# Final
# 2019 Baseline Monitoring Report
# Red Devil Mine, Alaska

**July 2020**

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# List of Abbreviations and Acronyms

| | |
|---|---|
| BLM | U.S. Department of the Interior Bureau of Land Management |
| BTEX | benzene, toluene, ethylbenzene, and xylenes |
| cfs | Cubic feet per second |
| COC | Contaminants of concern |
| DRO | diesel range organics |
| E & E | Ecology and Environment, Inc., member of WSP |
| GRO | gasoline range organics |
| IDW | investigation-derived waste |
| MPA | Main Processing Area |
| QC | quality control |
| RDM | Red Devil Mine |
| RI | Remedial Investigation |
| RRO | residual range organics |
| SMA | Surface mined area |
| SVOC | semi-volatile organic compound |
| TAL | target analyte list |
| TDS | total dissolved solids |
| TSS | total suspended solids |
| Work Plan | *Final Work Plan, Groundwater and Surface Water Baseline Monitoring, Red Devil Mine, Alaska* |

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# 1 Introduction

This report presents the results of the spring and fall 2019 baseline groundwater and surface water monitoring effort at the Red Devil Mine (RDM) site (see Figure 1-1). The RDM consists of an abandoned mercury mine and ore processing facility located on public lands managed by the U.S. Department of the Interior Bureau of Land Management (BLM) in the state of Alaska. Historical mining activities included underground and surface mining. Ore processing included crushing, retorting/furnacing, milling, and flotation. Ecology and Environment, Inc., member of WSP (hereafter referred to as E & E) prepared this baseline monitoring report on behalf of the BLM under Delivery Order Number 140L6318F0016 and General Services Administration Contract Number GS-10F-0160J.

This report summarizes the field activities, procedures, and results for baseline monitoring of groundwater and surface water performed at the RDM site during 2019.

## 1.1 Purpose and Objectives

The purpose of the baseline monitoring is to collect surface water and groundwater samples, as well as streamflow and groundwater elevation data to inform remedial actions at the RDM. This baseline monitoring expands upon work that began during the 2011–2014 Remedial Investigation (RI) and continued through the 2015–2018 RI Supplement and contemporaneous baseline monitoring for groundwater and surface water (see Figure 1-2). The objectives of the baseline monitoring are to:

- Define baseline conditions prior to remedial action;
- Characterize the seasonal variability in groundwater and surface water hydrology and chemistry; and
- Characterize the long-term (multiple-year) variability in groundwater and surface water hydrology and chemistry.

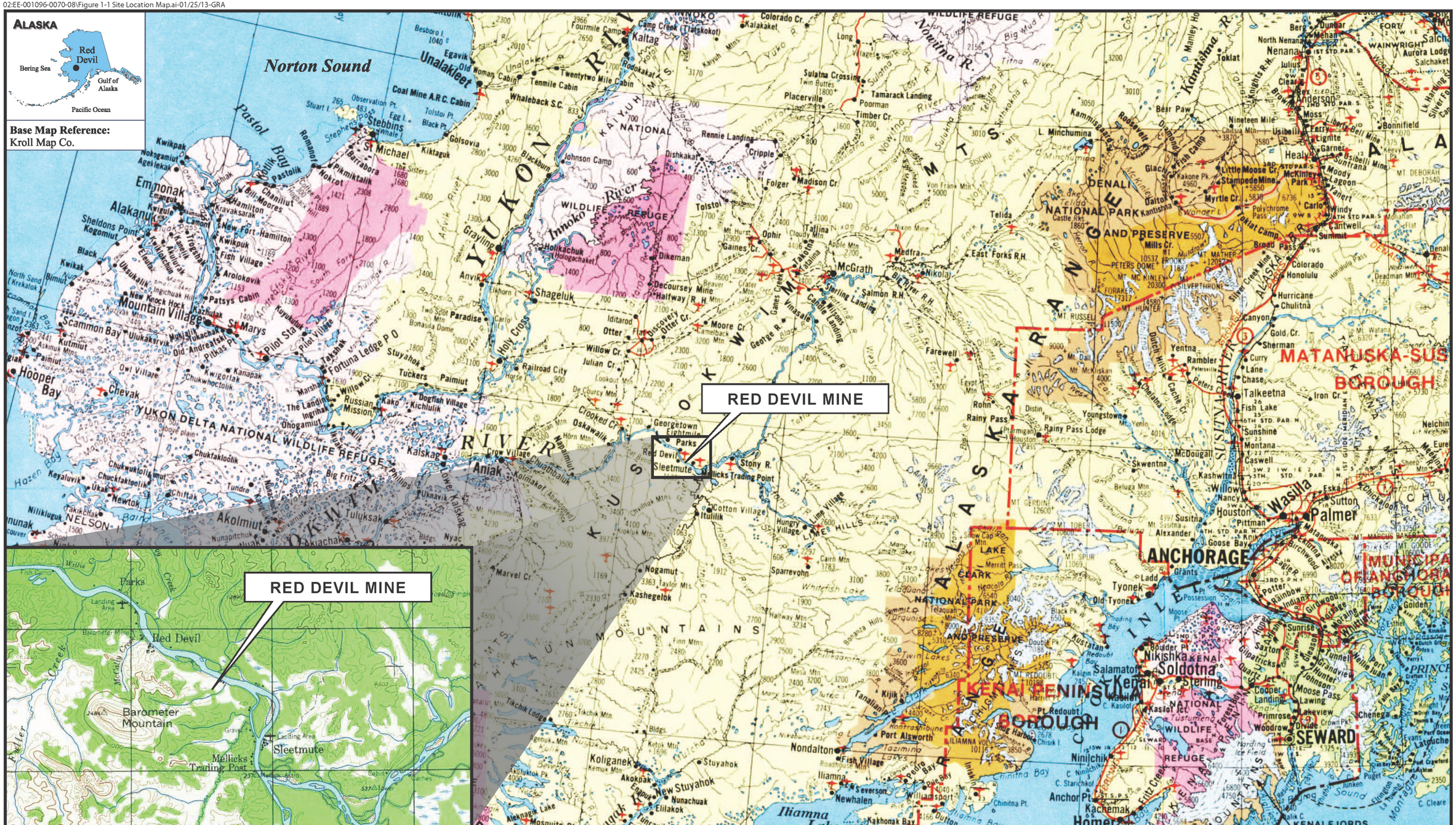
## 1.2 Project Location and Setting

The RDM site is located approximately 250 air miles west and 1,500 marine/river barge miles from Anchorage, Alaska. Located on the southwest bank of the Kuskokwim River, approximately 2 miles southeast of the village of Red Devil, the site is 75 air miles northeast of Aniak, the largest village in the region, and ap-

proximately 8 miles northwest of the village of Sleetmute. Approximately 15 villages are located downstream of Red Devil on the Kuskokwim River. The legal description for the RDM site is Township 19 North, Range 44 West, Southeast Quarter of Section 6, Sleetmute D-4 Quadrangle, Seward Meridian. The RDM site's approximate coordinates are 61° 45' 38.1" north latitude and 157° 18' 42.7" west longitude (North American Datum 1927).

The RDM site is in a remote location, and access to the site is available by boat or barge on the Kuskokwim River or by means of an airstrip at the nearby village of Red Devil. An unimproved road leads from the airstrip through the village of Red Devil to the RDM site.

02:EE-001096-0070-08\Figure 1-1 Site Location Map.ai-01/25/13-GRA




**ecology and environment, inc.**
International Specialists in the Environment
Seattle, Washington

0 40 80
Approximate Scale in Miles

**RED DEVIL MINE**
**Red Devil, Alaska**

**Figure 1-1**
**SITE LOCATION MAP**

| Date: | | |
|---|---|---|
| 04/18/13 | JSS | 02:EE-001096-0070-08 |

# 2 Field Activities and Procedures

This chapter presents and discusses the results of two field events. The events were designed to capture the hydrologic conditions present during the spring and fall seasons at the site. The Spring 2019 event was targeted for the period shortly after snow receded from the Red Devil Mine site and the seasonal ice on the Kuskokwim River broke up. The Spring 2019 event was conducted from May 18, 2019 to May 29, 2019. The fall event was targeted to begin as late in year as possible but before the first snowfall and before limited daylight and colder temperatures would adversely affect field productivity. The fall field event occurred from September 8, 2019 to September 19, 2019.

In general, activities performed for each monitoring event include measurement of groundwater elevations, surface water discharge measurements, surface water sampling and low-flow groundwater sampling. Specific activities for each field event are further described in Sections 2.1 through 2.2.

A field logbook was maintained throughout each sampling event. Pertinent information about the sampling locations and notes regarding flow measurements were recorded in the field logbook (see Appendix B). Additionally, field data sheets were completed using an electronic tablet and contain sample information and water quality measurements taken during the low-flow purge.

Field activities were performed in accordance with the *Final Work Plan, Groundwater and Surface Water Baseline Monitoring, Red Devil Mine, Alaska* (Work Plan) (E & E 2019a), with the exception of modifications resulting from field conditions described in Appendix D.

## 2.1 Spring 2019 Baseline Monitoring

### 2.1.1 Groundwater Monitoring

Groundwater monitoring during the spring 2019 baseline monitoring event consisted of four parts:

- Installing 25 dedicated bladder pumps into 25 monitoring wells;
- Measuring static water levels at all accessible monitoring wells at the RDM site in a single day in order to collect a groundwater “snapshot”;
- Downloading continuous water level data from pressure transducers and dataloggers installed in a network of monitoring wells; and

- Collecting groundwater samples from 35 existing monitoring wells.

The groundwater snapshot was collected in a single day on May 18, 2019. Static water level measurements were augmented with the continuous water-level measurements collected using pressure transducers and data-loggers between the spring of 2018 and spring 2019, as described in the Work Plan (E & E 2019). Pressure transducer data recorded between May 2018 and May 2019 from wells MW46, MW48, MW50, MW51, MW56, and MW59 were downloaded during the spring 2019 field event, and the transducers were then reinstalled in wells MW50, MW51, MW53, MW54, MW56, MW57, and MW58.

Table 2-1 provides a summary of the groundwater samples collected during the spring 2019 field event. Monitoring locations are illustrated in Figure 2-1. Groundwater samples were collected for laboratory analysis of the following using the methods identified in Table 2-1:

- Total target analyte list (TAL) Metals
- Total Low-Level Mercury
- Dissolved Low-Level Mercury
- Total Suspended Solids (TSS)
- Inorganic Ions
- Carbonate Alkalinity as Calcium Carbonate (CaCO3)
- Nitrate/Nitrite as Nitrogen (N)

Samples collected from monitoring wells MW19 and MW22 were also analyzed for semi-volatile organic compounds (SVOCs), diesel range organics (DRO), residual range organics (RRO), gasoline range organics (GRO), and benzene, toluene, ethylbenzene, and xylenes (BTEX) using the methods identified in Table 2-1.

Field water quality measurements for pH, temperature, specific conductance, oxidation-reduction potential, dissolved oxygen, and turbidity were collected at each monitoring well prior to sample collection.

Groundwater samples were collected using a low-flow sampling technique with a maximum flow rate of 0.5 liters per minute following sampling methodologies described in the Work Plan (E & E 2019a).

### 2.1.2 Red Devil Creek Surface Water Monitoring

During the fall 2019 baseline monitoring event, surface water monitoring was conducted at seven locations along Red Devil Creek between the creek's mouth at the Kuskokwim River and the reservoir south of the Main Processing Area (MPA). Surface water monitoring locations are illustrated on Figure 2-1. Table 2-2 provides a summary of the samples collected. Surface monitoring consisted of two parts: measuring discharge and collecting surface water samples. Surface

water discharge was measured using the mid-section method or timed filling procedure at each of the seven monitoring locations following methodologies described in the Work Plan (E & E 2019a). The most downstream surface water monitoring location (RD08) has been adjusted a short distance west, as the existing surface water monitoring location was beneath the flowing surface of the Kuskokwim River; the RD08 sample was collected from a location established in May 2018. Further detail is provided in Appendix C, Field Sampling Plan Deviations.

Red Devil Creek surface water samples were collected for laboratory analysis of the following using the methods identified in Table 2-2:

- Total target analyte list (TAL) Metals
- Dissolved TAL Metals
- Total Low-Level Mercury
- Dissolved Low-Level Mercury
- Total Organic Carbon
- Total Suspended Solids (TSS)
- Total Dissolved Solids (TDS)
- Inorganic Ions
- Carbonate Alkalinity as Calcium Carbonate (CaCO3)
- Nitrate Nitrite as Nitrogen (N)

Field water quality measurements for pH, temperature, specific conductance, oxidation-reduction potential, dissolved oxygen, and turbidity were collected at each sample station.

Surface water samples were collected using a battery-operated peristaltic pump outfitted with certified-clean, dedicated silicone tubing following sampling methodologies described in the Work Plan (E & E 2019a).

### 2.1.3 Sample Handling

Sample handling (e.g., chain-of-custody and field documentation etc.) during the spring 2019 baseline monitoring event was conducted as described in the Work Plan (E & E 2019a).

### 2.1.4 Quality Control Samples

Field quality control (QC) samples were collected for all matrices and analytes following the requirements specified in the Work Plan (E & E 2019a).

### 2.1.5 Investigation-Derived Waste Management

Investigation-derived waste (IDW) generated during the fall 2019 baseline monitoring included the following:

- Monitoring well development and purge water;
- Used dedicated sampling equipment, personal protective equipment, and paper towels; and
- Decontamination fluids generated during groundwater sampling.

IDW was managed in accordance with the Work Plan (E & E 2019a).

## 2.2 Fall 2019 Baseline Monitoring

### 2.2.1 Groundwater Monitoring

Groundwater monitoring during the fall 2019 baseline monitoring event consisted of three parts: Measuring static water levels at all accessible monitoring wells at the RDM site in a single day in order to collect a groundwater "snapshot," Downloading continuous water level data from pressure transducers and data-loggers installed in a network of monitoring wells, and collecting groundwater samples from 35 existing monitoring wells. The groundwater snapshot was collected on a single day, September 10, 2019. Static water-level measurements were augmented with the continuous water level measurements collected using pressure transducers between the spring of 2019 and fall 2019, as described in the Work Plan (E & E 2019a). Pressure transducer data recorded between May 2019 and September 2019 were downloaded during the fall 2019 field event, and the transducers were then reinstalled in wells MW50, MW51, MW53, MW54, MW56, MW57, and MW58.

Table 2-1 provides a summary of the groundwater samples collected during the Fall 2019 field event. Monitoring locations are illustrated in Figure 2-1. Groundwater samples were collected for laboratory analysis of the following using the methods identified in Table 2-1:

- TAL inorganic elements
- Total low-level mercury
- Dissolved low-level mercury
- Inorganic ions
- Nitrate/nitrite
- Carbonate/bicarbonate
- TSS

Samples collected from monitoring wells MW19 and MW22 were also analyzed for SVOCs, DRO, RRO, GRO, and BTEX using the methods identified in Table 2-1.

Field water quality measurements for pH, temperature, specific conductance, oxidation-reduction potential, dissolved oxygen, and turbidity were collected at each monitoring well prior to sample collection.

Groundwater samples were collected using a low-flow sampling technique with a maximum flow rate of 0.5 liters per minute following sampling methodologies described in the Work Plan (E & E 2019a). Due to low static water levels during the Fall 2019 sampling event, alternate purging and sampling techniques were used at MW08, MW09 and MW31, as summarized below.

**MW08.** The static water level at MW08 was near the working limit of the peristaltic pump (approximately 25 feet below ground surface). The well was bailed dry via the alternate purging method and sampled with a dedicated bailer following the methodologies described in the Work Plan (E & E 2019a).

**MW09.** The static water level at MW09 was near the bottom of the screened interval and too low to purge and sample via bladder pump. The well was bailed dry via the alternate purging method and sampled with a dedicated bailer following sampling methodologies described in the Work Plan (E & E 2019a).

**MW31.** The static water level at MW31 was near the bottom of the screened interval and too low to successfully purge via bladder pump. Shortly after beginning the purging procedure, the water level dropped below the screened interval. Due to the slow recharge rate and small water column in the well, MW 31 was not sampled via alternate purge method.

### 2.2.2 Red Devil Creek Surface Water Monitoring

During the Fall 2019 Baseline Monitoring event, surface water monitoring was conducted at seven locations along Red Devil Creek between the creek's mouth at the Kuskokwim River and the reservoir south of the MPA. Surface water monitoring locations are illustrated on Figure 2-1. Table 2-3 provides a summary of the samples collected. Surface monitoring consisted of two parts: measuring streamflow and collecting surface water samples. Surface water discharge was measured using the mid-section method at six of the seven monitoring locations following the mid-section methodology described in the Work Plan (E & E 2019a). At the seep (RD05), discharge was measured using the timed fill method described in the Work Plan (E & E 2019a). More detail is provided in Appendix C, Field Sampling Plan Deviations.

Red Devil Creek surface water samples were collected for laboratory analysis of the following using the methods identified in Table 2-2:

- Total target analyte list (TAL) Metals
- Dissolved TAL Metals
- Total Low-Level Mercury
- Dissolved Low-Level Mercury

- Total Organic Carbon
- Total Suspended Solids (TSS)
- Total Dissolved Solids (TDS)
- Inorganic Ions
- Carbonate Alkalinity as Calcium Carbonate (CaCO3)
- Nitrate Nitrite as Nitrogen (N)

Field water quality measurements for pH, temperature, specific conductance, oxidation-reduction potential, dissolved oxygen, and turbidity were collected at each sample station.

Surface water samples were collected using a battery-operated peristaltic pump outfitted with certified-clean, dedicated silicone tubing following sampling methodologies described in the Work Plan (E & E 2019a).

### 2.2.3 Sample Handling

Sample handling (e.g., chain-of-custody and field documentation) during the fall 2019 baseline monitoring event was conducted as described in the Work Plan (E & E 2019a).

### 2.2.4 Quality Control Samples

Field QC samples were collected for all matrices and analytes following the requirements specified in the Work Plan (E & E 2019a).

### 2.2.5 Investigation-Derived Waste Management

IDW generated during the fall 2019 baseline monitoring event includes the following:

- Monitoring well development and purge water;
- Used dedicated sampling equipment, personal protective equipment, and paper towels; and
- Decontamination fluids generated during groundwater sampling.

IDW was managed in accordance with the Work Plan (E & E 2019a).

**Table 2-1 Groundwater Sample Collection**

| Monitoring Well ID | Sample Analyses and Methods | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Sampling Method | Total TAL Metals | Total Low-Level Hg | Dissolved Low-Level Hg | Total Suspended Solids | Inorganic Ions | Carbonate Alkalinity as CaCO3 | Nitrate Nitrite as N | SVOCs | BTEX (VOCs) | GRO | DRO |
| | | EPA 6010C/6020A | EPA 1631E | EPA 1631E | SM 2540D | MCAWW 300.0 | SM 2320B | MCAWW 353.2 | SW846 8021B /8270D | SW846 8260C | AK101 | AK102 |
| MW09 | Bladder | ● | ● | ● | ● | ● | ● | ● | | | | |
| MW10 | Bladder | ● | ● | ● | ● | ● | ● | ● | | | | |
| MW01 | Bladder | ● | ● | ● | ● | ● | ● | ● | | | | |
| MW16 | Peristaltic | ● | ● | ● | ● | ● | ● | ● | | | | |
| MW17 | Peristaltic | ● | ● | ● | ● | ● | ● | ● | | | | |
| MW22 | Peristaltic | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| MW26 | Bladder | ● | ● | ● | ● | ● | ● | ● | | | | |
| MW27 | Bladder | ● | ● | ● | ● | ● | ● | ● | | | | |
| MW28 | Bladder | ● | ● | ● | ● | ● | ● | ● | | | | |
| MW06 | Peristaltic | ● | ● | ● | ● | ● | ● | ● | | | | |
| MW32 | Peristaltic | ● | ● | ● | ● | ● | ● | ● | | | | |
| MW33 | Peristaltic | ● | ● | ● | ● | ● | ● | ● | | | | |
| MW40 | Bladder | ● | ● | ● | ● | ● | ● | ● | | | | |
| MW42 | Bladder | ● | ● | ● | ● | ● | ● | ● | | | | |
| MW43 | Bladder | ● | ● | ● | ● | ● | ● | ● | | | | |
| MW29 | Bladder | ● | ● | ● | ● | ● | ● | ● | | | | |
| MW08 | Peristaltic | ● | ● | ● | ● | ● | ● | ● | | | | |
| MW19 | Peristaltic | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| MW31 | Bladder | ● | ● | ● | ● | ● | ● | ● | | | | |
| MW44 | Bladder | ● | ● | ● | ● | ● | ● | ● | | | | |
| MW45 | Bladder | ● | ● | ● | ● | ● | ● | ● | | | | |
| MW46 | Bladder | ● | ● | ● | ● | ● | ● | ● | | | | |
| MW47 | Bladder | ● | ● | ● | ● | ● | ● | ● | | | | |
| MW48 | Peristaltic | ● | ● | ● | ● | ● | ● | ● | | | | |
| MW49 | Bladder | ● | ● | ● | ● | ● | ● | ● | | | | |
| MW50 | Bladder | ● | ● | ● | ● | ● | ● | ● | | | | |
| MW51 | Bladder | ● | ● | ● | ● | ● | ● | ● | | | | |
| MW52 | Bladder | ● | ● | ● | ● | ● | ● | ● | | | | |
| MW53 | Bladder | ● | ● | ● | ● | ● | ● | ● | | | | |
| MW54 | Bladder | ● | ● | ● | ● | ● | ● | ● | | | | |
| MW55 | Peristaltic | ● | ● | ● | ● | ● | ● | ● | | | | |
| MW56 | Bladder | ● | ● | ● | ● | ● | ● | ● | | | | |
| MW57 | Bladder | ● | ● | ● | ● | ● | ● | ● | | | | |
| MW58 | Bladder | ● | ● | ● | ● | ● | ● | ● | | | | |
| MW59 | Bladder | ● | ● | ● | ● | ● | ● | ● | | | | |

**Key:**

BTEX = benzene, ethylbenzene, toluene, and xylenes
CaCO3 = calcium carbonate
DRO = diesel-range organics
EPA = U.S. Environmental Protection Agency
GRO = gasoline-range organics
Hg = mercury
SMA = Surface Mined Area
SVOC = semivolatile organic compound
TAL = Target Analyte List
VOC = volatile organic compound

**Table 2-2 Surface Water Sample Collection**

| Sample Location ID | Location Description | Sample Analyses and Methods | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | Total TAL Metals | Dissolved TAL Metals | Total Low-Level Hg | Dissolved Low-Level Hg | Total Organic Carbon | Total Suspended Solids | Total Dissolved Solids | Inorganic Ions | Carbonate Alkalinity as CaCO3 | Nitrate Nitrite as N |
| | | EPA 6010C/6020A | EPA 6010C/6020A | EPA 1631E | EPA 1631E | SW846 9060 | SM 2540D | SM 2540C | MCAWW 300.0 | SM 2320B | MCAWW 353.2 |
| RD10SW | Red Devil Creek, downstream of the reservoir, upstream of NTCRA. | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| RD14SW | Red Devil Creek, new station immediately upstream of the newly aligned section (post-NTCRA) of Red Devil Creek, near former station RD04SW | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| RD15SW | Red Devil Creek, new station immediately downstream of the newly aligned section (post-NTCRA) of Red Devil Creek, near former baseline monitoring station RD13SW | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| RD05SW | Seep on left bank of Red Devil Creek | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| RD16SW | Red Devil Creek, near Settling Pond #2 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| RD06SW | Red Devil Creek, near Settling Pond #3 | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |
| RD08SW | Red Devil Creek, near confluence of Red Devil Creek and Kuskokwim River, downstream of sediment trap constructed during NTCRA | ● | ● | ● | ● | ● | ● | ● | ● | ● | ● |

**Key:**

CaCO3 = calcium carbonate
EPA = Environmental Protection Agency
Hg = Mercury
MCAWW = Methods for Chemical Analysis of Water and Wastes
NTCRA = non-time-critical removal action
TAL = Target Analyte List

Ecology & Environment, Inc. GIS Department Project:
\\corp.ene.com\files\SEA\Projects\ACTIVE\Red Devil Mine\GIS - Seattle mirror\Work Products\Maps\FSP Figure2-1_SWGW locations.mxd Date: 5/10/2019

**Underground Workings**

**Adits, Levels, and Crosscuts**
- Dolly Area Crosscuts
- 325 Adit
- 311 Adit
- 242 Sub-level
- 33 Level
- 73 Level
- 150 Level / 200 Level
- 300 Level
- 450 Level
- 550 Crosscut

**Shafts, Raises, and Winzes**
- Shaft
- Raise or Winze
- Shaft going above and below level
- Ore shaft
- Stope ("V" points downward)

**Other Workings**
- Bottom of Shaft
- Foot of raise or winze
- Head of raise or winze

**Former Mine Openings**
- Adit Portal
- Shaft Collar
- Stope Surface Opening

MW55 MW52 MW47 MW51 MW46 MW54 MW50 MW58 MW53 MW45 MW59 MW39 MW57 MW56 MW44 MW31 MW48 MW40 MW49 MW42 MW29 MW43 MW30 MW33 RD08SW MW26 MW25 MW23 MW06 MW24 MW32 MW28 MW27 RD06SW RD16SW MW04 RD05SW MW20 MW22 RD15SW RD14SW MW03 MW21 MW17 MW16 RD10SW MW01 MW14 MW15 MW19 MW12 MW18 MW10 MW09 MW11 MW13 MW07 MW08

Kuskokwim River

2019 Baseline Wells to be Sampled
2017 Monitoring Well
2015 Monitoring Well
RI Monitoring Well
Abandoned RI Monitoring Well
2015 2-foot Contour
2015 10-foot Contour
Post-NTCRA Stream Alignment

Red Devil Creek
Settling Pond
Monofill
Historical Structure
Approximate Location of Proposed Repository Footprint
Area of 2014 NTCRA Re-grading
Seep Location
2019 Surface Water Sample Locations

Monitoring Well inside Approximate Location of Preliminary Refined Repository Footprint
Monitoring Well outside Approximate Location of Preliminary Refined Repository Footprint

*Digital 2015 topographic contours based on October 10, 2015 LiDAR Survey (Quantum Spatial 2015).*

*Aerial photograph taken on 9/21/2010 (AeroMetric 2012)*

**RED DEVIL MINE**

**Red Devil, Alaska**

## Figure 2-1

## 2019 Baseline Monitoring Surface water and Monitoring Well Locations

0 50 100 200 300 400
Feet
0 10 20 40 60 80 100
Meters
Scale 1:3,000

# 3 Baseline Monitoring Results

This section presents results of the 2019 baseline groundwater and surface water monitoring events.

## 3.1 Groundwater Elevation and Surface Water Discharge Monitoring

### 3.1.1 Spring 2019

Depth to groundwater measurements and calculated groundwater elevations for wells monitored during the spring 2019 baseline monitoring event are presented in Table 3-1. Estimated surface water discharge calculations for Red Devil Creek surface water stations monitored during the spring 2019 baseline monitoring event are presented in Table 3-2. Based on static water elevations, stream elevations, and discharge measurements along Red Devil Creek, a groundwater potentiometric surface and surface water discharge map for the spring 2019 baseline monitoring was generated and is presented as Figure 3-1. Pressure transducer data-logger files containing depth of submersion time series data were corrected for barometric pressure and converted to groundwater elevations. The resulting groundwater elevation time series plots are presented as Fig 3-3.

### 3.1.2 Fall 2019

Rainfall during summer 2019 was exceptionally low compared to previous field seasons at the RDM, and as a consequence, measured static water levels in fall 2019 were among the lowest recorded on site to date. Depth to groundwater measurements and calculated groundwater elevations for wells monitored during the fall 2019 baseline monitoring event are presented in Table 3-1. Estimated surface water discharge calculations for Red Devil Creek surface water stations monitored during the fall 2019 baseline monitoring event are presented in Table 3-2. Based on static water elevations, stream elevations, and discharge measurements along Red Devil Creek, a groundwater potentiometric surface and surface water discharge map for the fall 2019 baseline monitoring was generated and is presented as Figure 3-2. Pressure transducer data-logger files containing depth of submersion time series data were corrected for barometric pressure and converted to groundwater elevations. The resulting groundwater elevation time series plots are presented as Fig 3-3.

## 3.2 Spring 2019 Groundwater and Surface Water Sampling

### 3.2.1 Groundwater

Analytical results of groundwater sampling conducted during the spring 2019 baseline monitoring event are presented in Table 3-3. Data quality assurance review memoranda are provided in Appendix D. Maps of all sampling locations with corresponding analytical results for total and dissolved antimony, arsenic, and mercury are presented as Figures 3-4 through 3-6.

### 3.2.2 Surface Water

Analytical results of surface water sampling conducted during the spring 2019 baseline monitoring event are presented in Table 3-4. Data quality assurance review memoranda are provided in Appendix D. Maps of all sampling locations with corresponding analytical results for total and dissolved antimony, arsenic, and mercury are presented as Figures 3-4 through 3-6.

## 3.3 Fall 2019 Groundwater and Surface Water Sampling

### 3.3.1 Groundwater

Analytical results of groundwater sampling conducted during the fall 2019 baseline monitoring event are presented in Table 3-5. Data quality assurance review memoranda are provided in Appendix D. The following issues with data usability were noted:

- **Semi-volatile Organic Compounds by Method 8270D –** Two SVOC analytes, Butyl benzyl phthalate and Di-n-butyl phthalate, were not detected in sample 201909MW19GW. However, due to an error in the corresponding laboratory QC sample, it cannot be determined whether the non-detect is a result of 1) actual concentrations in the sample below the detection limit or 2) an error in measurement by the laboratory. Refer to the data quality assurance memo (see Appendix D) for more details. Previous years of baseline monitoring data at MW19 show non-detects for these two analytes.

Maps of all sampling locations with corresponding analytical results for total and dissolved antimony, arsenic, and mercury are presented as Figures 3-7 through 3-9.

### 3.3.2 Surface Water

Analytical results of surface water sampling conducted during the fall 2019 baseline monitoring event are presented in Table 3-6. Data quality assurance review memoranda are provided in Appendix D. Maps of all sampling locations with corresponding analytical results for total and dissolved antimony, arsenic, and mercury are presented as Figures 3-7 through 3-9.

**Table 3-1 Well Construction and Groundwater Depth Information**

| Monitoring Well ID | Soil Boring ID | Reported Well Total Depth As Constructed (feet bgs) | Reported Screened Interval (feet bgs) | Surveyed Ground Elevation (feet NAVD88) | Surveyed Top of Casing Elevation (feet NAVD88) | GW Observed During Drilling (feet bgs) | Measured Well Total Depth (feet below TOC) | Static Water Level | | | Ground Water Elevation (feet NAVD88) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Depth (feet below TOC) | Date | Time | |
| MW01 | B01 | 29.5 | 19.0 - 29.0 | 254.51 | 257.51 | 17.8 - TD | | 21.72 | 8/14/2000 | NR | 235.79 |
| MW01 | B01 | 29.5 | 19.0 - 29.0 | 254.51 | 257.51 | 17.8 - TD | | 19.87 | 9/5/2007 | 13:15 | 237.64 |
| MW01 | B01 | 29.5 | 19.0 - 29.0 | 254.51 | 257.51 | 17.8 - TD | | 22.16 | 9/18/2008 | 13:28 | 235.35 |
| MW01 | B01 | 29.5 | 19.0 - 29.0 | 254.51 | 257.51 | 17.8 - TD | | 19.62 | 6/19/2009 | NR | 237.89 |
| MW01 | B01 | 29.5 | 19.0 - 29.0 | 254.51 | 257.51 | 17.8 - TD | | 22.27 | 10/6/2009 | 17:30 | 235.24 |
| MW01 | B01 | 29.5 | 19.0 - 29.0 | 254.51 | 257.51 | 17.8 - TD | | 20.04 | 9/20/2010 | 18:18 | 237.47 |
| MW01 | B01 | 29.5 | 19.0 - 29.0 | 254.51 | 257.51 | 17.8 - TD | | 19.46 | 8/24/2011 | 16:38 | 238.05 |
| MW01 | B01 | 29.5 | 19.0 - 29.0 | 254.51 | 257.51 | 17.8 - TD | | 19.55 | 9/1/2011 | 16:03 | 237.96 |
| MW01 | B01 | 29.5 | 19.0 - 29.0 | 254.51 | 257.51 | 17.8 - TD | | 17.56 | 5/26/2012 | 14:32 | 239.95 |
| MW01 | B01 | 29.5 | 19.0 - 29.0 | 254.51 | 257.51 | 17.8 - TD | | 18.62 | 9/9/2012 | 17:05 | 238.89 |
| MW01 | B01 | 29.5 | 19.0 - 29.0 | 254.51 | 257.51 | 17.8 - TD | | 19.43 | 6/17/2015 | 13:03 | 238.08 |
| MW01 | B01 | 29.5 | 19.0 - 29.0 | 254.51 | 257.51 | 17.8 - TD | | 20.80 | 8/12/2015 | 12:15 | 236.71 |
| MW01 | B01 | 29.5 | 19.0 - 29.0 | 254.51 | 257.51 | 17.8 - TD | | 21.03 | 9/2/2015 | 9:50 | 236.48 |
| MW01 | B01 | 29.5 | 19.0 - 29.0 | 254.51 | 257.51 | 17.8 - TD | 29.82 | 20.36 | 9/10/2015 | NR | 237.15 |
| MW01 | B01 | 29.5 | 19.0 - 29.1 | 254.51 | 257.51 | 17.8 - TD | 29.80 | 18.26 | 9/28/2016 | 13:05 | 239.25 |
| MW01 | B01 | 29.5 | 19.0 - 29.1 | 254.51 | 257.51 | 17.8 - TD | 29.76 | 19.46 | 5/26/2017 | 1202 | 238.05 |
| MW01 | B01 | 29.5 | 19.0 - 29.1 | 254.51 | 257.51 | 17.8 - TD | 29.76 | 18.56 | 9/26/2017 | 1332 | 238.95 |
| MW01 | B01 | 29.5 | 19.0 - 29.1 | 254.51 | 257.51 | 17.8 - TD | NR | 17.65 | 5/18/2018 | 13:36 | 239.86 |
| MW01 | B01 | 29.5 | 19.0 - 29.1 | 254.51 | 257.51 | 17.8 - TD | NR | 17.43 | 5/18/2019 | 13:44 | 240.08 |
| MW01 | B01 | 29.5 | 19.0 - 29.1 | 254.51 | 257.51 | 17.8 - TD | NR | 21.83 | 9/10/2019 | 1242 | 235.68 |
| MW03 | B03 | 25.5 | 15.0 - 25.0 | 228.37 | 230.77 | 19.0 - TD | | 22.28 | 8/14/2000 | NR | 208.49 |
| MW03 | B03 | 25.5 | 15.0 - 25.0 | 228.37 | 230.77 | 19.0 - TD | | 20.68 | 9/5/2007 | 14:40 | 210.09 |
| MW03 | B03 | 25.5 | 15.0 - 25.0 | 228.37 | 230.77 | 19.0 - TD | | 22.57 | 9/18/2008 | 14:11 | 208.20 |
| MW03 | B03 | 25.5 | 15.0 - 25.0 | 228.37 | 230.77 | 19.0 - TD | | 19.51 | 6/19/2009 | NR | 211.26 |
| MW03 | B03 | 25.5 | 15.0 - 25.0 | 228.37 | 230.77 | 19.0 - TD | | 23.01 | 10/7/2009 | 13:20 | 207.76 |
| MW03 | B03 | 25.5 | 15.0 - 25.0 | 228.37 | 230.77 | 19.0 - TD | | 20.95 | 9/20/2010 | 19:50 | 209.82 |
| MW03 | B03 | 25.5 | 15.0 - 25.0 | 228.37 | 230.77 | 19.0 - TD | | 19.44 | 8/26/2011 | 10:18 | 211.33 |
| MW03 | B03 | 25.5 | 15.0 - 25.0 | 228.37 | 230.77 | 19.0 - TD | | 19.96 | 9/1/2011 | 15:41 | 210.81 |
| MW03 | B03 | 25.5 | 15.0 - 25.0 | 228.37 | 230.77 | 19.0 - TD | | 15.47 | 5/26/2012 | 15:17 | 215.30 |
| MW03 | B03 | 25.5 | 15.0 - 25.0 | 228.37 | 230.77 | 19.0 - TD | | 17.24 | 9/9/2012 | 17:10 | 213.53 |
| MW03 | B03 | 25.5 | 15.0 - 25.0 | 228.37 | 230.77 | 19.0 - TD | | 19.74 | 6/17/2015 | 10:54 | 211.03 |
| MW03 | B03 | 25.5 | 15.0 - 25.0 | 228.37 | 230.77 | 19.0 - TD | | 21.83 | 8/12/2015 | 12:33 | 208.94 |
| MW03 | B03 | 25.5 | 15.0 - 25.0 | 228.37 | 230.77 | 19.0 - TD | | 22.20 | 9/2/2015 | 9:45 | 208.57 |
| MW03 | B03 | 25.5 | 15.0 - 25.0 | 228.37 | 230.77 | 19.0 - TD | 27.98 | 21.92 | 9/10/2015 | NR | 208.85 |
| MW03 | B03 | 25.5 | 15.0 - 25.0 | 228.37 | 230.77 | 19.0 - TD | 27.85 | 16.77 | 9/28/2016 | 13:10 | 214.00 |
| MW03 | B03 | 25.5 | 15.0 - 25.0 | 228.37 | 230.77 | 19.0 - TD | NR | 22.60 | 5/26/2017 | 11:21 | 208.17 |
| MW03 | B03 | 25.5 | 15.0 - 25.0 | 228.37 | 230.77 | 19.0 - TD | 27.75 | 18.96 | 9/26/2017 | 1255 | 211.81 |
| MW03 | B03 | 25.5 | 15.0 - 25.0 | 228.37 | 230.77 | 19.0 - TD | NR | 15.64 | 5/18/2018 | 13:51 | 215.13 |
| MW03 | B03 | 25.5 | 15.0 - 25.0 | 228.37 | 230.77 | 19.0 - TD | NR | 14.78 | 5/18/2019 | 14:09 | 215.99 |
| MW03 | B03 | 25.5 | 15.0 - 25.0 | 228.37 | 230.77 | 19.0 - TD | NR | 22.79 | 9/10/2019 | 1340 | 207.98 |
| MW04 | B04 | 30.5 | 20.0 - 30.0 | 239.92 | 242.12 | 25.3 - TD | | 27.77 | 8/14/2000 | NR | 214.35 |
| MW04 | B04 | 30.5 | 20.0 - 30.0 | 239.92 | 242.12 | 25.3 - TD | | 26.78 | 9/5/2007 | 12:25 | 215.34 |
| MW04 | B04 | 30.5 | 20.0 - 30.0 | 239.92 | 242.12 | 25.3 - TD | | 26.82 | 9/18/2008 | 12:32 | 215.30 |
| MW04 | B04 | 30.5 | 20.0 - 30.0 | 239.92 | 242.12 | 25.3 - TD | | 25.43 | 6/19/2009 | NR | 216.69 |
| MW04 | B04 | 30.5 | 20.0 - 30.0 | 239.92 | 242.12 | 25.3 - TD | | 27.77 | 10/6/2009 | 18:55 | 214.35 |
| MW04 | B04 | 30.5 | 20.0 - 30.0 | 239.92 | 242.12 | 25.3 - TD | | 26.79 | 9/20/2010 | 16:09 | 215.33 |
| MW04 | B04 | 30.5 | 20.0 - 30.0 | 239.92 | 242.12 | 25.3 - TD | | 25.24 | 8/22/2011 | 16:02 | 216.88 |
| MW04 | B04 | 30.5 | 20.0 - 30.0 | 239.92 | 242.12 | 25.3 - TD | | 25.99 | 9/1/2011 | 15:00 | 216.13 |
| MW04 | B04 | 30.5 | 20.0 - 30.0 | 239.92 | 242.12 | 25.3 - TD | | 21.72 | 5/26/2012 | 16:47 | 220.40 |
| MW04 | B04 | 30.5 | 20.0 - 30.0 | 239.92 | 242.12 | 25.3 - TD | | 23.72 | 9/10/2012 | 14:15 | 218.40 |
| MW04 | B04 | 30.5 | 20.0 - 30.0 | 239.92 | 242.12 | 25.3 - TD | | 26.95 | 6/17/2015 | 15:13 | 215.17 |
| MW04 | B04 | 30.5 | 20.0 - 30.0 | 239.92 | 242.12 | 25.3 - TD | | NR | 8/12/2015 | NR | -- |
| MW04 | B04 | 30.5 | 20.0 - 30.0 | 239.92 | 242.12 | 25.3 - TD | | 28.61 | 9/2/2015 | 11:40 | 213.51 |
| MW04 | B04 | 30.5 | 20.0 - 30.0 | 239.92 | 242.12 | 25.3 - TD | 33.11 | 28.32 | 9/10/2015 | NR | 213.80 |
| MW04 | B04 | 30.5 | 20.0 - 30.0 | 239.92 | 242.12 | 25.3 - TD | 33.02 | 23.81 | 9/28/2016 | 12:42 | 218.31 |
| MW04 | B04 | 30.5 | 20.0 - 30.0 | 239.92 | 242.12 | 25.3 - TD | NR | 28.26 | 5/26/2017 | 12:11 | 213.86 |
| MW04 | B04 | 30.5 | 20.0 - 30.0 | 239.92 | 242.12 | 25.3 - TD | 32.83 | 24.86 | 9/26/2017 | 1729 | 217.26 |
| MW04 | B04 | 30.5 | 20.0 - 30.0 | 239.92 | 242.12 | 25.3 - TD | NR | 22.22 | 5/18/2018 | 12:59 | 219.90 |
| MW04 | B04 | 30.5 | 20.0 - 30.0 | 239.92 | 242.12 | 25.3 - TD | NR | 20.76 | 5/18/2019 | 16:12 | 221.36 |
| MW04 | B04 | 30.5 | 20.0 - 30.0 | 239.92 | 242.12 | 25.3 - TD | NR | 28.64 | 9/10/2019 | 1140 | 213.48 |
| MW06 | B06 | 23.5 | 13.0 - 23.0 | 214.99 | 217.49 | 20.0 - TD | | 19.29 | 8/14/2000 | NR | 198.20 |
| MW06 | B06 | 23.5 | 13.0 - 23.0 | 214.99 | 217.49 | 20.0 - TD | | 18.63 | 9/5/2007 | 15:30 | 198.86 |
| MW06 | B06 | 23.5 | 13.0 - 23.0 | 214.99 | 217.49 | 20.0 - TD | | 19.08 | 9/18/2008 | 11:35 | 198.41 |
| MW06 | B06 | 23.5 | 13.0 - 23.0 | 214.99 | 217.49 | 20.0 - TD | | 17.90 | 6/19/2009 | NR | 199.59 |
| MW06 | B06 | 23.5 | 13.0 - 23.0 | 214.99 | 217.49 | 20.0 - TD | | 19.29 | 10/7/2009 | 17:25 | 198.20 |
| MW06 | B06 | 23.5 | 13.0 - 23.0 | 214.99 | 217.49 | 20.0 - TD | | 19.03 | 9/20/2010 | 13:22 | 198.46 |
| MW06 | B06 | 23.5 | 13.0 - 23.0 | 214.99 | 217.49 | 20.0 - TD | | 18.78 | 8/24/2011 | 14:56 | 198.71 |
| MW06 | B06 | 23.5 | 13.0 - 23.0 | 214.99 | 217.49 | 20.0 - TD | | 18.70 | 9/1/2011 | 15:09 | 198.79 |
| MW06 | B06 | 23.5 | 13.0 - 23.0 | 214.99 | 217.49 | 20.0 - TD | | 16.25 | 5/26/2012 | 16:02 | 201.24 |
| MW06 | B06 | 23.5 | 13.0 - 23.0 | 214.99 | 217.49 | 20.0 - TD | | 18.29 | 9/9/2012 | 11:45 | 199.20 |
| MW06 | B06 | 23.5 | 13.0 - 23.0 | 214.99 | 217.49 | 20.0 - TD | | 18.24 | 6/17/2015 | 14:25 | 199.25 |
| MW06 | B06 | 23.5 | 13.0 - 23.0 | 214.99 | 217.49 | 20.0 - TD | | 19.17 | 8/12/2015 | 11:03 | 198.32 |
| MW06 | B06 | 23.5 | 13.0 - 23.0 | 214.99 | 217.49 | 20.0 - TD | | 19.20 | 9/2/2015 | 11:15 | 198.29 |
| MW06 | B06 | 23.5 | 13.0 - 23.0 | 214.99 | 217.49 | 20.0 - TD | 26.19 | 19.18 | 9/10/2015 | NR | 198.31 |
| MW06 | B06 | 23.5 | 13.0 - 23.0 | 214.99 | 217.49 | 20.0 - TD | 26.19 | 17.64 | 9/28/2016 | 13:38 | 199.85 |
| MW06 | B06 | 23.5 | 13.0 - 23.0 | 214.99 | 217.49 | 20.0 - TD | 26.12 | 19.05 | 5/26/2017 | 12:52 | 198.44 |
| MW06 | B06 | 23.5 | 13.0 - 23.0 | 214.99 | 217.49 | 20.0 - TD | 26.12 | 18.16 | 9/26/2017 | 1644 | 199.33 |
| MW06 | B06 | 23.5 | 13.0 - 23.0 | 214.99 | 217.49 | 20.0 - TD | NR | 16.07 | 5/18/2018 | 13:21 | 201.42 |
| MW06 | B06 | 23.5 | 13.0 - 23.0 | 214.99 | 217.49 | 20.0 - TD | NR | 15.75 | 5/18/2019 | 13:47 | 201.74 |
| MW06 | B06 | 23.5 | 13.0 - 23.0 | 214.99 | 217.49 | 20.0 - TD | NR | 19.62 | 9/10/2019 | 1218 | 197.87 |
| MW07 | B07 | 21.5 | 11.0 - 21.0 | 278.39 | 280.89 | 14.8 - TD | | Dry | 8/14/2000 | NR | Dry (Water Elevation <257.4 feet bgs) |
| MW07 | B07 | 21.5 | 11.0 - 21.0 | 278.39 | 280.89 | 14.8 - TD | | 20.42 | 9/5/2007 | 14:00 | 260.47 |
| MW07 | B07 | 21.5 | 11.0 - 21.0 | 278.39 | 280.89 | 14.8 - TD | | Dry | 9/18/2008 | NR | Dry (Water Elevation <257.4 feet bgs) |
| MW07 | B07 | 21.5 | 11.0 - 21.0 | 278.39 | 280.89 | 14.8 - TD | | 20.10 | 6/19/2009 | NR | 260.79 |
| MW07 | B07 | 21.5 | 11.0 - 21.0 | 278.39 | 280.89 | 14.8 - TD | | Dry | 10/7/2009 | NR | Dry (Water Elevation <257.4 feet bgs) |
| MW07 | B07 | 21.5 | 11.0 - 21.0 | 278.39 | 280.89 | 14.8 - TD | | 20.40 | 9/21/2010 | 10:20 | 260.49 |
| MW07 | B07 | 21.5 | 11.0 - 21.0 | 278.39 | 280.89 | 14.8 - TD | | 19.51 | 8/26/2011 | 9:12 | 261.38 |
| MW07 | B07 | 21.5 | 11.0 - 21.0 | 278.39 | 280.89 | 14.8 - TD | | 19.97 | 9/1/2011 | 16:14 | 260.92 |
| MW07 | B07 | 21.5 | 11.0 - 21.0 | 278.39 | 280.89 | 14.8 - TD | | 19.68 | 5/26/2012 | 13:36 | 261.21 |
| MW07 | B07 | 21.5 | 11.0 - 21.0 | 278.39 | 280.89 | 14.8 - TD | | 20.57 | 9/9/2012 | 16:45 | 260.32 |
| MW07 | B07 | 21.5 | 11.0 - 21.0 | 278.39 | 280.89 | 14.8 - TD | | 21.10 | 6/17/2015 | 12:25 | 259.79 |
| MW07 | B07 | 21.5 | 11.0 - 21.0 | 278.39 | 280.89 | 14.8 - TD | | 21.97 | 8/12/2015 | 11:54 | 258.92 |
| MW07 | B07 | 21.5 | 11.0 - 21.0 | 278.39 | 280.89 | 14.8 - TD | | 22.36 | 9/2/2015 | 10:50 | 258.53 |
| MW07 | B07 | 21.5 | 11.0 - 21.0 | 278.39 | 280.89 | 14.8 - TD | 23.67 | 22.41 | 9/10/2015 | NR | 258.48 |
| MW07 | B07 | 21.5 | 11.0 - 21.0 | 278.39 | 280.89 | 14.8 - TD | 23.70 | 20.40 | 9/28/2016 | 12:40 | 260.49 |
| MW07 | B07 | 21.5 | 11.0 - 21.0 | 278.39 | 280.89 | 14.8 - TD | NR | 23.17 | 5/26/2017 | 13:23 | 257.72 |
| MW07 | B07 | 21.5 | 11.0 - 21.0 | 278.39 | 280.89 | 14.8 - TD | 23.47 | 20.13 | 9/26/2017 | 1444 | 260.76 |

**Table 3-1 Well Construction and Groundwater Depth Information**

| Monitoring Well ID | Soil Boring ID | Reported Well Total Depth As Constructed (feet bgs) | Reported Screened Interval (feet bgs) | Surveyed Ground Elevation (feet NAVD88) | Surveyed Top of Casing Elevation (feet NAVD88) | GW Observed During Drilling (feet bgs) | Measured Well Total Depth (feet below TOC) | Static Water Level | | | Ground Water Elevation (feet NAVD88) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Depth (feet below TOC) | Date | Time | |
| MW07 | B07 | 21.5 | 11.0 - 21.0 | 278.39 | 280.89 | 14.8 - TD | NR | 20.02 | 5/18/2018 | 13:51 | 260.87 |
| MW07 | B07 | 21.5 | 11.0 - 21.0 | 278.39 | 280.89 | 14.8 - TD | NR | 16.82 | 5/18/2019 | 12:55 | 264.07 |
| MW07 | B07 | 21.5 | 11.0 - 21.0 | 278.39 | 280.89 | 14.8 - TD | NR | 23.14 | 9/10/2019 | 1414 | 257.75 |
| MW08 | 11MP01SB | 16.0 | 5.0 - 15.0 | 328.92 | 331.32 | 2.5 - 4.0, 10.5 - TD | | 13.70 | 8/30/2011 | 9:21 | 317.62 |
| MW08 | 11MP01SB | 16.0 | 5.0 - 15.0 | 328.92 | 331.32 | 2.5 - 4.0, 10.5 - TD | | 13.65 | 9/1/2011 | 16:28 | 317.67 |
| MW08 | 11MP01SB | 16.0 | 5.0 - 15.0 | 328.92 | 331.32 | 2.5 - 4.0, 10.5 - TD | | 11.64 | 5/26/2012 | 13:23 | 319.68 |
| MW08 | 11MP01SB | 16.0 | 5.0 - 15.0 | 328.92 | 331.32 | 2.5 - 4.0, 10.5 - TD | | 12.74 | 9/9/2012 | 16:10 | 318.58 |
| MW08 | 11MP01SB | 16.0 | 5.0 - 15.0 | 328.92 | 331.32 | 2.5 - 4.0, 10.5 - TD | | 13.54 | 6/17/2015 | 12:41 | 317.78 |
| MW08 | 11MP01SB | 16.0 | 5.0 - 15.0 | 328.92 | 331.32 | 2.5 - 4.0, 10.5 - TD | | 14.87 | 8/12/2015 | 11:58 | 316.45 |
| MW08 | 11MP01SB | 16.0 | 5.0 - 15.0 | 328.92 | 331.32 | 2.5 - 4.0, 10.5 - TD | | 15.04 | 9/2/2015 | 10:35 | 316.28 |
| MW08 | 11MP01SB | 16.0 | 5.0 - 15.0 | 328.92 | 331.32 | 2.5 - 4.0, 10.5 - TD | 17.61 | 14.89 | 9/10/2015 | NR | 316.43 |
| MW08 | 11MP01SB | 16.0 | 5.0 - 15.0 | 328.92 | 331.32 | 2.5 - 4.0, 10.5 - TD | 17.68 | 12.99 | 9/28/2016 | 14:32 | 318.33 |
| MW08 | 11MP01SB | 16.0 | 5.0 - 15.0 | 328.92 | 331.32 | 2.5 - 4.0, 10.5 - TD | 17.63 | 13.89 | 5/26/2017 | 13:07 | 317.43 |
| MW08 | 11MP01SB | 16.0 | 5.0 - 15.0 | 328.92 | 331.32 | 2.5 - 4.0, 10.5 - TD | 17.63 | 12.95 | 9/26/2017 | 1534 | 318.37 |
| MW08 | 11MP01SB | 16.0 | 5.0 - 15.0 | 328.92 | 331.32 | 2.5 - 4.0, 10.5 - TD | NR | 11.60 | 5/18/2018 | 12:56 | 319.72 |
| MW08 | 11MP01SB | 16.0 | 5.0 - 15.0 | 328.92 | 331.32 | 2.5 - 4.0, 10.5 - TD | NR | 11.02 | 5/18/2019 | 13:03 | 320.30 |
| MW08 | 11MP01SB | 16.0 | 5.0 - 15.0 | 328.92 | 331.32 | 2.5 - 4.0, 10.5 - TD | NR | 15.4 | 9/10/2019 | 1406 | 315.92 |
| MW09 | 11MP17SB | 31.0 | 20.0 - 30.0 | 274.88 | 277.28 | 14.0 - 16.0, 31.0 - TD | | >31.56 | 8/29/2011 | 18:21 | -- |
| MW09 | 11MP17SB | 31.0 | 20.0 - 30.0 | 274.88 | 277.28 | 14.0 - 16.0, 31.0 - TD | | 28.11 | 9/1/2011 | 16:43 | 249.17 |
| MW09 | 11MP17SB | 31.0 | 20.0 - 30.0 | 274.88 | 277.28 | 14.0 - 16.0, 31.0 - TD | | 26.67 | 5/26/2012 | 14:04 | 250.61 |
| MW09 | 11MP17SB | 31.0 | 20.0 - 30.0 | 274.88 | 277.28 | 14.0 - 16.0, 31.0 - TD | | 27.88 | 9/9/2012 | 15:30 | 249.40 |
| MW09 | 11MP17SB | 31.0 | 20.0 - 30.0 | 274.88 | 277.28 | 14.0 - 16.0, 31.0 - TD | | 27.81 | 9/11/2012 | 11:20 | 249.47 |
| MW09 | 11MP17SB | 31.0 | 20.0 - 30.0 | 274.88 | 277.28 | 14.0 - 16.0, 31.0 - TD | | 27.60 | 6/17/2015 | 11:31 | 249.68 |
| MW09 | 11MP17SB | 31.0 | 20.0 - 30.0 | 274.88 | 277.28 | 14.0 - 16.0, 31.0 - TD | | 27.93 | 8/12/2015 | 12:04 | 249.35 |
| MW09 | 11MP17SB | 31.0 | 20.0 - 30.0 | 274.88 | 277.28 | 14.0 - 16.0, 31.0 - TD | | 28.30 | 9/2/2015 | 10:00 | 248.98 |
| MW09 | 11MP17SB | 31.0 | 20.0 - 30.0 | 274.88 | 277.28 | 14.0 - 16.0, 31.0 - TD | 34.72 | 29.38 | 9/10/2015 | NR | 247.90 |
| MW09 | 11MP17SB | 31.0 | 20.0 - 30.0 | 274.88 | 277.28 | 14.0 - 16.0, 31.0 - TD | 34.63 | 26.05 | 9/28/2016 | NR | 251.23 |
| MW09 | 11MP17SB | 31.0 | 20.0 - 30.0 | 274.88 | 277.28 | 14.0 - 16.0, 31.0 - TD | 34.62 | 30.22 | 5/26/2017 | 12:40 | 247.06 |
| MW09 | 11MP17SB | 31.0 | 20.0 - 30.0 | 274.88 | 277.28 | 14.0 - 16.0, 31.0 - TD | 34.62 | 26.90 | 9/26/2017 | 1356 | 250.38 |
| MW09 | 11MP17SB | 31.0 | 20.0 - 30.0 | 274.88 | 277.28 | 14.0 - 16.0, 31.0 - TD | NR | 22.20 | 5/18/2018 | 13:21 | 255.08 |
| MW09 | 11MP17SB | 31.0 | 20.0 - 30.0 | 274.88 | 277.28 | 14.0 - 16.0, 31.0 - TD | NR | 24.00 | 5/18/2019 | 13:34 | 253.28 |
| MW09 | 11MP17SB | 31.0 | 20.0 - 30.0 | 274.88 | 277.28 | 14.0 - 16.0, 31.0 - TD | NR | 31.95 | 9/10/2019 | 1300 | 245.33 |
| MW10 | 11MP14SB | 61.0 | 50.0 - 60.0 | 274.31 | 276.21 | 48.0 - TD | | 30.60 | 8/29/2011 | 16:15 | 245.61 |
| MW10 | 11MP14SB | 61.0 | 50.0 - 60.0 | 274.31 | 276.21 | 48.0 - TD | | 29.17 | 9/1/2011 | 16:38 | 247.04 |
| MW10 | 11MP14SB | 61.0 | 50.0 - 60.0 | 274.31 | 276.21 | 48.0 - TD | | 25.62 | 5/26/2012 | 14:14 | 250.59 |
| MW10 | 11MP14SB | 61.0 | 50.0 - 60.0 | 274.31 | 276.21 | 48.0 - TD | | 26.39 | 9/9/2012 | 15:45 | 249.82 |
| MW10 | 11MP14SB | 61.0 | 50.0 - 60.0 | 274.31 | 276.21 | 48.0 - TD | | 26.88 | 9/10/2012 | 11:35 | 249.33 |
| MW10 | 11MP14SB | 61.0 | 50.0 - 60.0 | 274.31 | 276.21 | 48.0 - TD | | 28.98 | 6/17/2015 | 11:37 | 247.23 |
| MW10 | 11MP14SB | 61.0 | 50.0 - 60.0 | 274.31 | 276.21 | 48.0 - TD | | 32.90 | 8/12/2015 | 12:09 | 243.31 |
| MW10 | 11MP14SB | 61.0 | 50.0 - 60.0 | 274.31 | 276.21 | 48.0 - TD | | 33.52 | 9/2/2015 | 10:25 | 242.69 |
| MW10 | 11MP14SB | 61.0 | 50.0 - 60.0 | 274.31 | 276.21 | 48.0 - TD | 63.54 | 31.02 | 9/10/2015 | NR | 245.19 |
| MW10 | 11MP14SB | 61.0 | 50.0 - 60.0 | 274.31 | 276.21 | 48.0 - TD | 63.97 | 25.92 | 9/28/2016 | NR | 250.29 |
| MW10 | 11MP14SB | 61.0 | 50.0 - 60.0 | 274.31 | 276.21 | 48.0 - TD | 63.53 | 30.19 | 5/26/2017 | 12:46 | 246.02 |
| MW10 | 11MP14SB | 61.0 | 50.0 - 60.0 | 274.31 | 276.21 | 48.0 - TD | 63.53 | 26.03 | 9/26/2017 | 1347 | 250.18 |
| MW10 | 11MP14SB | 61.0 | 50.0 - 60.0 | 274.31 | 276.21 | 48.0 - TD | NR | 24.46 | 5/18/2018 | 13:28 | 251.75 |
| MW10 | 11MP14SB | 61.0 | 50.0 - 60.0 | 274.31 | 276.21 | 48.0 - TD | NR | 23.30 | 5/18/2019 | 13:43 | 252.91 |
| MW10 | 11MP14SB | 61.0 | 50.0 - 60.0 | 274.31 | 276.21 | 48.0 - TD | NR | 31.46 | 9/10/2019 | 1253 | 244.75 |
| MW11 | 11MP12SB | 23.0 | 12.0 - 22.0 | 268.70 | 271.30 | dry | | Dry | 8/29/2011 | 12:00 | Dry (Water Elevation <246.7 feet bgs) |
| MW11 | 11MP12SB | 23.0 | 12.0 - 22.0 | 268.70 | 271.30 | dry | | Dry | 9/1/2011 | 16:34 | Dry (Water Elevation <246.7 feet bgs) |
| MW11 | 11MP12SB | 23.0 | 12.0 - 22.0 | 268.70 | 271.30 | dry | | 22.60 | 5/26/2012 | 14:24 | 248.70 |
| MW11 | 11MP12SB | 23.0 | 12.0 - 22.0 | 268.70 | 271.30 | dry | | 24.24 | 9/9/2012 | 16:00 | Suspected Dry (Water Elevation <246.7 feet bgs) |
| MW11 | 11MP12SB | 23.0 | 12.0 - 22.0 | 268.70 | 271.30 | dry | | 23.69 | 6/17/2015 | 15:52 | Suspected Dry (Water Elevation <246.7 feet bgs) |
| MW11 | 11MP12SB | 23.0 | 12.0 - 22.0 | 268.70 | 271.30 | dry | | 24.08 | 8/12/2015 | 12:11 | Suspected Dry (Water Elevation <246.7 feet bgs) |
| MW11 | 11MP12SB | 23.0 | 12.0 - 22.0 | 268.70 | 271.30 | dry | | 24.36 | 9/2/2015 | 10:30 | Suspected Dry (Water Elevation <246.7 feet bgs) |
| MW11 | 11MP12SB | 23.0 | 12.0 - 22.0 | 268.70 | 271.30 | dry | 25.70 | 24.16 | 9/10/2015 | NR | Suspected Dry (Water Elevation <246.7 feet bgs) |
| MW11 | 11MP12SB | 23.0 | 12.0 - 22.0 | 268.70 | 271.30 | dry | 25.63 | 21.60 | 9/28/2016 | NR | 249.70 |
| MW11 | 11MP12SB | 23.0 | 12.0 - 22.0 | 268.70 | 271.30 | dry | NR | 25.20 | 5/26/2017 | 12:56 | 246.10 |
| MW11 | 11MP12SB | 23.0 | 12.0 - 22.0 | 268.70 | 271.30 | dry | 25.42 | 21.26 | 9/26/2017 | 13:41 | 250.04 |
| MW11 | 11MP12SB | 23.0 | 12.0 - 22.0 | 268.70 | 271.30 | dry | NR | 19.12 | 5/18/2018 | 13:21 | 252.18 |
| MW11 | 11MP12SB | 23.0 | 12.0 - 22.0 | 268.70 | 271.30 | -- | NR | 18.61 | 5/18/2019 | 13:50 | 252.69 |
| MW11 | 11MP12SB | 23.0 | 12.0 - 22.0 | 268.70 | 271.30 | -- | NR | 25.63 | 9/10/2019 | 1248 | 245.67 |
| MW12 | 11RD13SB | 15.0 | 4.0 - 14.0 | 263.22 | 265.62 | 1.0 - TD | | 3.72 | 8/31/2011 | 13:34 | 261.90 |
| MW12 | 11RD13SB | 15.0 | 4.0 - 14.0 | 263.22 | 265.62 | 1.0 - TD | | 3.70 | 9/1/2011 | 16:20 | 261.92 |
| MW12 | 11RD13SB | 15.0 | 4.0 - 14.0 | 263.22 | 265.62 | 1.0 - TD | | 2.46 | 5/26/2012 | 11:04 | 263.16 |
| MW12 | 11RD13SB | 15.0 | 4.0 - 14.0 | 263.22 | 265.62 | 1.0 - TD | | 3.30 | 9/9/2012 | 16:39 | 262.32 |
| MW12 | 11RD13SB | 15.0 | 4.0 - 14.0 | 263.22 | 265.62 | 1.0 - TD | | 5.02 | 6/17/2015 | 13:18 | 260.60 |
| MW12 | 11RD13SB | 15.0 | 4.0 - 14.0 | 263.22 | 265.62 | 1.0 - TD | | 6.80 | 8/12/2015 | 11:46 | 258.82 |
| MW12 | 11RD13SB | 15.0 | 4.0 - 14.0 | 263.22 | 265.62 | 1.0 - TD | | 6.98 | 9/2/2015 | 11:00 | 258.64 |
| MW12 | 11RD13SB | 15.0 | 4.0 - 14.0 | 263.22 | 265.62 | 1.0 - TD | 17.68 | 5.97 | 9/10/2015 | NR | 259.65 |
| MW12 | 11RD13SB | 15.0 | 4.0 - 14.0 | 263.22 | 265.62 | 1.0 - TD | 17.60 | 4.49 | 9/28/2016 | 10:40 | 261.13 |
| MW12 | 11RD13SB | 15.0 | 4.0 - 14.0 | 263.22 | 265.62 | 1.0 - TD | NR | 6.49 | 5/26/2017 | 13:29 | 259.13 |
| MW12 | 11RD13SB | 15.0 | 4.0 - 14.0 | 263.22 | 265.62 | 1.0 - TD | 17.39 | 4.81 | 9/26/2017 | -- | 260.81 |
| MW12 | 11RD13SB | 15.0 | 4.0 - 14.0 | 263.22 | 265.62 | 1.0 - TD | NR | 4.44 | 5/18/2018 | 12:26 | 261.18 |
| MW12 | 11RD13SB | 15.0 | 4.0 - 14.0 | 263.22 | 265.62 | 1.0 - TD | NR | NR | 5/18/2019 | 12:41 | Inner casing damaged from settling of outer casing, preventing access for DTW measurements. |
| MW12 | 11RD13SB | 15.0 | 4.0 - 14.0 | 263.22 | 265.62 | 1.0 - TD | NR | NR | 9/10/2019 | -- | |
| MW13 | 11MP20SB | 32.0 | 21.0 - 31.0 | 274.30 | 276.70 | 27.0 - TD | | 30.05 | 8/30/2011 | 18:04 | 246.65 |
| MW13 | 11MP20SB | 32.0 | 21.0 - 31.0 | 274.30 | 276.70 | 27.0 - TD | | 29.70 | 9/1/2011 | 16:09 | 247.00 |
| MW13 | 11MP20SB | 32.0 | 21.0 - 31.0 | 274.30 | 276.70 | 27.0 - TD | | 18.41 | 5/26/2012 | 13:45 | 258.29 |
| MW13 | 11MP20SB | 32.0 | 21.0 - 31.0 | 274.30 | 276.70 | 27.0 - TD | | 24.06 | 9/9/2012 | 16:50 | 252.64 |
| MW13 | 11MP20SB | 32.0 | 21.0 - 31.0 | 274.30 | 276.70 | 27.0 - TD | | 29.85 | 6/17/2015 | 12:13 | 246.85 |
| MW13 | 11MP20SB | 32.0 | 21.0 - 31.0 | 274.30 | 276.70 | 27.0 - TD | | DRY | 8/12/2015 | 11:51 | Dry (Water Elevation <243.3 feet bgs) |
| MW13 | 11MP20SB | 32.0 | 21.0 - 31.0 | 274.30 | 276.70 | 27.0 - TD | | DRY | 9/2/2015 | 10:45 | Dry (Water Elevation <243.3 feet bgs) |
| MW13 | 11MP20SB | 32.0 | 21.0 - 31.0 | 274.30 | 276.70 | 27.0 - TD | 31.70 | DRY | 9/10/2015 | NR | Dry (Water Elevation <243.3 feet bgs) |
| MW13 | 11MP20SB | 32.0 | 21.0 - 31.0 | 274.30 | 276.70 | 27.0 - TD | 31.65 | 24.35 | 9/28/2016 | 12:55 | 252.35 |
| MW13 | 11MP20SB | 32.0 | 21.0 - 31.0 | 274.30 | 276.70 | 27.0 - TD | 31.65 | DRY | 5/26/2017 | NR | Dry (Water Elevation <243.3 feet bgs) |
| MW13 | 11MP20SB | 32.0 | 21.0 - 31.0 | 274.30 | 276.70 | 27.0 - TD | 31.65 | 25.90 | 9/26/2017 | 1454 | 250.80 |
| MW13 | 11MP20SB | 32.0 | 21.0 - 31.0 | 274.30 | 276.70 | 27.0 - TD | NR | 19.14 | 5/18/2018 | 12:42 | 257.56 |
| MW13 | 11MP20SB | 32.0 | 21.0 - 31.0 | 274.30 | 276.70 | 27.0 - TD | NR | 14.88 | 5/18/2019 | 12:50 | 261.82 |
| MW13 | 11MP20SB | 32.0 | 21.0 - 31.0 | 274.30 | 276.70 | 27.0 - TD | 31.65 | DRY | 9/10/2019 | 1420 | Dry (Water Elevation <243.3 feet bgs) |
| MW14 | 11MP25SB | 36.0 | 25.0 - 35.0 | 246.71 | 249.01 | 25.7 - TD | | 30.51 | 8/31/2011 | 10:05 | 218.50 |
| MW14 | 11MP25SB | 36.0 | 25.0 - 35.0 | 246.71 | 249.01 | 25.7 - TD | | 30.01 | 9/1/2011 | 16:00 | 219.00 |
| MW14 | 11MP25SB | 36.0 | 25.0 - 35.0 | 246.71 | 249.01 | 25.7 - TD | | 24.40 | 5/26/2012 | 14:45 | 224.61 |
| MW14 | 11MP25SB | 36.0 | 25.0 - 35.0 | 246.71 | 249.01 | 25.7 - TD | | 27.34 | 9/10/2012 | 17:35 | 221.67 |
| MW14 | 11MP25SB | 36.0 | 25.0 - 35.0 | 246.71 | 249.01 | 25.7 - TD | | -- | -- | -- | Decommissioned in 2014 NTCRA |
| MW15 | 11MP29SB | 26.0 | 15.0 - 25.0 | 242.63 | 244.93 | 16.2 - TD | | 19.64 | 8/30/2011 | 10:35 | 225.29 |
| MW15 | 11MP29SB | 26.0 | 15.0 - 25.0 | 242.63 | 244.93 | 16.2 - TD | | 19.59 | 9/1/2011 | 15:56 | 225.34 |
| MW15 | 11MP29SB | 26.0 | 15.0 - 25.0 | 242.63 | 244.93 | 16.2 - TD | | 18.33 | 5/26/2012 | 14:56 | 226.60 |

