REPORT

2020 Monitoring Report

Blackbird Mine Site
Lemhi County, Idaho

Submitted to:

Blackbird Mine Site Group

Submitted by:

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APPENDICES

APPENDIX A
2020 Meteorology and Hydrology

APPENDIX B
2020 Data Validation Summary Assessment of Objectives and Criteria for Measurement Data

APPENDIX C
2020 Data Validation Reports (electronic version only)

LIST OF ACRONYMS AND ABBREVIATIONS

°C	Celsius
AMSL	Above Mean Seal Level
BLM	Biotic Ligand Model
BMSG	Blackbird Mine Site Group
BRCP	Biological Restoration and Compensation Plan
Ca	calcium
$CaCO_3$	calcium carbonate
CCC	criterion continuous concentration (chronic)
cfs	cubic feet per second
COC	constituents of concern
CMC	criterion maximum concentration (acute)
Cu	copper
EPA	United States Environmental Protection Agency
Golder	Golder Associates Inc.
gpm	gallons per minute
H_o	null hypothesis
IDAPA	Idaho Administrative Procedure Act,
IDEQ	Idaho Department of Environmental Quality
IWQS	Idaho Water Quality Standards
J	estimated value
J+	estimated value with a high bias
kg/day	kilograms per day
Mg	magnesium
mg/kg	milligrams per kilograms
mg/L	milligrams per liter
NAVD	North American Vertical Datum
NRCS	National Resource Conservation Service
P	Probability
PMP	Performance Monitoring Plan
QAPP	Quality Assurance Project Plan
QC	quality control
ROD	Record of Decision
SES	Salmon Environmental Services
SNOTEL	Snowpack Telemetry
SOW	Statement of Work
SWE	snow water equivalent
UAO	Unilateral Administrative Order
UJ	value is estimated and below the reporting limit
USDA	United Stated Department of Agriculture
USGS	United States Geological Survey

VWP	vibrating wire piezometers
WSRT	Wilcoxon Signed Rank Test
WTP	Water Treatment Plant
XRF	X-Ray Fluorescence

1.0 INTRODUCTION

This is the monitoring report for sampling conducted in accordance with the project Performance Monitoring Plan (PMP) during 2020 at the Blackbird Mine Site near Cobalt, Idaho. Data from prior years have been provided in historical data summary reports (years 1995 through 2005)[1] and monitoring reports (years 2006 through 2019)[2].

During 2019 the PMP was updated, which included a corresponding revision of the project Quality Assurance Project Plan (QAPP) under the PMP cover. The 2019 revision of the PMP (PMP–2019 Revision) and QAPP (Golder 2020a) were used for the associated PMP sampling conducted in 2020. These documents describe the monitoring program and quality assurance requirements for the post remedial action monitoring required by the Record of Decision (ROD) for the Unilateral Administrative Order Statement of Work (UAO SOW) for remedial design and remedial actions (EPA 2003).

Monitoring occurred during the spring and fall in both the Panther Creek and Big Deer Creek drainages, inclusive of Blackbird Creek, Bucktail Creek and South Fork Big Deer Creek tributaries and included monitoring of surface water, Water Treatment Plant (WTP) effluent, groundwater in monitoring wells, and sediment monitoring. Surface water monitoring was performed to evaluate water quality conditions using a combination of chronic criteria 96-hour sampling, weekly sampling, monthly sampling and synoptic monitoring sampling events. Groundwater monitoring occurred in two separate well networks / focus areas, including once annually in the upper Blackbird Creek cutoff wall wells (upgradient of the WTP), and once annually in the select West Fork Tailings Storage Facility wells (in the vicinity of West Fork Blackbird Creek).

Sampling described in this report was performed primarily by the Blackbird Mine Site Group (BMSG) and Salmon Environmental Services (SES) personnel in accordance with the PMP. Golder Associates Inc. (Golder) personnel assisted with data validation, data entry to the Blackbird Mine Site database, and coordinated data receipt from the major contract laboratory, Energy Laboratory Inc. of Billings, Montana.

Applicable report references for the PMP related sampling events completed in 2020 with brief descriptions of the objectives, rationale, sampling locations, sampling frequency, and analyses completed are summarized below:

- Table 1-1 summarizes sampling locations and details for surface water and in-stream sediment locations.
- Table 1-2 provides a summary of sampling locations and details for the chronic criteria 96-hour sampling.
- Tables 1-3 and 1-4 provide a list of synoptic monitoring sample locations and schedule for the Blackbird Creek drainage and the Bucktail/Big Deer Creek drainage, respectively.
- Table 1-5 provides sample locations and details for the monthly surface water monitoring for total arsenic and Table 1-6 summarizes voluntary copper Biotic Ligand Model (BLM) sampling that may be completed (see Section 5.1 for details).
- Table 1-7 provides a list of the groundwater monitoring well locations and associated sampling schedule.

[1] Historical data summary reports: Golder 1996, 1997, 1998, 1999, 2000, 2003, 2004, 2005a, 2006, and Remedial Investigation reports: Golder 2001, 2002.
[2] Monitoring reports: Golder 2007a; 2008; 2009; 2010; 2012, 2013, 2014a, 2014b, 2015a, 2016, 2017a, 2018b, 2019c, 2020b

- The Blackbird Mine Site area drainages and most surface water and sediment collection locations are shown in Figure 1-1. Figure 1-2 shows additional detail on surface water sample locations, symbolized by sampling events, and if a station is a point of compliance / downstream station or a background / upstream station.

Appendices for this report include meteorology figures and streamflow hydrographs (Appendix A) a 2020 data validation summary applied to all data received from the testing laboratory (Appendix B), and a compilation of all 2020 data validation checklist packages (Appendix C).

Spring 2020 sampling included the following:

- 96-hour Chronic Criteria, Panther Creek, Round 1: May 11 through May 14, 2020 at PASW-11, PASW-09, PASW-05, and PASW-04X.
- 96-hour Chronic Criteria, Big Deer Creek, Round 1: May 4 through May 7, 2020 at SFSW-04, SFSW-01, BDSW-04, BDSW-03, and BDSW-01.
- 96-hour Chronic Criteria, Big Deer Creek, Round 2: May 25 through May 28, 2020 at SFSW-04, SFSW-01, BDSW-04, BDSW-03, and BDSW-01.
- Blackbird/Panther Synoptic Sampling: May 12, 2020.
- Bucktail/South Fork/Big Deer Synoptic Sampling: May 5 and May 26.
- Blackbird Cutoff Wells Sampling: May 27, 2020.
- Monthly Surface Water Sampling at BBSW-01A and PASW-09.
- Monthly sample collection at the WTP.

Sampling conducted during summer and fall 2020 included the following:

- Bucktail / South Fork / Big Deer Synoptic Sampling: September 9 and September 28, 2020.
- 96-hour Chronic Criteria, Big Deer Creek, Fall Round: September 21 through September 24, 2020 at SFSW-04, SFSW-01, BDSW-04, BDSW-03, and BDSW-01.
- West Fork Monitoring Wells Sampling: September 16, 2020.
- Bucktail / South Fork / Big Deer Sediment Sampling: September 21 through 23, 2020.
- Blackbird / Panther Sediment Sampling: September 20 through 23, 2020.
- Monthly Surface Water Sampling at BBSW-01A and PASW-09.
- Monthly sample collection at the WTP.

The sampling efforts were performed to satisfy monitoring goals as outlined in the PMP and are described as follows:

- The 96-hour Chronic Criteria monitoring evaluates, on a statistical basis, if water quality criteria are met.

- The monthly surface water monitoring at selected stations in Blackbird Creek and Panther Creek, are used to evaluate compliance with the EPA adopted Idaho Water Quality Standards (IWQS) total arsenic cleanup level of 0.010 milligrams per liter (mg/L) in Panther Creek.
- The Bucktail, South Fork Big Deer, and Big Deer synoptic sampling is used to determine the effectiveness of the early actions and additional remedial actions within Bucktail Creek and the process of natural attenuation in reducing copper concentrations in South Fork Big Deer Creek and Big Deer Creek.
- The spring Blackbird and Panther Creek synoptic sampling event is used to determine the effectiveness of the early actions and additional remedial actions and the process of natural attenuation in reducing copper concentrations and to determine source(s) of any metal loading identified.
- The WTP sample collection is conducted to evaluate the effectiveness of the plant operations with regular and periodic monitoring to compare metals concentrations against applicable effluent criteria.
- Annual sampling and periodic water level measurement at the West Fork Tailings Storage Facility monitoring wells and Blackbird Creek cutoff wells provides water level elevation and water quality data.
- Annual sampling of in-stream sediments along Blackbird and Panther Creeks, as well as along Bucktail, South Fork Big Deer, and Big Deer Creeks, during the early fall allows measurement of natural recovery of the in-stream sediments.

The following additional sampling occurred during 2020; additional details are summarized in Section 5.0:

- Voluntary copper BLM water quality sample collection and analysis during select 2020 sampling events.
- Continuation of the focused Bucktail and South Fork Big Deer Creek copper loading investigations to identify potential unknown areas / zones of metals loading along the drainages. The investigations were completed under a separate Field Investigation Plan and Quality Assurance Plan (EcoMetrix 2019). The sampling included high-flow period synoptic sampling of surface waters and groundwater / pore water sampling via previously installed drive-point piezometers.

2.0 SURFACE WATER INVESTIGATIONS

This section provides a description of the surface water results from 2020 water quality sampling activities.

2.1 Snowpack, Meteorological, and Hydrological Conditions

Meteorological conditions at the Blackbird Mine site during 2020 are reported based on a representative Snowpack Telemetry (SNOTEL) site at Morgan Creek operated by the United States Department of Agriculture (USDA) National Resources Conservation Service (NRCS). Appendix A contains a summary of the snowpack, meteorological and hydrological data collected in 2020. Figures A-1 through A-4 provide the snowpack and meteorological data.

The United States Geological Survey (USGS) established and maintains two flow monitoring stations at the Site – BBSW-02 (USGS 13306336) and PASW-09 (USGS 13306370), and the BMSG installed transducers to record flows at stations BDSW-03 and BTSW-01 in accordance with the PMP– 2019 Revision (Golder 2020a). In 2020, the USGS decommissioned BBSW-02 (USGS 13306336) and stopped collecting data at the end of June. The BBSW-02 gaging station was installed to serve as the “trigger” for the acute (storm water) sampling at PASW-09. The acute sampling requirement for PASW-09 was removed in the 2019 PMP revision. Hydrographs for these

stations are presented in Appendix A. The manual flow measurements collected during synoptic events and preliminary instantaneous flow measurements for the USGS stations are provided for individual samples in Tables 2-2a through 2-2h. Figures A-5 through A-9 summarize the flows obtained from transducer readings or the USGS gages along with manual flow measurements. Tables A-1 through A-4 summarize the data collected at BDSW-03 and BTSW-01 as well as the historical rating curves for BDSW-03. In 2020, a rating curve was not developed for BDSW-03 because beaver activity interfered with the stage-discharge relationship. No rating curve is calculated at BTSW-01 because a weir equation is used to calculate flows based on transducer readings.

Conditions for 2020 include:

- Temperatures were slightly warmer in the winter but slightly cooler during the summer in comparison to the historical averages for the site.
  - Morgan Creek average minimum and maximum temperatures in January 2020 were -9.85 degrees Celsius (°C) and -1.06°C. These are warmer than the historical average minimum and maximum temperatures for the site in January of -15°C and -3.9°C.
  - Morgan Creek average minimum temperature for the site in July 2020 was 6.00°C, which is similar to the historical average minimum temperature in July of 5.6°C. The maximum temperature in July 2020 was 21.74°C, which is slightly below the historical average maximum of 23.9°C.
- At its peak, the 2020 snowpack at Blackbird Creek was 8.5 inches snow water equivalent (SWE). At Morgan Creek the peak was 9.8 inches, which was 84 percent of the average annual peak (or maximum) of the daily SWE for the period of 1981 to 2020 (11.7 inches, Figure A-3).
- Annual precipitation was below average (Figure A-4) in comparison to the historical average daily precipitation between 1981 and 2020. According to Morgan Creek data, the snowmelt occurred more rapidly compared to the average as observed at the beginning of May (Figure A-3).
- The highest mean daily precipitation occurred in June, while the lowest precipitation occurred in August, compared to the historical average highs and lows occurring in June and September, respectively.
- Peak seasonal streamflow occurred on:
  - Panther Creek – May 31, 2020 with a peak seasonal streamflow of 799 cubic feet per second (cfs) and peak average daily flow of 736 cfs, which is above the historical peak average flow on Panther Creek.
  - Big Deer Creek – The peak average daily flow is not available due to later than normal installation of instrumentation at BDSW-03 and beaver activity compromising the reliability of the streamflow rating curve. Available transducer data is plotted along with manually measured spring flows recorded between May and September 2020 (Table A-3).
- Although flow data for Big Deer Creek during 2020 was limited, available historical data suggest occasional event-driven peak discharges generally occur on the same days for Big Deer Creek and Panther Creek and appear to be driven by precipitation events and periods of higher temperatures.

Historically, the annual peak flow has occurred within a few days of each other on Panther and Big Deer Creeks, with peak flows in Big Deer Creek occurring later than Panther Creek.

In 2020, the peak flow at PASW-09 was approximately 136 percent of the historical average peak flow. As previously noted, the maximum SWE at Morgan Creek was approximately 84 percent of the average annual maximum of the1981 to 2020 average SWE, suggesting spring runoff was slightly below average. Despite the measured SWE conditions, the instantaneous peak spring hydrograph for PASW-09 is higher than the historical average peak of approximately 586 cfs (Figure A-8). Although the peak flow was not measured at BDSW-03 the manual flow measurement of 87.76 cfs was lower than the historical average based on recorded measurements dating back to 1995. Historically, peak concentrations of constituents of concern (COC) have been lower during years with below average spring runoff.

2.2 Surface Water Quality Summary for 2020 and Historical Copper and Cobalt Data

This section summarizes the current-year and historical dissolved copper and cobalt, and total arsenic concentrations at representative surface water monitoring stations on Panther Creek, Big Deer Creek, and South Fork Big Deer Creek. Discussion of water quality during specific sampling events is provided in Sections 2.3 through 2.4 and 2.8. The cleanup levels for surface water at the site are summarized in Table 2-1. Results for 2020 surface water quality for all sampling events are presented in Tables 2-2a through 2-2h and associated Figures 2-2a through 2-2ad. These figures are presented by station (for PASW-09, PASW-04X, BDSW-03, BDSW-01, and SFSW-01) and summarize historical high flow median, historical low flow median and all current year data for dissolved copper (Figures 2-2a through 2-2o) and dissolved cobalt (Figures 2-2p through 2-2ad). For purposes of the historical data summaries, the high flow figures include the median concentrations for data between April and June, and low flow figures include the median concentrations for data between July and March.

The historical summaries show dramatic reductions in dissolved copper and cobalt concentrations when comparing for the period of record. The completion of early action collection and treatment facilities in the late 1990s contributed to these reductions. The median low-flow copper concentrations at all Panther Creek and Big Deer Creek stations have been below cleanup levels for several years. For high flow data, the recent median copper concentrations for Panther Creek and Big Deer Creek are also below the cleanup levels. A single exception is for station BDSW-01, which continues to be in the range of the chronic and acute cleanup levels for copper. For South Fork Big Deer Creek, the recent median concentrations are close to the acute cleanup level. Generally, decreasing copper concentration trends remain evident at all stations. For cobalt, at all stations on Panther Creek, Big Deer Creek, and South Fork Big Deer Creek, both the high flow and low flow median concentrations have been well below the cobalt cleanup level since at least 2003.

All 2020 dissolved copper and cobalt surface water station data discussed above are presented in figures showing the annual median data for each station. In general, the current year data are consistent with the median data summarized above. The results for 2020 sampling events are discussed in Sections 2.3 through 2.4.

2.2.1 Water Quality Standards for Surface Water

Cleanup levels for the Blackbird site for arsenic, cobalt, and copper are presented in Table 1 of the Explanation of Significant Differences (EPA 2012) and are also provided as a reference in Appendix D of the PMP– 2019 Revision (Golder 2020a), which references the water source and the applicable drainage with the cleanup level target values. The surface water cleanup levels are provided in Table 2-1. Surface water quality cleanup levels for dissolved copper and cobalt do not apply to Blackbird Creek but rather the non-numeric narrative cleanup goal applies as specified in Section 8.3.3.1 of the ROD (EPA 2003). Acute and chronic cleanup levels for copper are calculated using Equations 2.1 and 2.2.

$$CMC = e^{([0.9422*\ln(hardness)]-1.464)}*x \quad \text{(Equation 2.1)}$$

Where:

CMC: Acute criterion maximum concentration
Hardness (milligrams per liter (mg/L) as $CaCO_3$) = 2.497Ca + 4.118Mg
x: Conversion factor, 0.96 for Cu

$$CCC = e^{([0.8545*\ln(hardness)]-1.465)}*x \quad \text{(Equation 2.2)}$$

Where:

CCC: Chronic criterion continuous concentration
Hardness (mg/L as $CaCO_3$) = 2.497Ca + 4.118Mg
x: Conversion factor, 0.96 for Cu

The cleanup level sets a lower limit of hardness of 25 mg/L for calculating hardness-based criteria.

Beginning in 2013, concentrations of total arsenic in all surface waters are compared to the IWQS for consumption of organisms, 0.010 mg/L (IDAPA 58.01.01210). This change is based on the EPA's 5-year review of the site, completed in 2013, and has not been formally modified within the ROD. Refer to Section 2.8 for 2020 related sampling and criteria comparisons.

In Sections 2.2 through 2.5, hardness-based copper cleanup levels are presented as "CMC (acute)" and "CCC (chronic)" for stations that have established copper cleanup levels (stations on Panther Creek, Big Deer Creek, and South Fork Big Deer Creek). A summary of hardness-based "acute" and "chronic" copper cleanup levels, along with associated hardness values used in the calculation for Panther Creek, South Fork Big Deer Creek, and Big Deer Creek are presented in Tables 2-2a through 2-2h. A one-hour averaging period applies for an acute (short term) concentration, while a four-day average applies for a chronic (long term) concentration (IDEQ 2007). Chronic criteria are compared to the dissolved copper concentrations measured during the chronic criteria sampling and exceedances of the chronic criteria are determined through statistical analyses. This procedure is discussed in Section 2.2.2.

2.2.2 Calculation of Hardness Based Chronic Copper Criteria

Section 3.9.1.1.4 of the UAO SOW (Modification No. 4, February 24, 2009) specifies that the measured copper concentrations at each station shall be compared using a nonparametric paired approach to determine whether the measured copper concentrations exceed the calculated CCC values. The nonparametric test is to be used as a default, even if the difference between measured concentrations and CCC values are normally distributed because the power (confidence that actual differences between measured concentration mean and the mean of the calculated CCC values) is understood to be similar between the parametric and nonparametric methods when the data are normally distributed and higher for the nonparametric methods when the data are not normally distributed.

The null hypothesis (H_0) is that the true mean or median of the measured dissolved copper concentrations is less than or equal to the true mean or median of the chronic criterion. The test of this hypothesis is carried out at a probability level of $\alpha = 0.05$, using a nonparametric version of the paired t-test, known as the Wilcoxon signed-

rank test (WSRT)[3]. Rejection of the null hypothesis for a given 96-hour data set (sampling event) implies that the CCC was exceeded at that sampling station. Failure to reject the null hypothesis using the WSRT implies that the CCC was not exceeded during the sampling event at that sampling station. The chronic criteria as described in the IWQS (IDAPA 58.01.02.010.15) states that these chronic criteria are expected to adequately protect the designated aquatic life use if not exceeded more than once every three years (IDEQ 2007).

2.2.2.1 Explanation of Chronic Copper Criteria Statistical Tables

Tables 2-3.1a through 2-3.1c are an example of the calculations for determining if chronic criteria were exceeded during the 96-hour event. Table 2-3.1a summarizes the data used for the May 2020 hardness-based chronic dissolved copper criteria comparisons for the Panther Creek stations, and is described in detail below:

- Columns 1 through 4: Station code and time of sampling, the measured dissolved copper, and the measured hardness, respectively.
- Column 5: Hardness-based chronic copper criterion, calculated from the measured values of hardness and dissolved copper using Equation 2.2 (Section 2.1).
- Column 6: CCC minus the measured dissolved copper concentration.
  - A negative value indicates that the measured value was greater than the calculated criterion.
  - A positive value indicates that the measured value was less than the calculated criterion.
  - A result of zero indicates the measured concentration was equal to the calculated criterion, which is not considered an exceedance.
- Column 7: The absolute value of column 6.
- Column 8: The ranks of the values in column 7 for each station.
  - A rank of 1 indicates that the difference, whether positive or negative, between the chronic copper criterion and the measured value, is the smallest.
  - Larger ranks indicate increasingly greater differences, irrespective of whether the difference is positive or negative.
- Column 9: Value in column 8 with the sign representing the sign in column 6.
  - A negative rank when the criterion is less than the measured value.
  - A positive rank when the criterion is greater than the measured value.
  - A zero signed rank when measured value equals the chronic copper criterion.
- Column 10: Listing of the positive ranks from column 9; if the value in column 9 is negative (i.e., the criterion was exceeded for that sample) column 10 is left blank.
- Column 11: Shows the magnitude of exceedance if one exists.

[3] The February 24, 2009, UAO SOW Modification No. 4 incorrectly specified an alpha value of 0.10. The use of an alpha of 0.05 was specified by EPA in an e-mail from Fran Allans to the BMSG dated October 13, 2010 (Allans 2010).

The WSRT data from May 2020 for the Panther Creek stations is summarized in Table 2-3.1b, as such:

- Row 1: R is the sum of the positive ranks for each station (column 9 of Table 2-3.1a). If all the ranks are negative, then this sum is 0.
- Row 2: Alpha (α) of 0.05 is the probability level at which the hypothesis test is performed.
- Row 3: N is the number of measurements for each station.
- Rows 4 and 5: Rc is the critical value of R; if the calculated value of R is less than Rc, then the null hypothesis is rejected, which implies that the measured dissolved copper concentrations for the station exceed the chronic copper criterion.

  The value of Rc is based on the number of samples, N, and a Type I error (alpha) of 0.05.
- Row 6: Decision Rule is to Reject H_0 if R < Rc.
- Row 7: The probability (P) reported is the probability of observing the value of R if the null hypothesis were true for N samples. The smaller the probability, the less probable the observed value of R could arise by chance if the null hypothesis were in fact true.
- Row 8: Notes the Result of the WSRT applied to the data for the Panther Creek Stations.

The normality tests, performed at the request of the EPA to provide insight into the data, are summarized in Table 2-3.1c showing the results of Shapiro-Wilk and skewness testing, as well as a final determination of data distribution for each station. The normality testing is performed using a 10% significance level.

2.2.3 Calculation of Hardness Based Acute Copper Criteria

Surface water quality comparisons and evaluations of acute copper criterion and testing for water quality exceedances at the site follow the guidelines as outlined in the UAO SOW. In accordance with UAO SOW, Section 3.9.1.1.3, acute criteria performance monitoring shall be conducted to determine compliance with cleanup levels during storm events with the use of automated samplers at PASW-09[4] and BDSW-03. Section 3.9.1.1.4 states if the arithmetic average of any two consecutive samples collected during a storm event by the automated samplers exceeds an acute criteria performance standard (i.e., CMC), this shall constitute an exceedance of the acute criteria. Furthermore, the UAO SOW states that if the arithmetic average of any two consecutive samples collected during any of the other surface water monitoring exceeds a CMC standard at PASW-04, PASW-09, SFSW-01, BDSW-01, or BDSW-03, this shall constitute an exceedance of the acute criteria. According to the UAO SOW if back-to-back exceedances occur, then there is a violation.

Appendix B [Biological Restoration and Compensation Plan (BRCP)] of the Consent Decree (District of Idaho 1995) has a different definition from the UAO SOW for determining an exceedance of the acute criterion for copper. According to the Appendix B - BRCP, when the arithmetic mean of dissolved copper concentrations for samples taken in any 24-hour period at a point of compliance exceeds by a factor of 2 or more the arithmetic mean of acute criteria calculated using the concurrent sample-specific hardness measurements for that point of

[4] Per e-mail correspondence from EPA to BMSG on February 22, 2019, authorization was issued for removal of the PMP requirement for acute criteria performance monitoring - automated storm sampling in the Panther Creek drainage (Wilkening 2019). The PMP–2019 Revision only has a discussion of the remaining requirement for acute criteria performance monitoring - automated storm sampling in the Big Deer Creek drainage (Golder 2020a).

compliance or 25 mg/L $CaCO_3$, whichever is greater, an exceedance occurs. Direct numerical comparison of the arithmetic mean of the dissolved copper concentration with two times the arithmetic mean of the acute criteria for the same point of compliance will be used to determine which value is greater. An exceedance of the acute criterion, as noted above, shall constitute a violation of the water quality provisions of Subparagraph 5(c) of the Consent Decree unless a determination can be made that the exceedance is not biologically significant or was caused by background copper concentrations, laboratory performance, or some other factor unrelated to the site (District of Idaho 1995).

2.3 96-Hour Sampling

The chronic criteria sampling in 2020 was completed in accordance with the requirements of the Consent Decree and UAO SOW, as modified in the PMP– 2019 Revision (Golder 2020a) and Table 1-2. The sampling was conducted from upstream to downstream (to approximate a synoptic collection) at Panther Creek and South Fork/Big Deer Creek locations, listed below, at approximately 8-hour intervals on four successive days.

Panther Creek 96-Hour Stations

- PASW-11, PASW-09, PASW-05, and PASW-04X.

South Fork / Big Deer Creek Stations

- BDSW-04, BDSW-03, and BDSW-01.

Per the PMP–2019 Revision, monitoring was conducted over a 96-hour period and was conducted during the spring, once in Panther Creek and two times in Big Deer Creek, and once during the low flow period in the early fall (Big Deer Creek only). Two samples were collected daily at each station for a total of eight samples per location for each 96-hour sampling event (Golder 2019b, 2020a).

No exceedances at background (upstream) locations have occurred during any 96-hour sampling event (Golder 2020a). Therefore, the frequency of laboratory sample analysis at background locations was reduced to one sample per background location per 96-hour sampling round. Sample collection of background (upstream) locations will continue, however only select samples are submitted for analysis, while a “Hold for Analysis” is to be requested for the remaining upstream station samples (Golder 2020a).

Data for the 96-hour events are included in Tables 2-2a through 2-2h and Figures 2-2a through 2-2ad along with other surface water sampling data for the year. Tables 2-3.1(a-c), 2-3.2 (a-f) and 2-3.3(a-c) provide the results of the evaluation for compliance with the CCC.

Table 2-1 summarizes cleanup levels for surface water on the Blackbird Mine Site, based on Table 1 in the 2012 Explanation of Significant Differences (EPA 2012 and Appendix D [Golder 2020a]). There were no exceedances of the EPA cleanup levels for dissolved cobalt (0.086 mg/L) nor were there any exceedances of the EPA cleanup level for total arsenic (0.010 mg/L) in any of the Panther Creek or Big Deer Creek 96-hour sampling events. Therefore, discussions in the following subsections focus on the results for copper.

2.3.1 Panther Creek Spring 96-Hour Sampling Data Results

Per the PMP–2019 Revision, one spring 96-hour event is required, to be timed approximately on the rising limb of the annual hydrograph (Golder 2019b, 2020a).

The Panther Creek 96-hour chronic criteria sampling was conducted from May 11 through May 14, 2020. Flows at PASW-09 averaged 420 cfs during the event. The flow at PASW-09 peaked on May 31 at 03:15 with a flow of 799 cfs, occurring on the second of a double peak runoff event (Figure A-8). Based on this the timing of the 96-hour event occurred during a high-flow event on the rising limb of the annual hydrograph. The dissolved copper results and chronic criteria comparisons are provided in Tables 2-3.1a through 2-3.1c.

No exceedances of the CCC were observed at any station, all dissolved copper concentrations were below the CCC, and the null hypotheses were supported at very high levels of probability (p-values at 1).

2.3.2 Big Deer Creek Spring 96-Hour Sampling Data Results

Per the PMP-2019 Revision, two spring 96-hour events are required (Golder 2019b, 2020a). The two 96-hour spring events were completed in 2020 during the rising limb of the annual hydrograph. Dissolved copper concentrations decreased at BDSW-01 and BDSW-04 between the first and second spring sampling events but increased at BDSW-03. Hardness increased from the first to second event in early to late-May and then doubled in the fall 96-hour event compared to the second spring event.

2.3.2.1 Big Deer Creek First Round: May 4 – 7

The first 96-hour chronic criteria sampling on Big Deer Creek was conducted from May 4 through May 7, 2020. The average of two manually measured flows at BDSW-03 during the event (recorded May 5 and May 7) is 66.7 cfs, which occurred on the rising limb of the hydrograph. The dissolved copper results and chronic criteria comparisons are provided in Tables 2-3.2a through 2-3.2c.

- Dissolved copper concentrations at BDSW-03 and BDSW-04 were all below the CCC, while all results were above the CCC at BDSW-01.
- Stations BDSW-03 and BDSW-04 did not exceed the CCC for the 96-hour event, with the null hypothesis supported at a very high level of probability (p-values at 1).
- At station BDSW-01, the CCC was exceeded for the sampling event (p=0.0039). The criterion for the duration of the event was calculated to be 0.0035 mg/L. Exceedances of the criterion ranged from 0.0017 to 0.0023 mg/L, with an average exceedance of 0.0020 mg/L.

2.3.2.2 Big Deer Creek Second Round: May 25 - 28

The second round of 96-hour chronic criteria sampling was conducted from May 25 through May 28, 2020. On May 26, a manual measured flow at BDSW-03 was 87.8 cfs. This manual measured flow was likely on the upper end of the rising limb of the annual hydrograph in advance of the peak, due to the timing of the Panther Creek peak runoff on May 31, 2020, and the typical seasonal timing of the Big Deer Creek peak runoff, historically occurring after Panther Creek's. During 2020, transducer instrumentation malfunction at BDSW-03 and BTSW-01 was realized during the initial deployment in early May 2020 and required offsite instrumentation troubleshooting. Therefore, reinstallation was delayed until June 11, 2020, and data collection for the average daily hydrograph commenced after the peak runoff had already occurred (Table A-7 and Figure A-7). The dissolved copper results and chronic criteria comparisons are provided in Tables 2-3.2d through 2-3.2f.

- Dissolved copper concentrations at BDSW-03 and BDSW-04 were below the CCC, however all samples were above the CCC at BDSW-01.

- Stations BDSW-03 and BDSW-04 did not exceed the CCC for the 96-hour event, with the null hypothesis supported at a very high level of probability (p-values at 1).
- At station BDSW-01, the CCC was exceeded for the sampling event (p=0.0039). The criterion for the duration of the event was calculated to be 0.0035 mg/L. Individual exceedances of the criterion ranged from 0.0007 to 0.0017 mg/L, with an average exceedance of 0.0011 mg/L.

2.3.3 Big Deer Creek Fall 96-hour Sampling

The fall 96-hour chronic criteria sampling was conducted from September 21 through September 24, 2020, a low-flow period of the hydrograph. A manually measured flow at BDSW-03 on September 24 was 9.6 cfs.

Pursuant to the 2019 PMP revision, a full round of samples was not analyzed for station BDSW-04 (upgradient / background station), therefore, statistical analysis was not performed for this station. The dissolved copper result for the single sample analyzed for BDSW-04 during the event was non-detect (less than 0.0003 mg/L).

Relevant dissolved copper results and chronic criteria comparisons are provided in Tables 2-3.3a through 2-3.3c.

- No individual sample results at BDSW-01 or BDSW-04 were above the CCC or CMC during the fall round of sampling.
- A single sample result at BDSW-03 was above the CCC and CMC during the fall round of sampling.
  - The single dissolved copper result of 0.0068 mg/L, sampled on September 22 at 13:20, appears to be anomalous. The field duplicate sampled at 13:30 had a dissolved copper concentration of 0.0025 mg/L and the preceding and subsequent samples collected at BDSW-03 on September 22 at 09:55 and early on September 23 at 09:50 were more similar to the field duplicate concentration, with results of 0.0024 and 0.0034 mg/L, respectfully.
  - The associated laboratory sample delivery group notes the laboratory reanalyzed the sample and confirmed the original sample result, therefore the potentially anomalous result may be attributed to isolated fugitive dust contamination during field sample collection.
  - Field parameters (i.e., pH, conductivity, and temperature) for the BDSW-03 samples collected immediately before and after this sample during the sampling event all appeared to be consistent and without any significant deviation from one another.
- Neither sampling station exceeded the CCC for the 96-hour event and the null hypothesis was supported at a high level of probability for BDSW-01 and BDSW-03 (p-values at 1 or 0.9961, respectively).

2.4 Synoptic Surface Water Monitoring

Synoptic surface water sampling was conducted on the Blackbird, West Fork Blackbird, and Panther Creek drainages, and the Bucktail, South Fork Big Deer and Big Deer Creek drainages to evaluate the effectiveness of the remedial actions and to evaluate changes in concentrations and potential metals loading along the drainages.

BMSG personnel and Morgan Creek SNOTEL data were consulted to determine appropriate sample timing. Tables 1-4 and 1-5 provide a list of surface water stations for sample collection within the drainages, and Figures 1-1 and 1-2 identify the location of each sampling point. The data for synoptic surface water monitoring events are provided in Tables 2-2a through 2-2h. The following sections identify dates, conditions, and results for the 2020 synoptic events.

2.4.1 Blackbird and Panther Creek Spring Synoptic Surface Water Sampling

2.4.1.1 Synoptic Sampling on May 12, 2020

The spring synoptic event for Blackbird and Panther Creek was performed by SES on May 12, 2020. This event occurred on the rising limb of the annual hydrograph on both Blackbird Creek and Panther Creek. The peak flow along Blackbird Creek was 70.6 cfs, recorded at the BBSW-02 USGS gaging station 8 days later, on May 20. The peak flow at PASW-09 occurred on May 31 with a flow of 799 cfs, marking the second of a double peak runoff event as seen in Appendix A - Figure A-8. Calculated flow and loading information for this sampling event is provided in Tables 2-4.1a through 2-4.1d and Figures 2-4.1a and 2-4.1b. Manual flow measurements were made at BBSW-01A and BBSW-02 and were used in place of the USGS gage, while the flow recorded at the USGS gage was used for PASW-09. Flow was not measured at PASW-11 during the event due to high water and unsafe conditions; flow at PASW-11 is estimated as PASW-09 less BBSW-01A.

The May synoptic samples were collected when the WTP was operating and the flow from the WTP was recorded. The treated water from the WTP discharges to Blackbird Creek upstream of station BBSW-07. Overall, metals loading at Blackbird and Panther Creek stations was variable at Blackbird and Panther Creek stations in comparison to most recent years (Golder 2019c, 2020a), likely due to the timing of the snow melt and subsequent varying flow volumes along Blackbird Creek versus Panther Creek, as well as the timing of the synoptic sampling event ahead of seasonal peak flow along both creeks. Of the synoptic sampling events in the recent past (i.e., 2009 through 2019), flows and concentrations observed in 2020 were similar to 2010 and 2013, which like 2020 were both lower flow years than typical. There were no unusual dissolved or total load increases for copper, cobalt or arsenic observed along the Blackbird Creek system during the 2020 event. Nonetheless, descriptions of the loading data are provided below based on agency requests for additional detail in comments on previous monitoring reports.

<u>Copper Load along Blackbird Creek</u>

- Dissolved copper load was variable along Blackbird Creek compared to previous years, increasing between stations MCSW-01 and BBSW-03, remaining the same between BBSW-03 and BBSW-02, and then increasing at BBSW-01A and again at PASW-09.
- Generally, flows along the Blackbird Creek reach were twice as high in May 2020 compared to May 2019, except at MCSW-01 where the 2020 flow was lower due to the recent weir related maintenance following the 2019 synoptic event. Also likely attributed to the 2019 weir maintenance (i.e., upstream sediment removal), the 2020 synoptic dissolved copper load trend between MCSW-01 and BBSW-07A returned to more “normal” levels.
- The increase in dissolved copper load between BBSW-07A and BBSW-07 was similar to those seen in recent years, with the exception of 2017 when the increase was higher than usual. The increase in dissolved copper load is not entirely accounted for by the measured loads from the WTP and Hawkeye Gulch (HGSW-01), which discharge into the reach between these two stations.
- Dissolved copper load increased between BBSW-07 and BBSW-05, which is similar to historical trends. Loading between BBSW-05 and BBSW-03 in 2018, 2019, and 2020 also increased, which differed from previous results. Loading remained essentially the same between BBSW-03 and BBSW-02, though increasing at BBSW-01A, whereas historically over the last five years it had generally remained the same or slightly decreased.

- Total load increased between BBSW-07A and BBSW-07 more than the dissolved load between these stations on both an absolute and percentage basis, which is similar to previous monitoring events, not including 2019.
- Historically, measured loads from the WTP and HGSW-01 accounted for the increase in total copper load between the Blackbird Creek stations, however in 2020 there was a slight load loss (-0.054 kg/day).
- Total load increased between stations BBSW-07 and BBSW-05, slightly increased between BBSW-05 to BBSW-03 and increased at BBSW-02 and BBSW-01A.

Cobalt Load along Blackbird Creek

- The WTP accounted for nearly 90 percent of the loading of total and dissolved cobalt upstream of station BBSW-07, which is similar to 2019, but was closer to 50 percent during 2018 (Golder 2019c).
- As in previous years, the main source of cobalt load downstream of station BBSW-07 is consistent with the location of the West Fork Tailings Storage Facility with a notable increase between stations BBSW-03 located upstream and BBSW-02 located downstream of the facility.
- Cobalt loads observed between stations BBSW-07 and BBSW-03 increased during 2020, which is generally consistent with the historical pattern of cobalt loading between these locations.

Arsenic Load along Blackbird Creek and Panther Creek

- Similar to recent years, dissolved arsenic load increased between each station along Blackbird Creek.
- The largest absolute load increase in dissolved arsenic along Blackbird Creek occurred between BBSW-02 and BBSW-01A.
- The dissolved arsenic load at upgradient station PASW-11 represented 88 percent of the load observed at PASW-09, which is inconsistent with 2018 and 2019. Note that the May 2020 flow at PASW-11 is estimated as the difference in flow between PASW-09 and BBSW-01A.
- In most recent years, total arsenic load increased between every station along Blackbird Creek. In 2020, this was generally the case, except a slight decrease between BBSW-07A and BBSW-07, which is consistent with 2019.
- The largest absolute increase in total arsenic load was observed between the stations BBSW-02 and BBSW-01A.

2.4.2 Bucktail and Big Deer Creek Spring Synoptic Surface Water Sampling

The spring synoptic events for the Bucktail / South Fork / Big Deer Creeks were performed on May 5 and May 26, 2020. Per the PMP–2019 Revision, previously identified mini-synoptic events that occurred once in the spring and once in the fall were both converted to full synoptic events and included all applicable Bucktail / South Fork / Big Deer Creek sampling locations (Golder 2019a, 2020a). Calculated flow and loading information for these sampling events are provided in Tables 2-4.2a through 2-4.2f and Figures 2-4.2a through 2-4.2d of this report.

There were no individual exceedances of the dissolved cobalt cleanup level (0.086 mg/L) or unusual dissolved or total load increases for cobalt observed along the Bucktail / South Fork / Big Deer Creek system during the spring 2020 synoptic events. Therefore, descriptions of the loading data for each event below are focused on copper.

2.4.2.1 Synoptic Sampling on May 5, 2020

The first of two spring synoptic events for the Bucktail / South Fork / Big Deer Creeks was performed by SES on May 5, 2020. Manually measured flow was recorded at SFSW-01, while flows at SFSW-02 and BDSW-01 were assumed to be the same flow at SFSW-01 and BDSW-03, respectively, for purposes of the loading calculations as directed by the PMP. The flow at PASW-05 was not measured due to unsafe conditions. Flow at PASW-05 was estimated as the sum of PASW-09 and BDSW-03. Station PASW-04X was inadvertently missed during the synoptic event and is not included in figures or tables.

Copper Load along Bucktail / South Fork / Big Deer Creeks

- During the spring synoptic event, dissolved and total copper load increased between all stations.
- During 2020 (and historically), the largest percentage load increase has generally been observed between BTSW-01.6 and BTSW-01 due to the effective collection of copper sources upstream of BTSW-01.6, which results in a small flow rate and load at BTSW-01.6.
- The dissolved copper load measured at BTSW-01 represents approximately 18% of the load at BDSW-03. This result continues a trend observed during the last three years where the dissolved copper load at BTSW-01 has been a declining contribution to the load at BDSW-03 (37%, 28%, and 22% observed in 2017, 2018, and 2019, respectively).
- Along South Fork and Big Deer Creeks, the largest absolute and percentage increase in dissolved and total copper load occurred between BDSW-03 and BDSW-01.

2.4.2.2 Synoptic Sampling on May 26, 2020

The second spring synoptic event for the Bucktail / South Fork / Big Deer Creeks was performed on May 26, 2020. In accordance with the PMP, flows were estimated at SFSW-02 (assumed to be the same flow at SFSW-01), at BDSW-01 (assumed to be the same flow at BDSW-03), and at PASW-05 (estimated as the sum of PASW-09 and BDSW-03) for purposes of the loading calculations and associated figures. Station PASW-04X was inadvertently missed during the synoptic event and is not included in figures or tables.

Copper Load along Bucktail / South Fork / Big Deer Creeks

- During the spring synoptic event, both dissolved and total copper loads increased between all sampled stations, which has been the trend in loading dynamics observed over the last 10 monitoring years.
- The largest absolute increase in load occurred between BDSW-03 and BDSW-01, while the largest percentage increase occurred between BTSW-01.6 and BTSW-01 (due to characteristic low flow and load at BTSW-01.6).

2.4.3 Bucktail and Big Deer Creek Fall Synoptic Surface Water Sampling

The fall synoptic events for the Bucktail / South Fork / Big Deer Creeks were performed on September 9 and September 28, 2020. Calculated flow and loading information for these sampling events are provided in Tables 2-4.3a through 2-4.3f and Figures 2-4.3a through 2-4.3d of this report. Similar to the spring 2020 synoptic events, there were no individual exceedances of the dissolved cobalt cleanup level (0.086 mg/L) or unusual dissolved or total load increases for cobalt observed along the Bucktail / South Fork / Big Deer Creek system during the fall 2020 synoptic events. Therefore, descriptions of the loading data for each event below are focused on copper.

2.4.3.1 Synoptic Sampling on September 9, 2020

Flows and loads at BDSW-01 and SFSW-02 are estimated using measured flows at BDSW-03 and SFSW-01, respectively.

Copper Load along Bucktail / South Fork / Big Deer Creeks

- Dissolved and total copper loads generally increased between upstream to downstream stations, except dissolved and total loading between SFSW-01 and BDSW-03, where loads slightly decreased. The decrease is considered to be within the potential analytical and flow measurement error for the methods used and is unlikely to represent an actual loss of load within the reach, especially for dissolved copper. Overall dissolved copper loads have been fairly consistent over recent years during the first fall synoptic event when considering station locations, magnitude and percent increases between stations.
- The largest absolute increase in load occurred between BDSW-01 and PASW-04X for both dissolved and total copper, while the largest percentage increase occurred between BTSW-01 and SFSW-02.

2.4.3.2 Synoptic Sampling on September 28, 2020

Flows and loads at BDSW-01 and SFSW-02 are estimated using measured flows at BDSW-03 and SFSW-01, respectively. Flows during this event were like the fall synoptic events in the recent past.

Copper Load along Bucktail / South Fork / Big Deer Creeks

- Dissolved and total copper loads increased from upgradient to downgradient between most stations, with the exception of BDSW-03, which decreased slightly, which is consistent with the first synoptic event in September 2020.
- The largest absolute increase in dissolved and total copper load occurred between BDSW-01 and PASW-04, while the largest total copper load percentage increase occurred between BTSW-01 and SFSW-02, which is consistent with the first synoptic event in September 2020.

2.5 CMC Comparison for Water Quality Sampling

Data for the 96-hour sampling events are included in Tables 2-2a through 2-2h along with other 2020 surface water sampling data. Although individual exceedances of the CMC do not constitute a violation, as stated in the UAO SOW, below is a summary comparison of 2020 dissolved copper results to the CMC. Most of these data were collected during the 96-hour sampling events.

Panther Creek

- No exceedances of CMCs were observed based on the dissolved copper samples at PASW-04X, PASW-05, PASW-09 and PASW-11 during the spring 96-hour sampling event.

South Fork / Big Deer Creeks

- No exceedances of CMCs were observed based on the dissolved copper samples at BDSW-03 and BDSW-04 during the spring and fall 96-hour sampling events.
- During the first 96-hour sampling event on May 4 through May 7, the dissolved copper samples at BDSW-01 ranged from 0.0052 to 0.0058 mg/L. All 8 individual samples during this event had dissolved copper concentrations above the CMC (Tables 2-2e through 2-2h).

- To determine if an exceedance of the acute criterion (CMC) occurred, in accordance with the BRCP of the Consent Decree, as discussed in Section 2.2.3, the dissolved copper concentration arithmetic means were calculated for each grouping of BDSW-01 sample results within a 24-hour period during the 96-hour event and were compared with the calculated arithmetic means of the acute criteria using the same 24-hour sample groups, resulting in a total of five groups with arithmetic means of four results each for comparison.
  - Based on these comparisons, none of the dissolved copper arithmetic means exceeded, by a factor of 2, the acute criteria arithmetic means, demonstrating that there were no violations of the water quality provisions of Subparagraph 5(c) of the Consent Decree.
- On May 5, the first spring synoptic sampling event was performed concurrent with the 96-hour sampling on that day and, similar to 2019, there were no observed individual dissolved copper results at SFSW-01 or SFSW-02 above the CMC.

- During the second 96-hour sampling event on May 25 through May 28, only 1 of 8 individual dissolved copper results at BDSW-01 was observed to be above the CMC.
- There were no observed exceedances of the CMC at any Big Deer Creek sampling station, SFSW-02 or SFSW-04, during the fall 96-hour sampling event performed September 21 through September 24 nor during the synoptic sampling events on September 9 and on September 28.
  - At SFSW-01, two exceedances of the CMC were observed with one of each occurring during the fall 96-hour sampling event on September 24 (0.0149 mg/L) and during the second fall synoptic sampling event on September 28 (0.0134 mg/L).

2.6 Water Treatment Plant Monitoring

The WTP is a lime precipitation plant that treats water from the 7100 Dam, the underdrain flows below the Meadow Creek cover, and the 6850 Portal (which collects mine drainage and Bucktail basin drainage). The WTP is located in the upper part of Blackbird Creek with an effluent line that discharges between sampling locations BBSW-07A and BBSW-07. The design capacity of the main plant was upgraded in 2013 to treat up to 1,200 gallons per minute (gpm). There is also a supplemental treatment system that increases the overall flow capacity to 2,500 gpm during high runoff years. The supplemental treatment system was not activated during 2020.

2.6.1 Summary of Operation

- The WTP normally operates between March and November.
- In 2020, the WTP was in operation from March through early December and treated a total of 134,908,000 gallons of water.
- Highest total flows were recorded from March through July, which is as expected for the current operations.
- The month with the highest treatment volume was May when 25,887,000 gallons of water were treated with an average treatment rate of 673 gpm, although the months of June and July were those with the highest average treatment rates of 756 and 792 gpm.

2.6.2 Summary of Monitoring

- An 8-hour composite sample of the WTP effluent is collected monthly with an automatic sampler and is sent to Energy Laboratory for total and dissolved copper, cobalt, and iron measurement.
- Automatic monitoring is performed continuously for flow, pH, and turbidity while the WTP is in operation.
- Table 2-6 summarizes the total and dissolved fractions of cobalt, copper and iron data for the monthly composite samples along with the volume of water treated each month during 2020.

Effluent Metals Concentrations of WTP Monthly Sampling:

- The effluent limits for total copper from the WTP are 0.15/0.30 mg/L (30-day average/daily maximum) (Golder 2014c, 2020a). The total copper results demonstrate the WTP is in compliance with the copper effluent limits for each monthly sampling event in 2020 (Table 2-6).
- The effluent limit for dissolved cobalt from the WTP is 0.6 mg/L (Golder 2014c, 2020a). Cobalt was below the effluent limit for each monthly sampling event (Table 2-6).

2.7 Dissolved Copper Concentrations in Big Deer Creek

This section is provided to evaluate changes in the dissolved copper "mystery load" that generally results in an increase in dissolved copper concentrations between Big Deer Creek stations BDSW-03 and BDSW-01. Table 2-7 shows the measured dissolved copper concentrations at BDSW-03 and BDSW-01 beginning in 1990 when sampling was performed on the same day at the two stations. The table, as well as Figure 2-7, show the difference in the concentrations between these stations and how they have changed over time. The trend in the difference in concentrations between BDSW-03 and BDSW-01 is used to understand if the "mystery load" between these stations is decreasing over time. A decreasing trend indicates that natural attenuation of Lower Big Deer Creek sources (mystery loads) is occurring and that these sources are contributing less to the copper concentrations observed at BDSW-01. The increase in "mystery load" observed during spring of 2017 and spring of 2018 may relate to the higher streamflows observed in these years relative to recent years, and the resulting increased saturation and leaching of metals from wetted perimeter sediments. The potential cause for the increase of the load observed during the spring of 2020 is not as evident, however may be similarly attributed to the increased groundwater and surface water contact with secondary copper sources in the overbank and wetted perimeter areas due to the presence of beaver dams downgradient of BDSW-03. Since 2012, and in comparing the results between 2012 and 2020, there continues to be fluctuations in dissolved copper concentrations at BDSW-03 and BDSW-01 reflecting the interplay of timing and magnitude of flows and copper concentrations.

These fluctuating subtleties can be seen by looking at the averages of dissolved copper at the individual stations and the averages of differences between BDSW-03 and BDSW-01 calculated by year for each of the spring / high-flow periods and fall / low-flow periods, as summarized below:

- Spring / High flow Period Averages:
  - **2012**: BDSW-01 = 0.0040 mg/L; BDSW-03 = 0.0017 mg/L; BDSW-01 – BDSW-03 = 0.0023 mg/L
  - **2013**: BDSW-01 = 0.0047 mg/L; BDSW-03 = 0.0016 mg/L; BDSW-01 – BDSW-03 = 0.0031 mg/L
  - **2014**: BDSW-01 = 0.0044 mg/L; BDSW-03 = 0.0021 mg/L; BDSW-01 – BDSW-03 = 0.0023 mg/L
  - **2015**: BDSW-01 = 0.0035 mg/L; BDSW-03 = 0.0014 mg/L; BDSW-01 – BDSW-03 = 0.0020 mg/L

- **2016**: BDSW-01 = 0.0035 mg/L; BDSW-03 = 0.0015 mg/L; BDSW-01 – BDSW-03 = 0.0021 mg/L
- **2017**: BDSW-01 = 0.0043 mg/L; BDSW-03 = 0.0018 mg/L; BDSW-01 – BDSW-03 = 0.0025 mg/L
- **2018**: BDSW-01 = 0.0034 mg/L; BDSW-03 = 0.0013 mg/L; BDSW-01 – BDSW-03 = 0.0022 mg/L
- **2019**: BDSW-01 = 0.0041 mg/L; BDSW-03 = 0.0014 mg/L; BDSW-01 – BDSW-03 = 0.0028 mg/L
- **2020**: BDSW-01 = 0.0050 mg/L; BDSW-03 = 0.0016 mg/L; BDSW-01 – BDSW-03 = 0.0034 mg/L

- Fall / Low flow Period Averages:
  - **2012**: BDSW-01 = 0.0046 mg/L; BDSW-03 = 0.0041 mg/L; BDSW-01 – BDSW-03 = 0.0005 mg/L
  - **2013**: BDSW-01 = 0.0043 mg/L; BDSW-03 = 0.0031 mg/L; BDSW-01 – BDSW-03 = 0.0012 mg/L
  - **2014**: BDSW-01 = 0.0043 mg/L; BDSW-03 = 0.0030 mg/L; BDSW-01 – BDSW-03 = 0.0013 mg/L
  - **2015**: BDSW-01 = 0.0037 mg/L; BDSW-03 = 0.0032 mg/L; BDSW-01 – BDSW-03 = 0.0005 mg/L
  - **2016**: BDSW-01 = 0.0041 mg/L; BDSW-03 = 0.0032 mg/L; BDSW-01 – BDSW-03 = 0.0009 mg/L
  - **2017**: BDSW-01 = 0.0038 mg/L; BDSW-03 = 0.0028 mg/L; BDSW-01 – BDSW-03 = 0.0010 mg/L
  - **2018**: BDSW-01 = 0.0035 mg/L; BDSW-03 = 0.0030 mg/L; BDSW-01 – BDSW-03 = 0.0005 mg/L
  - **2019**: BDSW-01 = 0.0037 mg/L; BDSW-03 = 0.0029 mg/L; BDSW-01 – BDSW-03 = 0.0008 mg/L
  - **2020**: BDSW-01 = 0.0036 mg/L; BDSW-03 = 0.0031 mg/L; BDSW-01 – BDSW-03 = 0.0005 mg/L

In 2020, the spring / high flow average dissolved copper concentration at BDSW-01 of 0.0050 mg/L is the highest observed since 2012, while at BDSW-03 average concentrations were similar over the same time period. Overall, the data suggest the mystery load is generally stable during high-flow periods and declining during low-flow times.

2.8 Monthly Surface Water Sampling for Total Arsenic

Total arsenic data is required to evaluate compliance with the IWQS IDAPA 58.01.02.210.03.d.ii adopted as the EPA cleanup level of 0.010 mg/L by calculation of the annual harmonic mean. The annual harmonic mean is equal to the number of samples divided by the sum of the reciprocals of the individual total arsenic results.

Per the PMP–2019 Revision, a monthly sampling event for surface water sample collection at BBSW-01A and PASW-09 was implemented during the 2019 monitoring year (Golder 2020a).

During 2020, a total of eight monthly samples were collected and total arsenic harmonic means calculated for stations BBSW-01A and PASW-09. Both stations' total arsenic harmonic means are observed to be below the associated EPA cleanup level at concentrations of 0.008 and 0.002 mg/L, respectively. Refer to Table 2-8 for additional monthly sampling details.

2.9 Storm Event Sampling

Acute criteria monitoring during storm events is conducted using an automated sampler at BDSW-03. The purpose of the monitoring is to assess levels of copper resulting from runoff from storm events and how they compare to the IWQS acute criterion. The sampling equipment, including telemetry, was installed in June 2020 on the Bucktail drainage, with the intent of recording and collecting one storm event before freezing conditions

require that sampling equipment be removed for the season. A storm on June 17, 2020 triggered sampling on the Big Deer Creek drainage. The data from the storm event are summarized in Table 2-9.

Per the PMP, samples were collected for 24-hours after the sampler was triggered and every other sample (odd numbered samples) was analyzed for total and dissolved arsenic, copper, and cobalt as well as hardness, specific conductivity, temperature, and pH. The even numbered samples were retained at the laboratory for further evaluation if required.

The analysis of the odd numbered 2020 storm event samples indicated that one of the twelve individual samples ('Bottle 1'), collected on June 17 at 02:51, had a dissolved copper concentration that exceeded the chronic criteria (CCC), but not the acute criteria (CMC). In all other samples, dissolved copper concentrations were below the CCC and CMC. Similarly, there were no exceedances of the cobalt cleanup level or arsenic IWQS based on all observed results.

Data quality associated with the storm event met acceptance guidelines. There were no issues of laboratory preparation blank contaminants, and all associated laboratory quality control (QC) including laboratory control samples, spiked blanks, and spiked sample matrices met acceptance limits.

3.0 GROUNDWATER

The PMP requires groundwater levels to be measured weekly during the months of April through June in the monitoring wells near the WTP and water quality samples to be collected during one event in the spring (Table 1-7). It also requires quarterly water level measurements at the West Fork wells and annual water quality monitoring at a selection of West Fork wells. Groundwater cleanup levels (Table 3-1) were established for residential and mine site areas and apply to the point of compliance for groundwater downstream of the Panther Creek Road, but do not apply directly to the Blackbird Creek or West Fork Wells. Furthermore, groundwater discharge cannot cause exceedances of surface water cleanup levels as previously discussed in Section 2.2 and as referenced in Table 2-1.

3.1 Blackbird Creek Wells

Several wells near the WTP were installed during a 2004 investigation of metals loading to the Blackbird Creek drainage (Golder 2005b) in the vicinity of the Blackbird Creek cutoff wall. Five monitoring wells (BBMW-03A, BBMW-05A, BBMW-06A, BBMW-07A, and BBMW-08A) were selected for continued groundwater level monitoring and periodic sampling for water quality (Table 1-7 and Figure 3-1). The general locations of the wells are described below:

- BBMW-03A: Upgradient of the cutoff wall and on the south side of the concrete channel.
- BBMW-05A: Upgradient of the cutoff wall and on the north side of the concrete channel.
- BBMW-06A: Downgradient of the cutoff wall and on the north side of the concrete channel.
- BBMW-07A: Downgradient of the cutoff wall and on the south side of the concrete channel.
- BBMW-08A: Downgradient of the cutoff wall and on the north side of the concrete channel.

Mine site groundwater cleanup levels are not applicable to the Blackbird Creek cutoff monitoring wells (EPA 2003). However, these wells are monitored to evaluate concentrations upstream and downstream from the

cutoff wall and to help evaluate sources, if exceedances in Panther Creek are suspected to be caused by loadings in this reach of Blackbird Creek. No such loadings have occurred during recent years.

3.1.1 Water Levels

Groundwater level measurements (Table 3-2a) were recorded monthly from January through December. A historic graph of groundwater elevations is provided in Figure 3-2 for each well from construction date in 2004 to December 2020. Groundwater elevations are represented as feet above mean sea level (AMSL) North American Vertical Datum of 1929 (NAVD 29) unless otherwise noted.

Groundwater elevations at all locations generally exhibited a small increase corresponding with the high surface water flow (March through May), followed by a general declining trend from June through December 2020. The steepest rise in groundwater elevations is observed at BBMW-05A, where a rise of approximately 2 feet occurred between April and early May 2020. In comparison with recent monitoring years, the groundwater elevation increases observed during the high surface water flow period were most like those in 2016 and 2019. Overall, the groundwater levels in the wells have remained relatively consistent since 2017 with each well exhibiting seasonal fluctuations.

3.1.2 Water Quality

Groundwater samples for laboratory analysis and depth to groundwater measurements were collected on May 27, 2020. Results are summarized in Table 3-2b and Figures 3-3 through 3-5.

<u>Dissolved Copper Concentrations</u>

- Dissolved copper concentrations (Figure 3-3) in the Blackbird Creek monitoring wells generally decreased from 2004 through 2008.
- Beginning in 2009, the concentrations in the wells became more variable.
  - The dissolved copper concentration in BBMW-03A decreased from 0.0021 mg/L in 2019 to a trace concentration of 0.0005 mg/L in 2020. Prior to 2018, trace concentrations more similar to 2020 were measured three consecutive years in 2015 through 2017, ranging from 0.0006 to 0.0009 mg/L.
  - At BBMW-05A, located upgradient of the cutoff wall and north of the concrete channel, the dissolved copper concentrations increased gradually between 2012 and 2017. However, over the last few years the dissolved copper concentrations decreased slightly in both 2018 (21.0 mg/L) and 2019 (14.4. mg/L), while slightly increasing in 2020 (17.3 mg/L).
  - Dissolved copper concentrations in BBMW-06A, have been variable from year to year, however in recent years have generally increased with the four highest concentrations on record observed over the last five monitoring years with the highest recorded concentration observed in 2020 (6.72 mg/L).
  - Dissolved copper concentrations in BBMW-07A have been variable, but since 2012, concentrations have been below historical maximums. At BBMW-07A dissolved copper was 0.0016 mg/L in 2020.
  - Very similar to BBMW-05A, at BBMW-08A, located downgradient of the cutoff wall and north of the concrete channel, the dissolved copper concentrations increased gradually between 2012 and 2017. However, over the last three years the dissolved copper concentrations decreased slightly in both 2018 (17.5 mg/L) and 2019 (14.7 mg/L), while slightly increasing in 2020 (16.1 mg/L).

Dissolved Cobalt Concentrations

- In 2020, dissolved cobalt concentrations at BBMW-03A, -05A, and -08A increased slightly back to concentrations similar to those observed in 2018, continued to increase in BBMW-06A and decreased in BBMW-07A relative to recent years (Figure 3-4).
- The 2017 dissolved cobalt concentrations recorded at BBMW-05A (11.8 mg/L) and BBMW-08A (12.1 mg/L) remain the highest recorded since monitoring began in 2004, however notable decreases were observed at both locations over the last few years.
- The 2020 dissolved cobalt concentration at BBMW-07A (0.576 mg/L) was the lowest on record as presented in Figure 3-4.

Dissolved Arsenic Concentrations

- Dissolved arsenic concentrations at BBMW-03A and -07A have remained relatively steady, while over the last 8 to 9 years concentrations have generally decreased at BBMW-05A and BBMW-06A (Figure 3-5).
- Since 2013, concentrations at BBMW-08A have been below historic levels. A slight increasing trend was observed in 2015 through 2017, followed by another reduction of concentration to a level equal to the laboratory arsenic report limit of 0.001 mg/L, as observed during the past three years.

3.2 West Fork Monitoring Wells

Wells in the vicinity of the West Fork Tailings Storage Facility are monitored for water level and in a few cases, water quality. In December 2012, several new wells (listed in Table 1-7) were added to support additional West Fork investigations. The West Fork Monitoring Wells, shown on Figure 3-6, include:

- Tailings Area: WFMW-11, WFMW-12, WFMW-13S, WFMW-13D, WFMW-9, WFMW-1109, WFMW-9T, WFMW-16A, WFMW-16C, WFMW-16T, WFMW-15C, WFMW-15T, WFMW-18, and WFMW-17.
- Lower Wells: WFMW-1S, WFMW-1D, WFMW-2, WFMW-4, WFMW-1101, WFMW-1110D, BOW-1, BPW-2, BOW-2, APW-1, APW-2, BPW-1, APW-3, and WFMW-1111D.
- Face of Dam: WFMW-6, GT-101, and GT-102.

Water quality monitoring is performed annually at WFMW-1D, WFMW-1S, WFMW-2, and WFMW-9 in accordance with the PMP (Golder 2020a).

3.2.1 Water Levels

Water levels were measured three times in 2020, taking place during May, August, and November. The vibrating wire piezometers (VWP) located at GT-104 and GT-105 had an additional spring reading taken on April 2. Water levels from West Fork wells are presented in Tables 3-3a through 3-3c and the water level trends are presented graphically in Figures 3-7, 3-8, and 3-9. Groundwater elevations are represented as feet AMSL (NAVD 29) unless otherwise noted. Water level monitoring will continue at these West Fork wells to determine if any unexpected fluctuations occur.

A summary of water level observations by West Fork Tailings Storage Facility area is provided below:

- Tailings Area Wells (Table 3-3a and Figure 3-7)

- Water levels in the Tailings Area wells have shown a gradual increase from 2000 through 2017, however over the last few years levels have exhibited less change with only seasonal fluctuations noted.
  - The exception in 2020 is at WFMW-16T, where the November 2020 water level reading was approximately 10 feet above average water levels in recent years. This water level is likely an anomalous data reading, however water levels will continue to be monitored for change.
- Tailings Area wells show a seasonal response with increased water levels during snowmelt and lower water levels during low flow periods.

- Lower Wells (Table 3-3b and Figure 3-8)
  - Historically, the water levels in the Lower Wells have generally remained steady or decreased.
  - Water levels in 2020 followed previous seasonal patterns with increased water levels during snowmelt and lower water levels during low flow periods. After 2018 West Fork Tailings Storage Facility construction, water level measurements in November 2018 were slightly lower than observed in recent years, but otherwise have remained consistent through 2020.
- Face of Dam (Table 3-3c and Figure 3-9)
  - GT-102 and WFMW-6 water levels increased steadily from 2001 to 2014, however levels have since shown little change outside of seasonal variations through 2020.
  - At well GT-101, water levels steadily increased between 2001 and 2010, but the damage to the 42-inch culvert in 2011 caused water levels to drop below historic measurements[5]. From 2011 to 2019, water levels in GT-101 increased slightly but are still below the historical maximums with the exception of the instance summarized below.
    - A potentially anomalous reading of 5,625.04 feet was recorded on August 22, 2019, but then returned to a seasonal average water level in November 2019. Water levels remained stable throughout 2020 and nothing unusual was observed with the well during the 2020 groundwater level monitoring period.
  - Water levels in 2020 followed historical patterns of increased water levels during snowmelt and lower water levels during the low flow period and overall have remained relatively constant compared to those observed in 2014 through 2018.

3.2.2 Water Quality

Groundwater samples for laboratory analysis and depth to groundwater measurements were collected on September 16, 2020. Water quality results for WFMW-9 (Tailings Area), WFMW-1D, WFMW-1S, and WFMW-2 (Lower Wells) can be found in Table 3-3d. No obvious trend is observed between water elevations and dissolved copper, cobalt, or arsenic concentrations (Figures 3-10 through 3-12).

[5] All of the West Fork Lower Wells and Face of Dam monitoring wells showed a significant, rapid water level increase in the spring of 2011, followed by a rapid decline (April 2011 to July 2011). The rapid decline was due to apparent damage to the drain line within the existing 42-inch buried culvert during routine maintenance resulting in increased flows from the culvert. After this, water levels declined steadily from summer into fall of 2011.

Dissolved Copper Concentrations

- Since the spring of 2012, all well locations have shown a general decreasing trend, although with some fluctuations.
- In 2020, dissolved copper concentrations remained stable at WFMW-02 and WFMW-9, increased slightly at WFMW-1D and spiked uncharacteristically at WFMW-1S compared to recent dissolved copper concentrations.
  - Between 2015 and 2019, concentrations at WFMW-1S had remained at trace levels, ranging from 0.0003 mg/L to 0.0005 mg/L, however in 2020 concentrations increased by an order of magnitude to 0.003 mg/L.
- Concentrations at WFMW-9 have been at trace levels since monitoring began back in 2004 and were non-detect, at a reporting limit of 0.0003 mg/L, in 2018 and 2019.
- All dissolved copper concentrations in 2020 remain below the historical maximum measured concentration at each monitored well location since 2005; or in the case of WFMW-2, since water quality monitoring began in 2012.

Dissolved Cobalt Concentrations

- Over the monitoring period of record, dissolved cobalt concentrations have generally decreased at WFMW-1S and WFMW-1D, but over the last 8 years or more have remained relatively steady (Figure 3-11). In 2020, dissolved cobalt concentrations decreased slightly at both locations.
- Since 2012, concentrations at WFMW-2 have slightly increased each year with the highest concentrations observed during 2018 (4.33 mg/L), 2019 (5.52 mg/L) and 2020 (5.99 mg/L).
- The dissolved cobalt concentration at WFMW-9 increased to 0.0094 mg/L in 2020, which is the highest recorded concentration since 2006.

Dissolved Arsenic Concentrations

- Dissolved arsenic concentrations (Figure 3-12) have generally increased in WFWM-1S, WFMW-1D, WFMW-9 and WFMW-2 since sampling began. However, since 2014, concentrations in WFMW-1S, WFMW-1D and WFMW-9 have exhibited little change.
- Over the last 7 years, there has been very little change in arsenic concentrations for wells WFWM-1S and WFMW-9.
- Over the last 5 years, there has been a slight reduction in arsenic concentrations at WFMW-1D.
- The dissolved arsenic concentration in WFMW-2 has shown a consistent increase between 2014 and 2020 and appears to be approaching similar levels observed in WFMW-1S.
- Individual exceedances of the EPA adopted total arsenic cleanup level at the nearest downstream Blackbird Creek surface water station (BBSW-02) have not occurred during recent years, nor has the total arsenic calculated annual harmonic mean exceeded the cleanup level since monitoring began in 2019 (see Section 2.8 for details on 2020 annual harmonic means for the Blackbird and Panther Creek stations).

4.0 SEDIMENT SAMPLING

In accordance with the ROD, cleanup level exceedances in stream sediments would be addressed through natural recovery. In-stream sediment monitoring is conducted annually during low flow periods in late summer or early fall to monitor the natural recovery of the in-stream sediments. In-stream sediment sampling locations are located on Blackbird, Panther, Bucktail, South Fork Big Deer and Big Deer Creeks (Table 1-1 and Figure 1-1). Sediment sampling locations are located at the corresponding streamflow station (e.g., BDSED-03 is located at BDSW-03, PASED-10 is located at PASW-10, etc.).

Table 4-1 summarizes cleanup levels for soils and sediments on the Blackbird Mine Site, based on Table 1 in the 2012 Explanation of Significant Differences (EPA 2012), included as Appendix D of the PMP– 2019 Revision (Golder 2020a). For Panther, South Fork Big Deer and Big Deer Creeks, the cleanup levels are based on aquatic toxicity. For Blackbird Creek, the criteria are human health based. To avoid confusion, only the aquatic toxicity criteria are presented in the figures and tables and discussed in the text below. A summary of the historic[6] (1995, 2000, and 2008 through 2020) data for arsenic, cobalt, and copper are listed in Table 4-2 and presented in Figures 4-1a through 4-5c.

<u>Blackbird Creek In-stream Metals Concentrations</u>

- Concentrations of arsenic, cobalt, and copper over time are shown on Figures 4-1a through 4-1c, which also indicates the completion of stabilization actions in Blackbird Creek in 2010.
  - Average 2020 arsenic concentrations showed little change at Blackbird Creek stations relative to 2019. In general, BBSED-01A, BBSED-03A, and BBSED-07 indicate a slight overall decreasing trend since completion of the stabilization actions, while upgradient station BBSED-08 shows no overall trend, but variability from year to year (Figure 4-1a).
  - Average cobalt concentrations generally remained the same or slightly increased at Blackbird Creek stations relative to 2019.
  - Average copper concentrations in 2020 remained relatively steady at the Blackbird Creek stations, with BBSED-01A continuing a slight decreasing trend since 2017 (Table 4-2).
- Fluctuations and variability in metals concentrations along Blackbird Creek can be expected as sediments continue to stabilize following completion of the major in-stream stabilization actions in 2010 and some additional actions in later years.

<u>Panther Creek In-stream Metals Concentrations</u>

- In most cases, concentrations of arsenic, cobalt, and copper in sediments sampled in 2020 were substantially lower than the sample results for the same stations in 2009 and 2010, prior to the stabilization actions in Blackbird Creek (Figures 4-2a through 4-2c).

[6] Earlier year station locations may be approximate based upon the location identifiers cited. For example, BBSW-01, as cited during the 2000 sample collection, is geographically in a different location than collection points for BBSW-01A performed in 2008 through 2020. Furthermore, BB-2A cited during the 1995 sample collection, is identified in the *Blackbird Mine Site Remedial Investigation, Volume 1* (Golder 2001) document as a sample site that "correlates" with the 2000 sediment locations. Therefore, some variability is inherent for the locations grouped for comparison in Table 4-2.

- In 2020, most stations had lower or similar arsenic, cobalt, and copper concentrations than those observed in 2019. Although in a few instances concentrations were slightly higher than the 2019 concentrations. Year-to-year or station-to-station fluctuations are expected considering the heterogeneity of the sediment sampling matrix and as natural recovery of the stream sediments occurs following completion of actions in the Blackbird Creek drainage.
  - Average arsenic concentration at Panther Creek station PASED-08 was observed to exceed the EPA's arsenic cleanup level of 35 milligrams per kilograms (mg/kg)
    - Even with this single EPA arsenic cleanup level exceedance, the 2020 average concentration, decreasing from 98 mg/kg in 2019 to 45 mg/kg, is the lowest on record and substantially lower than concentrations prior to completion of stabilization actions in Blackbird Creek.
  - The average arsenic concentration at PASED-07, previously exceeding EPA's arsenic cleanup level over the last four monitoring years, decreased to a concentration below the cleanup level in 2020 (31 mg/kg).
  - In recent years there were exceedances of the cobalt cleanup level (80 mg/kg) at PASED-08 and PASED-07, however average 2020 cobalt concentrations at these stations as well as all other Panther Creek stations were below the cleanup level.
  - All Panther Creek stations average copper concentrations are below the copper cleanup level (149 mg/kg).

<u>Bucktail / South Fork Big Deer / Big Deer Creek In-stream Metals Concentrations</u>

- Arsenic, cobalt, and copper show a generally decreasing trend with time in Bucktail Creek and South Fork Big Deer Creek. These decreasing trends indicate a continuing natural recovery of sediments in response to early actions and remedial actions in the Bucktail system.
- Concentrations of COCs have shown less of a trend since approximately 2010, with expected variability.
- Relative to 2019, the observed COC concentrations in Bucktail Creek were not noteworthy, with the exception of a single arsenic sample at BTSED-1.6 (BTSED-1.6-2) that was higher than typically observed, causing an increase in the average concentration for that station (Table 4-2, Figures 4-3a through 4-3c).
- South Fork Big Deer Creek stations exhibited little change between 2019 and 2020 average metals concentrations (Figures 4-4a through 4-4c).
- Exceedances of associated cleanup levels during 2020 are summarized below:
  - Average arsenic concentration at SFSED-01 (43 mg/kg) slightly exceeded EPA's arsenic cleanup level (35 mg/kg), marking the most recent exceedance at this station since 2014 (42 mg/kg).
  - The EPA copper cleanup level (637 mg/kg) has been exceeded at the SFSW-01 since sediment monitoring began, while average concentrations at SFSW-02 have exceeded the cleanup level most years since monitoring began at this station in 2011, except for 2015 and 2016.
    - The average copper concentration at SFSED-01 (1,244 mg/kg) in 2020 slightly decreased from the 2019 average concentration (1,830 mg/kg).

  - Similarly, the 2020 average concentration at SFSED-02 (858 mg/kg) decreased from the 2019 average concentration (889 mg/kg).

- In Big Deer Creek, average arsenic and cobalt concentrations have remained well below EPA's sediment cleanup levels, while copper concentrations have fluctuated near the EPA cleanup level in recent years.
  - Similar to 2019, 2020 arsenic, cobalt, and copper concentrations were all below the EPA cleanup levels in Big Deer Creek.
  - The average copper concentrations at BDSED-01 (56 mg/kg), BDSED-02 (75 mg/kg), and BDSED-03 (37 mg/kg) all decreased relative to 2019 and previous years and were all below the EPA's copper cleanup level of 149 mg/kg for Big Deer Creek.

5.0 ADDITIONAL SAMPLING

5.1 Voluntary Copper BLM Surface Water Quality Sampling

The BLM voluntary monitoring is to provide baseline information if future compliance monitoring should change to the EPA's BLM based copper criterion for monitoring water quality with dissolved copper concentrations in surface water at the Site. At the discretion of the BMSG, BLM sampling may be performed within existing PMP sample collection programs (Golder 2020a).

During 2020, surface water sample collection for BLM water quality parameters was performed in concert with the following scheduled standard sampling events at the respectively listed sampling locations:

- Blackbird Synoptic – At PASW-09 and BBSW-01A.
- Big Deer Synoptic (all events) – At BDSW-01, BDSW-03, SFSW-01, and SFSW-02.
  - At PASW-04X (fall events only)

Results are presented in Tables 2-2b, 2-2d, 2-2f, and 2-2h.

5.2 Bucktail & South Fork Big Deer Creek Copper Loading Investigation

Focused field investigations were implemented in 2019 along Bucktail Creek and South Fork Big Deer Creek with a combination of soils, sediments, groundwater and surface water quality sampling to investigate potential sources of copper loading. This work was performed by EcoMetrix in coordination with and overseen by the BMSG; and supported by SES and Golder. The investigations were completed under an effort-specific Field Investigation Plan and Quality Assurance Plan by EcoMetrix (EcoMetrix 2019). The investigation continued during the spring of 2020 with an additional surface water synoptic sampling event and groundwater/pore water sampling event occurring between May 8 and May 10, 2020. Data summary reporting and evaluation will be completed and summarized under a separate cover during 2021.

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Tables

Table 1-1: 2020 Sample Locations and Schedule

Sample ID	Description	Synoptic Sampling [A]	Monthly Sampling	Chronic Criteria Sampling	Acute Criteria Sampling [C]	Transducers / USGS Flow Monitoring [D, I]	Clean Hands Procedure Required	In-stream Sediment Monitoring[F]
	Matrix Type:	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Sediment
MCSW-01	Meadow Creek Channel Above Blackbird Creek	X						
BBSW-08	Upstream of the clean water reservoir	X						X
BBSW-07A	Upstream of WTP	X						
WTP-003	Water Treatment Plant Effluent Grab	X						
WTP-001[L]	Water Treatment Plant Effluent, Monthly Composite							
HGSW-01	Hawkeye Gulch discharge to Blackbird Creek	X						
BBSW-07	Downstream of WWTP discharge	X						X
BBSW-05	Upstream of Haynes-Stellite Mine Workings	X						

Table 1-1: 2020 Sample Locations and Schedule

Sample ID	Description	Synoptic Sampling [A]	Monthly Sampling	Chronic Criteria Sampling	Acute Criteria Sampling [C]	Transducers / USGS Flow Monitoring [D, I]	Clean Hands Procedure Required	In-stream Sediment Monitoring[F]
	Matrix Type:	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Surface Water	Sediment
BBSW-03	Upstream of W. Fork Blackbird Creek	X						X
WFINTDITCH	West Fork Seepage Interceptor Ditch	X						
WFTTSW-01	West Fork Toe Tailings Seepage Flow	X						
WFSW-03	West Fork Blackbird Creek upstream of tailings impoundment	X					X	
WFSW-02	West Fork Blackbird Creek at bottom of spillway	X					X	
WFSW-01	West Fork 42-inch culvert outlet	X						
BBSW-02	Upstream of bridge at Ludwig Gulch near mine gate	X				X (I)		
BBSW-01A	Mouth of Blackbird Creek	X	X			(I)		X

Table 1-1: 2020 Sample Locations and Schedule

Sample ID	Description	Synoptic Sampling [A]	Monthly Sampling	Chronic Criteria Sampling	Acute Criteria Sampling [C]	Transducers / USGS Flow Monitoring [D, I]	Clean Hands Procedure Required	In-stream Sediment Monitoring[F]
	Matrix Type:	**Surface Water**	**Surface Water**	**Surface Water**	**Surface Water**	**Surface Water**	**Surface Water**	**Sediment**
PASW-11	Panther Creek U/S of Blackbird Creek	X		*X*			X	X
PASW-10	Panther Creek D/S of Blackbird Creek							X
PASW-09	Panther Creek at Cobalt Townsite	X	X	*X*	*(C)*	*(C)*	X	
PASW-08	Panther Creek U/S of Deep Creek							X
PASW-07	Panther Creek U/S of Napias Creek							X
PASW-05	Panther Creek U/S of Big Deer Creek	X (G)		*X*			X	X
PASW-04	Panther Creek D/S of Big Deer Creek							X
PASW-04X	Panther Creek D/S of Big Deer Creek + 1000 yds.	X (G)		*X*			X	

Table 1-1: 2020 Sample Locations and Schedule

Sample ID	Description	Synoptic Sampling [A]	Monthly Sampling	Chronic Criteria Sampling	Acute Criteria Sampling [C]	Transducers / USGS Flow Monitoring [D, I]	Clean Hands Procedure Required	In-stream Sediment Monitoring[F]
	Matrix Type:	**Surface Water**	**Surface Water**	**Surface Water**	**Surface Water**	**Surface Water**	**Surface Water**	**Sediment**
PASW-01	Panther Creek ~1 mile U/S of mouth							X
BDSW-04	Big Deer Creek U/S of South Fork Big Deer Creek	X (G)		*X*			X	X
BDSW-03	Big Deer Creek below South Fork Big Deer Creek	X (G)		*X*	X	X	X	X
BDSW-01	Big Deer Creek ~ 100 yards U/S from mouth	X (G)		*X*			X	X
SFSW-04	South Fork Big Deer Creek U/S of Bucktail Creek	X (G)		*(B)*			X	X
SFSW-02	South Fork Big Deer Creek D/S of Bucktail Creek	X (G)					X (E)	X
SFSW-01	South Fork Big Deer Creek U/S from Big Deer Creek	X (G)		*(B)*			X (E)	X
BTSW-01.6	Bucktail Creek D/S of upper Bucktail Remedial Action system	X (G)						X

Table 1-1: 2020 Sample Locations and Schedule

Sample ID	Description	Synoptic Sampling [A]	Monthly Sampling	Chronic Criteria Sampling	Acute Criteria Sampling [C]	Transducers / USGS Flow Monitoring [D, I]	Clean Hands Procedure Required	In-stream Sediment Monitoring[F]
	Matrix Type:	**Surface Water**	**Surface Water**	**Surface Water**	**Surface Water**	**Surface Water**	**Surface Water**	**Sediment**
BTSW-01	Bucktail Creek U/S of South Fork Big Deer Creek	X (G)				X (J)		X

Notes:

A Synoptic sampling at these locations includes a spring sampling event only for the Blackbird /Panther Creek drainage (May 12, 2020) (i.e. no fall synoptic sampling), as requested by BMSG in the "Performance Monitoring Plan Amendments for Reduced Sampling Analysis" (Golder, 2007b). The Bucktail/ South Fork/ Big Deer drainage was sampled during 2 spring (high flow) events on May 5, 2020 and May 26, 2020 and two fall (low flow) events on September 9, 2020 and September 28, 2020. See Note G.

B When water quality is approaching cleanup levels at these stations, then the regular 96-hour monitoring will be performed.

C Storm event monitoring using automated samplers was conducted at BDSW-03 to evaluate acute criteria as required by the UAO SOW. Acute criteria evaluation for the remaining stations is required in the BRCP (i.e. PASW-11, PASW-05, PASW-04X, and BDSW-04) and will be based on samples collected during chronic criteria monitoring). Letter correspondence to BMSG from Matt Wilkening (EPA Remedial Project Manager) on February 23, 2019, provided authorization to discontinue acute criteria storm event monitoring in the Panther Creek drainage. A storm event was recorded on June 17, 2020 at BDSW-03 and sample collection with automated sampler was completed.

D Continuous stream gauging using pressure transducers or recorded at USGS gauge.

E The clean hands procedure will be implemented at these locations when water quality monitoring indicates concentrations are approaching the cleanup level.

F Sediment sample collection is performed in the fall.

G Two spring synoptic events (approximate high flow) and two other synoptic sampling events (late summer/early fall) will be conducted at these stations.

H Weekly sampling events were discontinued per the Blackbird Creek Performance Monitoring Plan – 2019 Revision and supporting documents (Golder 2020).

I USGS Gauges were installed at BBSW-02 and PASW-09 in November 2011. Streamflow data from the USGS gauges are used in this document in place of manually measured flows at these stations. Flows reported at BBSW-01A have been historically recorded from the USGS gauge at BBSW-02, unless otherwise noted. However, as of approximately mid-July 2020 the USGS Gauge station and subsequent data collection have been discontinued indefinitely.

J Stream gauging has been initiated at BTSW-01 in concert with acute criteria monitoring at BDSW-03.

K As of June 2016, WTP-001 has not been collected as part of the monthly sampling. In accordance with the 1990 NPDES permit requirements and from a recent NPDES review, it was determined that collection of the composite sample, identified as WTP-003, is the only requirement. Therefore, the routine grab sample, identified as WTP-001, will no longer be collected, and collection of the composited sample (WTP-003) will continue. Rather than collection of a month-long composite, WTP-003 will consist of an 8-hour composite sample collected once per month for strict adherence to the NPDES permit. If in the future, a grab sample is collected for additional monitoring, the results will be included in the annual monitoring report in accordance with the permit.

Table 1-2: 2020 Chronic Criteria Performance Monitoring

Sampling Events	Stations							Laboratory Analytes							Field Parameters				Sampling Times [1]	Sampling Frequency[1]	Comments
								Dissolved Fraction			Total Fraction										
	PASW-04X	PASW-05	PASW-09	PASW-11	BDSW-01	BDSW-03	BDSW-04	Arsenic	Cobalt	Copper	Arsenic	Cobalt	Copper	Hardness	Specific Conductance	Flow	pH	Temp			
96-hour Sampling	X	X	X	X	X	X	X			X				X	X		X	X	Two times/day for 96 hours	-One time in spring for the Panther Creek drainage -Two times in spring and once during low flow for the Big Deer Creek drainage	Once water quality approaches cleanup levels along South Fork Big Deer Creek, then regular 96-hour monitoring will commence at SFSW-01 and SFSW-04.
Dissolved and Total As and Co, and Total Cu Sampling	X	X	X	X	X	X	X	X	X		X	X	X						Once during 96-hour sampling	-One time in spring for the Panther Creek drainage -One time in the spring and once during low flow for the Big Deer Creek drainage	May coincide with Synoptic events.
			X					X	X		X	X	X						Once per day at the last sample of the day during 96-hour sampling	One time in spring	Only at PASW-09
Flow Measurements						X										X			Once / event during 96-hour sampling	Two times in spring and once during low flow	A physical flow measurement will be taken at frequency noted. Gage readings will be taken at established gaging stations throughout the sampling period at time of sampling. Blackbird and Panther Creek flows are now recorded at the USGS gauging stations at BBSW-02 and PASW-09.

Notes:
1 - a) The number of samples required during the 96-hour sampling round for both Panther Creek and Big Deer Creek drainages has been reduced from 12 to 8 samples, removing the nighttime samples (Golder 2019d).
b) The third spring 96-hour sampling round (receding limb of spring hydrograph) for both Panther Creek and Big Deer Creek drainages is no longer required (Golder 2019a).
c) The first spring 96-hour sampling round (rising limb of spring hydrograph) for Panther Creek drainage is no longer required (Golder 2019b).
d) The fall (low flow period) Panther Creek 96-hour sampling event is no longer required.
2 - Blackbird Creek flows have been recorded from the USGS gauging station at BBSW-02, however, as of July 2020, the USGS gauging station at BBSW-02 and subsequent data collection has been discontinued indefinitely.

Table 1-3: 2020 Synoptic Monitoring - Blackbird Creek Drainage

Sampling Events	Stations																	Laboratory Analytes													Field Parameters				Sampling Times	Sampling Frequency	Comments
																		Dissolved Fraction				Total Fraction															
	PASW-09	PASW-11	BBSW-01A	BBSW-02	BBSW-03	BBSW-05	BBSW-07	BBSW-07A	BBSW-08	WFSW-03	WFSW-02	WFSW-01	WFTTSW-01	WFINTDITCH	MCSW-01	HGSW-01	WTP-003	Arsenic	Cobalt	Copper	Iron	Arsenic	Cobalt	Copper	Iron	Calcium	Magnesium	Hardness	Sulfate	Total Suspended Solids	Specific Conductance	Flow	pH	Temp			
Synoptic Monitoring	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	Once during rising limb of hydrograph	Spring Only	The timing of the event will be determined based on monitoring of weather conditions, observations from BMSG personnel at the mine site, and checking the Morgan Creek SNOTEL station.
Flow Measurements	X[1]	X[2]	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X															X			Once per station during synoptic sampling		A physical flow measurement will be taken at each station including BBSW-02, however with the exception of PASW-09, In place of manual measured flows at PASW-09, the USGS station flows at PASW-09 will be used for synoptic event load calculations. The flow at WTP-003 will be obtained from the water treatment plant operator.

Notes:
1 - Due to safety considerations for the sampling team, the USGS station flow data at PASW-09 (USGS 13306370) will be used in place of manual measured flows for synoptic event load calculations.
2 -The flow at PASW-11 will be estimated by subtraction of measured flow at BBSW-01A from the USGS station flow at PASW-09.

Table 1-4: 2020 Synoptic Monitoring - Bucktail/Big Deer Creek Drainage

Sampling Events	Stations										Laboratory Analytes													Field Parameters				Sampling Times	Sampling Frequency	Comments
											Dissolved Fraction				Total Fraction															
	PASW-04X [3]	PASW-05	BTSW-01	BTSW-01.6	SFSW-01	SFSW-02	SFSW-04	BDSW-01	BDSW-03	BDSW-04	Arsenic	Cobalt	Copper	Iron	Arsenic	Cobalt	Copper	Iron	Calcium	Magnesium	Hardness	Sulfate	Total Suspended Solids	Specific Conductance	Flow	pH	Temp			
Full Synoptic Monitoring	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X		X	X	Spring and Low Flow	Two times in spring and two times during low flow periods	The timing of the Spring events will be determined based on monitoring of weather conditions, observations from BMSG personnel at the mine site, and checking the Morgan Creek SNOTEL station. The low flow events will occur during late summer/early fall.
Flow Measurements	X[1,2]	X[1]	X	X	X				X	X															X			Once per station during synoptic sampling	Once per station during synoptic sampling	A physical flow measurement will be taken at each station, except SFSW-02, SFSW-04, and BDSW-01. The following estimations will be used for these stations: - Flows at SFSW-01 will be used to calculate loads at SFSW-02 - Flows at SFSW-04 will be estimated as flow at SFSW-01 minus flow at BTSW-01 - Flows at BDSW-03 will be used to calculate loads at BDSW-01

Notes:

1 - Due to safety considerations for the sampling team, no manual flows will be measured where observed flows have the potential to create unsafe conditions.

2 - It was determined in 2016 that the flow measurement cross-section at PASW-04X was no longer suitable to obtain representative manually measured flows. Instead a more suitable cross-section at PASW-04, near the cable-way crossing, will be used to obtain a flow to represent conditions at PASW-04X, when deemed safe to do so.

3 - PASW-04X inadvertently was not sampled during either of the spring 2020 synoptic events and therefore loading calculations are not available for PASW-04X or PASW-05 during spring synoptic events.

Table 1-5: 2020 Monthly Surface Water Monitoring

Sampling Events	Stations		Laboratory Analytes			Field Parameters				Sampling Times	Sampling Frequency[2,3]	Comments
	BBSW-01A	PASW-09	Dissolved Arsenic	Total Arsenic	Total Suspended Solids	Specific Conductance	Flow[1]	pH	Temp			
Monthly Surface Water Sampling	X	X	X	X	X	X	X	X	X	Approximately the same time every month	Once a month	Monthly sampling during the winter months will be contingent on safe access to open water at or near the sampling locations.

Notes:
1 - Panther Creek flows will be recorded from the USGS gauging station at PASW-09.
Blackbird Creek flows have been recorded from the USGS gauging station at BBSW-02, however, as of July 2020, the USGS gauging station at BBSW-02 and subsequent data collection has been discontinued indefinitely.
2 - A minimum of 8 samples per station collected annually are assumed to provide enough sample data to calculate the annual harmonic mean.
3 - The second Monthly sampling event occurred during April 2020, however the samples were lost by courier in transit to the laboratory. Therefore an additional Monthly sampling event was completed during November 2020 to achieve the required 8 samples annually.

Table 1-6: 2020 Voluntary Copper BLM Parameter Sampling

Sampling Events	Stations						Laboratory Analytes																					Field Parameters				Sampling Times [1]	Sampling Frequency [1]	Comments
							Dissolved Fraction							Total Fraction																				
	PASW-04X	PASW-09	BDSW-01	BDSW-03	SFSW-01	SFSW-02	Arsenic	Calcium	Cobalt	Copper	Magnesium	Potassium	Sodium	Arsenic	Cobalt	Copper	Potassium	Sodium	Chloride	Sulfate	Calcium	Magnesium	Hardness	Alkalinity	Dissolved Organic Carbon	pH	Total Dissolved Solids	Total Suspended Solids	Specific Conductance	Flow	pH	Temperature			
BLM Parameter Sampling	X[1]	X[1]	X[1]	X[1]	X[1]	X[1]	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X	X[2,3]	X	X	At the PASW-09 station sample during the Blackbird Creek spring synoptic event. At stations BDSW-01, BDSW-03, SFSW-01, and SFSW-02 sample during each Bucktail/Big Deer Creek synoptic monitoring event, unless otherwise determined by the BMSG.		The BLM voluntary monitoring is to provide baseline information if future compliance monitoring should change to the EPA's BLM based copper criterion for monitoring water quality with dissolved copper concentrations in surface water at the Site. At the discretion of the BMSG, additional or less voluntary BLM sampling may be performed within existing PMP sample collection programs.

Notes:

1 - As of the spring 2019, sampling at the site will be supplemented with voluntary inclusion of periodic samples at the listed sample locations to occur within existing PMP sample collection programs and will include sample analysis of all listed BLM parameters. Specific sampling times and frequency will be communicated to the sampling crew with enough time to accommodate for the BLM sampling addition.

2 - USGS station flow at PASW-09, as well as transducer/gage height data from BDSW-03 will be recorded. No manual flow measurements are required for this program except the manual flow measurements needed to support development of the BDSW-03 rating curve.

3 - Blackbird Creek flows have been recorded from the USGS gauging station at BBSW-02, however, as of July 2020, the USGS gauging station at BBSW-02 and subsequent data collection has been discontinued indefinitely.

Table 1-7: 2020 Groundwater Monitoring Well Sampling Schedule

Well Number	Monthly Water Level Measurements[1]	Spring Water Quality Monitoring[2]	Quarterly Water Level Measurements	Annual Water Quality Monitoring [3]
BBMW-03A	X	X		
BBMW-05A	X	X		
BBMW-06A	X	X		
BBMW-07A	X	X		
BBMW-08A	X	X		
WFMW-1S			X	X
WFMW-1D			X	X
WFMW-02			X	X
WFMW-03			X	
WFMW-04			X[6]	
WFMW-06			X	
WFMW-09			X	X
WFMW-11			X	
WFMW-12			X	
WFMW-13S			X	
WFMW-13D			X	
WFMW-1101			X[4]	
WFMW-1109			X[4]	
GT-101			X	
GT-102			X	
WFMW-1101D			X[5]	
BOW-1			X[5]	
BPW-2			X[5]	
BOW-2			X[5]	
APW-1			X[5]	

Table 1-7: 2020 Groundwater Monitoring Well Sampling Schedule

Well Number	Monthly Water Level Measurements[1]	Spring Water Quality Monitoring[2]	Quarterly Water Level Measurements	Annual Water Quality Monitoring [3]
APW-2			X[5]	
BPW-1			X[5]	
APW-3			X[5]	
WFMW-111D			X[5]	
WFMW-9T			X[5]	
WFMW-16A			X[5]	
WFMW-16C			X[5]	
WFMW-16T			X[5]	
WFMW-15C			X[5]	
WFMW-15T			X[5]	
WFMW-18			X[5]	
WFMW-17			X[5]	

Notes:
X – Task Completed
1. Monthly water level measurements were recorded beginning in January 2020 for the Blackbird Cutoff Wells.
2. Blackbird Cutoff Well water quality monitoring was performed in the spring on May 27, 2020.
3. West Fork Monitoring Well water quality monitoring was performed in the fall on September 16, 2020. The PMP (Golder 2019) requires water quality monitoring for WFMW-1S, WFMW-1D, WFMW-02 and WFMW-09 only.
4. Monitoring began in October 2011 after the wells were installed.
5. Monitoring began in December 2012 after the wells were installed as part of the West Fork Investigation work.
6. WFMW-04 was decommissioned during the West Fork Tailings Storage Facility Embankment Stabilization Construction on July 25, 2018. A replacement well was installed in WFMW-04's former general location during July 2019.

Table 2-1: Summary of Surface Water Cleanup Levels for Blackbird Mine Site

Drainage/Area of Drainage	Total Arsenic[1]	Dissolved Cobalt[1]	Dissolved Copper[1]
Blackbird Creek	0.010 mg/L	Narrative Goal[2]	Narrative Goal[2]
Panther Creek	0.010 mg/L	0.086 mg/L	IWQS[3]
Bucktail Creek	Narrative Goal[2]	Narrative Goal[2]	Narrative Goal[2]
South Fork Big Deer Creek	0.010 mg/L	0.086 mg/L	IWQS[3]
Big Deer Creek	0.010 mg/L	0.086 mg/L	IWQS[3]

Notes:

1 - Cleanup levels for the Blackbird site for arsenic, cobalt, and copper are presented in Table 1 of the Explanation of Significant Difference prepared by the United States Environmental Protection Agency (EPA), dated May 31, 2012.

2 - See Narrative Goals in Section 8.3.3 of the 2003 ROD:

a. "The remedial goal for Blackbird Creek is to improve water and sediment quality such that cleanup levels are not exceeded downstream in Panther Creek. In addition, the remedial goal for Blackbird Creek is to support aquatic life at levels similar to that of nearby reference streams, although not necessarily to support salmonids or metals-sensitive macroinvertebrate taxa."

b. "The remedial goal for Bucktail Creek is to improve water and sediment quality such that cleanup levels are not exceeded downstream in South Fork Big Deer Creek or in Big Deer Creek."

3 - Idaho Water Quality Standards (IDAPA 58.01/02.210). See Section 2.2 for more detail.

