: 17FWAMW35-GWS **17FWAMW35X-GWS**		QC: [✓ Dup] [✓ MS/MSD]	Ferrous Iron (Fe^{2+}) (mg/L) = 0.0

Container/Preservative	Analysis Requested	Notes
(8) 1 L amber/4C ✓	DRO/RRO (MS/MSD)	Previous Bottom of well 16.4' bgs
(2) 500 mL poly/H2SO4 ✓	Nitrate/ Nitrite/ Ammonia	19.11' btoc
(2) 500 mL poly/4C ✓	Sulfate/ Alkalinity	NO MS/MSD
(2) 500 mL poly/HNO3 ✓	Potassium/Manganese/Phosphorus	
(6) 40 mL VOA/HCl ✓	Methane	

Groundwater Sampling Data Sheet

JACOBS

Site Name	Event	Well ID	Project Number
Former Communications Site	**Spring Ground Water Sampling**	**MW37**	**05M33101**

Weather Conditions	PID Readings of Total VOCs (ppm)	Date	Sampler Initials
Hazy sun, ~70°F, 5↺-5 mph	Ambient 0.0 Breathing Zone 0.0 In Well 0.0	7/20/17	DW

Well Information

Well Integrity	TOC Stickup (ft ags)	Well Casing Material	Casing Diameter(in) / Gallons per linear foot(gal/ft)
[✓ Good] Fair Poor	2.43	[✓ PVC] SS	1 / 0.041 [✓ 2/ 0.163] 4 / 0.653 6 / 1.469

Description of Damage (if present)	Photo Taken
None. (Dedicated tubing is 3/8".) (Replaced w/ 1/4".)	[✓ Yes] No

Depth to Product (ft)	Depth to GW (ft btoc)	Total Depth of Casing (ft btoc)	Product Thickness (ft) and Volume Recovered (mL)
—	15.12	19.72 (final)	—

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

SHOW WORK Max Purge Volume = (19.88 † ft – 15.12 ft) * 0.163 gal/ft * 3 = 2.33 gal * 3.785 L/gal = 8.8 L

Well Purging Information

Start Time	Finish Time	Depth of Tubing (ft btoc)	Equipment Used for Purging
11:55		16.2	Bailer Peristaltic Pump [✓ Submersible Pump]

Color	Odor	Sheen	Purged Dry	Meter Used During Purging
[✓ Clear] Cloudy Brown Other: Sl. effervescent	[✓ None] Moderate Faint Strong	Yes [✓ No]	Yes [✓ No]	[✓ YSI Multi Meter] [✓ HF Scientific Turbidimeter]

Purging reached: Stability [✓ Max Vol.] | Purge water was: Treated [✓ Stored] Other Note:

Time (HH:mm)	Volume (Gallons or Liters)		Acceptable Range to Demonstrate Stability						
			not applicable	± 3%	± 10% or 0.2 mg/L (whichever is greater)	not applicable	± 10 mV	± 10% or ±1 NTU or less than 5 NTU	Drawdown < 0.3 ft
	Change	Total	Temperature (°C)	Sp Conductivity (µS/cm)	DO (mg/L)	pH (std units)	ORP (mV)	Turbidity (NTU)	Water Level (feet btoc)
12:00	2.0	2.0	12.69	657	6.32	6.88	169.1	2.21 ✓	15.18
12:05	2.5	4.5	12.51	647 ✓	5.04 –	6.93	162.0	2.45 ✓	15.18
12:10	2.5	7.0	12.60	642 ✓	4.38 –	6.95	157.5 ✓	1.54 ✓	15.18
12:15	2.4	9.4	12.36	642 ✓	4.03 –	6.95	154.1 ✓	1.46 ✓	15.18
12:20	2.5	11.9	12.42	640 ✓	3.56 –	6.96	151.1 ✓	1.36 ✓	15.18
		Max volume			Σ still going down.				

Sample Collection Information

Start Time	Finish Time / Date	Depth of Tubing (ft btoc)	Equipment Used for Sampling
1225	1235	16.2	[✓ Peristaltic Pump] Submersible Pump
SAMPLE ID: 17FWAMW37-GWS		QC: ~~Dup MS/MSD~~	Ferrous Iron (Fe^{2+}) (mg/L) = 0.6

Container/Preservative	Analysis Requested	Notes
(2) 1 L amber/4C	DRO/RRO	Previous Bottom of well 17.0' bgs
(1) 500 mL poly/H2SO4	Nitrate/ Nitrite/ Ammonia	19.88' btoc
(1) 500 mL poly/4C	Sulfate/ Alkalinity	
(1) 500 mL poly/HNO3	Potassium/Manganese/Phosphorus	
(3) 40 mL VOA/HCl	Methane	

Groundwater Sampling Data Sheet

JACOBS

Site Name	Event	Well ID	Project Number
Former Communications Site	**Spring Ground Water Sampling**	**MW38**	**05M33101**
Weather Conditions	PID Readings of Total VOCs (ppm)	Date	Sampler Initials
68°F, Cloudy	Ambient 0.0 Breathing Zone 0 In Well 0 0	7/20/2017	GPS

Well Information

Well Integrity	TOC Stickup (ft ags)	Well Casing Material	Casing Diameter(in) / Gallons per linear foot(gal/ft)
[✓ Good] Fair Poor	2.35	[✓ PVC] SS	1 / 0.041 [✓ 2/ 0.163] 4 / 0.653 6 / 1.469

Description of Damage (if present)	Photo Taken
N/A	[✓ Yes] No

Depth to Product (ft)	Depth to GW (ft btoc)	Total Depth of Casing (ft btoc)	Product Thickness (ft) and Volume Recovered (mL)
N/A (none present)	14.46	19.79 (final)	N/A

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

=5.34 =0.87

SHOW WORK Max Purge Volume = (19.8 † ft – 14.46 ft) ∗ 0.163 gal/ft ∗ 3 = 2.61 gal ∗ 3.785 L/gal = 9.89 L

Well Purging Information

Start Time	Finish Time	Depth of Tubing (ft btoc)	Equipment Used for Purging
12:37	13:07	15.70	Bailer [✓ Peristaltic Pump] [✓ ~~Submersible~~ Pump] P.S

Color	Odor	Sheen	Purged Dry	Meter Used During Purging
[✓ Clear] Cloudy Brown Other:	[✓ None] Moderate Faint Strong	Yes [✓ No]	~~Yes~~ [✓ No]	[✓ YSI Multi Meter] [✓ HF Scientific Turbidimeter]

Purging reached: [✓ Stability] [✓ Max Vol] Purge water was: Treated [✓ Stored] Other Note:

Time (HH:mm)	Volume (Gallons or Liters)		Acceptable Range to Demonstrate Stability						
			not applicable	± 3%	± 10% or 0.2 mg/L (whichever is greater)	not applicable	± 10 mV	± 10% or ±1 NTU or less than 5 NTU	Drawdown < 0.3 ft
	Change	Total	Temperature (°C)	Sp Conductivity (µS/cm)	DO (mg/L)	pH (std units)	ORP (mV)	Turbidity (NTU)	Water Level (feet btoc)
12:40	0.75	0.75	5.26	741 ✓	2.90	6.70	-43.9	19.90	14.51 ✓
12:45	2.0	2.75	5.03	733 ✓	1.79 -	6.90	-66.2 ✓	9.01 -	14.53 ✓
12:50	1.75	4.5	4.77	751 ✓	1.53 -	6.97	-60.0 ✓	5.58 -	14.53 ✓
12:55	1.75	6.25	4.68	759 ✓	1.38 ✓	7.00	-62.0 ✓	4.09 ✓	14.53 ✓
13:00	1.75	8.00	4.71	764 ✓	1.29 ✓	7.02	-64.0 ✓	3.36 ✓	14.53 ✓
13:05	2.00	10.00	4.70	763 ✓	1.20 ✓	7.04	-62.0 ✓	3.00 ✓	14.52 ✓

* remember to disconnect flow-through cell

Sample Collection Information

Start Time	Finish Time / Date	Depth of Tubing (ft btoc)	Equipment Used for Sampling
13:10	13:35	15.70	[✓ Peristaltic Pump] Submersible Pump

SAMPLE ID: 17FWAMW38-GWS QC: ~~Dup~~ ~~MS/MSD~~ Ferrous Iron (Fe^{2+}) (mg/L) = 4.6

Container/Preservative	Analysis Requested	Notes
(2) 1 L amber/4C	DRO/RRO	Previous Bottom of well 17.2' bgs
(1) 500 mL poly/H2SO4	Nitrate/ Nitrite/ Ammonia	
(1) 500 mL poly/4C	Sulfate/ Alkalinity	
(1) 500 mL poly/HNO3	Potassium/Manganese/Phosphorus	
(3) 40 mL VOA/HCl	Methane	

Groundwater Sampling Data Sheet

JACOBS

Site Name	Event	Well ID	Project Number
Former Communications Site	Spring Ground Water Sampling	MW39	05M33101

Weather Conditions	PID Readings of Total VOCs (ppm)	Date	Sampler Initials
Sunny; 68°F	Ambient 0.0 Breathing Zone 0.0 In Well 0.0	7/18/2017	P.S.

Well Information

Well Integrity	TOC Stickup (ft ags)	Well Casing Material	Casing Diameter(in) / Gallons per linear foot(gal/ft)
[✓ Good] Fair Poor	2.55 ft	[✓ PVC] SS	1 / 0.041 [✓ 2/ 0.163] 4 / 0.653 6 / 1.469

Description of Damage (if present)	Photo Taken
N/A	[✓ Yes] No

Depth to Product (ft)	Depth to GW (ft btoc)	Total Depth of Casing (ft btoc)	Product Thickness (ft) and Volume Recovered (mL)
~~16.03~~ P.S. N/A	16.03	31.89 (final)	N/A

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

SHOW WORK Max Purge Volume = (31.87 † ft – 16.03 ft) ∗ 0.163 gal/ft ∗ 3 = 7.75 gal ∗ 3.785 L/gal = 29.3 L

Well Purging Information

Start Time	Finish Time	Depth of Tubing (ft btoc)	Equipment Used for Purging
10:12	11:27	17.2	Bailer [✓ Peristaltic Pump] ~~Submersible Pump~~ P.S.

Color	Odor	Sheen	Purged Dry	Meter Used During Purging
[✓ Clear] Cloudy Brown Other:	[✓ None] Moderate Faint Strong	Yes [✓ No]	Yes No	[✓ YSI Multi Meter] [✓ HF Scientific Turbidimeter]

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

Time (HH:mm)	Volume (Gallons or [✓ Liters])		Acceptable Range to Demonstrate Stability						
			not applicable	± 3%	± 10% or 0.2 mg/L (whichever is greater)	not applicable	± 10 mV	± 10% or ±1 NTU or less than 5 NTU	Drawdown < 0.3 ft
	Change	Total	Temperature (°C)	Conductivity (µS/cm)	DO (mg/L)	pH (std units)	ORP (mV)	Turbidity (NTU)	Water Level (feet btoc)
10:17	0.75	0.75	7.76	523	2.45	6.86	86.4	45.76	16.10 ✓
10:22	2.25	3.0	7.15	521	1.50	6.94	67.2	19.53	16.10 ✓
10:27	1.9	4.9	7.40	520 ✓	1.19	7.01	52.4	12.18	16.05 ✓
10:32	2.25	7.15	7.31	520 ✓	1.00 ✓	7.04	41.1 –	6.59 ✓	16.05 ✓
10:37	1.9	9.05	6.69	529 ✓	0.94 ✓	7.05	34.3 –	4.37 ✓	16.05 ✓
10:42	2.25	11.3	6.62	533 ✓	0.83 ✓	7.08	19.2 –	3.98 ✓	16.05 ✓
10:47	1.75	13.05	6.67	529 ✓	0.85 ✓	7.10	7.6 –	3.51 ✓	16.05 ✓
10:52	2.0	15.05	6.77	528 ✓	0.77 ✓	7.11	-7.7 –	3.80 ✓	16.05 ✓
10:57	2.0	17.05	6.62	529 ✓	0.77 ✓	7.12	-18.3 –	3.85 ✓	16.05 ✓
11:02	2.0	19.05	6.69	526 ✓	0.72 ✓	7.14	-29.5 –	4.16 ✓	16.05 ✓
11:07	2.0	21.05	6.74	526 ✓	0.69 ✓	7.15	-40.3 –	4.20 ✓	16.05 ✓
11:12	2.25	23.30	6.89	525 ✓	0.97 –	7.17	-53.1 –	2.83 ✓	16.05 ✓
11:17	2.25	25.55	6.83	524	0.71	7.18	-59.9	3.44	16.07

Sample Collection Information

Start Time	Finish Time / Date	Depth of Tubing (ft btoc)	Equipment Used for Sampling
11:38	11:55	17.2	[✓ Peristaltic Pump] Submersible Pump

SAMPLE ID: 17FWAMW39-GWS

QC: ~~Dup MS/MSD~~

Ferrous Iron (Fe^{2+}) (mg/L) = ~~1.0~~ 3.4

Container/Preservative	Analysis Requested	Notes
6 ~~(8)~~ 40 mL VOA/HCl ✓	SW8260SIM	Previous Bottom of well 29.6' bgs
(1) 500 mL poly/H2SO4 ✓	Nitrate/ Nitrite/ Ammonia	
(1) 500 mL poly/4C ✓	Sulfate/ Alkalinity	
(1) 500 mL poly/HNO3 ✓	Potassium/Manganese/Phosphorus	
(3) 40 mL VOA/HCl ✓	Methane	

Groundwater Sampling Data Sheet

JACOBS

Suggested Notation:

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

Page 1

Site Name	Event	Well ID	Project Number
Former Communications Site	Spring Ground Water Sampling	MW39	05M33101
		Date	Sampler Initials

Time (HH:mm)	Volume (Gallons or Liters)		Acceptable Range to Demonstrate Stability						
			± 0.2 °C	± 3%	± 10% or 0.2 mg/L (whichever is greater)	± 0.1	± 10 mV	± 10% or ±1 NTU	Drawdown < 0.3 ft
	Change	Total	Temperature (°C)	Conductivity (µS/cm)	DO (mg/L)	pH (std units)	ORP (mV)	Turbidity (NTU)	Water Level (feet btoc)
11:22	2.25	27.80	6.75	524	0.68	7.18	-67.2	3.11	16.05
11:27	2.25	30.05	6.70	527	0.64	7.19	-72.8	3.23	16.05

> max purge volume

Groundwater Sampling Data Sheet

JACOBS

Site Name **Former Communications Site**	Event **Spring Ground Water Sampling**	Well ID **MW47**	Project Number **05M33101**
Weather Conditions Sunny; 80°F	PID Readings of Total VOCs (ppm) Faulty PID; no odor Ambient ______ Breathing Zone ______ In Well ______	Date 7/18/2017	Sampler Initials P.S.

Well Information

Well Integrity [✓ Good] Fair Poor	TOC Stickup (ft ags) 2.90	Well Casing Material [✓ PVC] SS	Casing Diameter(in) / Gallons per linear foot(gal/ft) 1 / 0.041 [✓ 2/ 0.163] 4 / 0.653 6 / 1.469

Description of Damage (if present) N/A	Photo Taken [✓ Yes] No

Depth to Product (ft) N/A	Depth to GW (ft btoc) 15.63	Total Depth of Casing (ft btoc) 19.78 (final)	Product Thickness (ft) and Volume Recovered (mL) N/A

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

=4.15 =0.68

SHOW WORK Max Purge Volume = (19.78† ft – 15.63 ft) ∗ 0.163 gal/ft ∗ 3 = 2.03 gal ∗ 3.785 L/gal = 7.68 L

Well Purging Information

Start Time 16:45	Finish Time 17:08	Depth of Tubing (ft btoc) 16.9	Equipment Used for Purging Bailer [✓ Peristaltic Pump] ~~Submersible Pump~~ P.S.
Color [✓ Clear] Cloudy Brown Other:	Odor [✓ None] Moderate Faint Strong	Sheen Yes [✓ No] Purged Dry Yes [✓ No]	Meter Used During Purging [✓ YSI Multi Meter] [✓ HF Scientific Turbidimeter]

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

Time (HH:mm)	Volume (Gallons or Liters)		Acceptable Range to Demonstrate Stability						
			not applicable	± 3%	± 10% or 0.2 mg/L (whichever is greater)	not applicable	± 10 mV	± 10% or ±1 NTU or less than 5 NTU	Drawdown < 0.3 ft
	Change	Total	Temperature (°C)	Conductivity (µS/cm)	DO (mg/L)	pH (std units)	ORP (mV)	Turbidity (NTU)	Water Level (feet btoc)
16:50	2.0	2.0	5.20	536 ✓	2.81	6.90	86.8	0.67 ✓	15.72 ✓
16:55	2.0	4.0	5.03	527 ✓	2.07 ✓	6.96	83.9 ✓	0.33 ✓	15.72 ✓
17:00	2.25	6.25	5.04	531 ✓	2.00 ✓	7.02	79.5 ✓	0.27 ✓	15.72 ✓
17:05	2.5	8.75	5.12	530 ✓	1.76 –	7.04	76.9 ✓	0.04 ✓	15.72 ✓
17:08	1.5	10.25							

> max purge volume

Sample Collection Information

Start Time 17:10	Finish Time / Date 17:48	Depth of Tubing (ft btoc) 16.9	Equipment Used for Sampling [✓ Peristaltic Pump] Submersible Pump

SAMPLE ID: 17FWAMW47-GWS

QC: ~~Dup — MS/MSD~~

Ferrous Iron (Fe^{2+}) (mg/L) = 0.0

Container/Preservative	Analysis Requested	Notes
6 ~~(3)~~ 40 mL VOA/HCl	SW8260SIM	Previous Bottom of well 17.0' bgs
(1) 500 mL poly/H2SO4	Nitrate/ Nitrite/ Ammonia	
(1) 500 mL poly/4C	Sulfate/ Alkalinity	
(1) 500 mL poly/HNO3	Potassium/Manganese/Phosphorus	
(3) 40 mL VOA/HCl	Methane	

Groundwater Sampling Data Sheet

JACOBS

Site Name	Event	Well ID	Project Number
Former Communications Site	**Spring Ground Water Sampling**	**MW48**	**05M33101**
Weather Conditions	PID Readings of Total VOCs (ppm)	Date	Sampler Initials
Hazy sun, high 70s, SW ~~5~~ 0-3 mph	Ambient ______ Breathing Zone ______ In Well ______	7/19/17	DW+PS

Well Information

Well Integrity	TOC Stickup (ft ags)	Well Casing Material	Casing Diameter(in) / Gallons per linear foot(gal/ft)
[✓ Good] Fair Poor	1.07	[✓ PVC] SS	1 / 0.041 [✓ 2/ 0.163] 4 / 0.653 6 / 1.469

Description of Damage (if present)	Photo Taken
None.	[✓ Yes] No

Depth to Product (ft)	Depth to GW (ft btoc)	Total Depth of Casing (ft btoc)	Product Thickness (ft) and Volume Recovered (mL)
—	15.64	20.29 (final)	—

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

SHOW WORK Max Purge Volume = (18.57 † ft – 15.64 ft) ∗ 0.163 gal/ft ∗ 3 = 1.43 gal ∗ 3.785 L/gal = 5.4 L

Well Purging Information

Start Time	Finish Time	Depth of Tubing (ft btoc)	Equipment Used for Purging
16:52		16.6	Bailer [✓ Peristaltic Pump] ~~Submersible Pump~~ DW

Color	Odor	Sheen	Purged Dry	Meter Used During Purging
[✓ Clear] Cloudy Brown Other: sl. effervescence	[✓ None] Moderate Faint Strong	Yes [✓ No]	Yes [✓ No]	[✓ YSI Multi Meter] [✓ HF Scientific Turbidimeter]

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

Time (HH:mm)	Volume (Gallons or Liters)		Acceptable Range to Demonstrate Stability						
			not applicable	± 3%	± 10% or 0.2 mg/L (whichever is greater)	not applicable	± 10 mV	± 10% or ±1 NTU or less than 5 NTU	Drawdown < 0.3 ft
	Change	Total	Temperature (°C)	SpConductivity (µS/cm)	DO (mg/L)	pH (std units)	ORP (mV)	Turbidity (NTU)	Water Level (feet btoc)
16:57	0.9	0.9	6.27	761	5.33	6.78	149.8	1.35 ✓	15.73
17:02	1.6	2.5	6.00	723 -	4.73 -	6.86	141.1 -	0.93 ✓	15.73
17:07	1.6	4.1	5.77	712 ✓	4.29 -	6.89	139.4 ✓	1.05 ✓	15.73
17:12	1.6	5.7	5.78	702 ✓	4.25 ✓	6.93	136.7 ✓	0.66 ✓	15.73
			Max volume exceeded.						

Sample Collection Information

Start Time	Finish Time / Date	Depth of Tubing (ft btoc)	Equipment Used for Sampling
17:17	17:30	16.6	[✓ Peristaltic Pump] Submersible Pump
SAMPLE ID: 17FWAMW48-GWS		QC: ~~Dup — MS/MSD~~	Ferrous Iron (Fe^{2+}) (mg/L) = 0.0

Container/Preservative	Analysis Requested	Notes
6 (~~3~~) 40 mL VOA/HCl	SW8260SIM	~~Previous~~ Bottom of ~~well~~ screen 17.5' bgs
(1) 500 mL poly/H2SO4	Nitrate/ Nitrite/ Ammonia	
(1) 500 mL poly/4C	Sulfate/ Alkalinity	
(1) 500 mL poly/HNO3	Potassium/Manganese/Phosphorus	
(3) 40 mL VOA/HCl	Methane	

Groundwater Sampling Data Sheet

JACOBS

Site Name	Event	Well ID	Project Number
Former Communications Site	**Spring Ground Water Sampling**	**MW58**	**05M33101**
Weather Conditions	PID Readings of Total VOCs (ppm)	Date	Sampler Initials
70°F, Sunny	Ambient 0.0 Breathing Zone 0.0 In Well 0.0	7/20/17	MH

Well Information

Well Integrity	TOC Stickup (ft ags)	Well Casing Material	Casing Diameter(in) / Gallons per linear foot(gal/ft)
[✓ Good] Fair Poor	-0.34	[✓ PVC] SS	1 / 0.041 [✓ 2/ 0.163] 4 / 0.653 6 / 1.469

Description of Damage (if present)	Photo Taken
—	[✓ Yes] No

Depth to Product (ft)	Depth to GW (ft btoc)	Total Depth of Casing (ft btoc)	Product Thickness (ft) and Volume Recovered (mL)
—	12.81	18.19 (final)	—

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

SHOW WORK Max Purge Volume = (18.22 † ft – 12.81 ft) ∗ 0.163 gal/ft ∗ 3 = 2.65 gal ∗ 3.785 L/gal = 10.0 L

Well Purging Information

Start Time	Finish Time	Depth of Tubing (ft btoc)	Equipment Used for Purging
1330	1408	14.00	Bailer [✓ Peristaltic Pump] ~~[✓ Submersible Pump]~~ MH

Color	Odor	Sheen	Purged Dry	Meter Used During Purging
[✓ Clear] Cloudy [✓ Brown] Other:	[✓ None] Moderate Faint Strong	Yes [✓ No]	Yes [✓ No]	[✓ YSI Multi Meter] [✓ HF Scientific Turbidimeter]

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

Time (HH:mm)	Volume (Gallons or [✓ Liters])		Acceptable Range to Demonstrate Stability						
			not applicable	± 3%	± 10% or 0.2 mg/L (whichever is greater)	not applicable	± 10 mV	± 10% or ±1 NTU or less than 5 NTU	Drawdown < 0.3 ft
	Change	Total	Temperature (°C)	Conductivity (µS/cm)	DO (mg/L)	pH (std units)	ORP (mV)	Turbidity (NTU)	Water Level (feet btoc)
1330	—	0	—						12.88
1335	1.5	1.5	5.94	321	1.71	6.84	68.8	89.32	12.88
1340	1.5	3.0	6.13	321	1.20	6.92	62.6	32.87	12.89
1345	1.5	4.5	6.24	323✓	1.10↓	6.98	57.6↓	20.33↓	12.88
1350	1.5	6.0	6.16	324✓	1.00✓	7.02	54.0✓	14.87↓	12.88
1355	1.5	7.5	6.42	325✓	0.91✓	7.05	51.3✓	9.34↓	12.88
1400	1.5	9.0	6.11	325✓	0.88✓	7.05	50.4✓	5.94↓	12.89
1405	1.5	10.5	6.15	326✓	0.86✓	7.08	46.3✓	3.92↓	12.88

Sample Collection Information

Start Time	Finish Time / Date	Depth of Tubing (ft btoc)	Equipment Used for Sampling
1410	1433	14.00	[✓ Peristaltic Pump] Submersible Pump
SAMPLE ID: 17FWAMW58-GWS **17FWAMW58X-GWS**		QC: [✓ Dup] ~~MS/MSD~~	Ferrous Iron (Fe^{2+}) (mg/L) = 4.6

Container/Preservative	Analysis Requested	Notes
(4) 1 L amber/HCl	DRO/RRO (dup)	Previous Bottom of well 19.01' bgs
(1) 500 mL poly/H2SO4	Nitrate/ Nitrite/ Ammonia	sample time = 1410
(1) 500 mL poly/4C	Sulfate/ Alkalinity	
(1) 500 mL poly/HNO3	Potassium/Manganese/Phosphorus	
(3) 40 mL VOA/HCl	Methane	

no dup

Groundwater Sampling Data Sheet

JACOBS

Site Name	Event	Well ID	Project Number
Former Communications Site	**Spring Ground Water Sampling**	**MW61**	**05M33101**
Weather Conditions	PID Readings of Total VOCs (ppm)	Date	Sampler Initials
75°F, Sunny	Ambient 0.0 Breathing Zone 0.0 In Well 0.1	7/18/17	MH

Well Information

Well Integrity	TOC Stickup (ft ags)	Well Casing Material	Casing Diameter(in) / Gallons per linear foot(gal/ft)
[✓ Good] Fair Poor	0.90	[✓ PVC] SS	1 / 0.041 [✓ 2/ 0.163] 4 / 0.653 6 / 1.469

Description of Damage (if present)	Photo Taken
NA	[✓ Yes] No

Depth to Product (ft)	Depth to GW (ft btoc)	Total Depth of Casing (ft btoc)	Product Thickness (ft) and Volume Recovered (mL)
—	14.41	~~17.90~~ MH 20.13' (final)	—

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

SHOW WORK Max Purge Volume = (17.90 † ft – 14.41 ft) ∗ 0.163 gal/ft ∗ 3 = 1.71 gal ∗ 3.785 L/gal = 6.5 L

Well Purging Information

Start Time	Finish Time	Depth of Tubing (ft btoc)	Equipment Used for Purging
1410	1435	15.5	Bailer [✓ Peristaltic Pump] Submersible Pump

Color	Odor	Sheen	Purged Dry	Meter Used During Purging
Clear [✓ Cloudy] [✓ Brown] Other:	[✓ None] Moderate Faint Strong	Yes [✓ No]	Yes [✓ No]	[✓ YSI Multi Meter] [✓ HF Scientific Turbidimeter]

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

Time (HH:mm)	Volume (Gallons or Liters)		Acceptable Range to Demonstrate Stability						
			not applicable	± 3%	± 10% or 0.2 mg/L (whichever is greater)	not applicable	± 10 mV	± 10% or ±1 NTU or less than 5 NTU	Drawdown < 0.3 ft
	Change	Total	Temperature (°C)	Conductivity (µS/cm)	DO ~~(mg/L)~~ %	pH (std units)	ORP (mV)	Turbidity (NTU)	Water Level (feet btoc)
1410	—	0							14.41
1415	1.75	1.75	7.05	522	10.8	6.62	29.1	69.55	14.51
1420	1.75	3.5	6.40	488	7.0	6.70	-5.5	44.19	14.54
1425	1.75	5.25	6.17	473↓	5.2↓	6.74	-32.7↓	13.94↓	14.52
1430	1.75	7.00	6.51	474✓	4.4↓	6.79	-43.8↓	7.21↓	14.53
1435	1.75	8.75	6.55	473✓	3.8↓	6.81	-50.3↓	2.58↓	14.53

Sample Collection Information

Start Time	Finish Time / Date	Depth of Tubing (ft btoc)	Equipment Used for Sampling
1440	1455	15.5	[✓ Peristaltic Pump] Submersible Pump

SAMPLE ID: 17FWAMW61-GWS
~~17FWAMW61X-GWS~~ (PS) (FS)

QC: ~~Dup~~ (PS) [✓ MS/MSD]

Ferrous Iron (Fe^{2+}) (mg/L) = 3.0

Container/Preservative	Analysis Requested	Notes
17FWAMW61X-GWS ← (12) 40 mL VOA/HCl	(FS) dups. SW8260 ~~(dup~~, MS/MSD)	Previous Bottom of well 17.0' bgs
MH 1 ~~(2)~~ 500 mL poly/H2SO4	Nitrate/ Nitrite/ Ammonia ~~(dup)~~ MH	Sample time = 1440
MH 1 ~~(2)~~ 500 mL poly/4C	Sulfate/ Alkalinity ~~(dup)~~ MH	
MH 1 ~~(2)~~ 500 mL poly/HNO3	Potassium/Manganese/Phosphorus ~~(dup)~~ MH	
MH 3 ~~(6)~~ 40 mL VOA/HCl	Methane ~~(dup)~~ MH	

Groundwater Sampling Data Sheet

JACOBS

Site Name	Event	Well ID	Project Number
Former Communications Site	**Spring Ground Water Sampling**	**MW62**	**05M33101**

Weather Conditions	PID Readings of Total VOCs (ppm)	Date	Sampler Initials
75°F, Sunny	Ambient 0.0 Breathing Zone 0.0 In Well 0.1	7/18/19	MH

Well Information

Well Integrity	TOC Stickup (ft ags)	Well Casing Material	Casing Diameter(in) / Gallons per linear foot(gal/ft)
[✓ Good] Fair Poor	1.12	[✓ PVC] SS	1 / 0.041 [✓ 2/ 0.163] 4 / 0.653 6 / 1.469

Description of Damage (if present)	Photo Taken
—	[✓ Yes] No

Depth to Product (ft)	Depth to GW (ft btoc)	Total Depth of Casing (ft btoc)	Product Thickness (ft) and Volume Recovered (mL)
—	13.69	20.08 (final)	—

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

SHOW WORK Max Purge Volume = (2008 † ft – 13.69 ft) ∗ 0.163 gal/ft ∗ 3 = 3.12 gal ∗ 3.785 L/gal = 11.8 L

Well Purging Information

Start Time	Finish Time	Depth of Tubing (ft btoc)	Equipment Used for Purging
1555	1635	15.00	Bailer [✓ Peristaltic Pump] Submersible Pump

Color	Odor	Sheen	Purged Dry	Meter Used During Purging
Clear [✓ Cloudy] [✓ Brown] Other:	[✓ None] Moderate Faint Strong	Yes [✓ No]	Yes [✓ No]	[✓ YSI Multi Meter] [✓ HF Scientific Turbidimeter]

Purging reached: [✓ Stability] [✓ Max Vol] Purge water was: Treated [✓ Stored] Other Note:

Time (HH:mm)	Volume (Gallons or Liters)		Acceptable Range to Demonstrate Stability						
			not applicable	± 3%	± 10% or 0.2 mg/L (whichever is greater)	not applicable	± 10 mV	± 10% or ±1 NTU or less than 5 NTU	Drawdown < 0.3 ft
	Change	Total	Temperature (°C)	Conductivity (µS/cm)	DO ~~(mg/L)~~ %	pH (std units)	ORP (mV)	Turbidity (NTU)	Water Level (feet btoc)
1555	–	0	—						13.70
1600	1.5	1.5	7.75	668	9.4	6.54	124.3	15.05	13.73
1605	1.5	3.0	7.32	659	6.5	6.58	124.0	6.65	13.73
1610	1.5	4.5	7.22	658 ✓	5.7 ↓	6.61	124.8 ✓	3.73 ↓	13.74
1615	1.5	6.0	7.17	660 ✓	5.1 ↓	6.62	125.9 ✓	1.82 ↓	13.73
1620	1.5	7.5	6.95	660 ✓	4.8 ↓	6.62	127.4 ✓	0.88 ✓	13.75
1625	1.5	9.0	6.93	660 ✓	4.3 ↓	6.62	128.8 ✓	0.76 ✓	13.74
1630	1.5	10.5	6.87	661 ✓	4.3 ↓	6.63	129.9 ✓	0.89 ✓	13.75
1635	1.5	12.0	6.86	660 ✓	4.3 ✓	6.63	130.9 ✓	1.69 ✓	13.74

Sample Collection Information

Start Time	Finish Time / Date	Depth of Tubing (ft btoc)	Equipment Used for Sampling
1638	1700	15.00	[✓ Peristaltic Pump] Submersible Pump