**Table 3-1 Well Construction and Groundwater Depth Information**

| Monitoring Well ID | Soil Boring ID | Reported Well Total Depth As Constructed (feet bgs) | Reported Screened Interval (feet bgs) | Surveyed Ground Elevation (feet NAVD88) | Surveyed Top of Casing Elevation (feet NAVD88) | GW Observed During Drilling (feet bgs) | Measured Well Total Depth (feet below TOC) | Static Water Level | | | Ground Water Elevation (feet NAVD88) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Depth (feet below TOC) | Date | Time | |
| MW15 | 11MP29SB | 26.0 | 15.0 - 25.0 | 242.63 | 244.93 | 16.2 - TD | | 18.30 | 9/8/2012 | 13:00 | 226.63 |
| MW15 | 11MP29SB | 26.0 | 15.0 - 25.0 | 242.63 | 244.93 | 16.2 - TD | | -- | -- | -- | Decommissioned in 2014 NTCRA |
| MW16 | 11MP30SB | 22.0 | 11.0 - 21.0 | 226.09 | 228.09 | 16.0 - TD | | 13.84 | 8/30/2011 | 11:35 | 214.25 |
| MW16 | 11MP30SB | 22.0 | 11.0 - 21.0 | 226.09 | 228.09 | 16.0 - TD | | 14.90 | 9/1/2011 | 15:50 | 213.19 |
| MW16 | 11MP30SB | 22.0 | 11.0 - 21.0 | 226.09 | 228.09 | 16.0 - TD | | 6.17 | 5/26/2012 | 15:08 | 221.92 |
| MW16 | 11MP30SB | 22.0 | 11.0 - 21.0 | 226.09 | 228.09 | 16.0 - TD | | 8.88 | 9/8/2012 | 14:30 | 219.21 |
| MW16 | 11MP30SB | 22.0 | 11.0 - 21.0 | 226.09 | 228.09 | 16.0 - TD | | 13.13 | 6/18/2015 | 19:52 | 214.96 |
| MW16 | 11MP30SB | 22.0 | 11.0 - 21.0 | 226.09 | 228.09 | 16.0 - TD | | 14.80 | 8/12/2015 | 12:19 | 213.29 |
| MW16 | 11MP30SB | 22.0 | 11.0 - 21.0 | 226.09 | 228.09 | 16.0 - TD | | 15.19 | 9/2/2015 | 9:35 | 212.90 |
| MW16 | 11MP30SB | 22.0 | 11.0 - 21.0 | 226.09 | 228.09 | 16.0 - TD | 24.14 | 14.81 | 9/10/2015 | NR | 213.28 |
| MW16 | 11MP30SB | 22.0 | 11.0 - 21.0 | 226.09 | 228.09 | 16.0 - TD | 24.10 | 8.58 | 9/28/2016 | 13:33 | 219.51 |
| MW16 | 11MP30SB | 22.0 | 11.0 - 21.0 | 226.09 | 228.09 | 16.0 - TD | 24.08 | 15.09 | 5/26/2017 | 11:46 | 213.00 |
| MW16 | 11MP30SB | 22.0 | 11.0 - 21.0 | 226.09 | 228.09 | 16.0 - TD | 24.08 | 10.32 | 9/26/2017 | 13:14 | 217.77 |
| MW16 | 11MP30SB | 22.0 | 11.0 - 21.0 | 226.09 | 228.09 | 16.0 - TD | NR | 5.40 | 5/18/2018 | 13.44 | 222.69 |
| MW16 | 11MP30SB | 22.0 | 11.0 - 21.0 | 226.09 | 228.09 | 16.0 - TD | NR | 4.00 | 5/18/2019 | 14:05 | 224.09 |
| MW16 | 11MP30SB | 22.0 | 11.0 - 21.0 | 226.09 | 228.09 | 16.0 - TD | NR | 14.9 | 9/10/2019 | 1345 | 213.19 |
| MW17 | 11MP91SB | 52.5 | 41.5 - 51.5 | 226.36 | 228.66 | 25.0 - 33.0, 33.0 - TD | | 15.00 | 8/30/2011 | 9:20 | 213.66 |
| MW17 | 11MP91SB | 52.5 | 41.5 - 51.5 | 226.36 | 228.66 | 25.0 - 33.0, 33.0 - TD | | 13.78 | 9/1/2011 | 15:52 | 214.88 |
| MW17 | 11MP91SB | 52.5 | 41.5 - 51.5 | 226.36 | 228.66 | 25.0 - 33.0, 33.0 - TD | | 8.20 | 5/26/2012 | 15:03 | 220.46 |
| MW17 | 11MP91SB | 52.5 | 41.5 - 51.5 | 226.36 | 228.66 | 25.0 - 33.0, 33.0 - TD | | 10.79 | 9/8/2012 | 16:20 | 217.87 |
| MW17 | 11MP91SB | 52.5 | 41.5 - 51.5 | 226.36 | 228.66 | 25.0 - 33.0, 33.0 - TD | | 15.03 | 6/18/2015 | 19:40 | 213.63 |
| MW17 | 11MP91SB | 52.5 | 41.5 - 51.5 | 226.36 | 228.66 | 25.0 - 33.0, 33.0 - TD | | 17.01 | 8/12/2015 | 12:18 | 211.65 |
| MW17 | 11MP91SB | 52.5 | 41.5 - 51.5 | 226.36 | 228.66 | 25.0 - 33.0, 33.0 - TD | | 17.28 | 9/2/2015 | 9:36 | 211.38 |
| MW17 | 11MP91SB | 52.5 | 41.5 - 51.5 | 226.36 | 228.66 | 25.0 - 33.0, 33.0 - TD | 55.02 | 19.93 | 9/10/2015 | NR | 208.73 |
| MW17 | 11MP91SB | 52.5 | 41.5 - 51.5 | 226.36 | 228.66 | 25.0 - 33.0, 33.0 - TD | 54.80 | 10.58 | 9/28/2016 | 13:22 | 218.08 |
| MW17 | 11MP91SB | 52.5 | 41.5 - 51.5 | 226.36 | 228.66 | 25.0 - 33.0, 33.0 - TD | 54.77 | 17.19 | 5/26/2017 | 11:35 | 211.47 |
| MW17 | 11MP91SB | 52.5 | 41.5 - 51.5 | 226.36 | 228.66 | 25.0 - 33.0, 33.0 - TD | 54.77 | 12.18 | 9/26/2017 | 1312 | 216.48 |
| MW17 | 11MP91SB | 52.5 | 41.5 - 51.5 | 226.36 | 228.66 | 25.0 - 33.0, 33.0 - TD | NR | 7.50 | 5/18/2018 | 13:41 | 221.16 |
| MW17 | 11MP91SB | 52.5 | 41.5 - 51.5 | 226.36 | 228.66 | 25.0 - 33.0, 33.0 - TD | NR | 6.32 | 5/18/2019 | 14:05 | 222.34 |
| MW17 | 11MP91SB | 52.5 | 41.5 - 51.5 | 226.36 | 228.66 | 25.0 - 33.0, 33.0 - TD | NR | 17.29 | 9/10/2019 | 1350 | 211.37 |
| MW18 | 11MP31SB | 40.0 | 29.0 - 39.0 | 241.33 | 243.83 | 38.0 - TD | | 29.66 | 8/31/2011 | 15:47 | 214.17 |
| MW18 | 11MP31SB | 40.0 | 29.0 - 39.0 | 241.33 | 243.83 | 38.0 - TD | | 29.87 | 9/1/2011 | 15:37 | 213.96 |
| MW18 | 11MP31SB | 40.0 | 29.0 - 39.0 | 241.33 | 243.83 | 38.0 - TD | | 21.82 | 5/26/2012 | 13:10 | 222.01 |
| MW18 | 11MP31SB | 40.0 | 29.0 - 39.0 | 241.33 | 243.83 | 38.0 - TD | | 24.83 | 9/9/2012 | 17:20 | 219.00 |
| MW18 | 11MP31SB | 40.0 | 29.0 - 39.0 | 241.33 | 243.83 | 38.0 - TD | | 29.17 | 6/17/2015 | 10:46 | 214.66 |
| MW18 | 11MP31SB | 40.0 | 29.0 - 39.0 | 241.33 | 243.83 | 38.0 - TD | | 31.43 | 8/12/2015 | 12:31 | 212.40 |
| MW18 | 11MP31SB | 40.0 | 29.0 - 39.0 | 241.33 | 243.83 | 38.0 - TD | | 31.65 | 9/2/2015 | 9:30 | 212.18 |
| MW18 | 11MP31SB | 40.0 | 29.0 - 39.0 | 241.33 | 243.83 | 38.0 - TD | 41.57 | 31.20 | 9/10/2015 | NR | 212.63 |
| MW18 | 11MP31SB | 40.0 | 29.0 - 39.0 | 241.33 | 243.83 | 38.0 - TD | 41.38 | 23.85 | 9/28/2016 | 13:55 | 219.98 |
| MW18 | 11MP31SB | 40.0 | 29.0 - 39.0 | 241.33 | 243.83 | 38.0 - TD | NR | 30.85 | 5/26/2017 | 11:14 | 212.98 |
| MW18 | 11MP31SB | 40.0 | 29.0 - 39.0 | 241.33 | 243.83 | 38.0 - TD | 41.14 | 25.66 | 9/26/2017 | 1246 | 218.17 |
| MW18 | 11MP31SB | 40.0 | 29.0 - 39.0 | 241.33 | 243.83 | 38.0 - TD | NR | 20.64 | 5/18/2018 | 11:51 | 223.19 |
| MW18 | 11MP31SB | 40.0 | 29.0 - 39.0 | 241.33 | 243.83 | 38.0 - TD | NR | 18.59 | 5/18/2019 | 14:22 | 225.24 |
| MW18 | 11MP31SB | 40.0 | 29.0 - 39.0 | 241.33 | 243.83 | 38.0 - TD | NR | 31.73 | 9/10/2019 | 1358 | 212.10 |
| MW19 | 11MP33SB | 43.0 | 32.0 - 42.0 | 237.70 | 240.00 | 39.0 - TD | | 19.47 | 9/1/2011 | 15:32 | 220.53 |
| MW19 | 11MP33SB | 43.0 | 32.0 - 42.0 | 237.70 | 240.00 | 39.0 - TD | | 11.54 | 5/26/2012 | 12:59 | 228.46 |
| MW19 | 11MP33SB | 43.0 | 32.0 - 42.0 | 237.70 | 240.00 | 39.0 - TD | | 16.02 | 9/9/2012 | 17:25 | 223.98 |
| MW19 | 11MP33SB | 43.0 | 32.0 - 42.0 | 237.70 | 240.00 | 39.0 - TD | | 18.48 | 6/17/2015 | 10:31 | 221.52 |
| MW19 | 11MP33SB | 43.0 | 32.0 - 42.0 | 237.70 | 240.00 | 39.0 - TD | | 23.48 | 8/12/2015 | 12:33 | 216.52 |
| MW19 | 11MP33SB | 43.0 | 32.0 - 42.0 | 237.70 | 240.00 | 39.0 - TD | | 24.95 | 9/2/2015 | 9:20 | 215.05 |
| MW19 | 11MP33SB | 43.0 | 32.0 - 42.0 | 237.70 | 240.00 | 39.0 - TD | 45.70 | 23.94 | 9/10/2015 | NR | 216.06 |
| MW19 | 11MP33SB | 43.0 | 32.0 - 42.0 | 237.70 | 240.00 | 39.0 - TD | 45.50 | 14.67 | 9/28/2016 | 14:00 | 225.33 |
| MW19 | 11MP33SB | 43.0 | 32.0 - 42.0 | 237.70 | 240.00 | 39.0 - TD | 45.50 | 27.02 | 5/26/2017 | 11:05 | 212.98 |
| MW19 | 11MP33SB | 43.0 | 32.0 - 42.0 | 237.70 | 240.00 | 39.0 - TD | 45.50 | 15.90 | 9/26/2017 | 1238 | 224.10 |
| MW19 | 11MP33SB | 43.0 | 32.0 - 42.0 | 237.70 | 240.00 | 39.0 - TD | NR | 12.30 | 5/18/2018 | 13:57 | 227.70 |
| MW19 | 11MP33SB | 43.0 | 32.0 - 42.0 | 237.70 | 240.00 | 39.0 - TD | NR | 11.02 | 5/18/2019 | 14:28 | 228.98 |
| MW19 | 11MP33SB | 43.0 | 32.0 - 42.0 | 237.70 | 240.00 | 39.0 - TD | NR | 27.6 | 9/10/2019 | 1515 | 212.40 |
| MW20 | 11MP38SB | 15.5 | 4.5 - 14.5 | 212.90 | 215.20 | 6.5 - TD | | 6.89 | 8/31/2011 | 8:53 | 208.31 |
| MW20 | 11MP38SB | 15.5 | 4.5 - 14.5 | 212.90 | 215.20 | 6.5 - TD | | 6.97 | 9/1/2011 | 15:43 | 208.23 |
| MW20 | 11MP38SB | 15.5 | 4.5 - 14.5 | 212.90 | 215.20 | 6.5 - TD | | 4.82 | 5/26/2012 | 15:26 | 210.38 |
| MW20 | 11MP38SB | 15.5 | 4.5 - 14.5 | 212.90 | 215.20 | 6.5 - TD | | 5.53 | 9/9/2012 | 10:10 | 209.67 |
| MW20 | 11MP38SB | 15.5 | 4.5 - 14.5 | 212.90 | 215.20 | 6.5 - TD | | 7.11 | 6/17/2015 | 10:18 | 208.09 |
| MW20 | 11MP38SB | 15.5 | 4.5 - 14.5 | 212.90 | 215.20 | 6.5 - TD | | 7.92 | 8/12/2015 | 12:39 | 207.28 |
| MW20 | 11MP38SB | 15.5 | 4.5 - 14.5 | 212.90 | 215.20 | 6.5 - TD | | 8.12 | 9/2/2015 | 9:10 | 207.08 |
| MW20 | 11MP38SB | 15.5 | 4.5 - 14.5 | 212.90 | 215.20 | 6.5 - TD | 17.70 | 7.96 | 9/10/2015 | NR | 207.24 |
| MW20 | 11MP38SB | 15.5 | 4.5 - 14.5 | 212.90 | 215.20 | 6.5 - TD | 17.70 | 5.35 | 9/28/2016 | 14:15 | 209.85 |
| MW20 | 11MP38SB | 15.5 | 4.5 - 14.5 | 212.90 | 215.20 | 6.5 - TD | NR | 8.60 | 5/26/2017 | 10:50 | 206.60 |
| MW20 | 11MP38SB | 15.5 | 4.5 - 14.5 | 212.90 | 215.20 | 6.5 - TD | 17.47 | 6.32 | 9/26/2017 | 1303 | 208.88 |
| MW20 | 11MP38SB | 15.5 | 4.5 - 14.5 | 212.90 | 215.20 | 6.5 - TD | NR | 5.69 | 5/18/2018 | 13:57 | 209.51 |
| MW20 | 11MP38SB | 15.5 | 4.5 - 14.5 | 212.90 | 215.20 | 6.5 - TD | NR | 4.95 | 5/18/2019 | 14:15 | 210.25 |
| MW20 | 11MP38SB | 15.5 | 4.5 - 14.5 | 212.90 | 215.20 | 6.5 - TD | NR | 8.62 | 9/10/2019 | 1457 | 206.58 |
| MW21 | 11MP39SB | 17.5 | 6.5 - 16.5 | 208.23 | 210.13 | 7.0 - TD | | 8.80 | 8/31/2011 | 10:16 | 201.33 |
| MW21 | 11MP39SB | 17.5 | 6.5 - 16.5 | 208.23 | 210.13 | 7.0 - TD | | 8.82 | 9/1/2011 | 17:10 | 201.31 |
| MW21 | 11MP39SB | 17.5 | 6.5 - 16.5 | 208.23 | 210.13 | 7.0 - TD | | 7.91 | 5/26/2012 | 15:36 | 202.22 |
| MW21 | 11MP39SB | 17.5 | 6.5 - 16.5 | 208.23 | 210.13 | 7.0 - TD | | 8.29 | 9/8/2012 | 17:35 | 201.84 |
| MW21 | 11MP39SB | 17.5 | 6.5 - 16.5 | 208.23 | 210.13 | 7.0 - TD | | 8.55 | 6/17/2015 | 10:08 | 201.58 |
| MW21 | 11MP39SB | 17.5 | 6.5 - 16.5 | 208.23 | 210.13 | 7.0 - TD | | 9.10 | 8/12/2015 | 12:39 | 201.03 |
| MW21 | 11MP39SB | 17.5 | 6.5 - 16.5 | 208.23 | 210.13 | 7.0 - TD | | 9.45 | 9/2/2015 | 9:00 | 200.68 |
| MW21 | 11MP39SB | 17.5 | 6.5 - 16.5 | 208.23 | 210.13 | 7.0 - TD | 10.67 | 9.14 | 9/10/2015 | NR | 200.99 |
| MW21 | 11MP39SB | 17.5 | 6.5 - 16.5 | 208.23 | 210.13 | 7.0 - TD | 19.60 | 8.01 | 9/28/2016 | 14:30 | 202.12 |
| MW21 | 11MP39SB | 17.5 | 6.5 - 16.5 | 208.23 | 210.13 | 7.0 - TD | NR | 8.91 | 5/26/2017 | 10:34 | 201.22 |
| MW21 | 11MP39SB | 17.5 | 6.5 - 16.5 | 208.23 | 210.13 | 7.0 - TD | 19.39 | 8.13 | 9/26/2017 | 1229 | 202.00 |
| MW21 | 11MP39SB | 17.5 | 6.5 - 16.5 | 208.23 | 210.13 | 7.0 - TD | NR | 7.94 | 5/18/2018 | 13:50 | 202.19 |
| MW21 | 11MP39SB | 17.5 | 6.5 - 16.5 | 208.23 | 210.13 | 7.0 - TD | NR | 7.60 | 5/18/2019 | 14:39 | 202.53 |
| MW21 | 11MP39SB | 17.5 | 6.5 - 16.5 | 208.23 | 210.13 | 7.0 - TD | NR | 10.41 | 9/10/2019 | 1500 | 199.72 |
| MW22 | 11MP40SB | 15.5 | 4.5 - 14.5 | 203.10 | 205.10 | 7.8 - TD | | 8.20 | 8/31/2011 | 11:08 | 196.90 |
| MW22 | 11MP40SB | 15.5 | 4.5 - 14.5 | 203.10 | 205.10 | 7.8 - TD | | 8.48 | 9/1/2011 | 17:04 | 196.62 |
| MW22 | 11MP40SB | 15.5 | 4.5 - 14.5 | 203.10 | 205.10 | 7.8 - TD | | 5.55 | 5/26/2012 | 15:44 | 199.55 |
| MW22 | 11MP40SB | 15.5 | 4.5 - 14.5 | 203.10 | 205.10 | 7.8 - TD | | 7.77 | 9/9/2012 | 17:35 | 197.33 |
| MW22 | 11MP40SB | 15.5 | 4.5 - 14.5 | 203.10 | 205.10 | 7.8 - TD | | 8.47 | 6/17/2015 | 9:46 | 196.63 |
| MW22 | 11MP40SB | 15.5 | 4.5 - 14.5 | 203.10 | 205.10 | 7.8 - TD | | 10.01 | 8/12/2015 | 12:43 | 195.09 |
| MW22 | 11MP40SB | 15.5 | 4.5 - 14.5 | 203.10 | 205.10 | 7.8 - TD | | 10.33 | 9/2/2015 | 8:50 | 194.77 |
| MW22 | 11MP40SB | 15.5 | 4.5 - 14.5 | 203.10 | 205.10 | 7.8 - TD | 17.74 | 10.19 | 9/10/2015 | NR | 194.91 |
| MW22 | 11MP40SB | 15.5 | 4.5 - 14.5 | 203.10 | 205.10 | 7.8 - TD | 17.66 | 6.65 | 9/28/2016 | 14:40 | 198.45 |
| MW22 | 11MP40SB | 15.5 | 4.5 - 14.5 | 203.10 | 205.10 | 7.8 - TD | NR | 10.45 | 5/26/2017 | 10:21 | 194.65 |
| MW22 | 11MP40SB | 15.5 | 4.5 - 14.5 | 203.10 | 205.10 | 7.8 - TD | 17.50 | 7.23 | 9/26/2017 | 1220 | 197.87 |
| MW22 | 11MP40SB | 15.5 | 4.5 - 14.5 | 203.10 | 205.10 | 7.8 - TD | NR | 5.63 | 5/18/2018 | 13:44 | 199.47 |

**Table 3-1 Well Construction and Groundwater Depth Information**

| Monitoring Well ID | Soil Boring ID | Reported Well Total Depth As Constructed (feet bgs) | Reported Screened Interval (feet bgs) | Surveyed Ground Elevation (feet NAVD88) | Surveyed Top of Casing Elevation (feet NAVD88) | GW Observed During Drilling (feet bgs) | Measured Well Total Depth (feet below TOC) | Static Water Level | | | Ground Water Elevation (feet NAVD88) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Depth (feet below TOC) | Date | Time | |
| MW22 | 11MP40SB | 15.5 | 4.5 - 14.5 | 203.10 | 205.10 | 7.8 - TD | NR | 5.20 | 5/18/2019 | 14:44 | 199.90 |
| MW22 | 11MP40SB | 15.5 | 4.5 - 14.5 | 203.10 | 205.10 | 7.8 - TD | NR | 10.75 | 9/10/2019 | 1502 | 194.35 |
| MW23 | 11MP66SB | 29.0 | 18.0 - 28.0 | 201.96 | 204.16 | 20.0 - TD | | 16.02 | 8/30/2011 | 16:31 | 188.14 |
| MW23 | 11MP66SB | 29.0 | 18.0 - 28.0 | 201.96 | 204.16 | 20.0 - TD | | 16.01 | 9/1/2011 | 15:14 | 188.15 |
| MW23 | 11MP66SB | 29.0 | 18.0 - 28.0 | 201.96 | 204.16 | 20.0 - TD | | 14.60 | 5/26/2012 | 15:56 | 189.56 |
| MW23 | 11MP66SB | 29.0 | 18.0 - 28.0 | 201.96 | 204.16 | 20.0 - TD | | 15.56 | 9/9/2012 | 17:47 | 188.60 |
| MW23 | 11MP66SB | 29.0 | 18.0 - 28.0 | 201.96 | 204.16 | 20.0 - TD | | 15.88 | 6/17/2015 | 14:15 | 188.28 |
| MW23 | 11MP66SB | 29.0 | 18.0 - 28.0 | 201.96 | 204.16 | 20.0 - TD | | 16.92 | 8/12/2015 | 11:06 | 187.24 |
| MW23 | 11MP66SB | 29.0 | 18.0 - 28.0 | 201.96 | 204.16 | 20.0 - TD | | 16.63 | 9/2/2015 | 11:10 | 187.53 |
| MW23 | 11MP66SB | 29.0 | 18.0 - 28.0 | 201.96 | 204.16 | 20.0 - TD | 30.95 | 16.54 | 9/10/2015 | NR | 187.62 |
| MW23 | 11MP66SB | 29.0 | 18.0 - 28.0 | 201.96 | 204.16 | 20.0 - TD | 28.86 | 15.53 | 9/28/2016 | 13:46 | 188.63 |
| MW23 | 11MP66SB | 29.0 | 18.0 - 28.0 | 201.96 | 204.16 | 20.0 - TD | NR | 17.63 | 5/26/2017 | 13:00 | 186.53 |
| MW23 | 11MP66SB | 29.0 | 18.0 - 28.0 | 201.96 | 204.16 | 20.0 - TD | 30.58 | 15.86 | 9/26/2017 | 1634 | 188.30 |
| MW23 | 11MP66SB | 29.0 | 18.0 - 28.0 | 201.96 | 204.16 | 20.0 - TD | NR | 14.08 | 5/18/2018 | 13:27 | 190.08 |
| MW23 | 11MP66SB | 29.0 | 18.0 - 28.0 | 201.96 | 204.16 | 20.0 - TD | NR | 13.48 | 5/18/2019 | 15:41 | 190.68 |
| MW23 | 11MP66SB | 29.0 | 18.0 - 28.0 | 201.96 | 204.16 | 20.0 - TD | NR | 16.05 | 9/10/2019 | 1228 | 188.11 |
| MW24 | 11MP62SB | 30.0 | 19.0 - 29.0 | 221.41 | 223.51 | 20.0 - TD | | 17.70 | 8/30/2011 | 14:51 | 205.81 |
| MW24 | 11MP62SB | 30.0 | 19.0 - 29.0 | 221.41 | 223.51 | 20.0 - TD | | 17.61 | 9/1/2011 | 15:06 | 205.90 |
| MW24 | 11MP62SB | 30.0 | 19.0 - 29.0 | 221.41 | 223.51 | 20.0 - TD | | 14.59 | 5/26/2012 | 16:15 | 208.92 |
| MW24 | 11MP62SB | 30.0 | 19.0 - 29.0 | 221.41 | 223.51 | 20.0 - TD | | 16.45 | 9/9/2012 | 14:00 | 207.06 |
| MW24 | 11MP62SB | 30.0 | 19.0 - 29.0 | 221.41 | 223.51 | 20.0 - TD | | 16.89 | 6/17/2015 | 14:31 | 206.62 |
| MW24 | 11MP62SB | 30.0 | 19.0 - 29.0 | 221.41 | 223.51 | 20.0 - TD | | 17.88 | 8/12/2015 | 10:58 | 205.63 |
| MW24 | 11MP62SB | 30.0 | 19.0 - 29.0 | 221.41 | 223.51 | 20.0 - TD | | 19.02 | 9/2/2015 | 11:12 | 204.49 |
| MW24 | 11MP62SB | 30.0 | 19.0 - 29.0 | 221.41 | 223.51 | 20.0 - TD | 32.30 | 17.88 | 9/10/2015 | NR | 205.63 |
| MW24 | 11MP62SB | 30.0 | 19.0 - 29.0 | 221.41 | 223.51 | 20.0 - TD | 32.22 | 15.40 | 9/28/2016 | 13:26 | 208.11 |
| MW24 | 11MP62SB | 30.0 | 19.0 - 29.0 | 221.41 | 223.51 | 20.0 - TD | NR | 18.21 | 5/26/2017 | 12:48 | 205.30 |
| MW24 | 11MP62SB | 30.0 | 19.0 - 29.0 | 221.41 | 223.51 | 20.0 - TD | 31.97 | 15.96 | 9/26/2017 | 1651 | 207.55 |
| MW24 | 11MP62SB | 30.0 | 19.0 - 29.0 | 221.41 | 223.51 | 20.0 - TD | NR | 14.90 | 5/18/2018 | 13:15 | 208.61 |
| MW24 | 11MP62SB | 30.0 | 19.0 - 29.0 | 221.41 | 223.51 | 20.0 - TD | NR | 14.20 | 5/18/2019 | 15:51 | 209.31 |
| MW24 | 11MP62SB | 30.0 | 19.0 - 29.0 | 221.41 | 223.51 | 20.0 - TD | NR | 18.74 | 9/10/2019 | 1213 | 204.77 |
| MW25 | 11MP89SB | 42.0 | 31.0 - 41.0 | 237.56 | 239.76 | 32.0 - TD | | 31.85 | 8/30/2011 | 18:02 | 207.91 |
| MW25 | 11MP89SB | 42.0 | 31.0 - 41.0 | 237.56 | 239.76 | 32.0 - TD | | 31.88 | 9/1/2011 | 14:50 | 207.88 |
| MW25 | 11MP89SB | 42.0 | 31.0 - 41.0 | 237.56 | 239.76 | 32.0 - TD | | 29.74 | 5/26/2012 | 16:22 | 210.02 |
| MW25 | 11MP89SB | 42.0 | 31.0 - 41.0 | 237.56 | 239.76 | 32.0 - TD | | 33.87 | 9/9/2012 | 10:30 | 205.89 |
| MW25 | 11MP89SB | 42.0 | 31.0 - 41.0 | 237.56 | 239.76 | 32.0 - TD | | 31.81 | 6/17/2015 | 14:40 | 207.95 |
| MW25 | 11MP89SB | 42.0 | 31.0 - 41.0 | 237.56 | 239.76 | 32.0 - TD | | 32.48 | 8/12/2015 | 10:56 | 207.28 |
| MW25 | 11MP89SB | 42.0 | 31.0 - 41.0 | 237.56 | 239.76 | 32.0 - TD | | 32.60 | 9/2/2015 | 11:20 | 207.16 |
| MW25 | 11MP89SB | 42.0 | 31.0 - 41.0 | 237.56 | 239.76 | 32.0 - TD | 44.43 | 32.45 | 9/10/2015 | NR | 207.31 |
| MW25 | 11MP89SB | 42.0 | 31.0 - 41.0 | 237.56 | 239.76 | 32.0 - TD | 40.24 | 30.38 | 9/28/2016 | 13:22 | 209.38 |
| MW25 | 11MP89SB | 42.0 | 31.0 - 41.0 | 237.56 | 239.76 | 32.0 - TD | NR | 32.73 | 5/26/2017 | 12:41 | 207.03 |
| MW25 | 11MP89SB | 42.0 | 31.0 - 41.0 | 237.56 | 239.76 | 32.0 - TD | 44.44 | 30.99 | 9/26/2017 | 1705 | 208.77 |
| MW25 | 11MP89SB | 42.0 | 31.0 - 41.0 | 237.56 | 239.76 | 32.0 - TD | NR | 29.51 | 5/18/2018 | 13:08 | 210.25 |
| MW25 | 11MP89SB | 42.0 | 31.0 - 41.0 | 237.56 | 239.76 | 32.0 - TD | NR | 28.54 | 5/18/2019 | 15:57 | 211.22 |
| MW25 | 11MP89SB | 42.0 | 31.0 - 41.0 | 237.56 | 239.76 | 32.0 - TD | NR | 32.85 | 9/10/2019 | 1202 | 206.91 |
| MW26 | 11MP52SB | 43.0 | 32.0 - 42.0 | 244.03 | 245.93 | 34.0 - TD | | 36.25 | 8/30/2011 | 11:35 | 209.68 |
| MW26 | 11MP52SB | 43.0 | 32.0 - 42.0 | 244.03 | 245.93 | 34.0 - TD | | 36.30 | 9/1/2011 | 14:47 | 209.63 |
| MW26 | 11MP52SB | 43.0 | 32.0 - 42.0 | 244.03 | 245.93 | 34.0 - TD | | 32.76 | 5/26/2012 | 16:30 | 213.17 |
| MW26 | 11MP52SB | 43.0 | 32.0 - 42.0 | 244.03 | 245.93 | 34.0 - TD | | 34.01 | 9/9/2012 | 17:55 | 211.92 |
| MW26 | 11MP52SB | 43.0 | 32.0 - 42.0 | 244.03 | 245.93 | 34.0 - TD | | 36.04 | 6/17/2015 | 14:48 | 209.89 |
| MW26 | 11MP52SB | 43.0 | 32.0 - 42.0 | 244.03 | 245.93 | 34.0 - TD | | 36.98 | 8/12/2015 | 10:50 | 208.95 |
| MW26 | 11MP52SB | 43.0 | 32.0 - 42.0 | 244.03 | 245.93 | 34.0 - TD | | 37.24 | 9/2/2015 | 11:25 | 208.69 |
| MW26 | 11MP52SB | 43.0 | 32.0 - 42.0 | 244.03 | 245.93 | 34.0 - TD | 45.13 | 36.42 | 9/10/2015 | NR | 209.51 |
| MW26 | 11MP52SB | 43.0 | 32.0 - 42.0 | 244.03 | 245.93 | 34.0 - TD | 45.05 | 33.09 | 9/28/2016 | 13:10 | 212.84 |
| MW26 | 11MP52SB | 43.0 | 32.0 - 42.0 | 244.03 | 245.93 | 34.0 - TD | 45.01 | 35.53 | 5/26/2017 | 12:35 | 210.40 |
| MW26 | 11MP52SB | 43.0 | 32.0 - 42.0 | 244.03 | 245.93 | 34.0 - TD | 45.01 | 33.20 | 9/26/2017 | 1710 | 212.73 |
| MW26 | 11MP52SB | 43.0 | 32.0 - 42.0 | 244.03 | 245.93 | 34.0 - TD | NR | 31.08 | 5/18/2018 | 13:04 | 214.85 |
| MW26 | 11MP52SB | 43.0 | 32.0 - 42.0 | 244.03 | 245.93 | 34.0 - TD | NR | 29.99 | 5/18/2019 | 15:59 | 215.94 |
| MW26 | 11MP52SB | 43.0 | 32.0 - 42.0 | 244.03 | 245.93 | 34.0 - TD | NR | 36.41 | 9/10/2019 | 1158 | 209.52 |
| MW27 | 11MP60SB | 34.0 | 23.0 - 33.0 | 241.04 | 242.94 | 29.0 - TD | | 30.30 | 8/30/2011 | 16:50 | 212.64 |
| MW27 | 11MP60SB | 34.0 | 23.0 - 33.0 | 241.04 | 242.94 | 29.0 - TD | | 30.37 | 9/1/2011 | 14:58 | 212.57 |
| MW27 | 11MP60SB | 34.0 | 23.0 - 33.0 | 241.04 | 242.94 | 29.0 - TD | | 26.28 | 5/26/2012 | 16:38 | 216.66 |
| MW27 | 11MP60SB | 34.0 | 23.0 - 33.0 | 241.04 | 242.94 | 29.0 - TD | | 28.64 | 9/9/2012 | 12:50 | 214.30 |
| MW27 | 11MP60SB | 34.0 | 23.0 - 33.0 | 241.04 | 242.94 | 29.0 - TD | | 34.41 | 6/17/2015 | 14:58 | Suspected Dry (Water Elevation <208.4 feet) |
| MW27 | 11MP60SB | 34.0 | 23.0 - 33.0 | 241.04 | 242.94 | 29.0 - TD | | NR | 8/12/2015 | NR | -- |
| MW27 | 11MP60SB | 34.0 | 23.0 - 33.0 | 241.04 | 242.94 | 29.0 - TD | | 31.42 | 9/2/2015 | 22:30 | 211.52 |
| MW27 | 11MP60SB | 34.0 | 23.0 - 33.0 | 241.04 | 242.94 | 29.0 - TD | 35.77 | 31.24 | 9/10/2015 | NR | 211.52 |
| MW27 | 11MP60SB | 34.0 | 23.0 - 33.0 | 241.04 | 242.94 | 29.0 - TD | 35.70 | 27.51 | 9/28/2016 | 12:46 | 215.43 |
| MW27 | 11MP60SB | 34.0 | 23.0 - 33.0 | 241.04 | 242.94 | 29.0 - TD | 35.65 | 31.52 | 5/26/2017 | 12:30 | 211.42 |
| MW27 | 11MP60SB | 34.0 | 23.0 - 33.0 | 241.04 | 242.94 | 29.0 - TD | 35.65 | 28.83 | 9/26/2017 | 1718 | 214.11 |
| MW27 | 11MP60SB | 34.0 | 23.0 - 33.0 | 241.04 | 242.94 | 29.0 - TD | NR | 24.86 | 5/18/2018 | 12:57 | 218.08 |
| MW27 | 11MP60SB | 34.0 | 23.0 - 33.0 | 241.04 | 242.94 | 29.0 - TD | NR | 23.41 | 5/18/2019 | 16:08 | 219.53 |
| MW27 | 11MP60SB | 34.0 | 23.0 - 33.0 | 241.04 | 242.94 | 29.0 - TD | NR | 31.24 | 9/10/2019 | 1153 | 211.70 |
| MW28 | 11MP88SB | 64.0 | 53.0 - 63.0 | 239.94 | 241.94 | 49.0 - TD | | 25.50 | 8/30/2011 | 14:57 | 216.44 |
| MW28 | 11MP88SB | 64.0 | 53.0 - 63.0 | 239.94 | 241.94 | 49.0 - TD | | 28.61 | 9/1/2011 | 14:53 | 213.33 |
| MW28 | 11MP88SB | 64.0 | 53.0 - 63.0 | 239.94 | 241.94 | 49.0 - TD | | 24.19 | 5/26/2012 | 16:41 | 217.75 |
| MW28 | 11MP88SB | 64.0 | 53.0 - 63.0 | 239.94 | 241.94 | 49.0 - TD | | 27.01 | 9/10/2012 | 15:43 | 214.93 |
| MW28 | 11MP88SB | 64.0 | 53.0 - 63.0 | 239.94 | 241.94 | 49.0 - TD | | 28.90 | 6/17/2015 | 15:08 | 213.04 |
| MW28 | 11MP88SB | 64.0 | 53.0 - 63.0 | 239.94 | 241.94 | 49.0 - TD | | 29.88 | 8/12/2015 | 10:46 | 212.06 |
| MW28 | 11MP88SB | 64.0 | 53.0 - 63.0 | 239.94 | 241.94 | 49.0 - TD | | 30.10 | 9/2/2015 | 11:35 | 211.84 |
| MW28 | 11MP88SB | 64.0 | 53.0 - 63.0 | 239.94 | 241.94 | 49.0 - TD | 65.87 | 29.95 | 9/10/2015 | NR | 211.99 |
| MW28 | 11MP88SB | 64.0 | 53.0 - 63.0 | 239.94 | 241.94 | 49.0 - TD | 65.65 | 25.74 | 9/28/2016 | 13:00 | 216.20 |
| MW28 | 11MP88SB | 64.0 | 53.0 - 63.0 | 239.94 | 241.94 | 49.0 - TD | 65.58 | 30.13 | 5/26/2017 | 12:25 | 211.81 |
| MW28 | 11MP88SB | 64.0 | 53.0 - 63.0 | 239.94 | 241.94 | 49.0 - TD | 65.58 | 27.05 | 9/26/2017 | 1721 | 214.89 |
| MW28 | 11MP88SB | 64.0 | 53.0 - 63.0 | 239.94 | 241.94 | 49.0 - TD | NR | 23.18 | 5/18/2018 | 15:53 | 218.76 |
| MW28 | 11MP88SB | 64.0 | 53.0 - 63.0 | 239.94 | 241.94 | 49.0 - TD | NR | 21.47 | 5/18/2019 | 16:08 | 220.47 |
| MW28 | 11MP88SB | 64.0 | 53.0 - 63.0 | 239.94 | 241.94 | 49.0 - TD | NR | 29.99 | 9/10/2019 | 1150 | 211.95 |
| MW29 | 11MP41SB | 70.0 | 59.0 - 69.0 | 280.35 | 282.25 | 61.0 - TD | | 63.21 | 9/1/2011 | 13:20 | 219.04 |
| MW29 | 11MP41SB | 70.0 | 59.0 - 69.0 | 280.35 | 282.25 | 61.0 - TD | | 52.65 | 5/26/2012 | 17:09 | 229.60 |
| MW29 | 11MP41SB | 70.0 | 59.0 - 69.0 | 280.35 | 282.25 | 61.0 - TD | | 61.20 | 9/9/2012 | 16:22 | 221.05 |
| MW29 | 11MP41SB | 70.0 | 59.0 - 69.0 | 280.35 | 282.25 | 61.0 - TD | | 64.08 | 6/17/2015 | 15:41 | 218.17 |
| MW29 | 11MP41SB | 70.0 | 59.0 - 69.0 | 280.35 | 282.25 | 61.0 - TD | | 66.60 | 8/12/2015 | 11:12 | 215.65 |
| MW29 | 11MP41SB | 70.0 | 59.0 - 69.0 | 280.35 | 282.25 | 61.0 - TD | | 66.89 | 9/2/2015 | 12:11 | 215.36 |
| MW29 | 11MP41SB | 70.0 | 59.0 - 69.0 | 280.35 | 282.25 | 61.0 - TD | 71.75 | 66.81 | 9/10/2015 | NR | 215.44 |
| MW29 | 11MP41SB | 70.0 | 59.0 - 69.0 | 280.35 | 282.25 | 61.0 - TD | 71.59 | 55.01 | 9/28/2016 | 12:11 | 227.24 |
| MW29 | 11MP41SB | 70.0 | 59.0 - 69.0 | 280.35 | 282.25 | 61.0 - TD | 71.52 | 55.68 | 5/26/2017 | 11:45 | 226.57 |
| MW29 | 11MP41SB | 70.0 | 59.0 - 69.0 | 280.35 | 282.25 | 61.0 - TD | 71.52 | 58.36 | 9/26/2017 | 1818 | 223.89 |
| MW29 | 11MP41SB | 70.0 | 59.0 - 69.0 | 280.35 | 282.25 | 61.0 - TD | NR | 48.60 | 5/18/2018 | 12:19 | 233.65 |

**Table 3-1 Well Construction and Groundwater Depth Information**

| Monitoring Well ID | Soil Boring ID | Reported Well Total Depth As Constructed (feet bgs) | Reported Screened Interval (feet bgs) | Surveyed Ground Elevation (feet NAVD88) | Surveyed Top of Casing Elevation (feet NAVD88) | GW Observed During Drilling (feet bgs) | Measured Well Total Depth (feet below TOC) | Static Water Level | | | Ground Water Elevation (feet NAVD88) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Depth (feet below TOC) | Date | Time | |
| MW29 | 11MP41SB | 70.0 | 59.0 - 69.0 | 280.35 | 282.25 | 61.0 - TD | NR | 46.27 | 5/18/2019 | 16:55 | 235.98 |
| MW29 | 11MP41SB | 70.0 | 59.0 - 69.0 | 280.35 | 282.25 | 61.0 - TD | NR | 67.41 | 9/14/2019 | 13:00 | 214.84 |
| MW30 | 11SM31SB | 53.0 | 42.0 - 52.0 | 275.71 | 277.41 | 45.0 - TD | | 53.53 | 9/1/2011 | 14:35 | Suspected Dry (Water Elevation <223.7 feet) |
| MW30 | 11SM31SB | 53.0 | 42.0 - 52.0 | 275.71 | 277.41 | 45.0 - TD | | 52.63 | 5/26/2012 | 16:58 | Suspected Dry (Water Elevation <223.7 feet) |
| MW30 | 11SM31SB | 53.0 | 42.0 - 52.0 | 275.71 | 277.41 | 45.0 - TD | | NR | 9/9/2012 | NR | Suspected Dry (Water Elevation <223.7 feet) |
| MW30 | 11SM31SB | 53.0 | 42.0 - 52.0 | 275.71 | 277.41 | 45.0 - TD | | 54.25 | 6/17/2015 | 19:33 | Suspected Dry (Water Elevation <223.7 feet) |
| MW30 | 11SM31SB | 53.0 | 42.0 - 52.0 | 275.71 | 277.41 | 45.0 - TD | | 54.28 | 8/12/2015 | 11:19 | Suspected Dry (Water Elevation <223.7 feet) |
| MW30 | 11SM31SB | 53.0 | 42.0 - 52.0 | 275.71 | 277.41 | 45.0 - TD | | 54.32 | 9/2/2015 | 12:15 | Suspected Dry (Water Elevation <223.7 feet) |
| MW30 | 11SM31SB | 53.0 | 42.0 - 52.0 | 275.71 | 277.41 | 45.0 - TD | 55.63 | 54.45 | 9/10/2015 | NR | Suspected Dry (Water Elevation <223.7 feet) |
| MW30 | 11SM31SB | 53.0 | 42.0 - 52.0 | 275.71 | 277.41 | 45.0 - TD | 55.40 | 54.22 | 9/28/2016 | 12:24 | Suspected Dry (Water Elevation <223.7 feet) |
| MW30 | 11SM31SB | 53.0 | 42.0 - 52.0 | 275.71 | 277.41 | 45.0 - TD | 55.35 | 54.23 | 5/26/2017 | 11:35 | Suspected Dry (Water Elevation <223.7 feet) |
| MW30 | 11SM31SB | 53.0 | 42.0 - 52.0 | 275.71 | 277.41 | 45.0 - TD | 55.35 | 54.27 | 9/26/2017 | -- | Suspected Dry (Water Elevation <223.7 feet) |
| MW30 | 11SM31SB | 53.0 | 42.0 - 52.0 | 275.71 | 277.41 | 45.0 - TD | NR | 52.80 | 5/18/2018 | 12:12 | Suspected Dry (Water Elevation <223.7 feet) |
| MW30 | 11SM31SB | 53.0 | 42.0 - 52.0 | 275.71 | 277.41 | 45.0 - TD | NR | 51.31 | 5/18/2019 | 17:03 | Suspected Dry (Water Elevation <223.7 feet) |
| MW30 | 11SM31SB | 53.0 | 42.0 - 52.0 | 275.71 | 277.41 | 45.0 - TD | NR | 54.28 | 9/10/2019 | 1930 | Suspected Dry (Water Elevation <223.7 feet) |
| MW31 | 11UP11SB | 44.8 | 33.8 - 43.8 | 495.79 | 497.99 | 34.0 - TD | | 37.75 | 8/29/2011 | 13:51 | 460.24 |
| MW31 | 11UP11SB | 44.8 | 33.8 - 43.8 | 495.79 | 497.99 | 34.0 - TD | | 37.51 | 9/1/2011 | 14:05 | 460.48 |
| MW31 | 11UP11SB | 44.8 | 33.8 - 43.8 | 495.79 | 497.99 | 34.0 - TD | | 34.12 | 5/26/2012 | 10:10 | 463.87 |
| MW31 | 11UP11SB | 44.8 | 33.8 - 43.8 | 495.79 | 497.99 | 34.0 - TD | | 36.29 | 9/9/2012 | 18:10 | 461.70 |
| MW31 | 11UP11SB | 44.8 | 33.8 - 43.8 | 495.79 | 497.99 | 34.0 - TD | | 39.31 | 6/22/2015 | 19:09 | 458.68 |
| MW31 | 11UP11SB | 44.8 | 33.8 - 43.8 | 495.79 | 497.99 | 34.0 - TD | | 42.25 | 8/12/2015 | 11:31 | 455.74 |
| MW31 | 11UP11SB | 44.8 | 33.8 - 43.8 | 495.79 | 497.99 | 34.0 - TD | | 43.07 | 9/2/2015 | 12:45 | 454.92 |
| MW31 | 11UP11SB | 44.8 | 33.8 - 43.8 | 495.79 | 497.99 | 34.0 - TD | 47.10 | 41.75 | 9/10/2015 | NR | 456.24 |
| MW31 | 11UP11SB | 44.8 | 33.8 - 43.8 | 495.79 | 497.99 | 34.0 - TD | 47.10 | 35.22 | 10/1/2016 | 11:15 | 462.77 |
| MW31 | 11UP11SB | 44.8 | 33.8 - 43.8 | 495.79 | 497.99 | 34.0 - TD | 47.07 | 44.95 | 5/26/2017 | NR | 453.04 |
| MW31 | 11UP11SB | 44.8 | 33.8 - 43.8 | 495.79 | 497.99 | 34.0 - TD | 47.07 | 35.22 | 9/26/2017 | NR | 462.77 |
| MW31 | 11UP11SB | 44.8 | 33.8 - 43.8 | 495.79 | 497.99 | 34.0 - TD | NR | 33.98 | 5/15/2018 | NR | 464.01 |
| MW31 | 11UP11SB | 44.8 | 33.8 - 43.8 | 495.79 | 497.99 | 34.0 - TD | NR | 32.44 | 5/18/2019 | 19:51 | 465.55 |
| MW31 | 11UP11SB | 44.8 | 33.8 - 43.8 | 495.79 | 497.99 | 34.0 - TD | NR | DRY | 9/10/2019 | 1605 | Suspected Dry (Water Elevation <450 feet) |
| MW32 | 11RD05SB | 25.0 | 14.0 - 24.0 | 194.38 | 196.58 | 16.5 - TD | | 18.90 | 8/31/2011 | 15:55 | 177.68 |
| MW32 | 11RD05SB | 25.0 | 14.0 - 24.0 | 194.38 | 196.58 | 16.5 - TD | | 18.86 | 9/1/2011 | 15:26 | 177.72 |
| MW32 | 11RD05SB | 25.0 | 14.0 - 24.0 | 194.38 | 196.58 | 16.5 - TD | | 16.71 | 5/26/2012 | 12:45 | 179.87 |
| MW32 | 11RD05SB | 25.0 | 14.0 - 24.0 | 194.38 | 196.58 | 16.5 - TD | | 17.21 | 9/8/2012 | 15:40 | 179.37 |
| MW32 | 11RD05SB | 25.0 | 14.0 - 24.0 | 194.38 | 196.58 | 16.5 - TD | | 19.03 | 6/17/2015 | 9:30 | 177.55 |
| MW32 | 11RD05SB | 25.0 | 14.0 - 24.0 | 194.38 | 196.58 | 16.5 - TD | | 19.49 | 8/12/2015 | 12:47 | 177.09 |
| MW32 | 11RD05SB | 25.0 | 14.0 - 24.0 | 194.38 | 196.58 | 16.5 - TD | | 20.17 | 9/2/2015 | 12:45 | 176.41 |
| MW32 | 11RD05SB | 25.0 | 14.0 - 24.0 | 194.38 | 196.58 | 16.5 - TD | 26.73 | 20.05 | 9/10/2015 | NR | 176.53 |
| MW32 | 11RD05SB | 25.0 | 14.0 - 24.0 | 194.38 | 196.58 | 16.5 - TD | 26.43 | 18.35 | 9/28/2016 | 14:13 | 178.23 |
| MW32 | 11RD05SB | 25.0 | 14.0 - 24.0 | 194.38 | 196.58 | 16.5 - TD | 26.70 | 21.33 | 5/26/2017 | 9:53 | 175.25 |
| MW32 | 11RD05SB | 25.0 | 14.0 - 24.0 | 194.38 | 196.58 | 16.5 - TD | 26.70 | 18.00 | 9/26/2017 | 1212 | 178.58 |
| MW32 | 11RD05SB | 25.0 | 14.0 - 24.0 | 194.38 | 196.58 | 16.5 - TD | NR | 17.16 | 5/18/2018 | 13:38 | 179.42 |
| MW32 | 11RD05SB | 25.0 | 14.0 - 24.0 | 194.38 | 196.58 | 16.5 - TD | NR | 16.19 | 5/18/2019 | 14:54 | 180.39 |
| MW32 | 11RD05SB | 25.0 | 14.0 - 24.0 | 194.38 | 196.58 | 16.5 - TD | NR | 21.19 | 9/10/2019 | 1445 | 175.39 |
| MW33 | 11RD20SB | 23.0 | 12.0 - 22.0 | 176.62 | 178.92 | 10.5 - TD | | 8.14 | 8/31/2011 | 17:57 | 170.78 |
| MW33 | 11RD20SB | 23.0 | 12.0 - 22.0 | 176.62 | 178.92 | 10.5 - TD | | 8.19 | 9/1/2011 | 15:20 | 170.73 |
| MW33 | 11RD20SB | 23.0 | 12.0 - 22.0 | 176.62 | 178.92 | 10.5 - TD | | 3.98 | 5/26/2012 | 12:33 | 174.94 |
| MW33 | 11RD20SB | 23.0 | 12.0 - 22.0 | 176.62 | 178.92 | 10.5 - TD | | 5.97 | 9/8/2012 | 12:30 | 172.95 |
| MW33 | 11RD20SB | 23.0 | 12.0 - 22.0 | 176.62 | 178.92 | 10.5 - TD | | 8.50 | 6/17/2015 | 14:04 | 170.42 |
| MW33 | 11RD20SB | 23.0 | 12.0 - 22.0 | 176.62 | 178.92 | 10.5 - TD | | 9.05 | 8/12/2015 | 11:09 | 169.87 |
| MW33 | 11RD20SB | 23.0 | 12.0 - 22.0 | 176.62 | 178.92 | 10.5 - TD | | 9.23 | 9/2/2015 | 8:40 | 169.69 |
| MW33 | 11RD20SB | 23.0 | 12.0 - 22.0 | 176.62 | 178.92 | 10.5 - TD | 24.26 | 9.12 | 9/10/2015 | NR | 169.80 |
| MW33 | 11RD20SB | 23.0 | 12.0 - 22.0 | 176.62 | 178.92 | 10.5 - TD | 24.38 | 4.49 | 9/28/2016 | 13:56 | 174.43 |
| MW33 | 11RD20SB | 23.0 | 12.0 - 22.0 | 176.62 | 178.92 | 10.5 - TD | 24.40 | 8.96 | 5/26/2017 | 13:10 | 169.96 |
| MW33 | 11RD20SB | 23.0 | 12.0 - 22.0 | 176.62 | 178.92 | 10.5 - TD | 24.40 | 6.67 | 9/26/2017 | 1158 | 172.25 |
| MW33 | 11RD20SB | 23.0 | 12.0 - 22.0 | 176.62 | 178.92 | 10.5 - TD | NR | 3.43 | 5/18/2018 | 13:43 | 175.49 |
| MW33 | 11RD20SB | 23.0 | 12.0 - 22.0 | 176.62 | 178.92 | 10.5 - TD | NR | 2.62 | 5/18/2019 | 15:31 | 176.30 |
| MW33 | 11RD20SB | 23.0 | 12.0 - 22.0 | 176.62 | 178.92 | 10.5 - TD | NR | 8.69 | 9/10/2019 | 1942 | 170.23 |
| MW34 | AST5 MW1 | NR | NR | 290.95 | 294.25 | | | 15.57 | 9/1/2011 | 16:49 | 278.68 |
| MW34 | AST5 MW1 | NR | NR | 290.95 | 294.25 | | | 15.82 | 6/22/2015 | 11:54 | 278.43 |
| MW34 | AST5 MW1 | NR | NR | 290.95 | 294.25 | | | 17.11 | 9/2/2015 | 10:20 | 277.14 |
| MW34 | AST5 MW1 | NR | NR | 290.95 | 294.25 | | 22.80 | 16.38 | 9/10/2015 | NR | 277.87 |
| MW34 | AST5 MW1 | NR | NR | 290.95 | 294.25 | | 65.80 | 29.66 | 9/28/2016 | NR | 264.59 |
| MW34 | AST5 MW1 | NR | NR | 290.95 | 294.25 | | NR | 49.88 | 5/26/2017 | 12:30 | 244.37 |
| MW34 | AST5 MW1 | NR | NR | 290.95 | 294.25 | | 65.50 | 30.03 | 9/26/2017 | 1409 | 264.22 |
| MW34 | AST5 MW1 | NR | NR | 290.95 | 294.25 | | NR | 26.43 | 5/18/2018 | 13:06 | 267.82 |
| MW34 | AST5 MW1 | NR | NR | 290.95 | 294.25 | | NR | 25.47 | 5/18/2019 | 13:27 | 268.78 |
| MW35 | AST5 MW2 | NR | NR | 285.76 | 289.26 | | | 41.97 | 9/1/2011 | 16:55 | 247.29 |
| MW35 | AST5 MW2 | NR | NR | 285.76 | 289.26 | | | 40.01 | 6/22/2015 | 11:58 | 249.25 |
| MW35 | AST5 MW2 | NR | NR | 285.76 | 289.26 | | | 44.94 | 9/2/2015 | 10:15 | 244.32 |
| MW35 | AST5 MW2 | NR | NR | 285.76 | 289.26 | | 55.30 | 44.42 | 9/10/2015 | NR | 244.84 |
| MW35 | AST5 MW2 | NR | NR | 285.76 | 289.26 | | 55.20 | 36.03 | 9/28/2016 | NR | 253.23 |
| MW35 | AST5 MW2 | NR | NR | 285.76 | 289.26 | | NR | 47.78 | 5/26/2017 | 12:13 | 241.48 |
| MW35 | AST5 MW2 | NR | NR | 285.76 | 289.26 | | 54.95 | 36.34 | 9/26/2017 | 14:17 | 252.92 |
| MW35 | AST5 MW2 | NR | NR | 285.76 | 289.26 | | NR | 33.06 | 5/18/2018 | NR | 256.20 |
| MW35 | AST5 MW2 | NR | NR | 285.76 | 289.26 | | NR | 32.36 | 5/18/2019 | 13:22 | 256.90 |
| MW36 | AST5 MW3 | NR | NR | 286.33 | 290.03 | | | 35.81 | 9/1/2011 | 16:57 | 254.22 |
| MW36 | AST5 MW3 | NR | NR | 286.33 | 290.03 | | | 33.16 | 6/22/2015 | 12:08 | 256.87 |
| MW36 | AST5 MW3 | NR | NR | 286.33 | 290.03 | | | 40.89 | 9/2/2015 | 10:10 | 249.14 |
| MW36 | AST5 MW3 | NR | NR | 286.33 | 290.03 | | 65.38 | 39.39 | 9/10/2015 | NR | 250.64 |
| MW36 | AST5 MW3 | NR | NR | 286.33 | 290.03 | | 22.73 | 15.30 | 9/28/2016 | NR | 274.73 |
| MW36 | AST5 MW3 | NR | NR | 286.33 | 290.03 | | NR | 15.63 | 5/26/2017 | 12:26 | 274.40 |
| MW36 | AST5 MW3 | NR | NR | 286.33 | 290.03 | | 22.60 | 15.46 | 9/26/2017 | 1427 | 274.57 |
| MW36 | AST5 MW3 | NR | NR | 286.33 | 290.03 | | NR | 15.01 | 5/18/2018 | 13:12 | 275.02 |
| MW36 | AST5 MW3 | NR | NR | 286.33 | 290.03 | | NR | 14.15 | 5/18/2019 | 13:17 | 275.88 |
| MW39 | SM67 | 84.0 | 63 - 83 | 432.83 | 435.26 | | | 85.11 | 8/3/2015 | 9:00 | Dry (Water Elevation <349.8 feet) |
| MW39 | SM67 | 84.0 | 63 - 83 | 432.83 | 435.26 | | | Dry (>84) | 8/12/2015 | 11:25 | Dry (Water Elevation <349.8 feet) |
| MW39 | SM67 | 84.0 | 63 - 83 | 432.83 | 435.26 | | | Dry (>84) | 9/2/2015 | 12:35 | Dry (Water Elevation <349.8 feet) |
| MW39 | SM67 | 84.0 | 63 - 83 | 432.83 | 435.26 | | 86.02 | Dry (>84) | 9/10/2015 | NR | Dry (Water Elevation <349.8 feet) |
| MW39 | SM67 | 84.0 | 63 - 83 | 432.83 | 435.26 | | 85.95 | Dry (>84) | 9/28/2016 | 11:40 | Dry (Water Elevation <349.8 feet) |
| MW39 | SM67 | 84.0 | 63 - 83 | 432.83 | 435.26 | | 85.89 | Dry (>84) | 5/26/2017 | 10:59 | Dry (Water Elevation <349.8 feet) |
| MW39 | SM67 | 84.0 | 63 - 83 | 432.83 | 435.26 | | 85.89 | Dry (>84) | 9/26/2017 | -- | Dry (Water Elevation <349.8 feet) |
| MW39 | SM67 | 84.0 | 63 - 83 | 432.83 | 435.26 | | NR | Dry (>84) | 5/18/2018 | 14:24 | Dry (Water Elevation <349.8 feet) |
| MW39 | SM67 | 84.0 | 63 - 83 | 432.83 | 435.26 | | NR | Dry (>84) | 5/18/2019 | -- | Dry (Water Elevation <349.8 feet) |
| MW39 | SM67 | 84.0 | 63 - 83 | 432.83 | 435.26 | | NR | Dry (>84) | 9/10/2019 | 1550 | Dry (Water Elevation <349.8 feet) |
| MW40 | SM68c | 140.0 | 119 - 139 | 392.86 | 395.18 | 135 | | 131.11 | 8/12/2015 | 11:37 | 264.07 |
| MW40 | SM68c | 140.0 | 119 - 139 | 392.86 | 395.18 | 135 | | 131.49 | 9/2/2015 | 12:25 | 263.69 |
| MW40 | SM68c | 140.0 | 119 - 139 | 392.86 | 395.18 | 135 | 142.45 | 131.60 | 9/10/2015 | NR | 263.58 |

**Table 3-1 Well Construction and Groundwater Depth Information**

| Monitoring Well ID | Soil Boring ID | Reported Well Total Depth As Constructed (feet bgs) | Reported Screened Interval (feet bgs) | Surveyed Ground Elevation (feet NAVD88) | Surveyed Top of Casing Elevation (feet NAVD88) | GW Observed During Drilling (feet bgs) | Measured Well Total Depth (feet below TOC) | Static Water Level | | | Ground Water Elevation (feet NAVD88) |
|---|---|---|---|---|---|---|---|---|---|---|---|
| | | | | | | | | Depth (feet below TOC) | Date | Time | |
| MW40 | SM68c | 140.0 | 119 - 139 | 392.86 | 395.18 | | 143.38 | 127.64 | 9/28/2016 | 11:50 | 267.54 |
| MW40 | SM68c | 140.0 | 119 - 139 | 392.86 | 395.18 | | 142.35 | 132.03 | 5/26/2017 | 11:20 | 263.15 |
| MW40 | SM68c | 140.0 | 119 - 139 | 392.86 | 395.18 | | 142.35 | 128.72 | 9/26/2017 | -- | 266.46 |
| MW40 | SM68c | 140.0 | 119 - 139 | 392.86 | 395.18 | | NR | 126.79 | 5/18/2018 | 11:30 | 268.39 |
| MW40 | SM68c | 140.0 | 119 - 139 | 392.86 | 395.18 | | NR | 124.63 | 5/18/2019 | 17:33 | 270.55 |
| MW40 | SM68c | 140.0 | 119 - 139 | 392.86 | 395.18 | | NR | 130.95 | 9/10/2019 | 1536 | 264.23 |
| MW42 | SM70b | 140.0 | 119 - 139 | 339.85 | 342.34 | 99 | | NR | 8/12/2015 | NR | -- |
| MW42 | SM70b | 140.0 | 119 - 139 | 339.85 | 342.34 | 99 | | 129.10 | 9/2/2015 | 11:50 | 213.24 |
| MW42 | SM70b | 140.0 | 119 - 139 | 339.85 | 342.34 | 99 | 142.97 | 129.01 | 9/10/2015 | NR | 213.33 |
| MW42 | SM70b | 140.0 | 119 - 139 | 339.85 | 342.34 | | | 125.24 | 9/28/2016 | 9:57 | 217.10 |
| MW42 | SM70b | 140.0 | 119 - 139 | 339.85 | 342.34 | | 142.45 | 128.87 | 5/26/2017 | NR | 213.47 |
| MW42 | SM70b | 140.0 | 119 - 139 | 339.85 | 342.34 | | 142.45 | 126.60 | 9/26/2017 | 1750 | 215.74 |
| MW42 | SM70b | 140.0 | 119 - 139 | 339.85 | 342.34 | | NR | 122.62 | 5/18/2018 | 12:30 | 219.72 |
| MW42 | SM70b | 140.0 | 119 - 139 | 339.85 | 342.34 | | NR | 120.45 | 5/18/2019 | 16:22 | 221.89 |
| MW42 | SM70b | 140.0 | 119 - 139 | 339.85 | 342.34 | | NR | 128.95 | 9/10/2019 | 1901 | 213.39 |
| MW43 | SM71b | 118.5 | 98 - 118 | 300.87 | 303.69 | 94 | | 90.25 | 8/12/2015 | 10:33 | 213.44 |
| MW43 | SM71b | 118.5 | 98 - 118 | 300.87 | 303.69 | 94 | | 90.42 | 9/2/2015 | 12:00 | 213.27 |
| MW43 | SM71b | 118.5 | 98 - 118 | 300.87 | 303.69 | 94 | 121.13 | 90.34 | 9/10/2015 | NR | 213.35 |
| MW43 | SM71b | 118.5 | 98 - 118 | 300.87 | 303.69 | | 121.85 | 86.53 | 9/28/2016 | 10:17 | 217.16 |
| MW43 | SM71b | 118.5 | 98 - 118 | 300.87 | 303.69 | | 120.78 | 90.26 | 5/26/2017 | NR | 213.43 |
| MW43 | SM71b | 118.5 | 98 - 118 | 300.87 | 303.69 | | 120.78 | 87.83 | 9/26/2017 | 1740 | 215.86 |
| MW43 | SM71b | 118.5 | 98 - 118 | 300.87 | 303.69 | | NR | 83.95 | 5/18/2018 | 12:37 | 219.74 |
| MW43 | SM71b | 118.5 | 98 - 118 | 300.87 | 303.69 | | NR | 81.84 | 5/18/2019 | 16:33 | 221.85 |
| MW43 | SM71b | 118.5 | 98 - 118 | 300.87 | 303.69 | | NR | 90.27 | 9/10/2019 | 1853 | 213.42 |
| MW44 | SM72 | 69 | 48-68 | 378.92 | 381.59 | 64, possibly 50. | 71.73 | 32.51 | 9/26/2017 | 1900 | 349.08 |
| MW44 | SM72 | 69 | 48-68 | 378.92 | 381.59 | | 71.17 | 31.15 | 5/18/2018 | 11:38 | 350.44 |
| MW44 | SM72 | 69 | 48-68 | 378.92 | 381.59 | | NR | 30.18 | 5/18/2019 | 0:00 | 351.41 |
| MW44 | SM72 | 69 | 48-68 | 378.92 | 381.59 | | NR | 39.39 | 9/10/2019 | 1830 | 342.20 |
| MW45 | SM73 | 82 | 61-81 | 397.70 | 400.37 | 66 | 79.78 | 45.06 | 9/26/2017 | 1924 | 355.31 |
| MW45 | SM73 | 82 | 61-81 | 397.70 | 400.37 | | 79.40 | 41.51 | 5/18/2018 | 10:31 | 358.86 |
| MW45 | SM73 | 82 | 61-81 | 397.70 | 400.37 | | NR | 39.69 | 5/18/2019 | 18:20 | 360.68 |
| MW45 | SM73 | 82 | 61-81 | 397.70 | 400.37 | | NR | 54.18 | 9/10/2019 | 1820 | 346.19 |
| MW46 | SM74 | 57 | 36-56 | 399.62 | 402.50 | 41 | 60.04 | 31.81 | 9/26/2017 | 1934 | 370.69 |
| MW46 | SM74 | 57 | 36-56 | 399.62 | 402.50 | | 59.71 | 30.62 | 5/18/2018 | 10:24 | 371.88 |
| MW46 | SM74 | 57 | 36-56 | 399.62 | 402.50 | | NR | 29.32 | 5/18/2019 | 18:12 | 373.18 |
| MW46 | SM74 | 57 | 36-56 | 399.62 | 402.50 | | NR | 39.59 | 9/10/2019 | 1809 | 362.91 |
| MW47 | SM75 | 67 | 46-66 | 380.67 | 383.67 | 51 | 70.20 | 35.88 | 9/26/2017 | 1941 | 347.79 |
| MW47 | SM75 | 67 | 46-66 | 380.67 | 383.67 | | 69.44 | 33.31 | 5/18/2018 | 10:21 | 350.36 |
| MW47 | SM75 | 67 | 46-66 | 380.67 | 383.67 | | NR | 31.79 | 5/18/2019 | 17:46 | 351.88 |
| MW47 | SM75 | 67 | 46-66 | 380.67 | 383.67 | | NR | 42.93 | 9/10/2019 | 1759 | 340.74 |
| MW48 | SM76 | 44.5 | 23-43 | 348.87 | 351.51 | 28 | 46.76 | 19.23 | 9/26/2017 | 1850 | 332.28 |
| MW48 | SM76 | 44.5 | 23-43 | 348.87 | 351.51 | | 46.60 | 18.57 | 5/18/2018 | 11:47 | 332.94 |
| MW48 | SM76 | 44.5 | 23-43 | 348.87 | 351.51 | | NR | 17.92 | 5/18/2019 | 17:15 | 333.59 |
| MW48 | SM76 | 44.5 | 23-43 | 348.87 | 351.51 | | NR | 24.88 | 9/10/2019 | 1840 | 326.63 |
| MW49 | SM77 | 61.7 | 40-60 | 301.15 | 303.78 | 45 | 64.14 | 27.81 | 9/26/2017 | 1839 | 275.97 |
| MW49 | SM77 | 61.7 | 40-60 | 301.15 | 303.78 | | 63.75 | 26.40 | 5/18/2018 | 12:00 | 277.38 |
| MW49 | SM77 | 61.7 | 40-60 | 301.15 | 303.78 | | NR | 25.34 | 5/18/2019 | 16:46 | 278.44 |
| MW49 | SM77 | 61.7 | 40-60 | 301.15 | 303.78 | | NR | 35.75 | 9/10/2019 | 1103 | 268.03 |
| MW50 | SM78 | 92 | 71-91 | 439.58 | 442.6501 | estimated 75 | 96.71 | 50.47 | 9/26/2017 | 2037 | 392.18 |
| MW50 | SM78 | 92 | 71-91 | 439.58 | 442.6501 | | 95.36 | 42.81 | 5/18/2018 | 11:28 | 399.84 |
| MW50 | SM78 | 92 | 71-91 | 439.58 | 442.6501 | | NR | 41.66 | 5/18/2019 | 19:07 | 400.99 |
| MW50 | SM78 | 92 | 71-91 | 439.58 | 442.6501 | | NR | 54.61 | 9/10/2019 | 1705 | 388.04 |
| MW51 | SM79 | 77 | 56-76 | 422.38 | 425.05 | 61 | 80.40 | 38.69 | 9/26/2017 | 2056 | 386.36 |
| MW51 | SM79 | 77 | 56-76 | 422.38 | 425.05 | | 79.50 | 35.89 | 5/18/2018 | 10:58 | 389.16 |
| MW51 | SM79 | 77 | 56-76 | 422.38 | 425.05 | | NR | 34.26 | 5/18/2019 | 19:16 | 390.79 |
| MW51 | SM79 | 77 | 56-76 | 422.38 | 425.05 | | NR | 45.23 | 9/10/2019 | 1655 | 379.82 |
| MW52 | SM80 | 56 | 35-55 | 383.91 | 386.83 | 40 | 59.72 | 29.67 | 9/26/2017 | 1949 | 357.16 |
| MW52 | SM80 | 56 | 35-55 | 383.91 | 386.83 | | 59.33 | 27.36 | 5/18/2018 | 10:05 | 359.47 |
| MW52 | SM80 | 56 | 35-55 | 383.91 | 386.83 | | NR | 26.36 | 5/18/2019 | 18:03 | 360.47 |
| MW52 | SM80 | 56 | 35-55 | 383.91 | 386.83 | | NR | 37.8 | 9/10/2019 | 1747 | 349.03 |
| MW53 | SM81 | 62 | 41-61 | 460.82 | 463.7785 | 46 | 65.60 | 29.90 | 9/26/2017 | 2118 | 433.88 |
| MW53 | SM81 | 62 | 41-61 | 460.82 | 463.7785 | | 65.00 | 27.12 | 5/18/2018 | 10:36 | 436.66 |
| MW53 | SM81 | 62 | 41-61 | 460.82 | 463.7785 | | NR | 26.11 | 5/18/2019 | 19:37 | 437.67 |
| MW53 | SM81 | 62 | 41-61 | 460.82 | 463.7785 | | NR | 40.11 | 9/10/2019 | 1435 | 423.67 |
| MW54 | SM82 | 50 | 29-49 | 423.01 | 425.7406 | 34 | 53.50 | 29.80 | 9/26/2017 | -- | 395.94 |
| MW54 | SM82 | 50 | 29-49 | 423.01 | 425.7406 | | 53.10 | 27.26 | 5/18/2018 | 10:48 | 398.48 |
| MW54 | SM82 | 50 | 29-49 | 423.01 | 425.7406 | | NR | 26.17 | 5/18/2019 | 18:54 | 399.57 |
| MW54 | SM82 | 50 | 29-49 | 423.01 | 425.7406 | | NR | 33.22 | 9/10/2019 | 1642 | 392.52 |
| MW55 | SM83 | 27 | 10-20 | 341.26 | 344.09 | 13 | 23.92 | 12.27 | 9/26/2017 | -- | 331.82 |
| MW55 | SM83 | 27 | 10-20 | 341.26 | 344.09 | | 22.57 | 10.85 | 5/18/2018 | 9:50 | 333.24 |
| MW55 | SM83 | 27 | 10-20 | 341.26 | 344.09 | | NR | 9.51 | 5/18/2019 | 17:54 | 334.58 |
| MW55 | SM83 | 27 | 10-20 | 341.26 | 344.09 | | NR | 16.22 | 9/10/2019 | 1737 | 327.87 |
| MW56 | SM84 | 76 | 55-75 | 408.55 | 411.329 | 60 | 79.72 | 32.70 | 9/26/2017 | 1913 | 378.63 |
| MW56 | SM84 | 76 | 55-75 | 408.55 | 411.329 | | 78.65 | 30.61 | 5/18/2018 | 10:42 | 380.72 |
| MW56 | SM84 | 76 | 55-75 | 408.55 | 411.329 | | NR | 29.69 | 5/18/2019 | 18:28 | 381.64 |
| MW56 | SM84 | 76 | 55-75 | 408.55 | 411.329 | | NR | 52.24 | 9/10/2019 | 1727 | 359.09 |
| MW57 | SM85 | 60 | 37.5-57.5 | 461.00 | 463.8141 | 44 | 61.45 | 30.65 | 9/26/2017 | 2107 | 433.16 |
| MW57 | SM85 | 60 | 37.5-57.5 | 461.00 | 463.8141 | | 60.90 | 28.81 | 5/18/2018 | 11:41 | 435.00 |
| MW57 | SM85 | 60 | 37.5-57.5 | 461.00 | 463.8141 | | NR | 28.62 | 5/18/2019 | 20:00 | 435.19 |
| MW57 | SM85 | 60 | 37.5-57.5 | 461.00 | 463.8141 | | NR | 39.01 | 9/10/2019 | 1615 | 424.80 |
| MW58 | SM86 | 58 | 36.62-56.62 | 469.84 | 472.7246 | 42 | 60.63 | 28.84 | 9/26/2017 | 2128 | 443.88 |
| MW58 | SM86 | 58 | 36.62-56.62 | 469.84 | 472.7246 | | 60.39 | 27.90 | 5/18/2018 | 10:15 | 444.82 |
| MW58 | SM86 | 58 | 36.62-56.62 | 469.84 | 472.7246 | | NR | 26.06 | 5/18/2019 | 19:28 | 446.66 |
| MW58 | SM86 | 58 | 36.62-56.62 | 469.84 | 472.7246 | | NR | 34.73 | 9/10/2019 | 1625 | 437.99 |
| MW59 | SM87 | 161.5 | 140-160 | 432.63 | 435.4785 | 152 | 167.67 | 137.77 | 9/26/2017 | -- | 297.71 |
| MW59 | SM87 | 161.5 | 140-160 | 432.63 | 435.4785 | | 164.18 | 135.56 | 5/18/2018 | 10:54 | 299.92 |
| MW59 | SM87 | 161.5 | 140-160 | 432.63 | 435.4785 | | NR | 132.44 | 5/18/2019 | 18:39 | 303.04 |
| MW59 | SM87 | 161.5 | 140-160 | 432.63 | 435.4785 | | NR | 134.33 | 9/10/2019 | 1545 | 301.15 |

**Notes**

Elevation datum: NAVD88 calculated using GEOID09.

Top of casing (TOC) refers to the top of PVC inner casing.

**Key**

bgs = below ground surface
GW = groundwater
NR = Not Recorded
NTCRA = non-time-critical removal action
PVC = polyvinyl chloride
TD = Total depth
TOC = Top of Casing

**Table 3-2. Red Devil Creek and Seep Discharge**

| Monitoring Location[1] | Estimated Discharge (cfs) | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | August 18, 2011 | May 26, 2012 | September 12, 2012 | June 19, 2015 | September 2, 2015 | September 28 & 29, 2016 | June 1, 2017[2] | September 16, 2017 | September 27, 2017 | May 19, 2018 | May 18, 2019 | September 10, 2019[2] |
| RD02 | 5.96 | Station not monitored | Station not monitored | Station not monitored | Station not monitored | Station not monitored | Station not monitored | Station not monitored | Station not monitored | Station not monitored | Station not monitored | Station not monitored |
| RD03 | 4.09 | Station not monitored | Station not monitored | Station not monitored | Station not monitored | Station not monitored | Station not monitored | Station not monitored | Station not monitored | Station not monitored | Station not monitored | Station not monitored |
| RD10 | 5.52 | 12.18 | 4.64 | 1.25 | 0.48 | 2.45 | 1.20 | 5.22 | Station not monitored | 11.60 | 11.47 | 0.42 |
| RD14 | Station not established | Station not established | Station not established | 1.41 | 0.54 | 3.01 | 1.54 | 6.35 | Station not monitored | 10.84 | 12.87 | 0.37 |
| RD04 | 5.95 | 12.67 | 3.45 | Station not monitored | Station not monitored | Station not monitored | Station not monitored | Station not monitored | Station not monitored | Station not monitored | Station not monitored | Station not monitored |
| RD12 | 8.24 | 10.53 | 3.79 | Station not monitored | Station not monitored | Station not monitored | Station not monitored | Station not monitored | Station not monitored | Station not monitored | Station not monitored | Station not monitored |
| RD13 | Station not established | Station not monitored | Station not monitored | Station not monitored | Station not monitored | Station not monitored | Station not monitored | Station not monitored | Station not monitored | Station not monitored | Station not monitored | Station not monitored |
| RD15 | Station not established | Station not established | Station not established | 1.40 | 0.67 | 3.53 | 1.91 | 6.85 | Station not monitored | 15.80 | 13.04 | 0.41 |
| RD05 (seep) | 0.18 | Station not monitored | 0.16 | 0.23 | 0.19 | 0.35 | 0.01 | 0.05 | Station not monitored | 0.33 | 0.12 | 0.01 |
| RD16 | Station not established | Station not established | Station not established | 1.61 | 0.60 | Station not monitored | Station not monitored | Station not monitored | Station not monitored | Station not monitored | 12.14 | 0.47 |
| RD09 | 5.98 | 13.36 | 3.40 | 1.40 | 0.80 | 2.43 | 1.55 | 6.23 | Station not monitored | 14.87 | Station not monitored | Station not monitored |
| RD06 | 6.81 | 14.47 | 3.80 | 1.54 | 0.79 | 5.51 | 1.26 | 7.08 | Station not monitored | 13.69 | 15.15 | 0.33 |
| RD07 | 7.61 | Not monitored | 3.61 | Station not monitored | Station not monitored | Station not monitored | Station not monitored | Station not monitored | Station not monitored | Station not monitored | Station not monitored | Station not monitored |
| RD08 | 7.19 | 14.20 | 3.09 | 1.90 | 0.81 | Station Inaccessible | 2.15 | 7.38 | 5.21 | 10.41 | 13.12 | 0.26 |

**Notes:**

[1] Locations are organized from upstream to downstream along Red Devil Creek

[2] Flow at RD05 measured using 'bucket method.' Water was collected in a 5-liter volumetric container for 10 seconds. This process was repeated 5 times to generate an average volume per time.