Table 2-2a: 2020 Surface Water Sampling Summary Tables / Dissolved Constituents / Blackbird and Panther Creek (Date Sorted)

Sampling Location[1]	Date	Time	Event[2]	Cu IWQS Acute (CMC)[3] mg/L	Cu IWQS Chronic (CCC)[3] mg/L	Flow (cfs)	Staff Gauge Water Level (ft)	Dissolved[4,5,6]						
								Arsenic	Cobalt		Copper[8]		Iron	Manganese
								Conc. (mg/L)	Conc. (mg/L) Cleanup Level = 0.086 mg/L[7]	Load (kg/day)	Conc. (mg/L)	Load (kg/day)	Conc. (mg/L)	Conc. (mg/L)
WTP-003	25-Mar-20	8:00							0.180		0.005		0.03 U	
BBSW-01A	26-Mar-20	9:55	MTHY			4.63 A		0.001						
PASW-09	26-Mar-20	10:20	MTHY			41.1 P		0.001						
PASW-09 D	26-Mar-20	10:30	MTHY					0.001						
PASW-09 B	26-Mar-20	10:40	MTHY					0.001 U						
WTP-003	28-Apr-20	12:00							0.560		0.012		0.03 U	
PASW-05	5-May-20	17:10	S*	0.0046	0.0035			0.002	0.0061		0.0021		0.14	
PASW-11	11-May-20	10:20	96	0.0047	0.0035				0.0002		0.0008			
PASW-09	11-May-20	10:40	96	0.0048	0.0036	407 P			0.0081	8.07	0.0019	1.89		
PASW-05	11-May-20	11:05	96	0.0046	0.0035				0.0052		0.0017			
PASW-04X	11-May-20	11:25	96	0.0046	0.0035		1.78		0.0051		0.0019			
PASW-11	11-May-20	14:15	96	0.0048	0.0036				0.0002		0.0009			
PASW-09	11-May-20	14:35	96	0.0048	0.0036	387 P		0.001	0.0079	7.48	0.0018	1.70		
PASW-09 D	11-May-20	14:45	96	0.0048	0.0036				0.0079		0.0019			
PASW-09 B	11-May-20	14:55	96						0.0001 U		0.0003 U			
PASW-05	11-May-20	15:00	96	0.0046	0.0035				0.0050		0.0018			
PASW-04X	11-May-20	15:20	96	0.0046	0.0035		1.78		0.0048		0.0020			
MCSW-01	12-May-20	8:45	S			0.148 **	0.40	0.011	0.1210	0.04	0.0911	0.03	0.10	
BBSW-08	12-May-20	9:00	S			5.73 **		0.001 U	0.0002	0.00	0.0026	0.04	0.06	
BBSW-07A	12-May-20	9:15	S			9.15 **		0.001	0.0035	0.08	0.0055	0.12	0.06	
WTP-003	12-May-20	9:25	S			1.34		0.001 U	0.167	0.55	0.009	0.03	0.03 U	
HGSW-01	12-May-20	9:35	S			0.0381 **		0.017	0.2020	0.02	0.2430	0.02	0.29	
BBSW-07	12-May-20	9:50	S			8.50 **		0.002	0.0297	0.62	0.0105	0.22	0.04	
BBSW-05	12-May-20	10:05	S			13.5 **		0.005	0.0340	1.12	0.0167	0.55	0.04	
BBSW-03	12-May-20	10:20	S			16.2 **		0.007	0.0370	1.46	0.0200	0.79	0.07	
WFSW-03	12-May-20	10:40	S			29.3 **		0.003	0.0003	0.02	0.0031	0.22	0.13	
WFSW-02	12-May-20	11:00	S			29.1 **		0.003	0.0004	0.03	0.0026	0.19	0.07	
WFINTDITCH	12-May-20	11:10	S			0.348 **		0.176	6.68	5.69	0.0360	0.03	90.6	
WFSW-01	12-May-20	11:25	S			0.260 **		0.212	7.50	4.77	0.0145	0.01	111.0	
WFTTSW-01	12-May-20	11:35	S			0.101 **		0.055	3.53	0.87	0.0194	0.00	47.2	
BBSW-02	12-May-20	11:55	S			44.1 **		0.005	0.0511	5.51	0.0073	0.79	0.56	
BBSW-01A	12-May-20	12:20	S			53.8 **		0.007 J	0.0520	6.84	0.0092 J	1.21		
BBSW-01A D	12-May-20	12:35	S					0.004 J	0.0575		0.0066 J			
BBSW-01A B	12-May-20	12:45	S					0.001 U	0.0001 U		0.0003 U			
PASW-11	12-May-20	12:55	96/S	0.0046	0.0035			0.001 U	0.0002		0.0007		0.11	
PASW-09	12-May-20	13:15	96/S	0.0046	0.0035	460 P		0.001	0.0072	8.10	0.0017	1.91		
PASW-09 D	12-May-20	13:30	96/S	0.0046	0.0035			0.001	0.0073		0.0016			
PASW-09 B	12-May-20	13:45	96/S					0.001 U	0.0001 U		0.0003 U			
PASW-C	12-May-20	13:55						0.003	0.0044		0.0044			
PASW-05	12-May-20	14:30	96	0.0046	0.0035				0.0047		0.0018			
PASW-04X	12-May-20	14:40	96	0.0046	0.0035		1.88		0.0044		0.0019			
PASW-11	12-May-20	16:00	96	0.0046	0.0035				0.0002		0.0009			
PASW-09	12-May-20	16:20	96	0.0071	0.0051	460 P		0.001	0.0076	8.55	0.0019	2.14		
PASW-05	12-May-20	16:50	96	0.0046	0.0035				0.0045		0.0019			
PASW-04X	12-May-20	17:10	96	0.0046	0.0035		1.88		0.0043		0.0020			

Table 2-2a: 2020 Surface Water Sampling Summary Tables / Dissolved Constituents / Blackbird and Panther Creek (Date Sorted)

Sampling Location[1]	Date	Time	Event[2]	Cu IWQS Acute (CMC)[3] mg/L	Cu IWQS Chronic (CCC)[3] mg/L	Flow (cfs)	Staff Gauge Water Level (ft)	Dissolved[4,5,6]						
								Arsenic	Cobalt		Copper[8]		Iron	Manganese
								Conc. (mg/L)	Conc. (mg/L) Cleanup Level = 0.086 mg/L[7]	Load (kg/day)	Conc. (mg/L)	Load (kg/day)	Conc. (mg/L)	Conc. (mg/L)
PASW-11	13-May-20	8:30	96	0.0047	0.0035				0.0002		0.0009			
PASW-09	13-May-20	8:50	96	0.0048	0.0036	443 P			0.0083	9.00	0.0018	1.95		
PASW-05	13-May-20	9:20	96	0.0046	0.0035				0.0048		0.0017			
PASW-04X	13-May-20	9:40	96	0.0046	0.0035		1.90		0.0046		0.0019			
PASW-11	13-May-20	14:00	96	0.0046	0.0035				0.0002		0.0008			
PASW-09	13-May-20	14:20	96	0.0047	0.0035	422 P		0.001	0.0080	8.26	0.0018	1.86		
PASW-09 D	13-May-20	14:30	96	0.0047	0.0036				0.0079		0.0018			
PASW-09 B	13-May-20	14:40	96						0.0001 U		0.0012			
PASW-05	13-May-20	15:00	96	0.0046	0.0035				0.0045		0.0017			
PASW-04X	13-May-20	15:20	96	0.0046	0.0035		1.86		0.0044		0.0018			
PASW-11	14-May-20	8:35	96	0.0048	0.0036				0.0002		0.0009			
PASW-09	14-May-20	8:55	96	0.0049	0.0037	392 P			0.0091	8.73	0.0020	1.92		
PASW-05	14-May-20	9:30	96	0.0046	0.0035				0.0050		0.0016			
PASW-04X	14-May-20	9:50	96	0.0046	0.0035		1.80		0.0048		0.0018			
PASW-11	14-May-20	14:00	96	0.0048	0.0036				0.0003		0.0010			
PASW-09	14-May-20	14:20	96	0.0049	0.0037	387 P		0.001	0.0084	7.95	0.0018	1.70		
PASW-09 D	14-May-20	14:30	96	0.0049	0.0037				0.0085		0.0020			
PASW-09 B	14-May-20	14:40	96						0.0001 U		0.0003 U			
PASW-05	14-May-20	15:10	96	0.0046	0.0035				0.0047		0.0017			
PASW-04X	14-May-20	15:30	96	0.0046	0.0035		1.78		0.0048		0.0021			
PASW-C	14-May-20	15:40						0.003	0.0046		0.0047			
BBSW-01A	25-May-20	14:10	MTHY			42.0 P	1.10	0.005						
PASW-09	25-May-20	14:25	MTHY			358 P	5.84	0.002						
PASW-05	26-May-20	13:50	S*	0.0046	0.0035			0.001	0.0042		0.0014		0.12	
WTP-003	27-May-20	9:30							0.208		0.010		0.03 U	
BBMW-CTRL	27-May-20	14:55						0.003	0.0045		0.0045			
WTP-003	24-Jun-20	10:00							0.142		0.011		0.03 U	
BBSW-01A	27-Jun-20	14:00	MTHY			19.0 P		0.007						
PASW-09	27-Jun-20	14:20	MTHY			270 P		0.001						
PASW-09 D	27-Jun-20	14:30	MTHY					0.001						
PASW-09 B	27-Jun-20	14:40	MTHY					0.001 U						
WTP-003	21-Jul-20	12:00							0.124		0.009		0.04	
BBSW-01A	24-Jul-20	16:00	MTHY					0.002						
PASW-09	24-Jul-20	16:20	MTHY			95.6 P	4.95	0.001						
PASW-09 D	24-Jul-20	16:30	MTHY					0.001						
PASW-09 B	24-Jul-20	16:40	MTHY					0.001 U						
BBSW-01A	19-Aug-20	15:00	MTHY					0.001						
PASW-09	19-Aug-20	15:20	MTHY			55.8 P		0.001						
PASW-09 D	19-Aug-20	15:30	MTHY					0.001						
PASW-09 B	19-Aug-20	15:40	MTHY					0.001 U						

Table 2-2a: 2020 Surface Water Sampling Summary Tables / Dissolved Constituents / Blackbird and Panther Creek (Date Sorted)

Sampling Location[1]	Date	Time	Event[2]	Cu IWQS Acute (CMC)[3] mg/L	Cu IWQS Chronic (CCC)[3] mg/L	Flow (cfs)	Staff Gauge Water Level (ft)	Dissolved[4,5,6]						
								Arsenic	Cobalt		Copper[8]		Iron	Manganese
								Conc. (mg/L)	Conc. (mg/L) Cleanup Level = 0.086 mg/L[7]	Load (kg/day)	Conc. (mg/L)	Load (kg/day)	Conc. (mg/L)	Conc. (mg/L)
WTP-003	26-Aug-20	12:30							0.079		0.019		0.10	
PASW-05	9-Sep-20	14:00	S*	0.0071	0.0052	71.5 **		0.002	0.0119	2.08	0.0005	0.09	0.04	
PASW-04X	9-Sep-20	15:00	S*	0.0068	0.0050	76.7 **		0.001	0.0100	1.88	0.0009	0.17		
PASW-C	9-Sep-20	15:10						0.003	0.0044		0.0043			
BBSW-01A	16-Sep-20	8:50	MTHY					0.001 U						
PASW-09	16-Sep-20	9:10	MTHY			41.3 P		0.001						
WTP-003	23-Sep-20	10:00							0.084		0.012		0.04	
PASW-05	28-Sep-20	14:00	S*	0.0071	0.0051	67.0 **		0.002	0.0112	1.84	0.0005	0.08	0.03 U	
PASW-04X	28-Sep-20	14:55	S*	0.0068	0.0050	70.8 **		0.002	0.0097	1.68	0.0010	0.17		
PASW-C	28-Sep-20	15:05						0.004	0.0548		0.0032			
BBSW-01A	26-Oct-20	8:30	MTHY					0.001						
BBSW-01A D	26-Oct-20	8:40	MTHY					0.001						
BBSW-01A B	26-Oct-20	8:50	MTHY					0.001 U						
PASW-09	26-Oct-20	9:00	MTHY					0.002						
WTP-003	28-Oct-20	10:00							0.110		0.011		0.03 U	
BBSW-01A	16-Nov-20	10:30	MTHY					0.001						
PASW-09	16-Nov-20	11:00	MTHY					0.001 U						
PASW-09 D	16-Nov-20	11:10	MTHY					0.001 U						
PASW-09 B	16-Nov-20	11:20	MTHY					0.001 U						
WTP-003	24-Nov-20	12:00							0.108		0.005		0.03 U	
WTP-003	1-Dec-20	12:30							0.105		0.006		0.03 U	

Notes:
1. Sample Codes:
   Sample names with a 'B' flag are blank samples.
   Sample names with a 'D' flag are duplicate samples.
   Sample names with a 'C' suffix are control standards.
2. Event codes:
   "96": 96-hr sampling events
   "MTHY": Monthly sampling events
   "S": Synoptic sampling events
   "S*": Synoptic sampling events for Big Deer Creek, See Tables 2-2e-h
   "96/S": Synoptic event sampled concurrently with 96-hr event
3. Copper Idaho Water Quality Standards (Cu IWQS) calculated using hardness based formulas:
   Acute Cu IWQS (CMC) µg/L = e((0.9422*ln(hardness))-1.464)*0.96
   Chronic Cu IWQS (CCC) µg/L = e((0.8545*ln(hardness))-1.465)*0.96
4. The dissolved concentrations of some metals (i.e. cobalt) are often higher than the total concentrations.
   This is likely because the metals are present almost entirely in the dissolved form and the lower total metals are due to matrix effects.
5. Qualifiers:
   U - Concentration below reporting limits.
   J - The result is an estimated quantity due to a quality control deficiency.
6. Loading Calculations:
   Load (Kg/day) = Flow (cfs) * Conc. (mg/L)* Load Conversion
   Load Conversion = 2.4466
7. -There were no exceedances of the dissolved cobalt surface water quality cleanup level = 0.086 mg/L (Panther Creek). This cleanup level does not apply to the Blackbird Creek.
8. ** indicates that flow measurements were recorded by Hach 950 Marsh McBirney flow meter instead of from USGS stations at either BBSW-02 or PASW-09.
9. 'P' indicates that the flow measurements are flagged as provisional for publication on the USGS website at the writing of this report.
   Values are reported as whole numbers with no significant figures.
10. There were no exceedances of the dissolved copper CCC or CMC.

Table 2-2b: 2020 Surface Water Sampling Summary Tables / Total Constituents / Blackbird and Panther Creek (Date Sorted)

Sampling Location[1]	Date	Time	Event[2]	Flow (cfs)	Staff Gauge Water Level (ft)	Total[3,4,5]																						
						Arsenic	Cobalt		Copper		Iron	Manganese	Potassium	Sodium	Chloride	Sulfate		Calcium	Magnesium	Hardness	Alkalinity	DOC	pH-Lab	pH-Field	Cond.	Temp.	TDS	TSS
						Conc. (mg/L) Cleanup Level = 0.01 mg/L[6]	Conc. (mg/L)	Load (kg/day)	Conc. (mg/L)	Load (kg/day)	Conc. (mg/L)	Conc. (mg/L)	Conc. (mg/L)	Conc. (mg/L)	Conc. (mg/L)	Conc. (mg/L)	Load (kg/day)	Conc. (mg/L)	Conc. (mg/L)	Conc. (mg $CaCO_3$/L)	Conc. (mg/L)	Conc. (mg/L)	pH Unit	pH Unit	(uS/cm)	(deg C)	Conc. (mg/L)	Conc. (mg/L)
WTP-003	25-Mar-20	8:00					0.236		0.074		0.38																	
BBSW-01A	26-Mar-20	9:55	MTHY	4.63 A		0.013																		6.9	290.9	0.5		10 U
PASW-09	26-Mar-20	10:20	MTHY	41.1 P		0.003																		7.14	152.3	0		10 U
PASW-09 D	26-Mar-20	10:30	MTHY			0.003																						10 U
PASW-09 B	26-Mar-20	10:40	MTHY			0.001 U																						10 U
WTP-003	28-Apr-20	12:00					0.581		0.035		0.11																	
PASW-05	5-May-20	17:10	S*			0.002	0.0081		0.0026		0.67					5		7.1	1.5	23.9				7.52	61.2	7.6		10 U
PASW-11	11-May-20	10:20	96															8.1	1.6	25.6				7.34	61.1	4.9		
PASW-09	11-May-20	10:40	96	407 P														8.1	1.7	26				7.42	63.1	5.1		
PASW-05	11-May-20	11:05	96															6.2	1.4	20.4				7.46	50.6	5.6		
PASW-04X	11-May-20	11:25	96		1.78													6.3	1.4	20.8				7.31	50.4	5.7		
PASW-11	11-May-20	14:15	96															8.1	1.6	25.9				7.44	60.9	7.7		
PASW-09	11-May-20	14:35	96	387 P		0.002	0.0103	9.8	0.0032	3.0								8.2	1.7	26				7.48	63	8.2		
PASW-09 D	11-May-20	14:45	96															8.1	1.7	26								
PASW-09 B	11-May-20	14:55	96															0.5 U	0.5 U	0.5 U								
PASW-05	11-May-20	15:00	96															6.2	1.4	19.8				7.25	50.7	8.3		
PASW-04X	11-May-20	15:20	96		1.78													6.2	1.3	20				7.18	50.4	8.3		
MCSW-01	12-May-20	8:45	S	0.148 **	0.40	0.013	0.1240	0.04	0.1000	0.04	0.28					14	5.1	4.1	2.0	18.3				7.05	62.4	4.8		10 U
BBSW-08	12-May-20	9:00	S	5.73 **		0.003	0.0010	0.01	0.0074	0.10	0.57					1	14.0	4.1	1.2	15.2				6.81	37.3	2.1		10 U
BBSW-07A	12-May-20	9:15	S	9.15 **		0.003	0.0045	0.1	0.0091	0.2	0.49					2	44.8	4.1	1.2	15.1				6.88	37.9	2.3		10 U
WTP-003	12-May-20	9:25	S	1.34		0.001 U	0.202	0.7	0.126	0.4	0.15					286	936.2	116	15	352				9.9		7.6		10 U
HGSW-01	12-May-20	9:35	S	0.0381 **		0.018	0.2130	0.02	0.2790	0.03	0.43					9	0.8	1.8 J+	1.3	9.6				6.68	38.8	5.1		10 U
BBSW-07	12-May-20	9:50	S	8.50 **		0.003	0.0367	0.8	0.0283	0.6	0.49					35	727.9	17.4	2.8	54.9				7.27	136.7	2.9		10 U
BBSW-05	12-May-20	10:05	S	13.5 **		0.006	0.0401	1.3	0.0285	0.9	0.39					29	954.3	14.3	2.6	46.2				7.32	115.3	3.7		10 U
BBSW-03	12-May-20	10:20	S	16.2 **		0.008	0.0389	1.5	0.0248	1.0	0.27					27	1068.8	12.6	2.4	41.2				7.27	105.8	4.8		10 U
WFSW-03	12-May-20	10:40	S	29.3 **		0.003	0.0005	0.0	0.004	0.3	0.38					2	143.2	4.2	1.2	15.4				7.49	36.5	3.6		10 U
WFSW-02	12-May-20	11:00	S	29.1 **		0.004	0.0007	0.0	0.0037	0.3	0.39					2	142.3	4.2	1.2	15.6				7.29	37.6	4.1		10 U
WFINTDITCH	12-May-20	11:10	S	0.348 **		0.196	7.00	6.0	0.0379	0.03	95.3					366	311.6	30.2	13.9	133				4.67	661.3	7.4		12
WFSW-01	12-May-20	11:25	S	0.260 **		0.238	7.45	4.7	0.0184	0.01	111					402	255.7	31.2	14.1	136				5.57	688.4	7.4		13
WFTTSW-01	12-May-20	11:35	S	0.101 **		0.065	3.72	0.92	0.0194	0.00	51.0					266	65.7	25.9	10.6	108				4.67	488.4	9.8		13
BBSW-02	12-May-20	11:55	S	44.1 **		0.007	0.0531	5.7	0.01	1.1	1.03					15	1616.6	7.7	1.7	26.3				6.67	70.1	5.3		10 U
BBSW-01A	12-May-20	12:20	S	53.8 **		0.010	0.0554	7.3	0.0114	1.5			2	2	1	13	1711.2	7.4	1.8	27	15	3.5	7.4 J	6.93	67.6	7	58	10 U
BBSW-01A D	12-May-20	12:35	S			0.009	0.0634		0.011				1	2	1	13		7.6	1.8	26	15 U	3.5	7.3 J				57	10 U
BBSW-01A B	12-May-20	12:45	S			0.001 U	0.0001 U		0.0015				1 U	1 U	1 U	1 U		0.5 U	0.5 U	1 U	4	0.5 U	5.8 J				10 U	10 U
PASW-11	12-May-20	12:55	96/S			0.001	0.0003		0.0014		0.5					3		7.6	1.5	24.9				7.26	59.2	5.8		18
PASW-09	12-May-20	13:15	96/S	460 P		0.003	0.0099	11.1	0.0032	3.6			1	2	1 U	4	4501.7	7.6	1.5	25	25	4.8	7.7 J	7.47	60.5	6.4	61	20
PASW-09 D	12-May-20	13:30	96/S			0.003	0.0103		0.0033				1	3	1 U	4		6.9	1.6	25	25 U	4.9	7.7 J				52	18
PASW-09 B	12-May-20	13:45	96/S			0.001 U	0.0001 U		0.0004 U				1 U	1 U	1 U	1 U		0.5 U	0.5 U	1 U	4	0.5 U	6 J				10 U	10 U
PASW-C	12-May-20	13:55				0.003	0.0045		0.0042									0.5 U	0.5 U	0.5 U								
PASW-05	12-May-20	14:30	96															5.9	1.3	19.9				7.25	64.5	7.3		
PASW-04X	12-May-20	14:40	96		1.88													5.9	1.2	19.8				7.13	64.5	7.5		
PASW-11	12-May-20	16:00	96															7.8	1.5	24.9				7.4	58.8	7.5		
PASW-09	12-May-20	16:20	96	460 P		0.003	0.0099	11.1	0.0035	3.9								7.8	1.6	39.5				7.4	60.5	7.8		
PASW-05	12-May-20	16:50	96															5.9	1.3	19.9				7.19	48.6	8.2		
PASW-04X	12-May-20	17:10	96		1.88													5.9	1.3	19.4				7.13	48.3	8.2		

Table 2-2b: 2020 Surface Water Sampling Summary Tables / Total Constituents / Blackbird and Panther Creek (Date Sorted)

Sampling Location[1]	Date	Time	Event[2]	Flow (cfs)	Staff Gauge Water Level (ft)	Total[3,4,5]																						
						Arsenic	Cobalt		Copper		Iron	Manganese	Potassium	Sodium	Chloride	Sulfate		Calcium	Magnesium	Hardness	Alkalinity	DOC	pH-Lab	pH-Field	Cond.	Temp.	TDS	TSS
						Conc. (mg/L) Cleanup Level = 0.01 mg/L[6]	Conc. (mg/L)	Load (kg/day)	Conc. (mg/L)	Load (kg/day)	Conc. (mg/L)	Conc. (mg/L)	Conc. (mg/L)	Conc. (mg/L)	Conc. (mg/L)	Conc. (mg/L)	Load (kg/day)	Conc. (mg/L)	Conc. (mg/L)	Conc. (mg $CaCO_3$/L)	Conc. (mg/L)	Conc. (mg/L)	pH Unit	pH Unit	(uS/cm)	(deg C)	Conc. (mg/L)	Conc. (mg/L)
PASW-11	13-May-20	8:30	96															7.8	1.6	25.4				7.54	59.5	4		
PASW-09	13-May-20	8:50	96	443 P														7.9	1.7	26				7.63	61.6	4.2		
PASW-05	13-May-20	9:20	96															5.9	1.3	19.9				7.42	48.7	4.1		
PASW-04X	13-May-20	9:40	96		1.90													5.9	1.3	19.5				7.48	48.4	4.1		
PASW-11	13-May-20	14:00	96															7.8	1.6	25.1				7.52	59.5	6.8		
PASW-09	13-May-20	14:20	96	422 P		0.002	0.0096	9.9	0.0029	3.0								7.8	1.6	25.3				7.56	60.9	6		
PASW-09 D	13-May-20	14:30	96															7.7	1.5	25.7								
PASW-09 B	13-May-20	14:40	96															0.5 U	0.5 U	0.5 U								
PASW-05	13-May-20	15:00	96															5.9	1.2	19.7				7.41	48.9	6.7		
PASW-04X	13-May-20	15:20	96		1.86													5.9	1.2	19.6				7.34	48.6	7.34		
PASW-11	14-May-20	8:35	96															8	1.5	26.1				7.26	60.8	3		
PASW-09	14-May-20	8:55	96	392 P														8.1	1.6	26.7				7.32	62.9	3.2		
PASW-05	14-May-20	9:30	96															6	1.2	20.1				7.22	48.7	4.1		
PASW-04X	14-May-20	9:50	96		1.80													5.9	1.2	19.7				7.19	49.6	4.1		
PASW-11	14-May-20	14:00	96															7.9	1.6	26.2				7.61	60.4	5.6		
PASW-09	14-May-20	14:20	96	387 P		0.003	0.0110	10.4	0.0039	3.7								8	1.6	26.7				7.45	62.8	5.9		
PASW-09 D	14-May-20	14:30	96															8	1.6	26.6								
PASW-09 B	14-May-20	14:40	96															0.5 U	0.5 U	0.5 U								
PASW-05	14-May-20	15:10	96															6	1.3	20.2				7.4	50.5	6.2		
PASW-04X	14-May-20	15:30	96		1.78													6	1.3	20.1				7.38	49.9	6.3		
PASW-C	14-May-20	15:40				0.004	0.0048		0.0048									0.5 U	0.5 U	0.5 U								
BBSW-01A	25-May-20	14:10	MTHY	42.0 P	1.10	0.007																		7.29	59.3	9.6		10 U
PASW-09	25-May-20	14:25	MTHY	358 P	5.84	0.002																		7.59	63.5	8.5		10 U
PASW-05	26-May-20	13:50	S*			0.002	0.0057		0.0022		0.54					2		6.2	1.3	20.7				7.19	48.1	8.2		10
WTP-003	27-May-20	9:30					0.221		0.036		0.05																	
BBMW-CTRL	27-May-20	14:55				0.004	0.0046		0.0044									0.5 U	0.5 U	0.5 U								
WTP-003	24-Jun-20	10:00					0.154		0.053		0.08																	
BBSW-01A	27-Jun-20	14:00	MTHY	19.0 P		0.009																		7.43	75.4	11.65		10 U
PASW-09	27-Jun-20	14:20	MTHY	270 P		0.002																		7.93	66.2	10.85		10 U
PASW-09 D	27-Jun-20	14:30	MTHY			0.002																						10 U
PASW-09 B	27-Jun-20	14:40	MTHY			0.001 U																						10 U
WTP-003	21-Jul-20	12:00					0.143		0.049		0.08 J+																	
BBSW-01A	24-Jul-20	16:00	MTHY			0.008																		7.21	137	18.1		10 U
PASW-09	24-Jul-20	16:20	MTHY	95.6 P	4.95	0.002																		7.72	88.3	14.23		10 U
PASW-09 D	24-Jul-20	16:30	MTHY			0.002																						10 U
PASW-09 B	24-Jul-20	16:40	MTHY			0.001 U																						10 U
BBSW-01A	19-Aug-20	15:00	MTHY			0.007																		7.13	185.3	18.18		10 U
PASW-09	19-Aug-20	15:20	MTHY	55.8 P		0.002																		7.67	101.4	14.79		10 U
PASW-09 D	19-Aug-20	15:30	MTHY			0.002																						10 U
PASW-09 B	19-Aug-20	15:40	MTHY			0.001 U																						10 U

Table 2-2b: 2020 Surface Water Sampling Summary Tables / Total Constituents / Blackbird and Panther Creek (Date Sorted)

Sampling Location[1]	Date	Time	Event[2]	Flow (cfs)	Staff Gauge Water Level (ft)	Total[3,4,5]																					
						Arsenic	Cobalt		Copper		Iron	Manganese	Potassium	Sodium	Chloride	Sulfate		Calcium	Magnesium	Hardness	Alkalinity	DOC	pH-Lab	pH-Field	Cond.	Temp.	TDS	TSS
						Conc. (mg/L) Cleanup Level = 0.01 mg/L[6]	Conc. (mg/L)	Load (kg/day)	Conc. (mg/L)	Load (kg/day)	Conc. (mg/L)	Conc. (mg/L)	Conc. (mg/L)	Conc. (mg/L)	Conc. (mg/L)	Conc. (mg/L)	Load (kg/day)	Conc. (mg/L)	Conc. (mg/L)	Conc. (mg $CaCO_3$/L)	Conc. (mg/L)	Conc. (mg/L)	pH Unit	pH Unit	(uS/cm)	(deg C)	Conc. (mg/L)	Conc. (mg/L)
WTP-003	26-Aug-20	12:30					0.083		0.038		0.11																	
PASW-05	9-Sep-20	14:00	S*	71.5 **		0.002	0.0112	2.0	0.0007	0.1	0.12					8	1400.0	11.9	2.5	39.8				7.75	67.2	7.2		10 U
PASW-04X	9-Sep-20	15:00	S*	76.7 **		0.002	0.0094	1.8	0.0012	0.2			2	5	1 U	8	1500.8	11.6	2.3	38	41	1.7	6.2 J	7.75	66.9	7.19	72	10 U
PASW-C	9-Sep-20	15:10				0.003	0.0054		0.0053									0.5 U	0.5 U	0.5 U								
BBSW-01A	16-Sep-20	8:50	MTHY			0.006																		7.32	144.9	12.93		10 U
PASW-09	16-Sep-20	9:10	MTHY	41.3 P		0.002																		7.56	97.5	9.76		10 U
WTP-003	23-Sep-20	10:00					0.080		0.034		0.08 J+																	
PASW-05	28-Sep-20	14:00	S*	67.0 **		0.003	0.0121	2.0	0.0008 U	0.1	0.1 J+					9	1474.9	11.7	2.5	39.5				8.1	101.7	10.7		10 U
PASW-04X	28-Sep-20	14:55	S*	70.8 **		0.002	0.0104	1.8	0.0015	0.3			2	5	1	8	1385.2	11.9	2.4	38	42	1.7	8 J	8.16	100.2	10.7	75	10 U
PASW-C	28-Sep-20	15:05				0.004	0.0537		0.0037									0.5 U	0.5 U	0.5 U								
BBSW-01A	26-Oct-20	8:30	MTHY			0.008																		7.52	137.3	0		10 U
BBSW-01A D	26-Oct-20	8:40	MTHY			0.007																						10 U
BBSW-01A B	26-Oct-20	8:50	MTHY			0.001 U																						
PASW-09	26-Oct-20	9:00	MTHY			0.002																		7.67	121.4	-0.1		10 U
WTP-003	28-Oct-20	10:00					0.120		0.026		0.10																	
BBSW-01A	16-Nov-20	10:30	MTHY			0.007																		7.48	131.2	0		10 U
PASW-09	16-Nov-20	11:00	MTHY			0.001																		7.62	116.3	-0.1		10 U
PASW-09 D	16-Nov-20	11:10	MTHY			0.001																						10 U
PASW-09 B	16-Nov-20	11:20	MTHY			0.001 U																						10 U
WTP-003	24-Nov-20	12:00					0.113		0.022		0.10																	
WTP-003	1-Dec-20	12:30					0.114		0.019		0.07																	

Notes:

1. Sample Codes:
   - Sample names with a 'B' flag are blank samples.
   - Sample names with a 'D' flag are duplicate samples.
   - Sample names with a 'C' suffix are control standards.
2. Event codes:
   - "96": 96-hr sampling events
   - "MTHY": Monthly sampling events
   - "S": Synoptic sampling events
   - "S**": Synoptic sampling events for Big Deer Creek; See Tables 2-2e-h
   - "96/S": Synoptic event sampled concurrently with 96-hr event
3. The dissolved concentrations of some metals (i.e. cobalt) are often higher than the total concentrations. This is likely because the metals are present almost entirely in the dissolved form and the l
4. Qualifiers:
   - U - Concentration below reporting limits.
   - J - The result is an estimated quantity due to a quality control deficiency.
   - J+ - The result is an estimated quantity, but the result may be biased high.
5. Loading Calculations:
   - Load (kg/day) = Flow (cfs) * Conc. (mg/L)* Load Conversion
   - Load Conversion = 2.4466
6. Total arsenic surface water quality cleanup level = 0.010 mg/L (Panther Creek and Blackbird Creek). Exceedances are indicated by light orange shaded cells.
7. ** indicates that flow measurements were recorded by Hach 950 Marsh McBirney flow meter instead of from USGS stations at either BBSW-02 or PASW-09.
8. 'P' indicates that the flow measurements are flagged as provisional for publication on the USGS website at the writing of this report.

Values are reported as whole numbers with no significant figures.

Table 2-2c: 2020 Surface Water Sampling Summary Tables / Dissolved Constituents / Blackbird and Panther Creek (Location Sorted)

Sampling Location[1]	Date	Time	Event[2]	Cu IWQS Acute (CMC)[3] mg/L	Cu IWQS Chronic (CCC)[3] mg/L	Flow (cfs)	Staff Gauge Water Level (ft)	Dissolved[4,5,6]						
								Arsenic	Cobalt		Copper[8]		Iron	Manganese
								Conc. (mg/L)	Conc. (mg/L) Cleanup Level = 0.086 mg/L[7]	Load (kg/day)	Conc. (mg/L)	Load (kg/day)	Conc. (mg/L)	Conc. (mg/L)
BBMW-CTRL	27-May-20	14:55						0.003	0.0045		0.0045			
BBSW-01A	26-Mar-20	9:55	MTHY			4.63 A		0.001						
BBSW-01A	12-May-20	12:20	S			53.8 **		0.007 J	0.0520	6.84	0.0092 J	1.21		
BBSW-01A D	12-May-20	12:35	S					0.004 J	0.0575		0.0066 J			
BBSW-01A B	12-May-20	12:45	S					0.001 U	0.0001 U		0.0003 U			
BBSW-01A	25-May-20	14:10	MTHY			42.0 P	1.10	0.005						
BBSW-01A	27-Jun-20	14:00	MTHY			19.0 P		0.007						
BBSW-01A	24-Jul-20	16:00	MTHY					0.002						
BBSW-01A	19-Aug-20	15:00	MTHY					0.001						
BBSW-01A	16-Sep-20	8:50	MTHY					0.001 U						
BBSW-01A	26-Oct-20	8:30	MTHY					0.001						
BBSW-01A D	26-Oct-20	8:40	MTHY					0.001						
BBSW-01A B	26-Oct-20	8:50	MTHY					0.001 U						
BBSW-01A	16-Nov-20	10:30	MTHY					0.001						
BBSW-02	12-May-20	11:55	S			44.1 **		0.005	0.0511	5.51	0.0073	0.79	0.56	
BBSW-03	12-May-20	10:20	S			16.2 **		0.007	0.0370	1.46	0.0200	0.79	0.07	
BBSW-05	12-May-20	10:05	S			13.5 **		0.005	0.0340	1.12	0.0167	0.55	0.04	
BBSW-07	12-May-20	9:50	S			8.50 **		0.002	0.0297	0.62	0.0105	0.22	0.04	
BBSW-07A	12-May-20	9:15	S			9.15 **		0.001	0.0035	0.08	0.0055	0.12	0.06	
BBSW-08	12-May-20	9:00	S			5.73 **		0.001 U	0.0002	0.00	0.0026	0.04	0.06	
HGSW-01	12-May-20	9:35	S			0.0381 **		0.017	0.2020	0.02	0.2430	0.02	0.29	
MCSW-01	12-May-20	8:45	S			0.148 **	0.40	0.011	0.1210	0.04	0.0911	0.03	0.10	
PASW-04X	11-May-20	11:25	96	0.0046	0.0035		1.78		0.0051		0.0019			
PASW-04X	11-May-20	15:20	96	0.0046	0.0035		1.78		0.0048		0.0020			
PASW-04X	12-May-20	14:40	96	0.0046	0.0035		1.88		0.0044		0.0019			
PASW-04X	12-May-20	17:10	96	0.0046	0.0035		1.88		0.0043		0.0020			
PASW-04X	13-May-20	9:40	96	0.0046	0.0035		1.90		0.0046		0.0019			
PASW-04X	13-May-20	15:20	96	0.0046	0.0035		1.86		0.0044		0.0018			
PASW-04X	14-May-20	9:50	96	0.0046	0.0035		1.80		0.0048		0.0018			
PASW-04X	14-May-20	15:30	96	0.0046	0.0035		1.78		0.0048		0.0021			
PASW-04X	9-Sep-20	15:00	S*	0.0068	0.0050	76.7 **		0.001	0.0100	1.88	0.0009	0.17		
PASW-04X	28-Sep-20	14:55	S*	0.0068	0.0050	70.8 **		0.002	0.0097	1.68	0.0010	0.17		
PASW-05	5-May-20	17:10	S*	0.0046	0.0035			0.002	0.0061		0.0021		0.14	
PASW-05	11-May-20	11:05	96	0.0046	0.0035				0.0052		0.0017			
PASW-05	11-May-20	15:00	96	0.0046	0.0035				0.0050		0.0018			
PASW-05	12-May-20	14:30	96	0.0046	0.0035				0.0047		0.0018			
PASW-05	12-May-20	16:50	96	0.0046	0.0035				0.0045		0.0019			
PASW-05	13-May-20	9:20	96	0.0046	0.0035				0.0048		0.0017			
PASW-05	13-May-20	15:00	96	0.0046	0.0035				0.0045		0.0017			

Table 2-2c: 2020 Surface Water Sampling Summary Tables / Dissolved Constituents / Blackbird and Panther Creek (Location Sorted)

Sampling Location[1]	Date	Time	Event[2]	Cu IWQS Acute (CMC)[3] mg/L	Cu IWQS Chronic (CCC)[3] mg/L	Flow (cfs)	Staff Gauge Water Level (ft)	Dissolved[4,5,6]						
								Arsenic	Cobalt		Copper[8]		Iron	Manganese
								Conc. (mg/L)	Conc. (mg/L) Cleanup Level = 0.086 mg/L[7]	Load (kg/day)	Conc. (mg/L)	Load (kg/day)	Conc. (mg/L)	Conc. (mg/L)
PASW-05	14-May-20	9:30	96	0.0046	0.0035				0.0050		0.0016			
PASW-05	14-May-20	15:10	96	0.0046	0.0035				0.0047		0.0017			
PASW-05	26-May-20	13:50	S*	0.0046	0.0035			0.001	0.0042		0.0014		0.12	
PASW-05	9-Sep-20	14:00	S*	0.0071	0.0052	71.5 **		0.002	0.0119	2.08	0.0005	0.09	0.04	
PASW-05	28-Sep-20	14:00	S*	0.0071	0.0051	67.0 **		0.002	0.0112	1.84	0.0005	0.08	0.03 U	
PASW-09	26-Mar-20	10:20	MTHY			41.1 P		0.001						
PASW-09 D	26-Mar-20	10:30	MTHY					0.001						
PASW-09 B	26-Mar-20	10:40	MTHY					0.001 U						
PASW-09	11-May-20	10:40	96	0.0048	0.0036	407 P			0.0081	8.07	0.0019	1.89		
PASW-09	11-May-20	14:35	96	0.0048	0.0036	387 P		0.001	0.0079	7.48	0.0018	1.70		
PASW-09 D	11-May-20	14:45	96	0.0048	0.0036				0.0079		0.0019			
PASW-09 B	11-May-20	14:55	96						0.0001 U		0.0003 U			
PASW-09	12-May-20	13:15	96/S	0.0046	0.0035	460 P		0.001	0.0072	8.10	0.0017	1.91		
PASW-09 D	12-May-20	13:30	96/S	0.0046	0.0035			0.001	0.0073		0.0016			
PASW-09 B	12-May-20	13:45	96/S					0.001 U	0.0001 U		0.0003 U			
PASW-09	12-May-20	16:20	96	0.0071	0.0051	460 P		0.001	0.0076	8.55	0.0019	2.14		
PASW-09	13-May-20	8:50	96	0.0048	0.0036	443 P			0.0083	9.00	0.0018	1.95		
PASW-09	13-May-20	14:20	96	0.0047	0.0035	422 P		0.001	0.0080	8.26	0.0018	1.86		
PASW-09 D	13-May-20	14:30	96	0.0047	0.0036				0.0079		0.0018			
PASW-09 B	13-May-20	14:40	96						0.0001 U		0.0012			
PASW-09	14-May-20	8:55	96	0.0049	0.0037	392 P			0.0091	8.73	0.0020	1.92		
PASW-09	14-May-20	14:20	96	0.0049	0.0037	387 P		0.001	0.0084	7.95	0.0018	1.70		
PASW-09 D	14-May-20	14:30	96	0.0049	0.0037				0.0085		0.0020			
PASW-09 B	14-May-20	14:40	96						0.0001 U		0.0003 U			
PASW-09	25-May-20	14:25	MTHY			358 P	5.84	0.002						
PASW-09	27-Jun-20	14:20	MTHY			270 P		0.001						
PASW-09 D	27-Jun-20	14:30	MTHY					0.001						
PASW-09 B	27-Jun-20	14:40	MTHY					0.001 U						
PASW-09	24-Jul-20	16:20	MTHY			95.6 P	4.95	0.001						
PASW-09 D	24-Jul-20	16:30	MTHY					0.001						
PASW-09 B	24-Jul-20	16:40	MTHY					0.001 U						
PASW-09	19-Aug-20	15:20	MTHY			55.8 P		0.001						
PASW-09 D	19-Aug-20	15:30	MTHY					0.001						
PASW-09 B	19-Aug-20	15:40	MTHY					0.001 U						
PASW-09	16-Sep-20	9:10	MTHY			41.3 P		0.001						
PASW-09	26-Oct-20	9:00	MTHY					0.002						
PASW-09	16-Nov-20	11:00	MTHY					0.001 U						
PASW-09 D	16-Nov-20	11:10	MTHY					0.001 U						
PASW-09 B	16-Nov-20	11:20	MTHY					0.001 U						
PASW-11	11-May-20	10:20	96	0.0047	0.0035				0.0002		0.0008			
PASW-11	11-May-20	14:15	96	0.0048	0.0036				0.0002		0.0009			
PASW-11	12-May-20	12:55	96/S	0.0046	0.0035			0.001 U	0.0002		0.0007		0.11	
PASW-11	12-May-20	16:00	96	0.0046	0.0035				0.0002		0.0009			
PASW-11	13-May-20	8:30	96	0.0047	0.0035				0.0002		0.0009			
PASW-11	13-May-20	14:00	96	0.0046	0.0035				0.0002		0.0008			
PASW-11	14-May-20	8:35	96	0.0048	0.0036				0.0002		0.0009			
PASW-11	14-May-20	14:00	96	0.0048	0.0036				0.0003		0.0010			

Table 2-2c: 2020 Surface Water Sampling Summary Tables / Dissolved Constituents / Blackbird and Panther Creek (Location Sorted)

Sampling Location[1]	Date	Time	Event[2]	Cu IWQS Acute (CMC)[3] mg/L	Cu IWQS Chronic (CCC)[3] mg/L	Flow (cfs)	Staff Gauge Water Level (ft)	Dissolved[4,5,6]						
								Arsenic	Cobalt		Copper[8]		Iron	Manganese
								Conc. (mg/L)	Conc. (mg/L) Cleanup Level = 0.086 mg/L[7]	Load (kg/day)	Conc. (mg/L)	Load (kg/day)	Conc. (mg/L)	Conc. (mg/L)
PASW-C	12-May-20	13:55						0.003	0.0044		0.0044			
PASW-C	14-May-20	15:40						0.003	0.0046		0.0047			
PASW-C	9-Sep-20	15:10						0.003	0.0044		0.0043			
PASW-C	28-Sep-20	15:05						0.004	0.0548		0.0032			
WFINTDITCH	12-May-20	11:10	S			0.348 **		0.176	6.68	5.69	0.0360	0.03	90.6	
WFSW-01	12-May-20	11:25	S			0.260 **		0.212	7.50	4.77	0.0145	0.01	111.0	
WFSW-02	12-May-20	11:00	S			29.1 **		0.003	0.0004	0.03	0.0026	0.19	0.07	
WFSW-03	12-May-20	10:40	S			29.3 **		0.003	0.0003	0.02	0.0031	0.22	0.13	
WFTTSW-01	12-May-20	11:35	S			0.101 **		0.055	3.53	0.87	0.0194	0.00	47.2	
WTP-003	25-Mar-20	8:00							0.180		0.005		0.03 U	
WTP-003	28-Apr-20	12:00							0.560		0.012		0.03 U	
WTP-003	12-May-20	9:25	S			1.34		0.001 U	0.167	0.55	0.009	0.03	0.03 U	
WTP-003	27-May-20	9:30							0.208		0.010		0.03 U	
WTP-003	24-Jun-20	10:00							0.142		0.011		0.03 U	
WTP-003	21-Jul-20	12:00							0.124		0.009		0.04	
WTP-003	26-Aug-20	12:30							0.079		0.019		0.10	
WTP-003	23-Sep-20	10:00							0.084		0.012		0.04	
WTP-003	28-Oct-20	10:00							0.110		0.011		0.03 U	
WTP-003	24-Nov-20	12:00							0.108		0.005		0.03 U	
WTP-003	1-Dec-20	12:30							0.105		0.006		0.03 U	

Notes:

1. Sample Codes:
   - Sample names with a 'B' flag are blank samples.
   - Sample names with a 'D' flag are duplicate samples.
   - Sample names with a 'C' suffix are control standards.
2. Event codes:
   - "96": 96-hr sampling events
   - "MTHY": Monthly sampling events
   - "S": Synoptic sampling events
   - "S*": Synoptic sampling events for Big Deer Creek, See Tables 2-2e-h
   - "96/S": Synoptic event sampled concurrently with 96-hr event
3. Copper Idaho Water Quality Standards (Cu IWQS) calculated using hardness based formulas:
   - Acute Cu IWQS (CMC) µg/L = e([0.9422*ln(hardness)]-1.464)*0.96
   - Chronic Cu IWQS (CCC) µg/L = e([0.8545*ln(hardness)]-1.465)*0.96
4. The dissolved concentrations of some metals (i.e. cobalt) are often higher than the total concentrations.
   This is likely because the metals are present almost entirely in the dissolved form and the lower total metals are due to matrix effects.
5. Qualifiers:
   - U - Concentration below reporting limits.
   - J - The result is an estimated quantity due to a quality control deficiency.
6. Loading Calculations:
   - Load (Kg/day) = Flow (cfs) * Conc. (mg/L)* Load Conversion
   - Load Conversion = 2.4466
7. -There were no exceedances of the dissolved cobalt surface water quality cleanup level = 0.086 mg/L (Panther Creek). This cleanup level does not apply to the Blackbird Creek.
8. ** indicates that flow measurements were recorded by Hach 950 Marsh McBirney flow meter instead of from USGS stations at either BBSW-02 or PASW-09.
9. 'P' indicates that the flow measurements are flagged as provisional for publication on the USGS website at the writing of this report.
   Values are reported as whole numbers with no significant figures.
10. There were no exceedances of the dissolved copper CCC or CMC.

Table 2-2d: 2020 Surface Water Sampling Summary Tables / Total Constituents / Blackbird and Panther Creek (Location Sorted)

Sampling Location[1]	Date	Time	Event[2]	Flow (cfs)	Staff Gauge Water Level (ft)	Total[3,4,5]																						
						Arsenic	Cobalt		Copper		Iron	Manganese	Potassium	Sodium	Chloride	Sulfate		Calcium	Magnesium	Hardness	Alkalinity	DOC	pH-Lab	pH-Field	Cond.	Temp.	TDS	TSS
						Conc. (mg/L) Cleanup Level = 0.01 mg/L[6]	Conc. (mg/L)	Load (kg/day)	Conc. (mg/L)	Load (kg/day)	Conc. (mg/L)	Conc. (mg/L)	Conc. (mg/L)	Conc. (mg/L)	Conc. (mg/L)	Conc. (mg/L)	Load (kg/day)	Conc. (mg/L)	Conc. (mg/L)	Conc. (mg $CaCO_3$/L)	Conc. (mg/L)	Conc. (mg/L)	pH Unit	pH Unit	(uS/cm)	(deg C)	Conc. (mg/L)	Conc. (mg/L)
BBMW-CTRL	27-May-20	14:55				0.004	0.0046		0.0044									0.5 U	0.5 U	0.5 U								
BBSW-01A	26-Mar-20	9:55	MTHY	4.63 A		0.013																		6.9	290.9	0.5		10 U
BBSW-01A	12-May-20	12:20	S	53.8 **		0.010	0.0554	7.3	0.0114	1.5			2	2	1	13	1711.2	7.4	1.8	27	15	3.5	7.4 J	6.93	67.6	7	58	10 U
BBSW-01A D	12-May-20	12:35	S			0.009	0.0634		0.011				1	2	1	13		7.6	1.8	26	15 U	3.5	7.3 J				57	10 U
BBSW-01A B	12-May-20	12:45	S			0.001 U	0.0001 U		0.0015				1 U	1 U	1 U	1 U		0.5 U	0.5 U	1 U	4	0.5 U	5.8 J				10 U	10 U
BBSW-01A	25-May-20	14:10	MTHY	42.0 P	1.10	0.007																		7.29	59.3	9.6		10 U
BBSW-01A	27-Jun-20	14:00	MTHY	19.0 P		0.009																		7.43	75.4	11.65		10 U
BBSW-01A	24-Jul-20	16:00	MTHY			0.008																		7.21	137	18.1		10 U
BBSW-01A	19-Aug-20	15:00	MTHY			0.007																		7.13	185.3	18.18		10 U
BBSW-01A	16-Sep-20	8:50	MTHY			0.006																		7.32	144.9	12.93		10 U
BBSW-01A	26-Oct-20	8:30	MTHY			0.008																		7.52	137.3	0		10 U
BBSW-01A D	26-Oct-20	8:40	MTHY			0.007																						10 U
BBSW-01A B	26-Oct-20	8:50	MTHY			0.001 U																						
BBSW-01A	16-Nov-20	10:30	MTHY			0.007																		7.48	131.2	0		10 U
BBSW-02	12-May-20	11:55	S	44.1 **		0.007	0.0531	5.7	0.01	1.1	1.03					15	1616.6	7.7	1.7	26.3				6.67	70.1	5.3		10 U
BBSW-03	12-May-20	10:20	S	16.2 **		0.008	0.0389	1.5	0.0248	1.0	0.27					27	1068.8	12.6	2.4	41.2				7.27	105.8	4.8		10 U
BBSW-05	12-May-20	10:05	S	13.5 **		0.006	0.0401	1.3	0.0285	0.9	0.39					29	954.3	14.3	2.6	46.2				7.32	115.3	3.7		10 U
BBSW-07	12-May-20	9:50	S	8.50 **		0.003	0.0367	0.8	0.0283	0.6	0.49					35	727.9	17.4	2.8	54.9				7.27	136.7	2.9		10 U
BBSW-07A	12-May-20	9:15	S	9.15 **		0.003	0.0045	0.1	0.0091	0.2	0.49					2	44.8	4.1	1.2	15.1				6.88	37.9	2.3		10 U
BBSW-08	12-May-20	9:00	S	5.73 **		0.003	0.0010	0.01	0.0074	0.10	0.57					1	14.0	4.1	1.2	15.2				6.81	37.3	2.1		10 U
HGSW-01	12-May-20	9:35	S	0.0381 **		0.018	0.2130	0.02	0.2790	0.03	0.43					9	0.8	1.8 J+	1.3	9.6				6.68	38.8	5.1		10 U
MCSW-01	12-May-20	8:45	S	0.148 **	0.40	0.013	0.1240	0.04	0.1000	0.04	0.28					14	5.1	4.1	2.0	18.3				7.05	62.4	4.8		10 U
PASW-04X	11-May-20	11:25	96		1.78													6.3	1.4	20.8				7.31	50.4	5.7		
PASW-04X	11-May-20	15:20	96		1.78													6.2	1.3	20				7.18	50.4	8.3		
PASW-04X	12-May-20	14:40	96		1.88													5.9	1.2	19.8				7.13	64.5	7.5		
PASW-04X	12-May-20	17:10	96		1.88													5.9	1.3	19.4				7.13	48.3	8.2		
PASW-04X	13-May-20	9:40	96		1.90													5.9	1.3	19.5				7.48	48.4	4.1		
PASW-04X	13-May-20	15:20	96		1.86													5.9	1.2	19.6				7.34	48.6	7.34		
PASW-04X	14-May-20	9:50	96		1.80													5.9	1.2	19.7				7.19	49.6	4.1		
PASW-04X	14-May-20	15:30	96		1.78													6	1.3	20.1				7.38	49.9	6.3		
PASW-04X	9-Sep-20	15:00	S*	76.7 **		0.002	0.0094	1.8	0.0012	0.2			2	5	1 U	8	1500.8	11.6	2.3	38	41	1.7	8.2 J	7.75	66.9	7.19	72	10 U
PASW-04X	28-Sep-20	14:55	S*	70.8 **		0.002	0.0104	1.8	0.0015	0.3			2	5	1	8	1385.2	11.9	2.4	38	42	1.7	8 J	8.16	100.2	10.7	75	10 U
PASW-05	5-May-20	17:10	S*			0.002	0.0081		0.0026		0.67					5		7.1	1.5	23.9				7.52	81.2	7.6		10 U
PASW-05	11-May-20	11:05	96															6.2	1.4	20.4				7.46	50.6	5.6		
PASW-05	11-May-20	15:00	96															6.2	1.4	19.8				7.25	50.7	8.3		
PASW-05	12-May-20	14:30	96															5.9	1.3	19.9				7.25	64.5	7.3		
PASW-05	12-May-20	16:50	96															5.9	1.3	19.9				7.19	48.6	8.2		
PASW-05	13-May-20	9:20	96															5.9	1.3	19.9				7.42	48.7	4.1		
PASW-05	13-May-20	15:00	96															5.9	1.2	19.7				7.41	48.9	6.7		

Table 2-2d: 2020 Surface Water Sampling Summary Tables / Total Constituents / Blackbird and Panther Creek (Location Sorted)

Sampling Location[1]	Date	Time	Event[2]	Flow (cfs)	Staff Gauge Water Level (ft)	Total[3,4,5]																						
						Arsenic	Cobalt		Copper		Iron	Manganese	Potassium	Sodium	Chloride	Sulfate		Calcium	Magnesium	Hardness	Alkalinity	DOC	pH-Lab	pH-Field	Cond.	Temp.	TDS	TSS
						Conc. (mg/L) Cleanup Level = 0.01 mg/L[6]	Conc. (mg/L)	Load (kg/day)	Conc. (mg/L)	Load (kg/day)	Conc. (mg/L)	Conc. (mg/L)	Conc. (mg/L)	Conc. (mg/L)	Conc. (mg/L)	Conc. (mg/L)	Load (kg/day)	Conc. (mg/L)	Conc. (mg/L)	Conc. (mg $CaCO_3$/L)	Conc. (mg/L)	Conc. (mg/L)	pH Unit	pH Unit	(uS/cm)	(deg C)	Conc. (mg/L)	Conc. (mg/L)
PASW-05	14-May-20	9:30	96															6	1.2	20.1				7.22	48.7	4.1		
PASW-05	14-May-20	15:10	96															6	1.3	20.2				7.4	50.5	6.2		
PASW-05	26-May-20	13:50	S*			0.002	0.0057		0.0022		0.54					2		6.2	1.3	20.7				7.19	48.1	8.2		10
PASW-05	9-Sep-20	14:00	S*	71.5 **		0.002	0.0112	2.0	0.0007	0.1	0.12					8	1400.0	11.9	2.5	39.8				7.75	67.2	7.2		10 U
PASW-05	28-Sep-20	14:00	S*	67.0 **		0.003	0.0121	2.0	0.0008 U	0.1	0.1 J+					9	1474.9	11.7	2.5	39.5				8.1	101.7	10.7		10 U
PASW-09	26-Mar-20	10:20	MTHY	41.1 P		0.003																		7.14	152.3	0		10 U
PASW-09 D	26-Mar-20	10:30	MTHY			0.003																						10 U
PASW-09 B	26-Mar-20	10:40	MTHY			0.001 U																						10 U
PASW-09	11-May-20	10:40	96	407 P														8.1	1.7	26				7.42	63.1	5.1		
PASW-09	11-May-20	14:35	96	387 P		0.002	0.0103	9.8	0.0032	3.0								8.2	1.7	26				7.48	63	8.2		
PASW-09 D	11-May-20	14:45	96															8.1	1.7	26								
PASW-09 B	11-May-20	14:55	96															0.5 U	0.5 U	0.5 U								
PASW-09	12-May-20	13:15	96/S	460 P		0.003	0.0099	11.1	0.0032	3.6			1	2	1 U	4	4501.7	7.6	1.5	25	25	4.8	7.7 J	7.47	60.5	6.4	61	20
PASW-09 D	12-May-20	13:30	96/S			0.003	0.0103		0.0033				1	3	1 U	4		6.9	1.6	25	25 U	4.9	7.7 J				52	18
PASW-09 B	12-May-20	13:45	96/S			0.001 U	0.0001 U		0.0004 U				1 U	1 U	1 U	1 U		0.5 U	0.5 U	1 U	4	0.5 U	6 J				10 U	10 U
PASW-09	12-May-20	16:20	96	460 P		0.003	0.0099	11.1	0.0035	3.9								7.8	1.6	39.5				7.4	60.5	7.8		
PASW-09	13-May-20	8:50	96	443 P														7.9	1.7	26				7.63	61.6	4.2		
PASW-09	13-May-20	14:20	96	422 P		0.002	0.0096	9.9	0.0029	3.0								7.8	1.6	25.3				7.56	60.9	6		
PASW-09 D	13-May-20	14:30	96															7.7	1.5	25.7								
PASW-09 B	13-May-20	14:40	96															0.5 U	0.5 U	0.5 U								
PASW-09	14-May-20	8:55	96	392 P														8.1	1.6	26.7				7.32	62.9	3.2		
PASW-09	14-May-20	14:20	96	387 P		0.003	0.0110	10.4	0.0039	3.7								8	1.6	26.7				7.45	62.8	5.9		
PASW-09 D	14-May-20	14:30	96															8	1.6	26.6								
PASW-09 B	14-May-20	14:40	96															0.5 U	0.5 U	0.5 U								
PASW-09	25-May-20	14:25	MTHY	358 P	5.84	0.002																		7.59	63.5	8.5		10 U
PASW-09	27-Jun-20	14:20	MTHY	270 P		0.002																		7.93	66.2	10.85		10 U
PASW-09 D	27-Jun-20	14:30	MTHY			0.002																						10 U
PASW-09 B	27-Jun-20	14:40	MTHY			0.001 U																						10 U
PASW-09	24-Jul-20	16:20	MTHY	95.6 P	4.95	0.002																		7.72	88.3	14.23		10 U
PASW-09 D	24-Jul-20	16:30	MTHY			0.002																						10 U
PASW-09 B	24-Jul-20	16:40	MTHY			0.001 U																						10 U
PASW-09	19-Aug-20	15:20	MTHY	55.8 P		0.002																		7.67	101.4	14.79		10 U
PASW-09 D	19-Aug-20	15:30	MTHY			0.002																						10 U
PASW-09 B	19-Aug-20	15:40	MTHY			0.001 U																						10 U
PASW-09	16-Sep-20	9:10	MTHY	41.3 P		0.002																		7.56	97.5	9.76		10 U
PASW-09	26-Oct-20	9:00	MTHY			0.002																		7.67	121.4	-0.1		10 U
PASW-09	16-Nov-20	11:00	MTHY			0.001																		7.62	116.3	-0.1		10 U
PASW-09 D	16-Nov-20	11:10	MTHY			0.001																						10 U
PASW-09 B	16-Nov-20	11:20	MTHY			0.001 U																						10 U
PASW-11	11-May-20	10:20	96															8.1	1.6	25.6				7.34	61.1	4.9		
PASW-11	11-May-20	14:15	96															8.1	1.6	25.9				7.44	60.9	7.7		
PASW-11	12-May-20	12:55	96/S			0.001	0.0003		0.0014		0.5					3		7.6	1.5	24.9				7.26	59.2	5.8		18
PASW-11	12-May-20	16:00	96															7.8	1.5	24.9				7.4	58.8	7.5		
PASW-11	13-May-20	8:30	96															7.8	1.6	25.4				7.54	59.5	4		
PASW-11	13-May-20	14:00	96															7.8	1.6	25.1				7.52	59.5	6.8		
PASW-11	14-May-20	8:35	96															8	1.5	26.1				7.26	60.8	3		
PASW-11	14-May-20	14:00	96															7.9	1.6	26.2				7.61	60.4	5.6		

Table 2-2d: 2020 Surface Water Sampling Summary Tables / Total Constituents / Blackbird and Panther Creek (Location Sorted)

Sampling Location[1]	Date	Time	Event[2]	Flow (cfs)	Staff Gauge Water Level (ft)	Total[3,4,5]																						
						Arsenic	Cobalt		Copper		Iron	Manganese	Potassium	Sodium	Chloride	Sulfate		Calcium	Magnesium	Hardness	Alkalinity	DOC	pH-Lab	pH-Field	Cond.	Temp.	TDS	TSS
						Conc. (mg/L) Cleanup Level = 0.01 mg/L[6]	Conc. (mg/L)	Load (kg/day)	Conc. (mg/L)	Load (kg/day)	Conc. (mg/L)	Conc. (mg/L)	Conc. (mg/L)	Conc. (mg/L)	Conc. (mg/L)	Conc. (mg/L)	Load (kg/day)	Conc. (mg/L)	Conc. (mg/L)	Conc. (mg $CaCO_3$/L)	Conc. (mg/L)	Conc. (mg/L)	pH Unit	pH Unit	(uS/cm)	(deg C)	Conc. (mg/L)	Conc. (mg/L)
PASW-C	12-May-20	13:55				0.003	0.0045		0.0042									0.5 U	0.5 U	0.5 U								
PASW-C	14-May-20	15:40				0.004	0.0048		0.0048									0.5 U	0.5 U	0.5 U								
PASW-C	9-Sep-20	15:10				0.003	0.0054		0.0053									0.5 U	0.5 U	0.5 U								
PASW-C	28-Sep-20	15:05				0.004	0.0537		0.0037									0.5 U	0.5 U	0.5 U								
WFINTDITCH	12-May-20	11:10	S	0.348 **		0.196	7.00	6.0	0.0379	0.03	95.3					366	311.6	30.2	13.9	133				4.67	661.3	7.4		12
WFSW-01	12-May-20	11:25	S	0.260 **		0.238	7.45	4.7	0.0184	0.01	111					402	255.7	31.2	14.1	136				5.57	688.4	7.4		13
WFSW-02	12-May-20	11:00	S	29.1 **		0.004	0.0007	0.0	0.0037	0.3	0.39					2	142.3	4.2	1.2	15.6				7.29	37.6	4.1		10 U
WFSW-03	12-May-20	10:40	S	29.3 **		0.003	0.0005	0.0	0.004	0.3	0.38					2	143.2	4.2	1.2	15.4				7.49	36.5	3.6		10 U
WFTTSW-01	12-May-20	11:35	S	0.101 **		0.065	3.72	0.92	0.0194	0.00	51.0					266	65.7	25.9	10.6	108				4.67	488.4	9.8		13
WTP-003	25-Mar-20	8:00					0.236		0.074		0.38																	
WTP-003	28-Apr-20	12:00					0.581		0.035		0.11																	
WTP-003	12-May-20	9:25	S	1.34		0.001 U	0.202	0.7	0.126	0.4	0.15					286	936.2	116	15	352				9.9		7.6		10 U
WTP-003	27-May-20	9:30					0.221		0.036		0.05																	
WTP-003	24-Jun-20	10:00					0.154		0.053		0.08																	
WTP-003	21-Jul-20	12:00					0.143		0.049		0.08 J+																	
WTP-003	26-Aug-20	12:30					0.083		0.038		0.11																	
WTP-003	23-Sep-20	10:00					0.080		0.034		0.08 J+																	
WTP-003	28-Oct-20	10:00					0.120		0.026		0.10																	
WTP-003	24-Nov-20	12:00					0.113		0.022		0.10																	
WTP-003	1-Dec-20	12:30					0.114		0.019		0.07																	

Notes:

1. Sample Codes:
   - Sample names with a 'B' flag are blank samples.
   - Sample names with a 'D' flag are duplicate samples.
   - Sample names with a 'C' suffix are control standards.
2. Event codes:
   - "96": 96-hr sampling events
   - "MTHY": Monthly sampling events
   - "S": Synoptic sampling events
   - "S**": Synoptic sampling events for Big Deer Creek, See Tables 2-2e-h
   - "96/S": Synoptic event sampled concurrently with 96-hr event
3. The dissolved concentrations of some metals (i.e. cobalt) are often higher than the total concentrations. This is likely because the metals are present almost entirely in the dissolved form and the lowe
4. Qualifiers:
   - U - Concentration below reporting limits.
   - J - The result is an estimated quantity due to a quality control deficiency.
   - J+ - The result is an estimated quantity, but the result may be biased high.
5. Loading Calculations:
   - Load (kg/day) = Flow (cfs) * Conc. (mg/L)* Load Conversion
   - Load Conversion = 2.4466
6. Total arsenic surface water quality cleanup level = 0.010 mg/L (Panther Creek and Blackbird Creek). Exceedances are indicated by light orange shaded cells.
7. ** indicates that flow measurements were recorded by Hach 950 Marsh McBirney flow meter instead of from USGS stations at either BBSW-02 or PASW-09.
8. 'P' indicates that the flow measurements are flagged as provisional for publication on the USGS website at the writing of this report.

Values are reported as whole numbers with no significant figures.

Table 2-2e: 2020 Surface Water Sampling Summary Tables / Dissolved Constituents / Bucktail and Big Deer Creek (Date Sorted)

Sampling Location[1]	Date	Time	Event[2]	Cu IWQS Acute (CMC)[3] mg/L	Cu IWQS Chronic (CCC)[3] mg/L	Flow (cfs)	Staff Gauge Water Level (ft)	Dissolved[4,5,6]						
								Arsenic	Cobalt		Copper[8]		Iron	Manganese
								Conc. (mg/L)	Conc. (mg/L) Cleanup Level = 0.086 mg/L[7]	Load (kg/day)	Conc. (mg/L)	Load (kg/day)	Conc. (mg/L)	Conc. (mg/L)
BDSW-04	4-May-20	9:25	96	0.0046	0.0035						0.0005			
BDSW-03	4-May-20	9:40	96	0.0046	0.0035						0.0014			
BDSW-01	4-May-20	11:10	96	0.0046	0.0035						0.0056			
BDSW-04	4-May-20	14:10	96	0.0046	0.0035						0.0005			
BDSW-03	4-May-20	14:30	96	0.0046	0.0035						0.0014			
BDSW-03 D	4-May-20	14:40	96	0.0046	0.0035						0.0014			
BDSW-03 B	4-May-20	14:50	96								0.0003 U			
BDSW-01	4-May-20	16:00	96	0.0046	0.0035						0.0058			
BDSW-04	5-May-20	9:20	96	0.0046	0.0035						0.0004			
BDSW-03	5-May-20	9:40	96	0.0046	0.0035						0.0014			
BDSW-01	5-May-20	11:10	96	0.0046	0.0035						0.0053			
BTSW-01,6	5-May-20	12:40	S			0.0351		0.003	0.0965	0.0	0.0690	0.0	0.03 U	
BTSW-01	5-May-20	13:00	S			0.38	0.47	0.003	0.1110	0.1	0.0439	0.0	0.03 U	
SFSW-04	5-May-20	13:20	S	0.0122	0.0084	3.04		0.001 U	0.0001 U	0.0	0.0003 U	0.0	0.03 U	
SFSW-02	5-May-20	13:40	S	0.0122	0.0084			0.001 U	0.0111		0.0085			
SFSW-01	5-May-20	14:10	S	0.0122	0.0084	3.41	1.18	0.001 U	0.0110	0.1	0.0119	0.1		
BDSW-04	5-May-20	14:40	96/S	0.0046	0.0035	56.7		0.001 U	0.0001 U	0.0	0.0004	0.1	0.06	
BDSW-03	5-May-20	15:20	96/S	0.0046	0.0035	66.5		0.001 U	0.0008	0.1	0.0014	0.2		
BDSW-03 D	5-May-20	15:30	96/S	0.0046	0.0035			0.001 U	0.0009		0.0014			
BDSW-03 B	5-May-20	15:40	96/S					0.001 U	0.0001 U		0.0003 U			
BDSW-01	5-May-20	17:30	96/S	0.0046	0.0035			0.001 U	0.0012		0.0055			
BDSW-C	5-May-20	17:40						0.003	0.0043		0.0042			
BDSW-04	6-May-20	9:25	96	0.0046	0.0035						0.0006			
BDSW-03	6-May-20	9:45	96	0.0046	0.0035						0.0015			
BDSW-01	6-May-20	11:15	96	0.0046	0.0035						0.0056			
BDSW-04	6-May-20	14:10	96	0.0046	0.0035						0.0007			
BDSW-03	6-May-20	14:30	96	0.0046	0.0035						0.0018			
BDSW-03 D	6-May-20	14:40	96	0.0046	0.0035						0.0018			
BDSW-03 B	6-May-20	14:50	96								0.0003 U			
BDSW-01	6-May-20	16:00	96	0.0046	0.0035						0.0056			
BDSW-04	7-May-20	9:00	96	0.0046	0.0035						0.0005			
BDSW-03	7-May-20	9:20	96	0.0046	0.0035						0.0015			
BDSW-01	7-May-20	10:55	96	0.0046	0.0035						0.0052			
BDSW-04	7-May-20	13:00	96	0.0046	0.0035			0.001 U	0.0001 U		0.0005			
BDSW-03	7-May-20	13:20	96	0.0046	0.0035			0.001 U	0.0009		0.0015			
BDSW-03 D	7-May-20	13:30	96	0.0046	0.0035			0.001 U	0.0009		0.0015			
BDSW-03 B	7-May-20	13:40	96					0.001 U	0.0001 U		0.0003 U			
BDSW-03+200	7-May-20	13:50	INV	0.0046	0.0035			0.001 U	0.0007		0.0014			
BDSW-03	7-May-20	14:05	INV	0.0046	0.0035	66.8		0.001 U	0.0007	0.1	0.0013	0.2		
BDSW-03-200	7-May-20	14:30	INV	0.0046	0.0035			0.001 U	0.0008		0.0024			
BDSW-03-1425	7-May-20	15:00	INV	0.0046	0.0035			0.001 U	0.0009		0.0031			
BDSW-01	7-May-20	15:50	96	0.0046	0.0035			0.001 U	0.0011		0.0053			
BDSW-C	7-May-20	16:00						0.005	0.0558		0.0031			
SFSW-C	8-May-20	18:00						0.004	0.0045		0.0046			
SFSW-C	10-May-20	11:40						0.005	0.0530		0.0033			

Table 2-2e: 2020 Surface Water Sampling Summary Tables / Dissolved Constituents / Bucktail and Big Deer Creek (Date Sorted)

Sampling Location[1]	Date	Time	Event[2]	Cu IWQS Acute (CMC)[3] mg/L	Cu IWQS Chronic (CCC)[3] mg/L	Flow (cfs)	Staff Gauge Water Level (ft)	Dissolved[4,5,6]						
								Arsenic	Cobalt		Copper[8]		Iron	Manganese
								Conc. (mg/L)	Conc. (mg/L) Cleanup Level = 0.086 mg/L[7]	Load (kg/day)	Conc. (mg/L)	Load (kg/day)	Conc. (mg/L)	Conc. (mg/L)
BDSW-04	25-May-20	9:40	96	0.0046	0.0035						0.0003			
BDSW-03	25-May-20	10:00	96	0.0046	0.0035						0.0017			
BDSW-01	25-May-20	11:20	96	0.0046	0.0035						0.0042			
BDSW-04	25-May-20	13:00	96	0.0046	0.0035						0.0003			
BDSW-03	25-May-20	13:20	96	0.0046	0.0035						0.0018			
BDSW-03 D	25-May-20	13:30	96	0.0046	0.0035						0.0018			
BDSW-03 B	25-May-20	13:40	96								0.0003 U			
BDSW-01	25-May-20	15:00	96	0.0046	0.0035						0.0046			
BTSW-01.6	26-May-20	9:30	S			0.097		0.005	0.0824	0.0	0.0638	0.0	0.03 U	
BTSW-01	26-May-20	9:55	S			0.77	0.59	0.003	0.0848	0.2	0.0468	0.1	0.04	
SFSW-04	26-May-20	10:15	S	0.0091	0.0064	8.39		0.001 U	0.0001	0.0	0.0003 U	0.0	0.03 U	
SFSW-02	26-May-20	10:35	S	0.0094	0.0066			0.001 U	0.0063		0.0053			
SFSW-01	26-May-20	10:50	S	0.0094	0.0066	8.87	1.55	0.001 U	0.0070	0.2	0.0080	0.2		
BDSW-04	26-May-20	11:10	S	0.0046	0.0035	72.8		0.001 U	0.0001	0.0	0.0003 U	0.1	0.03 U	
BDSW-03	26-May-20	11:45	S	0.0046	0.0035	87.8		0.001 U	0.0011	0.2	0.0018	0.4		
BDSW-01	26-May-20	14:10	S	0.0046	0.0035			0.001 U	0.0014		0.0044			
BDSW-04	26-May-20	15:40	96	0.0046	0.0035						0.0003 U			
BDSW-03	26-May-20	16:00	96	0.0046	0.0035						0.0018			
BDSW-03 D	26-May-20	16:10	96	0.0046	0.0035						0.0017			
BDSW-03 B	26-May-20	16:20	96								0.0003 U			
BDSW-01	26-May-20	17:20	96	0.0046	0.0035						0.0045			
BDSW-C	26-May-20	17:30						0.005	0.0527		0.0029			
BDSW-04	27-May-20	9:20	96	0.0046	0.0035						0.0005			
BDSW-03	27-May-20	9:40	96	0.0046	0.0035						0.0016 J+			
BDSW-01	27-May-20	11:00	96	0.0046	0.0035						0.0052			
BDSW-04	27-May-20	16:40	96	0.0046	0.0035						0.0003 J+			
BDSW-03	27-May-20	17:00	96	0.0046	0.0035						0.0017 J+			
BDSW-03 D	27-May-20	17:10	96	0.0046	0.0035						0.0016 J+			
BDSW-03 B	27-May-20	17:20	96								0.0003 U			
BDSW-01	27-May-20	18:40	96	0.0046	0.0035						0.0046			
BDSW-04	28-May-20	9:40	96	0.0046	0.0035						0.0003 J+			
BDSW-03	28-May-20	10:00	96	0.0046	0.0035						0.0016 J+			
BDSW-01	28-May-20	11:50	96	0.0046	0.0035						0.0045			
BDSW-04	28-May-20	14:50	96	0.0046	0.0035						0.0003 J+			
BDSW-03	28-May-20	15:10	96	0.0046	0.0035						0.0017 J+			
BDSW-03 D	28-May-20	15:20	96	0.0046	0.0035						0.0017 J+			
BDSW-03 B	28-May-20	15:30	96								0.0003 U			
BDSW-01	28-May-20	16:40	96	0.0046	0.0035						0.0045			
BDSW-C	28-May-20	16:50						0.005	0.0548		0.0030			
BDSW-03	17-Jun-20	2:51	STRM	0.0046	0.0035			0.001 U	0.0049		0.0039			
BDSW-03	17-Jun-20	4:51	STRM	0.0046	0.0035			0.001 U	0.0012		0.0022			
BDSW-03	17-Jun-20	6:51	STRM	0.0046	0.0035			0.001 U	0.0011		0.0021			
BDSW-03	17-Jun-20	8:51	STRM	0.0046	0.0035			0.001 U	0.0011		0.0021			
BDSW-03	17-Jun-20	10:51	STRM	0.0046	0.0035			0.001 U	0.0011		0.0023			
BDSW-03	17-Jun-20	12:51	STRM	0.0046	0.0035			0.001 U	0.0011		0.0022			

Table 2-2e: 2020 Surface Water Sampling Summary Tables / Dissolved Constituents / Bucktail and Big Deer Creek (Date Sorted)

Sampling Location[1]	Date	Time	Event[2]	Cu IWQS Acute (CMC)[3] mg/L	Cu IWQS Chronic (CCC)[3] mg/L	Flow (cfs)	Staff Gauge Water Level (ft)	Dissolved[4,5,6]						
								Arsenic	Cobalt		Copper[8]		Iron	Manganese
								Conc. (mg/L)	Conc. (mg/L) Cleanup Level = 0.086 mg/L[7]	Load (kg/day)	Conc. (mg/L)	Load (kg/day)	Conc. (mg/L)	Conc. (mg/L)
BDSW-03	17-Jun-20	14:51	STRM	0.0046	0.0035			0.001 U	0.0012		0.0024			
BDSW-03	17-Jun-20	16:51	STRM	0.0046	0.0035			0.001 U	0.0011		0.0021			
BDSW-03	17-Jun-20	18:51	STRM	0.0046	0.0035			0.001 U	0.0011		0.0020			
BDSW-03	17-Jun-20	20:51	STRM	0.0046	0.0035			0.001 U	0.0011		0.0020			
BDSW-03	17-Jun-20	22:51	STRM	0.0046	0.0035			0.001 U	0.0010		0.0019			
BDSW-03	18-Jun-20	0:51	STRM	0.0046	0.0035			0.001 U	0.0011		0.0019			
BT-SEEP	9-Sep-20	9:40	S			0.00081		0.001	0.8110	0.0	0.1120	0.0	0.03 U	
BTSW-01.6	9-Sep-20	10:00	S			0.070		0.003	0.0866	0.0	0.0689	0.0	0.03 U	
BTSW-01	9-Sep-20	10:25	S			0.21	0.37	0.002	0.1390	0.1	0.0374	0.0	0.03 U	
SFSW-04	9-Sep-20	10:45	S	0.0141	0.0096	2.02		0.001 U	0.0007	0.0	0.0003 U	0.0	0.03 U	
SFSW-02	9-Sep-20	11:10	S	0.0131	0.0090			0.001 U	0.0155		0.0076			
SFSW-01	9-Sep-20	11:30	S	0.0133	0.0091	2.74	2.14	0.001 U	0.0154	0.1	0.0103	0.1		
BDSW-04	9-Sep-20	11:50	S	0.0056	0.0041	8.09		0.001 U	0.0001 U	0.0	0.0003 U	0.0	0.03 U	
BDSW-03	9-Sep-20	12:20	S	0.0070	0.0051	11.7	1.00	0.001 U	0.0036	0.1	0.0022	0.1		
BDSW-03 D	9-Sep-20	12:30	S	0.0070	0.0051			0.001 U	0.0033		0.0023			
BDSW-03 B	9-Sep-20	12:40	S					0.001 U	0.0002		0.0004 U			
BDSW-01	9-Sep-20	14:30	S	0.0073	0.0053			0.001 U	0.0025		0.0030			
BDSW-04	21-Sep-20	9:45	96	0.0056	0.0042			0.001 U	0.0001		0.0003 U			
BDSW-03	21-Sep-20	10:05	96	0.0073	0.0053		1.03	0.001 U	0.0027		0.0024			
BDSW-01	21-Sep-20	11:25	96	0.0074	0.0054			0.001 U	0.0019		0.0035			
BDSW-03	21-Sep-20	15:30	96	0.0072	0.0052		1.02				0.0025			
BDSW-03 D	21-Sep-20	15:40	96	0.0071	0.0051						0.0025			
BDSW-03 B	21-Sep-20	15:50	96								0.0003 U			
BDSW-01	21-Sep-20	17:00	96	0.0073	0.0053						0.0037			
BDSW-03	22-Sep-20	9:55	96	0.0073	0.0053		0.99				0.0024			
BDSW-01	22-Sep-20	11:00	96	0.0074	0.0053						0.0033			
BDSW-03	22-Sep-20	13:20	96	0.0072	0.0052		0.95				0.0068 J			
BDSW-03 D	22-Sep-20	13:30	96	0.0073	0.0053						0.0025 J			
BDSW-03 B	22-Sep-20	13:40	96								0.0003 U			
BDSW-01	22-Sep-20	16:20	96	0.0073	0.0052						0.0035			
BDSW-03	23-Sep-20	9:50	96	0.0071	0.0052		0.98				0.0034			
BDSW-01	23-Sep-20	11:05	96	0.0074	0.0053						0.0033			
BDSW-03	23-Sep-20	14:25	96	0.0072	0.0052		0.98				0.0026			
BDSW-03 D	23-Sep-20	14:35	96	0.0072	0.0052						0.0028			
BDSW-03 B	23-Sep-20	14:45	96								0.0003 U			
BDSW-01	23-Sep-20	17:00	96	0.0073	0.0053						0.0035			
BDSW-03	24-Sep-20	9:40	96	0.0073	0.0053		0.97				0.0028			
BDSW-01	24-Sep-20	10:55	96	0.0074	0.0053						0.0035			
SFSW-04	24-Sep-20	12:50	96	0.0134	0.0092	2.20					0.0003 U	0.0		
SFSW-01	24-Sep-20	13:15	96	0.0132	0.0090	2.33					0.0149	0.1		
BDSW-03	24-Sep-20	14:05	96	0.0072	0.0052	9.60	0.97				0.0029			
BDSW-03 D	24-Sep-20	14:15	96	0.0072	0.0052						0.0029			
BDSW-03 B	24-Sep-20	14:25	96								0.0003 U			
BDSW-01	24-Sep-20	16:10	96	0.0073	0.0053						0.0040			

Table 2-2e: 2020 Surface Water Sampling Summary Tables / Dissolved Constituents / Bucktail and Big Deer Creek (Date Sorted)

Sampling Location[1]	Date	Time	Event[2]	Cu IWQS Acute (CMC)[3] mg/L	Cu IWQS Chronic (CCC)[3] mg/L	Flow (cfs)	Staff Gauge Water Level (ft)	Dissolved[4,5,6]						
								Arsenic	Cobalt		Copper[8]		Iron	Manganese
								Conc. (mg/L)	Conc. (mg/L) Cleanup Level = 0.086 mg/L[7]	Load (kg/day)	Conc. (mg/L)	Load (kg/day)	Conc. (mg/L)	Conc. (mg/L)
BDSW-C	24-Sep-20	16:20						0.004	0.0502		0.0030			
BT-SEEP	28-Sep-20	9:00	S			0.00041		0.001 U	0.8410	0.0	0.4120	0.0	0.03 U	
BTSW-01,6	28-Sep-20	9:20	S			0.056		0.003	0.0874	0.0	0.0813	0.0	0.03 U	
BTSW-01	28-Sep-20	9:45	S			0.22	0.38	0.003	0.1330	0.1	0.0422	0.0	0.03 U	
SFSW-04	28-Sep-20	10:10	S	0.0130	0.0089	2.08		0.001 U	0.0002 J+	0.0	0.0004 U	0.0	0.03 U	
SFSW-02	28-Sep-20	10:40	S	0.0133	0.0091			0.001 U	0.0140		0.0097			
SFSW-01	28-Sep-20	11:00	S	0.0131	0.0090	2.27		0.001 U	0.0135	0.1	0.0134	0.1		
BDSW-04	28-Sep-20	11:30	S	0.0053	0.0039	7.73		0.001 U	0.0001 U	0.0	0.0004 U	0.0	0.03 U	
BDSW-03	28-Sep-20	12:00	S	0.0072	0.0052	9.22	0.98	0.001 U	0.0028	0.1	0.0029	0.1		
BDSW-03 D	28-Sep-20	12:10	S	0.0072	0.0052			0.001 U	0.0027		0.0030			
BDSW-03 B	28-Sep-20	12:20	S					0.001 U	0.0001 U		0.0003 U			
BDSW-01	28-Sep-20	14:30	S	0.0072	0.0052			0.001 U	0.0018		0.0045			

Notes:

1. Sample Codes:
   - Sample names with a 'B' flag are blank samples.
   - Sample names with a 'D' flag are duplicate samples.
   - Sample names with a 'C' suffix are control standards.
2. Event codes:
   - "96": 96-hr sampling events
   - "S": Synoptic sampling events
   - "96/S": Synoptic event sampled concurrently with 96-hr event
   - "INV": Investigational sampling event
   - "STRM": Storm sampling events at automated sampler locations.
3. Copper Idaho Water Quality Standards (Cu IWQS) calculated using hardness based formulas:
   - Acute Cu IWQS (CMC) µg/L = e([0.9422*ln(hardness)]-1.464)*0.96
   - Chronic Cu IWQS (CCC) µg/L = e([0.8545*ln(hardness)]-1.465)*0.96
4. The dissolved concentrations of some metals (i.e. cobalt) are often higher than the total concentrations.
   This is likely due to the fact that the metals are present almost entirely in the dissolved form and the lower total metals are due to matrix effects.
5. Qualifiers:
   - U - Concentration below reporting limits.
   - J - The result is an estimated quantity due to a quality control deficiency.
   - J+ - The result is an estimated quantity, but the result may be biased high.
6. Loading Calculations:
   - Load (Kg/day) = Flow (cfs) * Conc. (mg/L)* Load Conversion
   - Load Conversion = 2.4466
7. There were no exceedances of the dissolved cobalt surface water quality cleanup level = 0.086 mg/L (South Fork Big Deer and Big Deer Creeks).
8. Light green shaded cells indicate exceedances of the dissolved copper CCC and CMC. Light purple shaded cells indicate exceedance of the dissolved copper CCC only.

Table 2-2f: 2020 Surface Water Sampling Summary Tables / Total Constituents / Bucktail and Big Deer Creek (Date Sorted)

Sampling Location[1]	Date	Time	Event[2]	Flow (cfs)	Staff Gauge Water Level (ft)	Total[3,4,5]																						
						Arsenic	Cobalt		Copper		Iron	Manganese	Potassium	Sodium	Chloride	Sulfate		Calcium	Magnesium	Hardness	Alkalinity	DOC	pH-Lab	pH-Field	Cond.	Temp.	TDS	TSS
						Conc. (mg/L) Cleanup Level = 0.01 mg/L[6]	Conc. (mg/L)	Load (kg/day)	Conc. (mg/L)	Load (kg/day)	Conc. (mg/L)	Conc. (mg/L)	Conc. (mg/L)	Conc. (mg/L)	Conc. (mg/L)	Conc. (mg/L)	Load (kg/day)	Conc. (mg/L)	Conc. (mg/L)	Conc. (mg $CaCO_3$/L)	Conc. (mg/L)	Conc. (mg/L)	pH Unit	pH Unit	(uS/cm)	(deg C)	Conc. (mg/L)	Conc. (mg/L)
BDSW-04	4-May-20	9:25	96															4.6	0.6	14.2				7.1	36.9	2.5		
BDSW-03	4-May-20	9:40	96															6	0.8	18.1				7.3	44.4	2.8		
BDSW-01	4-May-20	11:10	96															6.2	0.8	18.9				7.1	47.4	4.4		
BDSW-04	4-May-20	14:10	96															4.5	0.6	13.9				7.1	36.8	5.9		
BDSW-03	4-May-20	14:30	96															6	0.8	18.1				7.3	44.3	6.3		
BDSW-03 D	4-May-20	14:40	96															5.9	0.7	17.7								
BDSW-03 B	4-May-20	14:50	96															0.5 U	0.5 U	0.5 U								
BDSW-01	4-May-20	16:00	96															6.2	0.8	18.9				7.3	47.4	7.8		
BDSW-04	5-May-20	9:20	96															4.7	0.6	14.3				7.0	37.7	2.4		
BDSW-03	5-May-20	9:40	96															6	0.8	18.2				7.4	45.8	2.6		
BDSW-01	5-May-20	11:10	96															6.6	0.9	20				7.2	49.6	4.4		
BTSW-01,6	5-May-20	12:40	S	0.0351		0.004	0.0985	0.01	0.0757	0.01	0.04					96	8.2	45.3	7.7	145				7.6	298.3	5.6		10 U
BTSW-01	5-May-20	13:00	S	0.38	0.47	0.003	0.1110	0.10	0.0482	0.04	0.03 U					30	27.9	14.7	4.5	55.2				7.6	138.6	5.6		10 U
SFSW-04	5-May-20	13:20	S	3.04		0.001 U	0.0001 U	0.00	0.0008 U	0.01	0.03 U					6	44.6	25.2	1.8	70.2				8.1	144.6	5.4		10 U
SFSW-02	5-May-20	13:40	S			0.001 U	0.0111		0.0110				2	3	1 U	8		24.4	2.2	70	65	2.4	8.0 J	7.9	145.9	6.0	90	10 U
SFSW-01	5-May-20	14:10	S	3.41	1.18	0.001 U	0.0116	0.10	0.0162	0.14			2	3	1 U	8	66.7	24.4	2.2	70	66	2.9	8.1 J	8.1	144.3	6.2	94	10 U
BDSW-04	5-May-20	14:40	96/S	56.7		0.001 U	0.0001 U	0.01	0.0008 U	0.11	0.16					1	138.7	4.7	0.6	14.4				7.3	37.4	6.1		10 U
BDSW-03	5-May-20	15:20	96/S	66.5		0.001 U	0.0009	0.15	0.0017	0.28			1 U	2	1 U	2	325.4	6.1	0.8	18	19	3.9	7.5 J	7.6	46.3	6.4	45	10 U
BDSW-03 D	5-May-20	15:30	96/S			0.001 U	0.0009		0.0017				1 U	2	1 U	2		6.2	0.8	18	19	4	7.4 J				46	10 U
BDSW-03 B	5-May-20	15:40	96/S			0.001 U	0.0001 U		0.0008 U				1 U	1 U	1 U	1 U		0.5 U	0.5 U	1 U	4 U	0.5 U	5.8 J				10 U	10 U
BDSW-01	5-May-20	17:30	96/S			0.001 U	0.0015		0.0070				1 U	3	1 U	2		6.5	0.9	19	21	4	7.5 J	7.4	49.3	7.8	48	10 U
BDSW-C	5-May-20	17:40				0.003	0.0043		0.0043									0.5 U	0.5 U	0.5 U								
BDSW-04	6-May-20	9:25	96															4.3	0.6	13				7.1	37.2	3.6		
BDSW-03	6-May-20	9:45	96															5.6	0.7	16.9				7.2	45.3	3.8		
BDSW-01	6-May-20	11:15	96															5.7	0.8	17.5				7.3	48.0	5.7		
BDSW-04	6-May-20	14:10	96															4.1	0.5	12.4				7.3	38.4	6.5		
BDSW-03	6-May-20	14:30	96															5.4	0.7	16.1				7.5	47.2	6.4		
BDSW-03 D	6-May-20	14:40	96															5.3	0.7	15.9								
BDSW-03 B	6-May-20	14:50	96															0.5 U	0.5 U	0.5 U								
BDSW-01	6-May-20	16:00	96															5.5	0.8	16.9				7.5	49.4	6.2		
BDSW-04	7-May-20	9:00	96															4.1	0.6	12.6				7.1	37.4	2.3		
BDSW-03	7-May-20	9:20	96															5.4	0.7	16.3				7.2	45.9	2.4		
BDSW-01	7-May-20	10:55	96															5.6	0.8	17				7.3	48.8	3.8		
BDSW-04	7-May-20	13:00	96			0.001 U	0.0001 U		0.0008 U									4	0.6	12.4				7.1	37.1	4.0		
BDSW-03	7-May-20	13:20	96			0.001 U	0.0009		0.0017									5.4	0.7	16.5				7.2	45.5	4.5		
BDSW-03 D	7-May-20	13:30	96			0.001 U	0.0008		0.0018									5.3	0.7	16.1								
BDSW-03 B	7-May-20	13:40	96			0.001 U	0.0001 U		0.0008 U									0.5 U	0.5 U	0.5 U								
BDSW-03+200	7-May-20	13:50	INV			0.001 U	0.0007		0.0016				1 U	2	1 U	2		5.3	0.7	16	19	3.9	7.5 J	7.3	46.0	4.7	40	10 U
BDSW-03	7-May-20	14:05	INV	66.8		0.001 U	0.0007	0.11	0.0016	0.26			1 U	2	1 U	2	326.9	5.4	0.7	16	19	3.9	7.4 J	7.3	46.1	5.0	38	10 U
BDSW-03-200	7-May-20	14:30	INV			0.001 U	0.0009		0.0024				1 U	2	1 U	2		5.6	0.7	17	21	3.9	7.4 J	7.2	45.3	5.3	38	10 U
BDSW-03-1425	7-May-20	15:00	INV			0.001 U	0.0010		0.0035				1 U	2	1 U	2		5.4	0.7	17	19	4.2	7.4 J	7.2	46.2	5.8	40	10 U
BDSW-01	7-May-20	15:50	96			0.001 U	0.0013		0.0067									5.6	0.8	17.3				7.4	49.8	7.1		
BDSW-C	7-May-20	16:00				0.005	0.0575		0.0033									0.5 U	0.5 U	0.5 U								
SFSW-C	8-May-20	18:00				0.004	0.0046		0.0047									0.5 U	0.5 U	0.5 U								
SFSW-C	10-May-20	11:40				0.005	0.0555		0.0033									0.5 U	0.5 U	0.5 U								

Table 2-2f: 2020 Surface Water Sampling Summary Tables / Total Constituents / Bucktail and Big Deer Creek (Date Sorted)

Sampling Location[1]	Date	Time	Event[2]	Flow (cfs)	Staff Gauge Water Level (ft)	Total[3,4,5]																						
						Arsenic	Cobalt		Copper		Iron	Manganese	Potassium	Sodium	Chloride	Sulfate		Calcium	Magnesium	Hardness	Alkalinity	DOC	pH-Lab	pH-Field	Cond.	Temp.	TDS	TSS
						Conc. (mg/L) Cleanup Level = 0.01 mg/L[6]	Conc. (mg/L)	Load (kg/day)	Conc. (mg/L)	Load (kg/day)	Conc. (mg/L)	Conc. (mg/L)	Conc. (mg/L)	Conc. (mg/L)	Conc. (mg/L)	Conc. (mg/L)	Load (kg/day)	Conc. (mg/L)	Conc. (mg/L)	Conc. (mg $CaCO_3$/L)	Conc. (mg/L)	Conc. (mg/L)	pH Unit	pH Unit	(uS/cm)	(deg C)	Conc. (mg/L)	Conc. (mg/L)
BDSW-04	25-May-20	9:40	96															4.7	0.6	14.2				7.1	36.5	3.9		
BDSW-03	25-May-20	10:00	96															7.9	0.8	23.1				7.2	46.8	4.2		
BDSW-01	25-May-20	11:20	96															6.6	0.8	20				7.4	50.0	6.0		
BDSW-04	25-May-20	13:00	96															4.6	0.6	14.2				7.1	37.4	6.8		
BDSW-03	25-May-20	13:20	96															7.9	0.7	22.7				7.2	48.9	7.2		
BDSW-03 D	25-May-20	13:30	96															6.8	0.7	20.1								
BDSW-03 B	25-May-20	13:40	96															1 J+	0.5 U	2.6								
BDSW-01	25-May-20	15:00	96															7.7	0.8	22.4				7.4	60.1	9.5		
BTSW-01.6	26-May-20	9:30	S	0.097		0.005	0.0923	0.02	0.0735	0.02	0.07					71	16.8	33.3	6	108				7.3	237.2	5.5		10 U
BTSW-01	26-May-20	9:55	S	0.77	0.59	0.004	0.0898	0.17	0.0624	0.12	0.14					20	37.7	11.1	3.2	41.1				7.5	104.3	6.4		10 U
SFSW-04	26-May-20	10:15	S	8.39		0.001 U	0.0001 U	0.00	0.0004 U	0.01	0.03 U					3	61.6	18.7	1.1	51.3				7.9	107.6	6.6		10 U
SFSW-02	26-May-20	10:35	S			0.001 U	0.0066		0.0090				1	2	1 U	4		18.3	1.4	53	51	2.3	8.0 J	8.1	108.5	6.0	62	10 U
SFSW-01	26-May-20	10:50	S	8.87	1.55	0.001 U	0.0079	0.17	0.0163	0.35			1	2	1 U	5	108.5	18.4	1.4	53	51	2.3	8.0 J	8.1	109.2	6.1	70	10
BDSW-04	26-May-20	11:10	S	72.8		0.001 U	0.0001 U	0.02	0.0013	0.23	0.07					1	178.1	4.6	0.5	13.6				7.3	34.9	6.0		10 U
BDSW-03	26-May-20	11:45	S	87.8		0.001 U	0.0012	0.26	0.0026	0.56			1 U	2	1 U	2	429.4	6.9	0.7	19	21	2.8	7.5 J	7.2	48.9	6.2	35	10 U
BDSW-01	26-May-20	14:10	S			0.001 U	0.0020		0.0085				1 U	2	1 U	2		6.9	0.8	20	21	3.3	7.6 J	7.2	48.0	8.4	35	10 U
BDSW-04	26-May-20	15:40	96															4.6	0.5 U	13.4				7.0	34.4	7.5		
BDSW-03	26-May-20	16:00	96															6.6	0.6	19.1				7.2	46.3	7.8		
BDSW-03 D	26-May-20	16:10	96															6.7	0.6	19.4								
BDSW-03 B	26-May-20	16:20	96															0.5 U	0.5 U	0.5								
BDSW-01	26-May-20	17:20	96															6.8	0.7	20.1				7.6	47.7	9.4		
BDSW-C	26-May-20	17:30				0.005	0.0560		0.0032									0.5 U	0.5 U	0.5 U								
BDSW-04	27-May-20	9:20	96															4.8	0.5	14.2				7.0	31.5	4.6		
BDSW-03	27-May-20	9:40	96															6.4	0.7	18.7				7.2	42.6	4.9		
BDSW-01	27-May-20	11:00	96															5.9	0.7	17.6				7.3	43.3	6.9		
BDSW-04	27-May-20	16:40	96															4	0.5 U	12				7.0	30.9	8.9		
BDSW-03	27-May-20	17:00	96															6.2	0.6	18.3				7.2	42.8	9.1		
BDSW-03 D	27-May-20	17:10	96															7.2	0.7	20.8								
BDSW-03 B	27-May-20	17:20	96															0.5 U	0.5 U	0.5								
BDSW-01	27-May-20	18:40	96															6.1	0.7	18.2				7.3	43.1	10.6		
BDSW-04	28-May-20	9:40	96															5.6	0.5	16.1				7.0	26.7	8.1		
BDSW-03	28-May-20	10:00	96															5.5	0.6	16.1				7.1	44.8	8.3		
BDSW-01	28-May-20	11:50	96															5.5	0.7	16.4				7.5	39.4	10.2		
BDSW-04	28-May-20	14:50	96															5.8	0.5	16.5				7.0	28.9	9.5		
BDSW-03	28-May-20	15:10	96															7.9	0.6	22.4				7.1	49.4	9.5		
BDSW-03 D	28-May-20	15:20	96															7.6	0.6	21.7								
BDSW-03 B	28-May-20	15:30	96															1.9	0.5 U	4.9								
BDSW-01	28-May-20	16:40	96															7	0.7	20.3				7.3	39.9	11.0		
BDSW-C	28-May-20	16:50				0.004	0.0555		0.0029									0.5 U	0.5 U	0.5 U								
BDSW-03	17-Jun-20	2:51	STRM			0.001 U	0.0010		0.0025									6	0.7	17.8				7.2	70.0	14.5		
BDSW-03	17-Jun-20	4:51	STRM			0.001 U	0.0010		0.0024									5.9	0.7	17.5				7.2	94.0	14.5		
BDSW-03	17-Jun-20	6:51	STRM			0.001 U	0.0010		0.0024									6	0.7	17.8				7.2	96.0	14.8		
BDSW-03	17-Jun-20	8:51	STRM			0.001 U	0.0010		0.0023									6.1	0.7	18				7.2	96.0	14.8		
BDSW-03	17-Jun-20	10:51	STRM			0.001 U	0.0011		0.0025									6.1	0.7	18.2				7.3	97.0	14.9		
BDSW-03	17-Jun-20	12:51	STRM			0.001 U	0.0011		0.0024									6	0.7	17.8				7.3	94.0	14.9		

Table 2-2f: 2020 Surface Water Sampling Summary Tables / Total Constituents / Bucktail and Big Deer Creek (Date Sorted)

Sampling Location[1]	Date	Time	Event[2]	Flow (cfs)	Staff Gauge Water Level (ft)	Total[3,4,5]																						
						Arsenic	Cobalt		Copper		Iron	Manganese	Potassium	Sodium	Chloride	Sulfate		Calcium	Magnesium	Hardness	Alkalinity	DOC	pH-Lab	pH-Field	Cond.	Temp.	TDS	TSS
						Conc. (mg/L) Cleanup Level = 0.01 mg/L[6]	Conc. (mg/L)	Load (kg/day)	Conc. (mg/L)	Load (kg/day)	Conc. (mg/L)	Conc. (mg/L)	Conc. (mg/L)	Conc. (mg/L)	Conc. (mg/L)	Conc. (mg/L)	Load (kg/day)	Conc. (mg/L)	Conc. (mg/L)	Conc. (mg $CaCO_3$/L)	Conc. (mg/L)	Conc. (mg/L)	pH Unit	pH Unit	(uS/cm)	(deg C)	Conc. (mg/L)	Conc. (mg/L)
BDSW-03	17-Jun-20	14:51	STRM			0.001 U	0.0011		0.0024									6.4	0.8	19				7.3	93.0	14.9		
BDSW-03	17-Jun-20	16:51	STRM			0.001 U	0.0011		0.0023									6.3	0.7	18.7				7.4	93.0	14.9		
BDSW-03	17-Jun-20	18:51	STRM			0.001 U	0.0010		0.0023									6.4	0.7	19.1				7.3	92.0	14.9		
BDSW-03	17-Jun-20	20:51	STRM			0.001 U	0.0010		0.0022									6.1	0.7	18.2				7.4	93.0	15.0		
BDSW-03	17-Jun-20	22:51	STRM			0.001 U	0.0011		0.0145									6.2	0.7	18.4				7.4	94.0	15.0		
BDSW-03	18-Jun-20	0:51	STRM			0.001 U	0.0010		0.0020									6.2	0.7	18.5				7.4	95.0	15.0		
BT-SEEP	9-Sep-20	9:40	S	0.00081		0.074	1.27	0.00	2.27 J+	0.00	35.1					86	0.2	33.5 J+	12.4	135				7.6	262.3	6.0		814
BTSW-01.6	9-Sep-20	10:00	S	0.070		0.003	0.0853	0.01	0.0762	0.01	0.03 U					101	17.3	52	8.4	165				7.6	313.5	2.8		10 U
BTSW-01	9-Sep-20	10:25	S	0.21	0.37	0.003	0.1990	0.10	0.0454	0.02	0.03					36	18.5	18.8	5.1	68				7.6	167.9	3.1		10 U
SFSW-04	9-Sep-20	10:45	S	2.02		0.001 U	0.0001 U	0.00	0.0004 U	0.00	0.03 U					6	29.7	29.6	2	82				7.9	170.1	3.6		10 U
SFSW-02	9-Sep-20	11:10	S			0.001 U	0.0151		0.0093				2	3	1 U	9		28.3	2.4	76	74	0.9	8.1 J	7.9	166.5	4.0	112	10 U
SFSW-01	9-Sep-20	11:30	S	2.74	2.14	0.001 U	0.0145	0.10	0.0167	0.11			2	3	1 U	10	67.0	28.3	2.4	77	77	1	8.0 J	7.9	167.3	4.1	104	10 U
BDSW-04	9-Sep-20	11:50	S	8.09		0.001 U	0.0001 U	0.00	0.0004 U	0.01	0.03 U					3	59.4	10.2	1.3	30.7				7.4	38.3	3.4		10 U
BDSW-03	9-Sep-20	12:20	S	11.7	1.00	0.001 U	0.0028	0.08	0.0030	0.09			1	4	1 U	4	114.7	14.1	1.6	39	42	1.5	7.8 J	7.5	43.2	3.7	69	10 U
BDSW-03 D	9-Sep-20	12:30	S			0.001 U	0.0029		0.0029				1	4	1 U	4		14.2	1.5	39	42	1.4	7.7 J				68	10 U
BDSW-03 B	9-Sep-20	12:40	S			0.001 U	0.0001 U		0.0004 U				1 U	1 U	1 U	1 U		0.5 U	0.5 U	1 U	4 U	0.5 U	5.8 J				10 U	10 U
BDSW-01	9-Sep-20	14:30	S			0.001 U	0.0019		0.0040				1	4	1 U	5		14	1.7	41	44	1.4	7.9 J	7.5	51.4	6.8	67	10 U
BDSW-04	21-Sep-20	9:45	96			0.001 U	0.0001 U		0.0008 U									10.2	1.3	30.9				7.4	75.7	7.8		
BDSW-03	21-Sep-20	10:05	96		1.03	0.001 U	0.0027		0.0027 J+									13.7	1.6	40.6				7.5	95.1	7.0		
BDSW-01	21-Sep-20	11:25	96			0.001 U	0.0019		0.0041 J+									13.8	1.7	41.5				7.4	99.2	7.6		
BDSW-03	21-Sep-20	15:30	96		1.02													13.6	1.5	40.1				7.7	94.4	7.9		
BDSW-03 D	21-Sep-20	15:40	96															13.4	1.5	39.6								
BDSW-03 B	21-Sep-20	15:50	96															0.5 U	0.5 U	0.5 U								
BDSW-01	21-Sep-20	17:00	96															13.7	1.7	41				7.6	103.4	10.9		
BDSW-03	22-Sep-20	9:55	96		0.99													13.7	1.6	40.7				7.6	95.9	7.1		
BDSW-01	22-Sep-20	11:00	96															13.7	1.7	41.1				7.7	100.4	8.0		
BDSW-03	22-Sep-20	13:20	96		0.95													13.6	1.5	40.2				7.9	96.0	7.1		
BDSW-03 D	22-Sep-20	13:30	96															13.8	1.5	40.6								
BDSW-03 B	22-Sep-20	13:40	96															0.5 U	0.5 U	0.5 U								
BDSW-01	22-Sep-20	16:20	96															13.5	1.7	40.5				7.9	100.4	10.3		
BDSW-03	23-Sep-20	9:50	96		0.98													13.4	1.5	39.8				7.7	96.4	7.6		
BDSW-01	23-Sep-20	11:05	96															13.7	1.7	41.2				7.9	100.5	8.5		
BDSW-03	23-Sep-20	14:25	96		0.98													13.4	1.5	39.9				7.7	91.3	10.1		
BDSW-03 D	23-Sep-20	14:35	96															13.5	1.5	40.1								
BDSW-03 B	23-Sep-20	14:45	96															0.5 U	0.5 U	0.5 U								
BDSW-01	23-Sep-20	17:00	96															13.6	1.7	41				7.8	100.5	10.4		
BDSW-03	24-Sep-20	9:40	96		0.97													13.8	1.6	40.9				7.8	97.1	7.9		
BDSW-01	24-Sep-20	10:55	96															13.8	1.7	41.3				7.7	101.2	8.4		
SFSW-04	24-Sep-20	12:50	96	2.20														28	1.9	77.9				8.2	162.9	7.8		
SFSW-01	24-Sep-20	13:15	96	2.33														26.6	2.3	76.2				8.3	165.8	8.5		
BDSW-03	24-Sep-20	14:05	96	9.60	0.97													13.6	1.5	40.2				7.8	96.4	9.6		
BDSW-03 D	24-Sep-20	14:15	96															13.6	1.5	40.3								
BDSW-03 B	24-Sep-20	14:25	96															0.5 U	0.5 U	0.5 U								
BDSW-01	24-Sep-20	16:10	96															13.6	1.6	40.7				7.8	102.1	10.2		

Table 2-2f: 2020 Surface Water Sampling Summary Tables / Total Constituents / Bucktail and Big Deer Creek (Date Sorted)

Sampling Location[1]	Date	Time	Event[2]	Flow (cfs)	Staff Gauge Water Level (ft)	Total[3,4,5]																						
						Arsenic	Cobalt		Copper		Iron	Manganese	Potassium	Sodium	Chloride	Sulfate		Calcium	Magnesium	Hardness	Alkalinity	DOC	pH-Lab	pH-Field	Cond.	Temp.	TDS	TSS
						Conc. (mg/L) Cleanup Level = 0.01 mg/L[6]	Conc. (mg/L)	Load (kg/day)	Conc. (mg/L)	Load (kg/day)	Conc. (mg/L)	Conc. (mg/L)	Conc. (mg/L)	Conc. (mg/L)	Conc. (mg/L)	Conc. (mg/L)	Load (kg/day)	Conc. (mg/L)	Conc. (mg/L)	Conc. (mg $CaCO_3$/L)	Conc. (mg/L)	Conc. (mg/L)	pH Unit	pH Unit	(uS/cm)	(deg C)	Conc. (mg/L)	Conc. (mg/L)
BDSW-C	24-Sep-20	16:20				0.004	0.0520		0.0031									0.5 U	0.5 U	0.5 U								
BT-SEEP	28-Sep-20	9:00	S	0.00041		0.003	0.8140	0.00	0.5060	0.00	0.94					87	0.1	31.8	7.8	112				7.7	253.7	10.0		1020
BTSW-01.6	28-Sep-20	9:20	S	0.056		0.003	0.0867	0.01	0.0813	0.01	0.03 U					101	13.8	48	8.3	154				7.6	336.5	7.1		10 U
BTSW-01	28-Sep-20	9:45	S	0.22	0.38	0.004	0.1360	0.07	0.0717	0.04	0.16					35	18.8	16.6	5	62				8.1	162.0	8.6		10 U
SFSW-04	28-Sep-20	10:10	S	2.08		0.001 U	0.0002	0.00	0.0004	0.00	0.03 U					7	35.6	26.9	2	75.4				8.2	162.8	7.8		10 U
SFSW-02	28-Sep-20	10:40	S			0.001 U	0.0140		0.0126				2	3	1 U	10		25.6	2.4	77	77	1.1	8.1 J	8.2	163.3	8.2	105	10 U
SFSW-01	28-Sep-20	11:00	S	2.27		0.001 U	0.0134	0.07	0.0179	0.10			2	3	1 U	10	55.5	25.1	2.4	76	78	1.1	8.1 J	8.3	163.7	8.1	103	10 U
BDSW-04	28-Sep-20	11:30	S	7.73		0.001 U	0.0001 U	0.00	0.0014	0.03	0.03 U					3	56.7	9.3	1.3	28.8				7.6	76.8	8.9		10 U
BDSW-03	28-Sep-20	12:00	S	9.22	0.98	0.001 U	0.0029	0.07	0.0037	0.08			1	4	1 U	5	112.8	14.2	1.6	40	43	1.5	7.8 J	7.7	87.3	9.1	75	10 U
BDSW-03 D	28-Sep-20	12:10	S			0.001 U	0.0028		0.0038				1	4	1 U	5		13.9	1.6	40	43	1.5	7.8 J				75	10 U
BDSW-03 B	28-Sep-20	12:20	S			0.001 U	0.0001 U		0.0004 U				1 U	1 U	1 U	1 U		0.5 U	0.5 U	1 U	4 U	0.5 U	5.8 J				10 U	10 U
BDSW-01	28-Sep-20	14:30	S			0.001 U	0.0019		0.0051				1	4	1 U	5		14.1	1.7	40	45	1.3	7.9 J	7.8	101.9	10.3	69	10 U

Notes:

1. Sample Codes:
   - Sample names with a 'B' flag are blank samples.
   - Sample names with a 'D' flag are duplicate samples.
   - Sample names with a 'C' suffix are control standards.
2. Event codes:
   - "96": 96-hr sampling events
   - "S": Synoptic sampling events
   - "96/S": Synoptic event sampled concurrently with 96-hr event
   - "INV": Investigational sampling event
   - "STRM": Storm sampling events at automated sampler locations.
3. The dissolved concentrations of some metals (i.e. cobalt) are often higher than the total concentrations.
   This is likely due to the fact that the metals are present almost entirely in the dissolved form and the lower total metals are due to matrix effects.
4. Qualifiers:
   - U - Concentration below reporting limits.
   - J - The result is an estimated quantity due to a quality control deficiency.
   - J+ - The result is an estimated quantity, but the result may be biased high.
5. Loading Calculations:
   - Load (Kg/day) = Flow (cfs) * Conc. (mg/L)* Load Conversion
   - Load Conversion = 2.4466
6. There were no exceedances of the EPA cleanup level for total arsenic of 0.010 mg/L (South Fork Big Deer and Big Deer Creeks).