SAMPLE ID: 17FWAMW62-GWS / 17FWAMW62X -GWS (Dup3)

QC: [✓ ~~Dup~~] ~~MS/MSD~~

Ferrous Iron (Fe^{2+}) (mg/L) = 0.0

Container/Preservative	Analysis Requested	Notes
((2) 1L amber/HCl	DRO/RRO	Previous Bottom of well 17.0' bgs
2 ~~(1)~~ 500 mL poly/H2SO4	Nitrate/ Nitrite/ Ammonia (dup)	Sample time: 1638
2 ~~(1)~~ 500 mL poly/4C	Sulfate/ Alkalinity (dup) MH	
2 ~~(1)~~ 500 mL poly/HNO3	Potassium/Manganese/Phosphorus (dup)	Water became clear after 1 L of purging, cloudiness appeared to be iron precipitate.
6 ~~(3)~~ 40 mL VOA/HCl	Methane (dup)	

MH

Groundwater Sampling Data Sheet

JACOBS

Site Name	Event	Well ID	Project Number
Former Communications Site	**Spring Ground Water Sampling**	**MW64**	**05M33101**
Weather Conditions	PID Readings of Total VOCs (ppm)	Date	Sampler Initials
60°F, cloudy	Ambient 0.0 Breathing Zone 0.0 In Well 0.0	7/20/17	MH

Well Information

Well Integrity	TOC Stickup (ft ags)	Well Casing Material	Casing Diameter(in) / Gallons per linear foot(gal/ft)
[✓ Good] Fair Poor	2.10	[✓ PVC] SS	1 / 0.041 [✓ 2/ 0.163] 4 / 0.653 6 / 1.469

Description of Damage (if present)	Photo Taken
—	[✓ Yes] No

Depth to Product (ft)	Depth to GW (ft btoc)	Total Depth of Casing (ft btoc)	Product Thickness (ft) and Volume Recovered (mL)
—	14.32	20.03 (final)	—

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

SHOW WORK Max Purge Volume = (20.08 † ft – 14.32 ft) ∗ 0.163 gal/ft ∗ 3 = 2.82 gal ∗ 3.785 L/gal = 10.7 L

Well Purging Information

Start Time	Finish Time	Depth of Tubing (ft btoc)	Equipment Used for Purging
0905	0942	15.50	Bailer [✓ Peristaltic Pump] ~~Submersible Pump~~ MH

Color	Odor	Sheen	Purged Dry	Meter Used During Purging
[✓ Clear] Cloudy [✓ Brown] Other:	[✓ None] Moderate Faint Strong	Yes [✓ No]	Yes [✓ No]	[✓ YSI Multi Meter] [✓ HF Scientific Turbidimeter]

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

Time (HH:mm)	Volume (Gallons or [✓ Liters])		Acceptable Range to Demonstrate Stability						
			not applicable	± 3%	± 10% or 0.2 mg/L (whichever is greater)	not applicable	± 10 mV	± 10% or ±1 NTU or less than 5 NTU	Drawdown < 0.3 ft
	Change	Total	Temperature (°C)	Conductivity (µS/cm)	DO (mg/L)	pH (std units)	ORP (mV)	Turbidity (NTU)	Water Level (feet btoc)
0905	—	0	—	—	—	—	—	—	14.39
0910	1.75	1.75	6.70	346	2.04	6.91	137.6	25.58	14.40
0915	1.75	3.5	6.44	339	1.60	6.94	120.0	1.34	14.40
0920	1.75	5.25	6.37	339 ✓	1.37 ↓	6.95	99.3 ↓	9.37 ↑	14.40
0925	1.25	6.5	6.36	338 ✓	1.21 ↓	6.97	89.7 ↓	6.77 ↓	14.41
0930	1.5	8.0	6.25	338 ✓	1.18 ↓	6.97	83.7 ↓	5.00 ↓	14.41
0935	1.5	9.5	6.30	338 ✓	1.08 ✓	6.99	77.8 ↓	3.77 ↓	14.41
0940	1.75	11.25	6.50	339 ✓	1.03 ✓	7.00	73.0 ↓	2.20 ↓	14.41

Sample Collection Information

Start Time	Finish Time / Date	Depth of Tubing (ft btoc)	Equipment Used for Sampling
0945	1003	15.50	[✓ Peristaltic Pump] Submersible Pump

SAMPLE ID: 17FWAMW64-GWS QC: ~~Dup MS/MSD~~ Ferrous Iron (Fe^{2+}) (mg/L) = 2.4

Container/Preservative	Analysis Requested	Notes
(2) 1 L amber/4C	DRO/RRO	Previous Bottom of well 17.0' bgs
(1) 500 mL poly/H2SO4	Nitrate/ Nitrite/ Ammonia	Sample time = 0945
(1) 500 mL poly/4C	Sulfate/ Alkalinity	
(1) 500 mL poly/HNO3	Potassium/Manganese/Phosphorus	
(3) 40 mL VOA/HCl	Methane	

Groundwater Sampling Data Sheet

JACOBS

Site Name	Event	Well ID	Project Number
Former Communications Site	**Spring Ground Water Sampling**	**MW77**	**05M33101**

Weather Conditions	PID Readings of Total VOCs (ppm)	Date	Sampler Initials
Cloudy ; 65°F	Ambient 0.0 Breathing Zone 0.0 In Well 0.0	7/20/2017	GPS

Well Information

Well Integrity	TOC Stickup (ft ags)	Well Casing Material	Casing Diameter(in) / Gallons per linear foot(gal/ft)
[✓ Good] Fair Poor	3.55	[✓ PVC] SS	1 / 0.041 [✓ 2/ 0.163] 4 / 0.653 6 / 1.469

Description of Damage (if present)	Photo Taken
N/A	[✓ Yes] No

Depth to Product (ft)	Depth to GW (ft btoc)	Total Depth of Casing (ft btoc)	Product Thickness (ft) and Volume Recovered (mL)
N/A (none present)	17.72	22.69 (final)	N/A

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

=4.84 =0.79

SHOW WORK Max Purge Volume = (22.56 † ft – 17.72 ft) * 0.163 gal/ft * 3 = 2.37 gal * 3.785 L/gal = 8.96 L

Well Purging Information

Start Time	Finish Time	Depth of Tubing (ft btoc)	Equipment Used for Purging
09:40	10:07	18.95	Bailer [✓ Peristaltic Pump] ~~Submersible Pump~~ GPS

Color	Odor	Sheen	Purged Dry	Meter Used During Purging
[✓ Clear] Cloudy Brown Other:	[✓ None] Moderate Faint Strong	Yes [✓ No]	Yes [✓ No]	[✓ YSI Multi Meter] [✓ HF Scientific Turbidimeter]

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

Time (HH:mm)	Volume (Gallons or Liters)		Acceptable Range to Demonstrate Stability						
			not applicable	± 3%	± 10% or 0.2 mg/L (whichever is greater)	not applicable	± 10 mV	± 10% or ±1 NTU or less than 5 NTU	Drawdown < 0.3 ft
	Change	Total	Temperature (°C)	Sp Conductivity (µS/cm)	DO (mg/L)	pH (std units)	ORP (mV)	Turbidity (NTU)	Water Level (feet btoc)
09:42	1.0	1.0	4.76	1029 ✓	2.98	6.39	169.7 ✓	3.03 ✓	17.88 ✓
09:47	2.0	3.0	4.82	1026 ✓	1.92 -	6.61	163.3 ✓	1.39 ✓	17.88 ✓
09:52	2.0	5.0	4.34	1009 ✓	1.65 ✓	6.60	166.9 ✓	0.78 ✓	17.85 ✓
09:57	1.75	6.75	4.25	1003 ✓	1.46 ✓	6.61	167.1 ✓	0.94 ✓	17.85 ✓
10:02	1.75	8.50	4.19	1002 ✓	1.37 ✓	6.62	167.2 ✓	1.47 ✓	17.85 ✓
10:05	1.00	9.50	4.17	1006 ✓	1.30 ✓	6.63	167.8 ✓	0.79 ✓	17.80 ✓

* remember to disconnect flow-through

Sample Collection Information

Start Time	Finish Time / Date	Depth of Tubing (ft btoc)	Equipment Used for Sampling
10:10	10:49	18.95	[✓ Peristaltic Pump] Submersible Pump

SAMPLE ID: 17FWAMW77-GWS	QC: ~~Dup MS/MSD~~	Ferrous Iron (Fe^{2+}) (mg/L) = 0.0

Container/Preservative	Analysis Requested	Notes
(2) 1 L amber/4C	DRO/RRO	Previous Bottom of well 19.5' bgs
(1) 500 mL poly/H2SO4	Nitrate/ Nitrite/ Ammonia	
(1) 500 mL poly/4C	Sulfate/ Alkalinity	
(1) 500 mL poly/HNO3	Potassium/Manganese/Phosphorus	
(3) 40 mL VOA/HCl	Methane	

Groundwater Sampling Data Sheet

JACOBS

Site Name	Event	Well ID	Project Number
Former Communications Site	**Spring Ground Water Sampling**	**MW78**	**05M33101**

Weather Conditions	PID Readings of Total VOCs (ppm)	Date	Sampler Initials
Sunny; 78°F	Ambient ____ Breathing Zone ____ In Well ____ Faulty PID; no odor	7/18/2017	P.S.

Well Information

Well Integrity	TOC Stickup (ft ags)	Well Casing Material	Casing Diameter(in) / Gallons per linear foot(gal/ft)
Good [✓ Fair] Poor	3.35	[✓ PVC] SS	1 / 0.041 [✓ 2/ 0.163] 4 / 0.653 6 / 1.469

Description of Damage (if present)	Photo Taken
No sand between conduit and casing; casing not centered within conduit; missing plug (No space, needs to be trimmed)	[✓ Yes] No

Depth to Product (ft)	Depth to GW (ft btoc)	Total Depth of Casing (ft btoc)	Product Thickness (ft) and Volume Recovered (mL)
N/A	16.47	37.33 (final)	N/A

Max purge volume (3 well casing volumes) = [previous† total depth of casing (ft) – (depth to water[GW table well] or top of filter pack[submerged well] (ft)] * gallons per linear foot of casing * 3 22.35 ~~-20.9~~ P.S ~~=2.41~~ P.S 2.88 ~~10.32~~ P.S ~~38.70~~ P.S 10.88

SHOW WORK Max Purge Volume = (~~37.36~~ P.S † ft – 16.47 ft) * 0.163 gal/ft * 3 = ~~3.41~~ P.S gal * 3.785 L/gal = ~~12.91~~ P.S L

Well Purging Information

Start Time	Finish Time	Depth of Tubing (ft btoc)	Equipment Used for Purging
14:15	14:56	17.70	Bailer [✓ Peristaltic Pump] ~~Submersible Pump~~ P.S

Color	Odor	Sheen	Purged Dry	Meter Used During Purging
[✓ Clear] Cloudy Brown Other:	[✓ None] Moderate Faint Strong	Yes [✓ No]	Yes [✓ No]	[✓ YSI Multi Meter] [✓ HF Scientific Turbidimeter]

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

Time (HH:mm)	Volume (Gallons or [✓ Liters])		Acceptable Range to Demonstrate Stability						
			not applicable	± 3%	± 10% or 0.2 mg/L (whichever is greater)	not applicable	± 10 mV	± 10% or ±1 NTU or less than 5 NTU	Drawdown < 0.3 ft
	Change	Total	Temperature (°C)	Conductivity (µS/cm)	DO (mg/L)	pH (std units)	ORP (mV)	Turbidity (NTU)	Water Level (feet btoc)
14:20	2.5	2.5	7.10	443	5.01	6.83	103.0	10.79	16.51
14:25	2.5	5.0	7.14	450 +	2.30 -	6.93	85.3 -	3.95 -	16.64✓
14:30	2.5	7.5	7.47	475 +	1.45 -	7.02	67.7 -	1.41 -	16.60✓
14:35	2.75	10.25	7.33	483 +	1.08 -	7.08	56.9 -	0.55 -	16.57✓
14:40	1.75	12.0	8.75	481 ✓	0.87 -	7.11	48.9 -	0.41 ✓	16.58✓
14:45	1.75	13.75	9.05	483	0.77	7.15	39.7 -	0.36 ✓	16.59✓
14:51	2.0	15.75	9.24	485	0.68	7.17	26.9 -	0.80 ✓	16.58✓
14:56	1.5	17.25							
		↑ > max purge volume							

Sample Collection Information

Start Time	Finish Time / Date	Depth of Tubing (ft btoc)	Equipment Used for Sampling
15:00	15:25	17.70	[✓ Peristaltic Pump] Submersible Pump

SAMPLE ID: 17FWAMW78-GWS	QC: ~~Dup MS/MSD~~	Ferrous Iron (Fe^{2+}) (mg/L) = ~~1.0~~ 3.8

Container/Preservative	Analysis Requested	Notes
6 ~~(3)~~ 40 mL VOA/HCl	SW8260SIM	Previous Bottom of well 19.0' bgs
(1) 500 mL poly/H2SO4	Nitrate/ Nitrite/ Ammonia	* Sampled thru *
(1) 500 mL poly/4C	Sulfate/ Alkalinity	* flow-thru *
(1) 500 mL poly/HNO3	Potassium/Manganese/Phosphorus	* cell *
(3) 40 mL VOA/HCl	Methane	*

↑ incorrect? 37.38' according to spreadsheet

Groundwater Sampling Data Sheet

JACOBS

Site Name Former Communications Site	Event Spring Ground Water Sampling	Well ID MW78 (re-sample)	Project Number 05M33101
Weather Conditions Sunny, calm, high 70s	PID Readings of Total VOCs (ppm) Ambient 1.6 Breathing Zone 1.6 In Well 1.6	Date 7/17/17	Sampler Initials DW

Well Information

Well Integrity Good [✓ Fair] Poor	TOC Stickup (ft ags) 3.36	Well Casing Material [✓ PVC] SS	Casing Diameter(in) / Gallons per linear foot(gal/ft) 1 / 0.041 [✓ 2/ 0.163] 4 / 0.653 6 / 1.469

Description of Damage (if present) No plug (not enough space). Casing needs to be trimmed.	Photo Taken (on 7/18 by PS.) [✓ Yes] No

Depth to Product (ft) —	Depth to GW (ft btoc) 16.56	Total Depth of Casing (ft btoc) 37.35 (firm) (final)	Product Thickness (ft) and Volume Recovered (mL) —

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

22.36 ← (bottom of screen at 17.0' bgs)

SHOW WORK Max Purge Volume = (~~37.38~~ † ft – 16.56 ft) ∗ 0.163 gal/ft ∗ 3 = 2.84 gal ∗ 3.785 L/gal = 10.7 L

Well Purging Information

Start Time 15:00	Finish Time	Depth of Tubing (ft btoc) 17.6	Equipment Used for Purging Bailer [✓ Peristaltic Pump] Submersible Pump

Color [✓ Clear] Cloudy Brown Other: sl. effervescent	Odor [✓ None] Moderate Faint Strong	Sheen Yes [✓ No]	Purged Dry Yes [✓ No]	Meter Used During Purging [✓ YSI Multi Meter] [✓ HF Scientific Turbidimeter]

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

Time (HH:mm)	Volume (Gallons or Liters)		Acceptable Range to Demonstrate Stability						
			not applicable	± 3%	± 10% or 0.2 mg/L (whichever is greater)	not applicable	± 10 mV	± 10% or ±1 NTU or less than 5 NTU	Drawdown < 0.3 ft
	Change	Total	Temperature (°C)	Sp. Conductivity (µS/cm)	DO (mg/L)	pH (std units)	ORP (mV)	Turbidity (NTU)	Water Level (feet btoc)
1510	1.8	1.8	7.99	474	3.72	6.83	100.7	NR	16.64
1515	2.5	4.3	8.07	475 ✓	1.69 –	6.92	83.9 –	1.82 ✓	16.66
1520	2.3	6.6	7.79	479 ✓	1.06 –	7.02	68.3 –	1.84 ✓	16.67
1525	2.4	9.0	8.00	483 ✓	0.83 –	7.09	55.2 –	1.62 ✓	16.68
1530	2.4	11.4	8.12	480 ✓	0.76 ✓	7.11	50.5 ✓	0.42 ✓	16.59

Sample Collection Information

Start Time 15:40	Finish Time / Date 16:00	Depth of Tubing (ft btoc) 17.6	Equipment Used for Sampling [✓ Peristaltic Pump] Submersible Pump

SAMPLE ID:

QC: Dup MS/MSD

Ferrous Iron (Fe^{2+}) (mg/L) = 3.4

Container/Preservative	Analysis Requested	Notes
6 40ml VOA w/HCl	SW8260 SIM	
1 500ml poly w/ H_2SO_4	Nitrate/Nitrite/Ammonia	
1 500ml poly w/ HNO_3	Potassium, Manganese, Phosphorus	
1 500ml poly	Sulfate, ~~salinity~~ alkalinity	
3 40ml VOA w/ HCl	Methane	

Groundwater Sampling Data Sheet

JACOBS

Site Name	Event	Well ID	Project Number
Former Communications Site	Spring Ground Water Sampling	MW79	05M33101
Weather Conditions	**PID Readings of Total VOCs (ppm)**	**Date**	**Sampler Initials**
Sunny ; 80°F	Ambient 0.0 Breathing Zone 0.0 In Well 0.0	7/19/2017	P.S.

Well Information

Well Integrity	TOC Stickup (ft ags)	Well Casing Material	Casing Diameter(in) / Gallons per linear foot(gal/ft)
Good [✓ Fair] Poor	3.03	[✓ PVC] SS	1 / 0.041 [✓ 2/ 0.163] 4 / 0.653 6 / 1.469

Description of Damage (if present)	Photo Taken
well plug sticking protective up in to casing cap	[✓ Yes] No

Depth to Product (ft)	Depth to GW (ft btoc)	Total Depth of Casing (ft btoc)	Product Thickness (ft) and Volume Recovered (mL)
N/A	17.90	21.72 (final)	N/A

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

SHOW WORK Max Purge Volume = (21.73 ft – 17.90 ft) • 0.163 gal/ft • 3 = 1.87 gal • 3.785 L/gal = 7.09 L

Well Purging Information

Start Time	Finish Time	Depth of Tubing (ft btoc)	Equipment Used for Purging
15:09	15:31	19.10	Bailer [✓ Peristaltic Pump] ~~[✓ Submersible Pump]~~ P.S.

Color	Odor	Sheen	Purged Dry	Meter Used During Purging
Clear Cloudy [✓ Brown] Other:	[✓ None] Moderate Faint Strong	Yes [✓ No]	Yes No	[✓ YSI Multi Meter] [✓ HF Scientific Turbidimeter]

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

Time (HH:mm)	Volume (Gallons or Liters)		Acceptable Range to Demonstrate Stability						
			not applicable	± 3%	± 10% or 0.2 mg/L (whichever is greater)	not applicable	± 10 mV	± 10% or ±1 NTU or less than 5 NTU	Drawdown < 0.3 ft
	Change	Total	Temperature (°C)	SP Conductivity (µS/cm)	DO (mg/L)	pH (std units)	ORP (mV)	Turbidity (NTU)	Water Level (feet btoc)
15:13	1.75	1.75	6.60	796	2.68	6.69	59.2	38.74	17.98 ✓
15:18	2.0	3.75	6.05	779 ✓	1.79 -	6.76	3.4 -	32.49 -	17.98 ✓
15:23	2.25	6.0	5.83	798 ✓	1.54 -	6.82	-14.2 -	4.15 -	17.98 ✓
15:28	2.25	8.25	6.05	809 ✓	1.28 -	6.88	-46.2 -	1.45 ✓	17.98 ✓
15:31	1.5	9.75							
			> max purge volume						

★ Remember to disconnect flow-through ✓

Sample Collection Information

Start Time	Finish Time / Date	Depth of Tubing (ft btoc)	Equipment Used for Sampling
15:32	16:05	19.10	[✓ Peristaltic Pump] Submersible Pump
SAMPLE ID: 17FWAMW79-GWS 17FWAMW79X-GWS		QC: [✓ Dup] [✓ MS/MSD]	Ferrous Iron (Fe^{2+}) (mg/L) = 3 4

Container/Preservative	Analysis Requested	Notes
(12) 40 mL VOA/HCl	SW8260SIM	Previous Bottom of well 19.5' bgs
(2) 500 mL poly/H2SO4	Nitrate/ Nitrite/ Ammonia	
(2) 500 mL poly/4C	Sulfate/ Alkalinity	
(2) 500 mL poly/HNO3	Potassium/Manganese/Phosphorus	
(6) 40 mL VOA/HCl	Methane	

Groundwater Sampling Data Sheet

JACOBS

Site Name	Event	Well ID	Project Number
Former Communications Site	**Spring Ground Water Sampling**	**MW80**	**05M33101**
Weather Conditions	PID Readings of Total VOCs (ppm)	Date	Sampler Initials
75°F, Sunny	Ambient 0.0 Breathing Zone 0.0 In Well 1.3	7/18/17	MH

Well Information

Well Integrity	TOC Stickup (ft ags)	Well Casing Material	Casing Diameter(in) / Gallons per linear foot(gal/ft)
[✓ Good] Fair Poor	2.08	[✓ PVC] SS	1 / 0.041 [✓ 2/ 0.163] 4 / 0.653 6 / 1.469

Description of Damage (if present)	Photo Taken
NONE	[✓ Yes] No

Depth to Product (ft)	Depth to GW (ft btoc)	Total Depth of Casing (ft btoc)	Product Thickness (ft) and Volume Recovered (mL)
—	13.94	46.73 (final)	—

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

SHOW WORK Max Purge Volume = (49.58 † ft – 39.58 ft) ∗ 0.163 gal/ft ∗ 3 = 4.89 gal ∗ 3.785 L/gal = 18.5 L

Well Purging Information

Start Time	Finish Time	Depth of Tubing (ft btoc)	Equipment Used for Purging
1241	1318	43.00'	Bailer [✓ Peristaltic Pump] ~~[✓ Submersible Pump]~~ MCH 7/18/1

Color	Odor	Sheen	Purged Dry	Meter Used During Purging
[✓ Clear] Cloudy Brown Other:	[✓ None] Moderate Faint Strong	Yes [✓ No]	Yes [✓ No]	[✓ YSI Multi Meter] [✓ HF Scientific Turbidimeter]

Purging reached: [✓ Stability] Max Vol. | Purge water was: Treated [✓ Stored] Other Note:

Time (HH:mm)	Volume (Gallons or [✓ Liters])		Acceptable Range to Demonstrate Stability						
			not applicable	± 3%	± 10% or 0.2 mg/L (whichever is greater)	not applicable	± 10 mV	± 10% or ±1 NTU or less than 5 NTU	Drawdown < 0.3 ft
	Change	Total	Temperature (°C)	Conductivity (µS/cm)	DO ~~(mg/L)~~ %	pH (std units)	ORP (mV)	Turbidity (NTU)	Water Level (feet btoc)
1241	—	0	—	—	—	—	—	—	13.94
1246	2.25	2.25	6.55	247	5.1	6.84	-84.2	0.47	13.92
1251	1.75	4.00	6.23	245	4.1	6.93	-99.0	0.23	13.93
1256	1.75	5.75	6.25	244✓	3.2↓	6.98	-102.1↓	0.04✓	13.92
1301	1.75	7.5	6.16	244✓	2.5↓	7.01	-107.8✓	0.00✓	13.92
1306	1.75	9.25	5.98	243✓	2.2↓	7.03	-108.4✓	0.01✓	13.92
1311	1.75	11.00	6.10	242✓	2.2↓	7.06	-111.5✓	0.26✓	13.92
1316	1.75	12.75	6.00	242✓	2.2✓	7.07	-112.9✓	0.21✓	13.92

Sample Collection Information

Start Time	Finish Time / Date	Depth of Tubing (ft btoc)	Equipment Used for Sampling
1319	1331	43'	[✓ Peristaltic Pump] Submersible Pump

SAMPLE ID: 17FWAMW80-GWS | QC: ~~Dup MS/MSD~~ | Ferrous Iron (Fe^{2+}) (mg/L) = 2.6

Container/Preservative	Analysis Requested	Notes
(3) 40 mL VOA/HCl	SW8260	Previous Bottom of well 47.5' bgs
(1) 500 mL poly/H2SO4	Nitrate/ Nitrite/ Ammonia	
(1) 500 mL poly/4C	Sulfate/ Alkalinity	Sample time 1319
(1) 500 mL poly/HNO3	Potassium/Manganese/Phosphorus	
(3) 40 mL VOA/HCl	Methane	

Groundwater Sampling Data Sheet

JACOBS

Site Name	Event	Well ID	Project Number
Former Communications Site	**Spring Ground Water Sampling**	**MW82**	**05M33101**
Weather Conditions	PID Readings of Total VOCs (ppm)	Date	Sampler Initials
75°F; Sunny	Ambient 0.0 Breathing Zone 0.0 In Well 0.2	7/20/2017	GPS

Well Information

Well Integrity	TOC Stickup (ft ags)	Well Casing Material	Casing Diameter(in) / Gallons per linear foot(gal/ft)
Good [✓ Fair] Poor	2.40	[✓ PVC] SS	1 / 0.041 [✓ 2/ 0.163] 4 / 0.653 6 / 1.469

Description of Damage (if present)	Photo Taken
Bent tubing: was replaced on 7/20/2017 by D Ward	[✓ Yes] No

Depth to Product (ft)	Depth to GW (ft btoc)	Total Depth of Casing (ft btoc)	Product Thickness (ft) and Volume Recovered (mL)
None present	17.15	21.78 (final)	N/A

Max purge volume (3 well casing volumes) = [previous† total depth of casing (ft) – (depth to water[GW table well] or top of filter pack[submerged well] (ft)] * gallons per linear foot of casing * 3 =4.64 =0.76

SHOW WORK Max Purge Volume = (21.79 † ft – 17.15 ft) * 0.163 gal/ft * 3 = 2.27 gal * 3.785 L/gal = 8.59 L

Well Purging Information

Start Time	Finish Time	Depth of Tubing (ft btoc)	Equipment Used for Purging
14:35	15:00	18.20	Bailer [✓ Peristaltic Pump] ~~Submersible Pump~~ GPS

Color	Odor	Sheen	Purged Dry	Meter Used During Purging
[✓ Clear] Cloudy Brown Other:	[✓ None] Moderate Faint Strong	Yes [✓ No]	Yes [✓ No]	[✓ YSI Multi Meter] [✓ HF Scientific Turbidimeter]

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

Time (HH:mm)	Volume (Gallons or Liters)		Acceptable Range to Demonstrate Stability						
			not applicable	± 3%	± 10% or 0.2 mg/L (whichever is greater)	not applicable	± 10 mV	± 10% or ±1 NTU or less than 5 NTU	Drawdown < 0.3 ft
	Change	Total	Temperature (°C)	SP Conductivity (µS/cm)	DO (mg/L)	pH (std units)	ORP (mV)	Turbidity (NTU)	Water Level (feet btoc)
14:38	1.5	1.5	8.27	1002 ✓	4.62	6.55	154.0	0.92 ✓	17.18 ✓
14:43	2.0	3.5	7.74	992 ✓	3.95 -	6.62	143.2 ✓	0.34 ✓	17.18 ✓
14:48	2.0	5.5	7.45	995 ✓	3.19 -	6.65	142.7 ✓	0.23 ✓	17.18 ✓
14:53	2.0	7.5	7.75	994 ✓	2.66 -	6.68	142.5 ✓	0.27 ✓	17.18 ✓
14:58	2.0	9.5	7.63	993 ✓	2.32 -	6.68	142.6 ✓	0.42 ✓	17.18 ✓

→ max purge volume

Sample Collection Information

Start Time	Finish Time / Date	Depth of Tubing (ft btoc)	Equipment Used for Sampling
15:01	15:23	18.20	[✓ Peristaltic Pump] Submersible Pump
SAMPLE ID: 17FWAMW82-GWS		QC: ~~Dup MS/MSD~~	Ferrous Iron (Fe^{2+}) (mg/L) = 0.0

Container/Preservative	Analysis Requested	Notes
(2) 1 L amber/HCl	DRO/RRO	Previous Bottom of well 20.0' bgs
(1) 500 mL poly/H2SO4	Nitrate/ Nitrite/ Ammonia	
(1) 500 mL poly/4C	Sulfate/ Alkalinity	
(1) 500 mL poly/HNO3	Potassium/Manganese/Phosphorus	
(3) 40 mL VOA/HCl	Methane	

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Groundwater Sampling Data Sheet

Site Name	Event	Well ID	Project Number
Former Communications Site	Spring Ground Water Sampling	MW91	05M33101
Weather Conditions	**PID Readings of Total VOCs (ppm)**	**Date**	**Sampler Initials**
Sunny, calm ~70°F	Ambient 1.0 Breathing Zone 1.0 In Well 2.2	7/17/17	DW

Well Information

Well Integrity	TOC Stickup (ft ags)	Well Casing Material	Casing Diameter(in) / Gallons per linear foot(gal/ft)
[✓ Good] Fair Poor	2.50	[✓ PVC] SS	1 / 0.041 [✓ 2/ 0.163] 4 / 0.653 6 / 1.469

Description of Damage (if present)	Photo Taken
None.	[✓ Yes] No

Depth to Product (ft)	Depth to GW (ft btoc)	Total Depth of Casing (ft btoc)	Product Thickness (ft) and Volume Recovered (mL)
—	16.38	~76.1 (v.soft)(final)	—

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

SHOW WORK Max Purge Volume = (~~76.74~~ 70 DW † ft – 50 ft) * 0.163 gal/ft * 3 = 9.7~~2~~ 8 DW gal * 3.785 L/gal = 14.3 L

Well Purging Information

Start Time	Finish Time	Depth of Tubing (ft btoc)	Equipment Used for Purging
14:57		62.5	Bailer [✓ Peristaltic Pump] ~~Submersible Pump~~

Color	Odor	Sheen	Purged Dry	Meter Used During Purging
[✓ Clear] Cloudy Brown Other: effervescent slightly	[✓ None] Moderate Faint Strong	Yes [✓ No]	Yes [✓ No]	[✓ YSI Multi Meter] [✓ HF Scientific Turbidimeter]

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

Time (HH:mm)	Volume (Gallons or Liters)		Acceptable Range to Demonstrate Stability						
			not applicable	± 3%	± 10% or 0.2 mg/L (whichever is greater)	not applicable	± 10 mV	± 10% or ±1 NTU or less than 5 NTU	Drawdown < 0.3 ft
	Change	Total	Temperature (°C)	Conductivity (µS/cm)	DO (mg/L)	pH (std units)	ORP (mV)	Turbidity (NTU)	Water Level (feet btoc)
15:02	0.80	0.80	7.98	422	2.60	7.04	-73.2	1.32	16.38
15:07	1.7	2.5	8.20	395 -	1.75 -	7.12	-67.7 ✓	1.33 ✓	16.38
15:12	1.9	3.4	7.54	~~266~~ 378 - ✓	2.29 +	7.1~~3~~7	-94.8 -	0.92 ✓	16.38
15:17	1.7	5.1	7.38	396 ✓	2.07 -	7.22	-93.1 ✓	1.16 ✓	16.38
15:22	1.9	7.0	7.41	397 ✓	2.01 ✓	7.24	-70.1 +	1.22 ✓	16.38
15:27	1.8	8.8	7.16	397 ✓	2.03 ✓	7.25	16.3 +	1.28 ✓	16.38
15:32	2.0	10.8	7.16	398 ✓	2.00 ✓	7.28	30.3 +	1.33 ✓	16.38
15:37	1.5	12.3	7.13	397 ✓	1.86 ✓	7.30	34.9 ✓	1.40 ✓	16.38
15:42	1.6	13.9	7.24	395 ✓	1.72 ✓	7.30	33.7 ✓	1.54 ✓	16.58
15:47	1.6	15.5	7.37	397 ✓	1.67 ✓	7.30	31.0 ✓	1.07	16.38

Stable + max purge volume

Sample Collection Information

Start Time	Finish Time / Date	Depth of Tubing (ft btoc)	Equipment Used for Sampling
15:51	16:01	62.5	[✓ Peristaltic Pump] Submersible Pump
SAMPLE ID: 17FWAMW91-GWS		QC: ~~Dup MS/MSD~~	Ferrous Iron (Fe^{2+}) (mg/L) = 2.8

Container/Preservative	Analysis Requested	Notes
6 ~~3~~ ~~(3)~~ 40 mL VOA/HCl	SW8260SIM	~~Previous~~ Bottom of ~~well~~ screen 70.0' bgs Top of screen at 50' bgs

Groundwater Sampling Data Sheet

JACOBS

Site Name	Event	Well ID	Project Number
Former Communications Site	**Spring Ground Water Sampling**	**MW93**	**05M33101**
Weather Conditions	PID Readings of Total VOCs (ppm)	Date	Sampler Initials
Sunny, calm, mid 60s	Ambient 0.0 Breathing Zone 0.0 In Well 0.6	7/19/17	DW

Well Information

Well Integrity	TOC Stickup (ft ags)	Well Casing Material	Casing Diameter(in) / Gallons per linear foot(gal/ft)
[✓ Good] Fair Poor	2.72	[✓ PVC] SS	1 / 0.041 [✓ 2/ 0.163] 4 / 0.653 6 / 1.469

Description of Damage (if present): Tubing has slipped 1.5' down, needs to be fished out. *

Photo Taken: [✓ Yes] No

Depth to Product (ft)	Depth to GW (ft btoc)	Total Depth of Casing (ft btoc)	Product Thickness (ft) and Volume Recovered (mL)
—	16.42	~73.65 (soft) (final)	—

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

SHOW WORK Max Purge Volume = (70.0 † ft – 50.0 ft) ∗ 0.163 gal/ft ∗ 3 = ~~3.26~~ 9.78 gal ∗ 3.785 L/gal = 37.0 L

Well Purging Information

Start Time	Finish Time	Depth of Tubing (ft btoc)	Equipment Used for Purging
10:30	11:05	62.6	Bailer [✓ Peristaltic Pump] ~~Submersible Pump~~ DW

Color	Odor	Sheen	Purged Dry	Meter Used During Purging
[✓ Clear] Cloudy Brown Other: sl. effervescent	[✓ None] Moderate Faint Strong	Yes [✓ No]	Yes [✓ No]	[✓ YSI Multi Meter] [✓ HF Scientific Turbidimeter]

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

Time (HH:mm)	Volume (Gallons or Liters)		Acceptable Range to Demonstrate Stability						
			not applicable	± 3%	± 10% or 0.2 mg/L (whichever is greater)	not applicable	± 10 mV	± 10% or ±1 NTU or less than 5 NTU	Drawdown < 0.3 ft
	Change	Total	Temperature (°C)	Sp Conductivity (µS/cm)	DO (mg/L)	pH (std units)	ORP (mV)	Turbidity (NTU)	Water Level (feet btoc)
10:35	1.5	1.5	7.18	458	2.25	7.28	79.9	NR	16.49
10:40	1.8	3.3	7.06	406	1.43	7.18	70.5	NR	16.49
10:45	2.0	5.3	6.72	406 ✓	1.26	7.40	63.6	NR	16.49
10:50	2.3	7.6	6.74	405 ✓	0.96 –	7.47	57.2	0.37 ✓	16.49
10:55	2.2	9.8	6.67	404 ✓	0.95 ✓	7.50	52.2 ✓	0.57 ✓	16.49
11:00	2.2	12.0	6.66	402 ✓	0.85 ✓	7.54	47.4 ✓	0.30 ✓	16.49
11:05	2.2	14.2	6.77	404 ✓	0.79 ✓	7.55	45.4 ✓	0.07 ✓	16.16
	Stable!								