**Key:**

cfs = Cubic feet per second

**Table 3-3. Groundwater Sample Results, Spring 2019**

| Analyte | Station ID | | Units | MW01 | | MW08 | | MW09 | | MW10 | | MW16 | | MW17 | | MW19 | | MW22 | | MW06 | | MW26 | | MW27 | | MW28 | | MW32 | | MW33 | | MW29 | | MW40 | | MW42 | | MW43 | | MW31 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Geographic Area | | | Post-1955 MPA | | | | | | | | | | | | | | | | Pre-1955 MPA | | | | | | | | Red Devil Creek Downstream Alluvial Area and Delta | | | | Surface Mined Area | | | | | | | | Upland Area West of Surface Mined Area | |
| | Sample ID | | | 0519MW01GW | | 0519MW08GW | | 0519MW09GW | | 0519MW10GW | | 0519MW16GW | | 0519MW17GW | | 0519MW19GW | | 0519MW22GW | | 0519MW06GW | | 0519MW26GW | | 0519MW27GW | | 0519MW28GW | | 0519MW32GW | | 0519MW33GW | | 0519MW29GW | | 0519MW40GW | | 0519MW42GW | | 0519MW43GW | | 0519MW31GW | |
| | Method | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Aluminum | Metals (ICP) | SW846 6010B | µg/L | 110 | U | 110 | U | 110 | U | 110 | U | 230 | U | 110 | U | 110 | U | 110 | U | 110 | U | 110 | U | 110 | U | 110 | U | 110 | U | 110 | U | 110 | U | 110 | U | 110 | U | 110 | U | 110 | U |
| Antimony | Metals (ICP/MS) | SW846 6020A | µg/L | 1.1 | J | 0.55 | U | 1.1 | J | 1.1 | J | 970 | | 12 | | 0.73 | J | 1000 | | 6.9 | | 45 | | 9.3 | | 4.2 | | 2.4 | | 350 | | 5.7 | | 14 | | 350 | | 1.7 | J | 1.1 | J |
| Arsenic | Metals (ICP/MS) | SW846 6020A | µg/L | 2.7 | J | 1 | U | 18 | | 96 | | 570 | | 4.5 | J | 1 | U | 250 | | 42 | | 1100 | | 29 | | 94 | | 2.2 | J | 27 | | 37 | | 270 | | 220 | | 310 | | 1 | U |
| Barium | Metals (ICP/MS) | SW846 6020A | µg/L | 62 | | 32 | | 400 | | 92 | | 29 | | 33 | | 44 | | 33 | | 91 | | 420 | | 37 | | 51 | | 13 | | 32 | | 160 | | 120 | | 140 | | 120 | | 3.2 | J |
| Beryllium | Metals (ICP/MS) | SW846 6020A | µg/L | 0.36 | U | 0.36 | U | 0.36 | U | 0.36 | U | 0.36 | U | 0.36 | U | 0.36 | U | 0.36 | U | 0.36 | U | 0.36 | U | 0.36 | U | 0.36 | U | 0.36 | U | 0.36 | U | 0.36 | U | 0.36 | U | 0.36 | U | 0.36 | U | 0.36 | U |
| Cadmium | Metals (ICP/MS) | SW846 6020A | µg/L | 0.5 | U | 0.5 | U | 0.5 | U | 0.5 | U | 0.5 | U | 0.5 | U | 0.5 | U | 0.5 | U | 0.5 | U | 0.5 | U | 0.5 | U | 0.5 | U | 0.5 | U | 0.5 | U | 0.5 | U | 0.5 | U | 0.5 | U | 0.5 | U | 0.5 | U |
| Calcium | Metals (ICP) | SW846 6010B | µg/L | 14000 | | 8500 | | 32000 | | 23000 | | 16000 | | 19000 | | 19000 | | 12000 | | 36000 | | 57000 | | 83000 | | 40000 | | 10000 | | 19000 | | 43000 | | 52000 | | 48000 | | 22000 | | 6800 | |
| Chromium | Metals (ICP/MS) | SW846 6020A | µg/L | 0.87 | U | 0.87 | U | 0.87 | U | 0.87 | U | 0.87 | U | 0.87 | U | 0.87 | U | 0.87 | U | 0.87 | U | 0.87 | U | 0.87 | U | 0.87 | U | 0.87 | U | 0.87 | U | 0.87 | U | 0.87 | U | 0.87 | U | 0.87 | U | 0.93 | J |
| Cobalt | Metals (ICP/MS) | SW846 6020A | µg/L | 0.2 | U | 0.2 | U | 3.1 | | 0.2 | U | 2.9 | | 0.2 | U | 0.43 | J | 0.2 | U | 2.1 | | 21 | | 1.4 | J | 2.9 | | 0.2 | U | 0.2 | U | 0.3 | J | 29 | | 16 | | 23 | | 0.2 | U |
| Copper | Metals (ICP/MS) | SW846 6020A | µg/L | 3 | U | 3 | U | 3 | U | 3 | U | 4.5 | J | 3 | U | 3 | U | 3 | U | 3 | U | 3 | U | 3.5 | J | 3 | U | 3 | U | 3 | U | 3 | U | 3 | U | 3 | U | 3 | U | 3 | U |
| Iron | Metals (ICP) | SW846 6010B | µg/L | 140 | U | 140 | U | 2700 | | 1200 | | 3800 | | 140 | U | 140 | U | 140 | U | 5400 | | 47000 | | 140 | U | 1500 | | 140 | U | 180 | J | 1800 | | 140 | U | 850 | | 3700 | | 140 | U |
| Lead | Metals (ICP/MS) | SW846 6020A | µg/L | 1 | U | 1 | U | 1 | U | 1 | U | 1 | U | 1 | U | 1 | U | 1 | U | 1 | U | 1 | U | 1 | U | 1 | U | 1 | U | 1 | U | 1 | U | 1 | U | 1 | U | 1 | U | 1 | U |
| Magnesium | Metals (ICP) | SW846 6010B | µg/L | 10000 | | 6400 | | 21000 | | 34000 | | 38000 | | 14000 | | 13000 | | 9900 | | 33000 | | 33000 | | 51000 | | 30000 | | 8300 | | 14000 | | 43000 | | 57000 | | 36000 | | 17000 | | 4700 | |
| Manganese | Metals (ICP/MS) | SW846 6020A | µg/L | 5.9 | J | 2.3 | U | 4200 | | 140 | | 1600 | | 5.2 | J | 77 | | 2.3 | U | 640 | | 5300 | | 690 | | 750 | | 5.2 | J | 2.3 | U | 290 | | 320 | | 1100 | | 2700 | | 2.3 | U |
| Mercury | Mercury (CVAA) | SW846 7470A | µg/L | 0.15 | U | 0.15 | U | 0.15 | U | 0.15 | U | 0.56 | | 0.15 | U | 0.15 | U | 0.15 | U | 0.15 | U | 0.56 | | 0.15 | U | 1.8 | | 0.15 | U | 0.15 | U | 0.15 | U | 0.15 | U | 0.15 | U | 0.15 | U | 0.15 | U |
| Nickel | Metals (ICP/MS) | SW846 6020A | µg/L | 1.3 | J | 0.65 | J | 4.9 | J | 0.62 | U | 4.8 | J | 0.62 | U | 0.79 | J | 1.5 | J | 3.2 | J | 19 | | 17 | | 8.1 | J | 4 | J | 0.87 | J | 1.2 | J | 110 | | 62 | | 62 | | 0.62 | U |
| Potassium | Metals (ICP) | SW846 6010B | µg/L | 430 | J | 410 | U | 480 | J | 1100 | U | 1900 | U | 410 | U | 410 | U | 420 | U | 870 | U | 3200 | J | 1300 | J | 900 | J | 410 | J | 700 | J | 730 | U | 820 | U | 780 | J | 500 | U | 410 | U |
| Selenium | Metals (ICP/MS) | SW846 6020A | µg/L | 10 | U | 10 | U | 10 | U | 10 | U | 10 | U | 10 | U | 10 | U | 10 | U | 10 | U | 10 | U | 10 | U | 10 | U | 10 | U | 10 | U | 10 | U | 10 | U | 10 | U | 10 | U | 10 | U |
| Silver | Metals (ICP/MS) | SW846 6020A | µg/L | 0.28 | U | 0.28 | U | 0.28 | U | 0.28 | U | 0.28 | U | 0.28 | U | 0.28 | U | 0.28 | U | 0.28 | U | 0.28 | U | 0.28 | U | 0.28 | U | 0.28 | U | 0.28 | U | 0.28 | U | 0.28 | U | 0.28 | U | 0.28 | U | 0.28 | U |
| Sodium | Metals (ICP) | SW846 6010B | µg/L | 2100 | | 1300 | J | 2700 | | 3700 | | 4000 | | 2600 | | 2400 | | 2200 | | 5100 | | 5100 | | 15000 | | 11000 | | 1600 | J | 4900 | | 2200 | | 2100 | | 3700 | | 3600 | | 1600 | U |
| Thallium | Metals (ICP/MS) | SW846 6020A | µg/L | 0.33 | U | 0.33 | U | 0.33 | U | 0.33 | U | 0.33 | U | 0.33 | U | 0.33 | U | 0.33 | U | 0.33 | U | 0.33 | U | 0.33 | U | 0.33 | U | 0.33 | U | 0.33 | U | 0.33 | U | 0.33 | U | 0.33 | U | 0.33 | U | 0.33 | U |
| Vanadium | Metals (ICP/MS) | SW846 6020A | µg/L | 4.1 | J | 4.3 | J | 3.7 | J | 6.5 | J | 2.7 | J | 2.3 | U | 2.3 | U | 2.3 | U | 6.6 | J | 5.4 | U | 6.2 | U | 7.8 | U | 7.3 | U | 7.9 | U | 7.3 | U | 7.3 | U | 8.5 | U | 8.5 | U | 2.3 | U |
| Zinc | Metals (ICP/MS) | SW846 6020A | µg/L | 9.5 | U | 9.5 | U | 9.5 | U | 9.5 | U | 9.5 | U | 9.5 | U | 9.5 | U | 9.5 | U | 9.5 | U | 9.5 | U | 10 | J | 9.5 | U | 9.5 | U | 9.5 | U | 9.5 | U | 10 | J | 9.5 | U | 9.5 | U | 9.5 | U |
| **Total Low Level Mercury** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Mercury | Total Mercury by EPA 1631 | EPA 1631 | ng/L | 7.79 | | 6.22 | | 18.3 | | 7.69 | | 650 | | 68.3 | | 4.35 | | 240 | | 5.36 | | 646 | | 560 | | 1790 | | 52 | | 10.3 | | 18 | | 8.9 | | 94.1 | | 10.7 | | 4.8 | |
| **Dissolved Low Level Mercury** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Mercury | Dissolved Mercury by EPA 1631 | EPA 1631 | ng/L | 4.19 | | 2.52 | | 5.67 | | 1.99 | | 252 | | 16.7 | | 1.64 | | 143 | | 0.65 | | 120 | | 419 | | 647 | | 8.46 | | 4.8 | | 6.01 | | 2.01 | | 39.7 | | 0.64 | | 4 | |
| **Semivolatile Organic Compounds** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Butyl benzyl phthalate | Semivolatile Organic Compounds (GC/MS) | SW846 8270D | µg/L | | | | | | | | | | | | | 0.36 | UJ | 0.35 | UJ | | | | | | | | | | | | | | | | | | | | | | |
| Di-n-butyl phthalate | Semivolatile Organic Compounds (GC/MS) | SW846 8270D | µg/L | | | | | | | | | | | | | 0.53 | UJ | 0.52 | UJ | | | | | | | | | | | | | | | | | | | | | | |
| 2-Fluorobiphenyl | Semivolatile Organic Compounds (GC/MS) | SW846 8270D | µg/L | | | | | | | | | | | | | 69 | | 68 | | | | | | | | | | | | | | | | | | | | | | |
| **Benzene, Toluene, Ethylbenzene, and Xylenes** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Benzene | Volatile Organic Compounds (GC/MS) | SW846 8260C | µg/L | | | | | | | | | | | | | 0.53 | U | 0.53 | U | | | | | | | | | | | | | | | | | | | | | | |
| Toluene | Volatile Organic Compounds (GC/MS) | SW846 8260C | µg/L | | | | | | | | | | | | | 0.39 | U | 0.39 | U | | | | | | | | | | | | | | | | | | | | | | |
| Ethylbenzene | Volatile Organic Compounds (GC/MS) | SW846 8260C | µg/L | | | | | | | | | | | | | 0.5 | U | 0.5 | U | | | | | | | | | | | | | | | | | | | | | | |
| m-Xylene & p-Xylene | Volatile Organic Compounds (GC/MS) | SW846 8260C | µg/L | | | | | | | | | | | | | 0.75 | U | 0.75 | U | | | | | | | | | | | | | | | | | | | | | | |
| o-Xylene | Volatile Organic Compounds (GC/MS) | SW846 8260C | µg/L | | | | | | | | | | | | | 0.39 | U | 0.39 | U | | | | | | | | | | | | | | | | | | | | | | |
| **Gasoline Range Organics and Diesel Range Organics** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Gasoline Range Organics (GRO)-C6-C10 | Alaska - Gasoline Range Organics (GC) | ADEC AK102 | mg/L | | | | | | | | | | | | | 0.1 | U | 0.1 | U | | | | | | | | | | | | | | | | | | | | | | |
| DRO (nC10-<nC25) | Alaska - Diesel Range Organics & Residual Range Organics (GC) | ADEC AK102 & 103 | mg/L | | | | | | | | | | | | | 0.11 | UJ | 0.13 | UJ | | | | | | | | | | | | | | | | | | | | | | |
| **General Chemistry** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Alkalinity | Alkalinity | SM 2320B | mg/L | 58 | | 40 | | 150 | | 160 | | 78 J | | 93 | | 84 | | 58 | | 160 | | 210 | | 230 | | 180 | | 45 | | 81 J | | 220 | | 290 | | 220 | | 110 | | 38 | |
| Bicarbonate Alkalinity as CaCO3 | Alkalinity | SM 2320B | mg/L | 58 | | 40 | | 150 | | 160 | | 78 | | 93 | | 84 | | 58 | | 160 | | 210 | | 230 | | 180 | | 45 | | 81 | | 220 | | 290 | | 220 | | 110 | | 38 | |
| Carbonate Alkalinity as CaCO3 | Alkalinity | SM 2320B | mg/L | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U |
| Chloride | Anions, Ion Chromatography | MCAWW 300.0 | mg/L | 0.83 | J | 0.98 | | 0.85 | J | 0.81 | U | 0.85 | J | 0.82 | J | 0.69 | J | 0.65 | J | 0.84 | U | 0.67 | U | 0.84 | U | 0.82 | U | 0.71 | U | 1.1 | U | 0.67 | J | 0.75 | J | 0.64 | U | 0.71 | J | 0.72 | J |
| Fluoride | Anions, Ion Chromatography | MCAWW 300.1 | mg/L | 0.03 | U | 0.13 | J | 0.19 | J | 0.16 | J | 0.29 | | 0.14 | U | 0.15 | J | 0.13 | J | 0.2 | | 0.23 | | 0.18 | J | 0.23 | | 0.03 | U | 0.098 | J | 0.2 | | 0.28 | | 0.17 | J | 0.26 | | 0.094 | J |
| Hydroxide Alkalinity as CaCO3 | Alkalinity | SM 2320B | mg/L | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 0.03 | U |
| Nitrate Nitrite as N | Nitrogen, Nitrate-Nitrite | MCAWW 353.2 | mg/L | 0.33 | | 0.63 | | 0.06 | UJ | 0.06 | U | 0.092 | J | 0.086 | J | 0.13 | J | 0.06 | U | 0.06 | U | 0.06 | UJ | 0.69 | | 0.06 | U | 5.8 | | 3.7 | | 0.06 | U | 0.06 | U | 0.06 | U | 0.06 | U | 0.064 | J |
| Sulfate | Anions, Ion Chromatography | MCAWW 300.2 | mg/L | 14 | | 4 | | 21 | | 8.9 | | 110 | | 5.7 | | 5.9 | | 5.9 | | 33 | | 63 | | 160 | | 44 | | 6 | | 16 | | 30 | | 19 | | 18 | | 9 | | 1.3 | |
| Total Suspended Solids | Solids, Total Suspended (TSS) | SM 2540D | mg/L | 2 | | 2 | U | 4.4 | | 2 | U | 6.6 | | 2 | U | 2 | U | 2 | U | 6.8 | | 52 | | 2 | U | 52 | | 2 | U | 2 | U | 5.4 | | 2 | U | 4.2 | J | 6.8 | | 2 | UJ |
| **Field Water Quality Parameters** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Temperature | Field Measurement | | Deg C | 7.92 | | 3.88 | | 12.81 | | 5.97 | | 5.77 | | 5.52 | | 4.3 | | 6.6 | | 5.74 | | 6.59 | | 12.39 | | 9.06 | | 5.62 | | 4.36 | | 4.54 | | 6.4 | | 5.26 | | 7.02 | | 7.37 | |
| pH | Field Measurement | | pH Units | 6.05 | | 6.5 | | 6.67 | | 7.35 | | 6.32 | | 6.73 | | 7.3 | | 6.48 | | 6.59 | | 6.57 | | 6.13 | | 6.54 | | 5.86 | | 5.9 | | 6.69 | | 6.85 | | 6.65 | | 6.41 | | 6.36 | |
| Conductivity | Field Measurement | | mS/cm | 0.103 | | 0.060 | | 0.279 | | 0.226 | | 0.215 | | 0.119 | | 0.104 | | 0.076 | | 0.452 | | 0.717 | | 0.862 | | 0.343 | | 0.082 | | 0.134 | | 0.308 | | 0.400 | | 0.333 | | 0.167 | | 0.050 | |
| Turbidity | Field Measurement | | NTU | 6.52 | | 5.61 | | 1.71 | | 2.41 | | 31.28 | | 0.01 | | 5.86 | | 2.78 | | 2.47 | | 1.46 | | 1.46 | | 83.65 | | 3.86 | | 0.03 | | 7.59 | | 1.36 | | 8.59 | | 2.56 | | 1.17 | |
| Dissolved Oxygen | Field Measurement | | mg/L | 3.63 | | 11.37 | | 2.19 | | 0.19 | | 1.72 | | 10.85 | | 6.83 | | 6.83 | | 0.86 | | 2.03 | | 2.03 | | 2.65 | | 9.15 | | 11.2 | | 1.17 | | 1.9 | | 1.77 | | 1.52 | | 11.48 | |
| Oxidation-Reduction Potential | Field Measurement | | mV | 132.8 | | 227.3 | | 53.5 | | -29.9 | | 105.8 | | 143.7 | | 198.3 | | 170.6 | | 21.7 | | -50.6 | | 179.5 | | 54 | | 250 | | 155.6 | | 79.8 | | 44.1 | | 65.1 | | 59.2 | | 209.4 | |

**Key**
µg/L = Micrograms per liter
ADEC = Alaska Department of Environmental Conservation
Deg C = Degrees Celsius.
EPA = United States Environmental Protection Agency
GC/MS = Gas Chromatography/Mass Spectrometry
ICP/ MS = Inductively coupled plasma/mass spectrometry
J = The analyte was detected. The associated result is estimated.
mg/L = milligrams per liter
mS/cm = Millisiemens per centimeter
mV = Millivolts
ng/L = Nanograms per liter
NTU = Nephelometric turbidity units
U = The analyte was analyzed for but not detected. The value provided is the method detection limit.
UJ = The analyte was analyzed for but not detected. The associated reporting limit is estimated.

**Table 3-3. Groundwater Sample Results, Spring 2019**

| Analyte | Station ID | | Units | MW44 | | MW45 | | MW46 | | MW47 | | MW48 | | MW49 | | MW50 | | MW51 | | MW52 | | MW53 | | MW54 | | MW55 | | MW56 | | MW57 | | MW58 | | MW59 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Geographic Area | | | Vicinity of the Proposed Repository | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Sample ID | | | 0519MW44GW | | 0519MW45GW | | 0519MW46GW | | 0519MW47GW | | 0519MW48GW | | 0519MW49GW | | 0519MW50GW | | 0519MW51GW | | 0519MW52GW | | 0519MW53GW | | 0519MW54GW | | 0519MW55GW | | 0519MW56GW | | 0519MW57GW | | 0519MW58GW | | 0519MW59GW | |
| | Method | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Aluminum | Metals (ICP) | SW846 6010B | µg/L | 110 | U | 120 | U | 130 | U | 110 | U | 110 | U | 170 | U | 630 | U | 170 | U | 110 | U | 410 | U | 180 | U | 110 | U | 110 | U | 110 | U | 110 | U | 140 | U |
| Antimony | Metals (ICP/MS) | SW846 6020A | µg/L | 0.55 | U | 0.55 | U | 0.55 | U | 0.55 | U | 1.4 | J | 0.55 | U | 8.2 | | 0.55 | U | 0.55 | U | 0.55 | U | 1.1 | J | 8.1 | | 0.55 | U | 0.55 | U | 0.55 | U | 0.55 | U |
| Arsenic | Metals (ICP/MS) | SW846 6020A | µg/L | 1.4 | J | 1.5 | J | 1 | U | 1 | U | 1 | U | 1.9 | J | 350 | | 5.9 | | 5.3 | | 1 | U | 51 | | 19 | | 1 | U | 1 | U | 1.9 | J | 53 | |
| Barium | Metals (ICP/MS) | SW846 6020A | µg/L | 25 | | 1.5 | J | 2.1 | J | 1.1 | U | 15 | | 2.1 | J | 300 | | 41 | | 3.7 | J | 120 | | 120 | | 77 | | 70 | | 4 | J | 93 | | 290 | |
| Beryllium | Metals (ICP/MS) | SW846 6020A | µg/L | 0.36 | U | 0.36 | U | 0.36 | U | 0.36 | U | 0.36 | U | 0.36 | U | 0.36 | U | 0.36 | U | 0.36 | U | 0.36 | U | 0.36 | U | 0.36 | U | 0.36 | U | 0.36 | U | 0.36 | U | 0.36 | U |
| Cadmium | Metals (ICP/MS) | SW846 6020A | µg/L | 0.5 | U | 0.5 | U | 0.5 | U | 0.5 | U | 0.5 | U | 0.5 | U | 0.5 | U | 0.5 | U | 0.5 | U | 0.5 | U | 0.5 | U | 0.5 | U | 0.5 | U | 0.5 | U | 0.5 | U | 0.5 | U |
| Calcium | Metals (ICP) | SW846 6010B | µg/L | 42000 | | 20000 | | 9000 | | 14000 | | 12000 | | 13000 | | 80000 | | 24000 | | 12000 | | 21000 | | 42000 | | 21000 | | 51000 | | 6300 | | 32000 | | 54000 | |
| Chromium | Metals (ICP/MS) | SW846 6020A | µg/L | 0.87 | U | 0.87 | U | 0.87 | U | 0.87 | U | 0.87 | U | 0.87 | U | 1.2 | J | 0.87 | U | 0.87 | U | 0.92 | J | 0.9 | J | 0.87 | U | 0.87 | U | 0.87 | U | 0.87 | U | 0.87 | U |
| Cobalt | Metals (ICP/MS) | SW846 6020A | µg/L | 2.8 | | 0.2 | U | 0.2 | U | 0.2 | U | 0.2 | U | 0.2 | U | 2.3 | | 1.3 | J | 0.29 | J | 0.55 | J | 1.4 | J | 5.3 | | 3.3 | | 0.2 | U | 0.34 | J | 1.1 | J |
| Copper | Metals (ICP/MS) | SW846 6020A | µg/L | 3 | U | 3 | U | 3 | U | 3 | U | 3 | U | 3 | U | 3 | U | 3 | U | 3 | U | 3 | U | 3 | U | 3 | U | 3 | U | 3 | U | 3 | U | 3 | U |
| Iron | Metals (ICP) | SW846 6010B | µg/L | 1200 | | 180 | J | 140 | U | 140 | U | 140 | U | 140 | U | 1300 | | 140 | U | 140 | U | 280 | U | 3200 | | 9700 | | 140 | U | 370 | U | 2400 | | 1300 | |
| Lead | Metals (ICP/MS) | SW846 6020A | µg/L | 1 | U | 1 | U | 1 | U | 1 | U | 1 | U | 1 | U | 1 | U | 1 | U | 1 | U | 1 | U | 1 | U | 1 | U | 1 | U | 1 | U | 1 | U | 1 | U |
| Magnesium | Metals (ICP) | SW846 6010B | µg/L | 36000 | | 17000 | | 11000 | | 15000 | | 10000 | | 9300 | | 63000 | | 22000 | | 6600 | | 12000 | | 41000 | | 15000 | | 47000 | | 3300 | | 25000 | | 52000 | |
| Manganese | Metals (ICP/MS) | SW846 6020A | µg/L | 650 | | 2.4 | J | 3.1 | J | 7.3 | J | 2.3 | U | 11 | | 890 | | 140 | | 22 | | 110 | | 350 | | 1100 | | 1500 | | 4.5 | J | 93 | | 370 | |
| Mercury | Mercury (CVAA) | SW846 7470A | µg/L | 0.15 | U | 0.15 | U | 0.15 | U | 0.15 | U | 0.15 | U | 0.15 | U | 1.4 | | 0.15 | U | 0.15 | U | 0.15 | U | 0.15 | U | 0.15 | U | 0.15 | U | 0.15 | U | 0.15 | U | 0.15 | U |
| Nickel | Metals (ICP/MS) | SW846 6020A | µg/L | 2.6 | J | 0.62 | U | 0.62 | U | 0.62 | U | 0.67 | J | 1.8 | J | 6.5 | J | 1.5 | J | 1.4 | J | 1.4 | J | 6.9 | J | 7.7 | J | 7.1 | J | 1.7 | J | 2.3 | J | 3.2 | J |
| Potassium | Metals (ICP) | SW846 6010B | µg/L | 500 | U | 570 | U | 460 | U | 430 | U | 480 | U | 530 | U | 970 | U | 410 | U | 410 | U | 410 | U | 630 | U | 660 | U | 490 | U | 410 | U | 410 | U | 600 | U |
| Selenium | Metals (ICP/MS) | SW846 6020A | µg/L | 10 | U | 10 | U | 10 | U | 10 | U | 10 | U | 10 | U | 10 | U | 10 | U | 10 | U | 10 | U | 10 | U | 10 | U | 10 | U | 10 | U | 10 | U | 10 | U |
| Silver | Metals (ICP/MS) | SW846 6020A | µg/L | 0.28 | U | 0.28 | U | 0.28 | U | 0.28 | U | 0.28 | U | 0.28 | U | 0.28 | U | 0.28 | U | 0.28 | U | 0.28 | U | 0.28 | U | 0.28 | U | 0.28 | U | 0.28 | U | 0.28 | U | 0.28 | U |
| Sodium | Metals (ICP) | SW846 6010B | µg/L | 2300 | | 1300 | J | 1200 | J | 1800 | J | 1700 | J | 1900 | J | 2700 | | 2200 | | 2800 | | 2200 | | 330 | U | 11000 | | 1400 | U | 2600 | | 1800 | U | 1800 | U |
| Thallium | Metals (ICP/MS) | SW846 6020A | µg/L | 0.33 | U | 0.33 | U | 0.33 | U | 0.33 | U | 0.33 | U | 0.33 | U | 0.33 | U | 0.33 | U | 0.33 | U | 0.33 | U | 0.33 | U | 0.33 | U | 0.33 | U | 0.33 | U | 0.33 | U | 0.33 | U |
| Vanadium | Metals (ICP/MS) | SW846 6020A | µg/L | 5 | J | 4.1 | J | 4.2 | J | 4.5 | J | 4.1 | J | 4.4 | J | 5.2 | U | 2.3 | U | 2.3 | U | 2.3 | U | 2.5 | U | 2.3 | U | 2.3 | U | 2.3 | U | 2.3 | U | 2.3 | U |
| Zinc | Metals (ICP/MS) | SW846 6020A | µg/L | 9.5 | U | 9.5 | U | 9.5 | U | 9.5 | U | 9.5 | U | 9.5 | U | 9.5 | U | 9.5 | U | 9.5 | U | 9.5 | U | 9.5 | U | 10 | J | 9.5 | U | 9.5 | U | 9.5 | U | 15 | J |
| **Total Low Level Mercury** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Mercury | Total Mercury by EPA 1631 | EPA 1631 | ng/L | 2.69 | | 16 | | 21.6 | | 3.11 | | 15.2 | | 66.3 | | 1750 | | 12 | | 14.1 | | 175 | | 89.7 | | 51.4 | | 12.5 | | 52.2 | | 3.15 | | 19 | |
| **Dissolved Low Level Mercury** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Mercury | Dissolved Mercury by EPA 1631 | EPA 1631 | ng/L | 0.62 | | 4.35 | | 8.2 | | 0.96 | | 5.98 | | 17.6 | | 206 | | 3.62 | | 3.06 | | 18.8 | | 3.09 | | 27.8 | | 1.14 | | 24.3 | | 0.51 | | 1.24 | |
| **Semivolatile Organic Compounds** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Butyl benzyl phthalate | Semivolatile Organic Compounds (GC/MS) | SW846 8270D | µg/L | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Di-n-butyl phthalate | Semivolatile Organic Compounds (GC/MS) | SW846 8270D | µg/L | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2-Fluorobiphenyl | Semivolatile Organic Compounds (GC/MS) | SW846 8270D | µg/L | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Benzene, Toluene, Ethylbenzene, and Xylenes** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Benzene | Volatile Organic Compounds (GC/MS) | SW846 8260C | µg/L | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Toluene | Volatile Organic Compounds (GC/MS) | SW846 8260C | µg/L | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Ethylbenzene | Volatile Organic Compounds (GC/MS) | SW846 8260C | µg/L | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| m-Xylene & p-Xylene | Volatile Organic Compounds (GC/MS) | SW846 8260C | µg/L | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| o-Xylene | Volatile Organic Compounds (GC/MS) | SW846 8260C | µg/L | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Gasoline Range Organics and Diesel Range Organics** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Gasoline Range Organics (GRO)-C6-C10 | Alaska - Gasoline Range Organics (GC) | ADEC AK102 | mg/L | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DRO (nC10-<nC25) | Alaska - Diesel Range Organics & Residual Range Organics (GC) | ADEC AK102 & 103 | mg/L | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **General Chemistry** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Alkalinity | Alkalinity | SM 2320B | mg/L | 200 | | 98 | | 57 | | 82 | | 61 | | 46 | | 380 | | 130 | | 49 | | 84 | | 230 | | 110 | | 270 | | 33 | | 140 | | 300 | |
| Bicarbonate Alkalinity as CaCO3 | Alkalinity | SM 2320B | mg/L | 200 | | 98 | | 57 | | 82 | | 61 | | 46 | | 380 | | 130 | | 49 | | 84 | | 230 | | 110 | | 270 | | 33 | | 140 | | 300 | |
| Carbonate Alkalinity as CaCO3 | Alkalinity | SM 2320B | mg/L | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U |
| Chloride | Anions, Ion Chromatography | MCAWW 300.0 | mg/L | 0.94 | | 0.86 | J | 0.76 | J | 0.98 | | 0.77 | J | 0.67 | J | 0.9 | | 0.66 | J | 0.57 | J | 0.91 | | 0.81 | J | 0.78 | J | 0.68 | J | 0.81 | J | 0.61 | J | 0.85 | J |
| Fluoride | Anions, Ion Chromatography | MCAWW 300.1 | mg/L | 0.3 | | 0.14 | J | 0.2 | | 0.18 | J | 0.077 | J | 0.082 | J | 0.16 | J | 0.22 | | 0.08 | J | 0.19 | J | 0.27 | | 0.17 | J | 0.25 | | 0.13 | J | 0.32 | | 0.25 | |
| Hydroxide Alkalinity as CaCO3 | Alkalinity | SM 2320B | mg/L | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U |
| Nitrate Nitrite as N | Nitrogen, Nitrate-Nitrite | MCAWW 353.2 | mg/L | 0.06 | UJ | 0.36 | | 1.1 | | 0.61 | | 1.9 | | 6 | | 0.06 | U | 0.064 | J | 1.6 | | 0.12 | J | 0.06 | U | 0.38 | | 0.35 | | 0.13 | J | 0.06 | U | 0.06 | U |
| Sulfate | Anions, Ion Chromatography | MCAWW 300.2 | mg/L | 6.5 | | 3.9 | | 1.9 | | 3.2 | | 3.6 | | 2.4 | | 7 | | 2.3 | | 1.5 | | 3.9 | | 9.3 | | 7.3 | | 4 | | 2.4 | | 9.4 | | 5.7 | |
| Total Suspended Solids | Solids, Total Suspended (TSS) | SM 2540D | mg/L | 3.2 | | 2.2 | J | 2 | UJ | 2 | U | 2 | U | 2 | | 23 | | 4.4 | | 2 | U | 8.8 | | 12 | | 17 | | 3.8 | | 2 | UJ | 3 | J | 8.6 | |
| **Field Water Quality Parameters** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Temperature | Field Measurement | | Deg C | 5.3 | | 4.75 | | 5.29 | | 8.98 | | 5.16 | | 5.14 | | 7.3 | | 5.67 | | 6.96 | | 5.09 | | 6.25 | | 5.32 | | 6.01 | | 6.91 | | 7.9 | | 5.63 | |
| pH | Field Measurement | | pH Units | 7 | | 6.58 | | 6.55 | | 6.39 | | 6.07 | | 5.78 | | 6.55 | | 6.54 | | 6.01 | | 6.22 | | 6.7 | | 6.09 | | 6.58 | | 6.12 | | 6.86 | | 6.75 | |
| Conductivity | Field Measurement | | mS/cm | 0.268 | | 0.134 | | 0.86 | | 0.119 | | 0.094 | | 0.091 | | 0.494 | | 0.165 | | 0.075 | | 0.104 | | 0.305 | | 0.178 | | 0.338 | | 0.043 | | 0.234 | | 0.369 | |
| Turbidity | Field Measurement | | NTU | 1.99 | | 6.22 | | 7.96 | | 6.05 | | 4.41 | | 8.15 | | 23.97 | | 10.85 | | 5.52 | | 7.38 | | 18.9 | | 25.47 | | 5.66 | | 2 | | 2.95 | | 8.23 | |
| Dissolved Oxygen | Field Measurement | | mg/L | 1.67 | | 8.09 | | 11.59 | | 10.43 | | 8.73 | | 8.73 | | 2.72 | | 4.77 | | -- | | 9.15 | | 1.79 | | 4.84 | | 2.38 | | 10.67 | | 1.4 | | 3.66 | |
| Oxidation-Reduction Potential | Field Measurement | | mV | 4.3 | | 259.3 | | 99.1 | | 128.2 | | 227.3 | | 258.4 | | 66.9 | | 123.6 | | 150.8 | | 137.3 | | 14.9 | | 114.2 | | 114.1 | | 233.5 | | 47 | | 51.5 | |

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EPA = United States Environmental Protection Agency
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ICP/ MS = Inductively coupled plasma/mass spectrometry
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NTU = Nephelometric turbidity units
U = The analyte was analyzed for but not detected. The value provided is the method detection limit.
UJ = The analyte was analyzed for but not detected. The associated reporting limit is estimated.

**Table 3-4. Surface Water Sample Results, Spring 2019**

| Analyte | Station ID | Geographic Area | Sample ID | Method | Units | Water Quality Comparison Criteria: Hardness-Dependent Aquatic Life Water Quality Criterion | Water Quality Comparison Criteria: National Recommended Water Quality Criteria; Fresh Water; Aquatic Life Criteria; CMC - Acute (1) | Water Quality Comparison Criteria: National Recommended Water Quality Criteria; Fresh Water; Aquatic Life Criteria; CCC - Chronic (2) | Water Quality Comparison Criteria: Alaska Water Quality Criteria for Toxics and Other Deleterious Substances; Aquatic Life for Fresh Water; Acute - CMC (3) | Water Quality Comparison Criteria: Alaska Water Quality Criteria for Toxics and Other Deleterious Substances; Aquatic Life for Fresh Water; Chronic - CCC (4) | RD10 Red Devil Creek 0519RD10SW | | RD14 Red Devil Creek 0519RD14SW | | RD15 Red Devil Creek 0519RD15SW | | RD05 Seep 0519RD05SW | | RD16 Red Devil Creek 0519RD06SW | | RD06 Red Devil Creek 0519RD06SW | | RD08 Red Devil Creek 0519RD08SW | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Total Inorganic Elements** | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Aluminum | Metals (ICP) | SW846 6010B | | | µg/L | | | | | | 110 | U | 110 | U | 130 | J | 110 | U | 110 | U | 410 | J | 330 | J |
| Antimony | Metals (ICP/MS) | SW846 6020A | | | µg/L | | | | | | 2.4 | | 24 | | 50 | | 210 | | 80 | | 180 | | 210 | |
| Arsenic | Metals (ICP/MS) | SW846 62A | | | µg/L | | | | | | 1.5 | J | 11 | | 20 | | 570 | | 32 | | 55 | | 63 | |
| Barium | Metals (ICP/MS) | SW846 6020A | | | µg/L | | | | | | 17 | | 17 | | 18 | | 88 | | 20 | | 24 | | 24 | |
| Beryllium | Metals (ICP/MS) | SW846 6020A | | | µg/L | | | | | | 0.36 | U | 0.36 | U | 0.36 | U | 0.36 | U | 0.36 | U | 0.36 | U | 0.36 | U |
| Cadmium | Metals (ICP/MS) | SW846 6020A | | | µg/L | | | | | | 0.5 | U | 0.5 | U | 0.5 | U | 0.5 | U | 0.5 | U | 0.5 | U | 0.5 | U |
| Calcium | Metals (ICP) | SW846 6010B | | | µg/L | | | | | | 12000 | | 11000 | | 11000 | | 41000 | | 12000 | | 12000 | | 12000 | |
| Chromium | Metals (ICP/MS) | SW846 6020A | | | µg/L | | | | | | 0.87 | U | 0.87 | U | 0.87 | U | 0.87 | U | 0.87 | U | 0.95 | J | 0.94 | J |
| Cobalt | Metals (ICP/MS) | SW846 6020A | | | µg/L | | | | | | 0.2 | U | 0.2 | U | 0.2 | U | 5.8 | | 0.24 | J | 0.34 | J | 0.34 | J |
| Copper | Metals (ICP/MS) | SW846 6020A | | | µg/L | | | | | | 3 | U | 3 | U | 3 | U | 3 | U | 3 | U | 3 | U | 3 | U |
| Iron | Metals (ICP) | SW846 6010B | | | µg/L | | | | | | 140 | U | 200 | J | 230 | J | 1200 | | 210 | J | 500 | | 450 | J |
| Lead | Metals (ICP/MS) | SW846 6020A | | | µg/L | | | | | | 1 | U | 1 | U | 1 | U | 1 | U | 1 | U | 1 | U | 1 | U |
| Magnesium | Metals (ICP) | SW846 6010B | | | µg/L | | | | | | 6700 | | 6500 | | 6400 | | 44000 | | 7300 | | 7600 | | 7800 | |
| Manganese | Metals (ICP/MS) | SW846 6020A | | | µg/L | | | | | | 11 | | 10 | | 13 | | 220 | | 15 | | 19 | | 19 | |
| Mercury | Mercury (CVAA) | SW846 7470A | | | µg/L | | | | | | 0.15 | U | 0.15 | U | 0.15 | U | 0.15 | U | 0.15 | U | 0.3 | | 0.19 | J |
| Nickel | Metals (ICP/MS) | SW846 6020A | | | µg/L | | | | | | 0.62 | U | 0.62 | U | 0.7 | J | 24 | | 0.76 | J | 1.2 | J | 1.3 | J |
| Potassium | Metals (ICP) | SW846 6010B | | | µg/L | | | | | | 410 | U | 410 | U | 410 | U | 1300 | J | 410 | U | 480 | J | 410 | U |
| Selenium | Metals (ICP/MS) | SW846 6020A | | | µg/L | | | | | | 10 | U | 10 | U | 10 | U | 10 | U | 10 | U | 10 | U | 10 | U |
| Silver | Metals (ICP/MS) | SW846 6020A | | | µg/L | | | | | | 0.28 | U | 0.28 | U | 0.28 | U | 0.28 | U | 0.28 | U | 0.28 | U | 0.28 | U |
| Sodium | Metals (ICP) | SW846 6010B | | | µg/L | | | | | | 1400 | J | 1400 | J | 1300 | J | 9800 | | 1500 | J | 1600 | J | 1600 | J |
| Thallium | Metals (ICP/MS) | SW846 6020A | | | µg/L | | | | | | 0.33 | U | 0.33 | U | 0.33 | U | 0.33 | U | 0.33 | U | 0.33 | U | 0.33 | U |
| Vanadium | Metals (ICP/MS) | SW846 6020A | | | µg/L | | | | | | 4.7 | U | 6 | U | 6.4 | U | 7.9 | U | 6.9 | U | 8.1 | U | 7.7 | U |
| Zinc | Metals (ICP/MS) | SW846 6020A | | | µg/L | | | | | | 9.5 | U | 9.5 | U | 9.5 | U | 10 | J | 9.5 | U | 9.5 | U | 9.5 | U |
| **Total Low Level Mercury** | | | | | | | | | | | | | | | | | | | | | | | | |
| Mercury | Total Mercury by EPA 1631 | EPA 1631 | | | ng/L | | | | | | 10.7 | | 1020 | | 274 | | 113 | | 3940 | | 826 | | 1020 | |
| **Dissolved Inorganic Elements** | | | | | | | | | | | | | | | | | | | | | | | | |
| Aluminum | Metals (ICP) (DISSOLVED) | SW846 6010B | | | µg/L | | 750 | 87 | 750 | 87 | 110 | U | 110 | U | 110 | U | 110 | U | 110 | U | 110 | U | 110 | U |
| Antimony | Metals (ICP/MS) (DISSOLVED) | SW846 6020A | | | µg/L | | | | | | 2.7 | | 86 | | 55 | | 200 | | 140 | | 180 | | 220 | |
| Arsenic | Metals (ICP/MS) (DISSOLVED) | SW846 6020A | | | µg/L | | 340 | 150 | 340 | 150 | 1 | U | 33 | | 19 | | 540 | | 42 | | 52 | | 60 | |
| Barium | Metals (ICP/MS) (DISSOLVED) | SW846 6020A | | | µg/L | | | | | | 16 | | 16 | | 17 | | 90 | | 19 | | 18 | | 19 | |
| Beryllium | Metals (ICP/MS) (DISSOLVED) | SW846 6020A | | | µg/L | | | | | | 0.36 | U | 0.36 | U | 0.36 | U | 0.36 | U | 0.36 | U | 0.36 | U | 0.36 | U |
| Cadmium | Metals (ICP/MS) (DISSOLVED) | SW846 6020A | | H (5)(6) | µg/L | | 1.0 | 0.44 | 1.1 | 0.16 | 0.5 | U | 0.5 | U | 0.5 | U | 0.5 | U | 0.5 | U | 0.5 | U | 0.5 | U |
| Calcium | Metals (ICP) (DISSOLVED) | SW846 6010B | | | µg/L | | | | | | 11000 | | 10000 | | 11000 | | 37000 | | 11000 | | 11000 | | 11000 | |
| Chromium | Metals (ICP/MS) (DISSOLVED) | SW846 6020A | | H (5)(6) | µg/L | | 338 | 44 | 338 | 44 | 0.87 | U | 0.87 | U | 0.87 | U | 0.87 | U | 0.87 | U | 0.87 | U | 0.87 | U |
| Cobalt | Metals (ICP/MS) (DISSOLVED) | SW846 6020A | | | µg/L | | | | | | 0.2 | U | 0.2 | U | 0.2 | U | 5.7 | | 0.2 | U | 0.2 | U | 0.2 | U |
| Copper | Metals (ICP/MS) (DISSOLVED) | SW846 6020A | | H (5)(6)(7) | µg/L | | -- | -- | 7 | 5.2 | 3 | U | 3 | U | 3 | U | 3 | U | 3 | U | 3 | U | 3 | U |
| Iron | Metals (ICP) (DISSOLVED) | SW846 6010B | | | µg/L | | -- | 1000 | -- | 1000 | 140 | U | 140 | U | 140 | U | 760 | | 140 | U | 140 | U | 140 | U |
| Lead | Metals (ICP/MS) (DISSOLVED) | SW846 6020A | | H (5)(6) | µg/L | | 32 | 1.3 | 32 | 1.3 | 1 | U | 1 | U | 1 | U | 1 | U | 1 | U | 1 | U | 1 | U |
| Magnesium | Metals (ICP) (DISSOLVED) | SW846 6010B | | | µg/L | | | | | | 5800 | | 5800 | | 5900 | | 39000 | | 6800 | | 6600 | | 6700 | |
| Manganese | Metals (ICP/MS) (DISSOLVED) | SW846 6020A | | | µg/L | | | | | | 2.7 | J | 4.9 | J | 6.5 | J | 240 | | 9.7 | J | 13 | | 11 | |
| Mercury | Mercury (CVAA) (DISSOLVED) | SW846 7470A | | | µg/L | | 1.4 | 0.77 | 1.4 | 0.77 | 0.15 | U | 0.15 | U | 0.15 | U | 0.15 | U | 0.15 | U | 0.15 | U | 0.15 | U |
| Nickel | Metals (ICP/MS) (DISSOLVED) | SW846 6020A | | H (5)(6) | µg/L | | 273 | 30 | 273 | 30 | 0.62 | U | 0.62 | U | 0.62 | U | 26 | | 0.63 | J | 0.62 | U | 0.91 | J |
| Potassium | Metals (ICP) (DISSOLVED) | SW846 6010B | | | µg/L | | | | | | 410 | U | 410 | U | 410 | U | 1200 | J | 410 | U | 410 | U | 410 | U |
| Selenium | Metals (ICP/MS) (DISSOLVED) | SW846 6020A | | | µg/L | | | | | | 10 | U | 10 | U | 10 | U | 10 | U | 10 | U | 10 | U | 10 | U |
| Silver | Metals (ICP/MS) (DISSOLVED) | SW846 6020A | | H (5) | µg/L | | 1.1 | -- | 1.1 | — | 0.28 | U | 0.28 | U | 0.28 | U | 0.28 | U | 0.28 | U | 0.28 | U | 0.28 | U |
| Sodium | Metals (ICP) (DISSOLVED) | SW846 6010B | | | µg/L | | | | | | 1400 | J | 1300 | J | 1300 | J | 8900 | | 1500 | J | 1500 | J | 1500 | J |
| Thallium | Metals (ICP/MS) (DISSOLVED) | SW846 6020A | | | µg/L | | | | | | 0.33 | U | 0.33 | U | 0.33 | U | 0.33 | U | 0.33 | U | 0.33 | U | 0.33 | U |
| Vanadium | Metals (ICP/MS) (DISSOLVED) | SW846 6020A | | | µg/L | | | | | | 2.3 | U | 2.3 | U | 2.3 | U | 2.3 | U | 2.3 | U | 2.3 | U | 2.3 | U |
| Zinc | Metals (ICP/MS) (DISSOLVED) | SW846 6020A | | H (5)(6) | µg/L | | 68.3 | 68.9 | 68.3 | 68.9 | 9.5 | U | 9.5 | U | 9.5 | U | 11 | J | 9.5 | U | 9.5 | U | 9.5 | U |
| **Dissolved Low Level Mercury** | | | | | | | | | | | | | | | | | | | | | | | | |
| Mercury | Dissolved Mercury by EPA 1631 | EPA 1631 | | | ng/L | | 1400 | 770 | 1400 | 770 | 4.32 | | 18.1 | | 26.3 | | 53 | | 26.4 | | 31.8 | | 144 | |
| **General Chemistry** | | | | | | | | | | | | | | | | | | | | | | | | |
| Alkalinity | Alkalinity | SM 2320B | | | mg/L | | | | | | 45 | | 45 | | 44 | | 230 | | 45 | | 48 | | 48 | |
| Bicarbonate Alkalinity as CaCO3 | Alkalinity | SM 2320B | | | mg/L | | | | | | 45 | | 45 | | 44 | | 230 | | 45 | | 48 | | 48 | |
| Carbonate Alkalinity as CaCO3 | Alkalinity | SM 2320B | | | mg/L | | | | | | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U |
| Chloride | Anions, Ion Chromatography | MCAWW 300.0 | | | mg/L | | 860 | 230 | 860 | 230 | 0.67 | U | 0.69 | U | 0.68 | U | 0.75 | U | 0.68 | U | 0.69 | U | 0.69 | U |
| Fluoride | Anions, Ion Chromatography | MCAWW 300.0 | | | mg/L | | | | | | 0.065 | J | 0.06 | J | 0.061 | J | 0.18 | J | 0.066 | J | 0.03 | U | 0.044 | J |
| Hydroxide Alkalinity as CaCO3 | Alkalinity | SM 2320B | | | mg/L | | | | | | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U |
| Nitrate Nitrite as N | Nitrogen, Nitrate-Nitrite | MCAWW 353.2 | | | mg/L | | | | | | 0.38 | | 0.38 | | 0.37 | | 0.17 | | 0.37 | | 0.35 | | 0.36 | |
| Sulfate | Anions, Ion Chromatography | MCAWW 300.0 | | | mg/L | | | | | | 5.5 | | 5.5 | | 5.9 | | 33 | | 6.3 | | 7.2 | | 7.1 | |
| Total Dissolved Solids | Solids, Total Dissolved (TDS) | SM 2540C | | | mg/L | | -- | 20 | -- | 20 | 49 | | 51 | | 35 | | 210 | | 54 | | 35 | | 45 | |
| Total Organic Carbon | Organic Carbon, Total (TOC) | SW846 9060 | | | mg/L | | | | | | 2.4 | | 2.3 | | 2.3 | | 1.3 | | 2.3 | | 2.4 | | 2.5 | |
| Total Suspended Solids | Solids, Total Suspended (TSS) | SM 2540D | | | mg/L | | | | | | 2 | U | 8.4 | J | 2 | U | 2 | U | 2 | U | 15 | | 2 | J |
| Hardness | Hardness as CaCO3 | Calculated | | | mg/L | | | | | | 51.4 | | 48.9 | | 51.8 | | 253.2 | | 55.5 | | 54.7 | | 55.1 | |
| **Field Water Quality Parameters** | | | | | | | | | | | | | | | | | | | | | | | | |
| Temperature | Field Measurement | -- | | | Deg C | | | | | | 4.08 | | 4.33 | | 4.47 | | 3.48 | | 4.65 | | 4.6 | | 4.67 | |
| pH | Field Measurement | -- | | | pH Units | | | 6.5 - 9.0 | | 6.5 - 8.5 | 7.3 | | 7.21 | | 7.11 | | 6.12 | | 6.83 | | 6.7 | | 6.85 | |
| Conductivity | Field Measurement | -- | | | mS/cm | | | | | | 0.093 | | 0.092 | | 0.095 | | 0.46 | | 0.103 | | 0.104 | | 0.104 | |
| Turbidity | Field Measurement | -- | | | NTU | | | | | | 4.6 | | 3.6 | | 13.58 | | 7.82 | | 4.87 | | 4.38 | | 8.08 | |
| Dissolved Oxygen | Field Measurement | -- | | | mg/L | | | | | ≥ 4 | 111.1 | | 14.43 | | 16.42 | | 3.56 | | 14.34 | | 11.22 | | 14.39 | |
| Oxidation-Reduction Potential | Field Measurement | -- | | | mV | | | | | | 158.3 | | 140.5 | | 155 | | 182 | | 251 | | 239 | | 233 | |

**Key**

µg/L = Micrograms per liter
ADEC = Alaska Department of Environmental Conservation
**Bold** = Detected
CCC = Criteria Continuous Concentration
CMC = Criteria Maximum Concentration
Deg C = Degrees Celsius.
EPA = United States Environmental Protection Agency
GC/MS = Gas Chromatography/Mass Spectrometry
H = Hardness-dependent water quality criterion for aquatic life.
ICP/ MS = Inductively coupled plasma/mass spectrometry
J = The analyte was detected. The associated result is estimated. "+" indicates high bias and "-" indicates low bias.
mg/L = milligrams per liter
mS/cm = Millisiemens per centimeter
mV = Millivolts
ng/L = Nanograms per liter
NTU = Nephelometric turbidity units
U = The analyte was analyzed for but not detected. The value provided is the method detection limit.
UJ = The analyte was analyzed for but not detected. The associated reporting limit is estimated.
Shading = Sample concentration exceeds one or more WQC value.

**Notes**

(1) USEPA. 2016. National Recommended Water Quality Criteria - Aquatic Life Criteria. Accessed on May 9, 2017 at: https://www.epa.gov/wqc/national-recommended-water-quality-criteria-aquatic-life-criteria-table#table
(2) USEPA. 2016. National Recommended Water Quality Criteria - Aquatic Life Criteria. Accessed on May 9, 2017 at: https://www.epa.gov/wqc/national-recommended-water-quality-criteria-aquatic-life-criteria-table#table
(3) ADEC. 2008. Alaska Water Quality Criteria Manual for Toxic and Other Deleterious Organic and Inorganic Substances (as amended through December 12, 2008). ADEC, Anchorage, Alaska
(4) ADEC. 2008. Alaska Water Quality Criteria Manual for Toxic and Other Deleterious Organic and Inorganic Substances (as amended through December 12, 2008). ADEC, Anchorage, Alaska
(5) Calculated total hardness as CaCO3 = Calcium Hardness (mg/L as CaCO3) + Magnesium Hardness (mg/L as CaCO3)
(6) Hardness-adjusted criterion value was calculated following EPA 2016 and ADEC 2008. A total hardness value of **73.4** mg/L as CaCO3, based on the average value for Red Devil Creek surface water samples, is assumed.
(7) As of 2017 the USEPA no longer considers copper to be hardness-dependent.

**Table 3-5. Groundwater Sample Results, Fall 2019**

| Analyte | Station ID | | Units | MW01 | | MW08 | | MW09 | | MW10 | | MW16 | | MW17 | | MW19 | | MW22 | | MW06 | | MW26 | | MW27 | | MW28 | | MW32 | | MW33 | | MW29 | | MW40 | | MW42 | | MW43 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Geographic Area | | | Post-1955 MPA | | | | | | | | | | | | | | | | Pre-1955 MPA | | | | | | | | Red Devil Creek Downstream Alluvial Area and Delta | | | | Surface Mined Area | | | | | | | |
| | Sample ID | | | 0919MW01GW | | 0919MW08GW | | 0919MW09GW | | 0919MW10GW | | 0919MW16GW | | 0919MW17GW | | 0919MW19GW | | 0919MW22GW | | 0919MW06GW | | 0919MW26GW | | 0919MW27GW | | 0919MW28GW | | 0919MW32GW | | 0919MW33GW | | 0919MW29GW | | 0919MW40GW | | 0919MW42GW | | 0919MW43GW | |
| | Method | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Aluminum | Metals (ICP) | SW846 6010B | µg/L | 110 | U | 810 | J | 110 | U | 170 | J | 110 | U | 110 | U | 110 | U | 110 | U | 110 | U | 110 | U | 110 | U | 250 | J | 110 | U | 110 | U | 110 | U | 110 | U | 110 | U | 110 | U |
| Antimony | Metals (ICP/MS) | SW846 6020A | µg/L | 3.1 | | 1.6 | J | 11 | | 0.91 | J | 440 | | 12 | | 1.1 | | 220 | | 12 | | 18 | | 1.4 | | 0.79 | | 0.34 | J | 83 | | 1.5 | | 6.1 | | 44 | | 1.6 | |
| Arsenic | Metals (ICP/MS) | SW846 6020A | µg/L | 14 | | 1 | U | 5.1 | | 100 | | 2000 | | 11 | | 5 | | 59 | | 58 | | 790 | | 5.6 | | 22 | | 0.22 | J | 5.7 | | 51 | | 210 | | 61 | | 66 | |
| Barium | Metals (ICP/MS) | SW846 6020A | µg/L | 81 | | 62 | | 500 | | 89 | J- | 69 | | 50 | | 53 | | 47 | | 93 | | 530 | | 8.2 | | 9.8 | | 4.6 | | 6.3 | | 230 | | 130 | | 21 | | 24 | |
| Beryllium | Metals (ICP/MS) | SW846 6020A | µg/L | 0.36 | U | 0.36 | U | 0.36 | U | 0.36 | U | 0.36 | U | 0.36 | U | 0.36 | U | 0.36 | U | 0.36 | U | 0.36 | U | 0.071 | U | 0.071 | U | 0.071 | U | 0.071 | U | 0.36 | U | 0.36 | U | 0.071 | U | 0.071 | U |
| Cadmium | Metals (ICP/MS) | SW846 6020A | µg/L | 0.5 | U | 0.5 | U | 0.5 | U | 0.5 | U | 0.5 | U | 0.5 | U | 0.5 | U | 0.5 | U | 0.5 | U | 0.5 | U | 0.1 | U | 0.1 | U | 0.1 | U | 0.1 | U | 0.5 | U | 0.5 | U | 0.1 | U | 0.1 | U |
| Calcium | Metals (ICP) | SW846 6010B | µg/L | 20000 | | 14000 | | 29000 | | 23000 | | 34000 | | 28000 | | 21000 | | 19000 | | 34000 | | 58000 | | 90000 | | 43000 | | 22000 | | 20000 | | 57000 | | 48000 | | 40000 | | 26000 | |
| Chromium | Metals (ICP/MS) | SW846 6020A | µg/L | 0.91 | J | 1.8 | J | 0.87 | U | 0.87 | U | 1 | | 0.9 | | 0.99 | | 0.87 | U | 0.87 | U | 3.2 | | 0.17 | U | 0.17 | U | 0.17 | U | 0.17 | U | 2.4 | | 0.87 | U | 0.17 | U | 0.17 | U |
| Cobalt | Metals (ICP/MS) | SW846 6020A | µg/L | 0.22 | J | 1.2 | J | 3.3 | | 0.2 | U | 11 | | 0.2 | U | 0.46 | | 0.2 | U | 2 | | 12 | | 0.68 | | 0.66 | | 0.081 | J | 0.039 | U | 0.46 | | 26 | | 1.1 | | 5.8 | |
| Copper | Metals (ICP/MS) | SW846 6020A | µg/L | 3 | U | 3 | U | 3 | U | 3 | U | 3 | U | 3 | U | 3 | U | 3 | U | 3 | U | 3 | U | 0.6 | U | 0.6 | U | 0.6 | U | 0.6 | U | 3 | U | 3 | U | 0.6 | U | 0.6 | U |
| Iron | Metals (ICP) | SW846 6010B | µg/L | 16000 | | 1100 | | 420 | J | 1400 | | 23000 | | 140 | U | 140 | U | 150 | J | 5200 | | 51000 | | 140 | U | 1400 | | 350 | J | 140 | U | 2400 | | 620 | | 910 | | 3400 | |
| Lead | Metals (ICP/MS) | SW846 6020A | µg/L | 1 | U | 1.5 | J | 1 | U | 1 | U | 1 | U | 1 | U | 1 | U | 1 | U | 1 | U | 1 | U | 0.2 | U | 0.2 | U | 0.2 | U | 0.2 | U | 1 | U | 1 | U | 0.2 | U | 0.2 | U |
| Magnesium | Metals (ICP) | SW846 6010B | µg/L | 13000 | | 11000 | | 20000 | | 33000 | | 59000 | | 19000 | | 13000 | | 15000 | | 30000 | | 36000 | | 55000 | | 32000 | | 24000 | | 14000 | | 53000 | | 47000 | | 29000 | | 18000 | |
| Manganese | Metals (ICP/MS) | SW846 6020A | µg/L | 420 | | 44 | | 4500 | | 140 | | 7100 | | 0 | U | 110 | | 15 | | 680 | | 5900 | | 500 | | 170 | | 13 | | 0.74 | J | 400 | | 290 | | 130 | | 520 | |
| Mercury | Mercury (CVAA) | SW846 7470A | µg/L | 0.15 | U | 0.15 | U | 0.15 | U | 0.15 | U | 0.35 | | 0.15 | U | 0.15 | U | 0.15 | U | 0.15 | U | 0.15 | U | 0.15 | U | 0.15 | U | 0.15 | U | 0.15 | U | 0.15 | U | 0.15 | U | 0.15 | U | 0.15 | U |
| Nickel | Metals (ICP/MS) | SW846 6020A | µg/L | 1.5 | J | 3.1 | J | 6.2 | J | 0.62 | U | 3.1 | | 0.62 | U | 1.4 | | 0.77 | J | 3.5 | | 7.3 | | 12 | | 1.6 | J | 1.5 | J | 0.22 | J | 1.2 | | 92 | | 5.4 | | 16 | |
| Potassium | Metals (ICP) | SW846 6010B | µg/L | 410 | U | 410 | U | 410 | U | 600 | U | 2000 | UJ | 520 | UJ | 410 | UJ | 410 | U | 950 | UJ | 2800 | UJ | 810 | U | 430 | U | 410 | U | 410 | U | 960 | UJ | 0 | UJ | 410 | U | 410 | U |
| Selenium | Metals (ICP/MS) | SW846 6020A | µg/L | 10 | U | 10 | U | 10 | U | 10 | U | 10 | U | 10 | U | 10 | U | 10 | U | 10 | U | 10 | U | 2.1 | U | 2.1 | U | 2.1 | U | 2.1 | U | 10 | U | 10 | U | 2.1 | U | 2.1 | U |
| Silver | Metals (ICP/MS) | SW846 6020A | µg/L | 0.28 | U | 0.28 | U | 0.28 | U | 0.28 | U | 0.28 | U | 0.28 | U | 0.28 | U | 0.28 | U | 0.28 | U | 0.28 | U | 0.055 | U | 0.055 | U | 0.055 | U | 0.055 | U | 0.28 | U | 0.28 | U | 0.055 | U | 0.055 | U |
| Sodium | Metals (ICP) | SW846 6010B | µg/L | 3100 | | 1600 | J | 2600 | | 3400 | | 5100 | | 3400 | | 2600 | | 2700 | | 4300 | | 5600 | | 14000 | | 11000 | | 1900 | J | 4900 | | 2000 | | 1700 | | 3300 | | 3600 | |
| Thallium | Metals (ICP/MS) | SW846 6020A | µg/L | 0.33 | U | 0.33 | U | 0.33 | U | 0.33 | U | 0.33 | U | 0.33 | U | 0.33 | U | 0.33 | U | 0.33 | U | 0.33 | U | 0.065 | U | 0.065 | U | 0.065 | U | 0.065 | U | 0.33 | U | 0.33 | U | 0.065 | U | 0.065 | U |
| Vanadium | Metals (ICP/MS) | SW846 6020A | µg/L | 2.3 | U | 2.3 | J | 2.3 | U | 2.3 | U | 18 | | 19 | | 18 | | 2.3 | U | 20 | U | 0 | U | 0.46 | U | 0.46 | U | 0.46 | U | 0.46 | U | 19 | | 20 | | 0.46 | U | 0.46 | U |
| Zinc | Metals (ICP/MS) | SW846 6020A | µg/L | 13 | J | 10 | J | 120 | | 9.5 | U | 9.5 | U | 9.5 | U | 11 | | 9.5 | U | 9.5 | U | 9.5 | U | 5.9 | J | 1.9 | U | 2.9 | J | 1.9 | U | 9.5 | U | 9.5 | U | 2 | J | 2.3 | J |
| **Total Low Level Mercury** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Mercury | Total Mercury by EPA 1631 | EPA 1631 | ng/L | 101 | | 672 | | 71.7 | | 31.5 | | 1170 | | 203 | | 6.61 | | 303 | | 15.8 | | 134 | | 698 | | 980 | | 63.3 | | 31 | | 28.3 | J | 1.1 | | 64 | | 4.33 | |
| **Dissolved Low Level Mercury** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Mercury | Dissolved Mercury by EPA 1631 | EPA 1631 | ng/L | 12.7 | | 0.79 | | 6.26 | | 3.22 | | 1060 | | 7.05 | | 1.33 | | 84.4 | | 3.71 | | 31.3 | | 519 | | 427 | | 14.9 | | 3.33 | | 0.79 | | 0.13 | U | 2.79 | | 1.04 | |
| **Semivolatile Organic Compounds** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Butyl benzyl phthalate | Semivolatile Organic Compounds (GC/MS) | SW846 8270D | µg/L | | | | | | | | | | | | | 0.36 | UR | 0.8 | UJ | | | | | | | | | | | | | | | | | | | | |
| Di-n-butyl phthalate | Semivolatile Organic Compounds (GC/MS) | SW846 8270D | µg/L | | | | | | | | | | | | | 0.54 | UR | 0.52 | U | | | | | | | | | | | | | | | | | | | | |
| 2-Fluorobiphenyl | Semivolatile Organic Compounds (GC/MS) | SW846 8270D | µg/L | | | | | | | | | | | | | 71 | | 64 | | | | | | | | | | | | | | | | | | | | | |
| **Benzene, Toluene, Ethylbenzene, and Xylenes** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Benzene | Volatile Organic Compounds (GC/MS) | SW846 8260C | µg/L | | | | | | | | | | | | | 0.53 | U | 0.53 | U | | | | | | | | | | | | | | | | | | | | |
| Toluene | Volatile Organic Compounds (GC/MS) | SW846 8260C | µg/L | | | | | | | | | | | | | 0.39 | U | 0.39 | U | | | | | | | | | | | | | | | | | | | | |
| Ethylbenzene | Volatile Organic Compounds (GC/MS) | SW846 8260C | µg/L | | | | | | | | | | | | | 0.5 | U | 0.5 | U | | | | | | | | | | | | | | | | | | | | |
| m-Xylene & p-Xylene | Volatile Organic Compounds (GC/MS) | SW846 8260C | µg/L | | | | | | | | | | | | | 0.75 | U | 0.75 | U | | | | | | | | | | | | | | | | | | | | |
| o-Xylene | Volatile Organic Compounds (GC/MS) | SW846 8260C | µg/L | | | | | | | | | | | | | 0.39 | U | 0.39 | U | | | | | | | | | | | | | | | | | | | | |
| **Gasoline Range Organics and Diesel Range Organics** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Gasoline Range Organics (GRO)-C6-C10 | Alaska - Gasoline Range Organics (GC) | ADEC AK102 | mg/L | | | | | | | | | | | | | 0.1 | U | 0.1 | U | | | | | | | | | | | | | | | | | | | | |
| DRO (nC10-<nC25) | Alaska - Diesel Range Organics & Residual Range Organics (GC) | ADEC AK102 & 103 | mg/L | | | | | | | | | | | | | 0.076 | U | 0.079 | U | | | | | | | | | | | | | | | | | | | | |
| **General Chemistry** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Alkalinity | Alkalinity | SM 2320B | mg/L | 95 | | 65 | | 140 | | 180 | | 6 J | | 100 | | 95 | | 93 | | 150 | | 270 | | 270 | | 190 | | 120 | | 88 J | | 290 | | 260 | | 200 | | 120 | |
| Bicarbonate Alkalinity as CaCO3 | Alkalinity | SM 2320B | mg/L | 95 | | 65 | | 140 | | 180 | | 6.1 | | 100 | | 95 | | 93 | | 150 | | 270 | | 270 | | 190 | | 120 | | 88 | | 290 | | 260 | | 200 | | 120 | |
| Carbonate Alkalinity as CaCO3 | Alkalinity | SM 2320B | mg/L | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U |
| Chloride | Anions, Ion Chromatography | MCAWW 300.0 | mg/L | 0.86 | J | 1.1 | | 0.97 | | 0.99 | | 0.84 | | 0.76 | | 0.63 | | 0.74 | J | 0.95 | | 1.1 | | 0.87 | J | 0.96 | | 0.7 | J | 0.93 | | 0.64 | | 0.76 | | 0.7 | J | 0.71 | J |
| Fluoride | Anions, Ion Chromatography | MCAWW 300.1 | mg/L | 0.12 | J | 0.11 | J | 0.12 | J | 0.15 | J | 0.27 | | 0.11 | | 0.13 | | 0.098 | J | 0.13 | | 0.21 | | 0.17 | J | 0.14 | J | 0.086 | J | 0.081 | J | 0.11 | | 0.21 | | 0.11 | J | 0.2 | |
| Hydroxide Alkalinity as CaCO3 | Alkalinity | SM 2320B | mg/L | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U |
| Nitrate Nitrite as N | Nitrogen, Nitrate-Nitrite | MCAWW 353.2 | mg/L | 0.12 | J | 0.37 | | 0.06 | U | 0.06 | UJ | 0.01 | U | 0.01 | U | 0.117 | | 0.12 | J | 0.01 | U | 0.01 | U | 0.06 | U | 0.06 | U | 0.49 | | 0.19 | | 0.01 | U | 0.017 | | 0.06 | U | 0.06 | U |
| Sulfate | Anions, Ion Chromatography | MCAWW 300.2 | mg/L | 12 | | 5.2 | | 6.7 | | 9.4 | | 230 | | 9.2 | | 6.7 | | 8 | | 46 | | 23 | | 150 | | 45 | | 20 | | 14 | | 36 | | 11 | | 16 | | 12 | |
| Total Suspended Solids | Solids, Total Suspended (TSS) | SM 2540D | mg/L | 45 | | 150 | | 3.8 | U | 8.2 | U | 14 | | 2 | U | 2 | UJ | 4.4 | U | 6.6 | | 60 | | 2 | | -- | | 6.4 | U | 2 | U | 5.8 | | 2.2 | | 2 | U | 5.4 | U |
| **Field Water Quality Parameters** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Temperature | Field Measurement | | Deg C | 10.79 | | 6.63 | | 9.34 | | 6.86 | | 14.65 | | 8.88 | | 5.95 | | 6.1 | | 5.41 | | 11.16 | | 8.57 | | 7.54 | | 12.52 | | 6.31 | | 5.38 | | -- | | 5.29 | | 4.64 | |
| pH | Field Measurement | | pH Units | 6.23 | | 6.75 | | 7.08 | | 7.32 | | 6.13 | | 7.42 | | 6.95 | | 6.75 | | 6.55 | | 6.26 | | 6.34 | | 6.99 | | 5.93 | | 6.66 | | 6.9 | | -- | | 7.21 | | 6.95 | |
| Conductivity | Field Measurement | | mS/cm | 0.131 | | 69 | | 0.188 | | 165 | | 0.478 | | 0.169 | | 0.109 | | 120 | | 0.219 | | 0.449 | | 517 | | 0.288 | | 0.187 | | 0.126 | | 358 | | -- | | 0.203 | | 121 | |
| Turbidity | Field Measurement | | NTU | 56.4 | | 983 | | 14.8 | | 2.79 | | 18.5 | | 2.81 | | 5.13 | | 1.2 | | 4.69 | | 3.58 | | 4.68 | | 15.7 | | 29.7 | | 2.3 | | 5.66 | | -- | | 7.98 | | 3.65 | |
| Dissolved Oxygen | Field Measurement | | mg/L | 1.88 | | 10.79 | | 6.85 | | 1.14 | | 0.33 | | 5.78 | | 4.05 | | 4.27 | | 0.82 | | 0.74 | | 3.72 | | 0.65 | | 1.82 | | 5.17 | | 1.38 | | -- | | 2.03 | | 1.6 | |
| Oxidation-Reduction Potential | Field Measurement | | mV | 58.7 | | 150.1 | | 44.2 | | 14 | | -52.5 | | 103 | | 185.1 | | 74.6 | | -2.9 | | -47.1 | | 209.8 | | 17.5 | | 89.2 | | 164.3 | | 37.8 | | -- | | 52.8 | | 59.9 | |

**Key**
µg/L = Micrograms per liter
ADEC = Alaska Department of Environmental Conservation
Deg C = Degrees Celsius.
EPA = United States Environmental Protection Agency
GC/MS = Gas Chromatography/Mass Spectrometry
ICP/ MS = Inductively coupled plasma/mass spectrometry
J = The analyte was detected. The associated result is estimated.
mg/L = milligrams per liter
mS/cm = Millisiemens per centimeter
mV = Millivolts
ng/L = Nanograms per liter
NTU = Nephelometric turbidity units
U = The analyte was analyzed for but not detected. The value provided is the method detection limit.
UJ = The analyte was analyzed for but not detected. The associated reporting limit is estimated.
UR = The analyte was rejected due to lab QA error.