Table 2-2g: 2020 Surface Water Sampling Summary Tables / Dissolved Constituents / Bucktail and Big Deer Creek (Location Sorted)

Sampling Location[1]	Date	Time	Event[2]	Cu IWQS Acute (CMC)[3] mg/L	Cu IWQS Chronic (CCC)[3] mg/L	Flow (cfs)	Staff Gauge Water Level (ft)	Dissolved[4,5,6]						
								Arsenic	Cobalt		Copper[8]		Iron	Manganese
								Conc. (mg/L)	Conc. (mg/L) Cleanup Level = 0.086 mg/L[7]	Load (kg/day)	Conc. (mg/L)	Load (kg/day)	Conc. (mg/L)	Conc. (mg/L)
BDSW-01	4-May-20	11:10	96	0.0046	0.0035						0.0056			
BDSW-01	4-May-20	16:00	96	0.0046	0.0035						0.0058			
BDSW-01	5-May-20	11:10	96	0.0046	0.0035						0.0053			
BDSW-01	5-May-20	17:30	96/S	0.0046	0.0035			0.001 U	0.0012		0.0055			
BDSW-01	6-May-20	11:15	96	0.0046	0.0035						0.0056			
BDSW-01	6-May-20	16:00	96	0.0046	0.0035						0.0056			
BDSW-01	7-May-20	10:55	96	0.0046	0.0035						0.0052			
BDSW-01	7-May-20	15:50	96	0.0046	0.0035			0.001 U	0.0011		0.0053			
BDSW-01	25-May-20	11:20	96	0.0046	0.0035						0.0042			
BDSW-01	25-May-20	15:00	96	0.0046	0.0035						0.0046			
BDSW-01	26-May-20	14:10	S	0.0046	0.0035			0.001 U	0.0014		0.0044			
BDSW-01	26-May-20	17:20	96	0.0046	0.0035						0.0045			
BDSW-01	27-May-20	11:00	96	0.0046	0.0035						0.0052			
BDSW-01	27-May-20	18:40	96	0.0046	0.0035						0.0046			
BDSW-01	28-May-20	11:50	96	0.0046	0.0035						0.0045			
BDSW-01	28-May-20	16:40	96	0.0046	0.0035						0.0045			
BDSW-01	9-Sep-20	14:30	S	0.0073	0.0053			0.001 U	0.0025		0.0030			
BDSW-01	21-Sep-20	11:25	96	0.0074	0.0054			0.001 U	0.0019		0.0035			
BDSW-01	21-Sep-20	17:00	96	0.0073	0.0053						0.0037			
BDSW-01	22-Sep-20	11:00	96	0.0074	0.0053						0.0033			
BDSW-01	22-Sep-20	16:20	96	0.0073	0.0052						0.0035			
BDSW-01	23-Sep-20	11:05	96	0.0074	0.0053						0.0033			
BDSW-01	23-Sep-20	17:00	96	0.0073	0.0053						0.0035			
BDSW-01	24-Sep-20	10:55	96	0.0074	0.0053						0.0035			
BDSW-01	24-Sep-20	16:10	96	0.0073	0.0053						0.0040			
BDSW-01	28-Sep-20	14:30	S	0.0072	0.0052			0.001 U	0.0018		0.0045			
BDSW-03	4-May-20	9:40	96	0.0046	0.0035						0.0014			
BDSW-03	4-May-20	14:30	96	0.0046	0.0035						0.0014			
BDSW-03 D	4-May-20	14:40	96	0.0046	0.0035						0.0014			
BDSW-03 B	4-May-20	14:50	96								0.0003 U			
BDSW-03	5-May-20	9:40	96	0.0046	0.0035						0.0014			
BDSW-03	5-May-20	15:20	96/S	0.0046	0.0035	66.5		0.001 U	0.0008	0.1	0.0014	0.2		
BDSW-03 D	5-May-20	15:30	96/S	0.0046	0.0035			0.001 U	0.0009		0.0014			
BDSW-03 B	5-May-20	15:40	96/S					0.001 U	0.0001 U		0.0003 U			
BDSW-03	6-May-20	9:45	96	0.0046	0.0035						0.0015			
BDSW-03	6-May-20	14:30	96	0.0046	0.0035						0.0018			
BDSW-03 D	6-May-20	14:40	96	0.0046	0.0035						0.0018			
BDSW-03 B	6-May-20	14:50	96								0.0003 U			
BDSW-03	7-May-20	9:20	96	0.0046	0.0035						0.0015			
BDSW-03	7-May-20	13:20	96	0.0046	0.0035			0.001 U	0.0009		0.0015			
BDSW-03 D	7-May-20	13:30	96	0.0046	0.0035			0.001 U	0.0009		0.0015			
BDSW-03 B	7-May-20	13:40	96					0.001 U	0.0001 U		0.0003 U			
BDSW-03	7-May-20	14:05	INV	0.0046	0.0035	66.8		0.001 U	0.0007	0.1	0.0013	0.2		
BDSW-03	25-May-20	10:00	96	0.0046	0.0035						0.0017			
BDSW-03	25-May-20	13:20	96	0.0046	0.0035						0.0018			
BDSW-03 D	25-May-20	13:30	96	0.0046	0.0035						0.0018			
BDSW-03 B	25-May-20	13:40	96								0.0003 U			
BDSW-03	26-May-20	11:45	S	0.0046	0.0035	87.8		0.001 U	0.0011	0.2	0.0018	0.4		
BDSW-03	26-May-20	16:00	96	0.0046	0.0035						0.0018			

Table 2-2g: 2020 Surface Water Sampling Summary Tables / Dissolved Constituents / Bucktail and Big Deer Creek (Location Sorted)

Sampling Location[1]	Date	Time	Event[2]	Cu IWQS Acute (CMC)[3] mg/L	Cu IWQS Chronic (CCC)[3] mg/L	Flow (cfs)	Staff Gauge Water Level (ft)	Dissolved[4,5,6]						
								Arsenic	Cobalt		Copper[8]		Iron	Manganese
								Conc. (mg/L)	Conc. (mg/L) Cleanup Level = 0.086 mg/L[7]	Load (kg/day)	Conc. (mg/L)	Load (kg/day)	Conc. (mg/L)	Conc. (mg/L)
BDSW-03 D	26-May-20	16:10	96	0.0046	0.0035						0.0017			
BDSW-03 B	26-May-20	16:20	96								0.0003 U			
BDSW-03	27-May-20	9:40	96	0.0046	0.0035						0.0016 J+			
BDSW-03	27-May-20	17:00	96	0.0046	0.0035						0.0017 J+			
BDSW-03 D	27-May-20	17:10	96	0.0046	0.0035						0.0016 J+			
BDSW-03 B	27-May-20	17:20	96								0.0003 U			
BDSW-03	28-May-20	10:00	96	0.0046	0.0035						0.0016 J+			
BDSW-03	28-May-20	15:10	96	0.0046	0.0035						0.0017 J+			
BDSW-03 D	28-May-20	15:20	96	0.0046	0.0035						0.0017 J+			
BDSW-03 B	28-May-20	15:30	96								0.0003 U			
BDSW-03	17-Jun-20	2:51	STRM	0.0046	0.0035			0.001 U	0.0049		0.0039			
BDSW-03	17-Jun-20	4:51	STRM	0.0046	0.0035			0.001 U	0.0012		0.0022			
BDSW-03	17-Jun-20	6:51	STRM	0.0046	0.0035			0.001 U	0.0011		0.0021			
BDSW-03	17-Jun-20	8:51	STRM	0.0046	0.0035			0.001 U	0.0011		0.0021			
BDSW-03	17-Jun-20	10:51	STRM	0.0046	0.0035			0.001 U	0.0011		0.0023			
BDSW-03	17-Jun-20	12:51	STRM	0.0046	0.0035			0.001 U	0.0011		0.0022			
BDSW-03	17-Jun-20	14:51	STRM	0.0046	0.0035			0.001 U	0.0012		0.0024			
BDSW-03	17-Jun-20	16:51	STRM	0.0046	0.0035			0.001 U	0.0011		0.0021			
BDSW-03	17-Jun-20	18:51	STRM	0.0046	0.0035			0.001 U	0.0011		0.0020			
BDSW-03	17-Jun-20	20:51	STRM	0.0046	0.0035			0.001 U	0.0011		0.0020			
BDSW-03	17-Jun-20	22:51	STRM	0.0046	0.0035			0.001 U	0.0010		0.0019			
BDSW-03	18-Jun-20	0:51	STRM	0.0046	0.0035			0.001 U	0.0011		0.0019			
BDSW-03	9-Sep-20	12:20	S	0.0070	0.0051	11.7	1.00	0.001 U	0.0036	0.1	0.0022	0.1		
BDSW-03 D	9-Sep-20	12:30	S	0.0070	0.0051			0.001 U	0.0033		0.0023			
BDSW-03 B	9-Sep-20	12:40	S					0.001 U	0.0002		0.0004 U			
BDSW-03	21-Sep-20	10:05	96	0.0073	0.0053		1.03	0.001 U	0.0027		0.0024			
BDSW-03	21-Sep-20	15:30	96	0.0072	0.0052		1.02				0.0025			
BDSW-03 D	21-Sep-20	15:40	96	0.0071	0.0051						0.0025			
BDSW-03 B	21-Sep-20	15:50	96								0.0003 U			
BDSW-03	22-Sep-20	9:55	96	0.0073	0.0053		0.99				0.0024			
BDSW-03	22-Sep-20	13:20	96	0.0072	0.0052		0.95				0.0068 J			
BDSW-03 D	22-Sep-20	13:30	96	0.0073	0.0053						0.0025 J			
BDSW-03 B	22-Sep-20	13:40	96								0.0003 U			
BDSW-03	23-Sep-20	9:50	96	0.0071	0.0052		0.98				0.0034			
BDSW-03	23-Sep-20	14:25	96	0.0072	0.0052		0.98				0.0026			
BDSW-03 D	23-Sep-20	14:35	96	0.0072	0.0052						0.0028			
BDSW-03 B	23-Sep-20	14:45	96								0.0003 U			
BDSW-03	24-Sep-20	9:40	96	0.0073	0.0053		0.97				0.0028			
BDSW-03	24-Sep-20	14:05	96	0.0072	0.0052	9.60	0.97				0.0029			
BDSW-03 D	24-Sep-20	14:15	96	0.0072	0.0052						0.0029			
BDSW-03 B	24-Sep-20	14:25	96								0.0003 U			
BDSW-03	28-Sep-20	12:00	S	0.0072	0.0052	9.22	0.98	0.001 U	0.0028	0.1	0.0029	0.1		
BDSW-03 D	28-Sep-20	12:10	S	0.0072	0.0052			0.001 U	0.0027		0.0030			
BDSW-03 B	28-Sep-20	12:20	S					0.001 U	0.0001 U		0.0003 U			
BDSW-03+200	7-May-20	13:50	INV	0.0046	0.0035			0.001 U	0.0007		0.0014			
BDSW-03-1425	7-May-20	15:00	INV	0.0046	0.0035			0.001 U	0.0009		0.0031			
BDSW-03-200	7-May-20	14:30	INV	0.0046	0.0035			0.001 U	0.0008		0.0024			

Table 2-2g: 2020 Surface Water Sampling Summary Tables / Dissolved Constituents / Bucktail and Big Deer Creek (Location Sorted)

Sampling Location[1]	Date	Time	Event[2]	Cu IWQS Acute (CMC)[3] mg/L	Cu IWQS Chronic (CCC)[3] mg/L	Flow (cfs)	Staff Gauge Water Level (ft)	Dissolved[4,5,6]						
								Arsenic	Cobalt		Copper[8]		Iron	Manganese
								Conc. (mg/L)	Conc. (mg/L) Cleanup Level = 0.086 mg/L[7]	Load (kg/day)	Conc. (mg/L)	Load (kg/day)	Conc. (mg/L)	Conc. (mg/L)
BDSW-04	4-May-20	9:25	96	0.0046	0.0035						0.0005			
BDSW-04	4-May-20	14:10	96	0.0046	0.0035						0.0005			
BDSW-04	5-May-20	9:20	96	0.0046	0.0035						0.0004			
BDSW-04	5-May-20	14:40	96/S	0.0046	0.0035	56.7		0.001 U	0.0001 U	0.0	0.0004	0.1	0.06	
BDSW-04	6-May-20	9:25	96	0.0046	0.0035						0.0006			
BDSW-04	6-May-20	14:10	96	0.0046	0.0035						0.0007			
BDSW-04	7-May-20	9:00	96	0.0046	0.0035						0.0005			
BDSW-04	7-May-20	13:00	96	0.0046	0.0035			0.001 U	0.0001 U		0.0005			
BDSW-04	25-May-20	9:40	96	0.0046	0.0035						0.0003			
BDSW-04	25-May-20	13:00	96	0.0046	0.0035						0.0003			
BDSW-04	26-May-20	11:10	S	0.0046	0.0035	72.8		0.001 U	0.0001	0.0	0.0003 U	0.1	0.03 U	
BDSW-04	26-May-20	15:40	96	0.0046	0.0035						0.0003 U			
BDSW-04	27-May-20	9:20	96	0.0046	0.0035						0.0005			
BDSW-04	27-May-20	16:40	96	0.0046	0.0035						0.0003 J+			
BDSW-04	28-May-20	9:40	96	0.0046	0.0035						0.0003 J+			
BDSW-04	28-May-20	14:50	96	0.0046	0.0035						0.0003 J+			
BDSW-04	9-Sep-20	11:50	S	0.0056	0.0041	8.09		0.001 U	0.0001 U	0.0	0.0003 U	0.0	0.03 U	
BDSW-04	21-Sep-20	9:45	96	0.0056	0.0042			0.001 U	0.0001		0.0003 U			
BDSW-04	28-Sep-20	11:30	S	0.0053	0.0039	7.73		0.001 U	0.0001 U	0.0	0.0004 U	0.0	0.03 U	
BDSW-C	5-May-20	17:40						0.003	0.0043		0.0042			
BDSW-C	7-May-20	16:00						0.005	0.0558		0.0031			
BDSW-C	26-May-20	17:30						0.005	0.0527		0.0029			
BDSW-C	28-May-20	16:50						0.005	0.0548		0.0030			
BDSW-C	24-Sep-20	16:20						0.004	0.0502		0.0030			
BT-SEEP	9-Sep-20	9:40	S			0.00081		0.001	0.8110	0.0	0.1120	0.0	0.03 U	
BT-SEEP	28-Sep-20	9:00	S			0.00041		0.001 U	0.8410	0.0	0.4120	0.0	0.03 U	
BTSW-01	5-May-20	13:00	S			0.38	0.47	0.003	0.1110	0.1	0.0439	0.0	0.03 U	
BTSW-01	26-May-20	9:55	S			0.77	0.59	0.003	0.0848	0.2	0.0468	0.1	0.04	
BTSW-01	9-Sep-20	10:25	S			0.21	0.37	0.002	0.1390	0.1	0.0374	0.0	0.03 U	
BTSW-01	28-Sep-20	9:45	S			0.22	0.38	0.003	0.1330	0.1	0.0422	0.0	0.03 U	
BTSW-01.6	5-May-20	12:40	S			0.0351		0.003	0.0965	0.0	0.0690	0.0	0.03 U	
BTSW-01.6	26-May-20	9:30	S			0.097		0.005	0.0824	0.0	0.0638	0.0	0.03 U	
BTSW-01.6	9-Sep-20	10:00	S			0.070		0.003	0.0866	0.0	0.0689	0.0	0.03 U	
BTSW-01.6	28-Sep-20	9:20	S			0.056		0.003	0.0874	0.0	0.0813	0.0	0.03 U	
SFSW-01	5-May-20	14:10	S	0.0122	0.0084	3.41	1.18	0.001 U	0.0110	0.1	0.0119	0.1		
SFSW-01	26-May-20	10:50	S	0.0094	0.0066	8.87	1.55	0.001 U	0.0070	0.2	0.0080	0.2		
SFSW-01	9-Sep-20	11:30	S	0.0133	0.0091	2.74	2.14	0.001 U	0.0154	0.1	0.0103	0.1		
SFSW-01	24-Sep-20	13:15	96	0.0132	0.0090	2.33					0.0149	0.1		
SFSW-01	28-Sep-20	11:00	S	0.0131	0.0090	2.27		0.001 U	0.0135	0.1	0.0134	0.1		
SFSW-02	5-May-20	13:40	S	0.0122	0.0084			0.001 U	0.0111		0.0085			
SFSW-02	26-May-20	10:35	S	0.0094	0.0066			0.001 U	0.0063		0.0053			
SFSW-02	9-Sep-20	11:10	S	0.0131	0.0090			0.001 U	0.0155		0.0076			
SFSW-02	28-Sep-20	10:40	S	0.0133	0.0091			0.001 U	0.0140		0.0097			

Table 2-2g: 2020 Surface Water Sampling Summary Tables / Dissolved Constituents / Bucktail and Big Deer Creek (Location Sorted)

Sampling Location[1]	Date	Time	Event[2]	Cu IWQS Acute (CMC)[3] mg/L	Cu IWQS Chronic (CCC)[3] mg/L	Flow (cfs)	Staff Gauge Water Level (ft)	Dissolved[4,5,6]						
								Arsenic	Cobalt		Copper[8]		Iron	Manganese
								Conc. (mg/L)	Conc. (mg/L) Cleanup Level = 0.086 mg/L[7]	Load (kg/day)	Conc. (mg/L)	Load (kg/day)	Conc. (mg/L)	Conc. (mg/L)
SFSW-04	5-May-20	13:20	S	0.0122	0.0084	3.04		0.001 U	0.0001 U	0.0	0.0003 U	0.0	0.03 U	
SFSW-04	26-May-20	10:15	S	0.0091	0.0064	8.39		0.001 U	0.0001	0.0	0.0003 U	0.0	0.03 U	
SFSW-04	9-Sep-20	10:45	S	0.0141	0.0096	2.02		0.001 U	0.0007	0.0	0.0003 U	0.0	0.03 U	
SFSW-04	24-Sep-20	12:50	96	0.0134	0.0092	2.20					0.0003 U	0.0		
SFSW-04	28-Sep-20	10:10	S	0.0130	0.0089	2.08		0.001 U	0.0002 J+	0.0	0.0004 U	0.0	0.03 U	
SFSW-C	8-May-20	18:00						0.004	0.0045		0.0046			
SFSW-C	10-May-20	11:40						0.005	0.0530		0.0033			

Notes:

1. Sample Codes:
   - Sample names with a 'B' flag are blank samples.
   - Sample names with a 'D' flag are duplicate samples.
   - Sample names with a 'C' suffix are control standards.
2. Event codes:
   - "96": 96-hr sampling events
   - "S": Synoptic sampling events
   - "96/S": Synoptic event sampled concurrently with 96-hr event
   - "INV": Investigational sampling event
   - "STRM": Storm sampling events at automated sampler locations.
3. Copper Idaho Water Quality Standards (Cu IWQS) calculated using hardness based formulas:
   - Acute Cu IWQS (CMC) µg/L = e((0.9422*ln(hardness))-1.464)*0.96
   - Chronic Cu IWQS (CCC) µg/L = e((0.8545*ln(hardness))-1.465)*0.96
4. The dissolved concentrations of some metals (i.e. cobalt) are often higher than the total concentrations.
   This is likely due to the fact that the metals are present almost entirely in the dissolved form and the lower total metals are due to matrix effects.
5. Qualifiers:
   - U - Concentration below reporting limits.
   - UJ - Concentration is below reporting limit, but is an estimated quantity.
   - J - The result is an estimated quantity due to a quality control deficiency.
   - J+ - The result is an estimated quantity, but the result may be biased high.
6. Loading Calculations:
   - Load (Kg/day) = Flow (cfs) * Conc. (mg/L)* Load Conversion
   - Load Conversion = 2.4466
7. There were no exceedances of the dissolved cobalt surface water quality cleanup level = 0.086 mg/L (South Fork Big Deer and Big Deer Creeks).
8. Light green shaded cells indicate exceedances of the dissolved copper CCC and CMC. Light purple shaded cells indicate exceedance of the dissolved copper CCC only.

Table 2-2h: 2020 Surface Water Sampling Summary Tables / Total Constituents / Bucktail and Big Deer Creek (Location Sorted)

Sampling Location[1]	Date	Time	Event[2]	Flow (cfs)	Staff Gauge Water Level (ft)	Total[3,4,5]																						
						Arsenic	Cobalt		Copper		Iron	Manganese	Potassium	Sodium	Chloride	Sulfate		Calcium	Magnesium	Hardness	Alkalinity	DOC	pH-Lab	pH-Field	Cond.	Temp.	TDS	TSS
						Conc. (mg/L) Cleanup Level = 0.01 mg/L[6]	Conc. (mg/L)	Load (kg/day)	Conc. (mg/L)	Load (kg/day)	Conc. (mg/L)	Conc. (mg/L)	Conc. (mg/L)	Conc. (mg/L)	Conc. (mg/L)	Conc. (mg/L)	Load (kg/day)	Conc. (mg/L)	Conc. (mg/L)	Conc. (mg $CaCO_3$/L)	Conc. (mg/L)	Conc. (mg/L)	pH Unit	pH Unit	(uS/cm)	(deg C)	Conc. (mg/L)	Conc. (mg/L)
BDSW-01	4-May-20	11:10	96															6.2	0.8	18.9				7.1	47.4	4.4		
BDSW-01	4-May-20	16:00	96															6.2	0.8	18.9				7.3	47.4	7.8		
BDSW-01	5-May-20	11:10	96															6.6	0.9	20				7.2	49.6	4.4		
BDSW-01	5-May-20	17:30	96/S			0.001 U	0.0015		0.0070				1 U	3	1 U	2		6.5	0.9	19	21	4	7.5 J	7.4	49.3	7.8	48	10 U
BDSW-01	6-May-20	11:15	96															5.7	0.8	17.5				7.3	48.0	5.7		
BDSW-01	6-May-20	16:00	96															5.5	0.8	16.9				7.5	49.4	6.2		
BDSW-01	7-May-20	10:55	96															5.6	0.8	17				7.3	48.8	3.8		
BDSW-01	7-May-20	15:50	96			0.001 U	0.0013		0.0067									5.6	0.8	17.3				7.4	49.8	7.1		
BDSW-01	25-May-20	11:20	96															6.6	0.8	20				7.4	50.0	6.0		
BDSW-01	25-May-20	15:00	96															7.7	0.8	22.4				7.4	60.1	9.5		
BDSW-01	26-May-20	14:10	S			0.001 U	0.0020		0.0085				1 U	2	1 U	2		6.9	0.8	20	21	3.3	7.6 J	7.2	48.0	8.4	35	10 U
BDSW-01	26-May-20	17:20	96															6.8	0.7	20.1				7.6	47.7	9.4		
BDSW-01	27-May-20	11:00	96															5.9	0.7	17.6				7.3	43.3	6.9		
BDSW-01	27-May-20	18:40	96															6.1	0.7	18.2				7.3	43.1	10.6		
BDSW-01	28-May-20	11:50	96															5.5	0.7	16.4				7.5	39.4	10.2		
BDSW-01	28-May-20	16:40	96															7	0.7	20.3				7.3	39.9	11.0		
BDSW-01	9-Sep-20	14:30	S			0.001 U	0.0019		0.0040				1	4	1 U	5		14	1.7	41	44	1.4	7.9 J	7.5	51.4	6.8	67	10 U
BDSW-01	21-Sep-20	11:25	96			0.001 U	0.0019		0.0041 J+									13.8	1.7	41.5				7.4	99.2	7.6		
BDSW-01	21-Sep-20	17:00	96															13.7	1.7	41				7.6	103.4	10.9		
BDSW-01	22-Sep-20	11:00	96															13.7	1.7	41.1				7.7	100.4	8.0		
BDSW-01	22-Sep-20	16:20	96															13.5	1.7	40.5				7.9	100.4	10.3		
BDSW-01	23-Sep-20	11:05	96															13.7	1.7	41.2				7.9	100.5	8.5		
BDSW-01	23-Sep-20	17:00	96															13.6	1.7	41				7.8	100.5	10.4		
BDSW-01	24-Sep-20	10:55	96															13.8	1.7	41.3				7.7	101.2	8.4		
BDSW-01	24-Sep-20	16:10	96															13.6	1.6	40.7				7.8	102.1	10.2		
BDSW-01	28-Sep-20	14:30	S			0.001 U	0.0019		0.0051				1	4	1 U	5		14.1	1.7	40	45	1.3	7.9 J	7.8	101.9	10.3	69	10 U
BDSW-03	4-May-20	9:40	96															6	0.8	18.1				7.3	44.4	2.8		
BDSW-03	4-May-20	14:30	96															6	0.8	18.1				7.3	44.3	6.3		
BDSW-03 D	4-May-20	14:40	96															5.9	0.7	17.7								
BDSW-03 B	4-May-20	14:50	96															0.5 U	0.5 U	0.5 U								
BDSW-03	5-May-20	9:40	96															6	0.8	18.2				7.4	45.8	2.6		
BDSW-03	5-May-20	15:20	96/S	66.5		0.001 U	0.0009	0.15	0.0017	0.28			1 U	2	1 U	2	325.4	6.1	0.8	18	19	3.9	7.5 J	7.6	46.3	6.4	45	10 U
BDSW-03 D	5-May-20	15:30	96/S			0.001 U	0.0009		0.0017				1 U	2	1 U	2		6.2	0.8	18	19	4	7.4 J				46	10 U
BDSW-03 B	5-May-20	15:40	96/S			0.001 U	0.0001 U		0.0008 U				1 U	1 U	1 U	1 U		0.5 U	0.5 U	1 U	4 U	0.5 U	5.8 J				10 U	10 U
BDSW-03	6-May-20	9:45	96															5.6	0.7	16.9				7.2	45.3	3.8		
BDSW-03	6-May-20	14:30	96															5.4	0.7	16.1				7.5	47.2	6.4		
BDSW-03 D	6-May-20	14:40	96															5.3	0.7	15.9								
BDSW-03 B	6-May-20	14:50	96															0.5 U	0.5 U	0.5 U								
BDSW-03	7-May-20	9:20	96															5.4	0.7	16.3				7.2	45.9	2.4		
BDSW-03	7-May-20	13:20	96			0.001 U	0.0009		0.0017									5.4	0.7	16.5				7.2	45.5	4.5		
BDSW-03 D	7-May-20	13:30	96			0.001 U	0.0008		0.0018									5.3	0.7	16.1								
BDSW-03 B	7-May-20	13:40	96			0.001 U	0.0001 U		0.0008 U									0.5 U	0.5 U	0.5 U								
BDSW-03	7-May-20	14:05	INV	66.8		0.001 U	0.0007	0.11	0.0016	0.26			1 U	2	1 U	2	326.9	5.4	0.7	16	19	3.9	7.4 J	7.3	46.1	5.0	38	10 U
BDSW-03	25-May-20	10:00	96															7.9	0.8	23.1				7.2	46.8	4.2		
BDSW-03	25-May-20	13:20	96															7.9	0.7	22.7				7.2	48.9	7.2		
BDSW-03 D	25-May-20	13:30	96															6.8	0.7	20.1								
BDSW-03 B	25-May-20	13:40	96															1 J+	0.5 U	2.6								
BDSW-03	26-May-20	11:45	S	87.8		0.001 U	0.0012	0.26	0.0026	0.56			1 U	2	1 U	2	429.4	6.9	0.7	19	21	2.8	7.5 J	7.2	48.9	6.2	35	10 U
BDSW-03	26-May-20	16:00	96															6.6	0.6	19.1				7.2	46.3	7.8		

Table 2-2h: 2020 Surface Water Sampling Summary Tables / Total Constituents / Bucktail and Big Deer Creek (Location Sorted)

Sampling Location[1]	Date	Time	Event[2]	Flow (cfs)	Staff Gauge Water Level (ft)	Total[3,4,5]																						
						Arsenic	Cobalt		Copper		Iron	Manganese	Potassium	Sodium	Chloride	Sulfate		Calcium	Magnesium	Hardness	Alkalinity	DOC	pH-Lab	pH-Field	Cond.	Temp.	TDS	TSS
						Conc. (mg/L) Cleanup Level = 0.01 mg/L[6]	Conc. (mg/L)	Load (kg/day)	Conc. (mg/L)	Load (kg/day)	Conc. (mg/L)	Conc. (mg/L)	Conc. (mg/L)	Conc. (mg/L)	Conc. (mg/L)	Conc. (mg/L)	Load (kg/day)	Conc. (mg/L)	Conc. (mg/L)	Conc. (mg $CaCO_3$/L)	Conc. (mg/L)	Conc. (mg/L)	pH Unit	pH Unit	(uS/cm)	(deg C)	Conc. (mg/L)	Conc. (mg/L)
BDSW-03 D	26-May-20	16:10	96															6.7	0.6	19.4								
BDSW-03 B	26-May-20	16:20	96															0.5 U	0.5 U	0.5								
BDSW-03	27-May-20	9:40	96															6.4	0.7	18.7				7.2	42.6	4.9		
BDSW-03	27-May-20	17:00	96															6.2	0.6	18.3				7.2	42.8	9.1		
BDSW-03 D	27-May-20	17:10	96															7.2	0.7	20.8								
BDSW-03 B	27-May-20	17:20	96															0.5 U	0.5 U	0.5								
BDSW-03	28-May-20	10:00	96															5.5	0.6	16.1				7.1	44.8	8.3		
BDSW-03	28-May-20	15:10	96															7.9	0.6	22.4				7.1	49.4	9.5		
BDSW-03 D	28-May-20	15:20	96															7.6	0.6	21.7								
BDSW-03 B	28-May-20	15:30	96															1.9	0.5 U	4.9								
BDSW-03	17-Jun-20	2:51	STRM			0.001 U	0.0010		0.0025									6	0.7	17.8				7.2	70.0	14.5		
BDSW-03	17-Jun-20	4:51	STRM			0.001 U	0.0010		0.0024									5.9	0.7	17.5				7.2	94.0	14.5		
BDSW-03	17-Jun-20	6:51	STRM			0.001 U	0.0010		0.0024									6	0.7	17.8				7.2	98.0	14.8		
BDSW-03	17-Jun-20	8:51	STRM			0.001 U	0.0010		0.0023									6.1	0.7	18				7.2	96.0	14.8		
BDSW-03	17-Jun-20	10:51	STRM			0.001 U	0.0011		0.0025									6.1	0.7	18.2				7.3	97.0	14.9		
BDSW-03	17-Jun-20	12:51	STRM			0.001 U	0.0011		0.0024									6	0.7	17.8				7.3	94.0	14.9		
BDSW-03	17-Jun-20	14:51	STRM			0.001 U	0.0011		0.0024									6.4	0.8	19				7.3	93.0	14.9		
BDSW-03	17-Jun-20	16:51	STRM			0.001 U	0.0011		0.0023									6.3	0.7	18.7				7.4	93.0	14.9		
BDSW-03	17-Jun-20	18:51	STRM			0.001 U	0.0010		0.0023									6.4	0.7	19.1				7.3	92.0	14.9		
BDSW-03	17-Jun-20	20:51	STRM			0.001 U	0.0010		0.0022									6.1	0.7	18.2				7.4	93.0	15.0		
BDSW-03	17-Jun-20	22:51	STRM			0.001 U	0.0011		0.0145									6.2	0.7	18.4				7.4	94.0	15.0		
BDSW-03	18-Jun-20	0:51	STRM			0.001 U	0.0010		0.0020									6.2	0.7	18.5				7.4	95.0	15.0		
BDSW-03	9-Sep-20	12:20	S	11.7	1.00	0.001 U	0.0028	0.08	0.0030	0.09			1	4	1 U	4	114.7	14.1	1.6	39	42	1.5	7.8 J	7.5	43.2	3.7	69	10 U
BDSW-03 D	9-Sep-20	12:30	S			0.001 U	0.0029		0.0029				1	4	1 U	4		14.2	1.5	39	42	1.4	7.7 J				68	10 U
BDSW-03 B	9-Sep-20	12:40	S			0.001 U	0.0001 U		0.0004 U				1 U	1 U	1 U	1 U		0.5 U	0.5 U	1 U	4 U	0.5 U	5.8 J				10 U	10 U
BDSW-03	21-Sep-20	10:05	96		1.03	0.001 U	0.0027		0.0027 J+									13.7	1.6	40.6				7.5	95.1	7.0		
BDSW-03	21-Sep-20	15:30	96		1.02													13.6	1.5	40.1				7.7	94.4	7.9		
BDSW-03 D	21-Sep-20	15:40	96															13.4	1.5	39.6								
BDSW-03 B	21-Sep-20	15:50	96															0.5 U	0.5 U	0.5 U								
BDSW-03	22-Sep-20	9:55	96		0.99													13.7	1.6	40.7				7.6	95.9	7.1		
BDSW-03	22-Sep-20	13:20	96		0.95													13.6	1.5	40.2				7.9	96.0	7.1		
BDSW-03 D	22-Sep-20	13:30	96															13.8	1.5	40.6								
BDSW-03 B	22-Sep-20	13:40	96															0.5 U	0.5 U	0.5 U								
BDSW-03	23-Sep-20	9:50	96		0.98													13.4	1.5	39.8				7.7	96.4	7.6		
BDSW-03	23-Sep-20	14:25	96	9.60	0.98													13.4	1.5	39.9				7.7	91.3	10.1		
BDSW-03 D	23-Sep-20	14:35	96															13.5	1.5	40.1								
BDSW-03 B	23-Sep-20	14:45	96															0.5 U	0.5 U	0.5 U								
BDSW-03	24-Sep-20	9:40	96		0.97													13.8	1.6	40.9				7.8	97.1	7.9		
BDSW-03	24-Sep-20	14:05	96		0.97													13.6	1.5	40.2				7.8	96.4	9.6		
BDSW-03 D	24-Sep-20	14:15	96															13.6	1.5	40.3								
BDSW-03 B	24-Sep-20	14:25	96															0.5 U	0.5 U	0.5 U								
BDSW-03	28-Sep-20	12:00	S	9.22	0.98	0.001 U	0.0029	0.07	0.0037	0.08			1	4	1 U	5	112.8	14.2	1.6	40	43	1.5	7.8 J	7.7	87.3	9.1	75	10 U
BDSW-03 D	28-Sep-20	12:10	S			0.001 U	0.0028		0.0038				1	4	1 U	5		13.9	1.6	40	43	1.5	7.8 J				75	10 U
BDSW-03 B	28-Sep-20	12:20	S			0.001 U	0.0001 U		0.0004 U				1 U	1 U	1 U	1 U		0.5 U	0.5 U	1 U	4 U	0.5 U	5.8 J				10 U	10 U
BDSW-03+200	7-May-20	13:50	INV			0.001 U	0.0007		0.0016				1 U	2	1 U	2		5.3	0.7	16	19	3.9	7.5 J	7.3	46.0	4.7	40	10 U
BDSW-03-1425	7-May-20	15:00	INV			0.001 U	0.0010		0.0035				1 U	2	1 U	2		5.4	0.7	17	19	4.2	7.4 J	7.2	46.2	5.8	40	10 U
BDSW-03-200	7-May-20	14:30	INV			0.001 U	0.0009		0.0024				1 U	2	1 U	2		5.6	0.7	17	21	3.9	7.4 J	7.2	45.3	5.3	38	10 U

Table 2-2h: 2020 Surface Water Sampling Summary Tables / Total Constituents / Bucktail and Big Deer Creek (Location Sorted)

Sampling Location[1]	Date	Time	Event[2]	Flow (cfs)	Staff Gauge Water Level (ft)	Total[3,4,5]																						
						Arsenic	Cobalt		Copper		Iron	Manganese	Potassium	Sodium	Chloride	Sulfate		Calcium	Magnesium	Hardness	Alkalinity	DOC	pH-Lab	pH-Field	Cond.	Temp.	TDS	TSS
						Conc. (mg/L) Cleanup Level = 0.01 mg/L[6]	Conc. (mg/L)	Load (kg/day)	Conc. (mg/L)	Load (kg/day)	Conc. (mg/L)	Conc. (mg/L)	Conc. (mg/L)	Conc. (mg/L)	Conc. (mg/L)	Conc. (mg/L)	Load (kg/day)	Conc. (mg/L)	Conc. (mg/L)	Conc. (mg $CaCO_3$/L)	Conc. (mg/L)	Conc. (mg/L)	pH Unit	pH Unit	(uS/cm)	(deg C)	Conc. (mg/L)	Conc. (mg/L)
BDSW-04	4-May-20	9:25	96															4.6	0.6	14.2				7.1	36.9	2.5		
BDSW-04	4-May-20	14:10	96															4.5	0.6	13.9				7.1	36.8	5.9		
BDSW-04	5-May-20	9:20	96															4.7	0.6	14.3				7.0	37.7	2.4		
BDSW-04	5-May-20	14:40	96/S	56.7		0.001 U	0.0001 U	0.01	0.0008 U	0.11	0.16					1	138.7	4.7	0.6	14.4				7.3	37.4	6.1		10 U
BDSW-04	6-May-20	9:25	96															4.3	0.6	13				7.1	37.2	3.6		
BDSW-04	6-May-20	14:10	96															4.1	0.5	12.4				7.3	38.4	6.5		
BDSW-04	7-May-20	9:00	96															4.1	0.6	12.6				7.1	37.4	2.3		
BDSW-04	7-May-20	13:00	96			0.001 U	0.0001 U		0.0008 U									4	0.6	12.4				7.1	37.1	4.0		
BDSW-04	25-May-20	9:40	96															4.7	0.6	14.2				7.1	36.5	3.9		
BDSW-04	25-May-20	13:00	96															4.6	0.6	14.2				7.1	37.4	6.8		
BDSW-04	26-May-20	11:10	S	72.8		0.001 U	0.0001 U	0.02	0.0013	0.23	0.07					1	178.1	4.6	0.5	13.6				7.3	34.9	6.0		10 U
BDSW-04	26-May-20	15:40	96															4.6	0.5 U	13.4				7.0	34.4	7.5		
BDSW-04	27-May-20	9:20	96															4.8	0.5	14.2				7.0	31.5	4.6		
BDSW-04	27-May-20	16:40	96															4	0.5 U	12				7.0	30.9	8.9		
BDSW-04	28-May-20	9:40	96															5.6	0.5	16.1				7.0	26.7	8.1		
BDSW-04	28-May-20	14:50	96															5.8	0.5	16.5				7.0	28.9	9.5		
BDSW-04	9-Sep-20	11:50	S	8.09		0.001 U	0.0001 U	0.00	0.0004 U	0.01	0.03 U					3	59.4	10.2	1.3	30.7				7.4	38.3	3.4		10 U
BDSW-04	21-Sep-20	9:45	96			0.001 U	0.0001 U		0.0008 U									10.2	1.3	30.9				7.4	75.7	7.8		
BDSW-04	28-Sep-20	11:30	S	7.73		0.001 U	0.0001 U	0.00	0.0014	0.03	0.03 U					3	56.7	9.3	1.3	28.8				7.6	76.8	8.9		10 U
BDSW-C	5-May-20	17:40				0.003	0.0043		0.0043									0.5 U	0.5 U	0.5 U								
BDSW-C	7-May-20	16:00				0.005	0.0575		0.0033									0.5 U	0.5 U	0.5 U								
BDSW-C	26-May-20	17:30				0.005	0.0560		0.0032									0.5 U	0.5 U	0.5 U								
BDSW-C	28-May-20	16:50				0.004	0.0555		0.0029									0.5 U	0.5 U	0.5 U								
BDSW-C	24-Sep-20	16:20				0.004	0.0520		0.0031									0.5 U	0.5 U	0.5 U								
BT-SEEP	9-Sep-20	9:40	S	0.00081		0.074	1.27	0.00	2.27 J+	0.00	35.1					86	0.2	33.5 J+	12.4	135				7.6	262.3	6.0		814
BT-SEEP	28-Sep-20	9:00	S	0.00041		0.003	0.8140	0.00	0.5060	0.00	0.94					87	0.1	31.8	7.8	112				7.7	253.7	10.0		1020
BTSW-01	5-May-20	13:00	S	0.38	0.47	0.003	0.1110	0.10	0.0482	0.04	0.03 U					30	27.9	14.7	4.5	55.2				7.6	138.6	5.6		10 U
BTSW-01	26-May-20	9:55	S	0.77	0.59	0.004	0.0898	0.17	0.0624	0.12	0.14					20	37.7	11.1	3.2	41.1				7.5	104.3	6.4		10 U
BTSW-01	9-Sep-20	10:25	S	0.21	0.37	0.003	0.1990	0.10	0.0454	0.02	0.03					36	18.5	18.8	5.1	68				7.6	167.9	3.1		10 U
BTSW-01	28-Sep-20	9:45	S	0.22	0.38	0.004	0.1360	0.07	0.0717	0.04	0.16					35	18.8	16.6	5	62				8.1	162.0	8.6		10 U
BTSW-01.6	5-May-20	12:40	S	0.0351		0.004	0.0985	0.01	0.0757	0.01	0.04					96	8.2	45.3	7.7	145				7.6	298.3	5.6		10 U
BTSW-01.6	26-May-20	9:30	S	0.097		0.005	0.0923	0.02	0.0735	0.02	0.07					71	16.8	33.3	6	108				7.3	237.2	5.5		10 U
BTSW-01.6	9-Sep-20	10:00	S	0.070		0.003	0.0853	0.01	0.0762	0.01	0.03 U					101	17.3	52	8.4	165				7.6	313.5	2.8		10 U
BTSW-01.6	28-Sep-20	9:20	S	0.056		0.003	0.0867	0.01	0.0813	0.01	0.03 U					101	13.8	48	8.3	154				7.6	336.5	7.1		10 U
SFSW-01	5-May-20	14:10	S	3.41	1.18	0.001 U	0.0116	0.10	0.0162	0.14			2	3	1 U	8	66.7	24.4	2.2	70	66	2.9	8.1 J	8.1	144.3	6.2	94	10 U
SFSW-01	26-May-20	10:50	S	8.87	1.55	0.001 U	0.0079	0.17	0.0163	0.35			1	2	1 U	5	108.5	18.4	1.4	53	51	2.3	8.0 J	8.1	109.2	6.1	70	10
SFSW-01	9-Sep-20	11:30	S	2.74	2.14	0.001 U	0.0145	0.10	0.0167	0.11			2	3	1 U	10	67.0	28.3	2.4	77	77	1	8.0 J	7.9	167.3	4.1	104	10 U
SFSW-01	24-Sep-20	13:15	96	2.33														26.6	2.3	76.2				8.3	165.8	8.5		
SFSW-01	28-Sep-20	11:00	S	2.27		0.001 U	0.0134	0.07	0.0179	0.10			2	3	1 U	10	55.5	25.1	2.4	76	78	1.1	8.1 J	8.3	163.7	8.1	103	10 U
SFSW-02	5-May-20	13:40	S			0.001 U	0.0111		0.0110				2	3	1 U	8		24.4	2.2	70	65	2.4	8.0 J	7.9	145.9	6.0	90	10 U
SFSW-02	26-May-20	10:35	S			0.001 U	0.0066		0.0090				1	2	1 U	4		18.3	1.4	53	51	2.3	8.0 J	8.1	108.5	6.0	62	10 U
SFSW-02	9-Sep-20	11:10	S			0.001 U	0.0151		0.0093				2	3	1 U	9		28.3	2.4	76	74	0.9	8.1 J	7.9	166.5	4.0	112	10 U
SFSW-02	28-Sep-20	10:40	S			0.001 U	0.0140		0.0126				2	3	1 U	10		25.6	2.4	77	77	1.1	8.1 J	8.2	163.3	8.2	105	10 U

Table 2-2h: 2020 Surface Water Sampling Summary Tables / Total Constituents / Bucktail and Big Deer Creek (Location Sorted)

Sampling Location[1]	Date	Time	Event[2]	Flow (cfs)	Staff Gauge Water Level (ft)	Total[3,4,5]																						
						Arsenic	Cobalt		Copper		Iron	Manganese	Potassium	Sodium	Chloride	Sulfate		Calcium	Magnesium	Hardness	Alkalinity	DOC	pH-Lab	pH-Field	Cond.	Temp.	TDS	TSS
						Conc. (mg/L) Cleanup Level = 0.01 mg/L[6]	Conc. (mg/L)	Load (kg/day)	Conc. (mg/L)	Load (kg/day)	Conc. (mg/L)	Conc. (mg/L)	Conc. (mg/L)	Conc. (mg/L)	Conc. (mg/L)	Conc. (mg/L)	Load (kg/day)	Conc. (mg/L)	Conc. (mg/L)	Conc. (mg $CaCO_3$/L)	Conc. (mg/L)	Conc. (mg/L)	pH Unit	pH Unit	(uS/cm)	(deg C)	Conc. (mg/L)	Conc. (mg/L)
SFSW-04	5-May-20	13:20	S	3.04		0.001 U	0.0001 U	0.00	0.0008 U	0.01	0.03 U					6	44.6	25.2	1.8	70.2				8.1	144.6	5.4		10 U
SFSW-04	26-May-20	10:15	S	8.39		0.001 U	0.0001 U	0.00	0.0004 U	0.01	0.03 U					3	61.6	18.7	1.1	51.3				7.9	107.6	6.6		10 U
SFSW-04	9-Sep-20	10:45	S	2.02		0.001 U	0.0001 U	0.00	0.0004 U	0.00	0.03 U					6	29.7	29.6	2	82				7.9	170.1	3.6		10 U
SFSW-04	24-Sep-20	12:50	96	2.20														28	1.9	77.9				8.2	162.9	7.8		
SFSW-04	28-Sep-20	10:10	S	2.08		0.001 U	0.0002	0.00	0.0004	0.00	0.03 U					7	35.6	26.9	2	75.4				8.2	162.8	7.8		10 U
SFSW-C	8-May-20	18:00				0.004	0.0046		0.0047									0.5 U	0.5 U	0.5 U								
SFSW-C	10-May-20	11:40				0.005	0.0555		0.0033									0.5 U	0.5 U	0.5 U								

Notes:

1. Sample Codes:
   - Sample names with a 'B' flag are blank samples.
   - Sample names with a 'D' flag are duplicate samples.
   - Sample names with a 'C' suffix are control standards.
2. Event codes:
   - "96": 96-hr sampling events
   - "S": Synoptic sampling events
   - "96/S": Synoptic event sampled concurrently with 96-hr event
   - "INV": Investigational sampling event
   - "STRM": Storm sampling events at automated sampler locations.
3. The dissolved concentrations of some metals (i.e. cobalt) are often higher than the total concentrations.
   This is likely due to the fact that the metals are present almost entirely in the dissolved form and the lower total metals are due to matrix effects.
4. Qualifiers:
   - U - Concentration below reporting limits.
   - UJ - Concentration is below reporting limit, but is an estimated quantity.
   - J - The result is an estimated quantity due to a quality control deficiency.
   - J+ - The result is an estimated quantity, but the result may be biased high.
5. Loading Calculations:
   - Load (Kg/day) = Flow (cfs) * Conc. (mg/L)* Load Conversion
   - Load Conversion = 2.4466
6. There were no exceedances of the EPA cleanup level for total arsenic of 0.010 mg/L (South Fork Big Deer and Big Deer Creeks).

Table 2-3.1a: Data Used for the May 2020 Hardness-based Chronic Dissolved Copper Criteria Comparisons for the Panther Creek Stations

Station Code	Date/Time of Collection	Dissolved Copper[1]	Hardness	IWQS Cu[2]	[IWQS Cu] minus [Dissolved Cu]	Absolute Difference	Rank	Signed Rank	Positive Ranks	Magnitude of Exceedance
Units:		mg/L	mg/L as $CaCO_3$	mg/L	mg/L	mg/L				mg/L
PASW-04X	5/11/20 11:25	0.0019	20.8	0.0035	0.0016	0.0016	5.0	5.0	5.0	
PASW-04X	5/11/20 15:20	0.0020	20.0	0.0035	0.0015	0.0015	2.5	2.5	2.5	
PASW-04X	5/12/20 14:40	0.0019	19.8	0.0035	0.0016	0.0016	5.0	5.0	5.0	
PASW-04X	5/12/20 17:10	0.0020	19.4	0.0035	0.0015	0.0015	2.5	2.5	2.5	
PASW-04X	5/13/20 9:40	0.0019	19.5	0.0035	0.0016	0.0016	5.0	5.0	5.0	
PASW-04X	5/13/20 15:20	0.0018	19.6	0.0035	0.0017	0.0017	7.5	7.5	7.5	
PASW-04X	5/14/20 9:50	0.0018	19.7	0.0035	0.0017	0.0017	7.5	7.5	7.5	
PASW-04X	5/14/20 15:30	0.0021	20.1	0.0035	0.0014	0.0014	1.0	1.0	1.0	
PASW-05	5/11/20 11:05	0.0017	20.4	0.0035	0.0018	0.0018	5.5	5.5	5.5	
PASW-05	5/11/20 15:00	0.0018	19.8	0.0035	0.0017	0.0017	2.5	2.5	2.5	
PASW-05	5/12/20 14:30	0.0018	19.9	0.0035	0.0017	0.0017	2.5	2.5	2.5	
PASW-05	5/12/20 16:50	0.0019	19.9	0.0035	0.0016	0.0016	1.0	1.0	1.0	
PASW-05	5/13/20 9:20	0.0017	19.9	0.0035	0.0018	0.0018	5.5	5.5	5.5	
PASW-05	5/13/20 15:00	0.0017	19.7	0.0035	0.0018	0.0018	5.5	5.5	5.5	
PASW-05	5/14/20 9:30	0.0016	20.1	0.0035	0.0019	0.0019	8.0	8.0	8.0	
PASW-05	5/14/20 15:10	0.0017	20.2	0.0035	0.0018	0.0018	5.5	5.5	5.5	
PASW-09	5/11/20 10:40	0.0019	26.0	0.0036	0.0017	0.0017	2.5	2.5	2.5	
PASW-09	5/11/20 14:35	0.0018	26.0	0.0036	0.0018	0.0018	6.0	6.0	6.0	
PASW-09	5/12/20 13:15	0.0017	25.0	0.0035	0.0018	0.0018	6.0	6.0	6.0	
PASW-09	5/12/20 16:20	0.0019	26.1	0.0036	0.0017	0.0017	2.5	2.5	2.5	
PASW-09	5/13/20 8:50	0.0018	26.0	0.0036	0.0018	0.0018	6.0	6.0	6.0	
PASW-09	5/13/20 14:20	0.0018	25.3	0.0035	0.0017	0.0017	2.5	2.5	2.5	
PASW-09	5/14/20 8:55	0.0020	26.7	0.0037	0.0017	0.0017	2.5	2.5	2.5	
PASW-09	5/14/20 14:20	0.0018	26.7	0.0037	0.0019	0.0019	8.0	8.0	8.0	
PASW-11	5/11/20 10:20	0.0008	25.6	0.0035	0.0027	0.0027	5.5	5.5	5.5	
PASW-11	5/11/20 14:15	0.0009	25.9	0.0036	0.0027	0.0027	5.5	5.5	5.5	
PASW-11	5/12/20 12:55	0.0007	24.9	0.0035	0.0028	0.0028	8.0	8.0	8.0	
PASW-11	5/12/20 16:00	0.0009	24.9	0.0035	0.0026	0.0026	2.0	2.0	2.0	
PASW-11	5/13/20 8:30	0.0009	25.4	0.0035	0.0026	0.0026	2.0	2.0	2.0	
PASW-11	5/13/20 14:00	0.0008	25.1	0.0035	0.0027	0.0027	5.5	5.5	5.5	
PASW-11	5/14/20 8:35	0.0009	26.1	0.0036	0.0027	0.0027	5.5	5.5	5.5	
PASW-11	5/14/20 14:00	0.0010	26.2	0.0036	0.0026	0.0026	2.0	2.0	2.0	

Notes:

1. Copper Idaho Water Quality Standards (IWQS Cu).

Table 2-3.1b: Results for Wilcoxon Signed Rank Test (WSRT) Applied to May 2020 Data for the Panther Creek Stations

	PASW-04X	PASW-05	PASW-09	PASW-11
R	36	36	36	36
alpha=0.05				
N	8	8	8	8
Rc	5	5	5	5
from EPA QA/G-9S, Table A-7				
Decision Rule: Reject H0 if R < Rc				
P (one-tailed)	1	1	1	1
Result:	Fail to Reject (Criterion Not Exceeded)	Fail to Reject (Criterion Not Exceeded)	Fail to Reject (Criterion Not Exceeded)	Fail to Reject (Criterion Not Exceeded)

Table 2-3.1c: Summary of Normality Tests for the May 2020 Dissolved Copper Data for the Panther Creek Stations

Station	Shapiro-Wilk			Skewness			Final Conclusion
	W-Statistic	p-value	Result	Skewness	p-value	Result	
PASW-04X	0.917	0.408	Fail to Reject	-0.386	0.602	Fail to Reject	Fail to Reject
PASW-05	0.906	0.324	Fail to Reject	-0.488	0.511	Fail to Reject	Fail to Reject
PASW-09	0.798	0.027	Reject	0.824	0.269	Fail to Reject	Reject
PASW-11	0.827	0.056	Reject	0.404	0.586	Fail to Reject	Reject

Note: Provided for informational purposes only. Normality Tests are performed using a 10% significance level.

Table 2-3.2a: Data Used for the Early May 2020 Hardness-based Chronic Dissolved Copper Criteria Comparisons for the Big Deer Creek and South Fork Stations

Station Code	Date/Time of Collection	Dissolved Copper[1]	Hardness	IWQS Cu[2]	[IWQS Cu] minus [Dissolved Cu]	Absolute Difference	Rank	Signed Rank	Positive Ranks	Magnitude of Exceedance
Units:		mg/L	mg/L as $CaCO_3$	mg/L	mg/L	mg/L				mg/L
BDSW-01	5/4/20 11:10	0.0056	18.9	0.0035	-0.0021	0.0021	6	-6		0.0021
BDSW-01	5/4/20 16:00	0.0058	18.9	0.0035	-0.0023	0.0023	8	-8		0.0023
BDSW-01	5/5/20 11:10	0.0053	20.0	0.0035	-0.0018	0.0018	2.5	-2.5		0.0018
BDSW-01	5/5/20 17:30	0.0055	19.0	0.0035	-0.0020	0.0020	4	-4		0.0020
BDSW-01	5/6/20 11:15	0.0056	17.5	0.0035	-0.0021	0.0021	6	-6		0.0021
BDSW-01	5/6/20 16:00	0.0056	16.9	0.0035	-0.0021	0.0021	6	-6		0.0021
BDSW-01	5/7/20 10:55	0.0052	17.0	0.0035	-0.0017	0.0017	1	-1		0.0017
BDSW-01	5/7/20 15:50	0.0053	17.3	0.0035	-0.0018	0.0018	2.5	-2.5		0.0018
BDSW-03	5/4/20 9:40	0.0014	18.1	0.0035	0.0021	0.0021	6.5	6.5	6.5	
BDSW-03	5/4/20 14:30	0.0014	18.1	0.0035	0.0021	0.0021	6.5	6.5	6.5	
BDSW-03	5/5/20 9:40	0.0014	18.2	0.0035	0.0021	0.0021	6.5	6.5	6.5	
BDSW-03	5/5/20 15:20	0.0014	18.0	0.0035	0.0021	0.0021	6.5	6.5	6.5	
BDSW-03	5/6/20 9:45	0.0015	16.9	0.0035	0.0020	0.0020	3	3	3	
BDSW-03	5/6/20 14:30	0.0018	16.1	0.0035	0.0017	0.0017	1	1	1	
BDSW-03	5/7/20 9:20	0.0015	16.3	0.0035	0.0020	0.0020	3	3	3	
BDSW-03	5/7/20 13:20	0.0015	16.5	0.0035	0.0020	0.0020	3	3	3	
BDSW-04	5/4/20 9:25	0.0005	14.2	0.0035	0.0030	0.0030	4.5	4.5	4.5	
BDSW-04	5/4/20 14:10	0.0005	13.9	0.0035	0.0030	0.0030	4.5	4.5	4.5	
BDSW-04	5/5/20 9:20	0.0004	14.3	0.0035	0.0031	0.0031	7.5	7.5	7.5	
BDSW-04	5/5/20 14:40	0.0004	14.4	0.0035	0.0031	0.0031	7.5	7.5	7.5	
BDSW-04	5/6/20 9:25	0.0006	13.0	0.0035	0.0029	0.0029	2	2	2	
BDSW-04	5/6/20 14:10	0.0007	12.4	0.0035	0.0028	0.0028	1	1	1	
BDSW-04	5/7/20 9:00	0.0005	12.6	0.0035	0.0030	0.0030	4.5	4.5	4.5	
BDSW-04	5/7/20 13:00	0.0005	12.4	0.0035	0.0030	0.0030	4.5	4.5	4.5	

Notes:

1. Copper Idaho Water Quality Standards (IWQS Cu).

Table 2-3.2b: Results for Wilcoxon Signed Rank Test (WSRT) Applied to Early May 2020 Data for the Big Deer Creek and South Fork Stations

	BDSW-01	BDSW-03	BDSW-04
R	0	36	36
alpha=0.05			
N	8	8	8
Rc	5	5	5
from EPA QA/G-9S, Table A-7			
Decision Rule: Reject H0 if R < Rc			
P (one-tailed)	0.0039	1	1
Result:	Reject (Criterion Exceeded)	Fail to Reject (Criterion Not Exceeded)	Fail to Reject (Criterion Not Exceeded)

Table 2-3.2c: Summary of Normality Tests for the Early May 2020 Dissolved Copper Data for the Big Deer Creek and South Fork Stations

Station	Shapiro-Wilk			Skewness			Final Conclusion
	W-Statistic	p-value	Result	Skewness	p-value	Result	
BDSW-01	0.922	0.45	Fail to Reject	0.049	0.947	Fail to Reject	Fail to Reject
BDSW-03	0.684	0.001	Reject	-2.126	0.006	Reject	Reject
BDSW-04	0.872	0.156	Fail to Reject	-0.862	0.247	Fail to Reject	Fail to Reject

Note: Provided for informational purposes only. Normality Tests are performed using a 10% significance level.

Table 2-3.2d: Data Used for the Late May 2020 Hardness-based Chronic Dissolved Copper Criteria Comparisons for the Big Deer Creek and South Fork Stations

Station Code	Date/Time of Collection	Dissolved Copper[1]	Hardness	IWQS Cu[2]	[IWQS Cu] minus [Dissolved Cu]	Absolute Difference	Rank	Signed Rank	Positive Ranks	Magnitude of Exceedance
Units:		mg/L	$CaCO_3$	mg/L	mg/L	mg/L				mg/L
BDSW-01	5/25/20 11:20	0.0042	20.0	0.0035	-0.0007	0.0007	1	-1		0.0007
BDSW-01	5/25/20 15:00	0.0046	22.4	0.0035	-0.0011	0.0011	6.5	-6.5		0.0011
BDSW-01	5/26/20 14:10	0.0044	20.0	0.0035	-0.0009	0.0009	2	-2		0.0009
BDSW-01	5/26/20 17:20	0.0045	20.1	0.0035	-0.0010	0.0010	4	-4		0.0010
BDSW-01	5/27/20 11:00	0.0052	17.6	0.0035	-0.0017	0.0017	8	-8		0.0017
BDSW-01	5/27/20 18:40	0.0046	18.2	0.0035	-0.0011	0.0011	6.5	-6.5		0.0011
BDSW-01	5/28/20 11:50	0.0045	16.4	0.0035	-0.0010	0.0010	4	-4		0.0010
BDSW-01	5/28/20 16:40	0.0045	20.3	0.0035	-0.0010	0.0010	4	-4		0.0010
BDSW-03	5/25/20 10:00	0.0017	23.1	0.0035	0.0018	0.0018	5	5	5	
BDSW-03	5/25/20 13:20	0.0018	22.7	0.0035	0.0017	0.0017	2	2	2	
BDSW-03	5/26/20 11:45	0.0018	19.0	0.0035	0.0017	0.0017	2	2	2	
BDSW-03	5/26/20 16:00	0.0018	19.1	0.0035	0.0017	0.0017	2	2	2	
BDSW-03	5/27/20 9:40	0.0016	18.7	0.0035	0.0019	0.0019	7.5	7.5	7.5	
BDSW-03	5/27/20 17:00	0.0017	18.3	0.0035	0.0018	0.0018	5	5	5	
BDSW-03	5/28/20 10:00	0.0016	16.1	0.0035	0.0019	0.0019	7.5	7.5	7.5	
BDSW-03	5/28/20 15:10	0.0017	22.4	0.0035	0.0018	0.0018	5	5	5	
BDSW-04	5/25/20 9:40	0.0003	14.2	0.0035	0.0032	0.0032	4	4	4	
BDSW-04	5/25/20 13:00	0.0003	14.2	0.0035	0.0032	0.0032	4	4	4	
BDSW-04	5/26/20 11:10	*0.00015*	13.6	0.0035	0.0033	0.0033	7.5	7.5	7.5	
BDSW-04	5/26/20 15:40	*0.00015*	13.4	0.0035	0.0033	0.0033	7.5	7.5	7.5	
BDSW-04	5/27/20 9:20	0.0005	14.2	0.0035	0.0030	0.0030	1	1	1	
BDSW-04	5/27/20 16:40	0.0003	12.0	0.0035	0.0032	0.0032	4	4	4	
BDSW-04	5/28/20 9:40	0.0003	16.1	0.0035	0.0032	0.0032	4	4	4	
BDSW-04	5/28/20 14:50	0.0003	16.5	0.0035	0.0032	0.0032	4	4	4	

Notes:

1. Non-detects for dissolved copper have been set to 0.00015 (half the reported detection limit) and indicated in italic type.
2. Copper Idaho Water Quality Standards (IWQS Cu).

Table 2-3.2e: Results for Wilcoxon Signed Rank Test (WSRT) Applied to Late May 2020 Data for the Big Deer Creek and South Fork Stations

	BDSW-01	BDSW-03	BDSW-04
R	0	36	36
alpha=0.05			
N	8	8	8
Rc	5	5	5
from EPA QA/G-9S, Table A-7			
Decision Rule: Reject H0 if R < Rc			
P (one-tailed)	0.0039	1	1
Result:	Reject (Criterion Exceeded)	Fail to Reject (Criterion Not Exceeded)	Fail to Reject (Criterion Not Exceeded)

Table 2-3.2f: Summary of Normality Tests for the Late May 2020 Dissolved Copper Data for the Big Deer Creek and South Fork Stations

Station	Shapiro-Wilk			Skewness			Final Conclusion
	W-Statistic	p-value	Result	Skewness	p-value	Result	
BDSW-01	0.813	0.039	Reject	-1.655	0.029	Reject	Reject
BDSW-03	0.835	0.067	Reject	0.277	0.709	Fail to Reject	Reject
BDSW-04	0.757	0.01	Reject	-1.44	0.056	Reject	Reject

Note: Provided for informational purposes only. Normality Tests are performed using a 10% significance level.

Table 2-3.3a: Data Used for the September 2020 Hardness-based Chronic Dissolved Copper Criteria Comparisons for the Big Deer Creek Stations

Station Code	Date/Time of Collection	Dissolved Copper	Hardness	IWQS Cu[1]	[IWQS Cu] minus [Dissolved Cu]	Absolute Difference	Rank	Signed Rank	Positive Ranks	Magnitude of Exceedance
Units:		mg/L	mg/L as $CaCO_3$	mg/L	mg/L	mg/L				mg/L
BDSW-01	9/21/20 11:25	0.0035	41.5	0.0054	0.0019	0.0019	6	6	6	
BDSW-01	9/21/20 17:00	0.0037	41.0	0.0053	0.0016	0.0016	2	2	2	
BDSW-01	9/22/20 11:00	0.0033	41.1	0.0053	0.0020	0.0020	7.5	7.5	7.5	
BDSW-01	9/22/20 16:20	0.0035	40.5	0.0052	0.0017	0.0017	3	3	3	
BDSW-01	9/23/20 11:05	0.0033	41.2	0.0053	0.0020	0.0020	7.5	7.5	7.5	
BDSW-01	9/23/20 17:00	0.0035	41.0	0.0053	0.0018	0.0018	4.5	4.5	4.5	
BDSW-01	9/24/20 10:55	0.0035	41.3	0.0053	0.0018	0.0018	4.5	4.5	4.5	
BDSW-01	9/24/20 16:10	0.0040	40.7	0.0053	0.0013	0.0013	1	1	1	
BDSW-03	9/21/20 10:05	0.0024	40.6	0.0053	0.0029	0.0029	7.5	7.5	7.5	
BDSW-03	9/21/20 15:30	0.0025	40.1	0.0052	0.0027	0.0027	6	6	6	
BDSW-03	9/22/20 9:55	0.0024	40.7	0.0053	0.0029	0.0029	7.5	7.5	7.5	
BDSW-03	9/22/20 13:20	0.0068	40.2	0.0052	-0.0016	0.0016	1	-1		0.0016
BDSW-03	9/23/20 9:50	0.0034	39.8	0.0052	0.0018	0.0018	2	2	2	
BDSW-03	9/23/20 14:25	0.0026	39.9	0.0052	0.0026	0.0026	5	5	5	
BDSW-03	9/24/20 9:40	0.0028	40.9	0.0053	0.0025	0.0025	4	4	4	
BDSW-03	9/24/20 14:05	0.0029	40.2	0.0052	0.0023	0.0023	3	3	3	

Notes:

1. Copper Idaho Water Quality Standards (IWQS Cu).

Table 2-3.3b: Results for Wilcoxon Signed Rank Test (WSRT) Applied to the September 2020 Data for the Big Deer Creek Stations

	BDSW-01	BDSW-03
R	36	35
alpha=0.05		
N	8	8
Rc	5	5
from EPA QA/G-9S, Table A-7		
Decision Rule: Reject H0 if R < Rc		
P (one-tailed)	1	0.9961
Result:	Fail to Reject (Criterion Not Exceeded)	Fail to Reject (Criterion Not Exceeded)

Table 2-3.3c: Summary of Normality Tests for the September 2020 Dissolved Copper Data for the Big Deer CreekStations

Station	Shapiro-Wilk			Skewness			Final Conclusion
	W-Statistic	p-value	Result	Skewness	p-value	Result	
BDSW-01	0.904	0.31	Fail to Reject	-1.119	0.135	Fail to Reject	Fail to Reject
BDSW-03	0.626	0.00	Reject	-2.530	0.001	Reject	Reject

Note: Provided for informational purposes only. Normality Tests are performed using a 10% significance level.

Table 2-4.1a: Blackbird / Panther Creek, May 12, 2020, Synoptic Reach Gain-Loss Analysis

Blackbird Creek Station	Tributary, Portal or Main Station	Creek Flow (cfs)	Measured Inflow (cfs)	Total Inflow (cfs)	Flow Between Stations		UA Flow Percent of Total at BBSW-01A	Sta. Flow Percent of Total at BBSW-01A
					Unaccounted (UA) for Flow Gain (+)/Loss (-) (cfs)	Percent Change		
MCSW-01		0.148						0.28%
	BBSW-08		5.73	5.73				10.7%
BBSW-07A		9.15			3.3	6082%	6.1%	17.0%
	WTP-003		1.34	1.34				
	HGSW-01		0.04	0.04				0.07%
BBSW-07		8.50			-2.0	-7.1%	-3.8%	15.8%
BBSW-05		13.5			5.0	58.2%	9.2%	25.0%
BBSW-03		16.2			2.7	20.3%	5.1%	30.1%
	WFSW-03		29.3					
	WFSW-01		0.26					
	WFINTDITCH		0.35					0.65%
	WFTTSW-01		0.101					0.19%
	WFSW-02		29.1	29.5				54.1%
BBSW-02		44.1			-1.7	172%	-3.1%	81.9%
BBSW-01A		53.8			9.8	22.1%	18.1%	100%
	PASW-11		406	406				755%
PASW-09		460						855%

Notes:
-Measured Inflow = Flows from tributaries, portals and springs between BLACKBIRD Creek stations.
-Total Inflow = Sum of all measured inflows between BLACKBIRD Creek stations.
-Unaccounted for Flow = Current BLACKBIRD Creek station flow - upstream BLACKBIRD Creek station flow - total inflow.
-Manual flow measurements were made at BBSW-01A and BBSW-02.
-Flows for MCSW-01 are measured at MCSW-03A.
-Flows measured at WFINTDITCH include flows at WFSW-01.
-Total Inflow for West Fork = Flow at WFSW-02 + Flow at WFINTDITCH + Flow at WFTTSW-01.
-Flow not measured at PASW-11 due to high water and unsafe conditions; Flow at PASW-11 is estimated as PASW-09 less BBSW-01A for purpose of loading calculations.

Table 2-4.1b: Blackbird / Panther Creek, May 12, 2020, Synoptic Copper Concentration and Loading

Blackbird Creek Station	Tributary, Portal or Spring Station	DISSOLVED COPPER						TOTAL COPPER					
		Conc. (mg/L)	Load (kg/day)	% Change on Blackbird Creek	Percent of Load at BBSW-01A	Measured Inflow Load (kg/day)[1]	Unaccounted for Load Gain/Loss (kg/day)	Conc. (mg/L)[3]	Load (kg/day)	% Change on Blackbird Creek	Percent of Load at BBSW-01A	Measured Inflow Load (kg/day)[1]	Unaccounted for Load Gain/Loss (kg/day)
MCSW-01		0.0911	0.033		2.7%			0.1000	0.036		3.0%		
	BBSW-08	0.0026	0.036			0.036		0.0074	0.104			0.104	
BBSW-07A		0.0055	0.123	273.3%	10.2%		0.054	0.0091	0.204	463%	16.8%		0.064
	WTP-003	0.0087	0.028					0.1260	0.412				
	HGSW-01	0.2430	0.023			0.051		0.2790	0.026			0.438	
BBSW-07		0.0105	0.218	77.3%	18.0%		0.044	0.0283	0.589	189%	48.6%		-0.054
BBSW-05		0.0167	0.550	151.7%	45.4%		0.331	0.0285	0.938	59.4%	77.4%		0.349
BBSW-03		0.0200	0.792	44.1%	65.4%		0.242	0.0248	0.982	4.7%	81.1%		0.044
	WFSW-03	0.0031	0.222					0.0040	0.286				
	WFSW-01	0.0145	0.009					0.0184	0.012				
	WFINTDITCH	0.0360	0.031					0.0379	0.032				
	WFTTSW-01	0.0194	0.005					0.0194	0.005				
	WFSW-02	0.0026	0.185			0.220		0.0037	0.263			0.300	
BBSW-02		0.0073	0.787	-0.6%	65.0%		-0.225	0.0100	1.08	9.8%	89.0%		-0.204
BBSW-01A		0.0092	1.21	53.9%	100%		0.424	0.0114	1.50	39.2%	124%		0.423
	PASW-11	0.0007	0.696			0.696		0.0014	1.39			1.39	
PASW-09		0.0017	1.91	58.0%	158%		0.007	0.0032	3.60	140%	297%		0.710

Notes:
Load = Flow (cfs) * Conc. (in mg/L)* Load Conversion
-Load Conversion =
-Measured Inflow Load = Loads from tributaries, portals and springs between the current and upstream BLACKBIRD Creek stations.
-Unaccounted Load =Current BLACKBIRD Creek station load - upstream BLACKBIRD Creek station load - total inflow load.
-The dissolved concentrations of some metals (e.g. cobalt) are often higher than the total concentrations.
This is likely due to the fact that the metals are present almost entirely in the dissolved form and the lower total metals are due to matrix effects.
-Loads at BBSW-02 and BBSW-01A are calculated from manual flow measurements.
-Loads at WFINTDITCH include loads at WFSW-01.
-Measured Inflow Load for West Fork = Load at WFSW-02 + Load at WFINTDITCH.
-There were no exceedances of the dissolved copper CCC or CMC.
1 - Load from WFSW-01 is subtracted from WFINTDITCH to avoid double counting in the load, since the new WFSW-01 sample location is the filter outlet which discharges into the WFINTDITCH infiltration ditch. Load from WFSW-03 is not included in total West Fork measured inflow load to avoid double-counting at WFSW-02.

Table 2-4.1c: Blackbird / Panther Creek, May 12, 2020, Synoptic Cobalt Concentration and Loading

Blackbird Creek Station	Tributary, Portal or Spring Station	DISSOLVED COBALT						TOTAL COBALT					
		Conc. (mg/L)	Load (kg/day)	% Change on Blackbird Creek	Percent of Load at BBSW-01A	Measured Inflow Load (kg/day)[1]	Unaccounted for Load Gain/Loss (kg/day)	Conc. (mg/L)	Load (kg/day)	% Change on Blackbird Creek	Percent of Load at BBSW-01A	Measured Inflow Load (kg/day)[1]	Unaccounted for Load Gain/Loss (kg/day)
MCSW-01		0.1210	0.044		0.6%			0.1240	0.045		0.7%		
	BBSW-08	0.0002	0.003			0.003		0.0010	0.014			0.014	
BBSW-07A		0.0035	0.078	78.8%	1.1%		0.032	0.0045	0.101	124%	1.5%		0.042
	WTP-003	0.1670	0.547					0.2020	0.661				
	HGSW-01	0.2020	0.019			0.566		0.2130	0.020			0.681	
BBSW-07		0.0297	0.618	688%	9.0%		-0.026	0.0367	0.763	658%	11.2%		-0.019
BBSW-05		0.0340	1.119	81.1%	16.3%		0.501	0.0401	1.320	72.9%	19.3%		0.556
BBSW-03		0.0370	1.465	30.9%	21.4%		0.346	0.0389	1.540	16.7%	22.5%		0.220
	WFSW-03	0.0003	0.021					0.0005	0.036				
	WFSW-01	7.50	4.77					7.45	4.74				
	WFINTDITCH	6.68	5.69					7.00	5.96				
	WFTTSW-01	3.53	0.872					3.72	0.919				
	WFSW-02	0.0004	0.028			6.59		0.0007	0.050			6.93	
BBSW-02		0.0511	5.51	276%	80.5%		-2.546	0.0531	5.72	272%	83.6%		-2.746
BBSW-01A		0.0520	6.84	24.3%	100%		1.337	0.0554	7.29	27.4%	107%		1.569
	PASW-11	0.0002	0.199			0.199		0.0003	0.298			0.298	
PASW-09		0.0072	8.10	18.4%	118%		1.060	0.0099	11.1	52.8%	163%		3.551

Notes:
Load = Flow (cfs) * Conc. (in mg/L)* Load Conversion
-Load Conversion = 2.447
-Measured Inflow Load = Loads from tributaries, portals and springs between the current and upstream BLACKBIRD Creek stations.
-Unaccounted Load =Current BLACKBIRD Creek station load - upstream BLACKBIRD Creek station load - total inflow load.
-The dissolved concentrations of some metals (e.g. cobalt) are often higher than the total concentrations.
This is likely due to the fact that the metals are present almost entirely in the dissolved form and the lower total metals are due to matrix effects.
-Loads at BBSW-02 and BBSW-01A are calculated from manual flow measurements.
-Loads at WFINTDITCH include loads at WFSW-01.
-Measured Inflow Load for West Fork = Load at WFSW-02 + Load at WFINTDITCH.
-There were no exceedances of the dissolved cobalt surface water quality cleanup level = 0.086 mg/L (Panther Creek). This cleanup level does not apply to the Blackbird Creek.
1 - Load from WFSW-01 is subtracted from WFINTDITCH to avoid double counting in the load, since the new WFSW-01 sample location is the filter outlet which discharges into the WFINTDITCH infiltration ditch. Load from WFSW-03 is not included in total West Fork measured inflow load to avoid double-counting at WFSW-02.

Table 2-4.1d: Blackbird / Panther Creek, May 12, 2020, Synoptic Arsenic Concentration and Loading

Blackbird Creek Station	Tributary, Portal or Spring Station	DISSOLVED ARSENIC						TOTAL ARSENIC					
		Conc. (mg/L)	Load (kg/day)	% Change on Blackbird Creek	Percent of Load at BBSW-01A	Measured Inflow Load (kg/day)[1]	Unaccounted for Load Gain/Loss (kg/day)	Conc. (mg/L)	Load (kg/day)	% Change on Blackbird Creek	Percent of Load at BBSW-01A	Measured Inflow Load (kg/day)[1]	Unaccounted for Load Gain/Loss (kg/day)
MCSW-01		0.011	0.004		0.4%			0.013	0.005		0.5%		
	BBSW-08	0.001	0.014			0.014		0.003	0.042			0.042	
BBSW-07A		0.001	0.022	462%	2.4%		0.004	0.003	0.067	1326.7%	7.3%		0.020
	WTP-003	0.001	0.003					0.001	0.003				
	HGSW-01	0.017	0.002			0.026		0.018	0.002			0.070	
BBSW-07		0.002	0.042	85.8%	4.5%		-0.006	0.003	0.062	-7.1%	6.8%		-0.075
BBSW-05		0.005	0.165	296%	17.9%		0.123	0.006	0.197	216%	21.4%		0.135
BBSW-03		0.007	0.277	68.4%	30.1%		0.113	0.008	0.317	60.4%	34.4%		0.119
	WFSW-03	0.003	0.215					0.003	0.215				
	WFSW-01	0.212	0.135					0.238	0.151				
	WFINTDITCH	0.176	0.150					0.196	0.167				
	WFTTSW-01	0.055	0.0136					0.065	0.016				
	WFSW-02	0.003	0.214			0.377		0.004	0.285			0.468	
BBSW-02		0.005	0.539	94.5%	58.5%		-0.115	0.007	0.754	138%	81.9%		-0.030
BBSW-01A		0.007	0.921	71.0%	100%		0.383	0.010	1.316	74.5%	143%		0.562
	PASW-11	0.001	0.994			0.994		0.001	0.994			0.994	
PASW-09		0.001	1.125	22.1%	122%		-0.790	0.003	3.376	157%	366%		1.066

Notes:
Load = Flow (cfs) * Conc. (in mg/L)* Load Conversion
-Load Conversion = 2.447
-Measured Inflow Load = Loads from tributaries, portals and springs between the current and upstream BLACKBIRD Creek stations.
-Unaccounted Load =Current BLACKBIRD Creek station load - upstream BLACKBIRD Creek station load - total inflow load.
-The dissolved concentrations of some metals (e.g. cobalt) are often higher than the total concentrations.
This is likely due to the fact that the metals are present almost entirely in the dissolved form and the lower total metals are due to matrix effects.
-Loads at BBSW-02 and BBSW-01A are calculated from manual flow measurements.
-Loads at WFINTDITCH include loads at WFSW-01.
-Measured Inflow Load for West Fork = Load at WFSW-02 + Load at WFINTDITCH.
-There were no exceedances of the EPA cleanup level for total arsenic of 0.010 mg/L for Blackbird Creek Stations. This cleanup level does not apply to the Blackbird "Tributary, Portal, or Spring Stations".
1 - Load from WFSW-01 is subtracted from WFINTDITCH to avoid double counting in the load, since the new WFSW-01 sample location is the filter outlet which discharges into the WFINTDITCH infiltration ditch. Load from WFSW-03 is not included in total West Fork measured inflow load to avoid double-counting at WFSW-02.

Table 2-4.2a: Bucktail / South Fork Big Deer / Big Deer Creek, May 5, 2020, Synoptic Reach Gain-Loss Analysis

Big Deer Creek Station	Tributary, Portal or Spring Station	Creek Flow (cfs)	Measured Inflow (cfs)	Total Inflow (cfs)	Flow Between Stations		Unaccounted Flow Percent of Total at BDSW-03	Sta. Flow Percent of Total at BDSW-03
					Unaccounted for Flow Gain (+)/Loss (-)	Percent Change		
BTSW-01.6		0.035						0.1%
BTSW-01		0.38			0.34	983%	0.52%	0.6%
	SFSW-04		3.04	3.04				4.6%
SFSW-02								
SFSW-01		3.41			-0.01	797%	-0.02%	5.1%
	BDSW-04		56.7	56.7				85.3%
BDSW-03		66.5			6.39	1850%	9.6%	100%
BDSW-01								
	PASW-05		325	325				488%

Notes:
-Measured Inflow = Flows from tributaries, portals and springs between BIG DEER Creek stations.
-Total Inflow = Sum of all measured inflows between BIG DEER Creek stations.
-Unaccounted for Flow = Current BIG DEER Creek station flow - upstream BIG DEER Creek station flow - total inflow.
-Flows at BTSW-01 were calculated using the weir flow conversion equation at Lower Bucktail.
-Flows at SFSW-04 are estimated as the difference between flows at SFSW-01 and BTSW-01
-Flow measurements are not required at BDSW-01, SFSW-02, or SFSW-04.
-Flows at SFSW-01 are used to calculate loads at SFSW-02.
-Flows at BDSW-03 are used to calculate loads at BDSW-01.
-Flow measurements were not obtained at PASW-05 nor PASW-04X due to unsafe conditions. Since no flow is available from PASW-05, flows at PASW-09 (258 cfs on 5/5/20 at 17:15 per USGS gaging station) and BDSW-03 are used to estimate flow for PASW-05 (i.e. PASW-09 + BDSW-03 = PASW-05) for the purpose of loading calculations.

Table 2-4.2b: Bucktail / South Fork Big Deer / Big Deer Creek, May 5, 2020, Synoptic Copper Concentration and Loading

Big Deer Creek Station	Tributary, Portal or Spring Station	Cu IWQS Acute (CMC) (mg/L)	Cu IWQS Chronic (CCC) (mg/L)	DISSOLVED COPPER						TOTAL COPPER					
				Conc. (mg/L)	Load (kg/day)	% Change on Big Deer Creek	Percent of Load at BDSW-03	Measured Inflow Load (kg/day)	Unaccounted for Load Gain/Loss kg/day)	Conc. (mg/L)	Load (kg/day)	% Change on Big Deer Creek	Percent of Load at BDSW-03	Measured Inflow Load (kg/day)	Unaccounted for Load Gain/Loss (kg/day)
BTSW-01.6				0.0690	0.006		2.6%			0.0757	0.007		2.3%		
BTSW-01				0.0439	0.041	589%	17.9%			0.0482	0.045	589%	16.2%		
	SFSW-04			0.0003	0.002			0.002		0.0008	0.006			0.006	
SFSW-02		0.0122	0.0084	0.0085	0.071	73.8%	31.1%		0.028	0.0110	0.092	105%	33.2%		0.041
SFSW-01		0.0122	0.0084	0.0119	0.099	40.0%	43.6%		0.028	0.0162	0.135	47.3%	48.9%		0.043
	BDSW-04	0.0046	0.0035	0.0004	0.055			0.055		0.0008	0.111			0.111	
BDSW-03		0.0046	0.0035	0.0014	0.228	129%	100%		0.073	0.0017	0.277	105%	100%		0.030
BDSW-01		0.0046	0.0035	0.0055	0.895	293%	393%		0.667	0.0070	1.139	312%	412%		0.862
	PASW-05	0.0046	0.0035	0.0021	1.667			1.67		0.0026	2.06			2.06	

Notes:
Load = Flow (cfs) * Conc. (in mg/L)* Load Conversion
-Load Conversion = 2.447
-Measured Inflow Load = Loads from tributaries, portals and springs between the current and upstream BIG DEER Creek stations.
-Unaccounted Load =Current BIG DEER Creek station load - upstream BIG DEER Creek station load - total inflow load.
-The dissolved concentrations of some metals (e.g. cobalt) are often higher than the total concentrations.
This is likely due to the fact that the metals are present almost entirely in the dissolved form and the lower total metals are due to matrix effects.
-Flows at SFSW-01 are used to calculate loads at SFSW-02.
-Flows at BDSW-03 are used to calculate loads at BDSW-01.
-Light purple shaded cells indicate dissolved copper results are above the CCC. Light green shaded cells indicate dissolved copper results are above the CMC and CCC.

Table 2-4.2c: Bucktail / South Fork Big Deer/ Big Deer Creek, May 5, 2020, Synoptic Cobalt Concentration and Loading

Big Deer Creek Station	Tributary, Portal or Spring Station	DISSOLVED COBALT						TOTAL COBALT					
		Conc. (mg/L)	Load (kg/day)	% Change on Big Deer Creek	Percent of Load at BDSW-03	Measured Inflow Load (kg/day)	Unaccounted for Load Gain/Loss (kg/day)	Conc. (mg/L)	Load (kg/day)	% Change on Big Deer Creek	Percent of Load at BDSW-03	Measured Inflow Load (kg/day)	Unaccounted for Load Gain/Loss (kg/day)
BTSW-01.6		0.0965	0.008		6.4%			0.0985	0.008		5.8%		
BTSW-01		0.1110	0.103	1145%	79.3%		0.095	0.1110	0.103	1120%	70.5%		0.095
	SFSW-04	0.0001	0.001			0.001		0.0001	0.001			0.001	
SFSW-02		0.0111	0.093	-10.3%	71.1%		-0.011	0.0111	0.093	-10.3%	63.2%		-0.011
SFSW-01		0.0110	0.092	-0.9%	70.5%			0.0116	0.097	4.5%	66.1%		
	BDSW-04	0.0001	0.014			0.014		0.0001	0.014			0.014	
BDSW-03		0.0008	0.130	41.9%	100%		0.025	0.0009	0.146	51.3%	100%		0.036
BDSW-01		0.0012	0.195	50.0%	150%		0.065	0.0015	0.244	66.7%	167%		0.098
	PASW-05	0.0061	4.84			4.84		0.0081	6.43			6.43	

Notes:
Load = Flow (cfs) * Conc. (in mg/L)* Load Conversion
-Load Conversion = 2.447
-Measured Inflow Load = Loads from tributaries, portals and springs between the current and upstream BIG DEER Creek stations.
-Unaccounted Load =Current BIG DEER Creek station load - upstream BIG DEER Creek station load - total inflow load.
-The dissolved concentrations of some metals (e.g. cobalt) are often higher than the total concentrations.
This is likely due to the fact that the metals are present almost entirely in the dissolved form and the lower total metals are due to matrix effects.
-Flows at SFSW-01 are used to calculate loads at SFSW-02.
-Flows at BDSW-03 are used to calculate loads at BDSW-01.
-There were no exceedances of the dissolved cobalt surface water quality cleanup level = 0.086 mg/L (Big Deer Creek and South Fork Big Deer Creek).

Table 2-4.2d: Bucktail / South Fork Big Deer / Big Deer Creek, May 26, 2020, Synoptic Reach Gain-Loss Analysis

Big Deer Creek Station	Tributary, Portal or Spring Station	Creek Flow (cfs)	Measured Inflow (cfs)	Total Inflow (cfs)	Flow Between Stations		Unaccounted Flow Percent of Total at BDSW-03	Sta. Flow Percent of Total at BDSW-03
					Unaccounted for Flow Gain (+)/Loss (-)	Percent Change		
BTSW-01.6		0.097						0.1%
BTSW-01		0.77			0.67	694%	0.77%	0.9%
	SFSW-04		8.39	8.39				9.6%
SFSW-02								
SFSW-01		8.87			-0.29	1052%	-0.33%	10.1%
	BDSW-04		72.8	72.8				83.0%
BDSW-03		87.8			6.08	889%	6.9%	100%
BDSW-01								
	PASW-05		480	480				547%

Notes:
-Measured Inflow = Flows from tributaries, portals and springs between BIG DEER Creek stations.
-Total Inflow = Sum of all measured inflows between BIG DEER Creek stations.
-Unaccounted for Flow = Current BIG DEER Creek station flow - upstream BIG DEER Creek station flow - total inflow.
-Flows at BTSW-01 were calculated using the weir flow conversion equation at Lower Bucktail.
-Flows at SFSW-04 are estimated as the difference between flows at SFSW-01 and BTSW-01
-Flow measurements are not required at BDSW-01, SFSW-02, or SFSW-04.
-Flows at SFSW-01 are used to calculate loads at SFSW-02.
-Flows at BDSW-03 are used to calculate loads at BDSW-01.
-Flow measurements were not obtained at PASW-05 nor PASW-04X due to unsafe conditions. Since no flow is available from PASW-05, flows at PASW-09 (392cfs 'A' on 5/26/20 at 13:45 per USGS gaging station) and BDSW-03 are used to estimate flow for PASW-05 (i.e. PASW-09 + BDSW-03 = PASW-05) for the purpose of loading calculations.

Table 2-4.2e: Bucktail / South Fork Big Deer / Big Deer Creek, May 26, 2020, Synoptic Copper Concentration and Loading

Big Deer Creek Station	Tributary, Portal or Spring Station	Cu IWQS Acute (CMC) (mg/L)	Cu IWQS Chronic (CCC) (mg/L)	DISSOLVED COPPER						TOTAL COPPER					
				Conc. (mg/L)	Load (kg/day)	% Change on Big Deer Creek	Percent of Load at BDSW-03	Measured Inflow Load (kg/day)	Unaccounted for Load Gain/Loss kg/day)	Conc. (mg/L)	Load (kg/day)	% Change on Big Deer Creek	Percent of Load at BDSW-03	Measured Inflow Load (kg/day)	Unaccounted for Load Gain/Loss (kg/day)
BTSW-01.6				0.0638	0.015		3.9%			0.0735	0.017		3.1%		
BTSW-01				0.0468	0.088	482%	22.8%			0.0624	0.118	574%	21.1%		
	SFSW-04			0.0003	0.006			0.006		0.0004	0.008			0.008	
SFSW-02		0.0094	0.0066	0.0053	0.115	30.5%	29.8%		0.021	0.0090	0.195	66.1%	35.0%		0.070
SFSW-01		0.0094	0.0066	0.0080	0.174	50.9%	44.9%		0.059	0.0163	0.354	81.1%	63.4%		0.158
	BDSW-04	0.0046	0.0035	0.0003	0.053			0.053		0.0013	0.232			0.232	
BDSW-03		0.0046	0.0035	0.0018	0.386	123%	100%		0.159	0.0026	0.558	57.8%	100%		-0.027
BDSW-01		0.0046	0.0035	0.0044	0.945	144%	244%		0.558	0.0085	1.83	227%	327%		1.27
	PASW-05	0.0046	0.0035	0.0014	1.64			1.64		0.0022	2.58			2.58	

Notes:
Load = Flow (cfs) * Conc. (in mg/L)* Load Conversion
-Load Conversion = 2.447
-Measured Inflow Load = Loads from tributaries, portals and springs between the current and upstream BIG DEER Creek stations.
-Unaccounted Load =Current BIG DEER Creek station load - upstream BIG DEER Creek station load - total inflow load.
-The dissolved concentrations of some metals (e.g. cobalt) are often higher than the total concentrations.
This is likely because the metals are present almost entirely in the dissolved form and the lower total metals are due to matrix effects.
-Flows at SFSW-01 are used to calculate loads at SFSW-02.
-Flows at BDSW-03 are used to calculate loads at BDSW-01.
-Light purple shaded cells indicate dissolved copper results are above the CCC. None of the dissolved copper results were above the CMC and CCC.

Table 2-4.2f: Bucktail / South Fork Big Deer/ Big Deer Creek, May 26, 2020, Synoptic Cobalt Concentration and Loading

Big Deer Creek Station	Tributary, Portal or Spring Station	DISSOLVED COBALT						TOTAL COBALT					
		Conc. (mg/L)	Load (kg/day)	% Change on Big Deer Creek	Percent of Load at BDSW-03	Measured Inflow Load (kg/day)	Unaccounted for Load Gain/Loss (kg/day)	Conc. (mg/L)	Load (kg/day)	% Change on Big Deer Creek	Percent of Load at BDSW-03	Measured Inflow Load (kg/day)	Unaccounted for Load Gain/Loss (kg/day)
BTSW-01.6		0.0824	0.020		8.3%			0.0923	0.022		8.5%		
BTSW-01		0.0848	0.160	717%	67.6%		0.140	0.0898	0.169	672%	65.7%		0.147
	SFSW-04	0.0001	0.002			0.002		0.0001	0.002			0.002	
SFSW-02		0.0063	0.137	-14.4%	57.9%		-0.025	0.0066	0.143	-15.3%	55.6%		-0.028
SFSW-01		0.0070	0.152	11.1%	64.3%			0.0079	0.171	19.7%	66.5%		
	BDSW-04	0.0001	0.018			0.018		0.0001	0.018			0.018	
BDSW-03		0.0011	0.236	55.5%	100%		0.066	0.0012	0.258	50.3%	100%		0.068
BDSW-01		0.0014	0.301	27.3%	127%			0.0020	0.429	66.7%	167%		
	PASW-05	0.0042	4.93			4.93		0.0057	6.69			6.69	

Notes:
Load = Flow (cfs) * Conc. (in mg/L)* Load Conversion
-Load Conversion = 2.447
-Measured Inflow Load = Loads from tributaries, portals and springs between the current and upstream BIG DEER Creek stations.
-Unaccounted Load =Current BIG DEER Creek station load - upstream BIG DEER Creek station load - total inflow load.
-The dissolved concentrations of some metals (e.g. cobalt) are often higher than the total concentrations.
This is likely because the metals are present almost entirely in the dissolved form and the lower total metals are due to matrix effects.
-Flows at SFSW-01 are used to calculate loads at SFSW-02.
-Flows at BDSW-03 are used to calculate loads at BDSW-01.
-Flow measurements were not obtained at PASW-04X nor PASW-05 due to unsafe conditions.
-There were no exceedances of the dissolved cobalt surface water quality cleanup level = 0.086 mg/L (Big Deer Creek and South Fork Big Deer Creek).

Table 2.4.3a: Bucktail / South Fork Big Deer / Big Deer Creek, September 9, 2020, Synoptic Reach Gain-Loss Analysis

Big Deer Creek Station	Tributary, Portal or Spring Station	Creek Flow (cfs)	Measured Inflow (cfs)	Total Inflow (cfs)	Flow Between Stations		Unaccounted Flow Percent of Total at BDSW-03	Sta. Flow Percent of Total at BDSW-03
					Unaccounted for Flow Gain (+)/Loss (-)	Percent Change		
BTSW-01.6		0.07						0.6%
BTSW-01		0.21			0.14	200%	1.2%	1.8%
	SFSW-04		2.02	2.02				17.2%
SFSW-02								
SFSW-01		2.74			0.51	1205%	4.4%	23.4%
	BDSW-04		8.09	8.09				69.0%
BDSW-03		11.7			0.89	328%	7.6%	100%
BDSW-01								
	PASW-05		71.5	71.5				610%
PASW-04X		76.7						654%

Notes:
-Measured Inflow = Flows from tributaries, portals and springs between BIG DEER Creek stations.
-Total Inflow = Sum of all measured inflows between BIG DEER Creek stations.
-Unaccounted for Flow = Current BIG DEER Creek station flow - upstream BIG DEER Creek station flow - total inflow.
-Flows at BTSW-01 were calculated using the weir flow conversion equation at Lower Bucktail.
-Flow measurements are not required at BDSW-01 or SFSW-02.

Table 2.4.3b: Bucktail / South Fork Big Deer / Big Deer Creek, September 9, 2020, Synoptic Copper Concentration and Loading

Big Deer Creek Station	Tributary, Portal or Spring Station	Cu IWQS Acute (CMC) (mg/L)	Cu IWQS Chronic (CCC) (mg/L)	DISSOLVED COPPER						TOTAL COPPER					
				Conc. (mg/L)	Load (kg/day)	% Change on Big Deer Creek	Percent of Load at BDSW-03	Measured Inflow Load (kg/day)	Unaccounted for Load Gain/Loss (kg/day)	Conc. (mg/L)	Load (kg/day)	% Change on Big Deer Creek	Percent of Load at BDSW-03	Measured Inflow Load (kg/day)	Unaccounted for Load Gain/Loss (kg/day)
BTSW-01.6				0.0689	0.012		18.7%			0.0762	0.013		15.2%		
BTSW-01				0.0374	0.019	62.8%	30.5%			0.0454	0.023	78.7%	27.1%		
	SFSW-04			0.0003	0.001			0.001		0.0004	0.002			0.002	
SFSW-02		0.0131	0.0090	0.0076	0.051	165%	80.8%		0.030	0.0093	0.062	167%	72.5%		0.037
SFSW-01		0.0133	0.0091	0.0103	0.069	35.5%	109%		0.018	0.0167	0.112	79.6%	130%		0.050
	BDSW-04	0.0056	0.0041	0.0003	0.006			0.006		0.0004	0.008			0.008	
BDSW-03		0.0070	0.0051	0.0022	0.063	-8.6%	100%		-0.012	0.0030	0.086	-23.2%	100%		-0.034
BDSW-01		0.0073	0.0053	0.0030	0.086	36.4%	136%		0.023	0.0040	0.115	33.3%	133%		0.029
	PASW-05	0.0071	0.0052	0.0005	0.088			0.088		0.0007	0.123			0.123	
PASW-04X		0.0068	0.0050	0.0009	0.169	96%	268%		-0.005	0.0012	0.225	96%	357%		-0.012

Notes: Cu - Copper; IWQS - Idaho Water Quality Standards; CMC - Acute Copper Criterion; CCC - Chronic Copper Criterion
Load = Flow (cfs) * Conc. (in mg/L)* Load Conversion
-Load Conversion = 2.447
-Measured Inflow Load = Loads from tributaries, portals and springs between the current and upstream BIG DEER Creek stations.
-Unaccounted Load =Current BIG DEER Creek station load - upstream BIG DEER Creek station load - total inflow load.
-The dissolved concentrations of some metals (e.g. cobalt) are often higher than the total concentrations.
This is likely because the metals are present almost entirely in the dissolved form and the lower total metals are due to matrix effects.
-Flows at SFSW-01 are used to calculate loads at SFSW-02.
-Flows at BDSW-03 are used to calculate loads at BDSW-01.
-Light purple shaded cells indicate dissolved copper results are above the CCC. None of the dissolved copper results were above the CMC and CCC.