Sample Collection Information

Start Time	Finish Time / Date	Depth of Tubing (ft btoc)	Equipment Used for Sampling
11:10	11:18	62.6	[✓ Peristaltic Pump] Submersible Pump

SAMPLE ID: 17FWAMW93-GWS

QC: ~~Dup MS/MSD~~

Ferrous Iron (Fe^{2+}) (mg/L) = 2.1

Container/Preservative	Analysis Requested	Notes
6 ~~3~~ ~~(3)~~ 40 mL VOA/HCl	SW8260SIM	~~Previous~~ Bottom of ~~well~~ screen 70.0' bgs Top of screen = 50.0 bgs

*Threaded 1/4" tubing inside the TFE-lined 1/2" tubing because the 1/4" tubing was too bouyant to push ~~so~~ past ~40' btoc.

Groundwater Sampling Data Sheet

JACOBS

Site Name	Event	Well ID	Project Number
Former Communications Site	**Fall 2017 Ground Water Sampling**	**MW03**	**05M33101**
Weather Conditions	PID Readings of Total VOCs (ppm)	Date	Sampler Initials
Rain ~~low 50s~~ high 30s °F (LP) 9/28	Ambient 0.0 Breathing Zone 0.0 In Well 0.0	9/28/17	LP

Well Information

Well Integrity	TOC Stickup (ft ags)	Well Casing Material	Casing Diameter(in) / Gallons per linear foot(gal/ft)
[✓ Good] Fair Poor	1.90	[✓ PVC] SS	1 / 0.041 [✓ 2/ 0.163] 4 / 0.653 6 / 1.469

Description of Damage (if present)	Photo Taken
none	Yes No

Depth to Product (ft)	Depth to GW (ft btoc)	Total Depth of Casing (ft btoc)	Product Thickness (ft) and Volume Recovered (mL)
none	15.49	(final)	none

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

SHOW WORK Max Purge Volume = (21.34 † ft – 15.49 ft) * 0.163 gal/ft * 3 = 2.9 gal * 3.785 L/gal = 11 L

Well Purging Information

Start Time	Finish Time	Depth of Tubing (ft btoc)	Equipment Used for Purging
1006	1051	16.5	Bailer [✓ Peristaltic Pump] Submersible Pump

Color	Odor	Sheen	Purged Dry	Meter Used During Purging
Clear Cloudy Brown Other: orange	[✓ None] Moderate Faint Strong	Yes [✓ No]	Yes No	[✓ YSI Multi Meter] [✓ HF Scientific Turbidimeter]

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

Time (HH:mm)	Volume (Gallons or [✓ Liters])		Acceptable Range to Demonstrate Stability						
			not applicable	± 3%	± 10% or 0.2 mg/L (whichever is greater)	not applicable	± 10 mV	± 10% or ±1 NTU or less than 5 NTU	Drawdown < 0.3 ft
	Change	Total	Temperature (°C)	Conductivity (µS/cm)	DO (mg/L)	pH (std units)	ORP (mV)	Turbidity (NTU)	Water Level (feet btoc)
1011	1.3	1.3	—	—		—	—	—	15.50
1016	1.4	2.7	—	—	—	—	—	—	15.50
1021	1.4	4.1	6.35	376	0.97	6.45	122.6	33.60	15.50
1026	1.4	5.5	6.11	373	0.43	6.54	99.9	21.15	1550
1031	1.4	6.9	6.05	373	0.38	6.60	91.4	16.19	15.50
1036	1.4	8.3	6.02	375	0.33	6.64	82.4	13.81	15.50
1041	1.4	9.7	5.95	376	0.31	6.67	76.3	9.64	15.50
1046	1.5	11.2	5.91	592/377	0.25	6.71	68.4	8.03	15.50
1051	1.5	12.7	5.90	593/377	0.25	6.73	63.4	7.17	1550

Sample Collection Information

Start Time	Finish Time / Date	Depth of Tubing (ft btoc)	Equipment Used for Sampling
1052	1108 / 9/28/17	16.5	[✓ Peristaltic Pump] Submersible Pump
SAMPLE ID: 17FWAMW03-GWF		QC: ~~Dup MS/MSD~~	Ferrous Iron (Fe^{2+}) (mg/L) = 2.0

Container/Preservative	Analysis Requested	Notes
(2) 1 L amber/4C	DRO/RRO	
(1) 500 mL poly/H2SO4	Nitrate/ Nitrite/ Ammonia	
(1) 500 mL poly/4C	Sulfate/ Alkalinity	
(1) 500 mL poly/HNO3	Potassium/Manganese/Phosphorus	
(3) 40 mL/HCl	Methane	

Groundwater Sampling Data Sheet

JACOBS

Site Name	Event	Well ID	Project Number
Former Communications Site	**Fall 2017 Ground Water Sampling**	**MW06A**	**05M33101**
Weather Conditions	PID Readings of Total VOCs (ppm)	Date	Sampler Initials
Rainy, 40's	Ambient 0.0 Breathing Zone 0.0 In Well 0.2	9/28/17	TL

Well Information

Well Integrity	TOC Stickup (ft ags)	Well Casing Material	Casing Diameter(in) / Gallons per linear foot(gal/ft)
[✓ Good] Fair Poor	2.63	[✓ PVC] SS	1 / 0.041 [✓ 2/ 0.163] 4 / 0.653 6 / 1.469

Description of Damage (if present): None

Photo Taken: [✓ Yes] No

Depth to Product (ft)	Depth to GW (ft btoc)	Total Depth of Casing (ft btoc)	Product Thickness (ft) and Volume Recovered (mL)
–	16.02	22.71 (final)	–

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

6.69

SHOW WORK Max Purge Volume = (22.71 † ft – 16.02 ft) ∗ 0.163 gal/ft ∗ 3 = 3.27 gal ∗ 3.785 L/gal = 12.38 L

Well Purging Information

Start Time	Finish Time	Depth of Tubing (ft btoc)	Equipment Used for Purging
1414	1444	17.0	Bailer [✓ Peristaltic Pump] Submersible Pump

Color	Odor	Sheen	Purged Dry	Meter Used During Purging
[✓ Clear] Cloudy Brown Other:	None Moderate [✓ Faint] Strong	Yes [✓ No]	Yes [✓ No]	[✓ YSI Multi Meter] [✓ HF Scientific Turbidimeter]

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

Time (HH:mm)	Volume (Gallons or Liters)		Acceptable Range to Demonstrate Stability						
			not applicable	± 3%	± 10% or 0.2 mg/L (whichever is greater)	not applicable	± 10 mV	± 10% or ±1 NTU or less than 5 NTU	Drawdown < 0.3 ft
	Change	Total	Temperature (°C)	Conductivity (µS/cm)	DO (mg/L)	pH (std units)	ORP (mV)	Turbidity (NTU)	Water Level (feet btoc)
1417	1.0	1.0	6.35	641	3.67	6.7	-20.7	3.42	16.03
1422	1.6	2.6	6.05	652	1.40	6.83	-47.8	0.00	16.04
1427	2.0	4.6	6.00	649	1.19	6.87	-58.8	0.00	16.04
1432	1.8	6.4	5.99	646	0.94	6.88	-64.5	0.55	16.04
1437 ~~1447~~	2.0	8.4	6.00	643	0.78	6.89	-69.2	0.00	16.04
1442	1.9	10.3	5.99	641 ✓	0.78 ✓	6.89	-72.1 ✓	0.00 ✓ *	16.04

Sample Collection Information

Start Time	Finish Time / Date	Depth of Tubing (ft btoc)	Equipment Used for Sampling
1446	1458	17.0	[✓ Peristaltic Pump] Submersible Pump
SAMPLE ID: 17FWAMW06A-GWF		QC: ~~Dup MS/MSD~~	Ferrous Iron (Fe^{2+}) (mg/L) = 0.5

Container/Preservative	Analysis Requested	Notes
(2) 1 L amber/4C	DRO/RRO	–
(1) 500 mL poly/H2SO4	Nitrate/ Nitrite/ Ammonia	
(1) 500 mL poly/4C	Sulfate/ Alkalinity	
(1) 500 mL poly/HNO3	Potassium/Manganese/Phosphorus	
(3) 40 mL/HCl	Methane	

Groundwater Sampling Data Sheet

JACOBS

Site Name	Event	Well ID	Project Number
Former Communications Site	**Fall 2017 Ground Water Sampling**	**MW08**	**05M33101**
Weather Conditions	PID Readings of Total VOCs (ppm)	Date	Sampler Initials
Rainy; 48°F; 2-5mph wind	Ambient 0.0 Breathing Zone 0.0 In Well 0.0	9/28/2017	GPS

Well Information

Well Integrity	TOC Stickup (ft ags)	Well Casing Material	Casing Diameter(in) / Gallons per linear foot(gal/ft)
Good [✓ Fair] Poor	2.5	[✓ PVC] SS	1 / 0.041 [✓ 2/ 0.163] 4 / 0.653 6 / 1.469

	Description of Damage (if present)	Photo Taken
Frostjacked		[✓ Yes] No

Depth to Product (ft)	Depth to GW (ft btoc)	Total Depth of Casing (ft btoc)	Product Thickness (ft) and Volume Recovered (mL)
N/A	18.21	22.25 (final)	N/A

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

SHOW WORK Max Purge Volume = (22.28 † ft – 18.21 ft) ∗ 0.163 gal/ft ∗ 3 = 1.990 gal ∗ 3.785 L/gal = 7.533 L

Well Purging Information

Start Time	Finish Time	Depth of Tubing (ft btoc)	Equipment Used for Purging
1554	1615	19.25	Bailer [✓ Peristaltic Pump] Submersible Pump

Color	Odor	Sheen	Purged Dry	Meter Used During Purging
[✓ Clear] Cloudy Brown Other:	[✓ None] Moderate Faint Strong	Yes [✓ No]	Yes [✓ No]	[✓ YSI Multi Meter] [✓ HF Scientific Turbidimeter]

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

Time (HH:mm)	Volume (Gallons or Liters)		Acceptable Range to Demonstrate Stability						
			not applicable	± 3%	± 10% or 0.2 mg/L (whichever is greater)	not applicable	± 10 mV	± 10% or ±1 NTU or less than 5 NTU	Drawdown < 0.3 ft
	Change	Total	Temperature (°C)	Conductivity (µS/cm)	DO (mg/L)	pH (std units)	ORP (mV)	Turbidity (NTU)	Water Level (feet btoc)
1557	1.7	1.7	4.29	609 ✓	10.03	6.52	40.0 ✓	0.00 ~	18.31 ✓
1602	2.2	3.9	4.25	611 ✓	4.17 -	6.54	40.0 ✓	0.00 ✓	18.31 ✓
1607	2.5	6.4	4.23	611 ✓	3.36 -	6.56	40.1 ✓	0.00 ✓	18.31 ✓
1612	2.5	8.9	4.22	611 ✓	3.00 -	6.57	40.6 ✓	0.00 ✓	18.31 ✓

Sample Collection Information

Start Time	Finish Time / Date	Depth of Tubing (ft btoc)	Equipment Used for Sampling
1618	16:31/9/28/17	19.25	[✓ Peristaltic Pump] Submersible Pump

SAMPLE ID: 17FWAMW08-GWF QC: ~~Dup MS/MSD~~ Ferrous Iron (Fe^{2+}) (mg/L) = 0.0

Container/Preservative	Analysis Requested	Notes
(6) 40 mL VOA/HCl	SW8260SIM	
(1) 500 mL poly/H2SO4	Nitrate/ Nitrite/ Ammonia	
(1) 500 mL poly/4C	Sulfate/ Alkalinity	
(1) 500 mL poly/HNO3	Potassium/Manganese/Phosphorus	
(3) 40 mL VOA/HCl	Methane	

Groundwater Sampling Data Sheet

JACOBS

Site Name	Event	Well ID	Project Number
Former Communications Site	**Fall 2017 Ground Water Sampling**	**MW12R**	**05M33101**
Weather Conditions	PID Readings of Total VOCs (ppm)	Date	Sampler Initials
Rainy; 48°F; no wind	Ambient 0.0 Breathing Zone ______ In Well 39.2	9/28/2017	GPS

Well Information

Well Integrity	TOC Stickup (ft ags)	Well Casing Material	Casing Diameter(in) / Gallons per linear foot(gal/ft)
[✓ Good] Fair Poor	-0.25	[✓ PVC] SS	1 / 0.041 [✓ 2/ 0.163] 4 / 0.653 6 / 1.469

Description of Damage (if present)	Photo Taken
	Yes No

Depth to Product (ft)	Depth to GW (ft btoc)	Total Depth of Casing (ft btoc)	Product Thickness (ft) and Volume Recovered (mL)
N/A	12.75	22.49 (final)	N/A

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

SHOW WORK Max Purge Volume = (22.49 † ft – 12.75 ft) ∗ 0.163 gal/ft ∗ 3 = 4.763 gal ∗ 3.785 L/gal = 18.027 L

Well Purging Information

Start Time	Finish Time	Depth of Tubing (ft btoc)	Equipment Used for Purging
1403	1436	13.75	Bailer [✓ Peristaltic Pump] Submersible Pump

Color	Odor	Sheen	Purged Dry	Meter Used During Purging
[✓ Clear] Cloudy Brown Other:	None Moderate [✓ Faint] Strong	Yes [✓ No]	Yes [✓ No]	[✓ YSI Multi Meter] [✓ HF Scientific Turbidimeter]

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

Time (HH:mm)	Volume (Gallons or Liters)		Acceptable Range to Demonstrate Stability						
			not applicable	± 3%	± 10% or 0.2 mg/L (whichever is greater)	not applicable	± 10 mV	± 10% or ±1 NTU or less than 5 NTU	Drawdown < 0.3 ft
	Change	Total	Temperature (°C)	Conductivity (µS/cm)	DO (mg/L)	pH (std units)	ORP (mV)	Turbidity (NTU)	Water Level (feet btoc)
1405	1.4	1.4	6.61	442 ✓	6.37	6.67	9.5	0.00 ✓	12.78 ✓
1410	2.8	4.2	6.04	455 ✓	1.29 –	6.74	-22.1 –	0.00 ✓	12.78 ✓
1415	2.0	6.2	5.97	457 ✓	0.46 –	6.75	-39.5 –	0.00 ✓	12.77 ✓
1421	3.0	9.2	5.95	467 ✓	0.78 –	6.76	-49.2 –	0.00 ✓	12.77 ✓
1425	1.8	11.0	5.95	472 ✓	0.58 –	6.76	-53.4 ✓	0.00 ✓	12.78 ✓
1430	2.3	13.3	5.98	471 ✓	0.48 ✓	6.77	-53.1 ✓	0.00 ✓	12.78 ✓
14:35	2.3	15.5	5.95	473	0.45	6.78	-55.9 ✓	0.00 ✓	12.78 ✓

Sample Collection Information

Start Time	Finish Time / Date	Depth of Tubing (ft btoc)	Equipment Used for Sampling
1440	1456	13.75	[✓ Peristaltic Pump] Submersible Pump
SAMPLE ID: 17FWAMW12R-GWF		QC: ~~Dup MS/MSD~~	Ferrous Iron (Fe^{2+}) (mg/L) = 2.1

Container/Preservative	Analysis Requested	Notes
(2) 1 L amber/4C	DRO/RRO	
(3) 40 mL VOA/HCl	VOC-ML	
(1) 500 mL poly/H2SO4	Nitrate/ Nitrite/ Ammonia	
(1) 500 mL poly/4C	Sulfate/ Alkalinity	
(1) 500 mL poly/HNO3	Potassium/Manganese/Phosphorus	
(3) 40 mL VOA/HCl	Methane	

Groundwater Sampling Data Sheet

JACOBS

Site Name	Event	Well ID	Project Number
Former Communications Site	Fall 2017 Ground Water Sampling	MW13	05M33101
Weather Conditions	**PID Readings of Total VOCs (ppm)**	**Date**	**Sampler Initials**
Sunny. E5-10, 50°F	Ambient 0.0 Breathing Zone 0.0 In Well 0.0	9/27/17	DW/BS/TL

Needs darker label

Well Information

Well Integrity	TOC Stickup (ft ags)	Well Casing Material	Casing Diameter(in) / Gallons per linear foot(gal/ft)
[✓ Good] Fair Poor	2.78	[✓ PVC] SS	1 / 0.041 [✓ 2/ 0.163] 4 / 0.653 6 / 1.469

Description of Damage (if present)	Photo Taken
Yellow paint is faded, peeling, with rust spots. Top was cut w/ Sawzall needs to be squared off.	Yes No

Depth to Product (ft)	Depth to GW (ft btoc)	Total Depth of Casing (ft btoc)	Product Thickness (ft) and Volume Recovered (mL)
—	16.08	19.24 (final)	N/A

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

SHOW WORK Max Purge Volume = (19.25 (3.17) † ft – 16.08 ft) ∗ 0.163 gal/ft ∗ 3 = 1.55 gal ∗ 3.785 L/gal = 5.87 L

Well Purging Information

Start Time	Finish Time	Depth of Tubing (ft btoc)	Equipment Used for Purging
12:58	TL ~~1324~~ 1330	17.08	Bailer [✓ Peristaltic Pump] Submersible Pump

Color	Odor	Sheen	Purged Dry	Meter Used During Purging
[✓ Clear] Cloudy Brown Other:	[✓ None] Moderate Faint Strong	Yes [✓ No]	Yes [✓ No]	[✓ YSI Multi Meter] [✓ HF Scientific Turbidimeter]

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

Time (HH:mm)	Volume (Gallons or [✓ Liters])		Acceptable Range to Demonstrate Stability						
			not applicable	± 3%	± 10% or 0.2 mg/L (whichever is greater)	not applicable	± 10 mV	± 10% or ±1 NTU or less than 5 NTU	Drawdown < 0.3 ft
	Change	Total	Temperature (°C)	Conductivity (µS/cm)	DO (mg/L)	pH (std units)	ORP (mV)	Turbidity (NTU)	Water Level (feet btoc)
1305	0.5	0.5	4.96	847	3.04	6.03	170.4	6.06	16.13
1310	1.7	2.2	4.26	784	1.77	6.30	164.1	2.35 ✓	16.14
1315	2.1	4.3	4.16	745 ✓	1.99	6.29	155.8 ✓	1.36 ✓	16.16
1320	2.2	6.5	4.15	732 ✓	1.15 ✓	6.34	151.5 ✓	0.36 ✓	16.16
1325	2.2	8.7	4.12	734 ✓	1.61 ✓	6.39	147.0 ✓	1.07 ✓	16.15
1330	2.2	10.9	4.15	732 ✓	1.05 ✓	6.43	142.6 ✓	0.22 ✓	16.16
Stable!									

Sample Collection Information

Start Time	Finish Time / Date	Depth of Tubing (ft btoc)	Equipment Used for Sampling
TL ~~1324~~ 1334	1347	17.08	[✓ Peristaltic Pump] Submersible Pump
SAMPLE ID: 17FWAMW13-GWF		QC: ~~Dup~~ ~~MS/MSD~~	Ferrous Iron (Fe^{2+}) (mg/L) = 1.0

Container/Preservative	Analysis Requested	Notes
(6) 40 mL VOA/HCl	SW8260SIM	
(1) 500 mL poly/H2SO4	Nitrate/ Nitrite/ Ammonia	
(1) 500 mL poly/4C	Sulfate/ Alkalinity	
(1) 500 mL poly/HNO3	Potassium/Manganese/Phosphorus	
(3) 40 mL VOA/HCl	Methane	

Groundwater Sampling Data Sheet

JACOBS

Site Name	Event	Well ID	Project Number
Former Communications Site	**Fall 2017 Ground Water Sampling**	**MW28**	**05M33101**
Weather Conditions	PID Readings of Total VOCs (ppm)	Date	Sampler Initials
cloudy, 35°F; no wind	Ambient 0.0 Breathing Zone 0.0 In Well 0.1	9/29/2017	GPS

Well Information

Well Integrity	TOC Stickup (ft ags)	Well Casing Material	Casing Diameter(in) / Gallons per linear foot(gal/ft)
[✓ Good] Fair Poor	2.2	[✓ PVC] SS	1 / 0.041 [✓ 2/ 0.163] 4 / 0.653 6 / 1.469

Description of Damage (if present)	Photo Taken
	[✓ Yes] No

Depth to Product (ft)	Depth to GW (ft btoc)	Total Depth of Casing (ft btoc)	Product Thickness (ft) and Volume Recovered (mL)
NA	17.33	19.08 (final)	NA

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

SHOW WORK Max Purge Volume = (19.07 † ft – 17.33 ft) ∗ 0.163 gal/ft ∗ 3 = ~~0.163~~ 0.851 P.S gal ∗ 3.785 L/gal = 3.221 L

Well Purging Information

Start Time	Finish Time	Depth of Tubing (ft btoc)	Equipment Used for Purging
1213	1231	18.40	Bailer [✓ Peristaltic Pump] Submersible Pump

Color	Odor	Sheen	Purged Dry	Meter Used During Purging
Clear Cloudy [✓ Brown] Other:	[✓ None] Moderate Faint Strong	Yes [✓ No]	Yes [✓ No]	[✓ YSI Multi Meter] [✓ HF Scientific Turbidimeter]

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

Time (HH:mm)	Volume (Gallons or Liters)		Acceptable Range to Demonstrate Stability						
			not applicable	± 3%	± 10% or 0.2 mg/L (whichever is greater)	not applicable	± 10 mV	± 10% or ±1 NTU or less than 5 NTU	Drawdown < 0.3 ft
	Change	Total	Temperature (°C)	Conductivity (µS/cm)	DO (mg/L)	pH (std units)	ORP (mV)	Turbidity (NTU)	Water Level (feet btoc)
1215	0.7	0.7	8.02	800	3.55	6.70	26.4 ✓	50.55	17.38 ✓
1220	2.5	3.2	8.32	786 -	1.65 -	6.75	22.6 ✓	5.21	17.37 ✓
1225	2.1	5.3	8.01	763 -	1.33 -	6.76	22.7 ✓	2.99	17.38 ✓
1230	2.2	7.5	7.99	755 -	1.06	6.77	22.9 ✓	5.69	17.37

Sample Collection Information

Start Time	Finish Time / Date	Depth of Tubing (ft btoc)	Equipment Used for Sampling
1235	1255	18.40	[✓ Peristaltic Pump] Submersible Pump

SAMPLE ID: 17FWAMW28-GWF

QC: ~~Dup MS/MSD~~

Ferrous Iron (Fe^{2+}) (mg/L) = 0.0

Container/Preservative	Analysis Requested	Notes
(2) 1 L amber/4C	DRO/RRO	
(1) 500 mL poly/H2SO4	Nitrate/ Nitrite/ Ammonia	
(1) 500 mL poly/4C	Sulfate/ Alkalinity	
(1) 500 mL poly/HNO3	Potassium/Manganese/Phosphorus	
(3) 40 mL VOA/HCl	Methane	

Groundwater Sampling Data Sheet

JACOBS

Site Name	Event	Well ID	Project Number
Former Communications Site	Fall 2017 Ground Water Sampling	MW32R	05M33101
Weather Conditions	PID Readings of Total VOCs (ppm)	Date	Sampler Initials
Cloudy, 40°F, no wind	Ambient 0.0 Breathing Zone 0.0 In Well 0.2	9/29/2017	GPS

Well Information

Well Integrity	TOC Stickup (ft ags)	Well Casing Material	Casing Diameter(in) / Gallons per linear foot(gal/ft)
[✓ Good] Fair Poor	-0.33	[✓ PVC] SS	1 / 0.041 [✓ 2/ 0.163] 4 / 0.653 6 / 1.469

Description of Damage (if present)	Photo Taken
None	[✓ Yes] No

Depth to Product (ft)	Depth to GW (ft btoc)	Total Depth of Casing (ft btoc)	Product Thickness (ft) and Volume Recovered (mL)
NA	14.30	22.93 (final)	NA

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

SHOW WORK Max Purge Volume = (22.90 † ft – 14.30 ft) ∗ 0.163 gal/ft ∗ 3 = ~~1.402~~ 4.205 gal ∗ 3.785 L/gal = ~~5.306~~ 15.917 L

Well Purging Information

Start Time	Finish Time	Depth of Tubing (ft btoc)	Equipment Used for Purging
1322	1407	15.35	Bailer [✓ Peristaltic Pump] Submersible Pump

Color	Odor	Sheen	Purged Dry	Meter Used During Purging
[✓ Clear] Cloudy Brown Other:	[✓ None] Moderate Faint Strong	Yes [✓ No]	Yes [✓ No]	[✓ YSI Multi Meter] [✓ HF Scientific Turbidimeter]

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

Time (HH:mm)	Volume (~~Gallons~~ or Liters)		Acceptable Range to Demonstrate Stability						
			not applicable	± 3%	± 10% or 0.2 mg/L (whichever is greater)	not applicable	± 10 mV	± 10% or ±1 NTU or less than 5 NTU	Drawdown < 0.3 ft
	Change	Total	Temperature (°C)	Sp.Conductivity (µS/cm)	DO (mg/L)	pH (std units)	ORP (mV)	Turbidity (NTU)	Water Level (feet btoc)
1324	1.0	1.0	6.66	893 ✓	3.39	6.47	47.6	8.16	14.32 ✓
1329	2.5	3.5	6.52	905 ✓	2.63 -	6.49	41.4 -	2.39 -	14.32 ✓
1334	2.3	5.8	6.47	903 ✓	2.14 -	6.50	42.5 ✓	0.99 ✓	14.31 ✓
1339	2.1	7.9	6.37	895 ✓	2.00 -	6.51	42.6 ✓	0.01 ✓	14.32 ✓
1344	2.2	10.1	6.39	888 ✓	1.88 -	6.51	43.7 ✓	0.93 ✓	14.32 ✓
1350	2.7	12.8	6.38	881 ✓	1.72 -	6.52	45.8 ✓	0.00 ✓	14.32 ✓
1355	2.2	15.0	6.34	873 ✓	1.61 ✓	6.52	46.8 ✓	0.00 ✓	14.33 ✓
1400	2.2	17.2	6.33	868 ✓	1.61 ✓	6.52	47.7 ✓	0.00 ✓	14.33 ✓
1405	2.1	19.3	6.31	864 ✓	1.58 ✓	6.53	48.3 ✓	0.00 ✓	14.32 ✓

Sample Collection Information

Start Time	Finish Time / Date	Depth of Tubing (ft btoc)	Equipment Used for Sampling
1408	1424	15.35	[✓ Peristaltic Pump] Submersible Pump
SAMPLE ID: 17FWAMW32R-GWF		QC: ~~Dup MS/MSD~~	Ferrous Iron (Fe^{2+}) (mg/L) = 0.0

Container/Preservative	Analysis Requested	Notes
(2) 1 L amber/4C (6) 40 mL VOA/HCl	DRO/RRO SW8260SIM	
(1) 500 mL poly/H2SO4	Nitrate/ Nitrite/ Ammonia	
(1) 500 mL poly/4C	Sulfate/ Alkalinity	
(1) 500 mL poly/HNO3	Potassium/Manganese/Phosphorus	
(3) 40 mL VOA/HCl	Methane	

Groundwater Sampling Data Sheet

JACOBS

Site Name	Event	Well ID	Project Number
Former Communications Site	**Fall 2017 Ground Water Sampling**	**MW33**	**05M33101**
Weather Conditions	PID Readings of Total VOCs (ppm)	Date	Sampler Initials
Cloudy, 36°F; no wind	Ambient 0.0 Breathing Zone 0.0 In Well 0.6	9/29/2017	GPS

Well Information

Well Integrity	TOC Stickup (ft ags)	Well Casing Material	Casing Diameter(in) / Gallons per linear foot(gal/ft)
[✓ Good] Fair Poor	2.30	[✓ PVC] SS	1 / 0.041 [✓ 2/ 0.163] 4 / 0.653 6 / 1.469

Description of Damage (if present)	Photo Taken
	[✓ Yes] No

Depth to Product (ft)	Depth to GW (ft btoc)	Total Depth of Casing (ft btoc)	Product Thickness (ft) and Volume Recovered (mL)
N/A	15.69	20.89 (final)	N/A

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

SHOW WORK Max Purge Volume = (20.90 † ft – 15.69 ft) ∗ 0.163 gal/ft ∗ 3 = 2.548 gal ∗ 3.785 L/gal = 9.643 L

Well Purging Information

Start Time	Finish Time	Depth of Tubing (ft btoc)	Equipment Used for Purging
1015	1048	16.75	Bailer [✓ Peristaltic Pump] Submersible Pump

Color	Odor	Sheen	Purged Dry	Meter Used During Purging
Clear Cloudy [✓ Brown] Other:	None Moderate [✓ ~~Faint~~] [✓ Strong]	[✓ Yes] [✓ ~~No~~] P.S.	Yes [✓ No]	[✓ YSI Multi Meter] [✓ HF Scientific Turbidimeter]

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

Time (HH:mm)	Volume (~~Gallons~~ or Liters)		Acceptable Range to Demonstrate Stability						
			not applicable	± 3%	± 10% or 0.2 mg/L (whichever is greater)	not applicable	± 10 mV	± 10% or ±1 NTU or less than 5 NTU	Drawdown < 0.3 ft
	Change	Total	Temperature (°C)	Conductivity (µS/cm)	DO (mg/L)	pH (std units)	ORP (mV)	Turbidity (NTU)	Water Level (feet btoc)
1017	1.0	1.0	6.59	911	2.41	6.37	-40.1	14.64	15.98 ✓
1022	2.2	3.2	6.05	884 –	1.52 –	6.50	-60.9 –	18.75	15.98 ✓
1027	2.3	5.5	6.02	878 ✓	1.11 –	6.58	-70.1 –	20.58 +	15.98 ✓
1032	2.4	7.9	5.98	866 ✓	0.99 ✓	6.63	-74.8 –	17.41 ✓	15.98 ✓
1037	2.3	10.2	5.98	855 ✓	0.91 ✓	6.66	-84.2 –	17.60 ✓	15.98 ✓
1042	2.4	12.6	5.95	842 ✓	0.86 ✓	6.68	-89.1 –	16.55 ✓	15.98 ✓
1047	2.3	14.9	5.96	843 ✓	0.86 ✓	6.70	-91.0 –	15.66 –	15.91 ✓