**Table 3-5. Groundwater Sample Results, Fall 2019**

| Analyte | Station ID | | Units | MW31 | | MW44 | | MW45 | | MW46 | | MW47 | | MW48 | | MW49 | | MW50 | | MW51 | | MW52 | | MW53 | | MW54 | | MW55 | | MW56 | | MW57 | | MW58 | | MW59 | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| | Geographic Area | | | Upland Area West of Surface Mined Area | | Vicinity of the Proposed Repository | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | Sample ID | | | 0919MW31GW | | 0919MW44GW | | 0919MW45GW | | 0919MW46GW | | 0919MW47GW | | 0919MW48GW | | 0919MW49GW | | 0919MW50GW | | 0919MW51GW | | 0919MW52GW | | 0919MW53GW | | 0919MW54GW | | 0919MW55GW | | 0919MW56GW | | 0919MW57GW | | 0919MW58GW | | 0919MW59GW | |
| | Method | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Aluminum | Metals (ICP) | SW846 6010B | µg/L | -- | | 220 | U | 110 | U | 1200 | | 110 | U | 110 | U | 1500 | | 110 | U | 110 | U | 530 | U | 110 | U | 110 | U | 110 | U | 110 | U | 110 | U | 120 | | 120 | |
| Antimony | Metals (ICP/MS) | SW846 6020A | µg/L | -- | | 0.55 | U | 0.55 | U | 0 | U | 0.55 | U | 0.55 | U | 0 | U | 8.3 | | 0.55 | U | 3.3 | | 0.55 | U | 1.1 | | 8 | | 0.55 | U | 0.55 | U | 0.55 | U | 0.55 | U |
| Arsenic | Metals (ICP/MS) | SW846 6020A | µg/L | -- | | 4.6 | | 4.5 | | 6 | | 3.7 | | 4.1 | | 9.6 | | 430 | | 9.7 | | 35 | | 5.2 | | 47 | | 26 | | 4 | | 4.2 | | 7.3 | | 61 | |
| Barium | Metals (ICP/MS) | SW846 6020A | µg/L | -- | | 32 | | 1.8 | | 23 | | 1.1 | U | 49 | | 25 | | 280 | | 37 | | 210 | | 150 | | 120 | | 91 | | 160 | | 5.8 | | 100 | | 330 | |
| Beryllium | Metals (ICP/MS) | SW846 6020A | µg/L | -- | | 0.36 | U | 0.36 | U | 0.36 | U | 0.36 | U | 0.36 | U | 0.36 | U | 0.36 | U | 0.36 | U | 0.36 | U | 0.36 | U | 0.36 | U | 0.36 | U | 0.36 | U | 0.36 | U | 0.36 | U | 0.36 | U |
| Cadmium | Metals (ICP/MS) | SW846 6020A | µg/L | -- | | 0.5 | U | 0.5 | U | 0.5 | U | 0.5 | U | 0.5 | U | 0.5 | U | 0.5 | U | 0.5 | U | 0.5 | U | 0.5 | U | 0.5 | U | 0.5 | U | 0.5 | U | 0.5 | U | 0.5 | U | 0.5 | U |
| Calcium | Metals (ICP) | SW846 6010B | µg/L | -- | | 40000 | | 21000 | | 17000 | | 21000 | | 21000 | | 16000 | | 71000 | | 28000 | | 43000 | | 36000 | | 42000 | | 34000 | | 56000 | | 13000 | | 31000 | | 61000 | |
| Chromium | Metals (ICP/MS) | SW846 6020A | µg/L | -- | | 0.87 | U | 1.1 | | 3.3 | | 0.87 | U | 0.87 | U | 3.7 | | 0.96 | | 0.87 | U | 2.2 | | 1.8 | | 0.98 | | 1.2 | | 0.87 | U | 1.4 | | 1.3 | | 1.5 | |
| Cobalt | Metals (ICP/MS) | SW846 6020A | µg/L | -- | | 2.5 | | 0.2 | U | 1.7 | | 0.2 | U | 0.2 | U | 1.9 | | 3.1 | | 0.98 | | 17 | | 0.6 | | 1.4 | | 4 | | 1.1 | | 0.2 | U | 0.57 | | 1.6 | |
| Copper | Metals (ICP/MS) | SW846 6020A | µg/L | -- | | 3 | U | 3 | U | 3 | U | 3 | U | 3 | U | 3 | | 3 | U | 3 | U | 3.4 | | 3 | U | 3 | U | 3 | U | 3 | U | 3 | U | 3 | U | 3 | U |
| Iron | Metals (ICP) | SW846 6010B | µg/L | -- | | 1100 | | 140 | U | 1500 | | 140 | U | 140 | U | 1500 | | 1500 | | 280 | | 1400 | | 140 | U | 3100 | | 12000 | | 140 | U | 140 | U | 3700 | | 0 | U |
| Lead | Metals (ICP/MS) | SW846 6020A | µg/L | -- | | 1 | U | 1 | U | 1 | | 1 | U | 1 | U | 1 | U | 1 | U | 1 | U | 1 | U | 1 | U | 1 | U | 1 | U | 1 | U | 1 | U | 1 | U | 1 | U |
| Magnesium | Metals (ICP) | SW846 6010B | µg/L | -- | | 32000 | | 17000 | | 21000 | | 21000 | | 19000 | | 11000 | | 56000 | | 23000 | | 36000 | | 21000 | | 36000 | | 24000 | | 52000 | | 6700 | | 24000 | | 55000 | |
| Manganese | Metals (ICP/MS) | SW846 6020A | µg/L | -- | | 670 | | 0 | U | 150 | | 28 | | 61 | | 150 | | 930 | | 120 | | 1400 | | 130 | | 370 | | 1100 | | 740 | | 8.5 | | 120 | | 420 | |
| Mercury | Mercury (CVAA) | SW846 7470A | µg/L | -- | | 0.15 | U | 0.15 | U | 0.15 | U | 0.15 | U | 0.15 | U | 0.15 | U | 0.15 | U | 0.15 | U | 0.15 | U | 0.15 | U | 0.15 | U | 0.15 | U | 0.15 | U | 0.15 | U | 0.15 | U | 0.15 | U |
| Nickel | Metals (ICP/MS) | SW846 6020A | µg/L | -- | | 2.3 | | 0.62 | U | 4 | | 0.62 | U | 0.62 | U | 5.9 | | 8.9 | | 0.7 | | 24 | | 2 | | 8.2 | | 9.9 | | 8 | | 1.6 | | 2.7 | | 4.4 | |
| Potassium | Metals (ICP) | SW846 6010B | µg/L | -- | | 520 | UJ | 910 | UJ | 760 | UJ | 460 | UJ | 460 | UJ | 780 | UJ | 670 | UJ | 410 | UJ | 740 | UJ | 410 | UJ | 460 | UJ | 670 | | 560 | | 410 | U | 410 | | 660 | |
| Selenium | Metals (ICP/MS) | SW846 6020A | µg/L | -- | | 10 | U | 10 | U | 10 | U | 10 | U | 10 | U | 10 | U | 10 | U | 10 | U | 10 | U | 10 | U | 10 | U | 10 | U | 10 | U | 10 | U | 10 | U | 10 | U |
| Silver | Metals (ICP/MS) | SW846 6020A | µg/L | -- | | 0.28 | U | 0.28 | U | 0.28 | U | 0.28 | U | 0.28 | U | 0.28 | U | 0.28 | U | 0.28 | U | 0.28 | U | 0.28 | U | 0.28 | U | 0.28 | U | 0.28 | U | 0.28 | U | 0.28 | U | 0.28 | U |
| Sodium | Metals (ICP) | SW846 6010B | µg/L | -- | | 2000 | | 1100 | | 770 | | 2100 | | 1600 | | 1700 | | 2100 | | 1800 | | 1800 | | 2400 | | 1900 | | 3300 | | 1300 | | 2300 | | 1100 | | 1500 | |
| Thallium | Metals (ICP/MS) | SW846 6020A | µg/L | -- | | 0.33 | U | 0.33 | U | 0.33 | U | 0.33 | U | 0.33 | U | 0.33 | U | 0.33 | U | 0.33 | U | 0.33 | U | 0.33 | U | 0.33 | U | 0.33 | U | 0.33 | U | 0.33 | U | 0.33 | U | 0.33 | U |
| Vanadium | Metals (ICP/MS) | SW846 6020A | µg/L | -- | | 0 | U | 18 | | 21 | | 17 | U | 18 | | 22 | | 19 | | 19 | | 20 | | 19 | | 19 | | 15 | | 13 | | 15 | | 15 | | 16 | |
| Zinc | Metals (ICP/MS) | SW846 6020A | µg/L | -- | | 9.5 | U | 9.5 | U | 9.5 | U | 9.5 | U | 9.5 | U | 11 | | 9.5 | U | 9.5 | U | 9.5 | U | 9.5 | U | 9.5 | U | 9.5 | U | 9.5 | U | 9.5 | U | 9.5 | U | 9.5 | U |
| **Total Low Level Mercury** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Mercury | Total Mercury by EPA 1631 | EPA 1631 | ng/L | | | 19.7 | | 19.9 | | 255 | | 3.92 | | 4.81 | | 677 | | 544 | | 4.3 | | 333 | | 107 | | 40.5 | | 37.6 | | 6.8 | | 83.9 | | 39.6 | | 76.8 | |
| **Dissolved Low Level Mercury** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Mercury | Dissolved Mercury by EPA 1631 | EPA 1631 | ng/L | | | 0.78 | | 3.44 | | 23.2 | | 0.23 | | 2.63 | | 63.2 | | 62.8 | | 0.42 | | 0.13 | | 12.7 | | 0.27 | | 6.63 | | 0.68 | | 12.6 | | 3.62 | | 35.8 | |
| **Semivolatile Organic Compounds** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Butyl benzyl phthalate | Semivolatile Organic Compounds (GC/MS) | SW846 8270D | µg/L | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Di-n-butyl phthalate | Semivolatile Organic Compounds (GC/MS) | SW846 8270D | µg/L | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 2-Fluorobiphenyl | Semivolatile Organic Compounds (GC/MS) | SW846 8270D | µg/L | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Benzene, Toluene, Ethylbenzene, and Xylenes** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Benzene | Volatile Organic Compounds (GC/MS) | SW846 8260C | µg/L | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Toluene | Volatile Organic Compounds (GC/MS) | SW846 8260C | µg/L | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Ethylbenzene | Volatile Organic Compounds (GC/MS) | SW846 8260C | µg/L | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| m-Xylene & p-Xylene | Volatile Organic Compounds (GC/MS) | SW846 8260C | µg/L | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| o-Xylene | Volatile Organic Compounds (GC/MS) | SW846 8260C | µg/L | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **Gasoline Range Organics and Diesel Range Organics** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Gasoline Range Organics (GRO)-C6-C10 | Alaska - Gasoline Range Organics (GC) | ADEC AK102 | mg/L | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| DRO (nC10-<nC25) | Alaska - Diesel Range Organics & Residual Range Organics (GC) | ADEC AK102 & 103 | mg/L | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| **General Chemistry** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Alkalinity | Alkalinity | SM 2320B | mg/L | -- | | 210 | | 110 | | 120 | | 110 | | 8.6 | J | 61 | | 380 | | 150 | | 220 | | 160 | | 230 | | 170 | | 310 | | 62 | | 140 | | 330 | |
| Bicarbonate Alkalinity as CaCO3 | Alkalinity | SM 2320B | mg/L | -- | | 210 | | 110 | | 120 | | 110 | | 8.6 | J | 61 | | 380 | | 150 | | 220 | | 160 | | 230 | | 170 | | 310 | | 62 | | 140 | | 330 | |
| Carbonate Alkalinity as CaCO3 | Alkalinity | SM 2320B | mg/L | -- | | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U |
| Chloride | Anions, Ion Chromatography | MCAWW 300.0 | mg/L | -- | | 1 | | 0.83 | J | 0.77 | | 0.87 | | 0.74 | | 0.7 | | 0.88 | | 0.63 | | 0.63 | | 1.1 | | 0.81 | | 0.75 | | 0.72 | | 0.76 | | 0.61 | | 0.84 | |
| Fluoride | Anions, Ion Chromatography | MCAWW 300.1 | mg/L | -- | | 0.2 | | 0.14 | | 0.22 | | 0.19 | | 0.096 | | 0.081 | | 0.13 | | 0.21 | | 0.2 | | 0.23 | | 0.22 | | 0.16 | | 0.23 | | 0.14 | | 0.31 | | 0.17 | |
| Hydroxide Alkalinity as CaCO3 | Alkalinity | SM 2320B | mg/L | -- | | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U |
| Nitrate Nitrite as N | Nitrogen, Nitrate-Nitrite | MCAWW 353.2 | mg/L | -- | | 0.01 | U | 0.268 | | 0.447 | | 0.212 | | 1.31 | | 0.038 | | 0.01 | U | 0.041 | | 0.071 | | 0.077 | | 0.01 | U | 0.158 | | 0.084 | | 0.158 | | 0.01 | U | 0.01 | U |
| Sulfate | Anions, Ion Chromatography | MCAWW 300.2 | mg/L | -- | | 7 | | 4.8 | J | 3.7 | | 4.7 | J | 4.1 | | 3.2 | | 8.3 | | 2.4 | | 5.9 | | 6.8 | | 9.5 | | 8.3 | | 6.2 | | 3.8 | | 9.2 | | 6 | |
| Total Suspended Solids | Solids, Total Suspended (TSS) | SM 2540D | mg/L | -- | | 10 | | 2 | U | 86 | | 2 | U | 2 | U | 27 | | 8.4 | | 2 | U | 48 | | 3.2 | | 7.6 | | 17 | | 2.4 | | 5.8 | | 19 | | 25 | |
| **Field Water Quality Parameters** | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Temperature | Field Measurement | | Deg C | -- | | 3.64 | | 4.04 | | 5.46 | | 3.6 | | 5.29 | | 4.96 | | 4.53 | | 5.88 | | 6.65 | | 3.9 | | 5.11 | | 5.81 | | 4.12 | | 4.54 | | 6.3 | | 4.68 | |
| pH | Field Measurement | | pH Units | -- | | 6.96 | | 7.61 | | 7.4 | | 7.72 | | 6.39 | | 6.06 | | 7.23 | | 6.57 | | 7.24 | | 7.48 | | 7.53 | | 6.72 | | 7.27 | | 6.2 | | 7.21 | | 6.91 | |
| Conductivity | Field Measurement | | mS/cm | -- | | 0.219 | | 121 | | 0.136 | | 137 | | 0.13 | | 155 | | 388 | | 0.268 | | 0.266 | | 162 | | 260 | | 0.219 | | 322 | | 0.067 | | 0.179 | | 0.337 | |
| Turbidity | Field Measurement | | NTU | -- | | 10.3 | | 7.77 | | 73.9 | | 2.42 | | 1.96 | | 45.4 | | 7.28 | | 5.59 | | 53.5 | | 5.55 | | 9.25 | | 26.8 | | -- | | 6.97 | | 15.1 | | 45.9 | |
| Dissolved Oxygen | Field Measurement | | mg/L | -- | | 0.51 | | 6.41 | | 5.7 | | 5 | | 4.47 | | 5.32 | | 1.12 | | 2.43 | | 1.65 | | 4.42 | | 1.3 | | 1.58 | | 2.27 | | 6.53 | | 0.58 | | 1.76 | |
| Oxidation-Reduction Potential | Field Measurement | | mV | -- | | 122.8 | | 121.4 | | 39.1 | | 135.1 | | 162.3 | | 134.9 | | 41.1 | | 229.2 | | 29.5 | | 91.8 | | 18.2 | | 7.6 | | 107.7 | | 194.4 | | 64.7 | | 113.9 | |

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µg/L = Micrograms per liter
ADEC = Alaska Department of Environmental Conservation
Deg C = Degrees Celsius.
EPA = United States Environmental Protection Agency
GC/MS = Gas Chromatography/Mass Spectrometry
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U = The analyte was analyzed for but not detected. The value provided is the method detection limit.
UJ = The analyte was analyzed for but not detected. The associated reporting limit is estimated.
UR = The analyte was rejected due to lab QA error.

**Table 3-6. Surface Water Sample Results, Fall 2019**

| Analyte | Station ID | Geographic Area | Sample ID | Method | Units | Water Quality Comparison Criteria: Hardness-Dependent Aquatic Life Water Quality Criterion | Water Quality Comparison Criteria: National Recommended Water Quality Criteria; Fresh Water; Aquatic Life Criteria; CMC - Acute (1) | Water Quality Comparison Criteria: National Recommended Water Quality Criteria; Fresh Water; Aquatic Life Criteria; CCC - Chronic (2) | Water Quality Comparison Criteria: Alaska Water Quality Criteria for Toxics and Other Deleterious Substances; Aquatic Life for Fresh Water; Acute - CMC (3) | Water Quality Comparison Criteria: Alaska Water Quality Criteria for Toxics and Other Deleterious Substances; Aquatic Life for Fresh Water; Chronic - CCC (4) | RD10 Red Devil Creek 0919RD10SW | | RD14 Red Devil Creek 0919RD14SW | | RD15 Red Devil Creek 0919RD15SW | | RD05 Seep 0919RD05SW | | RD16 Red Devil Creek 0919RD06SW | | RD06 Red Devil Creek 0919RD06SW | | RD08 Red Devil Creek 0919RD08SW | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| **Total Inorganic Elements** | | | | | | | | | | | | | | | | | | | | | | | | | |
| Aluminum | Metals (ICP) | SW846 6010B | | | µg/L | | | | | | 120 | J | 110 | U | 110 | U | 110 | U | 110 | U | 110 | U | 260 | J |
| Antimony | Metals (ICP/MS) | SW846 6020A | | | µg/L | | | | | | 2.4 | | 5.1 | | 18 | | 55 | | 20 | | 54 | | 82 | |
| Arsenic | Metals (ICP/MS) | SW846 62A | | | µg/L | | | | | | 1.3 | J | 1.5 | | 4.6 | | 20 | | 11 | | 20 | | 30 | |
| Barium | Metals (ICP/MS) | SW846 6020A | | | µg/L | | | | | | 30 | | 6.1 | | 6.2 | | 7.1 | | 6.8 | | 7 | | 7.8 | |
| Beryllium | Metals (ICP/MS) | SW846 6020A | | | µg/L | | | | | | 0.36 | U | 0.071 | U | 0.071 | U | 0.071 | U | 0.071 | U | 0.071 | U | 0.071 | U |
| Cadmium | Metals (ICP/MS) | SW846 6020A | | | µg/L | | | | | | 0.5 | U | 0.1 | U | 0.1 | U | 0.1 | U | 0.1 | U | 0.1 | U | 0.1 | U |
| Calcium | Metals (ICP) | SW846 6010B | | | µg/L | | | | | | 24000 | | 24000 | | 23000 | | 44000 | | 24000 | | 24000 | | 23000 | |
| Chromium | Metals (ICP/MS) | SW846 6020A | | | µg/L | | | | | | 0.87 | U | 0.17 | U | 0.17 | U | 0.17 | U | 0.17 | U | 0.17 | U | 0.17 | U |
| Cobalt | Metals (ICP/MS) | SW846 6020A | | | µg/L | | | | | | 0.2 | U | 0.039 | U | 0.039 | U | 0.048 | J | 0.045 | J | 0.042 | J | 0.048 | J |
| Copper | Metals (ICP/MS) | SW846 6020A | | | µg/L | | | | | | 3 | U | 0.6 | U | 0.6 | U | 0.6 | U | 0.6 | U | 0.6 | U | 0.6 | U |
| Iron | Metals (ICP) | SW846 6010B | | | µg/L | | | | | | 140 | U | 140 | U | 140 | U | 3100 | | 140 | U | 360 | J | 140 | U |
| Lead | Metals (ICP/MS) | SW846 6020A | | | µg/L | | | | | | 1 | U | 0.2 | U | 0.2 | U | 0.2 | U | 0.2 | U | 0.2 | U | 0.2 | U |
| Magnesium | Metals (ICP) | SW846 6010B | | | µg/L | | | | | | 12000 | | 13000 | | 13000 | | 46000 | | 14000 | | 15000 | | 15000 | |
| Manganese | Metals (ICP/MS) | SW846 6020A | | | µg/L | | | | | | 8.4 | J | 6.9 | | 5.5 | | 7.1 | | 7.3 | | 6.9 | | 5.6 | |
| Mercury | Mercury (CVAA) | SW846 7470A | | | µg/L | | | | | | 0.15 | U | 0.15 | U | 0.15 | U | 0.15 | U | 0.15 | U | 0.15 | U | 0.15 | U |
| Nickel | Metals (ICP/MS) | SW846 6020A | | | µg/L | | | | | | 0.62 | U | 0.12 | U | 0.12 | J | 0.27 | J | 0.21 | J | 0.24 | J | 0.28 | J |
| Potassium | Metals (ICP) | SW846 6010B | | | µg/L | | | | | | 410 | U | 410 | U | 410 | U | 0 | U | 410 | U | 410 | U | 410 | U |
| Selenium | Metals (ICP/MS) | SW846 6020A | | | µg/L | | | | | | 10 | U | 2.1 | U | 2.1 | U | 2.1 | U | 2.1 | U | 2.1 | U | 2.1 | U |
| Silver | Metals (ICP/MS) | SW846 6020A | | | µg/L | | | | | | 0.28 | U | 0.055 | U | 0.055 | U | 0.055 | U | 0.055 | U | 0.055 | U | 0.055 | U |
| Sodium | Metals (ICP) | SW846 6010B | | | µg/L | | | | | | 2000 | | 1900 | J | 1900 | J | 9700 | | 2100 | | 2700 | | 2800 | |
| Thallium | Metals (ICP/MS) | SW846 6020A | | | µg/L | | | | | | 0.33 | U | 0.065 | U | 0.065 | U | 0.065 | U | 0.065 | U | 0.065 | U | 0.065 | U |
| Vanadium | Metals (ICP/MS) | SW846 6020A | | | µg/L | | | | | | 2.3 | U | 0.46 | U | 0.46 | U | 0.46 | U | 0.46 | U | 0.46 | U | 0.46 | U |
| Zinc | Metals (ICP/MS) | SW846 6020A | | | µg/L | | | | | | 9.5 | U | 1.9 | U | 1.9 | U | 1.9 | U | 1.9 | U | 1.9 | U | 1.9 | U |
| **Total Low Level Mercury** | | | | | | | | | | | | | | | | | | | | | | | | | |
| Mercury | Total Mercury by EPA 1631 | EPA 1631 | | | ng/L | | | | | | 7.4 | | 11.5 | | 319.0 | | 28.8 | | 335.0 | | 448.0 | | 296.0 | |
| **Dissolved Inorganic Elements** | | | | | | | | | | | | | | | | | | | | | | | | | |
| Aluminum | Metals (ICP) (DISSOLVED) | SW846 6010B | | | µg/L | | 750 | 87 | 750 | 87 | 110 | U | 110 | U | 110 | U | 110 | U | 110 | U | 110 | U | 110 | U |
| Antimony | Metals (ICP/MS) (DISSOLVED) | SW846 6020A | | | µg/L | | | | | | 1.8 | J | 25 | | 81 | | 7 | | 91 | | 280 | | 410 | |
| Arsenic | Metals (ICP/MS) (DISSOLVED) | SW846 6020A | | | µg/L | | 340 | 150 | 340 | 150 | 1.4 | J | 7.6 | | 21 | | 1200 | | 49 | | 100 | | 140 | |
| Barium | Metals (ICP/MS) (DISSOLVED) | SW846 6020A | | | µg/L | | | | | | 29 | J- | 31 | | 30 | J | 93 | | 33 | | 37 | | 39 | |
| Beryllium | Metals (ICP/MS) (DISSOLVED) | SW846 6020A | | | µg/L | | | | | | 0.36 | U | 0.36 | U | 0.36 | U | 0.36 | U | 0.36 | U | 0.36 | U | 0.36 | U |
| Cadmium | Metals (ICP/MS) (DISSOLVED) | SW846 6020A | | H (5)(6) | µg/L | | 1.0 | 0.44 | 1.1 | 0.16 | 0.5 | U | 0.5 | U | 0.5 | U | 0.5 | U | 0.5 | U | 0.5 | U | 0.5 | U |
| Calcium | Metals (ICP) (DISSOLVED) | SW846 6010B | | | µg/L | | | | | | 21000 | J- | 21000 | | 20000 | | 39000 | | 22000 | | 22000 | | 21000 | |
| Chromium | Metals (ICP/MS) (DISSOLVED) | SW846 6020A | | H (5)(6) | µg/L | | 338 | 44 | 338 | 44 | 0.87 | U | 0.87 | U | 1.2 | J | 0.87 | U | 0.87 | U | 0.87 | U | 1.1 | J |
| Cobalt | Metals (ICP/MS) (DISSOLVED) | SW846 6020A | | | µg/L | | | | | | 0.2 | U | 0.2 | U | 0.2 | U | 4.2 | | 0.21 | J | 0.2 | U | 0.2 | U |
| Copper | Metals (ICP/MS) (DISSOLVED) | SW846 6020A | | H (5)(6)(7) | µg/L | | -- | -- | 7 | 5.2 | 3 | U | 3 | U | 3 | U | 3 | U | 3 | U | 3 | U | 3 | U |
| Iron | Metals (ICP) (DISSOLVED) | SW846 6010B | | | µg/L | | -- | 1000 | -- | 1000 | 140 | U | 140 | U | 140 | U | 2700 | | 140 | U | 140 | U | 140 | U |
| Lead | Metals (ICP/MS) (DISSOLVED) | SW846 6020A | | H (5)(6) | µg/L | | 32 | 1.3 | 32 | 1.3 | 1 | U | 1 | U | 1 | U | 1 | U | 1 | U | 1 | U | 1 | U |
| Magnesium | Metals (ICP) (DISSOLVED) | SW846 6010B | | | µg/L | | | | | | 11000 | | 11000 | | 11000 | | 39000 | | 12000 | | 13000 | | 13000 | |
| Manganese | Metals (ICP/MS) (DISSOLVED) | SW846 6020A | | | µg/L | | | | | | 7.5 | J | 35 | | 26 | | 300 | | 34 | | 34 | | 22 | |
| Mercury | Mercury (CVAA) (DISSOLVED) | SW846 7470A | | | µg/L | | 1.4 | 0.77 | 1.4 | 0.77 | 0.15 | U | 0.15 | U | 0.15 | U | 0.15 | U | 0.15 | U | 0.15 | U | 0.15 | U |
| Nickel | Metals (ICP/MS) (DISSOLVED) | SW846 6020A | | H (5)(6) | µg/L | | 273 | 30 | 273 | 30 | 0.62 | U | 0.68 | J | 0.99 | J | 14 | J | 1 | J | 1.3 | J | 1.2 | J |
| Potassium | Metals (ICP) (DISSOLVED) | SW846 6010B | | | µg/L | | | | | | 410 | U | 410 | U | 410 | U | 0 | U | 410 | U | 410 | U | 190 | U |
| Selenium | Metals (ICP/MS) (DISSOLVED) | SW846 6020A | | | µg/L | | | | | | 10 | U | 10 | U | 10 | U | 10 | U | 10 | U | 10 | U | 10 | U |
| Silver | Metals (ICP/MS) (DISSOLVED) | SW846 6020A | | H (5) | µg/L | | 1.1 | -- | 1.1 | — | 0.28 | U | 0.28 | U | 0.28 | U | 0.28 | U | 0.28 | U | 0.28 | U | 0.28 | U |
| Sodium | Metals (ICP) (DISSOLVED) | SW846 6010B | | | µg/L | | | | | | 0 | U | 0 | U | 0 | U | 9200 | | 0 | U | 0 | U | 0 | U |
| Thallium | Metals (ICP/MS) (DISSOLVED) | SW846 6020A | | | µg/L | | | | | | 0.33 | U | 0.33 | U | 0.33 | U | 0.33 | U | 0.33 | U | 0.33 | U | 0.33 | U |
| Vanadium | Metals (ICP/MS) (DISSOLVED) | SW846 6020A | | | µg/L | | | | | | 2.3 | U | 2.3 | U | 2.3 | U | 2.3 | U | 2.3 | U | 2.3 | U | 2.3 | U |
| Zinc | Metals (ICP/MS) (DISSOLVED) | SW846 6020A | | H (5)(6) | µg/L | | 68.3 | 68.9 | 68.3 | 68.9 | 9.5 | U | 9.5 | U | 9.5 | U | 9.5 | U | 9.5 | U | 9.5 | U | 9.5 | U |
| **Dissolved Low Level Mercury** | | | | | | | | | | | | | | | | | | | | | | | | | |
| Mercury | Dissolved Mercury by EPA 1631 | EPA 1631 | | | ng/L | | 1400 | 770 | 1400 | 770 | 5.62 | | 6.16 | | 23.8 | | 4.53 | | 27.4 | | 30.8 | | 68.3 | |
| **General Chemistry** | | | | | | | | | | | | | | | | | | | | | | | | | |
| Alkalinity | Alkalinity | SM 2320B | | | mg/L | | | | | | 98 | | 96 | | 110 | | 240 | | 110 | | 100 | | 110 | |
| Bicarbonate Alkalinity as CaCO3 | Alkalinity | SM 2320B | | | mg/L | | | | | | 98 | | 96 | | 110 | | 240 | | 110 | | 100 | | 110 | |
| Carbonate Alkalinity as CaCO3 | Alkalinity | SM 2320B | | | mg/L | | | | | | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U |
| Chloride | Anions, Ion Chromatography | MCAWW 300.0 | | | mg/L | | 860 | 230 | 860 | 230 | 0.62 | J | 0.63 | J | 0.63 | J | 0.73 | J | 0.63 | J | 0.64 | J | 0.63 | J |
| Fluoride | Anions, Ion Chromatography | MCAWW 300.0 | | | mg/L | | | | | | 0.074 | J | 0.08 | J | 0.081 | J | 0.11 | J | 0.079 | J | 0.078 | J | 0.08 | J |
| Hydroxide Alkalinity as CaCO3 | Alkalinity | SM 2320B | | | mg/L | | | | | | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U | 5 | U |
| Nitrate Nitrite as N | Nitrogen, Nitrate-Nitrite | MCAWW 353.2 | | | mg/L | | | | | | 0.06 | U | 0.06 | U | 0.06 | U | 0.06 | U J | 0.06 | U | 0.06 | U | 0.06 | U |
| Sulfate | Anions, Ion Chromatography | MCAWW 300.0 | | | mg/L | | | | | | 6 | | 7.1 | | 8 | | 35 | | 8.8 | | 11 | | 11 | |
| Total Dissolved Solids | Solids, Total Dissolved (TDS) | SM 2540C | | | mg/L | | -- | 20 | -- | 20 | 120 | | 100 | | 110 | J | 250 | | 67 | | 120 | | 120 | |
| Total Organic Carbon | Organic Carbon, Total (TOC) | SW846 9060 | | | mg/L | | | | | | 3.2 | | 3.1 | | 3 | | 0.78 | J | 3 | | 2.8 | | 2.6 | |
| Total Suspended Solids | Solids, Total Suspended (TSS) | SM 2540D | | | mg/L | | | | | | 2 | U | 2 | U | 2 | U | 6.2 | | 2 | U | 2 | U | 12 | |
| Hardness | Hardness as CaCO3 | Calculated | | | mg/L | | | | | | 97.82 | | 97.82 | | 95.32 | | 258.18 | | 104.44 | | 108.56 | | 106.06 | |
| **Field Water Quality Parameters** | | | | | | | | | | | | | | | | | | | | | | | | | |
| Temperature | Field Measurement | -- | | Deg C | -- | | -- | -- | -- | -- | 11.37 | | 11.16 | | 11.33 | | 3.66 | | 11.01 | | 10.7 | | 10.89 | |
| pH | Field Measurement | -- | | pH Units | -- | | -- | 6.5 - 9.0 | -- | 6.5 - 8.5 | 7.05 | | 7.13 | | 7.35 | | 6.54 | | 7.38 | | 7.48 | | 7.75 | |
| Conductivity | Field Measurement | -- | | mS/cm | -- | | -- | -- | -- | -- | 141 | | 142 | | 143 | | 0.534 | | 151 | | 155 | | 0.217 | |
| Turbidity | Field Measurement | -- | | NTU | -- | | -- | -- | -- | -- | 0.83 | | 0.84 | | -- | | -- | | 0.96 | | 2.83 | | 1.01 | |
| Dissolved Oxygen | Field Measurement | -- | | mg/L | -- | | -- | -- | -- | -- | ≥ 4 | | 10.64 | | 11.32 | | 5.86 | | 10.87 | | 12.21 | | 13.01 | |
| Oxidation-Reduction Potential | Field Measurement | -- | | mV | -- | | -- | -- | -- | -- | 146.2 | | 125 | | 18.2 | | 174 | | 200.2 | | 254.3 | | 275 | |

**Key**

µg/L = Micrograms per liter
ADEC = Alaska Department of Environmental Conservation
**Bold** = Detected
CCC = Criteria Continuous Concentration
CMC = Criteria Maximum Concentration
Deg C = Degrees Celsius.
EPA = United States Environmental Protection Agency
GC/MS = Gas Chromatography/Mass Spectrometry
H = Hardness-dependent water quality criterion for aquatic life.
ICP/ MS = Inductively coupled plasma/mass spectrometry
J = The analyte was detected. Associated result is estimated. "+" indicates high bias and "-" indicates low bias.
mg/L = milligrams per liter
mS/cm = Millisiemens per centimeter
mV = Millivolts
ng/L = Nanograms per liter
NTU = Nephelometric turbidity units
U = The analyte was analyzed for but not detected. The value provided is the method detection limit.
UJ = The analyte was analyzed for but not detected. The associated reporting limit is estimated.
Shading = Sample concentration exceeds one or more WQC value.

**Notes**

(1) USEPA. 2016. National Recommended Water Quality Criteria - Aquatic Life Criteria. Accessed May 9, 2017 at: https://www.epa.gov/wqc/national-recommended-water-quality-criteria-aquatic-life-criteria-table#table
(2) USEPA. 2016. National Recommended Water Quality Criteria - Aquatic Life Criteria. Accessed May 9, 2017 at: https://www.epa.gov/wqc/national-recommended-water-quality-criteria-aquatic-life-criteria-table#table
(3) ADEC. 2008. Alaska Water Quality Criteria Manual for Toxic and Other Deleterious Organic and Inorganic Substances (as amended through December 12, 2008). ADEC, Anchorage, Alaska
(4) ADEC. 2008. Alaska Water Quality Criteria Manual for Toxic and Other Deleterious Organic and Inorganic Substances (as amended through December 12, 2008). ADEC, Anchorage, Alaska
(5) Calculated total hardness as CaCO3 = Calcium Hardness (mg/L as CaCO3) + Magnesium Hardness (mg/L as CaCO3)
(6) Hardness-adjusted criterion value was calculated following EPA 2016 and ADEC 2008. A total hardness value of **73.4** mg/L as CaCO3, based on the average value for Red Devil Creek surface water samples, is assumed.
(7) As of 2017, the USEPA no longer considers copper to be hardness-dependent.

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**Underground Workings**

**Adits, Levels, and Crosscuts**
- Dolly Area Crosscuts
- 33 Level
- 73 Level
- 150 Level / 200 Level
- 242 Sub-level
- 325 Adit
- 311 Adit
- 300 Level
- 450 Level
- 550 Crosscut

**Shafts, Raises, and Winzes**
- Shaft
- Raise or Winze
- Shaft going above and below level
- Ore shaft
- Stope ("V" points downward)

**Other Workings**
- Bottom of Shaft
- Foot of raise or winze
- Head of raise or winze

**Former Mine Openings**
- Adit Portal
- Shaft Collar
- Stope Surface Opening

Monitoring Well
Abandoned RI Monitoring Well
Seep Location

2015 10-foot Contour
2015 2-foot Contour
Post-NTCRA Stream Alignment
Red Devil Creek
10-Foot Groundwater Contour
50-Foot Groundwater Contour

Settling Pond
Monofill
Historical Structure
Repository Footprint
Area of 2014 NTCRA Re-grading

**RED DEVIL MINE**

**Red Devil, Alaska**

# Figure 3-1
# Groundwater Potentiometric Surface, Spring 2019

0 50 100 200 300 400
Feet
0 12.5 25 50 75 100 125
Meters

*Groundwater elevations are in feet NAVD88*

*Digital 2015 topographic contours based on October 10, 2015 LIDAR Survey (Quantum Spatial 2015)*

*Aerial photograph taken on September 21, 2010 (AeroMetric 2012)*

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**Underground Workings**

**Adits, Levels, and Crosscuts**

- Dolly Area Crosscuts
- 33 Level
- 73 Level
- 150 Level / 200 Level
- 242 Sub-level
- 325 Adit
- 311 Adit
- 300 Level
- 450 Level
- 550 Crosscut

**Shafts, Raises, and Winzes**

- Shaft
- Raise or Winze
- Shaft going above and below level
- Ore shaft
- Stope ("V" points downward)

**Other Workings**

- Bottom of Shaft
- Foot of raise or winze
- Head of raise or winze

**Former Mine Openings**

- Adit Portal
- Shaft Collar
- Stope Surface Opening

MW55 327.9
MW52 349.0
MW47 340.7
MW51 379.8
MW46 362.9
MW54 392.5
MW58 438.0
MW50 388.0
MW53 423.7
MW45 346.2
MW39 <349.8
MW59 301.2
MW56 359.1
MW57 424.8
MW44 342.2
MW31 <452.0
MW48 326.6
MW40 264.2
MW49 268.0
MW42 213.4
MW29 214.8
MW30 <223.7
MW43 213.4
MW33 170.2
MW26 209.5
MW25 206.9
MW06 197.9
MW23 188.1
MW32 175.4
MW27 211.7
MW04 213.5
MW24 204.8
MW22 194.4
MW28 212.0
MW20 206.6
MW16 213.2
MW03 208.0
MW21 199.7
MW14
MW15
MW17 211.4
MW01 235.7
MW18 212.1
MW19 212.4
MW12
MW11 245.7
MW10 244.8
MW09 245.3
MW13 <243.3
MW07 257.8
MW08 315.9

Kuskokwim River

- Monitoring Well
- Abandoned RI Monitoring Well
- Seep Location
- 2015 10-foot Contour
- 2015 2-foot Contour
- Post-NTCRA Stream Alignment
- Red Devil Creek
- 10-Foot Groundwater Contour
- 50-Foot Groundwater Contour
- Settling Pond
- Monofill
- Historical Structure
- Repository Footprint
- Area of 2014 NTCRA Re-grading

**RED DEVIL MINE**

**Red Devil, Alaska**

# Figure 3-2
# Groundwater Potentiometric Surface, Fall 2019

0 50 100 200 300 400
Feet
0 12.5 25 50 75 100 125
Meters

*Groundwater elevations are in feet NAVD88*

*Digital 2015 topographic contours based on October 10, 2015 LIDAR Survey (Quantum Spatial 2015)*

*Aerial photograph taken on September 21, 2010 (AeroMetric 2012)*

**Underground Workings**

**Adits, Levels, and Crosscuts**
- Dolly Area Crosscuts
- 325 Adit
- 311 Adit
- 242 Sub-level
- 33 Level
- 73 Level
- 150 Level / 200 Level
- 300 Level
- 450 Level
- 550 Crosscut

**Shafts, Raises, and Winzes**
- Shaft
- Raise or Winze
- Shaft going above and below level
- Ore shaft
- Stope ("V" points downward)

**Other Workings**
- Bottom of Shaft
- Foot of raise or winze
- Head of raise or winze

**Former Mine Openings**
- Adit Portal
- Shaft Collar
- Stope Surface Opening

MW55 (tot) 8.1 µg/L
MW52 (tot) 0.55 µg/L U
MW47 (tot) 0.55 µg/L U
MW51 (tot) 0.55 µg/L U
MW46 (tot) 0.55 µg/L U
MW54 (tot) 1.1 µg/L J
MW58 (tot) 0.55 µg/L U
MW50 (tot) 8.2 µg/L
MW53 (tot) 0.55 µg/L U
MW45 (tot) 0.55 µg/L U
MW59 (tot) 0.55 µg/L U
MW57 (tot) 0.55 µg/L U
MW44 (tot) 0.55 µg/L U
MW31 (tot) 1.1 µg/L J
MW56 (tot) 0.55 µg/L U
MW48 (tot) 1.4 µg/L J
MW40 (tot) 14 µg/L
MW49 (tot) 0.55 µg/L U
MW29 (tot) 5.7 µg/L
MW42 (tot) 350 µg/L
MW43 (tot) 1.7 µg/L J
MW33 (tot) 350 µg/L
MW26 (tot) 45 µg/L
MW27 (tot) 9.3 µg/L
RD06 (tot) 180.0 µg/L (dis) 180.0 µg/L
RD08 (tot) 210.0 µg/L (dis) 220.0 µg/L
MW28 (tot) 4.2 µg/L
MW06 (tot) 6.9 µg/L
RD14 (tot) 24.0 µg/L (dis) 86.0 µg/L
MW17 (tot) 12 µg/L
RD16 (tot) 80.0 µg/L (dis) 140.0 µg/L
MW32 (tot) 2.4 µg/L
RD10 (tot) 2.4 µg/L (dis) 2.7 µg/L
MW22 (tot) 1000 µg/L
RD05 (tot) 210.0 µg/L (dis) 200.0 µg/L
RD15 (tot) 50.0 µg/L (dis) 55.0 µg/L
MW19 (tot) 0.73 µg/L J
MW16 (tot) 970 µg/L
MW01 (tot) 1.1 µg/L J
MW09 (tot) 1.1 µg/L J
MW10 (tot) 1.1 µg/L J
MW08 (tot) 0.55 µg/L U

Kuskokwim River

Surface Water
Ground Water
Seep Location

2014 5-foot Contour
2014 1-foot Contour
Area of 2014 NTCRA Re-grading
2010 5-foot Contour
Post-NTCRA Stream Alignment
Red Devil Creek

Settling Pond
Monofill
Historical Structure

**RED DEVIL MINE**

**Red Devil, Alaska**

**Figure 3-4**
**Groundwater and Surface Water Analytical Results, Spring 2019, Total and Dissolved Antimony**

0 50 100 200 300 400
Feet
0 12.5 25 50 75 100 125
Meters

*Digital 2010 5-foot topographic contours based on the aerial orthophotograph taken on September 21, 2010 (AeroMetric 2012)*

*Digital 2014 5-foot and 1-foot topographic contours based on Marsh Creek (2014)*

**Underground Workings**

**Adits, Levels, and Crosscuts**
- Dolly Area Crosscuts
- 325 Adit
- 311 Adit
- 242 Sub-level
- 33 Level
- 73 Level
- 150 Level / 200 Level
- 300 Level
- 450 Level
- 550 Crosscut

**Shafts, Raises, and Winzes**
- Shaft
- Raise or Winze
- Shaft going above and below level
- Ore shaft
- Stope ("V" points downward)

**Other Workings**
- Bottom of Shaft
- Foot of raise or winze
- Head of raise or winze

**Former Mine Openings**
- Adit Portal
- Shaft Collar
- Stope Surface Opening

MW55 (tot) 8.1 µg/L
MW52 (tot) 0.55 µg/L U
MW47 (tot) 0.55 µg/L U
MW51 (tot) 0.55 µg/L U
MW46 (tot) 0.55 µg/L U
MW54 (tot) 1.1 µg/L J
MW58 (tot) 0.55 µg/L U
MW50 (tot) 8.2 µg/L
MW53 (tot) 0.55 µg/L U
MW45 (tot) 0.55 µg/L U
MW59 (tot) 0.55 µg/L U
MW57 (tot) 0.55 µg/L U
MW44 (tot) 0.55 µg/L U
MW31 (tot) 1.1 µg/L J
MW56 (tot) 0.55 µg/L U
MW48 (tot) 1.4 µg/L J
MW40 (tot) 14 µg/L
MW49 (tot) 0.55 µg/L U
MW29 (tot) 5.7 µg/L
MW42 (tot) 350 µg/L
MW43 (tot) 1.7 µg/L J
MW33 (tot) 350 µg/L
RD08 (tot) 63.0 µg/L (dis) 60.0 µg/L
MW27 (tot) 9.3 µg/L
MW26 (tot) 45 µg/L
MW06 (tot) 6.9 µg/L
RD16 (tot) 32.0 µg/L (dis) 42.0 µg/L
RD06 (tot) 55.0 µg/L (dis) 52.0 µg/L
MW32 (tot) 2.4 µg/L
MW28 (tot) 4.2 µg/L
RD14 (tot) 11.0 µg/L (dis) 33.0 µg/L
MW17 (tot) 12 µg/L
RD05 (tot) 570.0 µg/L (dis) 540.0 µg/L
MW22 (tot) 1000 µg/L
RD10 (tot) 1.5 µg/L J (dis) 1.0 µg/L U
RD15 (tot) 20.0 µg/L (dis) 19.0 µg/L
MW16 (tot) 970 µg/L
MW19 (tot) 0.73 µg/L J
MW01 (tot) 1.1 µg/L J
MW09 (tot) 1.1 µg/L J
MW10 (tot) 1.1 µg/L J
MW08 (tot) 0.55 µg/L U

Kuskokwim River

Surface Water
Ground Water
Seep Location

2014 5-foot Contour
2014 1-foot Contour
Area of 2014 NTCRA Re-grading
2010 5-foot Contour
Post-NTCRA Stream Alignment
Red Devil Creek

Settling Pond
Monofill
Historical Structure

**RED DEVIL MINE**

**Red Devil, Alaska**

# Figure 3-5
# Groundwater and Surface Water Analytical Results, Spring 2019, Total and Dissolved Arsenic

0 50 100 200 300 400
Feet
0 12.5 25 50 75 100 125
Meters

*Digital 2010 5-foot topographic contours based on the aerial orthophotograph taken on September 21, 2010 (AeroMetric 2012)*

*Digital 2014 5-foot and 1-foot topographic contours based on Marsh Creek (2014)*

Ecology & Environment, Inc. GIS Department Project:
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**Underground Workings**

**Adits, Levels, and Crosscuts**
- Dolly Area Crosscuts
- 325 Adit
- 311 Adit
- 242 Sub-level
- 33 Level
- 73 Level
- 150 Level / 200 Level
- 300 Level
- 450 Level
- 550 Crosscut

**Shafts, Raises, and Winzes**
- Shaft
- Raise or Winze
- Shaft going above and below level
- Ore shaft
- Stope ("V" points downward)

**Other Workings**
- Bottom of Shaft
- Foot of raise or winze
- Head of raise or winze

**Former Mine Openings**
- Adit Portal
- Shaft Collar
- Stope Surface Opening

MW55 (tot) 51.4 ng/L (dis) 27.8 ng/L
MW52 (tot) 14.1 ng/L (dis) 3.06 ng/L
MW47 (tot) 3.11 ng/L (dis) 0.96 ng/L
MW51 (tot) 12.0 ng/L (dis) 3.62 ng/L
MW54 (tot) 89.7 ng/L (dis) 3.09 ng/L
MW46 (tot) 21.6 ng/L (dis) 8.2 ng/L
MW58 (tot) 3.15 ng/L (dis) 0.51 ng/L
MW50 (tot) 1750.0 ng/L (dis) 206.0 ng/L
MW45 (tot) 16.0 ng/L (dis) 4.35 ng/L
MW53 (tot) 175.0 ng/L (dis) 18.8 ng/L
MW59 (tot) 19.0 ng/L (dis) 1.24 ng/L
MW57 (tot) 52.2 ng/L (dis) 24.3 ng/L
MW44 (tot) 2.69 ng/L (dis) 0.62 ng/L
MW31 (tot) 4.8 ng/L (dis) 4.0 ng/L
MW56 (tot) 12.5 ng/L (dis) 1.14 ng/L
MW48 (tot) 15.2 ng/L (dis) 5.98 ng/L
MW40 (tot) 8.9 ng/L (dis) 2.01 ng/L
MW49 (tot) 66.3 ng/L (dis) 17.6 ng/L
MW29 (tot) 18.0 ng/L (dis) 6.01 ng/L
MW42 (tot) 94.1 ng/L (dis) 39.7 ng/L
MW43 (tot) 10.7 ng/L (dis) 0.64 ng/L
MW33 (tot) 10.3 ng/L (dis) 4.8 ng/L
MW27 (tot) 560.0 ng/L (dis) 419.0 ng/L
MW26 (tot) 646.0 ng/L (dis) 120.0 ng/L
MW06 (tot) 5.36 (dis) 0.65
RD06 (tot) 826.0 ng/L (dis) 31.8 ng/L
RD16 (tot) 3940.0 ng/L (dis) 26.4 ng/L
MW28 (tot) 1790.0 ng/L (dis) 647.0 ng/L
RD08 (tot) 1020.0 ng/L (dis) 144.0 ng/L
RD14 (tot) 1020.0 ng/L (dis) 18.1 ng/L
MW17 (tot) 68.3 ng/L (dis) 16.7 ng/L
RD10 (tot) 10.7 ng/L (dis) 4.32 ng/L
RD05 (tot) 113.0 ng/L (dis) 53.0 ng/L
MW22 (tot) 240.0 ng/L (dis) 143.0 ng/L
MW32 (tot) 52.0 ng/L (dis) 8.46 ng/L
MW16 (tot) 650.0 ng/L (dis) 252.0 ng/L
RD15 (tot) 274.0 ng/L (dis) 26.3 ng/L
MW19 (tot) 4.35 ng/L (dis) 1.64 ng/L
MW01 (tot) 7.79 ng/L (dis) 4.19 ng/L
MW10 (tot) 7.69 ng/L (dis) 1.99 ng/L
MW09 (tot) 18.3 ng/L (dis) 5.67 ng/L
MW08 (tot) 6.22 ng/L (dis) 2.52 ng/L

Kuskokwim River

- Surface Water
- Ground Water
- Seep Location
- 2014 5-foot Contour
- 2014 1-foot Contour
- Area of 2014 NTCRA Re-grading
- 2010 5-foot Contour
- Post-NTCRA Stream
- Red Devil Creek
- Settling Pond
- Monofill
- Historical Structure

**RED DEVIL MINE**

**Red Devil, Alaska**

**Figure 3-6**
**Groundwater and Surface Water Analytical Results, Spring 2019, Total and Dissolved Low-Level Mercury**

0 50 100 200 300 400 Feet
0 12.5 25 50 75 100 125 Meters

*Digital 2010 5-foot topographic contours based on the aerial orthophotograph taken on September 21, 2010 (AeroMetric 2012)*

*Digital 2014 5-foot and 1-foot topographic contours based on Marsh Creek (2014)*

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**Underground Workings**

**Adits, Levels, and Crosscuts**
- Dolly Area Crosscuts
- 325 Adit
- 311 Adit
- 242 Sub-level
- 33 Level
- 73 Level
- 150 Level / 200 Level
- 300 Level
- 450 Level
- 550 Crosscut

**Shafts, Raises, and Winzes**
- Shaft
- Raise or Winze
- Shaft going above and below level
- Ore shaft
- Stope ("V" points downward)

**Other Workings**
- Bottom of Shaft
- Foot of raise or winze
- Head of raise or winze

**Former Mine Openings**
- Adit Portal
- Shaft Collar
- Stope Surface Opening

MW55 (tot) 8 µg/L
MW52 (tot) 3.3 µg/L
MW47 (tot) 0.55 µg/L U
MW51 (tot) 0.55 µg/L U
MW46 (tot) 0 µg/L U
MW54 (tot) 1.1 µg/L
MW58 (tot) 0.55 µg/L U
MW50 (tot) 8.3 µg/L
MW53 (tot) 0.55 µg/L U
MW45 (tot) 0.55 µg/L U
MW59 (tot) 0.55 µg/L U
MW57 (tot) 0.55 µg/L U
MW44 (tot) 0.55 µg/L U
MW31 (tot) µg/L
MW56 (tot) 0.55 µg/L U
MW48 (tot) 0.55 µg/L U
MW40 (tot) 6.1 µg/L
MW49 (tot) 0 µg/L U
MW29 (tot) 1.5 µg/L
MW42 (tot) 44 µg/L
MW43 (tot) 1.6 µg/L
MW33 (tot) 83 µg/L
MW26 (tot) 18 µg/L
MW06 (tot) 12 µg/L
RD06 (tot) 54.0 µg/L (dis) 280.0 µg/L
RD16 (tot) 20.0 µg/L (dis) 91.0 µg/L
MW28 (tot) 0.79 µg/L
RD08 (tot) 82.0 µg/L (dis) 410.0 µg/L
RD10 (tot) 2.4 µg/L (dis) 1.8 µg/L J
RD14 (tot) 5.1 µg/L (dis) 25.0 µg/L
MW27 (tot) 1.4 µg/L
RD05 (tot) 55.0 µg/L (dis) 7.0 µg/L
MW22 (tot) 220 µg/L
MW32 (tot) 0.34 µg/L J
MW17 (tot) 12 µg/L
RD15 (tot) 18.0 µg/L (dis) 81.0 µg/L
MW19 (tot) 1.1 µg/L
MW01 (tot) 3.1 µg/L
MW16 (tot) 440 µg/L
MW09 (tot) 11 µg/L
MW10 (tot) 0.91 µg/L J
MW08 (tot) 1.6 µg/L J

Kuskokwim River

Surface Water
Ground Water
Seep Location

2014 5-foot Contour
2014 1-foot Contour
Area of 2014 NTCRA Re-grading
2010 5-foot Contour
Post-NTCRA Stream
Red Devil Creek

Settling Pond
Monofill
Historical Structure

**RED DEVIL MINE**

**Red Devil, Alaska**

# Figure 3-7
# Groundwater and Surface Water Analytical Results, Fall 2019, Total and Dissolved Antimony

0 50 100 200 300 400 Feet
0 12.5 25 50 75 100 125 Meters

*Digital 2010 5-foot topographic contours based on the aerial orthophotograph taken on September 21, 2010 (AeroMetric 2012)*

*Digital 2014 5-foot and 1-foot topographic contours based on Marsh Creek (2014)*

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**Underground Workings**

**Adits, Levels, and Crosscuts**
- Dolly Area Crosscuts
- 325 Adit
- 311 Adit
- 242 Sub-level
- 33 Level
- 73 Level
- 150 Level / 200 Level
- 300 Level
- 450 Level
- 550 Crosscut

**Shafts, Raises, and Winzes**
- Shaft
- Raise or Winze
- Shaft going above and below level
- Ore shaft
- Stope ("V" points downward)

**Other Workings**
- Bottom of Shaft
- Foot of raise or winze
- Head of raise or winze

**Former Mine Openings**
- Adit Portal
- Shaft Collar
- Stope Surface Opening

MW55 (tot) 8 µg/L
MW52 (tot) 3.3 µg/L
MW47 (tot) 0.55 µg/L U
MW51 (tot) 0.55 µg/L U
MW46 (tot) 0 µg/L U
MW54 (tot) 1.1 µg/L
MW58 (tot) 0.55 µg/L U
MW50 (tot) 8.3 µg/L
MW53 (tot) 0.55 µg/L U
MW45 (tot) 0.55 µg/L U
MW59 (tot) 0.55 µg/L U
MW57 (tot) 0.55 µg/L U
MW44 (tot) 0.55 µg/L U
MW31 (tot) µg/L
MW56 (tot) 0.55 µg/L U
MW48 (tot) 0.55 µg/L U
MW40 (tot) 6.1 µg/L
MW49 (tot) 0 µg/L U
MW29 (tot) 1.5 µg/L
MW42 (tot) 44 µg/L
MW43 (tot) 1.6 µg/L
MW33 (tot) 83 µg/L
MW26 (tot) 18 µg/L
RD16 (tot) 11.0 µg/L (dis) 49.0 µg/L
MW06 (tot) 12 µg/L
RD06 (tot) 20.0 µg/L (dis) 100.0 µg/L
RD08 (tot) 30.0 µg/L (dis) 140.0 µg/L
MW27 (tot) 1.4 µg/L
RD14 (tot) 1.5 µg/L (dis) 7.6 µg/L
MW28 (tot) 0.79 µg/L
RD10 (tot) 1.3 µg/L J (dis) 1.4 µg/L J
RD05 (tot) 20.0 µg/L (dis) 1200.0 µg/L
MW22 (tot) 220 µg/L
MW32 (tot) 0.34 µg/L J
RD15 (tot) 4.6 µg/L (dis) 21.0 µg/L
MW16 (tot) 440 µg/L
MW19 (tot) 1.1 µg/L
MW01 (tot) 3.1 µg/L
MW17 (tot) 12 µg/L
MW09 (tot) 11 µg/L
MW10 (tot) 0.91 µg/L J
MW08 (tot) 1.6 µg/L J

Kuskokwim River

- Surface Water
- Ground Water
- Seep Location
- 2014 5-foot Contour
- 2014 1-foot Contour
- Area of 2014 NTCRA Re-grading
- 2010 5-foot Contour
- Post-NTCRA Stream
- Red Devil Creek
- Settling Pond
- Monofill
- Historical Structure

*Digital 2010 5-foot topographic contours based on the aerial orthophotograph taken on September 21, 2010 (AeroMetric 2012)*

*Digital 2014 5-foot and 1-foot topographic contours based on Marsh Creek (2014)*

**RED DEVIL MINE**

**Red Devil, Alaska**

# Figure 3-8
# Groundwater and Surface Water Analytical Results, Fall 2019, Total and Dissolved Arsenic

0 50 100 200 300 400
Feet
0 12.5 25 50 75 100 125
Meters

Ecology & Environment, Inc. GIS Department Project:
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**Underground Workings**

**Adits, Levels, and Crosscuts**
- Dolly Area Crosscuts
- 325 Adit
- 311 Adit
- 242 Sub-level
- 33 Level
- 73 Level
- 150 Level / 200 Level
- 300 Level
- 450 Level
- 550 Crosscut

**Shafts, Raises, and Winzes**
- Shaft
- Raise or Winze
- Shaft going above and below level
- Ore shaft
- Stope ("V" points downward)

**Other Workings**
- Bottom of Shaft
- Foot of raise or winze
- Head of raise or winze

**Former Mine Openings**
- Adit Portal
- Shaft Collar
- Stope Surface Opening

MW52 (tot) 333.0 ng/L (dis) 0.13 ng/L
MW55 (tot) 37.6 ng/L (dis) 6.63 ng/L
MW51 (tot) 4.3 ng/L (dis) 0.42 ng/L
MW47 (tot) 3.92 ng/L (dis) 0.23 ng/L
MW46 (tot) 255.0 ng/L (dis) 23.2 ng/L
MW54 (tot) 40.5 ng/L (dis) 0.27 ng/L
MW50 (tot) 544.0 ng/L (dis) 62.8 ng/L
MW45 (tot) 19.9 ng/L (dis) 3.44 ng/L
MW58 (tot) 39.6 ng/L (dis) 3.62 ng/L
MW53 (tot) 107.0 ng/L (dis) 12.7 ng/L
MW56 (tot) 6.8 ng/L (dis) 0.68 ng/L
MW31 (tot) None ng/L (dis) None ng/L
MW57 (tot) 83.9 ng/L (dis) 12.6 ng/L
MW59 (tot) 76.8 ng/L (dis) 35.8 ng/L
MW44 (tot) 19.7 ng/L (dis) 0.78 ng/L
MW40 (tot) 1.1 ng/L (dis) 0.13 ng/L U
MW48 (tot) 4.81 ng/L (dis) 2.63 ng/L
MW49 (tot) 677.0 ng/L (dis) 63.2 ng/L
MW29 (tot) 28.3 ng/L J (dis) 0.79 ng/L
MW42 (tot) 64.0 ng/L (dis) 2.79 ng/L
MW27 (tot) 698.0 ng/L (dis) 519.0 ng/L
MW26 (tot) 134.0 ng/L (dis) 31.3 ng/L
MW06 (tot) 15.8 ng/L (dis) 3.71 ng/L
MW33 (tot) 31.0 ng/L (dis) 3.33 ng/L
RD08 (tot) 296.0 ng/L (dis) 68.3 ng/L
MW43 (tot) 4.33 ng/L (dis) 1.04 ng/L
MW28 (tot) 980.0 ng/L (dis) 427.0 ng/L
RD16 (tot) 335.0 ng/L (dis) 27.4 ng/L
RD06 (tot) 448.0 ng/L (dis) 30.8 ng/L
RD14 (tot) 11.5 ng/L (dis) 6.16 ng/L
RD10 (tot) 7.35 ng/L (dis) 5.62 ng/L
RD05 (tot) 28.8 ng/L (dis) 4.53 ng/L
MW22 (tot) 303.0 ng/L (dis) 84.4 ng/L
MW32 (tot) 63.3 ng/L (dis) 14.9 ng/L
RD15 (tot) 319.0 ng/L (dis) 23.8 ng/L
MW16 (tot) 1170.0 ng/L (dis) 1060.0 ng/L
MW01 (tot) 101.0 ng/L (dis) 12.7 ng/L
MW17 (tot) 203.0 ng/L (dis) 7.05 ng/L
MW19 (tot) 6.61 ng/L (dis) 1.33 ng/L
MW10 (tot) 31.5 ng/L (dis) 3.22 ng/L
MW09 (tot) 71.7 ng/L (dis) 6.26 ng/L
MW08 (tot) 672.0 ng/L (dis) 0.79 ng/L

Kuskokwim River

- Surface Water
- Ground Water
- Seep Location
- 2014 5-foot Contour
- 2014 1-foot Contour
- Area of 2014 NTCRA Re-grading
- 2010 5-foot Contour
- Post-NTCRA Stream Alignment
- Red Devil Creek
- Settling Pond
- Monofill
- Historical Structure

**RED DEVIL MINE**

**Red Devil, Alaska**

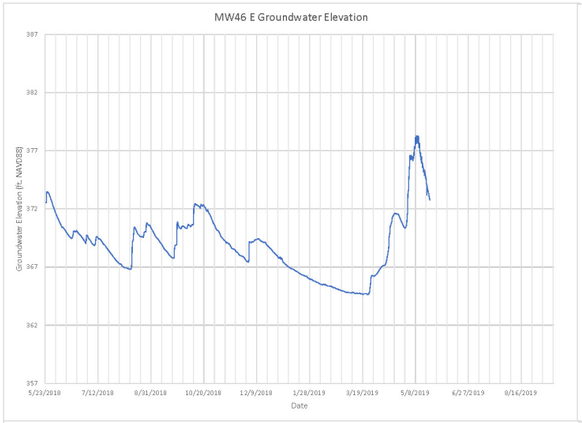
**Figure 3-9**
**Groundwater and Surface Water Analytical Results, Fall 2019, Total and Dissolved Low-Level Mercury**

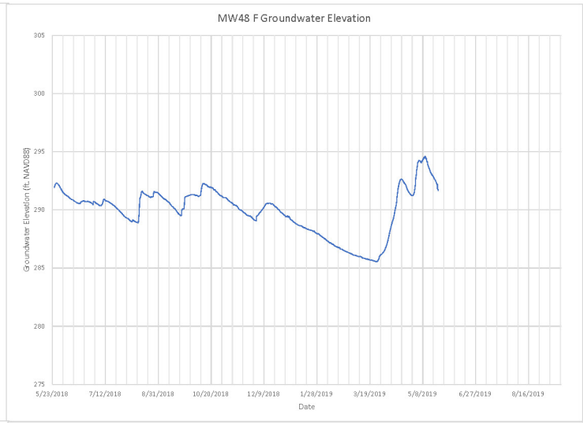
0 50 100 200 300 400 Feet
0 12.5 25 50 75 100 125 Meters

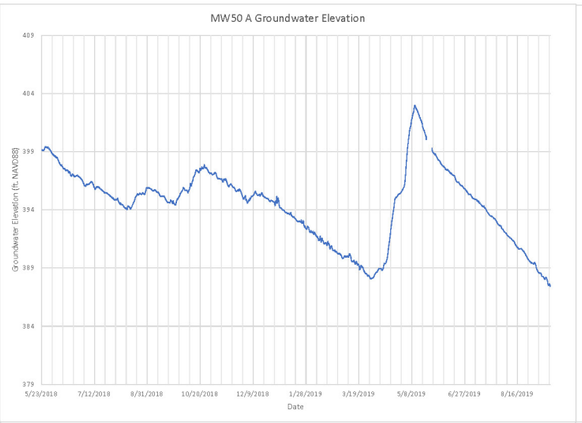
*Digital 2010 5-foot topographic contours based on the aerial orthophotograph taken on September 21, 2010 (AeroMetric 2012)*

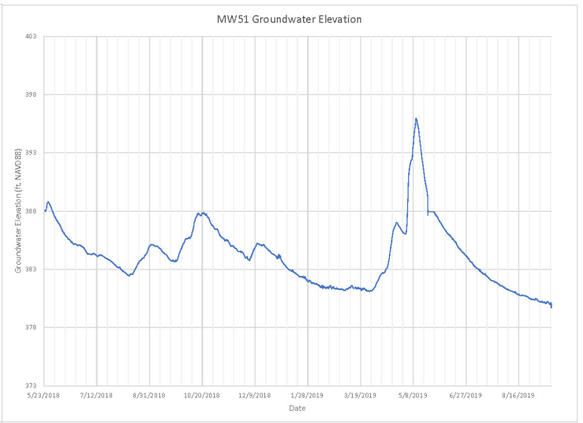
*Digital 2014 5-foot and 1-foot topographic contours based on Marsh Creek (2014)*

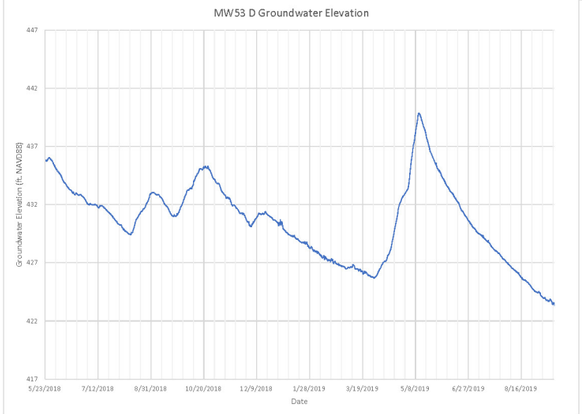
**Figure 3-3 Continuous Groundwater Levels in Selected Wells - Spring 2018 to Fall 2019**

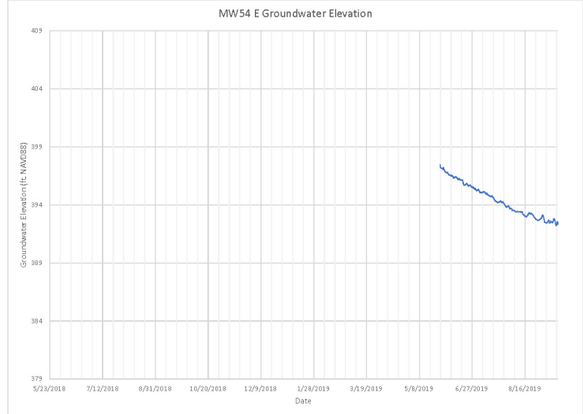


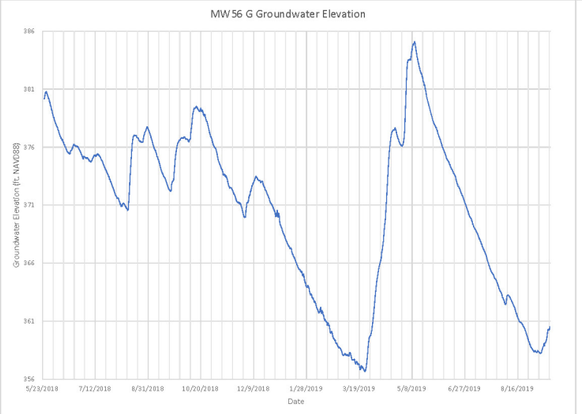



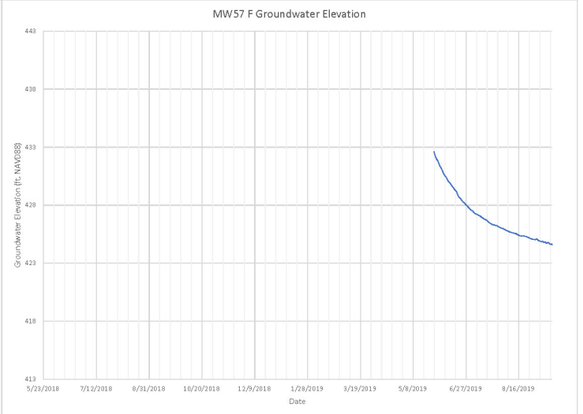



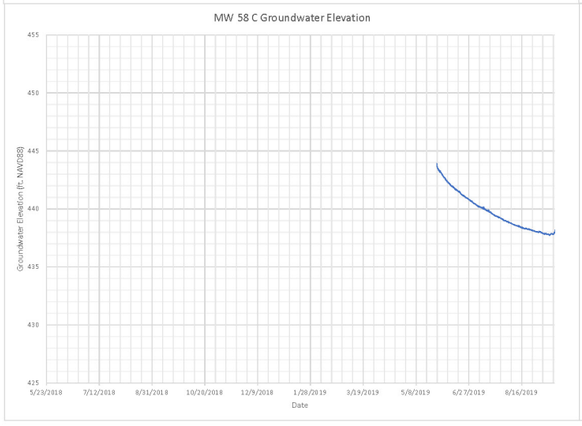



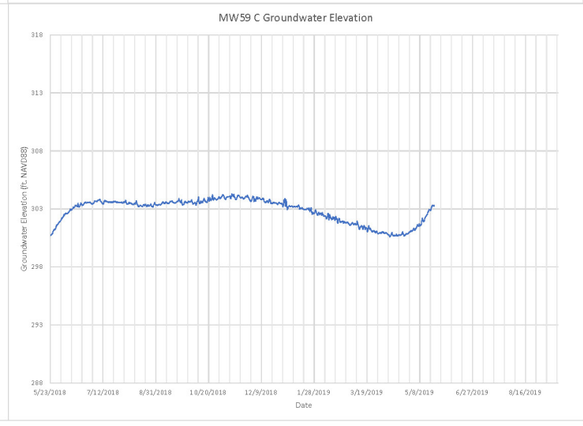



# 4 Conclusions and Recommendations

## 4.1 Groundwater

Groundwater monitoring results from 2019 baseline monitoring events are generally consistent with the results of previous investigations at the RDM, as described in the *Final Red Devil Mine Groundwater and Surface Water Report* (E & E 2019b).

Groundwater elevation results from the spring and fall 2019 baseline monitoring events support the existing understanding of groundwater flow in the MPA, SMA and upland areas of the site. Groundwater in the vicinity of the MPA generally mimics topography and flows toward Red Devil Creek. However, within the surface mined area (SMA) mine workings affect groundwater depth and gradient near the mine workings. The mine workings provide a highly transmissive hydraulic connection that depresses the water table in those areas and establishes a hydraulic gradient toward the collapsed mine workings. The groundwater elevation results indicate a preferential flow pathway in the vicinity of the mine workings through the center of the SMA .

Continuous groundwater elevation data from the 2019 baseline monitoring events (presented in Chapter 3 as Figure 3-3) build on previous understanding of seasonal trends in groundwater elevations at the RDM. In late spring, groundwater elevations quickly rise to a peak level corresponding with maximum snowmelt, followed by a period of generally decreasing water levels during the summer punctuated by occasional rises in water levels likely attributable to rain events. Water levels decrease during the winter with freezing conditions. Water levels at monitoring wells used to measure continuous groundwater elevations in the SMA varied seasonally by between approximately 10 to 35 feet, except for MW59, which varied by less than 5 feet.

Concentrations of contaminants of concern (COCs)—antimony, arsenic, and mercury—in groundwater samples from the 2019 baseline monitoring events follow expected trends in spatial distribution, based on previous sampling at the RDM. In general, the highest concentrations of COCs are found where tailings/waste rock lie below the water table, including the MPA and parts of the Red Devil Creek valley downstream alluvial area, with generally lower concentrations found in areas of the SMA that are not influenced by natural mineralization.

Concentrations of COCs in groundwater at the RDM do not exhibit obvious temporal trends. Graphs of groundwater COC concentrations and static water levels from spring 2010 through fall 2019 are presented in Figure 4-1.

## 4.2 Surface Water

Surface water monitoring results from 2019 baseline monitoring events are generally consistent with the results of previous investigations at the RDM, as described in the *Final Red Devil Mine Groundwater and Surface Water Report* (E & E 2019b). Estimated Red Devil Creek surface water discharge in spring 2019 ranged from 11.47 to 15.15 cubic feet per second (cfs). The creek generally appeared be gaining over most of its length below RD10, except for the reaches between RD15 and RD16 as well as between RD06 and RD08, where Red Devil Creek appeared to exhibit losing conditions. This observation is generally consistent with previous characterization of baseflow conditions in Red Devil Creek, described in section 3.2.2 of the 2014 RI (E & E, 2014). Discharge in fall 2019 was at its lowest since September 2015, with Red Devil Creek discharge ranging from 0.26 to 0.47 cfs. The creek generally appeared to be gaining over most of its length below RD10, except for an extended reach between RD16 and RD08 where Red Devil Creek appeared to exhibit losing conditions.

Trends in surface water concentrations of COCs at the RDM are a result of interaction between groundwater and surface water in Red Devil Creek. Groundwater emerges to surface water as Red Devil Creek baseflow and via the seep located adjacent to the creek in the MPA. Red Devil Creek is impacted primarily by emergence of groundwater into the stream along gaining reaches in the MPA. Concentrations of COCs increase longitudinally moving from upstream to downstream of the MPA along Red Devil Creek. A longitudinal plot of surface water concentrations in Red Devil Creek is presented as Figure 4-2.

## 4.3 Recommendations

Groundwater sampling and analysis has evolved through the RI/FS phases of this CERCLA project from characterization to baseline monitoring. Initial goals of groundwater sampling and analysis were consistent with the overall objectives of the Remedial Investigation (RI) and were focused primarily on the area along the lower reach of Red Devil Creek referred to as the Main Processing Area. Additional monitoring wells have been installed since the initial RI was completed that have broadened our understanding of flow within the bedrock aquifer in areas that are influenced by natural mineralization but are not affected by the tailings and waste rock. The BLM selected a preferred remedial action alternative in 2020 that involves consolidating tailings/waste rock in an engineered repository located in the Surface Mine Area. Consequently, groundwater characterization emphasizing the area dominated by tailings and a broad range of potential contaminants has transitioned to baseline monitoring of upper elevations (upgradient of the tailings) and more focus on the contaminants that are responsible for the majority of environmental risk estimated for the site.

Initial characterization and initial baseline monitoring have defined groundwater trends within the Main Processing Area that will influence design of any alternative evaluated in the FS, and particularly the preferred alternative. It is recommended that, beginning in 2020, the BLM should focus baseline monitoring efforts on the Surface Mine Area. A limited number of wells in the Main Processing Area will continue to be monitored to verify that seasonal trends remain within the documented range.

Specific recommendations for future baseline monitoring are listed below along with rationale for each recommended change.

**Recommendation 1.** Discontinue groundwater sampling at Monitoring Wells MW01, MW08, MW09, MW19, MW22, MW29, MW31, and MW32 beginning in 2020.

> **Rationale –** The monitoring wells listed above have been sampled for 9 years or longer. Furthermore, MW29 and MW31 are located in areas considered of secondary importance in defining baseline conditions in the SMA. None of these wells are considered critical for evaluating long term groundwater quality trends in the bedrock aquifer.

**Recommendation 2.** Resume groundwater sampling at wells MW44, MW47, MW48, MW53, MW54, MW55, and MW57 beginning in 2020.

> **Rationale –** The wells listed above were installed in 2017 to provide data on groundwater conditions in the vicinity of the proposed repository. Resumed sampling of these wells represents a shift toward focusing monitoring efforts on the upper portion of the watershed.

**Recommendation 3**. Discontinue laboratory analysis of all organic parameters applicable to assessment of petroleum hydrocarbons beginning in 2020.