Table 2.4.3c: Bucktail / South Fork Big Deer/ Big Deer Creek, September 9, 2020, Synoptic Cobalt Concentration and Loading

Big Deer Creek Station	Tributary, Portal or Spring Station	DISSOLVED COBALT						TOTAL COBALT					
		Conc. (mg/L)	Load (kg/day)	% Change on Big Deer Creek	Percent of Load at BDSW-03	Measured Inflow Load (kg/day)	Unaccounted for Load Gain/Loss (kg/day)	Conc. (mg/L)	Load (kg/day)	% Change on Big Deer Creek	Percent of Load at BDSW-03	Measured Inflow Load (kg/day)	Unaccounted for Load Gain/Loss (kg/day)
BTSW-01.6		0.0866	0.015		14.4%			0.0853	0.015		18.2%		
BTSW-01		0.1390	0.071	382%	69.2%		0.057	0.1990	0.102	600%	127%		0.088
	SFSW-04	0.0007	0.003			0.003		0.0001	0.000			0.0005	
SFSW-02		0.0155	0.104	45.5%	101%		0.029	0.0151	0.101	-1.0%	126%		-0.002
SFSW-01		0.0154	0.103	-0.65%	100%			0.0145	0.097	-4.0%	121%		
	BDSW-04	0.0001	0.002			0.002		0.0001	0.002			0.002	
BDSW-03		0.0036	0.103	0.0%	100%		-0.002	0.0028	0.080	-17.4%	100%		-0.019
BDSW-01		0.0025	0.072	-30.6%	69.4%			0.0019	0.054	-32.1%	67.9%		
	PASW-05	0.0119	2.08			2.08		0.0112	1.96			1.96	
PASW-04X		0.0100	1.88	2517%	1817%		-0.278	0.0094	1.76	3137%	1708%		-0.251

Notes: Co - Cobalt; IWQS - Idaho Water Quality Standards; CMC - Acute Copper Criterion; CCC - Chronic Copper Criterion
Load = Flow (cfs) * Conc. (in mg/L)* Load Conversion
-Load Conversion = 2.447
-Measured Inflow Load = Loads from tributaries, portals and springs between the current and upstream BIG DEER Creek stations.
-Unaccounted Load =Current BIG DEER Creek station load - upstream BIG DEER Creek station load - total inflow load.
-The dissolved concentrations of some metals (e.g. cobalt) are often higher than the total concentrations.
This is likely because the metals are present almost entirely in the dissolved form and the lower total metals are due to matrix effects.
-Flows at SFSW-01 are used to calculate loads at SFSW-02.
-Flows at BDSW-03 are used to calculate loads at BDSW-01.
-There were no exceedances of the dissolved cobalt surface water quality cleanup level = 0.086 mg/L (Big Deer Creek and South Fork Big Deer Creek).

Table 2.4.3d: Bucktail / South Fork Big Deer / Big Deer Creek, September 28, 2020, Synoptic Reach Gain-Loss Analysis

Big Deer Creek Station	Tributary, Portal or Spring Station	Creek Flow (cfs)	Measured Inflow (cfs)	Total Inflow (cfs)	Flow Between Stations		Unaccounted Flow Percent of Total at BDSW-03	Sta. Flow Percent of Total at BDSW-03
					Unaccounted for Flow Gain (+)/Loss (-)	Percent Change		
BTSW-01.6		0.056						0.6%
BTSW-01		0.22			0.16	293%	1.8%	2.4%
	SFSW-04		2.08	2.08				22.6%
SFSW-02								
SFSW-01		2.27			-0.03	932%	-0.3%	24.6%
	BDSW-04		7.73	7.73				83.8%
BDSW-03		9.22			-0.78	306%	-8.5%	100%
BDSW-01								
	PASW-05		67.0	67.0				726%
PASW-04X		70.8						768%

Notes:
-Measured Inflow = Flows from tributaries, portals and springs between BIG DEER Creek stations.
-Total Inflow = Sum of all measured inflows between BIG DEER Creek stations.
-Unaccounted for Flow = Current BIG DEER Creek station flow - upstream BIG DEER Creek station flow - total inflow.
-Flows at BTSW-01 were calculated using the weir flow conversion equation at Lower Bucktail.
-Flow measurements are not required at BDSW-01 or SFSW-02.

Table 2.4.3e: Bucktail / South Fork Big Deer / Big Deer Creek, September 28, 2020, Synoptic Copper Concentration and Loading

Big Deer Creek Station	Tributary, Portal or Spring Station	Cu IWQS Acute (CMC) (mg/L)	Cu IWQS Chronic (CCC) (mg/L)	DISSOLVED COPPER						TOTAL COPPER					
				Conc. (mg/L)	Load (kg/day)	% Change on Big Deer Creek	Percent of Load at BDSW-03	Measured Inflow Load (kg/day)	Unaccounted for Load Gain/Loss (kg/day)	Conc. (mg/L)	Load (kg/day)	% Change on Big Deer Creek	Percent of Load at BDSW-03	Measured Inflow Load (kg/day)	Unaccounted for Load Gain/Loss (kg/day)
BTSW-01.6				0.0813	0.011		17.0%			0.0813	0.011		13.3%		
BTSW-01				0.0422	0.023	104%	34.7%			0.0717	0.039	246%	46.2%		
	SFSW-04			0.0004	0.002			0.002		0.0004	0.002			0.002	
SFSW-02		0.0133	0.0091	0.0097	0.054	137%	82.4%		0.029	0.0126	0.070	81.3%	83.8%		0.029
SFSW-01		0.0131	0.0090	0.0134	0.074	38.1%	114%		0.021	0.0179	0.099	42.1%	119%		0.029
	BDSW-04	0.0053	0.0039	0.0004	0.008			0.008		0.0014	0.026			0.026	
BDSW-03		0.0072	0.0052	0.0029	0.065	-12.1%	100%		-0.017	0.0037	0.083	-16.0%	100%		-0.042
BDSW-01		0.0072	0.0052	0.0045	0.102	55.2%	155%		0.036	0.0051	0.115	37.8%	138%		0.032
	PASW-05	0.0071	0.0051	0.0005	0.082			0.082		0.0008	0.131			0.131	
PASW-04X		0.0068	0.0050	0.0010	0.173	71%	265%		-0.010	0.0015	0.260	126%	397%		0.014

Notes: Cu - Copper; IWQS - Idaho Water Quality Standards; CMC - Acute Copper Criterion; CCC - Chronic Copper Criterion
Load = Flow (cfs) * Conc. (in mg/L)* Load Conversion
-Load Conversion = 2.447
-Measured Inflow Load = Loads from tributaries, portals and springs between the current and upstream BIG DEER Creek stations.
-Unaccounted Load =Current BIG DEER Creek station load - upstream BIG DEER Creek station load - total inflow load.
-The dissolved concentrations of some metals (e.g. cobalt) are often higher than the total concentrations.
This is likely because the metals are present almost entirely in the dissolved form and the lower total metals are due to matrix effects.
-Flows at SFSW-01 are used to calculate loads at SFSW-02.
-Flows at BDSW-03 are used to calculate loads at BDSW-01.
-Light purple shaded cells indicate dissolved copper results are above the CCC. Light green shaded cells indicate dissolved copper results were above the CMC and CCC.

Table 2.4.3f: Bucktail / South Fork Big Deer/ Big Deer Creek, September 28, 2020, Synoptic Cobalt Concentration and Loading

Big Deer Creek Station	Tributary, Portal or Spring Station	DISSOLVED COBALT						TOTAL COBALT					
		Conc. (mg/L)	Load (kg/day)	% Change on Big Deer Creek	Percent of Load at BDSW-03	Measured Inflow Load (kg/day)	Unaccounted for Load Gain/Loss (kg/day)	Conc. (mg/L)	Load (kg/day)	% Change on Big Deer Creek	Percent of Load at BDSW-03	Measured Inflow Load (kg/day)	Unaccounted for Load Gain/Loss (kg/day)
BTSW-01.6		0.0874	0.012		19.0%			0.0867	0.012		18.2%		
BTSW-01		0.1330	0.072	498%	113%		0.060	0.1360	0.073	516%	112%		0.061
	SFSW-04	0.0002	0.001			0.001		0.0002	0.001			0.001	
SFSW-02		0.0140	0.078	8.61%	123%		0.005	0.0140	0.078	6.22%	119%		0.004
SFSW-01		0.0135	0.075	-3.57%	119%			0.0134	0.074	-4.29%	114%		
	BDSW-04	0.0001	0.002			0.002		0.0001	0.002			0.002	
BDSW-03		0.0028	0.063	-15.8%	100%		-0.014	0.0029	0.065	-12.1%	100%		-0.011
BDSW-01		0.0018	0.041	-35.7%	64.3%			0.0019	0.043	-34.5%	65.5%		
	PASW-05	0.0112	1.84			1.84		0.0121	1.98			1.98	
PASW-04X		0.0097	1.68	4036%	2659%		-0.196	0.0104	1.80	4101%	2851%		-0.225

Notes: Co - Cobalt; IWQS - Idaho Water Quality Standards; CMC - Acute Copper Criterion; CCC - Chronic Copper Criterion
Load = Flow (cfs) * Conc. (in mg/L)* Load Conversion
-Load Conversion = 2.447
-Measured Inflow Load = Loads from tributaries, portals and springs between the current and upstream BIG DEER Creek stations.
-Unaccounted Load =Current BIG DEER Creek station load - upstream BIG DEER Creek station load - total inflow load.
-The dissolved concentrations of some metals (e.g. cobalt) are often higher than the total concentrations.
This is likely because the metals are present almost entirely in the dissolved form and the lower total metals are due to matrix effects.
-Flows at SFSW-01 are used to calculate loads at SFSW-02.
-Flows at BDSW-03 are used to calculate loads at BDSW-01.
-There were no exceedances of the dissolved cobalt surface water quality cleanup level = 0.086 mg/L (Big Deer Creek and South Fork Big Deer Creek).

Table 2-6: Blackbird Mine Water Treatment Plant Effluent, 2020

Month	Flow		Total Cobalt		Dissolved Cobalt		Total Copper		Dissolved Copper		Total Iron		Dissolved Iron	
	Gallons	Cubic Meters	mg/L	kg/month	mg/L	kg/month	mg/L	kg/month	mg/L	kg/month	mg/L[1]	kg/month	mg/L[1]	kg/month
January		0												
February		0												
March	22,539,000	85,320	0.236	20.14	0.180	15.4	0.074	6.31	0.005	0.43	0.38	32.42	< 0.015	< 1.28
April	15,633,000	59,178	0.581	34.38	0.560	33.1	0.035	2.07	0.012	0.71	0.11	6.51	< 0.015	< 0.89
May	25,887,000	97,994	0.221	21.66	0.208	20.4	0.036	3.53	0.010	1.00	0.05	4.90	< 0.015	1.47
June	21,355,000	80,838	0.154	12.45	0.142	11.5	0.053	4.28	0.011	0.89	0.08	6.47	0.040	< 3.23
July	15,693,000	59,405	0.143	8.49	0.124	7.37	0.049	2.91	0.009	0.53	0.08	4.75	0.100	< 5.94
August	11,784,000	44,587	0.083	3.70	0.079	3.52	0.038	1.69	0.019	0.85	0.11	4.90	0.040	1.78
September	8,427,000	31,885	0.080	2.55	0.084	2.68	0.034	1.08	0.012	0.38	0.08	2.55	< 0.015	0.48
October	7,092,000	26,834	0.120	3.22	0.110	2.95	0.026	0.70	0.011	0.30	0.10	2.68	< 0.015	< 0.40
November	5,661,000	21,420	0.113	2.42	0.108	2.31	0.022	0.47	0.005	0.11	0.10	2.14	< 0.015	< 0.32
December	837,000	3,167	0.114	0.36	0.105	0.33	0.019	0.06	0.006	0.02	0.07	0.22	< 0.015	< 0.05
Totals	**134,908,000**	**510,628**		**109.37**		**99.52**		**23.12**		**5.21**		**67.55**		**< 15.84**
Average			**0.185**		**0.170**		**0.039**		**0.010**		**0.12**		**< 0.03**	

Note:
1. Results preceded by a '<' symbol represent non-detect values, which are reported in the table at half of the analytical laboratory reporting limit.

Table 2-7: Historic Change in Dissolved Copper Concentrations between BDSW-01 & BDSW-03 - 1990 through 2020

StartDateTime	BDSW-01 (mg/L)	BDSW-03 (mg/L)	BDSW-01 - BDSW-03 (mg/L)
11/30/1990	0.070	0.040	0.030
4/12/1991	0.070	0.040	0.030
4/25/1991	0.070	0.060	0.010
5/10/1991	0.200	0.180	0.020
7/9/1991	0.240	0.260	-0.020
8/13/1991	0.130	0.110	0.020
10/1/1992	0.063	0.105	-0.042
5/13/1993	0.112	0.077	0.035
9/9/1994	0.074	0.114	-0.040
10/17/1998	0.080	0.076	0.004
5/28/1999	0.034	0.035	-0.001
9/22/1999	0.028	0.025	0.003
5/20/2002	0.023	0.011	0.012
9/19/2002	0.015	0.015	0.000
5/29/2003	0.028	0.012	0.016
6/17/2003	0.003	0.007	-0.004
9/23/2003	0.009	0.010	-0.001
4/14/2004	0.009	0.003	0.006
4/21/2004	0.009	0.005	0.004
4/28/2004	0.012	0.005	0.007
5/5/2004	0.008	0.003	0.005
5/19/2004	0.012	0.005	0.007
5/26/2004	0.010	0.005	0.005
6/2/2004	0.008	0.007	0.001
6/9/2004	0.006	0.003	0.003
6/15/2004	0.008	0.004	0.004
9/24/2004	0.011	0.011	0.000
5/20/2006	0.011	0.006	0.005
5/23/2006	0.007	0.004	0.003
5/30/2006	0.007	0.005	0.002
10/20/2006	0.008	0.006	0.002
4/25/2007	0.008	0.004	0.004
5/8/2007	0.007	0.003	0.004
5/21/2007	0.007	0.002	0.005
10/8/2007	0.007	0.005	0.002
5/12/2008	0.007	0.003	0.004
5/13/2008	0.007	0.003	0.004
5/14/2008	0.008	0.003	0.005
5/15/2008	0.012	0.007	0.005
5/16/2008	0.010	0.006	0.004
5/27/2008	0.006	0.003	0.003
5/28/2008	0.006	0.003	0.003
5/29/2008	0.006	0.003	0.003
5/30/2008	0.006	0.004	0.002
6/4/2008	0.005	0.003	0.002
6/23/2008	0.004	0.002	0.002
6/24/2008	0.004	0.002	0.002
6/25/2008	0.004	0.002	0.002
6/26/2008	0.004	0.002	0.002
9/29/2008	0.006	0.005	0.001
9/30/2008	0.006	0.005	0.001
10/1/2008	0.006	0.005	0.001
10/2/2008	0.006	0.005	0.001
5/11/2009	0.007	0.003	0.004
5/11/2009	0.007	0.003	0.004
5/11/2009	0.007	0.004	0.003

Table 2-7: Historic Change in Dissolved Copper Concentrations between BDSW-01 & BDSW-03 - 1990 through 2020

StartDateTime	BDSW-01 (mg/L)	BDSW-03 (mg/L)	BDSW-01 - BDSW-03 (mg/L)
5/12/2009	0.007	0.003	0.004
5/12/2009	0.007	0.003	0.004
5/12/2009	0.007	0.003	0.004
5/13/2009	0.006	0.006	0.000
5/13/2009	0.007	0.003	0.004
5/13/2009	0.007	0.006	0.001
5/14/2009	0.006	0.003	0.003
5/14/2009	0.006	0.003	0.003
5/15/2009	0.010	0.003	0.007
5/26/2009	0.006	0.002	0.004
5/26/2009	0.006	0.002	0.004
5/26/2009	0.006	0.003	0.003
5/27/2009	0.005	0.002	0.003
5/27/2009	0.006	0.002	0.004
5/27/2009	0.006	0.002	0.004
5/28/2009	0.005	0.002	0.003
5/28/2009	0.005	0.002	0.003
5/28/2009	0.006	0.003	0.003
5/29/2009	0.005	0.002	0.003
5/29/2009	0.005	0.002	0.003
5/29/2009	0.005	0.003	0.002
6/2/2009	0.006	0.002	0.004
6/8/2009	0.004	0.002	0.002
6/8/2009	0.004	0.002	0.002
6/8/2009	0.004	0.002	0.002
6/9/2009	0.004	0.002	0.002
6/9/2009	0.005	0.002	0.003
6/9/2009	0.004	0.002	0.002
6/10/2009	0.004	0.002	0.002
6/10/2009	0.005	0.002	0.003
6/10/2009	0.005	0.002	0.003
6/11/2009	0.004	0.002	0.002
6/11/2009	0.004	0.002	0.002
6/11/2009	0.004	0.002	0.002
9/28/2009	0.005	0.004	0.001
9/28/2009	0.005	0.004	0.001
9/28/2009	0.005	0.005	0.000
9/29/2009	0.005	0.005	0.000
9/29/2009	0.006	0.005	0.001
9/29/2009	0.007	0.005	0.002
9/30/2009	0.009	0.005	0.004
9/30/2009	0.006	0.004	0.002
9/30/2009	0.006	0.005	0.001
10/1/2009	0.005	0.004	0.001
10/1/2009	0.006	0.005	0.001
10/1/2009	0.006	0.005	0.001
5/10/2010	0.007	0.003	0.004
5/10/2010	0.007	0.003	0.004
5/10/2010	0.007	0.003	0.004
5/11/2010	0.007	0.004	0.003
5/11/2010	0.007	0.003	0.004
5/11/2010	0.008	0.003	0.005
5/12/2010	0.006	0.003	0.003
5/12/2010	0.007	0.003	0.004
5/12/2010	0.007	0.004	0.003
5/13/2010	0.007	0.003	0.004

Table 2-7: Historic Change in Dissolved Copper Concentrations between BDSW-01 & BDSW-03 - 1990 through 2020

StartDateTime	BDSW-01 (mg/L)	BDSW-03 (mg/L)	BDSW-01 - BDSW-03 (mg/L)
5/13/2010	0.007	0.003	0.004
5/13/2010	0.007	0.003	0.004
5/24/2010	0.005	0.002	0.003
5/24/2010	0.005	0.002	0.003
5/24/2010	0.005	0.002	0.003
5/25/2010	0.005	0.002	0.003
5/25/2010	0.005	0.002	0.003
5/25/2010	0.006	0.002	0.004
5/26/2010	0.005	0.002	0.003
5/26/2010	0.006	0.002	0.004
5/26/2010	0.006	0.003	0.003
5/27/2010	0.006	0.003	0.003
5/27/2010	0.006	0.003	0.003
5/27/2010	0.006	0.003	0.003
6/7/2010	0.005	0.002	0.003
6/8/2010	0.004	0.002	0.002
6/8/2010	0.005	0.002	0.003
6/8/2010	0.005	0.002	0.003
6/9/2010	0.005	0.002	0.003
6/9/2010	0.005	0.002	0.003
6/9/2010	0.005	0.003	0.002
6/10/2010	0.005	0.002	0.003
6/10/2010	0.005	0.002	0.003
6/10/2010	0.005	0.002	0.003
6/11/2010	0.006	0.002	0.004
6/11/2010	0.005	0.005	0.000
9/20/2010	0.006	0.004	0.002
9/20/2010	0.006	0.004	0.002
9/20/2010	0.006	0.004	0.002
9/21/2010	0.005	0.004	0.001
9/21/2010	0.005	0.004	0.001
9/21/2010	0.005	0.003	0.002
9/22/2010	0.005	0.004	0.001
9/22/2010	0.006	0.004	0.002
9/22/2010	0.005	0.003	0.002
9/23/2010	0.005	0.003	0.002
9/23/2010	0.006	0.004	0.002
9/23/2010	0.006	0.005	0.001
5/9/2011	0.009	0.003	0.006
5/10/2011	0.009	0.004	0.005
5/11/2011	0.010	0.004	0.006
5/12/2011	0.010	0.004	0.006
6/6/2011	0.009	0.004	0.005
6/7/2011	0.009	0.004	0.005
6/8/2011	0.018	0.018	0.000
6/10/2011	0.006	0.003	0.003
6/14/2011	0.006	0.003	0.003
6/20/2011	0.007	0.002	0.005
6/21/2011	0.005	0.002	0.003
6/22/2011	0.007	0.003	0.004
6/23/2011	0.008	0.003	0.005
9/6/2011	0.004	0.003	0.001
9/17/2011	0.005	0.004	0.001
9/18/2011	0.005	0.004	0.001
9/19/2011	0.005	0.005	0.000
9/20/2011	0.005	0.004	0.001

Table 2-7: Historic Change in Dissolved Copper Concentrations between BDSW-01 & BDSW-03 - 1990 through 2020

StartDateTime	BDSW-01 (mg/L)	BDSW-03 (mg/L)	BDSW-01 - BDSW-03 (mg/L)
9/21/2011	0.004	0.004	0.000
9/23/2011	0.005	0.004	0.001
5/7/2012	0.0047	0.0021	0.0026
5/8/2012	0.0054	0.0022	0.0032
5/9/2012	0.0055	0.0022	0.0033
5/10/2012	0.0048	0.0019	0.0029
5/21/2012	0.0038	0.0016	0.0022
5/22/2012	0.0038	0.0015	0.0023
5/23/2012	0.0036	0.0016	0.0020
5/24/2012	0.0036	0.0016	0.0020
6/4/2012	0.0032	0.0007	0.0025
6/5/2012	0.0033	0.0015	0.0018
6/6/2012	0.0032	0.0021	0.0011
6/7/2012	0.0035	0.0014	0.0021
9/20/2012	0.0044	0.0035	0.0009
9/24/2012	0.0045	0.0038	0.0007
9/25/2012	0.0047	0.0043	0.0004
9/26/2012	0.0046	0.0037	0.0009
9/27/2012	0.0046	0.0052	-0.0006
4/29/2013	0.0053	0.0016	0.0037
4/29/2013	0.0055	0.0016	0.0039
4/29/2013	0.0054	0.0016	0.0038
4/30/2013	0.0050	0.0016	0.0034
4/30/2013	0.0050	0.0016	0.0034
4/30/2013	0.0057	0.0016	0.0041
5/1/2013	0.0048	0.0016	0.0032
5/1/2013	0.0051	0.0017	0.0034
5/1/2013	0.0049	0.0015	0.0034
5/2/2013	0.0046	0.0014	0.0032
5/2/2013	0.0048	0.0015	0.0033
5/2/2013	0.0050	0.0017	0.0033
5/12/2013	0.0108	0.0037	0.0071
5/13/2013	0.0052	0.0018	0.0034
5/13/2013	0.0053	0.0022	0.0031
5/13/2013	0.0070	0.0021	0.0049
5/14/2013	0.0056	0.0019	0.0037
5/14/2013	0.0054	0.0017	0.0037
5/14/2013	0.0055	0.0017	0.0038
5/15/2013	0.0044	0.0015	0.0029
5/15/2013	0.0045	0.0015	0.0030
5/15/2013	0.0045	0.0020	0.0025
5/16/2013	0.0043	0.0018	0.0025
5/16/2013	0.0043	0.0017	0.0026
5/28/2013	0.0036	0.0012	0.0024
5/28/2013	0.0032	0.0011	0.0021
5/28/2013	0.0032	0.0011	0.0021
5/29/2013	0.0030	0.0009	0.0021
5/29/2013	0.0034	0.0012	0.0022
5/29/2013	0.0038	0.0016	0.0022
5/30/2013	0.0036	0.0015	0.0021
5/30/2013	0.0037	0.0014	0.0023
5/30/2013	0.0037	0.0015	0.0022
5/31/2013	0.0035	0.0015	0.0020
5/31/2013	0.0036	0.0014	0.0022
5/31/2013	0.0036	0.0015	0.0021
9/16/2013	0.0046	0.0034	0.0012

Table 2-7: Historic Change in Dissolved Copper Concentrations between BDSW-01 & BDSW-03 - 1990 through 2020

StartDateTime	BDSW-01	BDSW-03	BDSW-01 - BDSW-03
	(mg/L)	(mg/L)	(mg/L)
9/16/2013	0.0046	0.0034	0.0012
9/16/2013	0.0053	0.0035	0.0018
9/17/2013	0.0040	0.0033	0.0007
9/17/2013	0.0043	0.0033	0.0010
9/17/2013	0.0044	0.0032	0.0012
9/18/2013	0.0088 [1]	0.0037	
9/18/2013	0.0046	0.0036	0.0010
9/18/2013	0.0043	0.0030	0.0013
9/19/2013	0.0039	0.0028	0.0011
9/19/2013	0.0038	0.0028	0.0010
9/19/2013	0.0039	0.0029	0.0010
10/9/2013	0.0042	0.0019	0.0023
4/28/2014	0.0047	0.0021	0.0026
4/28/2014	0.0049	0.0023	0.0026
4/28/2014	0.0043	0.0021	0.0022
4/29/2014	0.0043	0.0021	0.0022
4/29/2014	0.0051	0.0022	0.0029
4/29/2014	0.0043	0.0023	0.0020
4/30/2014	0.0047	0.0021	0.0026
4/30/2014	0.0048	0.0021	0.0027
4/30/2014	0.0047	0.0022	0.0025
5/1/2014	0.0045	0.0021	0.0024
5/1/2014	0.0050	0.0021	0.0029
5/1/2014	0.0055	0.0028	0.0027
5/19/2014	0.0056	0.0025	0.0031
5/19/2014	0.0057	0.0025	0.0032
5/19/2014	0.0057	0.0030	0.0027
5/20/2014	0.0055	0.0023	0.0032
5/20/2014	0.0053	0.0027	0.0026
5/20/2014	0.0051	0.0027	0.0024
5/21/2014	0.0048	0.0026	0.0022
5/21/2014	0.0054	0.0030	0.0024
5/21/2014	0.0053	0.0028	0.0025
5/22/2014	0.0053	0.0027	0.0026
5/22/2014	0.0054	0.0026	0.0028
5/22/2014	0.0057	0.0033	0.0024
6/9/2014	0.0030	0.0013	0.0017
6/9/2014	0.0030	0.0013	0.0017
6/9/2014	0.0031	0.0012	0.0019
6/10/2014	0.0029	0.0011	0.0018
6/10/2014	0.0030	0.0011	0.0019
6/10/2014	0.0031	0.0015	0.0016
6/11/2014	0.0029	0.0014	0.0015
6/11/2014	0.0030	0.0013	0.0017
6/11/2014	0.0036	0.0019	0.0017
6/12/2014	0.0028	0.0013	0.0015
6/12/2014	0.0033	0.0012	0.0021
6/12/2014	0.0031	0.0016	0.0015
9/15/2014	0.0037	0.0034	0.0003
9/29/2014	0.0042	0.0030	0.0012
9/29/2014	0.0045	0.0031	0.0014
9/29/2014	0.0042	0.0030	0.0012
9/30/2014	0.0049	0.0029	0.0020
9/30/2014	0.0053	0.0035	0.0018
9/30/2014	0.0044	0.0025	0.0019

Table 2-7: Historic Change in Dissolved Copper Concentrations between BDSW-01 & BDSW-03 - 1990 through 2020

StartDateTime	BDSW-01 (mg/L)	BDSW-03 (mg/L)	BDSW-01 - BDSW-03 (mg/L)
10/1/2014	0.0044	0.0027	0.0017
10/1/2014	0.0044	0.0032	0.0012
10/1/2014	0.0042	0.0030	0.0012
10/2/2014	0.0041	0.0029	0.0012
10/2/2014	0.0040	0.0029	0.0011
10/2/2014	0.0040	0.0028	0.0012
4/27/2015	0.0037	0.0015	0.0022
4/27/2015	0.0037	0.0015	0.0022
4/27/2015	0.0037	0.0015	0.0022
4/28/2015	0.0037	0.0015	0.0022
4/28/2015	0.0038	0.0016	0.0022
4/28/2015	0.0039	0.0016	0.0023
4/29/2015	0.0037	0.0015	0.0022
4/29/2015	0.0041	0.0016	0.0025
4/29/2015	0.0043	0.0016	0.0027
4/30/2015	0.0040	0.0015	0.0025
4/30/2015	0.0040	0.0016	0.0024
4/30/2015	0.0041	0.0016	0.0025
5/11/2015	0.0031	0.0013	0.0018
5/11/2015	0.0037	0.0012	0.0025
5/11/2015	0.0033	0.0015	0.0018
5/12/2015	0.0033	0.0013	0.0020
5/12/2015	0.0034	0.0015	0.0019
5/12/2015	0.0035	0.0015	0.0020
5/13/2015	0.0035	0.0048 [2]	
5/13/2015	0.0032	0.0015	0.0017
5/13/2015	0.0035	0.0014	0.0021
5/14/2015	0.0034	0.0014	0.0020
5/14/2015	0.0035	0.0014	0.0021
5/14/2015	0.0037	0.0016	0.0021
5/25/2015	0.0032	0.0014	0.0018
5/25/2015	0.0032	0.0016	0.0016
5/25/2015	0.0030	0.0014	0.0016
5/26/2015	0.0029	0.0012	0.0017
5/26/2015	0.0032	0.0014	0.0018
5/26/2015	0.0072 [3]	0.0014	
5/27/2015	0.0030	0.0013	0.0017
5/27/2015	0.0028	0.0014	0.0014
5/27/2015	0.0031	0.0014	0.0017
5/28/2015	0.0028	0.0015	0.0013
5/28/2015	0.0029	0.0013	0.0016
5/28/2015	0.0029	0.0012	0.0017
9/9/2015	0.0034	0.0031	0.0003
9/28/2015	0.0043	0.0031	0.0012
9/28/2015	0.0037	0.0034	0.0003
9/28/2015	0.0035	0.0032	0.0003
9/29/2015	0.0035	0.0033	0.0002
9/29/2015	0.0033	0.0031	0.0002
9/29/2015	0.0039	0.0033	0.0006
9/30/2015	0.0035	0.0031	0.0004
9/30/2015	0.0033	0.0031	0.0002
9/30/2015	0.0035	0.0029	0.0006
10/1/2015	0.0037	0.0035	0.0002
10/1/2015	0.0048	0.0034	0.0014
10/1/2015	0.0038	0.0032	0.0006

Table 2-7: Historic Change in Dissolved Copper Concentrations between BDSW-01 & BDSW-03 - 1990 through 2020

StartDateTime	BDSW-01	BDSW-03	BDSW-01 - BDSW-03
	(mg/L)	(mg/L)	(mg/L)
10/2/2015	0.0041	0.0034	0.0007
5/1/2016	0.0040	0.0013	0.0027
5/2/2016	0.0041	0.0011	0.0030
5/2/2016	0.0039	0.0012	0.0027
5/2/2016	0.0040	0.0012	0.0028
5/3/2016	0.0036	0.0012	0.0024
5/3/2016	0.0038	0.0012	0.0026
5/3/2016	0.0041	0.0011	0.0030
5/4/2016	0.0037	0.0011	0.0026
5/4/2016	0.0039	0.0012	0.0027
5/4/2016	0.0037	0.0010	0.0027
5/5/2016	0.0034	0.0009	0.0025
5/5/2016	0.0034	0.0010	0.0024
5/15/2016	0.0038	0.0018	0.0020
5/16/2016	0.0036	0.0017	0.0019
5/16/2016	0.0037	0.0017	0.0020
5/16/2016	0.0035	0.0016	0.0019
5/17/2016	0.0035	0.0016	0.0019
5/17/2016	0.0035	0.0016	0.0019
5/17/2016	0.0036	0.0018	0.0018
5/18/2016	0.0034	0.0015	0.0019
5/18/2016	0.0035	0.0019	0.0016
5/18/2016	0.0036	0.0017	0.0019
5/19/2016	0.0035	0.0027	0.0008
5/19/2016	0.0041	0.0021	0.0020
5/29/2016	0.0034	0.0017	0.0017
5/30/2016	0.0033	0.0015	0.0018
5/30/2016	0.0032	0.0016	0.0016
5/30/2016	0.0034	0.0016	0.0018
5/31/2016	0.0032	0.0015	0.0017
5/31/2016	0.0030	0.0016	0.0014
5/31/2016	0.0036	0.0017	0.0019
6/1/2016	0.0032	0.0015	0.0017
6/1/2016	0.0031	0.0013	0.0018
6/1/2016	0.0030	0.0015	0.0015
6/2/2016	0.0029	0.0014	0.0015
6/2/2016	0.0030	0.0013	0.0017
9/14/2016	0.0035	0.0031	0.0004
10/2/2016	0.0045	0.0034	0.0011
10/3/2016	0.0040	0.0030	0.0010
10/3/2016	0.0040	0.0030	0.0010
10/3/2016	0.0044	0.0040	0.0004
10/4/2016	0.0043	0.0032	0.0011
10/4/2016	0.0043	0.0029	0.0014
10/4/2016	0.0041	0.0030	0.0011
10/5/2016	0.0038	0.0033	0.0005
10/5/2016	0.0039	0.0030	0.0009
10/5/2016	0.0041	0.0030	0.0011
10/6/2016	0.0042	0.0034	0.0008
10/6/2016	0.0041	0.0029	0.0012
4/23/2017	0.0051	0.0019	0.0032
4/24/2017	0.0050	0.0018	0.0032
4/24/2017	0.0048	0.0016	0.0032
4/24/2017	0.0052	0.0016	0.0036
4/25/2017	0.0050	0.0016	0.0034
4/25/2017	0.0065	0.0017	0.0048

Table 2-7: Historic Change in Dissolved Copper Concentrations between BDSW-01 & BDSW-03 - 1990 through 2020

StartDateTime	BDSW-01 (mg/L)	BDSW-03 (mg/L)	BDSW-01 - BDSW-03 (mg/L)
4/25/2017	0.0050	0.0019	0.0031
4/26/2017	0.0055	0.0022	0.0033
4/26/2017	0.0055	0.0020	0.0035
4/26/2017	0.0058	0.0027	0.0031
4/27/2017	0.0052	0.0021	0.0031
4/27/2017	0.0051	0.0020	0.0031
5/14/2017	0.0041	0.0019	0.0022
5/15/2017	0.0041	0.0020	0.0021
5/15/2017	0.0052	0.0018	0.0034
5/15/2017	0.0042	0.0018	0.0024
5/16/2017	0.0040	0.0023	0.0017
5/16/2017	0.0041	0.0020	0.0021
5/16/2017	0.0042	0.0019	0.0023
5/17/2017	0.0041	0.0022	0.0019
5/17/2017	0.0042	0.0018	0.0024
5/17/2017	0.0041	0.0018	0.0023
5/18/2017	0.0038	0.0018	0.0020
5/18/2017	0.0041	0.0020	0.0021
6/11/2017	0.0029	0.0014	0.0015
6/12/2017	0.0028	0.0020	0.0008
6/12/2017	0.0029	0.0014	0.0015
6/12/2017	0.0032	0.0015	0.0017
6/13/2017	0.0046	0.0013	0.0033
6/13/2017	0.0040	0.0015	0.0025
6/13/2017	0.0034	0.0014	0.0020
6/14/2017	0.0031	0.0014	0.0017
6/14/2017	0.0035	0.0014	0.0021
6/14/2017	0.0031	0.0011	0.0020
6/15/2017	0.0035	0.0013	0.0022
6/15/2017	0.0030	0.0011	0.0019
9/24/2017	0.0041	0.0030	0.0011
9/25/2017	0.0038	0.0028	0.0010
9/25/2017	0.0039	0.0029	0.0010
9/25/2017	0.0038	0.0029	0.0009
9/26/2017	0.0037	0.0029	0.0008
9/26/2017	0.0039	0.0026	0.0013
9/26/2017	0.0039	0.0030	0.0009
9/27/2017	0.0037	0.0025	0.0012
9/27/2017	0.0038	0.0028	0.0010
9/27/2017	0.0042	0.0029	0.0013
9/28/2017	0.0036	0.0027	0.0009
9/28/2017	0.0038	0.0030	0.0008
10/2/2017	0.0036	0.0024	0.0012
4/22/2018	0.0058	0.0024	0.0034
4/23/2018	0.0054	0.0021	0.0033
4/23/2018	0.0053	0.0019	0.0034
4/23/2018	0.0051	0.0018	0.0033
4/24/2018	0.0049	0.0018	0.0031
4/24/2018	0.0043	0.0011	0.0032
4/24/2018	0.0047	0.0012	0.0035
4/25/2018	0.0039	0.0010	0.0029
4/25/2018	0.0041	0.0010	0.0031
4/25/2018	0.0043	0.0013	0.0030
4/26/2018	0.0038	0.0009	0.0029
4/26/2018	0.0043	0.0009	0.0034
5/13/2018	0.0040	0.0021	0.0019

Table 2-7: Historic Change in Dissolved Copper Concentrations between BDSW-01 & BDSW-03 - 1990 through 2020

StartDateTime	BDSW-01 (mg/L)	BDSW-03 (mg/L)	BDSW-01 - BDSW-03 (mg/L)
5/14/2018	0.0035	0.0015	0.0020
5/14/2018	0.0039	0.0018	0.0021
5/14/2018	0.0036	0.0014	0.0022
5/15/2018	0.0033	0.0012	0.0021
5/15/2018	0.0036	0.0016	0.0020
5/15/2018	0.0035	0.0013	0.0022
5/16/2018	0.0033	0.0011	0.0022
5/16/2018	0.0032	0.0014	0.0018
5/16/2018	0.0034	0.0012	0.0022
5/17/2018	0.0031	0.0012	0.0019
5/17/2018	0.0032	0.0012	0.0020
6/10/2018	0.0021	0.0006	0.0015
6/11/2018	0.0019	0.0007	0.0012
6/11/2018	0.0019	0.0005	0.0014
6/11/2018	0.0009	0.0022	-0.0013
6/12/2018	0.0018	0.0004	0.0014
6/12/2018	0.0021	0.0005	0.0016
6/12/2018	0.0022	0.0007	0.0015
6/13/2018	0.0027	0.0013	0.0014
6/13/2018	0.0023	0.0009	0.0014
6/13/2018	0.0024	0.0008	0.0016
6/14/2018	0.0025	0.0011	0.0014
6/14/2018	0.0026	0.0013	0.0013
9/23/2018	0.0036	0.0030	0.0006
9/24/2018	0.0035	0.0029	0.0006
9/24/2018	0.0033	0.0029	0.0004
9/24/2018	0.0039	0.0031	0.0008
9/25/2018	0.0036	0.0031	0.0005
9/25/2018	0.0036	0.0032	0.0004
9/25/2018	0.0038	0.0033	0.0005
9/26/2018	0.0036	0.0030	0.0006
9/26/2018	0.0033	0.0028	0.0005
9/26/2018	0.0033	0.0028	0.0005
9/27/2018	0.0034	0.0030	0.0004
9/27/2018	0.0030	0.0029	0.0001
10/1/2018	0.0037	0.0029	0.0008
4/28/2019	0.0043	0.0015	0.0028
4/29/2019	0.0041	0.0013	0.0028
4/29/2019	0.0045	0.0013	0.0032
4/29/2019	0.0041	0.0014	0.0027
4/30/2019	0.0040	0.0013	0.0027
4/30/2019	0.0048	0.0014	0.0034
4/30/2019	0.0050	0.0013	0.0037
5/1/2019	0.0039	0.0015	0.0024
5/1/2019	0.0039	0.0014	0.0025
5/1/2019	0.0040	0.0014	0.0026
5/2/2019	0.0039	0.0013	0.0026
5/2/2019	0.0040	0.0014	0.0026
5/12/2019	0.0038	0.0012	0.0026
5/12/2019	0.0042	0.0013	0.0029
5/13/2019	0.0039	0.0013	0.0026
5/13/2019	0.0041	0.0013	0.0028
5/13/2019	0.0043	0.0013	0.0030
5/14/2019	0.0043	0.0013	0.0030
5/14/2019	0.0042	0.0013	0.0029
5/14/2019	0.0044	0.0015	0.0029

Table 2-7: Historic Change in Dissolved Copper Concentrations between BDSW-01 & BDSW-03 - 1990 through 2020

StartDateTime	BDSW-01 (mg/L)	BDSW-03 (mg/L)	BDSW-01 - BDSW-03 (mg/L)
5/15/2019	0.0042	0.0014	0.0028
5/15/2019	0.0040	0.0013	0.0027
5/15/2019	0.0041	0.0019	0.0022
5/16/2019	0.0034	0.0013	0.0021
9/23/2019	0.0034	0.0027	0.0007
9/23/2019	0.0035	0.0030	0.0005
9/24/2019	0.0039	0.0033	0.0006
9/24/2019	0.0040	0.0029	0.0011
9/25/2019	0.0038	0.0028	0.0010
9/25/2019	0.0040	0.0031	0.0009
9/26/2019	0.0034	0.0027	0.0007
9/26/2019	0.0037	0.0028	0.0009
10/7/2019	0.0034	0.0024	0.0010
5/4/2020	0.0056	0.0014	0.0042
5/4/2020	0.0058	0.0014	0.0044
5/5/2020	0.0053	0.0014	0.0039
5/5/2020	0.0055	0.0014	0.0041
5/6/2020	0.0056	0.0015	0.0041
5/6/2020	0.0056	0.0018	0.0038
5/7/2020	0.0052	0.0015	0.0037
5/7/2020	0.0053	0.0015	0.0038
5/25/2020	0.0042	0.0017	0.0025
5/25/2020	0.0046	0.0018	0.0028
5/26/2020	0.0044	0.0018	0.0026
5/26/2020	0.0045	0.0018	0.0027
5/27/2020	0.0052	0.0016	0.0036
5/27/2020	0.0046	0.0017	0.0029
5/28/2020	0.0045	0.0016	0.0029
5/28/2020	0.0045	0.0017	0.0028
9/9/2020	0.0030	0.0022	0.0008
9/21/2020	0.0035	0.0024	0.0011
9/21/2020	0.0037	0.0025	0.0012
9/22/2020	0.0033	0.0024	0.0009
9/22/2020	0.0035	0.0068	-0.0033
9/23/2020	0.0033	0.0034	-0.0001
9/23/2020	0.0035	0.0026	0.0009
9/24/2020	0.0035	0.0028	0.0007
9/24/2020	0.0040	0.0029	0.0011
9/28/2020	0.0045	0.0029	0.0016

Note:

1. The value at BDSW-01 is considered potentially anomalous because the value is twice those recorded before and after without a corresponding increase in other Big Deer stations. No difference is calculated using this point.

2. The value at BDSW-03 is considered potentially anomalous because the value is > 3x the next highest BDSW-03 Cu-D concentration recorded during the entire spring BD 96HR event which occurred 5/10 thru 5/13/2015. No corresponding increase was observed in other Big Deer stations. Therefore, no difference is calculated using this point.

3. The value at BDSW-01 is considered potentially anomalous because the value is twice those recorded before and after without a corresponding increase in other Big Deer stations. No difference is calculated using this point.

Table 2-8: 2020 Harmonic Means of Monthly BBSW-01A & PASW-09 Total Arsenic Data Sets

Sampling Location	Collection Date/Time	Total Arsenic Results[1]	Sample Event[2]	Population of Total Arsenic Results[1]	Total Arsenic Harmonic Mean[3]
		(mg/L)		(n)	(mg/L)
BBSW-01A	3/26/20 9:55 AM	0.013	MTHY	8	0.008
	5/25/20 2:10 PM	0.007	MTHY		
	6/27/20 2:00 PM	0.009	MTHY		
	7/24/20 4:00 PM	0.008	MTHY		
	8/19/20 3:00 PM	0.007	MTHY		
	9/16/20 8:50 AM	0.006	MTHY		
	10/26/20 8:30 AM	0.008	MTHY		
	11/16/20 10:30 AM	0.007	MTHY		
PASW-09	3/26/20 10:20 AM	0.003	MTHY	8	0.002
	5/25/20 2:25 PM	0.002	MTHY		
	6/27/20 2:20 PM	0.002	MTHY		
	7/24/20 4:20 PM	0.002	MTHY		
	8/19/20 3:20 PM	0.002	MTHY		
	9/16/20 9:10 AM	0.002	MTHY		
	10/26/20 9:00 AM	0.002	MTHY		
	11/16/20 11:00 AM	0.001	MTHY		

Notes:

1-Field duplicates were not included in the number of observations (i.e. population "n") or in the calculations of the harmonic means.

2-The harmonic mean is an average, calculated by dividing the number of observations (i.e. population "n") by the sum of the reciprocals of each number in the sample set. Thus, the harmonic mean is the reciprocal of the arithmetic mean of the reciprocals.

Table 2-9: Stormwater Sampling Event Data Summary for Auto-Sampler on Big Deer Creek (BDSW-03), June 17 to 18, 2020

Sampling Location	Sample ID	Date	Time	Event[2]	Cu IWQS Chronic (CMC)[3] mg/L	Cu IWQS Acute (CCC)[3] mg/L	Dissolved[3,4,6,7]			Total[4,8]									
							Arsenic	Cobalt	Copper	Arsenic	Cobalt	Copper	Cobalt	Calcium	Magnesium	Hardness	pH	Conductivity	Temperature
							Conc. (mg/L)	Conc. (mg/L) Cleanup Level = 0.086 mg/L[7]	Conc. (mg/L)	Conc. (mg/L) Cleanup Level = 0.01 mg/L	Conc. (mg/L)	Conc. (mg/L)	Conc. (mg/L)	Conc. (mg/L)	Conc. (mg/L)	Conc. (mg $CaCO_3$/L)	pH unit	(uS/cm)	(deg C)
BDSW-03	**Bottle 1**	17-Jun-20	2:51	STRM	0.0046	0.0035	0.001 U	0.0049	0.0039	0.001 U	0.0010	0.0025	0.0010	6.0	0.7	17.8	7.19	70.0	14.5
	Bottle 3	17-Jun-20	4:51	STRM	0.0046	0.0035	0.001 U	0.0012	0.0022	0.001 U	0.0010	0.0024	0.0010	5.9	0.7	17.5	7.18	94.0	14.5
	Bottle 5	17-Jun-20	6:51	STRM	0.0046	0.0035	0.001 U	0.0011	0.0021	0.001 U	0.0010	0.0024	0.0010	6.0	0.7	17.8	7.21	98.0	14.8
	Bottle 7	17-Jun-20	8:51	STRM	0.0046	0.0035	0.001 U	0.0011	0.0021	0.001 U	0.0010	0.0023	0.0010	6.1	0.7	18.0	7.24	96.0	14.8
	Bottle 9	17-Jun-20	10:51	STRM	0.0046	0.0035	0.001 U	0.0011	0.0023	0.001 U	0.0011	0.0025	0.0011	6.1	0.7	18.2	7.26	97.0	14.9
	Bottle 11	17-Jun-20	12:51	STRM	0.0046	0.0035	0.001 U	0.0011	0.0022	0.001 U	0.0011	0.0024	0.0011	6.0	0.7	17.8	7.28	94.0	14.9
	Bottle 13	17-Jun-20	14:51	STRM	0.0046	0.0035	0.001 U	0.0012	0.0024	0.001 U	0.0011	0.0024	0.0011	6.4	0.8	19.0	7.30	93.0	14.9
	Bottle 15	17-Jun-20	16:51	STRM	0.0046	0.0035	0.001 U	0.0011	0.0021	0.001 U	0.0011	0.0023	0.0011	6.3	0.7	18.7	7.35	93.0	14.9
	Bottle 17	17-Jun-20	18:51	STRM	0.0046	0.0035	0.001 U	0.0011	0.0020	0.001 U	0.0010	0.0023	0.0010	6.4	0.7	19.1	7.34	92.0	14.9
	Bottle 19	17-Jun-20	20:51	STRM	0.0046	0.0035	0.001 U	0.0011	0.0020	0.001 U	0.0010	0.0022	0.0010	6.1	0.7	18.2	7.39	93.0	15.0
	Bottle 21	17-Jun-20	22:51	STRM	0.0046	0.0035	0.001 U	0.0010	0.0019	0.001 U	0.0011	0.0145	0.0011	6.2	0.7	18.4	7.39	94.0	15.0
	Bottle 23	18-Jun-20	0:51	STRM	0.0046	0.0035	0.001 U	0.0011	0.0019	0.001 U	0.0010	0.0020	0.0010	6.2	0.7	18.5	7.40	95.0	15.0

Notes:

1. Sample Codes: 'B' flag are blank samples, 'D' are duplicate samples, 'C' are control standards.
2. Event codes: "STRM": Storm sampling events at automated sampler locations.
3. Copper Idaho Water Quality Standards (Cu IWQS) calculated using hardness based formulas:
   Acute Cu IWQS (CMC) µg/L = e([0.9422*ln(hardness)]-1.464)*0.96
   Chronic Cu IWQS (CCC) µg/L = e([0.8545*ln(hardness)]-1.465)*0.96
4. The dissolved concentrations of some metals (i.e. cobalt) are often higher than the total concentrations likely due to metals present almost entirely in the dissolved form and the lower total metals are due to matrix effects.
5. Qualifiers:
   U - Concentration below reporting limits.
6. Light purple shaded cells indicate exceedance of the dissolved copper CCC only. There were no exceedances of the dissolved copper CMC.
7. There were no exceedances of the dissolved cobalt surface water quality cleanup level = 0.086 mg/L (Big Deer Creek and South Fork Big Deer Creek).
8. There were no exceedances of the total arsenic surface water quality cleanup level = 0.010 mg/L (South Fork Big Deer and Big Deer Creeks).

Table 3-1: Summary of Groundwater Cleanup Levels for Blackbird Mine Site

Drainage/Area of Drainage	Total Arsenic[1]	Dissolved Cobalt[1]	Dissolved Copper[1]
Residential[2]	0.010 mg/L	0.009 mg/L	1.30 mg/L
Mine Site[3]	0.010 mg/L	0.23 mg/L	3.06 mg/L

Notes:

1 - Cleanup levels for the Blackbird site for arsenic, cobalt, and copper are presented in Table 1 of the Explanation of Significant Difference prepared by the United States Environmental Protection Agency (EPA), dated May 31, 2012.

2 - Applies to residential, drinking water wells (Panther Creek Inn area and along Panther Creek).

3 - Only applies to wells downstream from Panther Creek Road.

Table 3-2a: 2020 and Historical Groundwater Elevations / Blackbird Cutoff Wells

Date	Location				
	BBMW-03A	BBMW-05A	BBMW-06A	BBMW-07A	BBMW-08A
	Elevation (ft AMSL)[1]				
5/14/2004	6768.53	6766.34	6748.34	6754.65	6764.68
6/17/2004	6768.52	6766.36	6748.59	6754.76	0
6/29/2004	6767.27	6766.35	6748.51	6754.71	6764.55
5/18/2006	6769.5	6771.94	6749.41	6758.04	6763.1
6/2/2006	6769.16	6768.9	6748.51	6755.04	6763.13
6/7/2006	6769.05	6768.26	6748.28	6754.99	6762.95
10/9/2006	6768.34	6766.66	6747.24	6754.16	6762.78
1/9/2007	6767.4	6766.7	6746.99	6753.75	6762.25
2/13/2007	6767.45	6767.13	6746.94	6753.74	6762.23
3/8/2007	6767.6	6767.49	6747.05	6753.59	6762.41
3/14/2007	6767.8	6767.6	6747.27	6753.74	6762.45
3/23/2007	6767.98	6767.73	6747.44	6754.04	6762.52
3/30/2007	6768.15	6769.44	6747.56	6754.17	6762.92
4/3/2007	6768.19	6770.68	6747.77	6754.34	6762.91
4/10/2007	6768.34	6769.74	6747.97	6754.71	6762.94
4/16/2007	6768.2	6768.47	6747.98	6754.65	6762.78
4/30/2007	6770.11	6770.92	6748.89	6758.36	6763.52
5/9/2007	6768.73	6768.28	6749.13	6756.08	6763.01
5/18/2007	6768.43	6767.58	6748.35	6755	6762.63
6/26/2007	6767.94	6766.81	6747.78	6754.82	6762.42
7/15/2007	6767.92	6766.72	6747.64	6754.69	6762.38
8/13/2007	6767.85	6766.49	6747.45	6754.43	6762.28
9/12/2007	6767.8	6766.77	6747.3	6754.27	6762.25
10/8/2007	6767.8	6766.62	6747.21	6754.1	6762.2
11/8/2007	6767.76	6766.63	6747.15	6754.05	6762.04
12/19/2007	6767.73	6766.57	6747.07	6753.94	6762.09
1/3/2008	6767.66	6766.52	6746.94	6753.78	6762.12
2/21/2008	6767.65	6766.47	6747.04	6753.97	6762.15
3/26/2008	6767.74	6767.07	6747.49	6754.1	6762.43
4/3/2008	6767.71	6767.04	6747.3	6754.04	6762.33
4/8/2008	6768.26	6767.3	6747.39	6756.05	6762.46
4/15/2008	6768.3	6767.74	6747.5	6756.96	6762.71
4/23/2008	6770.63	6768.17	6748.54	6758.79	6762.89
4/29/2008	6771.99	6771.2	6749.95	6760.44	6763.42
5/9/2008	6772.37	6771.74	6750.16	6760.81	6764.47
5/16/2008	6772.8	6772.01	6750.5	6761.14	6764.62
5/22/2008	6772.73	6771.97	6750.33	6760.85	6764.44
5/27/2008	6771.86	6771.14	6750.09	6760.23	6764.14
6/4/2008	6770.38	6770.39	6749.97	6758.95	6763.91
6/9/2008	6769.16	6768.87	6749.67	6756.82	6763.45
6/18/2008	6768.89	6768.6	6748.99	6756.13	6763.08
6/26/2008	6768.61	6767.89	6748.58	6755.43	6762.87
7/15/2008	6768.29	6767.05	6748.36	6755.25	6762.71
8/15/2008	6768.01	6765.93	6747.81	6755.12	6762.49
9/17/2008	6767.99	6766.24	6747.51	6754.9	6762.43
10/20/2008	6767.82	6766.71	6747.38	6754.66	6762.41
11/18/2008	6767.59	6766.73	6747.29	6754.48	6762.4
12/5/2008	6767.41	6766.71	6747.22	6754.31	6762.4
1/21/2009	6767.34	6766.64	6747.14	6754.14	6762.47
2/10/2009	6767.26	6766.58	6747.12	6753.87	6762.50
3/26/2009	6767.49	6767.18	6747.49	6754.05	6762.83
4/14/2009	6768.84	6771.82	6748.85	6754.75	6764.63
4/24/2009	6771.85	6772.36	6750.43	6755.63	6765.59
4/29/2009	6771.72	6772.25	6750.45	6755.88	6765.55
5/7/2009	6771.65	6772.17	6750.48	6756.10	6765.34
5/11/2009	6771.54	6772.13	6750.49	6756.14	6765.17
5/21/2009	6771.72	6772.24	6750.67	6762.56	6764.97
5/29/2009	6771.34	6772.03	6750.12	6762.64	6764.81
6/2/2009	6770.20	6771.93	6750.01	6758.40	6764.60
6/12/2009	6769.12	6771.83	6749.64	6756.79	6764.45
6/17/2009	6768.73	6771.64	6749.43	6756.57	6764.40
6/24/2009	6768.46	6770.18	6748.97	6756.36	6763.93
6/30/2009	6768.29	6769.15	6748.31	6755.89	6763.70
7/14/2009	6768.14	6767.99	6748.22	6755.49	6763.62

Table 3-2a: 2020 and Historical Groundwater Elevations / Blackbird Cutoff Wells

Date	Location				
	BBMW-03A	BBMW-05A	BBMW-06A	BBMW-07A	BBMW-08A
	Elevation (ft AMSL)[1]				
8/4/2009	6768.08	6767.30	6747.99	6755.30	6763.45
9/16/2009	6767.83	6767.12	6747.83	6754.97	6763.35
10/9/2009	6767.55	6766.59	6747.66	6754.73	6763.29
11/4/2009	6767.63	6766.59	6747.47	6754.62	6763.33
12/10/2009	6767.82	6767.64	6747.54	6754.61	6763.99
1/7/2010	6768.01	6768.52	6747.57	6754.57	6765.51
2/2/2010	6767.87	6767.35	6747.91	6754.66	6764.16
2/26/2010	6767.97	6767.58	6747.91	6754.64	6764.45
3/24/2010	6768.01	6768.15	6747.78	6754.67	6764.61
4/7/2010	6767.78	6767.72	6747.47	6754.27	6761.52
4/13/2010	6767.88	6767.80	6747.37	6754.26	6761.63
4/19/2010	6765.93	6771.74	6744.02	6754.51	6762.50
4/27/2010	6768.59	6771.84	6748.16	6755.19	6762.97
5/6/2010	6767.03	6771.77	6744.07	6755.14	6761.47
5/12/2010	6766.81	6771.74	6744.01	6755.20	6761.30
5/19/2010	6769.37	6772.04	6748.49	6755.54	6765.64
5/25/2010	6769.05	6771.94	6748.76	6755.52	6765.25
6/2/2010	6769.32	6771.92	6748.91	6755.84	6766.06
6/8/2010	6769.92	6771.91	6749.25	6755.97	6765.97
6/15/2010	6768.82	6771.81	6749.07	6755.55	6765.07
7/21/2010	6768.47	6771.11	6748.25	6755.26	6764.52
8/31/2010	6768.06	6767.49	6747.72	6754.89	6763.78
10/5/2010	6767.86	6766.97	6747.54	6754.64	6763.79
11/2/2010	6767.85	6766.76	6747.47	6754.61	6763.61
12/21/2010	6767.72	6766.66	6747.28	6754.30	6763.30
1/20/2011	6767.78	6766.78	6747.47	6754.56	6762.98
2/9/2011	6767.76	6766.83	6747.44	6754.46	6763.10
3/1/2011	6767.74	6766.83	6747.42	6754.43	6763.22
3/9/2011	6767.73	6766.87	6747.48	6754.46	6763.20
3/22/2011	6767.78	6766.93	6747.52	6754.43	6763.45
3/31/2011	6767.88	6767.43	6748.27	6754.51	6763.77
4/7/2011	6768.35	6769.17	6749.11	6755.11	6764.27
4/14/2011	6768.40	6770.76	6749.04	6755.04	6764.69
4/21/2011	6768.96	6771.73	6749.36	6755.36	6765.12
4/26/2011	6768.54	6770.78	6748.92	6755.28	6764.95
5/3/2011	6769.61	6771.79	6749.03	6755.41	6765.59
5/12/2011	6770.57	6771.99	6750.37	6755.82	6766.07
5/19/2011	6772.02	6772.09	6751.06	6759.90	6766.47
5/23/2011	6772.25	6771.97	6750.87	6761.96	6766.36
6/2/2011	6770.64	6771.90	6750.54	6760.75	6766.30
6/4/2011	6771.55	6771.92	6750.64	6760.64	6766.38
6/10/2011	6770.24	6771.84	6751.34	6760.34	6766.79
6/16/2011	6771.26	6771.90	6750.54	6759.87	6766.97
6/27/2011	6771.32	6771.80	6750.06	6758.05	6766.65
7/7/2011	6770.75	6771.73	6749.74	6756.68	6766.07
7/12/2011	6768.98	6768.71	6749.35	6755.89	6764.55
7/18/2011	6768.74	6768.16	6748.76	6755.62	6764.35
7/25/2011	6768.58	6767.81	6748.42	6755.43	6764.22
8/2/2011	6768.44	6767.62	6748.19	6755.46	6764.07
8/15/2011	6768.32	6767.48	6748.01	6755.31	6764.10
8/23/2011	6768.19	6767.28	6747.91	6755.21	6763.97
8/29/2011	6768.19	6767.33	6747.87	6755.18	6764.02
10/18/2011	6768.01	6767.18	6747.56	6754.75	6763.98
11/8/2011	6767.80	6766.96	6747.63	6754.71	6763.81
12/6/2011	6767.39	6766.82	6747.41	6754.23	6763.57
1/12/2012	6767.38	6766.81	6747.14	6753.98	6763.55
2/1/2012	6767.35	6766.80	6747.06	6753.91	6763.48
2/28/2012	6767.65	6767.60	6747.03	6753.87	6763.38
3/7/2012	6767.53	6767.38	6747.08	6753.90	6763.63
3/29/2012	6768.02	6768.84	6748.06	6754.43	6764.57
4/11/2012	6768.33	6767.97	6748.15	6754.84	6764.25
4/17/2012	6768.34	6768.19	6748.28	6755.20	6764.31
4/27/2012	6769.36	6769.98	6749.13	6758.05	6765.00
5/8/2012	6768.14	6768.40	6748.63	6755.38	6764.39

Table 3-2a: 2020 and Historical Groundwater Elevations / Blackbird Cutoff Wells

Date	Location				
	BBMW-03A	BBMW-05A	BBMW-06A	BBMW-07A	BBMW-08A
	Elevation (ft AMSL)[1]				
5/16/2012	6768.00	6768.15	6748.31	6755.30	6764.32
5/30/2012	6768.22	6768.03	6748.36	6755.38	6764.20
6/7/2012	6768.03	6767.89	6748.23	6755.31	6764.06
7/2/2012	6767.79	6767.52	6747.90	6755.01	6763.99
7/16/2012	6767.67	6767.40	6747.78	6754.89	6763.96
8/1/2012	6767.64	6767.44	6747.67	6754.83	6763.96
8/13/2012	6767.58	6767.27	6747.63	6754.65	6763.97
8/23/2012	6767.51	6767.26	6747.54	6754.60	6761.54
8/31/2012	6767.48	6767.21	6747.54	6754.52	6763.92
9/17/2012	6767.48	6767.16	6747.47	6754.44	6763.94
10/12/2012	6767.44	6767.24	6747.30	6754.28	6762.31
11/8/2012	6767.63	6767.40	6747.36	6754.28	6764.17
12/3/2012	6766.71	6767.57	6747.27	6754.11	6764.25
1/8/2013	6767.52	6767.40	6747.19	6754.10	6764.15
2/14/2013	6767.51	6767.37	6747.06	6753.90	6764.06
3/13/2013	6767.48	6767.43	6747.16	6753.83	6764.26
4/9/2013	6768.10	6768.25	6747.97	6754.41	6764.54
5/1/2013	6768.20	6768.33	6748.26	6755.24	6764.70
5/13/2013	6768.33	6768.66	6748.42	6755.46	6764.88
5/21/2013	6768.07	6768.35	6748.11	6755.12	6764.73
6/6/2013	6767.79	6767.89	6747.77	6754.71	6764.53
6/27/2013	6767.75	6767.83	6747.63	6754.51	6763.05
7/18/2013	6767.57	6767.57	6747.48	6754.25	6764.42
8/15/2013	6767.60	6767.42	6747.36	6754.15	6764.31
9/5/2013	6767.46	6767.37	6747.21	6753.96	6764.32
10/1/2013	6768.10	6767.95	6747.53	6754.18	6764.58
10/24/2013	6767.69	6767.63	6747.53	6754.33	6764.45
11/12/2013	6767.58	6767.57	6747.40	6754.09	6763.52
12/18/2013	6767.59	6767.39	6747.28	6753.91	6764.37
2/24/2014	6767.50	6767.28	6747.10	6753.67	6764.20
3/20/2014	6768.21	6770.38	6749.08	6754.67	6765.78
4/7/2014	6768.17	6769.53	6748.29	6754.43	6765.28
4/14/2014	6768.83	6773.23	6749.33	6754.96	6766.38
4/21/2014	6769.00	6772.80	6749.80	6755.42	6766.28
4/30/2014	6768.68	6771.84	6749.49	6755.41	6765.83
5/6/2014	6769.42	6772.35	6749.78	6757.70	6766.17
5/14/2014	6768.95	6772.01	6749.57	6755.66	6766.11
5/26/2014	6769.57	6772.20	6749.85	6759.80	6766.21
7/2/2014	6768.56	6768.61	6748.27	6755.46	6765.15
8/12/2014	6768.21	6768.08	6747.94	6755.10	6764.85
9/4/2014	6768.19	6768.15	6747.95	6755.01	6764.90
10/6/2014	6768.03	6767.93	6747.75	6754.70	6764.83
12/3/2014	6768.02	6767.92	6747.61	6754.46	6765.00
12/3/2014	6768.02	6767.92	6747.61	6754.46	6765.00
1/26/2015	6767.91	6767.94	6747.55	6754.31	6765.45
2/13/2015	6768.26	6769.13	6748.18	6754.47	6766.18
3/4/2015	6768.06	6769.07	6747.80	6754.40	6768.25
4/6/2015	6768.38	6770.01	6748.51	6755.26	6766.40
4/22/2015	6768.61	6770.11	6748.45	6755.41	6766.59
5/14/2015	6768.48	6769.58	6748.31	6755.31	6766.10
6/11/2015	6768.37	6769.12	6748.34	6755.31	6765.93
7/6/2015	6768.15	6768.57	6747.94	6754.98	6765.63
8/10/2015	6768.08	6768.33	6747.88	6754.71	6765.53
9/1/2015	6768.08	6768.37	6747.80	6754.71	6765.53
10/1/2015	6768.07	6768.47	6747.69	6754.41	6765.58
11/16/2015	6768.07	6768.42	6747.65	6754.23	6765.54
12/8/2015	6768.08	6768.48	6747.58	6754.21	6765.58
1/12/2016	6768.06	6768.44	6747.60	6754.32	6765.67
2/8/2016	6768.06	6768.84	6747.63	6754.41	6765.85
3/10/2016	6768.38	6770.51	6748.09	6754.56	6766.36
4/4/2016	6768.56	6771.25	6748.45	6754.69	6766.68
5/2/2016	6768.93	6771.50	6748.99	6755.46	6766.99
6/6/2016	6768.59	6770.71	6748.55	6755.43	6766.70
7/12/2016	6768.36	6769.13	6748.12	6755.01	6766.01

Table 3-2a: 2020 and Historical Groundwater Elevations / Blackbird Cutoff Wells

Date	Location				
	BBMW-03A	BBMW-05A	BBMW-06A	BBMW-07A	BBMW-08A
	Elevation (ft AMSL)[1]				
8/1/2016	6768.20	6768.76	6747.94	6754.80	6765.35
9/1/2016	6768.02	6768.54	6747.74	6754.56	6765.72
10/5/2016	6768.16	6768.71	6747.60	6754.53	6765.84
11/7/2016	6768.26	6768.64	6747.52	6754.31	6765.89
12/20/2016	6768.08	6767.89	6747.54	6754.19	6765.71
1/25/2017	6768.16	6768.00	6748.30	6754.67	6765.60
2/15/2017	6768.21	6768.42	6748.10	6754.53	6766.03
3/10/2017	6768.25	6768.86	6747.92	6754.26	6766.21
4/5/2017	6768.90	6772.04	6749.43	6755.46	6767.30
5/10/2017	6769.65	6772.56	6750.05	6759.58	6767.87
6/1/2017	6769.08	6771.71	6749.24	6755.96	6767.71
7/31/2017	6768.75	6769.76	6748.35	6755.41	6766.67
8/10/2017	6768.67	6769.62	6748.27	6759.32	6766.55
9/12/2017	6768.49	6769.14	6748.09	6755.06	6766.41
10/12/2017	6768.45	6769.00	6747.99	6754.86	6766.25
11/9/2017	6768.41	6768.78	6747.99	6754.70	6766.21
12/12/2017	6768.33	6768.76	6748.02	6754.72	6766.33
1/9/2018	6768.31	6768.60	6747.97	6754.74	6766.17
2/7/2018	6768.31	6768.46	6747.93	6754.60	6766.11
3/12/2018	6768.31	6768.76	6748.25	6754.66	6766.34
4/10/2018	6769.01	6772.08	6749.59	6755.22	6767.85
5/3/2018	6769.61	6772.46	6749.75	6756.35	6767.75
6/4/2018	6769.13	6771.71	6749.17	6755.60	6767.75
7/16/2018	6768.85	6770.71	6748.60	6755.51	6767.25
8/2/2018	6768.65	6769.56	6748.33	6755.31	6766.75
9/17/2018	6768.45	6767.76	6748.07	6754.94	6766.45
10/9/2018	6768.41	6768.86	6747.97	6754.80	6766.40
11/8/2018	6768.41	6768.81	6747.89	6754.66	6766.40
12/11/2018	6768.23	6768.56	6747.75	6754.56	6766.23
1/14/2019	6768.11	6768.48	6747.45	6754.76	6766.19
2/14/2019	6768.11	6768.46	6748.39	6754.86	6766.21
3/21/2019	6768.18	6768.51	6748.45	6754.90	6766.15
4/15/2019	6768.07	6771.16	6748.80	6755.08	6767.23
5/2/2019	6768.89	6771.48	6749.05	6755.46	6767.45
6/10/2019	6768.71	6770.00	6748.31	6755.16	6766.77
7/1/2019	6768.53	6769.12	6748.09	6754.86	6766.45
8/7/2019	6768.37	6768.76	6747.85	6754.58	6766.33
9/12/2019	6768.33	6768.64	6747.71	6754.38	6766.29
10/7/2019	6768.35	6768.76	6747.69	6754.46	6766.40
11/12/2019	6768.41	6768.66	6747.75	6754.36	6766.27
12/17/2019	6768.29	6768.56	6747.69	6754.30	6766.19
1/21/2020	6768.21	6768.46	6748.57	6754.76	6766.23
2/4/2020	6768.15	6768.46	6748.45	6754.80	6766.25
3/11/2020	6767.61	6769.60	6748.65	6754.90	6766.89
4/20/2020	6768.61	6766.76	6748.25	6754.76	6766.53
5/6/2020	6769.33	6771.46	6748.97	6755.52	6767.03
6/8/2020	6768.69	6770.50	6748.55	6755.31	6766.71
7/6/2020	6768.71	6770.36	6748.63	6755.36	6766.71
8/11/2020	6768.39	6768.96	6748.15	6754.86	6766.29
9/10/2020	6768.29	6768.66	6747.97	6754.62	6766.15
10/1/2020	6768.27	6768.66	6747.85	6754.46	6766.15
11/17/2020	6768.27	6768.66	6747.69	6754.28	6766.21
12/9/2020	6768.17	6768.50	6747.65	6754.24	6766.09

Notes:

1 - Groundwater elevation is represented as feet Above Mean Sea Level (AMSL), NAVD29.

Table 3-2b: 2020 and Historical Groundwater Quality / Blackbird Cutoff Wells

Location		BBMW-03A																
Date		5/14/2004	5/18/2006	10/9/2006	5/9/2007	6/11/2008	6/2/2009	5/25/2010	6/16/2011	5/16/2012	5/22/2013	5/16/2014	5/14/2015	5/19/2016	5/29/2017	5/21/2018	5/31/2019	5/27/2020
Collection Time		12:55	11:00	12:30	11:40	10:00	11:00	8:35	10:50	10:50	9:30	9:35	13:50	16:45	14:20	10:40	10:25	13:30
Field Parameters	*Units*																	
Conductivity	µS/cm	586		488	136	344	427	413	272	206	256	374	675	488	605	421	351	378
pH	s.u.	5.2		5.7	6.3	7.4	6.0	6.3	6.1	6.4	6.6	4.8	3.9	6.4	6.3	6.4	6.9	6.5
Total Dissolved Solids	mg/L	414			82	244	296	348	212	124 J	156	188	210	283	434	257	180	235
Total Suspended Solids	mg/L	14							47									
Temperature	°C	5.4		6.0	7.6	5.3	5.9	6.4	5.0	8.0	5.8	7.0	6.8	5.9	7.1	5.8	5.7	5.6
Dissolved Oxygen	mg/L											1.0	6.7	1.9	1.3	1.6	1.6	1.6
ORP	mV											-7.2	260.3	-139.3	-232.3	-53.6	-46.1	-76.3
Depth to water	ft											8.2	9.5	8.2	8.2	7.9	9.6	10.3
Pump Rate	gpm											0.34	0.46	2.0	1.4	2.6	3.0	4.0
Alkalinity	mg/L as $CaCO_3$																	
Hardness	mg/L as $CaCO_3$	181				127												
Dissolved Phase	*Units*																	
As	mg/L	0.673	0.091	0.064	0.081	0.005 U	0.032	0.114	0.039	0.153	0.148	0.181	0.172	0.187	0.161	0.180	0.178	0.175
Ca	mg/L																	
Co	mg/L	8.25	2.38	0.793	0.843	2.19	2.34	1.37	1.24	0.406	0.260	1.09	0.754	1.34	3.08	1.55	1.05	1.19
Cu	mg/L	2.63	0.147	0.133	0.024	1.34	0.207	0.014	0.028	0.002	0.0004	0.0056	0.0009	0.0006	0.0007	0.0011	0.0021	0.0005
Fe	mg/L	38.3	20.4	5.08	16.4	3.79	10.8	31.8	11.2	14.0	16.3	20.1	22.8	33.2	45.3	25.6	20.9	22.7
Mg	mg/L																	
Mn	mg/L	5.8																
Total Phase	*Units*																	
Ca	mg/L	44				34	32											
Cl	mg/L																	
Mg	mg/L	17				10	11											
SO4	mg/L	274																

Table 3-2b: 2020 and Historical Groundwater Quality / Blackbird Cutoff Wells

Location		BBMW-05A																	
Date		5/13/2004	7/16/2004	5/18/2006	10/9/2006	5/9/2007	6/11/2008	6/2/2009	5/25/2010	6/16/2011	5/16/2012	5/22/2013	5/16/2014	5/14/2015	5/19/2016	5/29/2017	5/21/2018	5/31/2019	5/27/2020
Collection Time		15:15	12:05	9:00	13:00	10:30	10:10	11:35	9:20	11:45	11:15	10:35	12:15	12:20	18:00	16:55	12:10	11:50	16:15
Field Parameters	***Units***																		
Conductivity	**µS/cm**	524			425	384	5215	484	325	375	443	467	592	356	745	665	589	572	600
pH	**s.u.**	4.1			3.9	4.0	5.0	4.24	3.9	4.0	4.3	4.6	3.8	6.6	3.8	4.0	3.9	4.4	4.1
Total Dissolved Solids	**mg/L**	349	415			212	408	321	286	354	428 J	445	438	515	583	525	426	403	450
Total Suspended Solids	**mg/L**	5	5							32		0							
Temperature	**°C**	5.9			5.4	7.3	5.6	7.3	6.2	6.5	9.3	6.3	7.2	5.9	8.7	12.9	8.3	8.1	9.5
Dissolved Oxygen	**mg/L**												3.6	3.5	9.2	2.0	2.6	3.2	1.2
ORP	**mV**												398.0	-128.9	203.1	-184.0	425.6	243.1	252.9
Depth to water	**ft**												3.6	8.9	5.8	5.5	3.7	5.4	6.1
Pump Rate	**gpm**												0.81	2.5	1.0	1.8	0.9	2.5	2.0
Alkalinity	**mg/L as $CaCO_3$**																		
Hardness	**mg/L as $CaCO_3$**	174					182												
Dissolved Phase	***Units***																		
As	**mg/L**	0.004		0.008	0.005	0.005	0.006		0.009	0.005	0.006	0.042	0.007	0.008	0.014	0.010	0.005	0.004	0.008
Ca	**mg/L**		40																
Co	**mg/L**	6.87	9.52	5.98	8.21	5.57	8.06	5.17	3.64	5.96	8.51	9.68	8.80	9.83	11.6	11.8	8.77	7.76	8.92
Cu	**mg/L**	10.8	14.9	9.39	13.2	7.58	11.9	8.96	6.1	11.8	14.2	16.4	18.8	17.2	21.9	23.8	21.0	14.4	17.3
Fe	**mg/L**	0.16	7.12	0.12	0.82	0.07	0.26		0.06	0.08	1.39	3.49	0.17	0.20	0.77	0.32	0.16	0.26	1.47
Mg	**mg/L**		18.10																
Mn	**mg/L**	4.2	4.3																
Total Phase	***Units***																		
Ca	**mg/L**	39	40				40	30											
Cl	**mg/L**		7																
Mg	**mg/L**	19	19				20	13											
SO4	**mg/L**	257	299																

Table 3-2b: 2020 and Historical Groundwater Quality / Blackbird Cutoff Wells

Location		BBMW-06A																
Date		5/13/2004	5/18/2006	10/9/2006	5/9/2007	6/11/2008	6/2/2009	5/25/2010	6/16/2011	5/16/2012	5/22/2013	5/16/2014	5/14/2015	5/19/2016	5/29/2017	5/21/2018	5/31/2019	5/27/2020
Collection Time		12:45	11:50	13:15	11:20	10:20	12:00	9:00	11:15	11:05	10:05	10:55	13:10	19:30	16:15	11:10	11:00	14:25
Field Parameters	***Units***																	
Conductivity	**µS/cm**	307		267	110	206	266	270	180	161	140	203	240	358	267	313	363	397
pH	**s.u.**	4.8		5.4	5.9	6.0	6.1	5.6	6.3	6.3	6.4	4.3	6.0	5.3	5.9	5.4	5.7	5.2
Total Dissolved Solids	**mg/L**	198			59	142	152	253	143	99 J	82	134	226	264	191	224	248	302
Total Suspended Solids	**mg/L**	128							28									
Temperature	**°C**	6.3		6.1	8.9	5.8	6.7	7.0	6.3	8.3	6.3	8.4	7.5	6.9	8.3	6.5	6.2	6.0
Dissolved Oxygen	**mg/L**											0.7	17.9	1.7	2.0	1.6	2.6	1.2
ORP	**mV**											132.2	115.5	160.6	-283.7	161.2	141.7	211.9
Depth to water	**ft**											19.2	20.6	20.4	20.0	19.4	20.7	21.2
Pump Rate	**gpm**											0.33	0.47	0.60	0.72	0.90	1.00	1.25
Alkalinity	**mg/L as $CaCO_3$**	1.0																
Hardness	**mg/L as $CaCO_3$**	98				64.7												
Dissolved Phase	***Units***																	
As	**mg/L**	0.021	0.125	0.212	0.199	0.167	0.159	0.108	0.188	0.285	0.251	0.166	0.134	0.076	0.105	0.074	0.068	0.074
Ca	**mg/L**																	
Co	**mg/L**	4.01	2.76	1.21	1.9	1.27	1.56	3.7	0.78	0.592	0.613	1.43	3.78	4.21	2.99	3.61	4.54	5.32
Cu	**mg/L**	4.4	2.4	0.175	1	0.546	0.846	2.96	0.053	0.0476	0.0217	1.16	2.60	5.28	3.37	5.38	5.20	6.72
Fe	**mg/L**	1.42	8.75	11.5	10.8	10.4	8.47	7.96	7.19	9.98	8.98	7.86	10.7	7.41	7.4	5.9	6.5	7.9
Mg	**mg/L**																	
Mn	**mg/L**	4.4																
Total Phase	***Units***																	
Ca	**mg/L**	20				13	12											
Cl	**mg/L**																	
Mg	**mg/L**	12				8	8											
SO4	**mg/L**	136																

Table 3-2b: 2020 and Historical Groundwater Quality / Blackbird Cutoff Wells

Location		BBMW-07A																
Date		5/11/2004	5/18/2006	10/9/2006	5/9/2007	6/11/2008	6/2/2009	5/25/2010	6/16/2011	5/16/2012	5/22/2013	5/16/2014	5/14/2015	5/19/2016	5/29/2017	5/21/2018	5/31/2019	5/27/2020
Collection Time		17:50	11:15	13:30	11:50	10:30	10:40	8:45	11:00	11:00	9:50	11:35	12:40	18:35	15:25	9:55	9:30	12:45
Field Parameters	***Units***																	
Conductivity	**µS/cm**	342		90	147	446	483	319	363	314	280	472	480	430	481	439	436	324
pH	**s.u.**	5.5		5.5	6.3	6.1	6.0	6.3	6.1	6.0	6.2	4.7	6.2	6.4	6.4	6.6	6.8	6.6
Total Dissolved Solids	**mg/L**	183			79	294	270	242	276	243 J	188	298	300	265	318	274	241	222
Total Suspended Solids	**mg/L**	315							10									
Temperature	**°C**	5.3		5.2	8.8	5.6	5.6	6.7	5.0	7.0	5.8	7.8	7.4	6.3	6.9	5.9	6.8	5.7
Dissolved Oxygen	**mg/L**											2.6	9.3	1.1	1.6	5.0	3.7	3.6
ORP	**mV**											-35.1	52.9	-204.1	-316.2	-17.8	-14.1	-113.1
Depth to water	**ft**											21.2	24.2	22.6	21.6	23.4	24.5	25.1
Pump Rate	**gpm**											0.48	0.50	0.60	3.0	0.65	0.50	1.00
Alkalinity	**mg/L as $CaCO_3$**	60																
Hardness	**mg/L as $CaCO_3$**	115				170												
Dissolved Phase	***Units***																	
As	**mg/L**	0.186	0.038	0.116	0.05	0.049	0.044	0.062	0.031	0.052	0.048	0.044	0.035	0.064	0.043	0.059	0.046	0.066
Ca	**mg/L**																	
Co	**mg/L**	0.922	3.1	1.47	1.97	2.42	3.13	1.17	3.06	2.57	2.13	2.55	3.65	1.52	2.40	1.81	2.40	0.58
Cu	**mg/L**	1.48	0.68	0.2	0.28	0.007	0.423	0.003	0.978	0.002	0.005	0.026	0.005	0.004	0.053	0.034	0.003	0.002
Fe	**mg/L**	3.04	6.00	7.77	11.5	23.1	9.27	10.8	12.4	16.4	13.5	16.4	20.1	12.3	13.2	10.1	12.8	5.58
Mg	**mg/L**																	
Mn	**mg/L**	3.9																
Total Phase	***Units***																	
Ca	**mg/L**	32				42	37											
Cl	**mg/L**																	
Mg	**mg/L**	8				16	13											
SO4	**mg/L**	88																

Table 3-2b: 2020 and Historical Groundwater Quality / Blackbird Cutoff Wells

Location		BBMW-08A																	
Date		5/13/2004	7/16/2004	5/18/2006	10/9/2006	5/9/2007	6/11/2008	6/2/2009	5/25/2010	6/16/2011	5/16/2012	5/22/2013	5/16/2014	5/14/2015	5/19/2016	5/29/2017	5/21/2018	5/31/2019	5/27/2020
Collection Time		13:42	12:10	9:45	14:00	11:00	10:40	11:45	9:10	11:30	11:10	10:15	11:35	12:40	18:35	17:35	12:40	12:20	15:15
Field Parameters	***Units***																		
Conductivity	**µS/cm**	531			498	262	569	514	357	404	313	412	513	670	649	667	557	538	579
pH	**s.u.**	4.7			3.8	4.7	4.4	4.03	4.1	4.0	4.2	4.5	3.8	4.3	4.0	3.8	3.8	4.5	4.1
Total Dissolved Solids	**mg/L**	416	444			141	462	327	341	338	399 J	409	373	525	546	519	395	398	429
Total Suspended Solids	**mg/L**	409	5							594									
Temperature	**°C**	6.0			6.6	8.8	6.0	8.1	6.8	7.5	9.0	6.3	7.6	7.6	8.3	7.2	6.7	7.0	6.5
Dissolved Oxygen	**mg/L**												1.8	16.5	5.3	0.6	1.1	1.1	2.0
ORP	**mV**												324.1	229.9	209.1	-39.3	393.5	268.2	249.5
Depth to water	**ft**												8.8	6.2	8.9	8.6	7.6	8.9	9.3
Pump Rate	**gpm**												0.44	1.0	1.2	0.53	0.60	1.0	1.5
Alkalinity	**mg/L as $CaCO_3$**																		
Hardness	**mg/L as $CaCO_3$**	190					204												
Dissolved Phase	***Units***																		
As	**mg/L**	0.006		0.005	0.005	0.005	0.005 U		0.006	0.005	0.005	0.001	0.001	0.002	0.002	0.004	0.001	0.001	0.001
Ca	**mg/L**		44.6																
Co	**mg/L**	7.19	9.61	7.57	8.9	5.34	9.38	6.34	4.85	6.83	8.44	5.86	7.62	11.1	11.0	12.1	8.27	7.80	8.82
Cu	**mg/L**	10.7	13.7	12.5	14.7	7.8	14.7	9.68	9.23	11.7	14.4	9.6	15.1	19.0	20.6	20.8	17.5	14.7	16.1
Fe	**mg/L**	4.00	15.0	2.10	14.0	3.41	11		0.18	1.37	8.53	8.28	0.91	8.34	1.96	1.91	1.53	2.58	3.96
Mg	**mg/L**		19																
Mn	**mg/L**	4.4	4.3																
Total Phase	***Units***																		
Ca	**mg/L**	46	44				43.9	29											
Cl	**mg/L**		6																
Mg	**mg/L**	19	18				23	14											
SO4	**mg/L**	262	308																

Table 3-3a: 2020 and Historical Groundwater Elevation at West Fork Monitoring Wells - Tailings Areas

Date	Location														
	WFMW-9	WFMW-9T	WFMW-16A	WFMW-16C	WFMW-16T	WFMW-11	WFMW-15C	WFMW-15T	WFMW-12	WFMW-12S	WFMW-13S	WFMW-13D	WFMW-18	WFMW-17	WFMW-1109
	Elevation (ft AMSL)[1]														
1-Jun-93	5614.00	NA	NA	NA	NA	5650.00	NA	NA	5654.00	NA	5662.00	5660.00	NA	NA	NA
1-Jun-95	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5672.37	5663.11	NA	NA	NA
1-Jul-95	5615.42	NA	NA	NA	NA	5649.86	NA	NA	NA	NA	NA	NA	NA	NA	NA
1-Sep-95	NA	NA	NA	NA	NA	5649.71	NA	NA	NA	NA	5672.22	5662.98	NA	NA	NA
1-Oct-96	5616.04	NA	NA	NA	NA	5651.05	NA	NA	NA	NA	5672.43	5665.17	NA	NA	NA
7-Jul-00	5618.36	NA	NA	NA	NA	NA	NA	NA	NA	NA	5673.11	5669.64	NA	NA	NA
30-Aug-00	5618.31	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
7-Nov-00	5617.83	NA	NA	NA	NA	5654.29	NA	NA	NA	NA	5672.90	5669.75	NA	NA	NA
11-Jan-01	5617.53	NA	NA	NA	NA	5654.07	NA	NA	NA	NA	5673.03	5669.87	NA	NA	NA
18-Apr-01	5617.83	NA	NA	NA	NA	5654.19	NA	NA	NA	NA	5673.05	5669.55	NA	NA	NA
10-Jul-01	5617.98	NA	NA	NA	NA	5654.49	NA	NA	NA	NA	5673.00	5669.45	NA	NA	NA
8-Oct-01	5618.18	NA	NA	NA	NA	5654.74	NA	NA	NA	NA	5673.05	5670.35	NA	NA	NA
16-Jan-02	5617.58	NA	NA	NA	NA	5654.74	NA	NA	NA	NA	5672.85	5670.45	NA	NA	NA
4-Apr-02	5619.28	NA	NA	NA	NA	5656.24	NA	NA	NA	NA	5673.35	5671.35	NA	NA	NA
9-May-02	5620.63	NA	NA	NA	NA	5655.54	NA	NA	NA	NA	5673.25	5671.15	NA	NA	NA
24-May-02	5620.53	NA	NA	NA	NA	5655.69	NA	NA	NA	NA	5673.25	5671.30	NA	NA	NA
17-Jul-02	5618.98	NA	NA	NA	NA	5655.39	NA	NA	NA	NA	5673.15	5671.00	NA	NA	NA
16-Oct-02	5619.15	NA	NA	NA	NA	5655.46	NA	NA	5669.39	NA	5673.02	5671.10	NA	NA	NA
15-Jan-03	5618.78	NA	NA	NA	NA	5655.59	NA	NA	5669.57	NA	5673.05	5671.15	NA	NA	NA
17-Apr-03	5624.78	NA	NA	NA	NA	5656.82	NA	NA	5670.08	NA	5673.26	5671.99	NA	NA	NA
22-May-03	5622.02	NA	NA	NA	NA	5656.04	NA	NA	5669.82	NA	5673.10	5671.60	NA	NA	NA
30-Jul-03	5622.88	NA	NA	NA	NA	5656.67	NA	NA	5670.48	NA	5673.27	5672.39	NA	NA	NA
14-Oct-03	5621.21	NA	NA	NA	NA	5656.12	NA	NA	5670.32	NA	5673.23	5672.14	NA	NA	NA
20-Jan-04	5619.97	NA	NA	NA	NA	5655.93	NA	NA	5670.22	NA	5673.14	5671.93	NA	NA	NA
29-Apr-04	5622.78	NA	NA	NA	NA	5656.45	NA	NA	5670.50	NA	5673.35	5672.32	NA	NA	NA
27-May-04	5622.60	NA	NA	NA	NA	5656.59	NA	NA	5670.37	NA	5673.27	5672.17	NA	NA	NA
28-Jul-04	5619.56	NA	NA	NA	NA	5655.61	NA	NA	5669.34	NA	5672.93	5671.15	NA	NA	NA
22-Sep-04	5618.72	NA	NA	NA	NA	5655.62	NA	NA	5669.49	NA	5672.86	5671.27	NA	NA	NA
23-Dec-04	5618.86	NA	NA	NA	NA	5655.74	NA	NA	5670.09	NA	5673.25	5671.74	NA	NA	NA
16-Mar-05	5620.09	NA	NA	NA	NA	5656.13	NA	NA	5670.46	NA	5673.37	5672.18	NA	NA	NA
27-Apr-05	5623.42	NA	NA	NA	NA	5657.14	NA	NA	5670.98	NA	5673.56	5672.83	NA	NA	NA
12-Sep-05	5621.22	NA	NA	NA	NA	5656.22	NA	NA	5670.44	NA	5673.18	5672.57	NA	NA	NA
19-Dec-05	5620.06	NA	NA	NA	NA	5656.19	NA	NA	5670.32	NA	5673.11	5672.13	NA	NA	NA
9-Feb-06	5620.36	NA	NA	NA	NA	5656.35	NA	NA	5670.51	NA	5673.22	5672.27	NA	NA	NA
14-Mar-06	5621.56	NA	NA	NA	NA	5656.74	NA	NA	5670.61	NA	5673.30	5672.38	NA	NA	NA
12-Apr-06	5629.96	NA	NA	NA	NA	5659.36	NA	NA	5671.94	NA	5673.92	5673.86	NA	NA	NA
30-Jun-06	5624.00	NA	NA	NA	NA	5656.88	NA	NA	5670.87	NA	5673.87	5673.41	NA	NA	NA
15-Sep-06	5624.87	NA	NA	NA	NA	5657.27	NA	NA	5671.21	NA	5673.42	5673.31	NA	NA	NA
7-Dec-06	5624.14	NA	NA	NA	NA	5657.45	NA	NA	5671.22	NA	5673.42	5673.05	NA	NA	NA
6-Mar-07	5623.25	NA	NA	NA	NA	5657.17	NA	NA	5671.19	NA	5673.45	5672.91	NA	NA	NA
13-Apr-07	5627.05	NA	NA	NA	NA	5657.98	NA	NA	5671.71	NA	5673.71	5673.40	NA	NA	NA
15-May-07	5626.62	NA	NA	NA	NA	5657.64	NA	NA	5671.47	NA	5673.56	5673.33	NA	NA	NA
15-Jul-07	5624.49	NA	NA	NA	NA	5657.26	NA	NA	5671.41	NA	5673.45	5673.28	NA	NA	NA
13-Aug-07	5624.03	NA	NA	NA	NA	5657.25	NA	NA	5671.34	NA	5673.47	5673.24	NA	NA	NA
8-Nov-07	5624.83	NA	NA	NA	NA	5657.52	NA	NA	5671.66	NA	5673.56	5673.31	NA	NA	NA
3-Jan-08	5624.63	NA	NA	NA	NA	5657.60	NA	NA	5671.78	NA	5673.67	5673.37	NA	NA	NA
21-Feb-08	5624.62	NA	NA	NA	NA	5657.74	NA	NA	5671.86	NA	5673.72	5673.35	NA	NA	NA
16-May-08	5631.20	NA	NA	NA	NA	5658.91	NA	NA	5672.70	NA	5674.44	5674.40	NA	NA	NA
15-Aug-08	5626.62	NA	NA	NA	NA	5658.13	NA	NA	5672.19	NA	5674.32	5673.86	NA	NA	NA
20-Oct-08	5625.78	NA	NA	NA	NA	5658.15	NA	NA	5672.30	NA	5674.13	5673.93	NA	NA	NA
5-Dec-08	5624.24	NA	NA	NA	NA	5657.69	NA	NA	5671.80	NA	5673.62	5673.52	NA	NA	NA
10-Feb-09	5622.53	NA	NA	NA	NA	5657.46	NA	NA	5671.65	NA	5673.55	5673.23	NA	NA	NA
26-Mar-09	5624.42	NA	NA	NA	NA	5658.33	NA	NA	5672.34	NA	5674.05	5673.62	NA	NA	NA
24-Apr-09	5631.56	NA	NA	NA	NA	5660.61	NA	NA	5671.87	NA	5675.10	5675.71	NA	NA	NA
21-May-09	5632.67	NA	NA	NA	NA	5659.80	NA	NA	5673.46	NA	5674.87	5675.61	NA	NA	NA
4-Aug-09	5631.49	NA	NA	NA	NA	5659.23	NA	NA	5673.08	NA	5674.45	5675.39	NA	NA	NA
4-Nov-09	5629.05	NA	NA	NA	NA	5658.68	NA	NA	5672.64	NA	5674.06	5674.45	NA	NA	NA

Table 3-3a: 2020 and Historical Groundwater Elevation at West Fork Monitoring Wells - Tailings Areas

Date	Location														
	WFMW-9	WFMW-9T	WFMW-16A	WFMW-16C	WFMW-16T	WFMW-11	WFMW-15C	WFMW-15T	WFMW-12	WFMW-12S	WFMW-13S	WFMW-13D	WFMW-18	WFMW-17	WFMW-1109
26-Feb-10	5628.31	NA	NA	NA	NA	5658.55	NA	NA	5672.57	NA	5674.05	5674.11	NA	NA	NA
13-May-10	5631.64	NA	NA	NA	NA	5659.43	NA	NA	5673.44	NA	5674.73	5674.89	NA	NA	NA
8-Jun-10	5632.61	NA	NA	NA	NA	5659.62	NA	NA	5673.54	NA	5674.16	5675.16	NA	NA	NA
21-Jul-10	5631.63	NA	NA	NA	NA	5658.98	NA	NA	5672.93	NA	5674.32	5674.81	NA	NA	NA
9-Sep-10	5629.09	NA	NA	NA	NA	5658.29	NA	NA	5672.39	NA	5673.91	5674.22	NA	NA	NA
17-Nov-10	5628.53	NA	NA	NA	NA	5658.38	NA	NA	5672.41	NA	5673.91	5674.07	NA	NA	NA
27-Jan-11	5628.08	NA	NA	NA	NA	5658.52	NA	NA	5672.51	NA	5673.99	5674.03	NA	NA	NA
24-Mar-11	5629.28	NA	NA	NA	NA	5659.19	NA	NA	5673.01	NA	5674.30	5674.42	NA	NA	NA
3-May-11	5633.64	NA	NA	NA	NA	5661.42	NA	NA	5675.37	NA	5676.01	5676.63	NA	NA	NA
23-May-11	5636.57	NA	NA	NA	NA	5663.27	NA	NA	5677.22	NA	5677.57	5678.60	NA	NA	NA
2-Jun-11	5637.39	NA	NA	NA	NA	5663.68	NA	NA	5677.44	NA	5677.85	5679.16	NA	NA	NA
17-Jun-11	5639.26	NA	NA	NA	NA	5664.62	NA	NA	5678.50	NA	5678.82	5680.51	NA	NA	NA
27-Jun-11	5639.11	NA	NA	NA	NA	5664.36	NA	NA	5677.85	NA	5678.20	5680.01	NA	NA	NA
29-Jun-11	5637.21	NA	NA	NA	NA	5664.13	NA	NA	5677.69	NA	5678.09	5679.89	NA	NA	NA
30-Jun-11	5636.31	NA	NA	NA	NA	5663.99	NA	NA	5677.62	NA	5678.00	5679.80	NA	NA	NA
1-Jul-11	5635.67	NA	NA	NA	NA	5663.91	NA	NA	5677.60	NA	5677.97	5679.69	NA	NA	NA
5-Jul-11	5634.61	NA	NA	NA	NA	5663.74	NA	NA	5677.38	NA	5677.82	5679.54	NA	NA	NA
7-Jul-11	5634.37	NA	NA	NA	NA	5663.71	NA	NA	5677.13	NA	5677.74	5679.48	NA	NA	NA
12-Jul-11	5633.84	NA	NA	NA	NA	5663.52	NA	NA	5677.17	NA	5677.56	5679.29	NA	NA	NA
18-Jul-11	5633.40	NA	NA	NA	NA	5663.33	NA	NA	5676.99	NA	5677.39	5679.06	NA	NA	NA
25-Jul-11	5632.92	NA	NA	NA	NA	5662.97	NA	NA	5676.96	NA	5677.38	5678.82	NA	NA	NA
29-Jul-11	5632.65	NA	NA	NA	NA	5662.98	NA	NA	5677.01	NA	5677.34	5678.77	NA	NA	NA
2-Aug-11	5632.65	NA	NA	NA	NA	5663.15	NA	NA	5677.11	NA	5677.49	5678.93	NA	NA	NA
15-Aug-11	5632.51	NA	NA	NA	NA	5663.23	NA	NA	5677.27	NA	5677.61	5678.94	NA	NA	NA
23-Aug-11	5632.14	NA	NA	NA	NA	5663.12	NA	NA	5677.20	NA	5677.51	5678.80	NA	NA	NA
30-Aug-11	5631.92	NA	NA	NA	NA	5663.04	NA	NA	5677.21	NA	5677.51	5678.74	NA	NA	NA
21-Sep-11	5631.61	NA	NA	NA	NA	5663.07	NA	NA	5677.41	NA	5677.71	5678.76	NA	NA	5683.95
6-Oct-11	5631.57	NA	NA	NA	NA	5663.25	NA	NA	5677.76	NA	5678.02	5678.84	NA	NA	5683.95
9-Nov-11	5632.12	NA	NA	NA	NA	5664.21	NA	NA	5679.44	NA	5679.60	5680.36	NA	NA	5683.30
25-Jan-12	5628.13	NA	NA	NA	NA	5661.41	NA	NA	5675.56	NA	5676.91	5671.90	NA	NA	5683.19
28-Feb-12	5629.94	NA	NA	NA	NA	5661.83	NA	NA	5676.40	NA	5677.51	5672.93	NA	NA	5682.85
4-Mar-12	5630.32	NA	NA	NA	NA	5661.97	NA	NA	5676.57	NA	5677.60	5673.34	NA	NA	5683.08
4-Apr-12	5634.36	NA	NA	NA	NA	5664.56	NA	NA	5680.07	NA	5681.03	5680.17	NA	NA	5683.42
11-Apr-12	5634.62	NA	NA	NA	NA	5664.91	NA	NA	5680.38	NA	5681.26	5680.66	NA	NA	5683.55
27-Apr-12	5635.85	NA	NA	NA	NA	5666.16	NA	NA	5681.92	NA	5682.69	5682.07	NA	NA	5683.73
11-May-12	5636.69	NA	NA	NA	NA	5666.60	NA	NA	5682.11	NA	5682.75	5682.28	NA	NA	5683.52
31-May-12	5636.65	NA	NA	NA	NA	5666.70	NA	NA	5681.21	NA	5683.01	5682.35	NA	NA	5683.44
2-Jul-12	5635.58	NA	NA	NA	NA	5665.87	NA	NA	5680.82	NA	5682.49	5681.83	NA	NA	5683.38
18-Jul-12	5635.57	NA	NA	NA	NA	5666.16	NA	NA	5681.91	NA	5682.56	5681.94	NA	NA	5683.38
13-Aug-12	5635.70	NA	NA	NA	NA	5666.34	NA	NA	5681.92	NA	5682.49	5682.02	NA	NA	5683.34
31-Aug-12	5635.49	NA	NA	NA	NA	5666.15	NA	NA	5681.85	NA	5682.50	5681.93	NA	NA	5683.34
12-Sep-12	5635.42	NA	NA	NA	NA	5666.07	NA	NA	5681.86	NA	5682.45	5681.91	NA	NA	5683.36
5-Oct-12	5635.98	NA	NA	NA	NA	5666.74	NA	NA	5682.55	NA	5683.05	5682.62	NA	NA	5683.20
13-Nov-12	5636.63	NA	NA	NA	NA	5666.99	NA	NA	5682.36	NA	5683.43	5682.41	NA	NA	5683.09
3-Dec-12	5636.59	5640.32	5641.32	5641.79	5647.86	5667.15	5680.42	5670.84	5682.77	NA	5683.30	5682.54	5684.96	5701.49	5683.23
8-Jan-13	5636.67	5641.56	5641.39	5641.80	5647.78	5667.39	5680.40	5670.87	5683.08	NA	5683.50	5683.12	5685.01	5701.02	5683.56
14-Feb-13	5636.52	5640.38	5641.34	5641.72	5647.72	5667.49	5680.52	5670.84	5683.37	NA	5683.77	5683.45	5685.10	5701.00	5683.56
13-Mar-13	5636.54	5640.52	5641.45	5641.82	5648.42	5667.86	5680.74	5671.10	5683.62	NA	5684.01	5683.73	5685.21	5701.13	5684.05
10-Apr-13	5638.70	5641.32	5643.45	5643.93	5648.57	5668.53	5682.26	5672.15	5685.61	NA	5685.96	5685.68	5686.51	5702.03	5685.97
1-May-13	5637.62	5640.83	5642.68	5642.97	5648.14	5668.56	5682.27	5672.29	5685.91	NA	5686.27	5685.98	5686.67	5702.27	5686.22
29-May-13	5638.35	5641.66	5643.35	5644.41	5648.72	5669.46	5682.84	5673.34	5686.59	NA	5686.90	5686.66	5687.15	5702.26	5686.59
27-Jun-13	5637.86	5641.17	5642.95	5643.28	5648.54	5669.31	5681.83	5672.90	5685.93	NA	5686.27	5685.94	5686.67	5701.99	5686.24
25-Jul-13	5636.96	5640.99	5642.03	5642.40	5648.31	5668.40	5680.41	5672.36	5684.56	NA	5684.93	5684.61	5685.75	5701.36	5684.93
15-Aug-13	5636.66	5640.91	5641.76	5642.14	5648.16	5668.12	5680.24	5672.11	5684.19	NA	5684.60	5684.28	5685.51	5701.15	5684.59
1-Oct-13	5636.72	5640.75	5641.84	5642.33	5648.14	5668.42	5680.86	5672.50	5684.87	NA	5685.12	5684.93	5686.10	5702.32	5685.04
12-Nov-13	5636.54	5640.63	5641.73	5642.47	5648.11	5669.13	5680.88	5672.92	5685.00	NA	5685.30	5685.06	5682.93	5701.12	5685.34
18-Dec-13	5636.05	5640.78	5641.25	5642.13	5648.06	5668.57	5680.72	5673.06	5685.04	NA	5685.38	5685.13	5686.01	5701.03	5685.39

Table 3-3a: 2020 and Historical Groundwater Elevation at West Fork Monitoring Wells - Tailings Areas

Date	Location														
	WFMW-9	WFMW-9T	WFMW-16A	WFMW-16C	WFMW-16T	WFMW-11	WFMW-15C	WFMW-15T	WFMW-12	WFMW-12S	WFMW-13S	WFMW-13D	WFMW-18	WFMW-17	WFMW-1109
27-Feb-14	5635.88	5640.55	5641.19	5642.11	5647.96	5668.80	5680.95	5673.21	5685.45	NA	5685.74	5685.50	5686.17	5701.13	5685.76
25-Mar-14	5637.42	5641.19	5642.72	5643.71	5648.64	5670.60	5683.05	5674.93	5687.87	NA	5688.14	5687.91	5688.14	5701.81	5688.16
16-Apr-14	5640.52	5642.32	5645.71	5646.70	5650.28	5673.51	5687.43	5677.44	5690.07	NA	5690.31	5690.12	5690.31	5702.29	5690.34
15-May-14	5641.32	5643.45	5646.36	5647.28	5651.46	5673.56	NA	5678.00	5690.88	NA	5691.19	5690.91	5691.08	5702.55	5691.14
23-Jul-14	5637.90	5641.78	5643.12	5644.05	5649.39	5671.29	5684.33	5675.90	5687.87	NA	5688.27	5687.92	5688.17	5701.66	5688.14
20-Aug-14	5637.06	NA	NA	NA	NA	5670.36	NA	NA	5687.07	NA	5687.22	5686.91	NA	NA	NA
23-Sep-14	5637.12	NA	NA	NA	NA	5670.64	NA	NA	5687.10	NA	5687.36	5687.14	NA	NA	NA
29-Oct-14	5637.25	NA	NA	NA	NA	5670.93	NA	NA	5687.16	NA	5687.49	5687.29	NA	NA	NA
24-Nov-14	5637.20	5640.87	5642.49	5643.37	5649.39	5670.80	5682.83	5675.00	5687.13	NA	5689.13	5687.35	5687.49	5701.22	5687.39
9-Mar-15	5637.72	5641.44	5643.06	5643.98	5650.07	5671.91	5684.27	5676.21	5688.29	NA	5688.53	5688.35	5688.55	5701.26	5688.56
8-Jun-15	5639.78	5642.66	5644.99	5645.96	5655.72	5674.23	5686.77	5678.73	5691.00	NA	5691.19	5691.02	5691.18	5702.04	5691.23
15-Sep-15	5638.07	5640.55	5643.45	5644.35	5655.72	5672.20	5683.97	5675.63	5688.57	NA	5688.71	5688.53	5688.74	5701.07	5688.75
17-May-16	5640.07	5642.88	5645.58	5646.47	5655.72	5675.50	5690.32	5680.73	5686.04	NA	5692.95	5692.94	5692.37	5702.36	5693.03
14-Sep-16	5638.22	5643.35	5643.80	5644.53	5655.72	5672.92	5687.30	5678.51	5689.38	NA	5689.60	5689.45	5689.61	5700.86	5684.49
17-Nov-16	5638.53	5641.65	5643.80	5644.63	5655.72	5673.14	5687.41	5678.70	5689.79	NA	5689.81	5689.80	5689.90	5701.15	5689.88
18-Apr-17	5641.90	5647.09	5647.24	5648.25	5655.72	5676.78	5691.40	5682.00	5693.81	NA	5693.85	5693.91	5694.01	5702.09	5694.11
20-Jun-17	5641.73	5644.92	5647.14	5648.17	5655.72	5677.34	5692.70	5682.74	5694.69	NA	5694.77	5694.86	5694.86	5702.19	5694.97
1-Aug-17	5640.48	5643.91	5645.82	5646.53	5655.72	5675.74	5690.90	5681.20	5692.90	NA	5692.99	5692.93	5693.07	5701.43	5693.19
9-Nov-17	5639.48	5643.21	5644.82	5645.47	5655.72	5674.78	5689.86	5680.26	5691.62	NA	5692.99	5692.93	5691.81	5701.11	5691.89
19-Apr-18	5643.88	5645.75	5649.04	5650.15	5655.72	5678.54	5693.92	5683.16	5695.44	NA	5695.47	5695.45	5695.61	5701.93	5695.71
7-Jun-18	5642.32	5645.25	5647.55	5648.49	5655.72	5678.74	5694.02	5683.70	5695.80	NA	5695.91	5695.87	5696.01	5702.11	5696.09
10-Jul-18	5641.92	5646.75	5647.22	5648.13	5655.72	5678.08	5693.16	5683.10	5695.12	NA	5695.21	5695.17	5695.31	5701.85	5695.31
16-Jul-18	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
19-Jul-18	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
23-Jul-18	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
23-Jul-18	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
24-Jul-18	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
27-Jul-18	5641.23	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
2-Aug-18	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
9-Aug-18	5640.79	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
17-Aug-18	5640.60	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
28-Aug-18	5640.44	5644.05	5645.74	5646.58	5655.72	5676.54	5691.45	5681.56	5693.32	NA	5693.35	5693.45	5693.53	5701.25	5693.59
26-Nov-18	5639.52	5643.73	5644.90	5645.73	5655.72	5675.78	5691.02	5680.78	5692.54	NA	5692.71	5692.59	5692.75	5700.95	5692.75
9-May-19	5640.88	5644.05	5646.10	5646.97	5655.72	5678.64	5690.76	5683.16	5695.42	NA	5695.49	5695.45	5695.61	5702.31	5695.73
22-Aug-19	5640.12	5644.07	5645.32	5646.11	5655.72	5677.22	5691.32	5681.76	5693.24	NA	5693.35	5693.25	5693.41	5700.97	5693.49
14-Nov-19	5639.88	5643.65	5645.30	5645.95	5655.72	5676.86	5692.00	5681.30	5692.84	NA	5692.97	5692.85	5693.15	5700.91	5693.19
20-May-20	5642.16	5644.55	5647.24	5648.03	5655.72	5680.04	5695.32	5684.26	5696.62	NA	5696.67	5696.69	5696.85	5702.71	5696.89
19-Aug-20	5641.12	5645.71	5646.32	5647.03	5655.72	5678.82	5693.20	5682.96	5694.52	NA	5694.75	5694.55	5694.71	5701.11	5694.81
4-Nov-20	5640.58	5643.65	5645.86	5656.58	5655.72	5678.06	5692.50	5682.18	5693.72	NA	5693.75	5693.75	5693.87	5701.01	5693.99

Notes:

1. Groundwater elevation is represented as feet Above Mean Sea Level (AMSL), NAVD29.
2. NA - Not available.
3. Several wells were added in late 2012 as part of the ongoing West Fork Investigation work (Golder 2013).