Sample Collection Information

Start Time	Finish Time / Date	Depth of Tubing (ft btoc)	Equipment Used for Sampling
1052	1115	17.00	[✓ Peristaltic Pump] Submersible Pump
SAMPLE ID: 17FWAMW33-GWF		QC: ~~Dup MS/MSD~~	Ferrous Iron (Fe^{2+}) (mg/L) = 1.9

Container/Preservative	Analysis Requested	Notes
(2) 1 L amber/4C (3) 40 mL VOA/HCl	DRO/RRO VOC-ML	
(1) 500 mL poly/H2SO4	Nitrate/ Nitrite/ Ammonia	
(1) 500 mL poly/4C	Sulfate/ Alkalinity	
(1) 500 mL poly/HNO3	Potassium/Manganese/Phosphorus	
(3) 40 mL VOA/HCl	Methane	

Groundwater Sampling Data Sheet

JACOBS

Site Name	Event	Well ID	Project Number
Former Communications Site	**Fall 2017 Ground Water Sampling**	**MW35**	**05M33101**
Weather Conditions	PID Readings of Total VOCs (ppm)	Date	Sampler Initials
36°F cloudy	Ambient 0.0 Breathing Zone 0.0 In Well 0.0	9/29/17	IP

Well Information

Well Integrity	TOC Stickup (ft ags)	Well Casing Material	Casing Diameter(in) / Gallons per linear foot(gal/ft)
Good [✓ Fair] Poor	2.59	[✓ PVC] SS	1 / 0.041 [✓ 2/ 0.163] 4 / 0.653 6 / 1.469

Description of Damage (if present)	Photo Taken
none	Yes [✓ No]

Depth to Product (ft)	Depth to GW (ft btoc)	Total Depth of Casing (ft btoc)	Product Thickness (ft) and Volume Recovered (mL)
no	14.13	19.05 (final)	no

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

SHOW WORK Max Purge Volume = (19.11 † ft – 14.13 ft) ∗ 0.163 gal/ft ∗ 3 = 2.4 gal ∗ 3.785 L/gal = 9.2 L

Well Purging Information

Start Time	Finish Time	Depth of Tubing (ft btoc)	Equipment Used for Purging
0935	1000	15.8	Bailer [✓ Peristaltic Pump] Submersible Pump

Color	Odor	Sheen	Purged Dry	Meter Used During Purging
[✓ Clear] Cloudy Brown Other:	[✓ None] Moderate Faint Strong	Yes [✓ No]	Yes [✓ No]	[✓ YSI Multi Meter] [✓ HF Scientific Turbidimeter]

Purging reached: [✓ Stability] Max Vol. | Purge water was: Treated [✓ Stored] Other | Note:

Time (HH:mm)	Volume (Gallons or [✓ Liters])		Acceptable Range to Demonstrate Stability						
			not applicable	± 3%	± 10% or 0.2 mg/L (whichever is greater)	not applicable	± 10 mV	± 10% or ±1 NTU or less than 5 NTU	Drawdown < 0.3 ft
	Change	Total	Temperature (°C)	Sp. Conductivity (µS/cm)°C	DO (mg/L)	pH (std units)	ORP (mV)	Turbidity (NTU)	Water Level (feet btoc)
0940	1.3	1.3	—	—	—	—	—	—	14.18
0945	1.8	~~1.8~~ 3.1	5.55	911	1.80	6.47	175.3	0.73	14.19
0950	1.6	4.7	5.39	915	1.11	6.56	172.4	0.38	14.19
0955	1.6	6.3	5.32	917 ✓	1.00 -	6.59	172.4 ✓	0.59 ✓	14.18
1000	1.6	7.9	5.26	921 ✓	0.92 ✓	6.61	171.4 ✓	0.00 ✓	14.19
								0.00 *	

* collected directly from sample tube (no flow-through cell)

Sample Collection Information

Start Time	Finish Time / Date	Depth of Tubing (ft btoc)	Equipment Used for Sampling
1002	~1040 / 9.29.17	15.8	[✓ Peristaltic Pump] Submersible Pump
SAMPLE ID: 17FWAMW35-GWF **17FWAMW35X-GWF**		QC: [✓ Dup] [✓ MS/MSD]	Ferrous Iron (Fe^{2+}) (mg/L) = 0.2

Container/Preservative	Analysis Requested	Notes
(8) 1 L amber/4C	DRO/RRO (dup, MS/MSD)	
(2) 500 mL poly/H2SO4	Nitrate/ Nitrite/ Ammonia (Dup)	
(2) 500 mL poly/4C	Sulfate/ Alkalinity (Dup)	
(2) 500 mL poly/HNO3	Potassium/Manganese/Phosphorus(Dup)	
(6) 40 mL VOA/HCl	Methane(Dup)	

Groundwater Sampling Data Sheet

JACOBS

Site Name	Event	Well ID	Project Number
Former Communications Site	Fall 2017 Ground Water Sampling	MW37	05M33101
Weather Conditions	**PID Readings of Total VOCs (ppm)**	**Date**	**Sampler Initials**
Cloudy, Low 40s	Ambient 0.0 Breathing Zone 0.0 In Well 0.0	9/29/17	TL

Well Information

Well Integrity	TOC Stickup (ft ags)	Well Casing Material	Casing Diameter(in) / Gallons per linear foot(gal/ft)
[✓ Good] Fair Poor	2.45'	[✓ PVC] SS	1 / 0.041 [✓ 2/ 0.163] 4 / 0.653 6 / 1.469

Description of Damage (if present)	Photo Taken
None	[✓ Yes] No

Depth to Product (ft)	Depth to GW (ft btoc)	Total Depth of Casing (ft btoc)	Product Thickness (ft) and Volume Recovered (mL)
—	15.49	19.69 (final)	N/A

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

SHOW WORK Max Purge Volume = (19.72 † ft – 15.49 ft) ∗ 0.163 gal/ft ∗ 3 = 2.07 gal ∗ 3.785 L/gal = 7.83 L

Well Purging Information

1456

Start Time	Finish Time	Depth of Tubing (ft btoc)	Equipment Used for Purging
TL ~~1216~~ TL 1449	1519	16.5	Bailer [✓ Peristaltic Pump] Submersible Pump

Color	Odor	Sheen	Purged Dry	Meter Used During Purging
[✓ Clear] Cloudy Brown Other:	[✓ None] Moderate Faint Strong	Yes [✓ No]	Yes [✓ No]	[✓ YSI Multi Meter] [✓ HF Scientific Turbidimeter]

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

Time (HH:mm)	Volume (Gallons or Liters)		Acceptable Range to Demonstrate Stability						
			not applicable	± 3%	± 10% or 0.2 mg/L (whichever is greater)	not applicable	± 10 mV	± 10% or ±1 NTU or less than 5 NTU	Drawdown < 0.3 ft
TL	Change	Total	Temperature (°C)	Conductivity (µS/cm)	DO (mg/L)	pH (std units)	ORP (mV)	Turbidity (NTU)	Water Level (feet btoc)
~~145~~ 1258	1.5	1.5	12.43	675	3.73	7.21	196.1	1.85 ✓	15.53
1303	1.8	3.3	12.33	~~68~~ TL 679	2.62	7.20	190.6	0.63 ✓	15.53
1508	2.1	5.4	12.24	680 ✓	2.81	7.19	184.8	0.68 ✓	15.52
1513	2.1	7.5	12.15	681 ✓	2.99	7.19	180.8 ✓	0.00 ✓	15.52
1518	2.0	9.5	12.14	679 ✓	2.84 ✓	7.18	177.8 ✓	0.07 ✓*	15.52
Stability reached									
		*taken before flow cell							

Sample Collection Information

Start Time	Finish Time / Date	Depth of Tubing (ft btoc)	Equipment Used for Sampling
1520	1533	16.5	[✓ Peristaltic Pump] Submersible Pump

SAMPLE ID: 17FWAMW37-GWF QC: ~~Dup MS/MSD~~ Ferrous Iron (Fe^{2+}) (mg/L) = 0.0

Container/Preservative	Analysis Requested	Notes
(2) 1 L amber/4C	DRO/RRO	—
(1) 500 mL poly/H2SO4	Nitrate/ Nitrite/ Ammonia	
(1) 500 mL poly/4C	Sulfate/ Alkalinity	
(1) 500 mL poly/HNO3	Potassium/Manganese/Phosphorus	
(3) 40 mL VOA/HCl	Methane	

Groundwater Sampling Data Sheet

JACOBS

Site Name	Event	Well ID	Project Number
Former Communications Site	Fall 2017 Ground Water Sampling	MW38	05M33101
Weather Conditions	**PID Readings of Total VOCs (ppm)**	**Date**	**Sampler Initials**
Rain, 40s	Ambient 0.0 Breathing Zone 0.0 In Well 0.0	9/28/17	TL

Well Information

Well Integrity	TOC Stickup (ft ags)	Well Casing Material	Casing Diameter(in) / Gallons per linear foot(gal/ft)
[✓ Good] Fair Poor	2.4	[✓ PVC] SS	1 / 0.041 [✓ 2/ 0.163] 4 / 0.653 6 / 1.469

Description of Damage (if present)	Photo Taken
None	[✓ Yes] No

Depth to Product (ft)	Depth to GW (ft btoc)	Total Depth of Casing (ft btoc)	Product Thickness (ft) and Volume Recovered (mL)
—	14.88	19.75 (final)	N/A

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

SHOW WORK Max Purge Volume = (19.79 ~~14.88~~ TL ft – 14.88 ft) * 0.163 gal/ft * 3 = 2.4 gal * 3.785 L/gal = 9.09 L

Well Purging Information

Start Time	Finish Time	Depth of Tubing (ft btoc)	Equipment Used for Purging
1600	1624	15.8	Bailer [✓ Peristaltic Pump] Submersible Pump

Color	Odor	Sheen	Purged Dry	Meter Used During Purging
Clear [✓ Cloudy] Brown Other:	[✓ None] Moderate Faint Strong	Yes [✓ No]	Yes [✓ No]	[✓ YSI Multi Meter] [✓ HF Scientific Turbidimeter]

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

Time (HH:mm)	Volume (Gallons or Liters)		Acceptable Range to Demonstrate Stability						
			not applicable	± 3%	± 10% or 0.2 mg/L (whichever is greater)	not applicable	± 10 mV	± 10% or ±1 NTU or less than 5 NTU	Drawdown < 0.3 ft
	Change	Total	Temperature (°C)	Conductivity (µS/cm)	DO (mg/L)	pH (std units)	ORP (mV)	Turbidity (NTU)	Water Level (feet btoc)
1602	1.0	1.0	9.46	759	3.50	6.97	-48.3	76.74	14.95
1607	1.8	2.8	9.24	778	2.93	7.09	-62.0	26.26	14.95
1612	2.2	4.0	9.19	787	5.80	7.12	-63.7	8.47	14.95
1617	2.0	6.0	9.19	789 ✓	5.84	7.12	-64.2 ✓	4.23 ✓	14.95
1622	2.1	8.1	9.16	790 ✓	~~5.64~~2 ✓	7.14	-65.2 ✓	2.34 ✓	14.95
Stability reached					5.65			1.49 ✓*	

* turbidity taken before flowcell

Sample Collection Information

Start Time	Finish Time / Date	Depth of Tubing (ft btoc)	Equipment Used for Sampling
1626	1638	15.8	[✓ Peristaltic Pump] Submersible Pump
SAMPLE ID: 17FWAMW38-GWF		QC: ~~Dup MS/MSD~~	Ferrous Iron (Fe²⁺) (mg/L) = 1.0

Container/Preservative	Analysis Requested	Notes
(2) 1 L amber/4C	DRO/RRO	
(1) 500 mL poly/H2SO4	Nitrate/ Nitrite/ Ammonia	
(1) 500 mL poly/4C	Sulfate/ Alkalinity	
(1) 500 mL poly/HNO3	Potassium/Manganese/Phosphorus	
(3) 40 mL VOA/HCl	Methane	

Groundwater Sampling Data Sheet

JACOBS

Site Name	Event	Well ID	Project Number
Former Communications Site	**Fall 2017 Ground Water Sampling**	**MW39**	**05M33101**
Weather Conditions	PID Readings of Total VOCs (ppm)	Date	Sampler Initials
Sunny, E3-7, 53°F	Ambient 0.0 Breathing Zone 0.0 In Well 0.0	9/27/17	DW

Well Information

Well Integrity	TOC Stickup (ft ags)	Well Casing Material	Casing Diameter(in) / Gallons per linear foot(gal/ft)
[✓ Good] Fair Poor		[✓ PVC] SS	1 / 0.041 [✓ 2/ 0.163] 4 / 0.653 6 / 1.469

Description of Damage (if present)	Photo Taken
Lock was unlocked, hanging in its hole.	Yes No

Depth to Product (ft)	Depth to GW (ft btoc)	Total Depth of Casing (ft btoc)	Product Thickness (ft) and Volume Recovered (mL)
—	16.41	31.94 (final)	N/A

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

SHOW WORK Max Purge Volume = (31.89 † ft – 16.41 ft) ∗ 0.163 gal/ft ∗ 3 = 7.57 gal ∗ 3.785 L/gal = 28.6 L

Well Purging Information

Start Time	Finish Time	Depth of Tubing (ft btoc)	Equipment Used for Purging
1509	1553	17.41	Bailer [✓ Peristaltic Pump] Submersible Pump

Color	Odor	Sheen	Purged Dry	Meter Used During Purging
[✓ Clear] Cloudy Brown Other:	[✓ None] Moderate Faint Strong	Yes [✓ No]	Yes [✓ No]	[✓ YSI Multi Meter] [✓ HF Scientific Turbidimeter]

Purging reached: [✓ Stability] Max Vol. | Purge water was: Treated [✓ Stored] Other Note:

Time (HH:mm)	Volume (Gallons or Liters)		Acceptable Range to Demonstrate Stability						
			not applicable	± 3%	± 10% or 0.2 mg/L (whichever is greater)	not applicable	± 10 mV	± 10% or ±1 NTU or less than 5 NTU	Drawdown < 0.3 ft
	Change	Total	Temperature (°C)	Sp. Conductivity (µS/cm)	DO (mg/L)	pH (std units)	ORP (mV)	Turbidity (NTU)	Water Level (feet btoc)
1513	0.5	0.5	7.01	585	2.79	6.83	-32.2	NR	16.42
1518	1.9	2.4	6.30	534✓	1.27	7.08	-62.2	21.06	16.42
1523	2.0	4.4	6.01	533✓	1.04	7.16	-76.4	8.46	16.42
1528	2.1	6.5	5.91	534✓	0.98	7.15	-80.4	7.57	16.42
1533	2.0	8.5	6.00	535✓	0.89	7.18	-85.9	4.83	16.42
1538	2.0	10.5	5.93	534✓	0.80✓	7.21	-91.2✓	5.40	16.42
1543	2.0	12.5	5.91	535✓	0.72✓	7.23	-95.2✓	3.48✓	16.42
1548	2.0	14.5	5.78	535✓	0.69✓	7.24	-98.5✓	2.95✓	16.42
1553	2.0	16.5	5.86	536✓	0.63✓	7.26	-97.0✓	1.24✓	16.42
-								1.26 at 1615 (not	
								through flow-	
								thru cell(!)	

Sample Collection Information

Start Time	Finish Time / Date	Depth of Tubing (ft btoc)	Equipment Used for Sampling
1558	1615	17.41	[✓ Peristaltic Pump] Submersible Pump

SAMPLE ID: 17FWAMW39-GWF | QC: ~~Dup MS/MSD~~ | Ferrous Iron (Fe^{2+}) (mg/L) = 1.9

Container/Preservative	Analysis Requested	Notes
(6) 40 mL VOA/HCl	SW8260SIM	
(1) 500 mL poly/H2SO4	Nitrate/ Nitrite/ Ammonia	
(1) 500 mL poly/4C	Sulfate/ Alkalinity	
(1) 500 mL poly/HNO3	Potassium/Manganese/Phosphorus	
(3) 40 mL VOA/HCl	Methane	

Groundwater Sampling Data Sheet

JACOBS

Site Name	Event	Well ID	Project Number
Former Communications Site	**Fall 2017 Ground Water Sampling**	**MW47**	**05M33101**
Weather Conditions	PID Readings of Total VOCs (ppm)	Date	Sampler Initials
Rainy ≈ 50°	Ambient 0.0 Breathing Zone 0.0 In Well 0.0	9/28/17	TL

Well Information

Well Integrity	TOC Stickup (ft ags)	Well Casing Material	Casing Diameter(in) / Gallons per linear foot(gal/ft)
[✓ Good] Fair Poor	2.9'	[✓ PVC] SS	1 / 0.041 [✓ 2/ 0.163] 4 / 0.653 6 / 1.469

Description of Damage (if present)	Photo Taken
None	[✓ Yes] No

Depth to Product (ft)	Depth to GW (ft btoc)	Total Depth of Casing (ft btoc)	Product Thickness (ft) and Volume Recovered (mL)
—	16.14	19.76 (final)	N/A

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

SHOW WORK Max Purge Volume = (19.78 † ft – 16.14 ft) * 0.163 gal/ft * 3 = 1.78 gal * 3.785 L/gal = 6.74 L

Well Purging Information

Start Time	Finish Time	Depth of Tubing (ft btoc)	Equipment Used for Purging
1011	1035	17.1	Bailer [✓ Peristaltic Pump] Submersible Pump

Color	Odor	Sheen	Purged Dry	Meter Used During Purging
[✓ Clear] Cloudy Brown Other:	[✓ None] Moderate Faint Strong	Yes [✓ No]	Yes [✓ No]	[✓ YSI Multi Meter] [✓ HF Scientific Turbidimeter]

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

Time (HH:mm)	Volume (Gallons or Liters)		Acceptable Range to Demonstrate Stability						
			not applicable	± 3%	± 10% or 0.2 mg/L (whichever is greater)	not applicable	± 10 mV	± 10% or ±1 NTU or less than 5 NTU	Drawdown < 0.3 ft
	Change	Total	Temperature (°C)	Conductivity (µS/cm)	DO (mg/L)	pH (std units)	ORP (mV)	Turbidity (NTU)	Water Level (feet btoc)
1014	0.5	0.5	6.31	600	2858	6.81	203.1	0.76	16.14
1019	2.0	2.5	6.06	599	9.91	6.89	201.6	0.69	16.14
1024	1.6	4.1	6.00	599	9.02	6.75	201.1	0.69 ✓	16.14
1029	1.6	5.7	5.99	598 ✓	8.68	6.44	201.0 ✓	0.00 ✓	16.14
1034	1.6	7.3	5.46	598 ✓	8.34 ✓	7.02	201.0 ✓	0.00 ✓ *	16.14
	Stability		reached						

TL

* Turbidity taken at before flow cell

Sample Collection Information

Start Time	Finish Time / Date	Depth of Tubing (ft btoc)	Equipment Used for Sampling
1037	1049	17.1	[✓ Peristaltic Pump] Submersible Pump

SAMPLE ID: 17FWAMW47-GWF QC: ~~Dup MS/MSD~~ Ferrous Iron (Fe^{2+}) (mg/L) = 0.0

Container/Preservative	Analysis Requested	Notes
(6) 40 mL VOA/HCl	SW8260SIM	—
(1) 500 mL poly/H2SO4	Nitrate/ Nitrite/ Ammonia	
(1) 500 mL poly/4C	Sulfate/ Alkalinity	
(1) 500 mL poly/HNO3	Potassium/Manganese/Phosphorus	
(3) 40 mL VOA/HCl	Methane	

Groundwater Sampling Data Sheet

JACOBS

Site Name	Event	Well ID	Project Number
Former Communications Site	**Fall 2017 Ground Water Sampling**	**MW48**	**05M33101**

Weather Conditions	PID Readings of Total VOCs (ppm) Faulty PID	Date	Sampler Initials
Rainy; 45°F; no wind	Ambient NA Breathing Zone NA In Well NA	9/28/2017	GPS

Well Information

Well Integrity	TOC Stickup (ft ags)	Well Casing Material	Casing Diameter(in) / Gallons per linear foot(gal/ft)
[✓ Good] Fair Poor	1.0	[✓ PVC] SS	1 / 0.041 [✓ 2/ 0.163] 4 / 0.653 6 / 1.469

Description of Damage (if present)	Photo Taken
	[✓ Yes] No

Depth to Product (ft)	Depth to GW (ft btoc)	Total Depth of Casing (ft btoc)	Product Thickness (ft) and Volume Recovered (mL)
N/A	16.07	20.28 (final)	N/A

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

SHOW WORK Max Purge Volume = (20.29 † ft – 16.07 ft) ∗ 0.163 gal/ft ∗ 3 = 2.064 gal ∗ 3.785 L/gal = 7.810 L

Well Purging Information

Start Time	Finish Time	Depth of Tubing (ft btoc)	Equipment Used for Purging
1201	1225	17.10	Bailer [✓ Peristaltic Pump] Submersible Pump

Color	Odor	Sheen	Purged Dry	Meter Used During Purging
[✓ Clear] Cloudy Brown Other:	[✓ None] Moderate Faint Strong	Yes [✓ No]	Yes [✓ No]	[✓ YSI Multi Meter] [✓ HF Scientific Turbidimeter]

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

Time (HH:mm)	Volume (Gallons or Liters)		Acceptable Range to Demonstrate Stability						
			not applicable	± 3%	± 10% or 0.2 mg/L (whichever is greater)	not applicable	± 10 mV	± 10% or ±1 NTU or less than 5 NTU	Drawdown < 0.3 ft
	Change	Total	Temperature (°C)	Conductivity (µS/cm)	DO (mg/L)	pH (std units)	ORP (mV)	Turbidity (NTU)	Water Level (feet btoc)
1204	1.2	1.2	5.74	644 ✓	8.52	6.85	39.8 ✓	0.00 ✓	16.19
1209	2.2	3.4	5.76	641 ✓	3.52 –	6.87	40.4 ✓	0.00 ✓	16.20
1214	2.2	5.6	5.75	635 ✓	2.92 –	6.88	41.0 ✓	0.00 ✓	16.20
1219	2.2	7.8	5.76	632 ✓	2.79 ✓	6.88	41.8 ✓	0.00 ✓	16.20
1224	2.4	10.2	5.74	633 ✓	2.72 ✓	6.88	42.5 ✓	0.00	16.13

Sample Collection Information

Start Time	Finish Time / Date	Depth of Tubing (ft btoc)	Equipment Used for Sampling
1235	1250 / 9/28/17	17.10	[✓ Peristaltic Pump] Submersible Pump

SAMPLE ID: 17FWAMW48-GWF QC: ~~Dup MS/MSD~~ Ferrous Iron (Fe^{2+}) (mg/L) = 0.0

Container/Preservative	Analysis Requested	Notes
(6) 40 mL VOA/HCl	SW8260SIM	
(1) 500 mL poly/H2SO4	Nitrate/ Nitrite/ Ammonia	
(1) 500 mL poly/4C	Sulfate/ Alkalinity	
(1) 500 mL poly/HNO3	Potassium/Manganese/Phosphorus	
(3) 40 mL VOA/HCl	Methane	

Groundwater Sampling Data Sheet

JACOBS

Site Name	Event	Well ID	Project Number
Former Communications Site	Fall 2017 Ground Water Sampling	MW58	05M33101

Weather Conditions	PID Readings of Total VOCs (ppm)	Date	Sampler Initials
Cloudy, Low 40s	Ambient 0.0 Breathing Zone 0.0 In Well 0.0	9/29/17	TL

Well Information

Well Integrity	TOC Stickup (ft ags)	Well Casing Material	Casing Diameter(in) / Gallons per linear foot(gal/ft)
[✓ Good] Fair Poor	~0.3'	[✓ PVC] SS	1 / 0.041 [✓ 2/ 0.163] 4 / 0.653 6 / 1.469

Description of Damage (if present)	Photo Taken
None	[✓ Yes] No

Depth to Product (ft)	Depth to GW (ft btoc)	Total Depth of Casing (ft btoc)	Product Thickness (ft) and Volume Recovered (mL)
~	13.51	18.20 (final)	N/A

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

SHOW WORK Max Purge Volume = (_18.19_ † ft – 13.51 ft) * 0.163 gal/ft * 3 = 2.29 gal * 3.785 L/gal = 8.66 L

Well Purging Information

Start Time	Finish Time	Depth of Tubing (ft btoc)	Equipment Used for Purging
1013	1046	14.5	Bailer [✓ Peristaltic Pump] Submersible Pump

Color	Odor	Sheen	Purged Dry	Meter Used During Purging
Clear [✓ Cloudy] Brown Other:	None Moderate [✓ Faint] Strong	Yes [✓ No]	Yes [✓ No]	[✓ YSI Multi Meter] [✓ HF Scientific Turbidimeter]

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

Time (HH:mm)	Volume (Gallons or Liters)		Acceptable Range to Demonstrate Stability						
			not applicable	± 3%	± 10% or 0.2 mg/L (whichever is greater)	not applicable	± 10 mV	± 10% or ±1 NTU or less than 5 NTU	Drawdown < 0.3 ft
	Change	Total	Temperature (°C)	Conductivity (µS/cm)	DO (mg/L)	pH (std units)	ORP (mV)	Turbidity (NTU)	Water Level (feet btoc)
1015	1.0	1.0	6.40	533	60.0	6.80	-77.7	57.40	13.62
1020	1.8	2.8	5.81	561	20.0	6.84	-93.6	17.50	13.62
1025	2.3	~~4~~5.1	5.72	569	1.89	6.90	-98.7	6.30	13.62
1030	2.2	7.3	5.68	571 ✓	1.54	6.95	-100.4 ✓	3.49 ✓	13.62
1035	2.0	9.3	5.68	574 ✓	1.42	6.99	-101.0 ✓	2.40 ✓	13.62
1040	2.1	11.4	5.67	574 ✓	1.31	7.03	-101.4 ✓	1.91 ✓	13.62
1045	1.8	13.2	5.68	574 ✓	1.25 ✓	7.06	-101.4 ✓	2.00 ✓*	13.62
Stability reached									
	* taken	before flow cell							

Sample Collection Information

Start Time	Finish Time / Date	Depth of Tubing (ft btoc)	Equipment Used for Sampling
1046	1103 / 9/29	14.5	[✓ Peristaltic Pump] Submersible Pump

SAMPLE ID: 17FWAMW58-GWF
17FWAMW58Y-GWF

QC: [✓ Dup] ~~MS/MSD~~

Ferrous Iron (Fe^{2+}) (mg/L) = 1.8

Container/Preservative	Analysis Requested	Notes
(4) 1 L amber/HCl	DRO/RRO (Dup)	Dup
(1) 500 mL poly/H2SO4	Nitrate/ Nitrite/ Ammonia	—
(1) 500 mL poly/4C	Sulfate/ Alkalinity	—
(1) 500 mL poly/HNO3	Potassium/Manganese/Phosphorus	—
(3) 40 mL VOA/HCl	Methane	—

Groundwater Sampling Data Sheet

JACOBS

Site Name	Event	Well ID	Project Number
Former Communications Site	Fall 2017 Ground Water Sampling	MW61	05M33101
Weather Conditions	PID Readings of Total VOCs (ppm)	Date	Sampler Initials
37°F Rain	Ambient 0.0 Breathing Zone 0.0 In Well 0.0	9/28/17	IP

1150

Well Information

Well Integrity	TOC Stickup (ft ags)	Well Casing Material	Casing Diameter(in) / Gallons per linear foot(gal/ft)
[✓ Good] Fair Poor	1.00	[✓ PVC] SS	1 / 0.041 [✓ 2/ 0.163] 4 / 0.653 6 / 1.469

Description of Damage (if present)	Photo Taken
none	Yes [✓ No]

Depth to Product (ft)	Depth to GW (ft btoc)	Total Depth of Casing (ft btoc)	Product Thickness (ft) and Volume Recovered (mL)
none	14.85	20.15 (final)	none

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

SHOW WORK Max Purge Volume = (_20.13_____† ft – 14.85 ft) ∗ 0.163 gal/ft ∗ 3 = 2.6 gal ∗ 3.785 L/gal = 9.9 L

Well Purging Information

Start Time	Finish Time	Depth of Tubing (ft btoc)	Equipment Used for Purging
1202	1237	16.0	Bailer [✓ Peristaltic Pump] Submersible Pump

Color	Odor	Sheen	Purged Dry	Meter Used During Purging
[✓ Clear] Cloudy Brown Other:	None Moderate [✓ Faint] Strong	Yes [✓ No]	Yes [✓ No]	[✓ YSI Multi Meter] [✓ HF Scientific Turbidimeter]

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

Time (HH:mm)	Volume (Gallons or [✓ Liters])		Acceptable Range to Demonstrate Stability						
			not applicable	± 3%	± 10% or 0.2 mg/L (whichever is greater)	not applicable	± 10 mV	± 10% or ±1 NTU or less than 5 NTU	Drawdown < 0.3 ft
	Change	Total	Temperature (°C)	Specific Conductivity (µS/cm)°C	DO (mg/L)	pH (std units)	ORP (mV)	Turbidity (NTU)	Water Level (feet btoc)
1207	1.4	1.4	—	—	—	—	—	58.4	14.85
1212	2.0	3.4	5.15	624	1.42	6.68	64.0	38.69	14.95
1217	1.9	5.3	5.12	626	0.57	6.77	57.6	14.70	14.97
1222	2.0	7.3	5.10	624 ✓	0.36 -	6.80	54.7 ✓	8.59 -	14.96
1227	2.0	9.3	5.08	624 ✓	0.33 -	6.82	52.3 ✓	5.93 -	14.97
1232	1.9	11.2	5.08	623 ✓	0.27 ✓	6.84	50.0 ✓	9.17 +	14.95
1237	2.0	13.2	—	—	—	—	—	—	14.95

Sample Collection Information

Start Time	Finish Time / Date	Depth of Tubing (ft btoc)	Equipment Used for Sampling
1237	1259 / 9/28/17	16.0	[✓ Peristaltic Pump] Submersible Pump
SAMPLE ID: 17FWAMW61-GWF 17FWAMW61Z-GWF		QC: [✓ Dup] [✓ MS/MSD]	Ferrous Iron (Fe^{2+}) (mg/L) = 1.2

Container/Preservative	Analysis Requested	Notes
(12) 40 mL VOA/HCl	SW8260 (dup, MS/MSD)	
(2) 500 mL poly/H2SO4	Nitrate/ Nitrite/ Ammonia (dup)	
(2) 500 mL poly/4C	Sulfate/ Alkalinity (dup)	
(2) 500 mL poly/HNO3	Potassium/Manganese/Phosphorus (dup)	
(6) 40 mL VOA/HCl	Methane (dup)	

Groundwater Sampling Data Sheet

JACOBS

Site Name	Event	Well ID	Project Number
Former Communications Site	**Fall 2017 Ground Water Sampling**	**MW62**	**05M33101**
Weather Conditions	PID Readings of Total VOCs (ppm)	Date	Sampler Initials
Partly cloudy, 54°F, 5-10mph wind	Ambient 0.0 Breathing Zone 0.0 In Well 0.0	9/27/2017	GPS

Well Information

Well Integrity	TOC Stickup (ft ags)	Well Casing Material	Casing Diameter(in) / Gallons per linear foot(gal/ft)
[✓ Good] Fair Poor	1.15	[✓ PVC] SS	1 / 0.041 [✓ 2/ 0.163] 4 / 0.653 6 / 1.469

Description of Damage (if present)	Photo Taken
None	[✓ Yes] No

Depth to Product (ft)	Depth to GW (ft btoc)	Total Depth of Casing (ft btoc)	Product Thickness (ft) and Volume Recovered (mL)
N/A	14.09	20.09 (final)	N/A

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

SHOW WORK Max Purge Volume = (20.08 † ft – 14.09 ft) ∗ 0.163 gal/ft ∗ 3 = 2.929 gal ∗ 3.785 L/gal = 11.087 L

Well Purging Information

Start Time	Finish Time	Depth of Tubing (ft btoc)	Equipment Used for Purging
~~14:55~~ P.S 9/27 14:58	15:20	15.10	Bailer [✓ Peristaltic Pump] Submersible Pump

Color	Odor	Sheen	Purged Dry	Meter Used During Purging
[✓ Clear] Cloudy Brown Other:	[✓ None] Moderate Faint Strong	Yes [✓ No]	Yes [✓ No]	[✓ YSI Multi Meter] [✓ HF Scientific Turbidimeter]

Purging reached: [✓ Stability] Max Vol.