> **Rationale** – Monitoring wells located downgradient from the former fuel tank farm have been sampled for hydrocarbon parameters since 2010 and no sample results have exceeded any DEC Method 2 cleanup levels. The time period covered by the current data set is sufficiently long to conclude that hydrocarbons are not migrating in groundwater from the old tank farm area in concentrations that exceed trace levels.

**Recommendation 4.** Eliminate major anions and nitrate/nitrite from baseline monitoring for groundwater and surface water beginning in 2021.

> **Rationale.** Major anions and nitrate/nitrite were incorporated into the groundwater characterization effort during the RI and have been retained through initial baseline monitoring to generate a robust data set to provide an understanding of gross geochemical characteristics. The existing data demonstrate that concentrations remain relatively constant over time.

**Recommendation 5.** Eliminate dissolved TAL metals from the list of analytes for Red Devil Creek surface water samples beginning in 2021.

> **Rationale.** Red Devil Creek surface water samples were analyzed for both total and dissolved TAL metals during the RI to address questions regarding potential COC transport. Those questions have been addressed and future monitoring will focus primarily on comparison of total TAL metals to the applicable regulatory levels.

**Recommendation 6.** Discontinue continuous water table elevation monitoring beginning in 2021.

> **Rationale.** Pressure transducers have been used to monitor water table elevations at multiple wells in the SMA for the last three years. The monitoring results illustrate water table elevation fluctuation over a wide range of snowpack and hydrologic conditions. Static water table elevations will continue to be recorded for all monitoring wells at Red Devil Mine during baseline monitoring events regardless of whether they are sampled. Monitoring events are scheduled shortly after spring breakup and during seasonal decline in water levels in the fall. Should future water table elevations exceed historical maximum elevations, the BLM will consider additional high frequency water level monitoring.

The baseline monitoring program is expected to continue for at least two more years, subject to available funding. Once the Record of Decision is complete and remedial action is better defined, baseline monitoring may be modified as necessary to meet remedial action objectives.

Figure 4-1a. Groundwater Concentrations and Elevation - Upstream Alluvial Area

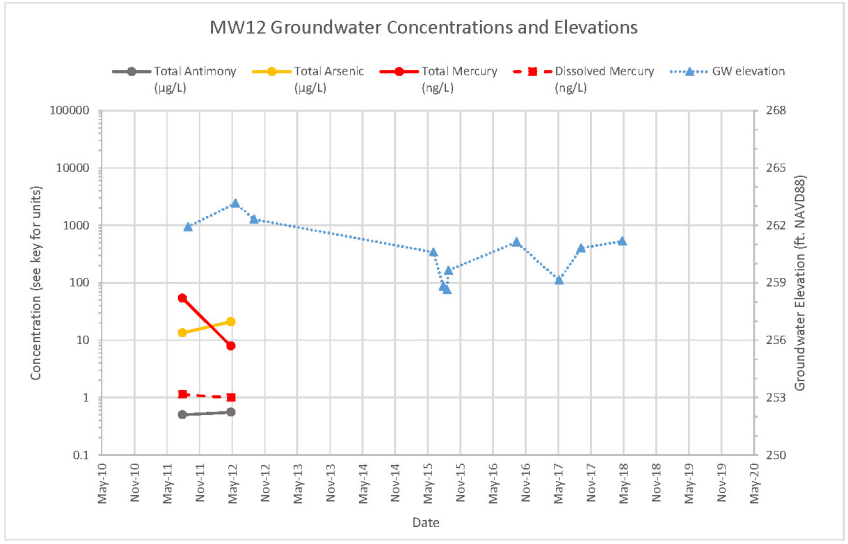


Figure 4-1b. Groundwater Concentrations and Elevation - Upland Area

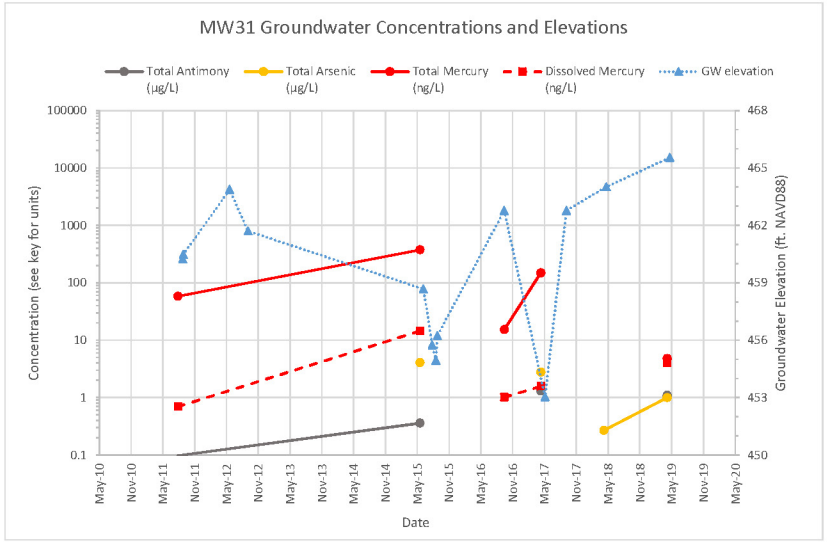
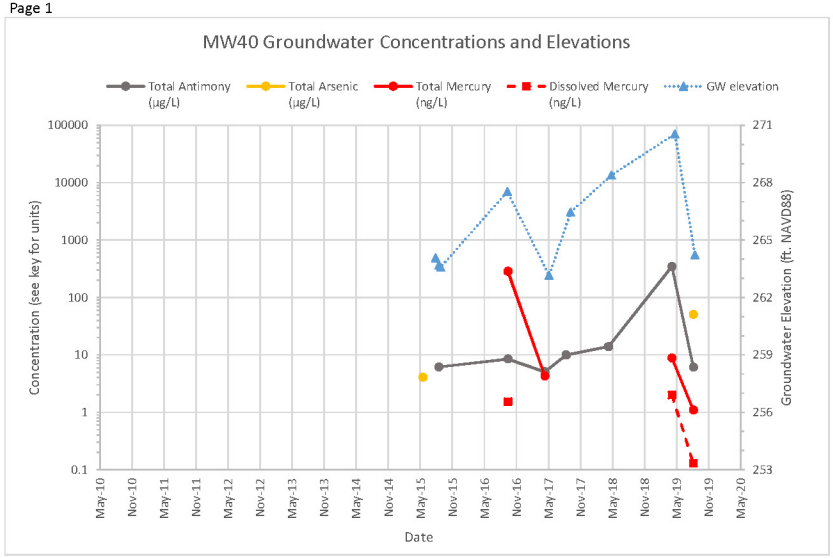
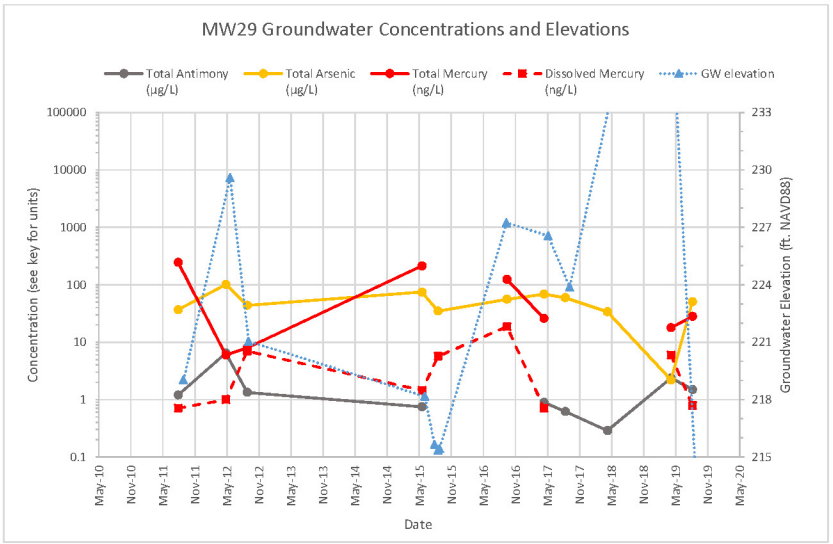
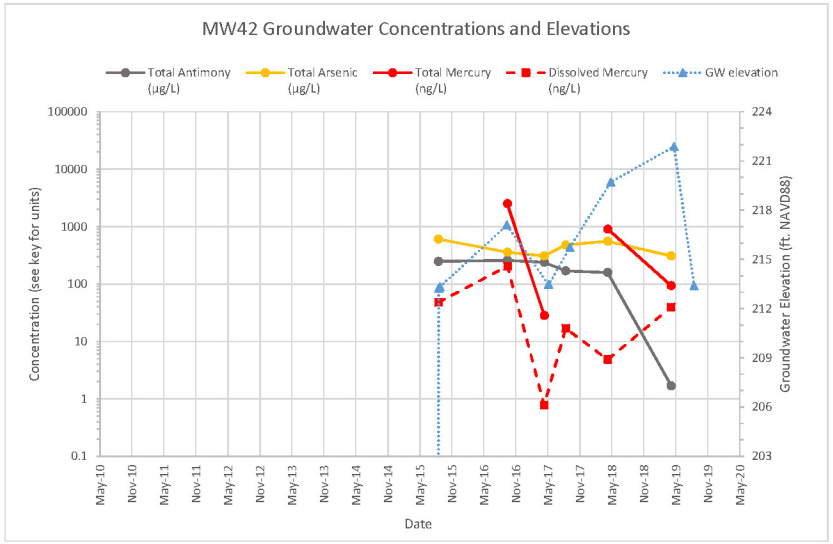


Figure 4-1c. Groundwater Concentrations and Elevation - Surface Mined Area
Page 1



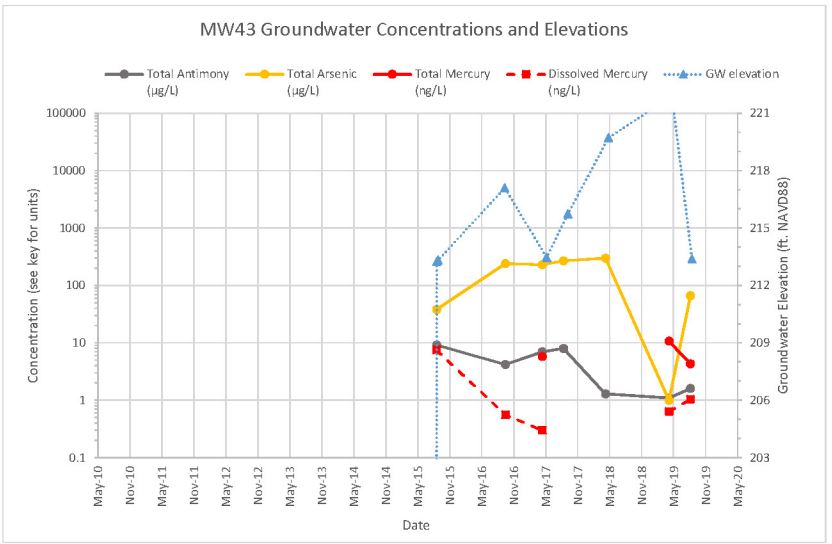
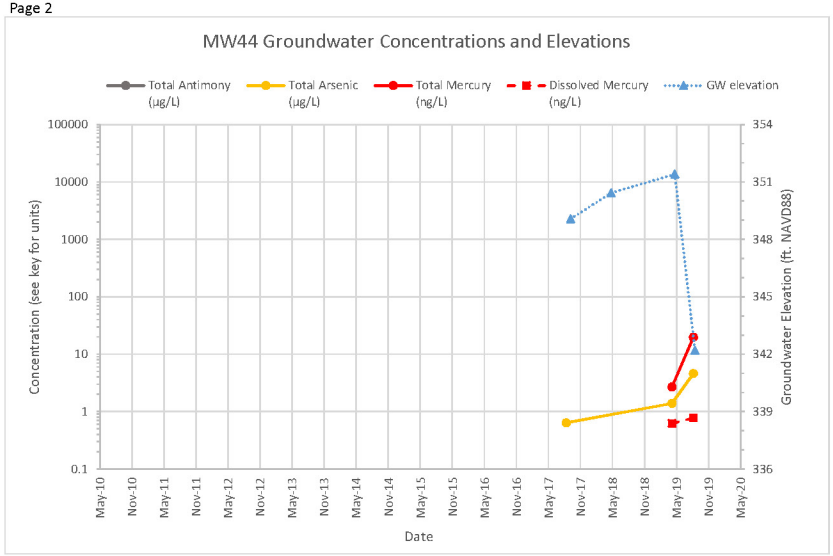
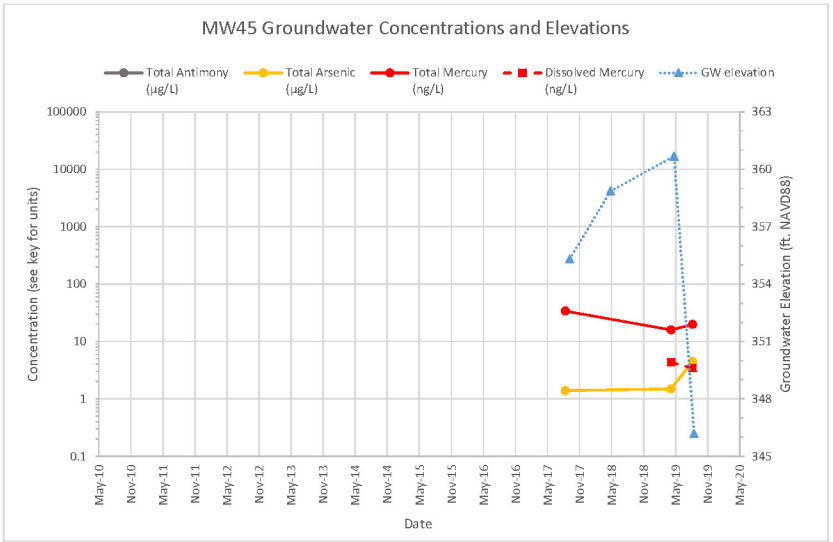
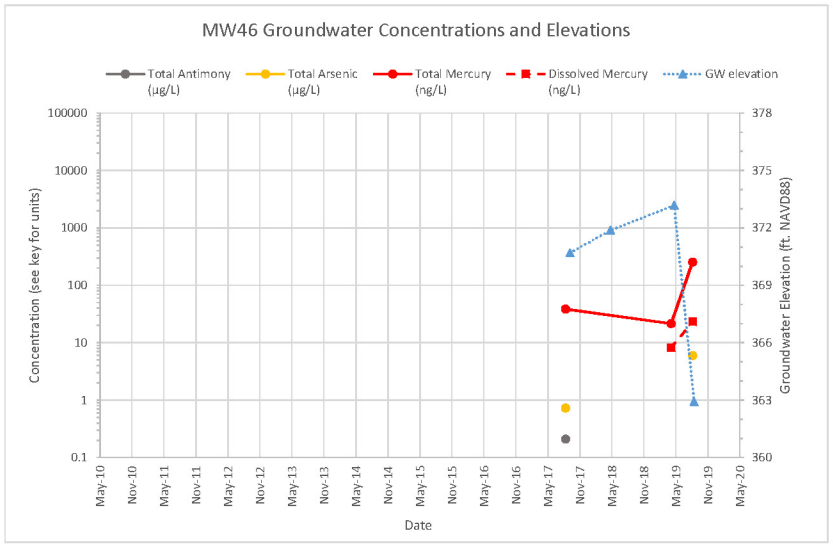



Figure 4-1c. Groundwater Concentrations and Elevation - Surface Mined Area
Page 2



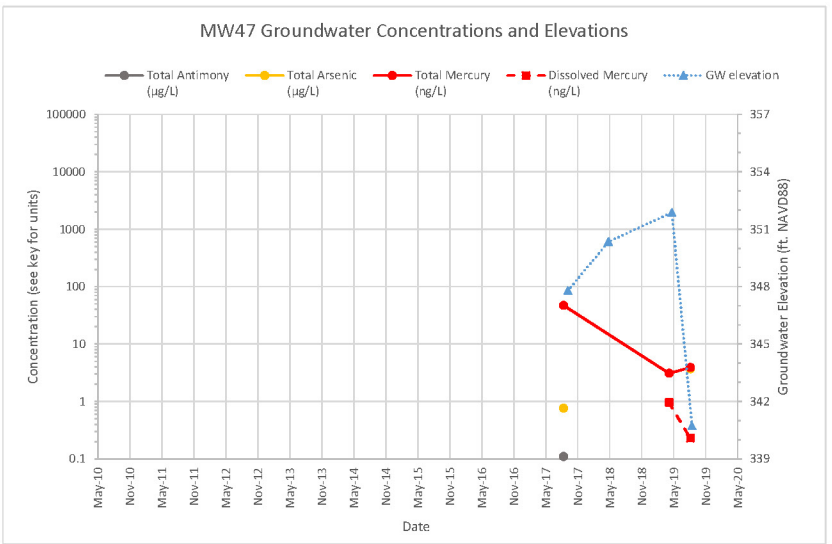
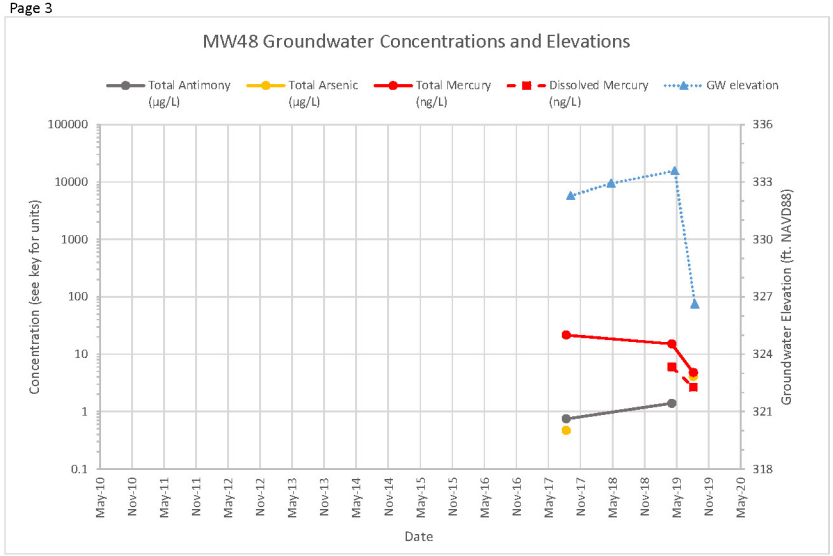
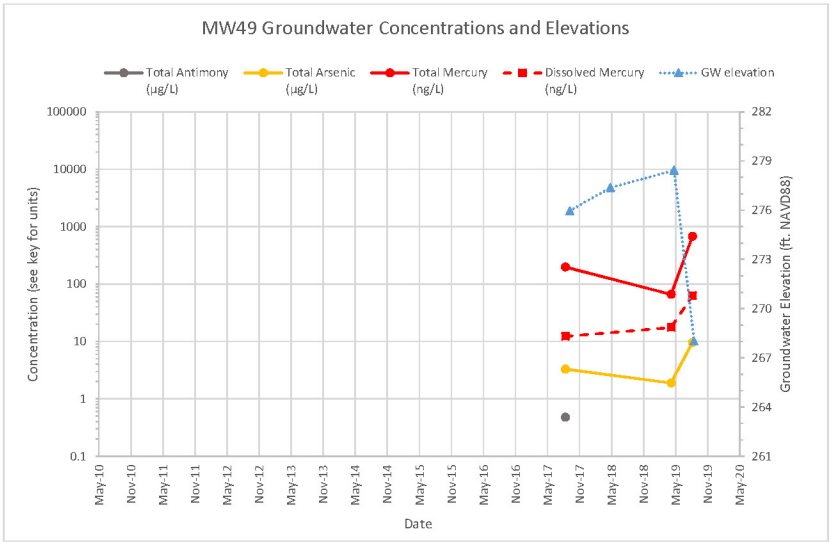
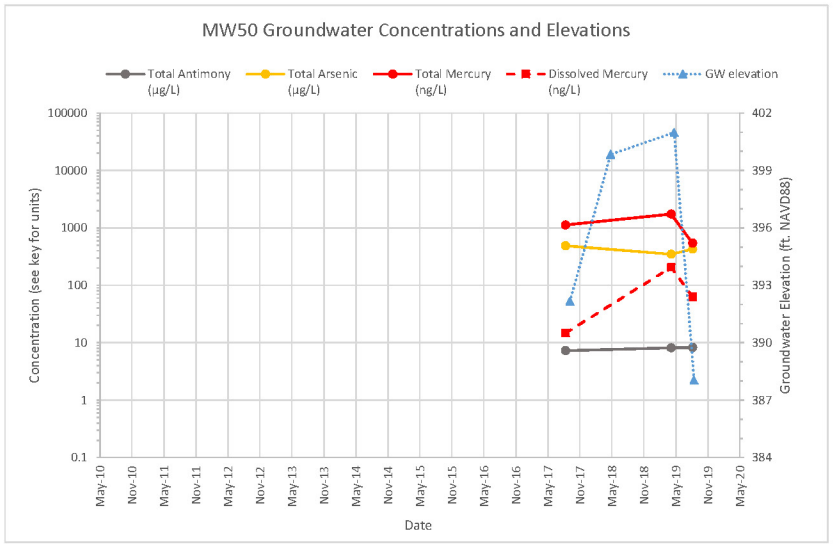



Figure 4-1c. Groundwater Concentrations and Elevation - Surface Mined Area
Page 3



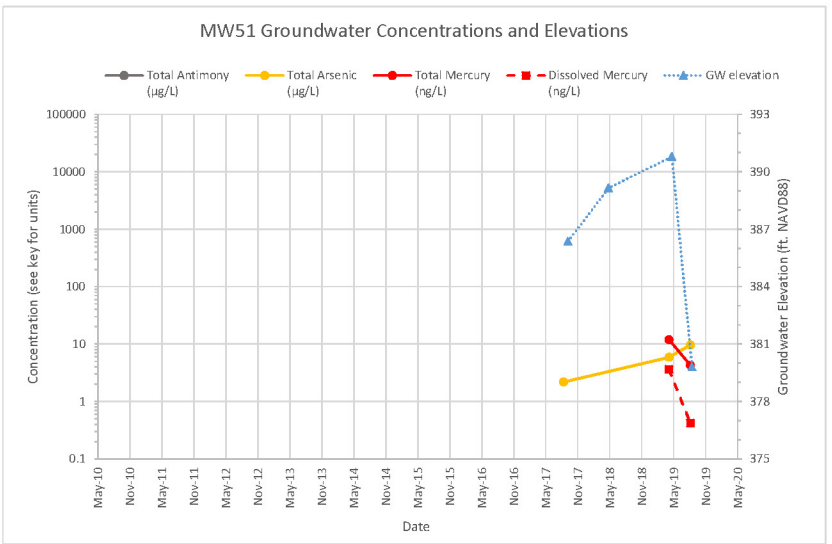
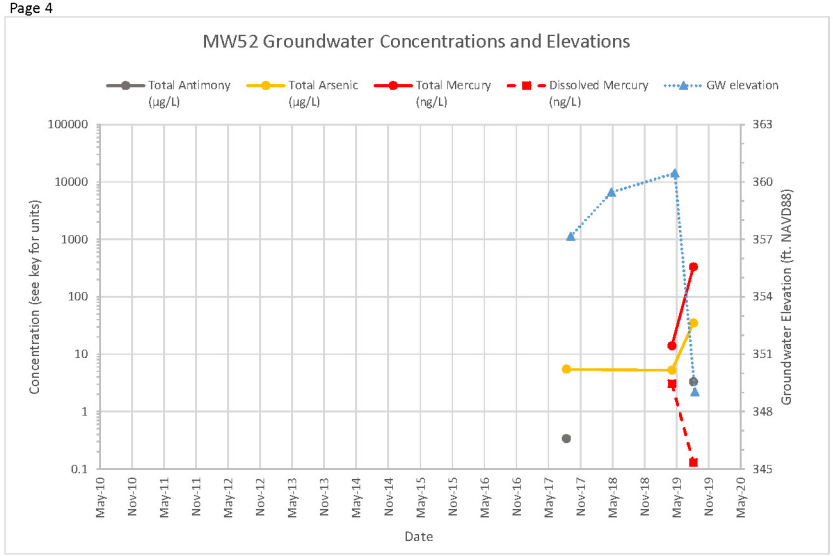
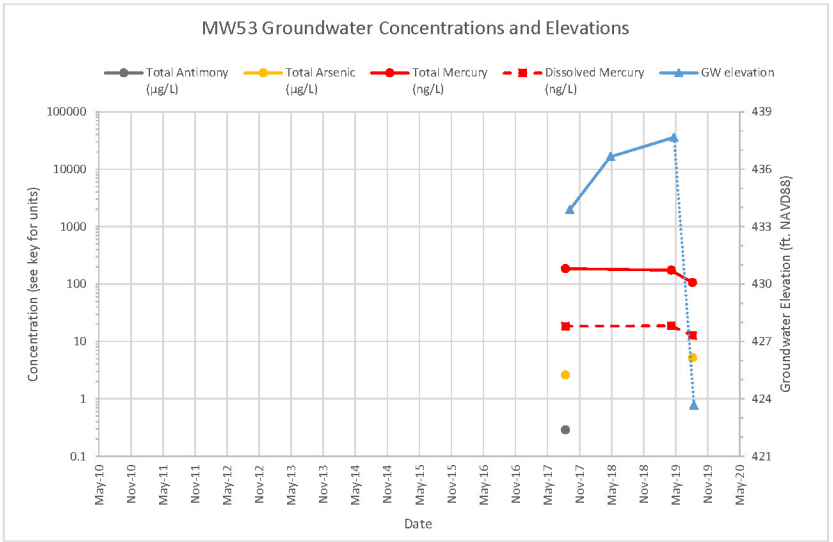
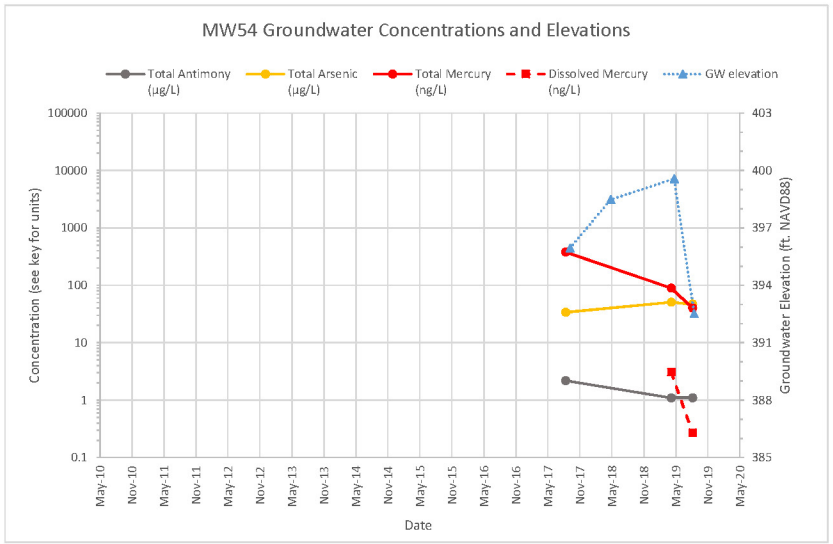



Figure 4-1c. Groundwater Concentrations and Elevation - Surface Mined Area

Page 4



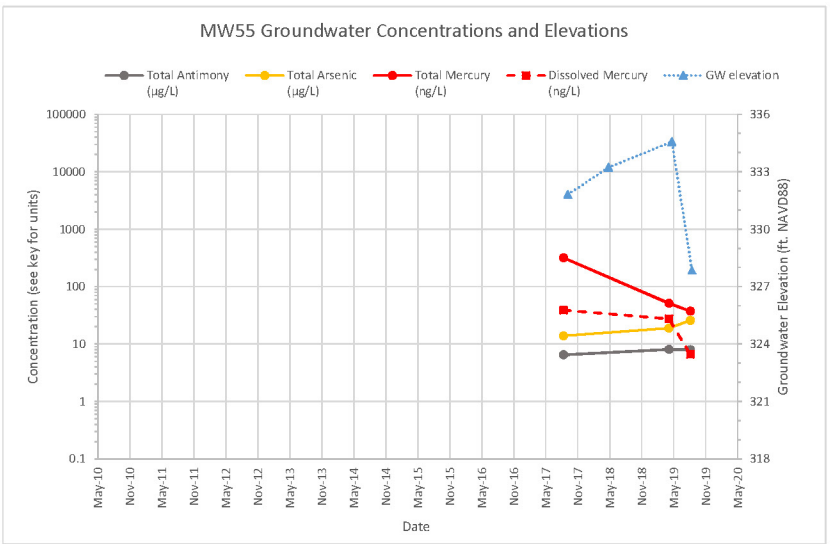
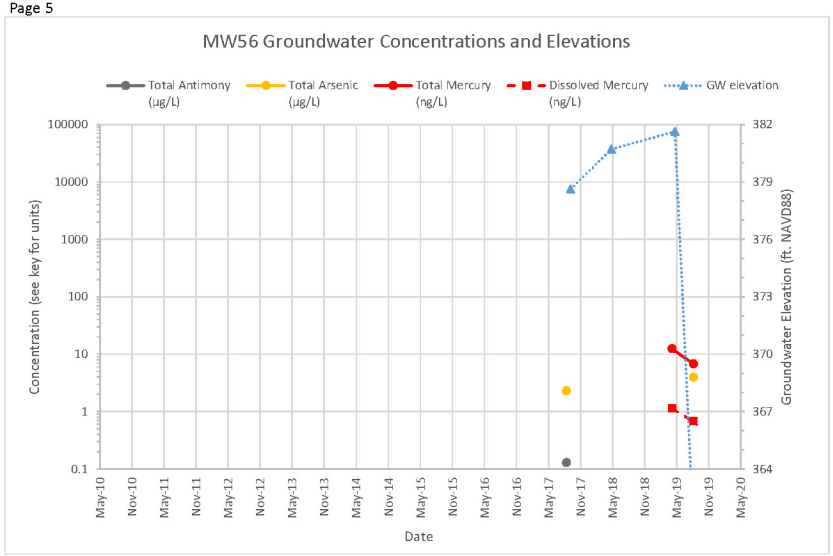
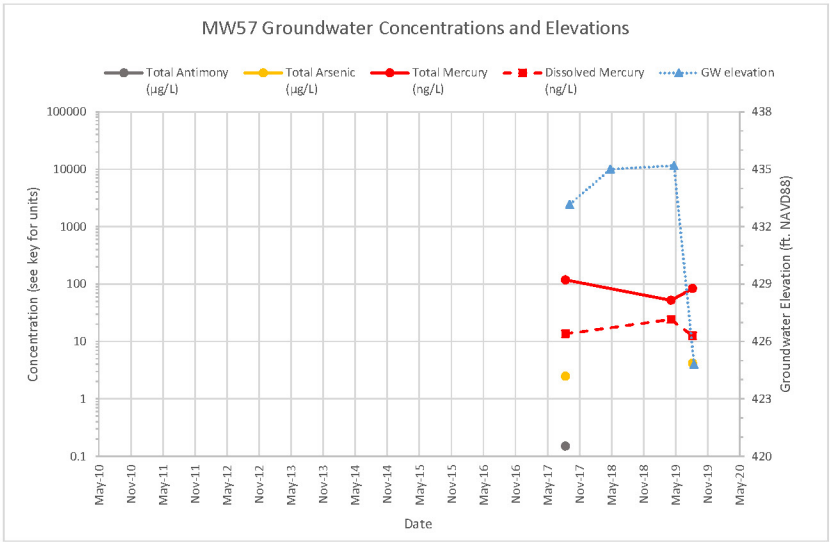
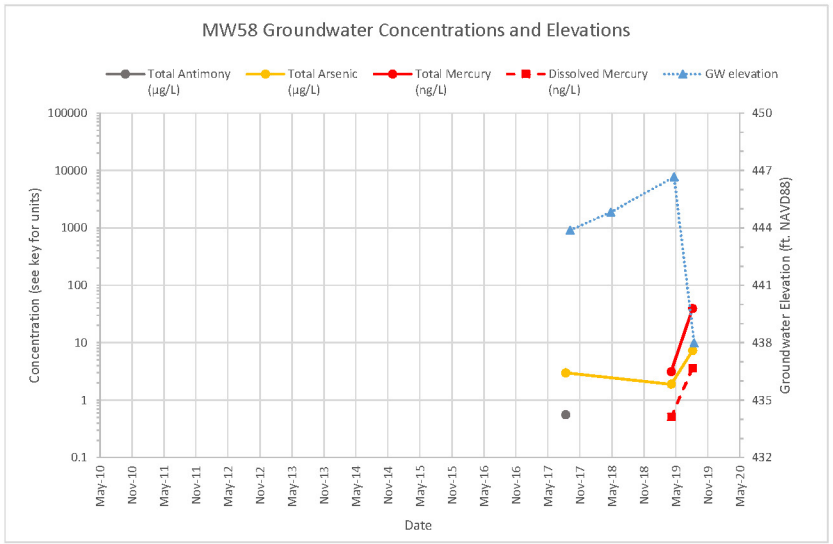



Figure 4-1c. Groundwater Concentrations and Elevation - Surface Mined Area
Page 5



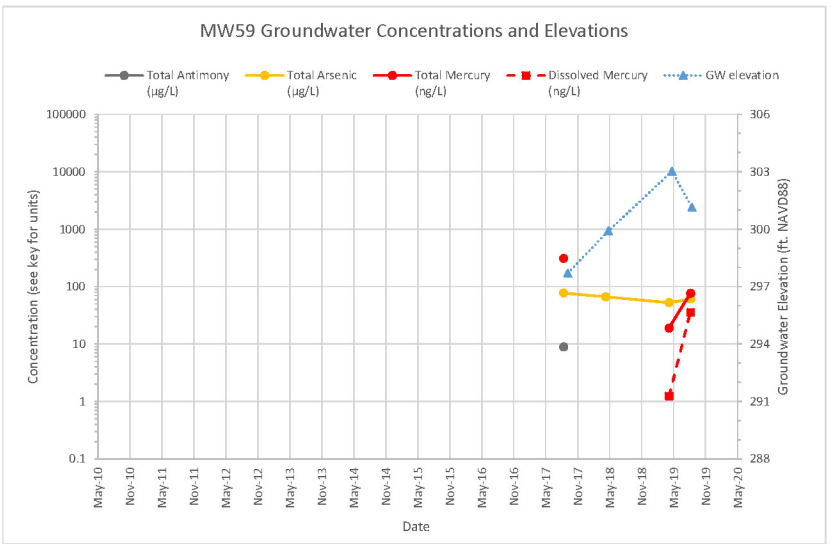
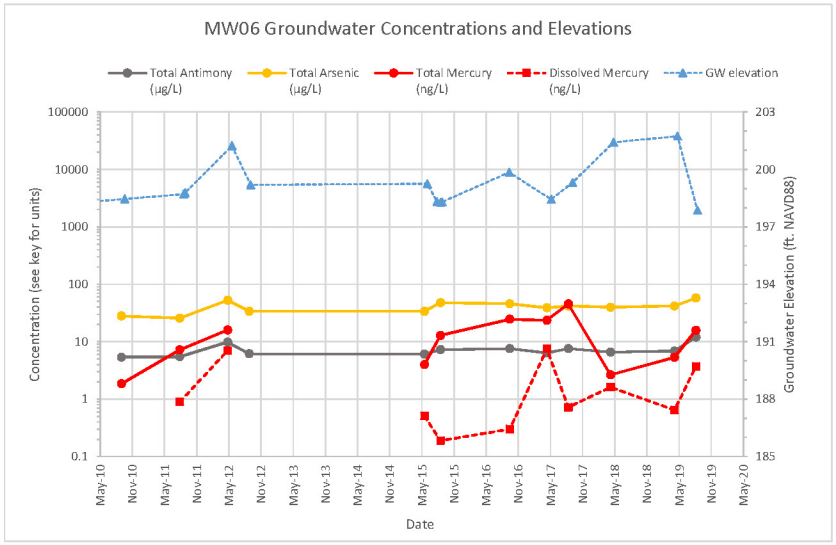
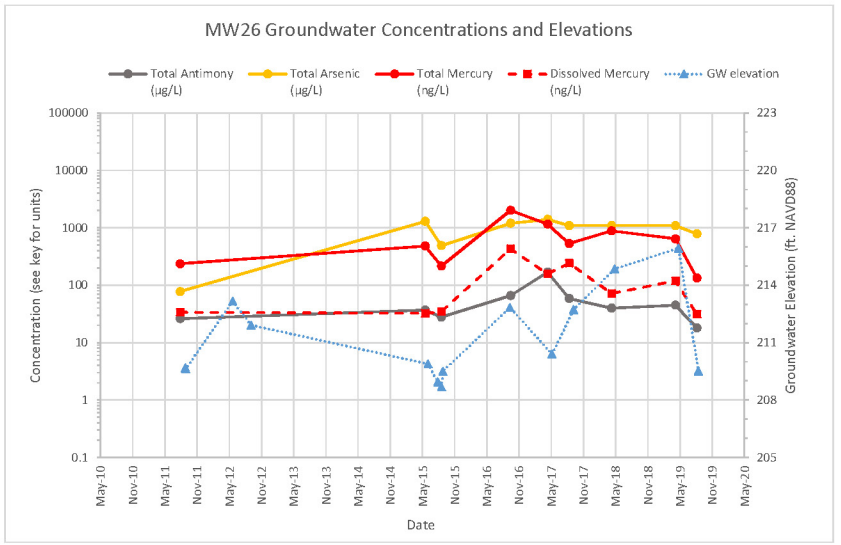
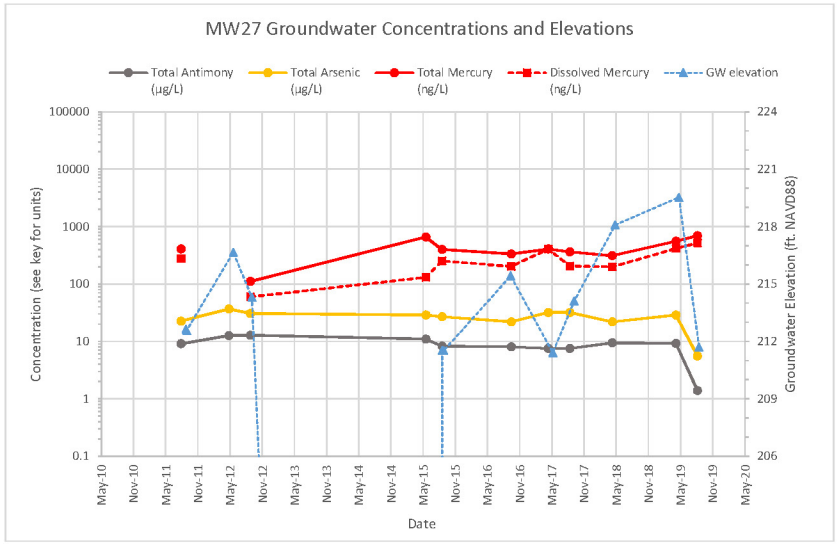



Figure 4-1d. Groundwater Concentrations and Elevation - Pre-1955 Main Processing Area



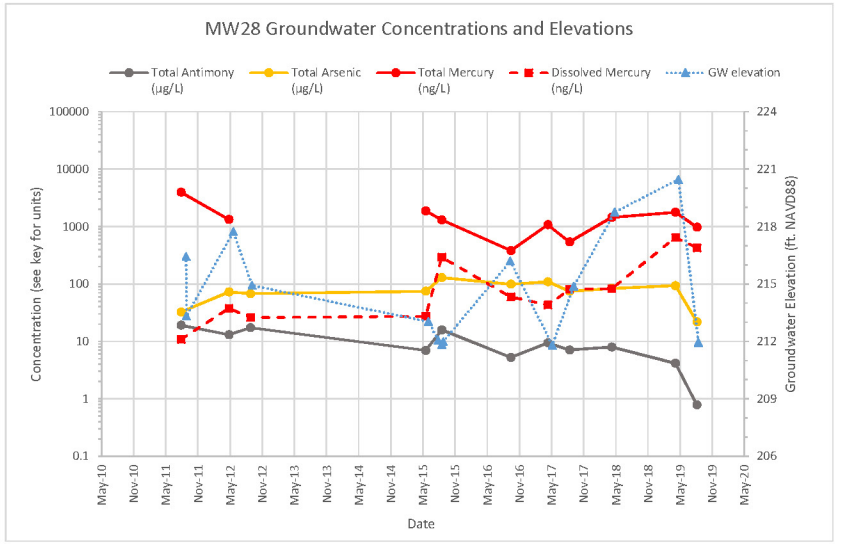
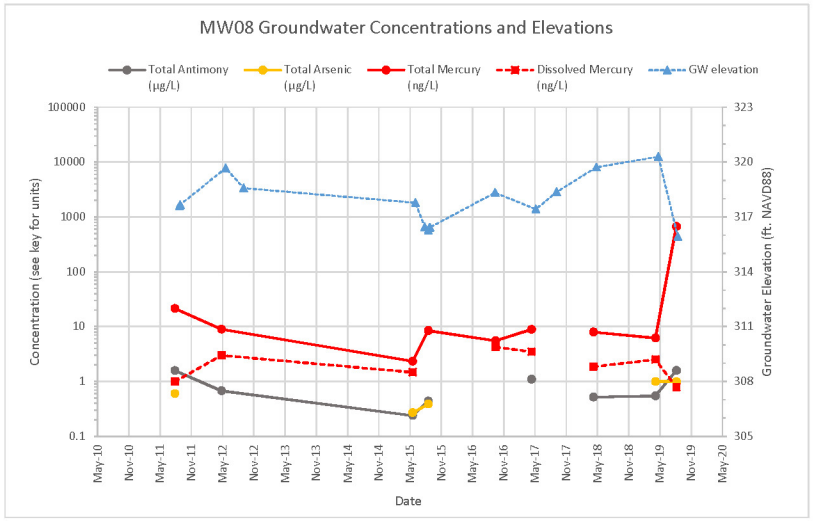
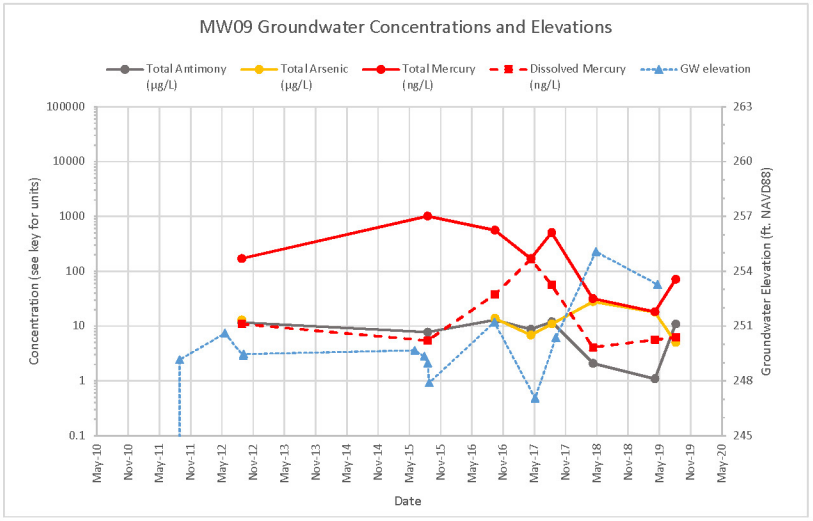
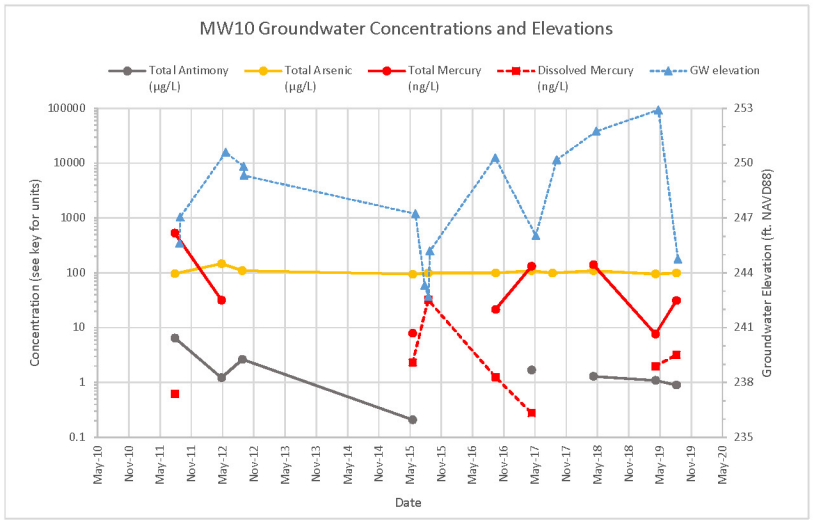



Figure 4-1e. Groundwater Concentrations and Elevation - Post-1955 Main Processing Area
Page 1



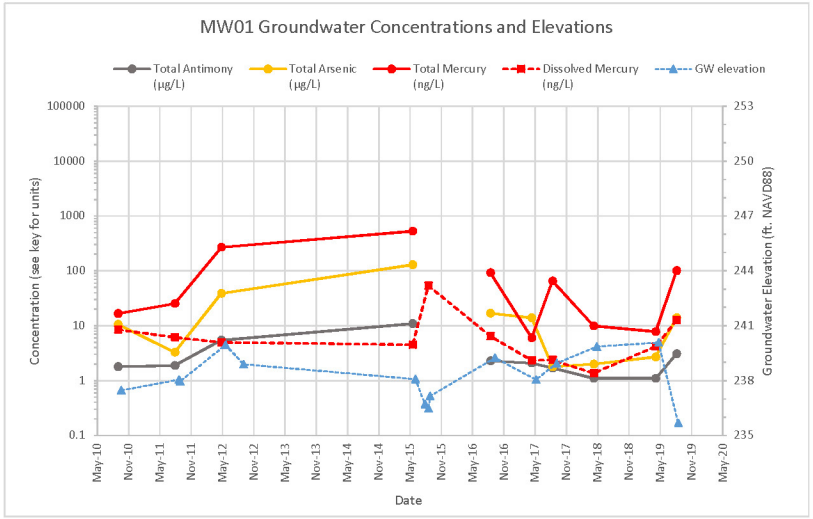
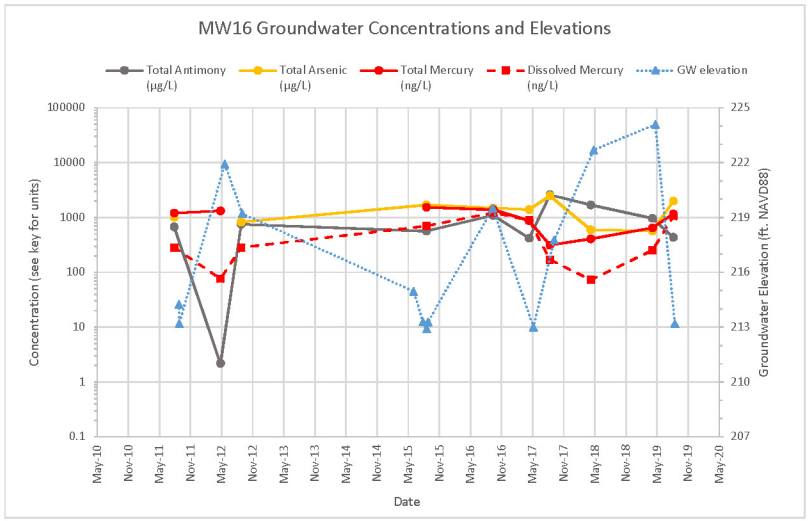
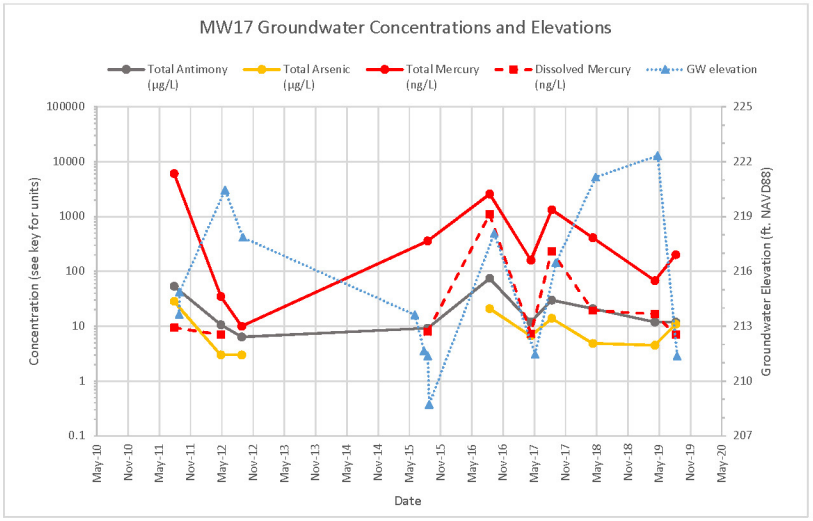
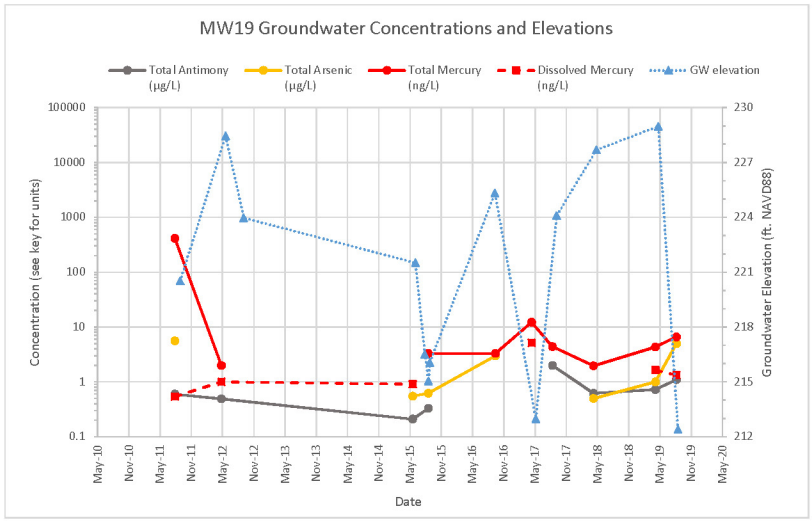



Figure 4-1e. Groundwater Concentrations and Elevation - Post-1955 Main Processing Area
Page 2



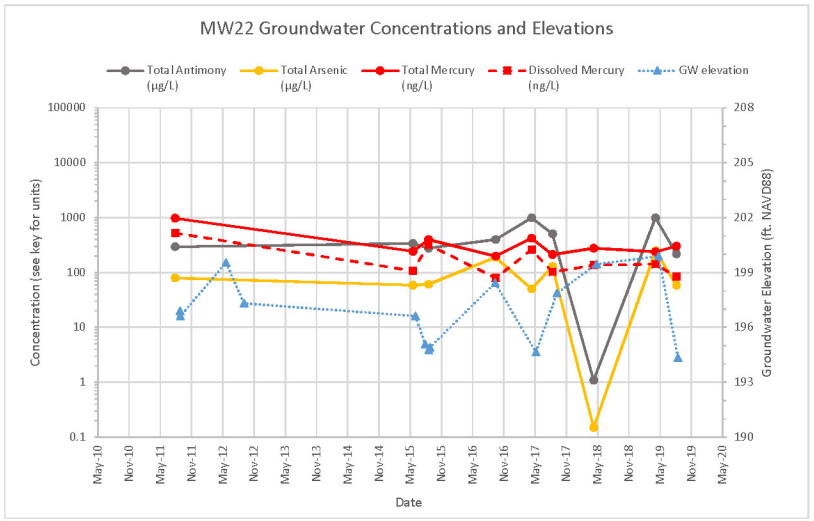
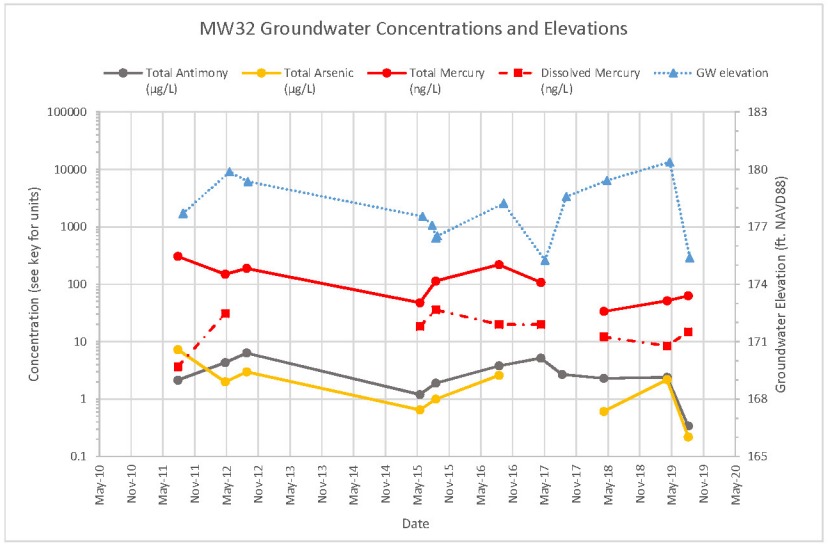



Figure 4-1f. Groundwater Concentrations and Elevation - Downstream Alluvial Area



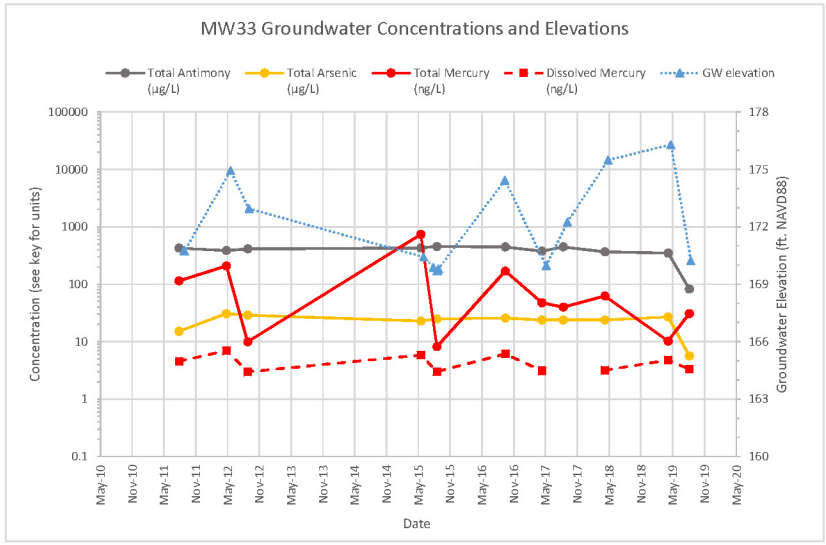
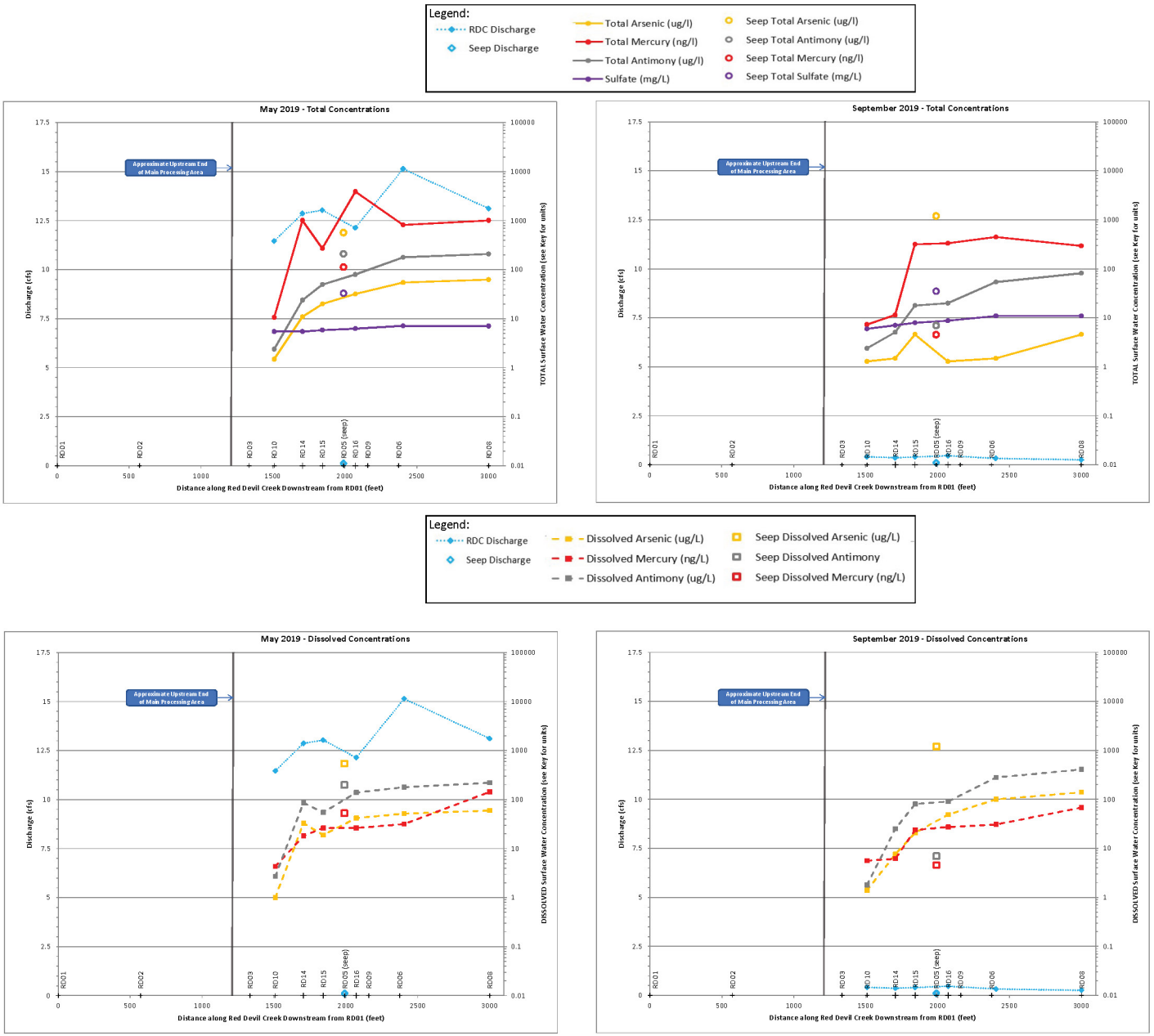



**Figure 4-2 Red Devil Creek and Seep Surface Water Concentrations and Discharge, Spring & Fall 2019**



# 5 References

Ecology and Environment, Inc. (E & E). 2014. *Final Remedial Investigation Report Red Devil Mine, Alaska.* November, 2014.

Ecology and Environment, Inc. (E & E). 2019a. *Final Work Plan, Groundwater and Surface Water Baseline Monitoring, Red Devil Mine, Alaska*. May 2019.

Ecology and Environment, Inc. (E & E). 2019b. *Final Red Devil Mine Groundwater and Surface Water Report, Red Devil, Alaska*. August 2019.

# 5 References

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# A Photolog

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Photo 1: View upstream from right bank of Red Devil Creek during peak flow around breached gabions.

| Direction: W | Date: 5/17/2019 | Time: 8:29 PM | Taken by: MT |
|---|---|---|---|

Photo 2: View upstream to breached beaver dam at Red Devil Creek Reservoir.

| Direction: W | Date: 5/17/2019 | Time: 8:47 PM | Taken by: MT |
|---|---|---|---|

Photo 3: Bent inner casing of MW12 as a result of frost-heaving.

| Direction: Down | Date: 5/18/2019 | Time: 12:38 PM | Taken by: MT |
|---|---|---|---|


Photo 4: Soil settling in the vicinity of MW51.

| Direction: Down | Date: 5/18/2019 | Time: 7:13 PM | Taken by: MT |
|---|---|---|---|

Photo 5: View from right bank of Red Devil Creek into NTCRA.

| Direction: NW | Date: 5/24/2019 | Time: 3:48 PM | Taken by: MT |
|---|---|---|---|

Photo 6: View downstream from the right bank of Red Devil Creek to the bypassed NTCRA.

| Direction: N | Date: 5/24/2019 | Time: 3:49 PM | Taken by: MT |
|---|---|---|---|

Photo 7: View upstream from right bank of Red Devil Creek to bypassed NTCRA.

| Direction: SW | Date: 5/24/2019 | Time: 3:49 PM | Taken by: MT |
|---|---|---|---|

Photo 8: View downstream from right bank of Red Devil Creek.

| Direction: N | Date: 5/24/2019 | Time: 3:49 PM | Taken by: MT |
|---|---|---|---|

Photo 9: View upgradient from MW16 and MW17 to monofill.

Direction: S Date: 5/24/2019 Time: 3:50 PM Taken by: MT

Photo 10: Flooding around settling pond.

Direction: W Date: 5/24/2019 Time: 3:51 PM Taken by: MT

Photo 11: View from right bank of Red Devil Creek to sediment settling pond.

Direction: N Date: 5/24/2019 Time: 3:55 PM Taken by: MT

Photo 12: View upstream from right bank of Red Devil Creek to sediment settling pond.

Direction: W Date: 5/24/2019 Time: 3:56 PM Taken by: MT

Photo 13: View upstream from left bank of Red Devil Creek to breached gabions of sediment settling pond.

Direction: NW Date: 5/24/2019 Time: 3:57 PM Taken by: MT

Photo 14: View to MW26 in pre-1955 MPA.

Direction: NW Date: 5/24/2019 Time: 4:00 PM Taken by: MT

Photo 15: View from pre-1955 MPA to breached NTCRA gabions.

Direction: S Date: 5/24/2019 Time: 4:02 PM Taken by: MT

Photo 16: View from left bank of Red Devil Creek to upstream NTCRA gabions. New seep visible in right of photo.

Direction: W Date: 5/24/2019 Time: 4:04 PM Taken by: MT

Photo 17: View upstream along Kuskokwim from RD08 showing the river stage in relation to the sampling location.

Direction: E | Date: 9/10/2019 | Time: 2:54 PM | Taken by: CB

Photo 18: View downstream from uppermost extent of NTCRA gabions.

Direction: NE | Date: 9/10/2019 | Time: 6:54 PM | Taken by: CB

Photo 19: View upstream from the uppermost extent of NTCRA gabions.

Direction: SW | Date: 9/10/2019 | Time: 7:03 PM | Taken by: CB

Photo 20: View from MW01 to monofill in post-1955 MPA.

Direction: SE | Date: 9/12/2019 | Time: 2:33 PM | Taken by: CB

# B Field Logbook

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ecology and environment

RDM **Computation Sheet** RDM

| | |
|---|---|
| Project No. | |
| Preliminary | ☐ |
| Final | ☐ |
| Void | ☐ |
| Sheet ____ of ____ | |

Project Name 2019 Fall Baseline Monitoring
Subject Interim logbook

| Rev. | Completed By: | Checked By: |
|---|---|---|
| ☒ | Initials: / / | Initials: / / |
| | Initials: / / | Initials: / / |

9/8/2019

0300 C Porreca depart BUF
0600 C Billor depart SEA
0650 B Ciecko depart PDX
0945 C Billor arrive ANC
1040 B Cieko arrive ANC
1400 C Porreca arrive ANC
1200 (late entry) T Dillon depart CLE
___ Finish supply runs (CB, BC, ½ CP)
2100 T Dillon arrive ANC

9/9/2019

0730 Crew muster for breakfast (CB, BC, CP, TD)
0900 Finish breakfast, begin final supply runs
1430 All 4 staff depart ANC for RDV in one Cessna 208. Had to leave half of cargo to make weight, took essential sampling eqpm. ½ personal gear. Other plane will arrive later today or 9/10 if possible.
1630 Arrived RDV and finish unload of first plane
2030 End for day

9/10/2019

0700 Crew muster for breakfast (CB, BC, CP, TD)
0800 H&S meeting.
~~0830~~ 0747 B Ciecko ~~calibrates~~ YSI calibration check w/ YSI
# on cable: 6 0036-4M 14B04
check soln lot: 19D1C, exp: 4/9/21
temp: 17.81 °C

| | confidence soln | measurement | result |
|---|---|---|---|
| cond - | 7630 - 7970 | 6884 | Fail |
| ORP - | 222 - 252 | 246.7 | Pass |
| pH - | 6.8 - 7.2 | 6.76 | Fail |

ecology and environment

RDM **Computation Sheet**

| | |
|---|---|
| Project No. | |
| Preliminary | ☐ |
| Final | ☐ |
| Void | ☐ |
| Sheet ____ of ____ | |

| Rev. | Completed By: | Checked By: |
|---|---|---|
| ☒ | Initials: / / | Initials: / / |
| | Initials: / / | Initials: / / |

Project Name 2019 Fall Baseline Monitoring

Subject Interim Logbook

9/10/2019 (cont'd)

0802 - Perform confidence check on YSI, # on cable: 600336-4M UH13.

| | confidence soln | meas | Result |
|---|---|---|---|
| cond | 7630-7970 | 7007 | Fail |
| ORP | 222-252 | 242.3 | Pass |
| pH | 6.8-7.2 | 6.96 | Pass |

0847 Confidence Check on YSI 12k39. Temp - 17.52

| | Soln | meas | Result |
|---|---|---|---|
| Cond | 7630 - 7970 | 7678 | Pass |
| ORP | 222 - 252 | 248.0 | Pass |
| pH | 6.8 - 7.2 | ~~7.764~~ 7.72 | Fail |

0856 Confidence check on Hach 2100P turbidimeter (TTT 17212)

| Check vial (NTU) | measured (NTU) |
|---|---|
| 5.82 | 5.79 |
| 52.9 | 52.2 |
| 553 | 558 |

0915 Calibrate pH on 12k39, YSI 556. Using 1 pt. calibration w/ pH 7.00, Lot# CC625355, Exp 6/7/21, Test w/ confidence soln: 6.90 - Pass

1000 TD & CP depart RDL for site, conducting GW snapshot.

1130 TD & CP have a tree down blocking 1 road.

1215 Discuss MS/MSD requirements with Kris Allen at TA, per FSP "SW Sampling guide" we will collect one extra volume each of Total TAL & Dissolved TAL metals.

1225 CB & BC depart for site for SW sampling

1245 CB & BC road maint. @ Repository road, then MW08

1400 CB & BC collect FB01

1420 Gauge RD creek at RD08; over →

ecology and environment

RDM **Computation Sheet** RDM

| | |
|---|---|
| Project No. | |
| Preliminary | ☐ |
| Final | ☐ |
| Void | ☐ |
| Sheet ____ of ____ | |

| Rev. | Completed By: | Checked By: |
|---|---|---|
| ☒ | Initials: / / | Initials: / / |
| | Initials: / / | Initials: / / |

Project Name 2019 Fall Baseline Monitoring
Subject Interim Logbook 9/10/2019

1420 continued. Gauging velocity is a 20-sec average.

| sta | Depth (ft) | velocity (ft/s) | comments |
|---|---|---|---|
| ~~RB~~ | | | |
| 2.4' | 0.05 | 0.0 | Right Bank (facing Downstream) |
| 2.8 | 0.15 | 1.25 | |
| 3.2 | 0.2 | 1.91 | |
| 3.6 | 0.05 | 1.64 | |
| 4.0 | 0.05 | 0.12 | |
| 4.2 | 0.05 | 0.0 | Left Bank |

1455 collect sample 092019RDO8SW
1521 collect sample 092019RDO6SW
1535 gauge RD creek at RDO6

| sta | depth (ft) | Velocity (ft/s) | comments |
|---|---|---|---|
| 2.3' | 0.05 | CLB ~~0.00 ft/s~~ → 0.0 | Left Bank |
| 2.5 | 0.05 | 0.06 | |
| 3.0 | 0.15 | CLP ~~0.70~~ → 0.75 | |
| 3.5 | 0.175 | CLB ~~1.00~~ → 1.33 | |
| 4.0 | 0.25 | 0.75 | |
| 4.5 | 0.20 | 0.24 | |
| 5.0 | 0.20 | 0.47 | |
| 5.5 | 0.10 | 6.00 | |
| 5.9 | 0.00 | 0.00 | Right Bank |

1618- collect sample 092019RD16SW1
1632- gauge Red Devil creek at RD16, continued on →

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**Computation Sheet** RDM

| | |
|---|---|
| Project No. | |
| Preliminary | ☐ |
| Final | ☐ |
| Void | ☐ |
| Sheet ____ of ____ | |

| Rev. | Completed By: | Checked By: |
|---|---|---|
| ☒ | Initials: / / | Initials: / / |
| | Initials: / / | Initials: / / |

Project Name 2019 Fall Baseline Monitoring
Subject Interim Logbook

9/10/2019 (cont'd)
1630 gauging RD16

| Sta. | depth (ft) | velocity ft/s | comments |
|---|---|---|---|
| 1.0' | 0.10 | 0.341 | Left bank |
| 1.5 | 0.20 | 0.14 | |
| 2.0 | 0.30 | 0.56 | |
| 2.5 | 0.29 | 0.60 | |
| 3.0 | 0.20 | 0.51 | |
| 3.5 | 0.25 | 0.41 | |
| 4.0 | 0.15 | 0.48 | |
| 4.5 | 0.15 | 0.24 | |
| 4.9 | 0.00 | 0.00 | Right bank |

1719 collect sample 092019RD05SW
1745 collect sample 092019RD15SW YSI pH sensor drifting ↑ will cal & remonitor
~~1820 gauge at RD15~~ 1745 collect sample 092019RD99SW DUP at RD15
1820 gauge at RD15

| sta. | depth | velocity | comments |
|---|---|---|---|
| 1.0' | 0.00 | 0.00 | Left bank |
| 1.2 | 0.30 | -0.09 | |
| 1.6 | 0.30 | 0.09 | |
| 2.0 | 0.45 | 0.23 | |
| 2.4 | 0.40 | 0.48 | |
| 2.8 | 0.30 | 0.68 | |
| 3.2 | 0.35 | 0.53 | |
| 3.6 | 0.20 | 0.75 | |
| 4.0 | 0.15 | 0.61 | |
| 4.4 | 0.10 | 0.48 | |
| 4.8 | 0.00 | 0.00 | Right bank |

1905 collect sample 092019RD14SW
1930 Begin gauging at RD14 contd on →

ecology and environment

**Computation Sheet** RDM

| | |
|---|---|
| Project No. | |
| Preliminary | ☐ |
| Final | ☐ |
| Void | ☐ |
| Sheet ____ of ____ | |

Project Name 2019 Fall Baseline Monitoring
Subject Interim Logbook

| Rev. | Completed By: | Checked By: |
|---|---|---|
| ☒ | Initials: / / | Initials: / / |
| | Initials: / / | Initials: / / |

9/10/2019 (cont'd)

1930 - Gauging at RD14

| sta (ft) | Depth (ft) | Velocity (ft/s) | comments |
|---|---|---|---|
| 6.8 | 0 | 0 | Right bank |
| 6.6 | ~~0.50~~ 0.05 | ~~0.05~~ 0 | |
| 6.2 | 0.10 | 0.25 | |
| 5.8 | 0.30 | 0.20 | |
| 5.4 | 0.30 | 0.31 | |
| 5.0 | 0.375 | 0.20 | |
| 4.6 | 0.45 | 0.92 | |
| 4.2 | 0.45 | 0.60 | |
| 3.8 | 0.40 | 0.14 | |
| 3.4 | 0.40 | -0.08 | |
| 3.01 | 0.30 | -0.15 | |
| 2.9 | 0.00 | 0.00 | Left bank |

2029 collect sample 092019RD10SW and extra vol. for MS/MSD

2050 Gauging at RD10 - Right side channel

| sta (ft) | Depth | Velocity | Comments |
|---|---|---|---|
| 1.0 | 0.0 | 0.0 | Right bank |
| 1.5 | 0.15 | 0.1 | |
| 2.0 | ~~0.5~~ 0.3 | 0.73 | |
| 2.5 | 0.2 | 0.49 | |
| 3.0 | 0.15 | 0.51 | |
| 3.5 | 0.15 | 0.41 | |
| 4.0 | 0.15 | 0.53 | |
| 4.5 | 0.1 | 0.4 | |
| 5.0 | 0.1 | 0.23 | |
| 5.5 | 0.1 | 0.0 | |
| 6.0 | 0.1 | 0.0 | |
| 6.5 | 0.05 | 0.0 | |
| 7.0 | 0.0 | 0.0 | |
| 7.5 | 0.0 | 0.0 | Left Bank |

ecology and environment

**Computation Sheet** RDM

| | |
|---|---|
| Project No. | |
| Preliminary | ☐ |
| Final | ☐ |
| Void | ☐ |
| Sheet ____ of ____ | |

Project Name 2019 Fall Baseline Monitoring
Subject Interim Logbook

| Rev. | Completed By: | Checked By: |
|---|---|---|
| ☒ | Initials: / / | Initials: / / |
| | Initials: / / | Initials: / / |

9/10/2019 (cont'd)

2050 - Use YSI w/ serial# ending UH13 to re-record pH at all SW sample sites due to drifting pH/out of calibration on YSI w/ serial# ending 12K39 Recorded corrected pH values as a new WQ entry.