Golder 2013. Draft for BMSG Review - Summary of 2012 West Fork Tailings Impoundment Field Investigation. Submitted to the BMSG. January 31.

Table 3-3b: 2020 and Historical Groundwater Elevation at West Fork Monitoring Wells - Lower Wells

Date	Location														
	WFMW-1S	WFMW-1D	WFMW-1101	WFMW-1110D	BOW-1	BPW-2	BOW-2	APW-1	APW-2	BPW-1	APW-3	WFMW-1111D	WFMW-2	WFMW-3	WFMW-4
	Elevation (ft AMSL)[1]														
1-Jun-93	5571.00	5570.00	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5571.00	5584.00	5570.00
1-Jun-95	5575.51	5573.69	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5573.60	NA	5577.11
1-Jul-95	5574.96	5573.28	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5573.34	NA	NA
1-Sep-95	5574.79	5572.93	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5573.22	NA	5575.95
1-Oct-96	5575.62	5573.72	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5574.34	NA	5577.05
7-Jul-00	5574.25	5572.20	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5574.79	5605.74	5577.04
30-Aug-00	5574.15	5572.15	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5574.84	5605.79	5576.94
7-Nov-00	5573.61	5572.01	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5574.41	5605.79	5576.68
11-Jan-01	5573.73	5571.89	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5574.39	5600.87	5576.66
18-Apr-01	5573.91	5572.16	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5574.76	NA	5576.78
10-Jul-01	5573.91	5572.31	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5574.51	NA	5576.78
8-Oct-01	5574.06	5572.31	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5574.76	NA	5576.88
16-Jan-02	5573.91	5572.21	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5574.86	NA	5576.68
4-Apr-02	5574.21	5572.71	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5575.51	NA	5577.58
9-May-02	5574.41	5572.91	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5575.51	NA	5577.38
24-May-02	5574.51	5573.01	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5575.56	NA	5577.43
17-Jul-02	5574.31	5572.61	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5575.31	NA	5577.23
16-Oct-02	5574.36	5572.61	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5575.82	NA	5577.24
15-Jan-03	5574.36	5572.56	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5576.21	NA	5577.18
17-Apr-03	5574.62	5573.10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5576.81	NA	5577.79
22-May-03	5574.63	5573.09	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5576.67	NA	5577.71
30-Jul-03	5574.60	5573.03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5576.79	NA	5577.64
14-Oct-03	5574.02	5572.12	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5576.64	NA	5577.11
20-Jan-04	5575.64	5573.31	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5576.73	NA	5578.04
29-Apr-04	5575.89	5573.82	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5576.61	NA	5578.42
27-May-04	5575.91	5573.86	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5576.53	NA	5578.40
28-Jul-04	5575.79	5573.48	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5576.22	NA	5578.10
22-Sep-04	5575.86	5573.69	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5576.24	NA	5578.15
23-Dec-04	5575.88	5573.51	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5576.28	NA	5578.10
16-Mar-05	5575.96	5573.66	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5577.28	NA	5578.21
27-Apr-05	5576.00	5573.82	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5576.41	NA	5578.39
12-Sep-05	5576.06	5573.68	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5576.31	NA	5578.41
19-Dec-05	5576.03	5573.65	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5576.22	NA	5578.30
9-Feb-06	5576.11	5573.69	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5576.15	NA	5578.23
14-Mar-06	5576.12	5573.72	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5576.14	NA	5578.32
12-Apr-06	5576.29	5574.11	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5576.52	NA	5578.72
30-Jun-06	5576.15	5573.89	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5576.42	NA	5578.66
15-Sep-06	5576.13	5573.83	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5576.29	NA	5578.59
7-Dec-06	5576.05	5573.53	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5576.23	NA	5578.45
6-Mar-07	5576.13	5573.72	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5576.24	NA	5578.55
13-Apr-07	5576.23	5574.06	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5576.23	NA	5578.81
15-May-07	5576.28	5574.15	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5576.22	NA	5578.78
15-Jul-07	5576.31	5573.87	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5576.06	NA	5578.70
13-Aug-07	5576.31	5573.82	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5576.03	NA	5578.69
8-Nov-07	5576.31	5573.88	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5576.10	NA	5578.79
3-Jan-08	5576.31	5573.89	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5576.10	NA	5578.78
21-Feb-08	5576.34	5573.91	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5576.12	NA	5578.80
16-May-08	5576.85	5574.72	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5576.45	NA	5579.51
15-Aug-08	5576.24	5574.25	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5576.19	NA	5578.85
20-Oct-08	5576.15	5574.03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5576.09	NA	5578.70
5-Dec-08	5576.04	5573.55	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5576.08	NA	5578.46
10-Feb-09	5576.04	5573.55	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5576.06	NA	5578.44
26-Mar-09	5576.53	5574.03	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5576.26	NA	5578.90
24-Apr-09	5576.84	5574.62	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5576.53	NA	5579.47
21-May-09	5576.39	5574.40	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5576.31	NA	5579.34
4-Aug-09	5576.54	5574.33	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5576.38	NA	5579.85
4-Nov-09	5576.31	5574.18	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5576.42	NA	5579.17

Table 3-3b: 2020 and Historical Groundwater Elevation at West Fork Monitoring Wells - Lower Wells

Date	Location														
	WFMW-1S	WFMW-1D	WFMW-1101	WFMW-1110D	BOW-1	BPW-2	BOW-2	APW-1	APW-2	BPW-1	APW-3	WFMW-1111D	WFMW-2	WFMW-3	WFMW-4
26-Feb-10	5576.70	5574.31	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5576.55	NA	5579.51
13-May-10	5576.74	5573.84	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5576.57	NA	5579.35
8-Jun-10	5576.69	5573.97	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5576.50	NA	5579.39
21-Jul-10	5576.59	5573.79	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5576.46	NA	5579.33
9-Sep-10	5576.46	5573.29	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5576.39	NA	5578.97
17-Nov-10	5576.40	5573.38	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5576.40	NA	5578.98
27-Jan-11	5576.89	5573.76	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5576.57	NA	5579.36
24-Mar-11	5576.59	5573.77	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5576.57	NA	5579.31
3-May-11	5576.70	5574.13	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5576.78	NA	5579.69
23-May-11	5577.14	5575.02	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5577.00	NA	5580.29
2-Jun-11	5576.67	5574.76	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5576.98	NA	5580.08
17-Jun-11	5576.75	5574.86	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5577.04	NA	5580.25
27-Jun-11	5576.74	5574.79	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5577.05	NA	5580.28
29-Jun-11	5576.36	5574.10	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5576.66	NA	5579.01
30-Jun-11	5576.22	5573.92	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5576.25	NA	5578.75
1-Jul-11	5576.13	5573.77	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5575.87	NA	5578.61
5-Jul-11	5575.97	5573.57	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5575.33	NA	5578.36
7-Jul-11	5575.92	5573.44	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5575.11	NA	5578.26
12-Jul-11	5575.83	5573.36	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5574.97	NA	5578.17
18-Jul-11	5575.85	5573.22	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5574.89	NA	5578.03
25-Jul-11	5575.79	5573.11	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5574.79	NA	5577.95
29-Jul-11	5575.72	5573.02	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5574.69	5606.86	5577.86
2-Aug-11	5575.72	5572.98	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5574.71	5607.00	5577.86
15-Aug-11	5575.64	5572.84	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5574.64	5607.34	5577.84
23-Aug-11	5575.65	5572.88	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5574.61	5606.97	5577.76
30-Aug-11	5575.60	5572.86	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5574.58	5606.83	5577.74
21-Sep-11	5575.49	5572.74	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5574.46	5607.17	5577.70
6-Oct-11	5575.53	5572.66	5579.17	NA	NA	NA	NA	NA	NA	NA	NA	NA	5574.50	5606.79	5577.64
9-Nov-11	5575.51	5572.58	5579.17	NA	NA	NA	NA	NA	NA	NA	NA	NA	5574.44	5606.77	5577.62
25-Jan-12	5575.50	5572.75	5579.06	NA	NA	NA	NA	NA	NA	NA	NA	NA	5575.71	5601.62	5577.65
28-Feb-12	5575.58	5572.78	5578.81	NA	NA	NA	NA	NA	NA	NA	NA	NA	5575.72	5606.84	5577.71
4-Mar-12	5575.62	5572.84	5578.89	NA	NA	NA	NA	NA	NA	NA	NA	NA	5575.65	5601.40	5577.67
4-Apr-12	5575.83	5572.27	5579.31	NA	NA	NA	NA	NA	NA	NA	NA	NA	5575.80	5600.79	5578.08
11-Apr-12	5575.93	5573.39	5579.43	NA	NA	NA	NA	NA	NA	NA	NA	NA	5575.88	5606.86	5578.16
27-Apr-12	5576.02	5573.80	5580.39	NA	NA	NA	NA	NA	NA	NA	NA	NA	5575.93	5601.79	5578.36
11-May-12	5575.96	5573.66	5580.02	NA	NA	NA	NA	NA	NA	NA	NA	NA	5575.77	5606.85	5578.39
31-May-12	5575.91	5573.64	5579.80	NA	NA	NA	NA	NA	NA	NA	NA	NA	5575.64	5601.79	5578.35
2-Jul-12	5575.87	5573.24	5579.42	NA	NA	NA	NA	NA	NA	NA	NA	NA	5575.34	5601.79	5578.17
18-Jul-12	5575.72	5573.11	5579.32	NA	NA	NA	NA	NA	NA	NA	NA	NA	5575.11	5601.79	5578.09
13-Aug-12	5575.75	5573.10	5579.14	NA	NA	NA	NA	NA	NA	NA	NA	NA	5575.07	NA	5578.11
31-Aug-12	5575.38	5572.78	5579.08	NA	NA	NA	NA	NA	NA	NA	NA	NA	5574.75	NA	5577.73
12-Sep-12	5575.37	5572.85	5578.83	NA	NA	NA	NA	NA	NA	NA	NA	NA	5574.70	NA	5577.76
5-Oct-12	5575.35	5572.92	5578.84	NA	NA	NA	NA	NA	NA	NA	NA	NA	5574.70	NA	5577.70
13-Nov-12	5574.28	5572.47	5578.74	NA	NA	NA	NA	NA	NA	NA	NA	NA	5574.18	NA	5576.96
3-Dec-12	5574.32	5572.52	5578.95	5579.41	5578.01	5571.41	5567.58	5573.68	5571.29	5570.52	5571.27	5567.00	5574.31	NA	5577.03
8-Jan-13	5574.31	5572.46	5579.05	5579.19	5577.94	5571.29	5567.48	5573.66	5571.34	5570.46	5571.18	5566.67	5574.15	NA	5576.99
14-Feb-13	5574.35	5572.48	5578.83	5579.22	5578.07	5571.22	5567.42	5573.68	5571.34	5570.42	5571.23	5566.53	5574.20	NA	5577.00
13-Mar-13	5574.38	5572.54	5579.14	5579.29	5578.26	5571.33	5567.50	5573.75	5571.39	5570.47	5571.30	5566.53	5574.26	NA	5577.06
10-Apr-13	5574.55	5572.85	5579.43	5579.69	5578.82	5571.59	5567.91	5573.81	5571.60	5570.85	5571.49	5567.75	5574.93	NA	5577.33
1-May-13	5574.58	5572.95	5579.71	5580.12	5579.17	5571.78	5568.24	5573.84	5571.68	5571.00	5571.44	5567.50	5574.71	NA	5577.41
29-May-13	5574.59	5572.98	5579.65	5579.98	5579.26	5571.79	5568.25	5573.86	5571.70	5571.00	5571.49	5567.37	5574.66	NA	5577.41
27-Jun-13	5574.55	5572.77	5579.40	5579.66	5579.15	5571.51	5567.73	5573.81	5571.57	5570.66	5571.36	5566.93	5574.60	NA	5577.33
25-Jul-13	5574.49	5572.59	5579.16	5579.31	5579.01	5571.27	5567.50	5573.76	5571.48	5570.43	5571.33	5566.55	5574.43	NA	5577.22
15-Aug-13	5574.45	5572.51	5579.06	5579.19	5579.03	5571.18	5567.37	5573.66	5571.40	5570.27	5571.29	5566.40	5574.30	NA	5577.14
1-Oct-13	5574.57	5572.78	5579.50	5579.88	5579.61	5571.54	5567.98	5573.83	5571.63	5570.55	5571.46	5566.94	5574.75	NA	5577.30
12-Nov-13	5574.47	5572.50	5579.10	5579.23	5579.33	5571.18	5567.49	5573.80	5571.50	5570.17	5571.36	5566.57	5574.36	NA	5577.19
18-Dec-13	5574.47	5572.46	5579.09	5579.21	5579.63	5571.13	5567.43	5573.77	5571.52	5569.99	5571.40	5566.50	5574.31	NA	5577.14

Table 3-3b: 2020 and Historical Groundwater Elevation at West Fork Monitoring Wells - Lower Wells

Date	Location														
	WFMW-1S	WFMW-1D	WFMW-1101	WFMW-1110D	BOW-1	BPW-2	BOW-2	APW-1	APW-2	BPW-1	APW-3	WFMW-1111D	WFMW-2	WFMW-3	WFMW-4
27-Feb-14	5574.50	5572.50	5579.18	5579.31	5579.63	5571.11	5567.48	5573.79	5571.58	5569.92	5571.57	5566.53	5574.38	NA	5577.17
25-Mar-14	5574.68	5572.80	5579.47	5579.81	5579.63	5571.47	5567.49	5573.88	5571.81	5570.27	5571.91	5567.12	5574.72	NA	5577.38
16-Apr-14	5574.93	5573.24	5579.95	5580.33	5580.42	5571.87	5568.55	5574.05	5572.04	5570.89	5572.24	5569.12	5575.52	NA	5578.22
15-May-14	5574.90	5573.31	5580.18	5580.66	5580.68	5572.03	5568.89	5574.01	5572.01	5570.95	5571.97	5569.55	5575.09	NA	5577.80
23-Jul-14	5574.67	5572.80	5579.25	5579.38	5579.92	5571.46	5567.98	5573.91	5571.70	5570.14	5574.78	5567.52	5574.42	NA	5577.42
20-Aug-14	5574.61	5572.65	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5573.24	NA	5577.28
23-Sep-14	5574.41	5572.42	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5573.02	NA	5577.06
29-Oct-14	5574.45	5572.36	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	5574.00	NA	5577.03
24-Nov-14	5575.06	5572.91	5579.15	5579.24	5579.47	5571.18	5567.65	5573.81	5572.06	5570.03	5572.11	5567.20	5575.71	NA	5577.79
9-Mar-15	5575.31	5573.08	5579.18	5579.26	NA	5571.33	5567.82	5573.88	5572.26	5570.17	5572.31	5567.29	5575.87	NA	5578.73
8-Jun-15	5575.22	5573.22	5579.57	5579.90	5579.52	5571.79	5568.45	5573.82	5572.28	5570.42	5572.14	5568.13	5575.33	NA	5578.21
15-Sep-15	5575.05	5572.82	5579.09	5579.16	5578.75	5571.22	5567.68	5573.84	5572.06	5569.88	5571.89	5567.05	5574.89	NA	5577.93
17-May-16	5575.31	5573.31	5579.97	5580.46	5579.63	5571.34	5568.83	5573.99	5572.35	5570.69	5572.15	5568.44	5574.89	NA	5578.48
14-Sep-16	5575.11	5572.77	5578.97	5579.16	5578.54	5571.37	5567.61	5573.84	5572.01	5569.92	5571.93	5566.99	5574.56	NA	5578.03
17-Nov-16	5575.16	5572.81	5579.10	5579.25	5578.62	5571.39	5567.78	5573.86	5572.04	5569.92	5572.05	5566.96	5574.81	NA	5578.08
18-Apr-17	5575.41	5573.37	5579.64	5579.25	5579.35	5571.97	5568.53	5574.04	5572.20	5570.72	5572.52	5569.28	5575.21	NA	5578.74
20-Jun-17	5575.59	5573.53	5579.72	5580.04	5579.47	5572.05	5568.65	5574.16	5572.80	5570.80	5572.89	5568.87	5575.31	NA	5578.78
1-Aug-17	5575.45	5573.17	5579.16	5579.26	5578.87	5571.59	5568.07	5574.10	5572.60	5570.54	5572.77	5568.00	5575.13	NA	5578.58
9-Nov-17	5575.23	5572.91	5578.97	5579.14	5578.71	5571.41	5567.89	5574.08	5572.18	5570.14	5572.13	5567.42	5574.95	NA	5578.42
19-Apr-18	5575.63	5573.39	5579.52	5579.96	5579.45	5571.89	5568.43	5574.22	5572.33	5570.74	5572.55	5569.52	5575.71	NA	5579.04
7-Jun-18	5575.51	5573.31	5579.50	5579.96	5579.63	5571.94	5568.51	5574.16	5572.50	5570.64	5572.29	5568.92	5575.59	NA	5579.03
10-Jul-18	5575.61	5572.91	5579.46	5579.78	5579.32	5571.82	5568.31	5574.32	5572.52	5570.54	5572.25	5568.42	5575.45	NA	5578.96
16-Jul-18	5575.88	5573.23	NA	NA	NA	NA	5568.29	NA	NA	NA	NA	NA	5575.59	NA	5579.09
19-Jul-18	5575.96	5573.42	NA	NA	NA	NA	5568.30	NA	NA	NA	NA	NA	5575.61	NA	5579.09
23-Jul-18	5576.11	5573.60	NA	NA	NA	NA	5568.40	NA	NA	NA	NA	NA	5575.62	NA	NA
23-Jul-18	5576.11	5573.60	NA	NA	NA	NA	5568.40	NA	NA	NA	NA	NA	5575.62	NA	NA
24-Jul-18	NA	NA	NA	NA	NA	NA	5568.12	NA	NA	NA	NA	NA	5575.60	NA	NA
27-Jul-18	NA	NA	NA	NA	NA	NA	5568.08	NA	NA	NA	NA	NA	5575.57	NA	NA
2-Aug-18	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA	NA
9-Aug-18	NA	NA	NA	NA	NA	NA	5567.97	NA	NA	NA	NA	NA	5575.53	NA	NA
17-Aug-18	NA	NA	NA	NA	NA	NA	5567.85	NA	NA	NA	NA	NA	5575.59	NA	NA
28-Aug-18	5575.26	5572.51	5579.06	5579.22	5578.83	5571.39	5567.65	5574.12	5572.13	5569.94	5571.97	5567.64	5575.21	NA	NA
26-Nov-18	5574.95	5572.19	5578.97	5579.16	5578.55	5571.07	5567.31	5573.96	5571.92	5569.58	5571.67	5567.28	5575.11	NA	NA
9-May-19	5575.19	5572.57	5579.37	5579.76	5579.63	5571.67	5568.01	5574.12	5572.23	5570.14	5571.71	5568.23	5575.17	NA	NA
22-Aug-19	5575.01	5572.26	5579.02	5579.20	5578.83	5571.18	5567.35	5573.98	5572.00	5569.68	5571.45	5567.38	5574.85	NA	5578.70
14-Nov-19	5575.01	5572.21	5578.97	5579.20	5578.63	5571.17	5567.31	5574.02	5572.02	5569.66	5571.63	5567.33	5575.25	NA	5578.66
20-May-20	5575.61	5573.01	5579.51	5580.03	5579.59	5572.01	5568.43	5574.48	5572.58	5570.74	5572.01	5568.74	5575.45	NA	5579.32
19-Aug-20	5575.35	5572.43	5578.62	5579.06	5578.61	5571.29	5567.51	5574.42	5572.30	5569.92	5571.71	5567.54	5574.99	NA	5579.03
4-Nov-20	5575.33	5572.41	5578.97	5579.04	5578.63	5571.27	5567.47	5574.62	5572.38	5569.82	5571.71	5567.38	5574.95	NA	5578.90

Notes:
1. Groundwater elevation is represented as feet Above Mean Sea Level (AMSL), NAVD29.
2. NA - Not available.
3. Several wells were added in late 2012 as part of the ongoing West Fork Investigation work (Golder 2013).
4. WFMW-4 was decommissioned during the West Fork Tailings Storage Facility Embankment Stabilization Construction on July 25, 2018.
A replacement well was installed in WFMW-04's former general location during July 2019.

Table 3-3c: 2020 and Historical Groundwater Elevation at West Fork Monitoring Wells - Face of Dam

Date	Location			
	WFMW-3	WFMW-6	GT-101	GT-102
	Elevation (ft AMSL)[1]			
1-Jun-93	5584.00	5589.00	NA	NA
1-Jun-95	NA	NA	NA	NA
1-Jul-95	NA	5593.71	NA	NA
1-Sep-95	NA	5593.54	NA	NA
1-Oct-96	NA	5595.14	NA	NA
7-Jul-00	5605.74	5603.54	NA	NA
30-Aug-00	5605.79	5603.34	NA	NA
7-Nov-00	5605.79	5601.69	5599.59	5604.43
11-Jan-01	5600.87	5600.74	5598.96	5603.13
18-Apr-01	NA	5601.94	5600.04	5603.38
10-Jul-01	NA	5602.49	5600.14	5602.83
8-Oct-01	NA	5603.09	5600.39	5603.08
16-Jan-02	NA	5602.54	5600.04	5600.43
4-Apr-02	NA	5604.34	5601.14	5604.33
9-May-02	NA	5605.54	5602.14	5605.73
24-May-02	NA	5605.49	5602.14	5605.93
17-Jul-02	NA	5604.49	5601.54	5605.43
16-Oct-02	NA	5604.63	5601.55	5605.70
15-Jan-03	NA	5604.24	5601.24	5605.23
17-Apr-03	NA	5608.07	5603.94	5607.61
22-May-03	NA	5607.07	5603.58	5607.50
30-Jul-03	NA	5607.71	5603.95	5607.86
14-Oct-03	NA	5606.74	5603.37	5607.45
20-Jan-04	NA	5605.97	5602.91	5606.61
29-Apr-04	NA	5607.88	5604.25	5608.11
27-May-04	NA	5607.85	5604.36	5608.00
28-Jul-04	NA	5605.97	5603.19	5607.24
22-Sep-04	NA	5605.09	5602.57	5605.97
23-Dec-04	NA	5605.23	5602.72	5605.90
16-Mar-05	NA	5606.25	5603.46	5606.77
27-Apr-05	NA	5608.16	5604.67	5608.05
12-Sep-05	NA	5607.36	5604.40	5608.00
19-Dec-05	NA	5606.44	5603.72	5607.11
9-Feb-06	NA	5606.68	5603.84	5607.25
14-Mar-06	NA	5607.36	5604.29	5607.72
12-Apr-06	NA	5611.71	5606.86	5610.18
30-Jun-06	NA	5609.57	5606.12	5609.94
15-Sep-06	NA	5609.91	5606.40	5610.25
7-Dec-06	NA	5609.56	5606.24	5609.96
6-Mar-07	NA	5608.90	5605.90	5609.38
13-Apr-07	NA	5611.15	5607.26	5611.06
15-May-07	NA	5611.11	5607.41	5611.21
15-Jul-07	NA	5609.79	5606.59	5610.27
13-Aug-07	NA	5609.45	5606.33	5610.01
8-Nov-07	NA	5609.83	5606.54	5610.27
3-Jan-08	NA	5609.79	5606.50	5610.20
21-Feb-08	NA	5609.66	5606.42	5609.99
16-May-08	NA	5613.94	5609.03	5613.15
15-Aug-08	NA	5610.98	5607.07	5611.33
20-Oct-08	NA	5610.15	5606.35	5610.60
5-Dec-08	NA	5608.95	5605.68	5609.60
10-Feb-09	NA	5607.92	5604.78	5608.52
26-Mar-09	NA	5608.93	5605.48	5609.15
24-Apr-09	NA	5613.56	5608.49	5612.44
21-May-09	NA	5615.25	5609.67	5614.57
4-Aug-09	NA	5614.83	5609.53	5614.80
4-Nov-09	NA	5612.79	5609.44	5613.42

Table 3-3c: 2020 and Historical Groundwater Elevation at West Fork Monitoring Wells - Face of Dam

Date	Location			
	WFMW-3	WFMW-6	GT-101	GT-102
26-Feb-10	NA	5613.01	5608.80	5614.10
13-May-10	NA	5615.28	5610.05	5615.81
8-Jun-10	NA	5616.00	5610.40	5616.35
21-Jul-10	NA	5615.58	5610.31	5616.48
9-Sep-10	NA	5613.51	5609.07	5615.00
17-Nov-10	NA	5613.00	5608.69	5614.44
27-Jan-11	NA	5612.80	5608.58	5614.20
24-Mar-11	NA	5613.54	5609.09	5614.84
3-May-11	NA	5617.35	5611.15	5618.21
23-May-11	NA	5620.38	5613.15	5620.26
2-Jun-11	NA	5621.25	5613.94	5620.85
17-Jun-11	NA	5622.67	5615.17	5621.99
27-Jun-11	NA	5622.74	5615.29	5622.24
29-Jun-11	NA	5617.34	5605.39	5618.84
30-Jun-11	NA	5616.10	5604.50	5617.50
1-Jul-11	NA	5615.30	5604.02	5616.69
5-Jul-11	NA	5614.03	5603.45	5615.50
7-Jul-11	NA	5613.74	5603.36	5615.31
12-Jul-11	NA	5613.24	5603.02	5614.87
18-Jul-11	NA	5612.79	5602.76	5614.52
25-Jul-11	NA	5612.23	5602.47	5614.02
29-Jul-11	5606.86	5611.88	5602.31	5613.76
2-Aug-11	5607.00	5611.87	5602.29	5613.77
15-Aug-11	5607.34	5611.81	5602.21	5613.63
23-Aug-11	5606.97	5611.46	5601.92	5613.28
30-Aug-11	5606.83	5611.26	5601.82	5613.08
21-Sep-11	5607.17	5610.96	5601.64	5612.70
6-Oct-11	5606.79	5610.87	5601.61	5612.45
9-Nov-11	5606.77	5611.16	5601.78	5609.67
25-Jan-12	5601.62	5608.58	5600.80	5608.53
28-Feb-12	5606.84	5609.90	5601.31	5609.41
4-Mar-12	5601.40	5610.28	5601.44	5609.23
4-Apr-12	5600.79	5613.99	5603.11	5614.95
11-Apr-12	5606.86	5614.26	5603.13	5615.37
27-Apr-12	5601.79	5615.12	5603.45	5616.05
11-May-12	5606.85	5615.72	5603.85	5616.70
31-May-12	5601.79	5615.63	5603.85	5616.63
2-Jul-12	5601.79	5614.85	5603.51	5615.86
18-Jul-12	5601.79	5614.70	5603.37	5615.63
13-Aug-12	NA	5614.81	5603.49	5615.77
31-Aug-12	NA	5614.51	5603.32	5615.46
12-Sep-12	NA	5614.46	5603.21	5615.34
5-Oct-12	NA	5614.76	5603.42	5615.76
13-Nov-12	NA	5615.08	5603.55	5616.27
3-Dec-12	NA	5614.98	5603.53	5616.10
8-Jan-13	NA	5614.95	5603.78	5616.13
14-Feb-13	NA	5614.74	5603.74	5615.90
13-Mar-13	NA	5614.74	5603.76	5615.90
10-Apr-13	NA	5616.45	5604.82	5617.15
1-May-13	NA	5615.93	5604.44	5616.89
29-May-13	NA	5616.44	5604.75	5617.37
27-Jun-13	NA	5616.09	5604.55	5617.16
25-Jul-13	NA	5615.37	5604.18	5616.55
15-Aug-13	NA	5614.99	5603.97	5616.27
1-Oct-13	NA	5615.01	5603.98	5616.33
12-Nov-13	NA	5614.74	5603.88	5616.09
18-Dec-13	NA	5614.20	5603.60	5615.69

Table 3-3c: 2020 and Historical Groundwater Elevation at West Fork Monitoring Wells - Face of Dam

Date	Location			
	WFMW-3	WFMW-6	GT-101	GT-102
27-Feb-14	NA	5613.88	5603.38	5615.47
25-Mar-14	NA	5615.28	5604.09	5616.75
16-Apr-14	NA	5617.42	5605.48	5618.21
15-May-14	NA	5618.07	5606.13	5618.97
23-Jul-14	NA	5615.58	5604.41	5617.07
20-Aug-14	NA	5614.80	5603.93	5616.35
23-Sep-14	NA	5614.74	5603.85	5616.27
29-Oct-14	NA	5614.82	5603.75	5616.30
24-Nov-14	NA	5614.74	5603.71	5616.14
9-Mar-15	NA	5614.88	5603.82	5616.18
8-Jun-15	NA	5616.07	5604.81	5617.25
15-Sep-15	NA	5614.74	5603.97	5616.18
17-May-16	NA	5614.50	5605.25	5617.14
14-Sep-16	NA	5614.64	5604.13	5615.73
17-Nov-16	NA	5614.74	5604.35	5615.75
18-Apr-17	NA	5618.04	5607.39	5618.37
20-Jun-17	NA	5617.92	5607.33	5618.45
1-Aug-17	NA	5616.94	5606.64	5617.73
9-Nov-17	NA	5615.88	5605.94	5616.91
19-Apr-18	NA	5618.90	5608.14	5619.07
7-Jun-18	NA	5618.34	5607.94	5618.89
10-Jul-18	NA	5617.96	5607.54	5619.65
16-Jul-18	NA	NA	NA	5618.49
19-Jul-18	NA	NA	NA	5618.45
23-Jul-18	NA	NA	NA	5618.32
23-Jul-18	NA	NA	NA	5618.32
24-Jul-18	NA	NA	NA	5618.29
27-Jul-18	NA	5617.20	NA	5618.12
2-Aug-18	NA	NA	NA	NA
9-Aug-18	NA	5616.79	NA	5617.71
17-Aug-18	NA	5616.54	NA	5617.50
28-Aug-18	NA	5616.49	5606.34	5617.45
26-Nov-18	NA	5615.06	5604.96	5616.37
9-May-19	NA	5616.34	5605.94	5617.25
22-Aug-19	NA	5615.54	5625.04	5616.75
14-Nov-19	NA	5614.74	5604.00	5616.03
20-May-20	NA	5616.86	5605.82	5617.45
19-Aug-20	NA	5615.14	5604.20	5616.43
4-Nov-20	NA	5614.54	5603.72	5615.83

Notes:
1. Groundwater elevation is represented as feet Above Mean Sea Level (AMSL), NAVD29.
2. NA - Not available.

Table 3-3d: 2020 and Historical Groundwater Quality at West Fork Monitoring Wells

Location		WFMW-01D																												
Date		28-Apr-93	30-Aug-93	23-Oct-93	29-Apr-94	28-Jul-94	12-Oct-94	23-Jun-95	23-Sep-95	25-Oct-96	27-Apr-98	22-Sep-04	4-May-06	4-May-06	4-May-06	15-May-07	4-Nov-09	4-Nov-09	5-Oct-10	6-Oct-11	4-Apr-12	21-Sep-12	1-Oct-13	15-Oct-14	13-Oct-15	11-Oct-16	2-Oct-17	1-Oct-18	7-Oct-19	16-Sep-20
Collection Time								10:30	17:00	14:05	0:00	19:55	12:39	13:29	13:59	10:15	13:20	13:20	12:14	13:05	13:55	10:35	9:15	6:00	11:30	12:05	16:15	15:40	18:35	11:50
Field Parameters	***Units***																													
Conductivity	**µS/cm**							3540	1560	952		760			965	92	664	664	526	454	446	502	50	500	443	442	440	463	462	430
pH	**s.u.**	6.0						6.3	5.7	6.0		6.3			6.0	6.1	4.4	4.4	6.0	6.1	5.6	6.0	5.5	5.7	5.8	5.6	5.6	5.8	5.8	6.1
Total Dissolved Solids	**mg/L**	897						1220	1300	1030	771 J	529 J+		693	687		489	489	490	360	429	357	317	336	321	322	314	340	341	321
Total Suspended Solids	**mg/L**		64.4	191.0	75.1	70.4	66.0	31.9	36.4		84.4 J						0.0				170.0									
Temperature	**°C**							8.0	7.2	5.3		6.3			6.4	7.5	0.0		7.9	7.7	7.3	8.2	6.1	6.6	7.0	6.4	6.5	6.4	6.3	6.6
Dissolved Oxygen	**mg/L**																							0.24	2.20	1.10	1.10	5.80	1.55	0.41
ORP	**mV**																							32.1	84.9	71.6	-230.1	66.7	53.4	114.8
Water level elevation	**ft**																							9.5	8.3	8.2	6.8	7.7	8.0	8.3
Pump Rate	**gpm**																							0.86	0.83	1.20	1.53	1.33	1.00	1.00
Alkalinity	**mg/L as $CaCO_3$**	37.4	40.8	1.9				1.8			1 U						0.0				4.0									
Dissolved Phase	***Units***																													
As	**mg/L**		0.003	0.008	0.008	0.015	0.015	0.0111 J	0.004 BJ	0.08 U	0.04 U	0.020		0.036	0.037	0.029	0.036	0.036	0.045	0.043	0.058	0.034	0.055	0.041	0.041	0.042	0.040	0.039	0.036	0.033
Co	**mg/L**		3.710	3.840	5.120	5.810	7.380	7.610	9.260	7.540	5.540	3.540		4.040	4.580	2.790	3.030	3.030	2.860	2.580	2.740	1.780	1.970	1.940	1.940	1.970	2.000	1.980	2.010	1.720
Cu	**mg/L**		0.017	0.011	0.010	0.005	0.002	0.047	0.085	0.086	0.027	0.001		0.012	0.012	0.004 J+	0.007	0.007	0.078	0.039	0.0408	0.0277	0.0094	0.0112	0.0230	0.0153	0.0151	0.0045	0.0059	0.0085
Fe	**mg/L**		36.5	55.6	79.0	88.7	111	93.1	128.0	95.4	64.7	56.3		85.2	87.3	55.9	58.3	58.3	53.4	42.6	47.1	36.5	32.8	29.3	29.1	29.0	26.0	28.5	28.2	24.9
Mn	**mg/L**																				6.20									
Total Phase	***Units***																													
As	**mg/L**	0.003	0.016	0.026	0.016	0.024	0.048	0.0157 J	0.012		0.04 U	0.136 J																		
Co	**mg/L**		3.240	3.770	5.000	5.870	7.190	7.760	9.090		4.350	4.370																		
Cu	**mg/L**	0.004 U	0.057	0.364	0.288	0.736	2.730	0.246	0.234		0.972	7.260																		
Fe	**mg/L**	36.4	47.4	58.1	78.3	91.0	110	94.4	126		52.0	68.1									51.2									
Mn	**mg/L**	11.3						18.5	20.4		10.4																			

Notes:
U - concentration below detectable limits at detection limit shown.
J - The result is an estimated quantity due to a quality control deficiency.
J+ - The result is an estimated quantity, but the result may be biased high.
Based on the amendment to the 2007 Revision of the PMP, groundwater quality at the West Fork wells were not measured in 2008.

Table 3-3d: 2020 and Historical Groundwater Quality at West Fork Monitoring Wells

Location		WFMW-01S																						
Date		27-Apr-93	19-Jun-95	23-Sep-95	26-Oct-96	22-Sep-04	22-Sep-04	4-May-06	15-May-07	4-Nov-09	5-Oct-10	5-Oct-10	5-Oct-10	6-Oct-11	4-Apr-12	21-Sep-12	1-Oct-13	15-Oct-14	13-Oct-15	11-Oct-16	2-Oct-17	1-Oct-18	7-Oct-19	16-Sep-20
Collection Time			15:22	15:30	14:05	19:20	19:21	12:47	10:00	13:08	12:04	12:15	12:20	12:55	13:50	10:45	9:00	8:25	10:30	11:45	15:40	18:05	19:20	12:30
Field Parameters	***Units***											Duplicate	Blank											
Conductivity	**µS/cm**		4010	1850	1530	850	850	1483	84	1100	911			390	447	389	591	473	457	470	474	523	527	369
pH	**s.u.**	2.8	3.2	3.3	4.0	5.7	5.7	5.4	5.5	3.1	5.8			5.7	5.9	5.9	5.6	5.9	6.0	5.9	6.0	6.0	6.1	6.4
Total Dissolved Solids	**mg/L**	1540	1560 J	1650	1250	730 J+	704 J+	1270		951	1100	1090	10 U	365	443	283	388	326	336	369	359	409	416	270
Total Suspended Solids	**mg/L**		1.4 J	0.1 U											60.0									
Temperature	**°C**		7.6	7.9	5.0	6.5	6.5	6.1	7.0		8.0			7.8	6.8	8.3	5.8	6.0	6.2	5.8	6.0	6.1	5.8	5.9
Dissolved Oxygen	**mg/L**																	0.19	1.10	0.60	1.50	6.30	1.41	0.32
ORP	**mV**																	28.5	13.3	-2.3	-226.8	7.7	13.9	42.7
Water level elevation	**ft**																	5.5	4.3	4.7	2.7	4.5	4.5	4.3
Pump Rate	**gpm**																	1.20	1.33	0.60	2.25	1.76	1.00	1.00
Alkalinity	**mg/L as $CaCO_3$**														4.0									
Dissolved Phase	***Units***																							
As	**mg/L**		0.0112 J	0.015 U	0.08 U	0.056	0.048	0.051	0.070	0.090	0.090	0.087	0.005 U	0.134	0.121	0.140	0.151	0.173	0.184	0.179	0.184	0.187	0.178	0.197
Co	**mg/L**		14.3 J	16,200	12,200	4,590	4,650	6,570	4,330	4,440	4,110	4,090	0.001 U	2,900	3,090	2,040	2,560	2,380	2,920	3,180	2,890	3,290	3,880	2,340
Cu	**mg/L**		0.907 J	0.502	0.300	0.001	0.001 U	0.002	0.002 J+	0.002	0.002	0.002	0.001 U	0.002	0.0042	0.0007	0.0022	0.0013	0.0004	0.0005	0.0005	0.0005	0.0003	0.0034
Fe	**mg/L**		242	264	215	123	123	240	206 D	196	217	226	0.08	69.7	79.1	61.9	66.2	55.4	63.2	66.1	60.8	70.9	69.3	50.4
Mn	**mg/L**														1.99									
Total Phase	***Units***																							
As	**mg/L**	0.143	0.0248 J	0.015 U		0.067 J	0.06 J																	
Co	**mg/L**		14.3 J	16,600		4,540	4,550																	
Cu	**mg/L**	0.339	0.911 J	0.510		0.002	0.003																	
Fe	**mg/L**	179	243	268		128	128								83.1									
Mn	**mg/L**	7.66	5.87 J	5.82																				

Notes:
U - concentration below detectable limits at detection limit shown.
J - The result is an estimated quantity due to a quality control deficiency.
J+ - The result is an estimated quantity, but the result may be biased high.
Based on the amendment to an earlier revision of the PMP in 2007, groundwater quality at the West Fork wells were not measured in 2008.

Table 3-3d: 2020 and Historical Groundwater Quality at West Fork Monitoring Wells

Location		WFMW-09																WFMW-02											
Date		28-Apr-93	22-Sep-04	4-May-06	4-May-06	15-May-07	4-Nov-09	5-Oct-10	6-Oct-11	4-Apr-12	20-Oct-14	23-Oct-15	11-Oct-16	2-Oct-17	1-Oct-18	7-Oct-19	16-Sep-20	9-Nov-11	4-Apr-12	21-Sep-12	1-Oct-13	15-Oct-14	13-Oct-15	11-Oct-16	2-Oct-17	1-Oct-18	7-Oct-19	16-Sep-20
Collection Time			20:55	18:15	18:53	9:40	12:35	11:48	12:30	12:50	6:25	10:20	9:45	14:20	14:30	16:05	10:00	11:45	13:20	10:20	9:30	5:10	11:50	10:40	15:10	15:05	17:50	11:00
Field Parameters	***Units***																												
Conductivity	**µS/cm**		220	212		87	139	158	89	115	128	115	111	114	110	107	103	407	214	535	705	723	679	714	726	802	973	8
pH	**s.u.**	3.1	6.8	6.8		6.9	7.3	7.2	7.0	7.1	6.8	6.9	5.7	6.9	7.2	7.0	6.8	5.8	5.5	5.6	5.4	5.8	5.9	5.8	5.8	5.9	5.9	6.4
Total Dissolved Solids	**mg/L**	559	130 J+	129		0	79	86	74	79	84	79	62	68	69	77 J+	73.0	343	151	409	491	519	514	577	577	655	833	883
Total Suspended Solids	**mg/L**									24.0								315.0	992.0									
Temperature	**°C**		7.6	7.0		7.4		8.3	7.4	7.1	6.1	5.7	5.4	6.0	6.3	5.9	6.3	6.8	6.5	9.2	6.1	6.2	7.0	6.3	6.6	6.7	6.7	6.9
Dissolved Oxygen	**mg/L**										4.99	33.80	35.30	1.75	16.60	6.4	5.6					0.29	1.40	0.70	1.72	6.50	1.02	0.39
ORP	**mV**										104.1	76.2	273.4	-223.4	144.0	193.4	300.4					15.8	52.6	29.8	-222.1	23.4	19.3	50.2
Water level elevation	**ft**										69.5	69.2	71.2	27.5	66.7	68.2	66.2					16.5	14.0	14.9	12.7	14.5	11.6	15.0
Pump Rate	**gpm**										0.90	1.43	1.00	1.56	1.00	1.00	1.00					0.86	1.00	0.60	3.50	1.60	1.20	1.00
Alkalinity	**mg/L as $CaCO_3$**									31.0									4.0									
Dissolved Phase	***Units***																											
As	**mg/L**		0.014	0.015		0.018	0.018	0.032	0.021	0.021	0.022	0.024	0.024	0.024	0.026	0.025	0.027	0.005	0.003	0.009	0.034	0.065	0.076	0.087	0.106	0.128	0.135	0.175
Co	**mg/L**		0.024	0.013		0.009	0.007	0.008	0.005	0.0060	0.0032	0.0031	0.0034	0.0033	0.0032	0.0039	0.0094	1.610	0.969	2.640	2.700	2.900	3.290	3.590	3.780	4.330	5.520	5.990
Cu	**mg/L**		0.001 U	0.001 U		0.001 U	0.001 U	0.002	0.001	0.0006	0.0004 J+	0.0002	0.0004	0.0002	0.0003 U	0.0003 U	0.0003 U	0.009	0.0096	0.0056	0.0025	0.0020	0.0072	0.0026	0.0020	0.0030	0.0022	0.0024
Fe	**mg/L**		0.02 U	0.03 U		0.05	0.04	0.52 J+	0.05	0.03	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	0.03 U	48.4	21.0	62.1	0.03	59.7	72.7	79.4	79.8	90.6	133.0	153.0
Mn	**mg/L**									0.002									0.778									
Total Phase	***Units***																											
As	**mg/L**	0.034	0.449 J																									
Co	**mg/L**		0.029																									
Cu	**mg/L**	0.004	0.005																									
Fe	**mg/L**	50.8	17.5							3.16									493									
Mn	**mg/L**	1.97																										

Notes:
U - concentration below detectable limits at detection limit shown.
J - The result is an estimated quantity due to a quality control deficiency.
J+ - The result is an estimated quantity, but the result may be biased high.
Based on the amendment to the 2007 Revision of the PMP, groundwater quality at the West Fork wells were not measured in 2008.

Table 4-1: Summary of In-stream Sediment Cleanup Levels for Blackbird Mine Site

Drainage/Area of Drainage	Total Arsenic[1]	Dissolved Cobalt[1]	Dissolved Copper[1]
Blackbird Creek/above mine gate[2]	8,500 mg/kg	5,500 mg/kg	None[3]
Blackbird Creek/below mine gate[2]	4,300 mg/kg	2,700 mg/kg	None[3]
Panther Creek	35 mg/kg	80 mg/kg	149 mg/kg
Bucktail Creek	Narrative Goal[4]	Narrative Goal[4]	Narrative Goal[4]
South Fork Big Deer Creek	35 mg/kg	436 mg/kg	637 mg/kg
Big Deer Creek	35 mg/kg	80 mg/kg	149 mg/kg

Notes:

1 - Cleanup levels for the Blackbird site for arsenic, cobalt, and copper are presented in Table 1 of the Explanation of Significant Difference prepared by the United States Environmental Protection Agency (EPA), dated May 31, 2012.

2 - These standards are Human Health based cleanup levels and are not used in Section 4 tables and figures.

3 - No cleanup level established because concentrations do not exceed risk based levels.

4 - See Narrative Goals in Section 8.3.3 of the 2003 ROD:

"The remedial goal for Bucktail Creek is to improve water and sediment quality such that cleanup levels are not exceeded downstream in South Fork Big Deer Creek or in Big Deer Creek."

Table 4-2: Summary of Sediment Sampling Data in Blackbird and Bucktail Drainages

Sample Identification[1]	Distance from Mouth of Associated Creek[2]	Collection Date	Arsenic[9]	Arsenic Avg.[3,4,9]	Cobalt[8]	Cobalt Avg.[3,4,8]	Copper[7]	Copper Avg.[3,4,7]
	Miles		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Blackbird Creek[5]								
BBSED-01A-1	0.2	9/22/2020	242	184	434	310	197	148
BBSED-01A-2	0.2	9/22/2020	110		199		87	
BBSED-01A-3	0.2	9/22/2020	199		296		161	
BBSED-01A-1	0.2	9/20/2019	219	199	338	370	197	183
BBSED-01A-2	0.2	9/20/2019	241		351		219	
BBSED-01A-3	0.2	9/20/2019	136		420		133	
BBSED-01A-1	0.2	9/18/2018	156	177	769	705	193	212
BBSED-01A-2	0.2	9/18/2018	165		737		187	
BBSED-01A-3	0.2	9/18/2018	209		610		257	
BBSED-01A-1	0.2	9/20/2017	87	355	254	278	89	245
BBSED-01A-2	0.2	9/20/2017	353		217		280	
BBSED-01A-3	0.2	9/20/2017	626		364		366	
BBSED-01A-1	0.2	10/11/2016	86	181	226	408	80	206
BBSED-01A-2	0.2	10/11/2016	179		659		216	
BBSED-01A-3	0.2	10/11/2016	278		338		321	
BBSED-01A-1	0.2	9/22/2015	127	150	229	369	126	156
BBSED-01A-2	0.2	9/22/2015	162		450		174	
BBSED-01A-3	0.2	9/22/2015	161		429		167	
BBSED-01A-1	0.2	10/7/2014	86	123	200	216	88	128
BBSED-01A-2	0.2	10/7/2014	173		256		188	
BBSED-01A-3	0.2	10/7/2014	109		193		107	
BBSED-01-1	0.2	9/30/2013	160	153	242	213	160	151
BBSED-01-2	0.2	9/30/2013	181		207		142	
BBSED-01-3	0.2	9/30/2013	118		190		152	
BBSED-01A	0.2	9/19/2012	174	174	209	209	196	196
BBSED-01a-1	0.2	10/4/2011	566	459	176	128	276	217
BBSED-01a-2	0.2	10/4/2011	381		90		160	
BBSED-01a-3	0.2	10/4/2011	429		118		215	
BBSW-01A #1	0.2	9/15/2010	462	393	233	199	397	301
BBSW-01A #2	0.2	9/15/2010	425		200		283	
BBSW-01A #3	0.2	9/15/2010	494		247		390	
BBSW-01A #1	0.2	11/3/2009	191	297	117	126	132	218
BBSW-01A #2	0.2	11/3/2009	533		176		417	
BBSW-01A #3	0.2	11/3/2009	168		85		106	
BBSW-01 #1	0.2	9/24/2009	1070	807	1750	1012	1250	847
BBSW-01 #2	0.2	9/24/2009	954		1150		1020	
BBSW-01 #3	0.2	9/24/2009	398		135		272	
BBSW-01A	0.2	10/6/2008	561	561	241	241	386	386
BBSW-01	0.2	10/9/2007	- -	732	- -	790	- -	1197
BBSW-01	0.2	9/21/2000	- -	555	- -	426	- -	1510
BB-2A		8/16/1995	- -	847	- -	628	- -	2490
BBSED-03-1	2.0	9/22/2020	309	277	222	228	523	539
BBSED-03-2	2.0	9/22/2020	415		292		685	
BBSED-03-3	2.0	9/22/2020	106		171		410	
BBSED-03-1	2.0	9/20/2019	495	472	221	220	628	606
BBSED-03-2	2.0	9/20/2019	440		208		565	
BBSED-03-3	2.0	9/20/2019	482		232		624	
BBSED-03-1	2.0	9/18/2018	412	413	218	207	569	567
BBSED-03-2	2.0	9/18/2018	411		189		546	
BBSED-03-3	2.0	9/18/2018	417		215		587	
BBSED-03-1	2.0	9/20/2017	396	413	174	176	504	522
BBSED-03-2	2.0	9/20/2017	468		184		547	
BBSED-03-3	2.0	9/20/2017	376		170		515	
BBSED-03-1	2.0	10/11/2016	385	371	217	199	565	501
BBSED-03-2	2.0	10/11/2016	442		203		484	
BBSED-03-3	2.0	10/11/2016	286		176		453	
BBSED-03-1	2.0	9/22/2015	596	566	228	224	574	552
BBSED-03-2	2.0	9/22/2015	650		244		586	
BBSED-03-3	2.0	9/22/2015	453		201		495	
BBSED-03-1	2.0	10/7/2014	477	600	234	226	611	613
BBSED-03-2	2.0	10/7/2014	712		204		617	
BBSED-03-3	2.0	10/7/2014	610		241		610	
BBSED-03-1	2.0	9/30/2013	279	323	211	184	595	566
BBSED-03-2	2.0	9/30/2013	356		186		547	
BBSED-03-3	2.0	9/30/2013	334		155		555	
BBSED-03	2	9/19/2012	343	343	157	157	518	518
BBSED-03-1	2.0	10/4/2011	561	619	175	182	357	434
BBSED-03-2	2.0	10/4/2011	654		207		577	
BBSED-03-3	2.0	10/4/2011	643		165		369	
BBSW-03A #1	2.0	9/15/2010	881	1006	163	202	665	798
BBSW-03A #2	2.0	9/15/2010	1270		226		894	
BBSW-03A #3	2.0	9/15/2010	867		217		834	

Table 4-2: Summary of Sediment Sampling Data in Blackbird and Bucktail Drainages

Sample Identification[1]	Distance from Mouth of Associated Creek[2]	Collection Date	Arsenic[9]	Arsenic Avg.[3,4,9]	Cobalt[8]	Cobalt Avg.[3,4,8]	Copper[7]	Copper Avg.[3,4,7]
	Miles		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Blackbird Creek[5]								
BBSW-03A #1	2.0	11/3/2009	429	591	166	202	348	478
BBSW-03A #2	2.0	11/3/2009	948		320		832	
BBSW-03A #3	2.0	11/3/2009	396		119		255	
BBSW-03A #1	2.0	12/18/2008	2290	1993	244	238	609	609
BBSW-03A #2	2.0	12/18/2008	1790		260		676	
BBSW-03A #3	2.0	12/18/2008	1900		209		543	
BBSW-03A	2.0	10/6/2008	392	392	81	81	206	206
BBSW-03A	2.0	10/9/2007	- -	1323	- -	356	- -	1110
BBSED-07-1	5.1	9/22/2020	84	103	230	332	546	760
BBSED-07-2	5.1	9/22/2020	88		447		1140	
BBSED-07-3	5.1	9/22/2020	138		318		594	
BBSED-07-1	5.1	9/20/2019	82	79	179	165	451	438
BBSED-07-2	5.1	9/20/2019	77		159		396	
BBSED-07-3	5.1	9/20/2019	79		158		467	
BBSED-07-1	5.1	9/18/2018	164	241	196	150	734	584
BBSED-07-2	5.1	9/18/2018	325		123		484	
BBSED-07-3	5.1	9/18/2018	235		132		535	
BBSED-07-1	5.1	9/20/2017	348	269	203	275	668	786
BBSED-07-2	5.1	9/20/2017	148		341		1070	
BBSED-07-3	5.1	9/20/2017	310		282		620	
BBSED-07-1	5.1	10/11/2016	136	142	284	333	871	1147
BBSED-07-2	5.1	10/11/2016	102		380		1390	
BBSED-07-3	5.1	10/11/2016	188		335		1180	
BBSED-07-1	5.1	9/22/2015	139	182	143	165	634	668
BBSED-07-2	5.1	9/22/2015	246		178		643	
BBSED-07-3	5.1	9/22/2015	161		175		728	
BBSED-07-1	5.1	10/7/2014	317	201	244	213	809	705
BBSED-07-2	5.1	10/7/2014	150		130		477	
BBSED-07-3	5.1	10/7/2014	135		264		828	
BBSED-07-1	5.1	9/30/2013	193	215	125	136	474	549
BBSED-07-2	5.1	9/30/2013	224		146		593	
BBSED-07-3	5.1	9/30/2013	227		138		580	
BBSED-07	5.1	9/19/2012	136	136	303	303	836	836
BBSED-07-1	5.1	10/4/2011	593	761	310	254	702	736
BBSED-07-2	5.1	10/4/2011	791		118		684	
BBSED-07-3	5.1	10/4/2011	899		335		822	
BBSW-07 #1	5.1	9/15/2010	211	234	169	205	637	735
BBSW-07 #2	5.1	9/15/2010	256 J		245 J		842	
BBSW-07 #3	5.1	9/15/2010	236		201		725	
BBSW-07 #1	5.1	11/3/2009	286	324	322	300	1130	1070
BBSW-07 #2	5.1	11/3/2009	340		291		900	
BBSW-07 #3	5.1	11/3/2009	346		286		1180	
BBSW-07 A	4.5	10/6/2008	264	264	137	137	619	619
BBSW-07	5.1	10/6/2008	246	246	356	356	1140	1140
BBSW-07 A	4.5	10/9/2007	- -	181	- -	268	- -	992
BBSED-08-1	6.0	9/22/2020	37	24	23	17	104	100
BBSED-08-2	6.0	9/22/2020	20		15		103	
BBSED-08-3	6.0	9/22/2020	14		12		94	
BBSED-08-1	6.0	9/20/2019	9	8	11	9	89	76
BBSED-08-2	6.0	9/20/2019	7		8		69	
BBSED-08-3	6.0	9/20/2019	8		9		69	
BBSED-08-1	6.0	9/18/2018	138	56	96	43	363	195
BBSED-08-2	6.0	9/18/2018	13		12		80	
BBSED-08-3	6.0	9/18/2018	17		20		143	
BBSED-08-1	6.0	9/20/2017	13	9	15	10	118	90
BBSED-08-2	6.0	9/20/2017	7		8		69	
BBSED-08-3	6.0	9/20/2017	8		8		82	
BBSED-08-1	6.0	10/11/2016	8	9	10	9	255	128
BBSED-08-2	6.0	10/11/2016	11		9		67	
BBSED-08-3	6.0	10/11/2016	9		8		61	
BBSED-08-1	6.0	9/22/2015	15	29	8	10	77	86
BBSED-08-2	6.0	9/22/2015	66		17		124	
BBSED-08-3	6.0	9/22/2015	7		6		57	
BBSED-08-1	6.0	10/7/2014	9	46	7	26	57	131
BBSED-08-2	6.0	10/7/2014	9		12		94	
BBSED-08-3	6.0	10/7/2014	121		58		243	
BBSED-08-1	6.0	9/30/2013	10	11	13	14	88	98
BBSED-08-2	6.0	9/30/2013	14		17		110	
BBSED-08-3	6.0	9/30/2013	10		13		95	
BBSED-08	6.0	9/19/2012	8	8	10	10	78	78
BBSED-08-1	6.0	10/4/2011	22	21	21	19	108	115
BBSED-08-2	6.0	10/4/2011	15		14		104	
BBSED-08-3	6.0	10/4/2011	27		21		134	

Table 4-2: Summary of Sediment Sampling Data in Blackbird and Bucktail Drainages

Sample Identification[1]	Distance from Mouth of Associated Creek[2]	Collection Date	Arsenic[9]	Arsenic Avg.[3,4,9]	Cobalt[8]	Cobalt Avg.[3,4,8]	Copper[7]	Copper Avg.[3,4,7]
	Miles		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Blackbird Creek[5]								
BBSW-08 #1	6.0	9/15/2010	38	27	38	29	285	221
BBSW-08 #2	6.0	9/15/2010	20		25		182	
BBSW-08 #3	6.0	9/15/2010	24		25		195	
BBSW-08 #1	6.0	11/3/2009	46	309	38	66	113	130
BBSW-08 #2	6.0	11/3/2009	823		119		134	
BBSW-08 #3	6.0	11/3/2009	59		41		143	
BBSW-08	6.0	10/9/2007	- -	32	- -	33	- -	18
BBSW-08	6.0	9/21/2000	- -	28.7	- -	17.5	- -	422
BB-18		8/17/1995	- -	73.2	- -	71.7	- -	256
Bucktail Creek[6]								
BTSED-01-1	0.7	9/21/2020	51	57	144	145	1070	1197
BTSED-01-2	0.7	9/21/2020	76		155		1330	
BTSED-01-3	0.7	9/21/2020	44		135		1190	
BTSED-01-1	0.7	9/25/2019	81	70	128	129	812	1934
BTSED-01-2	0.7	9/25/2019	54		147		2080	
BTSED-01-3	0.7	9/25/2019	74		113		2910	
BTSED-01-1	0.7	9/18/2018	40	42	102	124	1090	1193
BTSED-01-2	0.7	9/18/2018	36		107		1200	
BTSED-01-3	0.7	9/18/2018	50		162		1290	
BTSED-01-1	0.7	9/20/2017	85	83	134	179	976	1185
BTSED-01-2	0.7	9/20/2017	110		295		1340	
BTSED-01-3	0.7	9/20/2017	53		107		1240	
BTSED-01-1	0.7	10/18/2016	6	30	16	58	176	583
BTSED-01-2	0.7	10/18/2016	45		82		839	
BTSED-01-3	0.7	10/18/2016	39		77		734	
BTSED-01-1	0.7	9/22/2015	67	67	128	127	1070	1055
BTSED-01-2	0.7	9/22/2015	71		146		1140	
BTSED-01-3	0.7	9/22/2015	63		108		956	
BTSED-01-1	0.7	10/6/2014	64	86	109	117	548	859
BTSED-01-2	0.7	10/6/2014	96		106		858	
BTSED-01-3	0.7	10/6/2014	99		137		1170	
BTSED-01-1	0.7	10/1/2013	41	60	103	127	623	1234
BTSED-01-2	0.7	10/1/2013	74		117		1120	
BTSED-01-3	0.7	10/1/2013	65		160		1960	
BTSED-01	0.7	9/20/2012	71	71	202	202	3640	3640
BTSED-01-1	0.7	11/8/2011	95	83	157	181	1120	1107
BTSED-01-2	0.7	11/8/2011	59		226		1130	
BTSED-01-3	0.7	11/8/2011	94		161		1070	
BTSW-01 #1	0.7	9/21/2010	51	54	85	81	319	315
BTSW-01 #2	0.7	9/21/2010	65		100		404	
BTSW-01 #3	0.7	9/21/2010	45		59		223	
BTSW-01 #1	0.7	10/7/2009	56	50	145	124	1510	898
BTSW-01 #2	0.7	10/7/2009	66		116		692	
BTSW-01 #3	0.7	10/7/2009	27		112		492	
BTSW-01	0.7	10/8/2007	- -	89	- -	252	- -	2097
BTSED-1.6-1	1.9	9/21/2020	88	186	121	133	1180	1220
BTSED-1.6-2	1.9	9/21/2020	384		158		1370	
BTSED-1.6-3	1.9	9/21/2020	86		119		1110	
BTSED-1.6-1	1.9	9/25/2019	128	130	149	140	2030	1623
BTSED-1.6-2	1.9	9/25/2019	124		125		1230	
BTSED-1.6-3	1.9	9/25/2019	137		147		1610	
BTSED-1.6-1	1.9	9/18/2018	69	76	91	87	691	803
BTSED-1.6-2	1.9	9/18/2018	79		91		800	
BTSED-1.6-3	1.9	9/18/2018	80		80		919	
BTSED-1.6-1	1.9	9/20/2017	121	125	113	115	1040	1037
BTSED-1.6-2	1.9	9/20/2017	112		118		1160	
BTSED-1.6-3	1.9	9/20/2017	142		113		912	
BTSED-01.6-1	1.9	10/18/2016	58	66	59	71	764	889
BTSED-01.6-2	1.9	10/18/2016	73		79		967	
BTSED-01.6-3	1.9	10/18/2016	67		76		935	
BTSED-01.6-1	1.9	9/22/2015	64	61	77	70	761	826
BTSED-01.6-2	1.9	9/22/2015	65		78		897	
BTSED-01.6-3	1.9	9/22/2015	54		56		821	
BTSED-01.6-1	1.9	10/6/2014	97	87	96	93	890	914
BTSED-01.6-2	1.9	10/6/2014	108		111		1140	
BTSED-01.6-3	1.9	10/6/2014	55		73		712	
BTSED-01.6-1	1.9	10/1/2013	117	97	116	115	767	918
BTSED-01.6-2	1.9	10/1/2013	90		120		1000	
BTSED-01.6-3	1.9	10/1/2013	83		108		987	
BTSED-1.6	1.9	9/20/2012	121	121	104	104	1400	1400

Table 4-2: Summary of Sediment Sampling Data in Blackbird and Bucktail Drainages

Sample Identification[1]	Distance from Mouth of Associated Creek[2]	Collection Date	Arsenic[9]	Arsenic Avg.[3,4,9]	Cobalt[8]	Cobalt Avg.[3,4,8]	Copper[7]	Copper Avg.[3,4,7]
	Miles		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Bucktail Creek[6]								
BTSED-01.6-1	1.9	11/8/2011	122	124	92	101	1010	1097
BTSED-01.6-2	1.9	11/8/2011	113		99		1080	
BTSED-01.6-3	1.9	11/8/2011	136		113		1200	
BTSW-01.6 #1	1.9	9/21/2010	199	198	142	140	1360	1227
BTSW-01.6 #2	1.9	9/21/2010	208		149		1270	
BTSW-01.6 #3	1.9	9/21/2010	188		129		1050	
BTSW-01.6 #1	1.9	10/7/2009	150	154	140	127	1130	1133
BTSW-01.6 #2	1.9	10/7/2009	141		122		1150	
BTSW-01.6 #3	1.9	10/7/2009	170		120		1120	
BTSW-01.6	1.9	10/8/2007	- -	163	- -	219	- -	2483
South Fork Big Deer Creek								
Cleanup Levels - South Fork Big Deer Creek			**35 mg/kg**		**436 mg/kg**		**637 mg/kg**	
SFSED-01-1	0.0	9/21/2020	25	43	174	214	833	1244
SFSED-01-2	0.0	9/21/2020	63		250		1780	
SFSED-01-3	0.0	9/21/2020	40		219		1120	
SFSED-01-1	0.0	9/25/2019	30	32	254	223	1160	1830
SFSED-01-2	0.0	9/25/2019	24		290		1470	
SFSED-01-3	0.0	9/25/2019	41		125		2860	
SFSED-01-1	0.0	9/18/2018	26	29	132	147	926	1040
SFSED-01-2	0.0	9/18/2018	42		221		1490	
SFSED-01-3	0.0	9/18/2018	18		88		703	
SFSED-01-1	0.0	9/20/2017	26	29	203	187	858	894
SFSED-01-2	0.0	9/20/2017	45		200		926	
SFSED-01-3	0.0	9/20/2017	17		158		898	
SFSED-01-1	0.0	10/18/2016	28	27	270	212	1300	1064
SFSED-01-2	0.0	10/18/2016	31		229		1150	
SFSED-01-3	0.0	10/18/2016	22		138		741	
SFSED-01-1	0.0	9/22/2015	23	26	307	244	1140	1163
SFSED-01-2	0.0	9/22/2015	40		263		1740	
SFSED-01-3	0.0	9/22/2015	15		161		608	
SFSED-01-1	0.0	10/6/2014	35	42	183	193	2030	1228
SFSED-01-2	0.0	10/6/2014	25		126		394	
SFSED-01-3	0.0	10/6/2014	65		269		1260	
SFSED-01-1	0.0	10/1/2013	7	19	39	100	45	666
SFSED-01-2	0.0	10/1/2013	33		106		1070	
SFSED-01-3	0.0	10/1/2013	18		156		884	
SFSED-01	0.0	9/26/2012	17	17	102	102	1040	1040
SFSED-01-1	0.0	11/8/2011	29	29	118	113	855	930
SFSED-01-2	0.0	11/8/2011	24		98		796	
SFSED-01-3	0.0	11/8/2011	35		123		1140	
SFSW-01 #1	0.0	9/21/2010	65	84	190	239	1240	1553
SFSW-01 #2	0.0	9/21/2010	49		217		1620	
SFSW-01 #3	0.0	9/21/2010	139		309		1800	
SFSW-01 #1	0.0	10/7/2009	48	77	270	273	1700	1503
SFSW-01 #2	0.0	10/7/2009	137		250		1420	
SFSW-01 #3	0.0	10/7/2009	46		298		1390	
SFSW-01	0.0	10/8/2007	- -	65	- -	273	- -	2510
SFSW-01	0.0	9/21/2000	- -	176	- -	366	- -	6400
SF-1A	0.0	8/18/1995	- -	448	- -	499	- -	7350
SFSED-02-1	0.6	9/21/2020	14	21	94	151	504	858
SFSED-02-2	0.6	9/21/2020	31		127		1000	
SFSED-02-3	0.6	9/21/2020	18		231		1070	
SFSED-02-1	0.6	9/25/2019	26	23	191	171	1070	889
SFSED-02-2	0.6	9/25/2019	32		217		936	
SFSED-02-3	0.6	9/25/2019	10		106		661	
SFSED-02-1	0.6	9/18/2018	20	18	152	131	982	742
SFSED-02-2	0.6	9/18/2018	21		138		645	
SFSED-02-3	0.6	9/18/2018	14		103		600	
SFSED-02-1	0.6	9/20/2017	36	42	186	164	658	714
SFSED-02-2	0.6	9/20/2017	22		160		842	
SFSED-02-3	0.6	9/20/2017	67		145		641	
SFSED-02-1	#.#	10/18/2016	5	7	54	50	75	89
SFSED-02-2	#.#	10/18/2016	6		45		61	
SFSED-02-3	#.#	10/18/2016	9		52		131	
SFSED-02-1	#.#	9/22/2015	41	25	145	103	556	547
SFSED-02-2	#.#	9/22/2015	23		102		605	
SFSED-02-3	#.#	9/22/2015	10		61		480	
SFSED-02	#.#	Not Sampled in 2014 (not required in PMP)						
SFSED-02	#.#	9/20/2012	30	30	92	92	793	793
SFSED-02-1	#.#	11/8/2011	16	15	116	132	818	773
SFSED-02-2	#.#	11/8/2011	20		88		621	
SFSED-02-3	#.#	11/8/2011	9		191		881	

Table 4-2: Summary of Sediment Sampling Data in Blackbird and Bucktail Drainages

Sample Identification[1]	Distance from Mouth of Associated Creek[2]	Collection Date	Arsenic[9]	Arsenic Avg.[3,4,9]	Cobalt[8]	Cobalt Avg.[3,4,8]	Copper[7]	Copper Avg.[3,4,7]
	Miles		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
South Fork Big Deer Creek								
Cleanup Levels - South Fork Big Deer Creek			**35 mg/kg**		**436 mg/kg**		**637 mg/kg**	
SFSED-04-1	0.6	9/21/2020	9	10	6	6	9	9
SFSED-04-2	0.6	9/21/2020	8		7		7	
SFSED-04-3	0.6	9/21/2020	12		5		12	
SFSED-04-1	0.6	9/25/2019	10	9	5	5	9	8
SFSED-04-2	0.6	9/25/2019	8		3		7	
SFSED-04-3	0.6	9/25/2019	8		6		7	
SFSED-04-1	0.6	9/18/2018	12	10	6	6	13	11
SFSED-04-2	0.6	9/18/2018	10		6		9	
SFSED-04-3	0.6	9/18/2018	9		7		11	
SFSED-04-1	0.6	9/20/2017	9	7	7	5	12	9
SFSED-04-2	0.6	9/20/2017	6		5		7	
SFSED-04-3	0.6	9/20/2017	7		4		8	
SFSED-04-1	0.6	10/18/2016	2	5	ND	3	5	7
SFSED-04-2	0.6	10/18/2016	9		5		10	
SFSED-04-3	0.6	10/18/2016	5		3		7	
SFSED-04-1	0.6	9/22/2015	11	8	5	4	12	9
SFSED-04-2	0.6	9/22/2015	8		4		7	
SFSED-04-3	0.6	9/22/2015	4		2		8	
SFSED-04-1	0.6	10/6/2014	10	10	5	5	10	11
SFSED-04-2	0.6	10/6/2014	9		4		10	
SFSED-04-3	0.6	10/6/2014	12		6		12	
SFSED-04-1	0.6	10/1/2013	9	10	5	6	10	12
SFSED-04-2	0.6	10/1/2013	10		5		12	
SFSED-04-3	0.6	10/1/2013	10		7		13	
SFSED-04	0.6	9/26/2012	9	9	5	5	8	8
SFSED-04-1	0.6	11/8/2011	8	7	ND	2.5	10	9
SFSED-04-2	0.6	11/8/2011	8		ND		7	
SFSED-04-3	0.6	11/8/2011	6		ND		9	
SFSW-04 #1	0.6	9/21/2010	19	16	9	8	19	16
SFSW-04 #2	0.6	9/21/2010	16		9		17	
SFSW-04 #3	0.6	9/21/2010	14		6		12	
SFSW-04 #1	0.6	10/7/2009	15	14	8	8	16	16
SFSW-04 #2	0.6	10/7/2009	15		9		20	
SFSW-04 #3	0.6	10/7/2009	12		7		12	
SFSW-04	0.6	10/8/2007	- -	14	- -	10	- -	48
SFSW-04	0.6	9/21/2000	- -	30	- -	8.2	- -	154
SF-4		8/18/1995	- -	20.8	- -	19.4	- -	86.4
Big Deer Creek								
Cleanup Levels - Big Deer Creek			**35 mg/kg**		**80 mg/kg**		**149 mg/kg**	
BDSED-01-1	0.0	9/23/2020	4	6	29	23	94	56
BDSED-01-2	0.0	9/23/2020	2		26		59	
BDSED-01-3	0.0	9/23/2020	13		13		15	
BDSED-01-1	0.0	9/20/2019	7	6	31	35	131	126
BDSED-01-2	0.0	9/20/2019	7		39		141	
BDSED-01-3	0.0	9/20/2019	4		36		106	
BDSED-01-1	0.0	9/18/2018	8	5	41	36	149	186
BDSED-01-2	0.0	9/18/2018	5		34		124	
BDSED-01-3	0.0	9/18/2018	2		33		286	
BDSED-01-1	0.0	9/21/2017	6	8	37	31	169	122
BDSED-01-2	0.0	9/21/2017	3		27		92	
BDSED-01-3	0.0	9/21/2017	14		28		106	
BDSED-01-1	0.0	10/18/2016	3	5	21	31	52	113
BDSED-01-2	0.0	10/18/2016	8		44		192	
BDSED-01-3	0.0	10/18/2016	4		27		95	
BDSED-01-1	0.0	9/23/2015	6	6	27	30	112	107
BDSED-01-2	0.0	9/23/2015	3		28		86	
BDSED-01-3	0.0	9/23/2015	8		34		124	
BDSED-01-1	0.0	10/6/2014	10	5	38	39	151	134
BDSED-01-2	0.0	10/6/2014	3		47		122	
BDSED-01-3	0.0	10/6/2014	3		33		130	
BDSED-01-1	0.0	9/30/2013	6	6	33	33	146	170
BDSED-01-2	0.0	9/30/2013	7		30		146	
BDSED-01-3	0.0	9/30/2013	6		36		219	
BDSED-01-1	0.0	11/9/2011	7	6	33	32	137	142
BDSED-01-2	0.0	11/9/2011	5		32		156	
BDSED-01-3	0.0	11/9/2011	5		30		132	
BDSED-01-1	0.0	11/9/2011	7	6	33	32	137	142
BDSED-01-2	0.0	11/9/2011	5		32		156	
BDSED-01-3	0.0	11/9/2011	5		30		132	
BDSW-01 #1	0.0	9/21/2010	8	11	44	47	194	251
BDSW-01 #2	0.0	9/21/2010	15		35		128	
BDSW-01 #3	0.0	9/21/2010	10		63		431	

Table 4-2: Summary of Sediment Sampling Data in Blackbird and Bucktail Drainages

Sample Identification[1]	Distance from Mouth of Associated Creek[2]	Collection Date	Arsenic[9]	Arsenic Avg.[3,4,9]	Cobalt[8]	Cobalt Avg.[3,4,8]	Copper[7]	Copper Avg.[3,4,7]
	Miles		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Big Deer Creek								
Cleanup Levels - Big Deer Creek			**35 mg/kg**		**80 mg/kg**		**149 mg/kg**	
BDSW-01 #1	0.0	10/9/2009	11	10	43	48	235	257
BDSW-01 #2	0.0	10/9/2009	11		54		303	
BDSW-01 #3	0.0	10/9/2009	9		46		232	
BDSW-01 #1	0.0	12/19/2008	ND	2.5	35	47	118	161
BDSW-01 #2	0.0	12/19/2008	ND		47		175	
BDSW-01 #3	0.0	12/19/2008	ND		59		190	
BDSW-01	0.0	10/9/2007	- -	9	- -	52	- -	239
BDSED-02-1	1.8	9/23/2020	4	4	23	27	59	75
BDSED-02-2	1.8	9/23/2020	6		28		83	
BDSED-02-3	1.8	9/23/2020	3		30		83	
BDSED-02-1	1.8	9/20/2019	2	5	24	29	70	129
BDSED-02-2	1.8	9/20/2019	6		33		131	
BDSED-02-3	1.8	9/20/2019	6		30		186	
BDSED-02-1	1.8	9/18/2018	10	8	46	38	158	158
BDSED-02-2	1.8	9/18/2018	8		31		132	
BDSED-02-3	1.8	9/18/2018	7		37		184	
BDSED-02-1	1.8	9/21/2017	4	5	40	39	100	118
BDSED-02-2	1.8	9/21/2017	6		34		129	
BDSED-02-3	1.8	9/21/2017	5		42		125	
BDSED-02-1	1.8	10/18/2016	5	5	32	36	103	106
BDSED-02-2	1.8	10/18/2016	4		26		69	
BDSED-02-3	1.8	10/18/2016	7		50		147	
BDSED-02-1	1.8	9/23/2015	9	9	36	34	116	122
BDSED-02-2	1.8	9/23/2015	9		42		173	
BDSED-02-3	1.8	9/23/2015	8		23		76	
BDSED-02-1	1.8	10/6/2014	5	4	33	32	105	112
BDSED-02-2	1.8	10/6/2014	1		23		57	
BDSED-02-3	1.8	10/6/2014	7		40		175	
BDSED-02-1	1.8	9/30/2013	8	8	36	36	175	153
BDSED-02-2	1.8	9/30/2013	8		38		148	
BDSED-02-3	1.8	9/30/2013	7		35		137	
BDSED-02-1	1.8	11/9/2011	ND	2.5	35	30	107	99
BDSED-02-2	1.8	11/9/2011	ND		37		118	
BDSED-02-3	1.8	11/9/2011	ND		19		73	
BDSED-02-1	1.8	11/9/2011	ND	2.5	35	30	107	99
BDSED-02-2	1.8	11/9/2011	ND		37		118	
BDSED-02-3	1.8	11/9/2011	ND		19		73	
BDSW-02 #1	1.8	9/23/2010	7	5.5	44	37	128	118
BDSW-02 #2	1.8	9/23/2010	ND		31		101	
BDSW-02 #3	1.8	9/23/2010	7		36		126	
BDSW-02 #1	1.8	10/7/2009	7	16	43	54	198	255
BDSW-02 #2	1.8	10/7/2009	26		53		183	
BDSW-02 #3	1.8	10/7/2009	14		66		385	
BDSW-02	1.8	10/9/2007	- -	12	- -	86	- -	508
BDSED-03-1	3.0	9/22/2020	3	3	15	13	55	37
BDSED-03-2	3.0	9/22/2020	2		13		25	
BDSED-03-3	3.0	9/22/2020	4		12		30	
BDSED-03-1	3.0	9/25/2019	7	7	15	21	75	131
BDSED-03-2	3.0	9/25/2019	7		18		159	
BDSED-03-3	3.0	9/25/2019	6		29		160	
BDSED-03-1	3.0	9/18/2018	10	7	28	24	120	118
BDSED-03-2	3.0	9/18/2018	7		23		137	
BDSED-03-3	3.0	9/18/2018	5		22		97	
BDSED-03-1	3.0	9/20/2017	6	6	29	25	201	209
BDSED-03-2	3.0	9/20/2017	4		15		83	
BDSED-03-3	3.0	9/20/2017	9		32		343	
BDSED-03-1	3.0	10/18/2016	6	4	19	50	79	289
BDSED-03-2	3.0	10/18/2016	4		25		271	
BDSED-03-3	3.0	10/18/2016	2		105		518	
BDSED-03-1	3.0	9/22/2015	3	9	23	30	84	166
BDSED-03-2	3.0	9/22/2015	12		27		207	
BDSED-03-3	3.0	9/22/2015	12		41		208	
BDSED-03-1	3.0	10/6/2014	22	20	37	42	133	182
BDSED-03-2	3.0	10/6/2014	11		40		164	
BDSED-03-3	3.0	10/6/2014	26		48		250	
BDSED-03-1	3.0	10/1/2013	6	8	40	26	123	91
BDSED-03-2	3.0	10/1/2013	3		20		69	
BDSED-03-3	3.0	10/1/2013	14		17		81	
BDSED-03	3.0	9/27/2012	4	4	25	25	116	116

Table 4-2: Summary of Sediment Sampling Data in Blackbird and Bucktail Drainages

Sample Identification[1]	Distance from Mouth of Associated Creek[2]	Collection Date	Arsenic[9]	Arsenic Avg.[3,4,9]	Cobalt[8]	Cobalt Avg.[3,4,8]	Copper[7]	Copper Avg.[3,4,7]
	Miles		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Big Deer Creek								
Cleanup Levels - Big Deer Creek			**35 mg/kg**		**80 mg/kg**		**149 mg/kg**	
BDSED-03-1	3.0	11/8/2011	9	9	24	21	120	121
BDSED-03-2	3.0	11/8/2011	9		20		139	
BDSED-03-3	3.0	11/8/2011	10		18		104	
BDSW-03 #1	3.0	9/21/2010	14	11	36	38	169	168
BDSW-03 #2	3.0	9/21/2010	7		31		124	
BDSW-03 #3	3.0	9/21/2010	11		47		210	
BDSW-03 #1	3.0	10/7/2009	7	5.2	26	44	136	178
BDSW-03 #2	3.0	10/7/2009	ND		69		258	
BDSW-03 #3	3.0	10/7/2009	6		36		140	
BDSW-03A	3.0	10/8/2007	- -	14	- -	52	- -	409
BDSW-03	3.1	9/21/2000	- -	7.36	- -	15.8	- -	139
BD-6		8/16/1995	- -	52.5	- -	81.3	- -	1030
BDSED-04-1	3.2	9/22/2020	ND	1	1	1	2	2
BDSED-04-2	3.2	9/22/2020	1		1		3	
BDSED-04-3	3.2	9/22/2020	ND		1		2	
BDSED-04-1	3.2	9/25/2019	2	1	3	3	9	6
BDSED-04-2	3.2	9/25/2019	ND		2		7	
BDSED-04-3	3.2	9/25/2019	ND		ND		2	
BDSED-04-1	3.2	9/18/2018	ND	1	2	3	4	7
BDSED-04-2	3.2	9/18/2018	2		3		8	
BDSED-04-3	3.2	9/18/2018	1		3		8	
BDSED-04-1	3.2	9/20/2017	2	1	6	3	19	12
BDSED-04-2	3.2	9/20/2017	1		1		5	
BDSED-04-3	3.2	9/20/2017	ND		3		11	
BDSED-04-1	3.2	10/18/2016	ND	0.3	3	3	6	6
BDSED-04-2	3.2	10/18/2016	1		3		7	
BDSED-04-3	3.2	10/18/2016	ND		2		5	
BDSED-04-1	3.2	9/22/2015	ND	0.5	2	2	4	6
BDSED-04-2	3.2	9/22/2015	ND		2		7	
BDSED-04-3	3.2	9/22/2015	ND		2		6	
BDSED-04-1	3.2	10/6/2014	4	3	3	2	8	5
BDSED-04-2	3.2	10/6/2014	3		2		4	
BDSED-04-3	3.2	10/6/2014	2		2		4	
BDSED-04-1	3.2	10/1/2013	ND	0.7	3	3	6	7
BDSED-04-2	3.2	10/1/2013	1		3		10	
BDSED-04-3	3.2	10/1/2013	ND		3		6	
BDSED-04	3.2	9/27/2012	ND	0.5	1	1	2	2
BDSED-04-1	3.2	11/8/2011	ND	2.5		2.5		8
BDSED-04-2	3.2	11/8/2011	ND				8	
BDSED-04-3	3.2	11/8/2011	ND				7	
BDSW-04 #1	3.2	9/21/2010	ND	2.5	ND	2.5	8	8
BDSW-04 #2	3.2	9/21/2010	ND		ND		7	
BDSW-04 #3	3.2	9/21/2010	ND		ND		8	
BDSW-04 #1	3.2	10/7/2009	ND	2.5	ND	2.5	8	7.2
BDSW-04 #2	3.2	10/7/2009	ND		ND		11	
BDSW-04 #3	3.2	10/7/2009	ND		ND		ND	
BDSW-04	3.2	10/8/2007	- -	<5	- -	4	- -	17
BDSW-04	3.2	9/21/2000	- -	1	- -	1.4	- -	29.7
BD-8		8/16/1995	- -	3.3	- -	3.4	- -	12
Panther Creek								
Cleanup Levels - Panther Creek			**35 mg/kg**		**80 mg/kg**		**149 mg/kg**	
PASED-01-1	1.3	9/23/2020	9	7	21	22	24	46
PASED-01-2	1.3	9/23/2020	8		17		20	
PASED-01-3	1.3	9/23/2020	4		27		93	
PASED-01-1	1.3	9/20/2019	4	12	18	21	10	22
PASED-01-2	1.3	9/20/2019	11		18		21	
PASED-01-3	1.3	9/20/2019	21		28		36	
PASED-01-1	1.3	9/18/2018	3	9	21	35	8	25
PASED-01-2	1.3	9/18/2018	13		44		34	
PASED-01-3	1.3	9/18/2018	11		41		33	
PASED-01-1	1.3	9/21/2017	13	11	20	17	32	31
PASED-01-2	1.3	9/21/2017	9		16		25	
PASED-01-3	1.3	9/21/2017	10		16		36	
PASED-01-1	1.3	10/18/2016	2	2	16	19	4	5
PASED-01-2	1.3	10/18/2016	3		20		7	
PASED-01-3	1.3	10/18/2016	2		22		4	
PASED-01-1	1.3	9/23/2015	4	6	19	19	7	9
PASED-01-2	1.3	9/23/2015	6		16		13	
PASED-01-3	1.3	9/23/2015	7		21		8	

Table 4-2: Summary of Sediment Sampling Data in Blackbird and Bucktail Drainages

Sample Identification[1]	Distance from Mouth of Associated Creek[2]	Collection Date	Arsenic[9]	Arsenic Avg.[3,4,9]	Cobalt[8]	Cobalt Avg.[3,4,8]	Copper[7]	Copper Avg.[3,4,7]
	Miles		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
				Panther Creek				
Cleanup Levels - Panther Creek			35 mg/kg		80 mg/kg		149 mg/kg	
PASED-01-1	1.3	10/7/2014	2	3	12	16	3	8
PASED-01-2	1.3	10/7/2014	3		14		9	
PASED-01-3	1.3	10/7/2014	5		21		12	
PASED-01-1	1.3	9/24/2013	11	7	41	34	39	26
PASED-01-2	1.3	9/24/2013	6		29		22	
PASED-01-3	1.3	9/24/2013	5		32		17	
PASED-01	1.3	9/19/2012	7	7	24	24	32	32
PASED-01-1	1.3	10/4/2011	11	15	21	26	17	25
PASED-01-2	1.3	10/4/2011	21		27		25	
PASED-01-3	1.3	10/4/2011	14		31		34	
PASW-01 #1	1.3	9/14/2010	20	19	54	41	71	54
PASW-01 #2	1.3	9/14/2010	16		33		39	
PASW-01 #3	1.3	9/14/2010	20		36		53	
PASW-01 #1	1.3	11/3/2009	46	27	96	61	119	73
PASW-01 #2	1.3	11/3/2009	16		38		42	
PASW-01 #3	1.3	11/3/2009	18		50		57	
PASW-01 Low/High	1.3	11/4/2009	ND	2.5	10	10	12	12
PASW-01 #1	1.3	12/19/2008	7	9	31	39	23	33
PASW-01 #2	1.3	12/19/2008	13		48		43	
PASW-01 #3	1.3	12/19/2008	8		38		32	
PASW-01	1.3	10/9/2007	- -	8	- -	44	- -	33
PASW-01	1.3	9/21/2000	- -	10.1	- -	48.1	- -	62.1
PCS Site 1		8/15/1995	- -	10.2	- -	54.6	- -	55.9
PASED-04-1	11.4	9/23/2020	25	24	63	52	35	31
PASED-04-2	11.4	9/23/2020	29		56		26	
PASED-04-3	11.4	9/23/2020	19		37		33	
PASED-04-1	11.4	9/20/2019	25	26	38	48	47	53
PASED-04-2	11.4	9/20/2019	33		51		62	
PASED-04-3	11.4	9/20/2019	20		54		50	
PASED-04-1	11.4	9/18/2018	29	30	41	46	38	35
PASED-04-2	11.4	9/18/2018	30		63		34	
PASED-04-3	11.4	9/18/2018	30		35		34	
PASED-04-1	11.4	9/21/2017	25	30	44	39	40	44
PASED-04-2	11.4	9/21/2017	25		32		31	
PASED-04-3	11.4	9/21/2017	40		42		60	
PASED-04-1	11.4	10/18/2016	14	14	44	39	20	22
PASED-04-2	11.4	10/18/2016	18		36		26	
PASED-04-3	11.4	10/18/2016	10		38		19	
PASED-04-1	11.4	9/23/2015	28	24	42	51	41	39
PASED-04-2	11.4	9/23/2015	23		64		39	
PASED-04-3	11.4	9/23/2015	20		48		36	
PASED-04-1	11.4	10/7/2014	48	49	57	59	45	49
PASED-04-2	11.4	10/7/2014	47		80		53	
PASED-04-3	11.4	10/7/2014	51		41		50	
PASED-04-1	11.4	9/24/2013	35	26	59	50	40	38
PASED-04-2	11.4	9/24/2013	28		48		47	
PASED-04-3	11.4	9/24/2013	14		43		28	
PASED-04	11.4	9/19/2012	61	61	55	55	48	48
PASED-04-1	11.4	10/4/2011	49	39	40	47	46	37
PASED-04-2	11.4	10/4/2011	50		60		44	
PASED-04-3	11.4	10/4/2011	17		41		20	
PASW-04X #1	11.4	9/14/2010	107	88	73	93	126	109
PASW-04X #2	11.4	9/14/2010	74		127		108	
PASW-04X #3	11.4	9/14/2010	82		79		93	
PASW-04X #1	11.4	11/3/2009	47	60	55	97	133	129
PASW-04X #2	11.4	11/3/2009	84		109		176	
PASW-04X #3	11.4	11/3/2009	50		126		77	
PASW-04X Low/High	11.4	11/4/2009	72	72	60	60	110	110
PASW-04X #1	11.4	12/19/2008	23	17	37	47	105	59
PASW-04X #2	11.4	12/19/2008	14		51		37	
PASW-04X #3	11.4	12/19/2008	14		53		34	
PASW-04X	11.4	10/9/2007	- -	51	- -	109	- -	130
PASED-05-1	12.9	9/22/2020	30	25	58	63	36	31
PASED-05-2	12.9	9/22/2020	26		68		24	
PASED-05-3	12.9	9/22/2020	20		64		34	
PASED-05-1	12.9	9/20/2019	26	24	54	51	21	21
PASED-05-2	12.9	9/20/2019	18		47		20	
PASED-05-3	12.9	9/20/2019	27		51		22	

Table 4-2: Summary of Sediment Sampling Data in Blackbird and Bucktail Drainages

Sample Identification[1]	Distance from Mouth of Associated Creek[2]	Collection Date	Arsenic[9]	Arsenic Avg.[3,4,9]	Cobalt[8]	Cobalt Avg.[3,4,8]	Copper[7]	Copper Avg.[3,4,7]
	Miles		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Panther Creek								
Cleanup Levels - Panther Creek			35 mg/kg		80 mg/kg		149 mg/kg	
PASED-05-1	12.9	9/18/2018	23	25	52	58	35	37
PASED-05-2	12.9	9/18/2018	25		66		32	
PASED-05-3	12.9	9/18/2018	26		57		45	
PASED-05-1	12.9	9/21/2017	27	30	82	61	52	41
PASED-05-2	12.9	9/21/2017	27		44		29	
PASED-05-3	12.9	9/21/2017	35		56		43	
PASED-05-1	12.9	10/18/2016	14	15	42	49	20	22
PASED-05-2	12.9	10/18/2016	13		43		9	
PASED-05-3	12.9	10/18/2016	19		63		36	
PASED-05-1	12.9	9/23/2015	11	15	30	41	12	21
PASED-05-2	12.9	9/23/2015	22		47		22	
PASED-05-3	12.9	9/23/2015	13		45		28	
PASED-05-1	12.9	10/7/2014	24	22	67	51	36	27
PASED-05-2	12.9	10/7/2014	11		40		16	
PASED-05-3	12.9	10/7/2014	30		45		28	
PASED-05-1	12.9	9/24/2013	18	20	39	51	24	22
PASED-05-2	12.9	9/24/2013	24		72		19	
PASED-05-3	12.9	9/24/2013	17		41		23	
PASED-05	12.9	9/19/2012	28	28	63	63	36	36
PASED-05-1	12.9	10/4/2011	32	22	46	48	26	26
PASED-05-2	12.9	10/4/2011	19		55		33	
PASED-05-3	12.9	10/4/2011	16		42		18	
PASW-05 #1	12.9	9/14/2010	31	41	52	73	40	84
PASW-05 #2	12.9	9/14/2010	18		39		21	
PASW-05 #3	12.9	9/14/2010	73		127		191	
PASW-05 #1	12.9	11/3/2009	84	99	152	150	157	156
PASW-05 #2	12.9	11/3/2009	128		127		153	
PASW-05 #3	12.9	11/3/2009	85		172		159	
PASW-05 Low/High	12.9	11/4/2009	68	68	63	63	106	106
PASW-05 #1	12.9	12/19/2008	22	37	12	11	28	26
PASW-05 #2	12.9	12/19/2008	70		12		29	
PASW-05 #3	12.9	12/19/2008	18		10		21	
PASW-05	12.9	10/9/2007	- -	32	- -	169	- -	71
PASW-05	12.9	9/21/2000	- -	22.2	- -	84.7	- -	56.5
PCS Site 7		8/15/1995	- -	93	- -	117	- -	1450
PASED-07-1	19.7	9/22/2020	24	31	83	77	53	63
PASED-07-2	19.7	9/22/2020	44		80		73	
PASED-07-3	19.7	9/22/2020	24		68		62	
PASED-07-1	19.7	9/20/2019	67	117	91	86	138	150
PASED-07-2	19.7	9/20/2019	123		69		136	
PASED-07-3	19.7	9/20/2019	161		97		176	
PASED-07-1	19.7	9/18/2018	49	51	72	82	67	72
PASED-07-2	19.7	9/18/2018	52		79		85	
PASED-07-3	19.7	9/18/2018	53		95		64	
PASED-07-1	19.7	9/20/2017	63	58	74	115	72	79
PASED-07-2	19.7	9/20/2017	61		136		96	
PASED-07-3	19.7	9/20/2017	49		134		70	
PASED-07-1	19.7	10/11/2016	69	52	60	63	71	61
PASED-07-2	19.7	10/11/2016	29		66		56	
PASED-07-3	19.7	10/11/2016	57		64		55	
PASED-07-1	19.7	9/23/2015	30	21	75	78	51	39
PASED-07-2	19.7	9/23/2015	19		88		35	
PASED-07-3	19.7	9/23/2015	14		70		32	
PASED-07-1	19.7	10/7/2014	139	86	115	90	94	100
PASED-07-2	19.7	10/7/2014	54		87		112	
PASED-07-3	19.7	10/7/2014	64		68		94	
PASED-07-1	19.7	9/24/2013	53	50	95	92	107	130
PASED-07-2	19.7	9/24/2013	50		95		149	
PASED-07-3	19.7	9/24/2013	47		87		134	
PASED-07	19.7	9/19/2012	56	56	68	68	128	128
PASED-07-1	19.7	10/4/2011	48	62	91	95	124	145
PASED-07-2	19.7	10/4/2011	72		86		138	
PASED-07-3	19.7	10/4/2011	66		107		174	
PASW-07 #1	19.7	9/16/2010	248	201	219	240	329	345
PASW-07 #2	19.7	9/16/2010	149 J		287		306	
PASW-07 #3	19.7	9/16/2010	206		213		399	
PASW-07 #1	19.7	11/3/2009	306	341	193	199	498	502
PASW-07 #2	19.7	11/3/2009	365		214		524	
PASW-07 #3	19.7	11/3/2009	351		191		484	
PASW-07 Low/High	19.7	11/4/2009	341	341	224	224	439	439

Table 4-2: Summary of Sediment Sampling Data in Blackbird and Bucktail Drainages

Sample Identification[1]	Distance from Mouth of Associated Creek[2]	Collection Date	Arsenic[9]	Arsenic Avg.[3,4,9]	Cobalt[8]	Cobalt Avg.[3,4,8]	Copper[7]	Copper Avg.[3,4,7]
	Miles		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Panther Creek								
Cleanup Levels - Panther Creek			35 mg/kg		80 mg/kg		149 mg/kg	
PASW-07 #1	19.7	12/18/2008	254	385	112	118	341	348
PASW-07 #2	19.7	12/18/2008	501		123		359	
PASW-07 #3	19.7	12/18/2008	401		120		344	
PASW-07	19.7	10/9/2007	- -	99	- -	249	- -	267
PASW-07	19.7	9/21/2000	- -	54.2	- -	198	- -	94.7
PCS Site 10		8/17/1995	- -	65.7	- -	243	- -	174
PASED-08-1	22.2	9/22/2020	42	45	72	75	69	64
PASED-08-2	22.2	9/22/2020	47		76		56	
PASED-08-3	22.2	9/22/2020	47		77		66	
PASED-08-1	22.2	9/20/2019	36	99	84	71	40	62
PASED-08-2	22.2	9/20/2019	49		61		57	
PASED-08-3	22.2	9/20/2019	211		69		90	
PASED-08-1	22.2	9/18/2018	40	100	67	74	87	83
PASED-08-2	22.2	9/18/2018	198		76		91	
PASED-08-3	22.2	9/18/2018	63		80		71	
PASED-08-1	22.2	9/20/2017	298	174	94	78	103	77
PASED-08-2	22.2	9/20/2017	170		82		79	
PASED-08-3	22.2	9/20/2017	55		58		48	
PASED-08-1	22.2	10/11/2016	94	64	76	82	64	54
PASED-08-2	22.2	10/11/2016	29		100		34	
PASED-08-3	22.2	10/11/2016	69		70		64	
PASED-08-1	22.2	9/22/2015	189	103	72	79	113	81
PASED-08-2	22.2	9/22/2015	55		80		68	
PASED-08-3	22.2	9/22/2015	64		84		62	
PASED-08-1	22.2	10/7/2014	325	170	166	121	393	194
PASED-08-2	22.2	10/7/2014	77		98		99	
PASED-08-3	22.2	10/7/2014	107		99		91	
PASED-08-1	22.2	9/23/2013	43	64	103	107	90	76
PASED-08-2	22.2	9/23/2013	37		125		64	
PASED-08-3	22.2	9/23/2013	111		92		75	
PASED-08	22.2	9/19/2012	57	57	91	91	72	72
PASED-08-1	22.2	10/4/2011	269	183	98	98	171	152
PASED-08-2	22.2	10/4/2011	182		99		166	
PASED-08-3	22.2	10/4/2011	99		96		118	
PASW-08 #1	22.2	9/16/2010	131	194	112	151	127	209
PASW-08 #2	22.2	9/16/2010	190		154		192	
PASW-08 #3	22.2	9/16/2010	261		187		307	
PASW-08 #1	22.2	9/24/2009	103	292	204	237	152	328
PASW-08 #2	22.2	9/24/2009	388		299		348	
PASW-08 #3	22.2	9/24/2009	422		191		314	
PASW-08 Low/High	22.2	9/24/2009	253	253	254	254	497	497
PASW-08	22.2	10/9/2007	- -	107	- -	317	- -	219
PASW-08	22.2	9/21/2000	- -	203	- -	130	- -	141
PCS 11-04		8/15/1995	- -	72.8	- -	264	- -	450
PASW-09	23.0	Not Sampled in 2011 through 2016						
PASW-09 #1	23.0	9/14/2010	26	28	54	51	26	26
PASW-09 #2	23.0	9/14/2010	37		65		35	
PASW-09 #3	23.0	9/14/2010	21		34		18	
PASW-09 #1	23.0	11/3/2009	16	19	26	30	17	19
PASW-09 #2	23.0	11/3/2009	18		32		21	
PASW-09 #3	23.0	11/3/2009	22		32		19	
PASED-10-1	24.0	9/22/2020	17	17	19	15	19	20
PASED-10-2	24.0	9/22/2020	16		14		29	
PASED-10-3	24.0	9/22/2020	17		11		11	
PASED-10-1	24.0	9/20/2019	27	19	25	22	28	26
PASED-10-2	24.0	9/20/2019	11		18		19	
PASED-10-3	24.0	9/20/2019	20		23		30	
PASED-10-1	24.0	9/18/2018	62	33	30	17	52	29
PASED-10-2	24.0	9/18/2018	20		10		17	
PASED-10-3	24.0	9/18/2018	16		12		17	
PASED-10-1	24.0	9/20/2017	61	91	54	51	68	66
PASED-10-2	24.0	9/20/2017	92		38		54	
PASED-10-3	24.0	9/20/2017	119		61		75	
PASED-10-1	24.0	10/11/2016	36	21	21	22	68	37
PASED-10-2	24.0	10/11/2016	8		32		6	
PASED-10-3	24.0	10/11/2016	20		14		38	

Table 4-2: Summary of Sediment Sampling Data in Blackbird and Bucktail Drainages

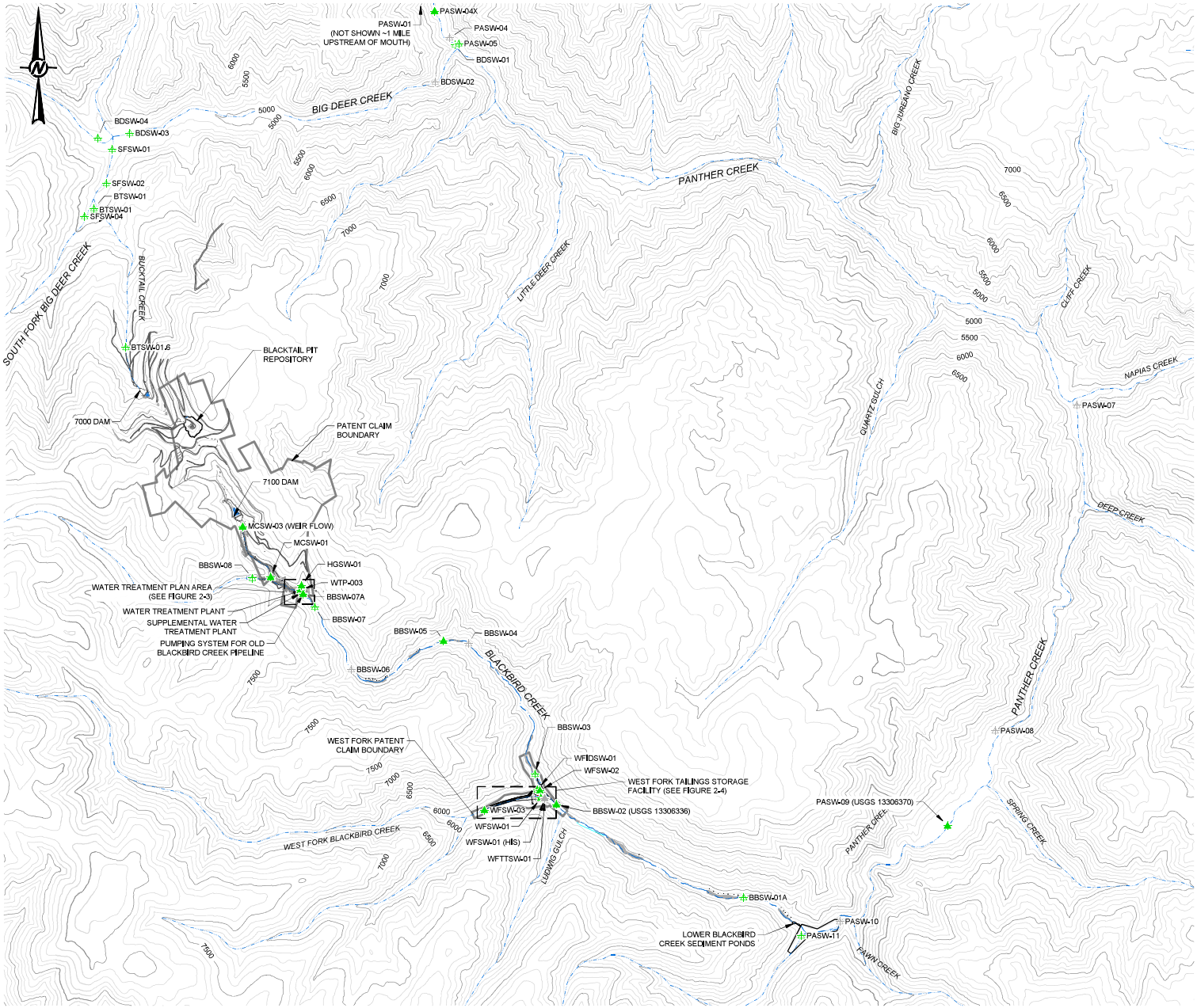
Sample Identification[1]	Distance from Mouth of Associated Creek[2]	Collection Date	Arsenic[9]	Arsenic Avg.[3,4,9]	Cobalt[8]	Cobalt Avg.[3,4,8]	Copper[7]	Copper Avg.[3,4,7]
	Miles		mg/kg	mg/kg	mg/kg	mg/kg	mg/kg	mg/kg
Panther Creek								
Cleanup Levels - Panther Creek			**35 mg/kg**		**80 mg/kg**		**149 mg/kg**	
PASED-10-1	24.0	9/22/2015	21	41	17	18	35	46
PASED-10-2	24.0	9/22/2015	23		11		44	
PASED-10-3	24.0	9/22/2015	79		26		60	
PASED-10-1	24.0	10/7/2014	18	39	48	29	19	80
PASED-10-2	24.0	10/7/2014	69		28		190	
PASED-10-3	24.0	10/7/2014	30		12		30	
PASED-10-1	24.0	9/23/2013	34	45	44	41	25	40
PASED-10-2	24.0	9/23/2013	30		33		42	
PASED-10-3	24.0	9/23/2013	71		47		52	
PASED-10	24.0	9/19/2012	71	71	37	37	85	85
PASED-10-1	24.0	10/4/2011	129	100	52	46	78	63
PASED-10-2	24.0	10/4/2011	92		44		64	
PASED-10-3	24.0	10/4/2011	80		42		48	
PASW-10 #1	24.0	9/14/2010	201	233	84	103	190	178
PASW-10 #2	24.0	9/14/2010	209		135		186	
PASW-10 #3	24.0	9/14/2010	288		90		158	
PASW-10 #1	24.0	9/24/2009	508	463	214	197	293	253
PASW-10 #2	24.0	9/24/2009	397		143		207	
PASW-10 #3	24.0	9/24/2009	485		235		259	
PASW-10 Low/High	24.0	9/24/2009	430	430	127	127	298	298
PASW-10 #1	24.0	12/18/2008	544	508	124	171	363	336
PASW-10 #2	24.0	12/18/2008	696		297		390	
PASW-10 #3	24.0	12/18/2008	283		91		256	
PASW-10	24.0	10/9/2007	- -	108	- -	125	- -	79
PASED-11-1	24.6	9/23/2020	5	4	5	5	6	7
PASED-11-2	24.6	9/23/2020	4		5		7	
PASED-11-3	24.6	9/23/2020	4		5		7	
PASED-11-1	24.6	9/20/2019	4	4	5	4	5	6
PASED-11-2	24.6	9/20/2019	4		4		6	
PASED-11-3	24.6	9/20/2019	3		4		6	
PASED-11-1	24.6	9/18/2018	14	9	12	11	8	8
PASED-11-2	24.6	9/18/2018	7		11		8	
PASED-11-3	24.6	9/18/2018	5		9		8	
PASED-11-1	24.6	10/2/2017	3	4	3	5	6	7
PASED-11-2	24.6	10/2/2017	4		3		5	
PASED-11-3	24.6	10/2/2017	6		9		9	
PASED-11-1	24.6	10/11/2016	2	2	5	4	3	4
PASED-11-2	24.6	10/11/2016	2		2		5	
PASED-11-3	24.6	10/11/2016	3		4		3	
PASED-11-1	24.6	9/22/2015	4	6	4	5	5	5
PASED-11-2	24.6	9/22/2015	9		10		4	
PASED-11-3	24.6	9/22/2015	4		2		5	
PASED-11-1	24.6	10/7/2014	5	6	12	7	11	7
PASED-11-2	24.6	10/7/2014	8		4		5	
PASED-11-3	24.6	10/7/2014	6		4		4	
PASED-11-1	24.6	9/23/2013	2	2	1	1	3	3
PASED-11-2	24.6	9/23/2013	2		2		4	
PASED-11-3	24.6	9/23/2013	2		1		3	
PASED-11	24.6	9/19/2012	4	4	5	5	6	6
PASED-11-1	24.6	10/4/2011	8	12	ND	2.5	11	10
PASED-11-2	24.6	10/4/2011	14		ND		10	
PASED-11-3	24.6	10/4/2011	13		ND		10	
PASW-11 #1	24.6	9/14/2010	17	9.2	16	11	16	12
PASW-11 #2	24.6	9/14/2010	8		10		10	
PASW-11 #3	24.6	9/14/2010	ND		8		9	
PASW-11 #1	24.6	11/3/2009	14	13	86	58	19	21
PASW-11 #2	24.6	11/3/2009	14		71		29	
PASW-11 #3	24.6	11/3/2009	12		17		15	
PASW-11 Low/High	24.6	11/4/2009	21	21	110	110	52	52
PASW-11 #1	24.6	12/18/2008	ND	2.5	ND	3.7	10	9
PASW-11 #2	24.6	12/18/2008	ND		ND		8	
PASW-11	24.6	10/6/2008	ND		6		9	
PASW-11	24.6	10/9/2007	- -	5	- -	9	- -	16

Notes: Shaded data represents historical information retrieved from various documents:

(Golder 2001; Golder 2008; Golder 2009; Golder 2010; Golder 2012, Golder 2013, Golder 2014, Golder 2015, Golder 2016, Golder 2017, Golder 2018, Golder 2019, Golder 2020).