Purge water was: Treated [✓ Stored] Other Note:

Time (HH:mm)	Volume (~~Gallons~~ or Liters)		Acceptable Range to Demonstrate Stability						
			not applicable	± 3%	± 10% or 0.2 mg/L (whichever is greater)	not applicable	± 10 mV	± 10% or ±1 NTU or less than 5 NTU	Drawdown < 0.3 ft
	Change	Total	Temperature (°C)	Sp.Conductivity (µS/cm)	DO (mg/L)	pH (std units)	ORP (mV)	Turbidity (NTU)	Water Level (feet btoc)
15:03	2.0L	2.0	7.32	1149 ✓	0.72	6.33	181.0 ✓	4.78 ✓	14.17 ✓
15:08	2.0	4.0	7.25	1178 ✓	0.41 ✓	6.37	179.5 ✓	2.37 ✓	14.18 ✓
15:13	2.2	6.2	7.23	1191 ✓	0.33 ✓	6.41	177.7 ✓	1.55 ✓	14.18 ✓
15:18	2.2	8.4	7.24	1199 ✓	0.32 ✓	6.44	176.4 ✓	1.06 ✓	14.18 ✓

Sample Collection Information

Start Time	Finish Time / Date	Depth of Tubing (ft btoc)	Equipment Used for Sampling
1525	1600	15.10	[✓ Peristaltic Pump] Submersible Pump
SAMPLE ID: 17FWAMW62-GWF, 17FWAMW62X-GWF		QC [✓ Dup] MS/MSD	Ferrous Iron (Fe^{2+}) (mg/L) = 0.0

Container/Preservative	Analysis Requested	Notes
(2) 1L amber/HCl	DRO/RRO	
(2) 500 mL poly/H2SO4	Nitrate/ Nitrite/ Ammonia(dup)	
(2) 500 mL poly/4C	Sulfate/ Alkalinity(dup)	
(2) 500 mL poly/HNO3	Potassium/Manganese/Phosphorus(dup)	
(6) 40 mL VOA/HCl	Methane (dup)	

Groundwater Sampling Data Sheet

JACOBS

Site Name	Event	Well ID	Project Number
Former Communications Site	**Fall 2017 Ground Water Sampling**	**MW64**	**05M33101**
Weather Conditions	PID Readings of Total VOCs (ppm)	Date	Sampler Initials
Rainy, high 40's	Ambient 0.0 Breathing Zone 0.0 In Well 0.1	9/28/17	TL

Well Information

Well Integrity	TOC Stickup (ft ags)	Well Casing Material	Casing Diameter(in) / Gallons per linear foot(gal/ft)
[✓ Good] Fair Poor	2.20	[✓ PVC] SS	1 / 0.041 [✓ 2/ 0.163] 4 / 0.653 6 / 1.469

Description of Damage (if present)	Photo Taken
None	[✓ Yes] No

Depth to Product (ft)	Depth to GW (ft btoc)	Total Depth of Casing (ft btoc)	Product Thickness (ft) and Volume Recovered (mL)
—	14.7'	20.04 (final)	N/A

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

5.33 0.163 TL

SHOW WORK Max Purge Volume = (__20.03______ † ft – 14.7 ft) ∗ ~~5.33~~ gal/ft ∗ 3 = 2.61 gal ∗ 3.785 L/gal = 9.87 L

Well Purging Information

Start Time	Finish Time	Depth of Tubing (ft btoc)	Equipment Used for Purging
1215	1249	15.7'	Bailer [✓ Peristaltic Pump] Submersible Pump

Color	Odor	Sheen	Purged Dry	Meter Used During Purging
[✓ Clear] Cloudy Brown Other:	[✓ None] Moderate Faint Strong	Yes [✓ No]	Yes [✓ No]	[✓ YSI Multi Meter] [✓ HF Scientific Turbidimeter]

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

Time (HH:mm)	Volume (Gallons or Liters)		Acceptable Range to Demonstrate Stability						
			not applicable	± 3%	± 10% or 0.2 mg/L (whichever is greater)	not applicable	± 10 mV	± 10% or ±1 NTU or less than 5 NTU	Drawdown < 0.3 ft
	Change	Total	Temperature (°C)	Conductivity (µS/cm)	DO (mg/L)	pH (std units)	ORP (mV)	Turbidity (NTU)	Water Level (feet btoc)
1218	0.8	0.8	6.69	528	5.69	7.16	144.3	14.12	14.79
1223	1.7	2.5	6.79	539	7.72	7.23	52.5	6.20	14.79
1228	1.7	4.2	6.80	544	9.11	7.27	21.4	3.18 ✓	14.79
1233	1.7	5.9	6.78	545 ✓	8.81	7.28	7.6	0.28 ✓	14.79
1238	1.7	7.6	6.80	546 ✓	8.90 ✓	7.29	-3.2	0.00 ✓	14.79
1243	1.9	9.5	6.80	547 ✓	8.74 ✓	7.29	-13.6	0.00 ✓	14.79
1248	1.9	11.4	6.80	547	8.24	7.24	-21.6	0.00✓ *	14.79
Max purge reached									
			* Turbidity taken before flow cell						

Sample Collection Information

Start Time	Finish Time / Date	Depth of Tubing (ft btoc)	Equipment Used for Sampling
1251	TL 9/28 ~~1307~~ 1306	15.7'	[✓ Peristaltic Pump] Submersible Pump

SAMPLE ID: 17FWAMW64-GWF

QC: ~~Dup MS/MSD~~

Ferrous Iron (Fe^{2+}) (mg/L) = 1.5

Container/Preservative	Analysis Requested	Notes
(2) 1 L amber/4C	DRO/RRO	—
(1) 500 mL poly/H2SO4	Nitrate/ Nitrite/ Ammonia	
(1) 500 mL poly/4C	Sulfate/ Alkalinity	
(1) 500 mL poly/HNO3	Potassium/Manganese/Phosphorus	
(3) 40 mL VOA/HCl	Methane	

Groundwater Sampling Data Sheet

JACOBS

Site Name	Event	Well ID	Project Number
Former Communications Site	**Fall 2017 Ground Water Sampling**	**MW77**	**05M33101**
Weather Conditions	PID Readings of Total VOCs (ppm)	Date	Sampler Initials
Cloudy, Low 40s	Ambient 0.0 Breathing Zone 0.0 In Well 0.9	9/28/17	TL

Well Information

Well Integrity	TOC Stickup (ft ags)	Well Casing Material	Casing Diameter(in) / Gallons per linear foot(gal/ft)
[✓ Good] Fair Poor	3.5	[✓ PVC] SS	1 / 0.041 [✓ 2/ 0.163] 4 / 0.653 6 / 1.469

Description of Damage (if present)	Photo Taken
None	[✓ Yes] No

Depth to Product (ft)	Depth to GW (ft btoc)	Total Depth of Casing (ft btoc)	Product Thickness (ft) and Volume Recovered (mL)
—	18.09	22.67 (final)	N/A

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

SHOW WORK Max Purge Volume = (22.69 †ft – 18.09 ft) * 0.163 gal/ft * 3 = 2.25 gal * 3.785 L/gal = 8.51 L

Well Purging Information

Start Time	Finish Time	Depth of Tubing (ft btoc)		Equipment Used for Purging
1323	1351	TL ~~19.0~~ 19.1		Bailer [✓ Peristaltic Pump] Submersible Pump
Color	Odor	Sheen	Purged Dry	Meter Used During Purging
[✓ Clear] Cloudy Brown Other:	None Moderate [✓ Faint] Strong	Yes [✓ No]	Yes [✓ No]	[✓ YSI Multi Meter] [✓ HF Scientific Turbidimeter]

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

Time (HH:mm)	Volume (Gallons or Liters)		Acceptable Range to Demonstrate Stability						
			not applicable	± 3%	± 10% or 0.2 mg/L (whichever is greater)	not applicable	± 10 mV	± 10% or ±1 NTU or less than 5 NTU	Drawdown < 0.3 ft
	Change	Total	Temperature (°C)	Conductivity (µS/cm)	DO (mg/L)	pH (std units)	ORP (mV)	Turbidity (NTU)	Water Level (feet btoc)
1325	1.0	1.0	5.53	1095	25.11	6.59	211.6	0.83 ✓	18.25
1330	2.5	3.5	4.95	1113	3.47	6.58	206.2	0.88 ✓	18.21
1335	1.9	5.4	4.97	1115	9.26	6.59	202.3	0.82 ✓	18.20
1340	1.8	7.2	4.91	1111 ✓	10.43	6.64	197.2 ✓	0.80 ✓	18.20
1345	1.8	9.0	4.90	1109 ✓	9.97	6.67	194.1 ✓	0.34 ✓	18.20
1350	1.8	10.8	4.89	1109 ✓	9.90 ✓	6.70	191.4 ✓	0.21 ✓	18.20
Reached Stability								0.95 ✓ *	
		* Taken before flow cell							

Sample Collection Information

Start Time	Finish Time / Date	Depth of Tubing (ft btoc)	Equipment Used for Sampling
1353	1405	19.1	[✓ Peristaltic Pump] Submersible Pump
SAMPLE ID: 17FWAMW77-GWS		QC: ~~Dup MS/MSD~~	Ferrous Iron (Fe^{2+}) (mg/L) = 0.0

Container/Preservative	Analysis Requested	Notes
(2) 1 L amber/4C	DRO/RRO	—
(1) 500 mL poly/H2SO4	Nitrate/ Nitrite/ Ammonia	
(1) 500 mL poly/4C	Sulfate/ Alkalinity	
(1) 500 mL poly/HNO3	Potassium/Manganese/Phosphorus	
(3) 40 mL VOA/HCl	Methane	

Groundwater Sampling Data Sheet

JACOBS

Site Name	Event	Well ID	Project Number
Former Communications Site	**Fall 2017 Ground Water Sampling**	**MW78**	**05M33101**
Weather Conditions	PID Readings of Total VOCs (ppm)	Date	Sampler Initials
Sunny, Slight wind, 90°F	Ambient 0.0 Breathing Zone 0.0 In Well 0.0	9/27/17	TL

* Needs trimmed and PVC cap

Well Information

Well Integrity	TOC Stickup (ft ags)	Well Casing Material	Casing Diameter(in) / Gallons per linear foot(gal/ft)
Good [✓ Fair] Poor	3.3'	[✓ PVC] SS	1 / 0.041 [✓ 2/ 0.163] 4 / 0.653 6 / 1.469

Description of Damage (if present)	Photo Taken
Small whole formed along concrete base, deep	[✓ Yes] No

Depth to Product (ft)	Depth to GW (ft btoc)	Total Depth of Casing (ft btoc)	Product Thickness (ft) and Volume Recovered (mL)
~	16.86	37.32 (final)	N/A

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

SHOW WORK Max Purge Volume = (37.35 † ft – 16.86 ft) ∗ 0.163 gal/ft ∗ 3 = 10.02 gal ∗ 3.785 L/gal = 37.92 L

Well Purging Information

Start Time	Finish Time	Depth of Tubing (ft btoc)	Equipment Used for Purging
1506	1544	17.85'	Bailer [✓ Peristaltic Pump] Submersible Pump

Color	Odor	Sheen	Purged Dry	Meter Used During Purging
[✓ Clear] Cloudy Brown Other:	[✓ None] Moderate Faint Strong	Yes [✓ No]	Yes [✓ No]	[✓ YSI Multi Meter] [✓ HF Scientific Turbidimeter]

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

Time (HH:mm)	Volume (Gallons or [✓ Liters])		Acceptable Range to Demonstrate Stability						
			not applicable	± 3%	± 10% or 0.2 mg/L (whichever is greater)	not applicable	± 10 mV	± 10% or ±1 NTU or less than 5 NTU	Drawdown < 0.3 ft
	Change	Total	Temperature (°C)	Conductivity (µS/cm)	DO (mg/L)	pH (std units)	ORP (mV)	Turbidity (NTU)	Water Level (feet btoc)
1508	0.5	0.5	7.54	522	2.87	6.41	91.7	7.96	16.89
1513	~~2.0~~ 2.2 TL	~~2.5~~ 2.7 TL	7.47	481	1.02	6.75	-2.5	2.78 ✓	16.88
1518	1.5	3.2	7.24	487	0.7	6.89	-55.0	1.79 ✓	16.89
1523	1.9	5.1	7.06	489 ✓	0.84	6.93	-82.3	1.27 ✓	16.89
1528	2.1	7.2	6.85	493 ✓	0.72 ✓	6.96	-79.9	1.22 ✓	16.89
1533	1.8	9.0	6.84	496 ✓	0.69	6.99	-81.9 ✓	1.17 ✓	16.89
1538	1.9	10.9	6.97	494 ✓	0.64	7.01	-91.3	0.91 ✓	16.89
1543	2.0	12.9	7.00	494 ✓	0.57 ✓	7.01	-86.9 ✓	0.11 ✓	16.89
	* stability								

Sample Collection Information

Start Time	Finish Time / Date	Depth of Tubing (ft btoc)	Equipment Used for Sampling
1544	1554 / 9/27	17.85'	[✓ Peristaltic Pump] Submersible Pump
SAMPLE ID: 17FWAMW78-GWF		QC: ~~Dup MS/MSD~~	Ferrous Iron (Fe^{2+}) (mg/L) = 3.5

Container/Preservative	Analysis Requested	Notes
(6) 40 mL VOA/HCl	SW8260SIM	—
(1) 500 mL poly/H2SO4	Nitrate/ Nitrite/ Ammonia	
(1) 500 mL poly/4C	Sulfate/ Alkalinity	
(1) 500 mL poly/HNO3	Potassium/Manganese/Phosphorus	
(3) 40 mL VOA/HCl	Methane	

Groundwater Sampling Data Sheet

JACOBS

Site Name	Event	Well ID	Project Number
Former Communications Site	**Fall 2017 Ground Water Sampling**	**MW79**	**05M33101**
Weather Conditions	PID Readings of Total VOCs (ppm)	Date	Sampler Initials
Fair; 40°F, no wind	Ambient 0.0 Breathing Zone 0.0 In Well 0.0	9/28/2017	GPS

Well Information

Well Integrity	TOC Stickup (ft ags)	Well Casing Material	Casing Diameter(in) / Gallons per linear foot(gal/ft)
Good [✓ Fair] Poor	3.10	[✓ PVC] SS	1 / 0.041 [✓ 2/ 0.163] 4 / 0.653 6 / 1.469

Description of Damage (if present)	Photo Taken
Frost jacked; well cap won't fit underneath cap for PC; hanging in well	[✓ Yes] No

Depth to Product (ft)	Depth to GW (ft btoc)	Total Depth of Casing (ft btoc)	Product Thickness (ft) and Volume Recovered (mL)
N/A	18.34	21.75 (final)	N/A

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

SHOW WORK | Max Purge Volume = (21.72 † ft – 18.34 ft) • 0.163 gal/ft • 3 = 1.653 gal • 3.785 L/gal = 6.256 L

Well Purging Information

Start Time	Finish Time	Depth of Tubing (ft btoc)	Equipment Used for Purging
1001	1019	19.40	Bailer [✓ Peristaltic Pump] Submersible Pump

Color	Odor	Sheen	Purged Dry	Meter Used During Purging
Clear Cloudy [✓ Brown] Other:	[✓ None] Moderate Faint Strong	Yes [✓ No]	Yes [✓ No]	[✓ YSI Multi Meter] [✓ HF Scientific Turbidimeter]

Purging reached: Stability [✓ Max Vol.] | Purge water was: Treated [✓ Stored] Other | Note:

Time (HH:mm)	Volume ~~(Gallons~~ or Liters)		Acceptable Range to Demonstrate Stability						
			not applicable	± 3%	± 10% or 0.2 mg/L (whichever is greater)	not applicable	± 10 mV	± 10% or ±1 NTU or less than 5 NTU	Drawdown < 0.3 ft
	Change	Total	Temperature (°C)	Conductivity (µS/cm)	DO (mg/L)	pH (std units)	ORP (mV)	Turbidity (NTU)	Water Level (feet btoc)
1004	1.3	1.3	6.29	749	4.46	6.65	161.8	35.85	18.39 ✓
1009	2.5	3.8	6.26	712 ✓	2.38 –	6.78	46.3 –	15.90 –	18.39 ✓
1014	2.5	6.3	6.22	713 ✓	1.74 –	6.86	4.7 –	5.08 –	18.39 ✓
1019	2.5	8.8	6.20	717	1.64	6.91	-10.4	1.40	18.39

Sample Collection Information

Start Time	Finish Time / Date	Depth of Tubing (ft btoc)	Equipment Used for Sampling
1028	1105	19.40	[✓ Peristaltic Pump] Submersible Pump

SAMPLE ID: 17FWAMW79-GWF **17FWAMW79Y-GWF**	QC: [✓ Dup] [✓ MS/MSD]	Ferrous Iron (Fe^{2+}) (mg/L) = 3.6

Container/Preservative	Analysis Requested	Notes
(24) 40 mL VOA/HCl	SW8260SIM (dup, MS/MSD)	
(2) 500 mL poly/H2SO4	Nitrate/ Nitrite/ Ammonia (dup)	
(2) 500 mL poly/4C	Sulfate/ Alkalinity (dup)	
(2) 500 mL poly/HNO3	Potassium/Manganese/Phosphorus(dup)	
(6) 40 mL VOA/HCl	Methane(dup)	

Groundwater Sampling Data Sheet

JACOBS

Site Name	Event	Well ID	Project Number
Former Communications Site	Fall 2017 Ground Water Sampling	MW80	05M33101

Weather Conditions	PID Readings of Total VOCs (ppm)	Date	Sampler Initials
37° F Cloudy rain	Ambient 0.0 Breathing Zone 0.0 In Well 0.0	9/28/17	IP

Well Information

Screened 40.08 - 49.58 ft ~~bgs~~ btoc IP 9/28

Well Integrity	TOC Stickup (ft ags)	Well Casing Material	Casing Diameter(in) / Gallons per linear foot(gal/ft)
[✓ Good] Fair Poor	2.01	[✓ PVC] SS	1 / 0.041 [✓ 2/ 0.163] 4 / 0.653 6 / 1.469

Description of Damage (if present)	Photo Taken
None	Yes [✓ No]

Depth to Product (ft)	Depth to GW (ft btoc)	Total Depth of Casing (ft btoc)	Product Thickness (ft) and Volume Recovered (mL)
None	14.39	46.80 (final)	none

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

SHOW WORK Max Purge Volume = (46.73 † ft – 14.39 ft) ∗ 0.163 gal/ft ∗ 3 = 15.8 gal ∗ 3.785 L/gal = 60 L

Well Purging Information

Start Time	Finish Time	Depth of Tubing (ft btoc)	Equipment Used for Purging
1327	1352	43.5	Bailer [✓ Peristaltic Pump] Submersible Pump

Color	Odor	Sheen	Purged Dry	Meter Used During Purging
[✓ Clear] Cloudy Brown Other:	None Moderate [✓ Faint] Strong	Yes [✓ No]	Yes [✓ No]	[✓ YSI Multi Meter] [✓ HF Scientific Turbidimeter]

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

Time (HH:mm)	Volume (Gallons or [✓ Liters])		Acceptable Range to Demonstrate Stability						
			not applicable	± 3%	± 10% or 0.2 mg/L (whichever is greater)	not applicable	± 10 mV	± 10% or ±1 NTU or less than 5 NTU	Drawdown < 0.3 ft
	Change	Total	Temperature (°C)	Specific Conductivity (µS/cm) c	DO (mg/L)	pH (std.units)	ORP (mV)	Turbidity (NTU)	Water Level (feet btoc)
~~1.6~~ 1332	1.6	1.6	—	—	—	—	—	0.78	14.39
1337	1.5	3.1	4.26	395	0.97	6.95	43.9	0.97	14.39
1342	1.5	4.6	4.15	395	0.60	6.98	40.9	0.46 ✓	14.39
1347	1.5	6.1	4.12	395 ✓	0.48 -	7.00	37.9 ✓	0.78 ✓	14.39
1352	1.5	7.6	4.08	395 ✓	0.40 ✓	7.01	36.8 ✓	0.71 ✓	14.39

Sample Collection Information

Start Time	Finish Time / Date	Depth of Tubing (ft btoc)	Equipment Used for Sampling
1354	1403 / 9.28.17	43.5	[✓ Peristaltic Pump] Submersible Pump

SAMPLE ID: 17FWAMW80-GWF

QC: ~~Dup MS/MSD~~

Ferrous Iron (Fe^{2+}) (mg/L) = 1.6

Container/Preservative	Analysis Requested	Notes
(3) 40 mL VOA/HCl	SW8260	
(1) 500 mL poly/H2SO4	Nitrate/ Nitrite/ Ammonia	
(1) 500 mL poly/4C	Sulfate/ Alkalinity	
(1) 500 mL poly/HNO3	Potassium/Manganese/Phosphorus	
(3) 40 mL VOA/HCl	Methane	

Groundwater Sampling Data Sheet

JACOBS

Site Name	Event	Well ID	Project Number
Former Communications Site	**Fall 2017 Ground Water Sampling**	**MW82**	**05M33101**
Weather Conditions	PID Readings of Total VOCs (ppm)	Date	Sampler Initials
37°F overcast	Ambient 0.0 Breathing Zone 0.0 In Well 0.0	9/29/17	IP

Well Information

Well Integrity	TOC Stickup (ft ags)	Well Casing Material	Casing Diameter(in) / Gallons per linear foot(gal/ft)
[✓ Good] Fair Poor	2.60	[✓ PVC] SS	1 / 0.041 [✓ 2/ 0.163] 4 / 0.653 6 / 1.469

Description of Damage (if present)	Photo Taken
NONE	Yes [✓ No]

Depth to Product (ft)	Depth to GW (ft btoc)	Total Depth of Casing (ft btoc)	Product Thickness (ft) and Volume Recovered (mL)
NONE	1751	21.74 (final)	NONE

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

SHOW WORK Max Purge Volume = (21.78 † ft – 17.51 ft) ∗ 0.163 gal/ft ∗ 3 = 2.1 gal ∗ 3.785 L/gal = 8 L

Well Purging Information

Start Time	Finish Time	Depth of Tubing (ft btoc)	Equipment Used for Purging
1318	1353	19.0	Bailer [✓ Peristaltic Pump] Submersible Pump

Color	Odor	Sheen	Purged Dry	Meter Used During Purging
[✓ Clear] Cloudy Brown Other:	[✓ None] Moderate Faint Strong	Yes [✓ No]	Yes [✓ No]	[✓ YSI Multi Meter] [✓ HF Scientific Turbidimeter]

Purging reached: Stability [✓ Max Vol.] | Purge water was: Treated [✓ Stored] Other | Note:

Time (HH:mm)	Volume (Gallons or [✓ Liters])		Acceptable Range to Demonstrate Stability						
			not applicable	± 3%	± 10% or 0.2 mg/L (whichever is greater)	not applicable	± 10 mV	± 10% or ±1 NTU or less than 5 NTU	Drawdown < 0.3 ft
	Change	Total	Temperature (°C)	Sp. Conductivity (µS/cm) °C	DO (mg/L)	pH (std units)	ORP (mV)	Turbidity (NTU)	Water Level (feet btoc)
1323	1.3	1.3	—	—	—	—	—	—	—
1328	1.7	3.0	—	—	—	—	—	0.00*	17.53
1333	1.4	4.4	7.00	1033	1.96	6.58	161.6	0.00	17.53
1338	1.6	6.0	6.99	1036	1.71	6.62	157.3	0.00	17.53
1343	1.6	7.6	6.95	1030 ✓	1.31 –	6.63	159.0 ✓	0.00 ✓	17.53
1348	1.7	9.3	6.96	1027 ✓	1.25 –	6.65	155.2 ✓	0.00 ✓	17.53
1353	1.7	11.0	6.94	1025 ✓	1.20 ✓	6.64	154.6 ✓	0.00 ✓	17.54
								0.00*	

* Taken straight from tubing w/No flow-through cell

Sample Collection Information

Start Time	Finish Time / Date	Depth of Tubing (ft btoc)	Equipment Used for Sampling
1354	1410 / 9.29.17	19.0	[✓ Peristaltic Pump] Submersible Pump

SAMPLE ID: 17FWAMW82-GWF | QC: ~~Dup MS/MSD~~ | Ferrous Iron (Fe^{2+}) (mg/L) = 0.0

Container/Preservative	Analysis Requested	Notes
(2) 1 L amber/HCl	DRO/RRO	
(1) 500 mL poly/H2SO4	Nitrate/ Nitrite/ Ammonia	
(1) 500 mL poly/4C	Sulfate/ Alkalinity	
(1) 500 mL poly/HNO3	Potassium/Manganese/Phosphorus	
(3) 40 mL VOA/HCl	Methane	

Groundwater Sampling Data Sheet

JACOBS

Site Name	Event	Well ID	Project Number
Former Communications Site	Fall 2017 Ground Water Sampling	MW91	05M33101
Weather Conditions	PID Readings of Total VOCs (ppm)	Date	Sampler Initials
39°F light rain	Ambient 0.0 Breathing Zone 0.0 In Well 0.0	9/28/17	IP

1500

Well Information

Screened ~~40.08 49.58 ft bgs~~ IP 9/28 52.5-72.5 ft btoc

Well Integrity	TOC Stickup (ft ags)	Well Casing Material	Casing Diameter(in) / Gallons per linear foot(gal/ft)
[✓ Good] Fair Poor	2.56	[✓ PVC] SS	1 / 0.041 [✓ 2/ 0.163] 4 / 0.653 6 / 1.469

Description of Damage (if present)	Photo Taken
none	Yes [✓ No]

Depth to Product (ft)	Depth to GW (ft btoc)	Total Depth of Casing (ft btoc)	Product Thickness (ft) and Volume Recovered (mL)
none	16.75	75.93 (final)	none

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

SHOW WORK Max Purge Volume = (76.10 † ft – 16.75 ft) * 0.163 gal/ft * 3 = 29.0 gal * 3.785 L/gal = 110 L

Well Purging Information

Start Time	Finish Time	Depth of Tubing (ft btoc)	Equipment Used for Purging
1512	1542	62.5	Bailer [✓ Peristaltic Pump] Submersible Pump

Color	Odor	Sheen	Purged Dry	Meter Used During Purging
[✓ Clear] Cloudy Brown Other:	None Moderate [✓ Faint] Strong organic	Yes [✓ No]	Yes [✓ No]	[✓ YSI Multi Meter] [✓ HF Scientific Turbidimeter]

Purging reached: [✓ Stability] Max Vol. | Purge water was: Treated [✓ Stored] Other Note:

Time (HH:mm)	Volume (Gallons or [✓ Liters])		Acceptable Range to Demonstrate Stability					
			not applicable	± 3%	± 10% or 0.2 mg/L (whichever is greater)	not applicable	± 10 mV	± 10% or ±1 NTU or less than 5 NTU	Drawdown < 0.3 ft
	Change	Total	Temperature (°C)	Specific Conductivity (µS/cm)°C	DO (mg/L)	pH (std units)	ORP (mV)	Turbidity (NTU)	Water Level (feet btoc)
1517	1.3	1.3	—	—	—	—	—	1.40	16.79
1522	1.4	2.7	4.94	406	2.20	7.09	56.6	0.79	16.79
1527	1.3	4.0	4.85	405	1.10	7.11	51.3	0.90	16.78
1532	1.4	5.4	4.82	405 ✓	0.61 -	7.15	42.4 -	0.59 ✓	16.79
1537	1.4	6.8	4.81	406 ✓	0.52 -	7.16	37.2 -	0.85 ✓	16.78
1542	1.4	8.2	4.80	406 ✓	0.49 ✓	7.18	34.6 ✓	1.26 ✓	16.78

Sample Collection Information

Start Time	Finish Time / Date	Depth of Tubing (ft btoc)	Equipment Used for Sampling
1544	1547 / 9.28.17	62.5	[✓ Peristaltic Pump] Submersible Pump
SAMPLE ID: 17FWAMW91-GWF		QC: ~~Dup MS/MSD~~	Ferrous Iron (Fe^{2+}) (mg/L) = —

Container/Preservative	Analysis Requested	Notes
(6) 40 mL VOA/HCl	SW8260SIM	

Groundwater Sampling Data Sheet

JACOBS

Site Name	Event	Well ID	Project Number
Former Communications Site	**Fall 2017 Ground Water Sampling**	**MW93**	**05M33101**
Weather Conditions	PID Readings of Total VOCs (ppm)	Date	Sampler Initials
37 °F mostly cloudy light breeze	Ambient 0.0 Breathing Zone 0.0 In Well 0.0	9/29/17	IP

Well Information

Well Integrity	TOC Stickup (ft ags)	Well Casing Material	Casing Diameter(in) / Gallons per linear foot(gal/ft)
[✓ Good] Fair Poor	2.83	[✓ PVC] SS	1 / 0.041 [✓ 2/ 0.163] 4 / 0.653 6 / 1.469

Description of Damage (if present)	Photo Taken
NONE	by DW [✓ Yes] ~~No~~ IP 9/29

Depth to Product (ft)	Depth to GW (ft btoc)	Total Depth of Casing (ft btoc)	Product Thickness (ft) and Volume Recovered (mL)
NONE	16.73	73.60 (final)	NONE

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

SHOW WORK Max Purge Volume = (73.65 † ft - 16.73 ft) ∗ 0.163 gal/ft ∗ 3 = 27.8 gal ∗ 3.785 L/gal = 105.4 L

Well Purging Information

Start Time	Finish Time	Depth of Tubing (ft btoc)	Equipment Used for Purging
1136	1226	62.5	Bailer [✓ Peristaltic Pump] Submersible Pump

Color	Odor	Sheen	Purged Dry	Meter Used During Purging
[✓ Clear] Cloudy Brown Other:	[✓ None] Moderate Faint Strong	Yes [✓ No]	Yes [✓ No]	[✓ YSI Multi Meter] [✓ HF Scientific Turbidimeter]

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

Time (HH:mm)	Volume (Gallons or [✓ Liters])		Acceptable Range to Demonstrate Stability						
			not applicable	± 3%	± 10% or 0.2 mg/L (whichever is greater)	not applicable	± 10 mV	± 10% or ±1 NTU or less than 5 NTU	Drawdown < 0.3 ft
	Change	Total	Temperature (°C)	Sp. Conductivity (µS/cm)℃	DO (mg/L)	pH (std units)	ORP (mV)	Turbidity (NTU)	Water Level (feet btoc)
1141	1.5	1.5	—	—	—	—	—	0.00*	16.73
1146	1.5	3.0	5.03	420	2.43	6.87	173.4	0.00	16.73
1151	1.3	4.3	4.85	410	0.73	6.84	156.5	0.00	16.73
1156	1.5	5.8	4.73	407	0.39 -	6.93	145.2	0.00 ✓	16.76
1201	1.8	7.6	4.68	407 ✓	0.27 -	7.02	135.1 -	0.00 ✓	16.78
1206	1.6	~~8~~9.2	4.64	407 ✓	0.26 ✓	7.06	126.8	0.00 ✓	16.79
1211	1.6	10.8	4.67	407 ✓	0.25 ✓	7.10	117.2 -	0.00 ✓	16.80
1216	1.7	12.5	4.72	407 ✓	0.23 ✓	7.13 ✓	111.6 -	0.00 ✓	16.81
1221	1.5	14.0	4.82	407 ✓	0.22 ✓	7.16 ✓	106.1 -	0.00 ✓	16.80
1226	1.6	15.6	4.76	407	0.18 ✓	7.18	102.4 ✓	0.00 ✓	16.80

* taken straight from tubing w/no flowthrough cell

Sample Collection Information

Start Time	Finish Time / Date	Depth of Tubing (ft btoc)	Equipment Used for Sampling
1229	1232 / 9.29.17	62.5	[✓ Peristaltic Pump] Submersible Pump

SAMPLE ID: 17FWAMW93-GWF QC: ~~Dup MS/MSD~~ Ferrous Iron (Fe^{2+}) (mg/L) = —

Container/Preservative	Analysis Requested	Notes
(6) 40 mL VOA/HCl	SW8260SIM	

APPENDIX D
Photograph Log

PHOTOGRAPH LOG
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Photo No. 1 – 18 July 2017
Purging of groundwater at monitoring well MW39 during the spring groundwater sampling event. View facing north.

Photo No. 2 – 20 July 2017
Flush-mount monitoring well (MW58) and sampling equipment during the spring sampling event. View facing down.

Photo No. 3 – 20 July 2017
Three waste drums are stored at DERA building prior to disposal during the spring groundwater sampling event. View facing west-southwest.

Photo No. 4 – 20 July 2017
Monitoring well MW77 with three bollards/bumper guards. View facing northeast.

Photo No. 5 – 20 July 2017
Monitoring well MW37, open, with PVC well cap. View facing down.

Photo No. 6 – 18 July 2017
Measuring depth to groundwater at monitoring well MW61. View facing north.

Photo No. 7 – 28 September 2017
Purging of groundwater at monitoring well MW03 during the fall groundwater sampling event. View facing southwest.

Photo No. 8 – 29 September 2017
Monitoring well MW79, with three bollards/bumper guards. View facing south-southwest.

Photo No. 9 – 29 September 2017
Cutting tool used to trim PVC well piping at monitoring well MW79 during the fall sampling event. View facing down.

Photo No. 10 – 2 June 2017
Hand digging around monitoring well (MW81) prior to removal.