2130 - Depart RDM site for Lodge

2145 - Finish days tasks

2005 (late entry)
Gauging at RD10 - Left side channel

| sta (ft) | depth (ft) | velocity (ft/s) | comment |
|---|---|---|---|
| 0.08 | 0.0 | 0.0 | Left bank |
| 1.0 | 0.05 | 0.12 | |
| 1.4 | 0.2 | 0.35 | |
| 1.8 | 0.1 | 0.42 | |
| 2.2 | 0.12 | 0.48 | |
| 2.6 | 0.1 | 0.59 | |
| 3.0 | 0.1 | 0.42 | |
| 3.4 | 0.05 | 0.00 | |
| 3.8 | 0.01 | 0.00 | |
| 3.9 | 0.00 | 0.00 | |

1719 (late entry)
Gauging at RD05 using volumetric fill method

| Volume (L) | Elapsed time (s) |
|---|---|
| 1.0 | 2.78 |
| 1.0 | 2.40 |
| 1.0 | 2.64 |
| 1.0 | 2.42 |
| 1.0 | 2.60 |
| 1.0 | 2.62 |

RDM 2019 Fall Baseline - GW Snapshot
Date: 9/10/19

| Well | Time | Static W.L. (ft) | Total Depth (ft) | Notes (casing cond., frostjacking etc.) |
|---|---|---|---|---|
| MW 01 | 1242 | 21.83 | | |
| 03 | 1340 | 22.79 | | |
| 04 | 1140 | 28.64 | | |
| 06 | 1218 | 19.62 | | |
| 07 | 1414 | 23.14 | | |
| 08 | 1406 | 15.4 | | |
| 09 | 1300 | 31.95 | | |
| 10 | 1253 | 31.46 | | |
| 11 | 1248 | 25.63 | | |
| 12 | ~~1419~~ 1432 | — | | top is pinched |
| 13 | 1420 | dry | 31.65 | |
| 14 | X abandoned X | | | |
| 15 | | | | |
| 16 | 1345 | 14.90 | | |
| 17 | 1350 | 17.29 | | |
| 18 | 1358 | 31.73 | | |
| 19 | 1515 | 27.60 | | |
| 20 | 1457 | 8.62 | | |
| 21 | 1500 | 10.41 | | |
| 22 | 1502 | 10.75 | | |
| 23 | 1228 | 16.05 | | |
| 24 | 1213 | ~~dry~~ 18.74 | ~~37~~ | |
| 25 | 1202 | 32.85 | | |
| 26 | 1158 | 37.41 | | |
| 27 | 1153 | 31.24 | | |
| 28 | 1150 | 29.99 | | |
| 29 | 1118 | no water at 64.96 | | top of pump? |
| 30 | 1930 | 54.28 | | |
| 31 | 1605 | dry | 44.37 | |
| 32 | 1445 | 21.19 | | |
| 33 | 1942 | 8.69 | | |
| 34 | X | X | | |
| 35 | | | | |
| 36 | | | | |
| 39 | 1550 | 84.9 | | |

# RDM 2019 Fall Baseline- GW Snapshot

Date: 9/10/19

| Well | Time | Static W.L. (ft) | Total Depth (ft) | Notes (casing cond. frostjacking etc. |
|---|---|---|---|---|
| MW40 | 1536 | 130.95 | | |
| MW42 | 1901 | 128.95 | | |
| 43 | 1853 | 90.27 | | |
| 44 | 1830 | 39.34 | | |
| 45 | 1820 | 54.18 | | |
| 46 | 1809 | 39.59 | | |
| 47 | 1754 | 42.93 | | |
| 48 | 1840 | 24.88 | | |
| 49 | 1103 | 35.75 | | |
| 50 | 1705 | 54.61 | | |
| 51 | 1655 | 45.23 | | |
| 52 | 1747 | 37.8 | | |
| 53 | 1435 | 40.11 | | |
| 54 | 1642 | 33.22 | | |
| 55 | 1737 | 16.22 | | |
| 56 | 1727 | 52.24 | | |
| 57 | 1615 | 39.01 | | |
| 58 | 1625 | 34.73 | | |
| 59 | 1545 | 134.33 | | |

M Baseline F19

T1

Rite in the Rain®

ALL-WEATHER

**ENVIRONMENTAL FIELD BOOK**

№ 550

RDM Baseline Monitoring Fall 2019 TEAM 1



ISBN 978-1-932149-36-4

Location Red Devil Mine Date 9/11/2019

Project / Client 2019 Fall Baseline Monitoring

0730 $H_2S$ meeting, topics: look both ways @ Wildearth runway.

0830 - Crew builds garage tent, CB to do Scribe import & blu iPad data

1015 Calibrating YSIs 556 MPS

Model #: 600336-4M 11H13

| Cal sol range | Response | |
|---|---|---|
| 1413 uS/cm | 1413 uS/cm | Pass |
| pH 7.06 | 7.06 | Pass |
| pH ~~10.01~~ (CB) 10.18 | 10.18 | Pass |
| pH 4.00 | 4.00 | Pass |
| DO | 98.8% | |
| ORP 250.5 mV | 250.4 | Pass |

Model #: ~~600336~~ (CB) 12K39

| Cal sol range | Response | |
|---|---|---|
| 1413 uS/cm | 1414 uS/cm | Pass |
| pH 7.06 | 7.06 | Pass |
| pH ~~10.01~~ (CB) 10.18 | 10.19 | Pass |
| pH 4.00 | 4.00 | Pass |
| DO | 99.1% | |
| ORP: 250.5 mV | — | — |

PH does not calibrate correctly therefore another instrument will be used.



Location Red Devil Mine Date 9/11/2019

Project / Client 2019 Fall Baseline Monitoring

Hach Turbidimeter meters 2100P

SN: 2100P-06.17212

| Standard (NTU) | response |
|---|---|
| 5.82 | 5.80 |
| 52.9 | 52.7 |
| 553 | 550 |

SN: 2100P-06.17284

| Standard (NTU) | Response |
|---|---|
| 5.82 | 5.68 |
| 52.9 | 51.6 |
| 553 | 558 |

1142 Calibrating backup YSI-556 MPS

Model # 14B04

| Cal Sol range | Response |
|---|---|
| 1413 uS/cm | 1413 uS/cm |
| pH 7.06 | 7.06 |
| pH 10.18 | 10.18 |
| pH 4.00 | 4.00 |
| DO | 98.8% |
| ORP 250.5 mV | |

Location Red Devil Mine Date 9/11/2019
Project / Client 2019 Fall Baseline Monitoring

1300 Depart lodge for site. Todays plan Team 1: CB & TD sample MW 28, Team 2 BC & CD sample MW 27. Shallow/deep well pair.
1330 Set up on MW 28. Top of pump previously recorded @ 58.3 btoic in SP19. Measured DTW = 29.95 Measured top of pump @ 58.05
1410 Begin purging MW 28, starting w/ discharge/refill 11.0/9.0 (CPM=3) Pumping @ 60 ft ga. / 25 psi.
1420 Water at t.o.c, filling flow-through
1423 slowly, increase to 70 ft ga & 10.0/10.0
1435 Team 2 pulls out pump @ MW27 masterflex connection at pump had pulled out/disconnected, reinsert & restart purging.
1450 Team 2 getting excessive drain back on refill cycle. Decide to pull pump again and reinforce/re-tighten masterflex tubing. CB back to lodge for zip ties & look for extra/replacement discharge barbs. - did not have



Location Red Devil Mine Date 9/11/2019
Project / Client 2019 Fall Baseline Monitoring

1450 (cont'd) replacement barbs, only bushings. Need to find record of which wells are connected w/ Masterflex.
1645 Team 1 collect sample 0919MW28GW1. Final stabilization was achieved after purging at 0.1 L/min w/ 70 ft ga / 30 psi 8.0 & 12.0 refill/discharge cycle.
1745 Depart site for lodge, plan to process SW samples & todays GW samples
1815 Arrive lodge & break for dinner
1915 Scribe import and sample processing for surface water samples.
2030 Finish sample processing, end day
late entry 1695 - cleared discharge lines of water using previously developed method at MW28.

CBillor 9/11/2019

Location Red Devil Mine Date 9/12/19

Project / Client Fall 2019 Baseline

830 H2S Meeting. Todays plan
T1: CB & TD Sample MW09.
T2: BC & CP sample MW 10, 01, 08
935 Depart Lodge for site
1035 Set up on MW 09 initial dtw = 31.85. Pump has been previously set at top (tape) depth = 31.92 Water level will be below top of pump almost immediately after begin purging. Pump inlet is set at 33.62 = bot. of screen int. Disauss purging, then decide to pull pump due to displacement volume of pump, w.l. is likely near 33.62 / bot. screen int.
1145 Pull pump from MW09, place pump, tubing & Kevlar line inside ziploc, then double bag in contractor bag and into a clean cooler. Measured water level = 32.22 after pulling pump. Will bail the well dry & consult with PD about sampling with bailer tomorrow.
1215 CB back to lodge for bailers, TD



Location Red Devil Mine Date 9/12/19

Project / Client 2019 Fall Baseline

1215 (cont'd) TD will begin purge on MW01. Masterflex/zip ties, are loose.
1310 - get bailers, send message to M. Longtine (PD), will return to the site and resume sampling MW 01 and call out on sat. phone.
1409 Collect sample 0919MW01GW1
Flowrate = ~~0.06~~ (CB) 0.6 L/m
4 CPM 5.0/10.0, 20ft gauge
1550 Finish sampling and close well (MW01) after clearing discharge line of water. Note pump was pulled & masterflex/zip tie connection @ discharge tightened, prior to sampling
1605 Begin bailing MW09, will bail entire casing sump to bottom.
1620 Finish bailing MW09, left bailer in well to sample after 24h recharge. Will check dtw. ~~after~~ at end of day
1650 Set up on MW 42. Start purging at 5 CPM

Location RDM Date 9/13/19

Project / Client BLM

2019 Fall Baseline

0855 Calibrating YSI with S.N of 16639AD unit and 12K39 card. The pH/ORP sensor is from the 14B04 card/sensor.

| Standard sol | calibration |
|---|---|
| DO % | 97.7% |
| Cond 1413uS/cm | 1413 uS/cm |
| pH 7.00 | pH not calibrating |
| pH 4.01 | switching display unit |
| pH 10.01 | on X |
| ORP 240mV | |

| Standard sol | calibration |
|---|---|
| DO % | 97.0% |
| Cond 1413uS/cm | 1413 |
| pH 7.00 | 7.00 |
| pH 4.01 | 4.01 |
| pH 10.01 | 10.00 |
| ORP 240mV | 240 |

Unit # 11F102278 with 12K39 card

1030 Depart for RDM

1100 Arrive at MW33 and setup at well



Location RDM Date 9/13/19

Project / Client BLM

2019 Fall Baseline

1105 Check turbimeter #17212

| Standard (NTU) | Response (NTU) |
|---|---|
| 553 | 555 |
| 52.9 | 53.7 |
| 5.82 | 5.89 |

1110 water level at MW33 – 8.57 ft

1115 Begin purge at MW33

1205 Collect 0919MW33GW at ~ 150mL/min

1300 Setup at MW32

1305 WL at MW32 - 21.03

1310 Begin purging MW32

1357 Loss of flow, team is trying to figure out the issue.

1450 Replaced master flex tubing at flow returned, starting stabilization over again.

1606 Collect 0919MW32GW at ~ 30mL/min

1638 Collect ~~0919FB~~ 0919FB03 near MW32 of low level Hg using "dirty" hands and "clean" hands, method.

1720 Complete sampling at MW32, demob from well.

TO

14

Location RDM Date 9/13/19

Project / Client BLM

2019 Fall Baseline

1740 Redeploying pump into mw09

1745 water level reading: 32.13 ft without pump in the well

31.87 ft with pump in the well.

top of pump: 32.77 ft

1830 Collect 0913MW09GW as a grab after purging dry twice yesterday 9/12. Team will make effort after collecting samples to perform low flow since more water is observed in the well than previously.

1900 Setup YSI flow through cell. The water level is ~~1.50~~ below the pump

1915 well ran dry one reading for water quality was performed.

1930 Check out stibnite dike

2045 Head back to lodge.

2115 Arrive at lodge and demob ATVs. End of day.

9/13/19

Location RDM Date 9/14/19 15

Project / Client BLM

2019 Fall Baseline

Personel. T.D. Allan + C. Porecca (T1)

CB + BC (T2)

Weather. sunny high 63°F

SOW: Continue sampling: ~~MW16~~ MW16 and MW17

~~0510~~ 0710 TD Conduct H+S meeting

0830 Check and Calibrate YSI,

Model cond # 12K39, unit # 11F102278

| Standard | Response | Calibrated? |
|---|---|---|
| DO% | 99.5% | Y |
| pH 6.8-7.2 | 6.84 | N |
| ORP(mV) 222-252 | 236.0 | ~~Y~~ N |
| Cond 1.413 mS/cm | 1.413 | Y |

Model cond # 11H13 ~~99.4%~~ Y TD

Model unit # 11H101295

| | | |
|---|---|---|
| DO% | 99.4% | Y |
| pH 6.8-7.2 | 7.08 | N |
| ORP(mV) 222-252 | 242.5 | N |
| Cond 1.413 mS/cm | 1.413 | Y |

0940 Depart to RDM

1000 Arrive at MW09

1015 Check turbidity meter #17212

| Standard (NTU) | Response (NTU) |
|---|---|
| 553 | 553 |
| 52.9 | 53.1 |
| 5.82 | 5.85 |

Location RDM Date 9/14/19

Project / Client BLM

2019 Fall Baseline

1020 Water level reading MW06: 19.64'
The water level is below top of screen interval (15.5-25.5')
1025 Begin purging MW06
1105 Collect 0919MW06GW at ~130mL/min low-level Hg using clean hands dirty hands method.
1120 Demob at MW06
1130 Arrive at MW26
1138 MW26 water level: 37.42 ft
1140 Begin purging MW26
1150 Pause purging to pull pump. The pump is tight enough at the fitting.
1200 Tighten purge line fitting and began purging again
1225 stabilized water level
1310 Collect 0919MW26GW at ~50mL/min low level Hg using clean hands / dirty hands method
1400 Complete sampling, demob and purge out water line to prevent frost bursting in line
1430 Water line clear
1440 Arrive at MW29 to take over for KB+BC.



Location RDM Date 9/14/19

Project / Client BLM

2019 Fall Baseline

1445 KB + BC depart RDM to manage samples and send off BC with samples to Anchorage.
1450 Collect 0919MW29GW with duplicate 0919MW101GW
1600 Complete sampling at MW29. Pump appears to be stuck in the well after purging the water line dry. Will need to revisit.
1620 Arrive at MW16 + MW17

Water Levels
MW16 - 14.55
MW17 - 17.12 ft

1635 Begin purging MW16 and MW17
1705 Collect 0919MW17GW at ~130mL/min
1725 Collect 0919MW16GW at ~60mL/min
1740 Complete at MW17
1750 Collect 0919FB04 using clean hands dirty hands.
1810 KB and Bryan arrive
1815 Complete at MW16
1835 Arrive at MW48

18

Location RDM Date 9/14/19

Project / Client BLM

2019 Fall Baseline

1835 Water level at MW48: 24.25

Begin purge setup.

1845 Begin purging MW48

1910 Collect 0914MW48GW at ~130mL/min clean hands dirty hands for low level Hg.

1930 Bench from MW48

2015 Arrive at lodge and repack ice for samples

2030 End of day

J. Roth 9/14/19

19

Location RDM Date 9/15/19

Project / Client BLM

2019 Fall Baseline

Personnel: T.D + CP (T1), BA + KB (T2)

Weather: high 52°F rain

SOW: Continue sampling, expecting to sample MW55 + MW46

0830 Calibrate and Check YSIs

| Team 1 | Model cond #12K39 | unit #11F102278 |
|---|---|---|
| Standard | Response | Calibrated? |
| DO% | 98.5% | Y |
| pH 7 | 7.00 | Y |
| pH 10.01 | 10.01 | Y |
| pH 4.01 | 4.03 | Y |
| ORP 222-252 mV | 234.9 | N |
| Cond 1.413 mS/cm | 1.413 | Y |

| Team 2 | Model cond #11H13 | unit #11H102295 |
|---|---|---|
| standard | Response | Calibrated? |
| DO% | 98.4% | Y |
| pH 6.8-7.2 | 7.10 | N |
| ORP 222-252 mV | 242.1 | N |
| Cond 1.413 mS/cm | 1.413 | Y |

0840 HHS meeting conducted

1050 Depart to RDM

1125 Arrive at MW55 and setup.

1130 water level at MW55: 15.51 ft

J. Roth

Location RDM Date 9/15/19

Project / Client BLM

Fall 2019 Baseline

1040 Begin purging MW55

1050 Check turbidity mete # 17212

| standard (NTU) | Response (NTU) |
|---|---|
| 5.82 | 6.08 |
| 52.9 | 53.6 |
| 553 | 554 |

1230 Collect 0915MW55GW at ~70mL/min use clean hands dirty hands for low level Hg samples

1245 Stopped sampling b/c flow stopped. Redoing purging b/c the water had fallen back down the well. Possible that the tubing inlet is right near the top of water level.

1345 After finding a leaking spot on the tubing outside the well, the team fixed the issue and purged until stabilized again. Collect 0915MW55GW at ~100mL/min

1410 Demob from MW55

1430 Arrive at ~~MW52~~ MW52

1445 Begin purging, water level was at 37.8 ft before purging

DnDn



Location RDM Date 9/15/19

Project / Client BLM

2019 Fall Baseline

1550 Collect 0915MW52GW at ~50mL/min. Controller specs: 52ft 2CPM 20Refill 10discharge

1625 Demob from MW52, team did need to pull pump to tighten Masterflex

1690 Arrive at MW46; water level 39.21

1705 Begin purging ~~MW46~~ MW46

1710 Pulling pump to tighten masterflex

1725 Continue purging

1810 Collect 0915MW46GW at ~70mL/min

1910 Complete sampling at MW46, demob and ~~clean~~ clear out water line.

1920 water line clear, depart for lodge

2000 Arrive at lodge. End of day

DnDn 9/15/19

Location RDM Date 9/16/19

Project / Client BLM

2019 Fall Baseline

Personel: TD + CP (T1) KB + BA (T2)
Weather: high 57°F partly cloudy
Saw: Continue to GW sample, expect to sample
0830 Conduct H+S meeting
0840 Calibrate + Check YSIs

Team 1 Model cord #12K39 Unit#11F102278

| Standard | Response | Calibrated? |
|---|---|---|
| DO% | 98.9% | Y |

Team 1 Model cord #14B04 Unit #11H100449

| Standard | Response | Calibrated? |
|---|---|---|
| pH 6.8-7.2 | 6.99 | ~~Y~~ N |
| ORP 222-252mV | 242.0mV | N |
| Cond 1.413 mS/cm | 1.414 mS/cm | Y |
| DO% | 98.9% | Y |

Team 2 Model cord #11H13 Unit # 11H101296

| Standard | Response | Calibrated? |
|---|---|---|
| DO% | 98.9% | Y |
| ORP 222-252mV | 240.8mV | N |
| pH 7.00 | 7.00 | Y |
| pH 4.01 | 4.01 | Y |
| pH 10.01 | 9.99 | Y |
| Cond 1.413 mS/cm | 1.413 mS/cm | Y |

Jon Lim



Location RDM Date 9/16/19

Project / Client BLM

2019 Fall Baseline

1010 Depart for RDM at MW57
1040 Arrive at MW51, water level 45.34ft
Pulling transducers from well SN: 00420779S4
1055 Begin purging
1100 Flakes of oxidized debris coming up from the well. Readings will be taken from YSI once debris is flushed out.
1130 Collect ~~0915FB06~~ 0919FB06
1145 Turbidity meter check #17212

| Standard (NTU) | Response (NTU) |
|---|---|
| 520 | 525 |
| 54.1 | 54.4 |
| 5.98 | 6.05 |

1210 Collect 0919MW51GW at ~90mL/min. Clean hands, dirty hands method for low level Hg.
1305 Complete at MW51, cleared out water line.
1320 Arrive at MW59 and MW39
1324 Pull transducer in MW39; WL: 84.91ft. Bottom of well: 85.94'
1329 MW59 water level: 134.62'
~~Pulling up transducer~~ no transducer

Location RDM Date 9/16/19

Project / Client BLM

2019 Fall Baseline

1340 Begin purging MW59

1350 Pulled pump about 40ft to see if water line was kinked. Water was seen in line and was moving slowly up the tube.

1400 Continue purging

1430 Pull pump to surface, a large kink identified at the pump and now the pump is running correctly. The barb fitting was the appropriate one.

1450 Continue purging

~~1630~~ 1530 The turbidity is very high, the team will wait until 1600 to determine if it is best to move on to another well and return to MW59 tomorrow.

1550 Demob from MW59, will revisit tomorrow when turbidity settles.

1555 Arrive at MW57; water level: 39.15

1558 Pulling transducer

1610 Begin purging

1645 Collect 0919 MW57GW at ~120mL/min using clean hands dirty hands for low level Hg.



Location RDM Date 9/16/19

Project / Client BLM

2019 Fall Baseline

1735 Complete MW57; demob to new location

1755 Arrive at MW58. water level: 34.52ft

~~1758~~ (11) Pull transducer (10)

1805

1810 Begin purging

1910 Collect 0919 MW58GW at ~270mL/min. Clean hand dirty hands for low level Hg

NOTE: MW57 was cleared of water in the water line.

1945 MW58 Complete, water has been cleared from lines. Demob and head back to the lodge

2015 Arrive at lodge, end of day

Location RDM Date 9/17/19

Project / Client BLM

2019 Fall Baseline

Personnel: TO + CP (T1); KB + BA (T2)
Weather: 52°F high cloudy w/ rain
SOW: Continue well sampling, expecting to sample MW59 + MW44
0830 Conduct HTS meeting
0840 Calibrate and check YSI

Team 1 Model cond # 14B04 unit # 11H100449

| | Standard | Response | Calibrated? |
|---|---|---|---|
| DO | | 99.1 % | Y |
| pH | 6.8-7.2 | 7.03 | N |
| ORP | 222-252 mV | 244.4 mV | N |
| Cond | 1.413 mS/cm | 1.413 mS/cm | Y |

Team 2 Model cond # 11H13 unit # 11H101295

| | Standard | Response | Calibrated? |
|---|---|---|---|
| DO | | 99.1 % | Y |
| pH | 6.8-7.2 | 6.88 | N |
| ORP | 222-252 mV | 243.6 mV | N |
| Cond | 1.413 mS/cm | 1.413 mS/cm | Y |

1000 Depart for RDM
1020 Arrive at MW44 water level 39.64'
1030 Begin purging MW44
1035 Check Turbidity meter ID 17212

| Standard (NTU) | Response (NTU) |
|---|---|
| 520 | 524 |
| 54.1 | 54.9 |
| 5.98 | 6.08 |

(10)



Location RDM Date 9/17/19

Project / Client BLM

2019 Fall Baseline

1118 Collect ~~A~~ (D) 0919MW44GW at ~ 70 mL/min. Clean hands dirty hands for low level Hg.
1200 Demob from MW44; water line cleared.
1210 Arrive at MW59. Water level is at 134.55
1225 No water coming up. Team was about to pull pump and a kink was felt loosen up resulting in water flow. Continue purging.
1230 Team will flush out line and wait for turbidity to decrease before connecting to YSI.
1340 Collect 0919MW59GW at ~70mL/min. Clean hands dirty hands for low level Hg.
1435 Complete MW59 cleared water line out. Demob to move to MW48.
1440 Team is recollecting sample from MW48 in order to collect a duplicate. MW19 was originally going to have a duplicate but is very low water

Location ROM Date 9/17/19

Project / Client BLM

2019 Fall Baseline

level and will pump very slow. Therefore MW48 will be sampled instead

1445 MW48 water level: 24.03ft

1516 Collect 0919MW486W with duplicate 0919MW1026W at ~ 70mL/min Clean hands, dirty hands for low level Hg.

1615 Complete at MW48. demob and move to MW19

1625 Arrive at MW19, water level: 26.97ft

1640 Begin purging MW19

1755 Collect 0919MW196W at ~ 70mL/min Collected all organics (BTEX/GRO, DRO and SVOCs)

2000 Demob from MW19

2020 Depart for lodge

2045 Arrive at lodge. End of day



Location Date

Project / Client

RDM Baseline F19 T2

Rite in the Rain®

ALL-WEATHER

**ENVIRONMENTAL FIELD BOOK**

№ 550

RDM Baseline Monitoring TEAM 2 Fall 2019

CONTENTS

| PAGE | REFERENCE | DATE |
|---|---|---|
| | | |



Location Red Devil Mine Date 9/11/19

Project / Client 2019 Fall Baseline

9-11-19 RDM

B. Crecelius + C. Perreira - Setup to Sample MW-27 @ 1400 hrs

DTW: 31.20 BTOIC

Top of pump: 32.15 BTOIC

Inlet: 32.15 + 1.7 = ~~30.45~~ (BC) ~~32.85~~

1415 Begin purge at 33.85

30 sec fill 30 sec recharge

Note after no discharge was observed we pulled pump & found that the discharge line had disconnected from the pump. ~~Repla~~ (BC) NEED TO REPLACE Barb FITTING

1436 resume ~~Sampling~~ at 50 ref. 11/10

discharge WL: 31.33

1500 had to pull pump in MW-27 because check valve was not working

C. Biller goes to lodge to get correct barbed fitting. I think that the check ball was fine, but the connection between masterflex & TUBE was leaking.

1550 no barbed fittings at lodge so we fastened discharge tube back

Location Reid Deal mine Date 9/11/19

Project / Client 2019 Fall Baseline

1550 cont ; restarted purge, DTW = 31.24

1649 Settle in on 37 sec refill ; 23 sec discharge at 20 psi

1650 begin Sample collection

official Sample Time 16:58

1713 collect FB02 in 1 125 mL FLPE

1721 complete Sample collection ; Start to Clean up site

1750 depart site for lodge

1815 Arrive back at lodge for Dinner

Sample processing after Dinner

9/11/19



Location RDM Date 9/12/19

Project / Client BLM 2019 FallBaseline

Personnel - B. Lieske + C. Porena

Weather: Rain in the morning, Showers in PM

SSW.

0900 checks on ~~Calibrate~~ ID YSI units

Unit # 14B04 Confidence solution Calibrate?

| Standard Range | Response | | |
|---|---|---|---|
| Cond 7630-7970 uS/cm | 6404 | Fail | Y |
| ORP 222-252 mV | 249.2 | Pass | |
| pH 6.8-7.2 | 6.83 | Pass | |
| Calibrate DO | 97.2% | | Y |

Unit # 11H13

| Standard Range | Response | | Calibrate |
|---|---|---|---|
| Cond 7630-7970 uS/cm | 6594 uS/cm | Fail | Y |
| ORP 222-252 mV | 242.8 mV | Pass | |
| pH 6.8-7.2 | 7.05 | Pass | |
| Calibrate DO | 97.0 ~~97.2~~ % | | Y |

9/12/19

Location Red Devil Mine Date 9-12-19

Project / Client 2019 Fall Baseline

0955 arrive at MW-10 & prep for Sampling. DTW = 31.22
Top of pump: 55.84
1017 Begin purge
1020 Pump check turbidimeter #17284

| Standard | Bump |
|---|---|
| 520 NTU | 602 NTU |
| 520 NTU | 522 NTU |
| 54.1 NTU | 55.1 |
| 5.98 NTU | 6.15 |

1121 Resume purge after observing that the water in the tubing was ~~not~~ BC falling back down the well between cycles. We had to pull pump & add 2 ziptries to the TLPE & transfer flex tubing b/c the connection was leaking.
1124 DTW: 31.64
1143 Pumping at 20sec recharge 10 sec discharg at 35 psi. water is drawing down slowly at at purge rate of ~ 0.15 - 0.20 Lpm.
1224 Begin Sample at MW10. note

BM 9/12/19



Location Red Devil Mine Date 9/12/19

Project / Client 2019 Fall Baseline

1224 continued. collect Blind Dup 0919MW99GW and extra volume for MS/MSD
1236 official sample time for 0919MW10GW, MS/MSD
1300 complete sample collection
1434 Set up at MW-08
1441 DTW: 15.37
1442 Begin purge w/ peristaltic
1542 after purging appx 3 liters water became very cloudy. Dump flow cell. note pump rate is fluctuating between 0.03 to 0.11 lpm
1554 note Bottom of screen is at ~ 16.60 BTOC, DTW is 16.18 = 0.42' of water above bottom of screen.
1607 flow cell full, but w/ really turbid brown water. Pumping very slow.
1640 WL = Bottom of screen, water is very turbid ~ 800 NTU's recharge is minimal. Pump out as much water as possible & leave w/ no sample. will return tomorrow to sample. will check DTW later today.

BM 9/12/19

Location Red Devil mine Date 9/12/19

Project / Client 2019 Fall Baseline

1649 Clean up at mw-8 before heady to mw-~~42~~ 00 mw-43

1743 MW-43 DTW: 90.23

top of pump: 101.15 + 1.7 = 102.85 at inlet.

1748 water in flow cell.

60 PSI 20 refill, 10 dBcmp

DTW = 90.23

1837 Begin Sample collection

1838 collect [0919MW43GW]

1858 Complete Sample collection & begin to break down.

1957 Return to mw-8 to check Dcmp

DTW = 15.36, 0.01 less than Static measured at 1441. decide to purge w/ peri & sample tomorrow.

2016 Check WL at MW09: 32.86

Static from earlier today was 31.85

so ~1.1 ft less than Static. Bail Dry. note, we observed a fuel odor at mw-9 during bailg.

9/12 CR



Location Red deer mine Date 9/13/19

Project / Client 2019 Fall Baseline

0800 $H_2S$ meeting. Troubleshoot YSI, ~~troubleshoo~~ discuss adding freeze protection, dedicated caps and replacement barbs (1/4") (for 11 pumps w/ 3/8" barb; masterflex)

1045 Team 1: TD & CP to site to sample MW3 & 32.

1105 Team 2: BC & CB re-tighten MW09 bladder pump. Will transport to site double bagged re-deploy and attempt low-flow purge

1205 Team 2 set up on MW~~20~~22 (LD)

initial dtw = 10.66' btoic

1210 Purging - performing cal check on Turbidimeter #17284

std: 520 result: 545

54.1 57.5

5.98 6.31

1253 Collect sample [0919MW22GW]

Collect sample [0919MW100GW]

DUP of MW22 (organics only)

1500 Set up on MW19 and begin purging. Initial dtw = 27.14 btoic.

1720 - Collect Sample [0919MW19GW]

Location Red Devil Mine Date 9/13/19

Project / Client 2019 Fall Baseline

1320 (cont'd) after consulting with M. Longtine decide to only collect inorganics, due to dtw > 25 ft, peristaltic pump is straining/pumping at a reduced rate/ irregularly. Will allow well to recharge & return to sample organic aliquots, and MS/MSD if possible.

1830 Team 2 up to MW08 to sample via alternate purge technique. Initial dtw = 15.27 btoic.

1853 Collect sample 0919 MW08 GW by alternative purge. Water became turbid at end of sample collection (ions). Pumped water to bottom of screen interval 16.60' btoic & marked inlet depth w/ duct tape

1930 Done w/ sampling @ MW08, Team 2 & Team 1 visit stibnite dike

2030 Depart site for Lodge

2100 End day.

9/13/19 CBailey



Location Red Devil Mine Date 9/14/19

Project / Client 2019 Fall Baseline

0830 H&S meeting. Today's plan:
T1: TD & CP sample MW06, MW26, then MW16/17 if time
T2: CB & BC sample MW31, 29

1010 Set up on MW31. Initial depth is below top of pump = 44.30
Inlet = 46.0 btoic = bot. of screen int.

1035 Pumping at 25-30 psi on 20/10 cycle. Not getting water / draining back down discharge line, so pull pump and tighten master flex @ barb. Needs replaced w/ 1/4" barb.

1045 Redeploy pump and attempt purge at 25 psi & 35/15 cycle. Flow-through cell is filling w/ turbid water

1115 Cal check on turbidimeter

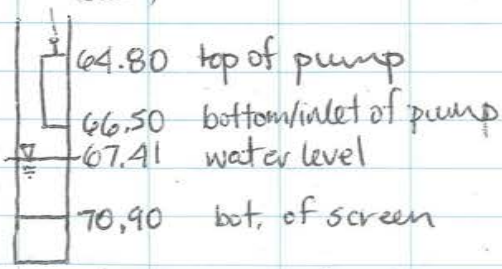
| Std: | 520 | read: | 544 |
|---|---|---|---|
| | 54.1 | | 59.0 |
| | 5.98 | | 6.70 |

1135 No longer getting water, purging at same rate, air bubbles up discharge line, well appears dry →

1135 (continued) Call M. Longtine on Sat. phone & discuss bailing well vs leaving pump in place & returning to attempt & grab sample w/ pump after recharge. Decide to wait for recharge & determine if project goals will be met w/ grab sample due to extremely turbid water.

1215 Set up on MW29, air line has (REPLACE) gone back down inner casing (free end (not fold) pull up line, suspect damaged air line so pull pump and inspect. Barb (¼") fitting is installed. Initial depth to water is > top of pump = 64.80 bottom of screened interval = ~~70~~ 70.90

1255 measured depth to water is 67.41 (btoic)




need to set pump (top) at 69.20 btoic to set inlet = bot. of screen. No extra safety



line, so would need to join kevlar (safety) line to extend. Air line is short so will decon 'air out' line from MP10 to extend down casing. Need to lower 4.4 feet from current depth. *Replace air line in spring

1315 Lowered pump (top) to 69.0 ft, Inlet = 70.7 began purge at 40 psi, qde 20/10, got water quickly. 3.21 ft of water above inlet.

1335 Pump rate around 0.2 L/m, reduce throttle to ~~28~~ psi. WL = 68.10 and appears to be stabilizing

1405 Approaching stabilization & minimal draw down. Need to get B. Ciecko back to lodge & finish sample processing for 5 PM flight RDV → ANC. with "Batch 1" samples for Test America Team 1 (TD & CP) will take over & collect sample @ MW29 & Team 2 (CB & BC) will head to lodge

1420 Team 1 set up on MW29 & will collect sample + DUP. T2 to lodge

Location Red Devil Mine Date 9/14/19

Project / Client 2019 Fall Baseline

1700 Finish sample processing for TestAmerica Batch 1 samples to go back w/ B Ciecko to Anc. B. Alexander in RDV

1735 Head back to site w. B Alexander

~~1830 Set up on~~ (CB)

1815 Measure MW19 dtw = 27.22

1830 Set up on MW49, begin pumping at 55 ft ga/27 psi 20/10 cycle. No water coming up so suspect damaged discharge lines. Will pull & inspect line.

1950 Turbidity is high (90 NTU) drain flow-through cell & reattach.

2101 Collect sample [0919MW49GW]

2130 Attempt to purge lines for freeze protection is unsuccessful, close MW49 w/o clearing lines

2140 Depart RDM for lodge (Team 2)

2215 End day

9/14/19 CB



Location Red Devil Mine Date 9/15/19

Project / Client 2019 Fall Baseline

(CB) 0830 H&S Meeting. Orient B. Alexander

0930 Today's plan: T1 - MW55, 52, 47
T2: MW44, 45, 46

1050 Depart lodge for site.

1128 Set up on MW56

1130 MW56 dtw = 50.81
pull transducer/levelogger serial 0042073183

1200 Purging MW56. 40 psi, 5 CPM 8/4 cycle. Turbidity is approaching stability (< 10 NTU)

1250 Turbidity meter stops working, showing 'E7' code. Contact M Longtine, decide project goals best met by collecting a sample then sharing remaining turbidity meter for remaining wells. (#17212)

1350 Resume purging at MW56. Will regain stability on other parameters prior to sampling.

1420 Collect sample [0919MW56GW]

1450 Attempt freeze protection procedure at MW56. Pull up 15 ft of line

Location Red Devil Mine Date 9/15/19

Project / Client 2019 Fall Baseline

Hold ~~inlet~~ (CB) outlet below highest point of tubing. Increase throttle to 55 psi, press & hold 'SAMPLE' Water is discharging from outlet but not being displaced. Inlet is above water level. Attempted to 'cycle' as well, but suspect that the compressed bladder is not rebounding and check valve at pump inlet prevents water from draining back/ being displaced by air.

1530 Close MW56 without successfully clearing line. Plan to return/re-attempt freeze protection when redeploying transducer.

1545 Set up on MW47. Will share turbidity meter w/ TI (#17212)

1609 Purge MW47 at 35 psi CPM=5 8/4

1635 ~~Etos~~ (CB) Collect sample 0919MW47GW

1700 ~~Set up on MW45~~ (CB) Freeze protection purge on MW47. Left pump attached & cycling @ 35 psi. Pulled up ~~15-20~~ (2) pump until inlet was above water. Tubing drained out quickly. Close well up freeze protection complete.



Location Red Devil Mine Date 9/15/19

Project / Client 2019 Fall Baseline

1730 (CB)

~~1715~~ Set up on MW45. ~~Set up~~ (CB) Begin purging @ 35 psi, 5 CPM 8/4

1804 Collect sample 0919FBDS at MW45. Rain has stopped, a gnat flew into the 1L BAL DI water, but was not collected in the FB container.

1936 Called sample 0919MW45GW

2000 Freeze protection purge on MW45, same procedure @ MW47. Left pump cycling @ 35 psi. Pulled ~20ft of tubing, which drained rapidly. Closed well w/ cleared lines.

2015 Depart site for lodge

2100 Arrived at lodge & finished gassing equipment & icing samples. End day

9/15/19 CBellon

Location Red Devil Mine Date 9/16/19

Project / Client 2019 Fall Baseline

0830 ~~0800~~ H&S meeting. Call TTT regarding malfunctioning turbidity meter. TTT will send a replacement via Sound Aviation. We will return meter #17284

Today's plan T1: MW51, 57, 59
T2 (CB & BA): MW54, 50, 58, 53
Will share turbidity meter (#17212) between teams.

1100 Set up at MW54

1110 dtw = 53.34', remove leveloggen 'E' #0042077952

1200 Pumping at 25 psi, 4 CPM ~~5~~ 1/10

1240 Collect sample 0919MW54GW

1315 Freeze protection purge using cycle above w/, successful. Close well. Lock needs WD-40

1350 Setup on MW50. dtw = 55.38

1425 Remove Levellogger 'A' #0042077953

~~1535~~ from MW50

1445 Consult w/ team! @ MW59 - line was kinked so they pulled the pump. Redeploying the pump introduced high turbidity (~200 NTU)



Location Red Devil Mine Date 9/16/19

Project / Client 2019 Fall Baseline

1445 (cont'd) we will use their turb. meter & they will continue to purge until NTU ↓.

1535 purging at MW50, @ 50 psi. 5 CPM 3/4.

1620 collect sample 0919MW50GW

1645 freeze protection procedure successful ('cycle' method) close well MW50 w/ cleared lines.

1730 set up at MW53

1737 dtw = 40.46', remove levellogger #0042077927

1815 pause purging to refill generator, swap turbidity meter w/ T2

1935 Collect sample 0919MW53GW

1950 Freeze protection purge using cycle method & close MW53

2030 Arrive at lodge, end day

9/14/19

0830 H&S Meeting. Todays plan:
T1: MW59, 44
T2: MW40, recollect sample & dup on peristaltic well. Fix kinked line @ MW29, clear line on MW56.
We are ahead of schedule and could demob on 9/19. Will consult w/ M. Longtine prior to changing demob.
1005 Depart lodge for site
1030 Set up on MW40. Initial dtw = 130.98 Pump inlet = 136.1. Begin purge @ 85-95 psi, 2 CPM 20/10.0
1110 No drawdown w/ throttle at 95 psi. Suspect kinked air/water lines. Decide to pull pump. Will carefully pull up & roll tubing into a clean bag, reattach line & redeploy.
1240 Finish redeploy of pump in MW40. fixed kink in water discharge. Left Kevlar line in place. Measured top (tape) depth of pump = 134.00, inlet = 135.7 btoic. Resume purge at previous set.
1404 Collect sample [0919 MW40 GW]
1425 Purge lines for freeze protection



1435 (cont'd) increased throttle ~5 psi purged approx. 15 feet of line before discharge stopped. Inlet above w.l.
1520 Set up bladder pump controller @ MW56 for freeze protection line clearing. Pulled up ~20ft, pumping at 40 psi, cycle mode took a few minutes to see water pulled up 10 more feet, discharge was sudden. May indicate damaged lines, need replacing in spring
1540 Head over to MW48, will meet T1, take their samples then get VOC Organics kit to sample MW19
1630 Return from lodge to MW19 with organics kit to assist T1 with sample collection.
2045 Collect sample [0919 FB07]
2115 Arrive at lodge, end day

9/17/19 CBM

Location Red Devil Mine Date 9/18/19

Project / Client 2019 Fall Baseline

0900 H&S Meeting. Todays plan: Sample processing & demob tasks

1200 Consult with M. Talaia-Murray regarding MSD volume for MW45. She spoke w/ Kris Allen (TA) on the phone & confirmed lab can run MSD off single volumes for inorganics

1530 Download pressure transducer data:

| Serial | Well Name | | Date | Time | W.L. |
|---|---|---|---|---|---|
| ~~77947~~ 77954* | MW51 | B | 9/16/19 | 1040 | 45.34' |
| " 77844 | MW39 | Baro | 9/16/19 | 1324 | |
| " 77947 | MW58* | C | 9/16/19 | 1805 | 34.52' |
| " 67275 | MW57 | F | 9/16/19 | 1558 | 39.15' |
| " 73183 | MW56 | G | 9/15/19 | 1130 | 50.81' |
| 77952 | MW54 | E | 9/16/19 | 1120 | 33.34' |
| 77927 | MW53 | D | 9/16/19 | 1737 | 40.46' |
| 77953 | MW50 | A | 9/16/19 | 1425 | 55.38' |

*note: data file is labeled MW59

1900 Finish transducer data download. End day

9/18/19 CBM



Location Red Devil Mine Date 9/19/19

Project / Client 2019 Fall Baseline

0800 H&S Meeting. Today's plan: Deploy transducers. Ryan Air to confirm demob of 1 flight today PM.

1145 - Deploy barologger in MW39 dtw=84.97 (sump)

1155 - Deploy transducer 'B' #77954 (dtw=45.34) in MW51

1208 - Deploy transducer 'E' #77952 in MW54 dtw = 33.28'

1220 - Deploy transducer 'A' #77953 in MW50 dtw = 55.36

1233 - Deploy transducer 'C' #77947 in MW58 dtw = 33.93

1245 - Deploy transducer 'D' #77927 in MW53 dtw = 40.56'

1300 - Deploy transducer 'F' #67275 (#6725) in MW57 dtw = 39.22'

1315 - Deploy transducer 'G' #73183 in MW56 dtw = 49.53'

*1233 (late entry) MW58 lock is stuck. Bring MD40's bolt cutters

1330 Arrive at MW29 to retrieve pump after it was extended ~4 ft to sample

Location Red Devil Mine Date 9/19/19

Project / Client 2019 Fall Baseline

1400 Pulled up MW29 pump to original deployment depth & secured original kevlar (safety) line to cap. Air line appears wedged between pump and casing, was not able to retrieve. Water & air line will need to be replaced. Will be difficult to pull out, bring tools to extract.

1415 Stop at borrow pit to photograph outcropping of Kuskokwim group fractures. Return to lodge.

1430 Complete remaining demob tasks inventory & sample processing.

1700 End day

9/19/19
CBillon



Location Red Devil Mine Date 9/20/19

Project / Client 2019 Fall Baseline

0700 - Crew muster for breakfast CB, TD, BA, CP all present. Ryan Air was unable to pick up yesterday. Confirmed 1st flight will arrive around 9AM. 1st flight will send. TD, BA & CP plus all samples. 2nd flight will be CB plus all remaining equipment.

1000 1st flight departs RDV

1200 1st flight lands ANC. TD, BA & CP ship samples to Brooks Analytical & Test America via Fed EX.

1300 2nd flight departs RDV

1430 2nd flight lands ANC. Drop off remaining rental equipment.

1630 End day. BA will depart ANC → PDX early AM on 9/21. TD & CP personal travel in ANC then ANC → BUF on 9/22. CB personal travel then ANC → SEA on 9/28.

9/20/19
CBillon

# C

# Field Sampling Plan Deviation Forms

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# Deviation from the Field Sampling Plan

**Red Devil Mine 2019 Spring Baseline Monitoring Sampling Event**

**Field Sampling Plan Deviation Documentation**

| **Date: 5/16/2019** | **Name: Jonathan Reeve** |
|---|---|
| **Description of Problem:** Planned Red Devil Creek surface water monitoring location RD08SW was not accessible at the time of the Spring 2019 baseline monitoring event because it was submerged. At the planned time of sampling, the Kuskokwim River stage at the Red Devil Mine was high, flooding most of the Red Devil Creek delta, including the RD08SW location. | |
| **Location of Problem:** RD08SW | |
| **Description of Deviation to Address Problem:** An alternate temporary (previously sampled for the May 2018 monitoring event) surface water monitoring location was selected at a location along Red Devil Creek just as far upstream as was necessary to be above the level of the Kuskokwim River and any possible mixing of Kuskokwim River water and Red Devil Creek water. The distance from the original location to the alternate upstream location was measured at 35 ft. | |
| **Other Means Considered but Rejected to Address Problem:**<br><br>None | |

# Deviation from the Field Sampling Plan

**Red Devil Mine 2019 Spring Baseline Monitoring Sampling Event**

**Field Sampling Plan Deviation Documentation**

| **Date: 5/18/2019** | **Name: Jonathan Reeve** |
|---|---|
| **Description of Problem:** Discovered Team 1 had collected un-filtered samples in containers for TDS at SW sampling locations RD08SW through RD15SW. | |
| **Location of Problem: RD08SW, RD06SW, RD16SW, RD05SW, RD15SW** | |
| **Description of Deviation to Address Problem:** Using RD14SW tubing and new field-filter cartridges for each location, progressed downstream from "cleanest" to "dirtiest", purged the tubing and filter at each location and collected a new field-filtered sample in the original TDS container for each location. At RD05SW, the original RD05SW tubing and field-filter cartridge was used to re-collect the TDS sample. | |
| **Other Means Considered but Rejected to Address Problem:** Lab-filtration of the TDS sample was considered, but ultimately rejected due to: previously observed tendency for dissolved solids to precipitate over time in the sample container; long hold-times for the SW samples; and consistency with past sampling methodology. | |

# Deviation from the Field Sampling Plan

**Red Devil Mine 2019 Fall Baseline Sampling Event**

**Field Sampling Plan Deviation Documentation**

| **Date: 9/14/2019** | **Name: Catherine Billor** |
|---|---|
| **Description of Problem:**<br><br>Groundwater monitoring well MW31 was dry or only had residual water in the well sump. | |
| **Location of Problem:**<br><br>MW31 | |
| **Description of Deviation to Address Problem:**<br><br>MW31 was not sampled. | |
| **Other Means Considered but Rejected to Address Problem:**<br><br>None | |

# D Data Usability Summary Report

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| Data Usability Summary Report | Project: Red Devil Mine: Baseline Monitoring |
|---|---|
| Date Completed: December 10, 2019 | Completed by: Eridania Marte |

The analytical data provided by the laboratory were reviewed for precision, accuracy, and completeness based on applicable sections of the following guidelines.

- *Final Quality Assurance Project Plan, Baseline Monitoring, Red Devil mine, Alaska.* May 2019.
- *National Functional Guidelines for Inorganic Superfund Methods Data Review*. EPA-540-R-2017-001, January 2017.

Specific criteria for QC limits were obtained from the site specific QAPP. Compliance with the project QA program is indicated in the checklist and tables below. Any major or minor concerns affecting data usability are listed below. The checklist and tables also indicate whether data qualification is required and/or the type of qualifier assigned.

Reference:

| Laboratory | Sample Delivery Group | Project Code |
|---|---|---|
| Test America, Seattle | 580-89193-1 | 1001095.0026.03 |

| Work Order | Matrix | Sample ID | Lab ID | Sample Date | Lab QC | QC | ID Corre-ctions |
|---|---|---|---|---|---|---|---|
| 580-89193-1 | WG | 0919MW01GW | 580-89193-1 | 9/12/2019 | | | |
| 580-89193-1 | WG | 0919MW08GW | 580-89193-2 | 9/13/2019 | | | |
| 580-89193-1 | WG | 0919MW09GW | 580-89193-3 | 9/13/2019 | | | |
| 580-89193-1 | WG | 0919MW100GW | 580-89193-4 | 9/13/2019 | | | |
| 580-89193-1 | WG | 0919MW10GW | 580-89193-5 | 9/12/2019 | | MS/MSD | |
| 580-89193-1 | WG | 0919MW22GW | 580-89193-6 | 9/13/2019 | | | |
| 580-89193-1 | WG | 0919MW27GW | 580-89193-7 | 9/12/2019 | | | |
| 580-89193-1 | WG | 0919MW28GW | 580-89193-8 | 9/12/2019 | | | |
| 580-89193-1 | WG | 0919MW32GW | 580-89193-9 | 9/13/2019 | | | |
| 580-89193-1 | WG | 0919MW33GW | 580-89193-10 | 9/13/2019 | | | |
| 580-89193-1 | WG | 0919MW42GW | 580-89193-11 | 9/12/2019 | | | |
| 580-89193-1 | WG | 0919MW43GW | 580-89193-12 | 9/12/2019 | | | |
| 580-89193-1 | WG | 0919MW99GW | 580-89193-13 | 9/12/2019 | LR | MS/MSD | |
| 580-89193-1 | SW | 0919RD05SW | 580-89193-14 | 9/10/2019 | | | |
| 580-89193-1 | SW | 0919RD06SW | 580-89193-15 | 9/10/2019 | | | |
| 580-89193-1 | SW | 0919RD08SW | 580-89193-16 | 9/10/2019 | | | |
| 580-89193-1 | SW | 0919RD10SW | 580-89193-17 | 9/10/2019 | | MS/MSD | |
| 580-89193-1 | SW | 0919RD14SW | 580-89193-18 | 9/10/2019 | | | |
| 580-89193-1 | SW | 0919RD15SW | 580-89193-19 | 9/10/2019 | LR/MS/MSD | | |
| 580-89193-1 | SW | 0919RD16SW | 580-89193-20 | 9/10/2019 | | | |
| 580-89193-1 | SW | 0919RD99SW | 580-89193-21 | 9/10/2019 | | | |
| 580-89193-1 | WQ | 0919TB02 | 580-89193-22 | 9/14/2019 | | | |

| SDG | Matrix | Test Method | Number of Samples | Sample Type |
|---|---|---|---|---|
| 580-89193-1 | WG | 6010C – Metals ICP (Al, Ca, Fe, Mg, K, Na) | 10 | N |
| 580-89193-1 | WG | 6010C – Metals ICP (Al, Ca, Fe, Mg, K, Na) | 2 | FD |
| 580-89193-1 | WG | 6010C – Metals ICP (Al, Ca, Fe, Mg, K, Na) | 2 | MS/MSD |
| 580-89193-1 | WG | 6010C – Metals ICP (Al, Ca, Fe, Mg, K, Na) | 1 | LR |
| 580-89193-1 | SW | 6010C – Metals ICP (Al, Ca, Fe, Mg, K, Na) | 7 | N |
| 580-89193-1 | SW | 6010C – Metals ICP (Al, Ca, Fe, Mg, K, Na) | 1 | FD |
| 580-89193-1 | SW | 6010C – Metals ICP (Al, Ca, Fe, Mg, K, Na) | 1 | MS/MSD |
| 580-89193-1 | SW | 6010C – Dissolved Metals ICP (Al, Ca, Fe, Mg, K, Na) | 7 | N |
| 580-89193-1 | SW | 6010C – Dissolved Metals ICP (Al, Ca, Fe, Mg, K, Na) | 1 | FD |
| 580-89193-1 | SW | 6010C – Dissolved Metals ICP (Al, Ca, Fe, Mg, K, Na) | 1 | LR |
| 580-89193-1 | SW | 6010C – Dissolved Metals ICP (Al, Ca, Fe, Mg, K, Na) | 2 | MS/MSD |
| 580-89193-1 | WG | 6020A – Metals ICP/MS | 10 | N |
| 580-89193-1 | WG | 6020A – Metals ICP/MS | 2 | FD |
| 580-89193-1 | WG | 6020A – Metals ICP/MS | 1 | LR |
| 580-89193-1 | WG | 6020A – Metals ICP/MS | 2 | MS/MSD |
| 580-89193-1 | SW | 6020A – Metals ICP/MS | 7 | N |
| 580-89193-1 | SW | 6020A – Metals ICP/MS | 1 | FD |
| 580-89193-1 | SW | 6020A – Metals ICP/MS | 2 | MS/MSD |
| 580-89193-1 | SW | 6020A – Dissolved Metals ICP/MS | 7 | N |
| 580-89193-1 | SW | 6020A – Dissolved Metals ICP/MS | 1 | FD |
| 580-89193-1 | SW | 6020A – Dissolved Metals ICP/MS | 1 | LR |
| 580-89193-1 | SW | 6020A – Dissolved Metals ICP/MS | 2 | MS/MSD |
| 580-89193-1 | WG | 7470A – Mercury | 10 | N |
| 580-89193-1 | WG | 7470A – Mercury | 2 | FD |
| 580-89193-1 | SW | 7470A – Mercury | 1 | LR |
| 580-89193-1 | SW | 7470A – Mercury | 2 | MS/MSD |
| 580-89193-1 | SW | 7470A – Mercury | 7 | N |
| 580-89193-1 | SW | 7470A – Mercury | 1 | FD |
| 580-89193-1 | SW | 7470A – Mercury | 1 | MS/MSD |
| 580-89193-1 | SW | 7470A – Dissolved Mercury | 7 | N |
| 580-89193-1 | SW | 7470A – Dissolved Mercury | 1 | FD |
| 580-89193-1 | SW | 7470A – Dissolved Mercury | 1 | LR |
| 580-89193-1 | SW | 7470A – Dissolved Mercury | 1 | MS/MSD |
| 580-89193-1 | WG | 300.0 - Anions, IC | 10 | N |
| 580-89193-1 | WG | 300.0 - Anions, IC | 2 | FD |
| 580-89193-1 | WG | 300.0 - Anions, IC | 2 | MS/MSD |
| 580-89193-1 | SW | 300.0 - Anions, IC | 7 | N |
| 580-89193-1 | SW | 300.0 - Anions, IC | 1 | FD |
| 580-89193-1 | WG | 353.2 - Nitrogen, Nitrate-Nitrite | 10 | N |
| 580-89193-1 | WG | 353.2 - Nitrogen, Nitrate-Nitrite | 2 | FD |
| 580-89193-1 | WG | 353.2 - Nitrogen, Nitrate-Nitrite | 1 | LR |

| SDG | Matrix | Test Method | Number of Samples | Sample Type |
|---|---|---|---|---|
| 580-89193-1 | WG | 353.2 - Nitrogen, Nitrate-Nitrite | 2 | MS/MSD |
| 580-89193-1 | SW | 353.2 - Nitrogen, Nitrate-Nitrite | 7 | N |
| 580-89193-1 | SW | 353.2 - Nitrogen, Nitrate-Nitrite | 1 | FD |
| 580-89193-1 | SW | 353.2 - Nitrogen, Nitrate-Nitrite | 1 | MS/MSD |
| 580-89193-1 | WG | SM2320B – Alkalinity | 10 | N |
| 580-89193-1 | WG | SM2320B – Alkalinity | 2 | FD |
| 580-89193-1 | WG | SM2320B – Alkalinity | 1 | LR |
| 580-89193-1 | SW | SM2320B – Alkalinity | 7 | N |
| 580-89193-1 | SW | SM2320B – Alkalinity | 1 | FD |
| 580-89193-1 | WG | SM2540D – Total Suspended Solids (TSS) | 10 | N |
| 580-89193-1 | WG | SM2540D – Total Suspended Solids (TSS) | 2 | FD |
| 580-89193-1 | WG | SM2540D – Total Suspended Solids (TSS) | 1 | LR |
| 580-89193-1 | SW | SM2540D – Total Suspended Solids (TSS) | 7 | N |
| 580-89193-1 | SW | SM2540D – Total Suspended Solids (TSS) | 1 | FD |
| 580-89193-1 | SW | SM2540C – Total Dissolved Solids (TDS) | 7 | N |
| 580-89193-1 | SW | SM2540C – Total Dissolved Solids (TDS) | 1 | FD |
| 580-89193-1 | SW | 9060A – Total Organic Carbon (TOC) | 7 | N |
| 580-89193-1 | SW | 9060A – Total Organic Carbon (TOC) | 1 | FD |
| 580-89193-1 | WG | 8260C - Volatile Organic Compounds by GC/MS | 1 | N |
| 580-89193-1 | WG | 8260C - Volatile Organic Compounds by GC/MS | 1 | FD |
| 580-89193-1 | WG | 8260C - Volatile Organic Compounds by GC/MS | 1 | TB |
| 580-89193-1 | WG | 8270D - Semivolatile Organic Compounds by GC/MS | 1 | N |
| 580-89193-1 | WG | 8270D - Semivolatile Organic Compounds by GC/MS | 1 | FD |
| 580-89193-1 | WG | AK101/EPA 8021 Gasoline Range Organics (GRO) | 1 | N |
| 580-89193-1 | WG | AK101/EPA 8021 Gasoline Range Organics (GRO) | 1 | FD |
| 580-89193-1 | WG | ADEC AK102 & 103 Diesel Range Organics (DRO) | 1 | N |
| 580-89193-1 | WG | ADEC AK102 & 103 Diesel Range Organics (DRO) | 1 | FD |

| General Sample Information | |
|---|---|
| Do Samples and Analyses on COC check against Lab Sample Tracking Form? | The sample times were not recorded on the COC; therefore, the laboratory logged in all sample times per container label.<br>Only one trip blank vial was provided for analysis. Laboratory proceeded with analysis. No qualification were made. |
| Did coolers arrive at lab between 2 and 6°C and in good condition as indicated on COC and Cooler Receipt Form? | Yes. |
| Frequency of Field QC Samples Correct?<br>Field Duplicate - 1/10 regular samples for each matrix and sampling method and/or type of equipment used.<br>MS/MSD - 1/20 samples for each matrix and each sampling event.<br>Equipment Blank - 1/20 field samples for each collection/decontamination method, by matrix and by sample type. | - Two field duplicates were collected per 11 groundwater samples.<br>- One field duplicate was collected per 7 surface water samples.<br>- One MS/MSD was collected for metals, anions, alkalinity, nitrate-nitrite, and TSS analysis per 10 groundwater samples.<br>- One MS/MSD was collected for metals analysis per 10 groundwater samples.<br>- One MS/MSD was collected for total and dissolved metals analysis per 7 surface water samples.<br>- One trip blank was collected per cooler for VOC analysis per 2 samples.<br>- An equipment blank was not included in this SDG. |
| Case narrative present and complete? | Yes. |
| Any holding time violations? | Yes.<br>Samples 0919MW01GW and 0919MW08GW were re-analyzed outside of the hold time due to associated detection in method blank. No qualification was made on original analyte run associated with method blank detection; therefore, reanalyzed samples were R qualified as unusable and original samples were reported. |

The following tables are presented at the end of this DUSR and provide summaries of results outside QC criteria:

- Method Blanks Results (Table 2, 2A, and 2B)
- MS/MSD Outside Limits (Table 3 and 3A)
- LCS Outside Limits (Table 4 and 4A)
- Serial Dilution Outside Limits (Table 5)
- Reanalysis Results (Table 6)
- Field Duplicate Results (Table 7)

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| Metals by Method SW-846 6010C | |
|---|---|
| **Description** | **Notes and Qualifiers** |
| Are any compounds present in method and field blanks as noted on Table 2? | Sodium was detected below the RL in method blank 580-313585/24-A. |
| For samples, if results are < 5 times the blank then "U" flag data (see Table 2A and 2B). | The sodium concentration in the associated sample 0919RD10SW was less than 5X the blank concentration; therefore, the sample result was U qualified as non-detect. The PQL was elevated to the sample result. |
| Is laboratory QC frequency one blank and LCS with each batch and one set of MS/MSD per 20 samples? | Yes. |
| Are MS/MSD within QC criteria (see Table 3 and 3A)? QC limits are not applicable to sample results greater than 4 times spike amount. | No.<br>Calcium was recovered below the acceptance limit in the MSD for 0919RD10SW. The parent sample result was qualified J- as estimated, low biased.<br><br>Arsenic was recovered below the acceptance limit in the PDS for 0919MW99GW. The associated sample MS and MSD were within the acceptance limit; therefore, no qualification was made.<br><br>The RPD for potassium in laboratory replicate for sample 0919MW99GW was recovered outside of the acceptance limit. The parent sample result was qualified non-detect due to associated laboratory blank detections. No qualification was made. |
| Is LCS within QC criteria (see Table 4)? If out, and the recovery high with no positive values, then no data qualification is required. | Yes. |
| Is initial calibration r ≥ 0.998 and RSD between multiple exposures ≤5%? Minimum 4-point linearity. | The r value was not reported by the laboratory. The data are considered acceptable for use. |
| Is there one serial dilution per 20 samples? Flag all data reported with an "E" as "J". | Yes. |
| Are serial dilutions within QC criteria (see Table 5)? | No.<br>The serial dilution in sample 0919MW99GW for calcium and magnesium was recovered outside the laboratory acceptance limit. The parent sample results were J qualified as estimated.<br><br>The serial dilution in sample 0919MW99GW for sodium was recovered outside the laboratory acceptance limit. The sample result was less than 50X the MDL; therefore, no qualification was required. |
| Spot check ICS recoveries 80-120%. | The ICSs were within acceptance criteria. |
| Spot check ICV 90-110%. | The ICVs were within acceptance criteria. |
| Spot check CCV 90-110%. | The CCVs were within acceptance criteria. |
| Spot check ICVL/CCVL 70-130% | The ICVL/CCVLs were within acceptance criteria. |
| Spot check ICB/CCB detections (see Table 2A and 2B). | Aluminum was detected below the RL in ICB 580-313701/8. Aluminum was non-detect in the |

| Metals by Method SW-846 6010C | |
|---|---|
| **Description** | **Notes and Qualifiers** |
| | associated samples; therefore, no qualification of the data was required.<br><br>Iron was detected below the RL in ICB 580-313701/8. The concentration in the associated three samples was less than 5X the blank concentration; therefore, the sample results were U qualified as non-detect. The MDL was elevated to the sample result. All other sample results were either 5X the blank concentration or not detected; therefore, no qualification was made.<br><br>Iron was detected below the RL in CCB 580-313701/135. All sample results were either U qualified from associated ICB detection or greater than 5X the ICB and CCB detection; therefore, no qualification was made.<br><br>Potassium was detected below the RL in ICB 580-313701/8. The concentration in the associated sample was less than 5X the blank concentration; therefore, the sample result was U qualified as non-detect. The MDL was elevated to the sample result. All other sample results were not detected; therefore, no qualification was made.<br><br>Sodium was detected below the RL in ICB 580-313701/8. The concentration in the associated six samples was less than 5X the blank concentration; therefore, the sample results were U qualified as non-detect. The PQL was elevated to the sample result. All other sample results were either U qualified from associated method blank detection or greater than 5X the method blank and ICB detection; therefore, no qualification was made.<br><br>Sodium was detected below the RL in CCBs 580-313701/112, 580-313701/124, 580-313701/135. All sample results were either U qualified from associated method blank and ICB detection or greater than 5X the method blank, ICB, and CCB detection; therefore, no qualification was made.<br><br>Calcium and magnesium were detected below the RL in ICB 580-313701/8. The sample results in the associated samples were greater than 5X the blank detection; therefore, no qualification was required.<br><br>Potassium was detected below the RL in ICB 580-313979/8. The concentration in the associated five samples were less than 5X the blank concentration; therefore, the sample result was U |

| Metals by Method SW-846 6010C | |
|---|---|
| **Description** | **Notes and Qualifiers** |
| | qualified as non-detect. The MDL was elevated to the sample result. All other sample results were not detected; therefore, no qualification was made.<br><br>Iron was detected below the RL in CCB 580-313979/53. The concentration in the associated five samples were less than 5X the blank concentration; therefore, the sample result was U qualified as non-detect. The MDL was elevated to the sample result. |
| Spot check the internal standard recoveries 50-150%. | The internal standards were acceptable. |
| Were any samples reanalyzed or diluted (see Table 6)? For any sample reanalysis or dilutions, is only one reportable result flagged? | No. |
| Do field duplicate results show good precision for all compounds (see Table 7)? | Yes. |

| Metals by Method SW-846 6020A | |
|---|---|
| **Description** | **Notes and Qualifiers** |
| Are any compounds present in method and field blanks as noted on Table 2? | No. |
| For samples, if results are < 5 times the blank then "U" flag data (see Table 2A and 2B). | No qualification required. |
| Is laboratory QC frequency one blank and LCS with each batch and one set of MS/MSD per 20 samples? | Yes. |
| Are MS/MSD within QC criteria (see Table 3 and 3A)? QC limits are not applicable to sample results greater than 4 times spike amount. | No.<br>Barium was recovered below the acceptance limit in the MS for 0919MW10GW and 0919RD10SW. The parent sample result was qualified J- as estimated, low biased.<br><br>Barium was recovered below the acceptance limit in the MS for 0919RD15SW. The PDS was within the acceptance limit. The parent sample result was qualified J as estimated.<br><br>The RPD for nickel in laboratory replicate for sample 0919RD15SW was recovered outside of the acceptance limit. The parent sample result was J qualified as estimated. |
| Is LCS within QC criteria (see Table 4)? If out, and the recovery high with no positive values, then no data qualification is required. | Yes. |
| Is initial calibration ≥ 0.995? Minimum 5-point linearity. | Yes. |
| Is there one serial dilution per 20 samples? Flag all data reported with an “E” as “J”. | Yes. |
| Are serial dilutions within QC criteria (see Table 5)? | Yes. |
| Spot check ICS recoveries 80-120%. | The ICSs were within acceptance criteria. |

| Metals by Method SW-846 6020A | |
|---|---|
| **Description** | **Notes and Qualifiers** |
| Spot check ICV 90-110% and < 20% RSD. | The ICVs were within acceptance criteria. |
| Spot check CCV 90-110%. | The CCVs were within acceptance criteria. |
| Spot check ICVL/CCVL 50-150%. | The ICVL/CCVLs were within acceptance criteria. |
| Spot check ICB/CCB detections (see Table 2A and 2B). | The ICB/CCBs were acceptable. |
| Spot check the internal standards – must be 30-120% of the intensity of the calibration blank. | The internal standards were acceptable. |
| Were any samples reanalyzed or diluted (see Table 6)? For any sample reanalysis or dilutions, is only one reportable result flagged? | Yes.<br>Samples 0919MW01GW, 0919MW08GW, 0919MW09GW, 0919MW10GW, 0919MW22GW, 0919MW99GW, and 0919RD10SW were diluted per laboratory prior to analysis. No data usability issues were observed.<br><br>Dissolved samples 0919RD05SW, 0919RD06SW, 0919RD08SW, 0919RD10SW, 0919RD14SW, 0919RD15SW, 0919RD16SW, and 0919RD99SW were diluted per laboratory prior to analysis. No data usability issues were observed. |
| Do field duplicate results show good precision for all compounds (see Table 7)? | No.<br>Barium exhibited poor precision in sample pair for 0919MW10GW and 0919MW99GW. The sample duplicate result was J qualified as estimated. Barium in sample 0919MW10GW was qualified J- as estimated, low biased due to MS/MSD recovery. |

| Mercury by Method SW-846 7470A | |
|---|---|
| **Description** | **Notes and Qualifiers** |
| Any compounds present in method or field blanks (see Table 2)? | No. |
| For samples, if results are < 5 times the blank, then "U" flag data (see Table 2A and 2B). | No qualification required. |
| Is Laboratory QC frequency at least one blank, LCS and MS/MSD with each batch? | Yes. |
| Is MS/MSD within QC criteria (see Table 3 and 3A)? If out and LCS is compliant, then “J” flag positive data in original sample due to matrix. | Yes. |
| Is LCS within QC criteria (see Table 4)? If out, and the recovery is high with no positive values, then no data qualification is required. | Yes. |
| Is initial calibration ≥ 0.995? | Yes. |
| Spot check ICV 90-110%. | The ICVs were acceptable. |
| Spot check CCV 80-120%. | The CCVs were acceptable. |
| Spot check ICB/CCB detections (see Table 2A and 2B). | The ICB/CCBs were acceptable. |
| Were any samples reanalyzed or diluted (see Table 6)? For any sample reanalysis or dilutions, is only one reportable result flagged? | No |
| Do field duplicate results show good precision for all compounds (see Table 7)? | Yes. |

| Benzene, Toluene, Ethylbenzene, and Xylenes by Method 8260C | |
|---|---|
| **Description** | **Notes and Qualifiers** |
| Any compounds present in method or field blanks (see Table 2)? | No. |
| For samples, if results are < 5 times the blank, then "U" flag data (see Table 2A and 2B). | No qualification required. |
| Are surrogates for method blanks and LCS within limits? | Yes. |
| Are surrogates for samples and MS/MSD within limits? (See Table 3). If not, were all samples reanalyzed for VOCs? Matrix effects should be established. | Yes. |
| Is Laboratory QC frequency at least one blank and LCS with each batch and one set of MS/MSD per 20 samples? | Yes. |
| Is MS/MSD within QC criteria (see Table 4 and 4A)? If out and LCS is compliant, then "J" flag positive data in original sample due to matrix. | Yes. |
| Is LCS within QC criteria (see Table 5)? If out, and the recovery is high with no positive values, then no data qualification is required. | Yes. |
| Do internal standards areas and retention time meet criteria? If not was sample re-analyzed to establish matrix (see Table 7)? | Yes. |
| Is initial calibration for target compounds <20 %RSD or curve fit? | Yes. |
| Is continuing calibration for target compounds <30.0 %D. | Yes. |
| Were any samples reanalyzed or diluted (see Table 7)? For any sample reanalysis or dilutions, is only one reportable result flagged? | No. |
| Do field duplicate results show good precision for all compounds (see Table 8)? | Yes. |

| Semi-volatile Organic Compounds by Method 8270D | |
|---|---|
| **Description** | **Notes and Qualifiers** |
| Any compounds present in method, trip, or, field blanks (see Table 2)? | Butyl benzyl phthalate was detected in method blank 580-311614/1-A. |
| For samples, if results are < 5 times the blank, then "U" flag data (see Table 2A and 2B). | The associated sample results for butyl benzyl phthalate were less than 5X the blank concentration; therefore, the sample results were U qualified as non-detect. The MDL was elevated to the sample result. |
| Are surrogates for method blanks and LCS within limits? | Yes. |
| Are surrogates for samples and MS/MSD within limits? (See Table 3). Semivolatile samples should be reanalyzed if more than one base-neutral and/or more than one acid phase compound for semivolatiles is out. Matrix effects should be established. | Yes. |
| Is Laboratory QC frequency at least one blank and LCS with each batch and one set of MS/MSD per 20 samples? | Yes. |

| Semi-volatile Organic Compounds by Method 8270D | |
|---|---|
| **Description** | **Notes and Qualifiers** |
| Is MS/MSD within QC criteria (see Table 4 and 4A)? If out and LCS is compliant, then "J" flag positive data in original sample due to matrix. | Yes. |
| Is LCS/LCSD within QC criteria (see Table 5 and 5A)? If out, and the recovery is high with no positive values, then no data qualification is required. | Bis(2-ethylhexyl) phthalate was recovered high in the LCS and LCSD in batch 311614. The sample results were J or UJ qualified as estimated.<br><br>4-Nitrophenol was recovered high in the LCS and LCSD in batch 311614. The analyte was UJ qualified as estimated non-detect in the associated samples.<br><br>Butyl benzyl phthalate was recovered high in the LCS in batch 311614. The analyte was UJ qualified as estimated non-detect in the associated samples. |
| Do internal standards areas and retention time meet criteria? If not was sample re-analyzed to establish matrix (see Table 7)? | Yes. |
| Is initial calibration for target compounds <15 %RSD or curve fit? | Yes. |
| Is continuing calibration for target compounds < 20.0%D. | N-nitrosodimethylamine, benzyl alcohol, 2-nitrophenol, 2,6-dinitrotoluene, 4-nitrophenol, 4,6-dinitro-2-metylphenol, butyl benzyl phthalate, chrysene, and indeno[1,2,3-cd]pyrene were recovered greater than 20% D in CCVIS 580-312721/3. All analytes were non-detect in the associated samples and qualified UJ as estimated non-detect.<br><br>Bis(2-ethylhexyl) phthalate and di-n-octyl phthalate were recovered greater than 20% D in CCVIS 580-312721/3. The analytes in associated samples were J qualified as estimated or UJ qualified as estimated non-detect.<br><br>N-nitrosodi-n-propylamine exhibited a minimum response factor outside of control limits in CCVIS 580-312721/3. The analyte was UJ qualified as estimated. |
| Were any samples reanalyzed or diluted (see Table 7)? For any sample reanalysis or dilutions, is only one reportable result flagged? | No. |
| Do field duplicate results show good precision for all compounds (see Table 8)? | Yes. |

| Gasoline Range Organics by Method ADEC AK101 | |
|---|---|
| **Description** | **Notes and Qualifiers** |
| Any compounds present in method or field blanks (see Table 2)? | No. |
| For samples, if results are < 5 times the blank, then "U" flag data (see Table 2A and 2B). | No qualification required. |
| Are surrogates for method blanks and LCS within limits? | Yes. |

| Gasoline Range Organics by Method ADEC AK101 | |
|---|---|
| **Description** | **Notes and Qualifiers** |
| Are surrogates for samples and MS/MSD within limits? (See Table 3). If not, were all samples reanalyzed for VOCs? Matrix effects should be established. | Yes. |
| Is Laboratory QC frequency at least one blank and LCS with each batch and one set of MS/MSD per 20 samples? | Yes. |
| Is MS/MSD within QC criteria (see Table 4 and 4A)? If out and LCS is compliant, then "J" flag positive data in original sample due to matrix. | Yes. |
| Is LCS/LCSD within QC criteria (see Table 5 and 5A)? If out, and the recovery is high with no positive values, then no data qualification is required. | Yes. |
| Is initial calibration for target compounds <25 %RSD or curve fit? | Yes. |
| Is continuing calibration for target compounds < 25.0%D. | Yes. |
| Were any samples reanalyzed or diluted (see Table 7)? For any sample reanalysis or dilutions, is only one reportable result flagged? | No. |
| Do field duplicate results show good precision for all compounds (see Table 8)? | There were no positive detections for the target analytes. |

| Diesel Range Organics by Method ADEC AK102 & 103 | |
|---|---|
| **Description** | **Notes and Qualifiers** |
| Any compounds present in method or field blanks (see Table 2)? | No. |
| For samples, if results are < 5 times the blank, then "U" flag data (see Table 2A and 2B). | No qualification required. |
| Are surrogates for method blanks and LCS within limits? | Yes. |
| Are surrogates for samples and MS/MSD within limits? (See Table 3). Semivolatile samples should be reanalyzed if more than one base-neutral and/or more than one acid phase compound for semivolatiles is out. Matrix effects should be established. | Yes. |
| Is Laboratory QC frequency at least one blank and LCS with each batch and one set of MS/MSD per 20 samples? | Yes. |
| Is MS/MSD within QC criteria (see Table 4 and 4A)? If out and LCS is compliant, then "J" flag positive data in original sample due to matrix. | Yes. |
| Is LCS/LCSD within QC criteria (see Table 5 and 5A)? If out, and the recovery is high with no positive values, then no data qualification is required. | Yes. |
| Is initial calibration for target compounds <25 %RSD or curve fit? | Yes. |
| Is continuing calibration for target compounds < 25% D. | Yes. |

| Diesel Range Organics by Method ADEC AK102 & 103 | |
|---|---|
| **Description** | **Notes and Qualifiers** |
| Were any samples reanalyzed or diluted (see Table 7)? For any sample reanalysis or dilutions, is only one reportable result flagged? | No. |
| Do field duplicate results show good precision for all compounds (see Table 8)? | There were no positive detections for the target analytes. |

| Alkalinity by Standard Method 2320B | |
|---|---|
| **Description** | **Notes and Qualifiers** |
| Are any compounds present in method and/or field blanks as noted on Table 2? | Method blanks are not applicable to this technique. |
| For samples, if results are <5 times the blank, then "U" flag data (see Table 2A and 2B). | N/A |
| Is laboratory QC frequency at least one LCS and duplicate with each batch of up to 20 samples? | Yes. |
| Is LCS/LCSD within QC criteria (see Table 4 and 4A)? If out, and the recovery high with no positive values, then no data qualification is required. | Yes. |
| Is initial calibration verification within QC limits? | Yes. |
| Is continuing calibration verification within QC limits? | Yes. |
| Are laboratory duplicates within QC limits? | Yes. |
| Do field duplicate results show good precision for all compounds (see Table 7)? | Yes. |

| Anions by EPA Method 300.0 | |
|---|---|
| **Description** | **Notes and Qualifiers** |
| Are any compounds present in method, continuing calibration, and/or field blanks? | No. |
| For samples, if results are <5 times the blank then "U" flag data (see Table 2A and 2B). | No qualification required. |
| Is laboratory QC frequency one blank and LCS with each batch and one set of MS/MSD per 20 samples? | Yes. |
| Are MS/MSD within QC criteria? QC limits are not applicable to sample results greater than 4 times spike amount. (see Table 3 and 3A) | Yes. |
| Is LCS/LCSD within QC criteria (see Table 4 and 4A)? If out, and the recovery high with no positive values, then no data qualification is required. | Yes. |
| Is initial calibration for target compounds within QC limits? Is initial calibration verification within QC limits? | Yes. |
| Is continuing calibration for target compounds within QC limits? | Yes. |
| Were any samples reanalyzed or diluted (see Table 6)? For any sample reanalysis or dilutions, is only one reportable result flagged? | Sample 0919MW27GW was diluted by the laboratory prior to analysis for sulfate. The diluted sample result was greater than the MDL; therefore, there is no impact to data usability. |
| Do field duplicate results show good precision for all compounds (see Table 7)? | Yes. |

| Nitrate/Nitrite by EPA Method 353.2 | |
|---|---|
| **Description** | **Notes and Qualifiers** |
| Any compounds present in method, continuing calibration, or field blanks (see Table 2)? | No. |
| For samples, if results are < 5 times the blank, then "U" flag data (see Table 2A and 2B). | No qualification required. |
| Is laboratory QC frequency one blank and LCS with each batch and one set of MS/MSD per 20 samples? | Yes. |
| Is MS/MSD within QC criteria (see Table 3 and 3A)? If out and LCS is compliant, then "J" flag positive data in original sample due to matrix. | The nitrate/nitrite recovery in sample 0919MW10GW and 0919RD05SW were low in the MS and MSD. The results in the parent samples were non-detect and UJ qualified as estimated non-detect. |
| Is LCS/LCSD within QC criteria (see Table 4 and 4A)? If out, and the recovery is high with no positive values, then no data qualification is required. | Yes. |
| Is initial calibration for target compounds within QC limits? Is initial calibration verification within QC limits? | Yes. |
| Is continuing calibration verification for target compounds within QC limits? | Yes. |
| Were any samples reanalyzed or diluted (see Table 6)? For any sample reanalysis or dilutions, is only one reportable result flagged? | No. |
| Do field duplicate results show good precision for all compounds (see Table 7)? | Yes. |

| TDS/TSS by Standard Method 2540C/2540D | |
|---|---|
| **Description** | **Notes and Qualifiers** |
| Are any compounds present in method blanks as noted on Table 2? | Yes.<br>TSS was detected in method blank 580-311545/1. |
| For samples, if results are <5 times the blank then "U" flag data (see Table 2A and 2B). | The associated six sample results for TSS were less than 5X the blank concentration; therefore, the sample results were U qualified as non-detect. The MDL was elevated to the sample result. All other associated sample results were either 5X the blank concentration or not detected; therefore, no qualification was made. |
| Is laboratory QC frequency one blank and LCS with each batch of 20 or fewer samples and one laboratory duplicate per 10 samples? | Yes. |
| Is LCS within QC criteria (see Table 4)? If out, and the recovery high with no positive values, then no data qualification is required. | Yes. |
| Were any samples reanalyzed or diluted (see Table 6)? For any sample reanalysis or dilutions, is only one reportable result flagged? | Samples 0919MW01GW and 0919MW08GW were re-analyzed outside of the hold time due to detection in method blank. There was insufficient volume remaining in other associated samples for re-analysis. Samples were not qualified due to method blank detection; therefore, reanalyzed samples were R qualified as unusable and original sample results were reported. |
| Are laboratory duplicates within QC limits? | The laboratory duplicate for TSS of sample 0919MW10GW exceeded the RPD limit of 20%. |

| TDS/TSS by Standard Method 2540C/2540D | |
|---|---|
| **Description** | **Notes and Qualifiers** |
| | The parent sample result was qualified non-detect due to associated laboratory blank detections. No qualification was made. |
| Do field duplicate results show good precision for all compounds (see Table 7)? | No.<br>TDS exhibited poor precision in sample pair for 0919RD15SW and 0919RD99SW. The sample pair results were J qualified as estimated. |

| Total Organic Carbon by Method SW-846 9060A | |
|---|---|
| **Description** | **Notes and Qualifiers** |
| Are any compounds present in method and field blanks as noted on Table 2? | No. |
| For samples, if results are < 5 times the blank then "U" flag data (see Table 2A and 2B). | No qualification required. |
| Is laboratory QC frequency one blank and LCS with each batch of 20 or fewer samples and one set of MS and one laboratory duplicate per 20 samples? | Yes. |
| Are MS/MSD within QC criteria (see Table 3 and 3A)? QC limits are not applicable to sample results greater than 4 times spike amount. | Yes. |
| Are laboratory duplicates within QC limits? | Yes. |
| Is LCS/LCSD within QC criteria (see Table 4 and 4A)? If out, and the recovery high with no positive values, then no data qualification is required. | Yes. |
| Is initial calibration for target compounds within QC limits? Is initial calibration verification within QC limits? | Yes. |
| Is continuing calibration verification for target compounds within QC limits? | Yes. |
| Were any samples reanalyzed or diluted (see Table 6)? For any sample reanalysis or dilutions, is only one reportable result flagged? | No. |
| Do field duplicate results show good precision for all compounds (see Table 7)? | Yes. |

| Summary of Potential Impacts on Data Usability |
|---|
| **Concerns** |
| 6010C (Total)<br>• Calcium was recovered below the acceptance limit in the MSD for 0919RD10SW. The parent sample result was qualified J- as estimated, low biased.<br>• The serial dilution in sample 0919MW99GW for calcium and magnesium was recovered outside the laboratory acceptance limit. The parent sample results were J qualified as estimated.<br>• Potassium was detected below the RL in ICB 580-313979/8. The concentration in the associated samples that were less than 5X the blank concentration were U qualified as non-detect. The MDL was elevated to the sample result.<br>• Iron was detected below the RL in CCB 580-313979/53. The concentration in the associated samples that were less than 5X the blank concentration were U qualified as non-detect. The MDL was elevated to the sample result.<br>6010C (Dissolved) |

- Sodium was detected in method blank and one sample result was U qualified as non-detect. The PQL was elevated to the sample result.
- Iron, potassium, and sodium were detected below the RL in ICB 580-313701/8. The concentration in the associated samples that were less than 5X the blank concentration were U qualified as non-detect. The MDL was elevated to the sample result.