1. "Low/High" - Indicates sample collected above the low water mark and below the high water mark.
2. Distance values cited are from 'Blackbird Mine Site Remedial Investigation (Vol. 1), Table 6.1, November, 2001'.
3. Data available for 1995 and 2000 assumed to be averaged data. All other data cited are averages or singular tests as indicated with the exception that results from 2012 represent single results and are not averages.
4. Laboratory analyte reporting limits for data from 2000 through 2011 were as follows: Arsenic = 5 mg/kg, Cobalt = 5 mg/kg, and Copper = 5 mg/kg. Reporting limits for data from 2012 to 2020 are as follows: Arsenic = 1 mg/kg, Cobalt = 1 mg/kg, and Copper = 1 mg/kg. Reporting limits are not available for 1995 and 2000 data.
For calculated averages where there are non-detect (ND) values, the ND value is estimated to be half of the analytes reporting limit for a given time period.
5. Human health based criteria were established for Blackbird Creek, but no aquatic toxicity based criteria were established.
All other criteria presented in this table are aquatic toxicity based.
6. Numeric criteria for sediments were not established for Bucktail Creeks.
7. Light purple shaded cells indicate exceedance of copper sediment cleanup levels observed during current monitoring year.
8. Light red shaded cells indicate exceedance of cobalt sediment cleanup levels observed during current monitoring year.
9. Light orange shaded cells indicate exceedance of arsenic sediment cleanup levels observed during current monitoring year.

Figures



LEGEND

- SURFACE WATER SAMPLE LOCATION
- SURFACE WATER AND SEDIMENT SAMPLE LOCATION
- SEDIMENT SAMPLE AND HISTORIC SURFACE WATER SAMPLE LOCATION
- HISTORIC SURFACE WATER SAMPLE LOCATION

NOTE(S)

1. HORIZONTAL DATUM: STATE PLANE COORDINATE SYSTEM IDAHO CENTRAL ZONE, NAD83/91, US FEET.
2. VERTICAL DATUM: NORTH AMERICAN VERTICAL DATUM 1988 (NAVD88).
3. FIGURES WERE ORIGINALLY PRODUCED IN THE BLACKBIRD MINE SITE LOCAL MINE DATUM AND UNDERWENT TRANSFORMATION TO STATE PLANE COORDINATE SYSTEM FOR THIS REVISION (MARCH 14, 2014).
4. WEIR MEASURED FOR MCSW-01 FLOW AND SYNOPTIC LOADING CALCULATION.

0 2000 4000
1" = 2000' FEET

CLIENT
BLACKBIRD MINE SITE GROUP

PROJECT
BLACKBIRD MINE
2020 MONITORING REPORT
LEMHI COUNTY, IDAHO

TITLE
BLACKBIRD MINE SURFACE WATER AND SEDIMENT MONITORING LOCATIONS

CONSULTANT
GOLDER

YYYY-MM-DD	2021-01-04
DESIGNED	-
PREPARED	REDMOND
REVIEWED	AR
APPROVED	CRS

PROJECT NO.	PHASE	REV.	SHEET
9431595011	3066	A	1-1

Path: \\golder.gds\data\geomatics\BMGS\Blackbird\09_PROJECT\9431595011_Blackbird\Mine\3066_2020\Monitoring\Report\02_PRODUCTION\DWG\ | File Name: 9431595011_3066_001.dwg
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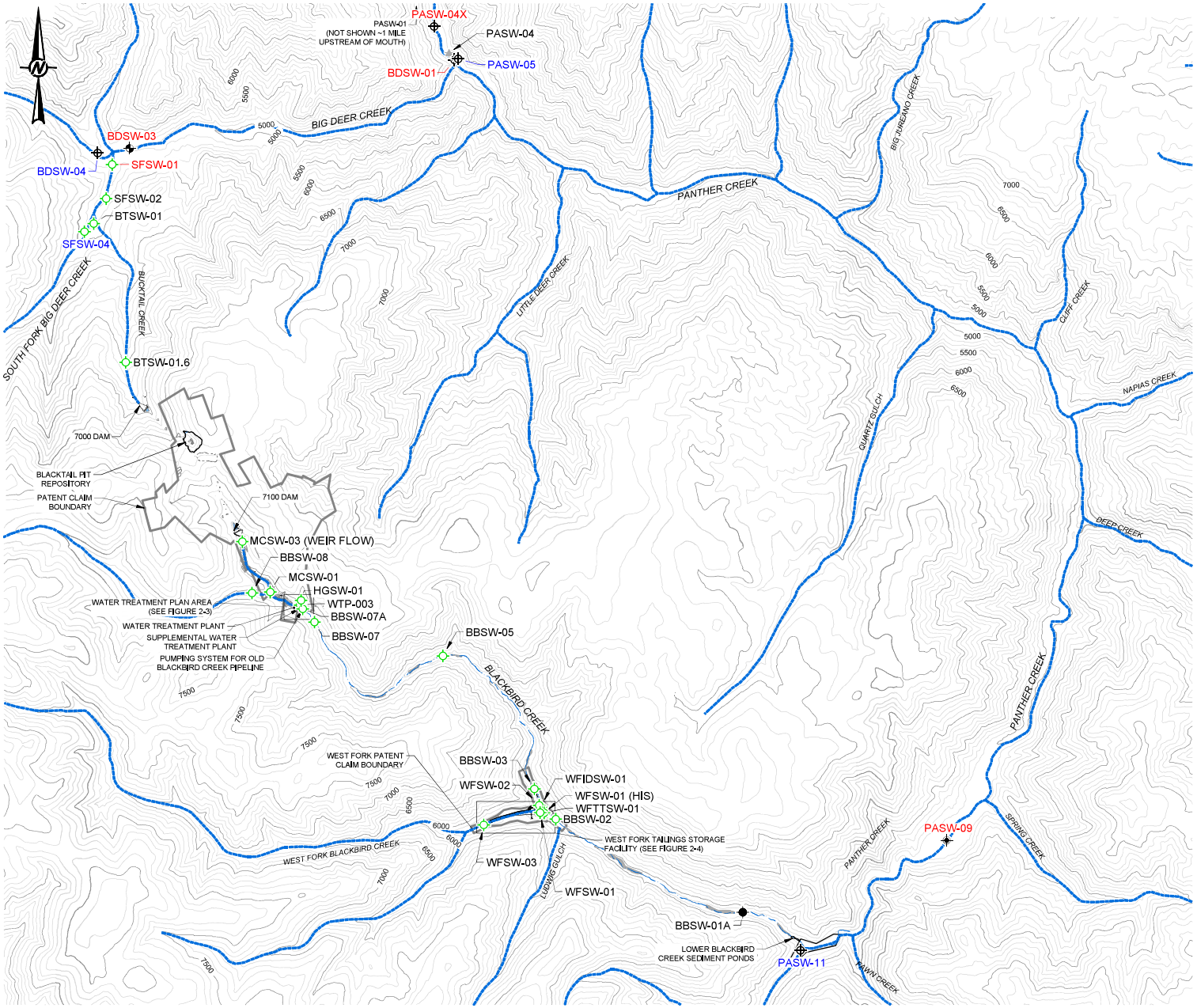


LEGEND

	HISTORIC SURFACE WATER SAMPLE LOCATION
	SYNOPTIC SAMPLING LOCATION
	SYNOPTIC AND MONTHLY SAMPLING LOCATION
	SYNOPTIC AND CHRONIC CRITERIA SAMPLING LOCATION
	SYNOPTIC, CHRONIC, AND ACUTE CRITERIA SAMPLING LOCATION
	SYNOPTIC, MONTHLY, AND CHRONIC CRITERIA SAMPLING LOCATION
BDSW-01	POINT OF COMPLIANCE / DOWNSTREAM STATION
SFSW-04	BACKGROUND / UPSTREAM STATION

NOTE(S)

1. HORIZONTAL DATUM: STATE PLANE COORDINATE SYSTEM IDAHO CENTRAL ZONE, NAD83/91, US FEET.
2. VERTICAL DATUM: NORTH AMERICAN VERTICAL DATUM 1988 (NAVD88).
3. FIGURES WERE ORIGINALLY PRODUCED IN THE BLACKBIRD MINE SITE LOCAL MINE DATUM AND UNDERWENT TRANSFORMATION TO STATE PLANE COORDINATE SYSTEM FOR THIS REVISION (MARCH 14, 2014).
4. WEIR MEASURED FOR MCSW-01 FLOW AND SYNOPTIC LOADING CALCULATIONS.

0 2000 4000
1" = 2000' FEET

CLIENT
BLACKBIRD MINE SITE GROUP

PROJECT
BLACKBIRD MINE
2020 MONITORING REPORT
LEMHI COUNTY, IDAHO

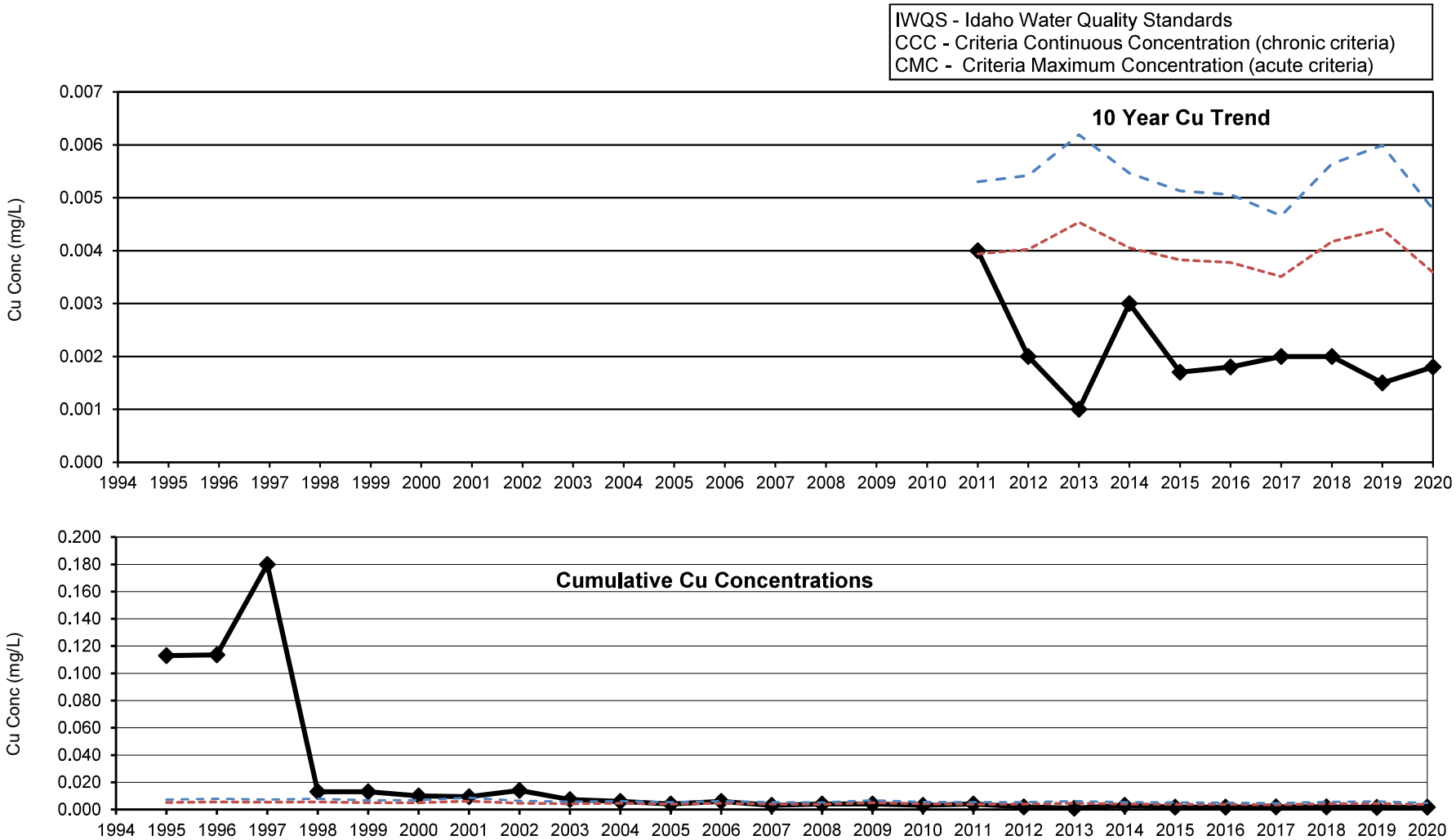
TITLE
SURFACE WATER MONITORING LOCATIONS WITH ASSOCIATED SAMPLING EVENTS

CONSULTANT
GOLDER

YYYY-MM-DD	2021-01-04
DESIGNED	-
PREPARED	REDMOND
REVIEWED	AR
APPROVED	CRS

PROJECT NO.	PHASE	REV.	SHEET
9431595011	3066	A	1-2

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI D



GOLDER

LEGEND

- Cu Conc
- IWQS CCC
- IWQS CMC

FIGURE **2-2a**

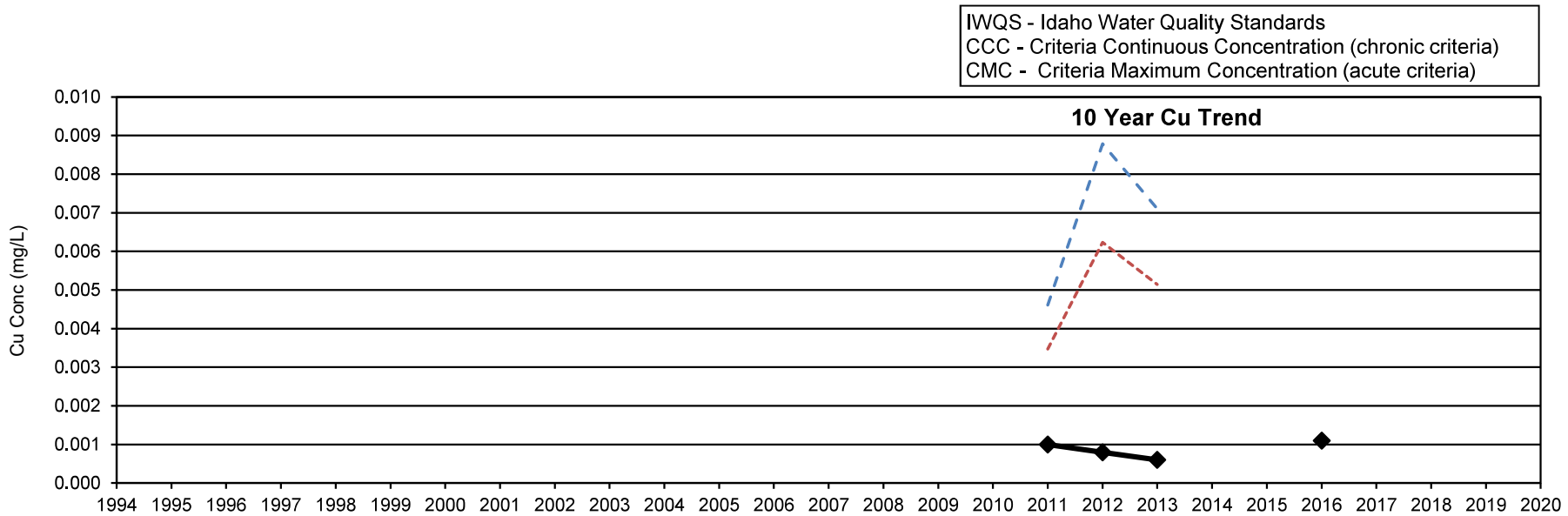
MEDIAN DISSOLVED COPPER CONCENTRATIONS AND IWQS AT PASW-09 AND PASW-10, 1995 - 2020, HIGH FLOW

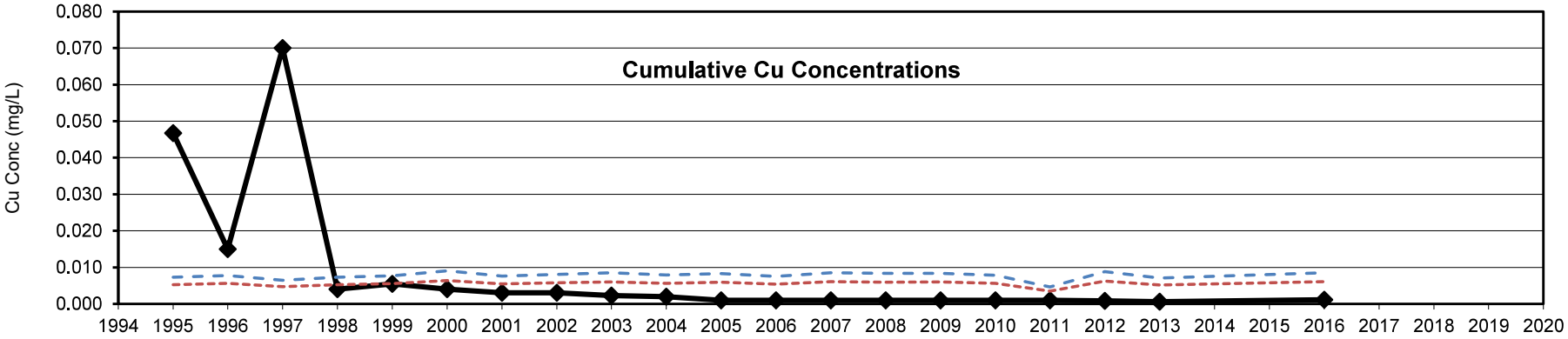
BMSG/2020 Monitoring Report/ID

943-1595-011.3066

Fig 2.2a-c_DissvCu PASW-09 & PASW-10_011221.xlsx

Golder Associates





GOLDER

LEGEND

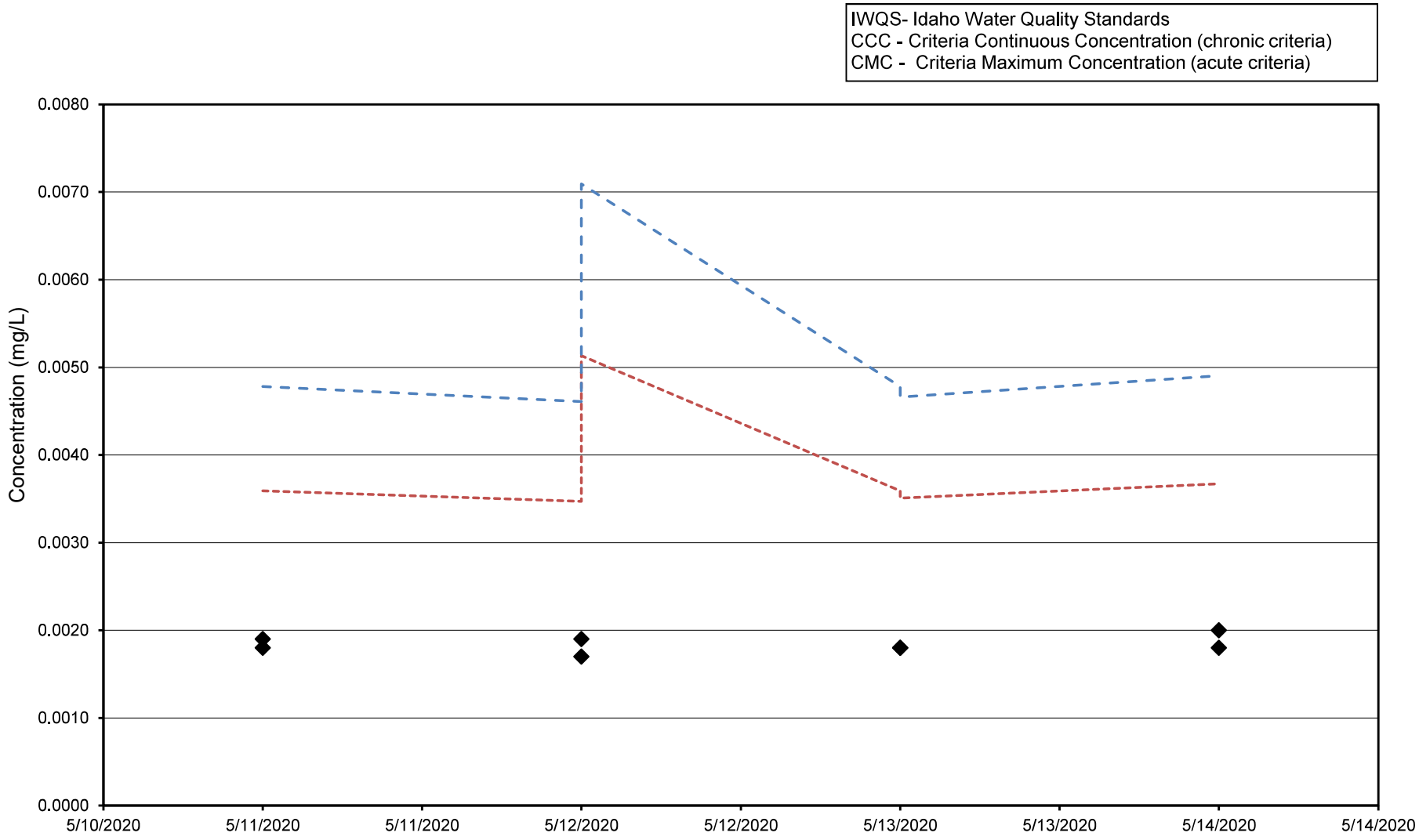
- Cu Conc
- IWQS CCC
- IWQS CMC

FIGURE **2-2b**

MEDIAN DISSOLVED COPPER CONCENTRATIONS AND IWQS AT PASW-09 AND PASW-10, 1995 - 2020, LOW FLOW

BMSG/2020 Monitoring Report/ID

943-1595-011.3066



LEGEND

- Cu Conc
- IWQS CCC
- IWQS CMC

GOLDER

FIGURE **2-2c**

2020 DISSOLVED COPPER CONCENTRATIONS AT PASW-09

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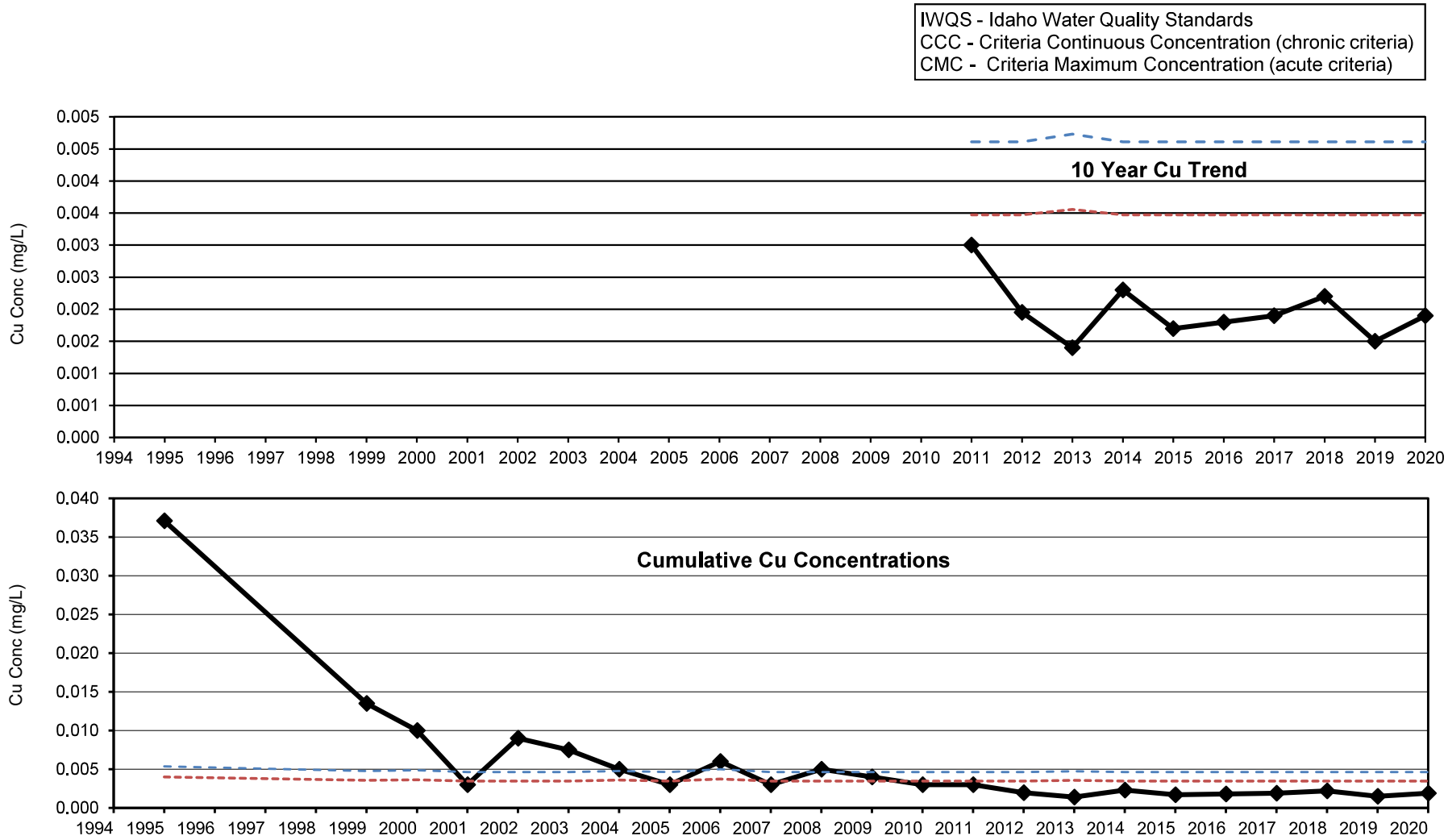
943-1595-011.3066



GOLDER

LEGEND

- Cu Conc
- IWQS CCC
- IWQS CMC

FIGURE **2-2d**

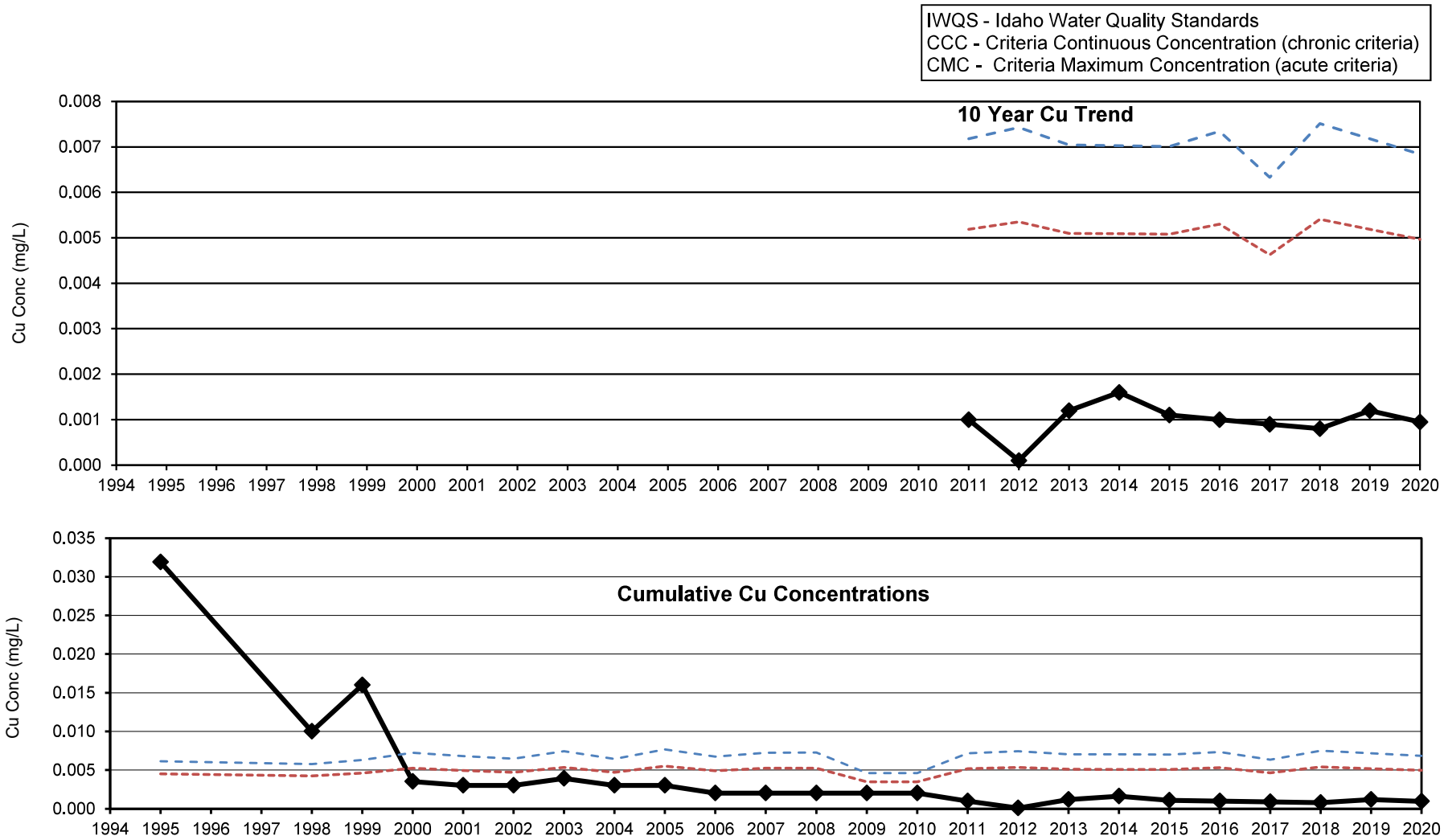
MEDIAN DISSOLVED COPPER CONCENTRATIONS AND IWQS AT PASW-04 AND PASW-04X, 1995 - 2020, HIGH FLOW

BMSG/2020 Monitoring Report/ID

943-1595-011.3066

Fig 2.2d-f_DissvCu PASW-04 & PASW-04X_011321.xlsx

Golder Associates



GOLDER

LEGEND

- Cu Conc
- IWQS CCC
- IWQS CMC

FIGURE **2-2e**

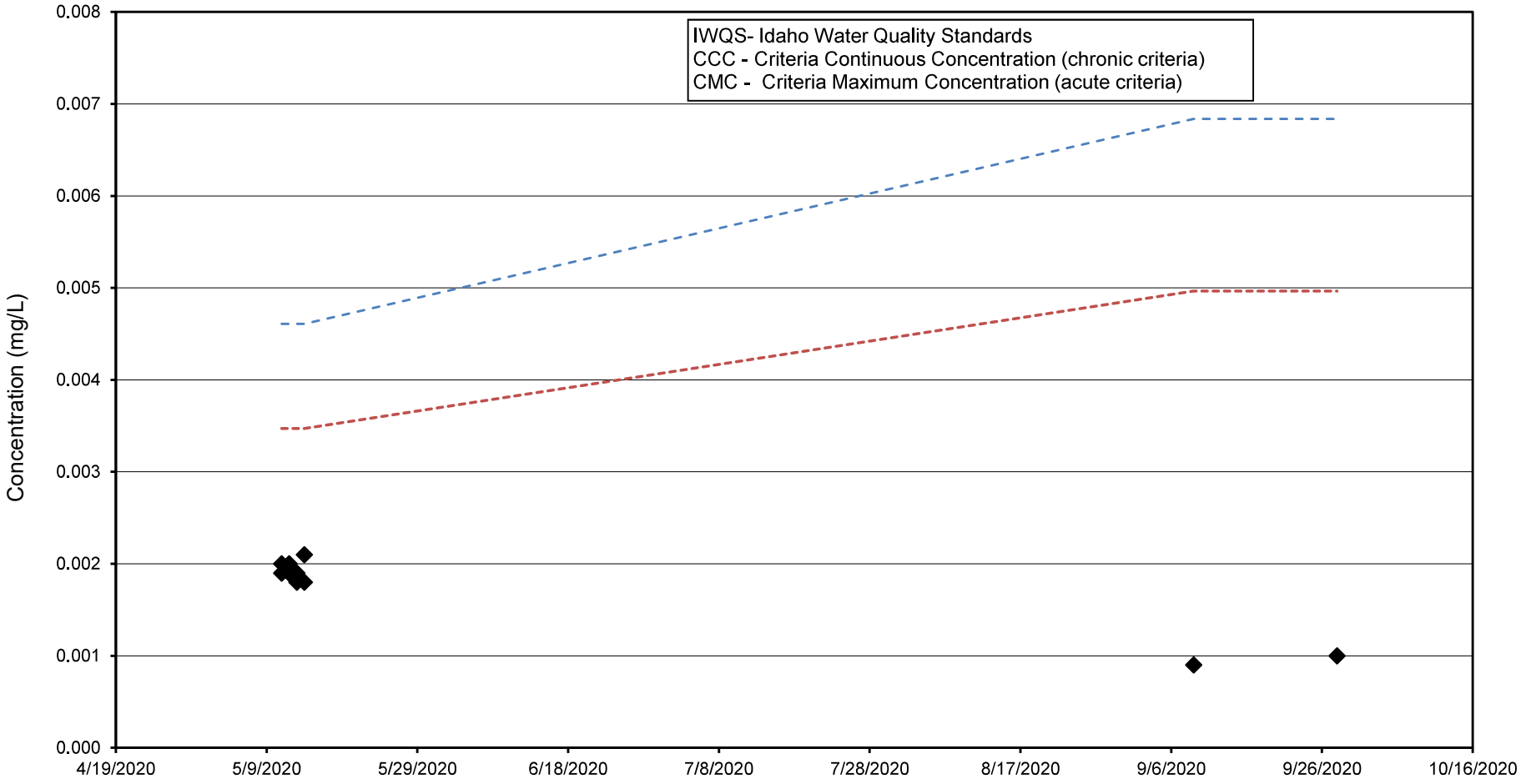
MEDIAN DISSOLVED COPPER CONCENTRATIONS AND IWQS AT PASW-04 AND PASW-04X, 1995 - 2020, LOW FLOW

BMSG/2020 Monitoring Report/ID

943-1595-011.3066

Fig 2.2d-f_DissvCu PASW-04 & PASW-04X_011321.xlsx

Golder Associates



GOLDER

LEGEND

- Cu Conc
- IWQS CCC
- IWQS CMC

FIGURE **2-2f**

2020 DISSOLVED COPPER CONCENTRATIONS AT PASW-04X

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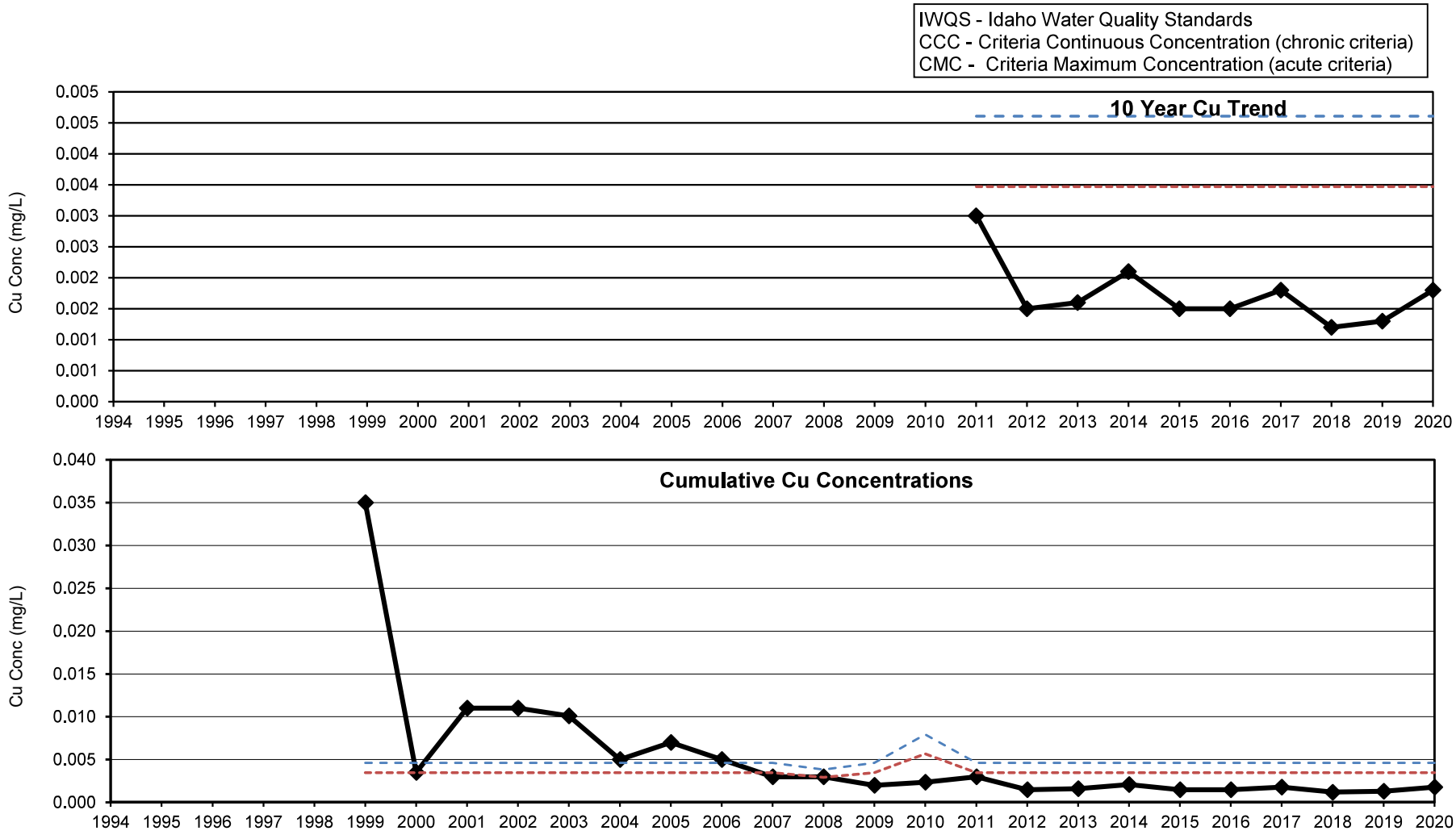
943-1595-011.3066

Fig 2.2d-f_DissvCu PASW-04 & PASW-04X_011321.xlsx

Golder Associates



GOLDER

LEGEND

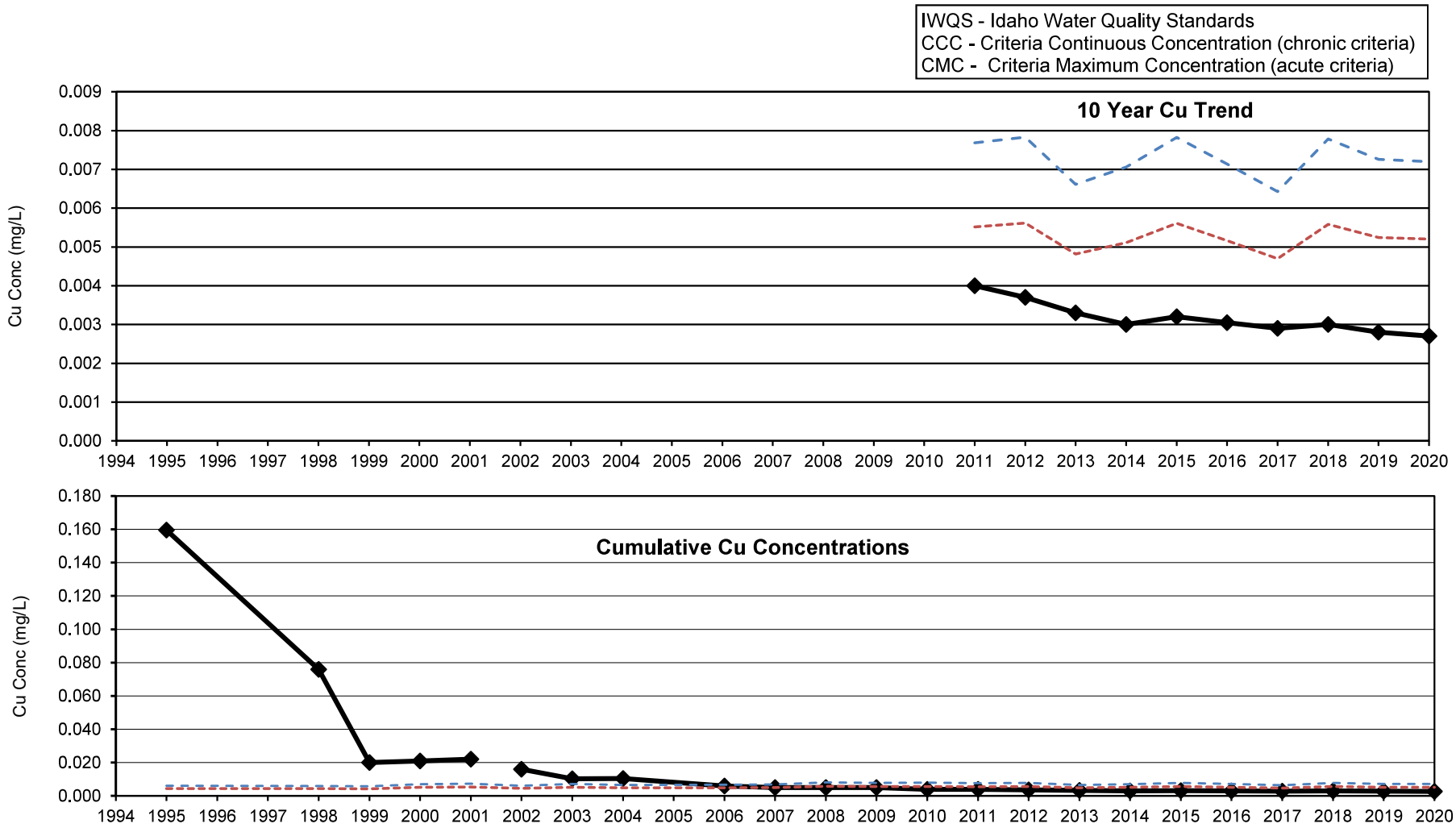
- Cu Conc
- IWQS CCC
- IWQS CMC

FIGURE **2-2g**

MEDIAN DISSOLVED COPPER CONCENTRATIONS AND IWQS AT BDSW-03 AND BDSW-03A, 1995 - 2020, HIGH FLOW

BMSG/2020 Monitoring Report/ID

943-1595-011.3066



GOLDER

LEGEND

- Cu Conc
- IWQS CCC
- IWQS CMC

FIGURE **2-2h**

MEDIAN DISSOLVED COPPER CONCENTRATIONS AND IWQS AT BDSW-03 AND BDSW-03A, 1995 - 2020, LOW FLOW

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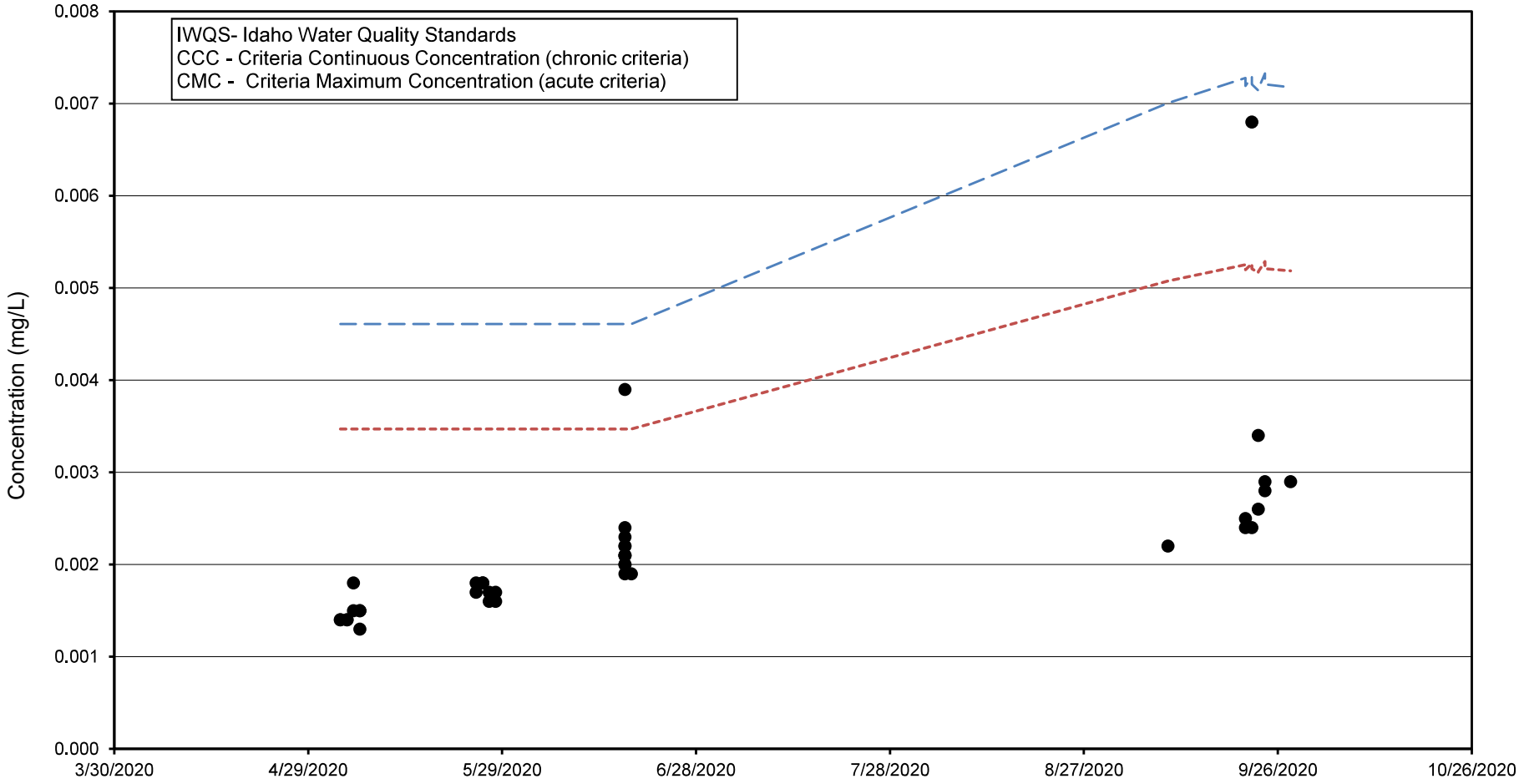
943-1595-011.3066

Fig 2.2g-i_DissvCu BDSW-03_011321.xlsx

Golder Associates



GOLDER

LEGEND

- Cu Conc
- IWQS CCC
- IWQS CMC

FIGURE **2-2i**

2020 DISSOLVED COPPER CONCENTRATIONS AT BDSW-03

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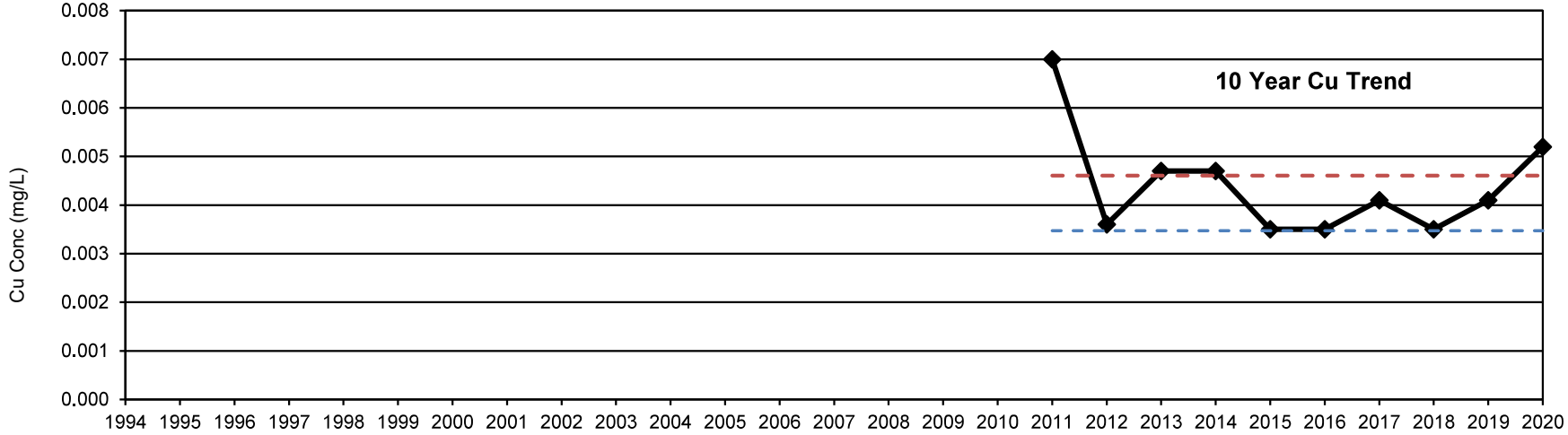
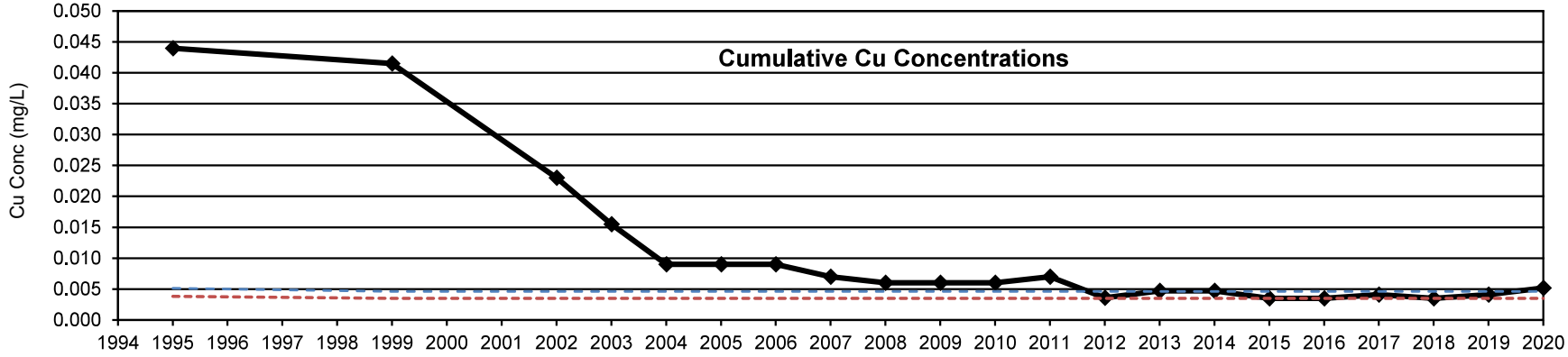
943-1595-011.3066

Fig 2.2g-i_DissvCu BDSW-03_011321.xlsx

Golder Associates

IWQS - Idaho Water Quality Standards
CCC - Criteria Continuous Concentration (chronic criteria)
CMC - Criteria Maximum Concentration (acute criteria)





GOLDER

LEGEND
- Cu Conc
- IWQS CCC
- IWQS CMC

FIGURE **2-2j**

MEDIAN DISSOLVED COPPER CONCENTRATIONS AND IWQS AT BDSW-01, 1995 - 2020, HIGH FLOW

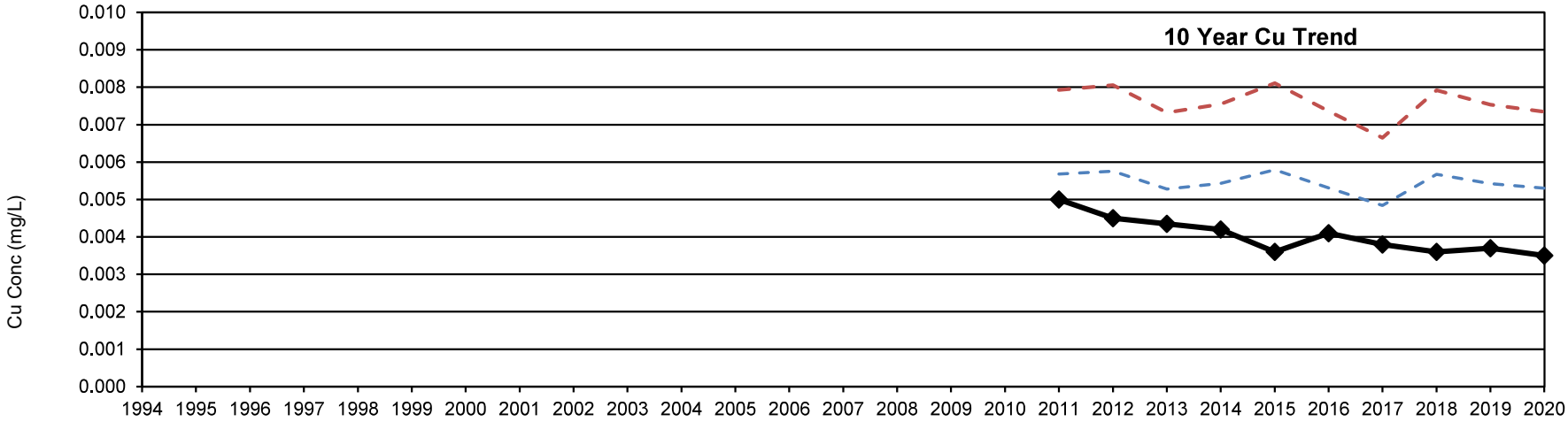
BMSG/2020 Monitoring Report/ID

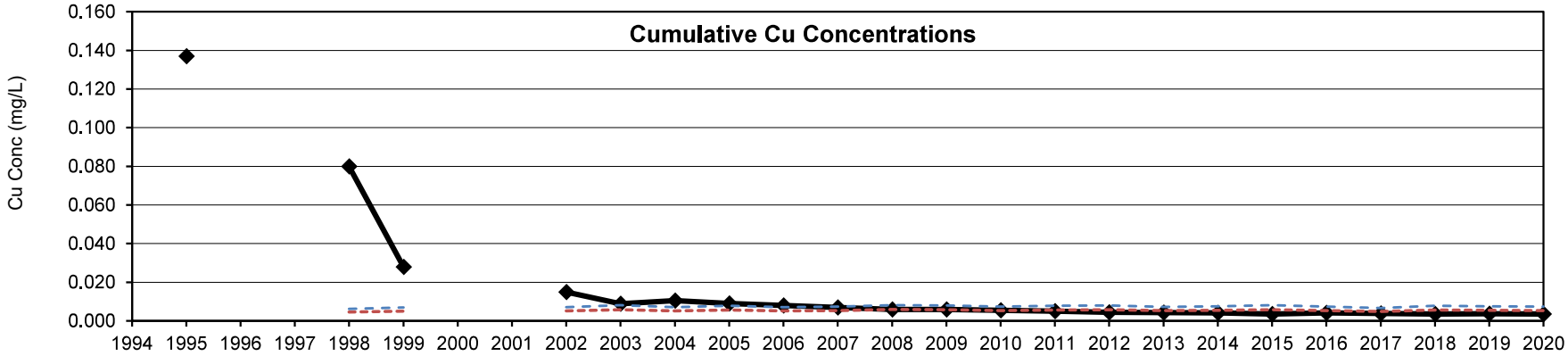
943-1595-011.3066

Fig 2.2j-l_DissvCu BDSW-01_011321.xlsx

Golder Associates

IWQS - Idaho Water Quality Standards
CCC - Criteria Continuous Concentration (chronic criteria)
CMC - Criteria Maximum Concentration (acute criteria)





GOLDER

LEGEND

- Cu Conc
- IWQS CCC
- IWQS CMC

FIGURE **2-2k**

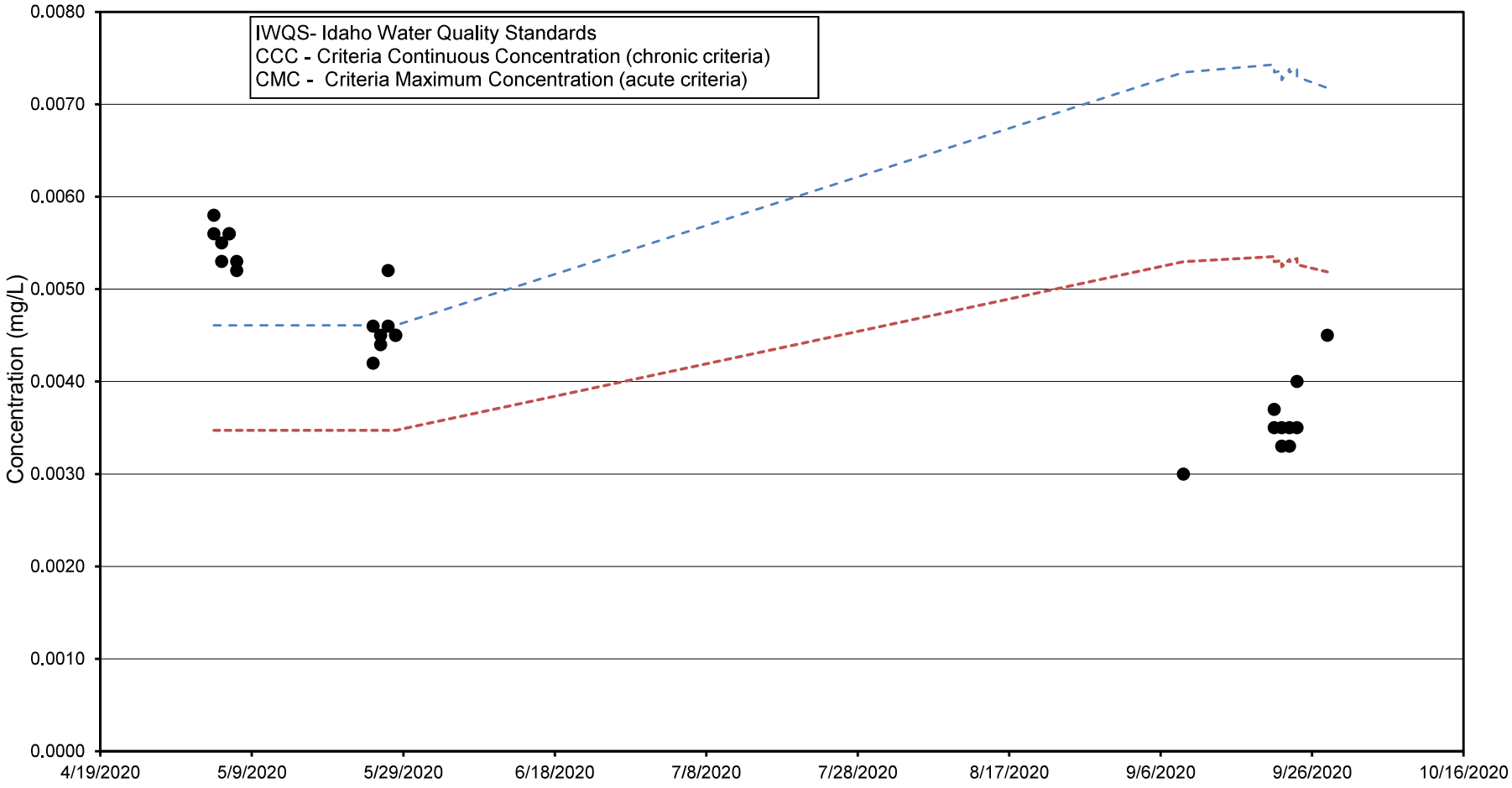
MEDIAN DISSOLVED COPPER CONCENTRATIONS AND IWQS AT BDSW-01, 1995 - 2020, LOW FLOW

BMSG/2020 Monitoring Report/ID

943-1595-011.3066

Fig 2.2j-l_DissvCu BDSW-01_011321.xlsx

Golder Associates



LEGEND

- Cu Conc
- IWQS CCC
- IWQS CMC

GOLDER

FIGURE **2-2I**

2020 DISSOLVED COPPER CONCENTRATIONS AT BDSW-01

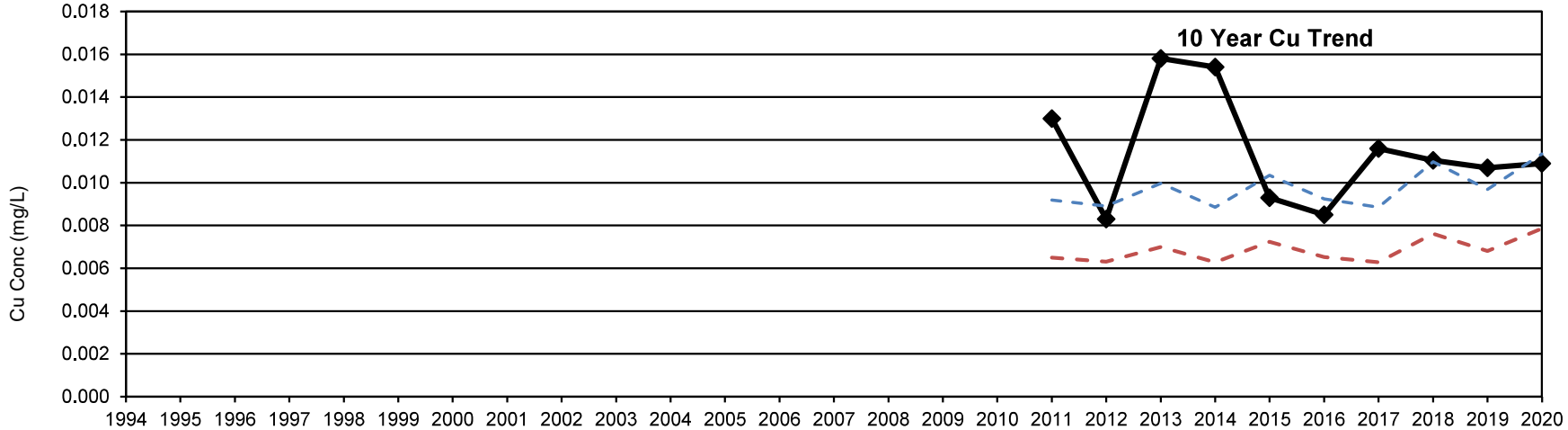
BMSG/2020 Monitoring Report/ID

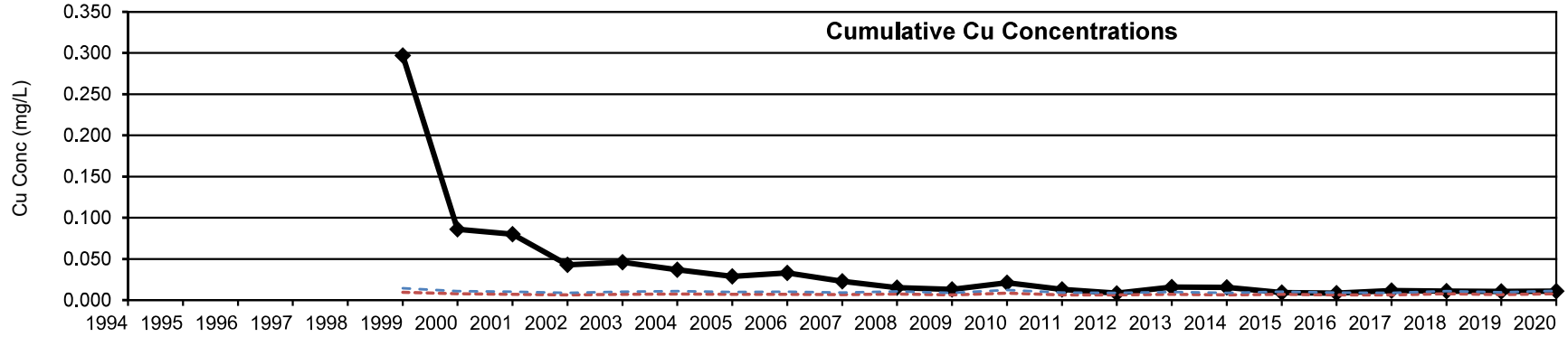
943-1595-011.3066

Fig 2.2j-l_DissvCu BDSW-01_011321.xlsx

Golder Associates

IWQS - Idaho Water Quality Standards
CCC - Criteria Continuous Concentration (chronic criteria)
CMC - Criteria Maximum Concentration (acute criteria)





GOLDER

LEGEND

- Cu Conc
- IWQS CCC
- IWQS CMC

FIGURE **2-2m**

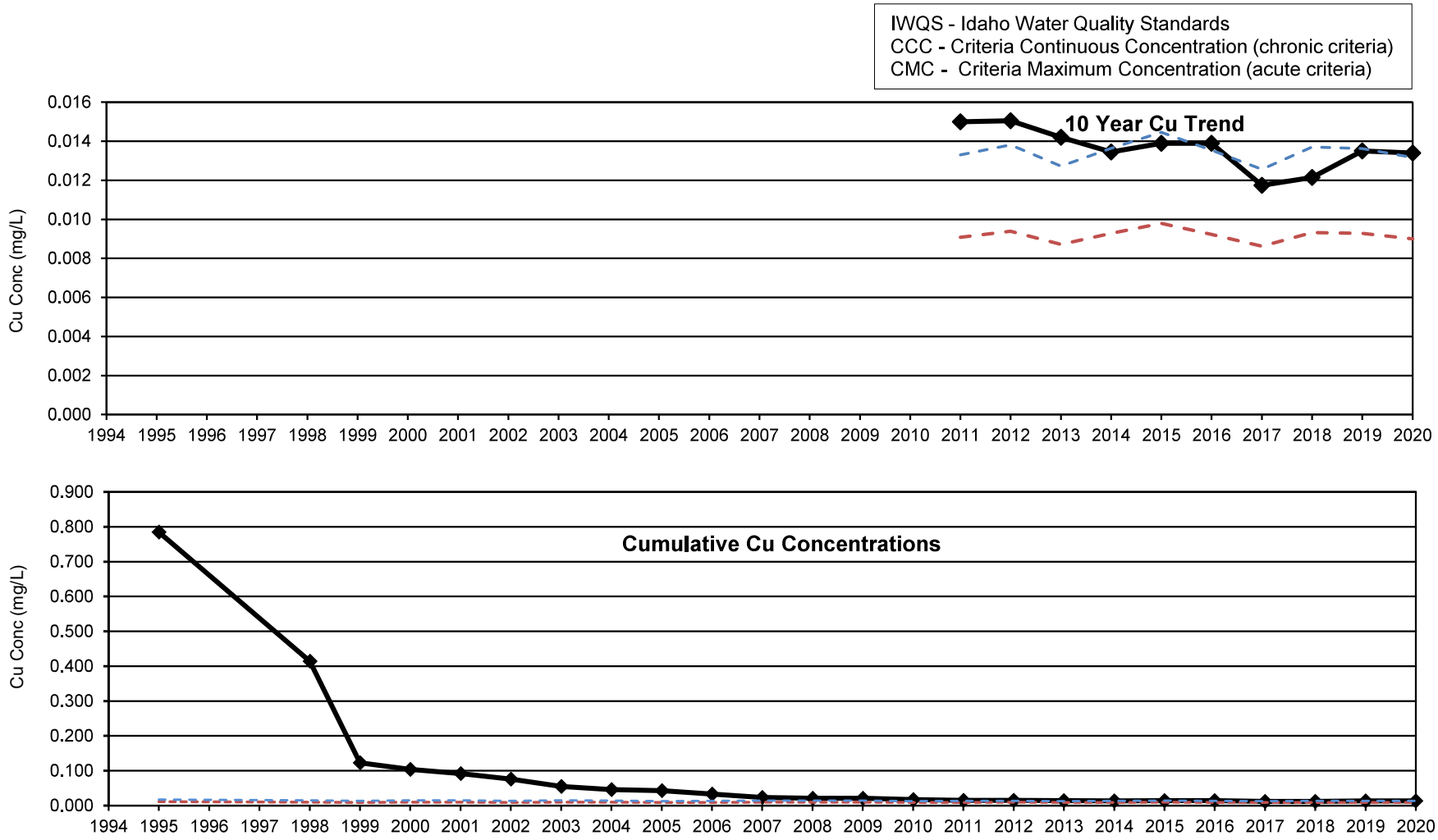
MEDIAN DISSOLVED COPPER CONCENTRATIONS AND IWQS AT SFSW-01, 1995 - 2020, HIGH FLOW

BMSG/2020 Monitoring Report/ID

943-1595-011.3066

Fig 2.2m-o_DissvCu SFSW-01_011321.xlsx

Golder Associates



GOLDER

LEGEND

- Cu Conc
- IWQS CCC
- IWQS CMC

FIGURE **2-2n**

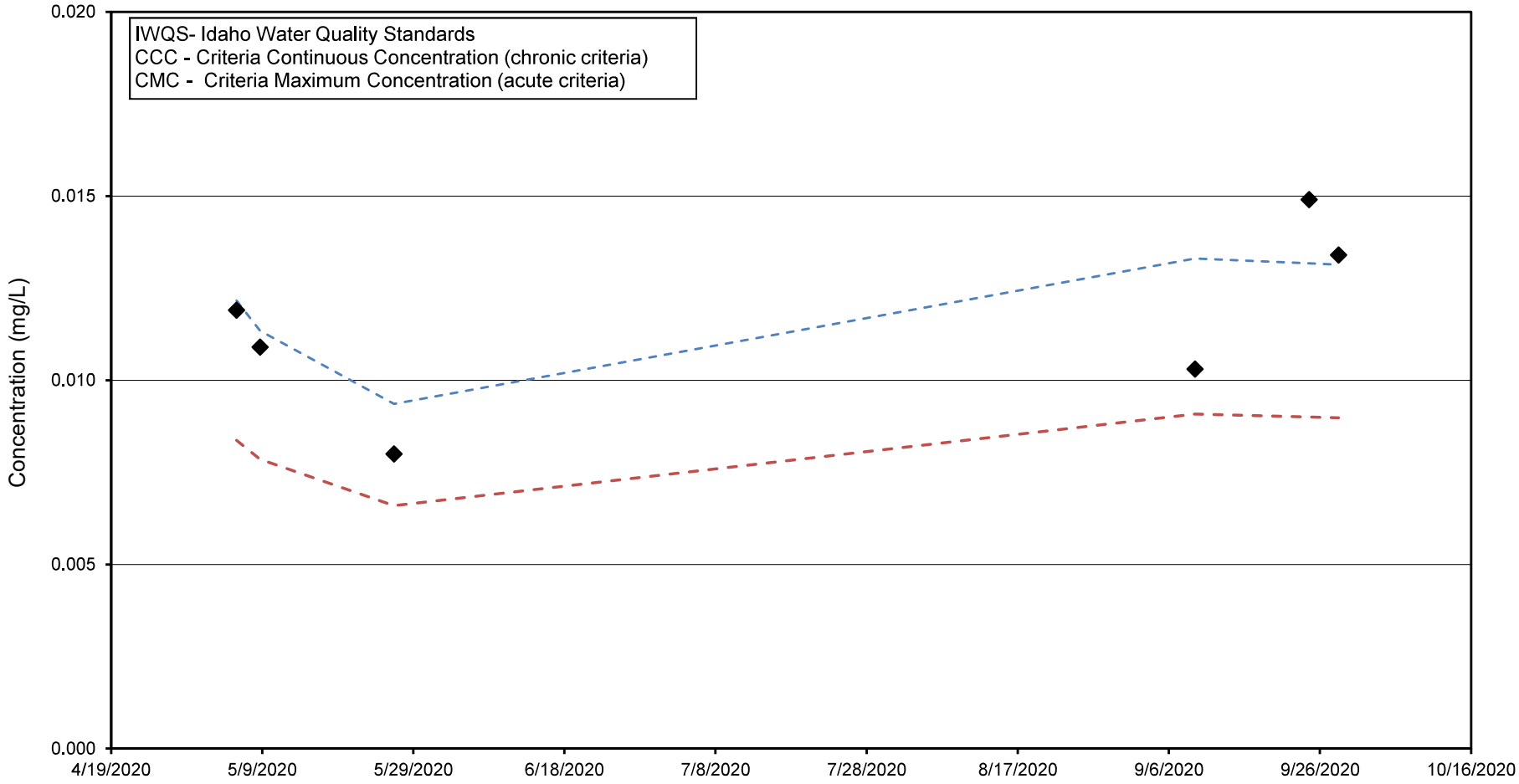
MEDIAN DISSOLVED COPPER CONCENTRATIONS AND IWQS AT SFSW-01, 1995 - 2020, LOW FLOW

BMSG/2020 Monitoring Report/ID

943-1595-011.3066

Fig 2.2m-o_DissvCu SFSW-01_011321.xlsx

Golder Associates



LEGEND

- Cu Conc
- IWQS CCC
- IWQS CMC

FIGURE **2-2o**

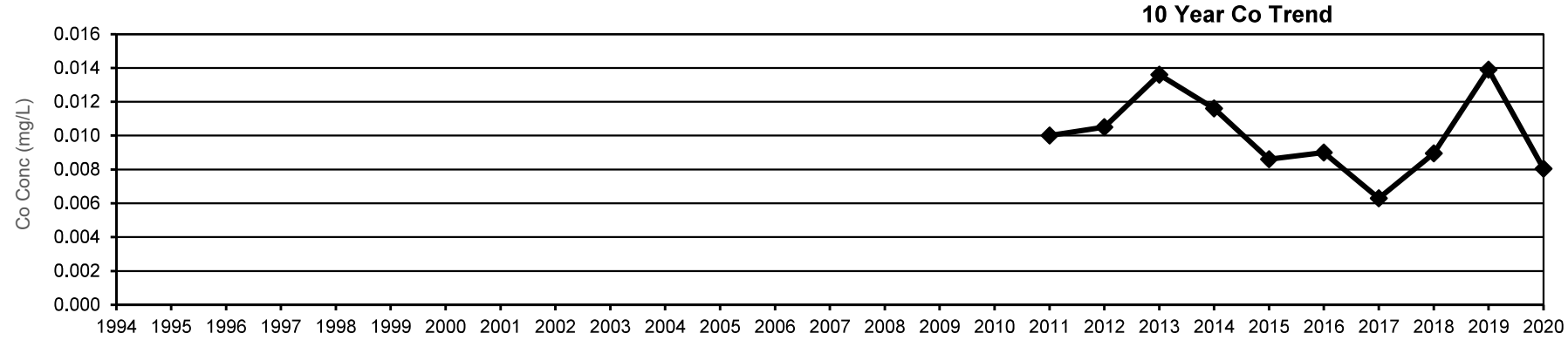
2020 DISSOLVED COPPER CONCENTRATIONS AT SFSW-01

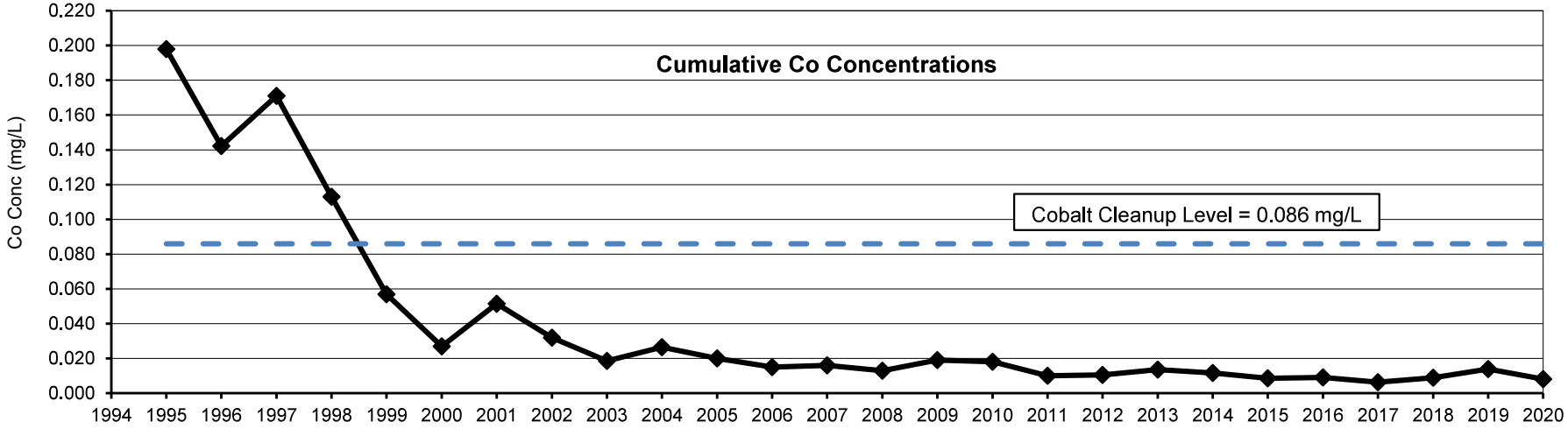
BMSG/2020 Monitoring Report/ID

943-1595-011.3066

Fig 2.2m-o_DissvCu SFSW-01_011321.xlsx

Golder Associates





Cobalt WQCL - Cobalt Water Quality Cleanup Level; A site-specific cobalt toxicity test program was conducted to determine the appropriate cobalt cleanup value for Blackbird Mine. After the conclusion of the toxicity testing, EPA selected a cobalt cleanup value of 86 ppb (0.86 mg/L). The BMSG disagrees and believes that the cleanup value based on the toxicity testing results should be 101 ppb cobalt. Because recent stream values have been below 86 ppb, EPA has advised the BMSG that it is not requesting response actions to address cobalt at this time.

GOLDER

LEGEND

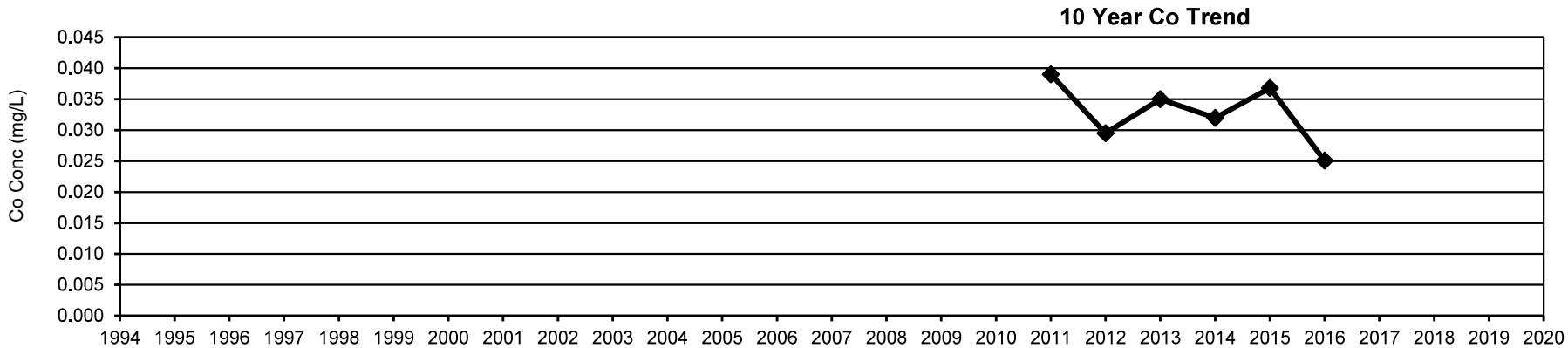
- Co Conc
- Co Cleanup Level

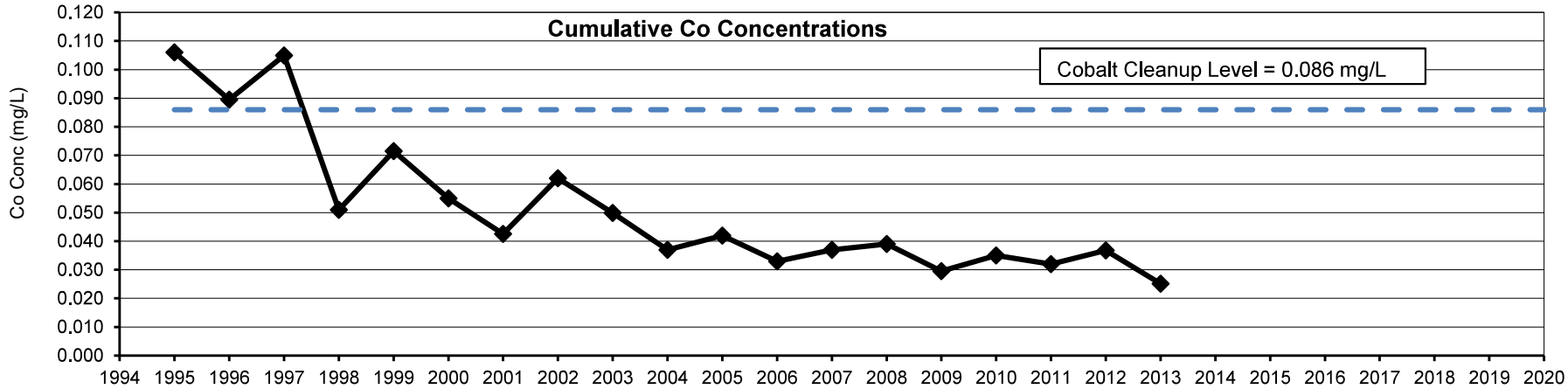
FIGURE **2-2p**

MEDIAN DISSOLVED COBALT CONCENTRATIONS AT PASW-09 AND PASW-10, 1995 - 2020, HIGH FLOW

BMSG/2020 Monitoring Report/ID

943-1595-011.3066





Cobalt WQCL - Cobalt Water Quality Cleanup Level; A site-specific cobalt toxicity test program was conducted to determine the appropriate cobalt cleanup value for Blackbird Mine. After the conclusion of the toxicity testing, EPA selected a cobalt cleanup value of 86 ppb (0.86 mg/L). The BMSG disagrees and believes that the cleanup value based on the toxicity testing results should be 101 ppb cobalt. Because recent stream values have been below 86 ppb, EPA has advised the BMSG that it is not requesting response actions to address cobalt at this time. No low flow data is available after 2013.

GOLDER

LEGEND

- Co Conc
- Co Cleanup Level

FIGURE **2-2q**

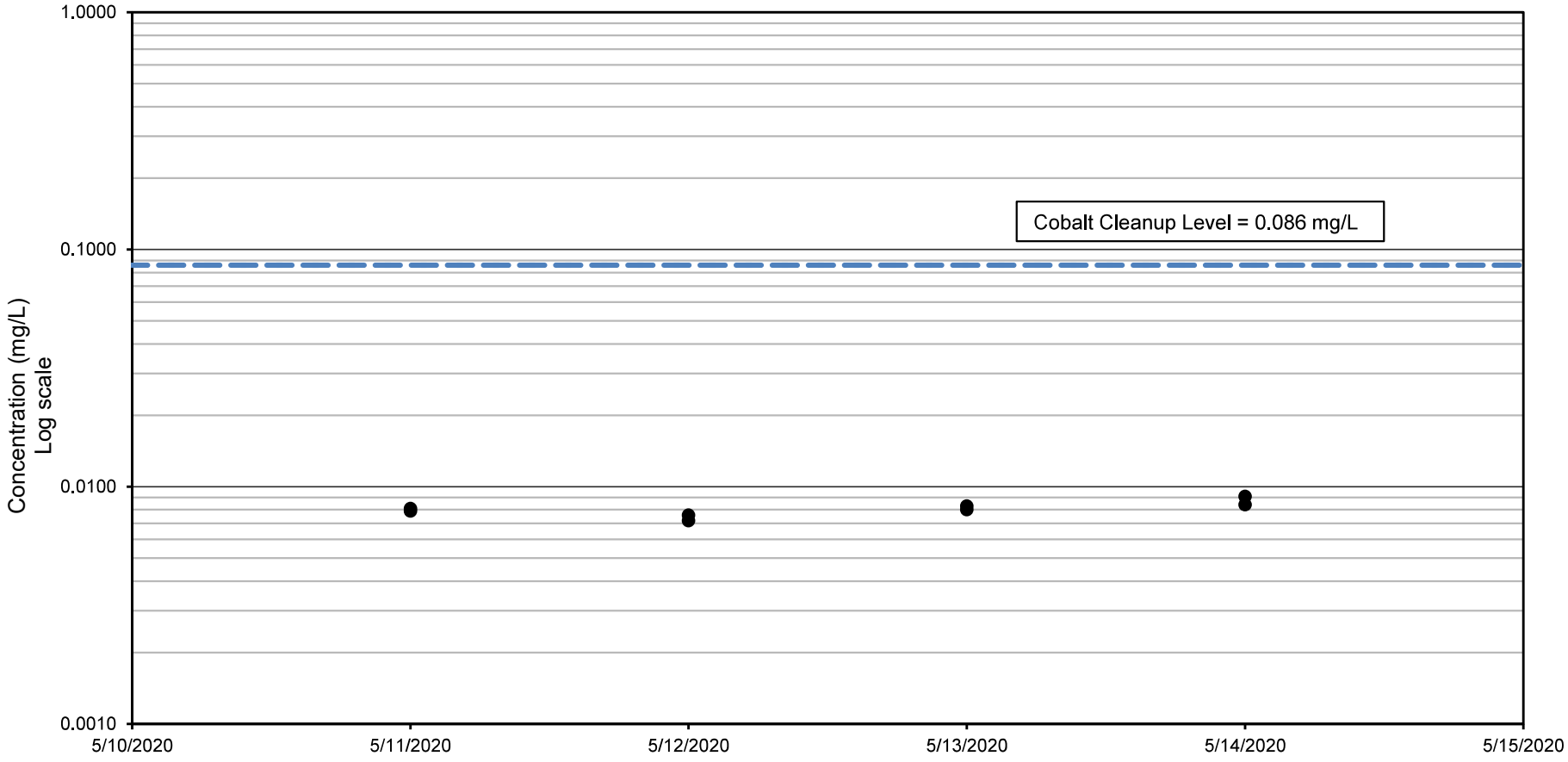
MEDIAN DISSOLVED COBALT CONCENTRATIONS AT PASW-09 AND PASW-10, 1995 - 2020, LOW FLOW

BMSG/2020 Monitoring Report/ID

943-1595-011.3066

Fig 2.2p-r_DissvCo PASW-09 & PASW-10_011320.xlsx

Golder Associates



Cobalt WQCL - Cobalt Water Quality Cleanup Level; A site-specific cobalt toxicity test program was conducted to determine the appropriate cobalt cleanup value for Blackbird Mine. After the conclusion of the toxicity testing, EPA selected a cobalt cleanup value of 86 ppb (0.86 mg/L). The BMSG disagrees and believes that the cleanup value based on the toxicity testing results should be 101 ppb cobalt. Because recent stream values have been below 86 ppb, EPA has advised the BMSG that it is not requesting response actions to address cobalt at this time.