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APPENDIX E
Waste Documentation

1.0 WASTE MANAGEMENT DISCUSSION

During the 2017 field season, waste was accrued during groundwater sampling and monitoring well decommissioning. The waste produced during groundwater sampling was stored in 10- and 55-gallon drums at Building 3489, the Defense Environmental Restoration Account building, at Fort Wainwright Alaska. During the spring sampling event, the waste was placed into specific containers based on the anticipated contaminants of concern, but during the fall sampling event, waste was not segregated. The wells that contributed to each container were tracked and groundwater sampling results from each were used to determine the level of contamination present prior to being handed off to the waste subcontractor for disposal. The results of these samples are presented in the waste tracking attachments. The waste accrued during well decommissioning (e.g., PVC casing, PVC screen or prepacked sand screen, and sand) was put into 1-cubic yard Super Sacks and then disposed of at the Fairbanks North Star Borough Landfill. Steel outer casings, bollards and well-locking caps were decontaminated and transported offsite. The EPA and ADEC approved landfill disposal of investigation-derived waste since there was no groundwater contamination in the decommissioned wells.

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2017 Former Communications Site Groundwater Monitoring Fort Wainwright, Alaska
Table E-1 Waste Sampling Results - Spring

Site ID	Generation Date	Date Staged	Initials	Contents	Waste Container (eg., Super Sack, Drum, etc.)	Volume (gallons)	% Full	Estimated Weight (lbs)	Staging area	Tracking #	Comments	Entity Taking Custody	TSDF
FCS	7/18/2017	7/18/2017	DW	Purge water (POL)	Drum	55	93%	435	DERA Building	17FWA-FCSGWS-01	MW13, MW08, MW48, MW78, MW39, MW91, MW93, MW62, MW32R, MW28, MW12R	ECC	ECC
FCS	7/18/2017	7/18/2017	DW	Purge water (TCE)	Drum	10	100%	85	DERA Building	17FWA-FCSGWS-02	MW80, MW61	ECC	ECC
FCS	7/18/2017	7/18/2017	DW	Purge water (TCP)	Drum	10	100%	85	DERA Building	17FWA-FCSGWS-03	MW47, MW79		
FCS	7/19/2017	7/19/2017	DW	Purge water (POL)	Drum	55	60%	290	DERA Building	17FWA-FCSGWS-04	MW33, MW64, MW06A, MW38, MW77, MW58, MW35, MW37, MW82	ECC	ECC

Note:

For definitions, refer to the Acronyms and Abbreviations section of the DQA.

2017 Former Communications Site Groundwater Monitoring Fort Wainwright, Alaska

Table E-2 Waste Sampling Results (Tracking No. 17FWA-FCSGWS-01) - Spring

				Location ID:	**MW08**	**MW12R**	**MW13**	**MW28**	**MW32R**
				Sample ID:	**17FWAMW08-GWS**	**17FWAMW12R-GWS**	**17FWAMW13-GWS**	**17FWAMW28-GWS**	**17FWAMW32R-GWS**
				Lab SDG:	**AZ58621**	**AZ58615**	**AZ58622**	**AZ58616**	**AZ58624**
				Matrix:	**W**	**W**	**W**	**W**	**W**
				Sample Date:	**7/19/2017**	**7/19/2017**	**7/19/2017**	**7/19/2017**	**7/19/2017**
				Laboratory:	**APPL**	**APPL**	**APPL**	**APPL**	**APPL**
Method	**Analyte**	**Units**	**RCRA TCLP Concentration[1]**	**Max Detected**					
AK102	Diesel Range Organics	mg/L		0.19		0.17		0.19	0.14
AK103	Residual Range Organics	mg/L		0		0		0	0
A2320B	Alkalinity as CaCO3	mg/L		453	284	179	453	297	440
E300.0	Sulfate	mg/L		97.7	27.5	36.8	56.1	62.4	47.5
E350.1	Nitrogen, Ammonia (as N)	mg/L		0.93	0	0.25	0	0	0
E353.2	Nitrogen, Nitrate (as N)	mg/L		4.4	0.24	0	0.043	0.92	3.5
RSK175	Methane	ug/L		91	0.97	52	9.5	24	0.75
SW6010C	Manganese	ug/L		1830	0	935	464	770	23.1
SW6010C	Phosphorus, Total (as P)	ug/L		141	0	107	0	0	0
SW6010C	Potassium	ug/L		7870	4280	3900	4570	5600	6140
SW8260C	1,1-Dichloroethene	ug/L	700	0		0			
SW8260C	1,2,3-Trichloropropane	ug/L		0.027	0.027	0	0		0
SW8260C	cis-1,2-Dichloroethene	ug/L		0		0			
SW8260C	Tetrachloroethene (PCE)	ug/L	700	0		0			
SW8260C	trans-1,2-Dichloroethene	ug/L		0		0			
SW8260C	Trichloroethene (TCE)	ug/L	500	0		0			
SW8260C	Vinyl chloride	ug/L	200	0	0	0	0		0

Notes:

[1] 40 CFR 261.24, Appendix II

Refer to Table E-1 for contents of container by tracking number.

For definitions, refer to the Acronyms and Abbreviations section of the DQA.

2017 Former Communications Site Groundwater Monitoring Fort Wainwright, Alaska
Table E-2 Waste Sampling Results (Tracking No. 17FWA-FCSGWS-01) - Spring

				Location ID:	MW39	MW48	MW62	MW62	MW78
				Sample ID:	17FWAMW39-GWS	17FWAMW48-GWS	17FWAMW62-GWS	17FWAMW62Y-GWS	17FWAMW78-GWS
				Lab SDG:	AZ58543	AZ58618	AZ58540	AZ58541	AZ58619
				Matrix:	W	W	W	W	W
				Sample Date:	7/18/2017	7/19/2017	7/18/2017	7/18/2017	7/19/2017
				Laboratory:	APPL	APPL	APPL	APPL	APPL
Method	**Analyte**	**Units**	**RCRA TCLP Concentration[1]**	**Max Detected**					
AK102	Diesel Range Organics	mg/L		0.19			0.092		
AK103	Residual Range Organics	mg/L		0			0		
A2320B	Alkalinity as CaCO3	mg/L		453	240	335	450	447	219
E300.0	Sulfate	mg/L		97.7	21.7	51	97.7	96.9	26.7
E350.1	Nitrogen, Ammonia (as N)	mg/L		0.93	0.19	0	0	0	0.93
E353.2	Nitrogen, Nitrate (as N)	mg/L		4.4	0	0.98	4.3	4.4	0
RSK175	Methane	ug/L		91	91	5.3	61	51	29
SW6010C	Manganese	ug/L		1830	860	59.9	1830	1680	725
SW6010C	Phosphorus, Total (as P)	ug/L		141	141	0	0	0	98.7
SW6010C	Potassium	ug/L		7870	5120	4990	7870	7240	4780
SW8260C	1,1-Dichloroethene	ug/L	700	0					
SW8260C	1,2,3-Trichloropropane	ug/L		0.027	0	0			0
SW8260C	cis-1,2-Dichloroethene	ug/L		0					
SW8260C	Tetrachloroethene (PCE)	ug/L	700	0					
SW8260C	trans-1,2-Dichloroethene	ug/L		0					
SW8260C	Trichloroethene (TCE)	ug/L	500	0					
SW8260C	Vinyl chloride	ug/L	200	0	0	0			0

Notes:

[1] 40 CFR 261.24, Appendix II

Refer to Table E-1 for contents of container by tracking number.

For definitions, refer to the Acronyms and Abbreviations section of the DQA.

2017 Former Communications Site Groundwater Monitoring Fort Wainwright, Alaska
Table E-2 Waste Sampling Results (Tracking No. 17FWA-FCSGWS-01) - Spring

				Location ID:	**MW91**	**MW93**
				Sample ID:	**17FWAMW91-GWS**	**17FWAMW93-GWS**
				Lab SDG:	**AZ58613**	**AZ58620**
				Matrix:	**W**	**W**
				Sample Date:	**7/18/2017**	**7/19/2017**
				Laboratory:	**APPL**	**APPL**
Method	**Analyte**	**Units**	**RCRA TCLP Concentration[1]**	**Max Detected**		
AK102	Diesel Range Organics	mg/L		0.19		
AK103	Residual Range Organics	mg/L		0		
A2320B	Alkalinity as CaCO3	mg/L		453		
E300.0	Sulfate	mg/L		97.7		
E350.1	Nitrogen, Ammonia (as N)	mg/L		0.93		
E353.2	Nitrogen, Nitrate (as N)	mg/L		4.4		
RSK175	Methane	ug/L		91		
SW6010C	Manganese	ug/L		1830		
SW6010C	Phosphorus, Total (as P)	ug/L		141		
SW6010C	Potassium	ug/L		7870		
SW8260C	1,1-Dichloroethene	ug/L	700	0		
SW8260C	1,2,3-Trichloropropane	ug/L		0.027	0	0
SW8260C	cis-1,2-Dichloroethene	ug/L		0		
SW8260C	Tetrachloroethene (PCE)	ug/L	700	0		
SW8260C	trans-1,2-Dichloroethene	ug/L		0		
SW8260C	Trichloroethene (TCE)	ug/L	500	0		
SW8260C	Vinyl chloride	ug/L	200	0	0	0

Notes:

[1] 40 CFR 261.24, Appendix II

Refer to Table E-1 for contents of container by tracking number.

For definitions, refer to the Acronyms and Abbreviations section of the DQA.

2017 Former Communications Site Groundwater Monitoring Fort Wainwright, Alaska
Table E-3 Waste Sampling Results (Tracking No. 17FWA-FCSGWS-02) - Spring

				Location ID:	MW61	MW61	MW80
				Sample ID:	17FWAMW61-GWS	17FWAMW61X-GWS	17FWAMW80-GWS
				Lab SDG:	AZ58542	AZ58612	AZ58545
				Matrix:	W	W	W
				Sample Date:	7/18/2017	7/18/2017	7/18/2017
				Laboratory:	APPL	APPL	APPL
Method	**Analyte**	**Units**	**RCRA TCLP Concentration[1]**	**Max Detected**			
A2320B	Alkalinity as CaCO3	mg/L		346	346		153
E300.0	Sulfate	mg/L		46.8	46.8		35.2
E350.1	Nitrogen, Ammonia (as N)	mg/L		0.16	0.13		0.16
E353.2	Nitrogen, Nitrate (as N)	mg/L		0	0		0
RSK175	Methane	ug/L		98	98		20
SW6010C	Manganese	ug/L		1800	1800		787
SW6010C	Phosphorus, Total (as P)	ug/L		139	33.7		139
SW6010C	Potassium	ug/L		5290	5290		3550
SW8260C	1,1-Dichloroethene	ug/L	700	0	0		0
SW8260C	1,2,3-Trichloropropane	ug/L		0	0	0	0
SW8260C	cis-1,2-Dichloroethene	ug/L		6.6	6.6		0
SW8260C	Tetrachloroethene (PCE)	ug/L	700	0	0		0
SW8260C	trans-1,2-Dichloroethene	ug/L		6.9	6.9		0
SW8260C	Trichloroethene (TCE)	ug/L	500	0.94	0.94		0
SW8260C	Vinyl chloride	ug/L	200	0.35	0.28	0.35	0

Notes:

[1] 40 CFR 261.24, Appendix II

Refer to Table E-1 for contents of container by tracking number.

For definitions, refer to the Acronyms and Abbreviations section of the DQA.

2017 Former Communications Site Groundwater Monitoring Fort Wainwright, Alaska
Table E-4 Waste Sampling Results (Tracking No. 17FWA-FCSGWS-03) - Spring

				Location ID:	MW47	MW79	MW79
				Sample ID:	17FWAMW47-GWS	17FWAMW79-GWS	17FWAMW79Z-GWS
				Lab SDG:	AZ58544	AZ58625	AZ58626
				Matrix:	W	W	W
				Sample Date:	7/18/2017	7/19/2017	7/19/2017
				Laboratory:	APPL	APPL	APPL
Method	**Analyte**	**Units**	**RCRA TCLP Concentration[1]**	**Max Detected**			
A2320B	Alkalinity as CaCO3	mg/L		382	255	382	382
E300.0	Sulfate	mg/L		65.7	27.9	65.2	65.7
E350.1	Nitrogen, Ammonia (as N)	mg/L		0.13	0	0.12	0.13
E353.2	Nitrogen, Nitrate (as N)	mg/L		0.48	0.21	0.3	0.48
RSK175	Methane	ug/L		26	23	21	26
SW6010C	Manganese	ug/L		1340	78.9	1340	1280
SW6010C	Phosphorus, Total (as P)	ug/L		27.6	0	27.6	26.2
SW6010C	Potassium	ug/L		5690	4590	5690	5450
SW8260C	1,2,3-Trichloropropane	ug/L		0.61	0.19	0.56	0.61
SW8260C	Vinyl chloride	ug/L	200	0	0	0	0

Notes:

[1] 40 CFR 261.24, Appendix II

Refer to Table E-1 for contents of container by tracking number.

For definitions, refer to the Acronyms and Abbreviations section of the DQA.

2017 Former Communications Site Groundwater Monitoring Fort Wainwright, Alaska
Table E-5 Waste Sampling Results (Tracking No. 17FWA-FCSGWS-04) - Spring

				Location ID:	MW06A	MW33	MW35	MW35
				Sample ID:	17FWAMW06A-GWS	17FWAMW33-GWS	17FWAMW35-GWS	17FWAMW35X-GWS
				Lab SDG:	AZ58676	AZ58617	AZ58673	AZ58674
				Matrix:	W	W	W	W
				Sample Date:	7/20/2017	7/19/2017	7/20/2017	7/20/2017
				Laboratory:	APPL	APPL	APPL	APPL
Method	**Analyte**	**Units**	**RCRA TCLP Concentration[1]**	**Max Detected**				
AK102	Diesel Range Organics	mg/L		26	3.9	26	0.1	0.082
AK103	Residual Range Organics	mg/L		4	0	4	0	0
A2320B	Alkalinity as CaCO3	mg/L		527	278	348	438	446
E300.0	Sulfate	mg/L		72.4	14.1	3.8	47.9	48.3
E350.1	Nitrogen, Ammonia (as N)	mg/L		0.48	0.17	0.48	0	0
E353.2	Nitrogen, Nitrate (as N)	mg/L		14.6	0.059	0.18	3.9	3.6
RSK175	Methane	ug/L		1300	930	1300	1.1	1.1
SW6010C	Manganese	ug/L		4600	1370	4600	208	230
SW6010C	Phosphorus, Total (as P)	ug/L		431	141	431	0	0
SW6010C	Potassium	ug/L		8800	4780	5420	6940	6850
SW8260C	1,1-Dichloroethene	ug/L	700	0		0		
SW8260C	1,2,3-Trichloropropane	ug/L		0		0		
SW8260C	cis-1,2-Dichloroethene	ug/L		0		0		
SW8260C	Tetrachloroethene (PCE)	ug/L	700	0		0		
SW8260C	trans-1,2-Dichloroethene	ug/L		0		0		
SW8260C	Trichloroethene (TCE)	ug/L	500	0		0		
SW8260C	Vinyl chloride	ug/L	200	0		0		

Notes:

[1] 40 CFR 261.24, Appendix II

Refer to Table E-1 for contents of container by tracking number.

For definitions, refer to the Acronyms and Abbreviations section of the DQA.

2017 Former Communications Site Groundwater Monitoring Fort Wainwright, Alaska
Table E-5 Waste Sampling Results (Tracking No. 17FWA-FCSGWS-04) - Spring

				Location ID:	MW37	MW38	MW58	MW58
				Sample ID:	17FWAMW37-GWS	17FWAMW38-GWS	17FWAMW58-GWS	17FWAMW58Y-GWS
				Lab SDG:	AZ58677	AZ58678	AZ58679	AZ58682
				Matrix:	W	W	W	W
				Sample Date:	7/20/2017	7/20/2017	7/20/2017	7/20/2017
				Laboratory:	APPL	APPL	APPL	APPL
Method	**Analyte**	**Units**	**RCRA TCLP Concentration[1]**	**Max Detected**				
AK102	Diesel Range Organics	mg/L		26	0.49	0.088	1.9	2
AK103	Residual Range Organics	mg/L		4	0	0	0.11	0
A2320B	Alkalinity as CaCO3	mg/L		527	300	361	238	
E300.0	Sulfate	mg/L		72.4	31.8	48.4	17.8	
E350.1	Nitrogen, Ammonia (as N)	mg/L		0.48	0	0.16	0.16	
E353.2	Nitrogen, Nitrate (as N)	mg/L		14.6	2.8	0.13	0	
RSK175	Methane	ug/L		1300	34	30	550	
SW6010C	Manganese	ug/L		4600	633	1230	1230	
SW6010C	Phosphorus, Total (as P)	ug/L		431	0	0	39.4	
SW6010C	Potassium	ug/L		8800	7380	6240	4260	
SW8260C	1,1-Dichloroethene	ug/L	700	0				
SW8260C	1,2,3-Trichloropropane	ug/L		0				
SW8260C	cis-1,2-Dichloroethene	ug/L		0				
SW8260C	Tetrachloroethene (PCE)	ug/L	700	0				
SW8260C	trans-1,2-Dichloroethene	ug/L		0				
SW8260C	Trichloroethene (TCE)	ug/L	500	0				
SW8260C	Vinyl chloride	ug/L	200	0				

Notes:

[1] 40 CFR 261.24, Appendix II

Refer to Table E-1 for contents of container by tracking number.

For definitions, refer to the Acronyms and Abbreviations section of the DQA.

2017 Former Communications Site Groundwater Monitoring Fort Wainwright, Alaska
Table E-5 Waste Sampling Results (Tracking No. 17FWA-FCSGWS-04) - Spring

				Location ID:	**MW64**	**MW77**	**MW82**
				Sample ID:	**17FWAMW64-GWS**	**17FWAMW77-GWS**	**17FWAMW82-GWS**
				Lab SDG:	**AZ58672**	**AZ58675**	**AZ58680**
				Matrix:	**W**	**W**	**W**
				Sample Date:	**7/20/2017**	**7/20/2017**	**7/20/2017**
				Laboratory:	**APPL**	**APPL**	**APPL**
Method	**Analyte**	**Units**	**RCRA TCLP Concentration[1]**	**Max Detected**			
AK102	Diesel Range Organics	mg/L		26	0	0.28	0
AK103	Residual Range Organics	mg/L		4	0	0	0
A2320B	Alkalinity as CaCO3	mg/L		527	267	432	527
E300.0	Sulfate	mg/L		72.4	13.8	72.4	26.1
E350.1	Nitrogen, Ammonia (as N)	mg/L		0.48	0	0	0
E353.2	Nitrogen, Nitrate (as N)	mg/L		14.6	0	14.6	2.9
RSK175	Methane	ug/L		1300	24	1.2	6.1
SW6010C	Manganese	ug/L		4600	447	854	54.4
SW6010C	Phosphorus, Total (as P)	ug/L		431	0	9.3	0
SW6010C	Potassium	ug/L		8800	4390	8800	6290
SW8260C	1,1-Dichloroethene	ug/L	700	0			
SW8260C	1,2,3-Trichloropropane	ug/L		0			
SW8260C	cis-1,2-Dichloroethene	ug/L		0			
SW8260C	Tetrachloroethene (PCE)	ug/L	700	0			
SW8260C	trans-1,2-Dichloroethene	ug/L		0			
SW8260C	Trichloroethene (TCE)	ug/L	500	0			
SW8260C	Vinyl chloride	ug/L	200	0			

Notes:

[1] 40 CFR 261.24, Appendix II

Refer to Table E-1 for contents of container by tracking number.

For definitions, refer to the Acronyms and Abbreviations section of the DQA.

2017 Former Communications Site Groundwater Monitoring Fort Wainwright, Alaska

Table E-6 2017 Waste Tracking Log - Fall

Site ID	Generation Date	Date Staged	Initials	Contents	Waste Container (eg. Supersack, Drum, etc)	Volume (gallons)	% Full	Estimated Weight (lbs)	Staging area	Tracking #	Comments	Entity Taking Custody	TSDF
FCS	9/27/2017-9/29/2017	9/29/17	DW	Purge water (POL; MW47 contains TCP)	Drum	55	75%	355	DERA Building	17FWA-FCSGWF-01	MW13, MW62, MW78, MW39, MW03, **MW47**, MW37, MW77, MW33, MW32R, MW82	ECC	ECC
FCS	9/28/17	9/28/17	DW	Purge water (TCP)	Drum	10	40%	35	DERA Building	17FWA-FCSGWF-02	MW79	ECC	ECC
FCS	9/27/2017-9/29/2017	9/29/17	DW	Purge water (POL; MW80 & MW61 contains TCE)	Drum	55	92%	420	DERA Building	17FWA-FCSGWF-03	MW48, MW12R, MW64, **MW80, MW61**, MW06A, MW91, MW08, MW38, MW35, MW58, MW33, MW32R, MW28, MW93	ECC	ECC

Note:

For definitions, refer to the Acronyms and Abbreviations section of the DQA.

2017 Former Communications Site Groundwater Monitoring Fort Wainwright, Alaska
Table E-7 Waste Sampling Results (Tracking No. 17FWA-FCSGWF-01) - Fall

				Location ID:	MW03	MW13	MW32R	MW33	MW37
				Sample ID:	17FWAMW03-GWF	17FWAMW13-GWF	17FWAMW32R-GWF	17FWAMW33-GWF	17FWAMW37-GWF
				Lab SDG:	AZ61890	AZ61888	AZ62055	AZ62056	AZ62058
				Matrix:	W	W	W	W	W
				Sample Date:	9/28/2017	9/27/2017	9/29/2017	9/29/2017	9/29/2017
				Laboratory:	APPL	APPL	APPL	APPL	APPL
Method	**Analyte**	**Units**	**RCRA TCLP Concentration[1]**	**Max Detected**					
AK102	Diesel Range Organics	mg/L		25	0		0.6	25	0.45
AK103	Residual Range Organics	mg/L		0.24	0		0.2	0	0.2
A2320B	Alkalinity as CaCO3	mg/L		594	249	342	392	356	295
E300.0	Sulfate	mg/L		64	39.7	42.2	45.1	5.4	29.2
E350.1	Nitrogen, Ammonia (as N)	mg/L		0.41	0	0	0	0.36	0
E353.2	Nitrogen, Nitrate (as N)	mg/L		13.3	0	0.042	4.6	0	3.8
RSK175	Methane	ug/L		510	42	50	0.49	510	0
SW6010C	Manganese	ug/L		3680	764	296	16.1	3680	658
SW6010C	Phosphorus, Total (as P)	ug/L		527	117	0	72.1	527	40.9
SW6010C	Potassium	ug/L		9580	4460	4120	5940	5260	6070
SW8260C	1,1-Dichloroethene	ug/L	700	0				0	
SW8260C	1,2,3-Trichloropropane	ug/L		0.3		0	0	0	
SW8260C	cis-1,2-Dichloroethene	ug/L		0				0	
SW8260C	Tetrachloroethene (PCE)	ug/L	700	0				0	
SW8260C	trans-1,2-Dichloroethene	ug/L		0				0	
SW8260C	Trichloroethene (TCE)	ug/L	500	0				0	
SW8260C	Vinyl chloride	ug/L	200	0		0	0	0	

Notes:

[1] 40 CFR 261.24, Appendix II

Refer to Table E-6 for contents of container by tracking number.

For definitions, refer to the Acronyms and Abbreviations section of the DQA.

2017 Former Communications Site Groundwater Monitoring Fort Wainwright, Alaska
Table E-7 Waste Sampling Results (Tracking No. 17FWA-FCSGWF-01) - Fall

				Location ID:	**MW39**	**MW47**	**MW62**	**MW62**	**MW77**
				Sample ID:	**17FWAMW39-GWF**	**17FWAMW47-GWF**	**17FWAMW62-GWF**	**17FWAMW62Y-GWF**	**17FWAMW77-GWF**
				Lab SDG:	**AZ61889**	**AZ61895**	**AZ61886**	**AZ61887**	**AZ62057**
				Matrix:	**W**	**W**	**W**	**W**	**W**
				Sample Date:	**9/27/2017**	**9/28/2017**	**9/27/2017**	**9/27/2017**	**9/29/2017**
				Laboratory:	**APPL**	**APPL**	**APPL**	**APPL**	**APPL**
Method	**Analyte**	**Units**	**RCRA TCLP Concentration[1]**	**Max Detected**					
AK102	Diesel Range Organics	mg/L		25			0.18		0.64
AK103	Residual Range Organics	mg/L		0.24			0.18		0.24
A2320B	Alkalinity as CaCO3	mg/L		594	234	276	594	592	476
E300.0	Sulfate	mg/L		64	21.6	28.3	40.9	40	64
E350.1	Nitrogen, Ammonia (as N)	mg/L		0.41	0.41	0	0.23	0	0
E353.2	Nitrogen, Nitrate (as N)	mg/L		13.3	0	1.2	12.5	13.3	12.2
RSK175	Methane	ug/L		510	120	12	0	0	0
SW6010C	Manganese	ug/L		3680	720	102	1340	1280	792
SW6010C	Phosphorus, Total (as P)	ug/L		527	184	0	55.7	40.6	33.8
SW6010C	Potassium	ug/L		9580	4500	4750	9580	9400	8480
SW8260C	1,1-Dichloroethene	ug/L	700	0					
SW8260C	1,2,3-Trichloropropane	ug/L		0.3	0.0065	0.3			
SW8260C	cis-1,2-Dichloroethene	ug/L		0					
SW8260C	Tetrachloroethene (PCE)	ug/L	700	0					
SW8260C	trans-1,2-Dichloroethene	ug/L		0					
SW8260C	Trichloroethene (TCE)	ug/L	500	0					
SW8260C	Vinyl chloride	ug/L	200	0	0	0			

Notes:

[1] 40 CFR 261.24, Appendix II

Refer to Table E-6 for contents of container by tracking number.

For definitions, refer to the Acronyms and Abbreviations section of the DQA.

2017 Former Communications Site Groundwater Monitoring Fort Wainwright, Alaska
Table E-7 Waste Sampling Results (Tracking No. 17FWA-FCSGWF-01) - Fall

				Location ID:	MW78	MW82
				Sample ID:	17FWAMW78-GWF	17FWAMW82-GWF
				Lab SDG:	AZ61885	AZ62053
				Matrix:	W	W
				Sample Date:	9/27/2017	9/29/2017
				Laboratory:	APPL	APPL
Method	**Analyte**	**Units**	**RCRA TCLP Concentration[1]**	**Max Detected**		
AK102	Diesel Range Organics	mg/L		25		0.15
AK103	Residual Range Organics	mg/L		0.24		0.16
A2320B	Alkalinity as CaCO3	mg/L		594	214	519
E300.0	Sulfate	mg/L		64	22.6	27.2
E350.1	Nitrogen, Ammonia (as N)	mg/L		0.41	0	0
E353.2	Nitrogen, Nitrate (as N)	mg/L		13.3	0	3.2
RSK175	Methane	ug/L		510	39	0
SW6010C	Manganese	ug/L		3680	645	50.8
SW6010C	Phosphorus, Total (as P)	ug/L		527	151	46.5
SW6010C	Potassium	ug/L		9580	4400	6240
SW8260C	1,1-Dichloroethene	ug/L	700	0		
SW8260C	1,2,3-Trichloropropane	ug/L		0.3	0.0062	
SW8260C	cis-1,2-Dichloroethene	ug/L		0		
SW8260C	Tetrachloroethene (PCE)	ug/L	700	0		
SW8260C	trans-1,2-Dichloroethene	ug/L		0		
SW8260C	Trichloroethene (TCE)	ug/L	500	0		
SW8260C	Vinyl chloride	ug/L	200	0	0	

Notes:

[1] 40 CFR 261.24, Appendix II

Refer to Table E-6 for contents of container by tracking number.

For definitions, refer to the Acronyms and Abbreviations section of the DQA.

2017 Former Communications Site Groundwater Monitoring Fort Wainwright, Alaska
Table E-8 Waste Sampling Results (Tracking No. 17FWA-FCSGWF-02) - Fall

				Location ID:	MW79	MW79
				Sample ID:	17FWAMW79-GWF	17FWAMW79Y-GWF
				Lab SDG:	AZ61902	AZ61903
				Matrix:	W	W
				Sample Date:	9/28/2017	9/28/2017
				Laboratory:	APPL	APPL
Method	**Analyte**	**Units**	**RCRA TCLP Concentration[1]**	**Max Detected**		
A2320B	Alkalinity as CaCO3	mg/L		341	341	340
E300.0	Sulfate	mg/L		38.7	38.7	38.6
E350.1	Nitrogen, Ammonia (as N)	mg/L		0.13	0.13	0
E353.2	Nitrogen, Nitrate (as N)	mg/L		0.21	0.18	0.21
RSK175	Methane	ug/L		38	38	33
SW6010C	Manganese	ug/L		906	906	815
SW6010C	Phosphorus, Total (as P)	ug/L		70.9	70.9	59.1
SW6010C	Potassium	ug/L		5390	5390	4890
SW8260C	1,2,3-Trichloropropane	ug/L		1.2	1.2	1
SW8260C	Vinyl chloride	ug/L	200	0	0	0

Notes:

[1] 40 CFR 261.24, Appendix II

Refer to Table E-6 for contents of container by tracking number.

For definitions, refer to the Acronyms and Abbreviations section of the DQA.

2017 Former Communications Site Groundwater Monitoring Fort Wainwright, Alaska

Table E-9 Waste Sampling Results (Tracking No. 17FWA-FCSGWF-03) - Fall

				Location ID:	MW06A	MW08	MW12R	MW28	MW32R
				Sample ID:	17FWAMW06A-GWF	17FWAMW08-GWF	17FWAMW12R-GWF	17FWAMW28-GWF	17FWAMW32R-GWF
				Lab SDG:	AZ61897	AZ61899	AZ61900	AZ62054	AZ62055
				Matrix:	W	W	W	W	W
				Sample Date:	9/28/2017	9/28/2017	9/28/2017	9/29/2017	9/29/2017
				Laboratory:	APPL	APPL	APPL	APPL	APPL
Method	**Analyte**	**Units**	**RCRA TCLP Conc[1]**	**Max Detected**					
AK102	Diesel Range Organics	mg/L		25	5		1.6	0.57	0.6
AK103	Residual Range Organics	mg/L		0.32	0.32		0.18	0.2	0.2
A2320B	Alkalinity as CaCO3	mg/L		455	294	298	197	315	392
E300.0	Sulfate	mg/L		55.5	8.8	24.3	24.4	55.5	45.1
E350.1	Nitrogen, Ammonia (as N)	mg/L		0.36	0.23	0	0.15	0	0
E353.2	Nitrogen, Nitrate (as N)	mg/L		4.6	0	0.12	0	2.4	4.6
RSK175	Methane	ug/L		5900	5900	0	710	4.3	0.49
SW6010C	Manganese	ug/L		3680	1240	2.8	953	681	16.1
SW6010C	Phosphorus, Total (as P)	ug/L		527	159	0	56.3	0	72.1
SW6010C	Potassium	ug/L		6730	4690	4840	4250	5450	5940
SW8260C	1,1-Dichloroethene	ug/L	700	0			0		
SW8260C	1,2,3-Trichloropropane	ug/L		0.031		0.031	0		0
SW8260C	cis-1,2-Dichloroethene	ug/L		7.2			0		
SW8260C	Tetrachloroethene (PCE)	ug/L	700	0			0		
SW8260C	trans-1,2-Dichloroethene	ug/L		6.6			0		
SW8260C	Trichloroethene (TCE)	ug/L	500	1.2			0		
SW8260C	Vinyl chloride	ug/L	200	0		0	0		0

Notes:

[1] 40 CFR 261.24, Appendix II

Refer to Table E-6 for contents of container by tracking number.

For definitions, refer to the Acronyms and Abbreviations section of the DQA.