6020A (Total)

- Barium was recovered below the acceptance limit in the MS for 0919MW10GW. The parent sample result was qualified J as estimated.
- Barium exhibited poor precision in sample pair for 0919MW10GW and 0919MW99GW. The sample pair results were J qualified as estimated.

6020A (Dissolved)

- Barium was recovered below the acceptance limit in the MS for 0919RD10SW and 0919RD15SW. The parent sample result was qualified J as estimated or J- as estimated low biased.
- The RPD for nickel in laboratory replicate for sample 0919RD15SW was recovered outside of the acceptance limit. The parent sample result was J qualified as estimated.

8270D

- Butyl benzyl phthalate was detected in method blank and two sample results were U qualified as non-detect. The MDL was elevated to the sample result.
- Bis(2-ethylhexyl) phthalate, 4-nitrophenol, and butyl benzyl phthalate were recovered high in the LCS and/or LCSD in batch 311614. The sample results were J or UJ qualified as estimated.
- N-nitrosodimethylamine, benzyl alcohol, 2-nitrophenol, 2,6-dinitrotoluene, 4-nitrophenol, 4,6-dinitro-2-metylphenol, butyl benzyl phthalate, chrysene, indeno[1,2,3-cd]pyrene, bis(2-ethylhexyl) phthalate and di-n-octyl phthalate were recovered greater than 20% D in CCVIS 580-312721/3. The analytes in associated samples were J qualified as estimated or UJ qualified as estimated non-detect.
- N-nitrosodi-n-propylamine exhibited a minimum response factor outside of control limits in CCVIS 580-312721/3. The analyte was UJ qualified as estimated.

E353.2

- The nitrate/nitrite recovery in sample 0919MW10GW and 0919RD05SW were low in the MS and MSD. The results in the parent samples were non-detect and UJ qualified as estimated non-detect.

SM 2540D

- TSS was detected in method blank and six sample results were U qualified as non-detect. The MDL was elevated to the sample result. There was insufficient volume remaining in associated samples for re-analysis.

SM 2540C

- TDS exhibited poor precision in sample pair for 0919RD15SW and 0919RD99SW. The sample pair results were J qualified as estimated.

**Table 2 – List of Positive Results for Blank Samples**

| Method | Sample ID | Sample Type | Analyte | Result | Qualifier | Units | MDL | PQL |
|---|---|---|---|---|---|---|---|---|
| 8270D | 580-311614/1-A | MB | Butyl benzyl phthalate | 0.505 | J | ug/L | 0.37 | 10 |
| 6010C | 580-313585/24-A | MB | Sodium | 0.424 | J | mg/L | 0.33 | 2.0 |
| SM 2540D | 580-311545/1 | MB | Total Suspended Solids | 3.6 | | mg/L | 2.0 | 2.0 |
| 6010C (dissolved) | 580-313701/8 | ICB | Aluminum | 0.161 | J | mg/L | 0.11 | 1.5 |
| 6010C (dissolved) | 580-313701/8 | ICB | Calcium | 0.176 | J | mg/L | 0.1554 | 1.1 |
| 6010C (dissolved) | 580-313701/8 | ICB | Iron | 0.142 | J | mg/L | 0.14 | 0.5 |
| 6010C (dissolved) | 580-313701/8 | ICB | Magnesium | 0.207 | J | mg/L | 0.133 | 1.1 |
| 6010C (dissolved) | 580-313701/8 | ICB | Potassium | 0.799 | J | mg/L | 0.4111 | 3.3 |
| 6010C (dissolved) | 580-313701/8 | ICB | Sodium | 1.10 | J | mg/L | 0.3302 | 2 |
| 6010C (dissolved) | 580-313701/112 | CCB | Sodium | 0.378 | J | mg/L | 0.3302 | 2 |
| 6010C (dissolved) | 580-313701/124 | CCB | Sodium | 0.635 | J | mg/L | 0.3302 | 2 |
| 6010C (dissolved) | 580-313701/135 | CCB | Sodium | 0.819 | J | mg/L | 0.3302 | 2 |
| 6010C | 580-313701/135 | CCB | Iron | 0.152 | J | mg/L | 0.14 | 0.5 |
| 6010C | 580-313979/8 | ICB | Potassium | 0.482 | J | mg/L | 0.4111 | 3.3 |
| 6010C | 580-313979/53 | CCB | Iron | 0.147 | J | mg/L | 0.14 | 0.5 |

**Table 2A – List of Samples Qualified for Method Blank Contamination**

| Method | Blank | Matrix | Analyte | Blank Result | Sample Result | Lab Qualifier | PQL | Affected Samples | Sample Flag |
|---|---|---|---|---|---|---|---|---|---|
| 8270D | 580-311614/1-A | MB | Butyl benzyl phthalate | 0.505 | 0.37 | J B * | 10 | 0919MW100GW | U Flag |
| 8270D | 580-311614/1-A | MB | Butyl benzyl phthalate | 0.505 | 1.8 | J B * | 9.5 | 0919MW22GW | U Flag |
| SM 2540D | 580-311545/1 | MB | Total Suspended Solids | 3.6 | 45 | B | 7.2 | 0919MW01GW | None |
| SM 2540D | 580-311545/1 | MB | Total Suspended Solids | 3.6 | 150 | B | 5.9 | 0919MW08GW | None |
| SM 2540D | 580-311545/1 | MB | Total Suspended Solids | 3.6 | 3.8 | B | 2 | 0919MW09GW | U Flag |
| SM 2540D | 580-311545/1 | MB | Total Suspended Solids | 3.6 | 8.2 | B | 2 | 0919MW10GW | U Flag |
| SM 2540D | 580-311545/1 | MB | Total Suspended Solids | 3.6 | 4.4 | B | 2 | 0919MW22GW | U Flag |
| SM 2540D | 580-311545/1 | MB | Total Suspended Solids | 3.6 | 6.4 | B | 2 | 0919MW32GW | U Flag |
| SM 2540D | 580-311545/1 | MB | Total Suspended Solids | 3.6 | 5.4 | B | 2 | 0919MW43GW | U Flag |
| SM 2540D | 580-311545/1 | MB | Total Suspended Solids | 3.6 | 2.2 | B | 2 | 0919MW99GW | U Flag |
| 6010C (dissolved) | 580-313701/8 | ICB | Calcium | 0.176 | 39 | | 1.1 | 0919RD05SW | None |
| 6010C (dissolved) | 580-313701/8 | ICB | Calcium | 0.176 | 22 | | 1.1 | 0919RD06SW | None |
| 6010C (dissolved) | 580-313701/8 | ICB | Calcium | 0.176 | 21 | | 1.1 | 0919RD08SW | None |

| Data Usability Summary Report | Project: Red Devil Mine: Baseline Monitoring |
|---|---|
| Date Completed: December 10, 2019 | Completed by: Eridania Marte |

| Method | Blank | Matrix | Analyte | Blank Result | Sample Result | Lab Qualifier | PQL | Affected Samples | Sample Flag |
|---|---|---|---|---|---|---|---|---|---|
| 6010C (dissolved) | 580-313701/8 | ICB | Calcium | 0.176 | 21 | | 1.1 | 0919RD10SW | None |
| 6010C (dissolved) | 580-313701/8 | ICB | Calcium | 0.176 | 21 | | 1.1 | 0919RD14SW | None |
| 6010C (dissolved) | 580-313701/8 | ICB | Calcium | 0.176 | 20 | | 1.1 | 0919RD15SW | None |
| 6010C (dissolved) | 580-313701/8 | ICB | Calcium | 0.176 | 22 | | 1.1 | 0919RD16SW | None |
| 6010C (dissolved) | 580-313701/8 | ICB | Calcium | 0.176 | 22 | | 1.1 | 0919RD99SW | None |
| 6010C (dissolved) | 580-313701/8 | ICB | Iron | 0.142 | 2.7 | | 0.5 | 0919RD05SW | None |
| 6010C (dissolved) | 580-313701/8 | ICB | Iron | 0.142 | 0.33 | J | 0.5 | 0919RD08SW | U Flag |
| 6010C (dissolved) | 580-313701/8 | ICB | Iron | 0.142 | 0.24 | J | 0.5 | 0919RD14SW | U Flag |
| 6010C (dissolved) | 580-313701/8 | ICB | Iron | 0.142 | 0.19 | J | 0.5 | 0919RD99SW | U Flag |
| 6010C (dissolved) | 580-313701/8 | ICB | Magnesium | 0.207 | 39 | | 1.1 | 0919RD05SW | None |
| 6010C (dissolved) | 580-313701/8 | ICB | Magnesium | 0.207 | 13 | | 1.1 | 0919RD06SW | None |
| 6010C (dissolved) | 580-313701/8 | ICB | Magnesium | 0.207 | 13 | | 1.1 | 0919RD08SW | None |
| 6010C (dissolved) | 580-313701/8 | ICB | Magnesium | 0.207 | 11 | | 1.1 | 0919RD10SW | None |
| 6010C (dissolved) | 580-313701/8 | ICB | Magnesium | 0.207 | 11 | | 1.1 | 0919RD14SW | None |
| 6010C (dissolved) | 580-313701/8 | ICB | Magnesium | 0.207 | 11 | | 1.1 | 0919RD15SW | None |
| 6010C (dissolved) | 580-313701/8 | ICB | Magnesium | 0.207 | 12 | | 1.1 | 0919RD16SW | None |
| 6010C (dissolved) | 580-313701/8 | ICB | Magnesium | 0.207 | 11 | | 1.1 | 0919RD99SW | None |
| 6010C (dissolved) | 580-313701/8 | ICB | Potassium | 0.799 | 0.76 | J | 3.3 | 0919RD05SW | U Flag |
| 6010C (dissolved) | 580-313585/24-A | MB | Sodium | 0.424 | 9.2 | B | 2 | 0919RD05SW | None |
| 6010C (dissolved) | 580-313585/24-A | MB | Sodium | 0.424 | 2 | B | 2 | 0919RD10SW | U Flag |
| 6010C (dissolved) | 580-313701/8 | ICB | Sodium | 1.10 | 3.4 | B | 2 | 0919RD06SW | U Flag |
| 6010C (dissolved) | 580-313701/8 | ICB | Sodium | 1.10 | 2.9 | B | 2 | 0919RD08SW | U Flag |
| 6010C (dissolved) | 580-313701/8 | ICB | Sodium | 1.10 | 2.9 | B | 2 | 0919RD14SW | U Flag |
| 6010C (dissolved) | 580-313701/8 | ICB | Sodium | 1.10 | 2.5 | B | 2 | 0919RD15SW | U Flag |
| 6010C (dissolved) | 580-313701/8 | ICB | Sodium | 1.10 | 2.8 | B | 2 | 0919RD16SW | U Flag |
| 6010C (dissolved) | 580-313701/8 | ICB | Sodium | 1.10 | 2.9 | B | 2 | 0919RD99SW | U Flag |
| 6010C | 580-313979/53 | CCB | Iron | 0.147 | 0.32 | J | 0.14 | 0919RD08SW | U Flag |
| 6010C | 580-313979/53 | CCB | Iron | 0.147 | 0.25 | J | 0.14 | 0919RD14SW | U Flag |
| 6010C | 580-313979/53 | CCB | Iron | 0.147 | 0.26 | J | 0.14 | 0919RD15SW | U Flag |
| 6010C | 580-313979/53 | CCB | Iron | 0.147 | 0.24 | J | 0.14 | 0919RD16SW | U Flag |
| 6010C | 580-313979/53 | CCB | Iron | 0.147 | 0.27 | J | 0.14 | 0919RD99SW | U Flag |
| 6010C | 580-313979/8 | ICB | Potassium | 0.482 | 0.6 | J | 0.41 | 0919MW10GW | U Flag |

| Method | Blank | Matrix | Analyte | Blank Result | Sample Result | Lab Qualifier | PQL | Affected Samples | Sample Flag |
|---|---|---|---|---|---|---|---|---|---|
| 6010C | 580-313979/8 | ICB | Potassium | 0.482 | 0.81 | J | 0.41 | 0919MW27GW | U Flag |
| 6010C | 580-313979/8 | ICB | Potassium | 0.482 | 0.43 | J | 0.41 | 0919MW28GW | U Flag |
| 6010C | 580-313979/8 | ICB | Potassium | 0.482 | 0.69 | J | 0.41 | 0919MW99GW | U Flag |
| 6010C | 580-313979/8 | ICB | Potassium | 0.482 | 0.75 | J | 0.41 | 0919RD05SW | U Flag |

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**Table 2B – List of Samples Qualified for Field Blank Contamination**

N/A

**Table 3 – List of MS/MSD Recoveries outside Control Limits**

| Method | Sample ID | Sample Type | Analyte | Orig. Result | Spike Amount | MS | MSD | Low Limit | High Limit | Sample Qualifier |
|---|---|---|---|---|---|---|---|---|---|---|
| 6010C | 0919RD10SW | MSD | Calcium | 21 | 20 | 87 | 72 | 75 | 125 | J- Flag |
| 6020A | 0919MW10GW | MS | Barium | 0.089 | 1.0 | 75 | 85 | 80 | 120 | J- Flag |
| 6020A | 0919RD10SW | MS | Barium | 0.029 | 1.0 | 79 | 86 | 80 | 120 | J- Flag |
| 6020A | 0919RD15SW | MS | Barium | 0.030 | 1.0 | 78 | 83 | 80 | 120 | J Flag |
| 9060A | 0919MW10GW | MS/MSD | Nitrate Nitrite as N | ND | 0.500 | 69 | 69 | 90 | 110 | UJ Flag |
| 9060A | 0919RD05SW | MS/MSD | Nitrate Nitrite as N | ND | 0.500 | 58 | 58 | 90 | 110 | UJ Flag |

**Table 3A – List of RPDs outside Control Limits**

| Method | Sample ID | Sample Type | Analyte | RPD | RPD Limit | Sample Qualifier |
|---|---|---|---|---|---|---|
| 6010C | 0919MW99GW | LR | Potassium | 21 | 20 | None |
| 6020A | 0919RD15SW | LR | Nickel | 24 | 20 | J Flag |
| SM 2540D | 0919MW10GW | LR | Total Suspended Solids | 83 | 20 | None |

**Table 4 – List of LCS Recoveries outside Control Limits**

| Method | Sample ID | Analyte | Rec. | Low Limit | High Limit | Sample Qualifier |
|---|---|---|---|---|---|---|
| 8270D | LCS 580-311614/2-A | 4-Nitrophenol | 206 | 33 | 150 | UJ Flag |
| 8270D | LCSD 580-311614/3-A | 4-Nitrophenol | 196 | 33 | 150 | UJ Flag |
| 8270D | LCS 580-311614/2-A | Bis(2-ethylhexyl) phthalate | 256 | 20 | 150 | J/UJ Flag |
| 8270D | LCSD 580-311614/3-A | Bis(2-ethylhexyl) phthalate | 320 | 20 | 150 | J/UJ Flag |
| 8270D | LCS 580-311614/2-A | Butyl benzyl phthalate | 300 | 20 | 150 | UJ Flag |

**Table 4A – List of RPDs outside Control Limits**

None.

**Table 5 – List of Serial Dilution Recoveries outside Control Limits**

| Method | Sample ID | Analyte | Orig. Result | Serial Dilution Result | MDL | %D | Sample Qualifier |
|---|---|---|---|---|---|---|---|
| 6010C | 0919MW99GW | Calcium | 22 | 4.7 | 0.16 | 79 | J Flag |
| 6010C | 0919MW99GW | Magnesium | 32 | 6.62 | 0.13 | 80 | J Flag |
| 6010C | 0919MW99GW | Sodium | 3.4 | 0.725 | 0.33 | 79 | None < 50x |

**Table 6 – Samples that were Re-analyzed**

| Sample ID | Lab ID | Method | Sample Type | Action |
|---|---|---|---|---|
| 0919MW27GW | 580-89193-7 | 300.0 | WG | 10X: Per the laboratory, the sample required dilution prior to analysis. Only the result for sulfate was reported from the dilution and was detected greater than the MDL. No impact to data usability. |
| 0919MW01GW | 580-89193-1 | 6020A | WG | 5X: Per the laboratory, the sample required dilution prior to analysis. No impact to data usability. |
| 0919MW08GW | 580-89193-2 | 6020A | WG | 5X: Per the laboratory, the sample required dilution prior to analysis. No impact to data usability. |
| 0919MW09GW | 580-89193-3 | 6020A | WG | 5X: Per the laboratory, the sample required dilution prior to analysis. No impact to data usability. |
| 0919MW10GW | 580-89193-5 | 6020A | WG | 5X: Per the laboratory, the sample required dilution prior to analysis. No impact to data usability. |
| 0919MW22GW | 580-89193-6 | 6020A | WG | 5X: Per the laboratory, the sample required dilution prior to analysis. No impact to data usability. |
| 0919MW99GW | 580-89193-13 | 6020A | WG | 5X: Per the laboratory, the sample required dilution prior to analysis. No impact to data usability. |
| 0919RD05SW | 580-89193-14 | 6020A | SW | 5X: Per the laboratory, the dissolved sample required dilution prior to analysis. No impact to data usability. |
| 0919RD06SW | 580-89193-15 | 6020A | SW | 5X: Per the laboratory, the dissolved sample required dilution prior to analysis. No impact to data usability. |
| 0919RD08SW | 580-89193-16 | 6020A | SW | 5X: Per the laboratory, the dissolved sample required dilution prior to analysis. No impact to data usability. |
| 0919RD10SW | 580-89193-17 | 6020A | SW | 5X: Per the laboratory, the sample required dilution prior to analysis. No impact to data usability. |
| 0919RD10SW | 580-89193-17 | 6020A | SW | 5X: Per the laboratory, the dissolved sample required dilution prior to analysis. No impact to data usability. |
| 0919RD14SW | 580-89193-18 | 6020A | SW | 5X: Per the laboratory, the dissolved sample required dilution prior to analysis. No impact to data usability. |
| 0919RD15SW | 580-89193-19 | 6020A | SW | 5X: Per the laboratory, the dissolved sample required dilution prior to analysis. No impact to data usability. |
| 0919RD16SW | 580-89193-20 | 6020A | SW | 5X: Per the laboratory, the dissolved sample required dilution prior to analysis. No impact to data usability. |
| 0919RD99SW | 580-89193-21 | 6020A | SW | 5X: Per the laboratory, the dissolved sample required dilution prior to analysis. No impact to data usability. |

| Sample ID | Lab ID | Method | Sample Type | Action |
|---|---|---|---|---|
| 0919MW01GW | 580-89193-1 | SM 2540D | WG | Re-analyzed due to detection in method blank. |
| 0919MW08GW | 580-89193-2 | SM 2540D | WG | Re-analyzed due to detection in method blank. |

**Table 7 – Summary of Field Duplicate Results**

| Method | Analyte | Unit | Matrix | PQL | 0919MW10GW | 0919MW99GW | RPD | RPD Rating | Sample Qual |
|---|---|---|---|---|---|---|---|---|---|
| SM 2320B | Alkalinity | mg/L | WG | 5 | 180 | 160 | 11.8% | Good | None |
| SW846 6010C | Aluminum | mg/L | WG | 1.5 | 0.17 | 0.26 | 41.9% | Poor | <5X PQL |
| SW846 6020A | Antimony | mg/L | WG | 0.002 | 0.0009 | 0.0006 | 41.1% | Poor | <5X PQL |
| SW846 6020A | Arsenic | mg/L | WG | 0.005 | 0.1 | 0.11 | 9.5% | Good | None |
| SW846 6020A | Barium | mg/L | WG | 0.006 | 0.089 | 0.045 | 65.7% | Poor | J Flag |
| SM 2320B | Bicarbonate Alkalinity as CaCO3 | mg/L | WG | 5 | 180 | 160 | 11.8% | Good | None |
| SW846 6010C | Calcium | mg/L | WG | 1.1 | 23 | 22 | 4.4% | Good | None |
| MCAWW 300.0 | Chloride | mg/L | WG | 0.9 | 0.99 | 0.8 | 21.2% | Good | None |
| MCAWW 300.0 | Fluoride | mg/L | WG | 0.2 | 0.15 | 0.15 | 0.0% | Good | None |
| SW846 6010C | Iron | mg/L | WG | 0.5 | 1.4 | 1.1 | 24.0% | Good | None |
| SW846 6010C | Magnesium | mg/L | WG | 1.1 | 33 | 32 | 3.1% | Good | None |
| SW846 6020A | Manganese | mg/L | WG | 0 | 0.14 | 0.15 | 6.9% | Good | None |
| SW846 6010C | Sodium | mg/L | WG | 2 | 3.4 | 3.4 | 0.0% | Good | None |
| MCAWW 300.0 | Sulfate | mg/L | WG | 1.2 | 9.4 | 9.6 | 2.1% | Good | None |

| Method | Analyte | Unit | Matrix | PQL | 0919MW22GW | 0919MW100GW | RPD | RPD Rating | Sample Qual |
|---|---|---|---|---|---|---|---|---|---|
| SW846 8270D | 3 & 4 Methylphenol | mg/L | WG | 0.8 | 2.9 | 0.98 | 99.0% | Poor | <5x PQL |
| SW846 8270D | Bis(2-ethylhexyl) phthalate | mg/L | WG | 14 | 9.2 | ND | NC | -- | None |
| SW846 8270D | Di-n-octyl phthalate | mg/L | WG | 1 | 0.52 | ND | NC | -- | None |
| SW846 8270D | Benzoic acid | mg/L | WG | 3.8 | ND | 0.92 | NC | -- | None |

| Method | Analyte | Unit | Matrix | PQL | 0919RD15SW | 0919RD99SW | RPD | RPD Rating | Sample Qual |
|---|---|---|---|---|---|---|---|---|---|
| SM 2320B | Alkalinity | mg/L | WG | 5 | 110 | 100 | 9.5% | Good | None |
| 6020A | Antimony | mg/L | WG | 0.0004 | 0.018 | 0.019 | 5.4% | Good | None |

| Method | Analyte | Unit | Matrix | PQL | 0919RD15SW | 0919RD99SW | RPD | RPD Rating | Sample Qual |
|---|---|---|---|---|---|---|---|---|---|
| 6020A (dissolved) | Antimony | mg/L | WG | 0.002 | 0.081 | 0.088 | 8.3% | Good | None |
| SW846 6020A | Arsenic | mg/L | WG | 0.001 | 0.0046 | 0.0048 | 4.3% | Good | None |
| 6020A (dissolved) | Arsenic | mg/L | WG | 0.005 | 0.021 | 0.022 | 4.7% | Good | None |
| 6020A | Barium | mg/L | WG | 0.001 | 0.0062 | 0.0064 | 3.2% | Good | None |
| 6020A (dissolved) | Barium | mg/L | WG | 0.006 | 0.03 | 0.031 | 3.3% | Good | None |
| SM 2320B | Bicarbonate Alkalinity as CaCO3 | mg/L | WG | 5 | 110 | 100 | 9.5% | Good | None |
| 6010C (dissolved) | Calcium | mg/L | WG | 1.1 | 20 | 22 | 9.5% | Good | None |
| 6010C | Calcium | mg/L | WG | 1.1 | 23 | 24 | 4.3% | Good | None |
| MCAWW 300.0 | Chloride | mg/L | WG | 0.9 | 0.63 | 0.62 | 1.6% | Good | None |
| 6020A (Dissolved) | Chromium | mg/L | WG | 0.002 | 0.0012 | ND | NC | -- | None |
| MCAWW 300.0 | Fluoride | mg/L | WG | 0.2 | 0.081 | 0.071 | 13.2% | Good | None |
| 6010C (dissolved) | Magnesium | mg/L | WG | 1.1 | 11 | 11 | 0.0% | Good | None |
| 6010C | Magnesium | mg/L | WG | 1.1 | 13 | 13 | 0.0% | Good | None |
| 6020A | Manganese | mg/L | WG | 0.002 | 0.0055 | 0.0058 | 5.3% | Good | None |
| 6020A (dissolved) | Manganese | mg/L | WG | 0.01 | 0.026 | 0.026 | 0.0% | Good | None |
| 6020A | Nickel | mg/L | WG | 0.003 | 0.00012 | 0.00015 | 22.2% | Good | None |
| 6020A (dissolved) | Nickel | mg/L | WG | 0.015 | 0.00099 | 0.00069 | 35.7% | Good | None |
| 6010C | Sodium | mg/L | WG | 2 | 1.9 | 2 | 5.1% | Good | None |
| MCAWW 300.0 | Sulfate | mg/L | WG | 1.2 | 8 | 7.9 | 1.3% | Good | None |
| SM 2540C | Total Dissolved Solids | mg/L | WG | 10 | 110 | 62 | 55.8% | Poor | J Flag |
| SW846 9060 | Total Organic Carbon | mg/L | WG | 1 | 3 | 3.1 | 3.3% | Good | None |

**Acronym List and Table Key**:

CCB = continuing calibration blank
CCV = continuing calibration verification
CCVL = reporting limit continuing calibration verification
COC = chain of custody
CRDL = contract required detection limits
DUSR = data usability summary report
FD = field duplicate
ICB = initial calibration blank

**Acronym List and Table Key**:

| | | |
|---|---|---|
| ICS | = | interference check standard |
| ICV | = | initial calibration verification |
| ICVL | = | reporting limit initial calibration verification |
| LCS | = | laboratory control sample |
| LCSD | = | laboratory control sample duplicate |
| LR | = | laboratory replicate |
| MB | = | method blank |
| MS | = | matrix spike |
| MSD | = | matrix spike duplicate |
| N | = | normal sample |
| ND | = | not detected |
| PDS | = | post-digestion spike |
| PQL | = | practical quantitation limit |
| QA | = | quality assurance |
| QAPP | = | quality assurance project plan |
| QC | = | quality control |
| RB | = | rinsate blank |
| RL | = | reporting limit |
| RPD | = | relative percent difference |
| RSD | = | relative standard deviation |
| SDG | = | sample delivery group |
| TDS | = | total dissolved solids |
| TSS | = | total suspended solids |

| Data Usability Summary Report | Project: Red Devil Mine: Baseline Monitoring |
|---|---|
| Date Completed: December 19, 2019 | Completed by: Eridania Marte |

The analytical data provided by the laboratory were reviewed for precision, accuracy, and completeness based on applicable sections of the following guidelines.

- *Final Quality Assurance Project Plan, Baseline Monitoring, Red Devil mine, Alaska.* May 2019.
- *National Functional Guidelines for Inorganic Superfund Methods Data Review*. EPA-540-R-2017-001, January 2017.

Specific criteria for QC limits were obtained from the site specific QAPP. Compliance with the project QA program is indicated in the checklist and tables below. Any major or minor concerns affecting data usability are listed below. The checklist and tables also indicate whether data qualification is required and/or the type of qualifier assigned.

Reference:

| Laboratory | Sample Delivery Group | Project Code |
|---|---|---|
| Test America, Seattle | 580-89377-1<br>19J0211 | 1001095.0026.03 |

| Work Order | Matrix | Sample ID | Lab ID | Sample Date | Lab QC | QC | ID Corre-ctions |
|---|---|---|---|---|---|---|---|
| 580-89377-1 | WG | 0919MW06GW | 580-89377-1 | 9/14/2019 | MS/MSD/ LR | | |
| 580-89377-1 | WG | 0919MW101GW | 580-89377-2 | 9/14/2019 | LR | | |
| 580-89377-1 | WG | 0919MW102GW | 580-89377-3 | 9/17/2019 | | | |
| 580-89377-1 | WG | 0919MW16GW | 580-89377-4 | 9/14/2019 | | | |
| 580-89377-1 | WG | 0919MW17GW | 580-89377-5 | 9/14/2019 | | | |
| 580-89377-1 | WG | 0919MW19AGW | 580-89377-6 | 9/13/2019 | | | |
| 580-89377-1 | WG | 0919MW19BGW | 580-89377-7 | 9/18/2019 | | MS/MSD | |
| 580-89377-1 | WG | 0919MW26GW | 580-89377-8 | 9/14/2019 | | | |
| 580-89377-1 | WG | 0919MW29GW | 580-89377-9 | 9/14/2019 | | | |
| 580-89377-1 | WG | 0919MW40GW | 580-89377-10 | 9/17/2019 | | | |
| 580-89377-1 | WG | 0919MW44GW | 580-89377-11 | 9/17/2019 | | | |
| 580-89377-1 | WG | 0919MW45GW | 580-89377-12 | 9/15/2019 | LR | MS/MSD | |
| 580-89377-1 | WG | 0919MW46GW | 580-89377-13 | 9/15/2019 | | | |
| 580-89377-1 | WG | 0919MW47GW | 580-89377-14 | 9/15/2019 | MS/MSD | | |
| 580-89377-1 | WG | 0919MW48GW | 580-89377-15 | 9/17/2019 | | | |
| 580-89377-1 | WG | 0919MW49GW | 580-89377-16 | 9/14/2019 | | | |
| 580-89377-1 | WG | 0919MW50GW | 580-89377-17 | 9/16/2019 | LR | | |
| 580-89377-1 | WG | 0919MW51GW | 580-89377-18 | 9/16/2019 | | | |
| 580-89377-1 | WG | 0919MW52GW | 580-89377-19 | 9/15/2019 | | | |
| 580-89377-1 | WG | 0919MW53GW | 580-89377-20 | 9/16/2019 | | | |
| 580-89377-1 | WG | 0919MW54GW | 580-89377-21 | 9/16/2019 | | | |
| 580-89377-1 | WG | 0919MW55GW | 580-89377-22 | 9/15/2019 | MS/MSD/ LR | | |
| 580-89377-1 | WG | 0919MW56GW | 580-89377-23 | 9/15/2019 | | | |
| 580-89377-1 | WG | 0919MW57GW | 580-89377-24 | 9/16/2019 | | | |
| 580-89377-1 | WG | 0919MW58GW | 580-89377-25 | 9/16/2019 | | | |
| 580-89377-1 | WG | 0919MW59GW | 580-89377-26 | 9/17/2019 | | | |
| 580-89377-1 | WQ | 0919TB03 | 580-89377-27 | 9/18/2019 | | | |

| Work Order | Matrix | Sample ID | Lab ID | Sample Date | Lab QC | QC | ID Corre-ctions |
|---|---|---|---|---|---|---|---|
| 19J0211 | WG | 0919MW06GW | 19J0211-01 | 09/14/2019 | | | |
| 19J0211 | WG | 0919MW101GW | 19J0211-02 | 09/14/2019 | | | |
| 19J0211 | WG | 0919MW16GW | 19J0211-04 | 09/14/2019 | | | |
| 19J0211 | WG | 0919MW17GW | 19J0211-05 | 09/14/2019 | | | |
| 19J0211 | WG | 0919MW19AGW | 19J0211-06 | 09/13/2019 | | | |
| 19J0211 | WG | 0919MW26GW | 19J0211-07 | 09/14/2019 | | | |
| 19J0211 | WG | 0919MW29GW | 19J0211-08 | 09/14/2019 | | | |
| 19J0211 | WG | 0919MW45GW | 19J0211-11 | 09/15/2019 | | MS/LR | |
| 19J0211 | WG | 0919MW46GW | 19J0211-12 | 09/15/2019 | | | |
| 19J0211 | WG | 0919MW47GW | 19J0211-13 | 09/15/2019 | | | |
| 19J0211 | WG | 0919MW49GW | 19J0211-15 | 09/14/2019 | | | |
| 19J0211 | WG | 0919MW52GW | 19J0211-18 | 09/15/2019 | | | |
| 19J0211 | WG | 0919MW55GW | 19J0211-21 | 09/15/2019 | | | |
| 19J0211 | WG | 0919MW56GW | 19J0211-22 | 09/15/2019 | | | |
| 19J0211 | WG | 0919MW102GW | 19J0211-03RE1 | 09/17/2019 | MS/LR | | |
| 19J0211 | WG | 0919MW40GW | 19J0211-09 | 09/17/2019 | | | |
| 19J0211 | WG | 0919MW44GW | 19J0211-10 | 09/17/2019 | | | |
| 19J0211 | WG | 0919MW48GW | 19J0211-14RE1 | 09/17/2019 | | | |
| 19J0211 | WG | 0919MW50GW | 19J0211-16 | 09/16/2019 | | | |
| 19J0211 | WG | 0919MW51GW | 19J0211-17 | 09/16/2019 | | | |
| 19J0211 | WG | 0919MW53GW | 19J0211-19 | 09/16/2019 | | | |
| 19J0211 | WG | 0919MW54GW | 19J0211-20 | 09/16/2019 | | | |
| 19J0211 | WG | 0919MW57GW | 19J0211-23 | 09/16/2019 | | | |
| 19J0211 | WG | 0919MW58GW | 19J0211-24 | 09/16/2019 | | | |
| 19J0211 | WG | 0919MW59GW | 19J0211-25 | 09/17/2019 | | | |

| SDG | Matrix | Test Method | Number of Samples | Sample Type |
|---|---|---|---|---|
| 580-89377-1 | WG | 6010C – Metals ICP (Al, Ca, Fe, Mg, K, Na) | 23 | N |
| 580-89377-1 | WG | 6010C – Metals ICP (Al, Ca, Fe, Mg, K, Na) | 2 | FD |
| 580-89377-1 | WG | 6010C – Metals ICP (Al, Ca, Fe, Mg, K, Na) | 2 | MS/MSD |
| 580-89377-1 | WG | 6010C – Metals ICP (Al, Ca, Fe, Mg, K, Na) | 2 | LR |
| 580-89377-1 | WG | 6020A – Metals ICP/MS | 23 | N |
| 580-89377-1 | WG | 6020A – Metals ICP/MS | 2 | FD |
| 580-89377-1 | WG | 6020A – Metals ICP/MS | 2 | LR |
| 580-89377-1 | WG | 6020A – Metals ICP/MS | 2 | MS/MSD |
| 580-89377-1 | WG | 7470A – Mercury | 23 | N |
| 580-89377-1 | WG | 7470A – Mercury | 2 | FD |
| 580-89377-1 | WG | 7470A – Mercury | 1 | MS/MSD |
| 580-89377-1 | WG | 7470A – Mercury | 1 | LR |
| 580-89377-1 | WG | 300.0 - Anions, IC | 23 | N |

| SDG | Matrix | Test Method | Number of Samples | Sample Type |
|---|---|---|---|---|
| 580-89377-1 | WG | 300.0 - Anions, IC | 2 | FD |
| 580-89377-1 | WG | 300.0 - Anions, IC | 2 | MS/MSD |
| 19J0211 | WG | 353.2 - Nitrate + Nitrite as N | 23 | N |
| 19J0211 | WG | 353.2 - Nitrate + Nitrite as N | 2 | FD |
| 19J0211 | WG | 353.2 - Nitrate + Nitrite as N | 1 | LR |
| 19J0211 | WG | 353.2 - Nitrate + Nitrite as N | 1 | MS/MSD |
| 580-89377-1 | WG | SM2320B – Alkalinity | 23 | N |
| 580-89377-1 | WG | SM2320B – Alkalinity | 2 | FD |
| 580-89377-1 | WG | SM2320B – Alkalinity | 2 | LR |
| 580-89377-1 | WG | SM2540D – Total Suspended Solids (TSS) | 23 | N |
| 580-89377-1 | WG | SM2540D – Total Suspended Solids (TSS) | 2 | FD |
| 580-89377-1 | WG | 8260C - Volatile Organic Compounds by GC/MS | 1 | N |
| 580-89377-1 | WG | 8260C - Volatile Organic Compounds by GC/MS | 1 | MS/MSD |
| 580-89377-1 | WG | 8260C - Volatile Organic Compounds by GC/MS | 1 | TB |
| 580-89377-1 | WG | 8270D - Semivolatile Organic Compounds by GC/MS | 1 | N |
| 580-89377-1 | WG | 8270D - Semivolatile Organic Compounds by GC/MS | 1 | MS/MSD |
| 580-89377-1 | WG | AK101/EPA 8021 Gasoline Range Organics (GRO) | 1 | N |
| 580-89377-1 | WG | AK101/EPA 8021 Gasoline Range Organics (GRO) | 1 | MS/MSD |
| 580-89377-1 | WG | ADEC AK102 & 103 Diesel Range Organics (DRO) | 1 | N |
| 580-89377-1 | WG | ADEC AK102 & 103 Diesel Range Organics (DRO) | 1 | MS/MSD |

| Data Usability Summary Report | Project: Red Devil Mine: Baseline Monitoring |
|---|---|
| Date Completed: December 19, 2019 | Completed by: Eridania Marte |

| General Sample Information | |
|---|---|
| Do Samples and Analyses on COC check against Lab Sample Tracking Form? | The sample times were not recorded on the COC; therefore, the laboratory logged in all sample times per container label. |
| Did coolers arrive at lab between 2 and 6°C and in good condition as indicated on COC and Cooler Receipt Form? | No.<br>Several of the coolers were recorded at a temperature of <2° C. There was no indication of the samples being frozen. No qualification of the data was made.<br><br>Laboratory noted that samples 0919MW29GW, 0919MW55GW, and 0919MW59GW were received partially frozen for Nitrate + Nitrite as N analysis. No qualification of the data was made. |
| Frequency of Field QC Samples Correct?<br>Field Duplicate - 1/10 regular samples for each matrix and sampling method and/or type of equipment used.<br>MS/MSD - 1/20 samples for each matrix and each sampling event.<br>Equipment Blank - 1/20 field samples for each collection/decontamination method, by matrix and by sample type. | - Two field duplicates were collected per 23 groundwater samples.<br>- One MS/MSD was collected for metals, anions, alkalinity, nitrate-nitrite, and TSS analysis per 23 groundwater samples.<br>- One MS/MSD was collected for DRO, GRO, and SVOCs analysis per 23 groundwater samples.<br>- One MS/MSD was collected for total and dissolved metals analysis per 7 surface water samples.<br>- One trip blank was collected per cooler for VOC analysis per 2 samples.<br>- An equipment blank was not included in this SDG. |
| Case narrative present and complete? | Yes. |
| Any holding time violations? | Yes.<br>Hold time was exceeded for TSS in sample 0919MW19AGW. The sample was received with less than one day on the hold time. The laboratory has insufficient time remaining to perform analysis within hold time. The sample was analysis one day pass hold time and was qualified UJ as estimated non-detect.<br><br>Sample 0919MW19BGW was re-extracted and re-analyzed outside of hold time for SVOCs due to several surrogates being recovered below acceptance limits and LCS failures. All analytes were non-detect and UJ qualified as estimated non-detect. |

The following tables are presented at the end of this DUSR and provide summaries of results outside QC criteria:

- Method Blanks Results (Table 2, 2A, and 2B)
- Surrogates Outside Limits (Table 3)
- MS/MSD Outside Limits (Table 4 and 4A)
- LCS Outside Limits (Table 5 and 5A)
- Serial Dilution Outside Limits (Table 6)
- Reanalysis Results (Table 7)
- Field Duplicate Results (Table 8)

**Go to List**

| Metals by Method SW-846 6010C | |
|---|---|
| **Description** | **Notes and Qualifiers** |
| Are any compounds present in method and field blanks as noted on Table 2? | Yes.<br>Potassium was detected below the RL in method blank 580-314072/24-A. |
| For samples, if results are < 5 times the blank then "U" flag data (see Table 2A and 2B). | The potassium concentration in the associated seventeen samples were less than 5X the blank concentration; therefore, the sample result was U qualified as non-detect. The MDL was elevated to the sample result. All other sample results were not detected; therefore, no qualification was made. |
| Is laboratory QC frequency one blank and LCS with each batch and one set of MS/MSD per 20 samples? | Yes. |
| Are MS/MSD within QC criteria (see Table 4 and 4A)? QC limits are not applicable to sample results greater than 4 times spike amount. | Yes.<br>Magnesium was recovered below the acceptance limit in the PDS for 0919MW45GW. The associated sample MS and MSD were within the acceptance limit; therefore, no qualification was made. |
| Is LCS within QC criteria (see Table 5)? If out, and the recovery high with no positive values, then no data qualification is required. | Yes. |
| Is initial calibration ≥ 0.998 and RSD between multiple exposures ≤5%? Minimum 4-point linearity. | The r value was not reported by the laboratory. The data are considered acceptable for use. |
| Is there one serial dilution per 20 samples? Flag all data reported with an “E” as “J”. | Yes. |
| Are serial dilutions within QC criteria (see Table 6)? | Yes. |
| Spot check ICS recoveries 80-120%. | The ICSs were within acceptance criteria. |
| Spot check ICV 90-110%. | The ICVs were within acceptance criteria. |
| Spot check CCV 90-110%. | The CCVs were within acceptance criteria. |
| Spot check ICVL/CCVL 70-130% | The ICVL was within acceptance criteria.<br>Potassium was recovered above the acceptance criteria in CCVL 580-314277/42. The associated bracketed 20 sample result for were UJ qualified as estimated non-detect. |
| Spot check ICB/CCB detections (see Table 2A and 2B). | Potassium was detected below the RL in CCBs 580-314277/41 and 580-314277/53. All detected sample results were U qualified from associated MB detection; therefore, no additional qualification was made.<br><br>Aluminum was detected below the RL in CCB 580-314277/65. The concentration in the associated three samples were less than 5X the blank concentration; therefore, the sample result was U qualified as non-detect. The MDL was elevated to the sample result. All other sample results were either 5X the blank concentration or not detected; therefore, no qualification was made. |

| Metals by Method SW-846 6010C | |
|---|---|
| **Description** | **Notes and Qualifiers** |
| | Magnesium was detected below the RL in CCB 580-314277/65. The sample results in the associated samples were greater than 5X the blank detection; therefore, no qualification was required.<br><br>Iron was detected below the RL in CCB 580-314277/116. The concentration in the associated sample was less than 5X the blank concentration; therefore, the sample result was U qualified as non-detect. The PQL was elevated to the sample result. All other sample results were either 5X the blank concentration or not detected; therefore, no qualification was made.<br><br>Magnesium was detected below the RL in CCB 580-314277/128. The sample results in the associated samples were greater than 5X the blank detection; therefore, no qualification was required. |
| Spot check the internal standard recoveries 50-150%. | The internal standards were acceptable. |
| Were any samples reanalyzed or diluted (see Table 7)? For any sample reanalysis or dilutions, is only one reportable result flagged? | No. |
| Do field duplicate results show good precision for all compounds (see Table 8)? | Yes. |

| Metals by Method SW-846 6020A | |
|---|---|
| **Description** | **Notes and Qualifiers** |
| Are any compounds present in method and field blanks as noted on Table 2? | Yes.<br>Manganese was detected below the RL in method blank 580-314072/24-A.<br>Vanadium was detected below the RL in method blank 580-314072/24-A and 580-314087/22-A. |
| For samples, if results are < 5 times the blank then "U" flag data (see Table 2A and 2B). | The manganese concentration in the associated two samples were less than 5X the blank concentration; therefore, the sample result was U qualified as non-detect. The MDL was elevated to the sample result. All other sample results were greater than 5X the blank detection; therefore, no qualification was made.<br><br>The vanadium concentration in the associated five samples were less than 5X the blank (580-314072/24-A) concentration; therefore, the sample result was U qualified as non-detect. The MDL was elevated to the sample result. All other sample results were greater than 5X the blank detection; therefore, no qualification was made.<br><br>The vanadium concentration in the associated samples were greater than 5X the blank (580- |

| Metals by Method SW-846 6020A | |
|---|---|
| **Description** | **Notes and Qualifiers** |
| | 314087/22-A) detection: therefore, no qualification was required. |
| Is laboratory QC frequency one blank and LCS with each batch and one set of MS/MSD per 20 samples? | Yes. |
| Are MS/MSD within QC criteria (see Table 4 and 4A)? QC limits are not applicable to sample results greater than 4 times spike amount. | Yes. |
| Is LCS within QC criteria (see Table 5)? If out, and the recovery high with no positive values, then no data qualification is required. | Yes. |
| Is initial calibration ≥ 0.995? Minimum 5-point linearity. | Yes. |
| Is there one serial dilution per 20 samples? Flag all data reported with an "E" as "J". | Yes. |
| Are serial dilutions within QC criteria (see Table 6)? | Yes. |
| Spot check ICS recoveries 80-120%. | The ICSs were within acceptance criteria. |
| Spot check ICV 90-110% and < 20% RSD. | The ICVs were within acceptance criteria. |
| Spot check CCV 90-110%. | The CCVs were within acceptance criteria. |
| Spot check ICVL/CCVL 50-150%. | The ICVL/CCVL were within acceptance criteria. |
| Spot check ICB/CCB detections (see Table 2A and 2B). | Antimony was detected below the RL in CCB 580-314274/178, 580-314274/165, and 580-314274/191. The sample results in the associated samples were greater than 5X the blank detection; therefore, no qualification was required.<br><br>Vanadium was detected below the RL in CCBs 580-314274/178, 580-314274/165, 580-314274/191, 580-314274/194, and 580-314274/207. All sample results were either U qualified from associated method blank (580-314072/24-A) detection or greater than 5X the method blank and CCB detection; therefore, no qualification was made.<br><br>Antimony was detected below the RL in CCB 580-314274/194 and 580-314274/207. The concentration in the associated two samples were less than 5X the blank concentration; therefore, the sample result was U qualified as non-detect. The MDL was elevated to the sample result. All other sample results were either 5X the blank concentration or not detected; therefore, no qualification was made.<br><br>Antimony was detected below the RL in CCB and 580-314302/13, 580-314302/24, and 580-314302/33. The sample result in the associated sample was greater than 5X the blank detection or not detected; therefore, no qualification was required. |

| Metals by Method SW-846 6020A | |
|---|---|
| **Description** | **Notes and Qualifiers** |
| | Arsenic was detected below the RL in CCB 580-314274/194 and 580-314302/13. The sample results in the associated samples were greater than 5X the blank detection; therefore, no qualification was required. |
| Spot check the internal standards – must be 30-120% of the intensity of the calibration blank. | The internal standards were acceptable. |
| Were any samples reanalyzed or diluted (see Table 7)? For any sample reanalysis or dilutions, is only one reportable result flagged? | Yes.<br>All samples were diluted per laboratory at a 5X dilution prior to analysis. No data usability issues were observed. |
| Do field duplicate results show good precision for all compounds (see Table 8)? | Yes. |

| Mercury by Method SW-846 7470A | |
|---|---|
| **Description** | **Notes and Qualifiers** |
| Any compounds present in method or field blanks (see Table 2)? | No. |
| For samples, if results are < 5 times the blank, then "U" flag data (see Table 2A and 2B). | No qualification required. |
| Is Laboratory QC frequency at least one blank, LCS and MS/MSD with each batch? | Yes. |
| Is MS/MSD within QC criteria (see Table 4 and 4A)? If out and LCS is compliant, then “J” flag positive data in original sample due to matrix. | Yes. |
| Is LCS within QC criteria (see Table 5)? If out, and the recovery is high with no positive values, then no data qualification is required. | Yes. |
| Is initial calibration ≥ 0.995? | Yes. |
| Spot check ICV 90-110%. | The ICVs were acceptable. |
| Spot check CCV 80-120%. | The CCVs were acceptable. |
| Spot check ICB/CCB detections (see Table 2A and 2B). | The ICB/CCBs were acceptable. |
| Were any samples reanalyzed or diluted (see Table 7)? For any sample reanalysis or dilutions, is only one reportable result flagged? | No |
| Do field duplicate results show good precision for all compounds (see Table 8)? | Yes. |

| Benzene, Toluene, Ethylbenzene, and Xylenes by Method 8260C | |
|---|---|
| **Description** | **Notes and Qualifiers** |
| Any compounds present in method or field blanks (see Table 2)? | Yes.<br>Toluene was detected in trip blank 0919TB03. |
| For samples, if results are < 5 times the blank, then "U" flag data (see Table 2A and 2B). | The associated sample result for toluene was greater than 5X the blank detection; therefore, no qualification was required. |
| Are surrogates for method blanks and LCS within limits? | Yes. |
| Are surrogates for samples and MS/MSD within limits? (See Table 3). If not, were all samples reanalyzed for VOCs? Matrix effects should be established. | Yes. |

| Benzene, Toluene, Ethylbenzene, and Xylenes by Method 8260C | |
|---|---|
| **Description** | **Notes and Qualifiers** |
| Is Laboratory QC frequency at least one blank and LCS with each batch and one set of MS/MSD per 20 samples? | Yes. |
| Is MS/MSD within QC criteria (see Table 4 and 4A)? If out and LCS is compliant, then "J" flag positive data in original sample due to matrix. | Yes. |
| Is LCS within QC criteria (see Table 5)? If out, and the recovery is high with no positive values, then no data qualification is required. | Yes. |
| Do internal standards areas and retention time meet criteria? If not was sample re-analyzed to establish matrix (see Table 7)? | Yes. |
| Is initial calibration for target compounds <20 %RSD or curve fit? | Yes. |
| Is continuing calibration for target compounds <30.0 %D. | Yes. |
| Were any samples reanalyzed or diluted (see Table 7)? For any sample reanalysis or dilutions, is only one reportable result flagged? | No. |
| Do field duplicate results show good precision for all compounds (see Table 8)? | Yes. |

| Semi-volatile Organic Compounds by Method 8270D | |
|---|---|
| **Description** | **Notes and Qualifiers** |
| Any compounds present in method, trip, or, field blanks (see Table 2)? | Butyl benzyl phthalate was detected in method blank 580-311614/1-A. |
| For samples, if results are < 5 times the blank, then "U" flag data (see Table 2A and 2B). | The associated sample results for butyl benzyl phthalate was not detected; therefore, no qualification was required. |
| Are surrogates for method blanks and LCS within limits? | 2,4,6-Tribromophenol, phenol-d5, and 2-fluorophenol were recovered low in method blank 580-312174/1-A. A re-extraction and re-analysis was performed and 2-Fluorophenol and Phenol-d5 were recovered low in method blank 580-313338/1-A. The associated sample results were considered unusable and UR qualified as rejected, non-detect.<br><br>2-Fluorophenol and phenol-d5 were recovered low in LCS 580-312174/2-A. A re-analysis was performed and 2-fluorophenol was recovered low in LCS 580-313338/2-A. The associated sample results were considered unusable and UR qualified as rejected, non-detect.<br><br>2,4,6-Tribromophenol, 2-Fluorophenol, and Phenol-d5 were recovered low in LCSD 580-312174/3-A. A re-analysis was performed and 2-fluorophenol and phenol-d5 were recovered low in LCSD 580-313338/3-A. The associated sample results were considered unusable and UR qualified as rejected, non-detect. |
| Are surrogates for samples and MS/MSD within limits? (See Table 3). Semivolatile samples | 2-Fluorophenol and phenol-d5 was recovered low in sample 0919MW19BGW. A re-analysis was |

| Semi-volatile Organic Compounds by Method 8270D | |
|---|---|
| **Description** | **Notes and Qualifiers** |
| should be reanalyzed if more than one base-neutral and/or more than one acid phase compound for semivolatiles is out. Matrix effects should be established. | performed and exhibited the same acid surrogates outside of recovery criteria. Laboratory noted there was evidence of matrix interference established. However, associated laboratory QC was also outside of the acceptance criteria for acid surrogates. There was no additional volume for additional re-extraction. Both sets of data were considered unusable. The first set of data was reported, and R/UR qualified as rejected, rejected non-detect with the exception of PAHs. The second set of data was not reported and qualified R to indicate unusable – not reportable. |
| Is Laboratory QC frequency at least one blank and LCS with each batch and one set of MS/MSD per 20 samples? | Yes. |
| Is MS/MSD within QC criteria (see Table 4 and 4A)? If out and LCS is compliant, then "J" flag positive data in original sample due to matrix. | No.<br>2,4-Dimethylphenol and 3,3'-dichlorobenzidine were recovered at 0% in the MS and MSD of sample 0919MW19BGW. The analytes also exhibited a recovery below the lower limit in the LCS/LCSD. The associated results would be UR qualified as rejected non-detect. The MS/MSD was reported from the re-extracted sample analysis batch and initial sample results were reported; therefore, no qualification was made.<br><br>Benzyl alcohol, 4,6-dinitro-2-methylphenol, pentachlorophenol were recovered at 0% in the MS and/or MSD of sample 0919MW19BGW. The analytes in the LCS/LCSD were compliant. The sample results would be UJ qualified as estimated non-detect. The MS/MSD was reported from the re-extracted sample analysis batch and initial sample results were reported; therefore, no qualification was made.<br><br>Hexachlorocyclopentadiene was recovered below the acceptance limit in the MS and MSD of sample 0919MW19BGW. The RPD was also outside of the acceptance limit. The sample results would be UJ qualified as estimated non-detect. The MS/MSD was reported from the re-extracted sample analysis batch and initial sample results were reported; therefore, no qualification was made.<br><br>The RPD for anthracene was outside of the acceptance limit. However, the MS and MSD were within the acceptance limit and no qualification was made. |
| Is LCS/LCSD within QC criteria (see Table 5 and 5A)? If out, and the recovery is high with no positive values, then no data qualification is required. | Multiple analytes were recovered outside of the LCS and LCSD (580-312174) and exhibited poor precision between the LCS and LCSD in batch 312865. The LCS and LCSD (580-313338) were |

| Semi-volatile Organic Compounds by Method 8270D | |
|---|---|
| **Description** | **Notes and Qualifiers** |
| | re-analyzed, associated with batch 314408 and re-analysis also exhibited multiple analytes recovered outside of the acceptance limits. The associated sample results for the initial analysis were UR qualified as unusable, rejected non-detect due to poor recoveries in associated surrogates. |
| Do internal standards areas and retention time meet criteria? If not was sample re-analyzed to establish matrix (see Table 7)? | Yes. |
| Is initial calibration for target compounds <15 %RSD or curve fit? | Yes. |
| Is continuing calibration for target compounds < 20.0%D. | Carbazole and 3,3'-dichlorobenzidine were recovered greater than 20% D in CCVIS 580-312865/3. The analyte would be UJ qualified as estimated non-detect; however, the associated sample results were UR qualified as unusable, rejected non-detect due to poor recoveries in associated surrogates.<br><br>Benzyl alcohol and 4-nitrophenol were recovered greater than 20% D in CCVIS 580-314408/3. The associated sample results were reported from initial analysis and analytes were not qualified.<br><br>N-Nitrosodi-n-propylamine was below the minimum response factor for CCVIS 580-314408/3. The associated sample results were reported from initial analysis and analytes were not qualified. |
| Were any samples reanalyzed or diluted (see Table 7)? For any sample reanalysis or dilutions, is only one reportable result flagged? | Yes.<br>Sample 0919MW19BGW was re-extracted and re-analyzed due to several surrogates being recovered below acceptance limits and LCS failures. Both data sets were reported, initial analysis was considered reportable and second analysis was R qualified as non-reportable. |
| Do field duplicate results show good precision for all compounds (see Table 8)? | Yes. |

| Gasoline Range Organics by Method ADEC AK101 | |
|---|---|
| **Description** | **Notes and Qualifiers** |
| Any compounds present in method or field blanks (see Table 2)? | No. |
| For samples, if results are < 5 times the blank, then "U" flag data (see Table 2A and 2B). | No qualification required. |
| Are surrogates for method blanks and LCS within limits? | Yes. |
| Are surrogates for samples and MS/MSD within limits? (See Table 3). If not, were all samples reanalyzed for VOCs? Matrix effects should be established. | Yes. |

| Gasoline Range Organics by Method ADEC AK101 | |
|---|---|
| **Description** | **Notes and Qualifiers** |
| Is Laboratory QC frequency at least one blank and LCS with each batch and one set of MS/MSD per 20 samples? | Yes. |
| Is MS/MSD within QC criteria (see Table 4 and 4A)? If out and LCS is compliant, then "J" flag positive data in original sample due to matrix. | Yes. |
| Is LCS/LCSD within QC criteria (see Table 5 and 5A)? If out, and the recovery is high with no positive values, then no data qualification is required. | Yes. |
| Is initial calibration for target compounds <25 %RSD or curve fit? | Yes. |
| Is continuing calibration for target compounds < 25.0%D. | Yes. |
| Were any samples reanalyzed or diluted (see Table 7)? For any sample reanalysis or dilutions, is only one reportable result flagged? | No. |
| Do field duplicate results show good precision for all compounds (see Table 8)? | There were no positive detections for the target analytes. |

| Diesel Range Organics by Method ADEC AK102 & 103 | |
|---|---|
| **Description** | **Notes and Qualifiers** |
| Any compounds present in method or field blanks (see Table 2)? | No. |
| For samples, if results are < 5 times the blank, then "U" flag data (see Table 2A and 2B). | No qualification required. |
| Are surrogates for method blanks and LCS within limits? | Yes. |
| Are surrogates for samples and MS/MSD within limits? (See Table 3). Semivolatile samples should be reanalyzed if more than one base-neutral and/or more than one acid phase compound for semivolatiles is out. Matrix effects should be established. | Yes. |
| Is Laboratory QC frequency at least one blank and LCS with each batch and one set of MS/MSD per 20 samples? | Yes. |
| Is MS/MSD within QC criteria (see Table 4 and 4A)? If out and LCS is compliant, then "J" flag positive data in original sample due to matrix. | Yes. |
| Is LCS/LCSD within QC criteria (see Table 5 and 5A)? If out, and the recovery is high with no positive values, then no data qualification is required. | Yes. |
| Is initial calibration for target compounds <25 %RSD or curve fit? | Yes. |
| Is continuing calibration for target compounds < 25% D. | Yes. |
| Were any samples reanalyzed or diluted (see Table 7)? For any sample reanalysis or dilutions, is only one reportable result flagged? | No. |
| Do field duplicate results show good precision for all compounds (see Table 8)? | There were no positive detections for the target analytes. |

| Alkalinity by Standard Method 2320B | |
|---|---|
| **Description** | **Notes and Qualifiers** |
| Are any compounds present in method and/or field blanks as noted on Table 2? | Method blanks are not applicable to this technique. |
| For samples, if results are < 5 times the blank, then "U" flag data (see Table 2A and 2B). | N/A |
| Is laboratory QC frequency at least one LCS and duplicate with each batch of up to 20 samples? | Yes. |
| Is LCS/LCSD within QC criteria (see Table 5 and 5A)? If out, and the recovery high with no positive values, then no data qualification is required. | Yes. |
| Is initial calibration verification within QC limits? | Yes. |
| Is continuing calibration within QC limits? | Yes. |
| Are laboratory duplicates within QC limits? | Yes. |
| Do field duplicate results show good precision for all compounds (see Table 8)? | No.<br>Sample pair for 0919MW48GW and 0919MW102GW exhibited poor precision for alkalinity and Bicarbonate Alkalinity as CaCO3. The sample results were J qualified as estimated. |

| Anions by EPA Method 300.0 | |
|---|---|
| **Description** | **Notes and Qualifiers** |
| Are any compounds present in method, continuing calibration, and/or field blanks? | No. |
| For samples, if results are < 5 times the blank, then "U" flag data (see Table 2A and 2B). | No qualification required. |
| Is laboratory QC frequency one blank and LCS with each batch and one set of MS/MSD per 20 samples? | Yes. |
| Are MS/MSD within QC criteria? QC limits are not applicable to sample results greater than 4 times spike amount. (see Table 4 and 4A) | No.<br>Chloride and sulfate were recovered above the acceptance limit for sample 0919MW45GW. The sample results were J qualified as estimated.<br><br>Sulfate was recovered above the acceptance limit for sample 0919MW47GW. The sample results were J qualified as estimated. |
| Is LCS/LCSD within QC criteria (see Table 5 and 5A)? If out, and the recovery high with no positive values, then no data qualification is required. | Yes. |
| Is initial calibration for target compounds within QC limits? Is initial calibration verification within QC limits? | Yes. |
| Is continuing calibration verification for target compounds within QC limits? | Yes. |
| Were any samples reanalyzed or diluted (see Table 7)? For any sample reanalysis or dilutions, is only one reportable result flagged? | Sample 0919MW16GW was diluted by the laboratory prior to analysis for sulfate. The diluted sample result was greater than the MDL; therefore, there is no impact to data usability. |
| Do field duplicate results show good precision for all compounds (see Table 8)? | Yes. |

| Nitrate/Nitrite by EPA Method 353.2 | |
|---|---|
| **Description** | **Notes and Qualifiers** |
| Any compounds present in method, continuing calibration, and/or field blanks (see Table 2)? | Yes.<br>Nitrate + Nitrite as N was present in the closing CCB SHJ0230-CCB3 at a negative value above the MDL/PQL value. |
| For samples, if results are < 5 times the blank, then "U" flag data (see Table 2A and 2B). | The associated sample result for 0919MW48GW was greater than 5X the absolute blank value. No qualification was made. |
| Is laboratory QC frequency one blank and LCS with each batch and one set of MS/MSD per 20 samples? | Yes. |
| Is MS/MSD within QC criteria (see Table 4 and 4A)? If out and LCS is compliant, then “J” flag positive data in original sample due to matrix. | Yes. |
| Is LCS/LCSD within QC criteria (see Table 5 and 5A)? If out, and the recovery is high with no positive values, then no data qualification is required. | Yes. |
| Is initial calibration for target compounds within QC limits? Is initial calibration verification within QC limits? | Yes. |
| Is continuing calibration verification for target compounds within QC limits? | Yes. |
| Were any samples reanalyzed or diluted (see Table 7)? For any sample reanalysis or dilutions, is only one reportable result flagged? | No. |
| Do field duplicate results show good precision for all compounds (see Table 8)? | Yes. |

| TDS/TSS by Standard Method 2540C/2540D | |
|---|---|
| **Description** | **Notes and Qualifiers** |
| Are any compounds present in method blanks as noted on Table 2? | No. |
| For samples, if results are <5 times the blank then "U" flag data (see Table 2A and 2B). | No qualification required. |
| Is laboratory QC frequency one blank and LCS with each batch of 20 or fewer samples and one laboratory duplicate per 10 samples? | Yes. |
| Is LCS within QC criteria (see Table 5)? If out, and the recovery high with no positive values, then no data qualification is required. | Yes. |
| Were any samples reanalyzed or diluted (see Table 7)? For any sample reanalysis or dilutions, is only one reportable result flagged? | No. |
| Are laboratory duplicates within QC limits? | Yes. |
| Do field duplicate results show good precision for all compounds (see Table 8)? | Yes. |

| Total Organic Carbon by Method SW-846 9060A | |
|---|---|
| **Description** | **Notes and Qualifiers** |
| Are any compounds present in method and field blanks as noted on Table 2? | No. |
| For samples, if results are < 5 times the blank then "U" flag data (see Table 2A and 2B). | No qualification required. |

| Total Organic Carbon by Method SW-846 9060A | |
|---|---|
| **Description** | **Notes and Qualifiers** |
| Is laboratory QC frequency one blank and LCS with each batch of 20 or fewer samples and one set of MS and one laboratory duplicate per 20 samples? | Yes. |
| Are MS/MSD within QC criteria (see Table 4 and 4A)? QC limits are not applicable to sample results greater than 4 times spike amount. | Yes. |
| Are laboratory duplicates within QC limits? | Yes. |
| Is LCS/LCSD within QC criteria (see Table 5 and 5A)? If out, and the recovery high with no positive values, then no data qualification is required. | Yes. |
| Is initial calibration for target compounds within QC limits? Is initial calibration verification within QC limits? | Yes. |
| Is continuing calibration verification for target compounds within QC limits? | Yes. |
| Were any samples reanalyzed or diluted (see Table 7)? For any sample reanalysis or dilutions, is only one reportable result flagged? | No. |
| Do field duplicate results show good precision for all compounds (see Table 8)? | Yes. |

**Summary of Potential Impacts on Data Usability**

**Concerns**

6010C (Total)

- Potassium was detected in method blank 580-314072/24-A and CCBs 580-314277/41 and 580-314277/53. The associated seventeen sample results less than 5X the blank concentration were U qualified as non-detect. The MDL was elevated to the sample result.
- Potassium was recovered above the acceptance criteria in CCVL 580-314277/42. The associated 20 sample result for were UJ qualified as estimated non-detect.
- Aluminum was detected below the RL in CCB 580-314277/65. The associated three sample results less than 5X the blank concentration were U qualified as non-detect. The MDL was elevated to the sample result.
- Iron was detected below the RL in CCB 580-314277/116. The associated sample result less than 5X the blank concentration was U qualified as non-detect. The PQL was elevated to the sample result.

6020A (Total)

- Manganese was detected in method blank 580-314072/24-A. The associated two sample results less than 5X the blank concentration were U qualified as non-detect. The MDL was elevated to the sample result.
- Vanadium was detected in method blanks 580-314072/24-A, 580-314087/22-A and CCBs 580-314274/178, 580-314274/165, 580-314274/191, 580-314274/194, and 580-314274/207. The associated five sample results less than 5X the blank concentration were U qualified as non-detect. The MDL was elevated to the sample result.
- Antimony was detected below the RL in CCB 580-314274/194 and 580-314274/207. The associated two sample results less than 5X the blank concentration were U qualified as non-detect. The MDL was elevated to the sample result.

8270D

- Multiple surrogates were recovered low in initial analysis of method blank, LCS, and LCSD. A re-extraction and re-analysis were performed and multiple surrogates were also recovered low. The associated sample results for 0919MW19BGW were considered unusable and UR qualified as rejected, non-detect.

- Two acid surrogates were recovered low in sample 0919MW19BGW. A re-analysis was performed and exhibited the same acid surrogates outside of recovery criteria. Laboratory noted there was evidence of matrix interference established. However, associated laboratory QC was also outside of the acceptance criteria for acid surrogates. There was no additional volume for additional re-extraction. Both sets of data were considered unusable. The first set of data was reported, and R/UR qualified as rejected, rejected non-detect, with the exception of PAHs. The second set of data was not reported and qualified R to indicate unusable – not reportable.
- Multiple analytes were recovered outside of the LCS and LCSD (580-312174) and exhibited poor precision between the LCS and LCSD in batch 312865. The LCS and LCSD (580-313338) were re-analyzed, associated with batch 314408 and re-analysis also exhibited multiple analytes recovered outside of the acceptance limits. The associated sample results for the initial analysis were UR qualified as unusable, rejected non-detect due to poor recoveries in associated surrogates.
- Carbazole and 3,3'-dichlorobenzidine were recovered greater than 20% D in CCVIS 580-312865/3. The analytes would be considered estimated non-detect; however, the associated sample results were UR qualified as unusable, rejected non-detect due to poor recoveries in associated surrogates.
- Sample 0919MW19BGW was re-extracted and re-analyzed outside of hold time due to several surrogates being recovered below acceptance limits and LCS failures. Initial analysis was considered reportable and second analysis was R qualified as unusable, not reportable.