GOLDER

LEGEND

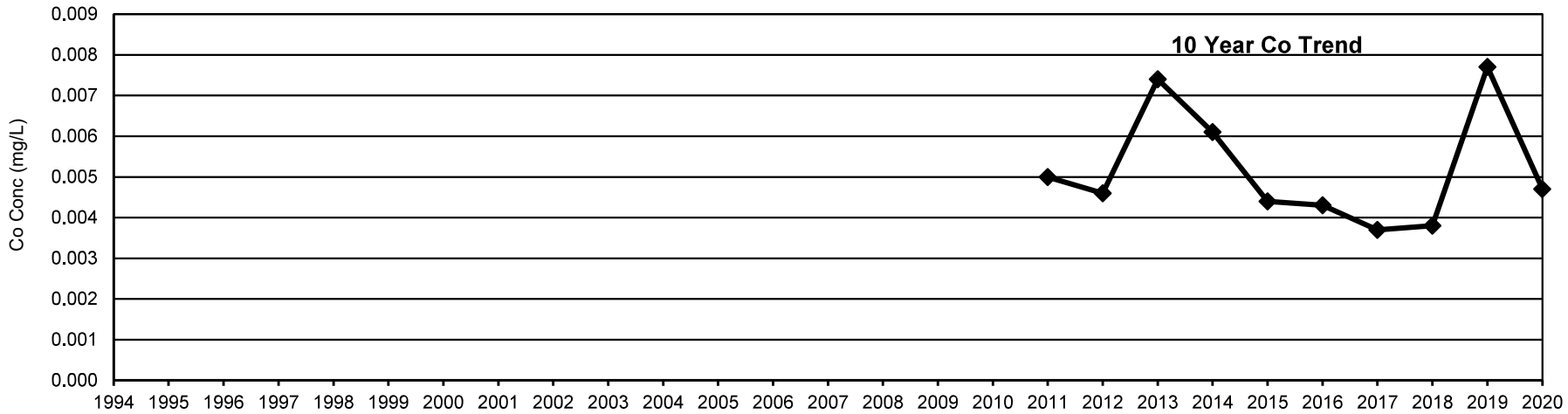
- Co Conc
- Co Cleanup Level

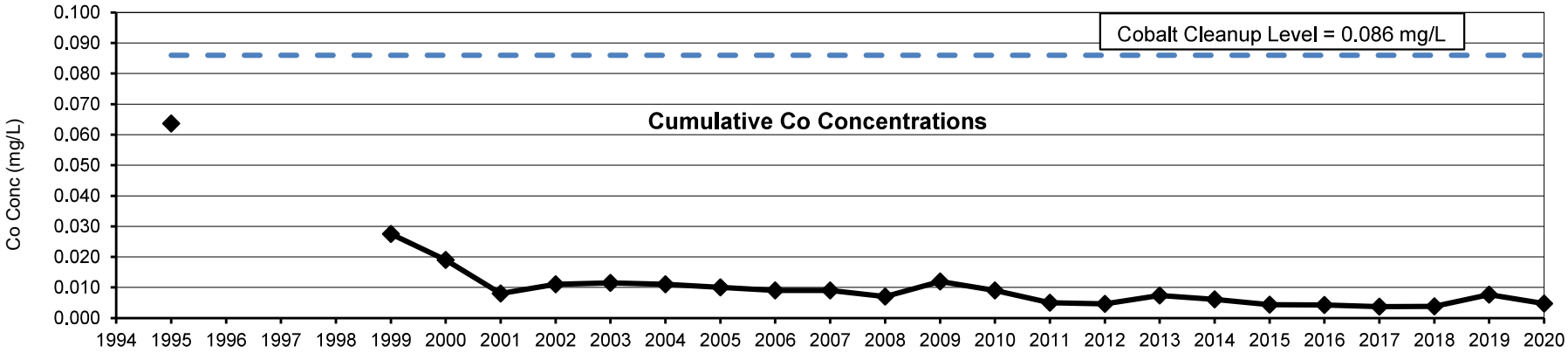
FIGURE **2-2r**

2020 DISSOLVED COBALT CONCENTRATIONS AT PASW-09

BMSG/2020 Monitoring Report/ID

943-1595-011.3066





Cobalt WQCL - Cobalt Water Quality Cleanup Level; A site-specific cobalt toxicity test program was conducted to determine the appropriate cobalt cleanup value for Blackbird Mine. After the conclusion of the toxicity testing, EPA selected a cobalt cleanup value of 86 ppb (0.86 mg/L). The BMSG disagrees and believes that the cleanup value based on the toxicity testing results should be 101 ppb cobalt. Because recent stream values have been below 86 ppb, EPA has advised the BMSG that it is not requesting response actions to address cobalt at this time.

GOLDER

LEGEND

- Co Conc
- Co Cleanup Level

FIGURE **2-2s**

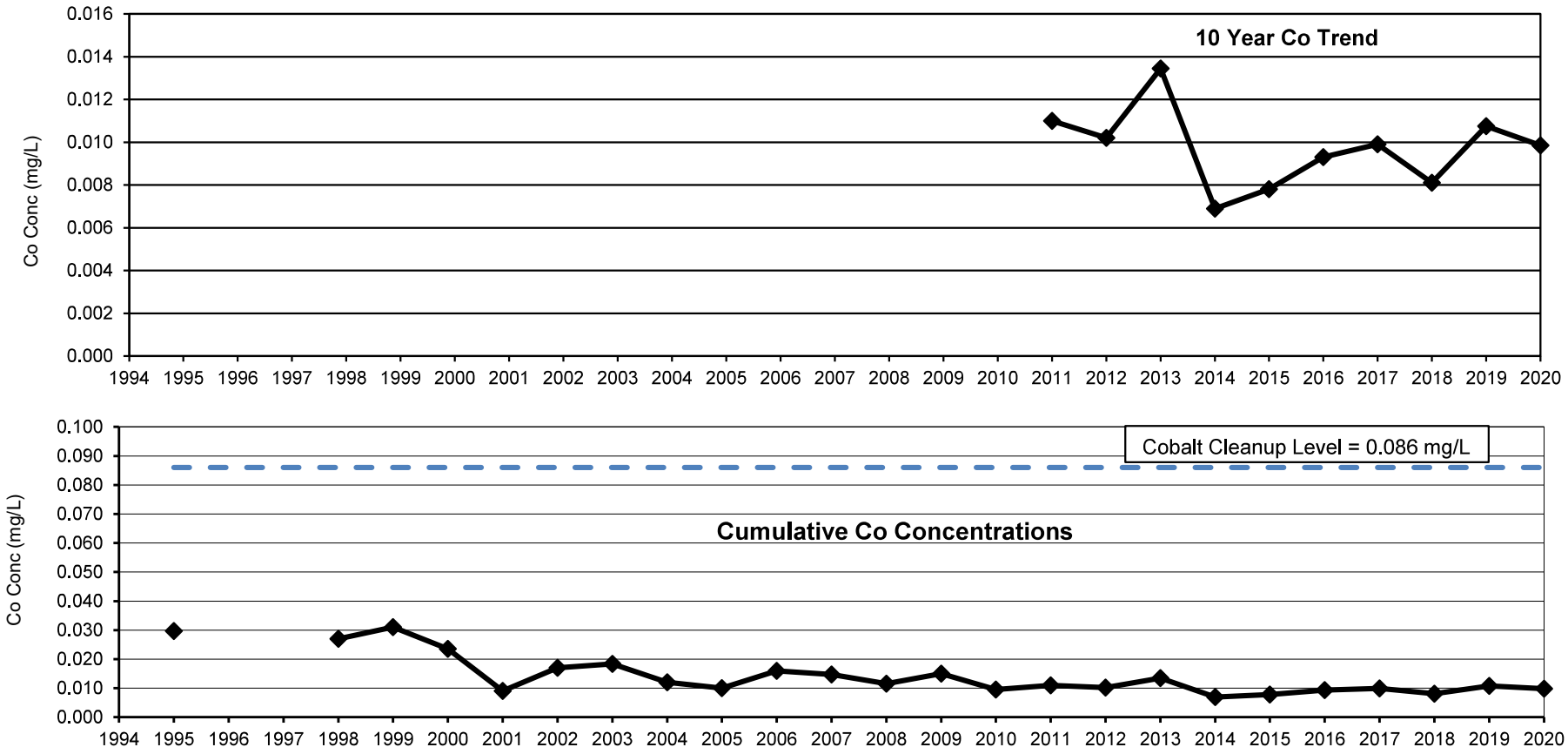
MEDIAN DISSOLVED COBALT CONCENTRATIONS AT PASW-04 AND PASW-04X, 1995 - 2020, HIGH FLOW

BMSG/2020 Monitoring Report/ID

943-1595-011.3066

Fig 2.2s-u_DissvCo PASW-04 & PASW-04X_011221.xlsx

Golder Associates



Cobalt WQCL - Cobalt Water Quality Cleanup Level; A site-specific cobalt toxicity test program was conducted to determine the appropriate cobalt cleanup value for Blackbird Mine. After the conclusion of the toxicity testing, EPA selected a cobalt cleanup value of 86 ppb (0.86 mg/L). The BMSG disagrees and believes that the cleanup value based on the toxicity testing results should be 101 ppb cobalt. Because recent stream values have been below 86 ppb, EPA has advised the BMSG that it is not requesting response actions to address cobalt at this time.

GOLDER

LEGEND

- Co Conc
- Co Cleanup Level

FIGURE **2-2t**

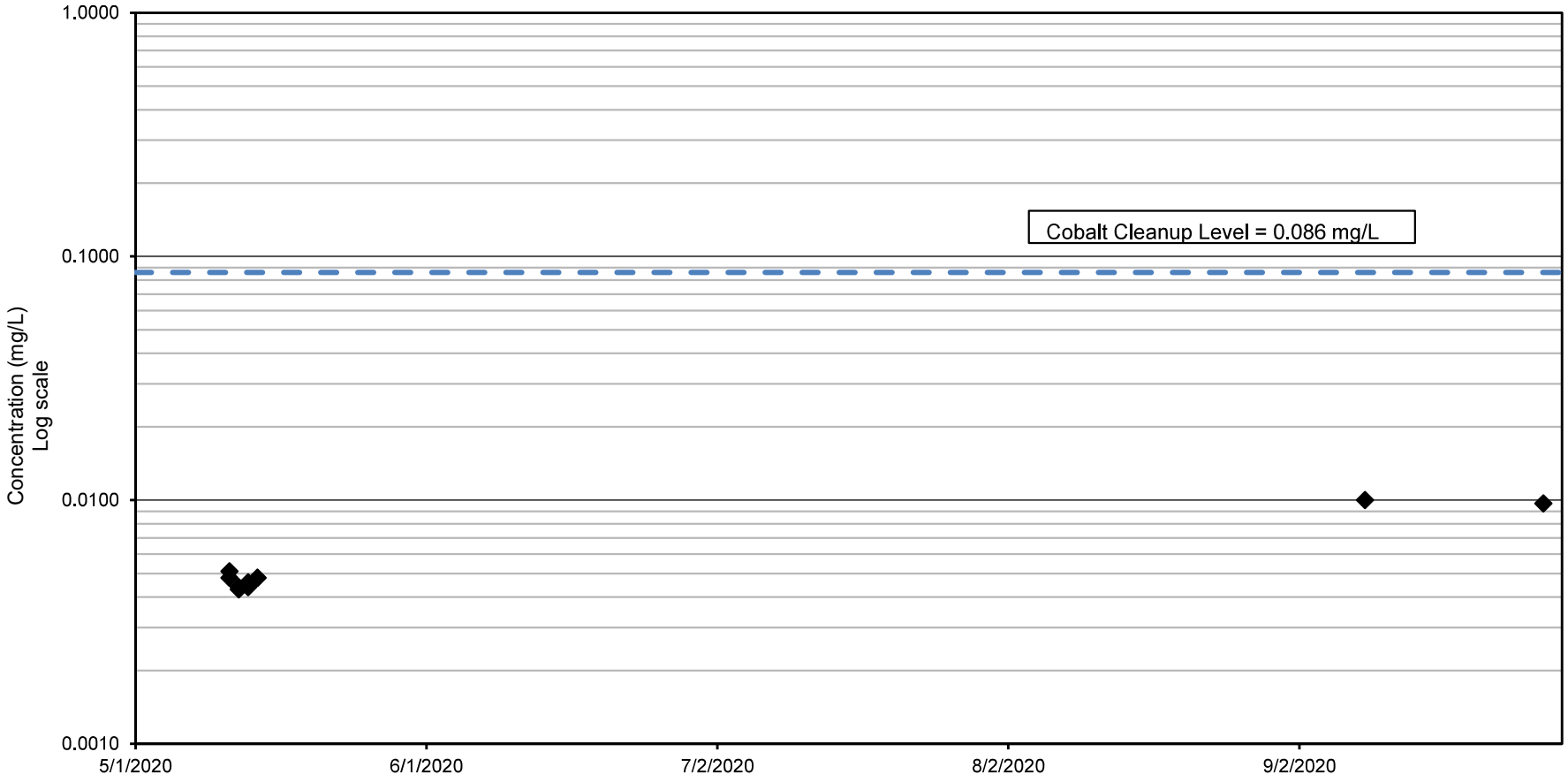
MEDIAN DISSOLVED COBALT CONCENTRATIONS AT PASW-04 AND PASW-04X, 1995 - 2020, LOW FLOW

BMSG/2020 Monitoring Report/ID

943-1595-011.3066

Fig 2.2s-u_DissvCo PASW-04 & PASW-04X_011221.xlsx

Golder Associates



Cobalt WQCL - Cobalt Water Quality Cleanup Level; A site-specific cobalt toxicity test program was conducted to determine the appropriate cobalt cleanup value for Blackbird Mine. After the conclusion of the toxicity testing, EPA selected a cobalt cleanup value of 86 ppb (0.86 mg/L). The BMSG disagrees and believes that the cleanup value based on the toxicity testing results should be 101 ppb cobalt. Because recent stream values have been below 86 ppb, EPA has advised the BMSG that it is not requesting response actions to address cobalt at this time.

GOLDER

LEGEND

- ◆ Co Conc
- Co Cleanup Level

FIGURE **2-2u**

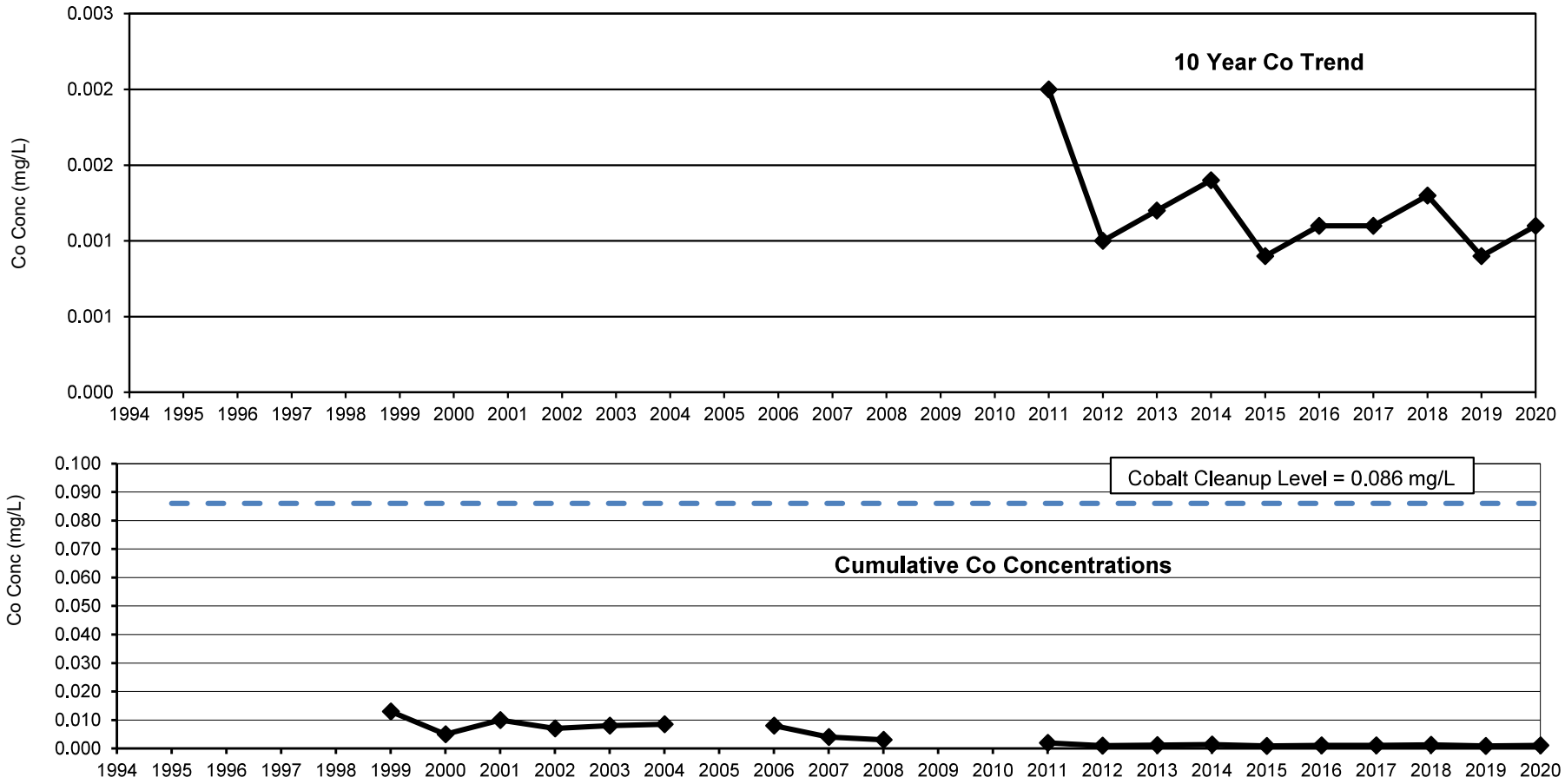
2020 DISSOLVED COBALT CONCENTRATIONS AT PASW-04X

BMSG/2020 Monitoring Report/ID

943-1595-011.3066

Fig 2.2s-u_DissvCo PASW-04 & PASW-04X_011221.xlsx

Golder Associates



Cobalt WQCL - Cobalt Water Quality Cleanup Level; A site-specific cobalt toxicity test program was conducted to determine the appropriate cobalt cleanup value for Blackbird Mine. After the conclusion of the toxicity testing, EPA selected a cobalt cleanup value of 86 ppb (0.86 mg/L). The BMSG disagrees and believes that the cleanup value based on the toxicity testing results should be 101 ppb cobalt. Because recent stream values have been below 86 ppb, EPA has advised the BMSG that it is not requesting response actions to address cobalt at this time.

GOLDER

LEGEND

- Co Conc
- Co Cleanup Level

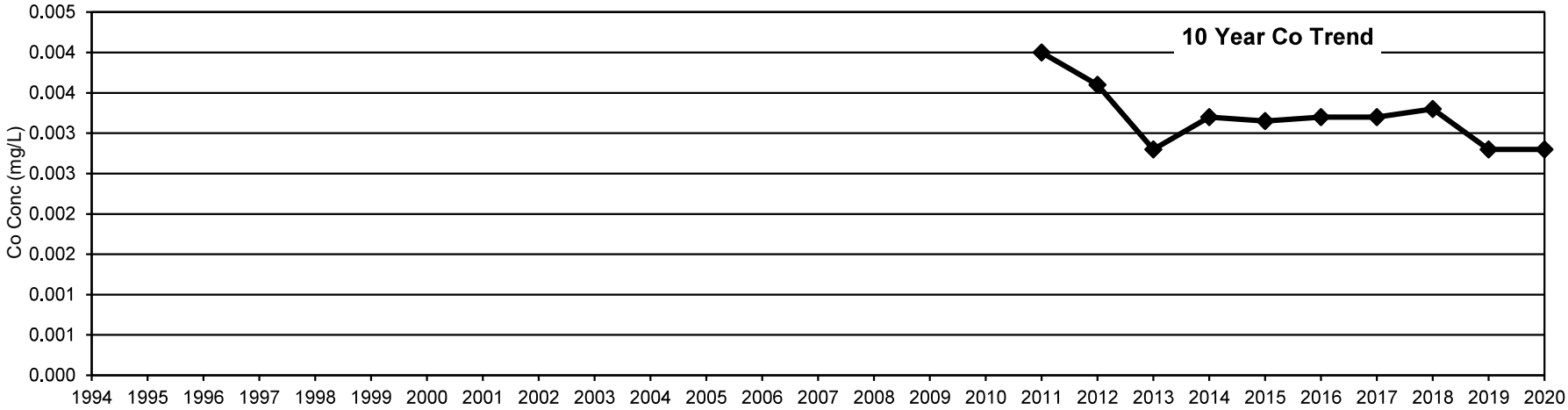
FIGURE **2-2v**

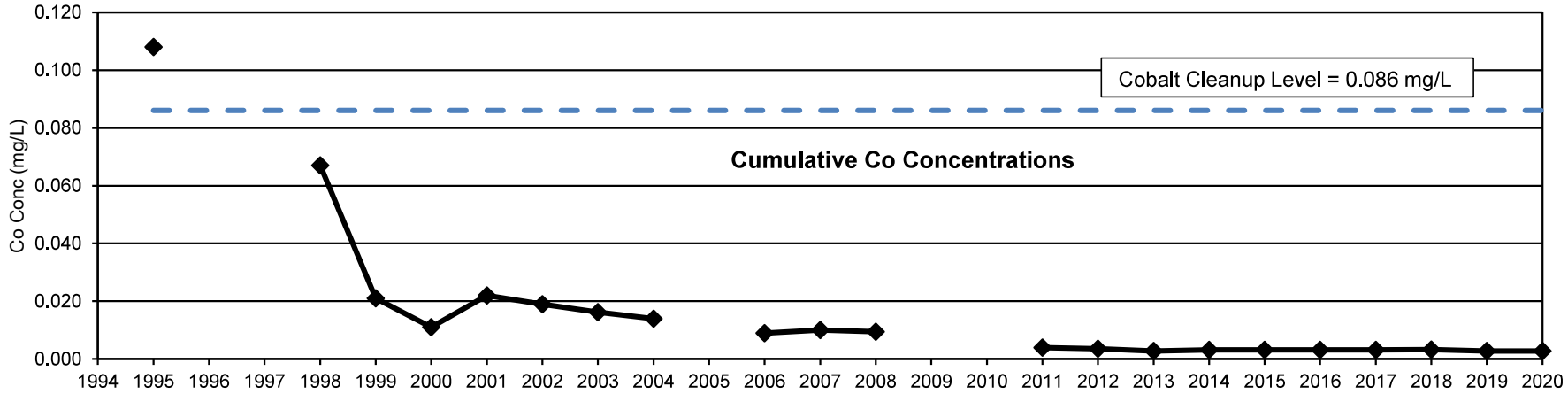
MEDIAN DISSOLVED COBALT CONCENTRATIONS AT BDSW-03, 1995 - 2020, HIGH FLOW

BMSG/2020 Monitoring Report/ID

943-1595-011.3066

Golder Associates





GOLDER

LEGEND

- Co Conc
- Co Cleanup Level

FIGURE **2-2w**

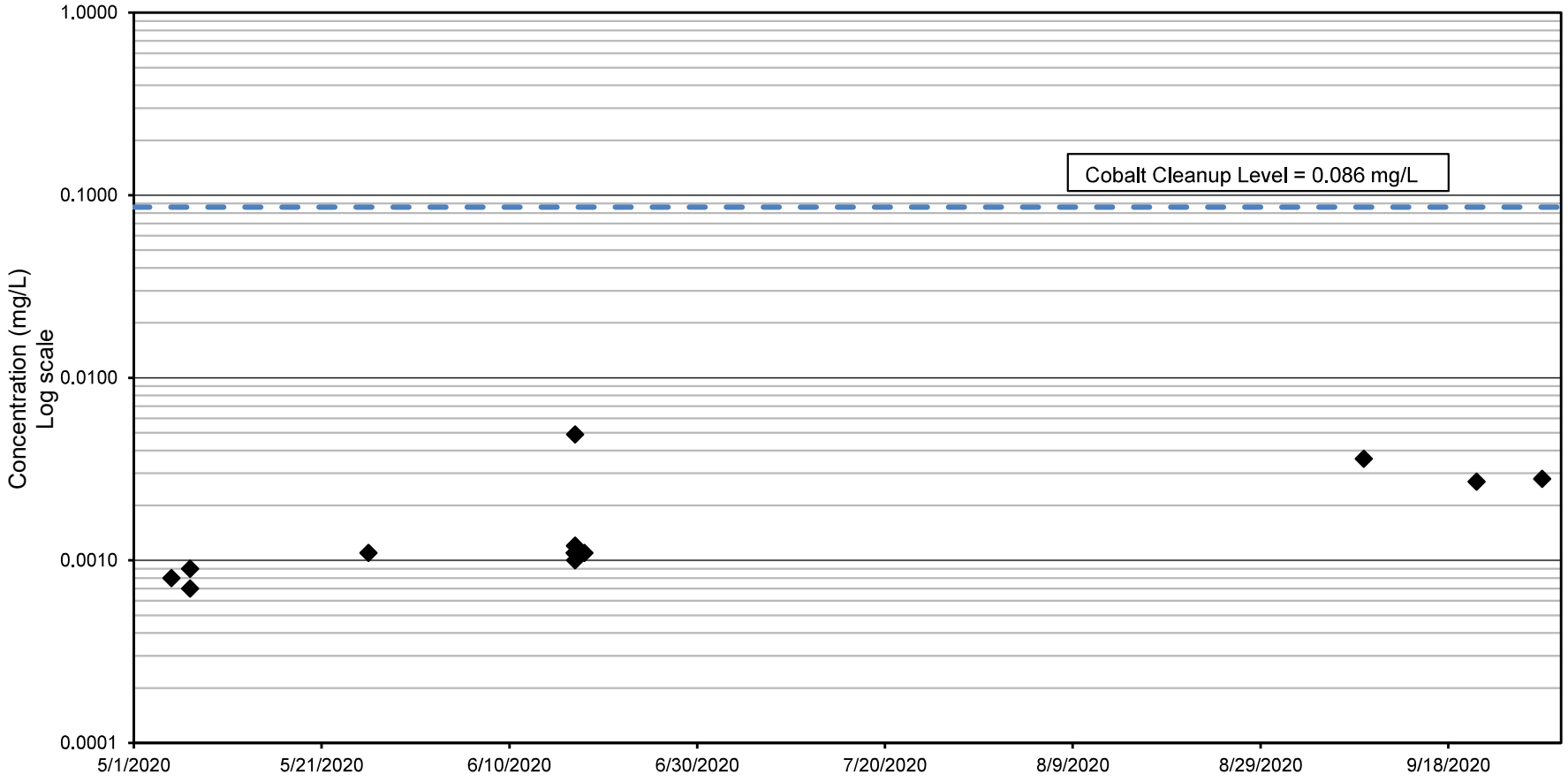
MEDIAN DISSOLVED COBALT CONCENTRATIONS AT BDSW-03, 1995 - 2020, LOW FLOW

BMSG/2020 Monitoring Report/ID

943-1595-011.3066

Fig 2.2v-x_DissvCo BDSW-03_011321.xlsx

Golder Associates



Cobalt WQCL - Cobalt Water Quality Cleanup Level; A site-specific cobalt toxicity test program was conducted to determine the appropriate cobalt cleanup value for Blackbird Mine. After the conclusion of the toxicity testing, EPA selected a cobalt cleanup value of 86 ppb (0.86 mg/L). The BMSG disagrees and believes that the cleanup value based on the toxicity testing results should be 101 ppb cobalt. Because recent stream values have been below 86 ppb, EPA has advised the BMSG that it is not requesting response actions to address cobalt at this time.

GOLDER

LEGEND

- ◆ Co Conc
- Co Cleanup Level

FIGURE **2-2x**

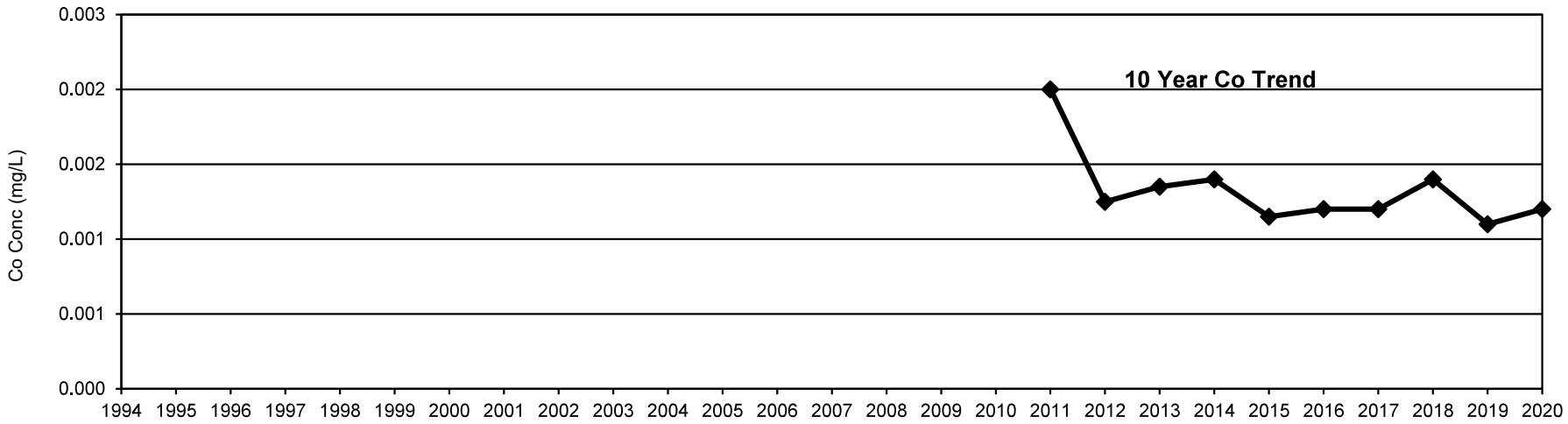
2020 DISSOLVED COBALT CONCENTRATIONS AT BDSW-03

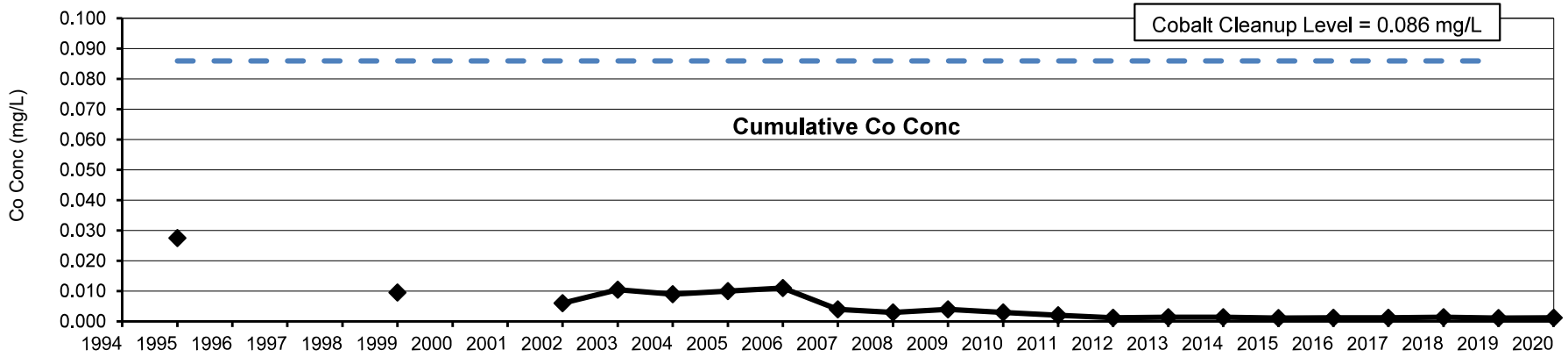
BMSG/2020 Monitoring Report/ID

943-1595-011.3066

Fig 2.2v-x_DissvCo BDSW-03_011321.xlsx

Golder Associates





Cobalt WQCL - Cobalt Water Quality Cleanup Level; A site-specific cobalt toxicity test program was conducted to determine the appropriate cobalt cleanup value for Blackbird Mine. After the conclusion of the toxicity testing, EPA selected a cobalt cleanup value of 86 ppb (0.86 mg/L). The BMSG disagrees and believes that the cleanup value based on the toxicity testing results should be 101 ppb cobalt. Because recent stream values have been below 86 ppb, EPA has advised the BMSG that it is not requesting response actions to address cobalt at this time.

GOLDER

LEGEND

- Co Conc
- Co Cleanup Level

FIGURE **2-2y**

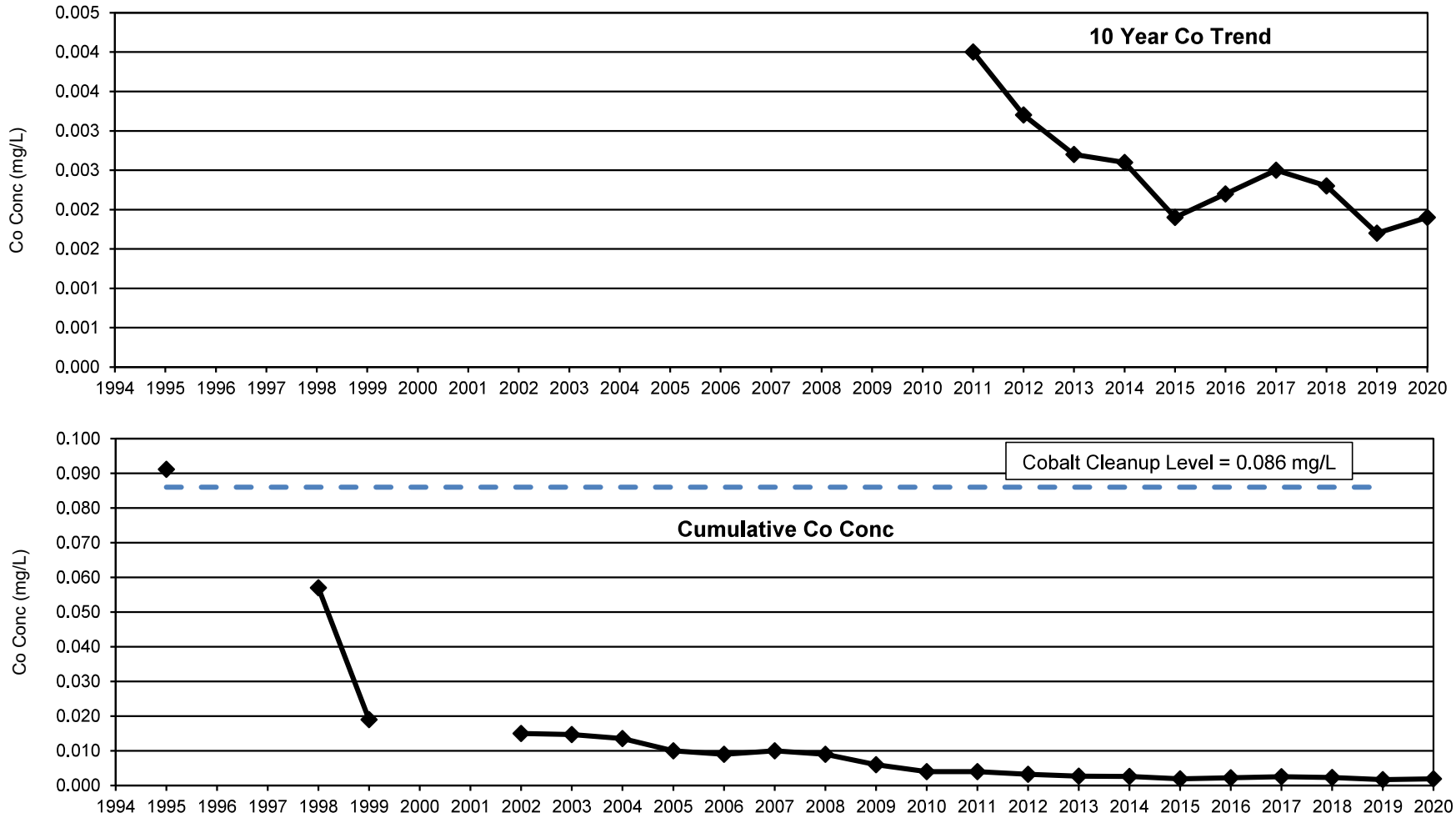
MEDIAN DISSOLVED COBALT CONCENTRATIONS AT BDSW-01, 1995 - 2020, HIGH FLOW

BMSG/2020 Monitoring Report/ID

943-1595-011.3066

Fig 2.2y-aa_DissvCo BDSW-01_011321.xlsx

Golder Associates



GOLDER

LEGEND

- Co Conc
- Co Cleanup Level

FIGURE **2-2z**

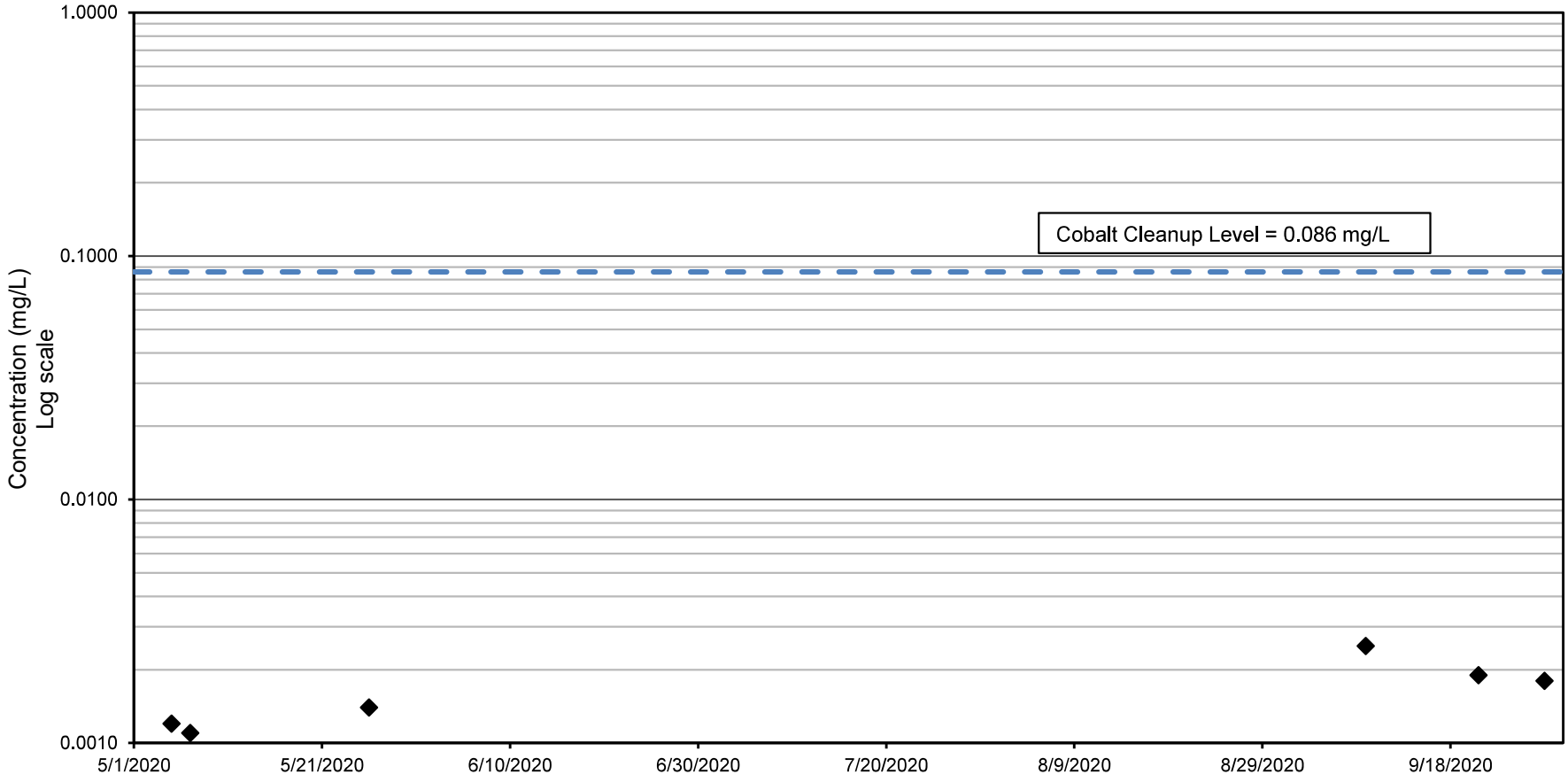
MEDIAN DISSOLVED COBALT CONCENTRATIONS AT BDSW-01, 1995 - 2020, LOW FLOW

BMSG/2020 Monitoring Report/ID

943-1595-011.3066

Fig 2.2y-aa_DissvCo BDSW-01_011321.xlsx

Golder Associates



Cobalt WQCL - Cobalt Water Quality Cleanup Level; A site-specific cobalt toxicity test program was conducted to determine the appropriate cobalt cleanup value for Blackbird Mine. After the conclusion of the toxicity testing, EPA selected a cobalt cleanup value of 86 ppb (0.86 mg/L). The BMSG disagrees and believes that the cleanup value based on the toxicity testing results should be 101 ppb cobalt. Because recent stream values have been below 86 ppb, EPA has advised the BMSG that it is not requesting response actions to address cobalt at this time.

GOLDER

LEGEND

- ◆ Co Conc
- Co Cleanup Level

FIGURE **2-2aa**

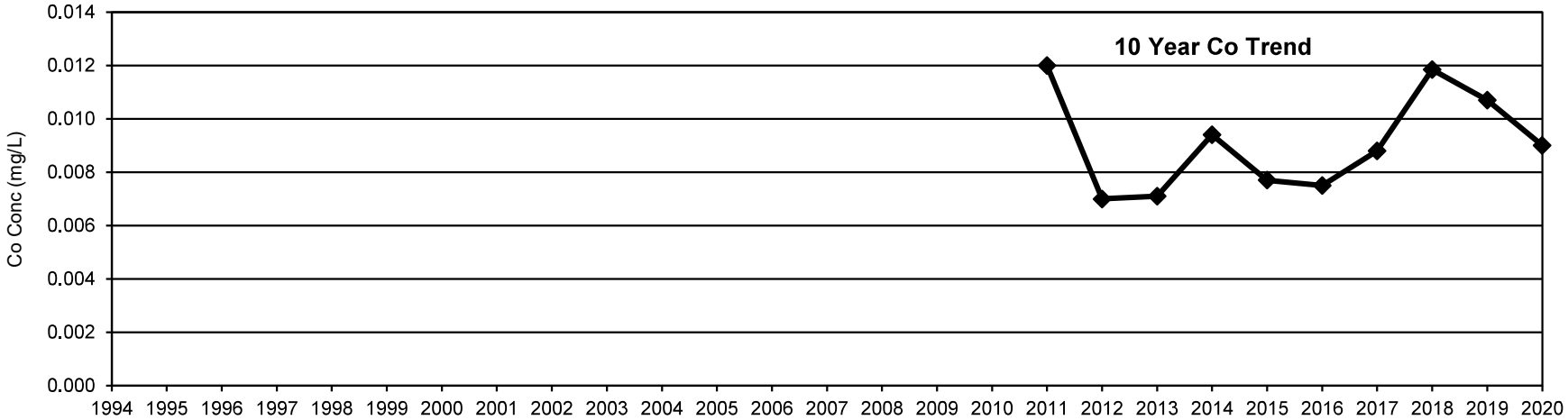
2020 DISSOLVED COBALT CONCENTRATIONS AT BDSW-01

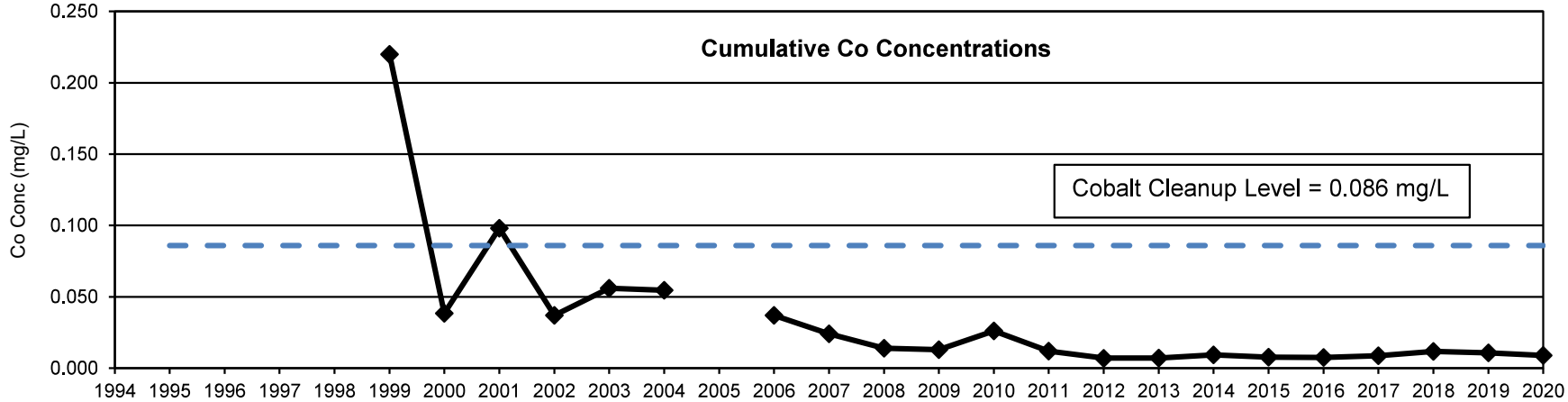
BMSG/2020 Monitoring Report/ID

943-1595-011.3066

Fig 2.2y-aa_DissvCo BDSW-01_011321.xlsx

Golder Associates





Cobalt WQCL - Cobalt Water Quality Cleanup Level; A site-specific cobalt toxicity test program was conducted to determine the appropriate cobalt cleanup value for Blackbird Mine. After the conclusion of the toxicity testing, EPA selected a cobalt cleanup value of 86 ppb (0.86 mg/L). The BMSG disagrees and believes that the cleanup value based on the toxicity testing results should be 101 ppb cobalt. Because recent stream values have been below 86 ppb, EPA has advised the BMSG that it is not requesting response actions to address cobalt at this time.

GOLDER

LEGEND

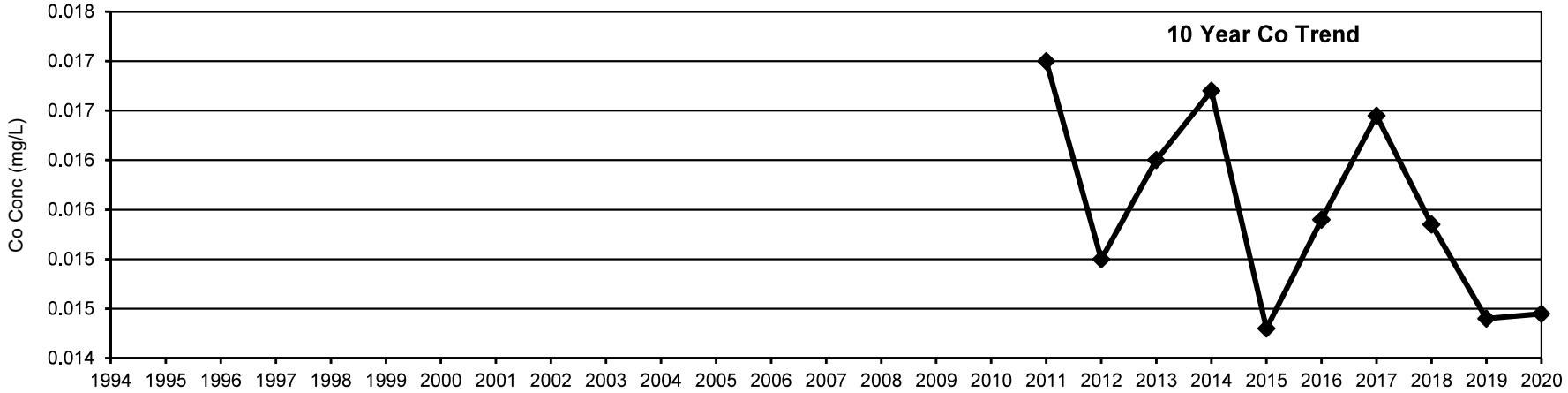
- Co Conc
- Co Cleanup Level

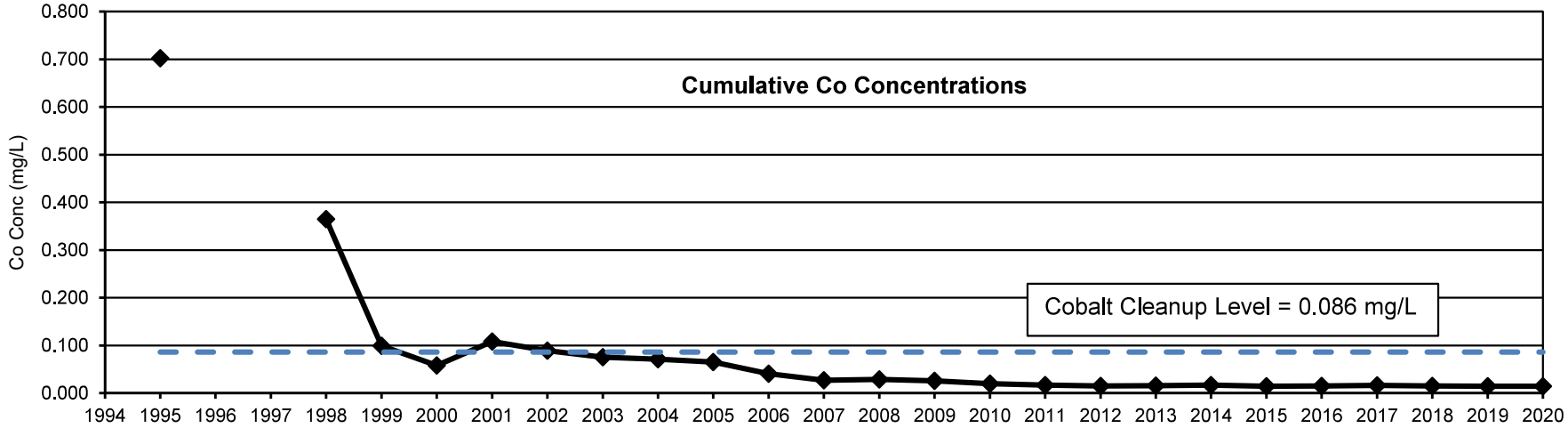
FIGURE **2-2ab**

MEDIAN DISSOLVED COBALT CONCENTRATIONS AT SFSW-01, 1995 - 2020, HIGH FLOW

BMSG/2020 Monitoring Report/ID

943-1595-011.3066





Cobalt WQCL - Cobalt Water Quality Cleanup Level; A site-specific cobalt toxicity test program was conducted to determine the appropriate cobalt cleanup value for Blackbird Mine. After the conclusion of the toxicity testing, EPA selected a cobalt cleanup value of 86 ppb (0.86 mg/L). The BMSG disagrees and believes that the cleanup value based on the toxicity testing results should be 101 ppb cobalt. Because recent stream values have been below 86 ppb, EPA has advised the BMSG that it is not requesting response actions to address cobalt at this time.

GOLDER

LEGEND

- Co Conc
- Co Cleanup Level

FIGURE **2-2ac**

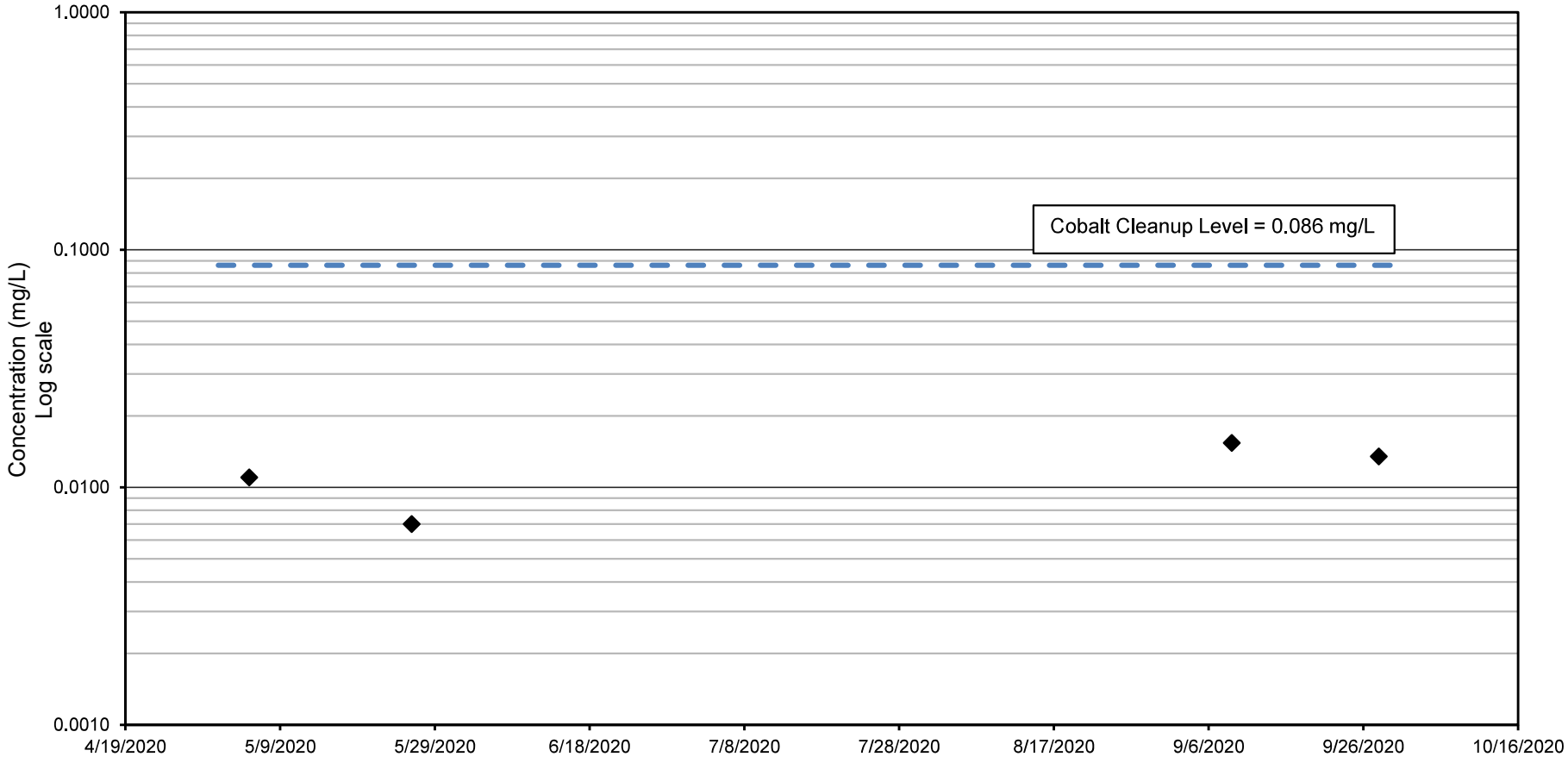
MEDIAN DISSOLVED COBALT CONCENTRATIONS AT SFSW-01, 1995 - 2020, LOW FLOW

BMSG/2020 Monitoring Report/ID

943-1595-011.3066

Fig 2.2ab-ad_DissvCo SFSW-01_011321.xlsx

Golder Associates



Cobalt WQCL - Cobalt Water Quality Cleanup Level; A site-specific cobalt toxicity test program was conducted to determine the appropriate cobalt cleanup value for Blackbird Mine. After the conclusion of the toxicity testing, EPA selected a cobalt cleanup value of 86 ppb (0.86 mg/L). The BMSG disagrees and believes that the cleanup value based on the toxicity testing results should be 101 ppb cobalt. Because recent stream values have been below 86 ppb, EPA has advised the BMSG that it is not requesting response actions to address cobalt at this time.

GOLDER

LEGEND

- ◆ Co Conc
- Co Cleanup Level

FIGURE **2-2ad**

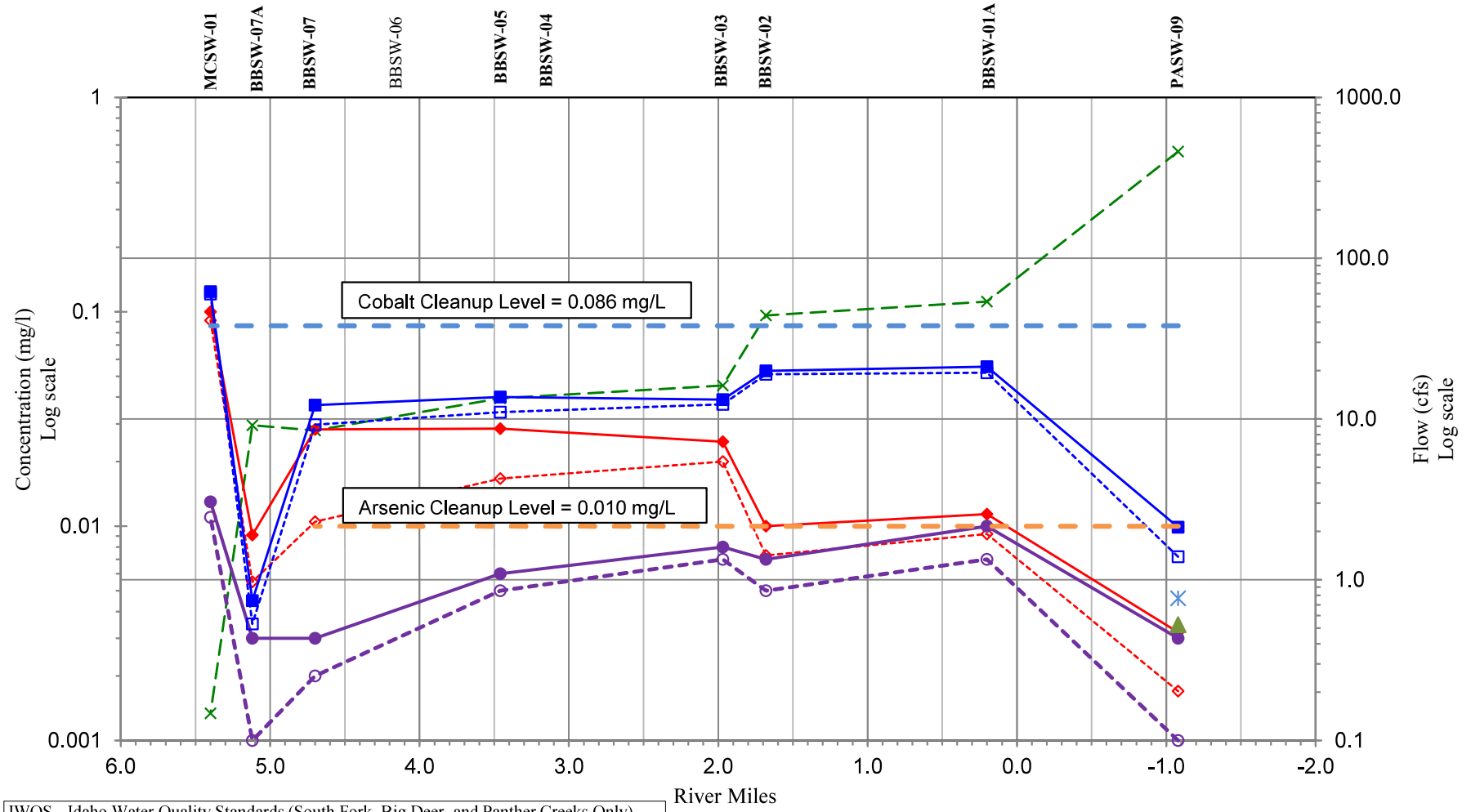
2020 DISSOLVED COBALT CONCENTRATIONS AT SFSW-01

BMSG/2020 Monitoring Report/ID

943-1595-011.3066

Fig 2.2ab-ad_DissvCo SFSW-01_011321.xlsx

Golder Associates



IWQS - Idaho Water Quality Standards (South Fork, Big Deer, and Panther Creeks Only)
CCC - "Criteria Continuous Concentration" for copper (chronic criteria)
CMC - "Criteria Maximum Concentration" for copper (acute criteria)

Notes: 1.The dissolved concentrations of some metals (i.e. cobalt) are often higher than the total concentrations. This is likely due to the fact that the metals are present almost entirely in the dissolved form and the lower total metals are due to matrix effects.
2. MCSW-01 is located on Meadow Creek, a tributary to Blackbird Creek.

LEGEND

- Flow (cfs)
- IWQS CCC
- IWQS CMC
- As (tot)
- As (dis)
- Co (dis) Cleanup Level
- Cu (tot)
- Cu (dis)
- Co (tot)
- Co (dis)
- As (tot) Cleanup Level

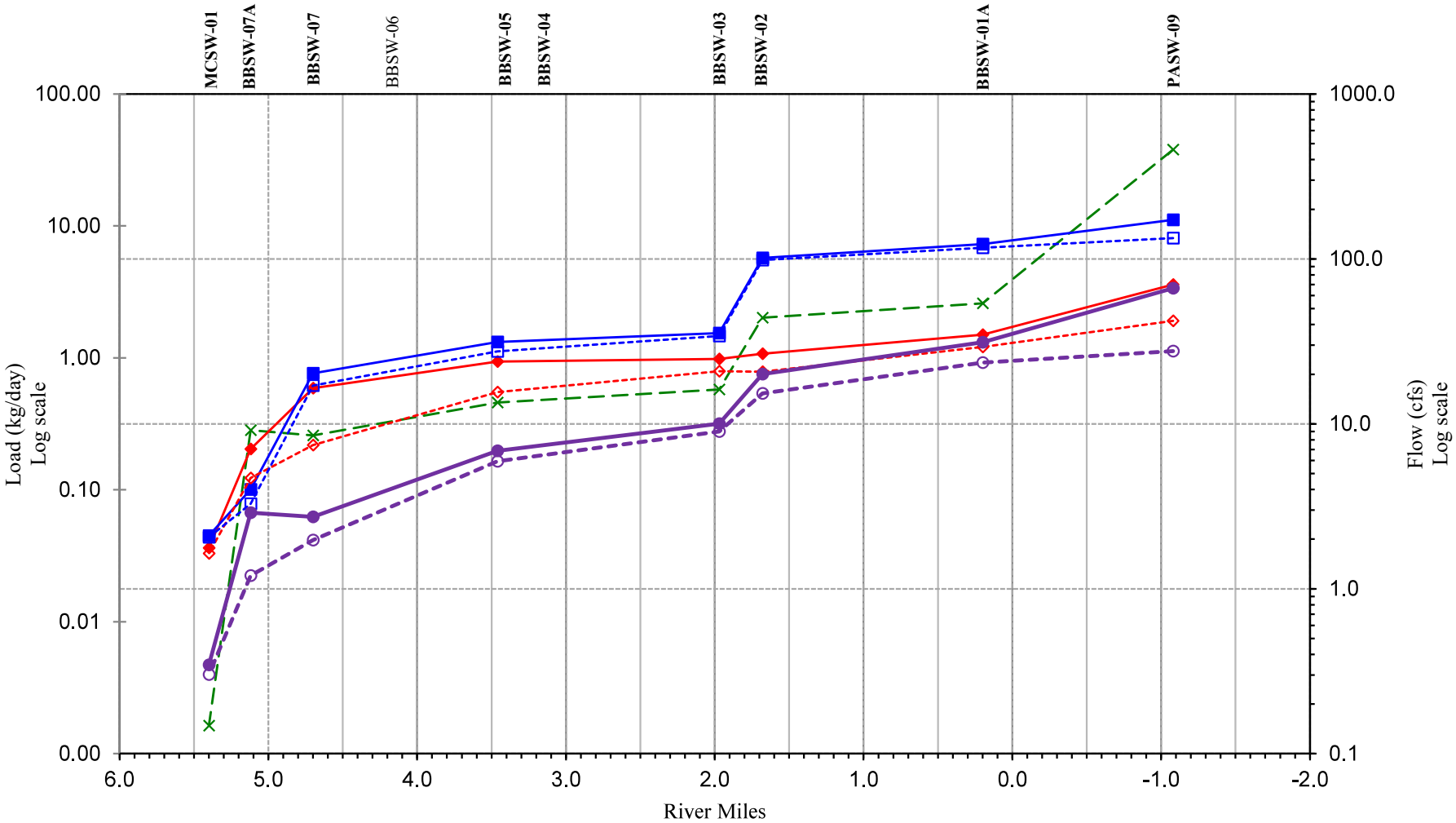
GOLDER

FIGURE **2-4.1a**

MAY 12, 2020 BLACKBIRD / PANTHER CREEK SYNOPTIC, COPPER, COBALT, AND ARSENIC CONCENTRATIONS

BMSG/2020 Monitoring Report/ID

943-1595-011.3066



Note: 1. MCSW-01 is located on Meadow Creek, a tributary to Blackbird Creek.

LEGEND

- Flow (cfs)
- Co (tot)
- Co (dis)
- As (dis)
- Cu (tot)
- Cu (dis)
- As (tot)

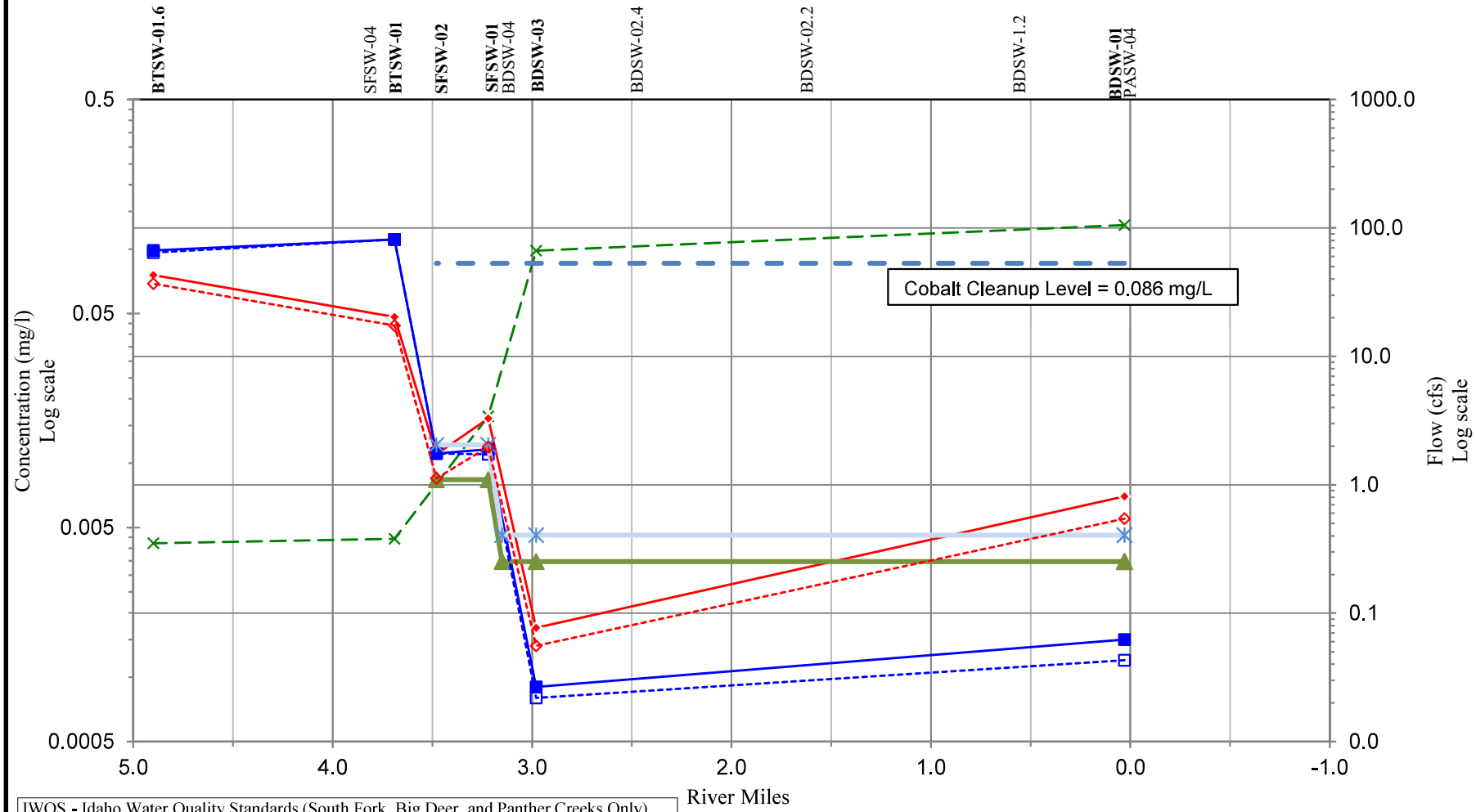
GOLDER

FIGURE **2-4.1b**

MAY 12, 2020 BLACKBIRD / PANTHER CREEK SYNOPTIC, COPPER, COBALT, AND ARSENIC LOADING

BMSG/2020 Monitoring Report/ID

943-1595-011.3066



IWQS - Idaho Water Quality Standards (South Fork, Big Deer, and Panther Creeks Only)
CCC - "Criteria Continuous Concentration" for copper (chronic criteria)
CMC - "Criteria Maximum Concentration" for copper (acute criteria)

Note: The dissolved concentrations of some metals (i.e. cobalt) are often higher than the total concentrations. This is likely due to the fact that the metals are present almost entirely in the dissolved form and the lower total metals are due to matrix effects.

LEGEND

- Flow (cfs)
- Co (tot)
- Co (dis)
- Cu (dis)
- Cu (tot)
- IWQS CCC
- IWQS CMC
- Co (diss) Clean Up Level

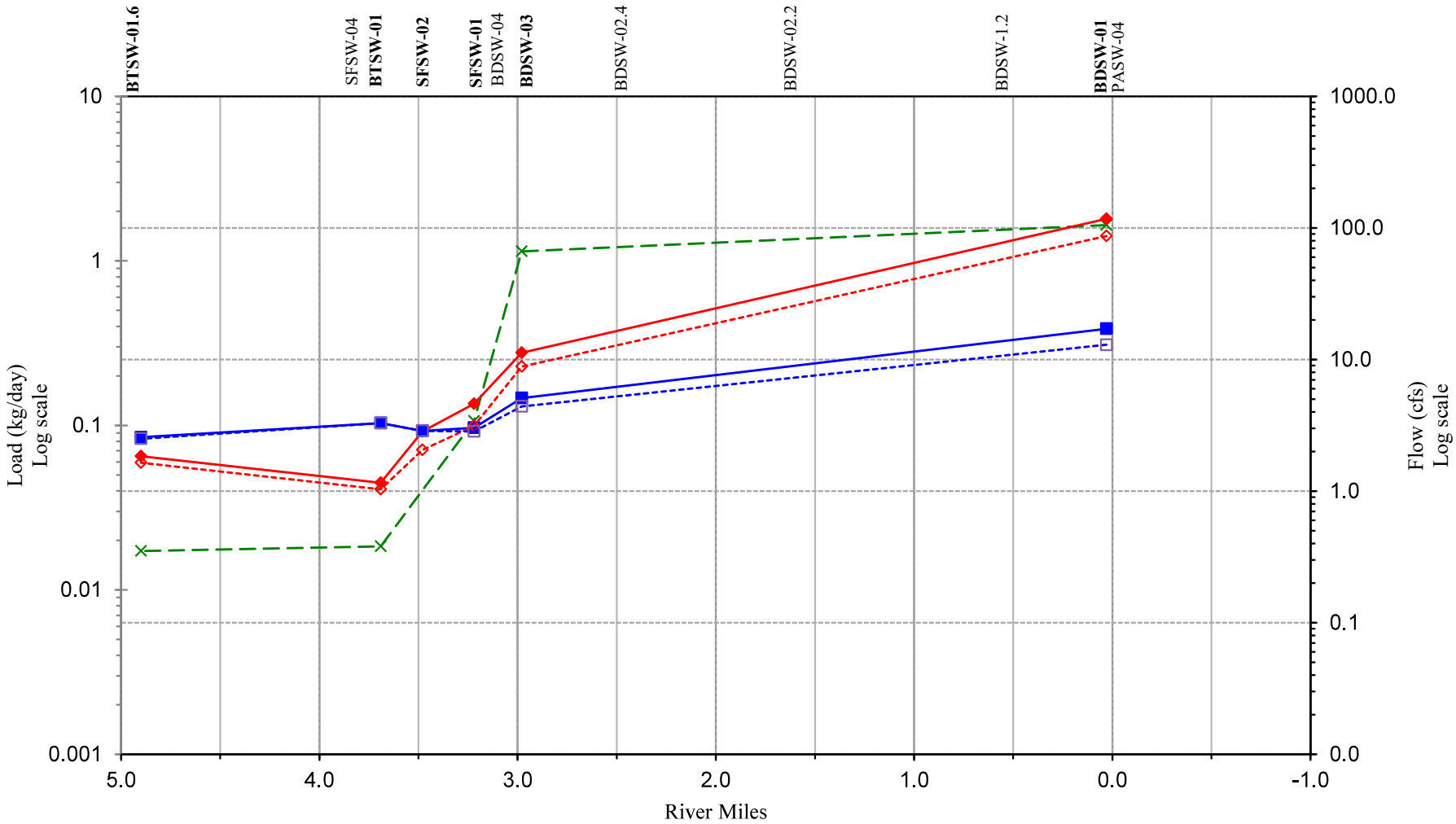
GOLDER

FIGURE **2-4.2a**

MAY 5, 2020 BUCKTAIL / SOUTH FORK BIG DEER / BIG DEER CREEK SYNOPTIC, COPPER AND COBALT CONCENTRATIONS

BMSG/2020 Monitoring Report/ID

943-1595-011.3066



Note: 1. Loads at SFSW-02 are calculated using flows at SFSW-02.
2. Loads at BDSW-01 are calculated using flows at BDSW-03.

LEGEND

- Flow (cfs)
- Cu (tot)
- Co (tot)
- Cu (dis)
- Co (dis)

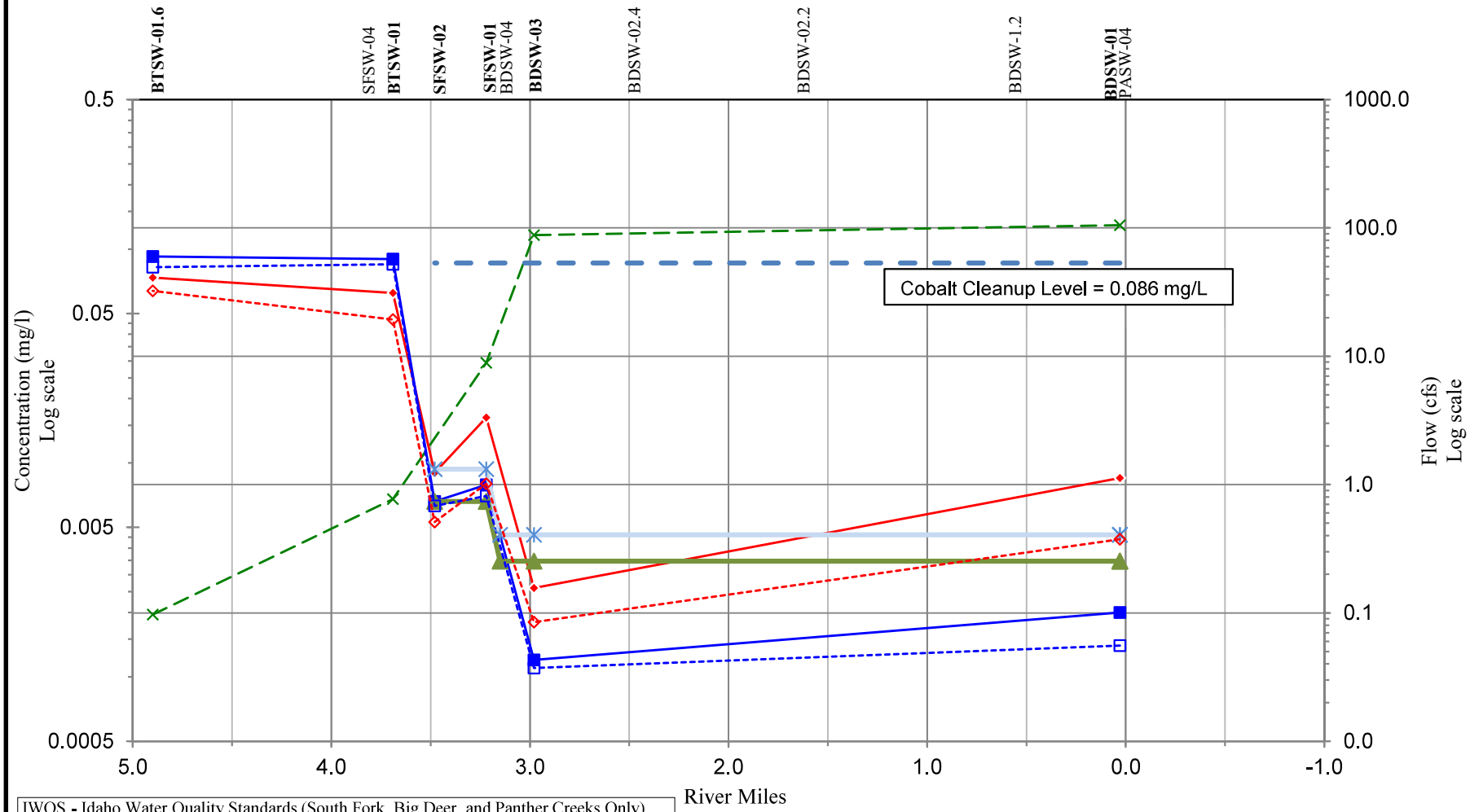
GOLDER

FIGURE **2-4.2b**

MAY 5, 2020 BUCKTAIL / SOUTH FORK BIG DEER / BIG DEER CREEK SYNOPTIC, COPPER AND COBALT LOADING

BMSG/2020 Monitoring Report/ID

943-1595-011.3066



IWQS - Idaho Water Quality Standards (South Fork, Big Deer, and Panther Creeks Only)
CCC - "Criteria Continuous Concentration" for copper (chronic criteria)
CMC - "Criteria Maximum Concentration" for copper (acute criteria)

Note: The dissolved concentrations of some metals (i.e. cobalt) are often higher than the total concentrations. This is likely due to the fact that the metals are present almost entirely in the dissolved form and the lower total metals are due to matrix effects.

LEGEND

- Flow (cfs)
- Co (tot)
- Co (dis)
- Cu (dis)
- Cu (tot)
- IWQS CCC
- IWQS CMC
- Co (diss) Clean Up Level

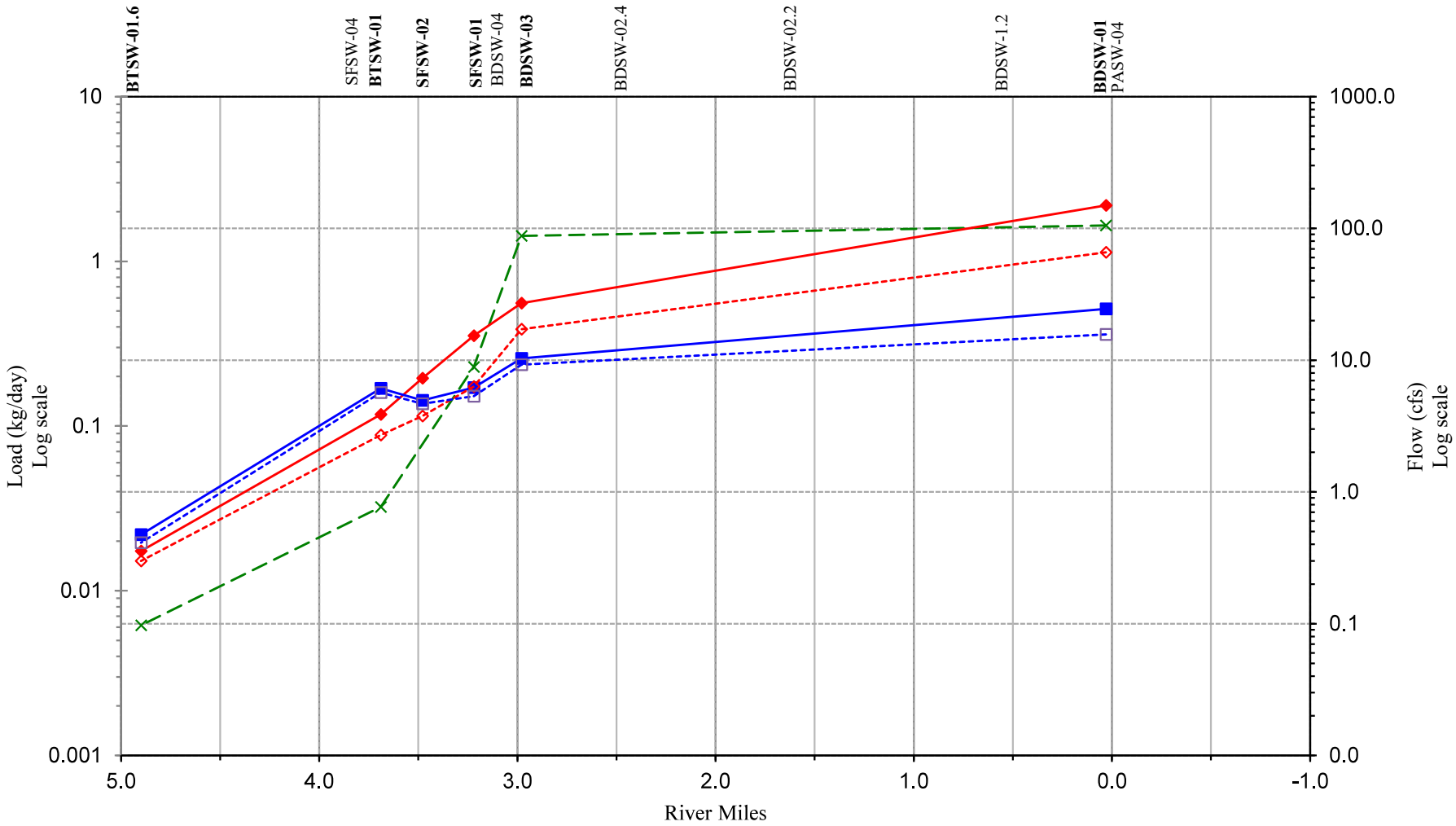
GOLDER

FIGURE **2-4.2c**

MAY 26, 2020 BUCKTAIL / SOUTH FORK BIG DEER / BIG DEER CREEK SYNOPTIC, COPPER AND COBALT CONCENTRATIONS

BMSG/2020 Monitoring Report/ID

943-1595-011.3066



Note: 1. Loads at SFSW-02 are calculated using flows at SFSW-02.
2. Loads at BDSW-01 are calculated using flows at BDSW-03.

LEGEND

- Flow (cfs)
- Co (tot)
- Co (dis)
- Cu (tot)
- Cu (dis)

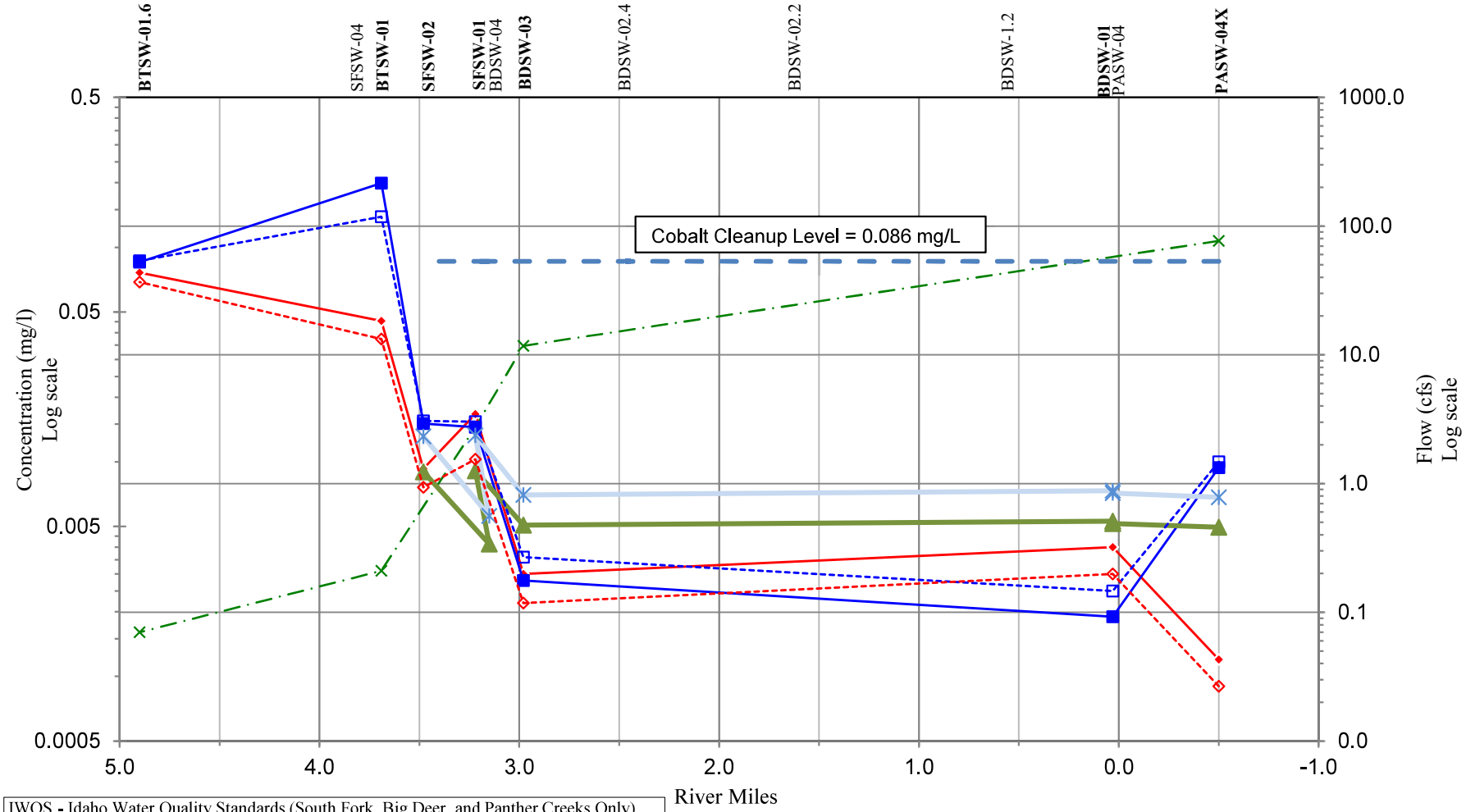
GOLDER

FIGURE **2-4.2d**

MAY 26, 2020 BUCKTAIL / SOUTH FORK BIG DEER / BIG DEER CREEK SYNOPTIC, COPPER AND COBALT LOADING

BMSG/2020 Monitoring Report/ID

943-1595-011.3066



IWQS - Idaho Water Quality Standards (South Fork, Big Deer, and Panther Creeks Only)
CCC - "Criteria Continuous Concentration" for copper (chronic criteria)
CMC - "Criteria Maximum Concentration" for copper (acute criteria)

Note: The dissolved concentrations of some metals (i.e. cobalt) are often higher than the total concentrations. This is likely due to the fact that the metals are present almost entirely in the dissolved form and the lower total metals are due to matrix effects.

LEGEND

- Flow (cfs)
- Co (tot)
- Co (dis)
- Cu (dis)
- Cu (tot)
- IWQS CCC
- IWQS CMC
- Co (diss) Clean Up Level

GOLDER

FIGURE **2-4.3a**

SEPTEMBER 9, 2020 BUCKTAIL / SOUTH FORK BIG DEER / BIG DEER CREEK SYNOPTIC, COPPER AND COBALT CONCENTRATIONS

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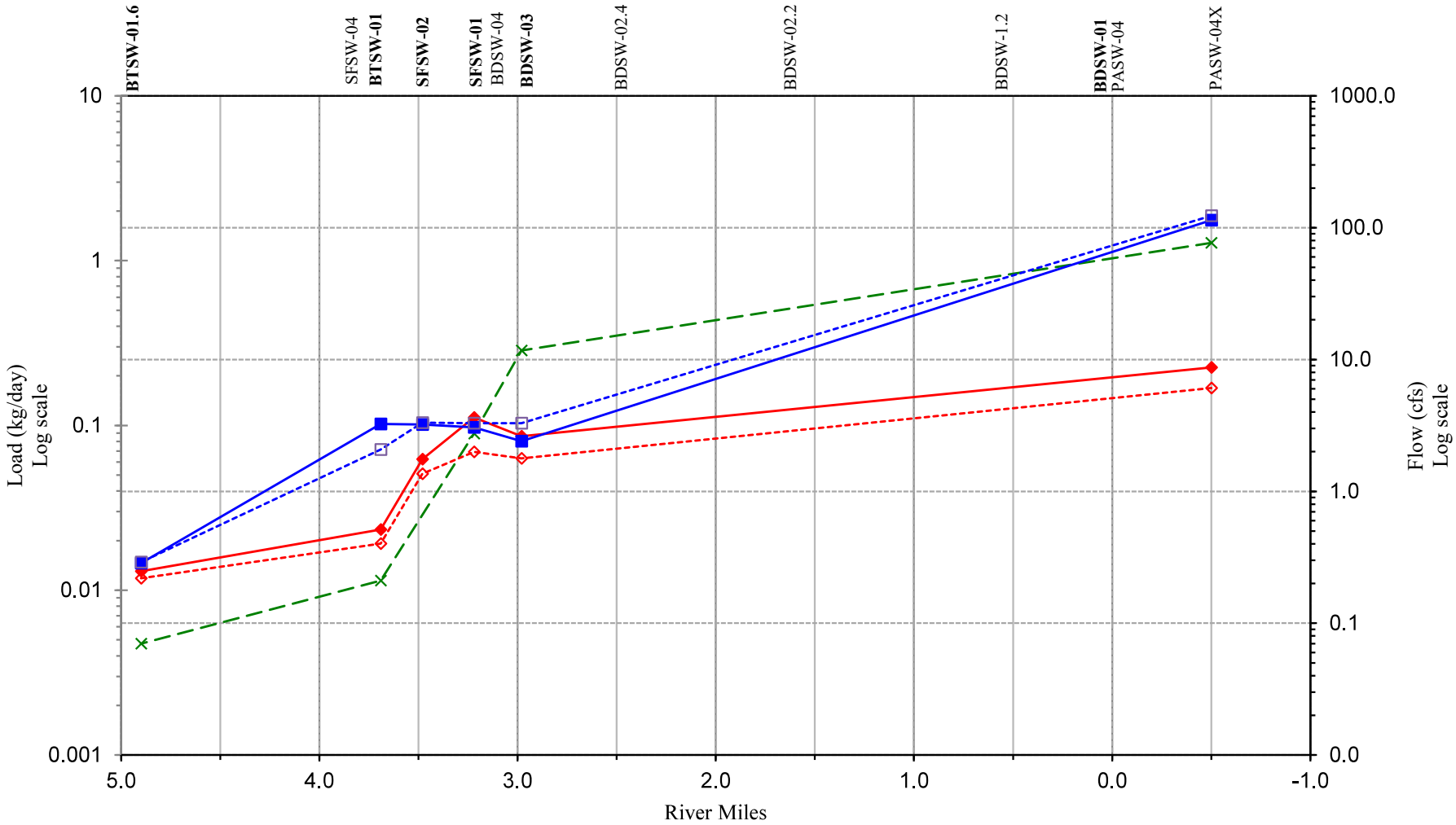

Note: 1. Loads at SFSW-02 are calculated using flows at SFSW-02.
2. Loads at BDSW-01 are calculated using flows at BDSW-03.

LEGEND

- Flow (cfs)
- Co (tot)
- Co (dis)
- Cu (tot)
- Cu (dis)

GOLDER

FIGURE **2-4.3b**

SEPTEMBER 9, 2020 BUCKTAIL / SOUTH FORK BIG DEER / BIG DEER CREEK SYNOPTIC, COPPER AND COBALT LOADING

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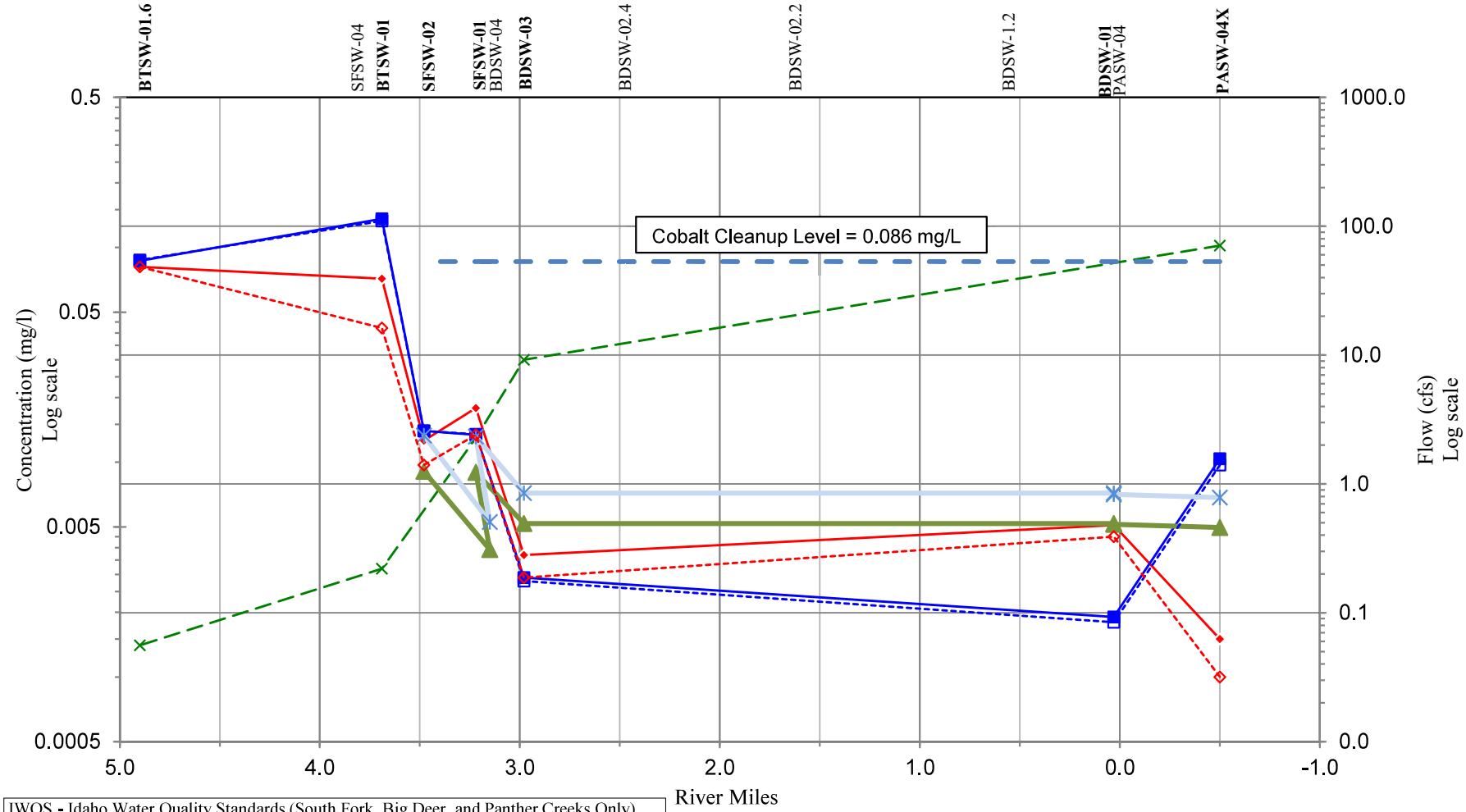
943-1595-011.3066



IWQS - Idaho Water Quality Standards (South Fork, Big Deer, and Panther Creeks Only)
CCC - "Criteria Continuous Concentration" for copper (chronic criteria)
CMC - "Criteria Maximum Concentration" for copper (acute criteria)

Note: The dissolved concentrations of some metals (i.e. cobalt) are often higher than the total concentrations. This is likely due to the fact that the metals are present almost entirely in the dissolved form and the lower total metals are due to matrix effects.

LEGEND

- Flow (cfs)
- Co (tot)
- Co (dis)
- Cu (dis)
- Cu (tot)
- IWQS CCC
- IWQS CMC
- Co (diss) Clean Up Level

GOLDER

FIGURE **2-4.3c**

SEPTEMBER 28, 2020 BUCKTAIL / SOUTH FORK BIG DEER / BIG DEER CREEK SYNOPTIC, COPPER AND COBALT CONCENTRATIONS

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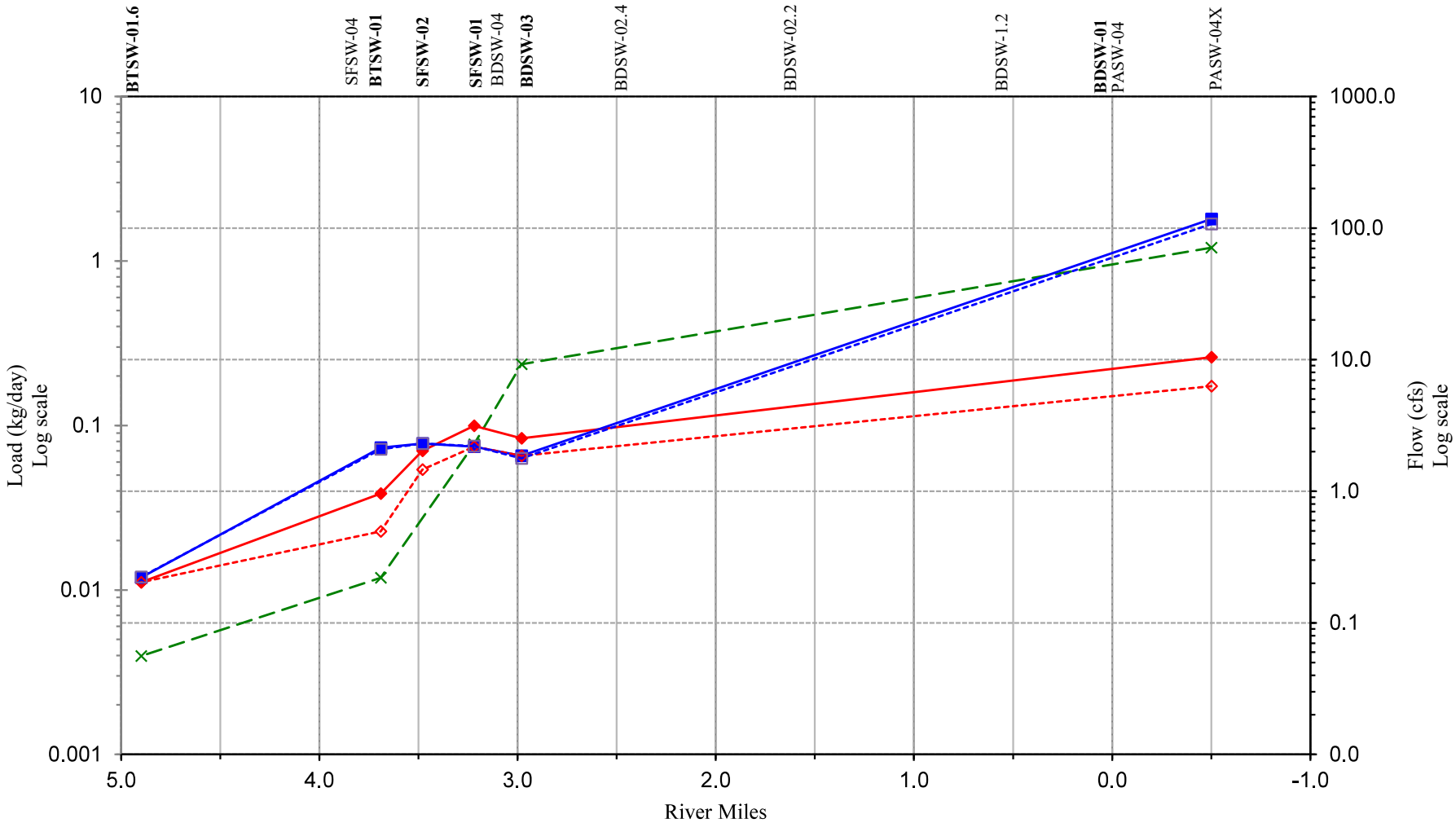
943-1595-011.3066



Note: 1. Loads at SFSW-02 are calculated using flows at SFSW-02.
2. Loads at BDSW-01 are calculated using flows at BDSW-03.