2017 Former Communications Site Groundwater Monitoring Fort Wainwright, Alaska
Table E-9 Waste Sampling Results (Tracking No. 17FWA-FCSGWF-03) - Fall

				Location ID:	MW33	MW35	MW35	MW38	MW48
				Sample ID:	17FWAMW33-GWF	17FWAMW35-GWF	17FWAMW35X-GWF	17FWAMW38-GWF	17FWAMW48-GWF
				Lab SDG:	AZ62056	AZ62051	AZ62052	AZ61898	AZ61901
				Matrix:	W	W	W	W	W
				Sample Date:	9/29/2017	9/29/2017	9/29/2017	9/28/2017	9/28/2017
				Laboratory:	APPL	APPL	APPL	APPL	APPL
Method	**Analyte**	**Units**	**RCRA TCLP Conc[1]**	**Max Detected**					
AK102	Diesel Range Organics	mg/L		25	25	0.18	0.15	0	
AK103	Residual Range Organics	mg/L		0.32	0	0.14	0.14	0	
A2320B	Alkalinity as CaCO3	mg/L		455	356	455	451	356	274
E300.0	Sulfate	mg/L		55.5	5.4	34.3	35	37.9	37.4
E350.1	Nitrogen, Ammonia (as N)	mg/L		0.36	0.36	0	0	0.12	0
E353.2	Nitrogen, Nitrate (as N)	mg/L		4.6	0	3.8	4.1	0.11	0.42
RSK175	Methane	ug/L		5900	510	0	0	24	11
SW6010C	Manganese	ug/L		3680	3680	176	184	1120	68.1
SW6010C	Phosphorus, Total (as P)	ug/L		527	527	22.4	16.3	0	15
SW6010C	Potassium	ug/L		6730	5260	6610	6730	6050	4790
SW8260C	1,1-Dichloroethene	ug/L	700	0	0				
SW8260C	1,2,3-Trichloropropane	ug/L		0.031	0				0
SW8260C	cis-1,2-Dichloroethene	ug/L		7.2	0				
SW8260C	Tetrachloroethene (PCE)	ug/L	700	0	0				
SW8260C	trans-1,2-Dichloroethene	ug/L		6.6	0				
SW8260C	Trichloroethene (TCE)	ug/L	500	1.2	0				
SW8260C	Vinyl chloride	ug/L	200	0	0				0

Notes:

[1] 40 CFR 261.24, Appendix II

Refer to Table E-6 for contents of container by tracking number.

For definitions, refer to the Acronyms and Abbreviations section of the DQA.

2017 Former Communications Site Groundwater Monitoring Fort Wainwright, Alaska
Table E-9 Waste Sampling Results (Tracking No. 17FWA-FCSGWF-03) - Fall

				Location ID:	MW58	MW58	MW61	MW61	MW64
				Sample ID:	17FWAMW58-GWF	17FWAMW58Y-GWF	17FWAMW61-GWF	17FWAMW61Z-GWF	17FWAMW64-GWF
				Lab SDG:	AZ62059	AZ62062	AZ61891	AZ61892	AZ61896
				Matrix:	W	W	W	W	W
				Sample Date:	9/29/2017	9/29/2017	9/28/2017	9/28/2017	9/28/2017
				Laboratory:	APPL	APPL	APPL	APPL	APPL
Method	**Analyte**	**Units**	**RCRA TCLP Conc[1]**	**Max Detected**					
AK102	Diesel Range Organics	mg/L		25	2	2.1			0
AK103	Residual Range Organics	mg/L		0.32	0.26	0.24			0
A2320B	Alkalinity as CaCO3	mg/L		455	252		274	274	266
E300.0	Sulfate	mg/L		55.5	16.2		38.4	38.6	14.7
E350.1	Nitrogen, Ammonia (as N)	mg/L		0.36	0		0	0	0
E353.2	Nitrogen, Nitrate (as N)	mg/L		4.6	0.18		0	0	0.061
RSK175	Methane	ug/L		5900	280		70	84	0
SW6010C	Manganese	ug/L		3680	1140		1390	1320	307
SW6010C	Phosphorus, Total (as P)	ug/L		527	96.5		49.1	27	18.7
SW6010C	Potassium	ug/L		6730	4320		5120	5300	4460
SW8260C	1,1-Dichloroethene	ug/L	700	0			0	0	
SW8260C	1,2,3-Trichloropropane	ug/L		0.031			0	0	
SW8260C	cis-1,2-Dichloroethene	ug/L		7.2			7.2	7.1	
SW8260C	Tetrachloroethene (PCE)	ug/L	700	0			0	0	
SW8260C	trans-1,2-Dichloroethene	ug/L		6.6			6.6	6.6	
SW8260C	Trichloroethene (TCE)	ug/L	500	1.2			1.2	1.1	
SW8260C	Vinyl chloride	ug/L	200	0			0	0	

Notes:

[1] 40 CFR 261.24, Appendix II

Refer to Table E-6 for contents of container by tracking number.

For definitions, refer to the Acronyms and Abbreviations section of the DQA.

2017 Former Communications Site Groundwater Monitoring Fort Wainwright, Alaska
Table E-9 Waste Sampling Results (Tracking No. 17FWA-FCSGWF-03) - Fall

				Location ID:	MW80	MW91	MW93
				Sample ID:	17FWAMW80-GWF	17FWAMW91-GWF	17FWAMW93-GWF
				Lab SDG:	AZ61893	AZ61894	AZ62232
				Matrix:	W	W	W
				Sample Date:	9/28/2017	9/28/2017	9/29/2017
				Laboratory:	APPL	APPL	APPL
Method	**Analyte**	**Units**	**RCRA TCLP Conc[1]**	**Max Detected**			
AK102	Diesel Range Organics	mg/L		25			
AK103	Residual Range Organics	mg/L		0.32			
A2320B	Alkalinity as CaCO3	mg/L		455	154		
E300.0	Sulfate	mg/L		55.5	30.6		
E350.1	Nitrogen, Ammonia (as N)	mg/L		0.36	0		
E353.2	Nitrogen, Nitrate (as N)	mg/L		4.6	0		
RSK175	Methane	ug/L		5900	31		
SW6010C	Manganese	ug/L		3680	769		
SW6010C	Phosphorus, Total (as P)	ug/L		527	107		
SW6010C	Potassium	ug/L		6730	3590		
SW8260C	1,1-Dichloroethene	ug/L	700	0	0		
SW8260C	1,2,3-Trichloropropane	ug/L		0.031	0	0	0
SW8260C	cis-1,2-Dichloroethene	ug/L		7.2	0		
SW8260C	Tetrachloroethene (PCE)	ug/L	700	0	0		
SW8260C	trans-1,2-Dichloroethene	ug/L		6.6	0		
SW8260C	Trichloroethene (TCE)	ug/L	500	1.2	0		
SW8260C	Vinyl chloride	ug/L	200	0	0	0	0

Notes:

[1] 40 CFR 261.24, Appendix II

Refer to Table E-6 for contents of container by tracking number.

For definitions, refer to the Acronyms and Abbreviations section of the DQA.

APPENDIX F
Geometric Regression Input

Statistical Geometric Regression to Evaluate Completion of the Remediation Phase

P. Sartz Jacobs Engineering December 2017

🟧 = cells to be updated by the user

	Year	X	Max Y
Start	2007	39084	20
End	2018	43103	1.5

FTWW Former Communications Site

MW06A

DRO

Date	mg/L	Qualifer	Log mg/L
Included			24
10/17/2007	8.2		0.91
5/20/2008	5.5		0.74
10/8/2008	4.5		0.65
5/30/2009	3.04		0.48
9/21/2009	4.98		0.70
7/19/2010	9		0.95
10/29/2010	7.2		0.86
7/14/2011	3.2		0.51
10/5/2011	5.2		0.72
7/11/2012	7.6	HD,CI	0.88
9/26/2012	4.8	HD,CI	0.68
5/19/2016	6.6	HD,CI	0.82
9/9/2016	4.9	HD,CI	0.69
7/20/2017	3.9		0.59
9/28/2017	5		0.70
Fall Samples			
10/17/2007	8.2		0.91
10/8/2008	4.5		0.65
9/21/2009	4.98		0.70
10/29/2010	7.2		0.86
10/5/2011	5.2		0.72
9/26/2012	4.8	HD,CI	0.68
9/9/2016	4.9	HD,CI	0.69
9/28/2017	5		0.70

Mann-Kendall Trend Detection (from MAROS)

N	MK_S	COV	MKconf	MKTrend
15	-13	0.32	72%	Stable

MAROS Trend Table

MK_S	COV	Mkconf	MKTrend
> 0	any	> 95%	Increasing
		<= 95% and > 90%	Probably Increasing
		<= 90%	No Trend
< 0	any	> 95%	Decreasing
		<= 95% and > 90%	Probably Decreasing
	< 1	<= 90%	Stable
	>= 1		No Trend

LinEst of Log COCs		
-1.53E-05	1.35	m (1/day), b
3.09E-05	1.27	se(m), se(b)
0.02	0.14	r², se(y intercept)
0.24	13	F,degrees of freedom
0.01	0.27	regression sum of squares, residual sum of squares
	0.14	Standard Deviation
	1.77	Student's t for one-tailed 95% confidence interval
	0.25	± for 95% CI

Cleanup Level

Date	DRO
1/2/2007	1.5
1/3/2018	1.5

Goal Seek for Cleanup Dates

		Log			Linear			GoalSeek
Phase	Date	-95%	Trend	+95%	-95%	Trend	+95%	Target
Remed	5/17/2156	-0.33	-0.08	0.18	4.64E-01	8.35E-01	1.50E+00	1.000247
Attain	9/9/2110	-0.08	0.18	0.43	8.35E-01	1.50E+00	2.70E+00	1.000267

Statistical Geometric Regression to Evaluate Completion of the Remediation Phase

P. Sartz Jacobs Engineering December 2017

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FTWW Former Communications Site			
MW12R			
DRO			
Date	**mg/L**	**Qualifer**	**Log mg/L**
Included			23
5/20/2008	6.1		0.79
10/5/2008	11		1.04
5/30/2009	7.43		0.87
9/22/2009	5.67		0.75
7/15/2010	5.3		0.72
10/30/2010	6.5		0.81
7/20/2011	9.8	D	0.99
10/4/2011	13		1.11
7/11/2012	12	HD, Cl	1.08
9/25/2012	9.7	HD, Cl	0.99
5/19/2016	0.23	J	-0.64
9/9/2016	14	D, HD, Cl	1.15
7/19/2017	0.17	JL-	-0.77
9/28/2017	1.6		0.20
Fall Samples			
10/5/2008	11		1.04
9/22/2009	5.67		0.75
10/30/2010	6.5		0.81
10/4/2011	13		1.11
9/25/2012	9.7	HD, Cl	0.99
9/9/2016	14	D, HD, Cl	1.15
9/28/2017	1.6		0.20

	Year	**X**	**Max Y**
Start	2007	39084	20
End	2018	43103	1.5

Mann-Kendall Trend Detection (from MAROS)				
N	**MK_S**	**COV**	**MKconf**	**MKTrend**
14	-7	0.62	63%	Stable

MAROS Trend Table			
MK_S	**COV**	**Mkconf**	**MKTrend**
> 0	any	> 95%	Increasing
		<= 95% and > 90%	Probably Increasing
		<= 90%	No Trend
< 0	any	> 95%	Decreasing
		<= 95% and > 90%	Probably Decreasing
	< 1	<= 90%	Stable
	>= 1		No Trend

LinEst of Log COCs		
-3.17E-04	13.66	m (1/day), b
1.17E-04	4.81	se(m), se(b)
0.38	0.51	r², se(y intercept)
7.31	12	F,degrees of freedom
1.90	3.11	regression sum of squares, residual sum of squares
	0.51	Standard Deviation
	1.78	Student's t for one-tailed 95% confidence interval
	0.91	± for 95% CI

Cleanup Level	
Date	**DRO**
1/2/2007	1.5
1/3/2018	1.5

Goal Seek for Cleanup Dates

		Log			Linear			GoalSeek
Phase	**Date**	**-95%**	**Trend**	**+95%**	**-95%**	**Trend**	**+95%**	**Target**
Remed	5/31/2024	-1.64	-0.73	0.18	2.29E-02	1.86E-01	1.50E+00	1.000896
Attain	7/26/2016	-0.73	0.18	1.08	1.85E-01	1.50E+00	1.21E+01	0.999983

Statistical Geometric Regression to Evaluate Completion of the Remediation Phase

P. Sartz Jacobs Engineering December 2017

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FTWW Former Communications Site			
MW33			
DRO			
Date	**mg/L**	**Qualifer**	**Log mg/L**
Included			23
10/12/2007	28		1.45
5/20/2008	10		1.00
10/7/2008	29		1.46
5/30/2009	13.2		1.12
9/21/2009	13		1.11
7/15/2010	10		1.00
10/29/2010	31		1.49
7/20/2011	6.7		0.83
10/4/2011	22	D	1.34
9/26/2012	19	HD,Cl	1.28
5/19/2016	34	HD,Cl	1.53
9/9/2016	76	HD, Cl	1.88
7/19/2017	35	JL-	1.54
9/29/2017	25		1.40
Fall Samples			
10/12/2007	28		1.45
10/7/2008	29		1.46
9/21/2009	13		1.11
10/29/2010	31		1.49
10/4/2011	22	D	1.34
9/26/2012	19	HD,Cl	1.28
9/9/2016	76	HD,Cl	1.88
9/29/2017	25		1.40

	Year	X	Max Y
Start	2007	39084	80
End	2018	43103	1.5

Mann-Kendall Trend Detection (from MAROS)				
N	**MK_S**	**COV**	**MKconf**	**MKTrend**
14	28	0.69	93%	Probably Increasing

MAROS Trend Table			
MK_S	**COV**	**Mkconf**	**MKTrend**
> 0	any	> 95%	Increasing
		<= 95% and > 90%	Probably Increasing
		<= 90%	No Trend
< 0	any	> 95%	Decreasing
		<= 95% and > 90%	Probably Decreasing
	< 1	<= 90%	Stable
	>= 1		No Trend

LinEst of Log COCs		
1.16E-04	-3.42	m (1/day), b
5.28E-05	2.16	se(m), se(b)
0.29	0.25	r², se(y intercept)
4.79	12	F,degrees of freedom
0.29	0.72	regression sum of squares, residual sum of squares
	0.25	Standard Deviation
	1.78	Student's t for one-tailed 95% confidence interval
	0.44	± for 95% CI

Cleanup Level	
Date	**DRO**
1/2/2007	1.5
1/3/2018	1.5

Goal Seek for Cleanup Dates

		Log			Linear			GoalSeek
Phase	**Date**	**-95%**	**Trend**	**+95%**	**-95%**	**Trend**	**+95%**	**Target**
Remed	9/28/1974	-0.70	-0.26	0.18	2.00E-01	5.47E-01	1.50E+00	1.000059
Attain	2/14/1985	-0.26	0.18	0.61	5.47E-01	1.50E+00	4.12E+00	1.000823

Statistical Geometric Regression to Evaluate Completion of the Remediation Phase

P. Sartz Jacobs Engineering December 2017

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	Year	X	Max Y
Start	2007	39084	10
End	2018	43103	1

FTWW Former Communications Site			
MW58			
DRO			
Date	mg/L	Qualifer	Log mg/L
Included			23
10/13/2007	3.2		0.51
5/17/2008	2.2		0.34
10/5/2008	1		0.00
6/1/2009	2.25		0.35
9/20/2009	2.83		0.45
7/17/2010	3.3		0.52
10/30/2010	1.2		0.08
7/16/2011	2.2		0.34
7/13/2012	2.6	HD,CL	0.41
9/24/2012	2	HD,Cl	0.30
5/19/2016	2.7	HD,Cl	0.43
9/9/2016	0.8	HD,Cl	-0.10
7/20/2017	2		0.30
9/29/2017	2.1		0.32
Fall Samples			
10/13/2007	3.2		0.51
10/5/2008	1		0.00
9/20/2009	2.83		0.45
10/30/2010	1.2		0.08
9/24/2012	2		0.30
9/9/2016	0.8	HD,Cl	-0.10
9/29/2017	2.1		0.32

Mann-Kendall Trend Detection (from MAROS)				
N	MK_S	COV	MKconf	MKTrend
14	-19	0.35	84%	Stable

MAROS Trend Table			
MK_S	COV	Mkconf	MKTrend
> 0	any	> 95%	Increasing
		<= 95% and > 90%	Probably Increasing
		<= 90%	No Trend
< 0	any	> 95%	Decreasing
		<= 95% and > 90%	Probably Decreasing
	< 1	<= 90%	Stable
	>= 1		No Trend

LinEst of Log COCs		
-2.89E-05	1.49	m (1/day), b
4.06E-05	1.66	se(m), se(b)
0.04	0.19	r², se(y intercept)
0.51	12	F,degrees of freedom
0.02	0.43	regression sum of squares, residual sum of squares
	0.19	Standard Deviation
	1.78	Student's t for one-tailed 95% confidence interval
	0.34	± for 95% CI

Cleanup Level	
Date	DRO
1/2/2007	1.5
1/3/2018	1.5

Goal Seek for Cleanup Dates

		Log			Linear			GoalSeek
Phase	Date	-95%	Trend	+95%	-95%	Trend	+95%	Target
Remed	4/25/2056	-0.50	-0.16	0.18	3.18E-01	6.91E-01	1.50E+00	1.000013
Attain	5/9/2024	-0.16	0.18	0.51	6.91E-01	1.50E+00	3.26E+00	1.000629

Statistical Geometric Regression to Evaluate Completion of the Remediation Phase

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	Year	X	Max Y
Start	2007	39084	29
End	2018	43103	1.5

FTWW Former Communications Site			
MW62			
DRO			
Date	**mg/L**	**Qualifer**	**Log mg/L**
Included			23
10/22/2007	0.061	J	-1.21
5/19/2008	0.041	J	-1.39
10/6/2008	7.7		0.89
5/30/2009	0.25	ND	-0.60
9/21/2009	0.245	ND	-0.61
7/14/2010	0.38		-0.42
10/28/2010	29		1.46
6/21/2011	0.22	J	-0.66
10/5/2011	18	D	1.26
9/26/2012	0.14	J	-0.85
5/18/2016	0.1	J	-1.00
9/8/2016	0.097	J	-1.01
7/18/2017	0.092	JL-	-1.04
9/27/2017	0.18		-0.74
Fall Samples			
10/22/2007	0.61	J	-0.21
10/6/2008	7.7		0.89
9/21/2009	0.245	ND	-0.61
10/28/2010	29		1.46
10/5/2011	18	D	1.26
9/26/2012	0.14	J	-0.85
9/9/2016	0.097	J	-1.01
9/27/2017	0.18		-0.74

Mann-Kendall Trend Detection (from MAROS)				
N	**MK_S**	**COV**	**MKconf**	**MKTrend**
14	-13	2.17	74%	No Trend

MAROS Trend Table			
MK_S	**COV**	**Mkconf**	**MKTrend**
> 0	any	> 95%	Increasing
		<= 95% and > 90%	Probably Increasing
		<= 90%	No Trend
< 0	any	> 95%	Decreasing
		<= 95% and > 90%	Probably Decreasing
	< 1	<= 90%	Stable
	>= 1		No Trend

LinEst of Log COCs		
-1.67E-04	6.42	m (1/day), b
2.01E-04	8.25	se(m), se(b)
0.05	0.94	r², se(y intercept)
0.69	12	F,degrees of freedom
0.60	10.51	regression sum of squares, residual sum of squares
	0.94	Standard Deviation
	1.78	Student's t for one-tailed 95% confidence interval
	1.67	± for 95% CI

Cleanup Level	
Date	**DRO**
1/2/2007	1.5
1/3/2018	1.5

Goal Seek for Cleanup Dates

		Log			Linear			GoalSeek
Phase	**Date**	**-95%**	**Trend**	**+95%**	**-95%**	**Trend**	**+95%**	**Target**
Remed	8/15/2029	-3.16	-1.49	0.18	6.92E-04	3.22E-02	1.50E+00	0.999211
Attain	4/17/2002	-1.49	0.18	1.84	3.22E-02	1.50E+00	6.98E+01	1.000290

Statistical Geometric Regression to Evaluate Completion of the Remediation Phase

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	Year	X	Max Y
Start	2007	39084	40
End	2018	43103	1.5

FTWW Former Communications Site			
MW77			
DRO			
Date	**mg/L**	**Qualifer**	**Log mg/L**
Included			22
10/5/2008	2.7		0.43
6/2/2009	1.1		0.04
9/20/2009	0.271	J	-0.57
7/23/2010	1.8		0.26
10/28/2010	1		0.00
7/21/2011	1.6		0.20
10/6/2011	4.2		0.62
7/11/2012	0.71	J	-0.15
9/26/2012	0.46	J	-0.34
5/18/2016	1.2	HD,Cl	0.08
9/9/2016	20	D,HD,Cl	1.30
7/20/2017	0.28		-0.55
9/29/2017	0.64	AJ	-0.19
Fall Samples			
10/5/2008	2.7		0.43
9/20/2009	0.271	J	-0.57
10/28/2010	1		0.00
10/6/2011	4.2		0.62
9/26/2012	0.46	J	-0.34
9/9/2016	20	H,HD,Cl	1.30
9/29/2017	0.64	AJ	-0.19

Mann-Kendall Trend Detection (from MAROS)				
N	**MK_S**	**COV**	**MKconf**	**MKTrend**
13	-12	1.91	75%	No Trend

MAROS Trend Table			
MK_S	**COV**	**Mkconf**	**MKTrend**
> 0	any	> 95%	Increasing
		<= 95% and > 90%	Probably Increasing
		<= 90%	No Trend
< 0	any	> 95%	Decreasing
		<= 95% and > 90%	Probably Decreasing
	< 1	<= 90%	Stable
	>= 1		No Trend

LinEst of Log COCs		
5.06E-06	-0.12	m (1/day), b
1.30E-04	5.37	se(m), se(b)
0.00	0.53	r², se(y intercept)
0.00	11	F,degrees of freedom
0.00	3.08	regression sum of squares, residual sum of squares
	0.53	Standard Deviation
	1.80	Student's t for one-tailed 95% confidence interval
	0.95	± for 95% CI

Cleanup Level	
Date	**DRO**
1/2/2007	1.5
1/3/2018	1.5

Goal Seek for Cleanup Dates

		Log			Linear			GoalSeek
Phase	**Date**	**-95%**	**Trend**	**+95%**	**-95%**	**Trend**	**+95%**	**Target**
Remed	##############	-1.73	-0.77	0.18	1.88E-02	1.68E-01	1.50E+00	1.000633
Attain	10/17/2060	-0.77	0.18	1.13	1.68E-01	1.50E+00	1.34E+01	0.999853

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FTWW Former Communications Site			
MW06A			
RRO			
Date	**mg/L**	**Qualifer**	**Log mg/L**
Included			24
10/17/2007	0.84	ND	-0.08
5/20/2008	1.8	ND	0.26
10/8/2008	0.96	ND	-0.02
5/30/2009	0.156	ND	-0.81
9/21/2009	0.147	ND	-0.83
7/19/2010	1.1		0.04
10/29/2010	0.33	J	-0.48
7/14/2011	0.58		-0.24
10/5/2011	0.51		-0.29
7/11/2012	0.58	HD,Cl	-0.24
9/26/2012	0.33	J	-0.48
5/19/2016	0.49	J	-0.31
9/9/2016	0.63	HD,Cl	-0.20
7/20/2017	0.55	ND	-0.26
9/28/2017	0.32	J	-0.49
Fall Samples			
10/17/2007	0.84	ND	-0.08
10/8/2008	0.96	ND	-0.02
9/21/2009	0.147	ND	-0.83
10/29/2010	0.33	J	-0.48
10/5/2011	0.51		-0.29
9/26/2012	0.33	J	-0.48
9/9/2016	0.63	HD,Cl	-0.20
9/28/2017	0.32	J	-0.49

	Year	X	Max Y
Start	2007	39084	3
End	2018	43103	0

Mann-Kendall Trend Detection (from MAROS)				
N	**MK_S**	**COV**	**MKconf**	**MKTrend**
15	-23	0.68	86%	Stable

MAROS Trend Table			
MK_S	**COV**	**Mkconf**	**MKTrend**
> 0	any	> 95%	Increasing
		<= 95% and > 90%	Probably Increasing
		<= 90%	No Trend
< 0	any	> 95%	Decreasing
		<= 95% and > 90%	Probably Decreasing
	< 1	<= 90%	Stable
	>= 1		No Trend

LinEst of Log COCs		
-3.77E-05	1.25	m (1/day), b
6.50E-05	2.66	se(m), se(b)
0.03	0.30	r², se(y intercept)
0.34	13	F,degrees of freedom
0.03	1.19	regression sum of squares, residual sum of squares
	0.30	Standard Deviation
	1.77	Student's t for one-tailed 95% confidence interval
	0.54	± for 95% CI

Cleanup Level	
Date	**RRO**
1/2/2007	1.1
1/3/2018	1.1

Goal Seek for Cleanup Dates

Phase		Log			Linear			GoalSeek Target
	Date	-95%	Trend	+95%	-95%	Trend	+95%	
Remed	8/6/2026	-1.03	-0.49	0.04	9.34E-02	3.20E-01	1.10E+00	0.999338
Attain	9/18/1987	-0.49	0.04	0.58	3.21E-01	1.10E+00	3.77E+00	1.000019

Statistical Geometric Regression to Evaluate Completion of the Remediation Phase

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	Year	X	Max Y
Start	2007	39084	5
End	2018	43103	1.5

FTWW Former Communications Site			
MW12R			
RRO			
Date	mg/L	Qualifer	Log mg/L
Included			23
5/20/2008	1.8	ND	0.26
10/5/2008	2	ND	0.30
5/30/2009	0.406	J	-0.39
9/22/2009	0.257	J	-0.59
7/15/2010	0.15	JD	-0.82
10/30/2010	0.29	J	-0.54
7/20/2011	1.3		0.11
10/4/2011	1.3		0.11
7/25/2012	0.71	HD,Cl	-0.15
9/25/2012	0.4	J	-0.40
5/19/2016	0.066	J	-1.18
9/9/2016	1.6	D,HD,Cl	0.20
7/19/2017	0.11	ND	-0.96
9/28/2017	0.18	J	-0.74
Fall Samples			
10/15/2008	2	ND	0.30
9/22/2009	0.257	J	-0.59
10/30/2010	0.29	J	-0.54
10/4/2011	1.3		0.11
9/25/2012	0.4	J	-0.40
9/9/2016	1.6	D,HD,Cl	0.20
9/28/2017	0.18	J	-0.74

Mann-Kendall Trend Detection (from MAROS)				
N	MK_S	COV	MKconf	MKTrend
14	-28	0.92	93%	Probably Decreasing

MAROS Trend Table			
MK_S	COV	Mkconf	MKTrend
> 0	any	> 95%	Increasing
		<= 95% and > 90%	Probably Increasing
		<= 90%	No Trend
< 0	any	> 95%	Decreasing
		<= 95% and > 90%	Probably Decreasing
	< 1	<= 90%	Stable
	>= 1		No Trend

LinEst of Log COCs		
-1.87E-04	7.35	m (1/day), b
1.04E-04	4.26	se(m), se(b)
0.21	0.45	r², se(y intercept)
3.27	12	F,degrees of freedom
0.66	2.44	regression sum of squares, residual sum of squares

0.45 Standard Deviation

1.78 Student's t for one-tailed 95% confidence interval

0.80 ± for 95% CI

Cleanup Level	
Date	RRO
1/2/2007	1.1
1/3/2018	1.1

Goal Seek for Cleanup Dates

		Log			Linear			GoalSeek
Phase	Date	-95%	Trend	+95%	-95%	Trend	+95%	Target
Remed	8/13/2018	-1.57	-0.76	0.04	2.72E-02	1.73E-01	1.10E+00	0.999962
Attain	11/14/2006	-0.76	0.04	0.85	1.73E-01	1.10E+00	7.00E+00	1.000011

Statistical Geometric Regression to Evaluate Completion of the Remediation Phase

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FTWW Former Communications Site			
MW33			
RRO			
Date	**mg/L**	**Qualifer**	**Log mg/L**
Included			**23**
10/12/2007	0.84	ND	-0.08
5/20/2008	1.9	ND	0.28
10/7/2008	4.3	ND	0.63
5/30/2009	1.12		0.05
9/21/2009	1.49		0.17
7/15/2010	0.4		-0.40
10/29/2010	2.1		0.32
7/20/2011	1.1		0.04
10/4/2011	3.2		0.51
9/26/2012	1.2	HD,Cl	0.08
5/19/2016	2.3	HD,Cl	0.36
9/9/2016	4.7	D,HD,Cl	0.67
7/19/2017	4		0.60
9/29/2017	5.5	ND	0.74
Fall Samples			
10/12/2007	0.84	ND	-0.08
10/7/2008	4.3	ND	0.63
9/21/2009	1.49		0.17
10/29/2010	2.1		0.32
10/4/2011	3.2		0.51
9/26/2012	1.2	HD,Cl	0.08
9/9/2016	4.7	D,HD,Cl	0.67
9/29/2017	5.5	ND	0.74

	Year	X	Max Y
Start	2007	39084	10
End	2025	45660	1.5

Mann-Kendall Trend Detection (from MAROS)				
N	**MK_S**	**COV**	**MKconf**	**MKTrend**
14	41	0.66	99%	Increasing

MAROS Trend Table			
MK_S	**COV**	**Mkconf**	**MKTrend**
> 0	any	> 95%	Increasing
		<= 95% and > 90%	Probably Increasing
		<= 90%	No Trend
< 0	any	> 95%	Decreasing
		<= 95% and > 90%	Probably Decreasing
	< 1	<= 90%	Stable
	>= 1		No Trend

LinEst of Log COCs		
1.46E-04	-5.71	m (1/day), b
6.01E-05	2.46	se(m), se(b)
0.33	0.28	r², se(y intercept)
5.93	12	F,degrees of freedom
0.46	0.94	regression sum of squares, residual sum of squares
	0.28	Standard Deviation
	1.78	Student's t for one-tailed 95% confidence interval
	0.50	± for 95% CI

Cleanup Level	
Date	**RRO**
1/2/2007	1.1
1/3/2025	1.1

Goal Seek for Cleanup Dates

		Log			Linear			GoalSeek
Phase	**Date**	**-95%**	**Trend**	**+95%**	**-95%**	**Trend**	**+95%**	**Target**
Remed	4/3/1998	-0.96	-0.46	0.04	1.11E-01	3.49E-01	1.10E+00	1.000093
Attain	7/30/2007	-0.46	0.04	0.54	3.49E-01	1.10E+00	3.46E+00	0.999973

Statistical Geometric Regression to Evaluate Completion of the Remediation Phase

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FTWW Former Communications Site			
MW58			
RRO			
Date	**mg/L**	**Qualifer**	**Log mg/L**
Included			23
10/13/2007	0.2		-0.70
5/17/2008	0.094	ND	-1.03
10/5/2008	0.1		-1.00
6/1/2009	0.15	ND	-0.82
9/20/2009	0.144	ND	-0.84
7/17/2010	0.61		-0.21
10/30/2010	0.17		-0.77
7/16/2011	0.52		-0.28
7/13/2012	0.27	J	-0.57
9/24/2012	0.14	J	-0.85
5/19/2016	0.31	J	-0.51
9/9/2016	0.24	J	-0.62
7/20/2017	0.11	J	-0.96
9/29/2017	0.26	J	-0.59
Fall Samples			
10/13/2007	0.2		-0.70
10/5/2008	0.1		-1.00
9/20/2009	0.144	ND	-0.84
10/30/2010	0.17		-0.77
9/24/2012	0.14	J	-0.85
9/9/2016	0.24	J	-0.62
9/29/2017	0.26	J	-0.59

	Year	X	Max Y
Start	2007	39084	3
End	2020	43833	0

Mann-Kendall Trend Detection (from MAROS)				
N	MK_S	COV	MKconf	MKTrend
14	17	0.65	81%	No Trend

MAROS Trend Table			
MK_S	COV	Mkconf	MKTrend
> 0	any	> 95%	Increasing
		<= 95% and > 90%	Probably Increasing
		<= 90%	No Trend
< 0	any	> 95%	Decreasing
		<= 95% and > 90%	Probably Decreasing
	< 1	<= 90%	Stable
	>= 1		No Trend

LinEst of Log COCs		
3.99E-05	-2.33	m (1/day), b
5.46E-05	2.24	se(m), se(b)
0.04	0.25	r², se(y intercept)
0.53	12	F,degrees of freedom
0.03	0.78	regression sum of squares, residual sum of squares
	0.25	Standard Deviation
	1.78	Student's t for one-tailed 95% confidence interval
	0.45	± for 95% CI

Cleanup Level	
Date	RRO
1/2/2007	1.1
1/3/2020	1.1

Goal Seek for Cleanup Dates

Phase	Date	Log			Linear			GoalSeek Target
		-95%	Trend	+95%	-95%	Trend	+95%	
Remed	10/4/2031	-0.86	-0.41	0.04	1.37E-01	3.88E-01	1.10E+00	0.999976
Attain	11/17/2062	-0.41	0.04	0.49	3.88E-01	1.10E+00	3.12E+00	1.000689

Statistical Geometric Regression to Evaluate Completion of the Remediation Phase

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FTWW Former Communications Site			
MW62			
RRO			
Date	**mg/L**	**Qualifer**	**Log mg/L**
Included			23
10/22/2007	0.04	J	-1.40
5/19/2008	0.094	ND	-1.03
10/6/2008	0.95	ND	-0.02
5/30/2009	0.15	ND	-0.82
9/21/2009	0.147	ND	-0.83
7/14/2010	0.29		-0.54
10/28/2010	4.6		0.66
6/21/2011	0.25	B	-0.60
10/5/2011	5		0.70
9/26/2012	0.09	J	-1.05
5/18/2016	0.12	J	-0.92
9/8/2016	0.082	J	-1.09
7/18/2017	0.11	ND	-0.96
9/27/2017	0.18		-0.74
Fall Samples			
10/22/2007	0.04	J	-1.40
10/6/2008	0.95	ND	-0.02
9/21/2009	0.147	ND	-0.83
10/28/2010	4.6		0.66
10/5/2011	5		0.70
9/26/2012	0.09	J	-1.05
9/9/2016	0.082	J	-1.09
9/27/2017	0.18		-0.74