SM 2320B

- Sample pair for 0919MW48GW exhibited poor precision for alkalinity and Bicarbonate Alkalinity as CaCO3. The sample results were J qualified as estimated.

E300.0

- Chloride and sulfate were recovered above the acceptance limit for sample 0919MW45GW. The sample results were J qualified as estimated.
- Sulfate was recovered above the acceptance limit for sample 0919MW47GW. The sample results were J qualified as estimated.

**Table 2 – List of Positive Results for Blank Samples**

| Method | Sample ID | Sample Type | Analyte | Result | Qualifier | Units | MDL | PQL |
|---|---|---|---|---|---|---|---|---|
| 8270D | 580-313338/1-A | MB | Butyl benzyl phthalate | 0.496 | J | ug/L | 0.37 | 10 |
| 6010C | 580-314072/24-A | MB | Potassium | 0.737 | J | mg/L | 0.41 | 3.3 |
| 6020A | 580-314072/24-A | MB | Manganese | 0.00342 | J | mg/L | 0.0023 | 0.010 |
| 6020A | 580-314072/24-A | MB | Vanadium | 0.00356 | J | mg/L | 0.0095 | 0.035 |
| 6020A | 580-314087/22-A | MB | Vanadium | 0.000786 | J | mg/L | 0.00046 | 0.0040 |
| 8260C | 0919TB03 | TB | Toluene | 0.92 | J | ug/L | 0.39 | 2.0 |
| 6010C | 580-314277/41 | CCB | Potassium | 2.17 | J | mg/L | 0.4111 | 3.3 |
| 6010C | 580-314277/53 | CCB | Potassium | 0.626 | J | mg/L | 0.4111 | 3.3 |
| 6010C | 580-314277/65 | CCB | Aluminum | 0.111 | J | mg/L | 0.11 | 1.5 |
| 6010C | 580-314277/65 | CCB | Magnesium | 0.244 | J | mg/L | 0.133 | 1.1 |
| 6010C | 580-314277/116 | CCB | Iron | 0.329 | J | mg/L | 0.14 | 0.5 |
| 6010C | 580-314277/128 | CCB | Magnesium | 0.133 | J | mg/L | 0.133 | 1.1 |
| 6020A | 580-314274/165 | CCB | Antimony | 0.147 | J | ug/L | 0.11 | 0.4 |
| 6020A | 580-314274/178 | CCB | Antimony | 0.179 | J | ug/L | 0.11 | 0.4 |
| 6020A | 580-314274/191 | CCB | Antimony | 0.178 | J | ug/L | 0.11 | 0.4 |
| 6020A | 580-314274/165 | CCB | Vanadium | 0.876 | J | ug/L | 0.456 | 4 |
| 6020A. | 580-314274/178 | CCB | Vanadium | 0.679 | J | ug/L | 0.456 | 4 |
| 6020A | 580-314274/191 | CCB | Vanadium | 0.949 | J | ug/L | 0.456 | 4 |
| 6020A | 580-314274/194 | CCB | Antimony | 0.186 | J | ug/L | 0.11 | 0.4 |
| 6020A | 580-314274/207 | CCB | Antimony | 0.142 | J | ug/L | 0.11 | 0.4 |
| 6020A | 580-314274/194 | CCB | Arsenic | 0.246 | J | ug/L | 0.204 | 1 |
| 6020A | 580-314274/194 | CCB | Vanadium | 0.897 | J | ug/L | 0.456 | 4 |
| 6020A | 580-314274/207 | CCB | Vanadium | 0.935 | J | ug/L | 0.456 | 4 |
| 6020A | 580-314302/13 | CCB | Antimony | 0.225 | J | ug/L | 0.11 | 0.4 |
| 6020A | 580-314302/24 | CCB | Antimony | 0.161 | J | ug/L | 0.11 | 0.4 |
| 6020A | 580-314302/33 | CCB | Antimony | 0.135 | J | ug/L | 0.11 | 0.4 |
| 6020A | 580-314302/13 | CCB | Arsenic | 0.420 | J | ug/L | 0.204 | 1 |
| 6020A | 580-314302/13 | CCB | Vanadium | 0.990 | J | ug/L | 0.456 | 4 |
| EPA 353.2 | SHJ0230-CCB3 | CCB | Nitrate + Nitrite as N | -0.012 | J | Mg-N/L | 0.01 | 0.01 |

| Data Usability Summary Report | Project: Red Devil Mine: Baseline Monitoring |
|---|---|
| Date Completed: December 19, 2019 | Completed by: Eridania Marte |

**Table 2A – List of Samples Qualified for Method Blank Contamination**

| Method | Blank | Matrix | Analyte | Blank Result | Sample Result | Lab Qualifier | PQL | Affected Samples | Sample Flag |
|---|---|---|---|---|---|---|---|---|---|
| 6010C | 580-314072/24-A | MB | Potassium | 0.737 | 0.95 | J B ^ | 3.3 | 0919MW06GW | U Flag |
| 6010C | 580-314072/24-A | MB | Potassium | 0.737 | 2 | J B ^ | 3.3 | 0919MW16GW | U Flag |
| 6010C | 580-314072/24-A | MB | Potassium | 0.737 | 0.52 | J B ^ | 3.3 | 0919MW17GW | U Flag |
| 6010C | 580-314072/24-A | MB | Potassium | 0.737 | 2.8 | J B ^ | 3.3 | 0919MW26GW | U Flag |
| 6010C | 580-314072/24-A | MB | Potassium | 0.737 | 0.86 | J B ^ | 3.3 | 0919MW40GW | U Flag |
| 6010C | 580-314072/24-A | MB | Potassium | 0.737 | 0.52 | J B ^ | 3.3 | 0919MW44GW | U Flag |
| 6010C | 580-314072/24-A | MB | Potassium | 0.737 | 0.91 | J B ^ | 3.3 | 0919MW45GW | U Flag |
| 6010C | 580-314072/24-A | MB | Potassium | 0.737 | 0.76 | J B ^ | 3.3 | 0919MW46GW | U Flag |
| 6010C | 580-314072/24-A | MB | Potassium | 0.737 | 0.46 | J B ^ | 3.3 | 0919MW47GW | U Flag |
| 6010C | 580-314072/24-A | MB | Potassium | 0.737 | 0.78 | J B ^ | 3.3 | 0919MW49GW | U Flag |
| 6010C | 580-314072/24-A | MB | Potassium | 0.737 | 0.67 | J B ^ | 3.3 | 0919MW50GW | U Flag |
| 6010C | 580-314072/24-A | MB | Potassium | 0.737 | 0.74 | J B ^ | 3.3 | 0919MW52GW | U Flag |
| 6010C | 580-314072/24-A | MB | Potassium | 0.737 | 0.46 | J B ^ | 3.3 | 0919MW54GW | U Flag |
| 6010C | 580-314072/24-A | MB | Potassium | 0.737 | 1.1 | J B ^ | 3.3 | 0919MW101GW | U Flag |
| 6010C | 580-314072/24-A | MB | Potassium | 0.737 | 0.96 | J B ^ | 3.3 | 0919MW29GW | U Flag |
| 6010C | 580-314072/24-A | MB | Potassium | 0.737 | 0.61 | J B ^ | 3.3 | 0919MW102GW | U Flag |
| 6010C | 580-314072/24-A | MB | Potassium | 0.737 | 0.46 | J B ^ | 3.3 | 0919MW48GW | U Flag |
| 6020A | 580-314072/24-A | MB | Manganese | 0.00342 | 0.68 | B | 0.01 | 0919MW06GW | None |
| 6020A | 580-314072/24-A | MB | Manganese | 0.00342 | 0.39 | B | 0.01 | 0919MW101GW | None |
| 6020A | 580-314072/24-A | MB | Manganese | 0.00342 | 0.4 | B | 0.01 | 0919MW29GW | None |
| 6020A | 580-314072/24-A | MB | Manganese | 0.00342 | 0.084 | B | 0.01 | 0919MW102GW | None |
| 6020A | 580-314072/24-A | MB | Manganese | 0.00342 | 0.061 | B | 0.01 | 0919MW48GW | None |
| 6020A | 580-314072/24-A | MB | Manganese | 0.00342 | 7.1 | B | 0.01 | 0919MW16GW | None |
| 6020A | 580-314072/24-A | MB | Manganese | 0.00342 | 0.0089 | J B | 0.01 | 0919MW17GW | U Flag |
| 6020A | 580-314072/24-A | MB | Manganese | 0.00342 | 0.11 | B | 0.01 | 0919MW19AGW | None |
| 6020A | 580-314072/24-A | MB | Manganese | 0.00342 | 5.9 | B | 0.01 | 0919MW26GW | None |
| 6020A | 580-314072/24-A | MB | Manganese | 0.00342 | 0.29 | B | 0.01 | 0919MW40GW | None |
| 6020A | 580-314072/24-A | MB | Manganese | 0.00342 | 0.67 | B | 0.01 | 0919MW44GW | None |
| 6020A | 580-314072/24-A | MB | Manganese | 0.00342 | 0.0031 | J B | 0.01 | 0919MW45GW | U Flag |
| 6020A | 580-314072/24-A | MB | Manganese | 0.00342 | 0.15 | B | 0.01 | 0919MW46GW | None |

| Method | Blank | Matrix | Analyte | Blank Result | Sample Result | Lab Qualifier | PQL | Affected Samples | Sample Flag |
|---|---|---|---|---|---|---|---|---|---|
| 6020A | 580-314072/24-A | MB | Manganese | 0.00342 | 0.028 | B | 0.01 | 0919MW47GW | None |
| 6020A | 580-314072/24-A | MB | Manganese | 0.00342 | 0.15 | B | 0.01 | 0919MW49GW | None |
| 6020A | 580-314072/24-A | MB | Manganese | 0.00342 | 0.93 | B | 0.01 | 0919MW50GW | None |
| 6020A | 580-314072/24-A | MB | Manganese | 0.00342 | 0.12 | B | 0.01 | 0919MW51GW | None |
| 6020A | 580-314072/24-A | MB | Manganese | 0.00342 | 1.4 | B | 0.01 | 0919MW52GW | None |
| 6020A | 580-314072/24-A | MB | Manganese | 0.00342 | 0.13 | B | 0.01 | 0919MW53GW | None |
| 6020A | 580-314072/24-A | MB | Manganese | 0.00342 | 0.37 | B | 0.01 | 0919MW54GW | None |
| 6020A | 580-314072/24-A | MB | Vanadium | 0.00356 | 0.015 | J B | 0.02 | 0919MW06GW | U Flag |
| 6020A | 580-314072/24-A | MB | Vanadium | 0.00356 | 0.018 | J B | 0.02 | 0919MW16GW | None |
| 6020A | 580-314072/24-A | MB | Vanadium | 0.00356 | 0.019 | J B | 0.02 | 0919MW17GW | None |
| 6020A | 580-314072/24-A | MB | Vanadium | 0.00356 | 0.018 | J B | 0.02 | 0919MW19AGW | None |
| 6020A | 580-314072/24-A | MB | Vanadium | 0.00356 | 0.016 | J B | 0.02 | 0919MW26GW | U Flag |
| 6020A | 580-314072/24-A | MB | Vanadium | 0.00356 | 0.017 | J B | 0.02 | 0919MW101GW | U Flag |
| 6020A | 580-314072/24-A | MB | Vanadium | 0.00356 | 0.019 | J B | 0.02 | 0919MW29GW | None |
| 6020A | 580-314072/24-A | MB | Vanadium | 0.00356 | 0.02 | B | 0.02 | 0919MW40GW | None |
| 6020A | 580-314072/24-A | MB | Vanadium | 0.00356 | 0.016 | J B | 0.02 | 0919MW44GW | U Flag |
| 6020A | 580-314072/24-A | MB | Vanadium | 0.00356 | 0.018 | J B | 0.02 | 0919MW45GW | None |
| 6020A | 580-314072/24-A | MB | Vanadium | 0.00356 | 0.021 | B | 0.02 | 0919MW46GW | None |
| 6020A | 580-314072/24-A | MB | Vanadium | 0.00356 | 0.017 | J B | 0.02 | 0919MW47GW | U Flag |
| 6020A | 580-314072/24-A | MB | Vanadium | 0.00356 | 0.018 | J B | 0.02 | 0919MW102GW | None |
| 6020A | 580-314072/24-A | MB | Vanadium | 0.00356 | 0.018 | J B | 0.02 | 0919MW48GW | None |
| 6020A | 580-314072/24-A | MB | Vanadium | 0.00356 | 0.022 | B | 0.02 | 0919MW49GW | None |
| 6020A | 580-314072/24-A | MB | Vanadium | 0.00356 | 0.019 | J B | 0.02 | 0919MW50GW | None |
| 6020A | 580-314072/24-A | MB | Vanadium | 0.00356 | 0.019 | J B | 0.02 | 0919MW51GW | None |
| 6020A | 580-314072/24-A | MB | Vanadium | 0.00356 | 0.02 | B | 0.02 | 0919MW52GW | None |
| 6020A | 580-314072/24-A | MB | Vanadium | 0.00356 | 0.019 | J B | 0.02 | 0919MW53GW | None |
| 6020A | 580-314072/24-A | MB | Vanadium | 0.00356 | 0.019 | J B | 0.02 | 0919MW54GW | None |
| 6020A | 580-314087/22-A | MB | Vanadium | 0.000786 | 0.015 | J B | 0.02 | 0919MW55GW | None |
| 6020A | 580-314087/22-A | MB | Vanadium | 0.000786 | 0.013 | J B | 0.02 | 0919MW56GW | None |
| 6020A | 580-314087/22-A | MB | Vanadium | 0.000786 | 0.015 | J B | 0.02 | 0919MW57GW | None |
| 6020A | 580-314087/22-A | MB | Vanadium | 0.000786 | 0.015 | J B | 0.02 | 0919MW58GW | None |
| 6020A | 580-314087/22-A | MB | Vanadium | 0.000786 | 0.016 | J B | 0.02 | 0919MW59GW | None |

| Method | Blank | Matrix | Analyte | Blank Result | Sample Result | Lab Qualifier | PQL | Affected Samples | Sample Flag |
|---|---|---|---|---|---|---|---|---|---|
| 6010C | 580-314277/65 | CCB | Aluminum | 0.111 | 0.22 | J | 1.5 | 0919MW44GW | U Flag |
| 6010C | 580-314277/65 | CCB | Aluminum | 0.111 | 1.2 | J | 1.5 | 0919MW46GW | None |
| 6010C | 580-314277/65 | CCB | Aluminum | 0.111 | 1.5 | | 1.5 | 0919MW49GW | None |
| 6010C | 580-314277/65 | CCB | Aluminum | 0.111 | 0.53 | J | 1.5 | 0919MW52GW | U Flag |
| 6010C | 580-314277/65 | CCB | Aluminum | 0.111 | 0.11 | J | 1.5 | 0919MW54GW | U Flag |
| 6010C | 580-314277/65 | CCB | Magnesium | 0.244 | 30 | | 1.1 | 0919MW06GW | None |
| 6010C | 580-314277/65 | CCB | Magnesium | 0.244 | 59 | | 1.1 | 0919MW16GW | None |
| 6010C | 580-314277/65 | CCB | Magnesium | 0.244 | 19 | | 1.1 | 0919MW17GW | None |
| 6010C | 580-314277/65 | CCB | Magnesium | 0.244 | 13 | | 1.1 | 0919MW19AGW | None |
| 6010C | 580-314277/65 | CCB | Magnesium | 0.244 | 36 | | 1.1 | 0919MW26GW | None |
| 6010C | 580-314277/65 | CCB | Magnesium | 0.244 | 47 | | 1.1 | 0919MW40GW | None |
| 6010C | 580-314277/65 | CCB | Magnesium | 0.244 | 32 | | 1.1 | 0919MW44GW | None |
| 6010C | 580-314277/65 | CCB | Magnesium | 0.244 | 21 | | 1.1 | 0919MW46GW | None |
| 6010C | 580-314277/65 | CCB | Magnesium | 0.244 | 21 | | 1.1 | 0919MW47GW | None |
| 6010C | 580-314277/65 | CCB | Magnesium | 0.244 | 11 | | 1.1 | 0919MW49GW | None |
| 6010C | 580-314277/65 | CCB | Magnesium | 0.244 | 56 | | 1.1 | 0919MW50GW | None |
| 6010C | 580-314277/65 | CCB | Magnesium | 0.244 | 23 | | 1.1 | 0919MW51GW | None |
| 6010C | 580-314277/65 | CCB | Magnesium | 0.244 | 36 | | 1.1 | 0919MW52GW | None |
| 6010C | 580-314277/65 | CCB | Magnesium | 0.244 | 21 | | 1.1 | 0919MW53GW | None |
| 6010C | 580-314277/65 | CCB | Magnesium | 0.244 | 36 | | 1.1 | 0919MW54GW | None |
| 6010C | 580-314277/65 | CCB | Magnesium | 0.244 | 54 | | 1.1 | 0919MW101GW | None |
| 6010C | 580-314277/65 | CCB | Magnesium | 0.244 | 53 | | 1.1 | 0919MW29GW | None |
| 6010C | 580-314277/65 | CCB | Magnesium | 0.244 | 19 | | 1.1 | 0919MW102GW | None |
| 6010C | 580-314277/65 | CCB | Magnesium | 0.244 | 19 | | 1.1 | 0919MW48GW | None |
| 6010C | 580-314277/116 | CCB | Iron | 0.329 | 12 | | 0.5 | 0919MW55GW | None |
| 6010C | 580-314277/116 | CCB | Iron | 0.329 | 3.7 | | 0.5 | 0919MW58GW | None |
| 6010C | 580-314277/116 | CCB | Iron | 0.329 | 1.6 | | 0.5 | 0919MW59GW | U Flag |
| 6010C | 580-314277/128 | CCB | Magnesium | 0.133 | 52 | | 1.1 | 0919MW56GW | None |
| 6010C | 580-314277/128 | CCB | Magnesium | 0.133 | 6.7 | | 1.1 | 0919MW57GW | None |
| 6010C | 580-314277/128 | CCB | Magnesium | 0.133 | 24 | | 1.1 | 0919MW58GW | None |
| 6010C | 580-314277/128 | CCB | Magnesium | 0.133 | 55 | | 1.1 | 0919MW59GW | None |
| 6020A | 580-314274/178 | CCB | Antimony | 0.179 | 2.2 | | 2 | 0919MW101GW | None |

| Method | Blank | Matrix | Analyte | Blank Result | Sample Result | Lab Qualifier | PQL | Affected Samples | Sample Flag |
|---|---|---|---|---|---|---|---|---|---|
| 6020A | 580-314274/178 | CCB | Antimony | 0.179 | 1.5 | J | 2 | 0919MW29GW | None |
| 6020A | 580-314274/178 | CCB | Antimony | 0.179 | 12 | | 2 | 0919MW06GW | None |
| 6020A | 580-314274/178 | CCB | Antimony | 0.179 | 440 | | 2 | 0919MW16GW | None |
| 6020A | 580-314274/178 | CCB | Antimony | 0.179 | 12 | | 2 | 0919MW17GW | None |
| 6020A | 580-314274/178 | CCB | Antimony | 0.179 | 1.1 | J | 2 | 0919MW19AGW | None |
| 6020A | 580-314274/178 | CCB | Antimony | 0.179 | 18 | | 2 | 0919MW26GW | None |
| 6020A | 580-314274/178 | CCB | Antimony | 0.179 | 6.1 | | 2 | 0919MW40GW | None |
| 6020A | 580-314274/194 | CCB | Arsenic | 0.246 | 4.1 | J | 5 | 0919MW48GW | None |
| 6020A | 580-314274/194 | CCB | Arsenic | 0.246 | 6 | | 5 | 0919MW46GW | None |
| 6020A | 580-314274/194 | CCB | Arsenic | 0.246 | 3.7 | J | 5 | 0919MW47GW | None |
| 6020A | 580-314274/194 | CCB | Arsenic | 0.246 | 9.6 | | 5 | 0919MW49GW | None |
| 6020A | 580-314274/194 | CCB | Arsenic | 0.246 | 430 | | 5 | 0919MW50GW | None |
| 6020A | 580-314274/194 | CCB | Arsenic | 0.246 | 9.7 | | 5 | 0919MW51GW | None |
| 6020A | 580-314274/194 | CCB | Arsenic | 0.246 | 35 | | 5 | 0919MW52GW | None |
| 6020A | 580-314274/194 | CCB | Arsenic | 0.246 | 5.2 | | 5 | 0919MW53GW | None |
| 6020A | 580-314274/194 | CCB | Arsenic | 0.246 | 47 | | 5 | 0919MW54GW | None |
| 6020A | 580-314274/194 | CCB | Antimony | 0.186 | 0.57 | J | 2 | 0919MW46GW | U Flag |
| 6020A | 580-314274/194 | CCB | Antimony | 0.186 | 0.63 | J | 2 | 0919MW49GW | U Flag |
| 6020A | 580-314274/194 | CCB | Antimony | 0.186 | 8.3 | | 2 | 0919MW50GW | None |
| 6020A | 580-314274/194 | CCB | Antimony | 0.186 | 3.3 | | 2 | 0919MW52GW | None |
| 6020A | 580-314274/194 | CCB | Antimony | 0.186 | 1.1 | J | 2 | 0919MW54GW | None |
| 6020A | 580-314302/13 | CCB | Antimony | 0.225 | 8 | | 2 | 0919MW55GW | None |
| 6020A | 580-314302/13 | CCB | Arsenic | 0.420 | 26 | | 5 | 0919MW55GW | None |
| EPA 353.2 | SHJ0230-CCB3 | CCB | Nitrate + Nitrite as N | -0.012 | 1.31 | | 0.01 | 0919MW48GW | None |

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**Table 2B – List of Samples Qualified for Field Blank Contamination**

None.

**Table 3 – List of Samples with Surrogates outside Control Limits**

| Method | Sample ID | Sample Type | Analyte | Rec. % | Low Limit | High Limit | Dilution Factor | Sample Qualifier |
|---|---|---|---|---|---|---|---|---|
| 8270D | 580-312174/1-A | MB | 2,4,6-Tribromophenol | 8 | 48 | 125 | 1 | UR Flag |
| 8270D | 580-312174/1-A | MB | 2-Fluorophenol | 0.3 | 36 | 120 | 1 | UR Flag |

| Method | Sample ID | Sample Type | Analyte | Rec. % | Low Limit | High Limit | Dilution Factor | Sample Qualifier |
|---|---|---|---|---|---|---|---|---|
| 8270D | 580-312174/1-A | MB | Phenol-d5 | 0 | 38 | 120 | 1 | UR Flag |
| 8270D | 580-313338/1-A | MB | 2-Fluorophenol | 2 | 36 | 120 | 1 | R Flag |
| 8270D | 580-313338/1-A | MB | Phenol-d5 | 20 | 38 | 120 | 1 | R Flag |
| 8270D | 580-312174/2-A | LCS | 2-Fluorophenol | 0.5 | 36 | 120 | 1 | UR Flag |
| 8270D | 580-312174/2-A | LCS | Phenol-d5 | 7 | 38 | 120 | 1 | UR Flag |
| 8270D | 580-312174/3-A | LCSD | 2,4,6-Tribromophenol | 16 | 48 | 125 | 1 | UR Flag |
| 8270D | 580-312174/3-A | LCSD | 2-Fluorophenol | 0 | 36 | 120 | 1 | UR Flag |
| 8270D | 580-312174/3-A | LCSD | Phenol-d5 | 5 | 38 | 120 | 1 | UR Flag |
| 8270D | 580-313338/3-A | LCSD | 2-Fluorophenol | 7 | 36 | 120 | 1 | R Flag |
| 8270D | 580-313338/3-A | LCSD | Phenol-d5 | 37 | 38 | 120 | 1 | R Flag |
| 8270D | 0919MW19BGW | N | 2-Fluorophenol | 2 | 36 | 120 | 1 | UR/R Flag |
| 8270D | 0919MW19BGW | N | Phenol-d5 | 17 | 38 | 120 | 1 | UR/R Flag |
| 8270D | 0919MW19BGW | RE | 2-Fluorophenol | 6 | 36 | 120 | 1 | R Flag |
| 8270D | 0919MW19BGW | RE | Phenol-d5 | 25 | 38 | 120 | 1 | R Flag |

**Table 4 – List of MS/MSD Recoveries outside Control Limits**

| Method | Sample ID | Sample Type | Analyte | Orig. Result | Spike Amount | MS | MSD | Low Limit | High Limit | Sample Qualifier |
|---|---|---|---|---|---|---|---|---|---|---|
| 8270D | 0919MW19BGW | MS/MSD | 2,4-Dimethylphenol | ND | 1.89 | 0 | 0 | 20 | 120 | UR Flag |
| 8270D | 0919MW19BGW | MS/MSD | 3,3'-Dichlorobenzidine | ND | 3.78 | 0 | 0 | 20 | 150 | UR Flag |
| 8270D | 0919MW19BGW | MSD | Benzyl Alcohol | ND | 1.79 | 40 | 0 | 20 | 150 | UJ Flag |
| 8270D | 0919MW19BGW | MS | 4,6-Dinitro-2-methylphenol | ND | 3.78 | 0 | 77 | 20 | 150 | UJ Flag |
| 8270D | 0919MW19BGW | MS/MSD | Hexachlorocyclopentadiene | ND | 1.89 | 4 | 15 | 20 | 120 | UJ Flag |
| 8270D | 0919MW19BGW | MS/MSD | Pentachlorophenol | ND | 3.78 | 0 | 0 | 20 | 135 | UJ Flag |
| 300.0 | 0919MW45GW | MS/MSD | Chloride | 0.83 | 50 | 115 | 115 | 90 | 110 | J Flag |
| 300.0 | 0919MW45GW | MS/MSD | Sulfate | 4.8 | 50 | 117 | 117 | 90 | 110 | J Flag |
| 300.0 | 0919MW47GW | MS/MSD | Sulfate | 4.7 | 50 | 111 | 111 | 90 | 110 | J Flag |

**Table 4A – List of RPDs outside Control Limits**

| Method | Sample ID | Sample Type | Analyte | RPD | RPD Limit | Sample Qualifier |
|---|---|---|---|---|---|---|
| 8270D | 0919MW19BGW | MS/MSD | Hexachlorocyclopentadiene | 110 | 35 | UJ Flag |
| 8270D | 0919MW19BGW | MS/MSD | Anthracene | 31 | 26 | None |

**Table 5 – List of LCS Recoveries outside Control Limits**

| Method | Sample ID | Analyte | Rec. | Low Limit | High Limit | Sample Qualifier |
|---|---|---|---|---|---|---|
| 8270D | LCS 580-312174/2-A | 2,4,5-Trichlorophenol | 29 | 56 | 122 | UR Flag |
| 8270D | LCS 580-312174/2-A | 2,4,6-Trichlorophenol | 18 | 50 | 126 | UR Flag |
| 8270D | LCS 580-312174/2-A | 2,4-Dichlorophenol | 12 | 54 | 120 | UR Flag |
| 8270D | LCS 580-312174/2-A | 2,4-Dinitrophenol | 0 | 20 | 150 | UR Flag |
| 8270D | LCS 580-312174/2-A | 2-Chlorophenol | 5 | 54 | 120 | UR Flag |
| 8270D | LCS 580-312174/2-A | 2-Methylphenol | 24 | 43 | 120 | UR Flag |
| 8270D | LCS 580-312174/2-A | 2-Nitrophenol | 24 | 41 | 127 | UR Flag |
| 8270D | LCS 580-312174/2-A | 3 & 4 Methylphenol | 19 | 43 | 120 | UR Flag |
| 8270D | LCS 580-312174/2-A | 4-Chloro-3-methylphenol | 30 | 47 | 126 | UR Flag |
| 8270D | LCS 580-312174/2-A | 4-Nitroaniline | 121 | 51 | 120 | UR Flag |
| 8270D | LCS 580-312174/2-A | Benzoic acid | 0 | 20 | 120 | UR Flag |
| 8270D | LCS 580-312174/2-A | Carbazole | 145 | 67 | 135 | UR Flag |
| 8270D | LCS 580-312174/2-A | Phenol | 7 | 41 | 120 | UR Flag |
| 8270D | LCSD 580-312174/3-A | 2,4,5-Trichlorophenol | 6 | 56 | 122 | UR Flag |
| 8270D | LCSD 580-312174/3-A | 2,4,6-Trichlorophenol | 6 | 50 | 126 | UR Flag |
| 8270D | LCSD 580-312174/3-A | 2,4-Dichlorophenol | 4 | 54 | 120 | UR Flag |
| 8270D | LCSD 580-312174/3-A | 2,4-Dinitrophenol | 0 | 20 | 150 | UR Flag |
| 8270D | LCSD 580-312174/3-A | 2-Chlorophenol | 2 | 54 | 120 | UR Flag |
| 8270D | LCSD 580-312174/3-A | 2-Methylphenol | 35 | 43 | 120 | UR Flag |
| 8270D | LCSD 580-312174/3-A | 2-Nitrophenol | 8 | 41 | 127 | UR Flag |
| 8270D | LCSD 580-312174/3-A | 3 & 4 Methylphenol | 24 | 43 | 120 | UR Flag |
| 8270D | LCSD 580-312174/3-A | 3,3'-Dichlorobenzidine | 0.8 | 20 | 150 | UR Flag |
| 8270D | LCSD 580-312174/3-A | 4,6-Dinitro-2-methylphenol | 25 | 20 | 150 | UR Flag |
| 8270D | LCSD 580-312174/3-A | 4-Chloro-3-methylphenol | 33 | 47 | 126 | UR Flag |
| 8270D | LCSD 580-312174/3-A | 4-Chloroaniline | 43 | 20 | 120 | UR Flag |
| 8270D | LCSD 580-312174/3-A | 4-Nitroaniline | 83 | 51 | 120 | UR Flag |
| 8270D | LCSD 580-312174/3-A | 4-Nitrophenol | 43 | 33 | 150 | UR Flag |
| 8270D | LCSD 580-312174/3-A | Benzoic acid | 0 | 20 | 120 | UR Flag |
| 8270D | LCSD 580-312174/3-A | Bis(2-chloroethoxy)methane | 71 | 53 | 120 | UR Flag |
| 8270D | LCSD 580-312174/3-A | Bis(2-ethylhexyl) phthalate | 361 | 20 | 150 | UR Flag |
| 8270D | LCSD 580-312174/3-A | Carbazole | 91 | 67 | 135 | UR Flag |

| Method | Sample ID | Analyte | Rec. | Low Limit | High Limit | Sample Qualifier |
|---|---|---|---|---|---|---|
| 8270D | LCSD 580-312174/3-A | Hexachlorocyclopentadiene | 7 | 20 | 120 | UR Flag |
| 8270D | LCSD 580-312174/3-A | Pentachlorophenol | 13 | 20 | 135 | UR Flag |
| 8270D | LCSD 580-312174/3-A | Phenol | 6 | 41 | 120 | UR Flag |
| 8270D | LCS 580-313338/2-A | 2,4-Dimethylphenol | 17 | 20 | 120 | UR Flag |
| 8270D | LCS 580-313338/2-A | 2-Chlorophenol | 41 | 54 | 120 | UR Flag |
| 8270D | LCS 580-313338/2-A | 3,3'-Dichlorobenzidine | 11 | 20 | 150 | UR Flag |
| 8270D | LCS 580-313338/2-A | Benzo[a]pyrene | 34 | 41 | 120 | UR Flag |
| 8270D | LCS 580-313338/2-A | Hexachlorocyclopentadiene | 2 | 20 | 120 | UR Flag |
| 8270D | LCSD 580-313338/3-A | 2,4-Dimethylphenol | 16 | 20 | 120 | UR Flag |
| 8270D | LCSD 580-313338/3-A | 2-Chlorophenol | 36 | 54 | 120 | UR Flag |
| 8270D | LCSD 580-313338/3-A | 3,3'-Dichlorobenzidine | 10 | 20 | 150 | UR Flag |
| 8270D | LCSD 580-313338/3-A | Benzo[a]pyrene | 29 | 41 | 120 | UR Flag |
| 8270D | LCSD 580-313338/3-A | Hexachlorocyclopentadiene | 2 | 20 | 120 | UR Flag |
| 8270D | LCSD 580-313338/3-A | Phenol | 36 | 41 | 120 | UR Flag |

**Table 5A – List of RPDs outside Control Limits**

| Method | Sample ID | Sample Type | Analyte | RPD | RPD Limit | Sample Qualifier |
|---|---|---|---|---|---|---|
| 8270D | 580-312174 | LCS/LCSD | 2,4,5-Trichlorophenol | 126 | 35 | UR Flag |
| 8270D | 580-312174 | LCS/LCSD | 2,4,6-Trichlorophenol | 101 | 20 | UR Flag |
| 8270D | 580-312174 | LCS/LCSD | 2,4-Dichlorophenol | 105 | 35 | UR Flag |
| 8270D | 580-312174 | LCS/LCSD | 2-Chlorophenol | 94 | 35 | UR Flag |
| 8270D | 580-312174 | LCS/LCSD | 2-Methylphenol | 38 | 35 | UR Flag |
| 8270D | 580-312174 | LCS/LCSD | 2-Nitrophenol | 103 | 35 | UR Flag |
| 8270D | 580-312174 | LCS/LCSD | 3 & 4 Methylphenol | 26 | 35 | UR Flag |
| 8270D | 580-312174 | LCS/LCSD | 3,3'-Dichlorobenzidine | 197 | 35 | UR Flag |
| 8270D | 580-312174 | LCS/LCSD | 4,6-Dinitro-2-methylphenol | 54 | 35 | UR Flag |
| 8270D | 580-312174 | LCS/LCSD | 4-Chloroaniline | 61 | 35 | UR Flag |
| 8270D | 580-312174 | LCS/LCSD | 4-Nitroaniline | 38 | 35 | UR Flag |
| 8270D | 580-312174 | LCS/LCSD | 4-Nitrophenol | 39 | 35 | UR Flag |
| 8270D | 580-312174 | LCS/LCSD | Bis(2-chloroethoxy)methane | 30 | 27 | UR Flag |
| 8270D | 580-312174 | LCS/LCSD | Bis(2-ethylhexyl) phthalate | 91 | 35 | UR Flag |
| 8270D | 580-312174 | LCS/LCSD | Carbazole | 46 | 20 | UR Flag |

| Method | Sample ID | Sample Type | Analyte | RPD | RPD Limit | Sample Qualifier |
|---|---|---|---|---|---|---|
| 8270D | 580-312174 | LCS/LCSD | Hexachlorocyclopentadiene | 99 | 35 | UR Flag |
| 8270D | 580-312174 | LCS/LCSD | Pentachlorophenol | 76 | 35 | UR Flag |

**Table 6 – List of Serial Dilution Recoveries outside Control Limits**
None.

**Table 7 – Samples that were Re-analyzed**

| Sample ID | Lab ID | Method | Sample Type | Action |
|---|---|---|---|---|
| 0919MW16GW | 580-89377-4 | 300.0 | WG | 10X: Per the laboratory, the sample required dilution prior to analysis. Only the result for sulfate was reported from the dilution and was detected greater than the MDL. No impact to data usability. |
| 0919MW06GW | 580-89377-1 | 6020A | WG | 5X: Per the laboratory, the sample required dilution prior to analysis. No impact to data usability. |
| 0919MW101GW | 580-89377-2 | 6020A | WG | 5X: Per the laboratory, the sample required dilution prior to analysis. No impact to data usability. |
| 0919MW102GW | 580-89377-3 | 6020A | WG | 5X: Per the laboratory, the sample required dilution prior to analysis. No impact to data usability. |
| 0919MW16GW | 580-89377-4 | 6020A | WG | 5X: Per the laboratory, the sample required dilution prior to analysis. No impact to data usability. |
| 0919MW17GW | 580-89377-5 | 6020A | WG | 5X: Per the laboratory, the sample required dilution prior to analysis. No impact to data usability. |
| 0919MW19AGW | 580-89377-6 | 6020A | WG | 5X: Per the laboratory, the sample required dilution prior to analysis. No impact to data usability. |
| 0919MW26GW | 580-89377-8 | 6020A | WG | 5X: Per the laboratory, the sample required dilution prior to analysis. No impact to data usability. |
| 0919MW29GW | 580-89377-9 | 6020A | WG | 5X: Per the laboratory, the sample required dilution prior to analysis. No impact to data usability. |
| 0919MW40GW | 580-89377-10 | 6020A | WG | 5X: Per the laboratory, the sample required dilution prior to analysis. No impact to data usability. |
| 0919MW44GW | 580-89377-11 | 6020A | WG | 5X: Per the laboratory, the sample required dilution prior to analysis. No impact to data usability. |
| 0919MW45GW | 580-89377-12 | 6020A | WG | 5X: Per the laboratory, the sample required dilution prior to analysis. No impact to data usability. |
| 0919MW46GW | 580-89377-13 | 6020A | WG | 5X: Per the laboratory, the sample required dilution prior to analysis. No impact to data usability. |
| 0919MW47GW | 580-89377-14 | 6020A | WG | 5X: Per the laboratory, the sample required dilution prior to analysis. No impact to data usability. |
| 0919MW48GW | 580-89377-15 | 6020A | WG | 5X: Per the laboratory, the sample required dilution prior to analysis. No impact to data usability. |
| 0919MW49GW | 580-89377-16 | 6020A | WG | 5X: Per the laboratory, the sample required dilution prior to analysis. No impact to data usability. |
| 0919MW50GW | 580-89377-17 | 6020A | WG | 5X: Per the laboratory, the sample required dilution prior to analysis. No impact to data usability. |
| 0919MW51GW | 580-89377-18 | 6020A | WG | 5X: Per the laboratory, the sample required dilution prior to analysis. No impact to data usability. |
| 0919MW52GW | 580-89377-19 | 6020A | WG | 5X: Per the laboratory, the sample required dilution prior to analysis. No impact to data usability. |
| 0919MW53GW | 580-89377-20 | 6020A | WG | 5X: Per the laboratory, the sample required dilution prior to analysis. No impact to data usability. |
| 0919MW54GW | 580-89377-21 | 6020A | WG | 5X: Per the laboratory, the sample required dilution prior to analysis. No impact to data usability. |
| 0919MW55GW | 580-89377-22 | 6020A | WG | 5X: Per the laboratory, the sample required dilution prior to analysis. No impact to data usability. |
| 0919MW56GW | 580-89377-23 | 6020A | WG | 5X: Per the laboratory, the sample required dilution prior to analysis. No impact to data usability. |

| Sample ID | Lab ID | Method | Sample Type | Action |
|---|---|---|---|---|
| 0919MW57GW | 580-89377-24 | 6020A | WG | 5X: Per the laboratory, the sample required dilution prior to analysis. No impact to data usability. |
| 0919MW58GW | 580-89377-25 | 6020A | WG | 5X: Per the laboratory, the sample required dilution prior to analysis. No impact to data usability. |
| 0919MW59GW | 580-89377-26 | 6020A | WG | 5X: Per the laboratory, the sample required dilution prior to analysis. No impact to data usability. |

**Table 8 – Summary of Field Duplicate Results**

| Method | Analyte | Unit | Matrix | PQL | 0919MW29GW | 0919MW101GW | RPD | RPD Rating | Sample Qual |
|---|---|---|---|---|---|---|---|---|---|
| SM 2320B | Alkalinity | mg/L | WG | 5 | 290 | 290 | 0.0% | Good | None |
| SW846 6020A | Antimony | mg/L | WG | 0 | 0.0015 | 0.0022 | 37.8% | Good | None |
| SW846 6020A | Arsenic | mg/L | WG | 0.01 | 0.051 | 0.047 | 8.2% | Good | None |
| SW846 6020A | Barium | mg/L | WG | 0.01 | 0.23 | 0.23 | 0.0% | Good | None |
| SM 2320B | Bicarbonate Alkalinity as CaCO3 | mg/L | WG | 5 | 290 | 290 | 0.0% | Good | None |
| SW846 6010C | Calcium | mg/L | WG | 1.1 | 57 | 57 | 0.0% | Good | None |
| MCAWW 300.0 | Chloride | mg/L | WG | 0.9 | 0.64 | 0.65 | 1.6% | Good | None |
| SW846 6020A | Chromium | mg/L | WG | 0.002 | 0.0024 | ND | NC | -- | None |
| SW846 6020A | Cobalt | mg/L | WG | 0.002 | 0.00046 | 0.00039 | 16.5% | Good | None |
| MCAWW 300.0 | Fluoride | mg/L | WG | 0.2 | 0.11 | 0.097 | 12.6% | Good | None |
| SW846 6010C | Iron | mg/L | WG | 0.5 | 2.4 | 2.3 | 4.3% | Good | None |
| SW846 6010C | Magnesium | mg/L | WG | 1.1 | 53 | 54 | 1.9% | Good | None |
| SW846 6020A | Manganese | mg/L | WG | 0.01 | 0.4 | 0.39 | 2.5% | Good | None |
| SW846 6020A | Nickel | mg/L | WG | 0.02 | 0.0012 | 0.00084 | 35.3% | Good | None |
| SW846 6010C | Potassium | mg/L | WG | 3.3 | 0.96 | 1.1 | 13.6% | Good | None |
| SW846 6010C | Sodium | mg/L | WG | 2 | 2 | 2 | 0.0% | Good | None |
| MCAWW 300.0 | Sulfate | mg/L | WG | 1.2 | 36 | 36 | 0.0% | Good | None |
| SM 2540D | Total Suspended Solids | mg/L | WG | 2 | 5.8 | 4.4 | 27.5% | Good | None |
| SW846 6020A | Vanadium | mg/L | WG | 0.02 | 0.019 | 0.017 | 11.1% | Good | None |

| Method | Analyte | Unit | Matrix | PQL | 0919MW48GW | 0919MW102GW | RPD | RPD Rating | Sample Qual |
|---|---|---|---|---|---|---|---|---|---|
| SM 2320B | Alkalinity | mg/L | WG | 5 | 8.6 | 120 | 173.3% | Poor | J Flag |
| SM 2320B | Bicarbonate Alkalinity as CaCO3 | mg/L | WG | 5 | 8.6 | 120 | 173.3% | Poor | J Flag |
| SW846 6020A | Arsenic | mg/L | WG | 0.01 | 0.0041 | 0.004 | 2.5% | Good | None |

| Data Usability Summary Report | Project: Red Devil Mine: Baseline Monitoring |
|---|---|
| Date Completed: December 19, 2019 | Completed by: Eridania Marte |

| Method | Analyte | Unit | Matrix | PQL | 0919MW48GW | 0919MW102GW | RPD | RPD Rating | Sample Qual |
|---|---|---|---|---|---|---|---|---|---|
| SW846 6020A | Barium | mg/L | WG | 0.01 | 0.049 | 0.052 | 5.9% | Good | None |
| SW846 6010C | Calcium | mg/L | WG | 1.1 | 21 | 22 | 4.7% | Good | None |
| MCAWW 300.0 | Chloride | mg/L | WG | 0.9 | 0.74 | 0.74 | 0.0% | Good | None |
| SW846 6020A | Chromium | mg/L | WG | 0.002 | ND | 0.00091 | NC | -- | None |
| MCAWW 300.0 | Fluoride | mg/L | WG | 0.2 | 0.096 | 0.096 | 0.0% | Good | None |
| SW846 6010C | Magnesium | mg/L | WG | 1.1 | 19 | 19 | 0.0% | Good | None |
| SW846 6020A | Manganese | mg/L | WG | 0.01 | 0.061 | 0.084 | 31.7% | Good | None |
| SW846 6010C | Potassium | mg/L | WG | 3.3 | 0.46 | 0.61 | 28.0% | Good | None |
| SW846 6010C | Sodium | mg/L | WG | 2 | 1.6 | 1.8 | 11.8% | Good | None |
| MCAWW 300.0 | Sulfate | mg/L | WG | 1.2 | 4.1 | 4.3 | 4.8% | Good | None |
| SW846 6020A | Vanadium | mg/L | WG | 0.02 | 0.018 | 0.018 | 0.0% | Good | None |
| EPA 353.2 | Nitrate + Nitrite as N | mg/L | WG | 0.05 | 1.31 | 1.36 | 3.7% | Good | None |

**Acronym List and Table Key**:

CCB = continuing calibration blank
CCV = continuing calibration verification
CCVL = reporting limit continuing calibration verification
COC = chain of custody
CRDL = contract required detection limits
DUSR = data usability summary report
FD = field duplicate
ICB = initial calibration blank
ICS = interference check standard
ICV = initial calibration verification
ICVL = reporting limit initial calibration verification
LCS = laboratory control sample
LCSD = laboratory control sample duplicate
LR = laboratory replicate
MB = method blank
MS = matrix spike

**Acronym List and Table Key**:

| | | |
|---|---|---|
| MSD | = | matrix spike duplicate |
| N | = | normal sample |
| ND | = | not detected |
| PAH | = | polycyclic aromatic hydrocarbons |
| PDS | = | post-digestion spike |
| PQL | = | practical quantitation limit |
| QA | = | quality assurance |
| QAPP | = | quality assurance project plan |
| QC | = | quality control |
| RB | = | rinsate blank |
| RL | = | reporting limit |
| RPD | = | relative percent difference |
| RSD | = | relative standard deviation |
| SDG | = | sample delivery group |
| TDS | = | total dissolved solids |
| TSS | = | total suspended solids |

| Data Usability Summary Report | Project: Red Devil Mine: Baseline Monitoring |
|---|---|
| Date Completed: December 17, 2019 | Completed by: Eridania Marte |

The analytical data provided by the laboratory were reviewed for precision, accuracy, and completeness based on applicable sections of the following guidelines.

- *Final Quality Assurance Project Plan, Baseline Monitoring, Red Devil mine, Alaska.* May 2019.
- *National Functional Guidelines for Inorganic Superfund Methods Data Review*. EPA-540-R-2017-001, January 2017.

Specific criteria for QC limits were obtained from the site specific QAPP. Compliance with the project QA program is indicated in the checklist and tables below. Any major or minor concerns affecting data usability are listed below. The checklist and tables also indicate whether data qualification is required and/or the type of qualifier assigned.

Reference:

| Laboratory | Sample Delivery Group | Project Code |
|---|---|---|
| Brooks Applied Labs | 1938089<br>1938090 | 1001095.0026.03 |

| Work Order | Matrix | Sample ID | Lab ID | Sample Date | QC | Comment |
|---|---|---|---|---|---|---|
| 1938089 | WQ | 0919EB01 | 1938089-56RE1 | 09/18/2019 | | Total |
| 1938089 | WQ | 0919FB01 | 1938089-57RE1 | 09/10/2019 | | Total |
| 1938089 | WQ | 0919FB02 | 1938089-58RE1 | 09/11/2019 | | Total |
| 1938089 | WQ | 0919FB03 | 1938089-59RE1 | 09/13/2019 | | Total |
| 1938089 | WQ | 0919FB04 | 1938089-01RE1 | 09/14/2019 | | Total |
| 1938089 | WQ | 0919FB05 | 1938089-02RE1 | 09/15/2019 | | Total |
| 1938089 | WQ | 0919FB06 | 1938089-03RE1 | 09/16/2019 | | Total |
| 1938089 | WQ | 0919FB07 | 1938089-04RE1 | 09/17/2019 | | Total |
| 1938089 | WG | 0919MW01GW | 1938089-60RE1 | 09/12/2019 | MS/MSD | Total |
| 1938089 | WG | 0919MW01GW | 1938089-61RE1 | 09/12/2019 | | Dissolved |
| 1938089 | WG | 0919MW06GW | 1938089-05 | 09/14/2019 | | Total |
| 1938089 | WG | 0919MW06GW | 1938089-06 | 09/14/2019 | | Dissolved |
| 1938089 | WG | 0919MW08GW | 1938089-62RE1 | 09/13/2019 | | Total |
| 1938089 | WG | 0919MW08GW | 1938089-63RE1 | 09/13/2019 | | Dissolved |
| 1938089 | WG | 0919MW09GW | 1938089-64RE1 | 09/13/2019 | MS/MSD | Total |
| 1938089 | WG | 0919MW09GW | 1938089-65RE1 | 09/13/2019 | | Dissolved |
| 1938089 | WG | 0919MW101GW | 1938089-07 | 09/14/2019 | | Total |
| 1938089 | WG | 0919MW101GW | 1938089-08RE1 | 09/14/2019 | | Dissolved |
| 1938089 | WG | 0919MW102GW | 1938089-09 | 09/17/2019 | | Total |
| 1938089 | WG | 0919MW102GW | 1938089-10 | 09/17/2019 | | Dissolved |
| 1938089 | WG | 0919MW10GW | 1938089-66RE1 | 09/12/2019 | MS/MSD | Total |
| 1938089 | WG | 0919MW10GW | 1938089-67RE1 | 09/12/2019 | MS/MSD | Dissolved |
| 1938089 | WG | 0919MW16GW | 1938089-11 | 09/14/2019 | | Total |
| 1938089 | WG | 0919MW16GW | 1938089-12 | 09/14/2019 | | Dissolved |
| 1938089 | WG | 0919MW17GW | 1938089-13 | 09/14/2019 | | Total |
| 1938089 | WG | 0919MW17GW | 1938089-14 | 09/14/2019 | | Dissolved |
| 1938089 | WG | 0919MW19AGW | 1938089-15 | 09/13/2019 | MS/MSD | Total |
| 1938089 | WG | 0919MW19AGW | 1938089-16RE1 | 09/13/2019 | | Dissolved |

| Work Order | Matrix | Sample ID | Lab ID | Sample Date | QC | Comment |
|---|---|---|---|---|---|---|
| 1938089 | WG | 0919MW22GW | 1938089-68RE1 | 09/13/2019 | | Total |
| 1938089 | WG | 0919MW22GW | 1938089-69RE1 | 09/13/2019 | | Dissolved |
| 1938089 | WG | 0919MW26GW | 1938089-17 | 09/14/2019 | | Total |
| 1938089 | WG | 0919MW26GW | 1938089-18 | 09/14/2019 | | Dissolved |
| 1938089 | WG | 0919MW27GW | 1938089-70RE1 | 09/11/2019 | | Total |
| 1938089 | WG | 0919MW27GW | 1938089-71RE1 | 09/11/2019 | | Dissolved |
| 1938089 | WG | 0919MW28GW | 1938089-72RE1 | 09/11/2019 | | Total |
| 1938089 | WG | 0919MW28GW | 1938089-73RE1 | 09/11/2019 | | Dissolved |
| 1938089 | WG | 0919MW29GW | 1938089-19 | 09/14/2019 | | Total |
| 1938089 | WG | 0919MW29GW | 1938089-20RE1 | 09/14/2019 | | Dissolved |
| 1938089 | WG | 0919MW32GW | 1938089-74RE1 | 09/13/2019 | MS/MSD | Total |
| 1938089 | WG | 0919MW32GW | 1938089-75RE1 | 09/13/2019 | | Dissolved |
| 1938089 | WG | 0919MW33GW | 1938089-76RE1 | 09/13/2019 | | Total |
| 1938089 | WG | 0919MW33GW | 1938089-77RE1 | 09/13/2019 | | Dissolved |
| 1938089 | WG | 0919MW40GW | 1938089-21RE1 | 09/17/2019 | | Total |
| 1938089 | WG | 0919MW40GW | 1938089-22RE1 | 09/17/2019 | | Dissolved |
| 1938089 | WG | 0919MW42GW | 1938089-78RE1 | 09/12/2019 | | Total |
| 1938089 | WG | 0919MW42GW | 1938089-79RE1 | 09/12/2019 | | Dissolved |
| 1938089 | WG | 0919MW43GW | 1938089-80RE1 | 09/12/2019 | | Total |
| 1938089 | WG | 0919MW43GW | 1938089-81RE1 | 09/12/2019 | | Dissolved |
| 1938089 | WG | 0919MW44GW | 1938089-23RE1 | 09/17/2019 | MS/MSD | Total |
| 1938089 | WG | 0919MW44GW | 1938089-24RE1 | 09/17/2019 | | Dissolved |
| 1938089 | WG | 0919MW45GW | 1938089-25 | 09/15/2019 | MS/MSD | Total |
| 1938089 | WG | 0919MW45GW | 1938089-26 | 09/15/2019 | MS/MSD | Dissolved |
| 1938089 | WG | 0919MW46GW | 1938089-27 | 09/15/2019 | | Total |
| 1938089 | WG | 0919MW46GW | 1938089-28 | 09/15/2019 | | Dissolved |
| 1938089 | WG | 0919MW47GW | 1938089-29RE1 | 09/15/2019 | MS/MSD | Total |
| 1938089 | WG | 0919MW47GW | 1938089-30RE1 | 09/15/2019 | | Dissolved |
| 1938089 | WG | 0919MW48GW | 1938089-31RE1 | 09/17/2019 | | Total |
| 1938089 | WG | 0919MW48GW | 1938089-32RE1 | 09/17/2019 | | Dissolved |
| 1938089 | WG | 0919MW49GW | 1938089-33RE1 | 09/14/2019 | | Total |
| 1938089 | WG | 0919MW49GW | 1938089-34RE1 | 09/14/2019 | | Dissolved |
| 1938089 | WG | 0919MW50GW | 1938089-35RE1 | 09/16/2019 | | Total |
| 1938089 | WG | 0919MW50GW | 1938089-36RE1 | 09/16/2019 | | Dissolved |
| 1938089 | WG | 0919MW51GW | 1938089-37RE1 | 09/16/2019 | | Total |
| 1938089 | WG | 0919MW51GW | 1938089-38RE1 | 09/16/2019 | | Dissolved |
| 1938089 | WG | 0919MW52GW | 1938089-39RE1 | 09/15/2019 | | Total |
| 1938089 | WG | 0919MW52GW | 1938089-40RE1 | 09/15/2019 | | Dissolved |
| 1938089 | WG | 0919MW53GW | 1938089-41RE1 | 09/16/2019 | MS/MSD | Total |
| 1938089 | WG | 0919MW53GW | 1938089-42RE1 | 09/16/2019 | | Dissolved |
| 1938089 | WG | 0919MW54GW | 1938089-43RE1 | 09/16/2019 | MS/MSD | Total |
| 1938089 | WG | 0919MW54GW | 1938089-44RE1 | 09/16/2019 | | Dissolved |

| Work Order | Matrix | Sample ID | Lab ID | Sample Date | QC | Comment |
|---|---|---|---|---|---|---|
| 1938089 | WG | 0919MW55GW | 1938089-45RE1 | 09/15/2019 | | Total |
| 1938089 | WG | 0919MW55GW | 1938089-46RE1 | 09/15/2019 | | Dissolved |
| 1938089 | WG | 0919MW56GW | 1938089-47RE1 | 09/15/2019 | | Total |
| 1938089 | WG | 0919MW56GW | 1938089-48RE1 | 09/15/2019 | | Dissolved |
| 1938089 | WG | 0919MW57GW | 1938089-49RE1 | 09/16/2019 | | Total |
| 1938089 | WG | 0919MW57GW | 1938089-50RE1 | 09/16/2019 | | Dissolved |
| 1938089 | WG | 0919MW58GW | 1938089-51RE1 | 09/16/2019 | | Total |
| 1938089 | WG | 0919MW58GW | 1938089-52RE1 | 09/16/2019 | | Dissolved |
| 1938089 | WG | 0919MW59GW | 1938089-53RE1 | 09/17/2019 | | Total |
| 1938089 | WG | 0919MW59GW | 1938089-54RE1 | 09/17/2019 | | Dissolved |
| 1938089 | WG | 0919MW99GW | 1938089-82RE1 | 09/12/2019 | | Total |
| 1938089 | WG | 0919MW99GW | 1938089-83RE1 | 09/12/2019 | | Dissolved |
| 1938089 | WQ | 0919TB04 | 1938089-55RE1 | 09/19/2019 | | Total |
| 1938090 | SW | 0919RD05SW | 1938090-01 | 09/10/2019 | MS/MSD | Total |
| 1938090 | SW | 0919RD05SW | 1938090-02 | 09/10/2019 | | Dissolved |
| 1938090 | SW | 0919RD06SW | 1938090-03 | 09/10/2019 | | Total |
| 1938090 | SW | 0919RD06SW | 1938090-04 | 09/10/2019 | | Dissolved |
| 1938090 | SW | 0919RD08SW | 1938090-05 | 09/10/2019 | | Total |
| 1938090 | SW | 0919RD08SW | 1938090-06 | 09/10/2019 | | Dissolved |
| 1938090 | SW | 0919RD10SW | 1938090-07 | 09/10/2019 | MS/MSD | Total |
| 1938090 | SW | 0919RD10SW | 1938090-08 | 09/10/2019 | | Dissolved |
| 1938090 | SW | 0919RD14SW | 1938090-09 | 09/10/2019 | | Total |
| 1938090 | SW | 0919RD14SW | 1938090-10 | 09/10/2019 | | Dissolved |
| 1938090 | SW | 0919RD15SW | 1938090-11 | 09/10/2019 | | Total |
| 1938090 | SW | 0919RD15SW | 1938090-12 | 09/10/2019 | | Dissolved |
| 1938090 | SW | 0919RD16SW | 1938090-13 | 09/10/2019 | MS/MSD | Total |
| 1938090 | SW | 0919RD16SW | 1938090-14 | 09/10/2019 | | Dissolved |
| 1938090 | SW | 0919RD99SW | 1938090-15 | 09/10/2019 | | Total |
| 1938090 | SW | 0919RD99SW | 1938090-16 | 09/10/2019 | | Dissolved |
| 1938090 | WQ | 0919TB01 | 1938090-17 | 09/11/2019 | | Total |

| SDG | Matrix | Test Method | Number of Samples | Sample Type |
|---|---|---|---|---|
| 1938089 | W | EPA 1631 – Low-Level Mercury | 1 | RB |
| 1938089 | W | EPA 1631 – Low-Level Mercury | 37 | N/FD |
| 1938089 | W | EPA 1631 – Dissolved Low-Level Mercury | 37 | N/FD |
| 1938089 | W | EPA 1631 – Low-Level Mercury | 7 | FB |
| 1938089 | W | EPA 1631 – Low-Level Mercury | 1 | EB |
| 1938089 | W | EPA 1631 – Low-Level Mercury | 1 | TB |
| 1938090 | W | EPA 1631 – Low-Level Mercury | 8 | N/FD |
| 1938090 | W | EPA 1631 – Dissolved Low-Level Mercury | 8 | N/FD |
| 1938090 | W | EPA 1631 – Low-Level Mercury | 1 | TB |

| General Sample Information | |
|---|---|
| Do Samples and Analyses on COC check against Lab Sample Tracking Form? | Yes. |
| Did coolers arrive at lab between 2 and 6°C and in good condition as indicated on COC and Cooler Receipt Form? | Thermal preservation of the samples is not required per the method. |
| Frequency of Field QC Samples Correct?<br>Field Duplicate - 1/20 samples<br>MS/MSD - 1/20 samples<br>Equipment Blank - 1/ set of samples per day? | - Three field duplicates for total and dissolved portions were collected for 34 groundwater samples.<br>- One field duplicate was collected for total and dissolved portions for 6 surface water samples.<br>- Two MS/MSD was collected for 40 aqueous samples.<br>- Seven field blanks were collected in the field.<br>- One equipment blank was collected from the field filter and peristaltic pump.<br>- Trip blanks were provided with each cooler shipment of samples. |
| Case narrative present and complete? | Yes. |
| Any holding time violations? | No. |

The following tables are presented at the end of this DUSR and provide summaries of results outside QC criteria:

- Method Blanks Results (Table 2, 2A, and 2B)
- MS/MSD Outside Limits (Table 3 and 3A)
- LCS Outside Limits (Table 4)
- Reanalysis Results (Table 5)
- Field Duplicate Results (Table 6)

**Go to List**

| Mercury by EPA Method 1631 | |
|---|---|
| **Description** | **Notes and Qualifiers** |
| Any compounds present in method, trip, or field blanks (see Table 2)? | Mercury was detected in field blank 0919FB03 and trip blank 0919TB01. |
| For samples, if results are < 5 times the blank, then "U" flag data (see Tables 2A and 2B). | The field sample 0919MW32GW associated with field blank detection was greater than 5x the blank detection. No qualification was made.<br><br>The seven field samples associated with trip blank were greater than 5x the blank detection. No qualification was made. |
| Is Laboratory QC frequency at least one blank, standard reference material (SRM) and MS/MSD with each batch? | Yes. |
| Is MS/MSD within QC criteria (see Table 3 and 3A)? If out and LCS is compliant, then "J" flag positive data in original sample due to matrix. | Yes. |
| Is SRM within QC criteria (see Table 4)? | Yes. |
| Are the initial calibration standards recovered between 90-110? | Yes. |
| Spot check ICV 85-115%. | ICV 1901275-ICV2 did not meet the acceptance criteria. The ICV was re-analyzed as 1901275-ICV3 and 1901275-ICV4 and recovery was within acceptance criteria. No qualification was made. |
| Spot check CCV 77-123%. | CCVs 1901275-CCV8, 1901275-CCVA, and 1901275-CCVD from analysis sequence 1901275 were recovered below the acceptance criteria. All samples bracketed by these CCVs were re-analyzed and reported from analysis sequence 1901330. All CCVs from analysis sequence 1901330 were within acceptance criteria and no qualification was made. |
| Spot check ICB/CCB detections. | The CCBs were acceptable. |
| Were any samples reanalyzed or diluted (see Table 5)? For any sample reanalysis or dilutions, is only one reportable result flagged? | Twenty samples (total and dissolved) were re-analyzed due to being associated with CCVs outside of the acceptance criteria and were reported in sequence 1901330.<br><br>Six total and dissolved samples and four dissolved only samples yielded results non-detectable results and were re-analyzed using a larger aliquot. All re-analyses except 0919MW40GW yielded detectable results and re-analyses were reported in sequence 1901330. |
| Do field duplicate results show good precision for all compounds (see Table 6)? | No.<br>Sample pair of 0919MW10GW and 0919MW99GW exhibited poor precision for total and dissolved mercury. The sample results were J qualified as estimated.<br><br>Sample pair of 0919MW29GW and 0919MW101GW exhibited poor precision for total mercury. The sample results were J qualified as estimated. |

| Summary of Potential Impacts on Data Usability |
|---|
| **Concerns** |
| • Sample pair of 0919MW10GW and 0919MW99GW exhibited poor precision for total and dissolved mercury. The sample results were J qualified as estimated.<br>• Sample pair of 0919MW29GW and 0919MW101GW exhibited poor precision for total mercury. The sample results were J qualified as estimated. |

**Table 2 – List of Positive Results for Blank Samples**

| Method | Sample ID | Sample Type | Analyte | Result | Qualifier | Units | MDL | PQL |
|---|---|---|---|---|---|---|---|---|
| 1631E | 0919FB03 | FB | Mercury | 0.25 | J | ng/L | 0.13 | 0.40 |
| 1631E | 0919TB01 | TB | Mercury | 0.31 | J | ng/L | 0.13 | 0.40 |

**Table 2A – List of Samples Qualified for Method Blank Contamination**

None

**Table 2B – List of Samples Qualified for Field Blank Contamination**

| Method | Field Blank | Matrix | Analyte | Blank Result | Sample Result* | Lab Qualifier | PQL | Affected Samples | Sample Flag |
|---|---|---|---|---|---|---|---|---|---|
| 1631E | 0919FB03 | FB | Mercury | 0.25 | 63.3/14.9 | | 2.02/0.40 | 0919MW32GW | None |
| 1631E | 0919TB01 | TB | Mercury | 0.31 | 28.8/4.53 | | 2.02 | 0919RD05SW | None |
| 1631E | 0919TB01 | TB | Mercury | 0.31 | 448/30.8 | | 2.02 | 0919RD06SW | None |
| 1631E | 0919TB01 | TB | Mercury | 0.31 | 296/68.3 | | 2.02 | 0919RD08SW | None |
| 1631E | 0919TB01 | TB | Mercury | 0.31 | 7.35/5.62 | | 2.02 | 0919RD10SW | None |
| 1631E | 0919TB01 | TB | Mercury | 0.31 | 11.5/6.16 | | 2.02 | 0919RD14SW | None |
| 1631E | 0919TB01 | TB | Mercury | 0.31 | 319/23.8 | | 2.02 | 0919RD15SW | None |
| 1631E | 0919TB01 | TB | Mercury | 0.31 | 335/27.4 | | 2.02 | 0919RD16SW | None |
| 1631E | 0919TB01 | TB | Mercury | 0.31 | 257/23.8 | | 2.02 | 0919RD99SW | None |

*The results for total and dissolved mercury are provided under the “Sample Result” column.

**Table 3 – List of MS/MSD Recoveries outside Control Limits**

None

**Table 3A – List of RPDs outside Control Limits**

None

**Table 4 – List of SRM Recoveries outside Control Limits**

None

**Table 5 – Samples that were Re-analyzed**

| Sample ID | Lab ID | Method | Sample Type | Action |
|---|---|---|---|---|
| 0919EB01 | 1938089-56RE1 | 1631E | RB | The sample yielded non-detectable results and was re-analyzed using a larger aliquot. |
| 0919FB01 | 1938089-57RE1 | 1631E | FB | The sample yielded non-detectable results and was re-analyzed using a larger aliquot. |

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|---|---|
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| Sample ID | Lab ID | Method | Sample Type | Action |
|---|---|---|---|---|
| 0919FB02 | 1938089-58RE1 | 1631E | FB | The sample yielded non-detectable results and was re-analyzed using a larger aliquot. |
| 0919FB04 | 1938089-01RE1 | 1631E | FB | The sample yielded non-detectable results and was re-analyzed using a larger aliquot. |
| 0919FB05 | 1938089-02RE1 | 1631E | FB | The sample yielded non-detectable results and was re-analyzed using a larger aliquot. |
| 0919FB06 | 1938089-03RE1 | 1631E | FB | The sample yielded non-detectable results and was re-analyzed using a larger aliquot. |
| 0919FB07 | 1938089-04RE1 | 1631E | FB | The sample yielded non-detectable results and was re-analyzed using a larger aliquot. |
| 0919MW101GW | 1938089-08RE1 | 1631E | N | The sample yielded non-detectable results and was re-analyzed using a larger aliquot. |
| 0919MW19AGW | 1938089-16RE1 | 1631E | N | The sample yielded non-detectable results and was re-analyzed using a larger aliquot. |
| 0919MW29GW | 1938089-20RE1 | 1631E | N | The sample yielded non-detectable results and was re-analyzed using a larger aliquot. |
| 0919MW32GW | 1938089-75RE1 | 1631E | N | The sample yielded non-detectable results and was re-analyzed using a larger aliquot. |
| 0919MW33GW | 1938089-76/77RE1 | 1631E | N | The sample yielded non-detectable results and was re-analyzed using a larger aliquot. |
| 0919MW40GW | 1938089-21/22RE1 | 1631E | N | The sample yielded non-detectable results and was re-analyzed using a larger aliquot. |
| 0919MW42GW | 1938089-78/79RE1 | 1631E | N | The sample yielded non-detectable results and was re-analyzed using a larger aliquot. |
| 0919MW43GW | 1938089-80/81RE1 | 1631E | N | The sample yielded non-detectable results and was re-analyzed using a larger aliquot. |
| 0919MW44GW | 1938089-23/24RE1 | 1631E | N | The sample yielded non-detectable results and was re-analyzed using a larger aliquot. |
| 0919MW99GW | 1938089-82/83RE1 | 1631E | N | The sample yielded non-detectable results and was re-analyzed using a larger aliquot. |
| 0919TB04 | 1938089-55RE1 | 1631E | TB | The sample yielded non-detectable results and was re-analyzed using a larger aliquot. |
| 0919FB03 | 1938089-59RE1 | 1631E | FB | The sample was bracketed by CCV(s) outside of acceptance criteria and was re-analyzed. |
| 0919MW01GW | 1938089-60/61RE1 | 1631E | N | The sample was bracketed by CCV(s) outside of acceptance criteria and was re-analyzed. |
| 0919MW08GW | 1938089-62/63RE1 | 1631E | N | The sample was bracketed by CCV(s) outside of acceptance criteria and was re-analyzed. |
| 0919MW09GW | 1938089-64/65RE1 | 1631E | N | The sample was bracketed by CCV(s) outside of acceptance criteria and was re-analyzed. |
| 0919MW10GW | 1938089-66/67RE1 | 1631E | N | The sample was bracketed by CCV(s) outside of acceptance criteria and was re-analyzed. |
| 0919MW22GW | 1938089-68/69RE1 | 1631E | N | The sample was bracketed by CCV(s) outside of acceptance criteria and was re-analyzed. |
| 0919MW27GW | 1938089-70/71RE1 | 1631E | N | The sample was bracketed by CCV(s) outside of acceptance criteria and was re-analyzed. |
| 0919MW28GW | 1938089-72/73RE1 | 1631E | N | The sample was bracketed by CCV(s) outside of acceptance criteria and was re-analyzed. |
| 0919MW32GW | 1938089-74RE1 | 1631E | N | The sample was bracketed by CCV(s) outside of acceptance criteria and was re-analyzed. |
| 0919MW47GW | 1938089-29/30RE1 | 1631E | N | The sample was bracketed by CCV(s) outside of acceptance criteria and was re-analyzed. |
| 0919MW48GW | 1938089-31/32RE1 | 1631E | N | The sample was bracketed by CCV(s) outside of acceptance criteria and was re-analyzed. |
| 0919MW49GW | 1938089-33/34RE1 | 1631E | N | The sample was bracketed by CCV(s) outside of acceptance criteria and was re-analyzed. |
| 0919MW50GW | 1938089-35/36RE1 | 1631E | N | The sample was bracketed by CCV(s) outside of acceptance criteria and was re-analyzed. |
| 0919MW51GW | 1938089-37/38RE1 | 1631E | N | The sample was bracketed by CCV(s) outside of acceptance criteria and was re-analyzed. |
| 0919MW52GW | 1938089-39/40RE1 | 1631E | N | The sample was bracketed by CCV(s) outside of acceptance criteria and was re-analyzed. |
| 0919MW53GW | 1938089-41/42RE1 | 1631E | N | The sample was bracketed by CCV(s) outside of acceptance criteria and was re-analyzed. |

| Sample ID | Lab ID | Method | Sample Type | Action |
|---|---|---|---|---|
| 0919MW54GW | 1938089-43/44RE1 | 1631E | N | The sample was bracketed by CCV(s) outside of acceptance criteria and was re-analyzed. |
| 0919MW55GW | 1938089-45/46RE1 | 1631E | N | The sample was bracketed by CCV(s) outside of acceptance criteria and was re-analyzed. |
| 0919MW56GW | 1938089-47/48RE1 | 1631E | N | The sample was bracketed by CCV(s) outside of acceptance criteria and was re-analyzed. |
| 0919MW57GW | 1938089-49/50RE1 | 1631E | N | The sample was bracketed by CCV(s) outside of acceptance criteria and was re-analyzed. |
| 0919MW58GW | 1938089-51/52RE1 | 1631E | N | The sample was bracketed by CCV(s) outside of acceptance criteria and was re-analyzed. |
| 0919MW59GW | 1938089-53/54RE1 | 1631E | N | The sample was bracketed by CCV(s) outside of acceptance criteria and was re-analyzed. |

**Table 6 – Summary of Field Duplicate Results**

| Method | Analyte | Unit | Matrix | PQL | Anal Type | 0919MW10GW | 0919MW99GW | RPD | RPD Rating | Sample Qual |
|---|---|---|---|---|---|---|---|---|---|---|
| 1631E | Mercury, Total | ng/L | WG | 0.40 | A | 31.5 | 53.5 | 51.8% | Poor | J Flag |
| 1631E | Mercury, Dissolved | ng/L | WG | 0.40 | A | 3.22 | 2.02 | 45.8% | Poor | J Flag |

| Method | Analyte | Unit | Matrix | PQL | Anal Type | 0919MW29GW | 0919MW101GW | RPD | RPD Rating | Samp Qual |
|---|---|---|---|---|---|---|---|---|---|---|
| 1631E | Mercury, Total | ng/L | WG | 2.02 | A | 28.3 | 4.50 | 145.1% | Poor | J Flag |
| 1631E | Mercury, Dissolved | ng/L | WG | 0.40 | A | 0.79 | 1.03 | 26.4% | Good | None |

| Method | Analyte | Unit | Matrix | PQL | Anal Type | 0919MW48GW | 0919MW102GW | RPD | RPD Rating | Samp Qual |
|---|---|---|---|---|---|---|---|---|---|---|
| 1631E | Mercury, Total | ng/L | WG | 2.02 | A | 4.81 | 2.88 | 50.2% | Poor | < 5X PQL |
| 1631E | Mercury, Dissolved | ng/L | WG | 2.02 | A | 2.63 | 4.20 | 46.0% | Poor | < 5X PQL |

| Method | Analyte | Unit | Matrix | PQL | Anal Type | 0919RD15SW | 0919RD99SW | RPD | RPD Rating | Samp Qual |
|---|---|---|---|---|---|---|---|---|---|---|
| 1631E | Mercury, Total | ng/L | WG | 2.02 | A | 319 | 257 | 21.5% | Good | None |
| 1631E | Mercury, Dissolved | ng/L | WG | 2.02 | A | 23.8 | 23.8 | 0.0% | Good | None |

**Acronym List and Table Key**:

CCB = continuing calibration blank

**Acronym List and Table Key**:

| | | |
|---|---|---|
| CCV | = | continuing calibration verification |
| COC | = | chain of custody |
| DUSR | = | data usability summary report |
| EB | = | equipment blank |
| FB | = | field blank |
| FD | = | field duplicate |
| ICB | = | initial calibration blank |
| ICV | = | initial calibration verification |
| LR | = | laboratory replicate |
| MB | = | method blank |
| MS | = | matrix spike |
| MSD | = | matrix spike duplicate |
| N | = | normal sample |
| ND | = | not detected |
| QA | = | quality assurance |
| QAPP | = | quality assurance project plan |
| QC | = | quality control |
| RB | = | rinsate blank |
| RPD | = | relative percent difference |
| SDG | = | sample delivery group |