	Year	**X**	**Max Y**
Start	2007	39084	7
End	2018	43103	1.5

Mann-Kendall Trend Detection (from MAROS)				
N	**MK_S**	**COV**	**MKconf**	**MKTrend**
14	1	1.95	50%	No Trend

MAROS Trend Table			
MK_S	**COV**	**Mkconf**	**MKTrend**
> 0	any	> 95%	Increasing
		<= 95% and > 90%	Probably Increasing
		<= 90%	No Trend
< 0	any	> 95%	Decreasing
		<= 95% and > 90%	Probably Decreasing
	< 1	<= 90%	Stable
	>= 1		No Trend

LinEst of Log COCs		
-7.70E-05	2.54	m (1/day), b
1.40E-04	5.74	se(m), se(b)
0.02	0.65	r², se(y intercept)
0.30	12	F,degrees of freedom
0.13	5.10	regression sum of squares, residual sum of squares
	0.65	Standard Deviation
	1.78	Student's t for one-tailed 95% confidence interval
	1.16	± for 95% CI

Cleanup Level	
Date	**RRO**
1/2/2007	1.1
1/3/2018	1.1

Goal Seek for Cleanup Dates

		Log			Linear			GoalSeek
Phase	**Date**	**-95%**	**Trend**	**+95%**	**-95%**	**Trend**	**+95%**	**Target**
Remed	1/7/2030	-2.28	-1.12	0.04	5.22E-03	7.58E-02	1.10E+00	1.000022
Attain	9/19/1988	-1.12	0.04	1.20	7.58E-02	1.10E+00	1.60E+01	0.999925

Statistical Geometric Regression to Evaluate Completion of the Remediation Phase

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FTWW Former Communications Site			
MW77			
RRO			
Date	**mg/L**	**Qualifer**	**Log mg/L**
Included			22
10/5/08	0.56	ND	-0.25
6/2/09	0.322	J	-0.49
9/20/09	0.144	ND	-0.84
7/23/10	0.61		-0.21
10/28/10	0.31		-0.51
7/21/11	0.71		-0.15
10/6/11	0.21		-0.68
7/11/12	0.2	J	-0.70
9/26/12	0.064	J	-1.19
5/18/16	0.3	J	-0.52
9/9/16	1.8	D,HD,Cl	0.26
7/20/17	0.11	ND	-0.96
9/29/17	0.24		-0.62
Fall Samples			
10/5/08	0.56	ND	-0.25
9/20/09	0.144	ND	-0.84
10/28/10	0.31		-0.51
10/6/11	0.21		-0.68
9/26/12	0.064	J	-1.19
9/9/16	1.8	D,HD,Cl	0.26
9/29/17	0.24		-0.62

	Year	X	Max Y
Start	2007	39084	10
End	2018	43103	1.5

Mann-Kendall Trend Detection (from MAROS)				
N	**MK_S**	**COV**	**MKconf**	**MKTrend**
13	-16	1.06	82%	No Trend

MAROS Trend Table			
MK_S	**COV**	**Mkconf**	**MKTrend**
> 0	any	> 95%	Increasing
		<= 95% and > 90%	Probably Increasing
		<= 90%	No Trend
< 0	any	> 95%	Decreasing
		<= 95% and > 90%	Probably Decreasing
	< 1	<= 90%	Stable
	>= 1		No Trend

LinEst of Log COCs		
-1.49E-05	0.09	m (1/day), b
9.72E-05	4.01	se(m), se(b)
0.00	0.40	r², se(y intercept)
0.02	11	F,degrees of freedom
0.00	1.72	regression sum of squares, residual sum of squares
	0.40	Standard Deviation
	1.80	Student's t for one-tailed 95% confidence interval
	0.71	± for 95% CI

Cleanup Level	
Date	**RRO**
1/2/07	1.1
1/3/18	1.1

Goal Seek for Cleanup Dates

		Log			Linear			GoalSeek
Phase	**Date**	**-95%**	**Trend**	**+95%**	**-95%**	**Trend**	**+95%**	**Target**
Remed	5/10/38	-1.38	-0.67	0.04	4.19E-02	2.15E-01	1.10E+00	1.000136
Attain	2/9/08	-0.67	0.04	0.75	2.15E-01	1.10E+00	5.64E+00	1.000098

Statistical Geometric Regression to Evaluate Completion of the Remediation Phase

P. Sartz Jacobs Engineering December 2017

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	Year	X	Max Y
Start	2007	39084	0.016
End	2020	43833	0

FTWW Former Communications Site				
MW61				
TCE				
Date	mg/L	Qualifer	Log mg/L	
Included			23	
10/21/2007	0.014		-1.85	
5/19/2008	0.01		-2.00	
5/29/2009	0.0091		-2.04	
9/20/2009	0.0086		-2.07	
7/13/2010	0.0056		-2.25	
10/28/2010	0.0075		-2.12	
7/20/2011	0.0033		-2.48	
10/4/2011	0.0034		-2.47	
7/11/2012	0.0021		-2.68	
9/25/2012	0.0024		-2.62	
5/18/2016	0.001		-3.00	
9/8/2016	0.001		-3.00	
7/18/2017	0.00094	J	-3.03	
9/28/2017	0.0012		-2.92	
Fall Samples				
10/21/2007	0.014		-1.85	
10/7/2008	0.000014	ND	-4.85	Excluded outlier!
9/20/2009	0.0086		-2.07	
10/28/2010	0.0075		-2.12	
10/4/2011	0.0034		-2.47	
9/25/2012	0.0024		-2.62	
9/8/2016	0.001		-3.00	
9/28/2017	0.0012		-2.92	

Mann-Kendall Trend Detection (from MAROS)				
N	MK_S	COV	MKconf	MKTrend
14	-78	0.83	100%	Decreasing

MAROS Trend Table			
MK_S	COV	Mkconf	MKTrend
> 0	any	> 95%	Increasing
		<= 95% and > 90%	Probably Increasing
		<= 90%	No Trend
< 0	any	> 95%	Decreasing
		<= 95% and > 90%	Probably Decreasing
	< 1	<= 90%	Stable
	>= 1		No Trend

LinEst of Log COCs		
-3.24E-04	10.85	m (1/day), b
2.50E-05	1.03	se(m), se(b)
0.93	0.11	r^2, se(y intercept)
167.79	12	F,degrees of freedom
2.11	0.15	regression sum of squares, residual sum of squares
	0.11	Standard Deviation
	1.78	Student's t for one-tailed 95% confidence interval
	0.20	± for 95% CI

Cleanup Level	
Date	TCE
1/2/2007	0.005
1/3/2020	0.005

Goal Seek for Cleanup Dates

		Log			Linear			GoalSeek
Phase	Date	-95%	Trend	+95%	-95%	Trend	+95%	Target
Remed	9/7/2012	-2.70	-2.50	-2.30	1.99E-03	3.16E-03	5.00E-03	0.999994
Attain	12/31/2010	-2.50	-2.30	-2.10	3.16E-03	5.00E-03	7.92E-03	1.000458

Statistical Geometric Regression to Evaluate Completion of the Remediation Phase

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FTWW Former Communications Site			
MW80			
TCE			
Date	**mg/L**	**Qualifer**	**Log mg/L**
Included			22
10/7/2008	0.000014		-4.85
5/29/2009	0.000019	J	-4.72
9/20/2009	0.000032	J	-4.49
7/13/2010	0.00005	ND	-4.30
10/29/2010	0.00018	J	-3.74
7/20/2011	0.00045	ND	-3.35
10/4/2011	0.00005	ND	-4.30
7/11/2012	0.000025	U	-4.60
9/25/2012	0.00005	U	-4.30
5/17/2016	0.0001	U	-4.00
9/7/2016	0.0001	U	-4.00
7/18/2017	0.00016	ND	-3.80
9/28/2017	0.00016	ND	-3.80
Fall Samples			
10/7/2008	0.000014		-4.85
9/20/2009	0.000032	J	-4.49
10/29/2010	0.00018	J	-3.74
10/4/2011	0.00005	ND	-4.30
9/25/2012	0.00005	ND, U	-4.30
9/7/2016	0.0001	ND, U	-4.00
9/28/2017	0.00016	ND	-3.80

	Year	X	Max Y
Start	2007	39084	0.006
End	2036	49677	0

Mann-Kendall Trend Detection (from MAROS)				
N	**MK_S**	**COV**	**MKconf**	**MKTrend**
13	39	1.10	99%	Increasing

MAROS Trend Table			
MK_S	**COV**	**Mkconf**	**MKTrend**
> 0	any	> 95%	Increasing
		<= 95% and > 90%	Probably Increasing
		<= 90%	No Trend
< 0	any	> 95%	Decreasing
		<= 95% and > 90%	Probably Decreasing
	< 1	<= 90%	Stable
	>= 1		No Trend

LinEst of Log COCs		
2.04E-04	-12.56	m (1/day), b
9.46E-05	3.90	se(m), se(b)
0.30	0.38	r², se(y intercept)
4.63	11	F,degrees of freedom
0.69	1.63	regression sum of squares, residual sum of squares
	0.38	Standard Deviation
	1.80	Student's t for one-tailed 95% confidence interval
	0.69	± for 95% CI

Cleanup Level	
Date	**TCE**
1/2/2007	0.005
1/3/2036	0.005

Goal Seek for Cleanup Dates

		Log			Linear			GoalSeek
Phase	**Date**	**-95%**	**Trend**	**+95%**	**-95%**	**Trend**	**+95%**	**Target**
Remed	9/3/2028	-3.68	-2.99	-2.30	2.08E-04	1.02E-03	5.00E-03	0.999641
Attain	12/17/2037	-2.99	-2.30	-1.61	1.02E-03	5.00E-03	2.45E-02	1.000163

Statistical Geometric Regression to Evaluate Completion of the Remediation Phase

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FTWW Former Communications Site			
MW08			
TCP			
Date	**µg/L**	**Qualifer**	**Log µg/L**
Included			24
10/16/2007	0.3		-0.52
5/14/2008	0.023	J	-1.64
10/3/2008	0.26	J	-0.59
5/27/2009	0.024		-1.62
9/19/2009	0.034		-1.47
7/19/2010	0.3	ND	-0.52
10/25/2010	0.45	ND	-0.35
7/12/2011	0.45	ND	-0.35
10/4/2011	0.057	J	-1.24
7/9/2012	0.05	ND	-1.30
9/24/2012	0.1	ND	-1.00
5/17/2016	0.1	ND	-1.00
9/7/2016	0.03	J	-1.52
7/19/2017	0.027	JS-	-1.57
9/28/2017	0.031		-1.51
Excluded (Fall Samples for FCS)			
10/16/2007	0.3		-0.52
10/3/2008	0.26	J	-0.59
9/19/2009	0.034		-1.47
10/25/2010	0.45	ND	-0.35
10/4/2011	0.057	J	-1.24
9/24/2012	0.1	ND	-1.00
9/7/2016	0.03	J	-1.52
9/28/2017	0.000031		-4.51

	Year	**X**	**Max Y**
Start	2007	39084	0.8
End	2030	47486	2

Mann-Kendall Trend Detection (from MAROS)				
N	**MK_S**	**COV**	**MKconf**	**MKTrend**
15	-14	1.06	74%	No Trend

MAROS Trend Table			
MK_S	**COV**	**Mkconf**	**MKTrend**
> 0	any	> 95%	Increasing
		<= 95% and > 90%	Probably Increasing
		<= 90%	No Trend
< 0	any	> 95%	Decreasing
		<= 95% and > 90%	Probably Decreasing
	< 1	<= 90%	Stable
	>= 1		No Trend

LinEst of Log COCs		
-1.44E-04	4.84	m (1/day), b
1.02E-04	4.19	se(m), se(b)
0.13	0.48	r², se(y intercept)
1.99	13	F,degrees of freedom
0.45	2.95	regression sum of squares, residual sum of squares
	0.48	Standard Deviation
	1.77	Student's t for one-tailed 95% confidence interval
	0.84	± for 95% CI

Cleanup Level	
Date	**TCP**
1/2/2007	0.12
1/3/2030	0.12

Goal Seek for Cleanup Dates

		Log			Linear			GoalSeek
Phase	**Date**	**-95%**	**Trend**	**+95%**	**-95%**	**Trend**	**+95%**	**Target**
Remed	2/13/2025	-2.61	-1.76	-0.92	2.47E-03	1.72E-02	1.20E-01	1.000771
Attain	2/20/2009	-1.76	-0.92	-0.08	1.72E-02	1.20E-01	8.37E-01	0.999972

Statistical Geometric Regression to Evaluate Completion of the Remediation Phase

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FTWW Former Communications Site			
MW13			
TCP			
Date	**µg/L**	**Qualifer**	**Log µg/L**
Included			**23**
10/9/2007	**0.3**	**ND**	-0.52
5/18/2008	**0.21**		-0.68
10/7/2008	**0.014**	**ND**	-1.85
5/28/2009	**0.014**	**ND**	-1.85
9/19/2009	**0.014**	**ND**	-1.85
7/12/2010	**0.3**	**ND**	-0.52
10/26/2010	**0.45**	**ND**	-0.35
7/12/2011	**0.45**	**ND**	-0.35
10/6/2011	**0.1**	**ND**	-1.00
9/24/2012	**0.1**	**ND**	-1.00
5/17/2016	**0.1**	**ND**	-1.00
9/7/2016	**0.04**	**ND**	-1.40
7/19/2017	**0.0025**	**ND, JS-**	-2.60
9/27/2017	**0.0025**	**ND**	-2.60
Excluded (Fall Samples for FCS)			
10/9/2007	**0.3**	**ND**	-0.52
10/7/2008	**0.014**	**ND**	-1.85
9/19/2009	**0.014**	**ND**	-1.85
10/26/2010	**0.45**	**ND**	-0.35
10/6/2011	**0.1**	**ND**	-1.00
9/24/2012	**0.1**	**ND**	-1.00
9/7/2016	**0.04**	**ND**	-1.40
9/27/2017	**0.0025**	**ND**	-2.60

	Year	**X**	**Max Y**
Start	**2007**	39084	**0.5**
End	**2018**	43103	1.5

Mann-Kendall Trend Detection (from MAROS)				
N	**MK_S**	**COV**	**MKconf**	**MKTrend**
14	-26	1.09	91%	Probably Decreasing

MAROS Trend Table			
MK_S	**COV**	**Mkconf**	**MKTrend**
> 0	any	> 95%	Increasing
		<= 95% and > 90%	Probably Increasing
		<= 90%	No Trend
< 0	any	> 95%	Decreasing
		<= 95% and > 90%	Probably Decreasing
	< 1	<= 90%	Stable
	>= 1		No Trend

LinEst of Log COCs		
-2.96E-04	10.86	m (1/day), b
1.53E-04	6.27	se(m), se(b)
0.24	0.71	r², se(y intercept)
3.74	12	F,degrees of freedom
1.90	6.08	regression sum of squares, residual sum of squares
	0.71	Standard Deviation
	1.78	Student's t for one-tailed 95% confidence interval
	1.27	± for 95% CI

Cleanup Level	
Date	**TCP**
1/2/2007	**0.12**
1/3/2018	0.12

Goal Seek for Cleanup Dates

		Log			Linear			GoalSeek
Phase	**Date**	**-95%**	**Trend**	**+95%**	**-95%**	**Trend**	**+95%**	**Target**
Remed	10/7/2020	-3.46	-2.19	-0.92	3.48E-04	6.46E-03	1.20E-01	1.000014
Attain	1/8/2009	-2.19	-0.92	0.35	6.47E-03	1.20E-01	2.23E+00	1.000249

Statistical Geometric Regression to Evaluate Completion of the Remediation Phase

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FTWW Former Communications Site			
MW47			
TCP Plume			
Date	**µg/L**	**Qualifer**	**Log µg/L**
Included			**23**
10/17/2007	**0.54**	**J**	-0.27
5/16/2008	**0.58**	**J**	-0.24
10/3/2008	**0.39**		-0.41
5/27/2009	**0.4**		-0.40
9/19/2009	**0.65**		-0.19
7/13/2010	**0.43**	**J**	-0.37
10/25/2010	**0.4**	**J**	-0.40
7/12/2011	**0.45**	**ND**	-0.35
10/3/2011	**0.087**	**ND**	-1.06
7/10/2012	**0.16**	**J**	-0.80
9/25/2012	**0.29**		-0.54
9/8/2016	**0.16**		-0.80
7/18/2017	**0.19**	**JS-**	-0.72
9/28/2017	**0.3**		-0.52
Fall Samples			
10/17/2007	**0.54**	**J**	-0.27
10/3/2008	**0.39**		-0.41
9/19/2009	**0.65**		-0.19
10/25/2010	**0.4**	**J**	-0.40
10/3/2011	**0.087**	**ND**	-1.06
9/25/2012	**0.29**		-0.54
9/8/2016	**0.16**		-0.80
9/28/2017	**0.3**		-0.52

	Year	**X**	**Max Y**
Start	**2007**	39084	**1**
End	**2030**	47486	0

Mann-Kendall Trend Detection (from MAROS)				
N	**MK_S**	**COV**	**MKconf**	**MKTrend**
14	-39	0.47	98%	Decreasing

MAROS Trend Table			
MK_S	**COV**	**Mkconf**	**MKTrend**
> 0	any	> 95%	Increasing
		<= 95% and > 90%	Probably Increasing
		<= 90%	No Trend
< 0	any	> 95%	Decreasing
		<= 95% and > 90%	Probably Decreasing
	< 1	<= 90%	Stable
	>= 1		No Trend

LinEst of Log COCs		
-1.22E-04	4.49	m (1/day), b
4.88E-05	1.99	se(m), se(b)
0.34	0.21	r², se(y intercept)
6.26	12	F,degrees of freedom
0.29	0.55	regression sum of squares, residual sum of squares
	0.21	Standard Deviation
	1.78	Student's t for one-tailed 95% confidence interval
	0.38	± for 95% CI

Cleanup Level	
Date	**TCP Plume**
1/2/2007	**0.12**
1/3/2030	0.12

Goal Seek for Cleanup Dates

		Log			**Linear**			**GoalSeek**
Phase	**Date**	**-95%**	**Trend**	**+95%**	**-95%**	**Trend**	**+95%**	**Target**
Remed	9/28/2029	-1.68	-1.30	-0.92	2.08E-02	5.00E-02	1.20E-01	1.000216
Attain	3/18/2021	-1.30	-0.92	-0.54	5.00E-02	1.20E-01	2.88E-01	1.000338

Statistical Geometric Regression to Evaluate Completion of the Remediation Phase

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	Year	X	Max Y
Start	2007	39084	2
End	2018	43103	0

FTWW Former Communications Site			
MW79			
TCP			
Date	**µg/L**	**Qualifer**	**Log µg/L**
Included			21
10/5/2008	0.77		-0.11
5/27/2009	0.34		-0.47
9/19/2009	1.2		0.08
7/13/2010	0.33	J	-0.48
10/25/2010	0.5	J	-0.30
7/11/2011	0.34		-0.47
10/4/2011	0.38		-0.42
7/9/2012	0.24		-0.62
9/25/2012	0.57		-0.24
9/8/2016	1.9		0.28
7/19/2017	0.61	JS-	-0.21
9/28/2017	1.2		0.08
Fall Samples			
10/5/2008	1		0.00
9/19/2009	1.2		0.08
10/25/2010	0.5	J	-0.30
10/4/2011	0.38		-0.42
9/25/2012	0.57		-0.24
9/8/2016	1.9		0.28
9/28/2017	1.2		0.08

Mann-Kendall Trend Detection (from MAROS)				
N	**MK_S**	**COV**	**MKconf**	**MKTrend**
12	14	0.71	81%	No Trend

MAROS Trend Table			
MK_S	**COV**	**Mkconf**	**MKTrend**
> 0	any	> 95%	Increasing
		<= 95% and > 90%	Probably Increasing
		<= 90%	No Trend
< 0	any	> 95%	Decreasing
		<= 95% and > 90%	Probably Decreasing
	< 1	<= 90%	Stable
	>= 1		No Trend

LinEst of Log COCs		
1.06E-04	-4.58	m (1/day), b
6.75E-05	2.77	se(m), se(b)
0.20	0.26	r², se(y intercept)
2.45	10	F,degrees of freedom
0.16	0.67	regression sum of squares, residual sum of squares
	0.26	Standard Deviation
	1.81	Student's t for one-tailed 95% confidence interval
	0.47	± for 95% CI

Cleanup Level	
Date	**TCP**
1/2/2007	0.12
1/3/2018	0.12

Goal Seek for Cleanup Dates

		Log			Linear			GoalSeek
Phase	**Date**	**-95%**	**Trend**	**+95%**	**-95%**	**Trend**	**+95%**	**Target**
Remed	9/16/1982	-1.86	-1.39	-0.92	1.39E-02	4.08E-02	1.20E-01	1.000017
Attain	11/13/1994	-1.39	-0.92	-0.45	4.08E-02	1.20E-01	3.53E-01	1.000580

APPENDIX G
Response to Comments

REVIEW COMMENTS

PROJECT: Fort Wainwright, Alaska

DOCUMENT: OU6 Former Communications Site 2017 Activities and Groundwater Monitoring Annual Report, March 2018

U.S. ARMY CORPS OF ENGINEERS	**DATE: March 2018** **REVIEWER: Blake** **PHONE: 907-451-2182**	**Action taken on comment by:** **Jacobs (Kari Hagen and Dave Ward)**

Item No.	**Drawing Sheet No., Spec. Para.**	**COMMENTS**	**REVIEW CONFERENCE A - comment accepted W - comment withdrawn (if neither, explain)**	**CONTRACTOR RESPONSE**	**ADEC RESPONSE ACCEPTANCE (A-AGREE) (D-DISAGREE)**
1.	General	DEC concurs with the recommendation for continued monitoring and to continue with the currently approved sampling program.	A	No revisions necessary.	Accept
2.	Laboratory Data Review Checklist Review Work Order 83363 LDRC: Section 6.a Method Blanks	Page 81 of the SDG deliverable for work order 83363 there is a method blank detection for methane. There is no explanation in the checklist regarding this method blank detection. Even though methane is a monitored natural attenuation parameter (MNA), please add to this checklist a brief explanation regarding the methane method blank detection.	A	Checklist 83363, section 6a.ii.- Added comment “All method blank results were less than the LOQ (PQL), however all method blanks and samples were evaluated if an analyte was detected. Sample results were qualified if the sample result was within 10 times the method blank concentration. **RSK175 -** Methane was detected in the method blank at 0.53 ug/L.” Checklist 83363, section 6a.iii./iv./v. - Added comment “The methane concentration in all associated samples were 10 times or greater than the method blank concentration. No samples were affected or required qualification due to method blank contamination.	Accept with comment back-check.
3.	Laboratory Data Review Checklist Work Order 83363 LDRC: Section 6.d Trip Blank	The checklist indicates there may be a trip blank accompanying the samples, however, the SDG for work order 83363 does not have any trip blank samples included.	A	The initial response below was incorrect and needed to be updated. Volatiles were reported in SDG 83363. The volatile samples logged in as SDGs 83363 and 83385 were shipped in the same cooler, ‘Tan Pancake’, but the lab logged in the samples under 2 separate SDGs. The trip blank, 17FWAFCS-TB01 from this cooler was	Accept with comment back-check.

Item No.	**Drawing Sheet No., Spec. Para.**	**COMMENTS**	**REVIEW CONFERENCE A - comment accepted W - comment withdrawn (if neither, explain)**	**CONTRACTOR RESPONSE**	**ADEC RESPONSE ACCEPTANCE (A-AGREE) (D-DISAGREE)**
				logged in under SDG 83385. The ADEC checklist, 83363 section 6.d.ii will be updated to state the following: 'Volatile samples and the trip blank were shipped in cooler 'Tan Pancake', however the laboratory logged in the samples under two SDGs, 83363 and 83385. The trip blank, 17FWAFCS-TB01 associated with the samples reported in SDG 83363 was logged in and reported under SDG 83385.' ~~This SDG (83363) did not have a trip blank associated with it (all analyses in these coolers were non-volatile). The responses to 6.d have been updated as follows: 6.d.i: No, "No volatile analyses submitted with this SDG." 6d.ii-iv: No, "N/A". 6.d.v: "The data quality and usability were not affected."~~	
4.	Laboratory Data Review Checklist Work Order 83363LDRC: Section 6.e Field Duplicate	Please clarify in the checklist and report text, was there a field duplicate sample for 17FWAMW61-GWS submitted with Work Order 83363? The checklist makes it sound like a field duplicate pair was submitted, however the field duplicate sample number is not included in Work Order 83363.	A	The initial response below was incorrect and needed to be updated. The primary sample and field duplicate were logged in under two SDGs. ADEC checklists 83363 and 83385 section 6.e.i. will be updated to state the following: "Samples 17FWAMW61-GWS and 17FWAMW61X-GWS were submitted as a field duplicate pair. The samples were logged	Accept with comment back-check.

U.S. ARMY CORPS OF ENGINEERS	**DATE: March 2018** **REVIEWER: Blake** **PHONE: 907-451-2182**	**Action taken on comment by:** **Jacobs (Kari Hagen and Dave Ward)**

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				in and reported under two SDGs. Sample 17FWAMW61-GWS was logged in under SDG 83363 and the field duplicate, 17FWAMW61X-GWS was logged in under SDG 83385.” Field duplicate pair, 17FWAMW61-GWS/17FWAMW61X-GWS was supposed to be submitted for method SW8260, however method SW8260SIM was inadvertently requested on the field duplicate sample, 17FWAMW61X-GWS. For method SW8260, the 10 percent field duplicate frequency was not met. ~~17FWAMW61-GWS/17FWAMW61X-GWS were submitted with SDG 83385, not 83363. Both checklists have been corrected with the correct field duplicates.~~	
5.	Laboratory Data Review Checklist Work Order 83363 and 83385 LDRC: Section 6.e Field Duplicate	Please clarify in the checklists that samples for 17FWAMW61-GWS and 17FWAMW61X-GWS were submitted in separate work orders.	A	The initial response below was incorrect and needed to be updated. The primary sample and field duplicate were logged in under two SDGs. ADEC checklists 83363 and 83385 section 6.e.i. will be updated to state the following (same response as above, comment 4: “Samples 17FWAMW61-GWS and 17FWAMW61X-GWS were submitted as a field duplicate pair. The samples were logged	Accept with comment back-check.

U.S. ARMY CORPS OF ENGINEERS	**DATE: March 2018** **REVIEWER: Blake** **PHONE: 907-451-2182**	**Action taken on comment by:** **Jacobs (Kari Hagen and Dave Ward)**

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				in and reported under two SDGs. Sample 17FWAMW61-GWS was logged in under SDG 83363 and the field duplicate, 17FWAMW61X-GWS was logged in under SDG 83385.” Field duplicate pair, 17FWAMW61-GWS/17FWAMW61X-GWS was supposed to be submitted for method SW8260, however method SW8260SIM was inadvertently requested on the field duplicate sample, 17FWAMW61X-GWS. For method SW8260, the 10 percent field duplicate frequency was not met. ~~Field duplicate pair, 17FWAMW61-GWS and 17FWAMW61X-GWS was submitted under SDG 83385, not SDG 83363.~~ ~~Checklist 83385, section 6.e.i. has been corrected to read the following:~~ ~~**“SW8260 Mid Level** - Field duplicate pair, 17FWAMW61-GWS/17FWAMW61X-GWS was supposed to be submitted for method SW8260 mid- level, however method SW8260 SIM low-level was inadvertently requested on the field duplicate sample, 17FWAMW61X-GWS. For method SW8260 mid-level, the 10~~	

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				~~percent field duplicate frequency was not met.”~~	
6	Appendix C Field Notes and Forms	The Groundwater Sampling Data Sheet has a note on it that the parameters reached stabilization and not maximum volume. Is this sheet going to be corrected and re-scanned?	A	The pop-up note on the field form for MW82 will be revised to appears as an always-visible annotation. Purging reached both max volume and stabilization criteria.	Accept with comment back-check.
7	Appendix F Geometric Regression Input - MAROS Trends for MW77	On the MW77 RRO trend sheet, the boxes are not filled for the Mann-Kendall Trend Detection (from MAROS). Please revise this sheet so the boxes are filled.	A	The MW77 RRO trend sheet will be updated with the Mann-Kendall parameters, which also appear in Table 5-4.	Accept with comment back-check.
8	Appendix F Geometric Regression Input - MAROS Trends for MW80#1705152	On the MW80 TCE trend sheet, the MAROS trend indicates there is an increasing trend. Results from MW80 in 2017 were ND. Please explain why there is an increasing trend at MW80 for TCE..	A	The following paragraph will be added to section 5.4.2: Trend analysis of TCE results in MW80 is included in Appendix F for completeness but the statistical tools do not give meaningful results for data sets that are mostly nondetects. Although the Mann-Kendall statistic indicates an increasing trend, this is a reflection of slight increases in the limits of detection over time rather than real changes in TCE concentration.	Accept with comment back-check.
		--- End of Comments ---			

REVIEW COMMENTS **PROJECT: OU6 Former Comm Site 2017 Activities and GW Monitoring W912DR-13-D-0015 TO ZJ01**
DOCUMENT: Draft Groundwater Monitoring Annual Rpt (August 2018) **Location: Fort Wainwright, Alaska**

ENVIRONMENTAL PROTECTION AGENCY	**DATE: 6 August 2018** **REVIEWER: Sandra Halstead** **PHONE: 907-271-1218**	**Action taken on comment by: T. Laiti**

Item No.	**Drawing Sheet No., Spec. Para.**	**COMMENTS**	**REVIEW CONFERENCE** **A - comment accepted** **W - comment withdrawn** **(if neither, explain)**	**CONTRACTOR RESPONSE**	**USAED/ADEC RESPONSE ACCEPTANCE (A-AGREE) (D-DISAGREE)**
1.	General	Include a summary of the results at the water supply sentry wells. There is really no discussion of what analytes are included and what is reported by the laboratory. The data tables (B-1-2 Spring and B-1-3 Fall) only report values for 123-TCP and vinyl chloride.	A	The TCP sentry well analytes followed the 2017 Groundwater Monitoring Work Plan. MW39 and MW78 were analyzed for TCP, vinyl chloride, and MNA parameters. MW91 and MW93 were analyzed for TCP and vinyl chloride. Table 3-2 was revised to agree with QAPP WS#18 of the 2017 Groundwater Monitoring Work Plan as follows: "**Notes:** [1] VOCs reported include 1,1-dichloroethene, 1,2,3-TCP, cis-1,2-dichloroethene, tetrachloroethene, trans-1,2-dichloroethene, TCE, and vinyl chloride. [2]Low-level VOC analysis for 1,2,3-TCP." The following paragraph was added to the end of section 5.3.4 TCP Plume Summary to discuss the sentry well as requested: "TCP was not detected above the LOD in any of the TCP plume sentry wells (MW39, MW78, MW91, and MW93) during the 2017 spring sampling event. Although TCP was detected in two wells (MW39 and MW78) during the 2017 fall sampling event (see Table 5-5), the observed concentrations were less than the concentrations seen in 2016: in MW39 a decrease from	

ENVIRONMENTAL PROTECTION AGENCY	**DATE: 6 August 2018** **REVIEWER: Sandra Halstead** **PHONE: 907-271-1218**	**Action taken on comment by: T. Laiti**

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				0.000012 mg/L and in MW78 a decrease from the LOD of 0.00004 mg/L. Comparison of the 2017 results to 2016 results indicates that the TCP plume is not spreading in the direction of the sentry wells. The detectable levels in the fall can be attributed to varying groundwater levels and site conditions between the spring and fall sampling events. The TCP sentry wells were only analyzed for TCP, vinyl chloride, and MNA parameters according to the 2017 work plan (USACE 2017a). Vinyl chloride was not detected in any of the TCP plume sentry wells during the 2017 sampling events and MNA parameters for the plume are summarized in section 5.3.3.”	
2.	P. 3-5, Table 3-2	Says 2016 at the top.	A	The title of Table 3-2 was changed to the following: “2017 Groundwater Sampling”	
3.	p. 5-14, Table 5-5	Footnote needs to strike the "For DRO and RRO".	A	The statement was revised as requested. The statement “For DRO and RRO” was removed in Table 5-5.	
4.	p. 5-18, Table 5-7	Same for Table 5-7, p. 5-18 strike the "For DRO and RRO".	A	The statement was revised as requested. The statement “For DRO and RRO” was removed in Table 5-7.	
END OF COMMENTS					