LEGEND

- Flow (cfs)
- Cu (tot)
- Co (tot)
- Cu (dis)
- Co (dis)

GOLDER

FIGURE **2-4.3d**

SEPTEMBER 28, 2020 BUCKTAIL / SOUTH FORK BIG DEER / BIG DEER CREEK SYNOPTIC, COPPER AND COBALT LOADING

BMSG/2020 Monitoring Report/ID

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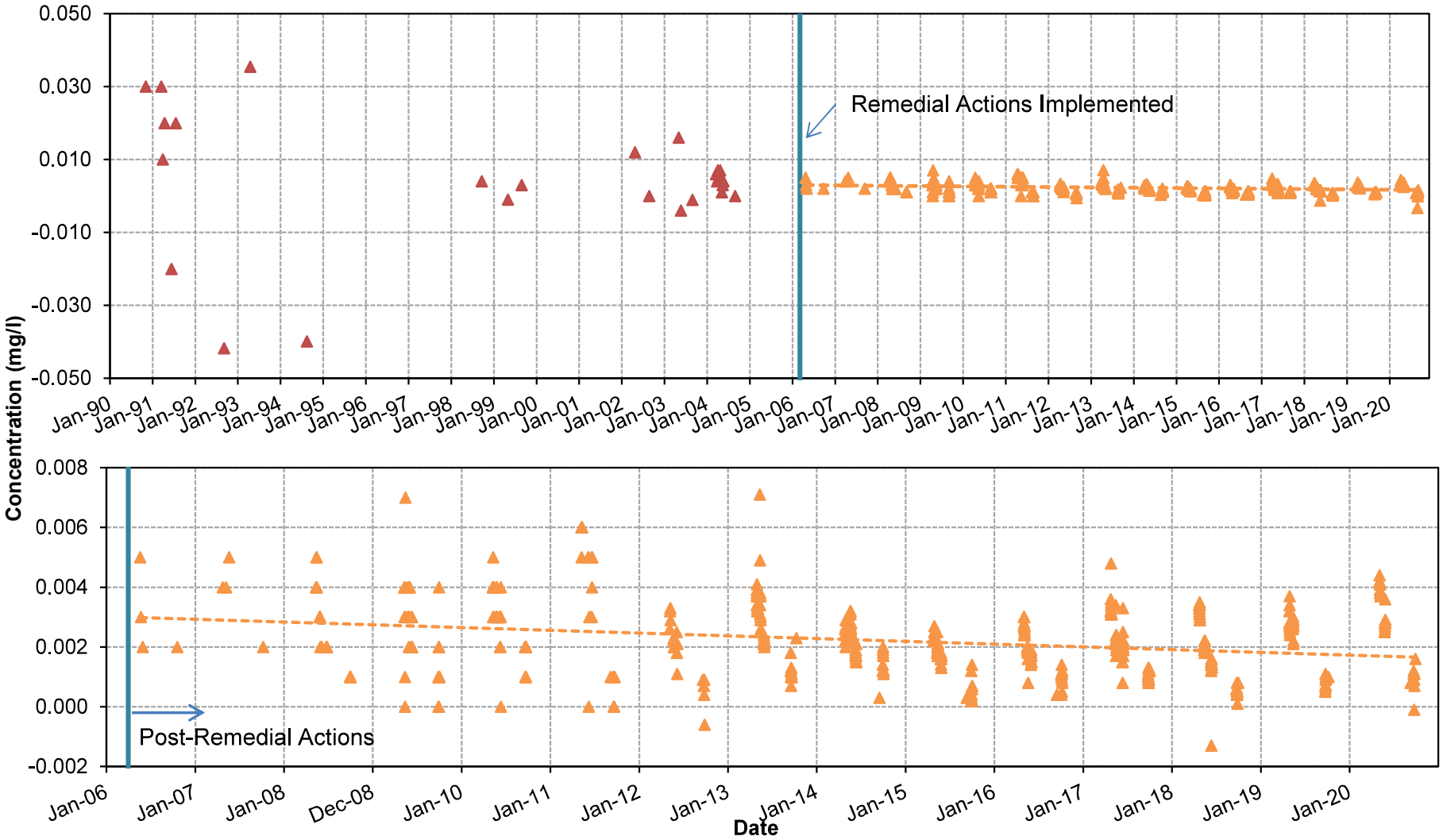

GOLDER

LEGEND

- Remedial Action Implementation (2006)
- Dissolved Copper After Remedial Actions
- Dissolved Copper Before Remedial Actions
- Linear (Dissolved Copper After Remedial Actions)

FIGURE **2-7**

CHANGE IN COPPER CONCENTRATIONS ON BIG DEER CREEK (BDSW-01 – BDSW-03), HISTORICAL VS. POST-REMEDIAL ACTION (2006 - 2020)

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LEGEND

- GROUNDWATER MONITORING WELL LOCATIONS (APPROXIMATE)
- GROUNDWATER EXTRACTION WELL LOCATIONS
- SURFACE WATER SAMPLING LOCATIONS (APPROXIMATE)
- GROUNDWATER MONITORING (HISTORIC) WELL LOCATIONS (APPROXIMATE)

NOTE(S)

1. HORIZONTAL DATUM: STATE PLANE COORDINATE SYSTEM IDAHO CENTRAL ZONE, NAD83/91, US FEET.
2. VERTICAL DATUM: NORTH AMERICAN VERTICAL DATUM 1988 (NAVD88).
3. FIGURES WERE ORIGINALLY PRODUCED IN THE BLACKBIRD MINE SITE LOCAL MINE DATUM AND UNDERWENT TRANSFORMATION TO STATE PLANE COORDINATE SYSTEM FOR THIS REVISION).
4. AERIAL IMAGERY WAS GATHERED IN CONJUNCTION WITH LIDAR AND IS DATED 2012-08-05.
5. HGSW-03 IS LOCATED ABOVE THE PORTAL IN THE HAWKEYE GULCH NORTH OF HGSW-02.

0 50 100
1" = 50' FEET

CLIENT
BLACKBIRD MINE SITE GROUP

PROJECT
BLACKBIRD MINE
2020 MONITORING REPORT
LEMHI COUNTY, IDAHO

TITLE
MONITORING WELL SAMPLING LOCATIONS IN UPPER BLACKBIRD CREEK

CONSULTANT
GOLDER

YYYY-MM-DD	2021-01-04
DESIGNED	-
PREPARED	REDMOND
REVIEWED	AR
APPROVED	CRS

PROJECT NO.	PHASE	REV.	SHEET
9431595011	3066	A	3-1

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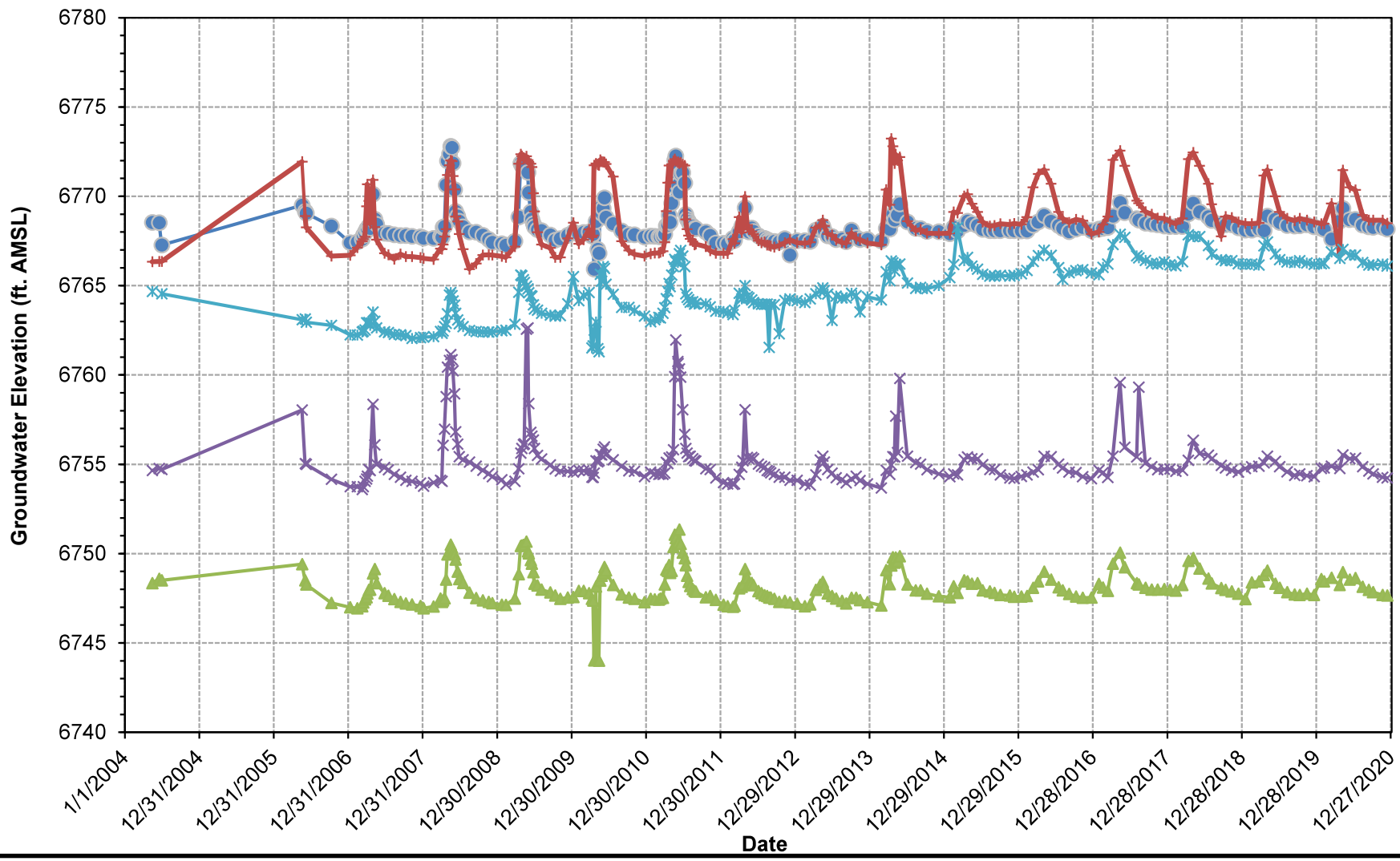

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LEGEND

- BBMW-03A
- BBMW-05A
- BBMW-06A
- BBMW-07A
- BBMW-08A

FIGURE **3-2**

BLACKBIRD CUTOFF MONITORING WELLS - HISTORICAL ELEVATIONS

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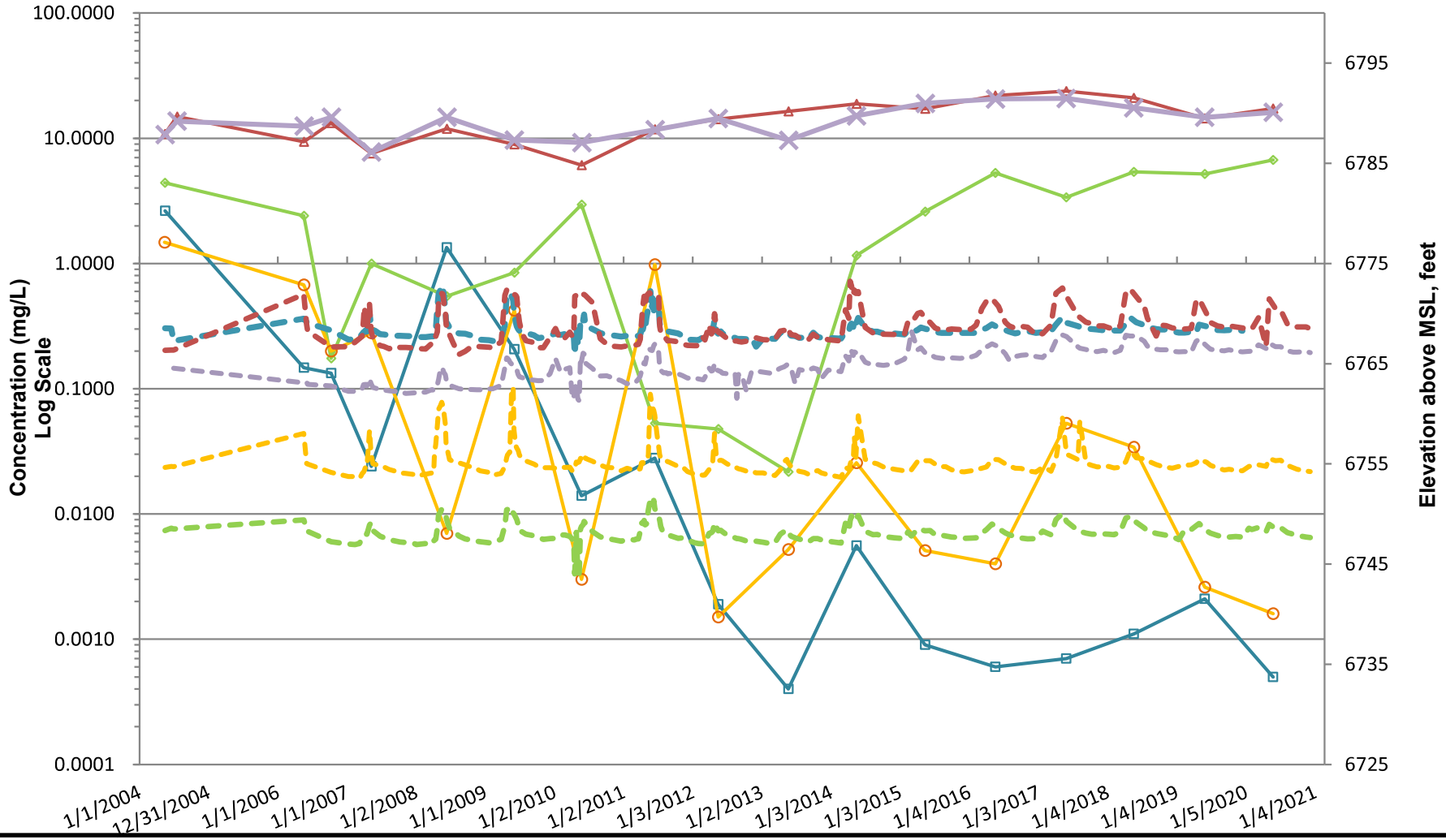
943-1595-011.3066



LEGEND

- Cu-D at BBMW-03A
- Cu-D at BBMW-05A
- Cu-D at BBMW-06A
- Cu-D at BBMW-07A
- Cu-D at BBMW-08A
- Water Level at BBMW-03A
- Water Level at BBMW-05A
- Water Level at BBMW-06A
- Water Level at BBMW-07A
- Water Level at BBMW-08A

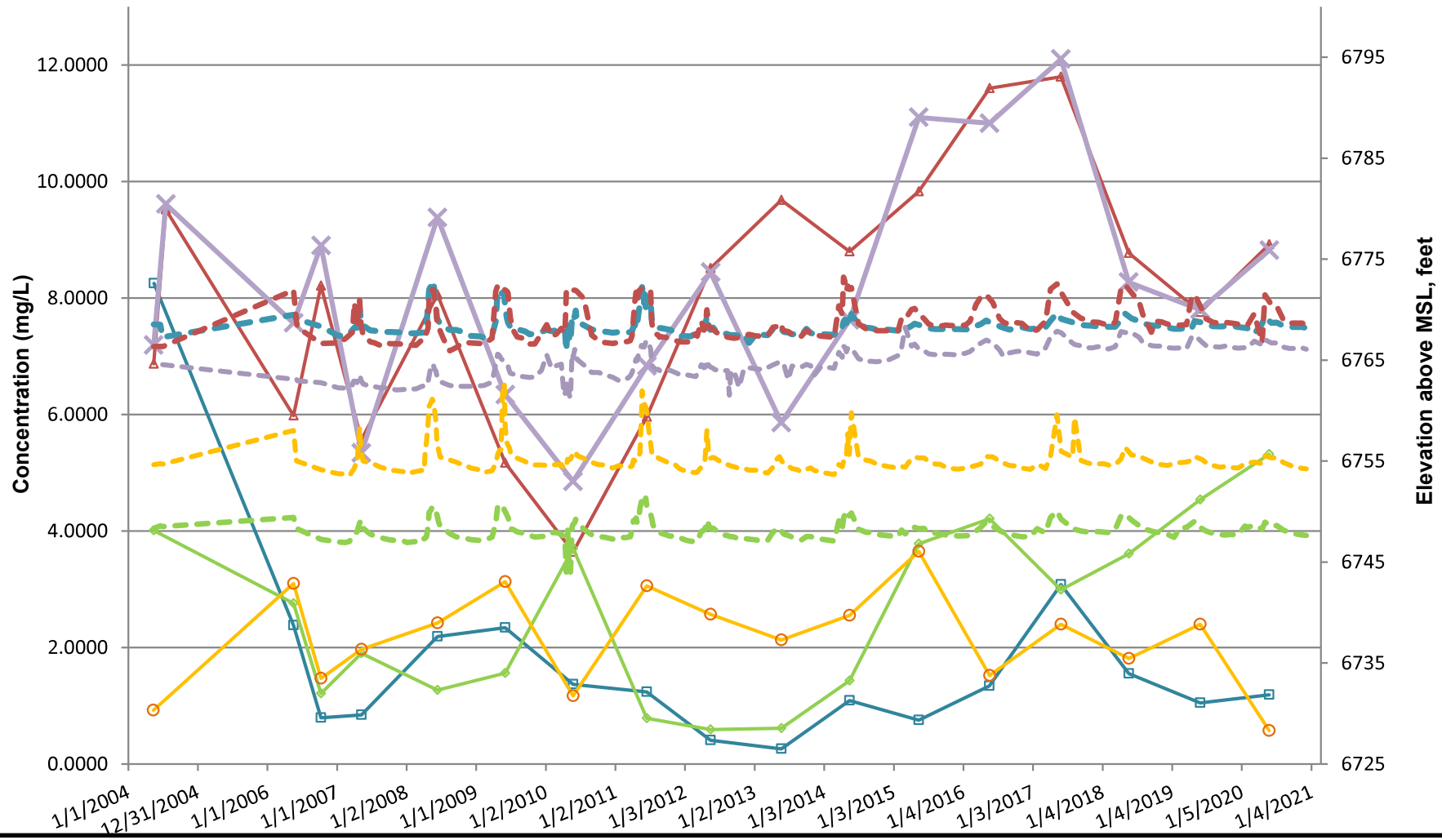
GOLDER

FIGURE **3-3**

BLACKBIRD CUTOFF MONITORING WELLS 2020 AND HISTORICAL DISSOLVED COPPER GROUNDWATER QUALITY AND ELEVATIONS

BMSG/ 2020 Monitoring Report/ID

943-1595-011.3066



LEGEND

- Co-D at BBMW-03A
- Co-D at BBMW-05A
- Co-D at BBMW-06A
- Co-D at BBMW-07A
- Co-D at BBMW-08A
- Water Level at BBMW-03A
- Water Level at BBMW-05A
- Water Level at BBMW-06A
- Water Level at BBMW-07A
- Water Level at BBMW-08A

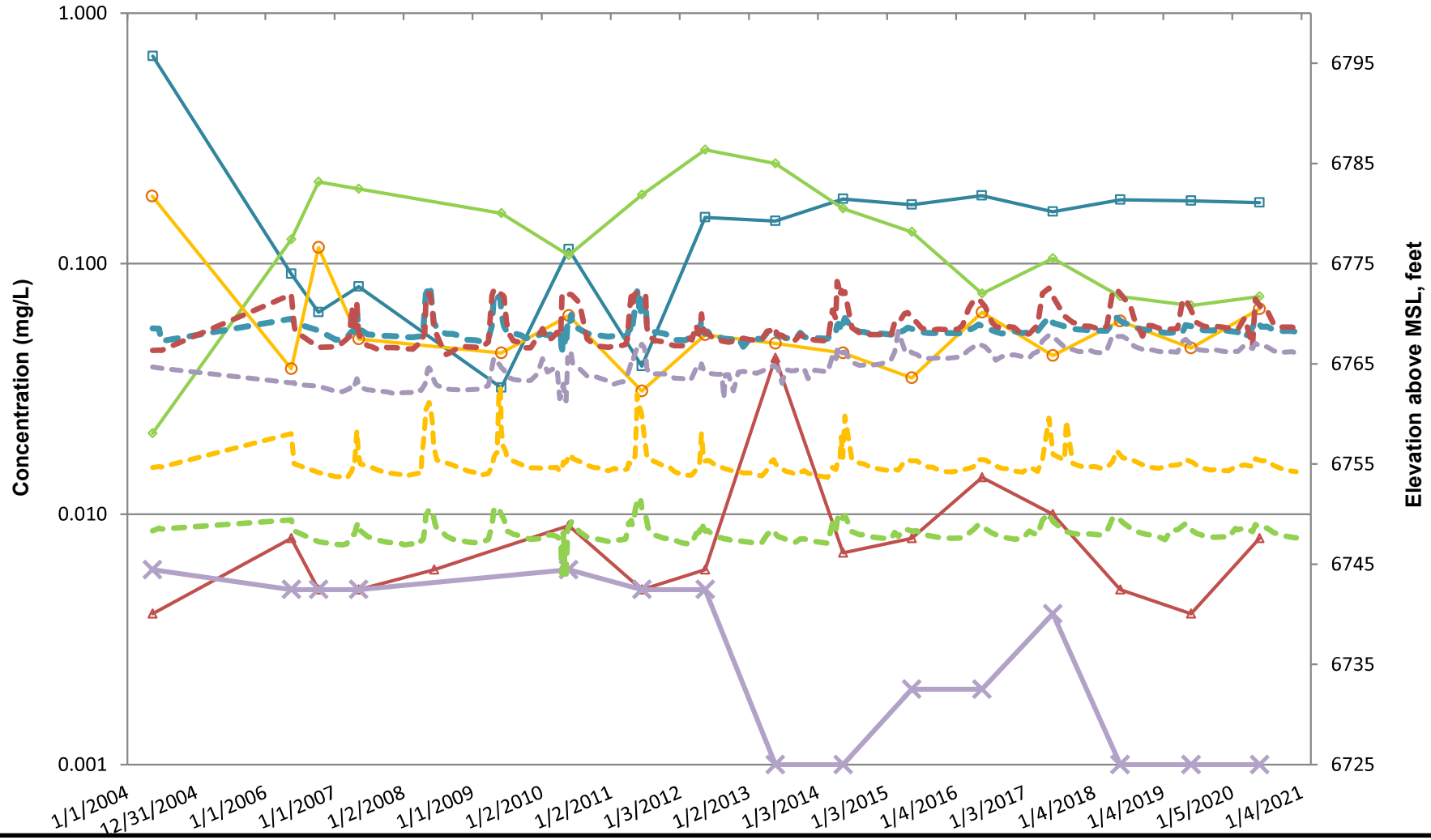
GOLDER

FIGURE **3-4**

BLACKBIRD CUTOFF MONITORING WELLS 2020 AND HISTORICAL DISSOLVED COBALT GROUNDWATER QUALITY AND ELEVATIONS

BMSG/ 2020 Monitoring Report/ID

943-1595-011.3066



LEGEND

- As-D at BBMW-03A
- As-D at BBMW-05A
- As-D at BBMW-06A
- As-D at BBMW-07A
- As-D at BBMW-08A
- Water Level at BBMW-03A
- Water Level at BBMW-05A
- Water Level at BBMW-06A
- Water Level at BBMW-07A
- Water Level at BBMW-08A

GOLDER

FIGURE **3-5**

BLACKBIRD CUTOFF MONITORING WELLS 2020 AND HISTORICAL DISSOLVED ARSENIC GROUNDWATER QUALITY AND ELEVATIONS

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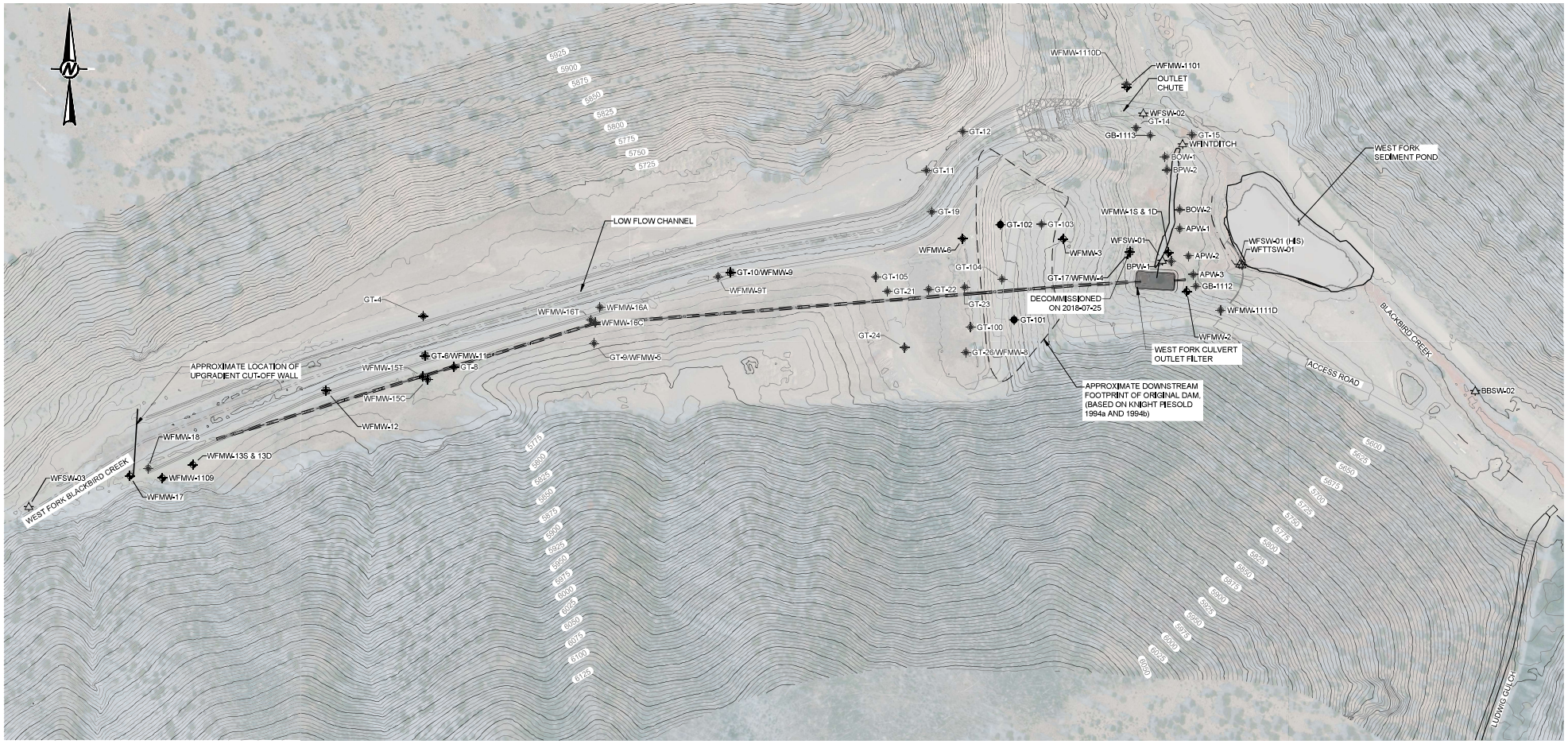


LEGEND

- GEOTECHNICAL MONITORING WELLS
- SURFACE WATER SAMPLING LOCATIONS
- GROUNDWATER MONITORING WELL
- GEOTECHNICAL BORING CONVERTED TO MONITORING WELL
- 2011 AND 2012 BORE HOLE AND MONITORING WELL LOCATIONS
- UNDERGROUND CULVERT

NOTE(S)

1. CONTOUR ARE BASED ON LIDAR DATA COLLECTED BY AEROMETRICS 2012-08-05
2. SURVEY CONTROL PROVIDED BY WADE SURVEY
3. AERIAL IMAGERY WAS GATHERED IN CONJUNCTION WITH THE LIDAR AND IS DATED 2012-08-05.

REFERENCE(S)

1. HORIZONTAL DATUM: STATE PLANE COORDINATE SYSTEM IDAHO CENTRAL ZONE, NAD83/91, US FEET.
2. VERTICAL DATUM: NORTH AMERICAN VERTICAL DATUM 1988 (NAVD88)

OVERALL SITE
SCALE 1" = 100'

0 100 200
1" = 100' FEET

CLIENT
BLACKBIRD MINE SITE GROUP

PROJECT
BLACKBIRD MINE
2020 MONITORING REPORT
LEMHI COUNTY, IDAHO

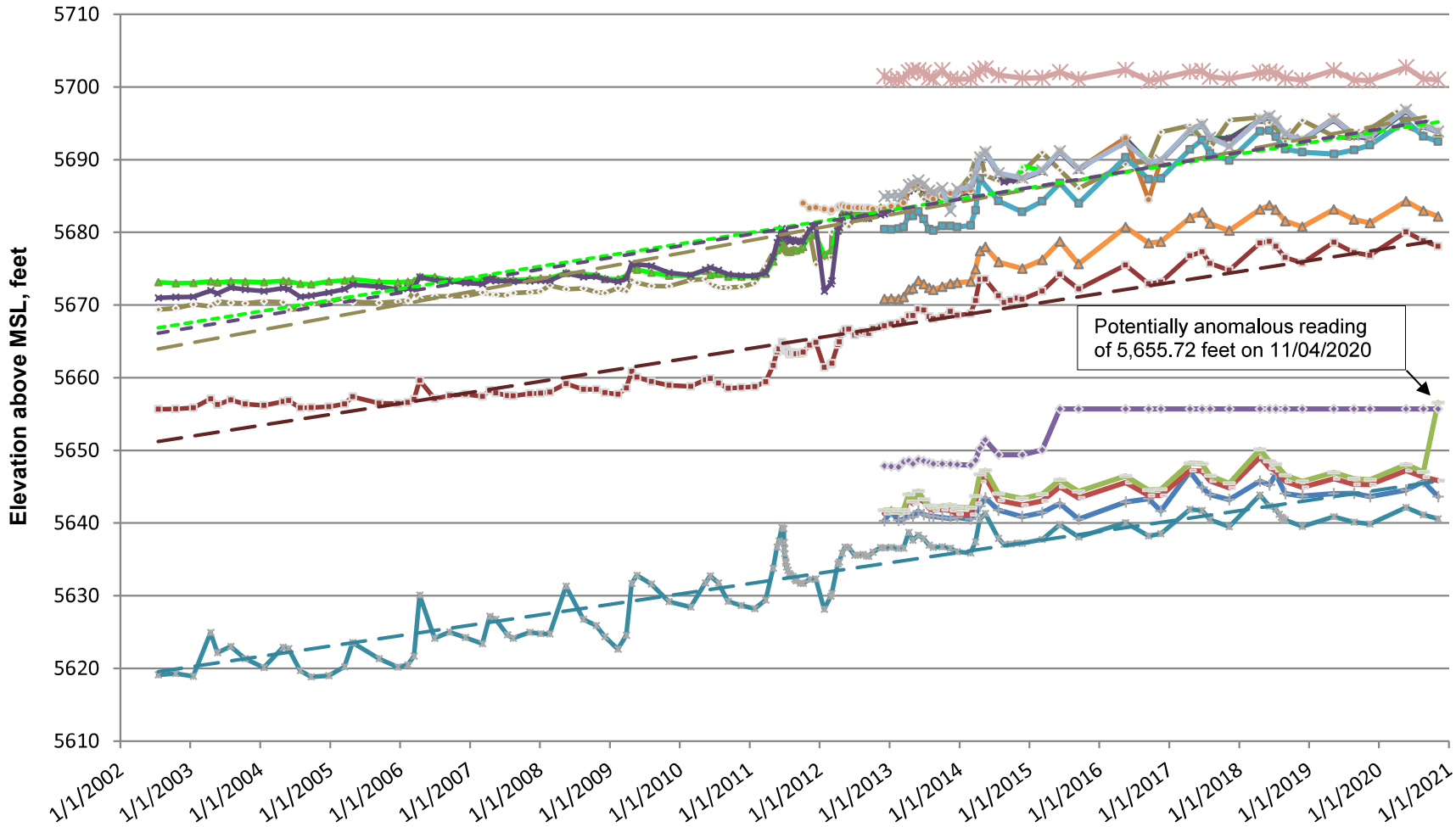
TITLE
MONITORING WELL SAMPLING LOCATIONS IN WEST FORK TAILINGS STORAGE FACILITY

CONSULTANT
GOLDER

YYYY-MM-DD	2021-01-04
DESIGNED	-
PREPARED	REDMOND
REVIEWED	AR
APPROVED	CRS

PROJECT NO.	PHASE	REV.	SHEET
9431595011	3066	A	3-6

IF THIS MEASUREMENT DOES NOT MATCH WHAT IS SHOWN, THE SHEET SIZE HAS BEEN MODIFIED FROM: ANSI D



LEGEND

- WFMW-11
- WFMW-12
- WFMW-13S
- WFMW-13D
- WFMW-9
- WFMW-1109
- WFMW-9T
- WFMW-16A
- WFMW-16C
- WFMW-16T
- WFMW-15C
- WFMW-15T
- WFMW-18
- WFMW-17
- Linear (WFMW-11)
- Linear (WFMW-12)
- Linear (WFMW-13S)
- Linear (WFMW-13D)
- Linear (WFMW-9)

GOLDER

FIGURE **3-7**

WEST FORK MONITORING WELL WATER ELEVATION TRENDS - TAILINGS AREAS

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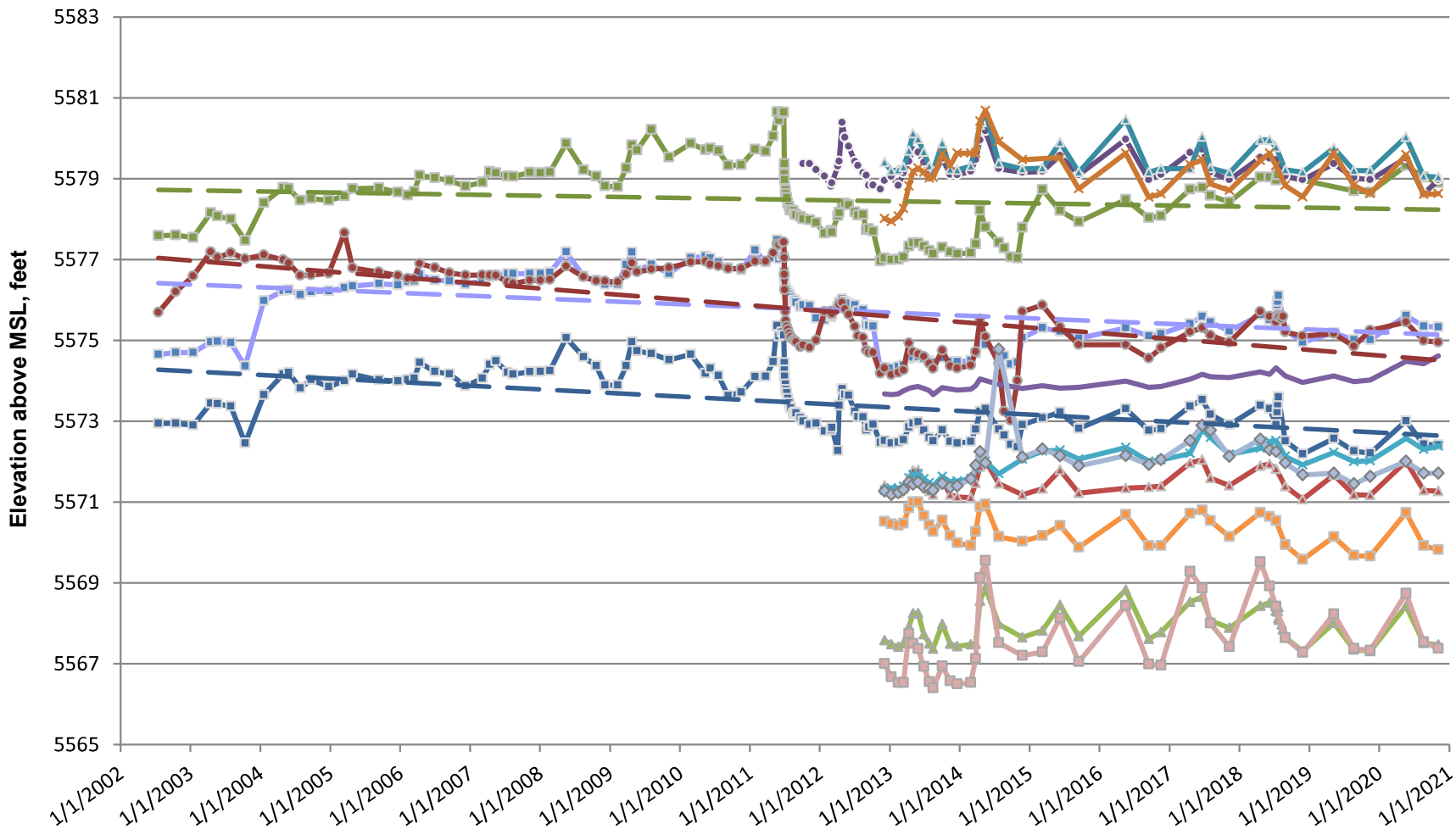

LEGEND

WFMW-1S	WFMW-1D	WFMW-2
WFMW-4	WFMW-1101	WFMW-1110D
BOW-1	BPW-2	BOW-2
APW-1	APW-2	BPW-1
APW-3	WFMW-1111D	Linear (WFMW-1S)
Linear (WFMW-1D)	Linear (WFMW-2)	Linear (WFMW-4)

GOLDER

FIGURE **3-8**

WEST FORK MONITORING WELL WATER ELEVATION TRENDS - LOWER WELLS

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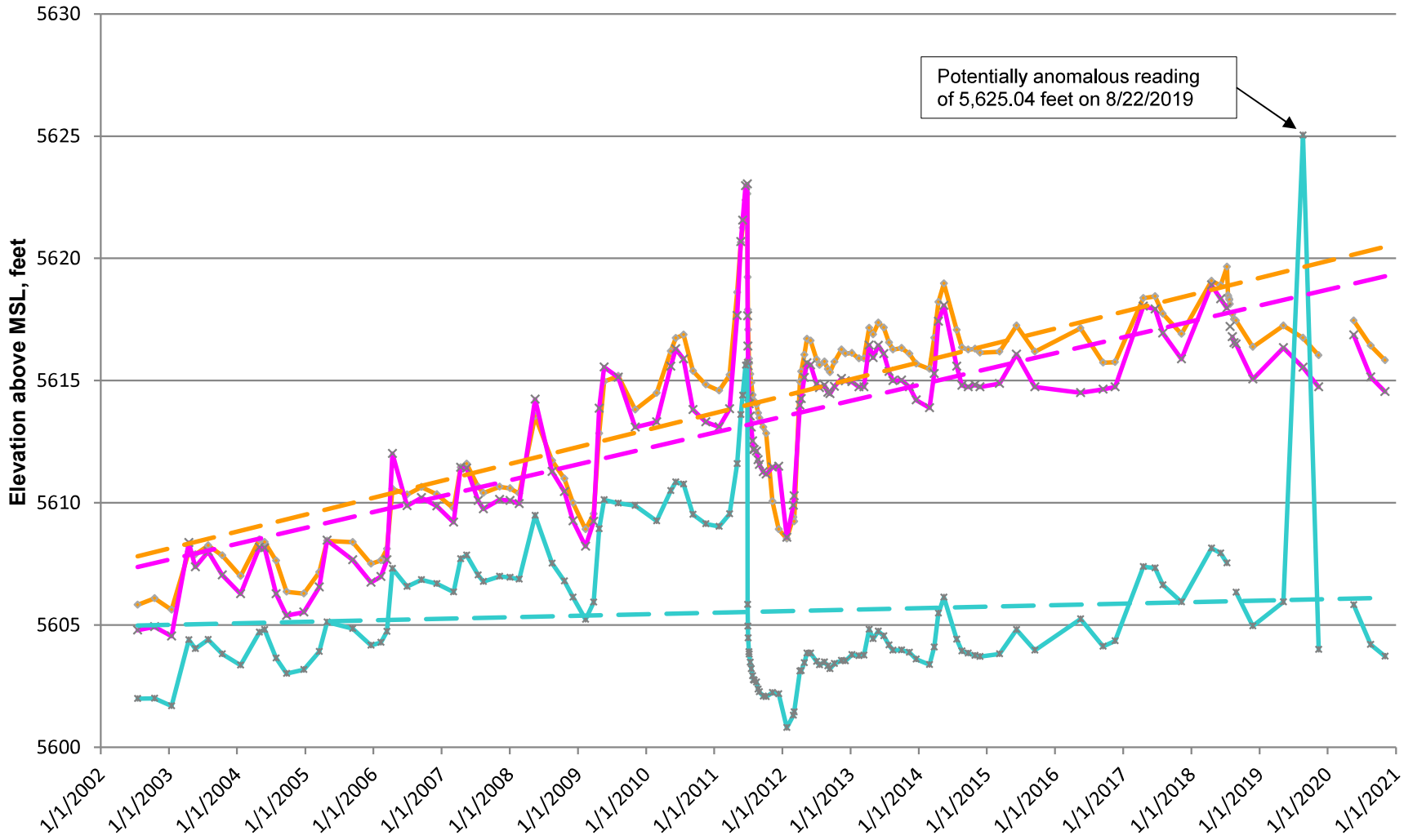

GOLDER

LEGEND

- GT-102
- WFMW-6
- GT-101
- Linear (GT-102)
- Linear (WFMW-6)
- Linear (GT-101)

FIGURE **3-9**

WEST FORK MONITORING WELL WATER ELEVATION TRENDS - FACE OF DAM

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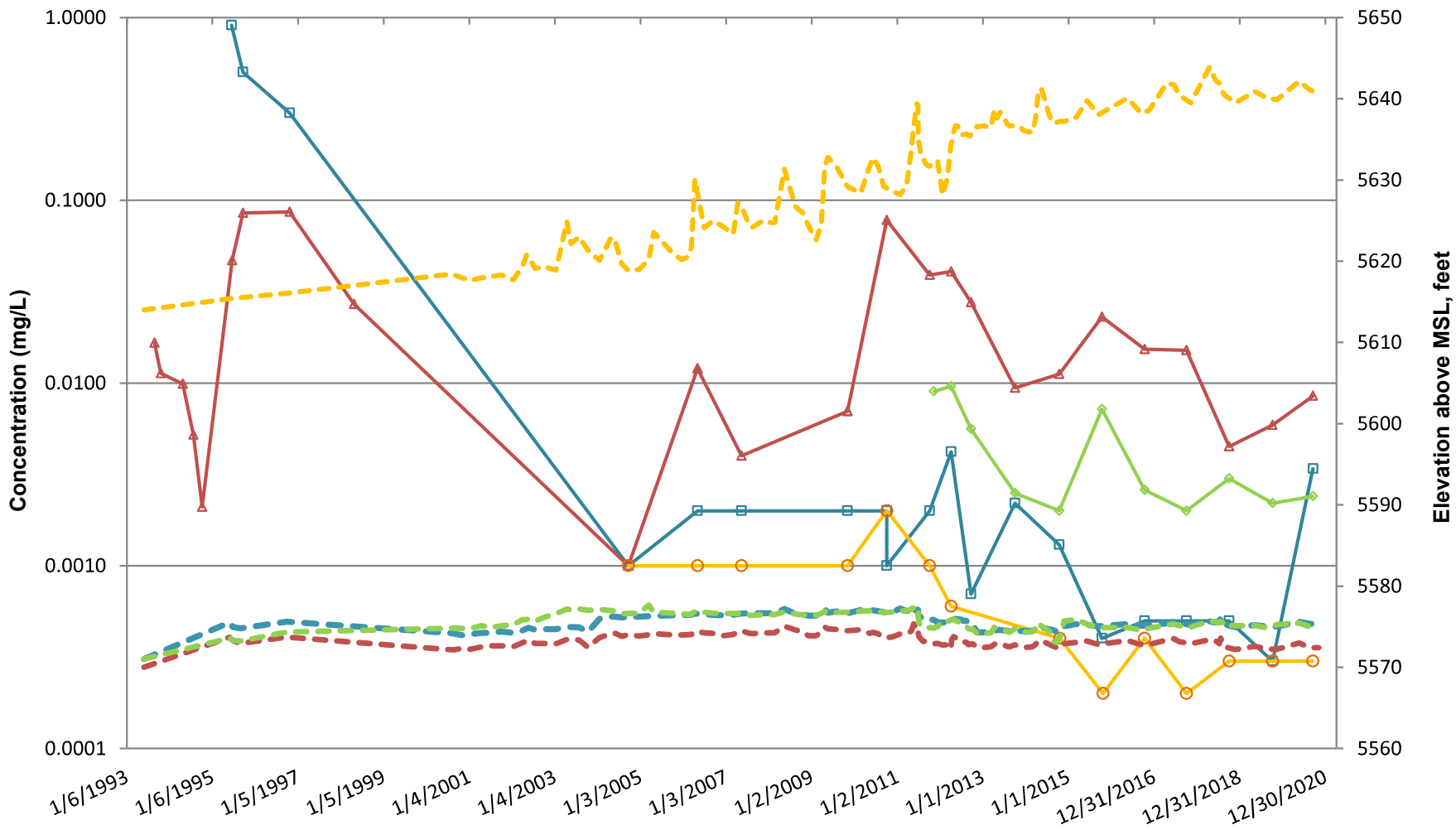
943-1595-011.3066



LEGEND

- Cu-D at WFMW-1S
- Cu-D at WFMW-1D
- Cu-D at WFMW-2
- Cu-D at WFMW-9
- Water Level at WFMW-1S
- Water Level at WFMW-1D
- Water Level at WFMW-2
- Water Level at WFMW-9

GOLDER

FIGURE **3-10**

WEST FORK MONITORING WELLS
2020 AND HISTORICAL DISSOLVED COPPER
GROUNDWATER QUALITY AND ELEVATIONS

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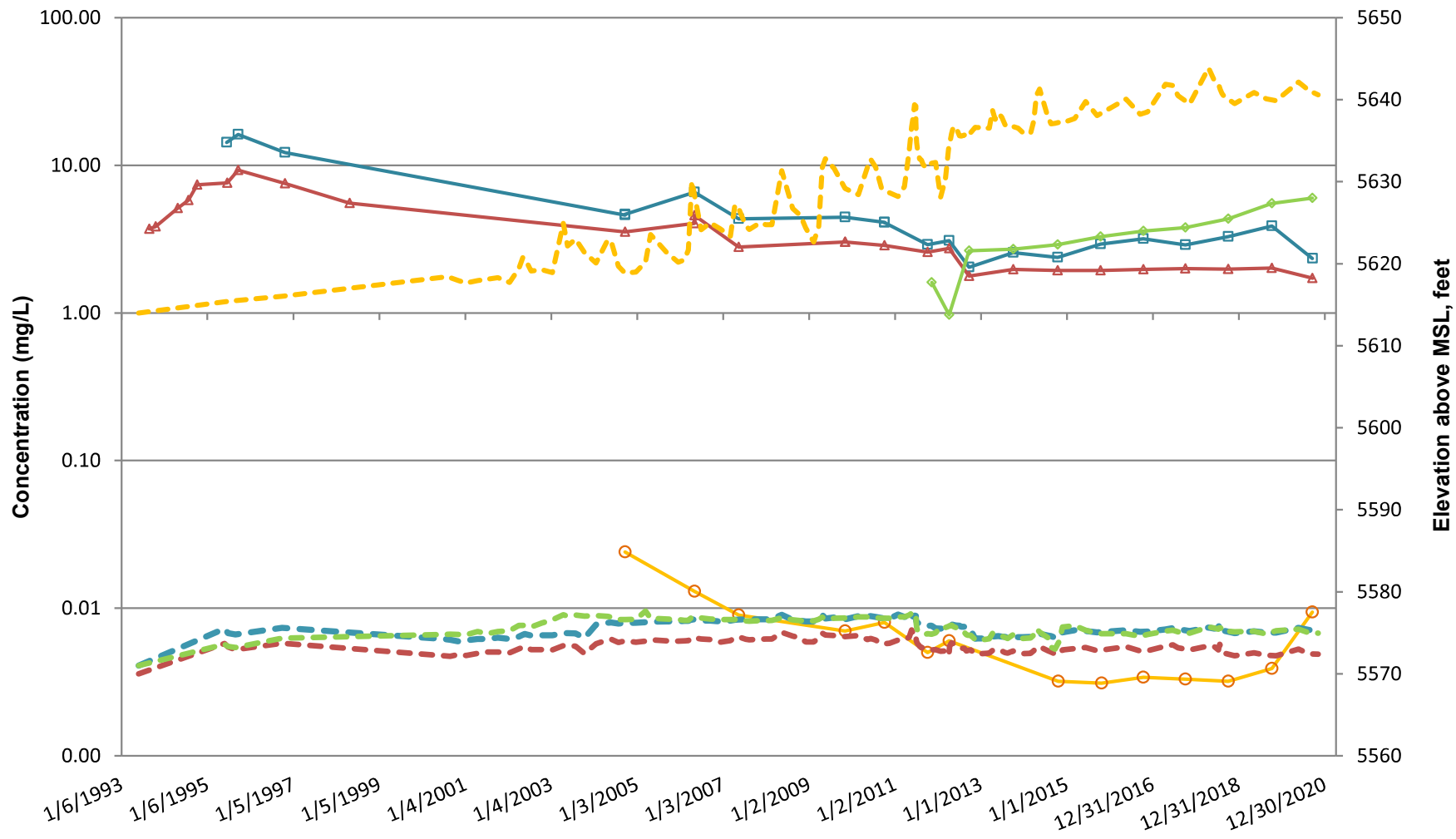
943-1595-011.3066



LEGEND

- Co-D at WFMW-1S
- Co-D at WFMW-1D
- Co-D at WFMW-2
- Co-D at WFMW-9
- Water Level at WFMW-1S
- Water Level at WFMW-1D
- Water Level at WFMW-2
- Water Level at WFMW-9

GOLDER

FIGURE **3-11**

WEST FORK MONITORING WELLS
2020 AND HISTORICAL DISSOLVED COBALT
GROUNDWATER QUALITY AND ELEVATIONS

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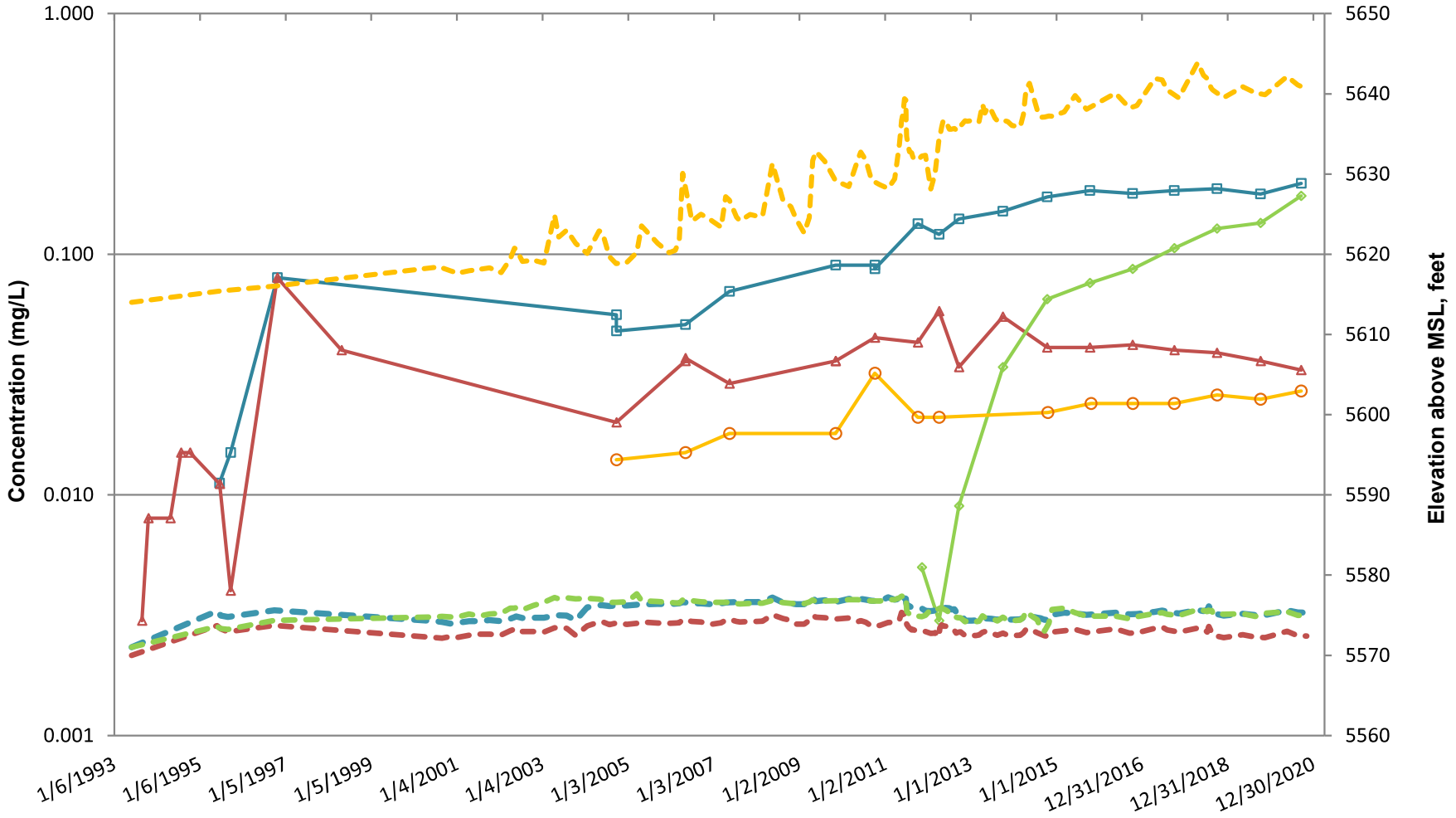

LEGEND

- As-D at WFMW-1S
- As-D at WFMW-1D
- As-D at WFMW-2
- As-D at WFMW-9
- Water Level at WFMW-1S
- Water Level at WFMW-1D
- Water Level at WFMW-2
- Water Level at WFMW-9

GOLDER

FIGURE **3-12**

WEST FORK MONITORING WELLS
2020 AND HISTORICAL DISSOLVED ARSENIC
GROUNDWATER QUALITY AND ELEVATIONS

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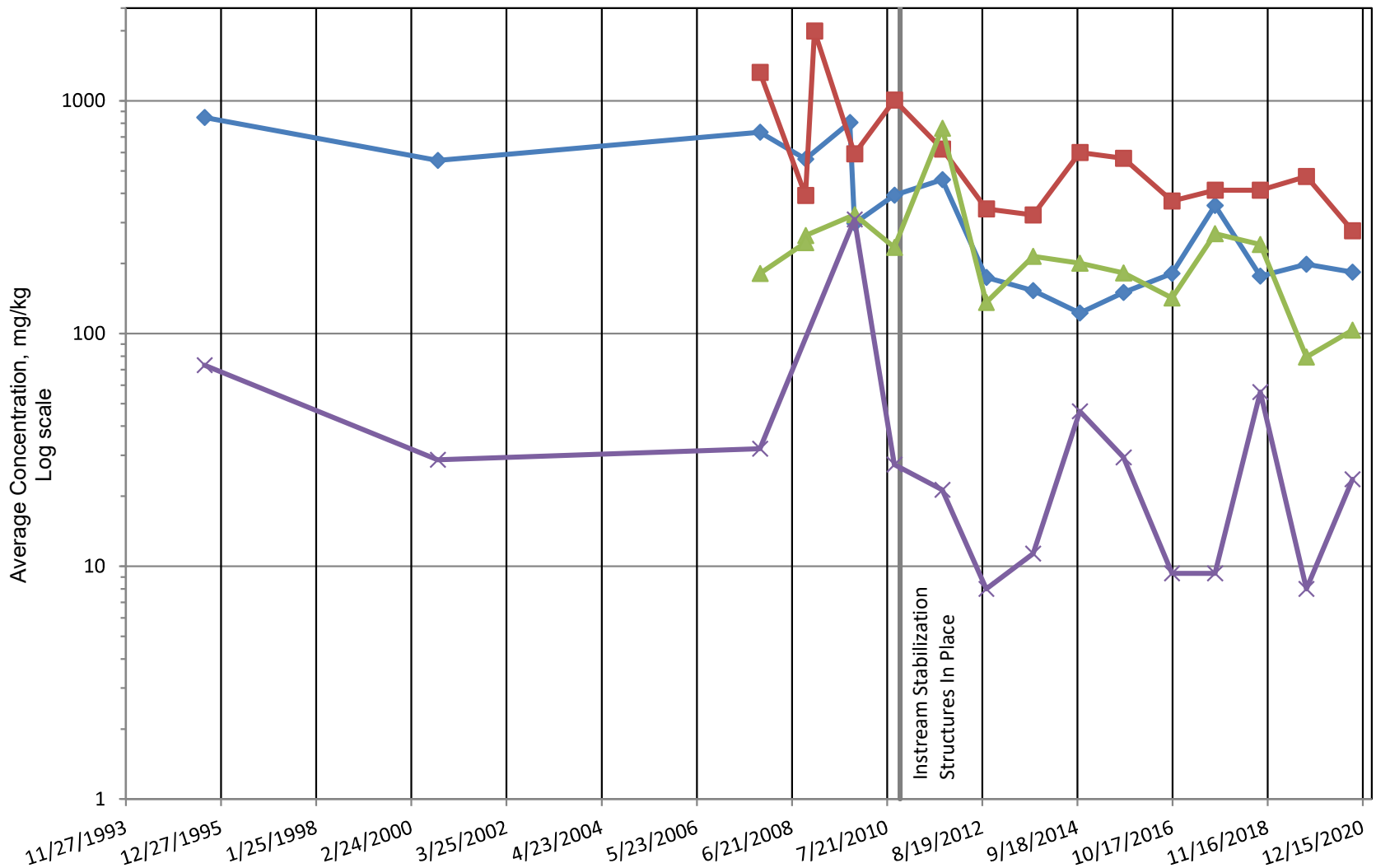

LEGEND

- BBSED-01A
- BBSED-03
- BBSED-07
- BBSED-08

GOLDER

FIGURE **4-1a**

IN-STREAM SEDIMENTS - BLACKBIRD CREEK, AVERAGE TOTAL ARSENIC CONCENTRATION

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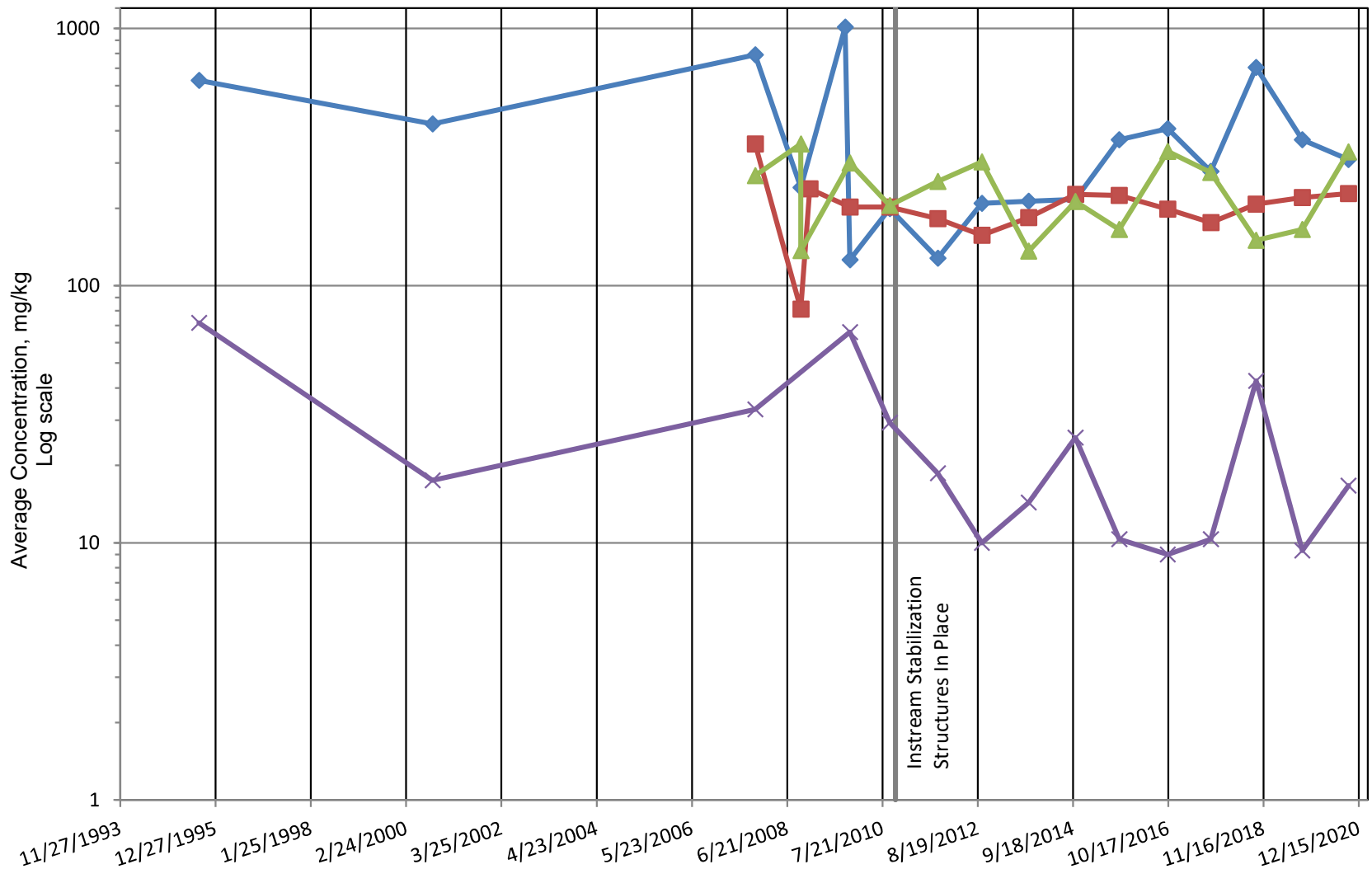
943-1595-011.3066



LEGEND

- BBSED-01A
- BBSED-03
- BBSED-07
- BBSED-08

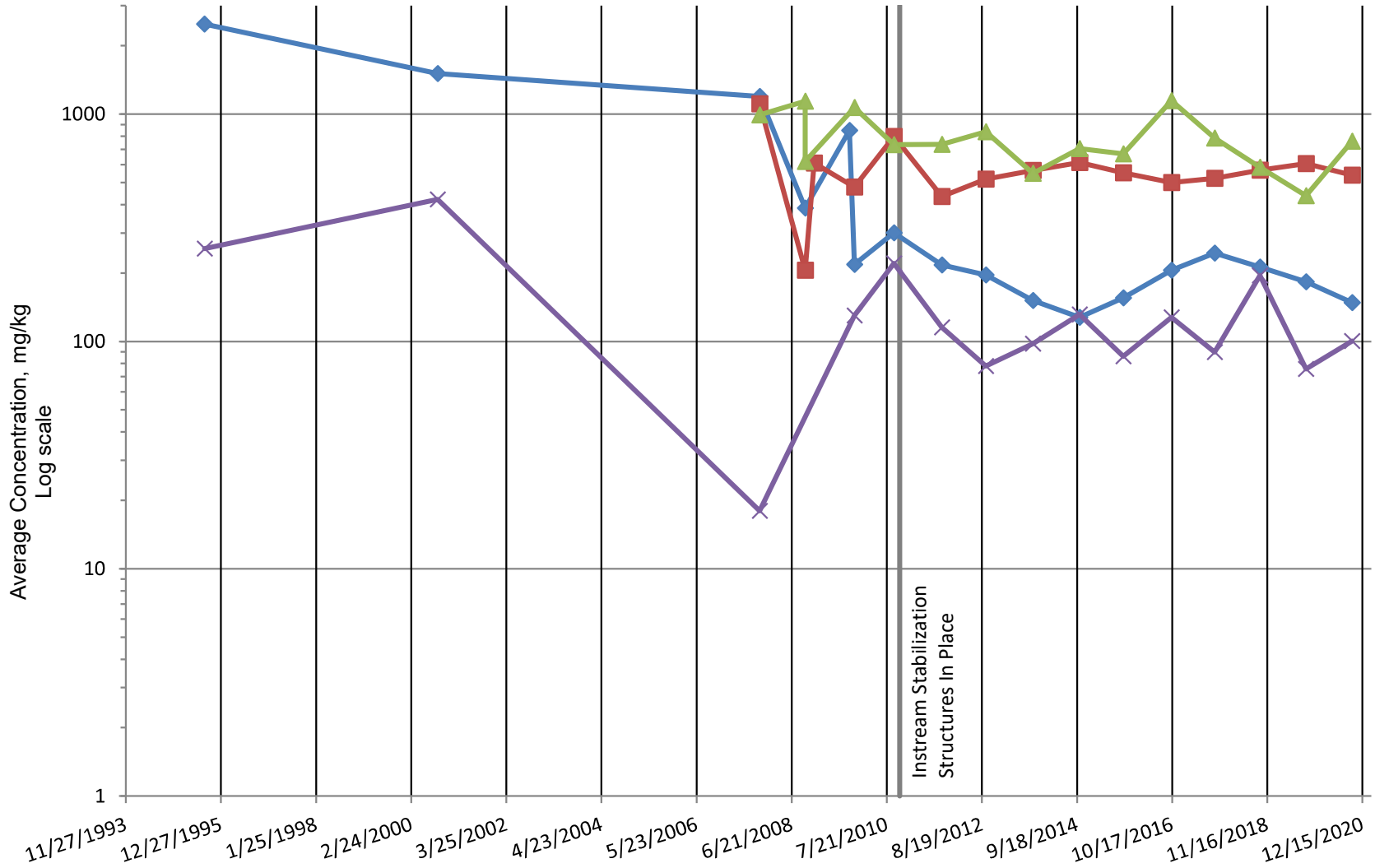
GOLDER

FIGURE **4-1b**

IN-STREAM SEDIMENTS - BLACKBIRD CREEK, AVERAGE TOTAL COBALT CONCENTRATION

BMSG/ 2020 Monitoring Report/ID

943-1595-011.3066



LEGEND

BBSED-01A
BBSED-03
BBSED-07
BBSED-08

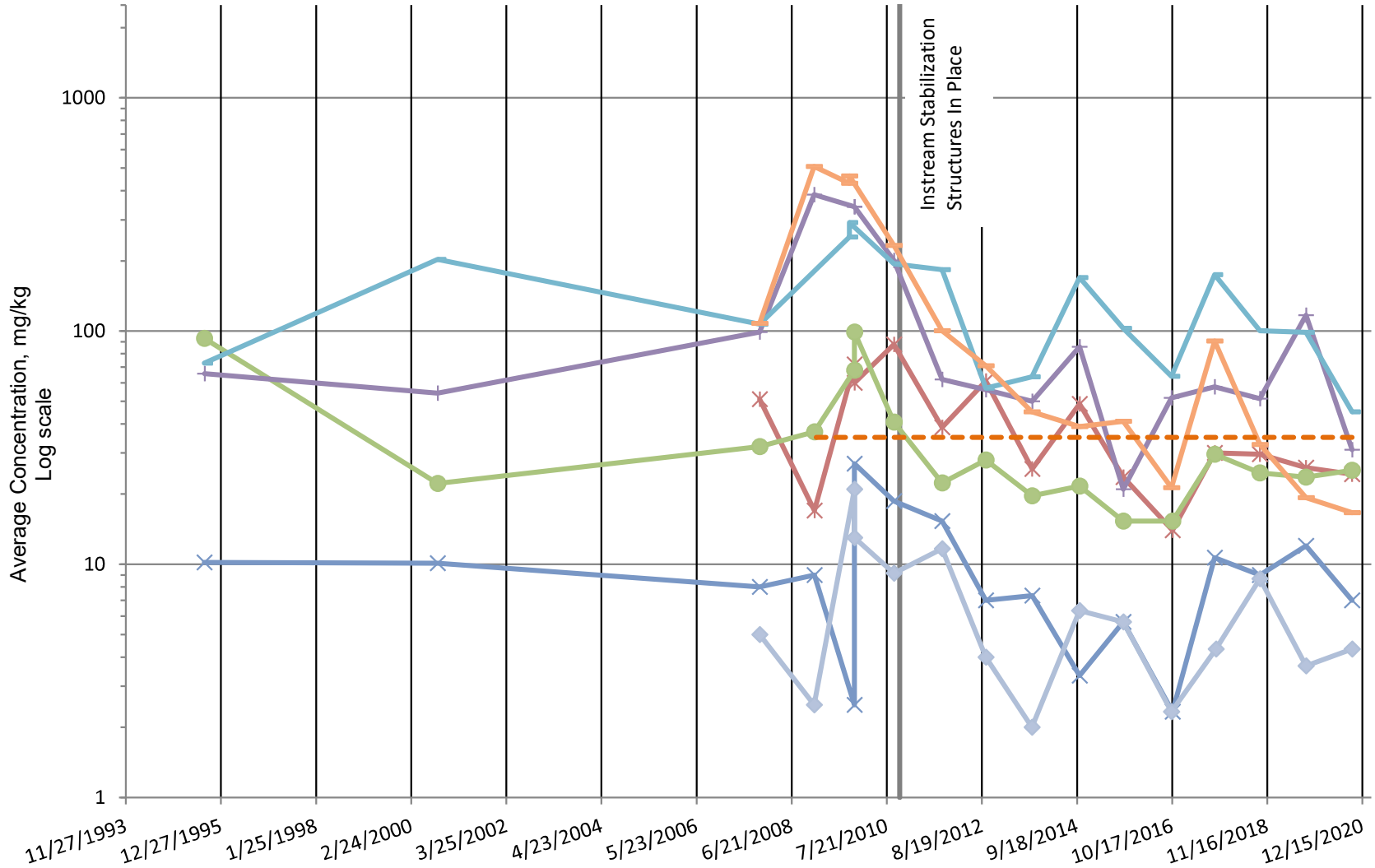
GOLDER

FIGURE **4-1c**

IN-STREAM SEDIMENTS - BLACKBIRD CREEK, AVERAGE TOTAL COPPER CONCENTRATION

BMSG/ 2020 Monitoring Report/ID

943-1595-011.3066



LEGEND

- PASED-01
- PASED-04
- PASED-05
- PASED-07
- PASED-08
- PASED-10
- PASED-11
- As Cleanup Level (35 mg/kg)

GOLDER

FIGURE **4-2a**

IN-STREAM SEDIMENTS - PANTHER CREEK, AVERAGE TOTAL ARSENIC CONCENTRATION

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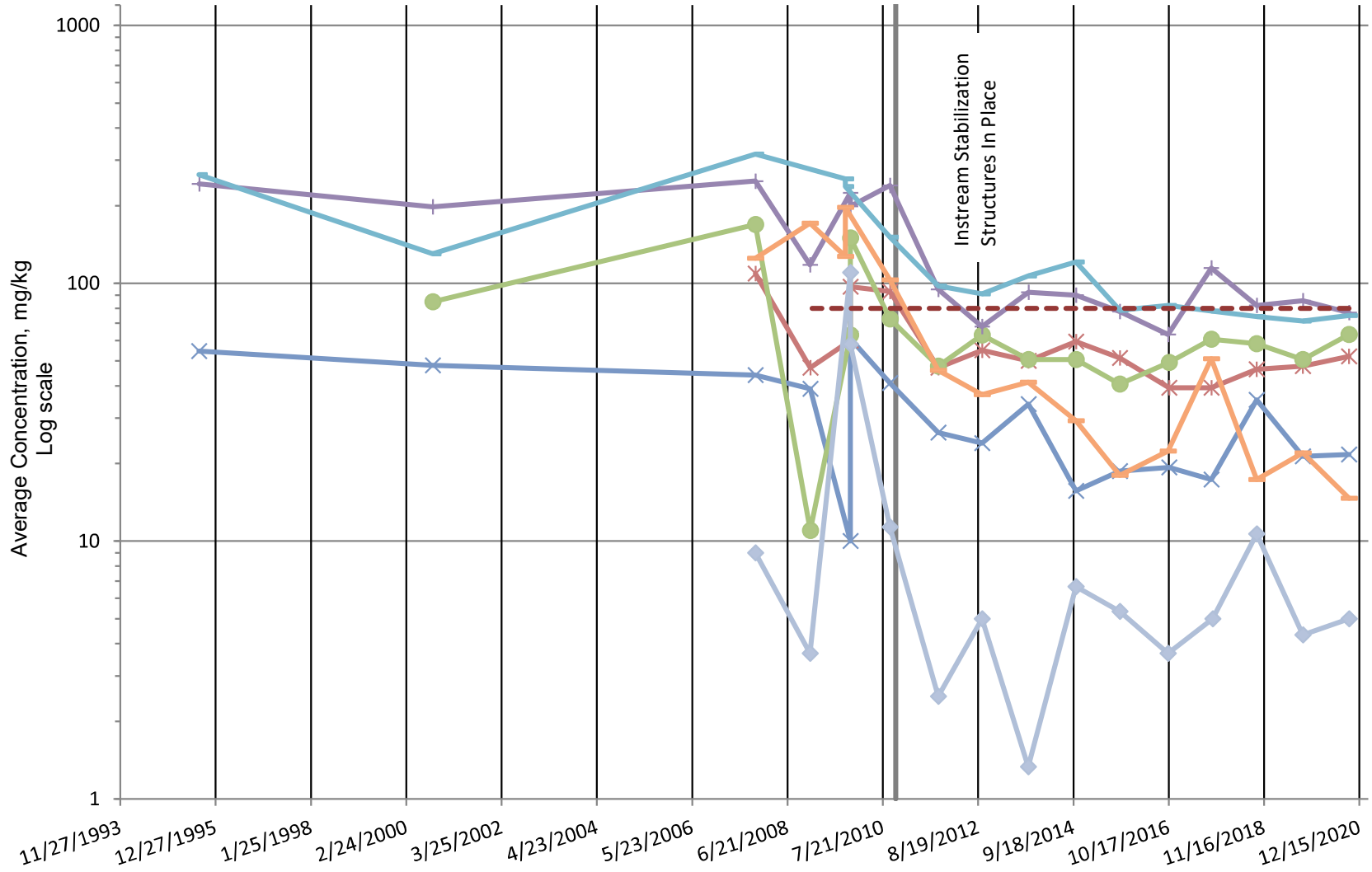
943-1595-011.3066

Table 4-2_and_Figure 4-1a-c to Figure 4-5a-c_011321.xlsx

Golder Associates



LEGEND

- PASED-01
- PASED-04
- PASED-05
- PASED-07
- PASED-08
- PASED-10
- PASED-11
- Co Cleanup Level (80 mg/kg)

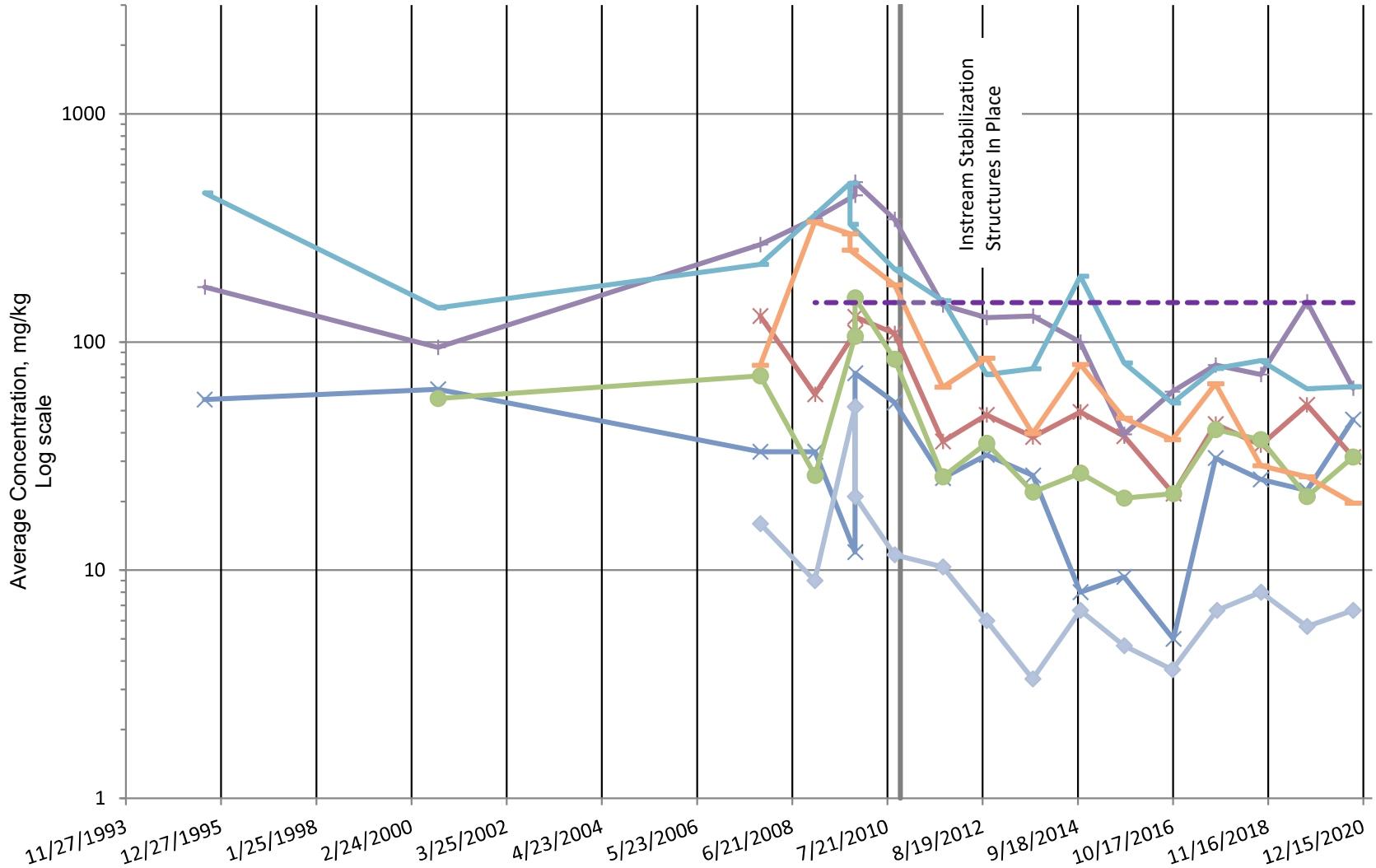
GOLDER

FIGURE **4-2b**

IN-STREAM SEDIMENTS - PANTHER CREEK, AVERAGE TOTAL COBALT CONCENTRATION

BMSG/ 2020 Monitoring Report/ID

943-1595-011.3066



LEGEND

- PASED-01
- PASED-04
- PASED-05
- PASED-07
- PASED-08
- PASED-10
- PASED-11
- Cu Cleanup Level (149 mg/kg)

GOLDER

FIGURE **4-2c**

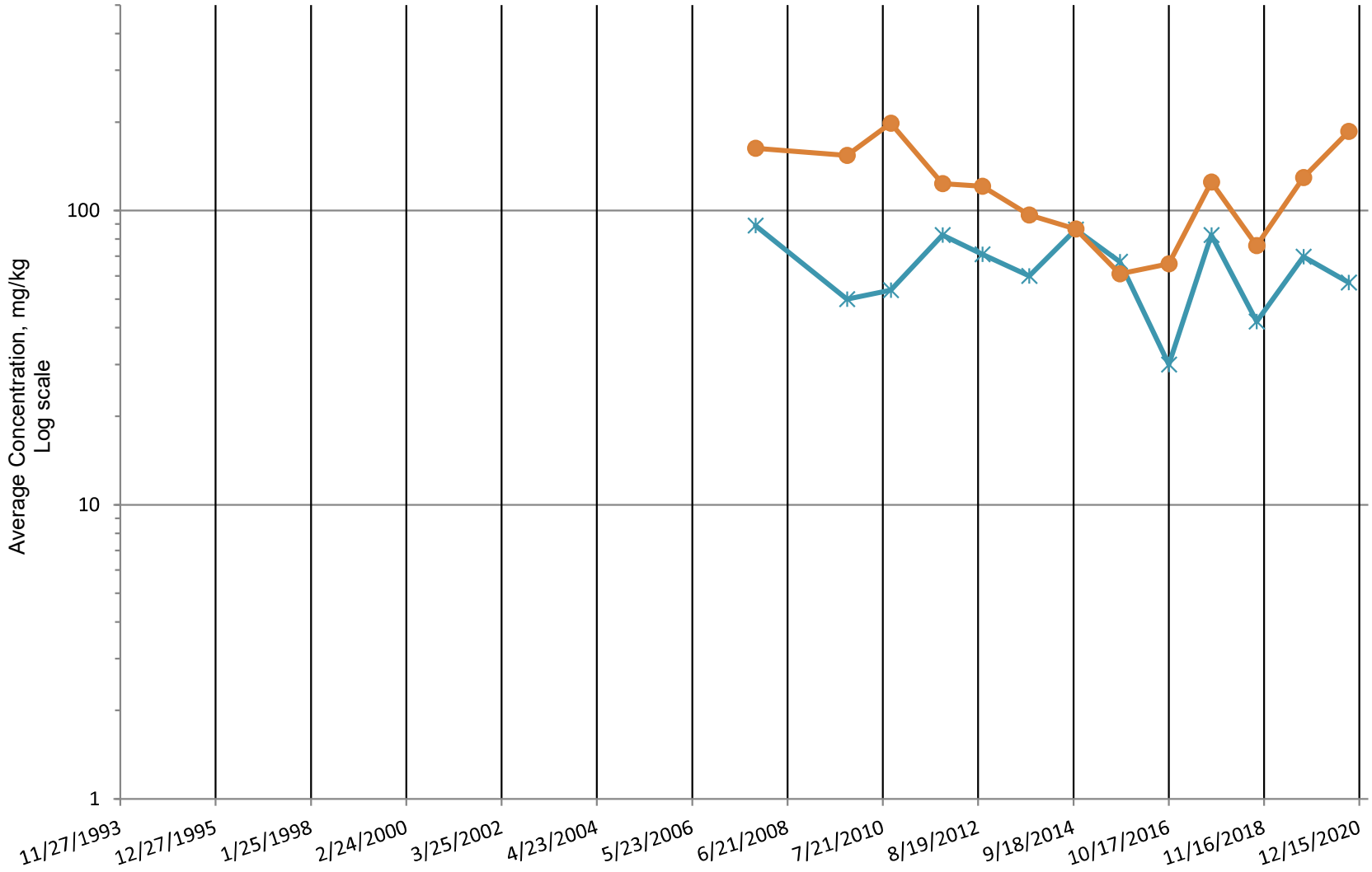
IN-STREAM SEDIMENTS - PANTHER CREEK, AVERAGE TOTAL COPPER CONCENTRATION

BMSG/ 2020 Monitoring Report/ID

943-1595-011.3066

Table 4-2_and_Figure 4-1a-c to Figure 4-5a-c_011321.xlsx

Golder Associates



LEGEND

BTSED-01 BTSED-1.6

GOLDER

FIGURE **4-3a**

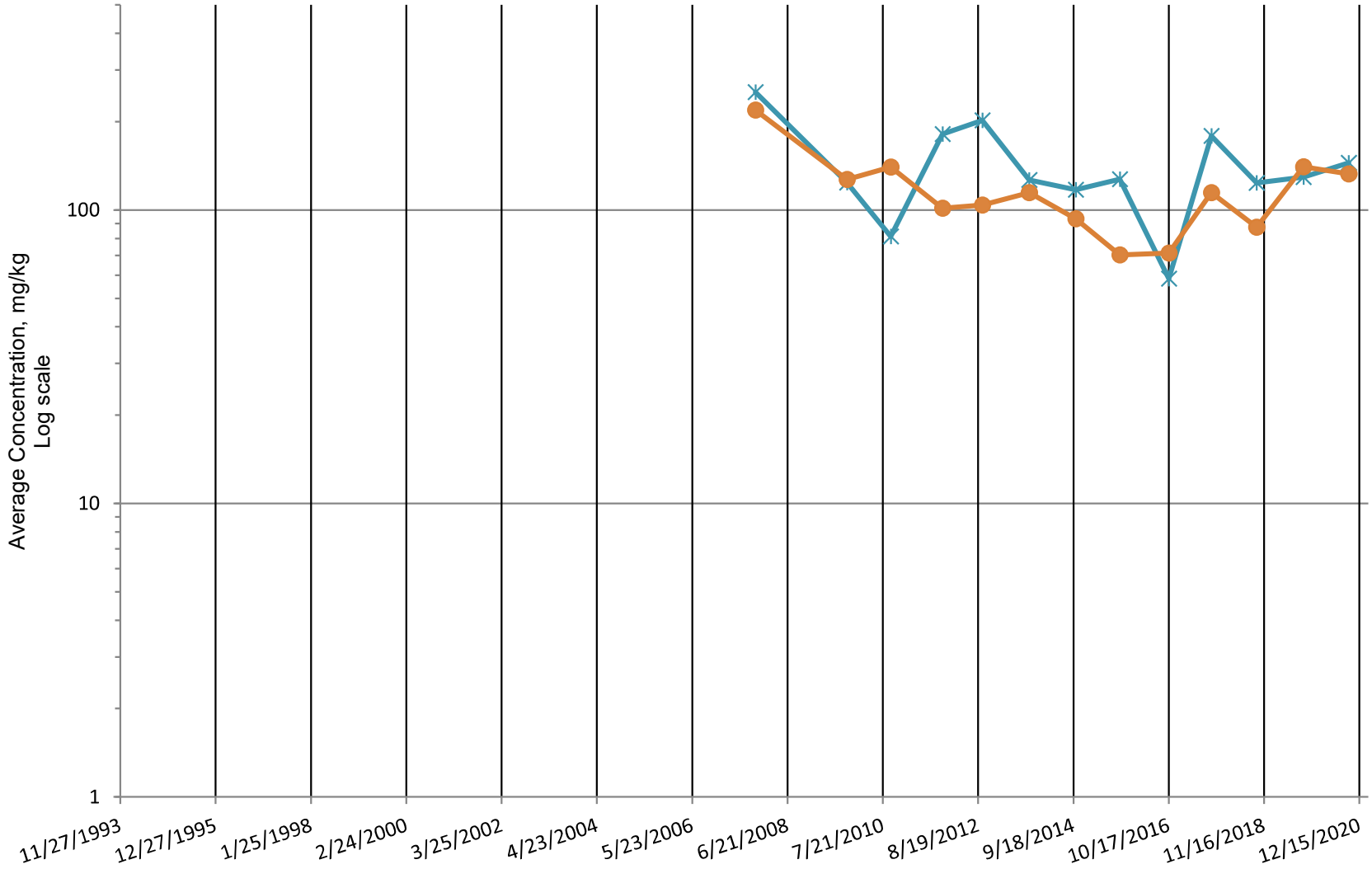
IN-STREAM SEDIMENTS - BUCKTAIL CREEK, AVERAGE TOTAL ARSENIC CONCENTRATION

BMSG/ 2020 Monitoring Report/ID

943-1595-011.3066

Table 4-2_and_Figure 4-1a-c to Figure 4-5a-c_011321.xlsx

Golder Associates



LEGEND

BTSED-01

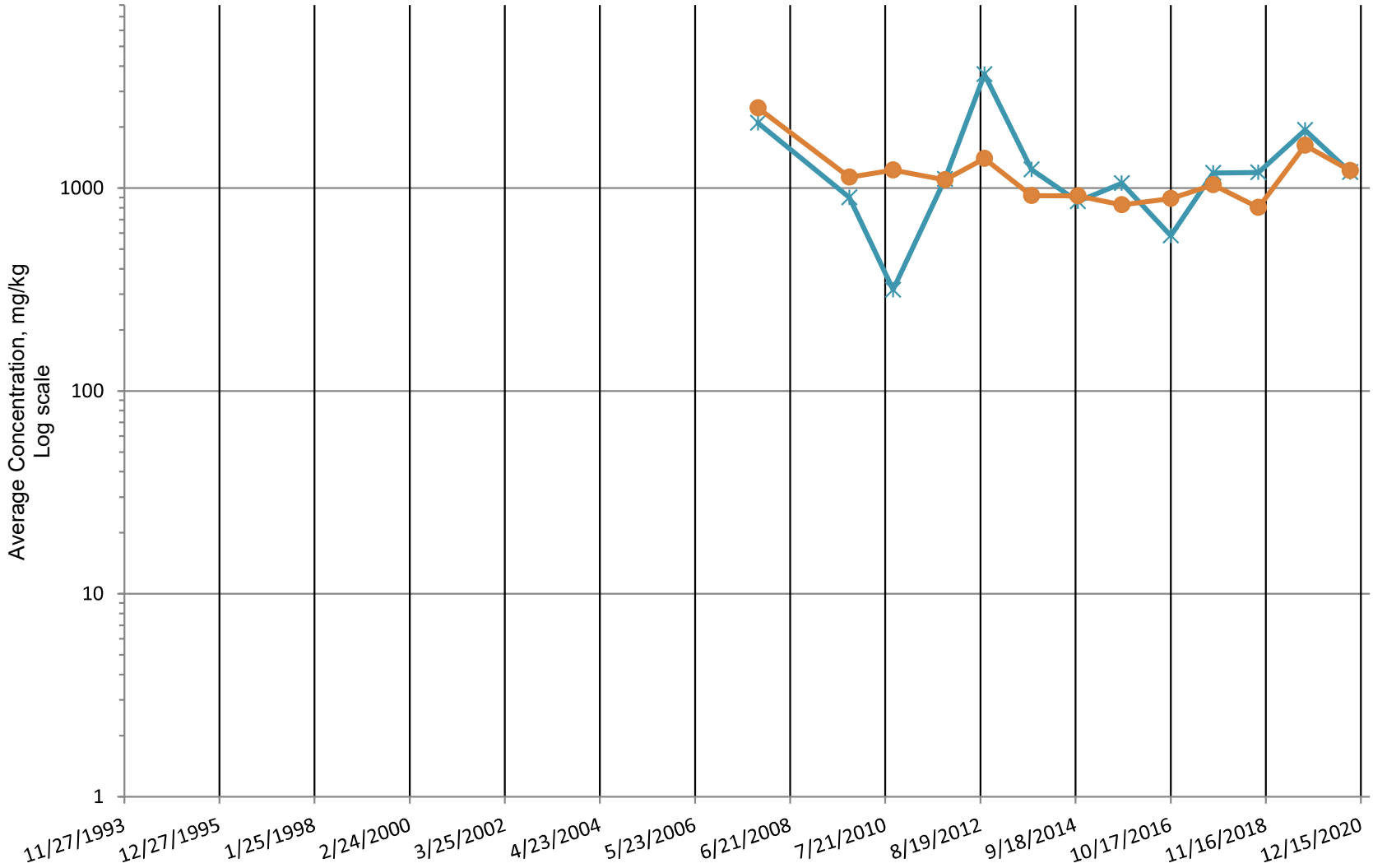
BTSED-1.6

FIGURE **4-3b**

IN-STREAM SEDIMENTS - BUCKTAIL CREEK, AVERAGE TOTAL COBALT CONCENTRATION

BMSG/ 2020 Monitoring Report/ID

943-1595-011.3066



LEGEND

BTSED-01 BTSED-1.6

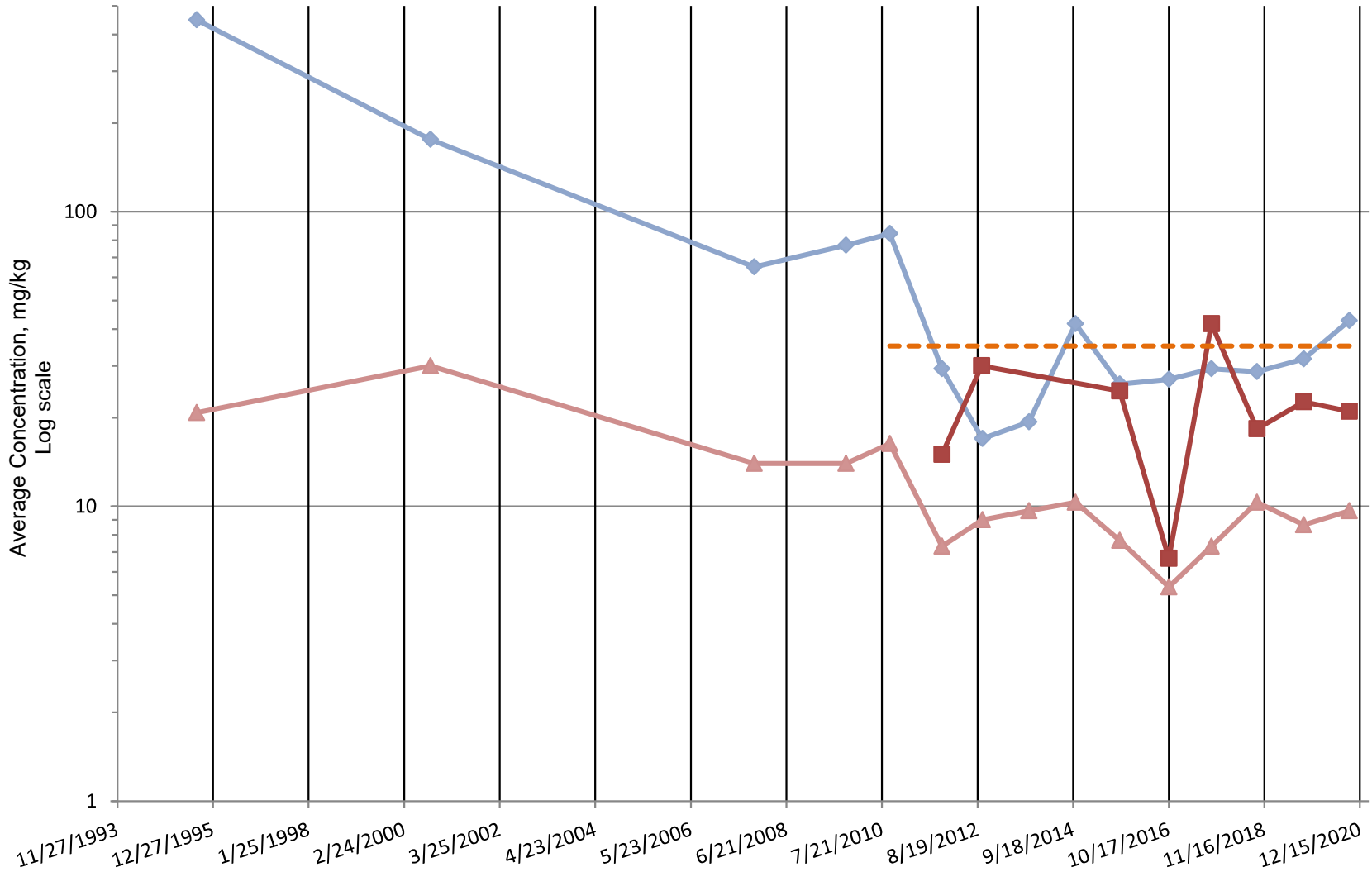
GOLDER

FIGURE **4-3c**

IN-STREAM SEDIMENTS - BUCKTAIL CREEK, AVERAGE TOTAL COPPER CONCENTRATION

BMSG/ 2020 Monitoring Report/ID

943-1595-011.3066



GOLDER

LEGEND

- SFSED-01
- SFSED-04
- SFSED-02
- As Cleanup Level (35 mg/kg)

FIGURE **4-4a**

IN-STREAM SEDIMENTS - SOUTH FORK BIG DEER CREEK, AVERAGE TOTAL ARSENIC CONCENTRATION

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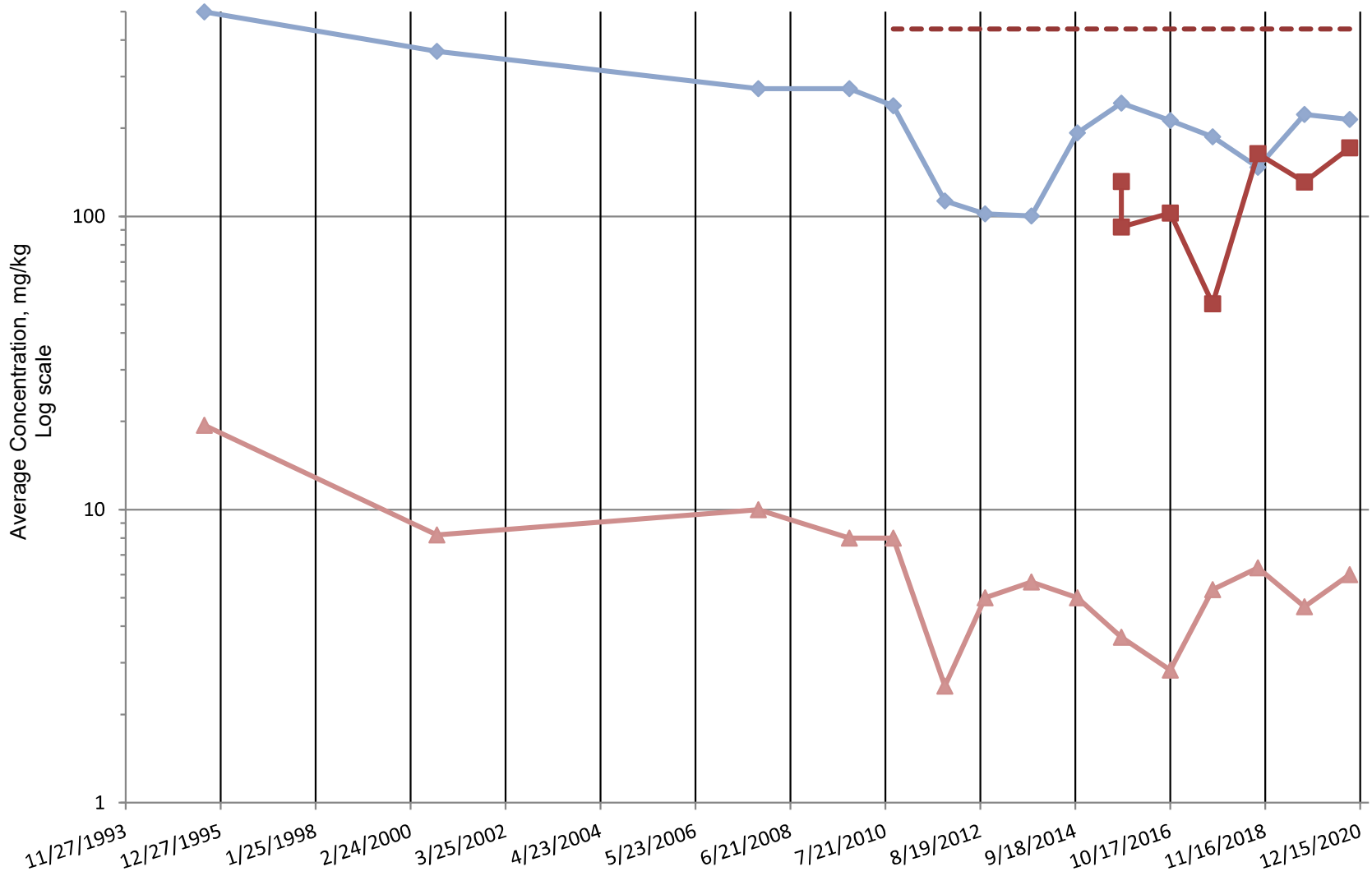
943-1595-011.3066



GOLDER

LEGEND

- SFSED-01
- SFSED-04
- SFSED-02
- Co Cleanup Level (436 mg/kg)

FIGURE **4-4b**

IN-STREAM SEDIMENTS - SOUTH FORK BIG DEER CREEK, AVERAGE TOTAL COBALT CONCENTRATION

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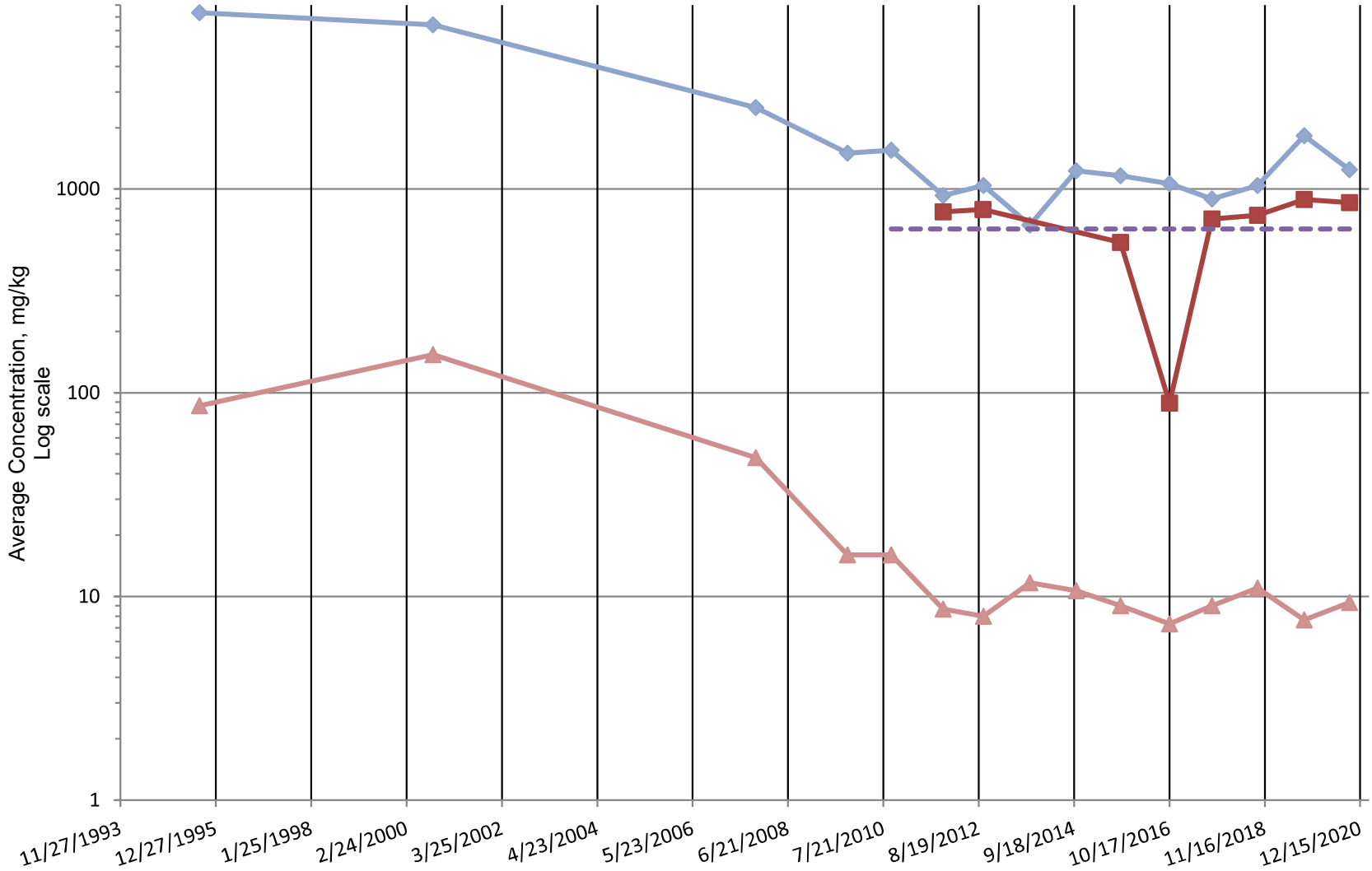
943-1595-011.3066



GOLDER

LEGEND

- SFSED-01
- SFSED-04
- SFSED-02
- Cu Cleanup Level (637 mg/kg)

FIGURE **4-4c**

IN-STREAM SEDIMENTS - SOUTH FORK BIG DEER CREEK, AVERAGE TOTAL COPPER CONCENTRATION

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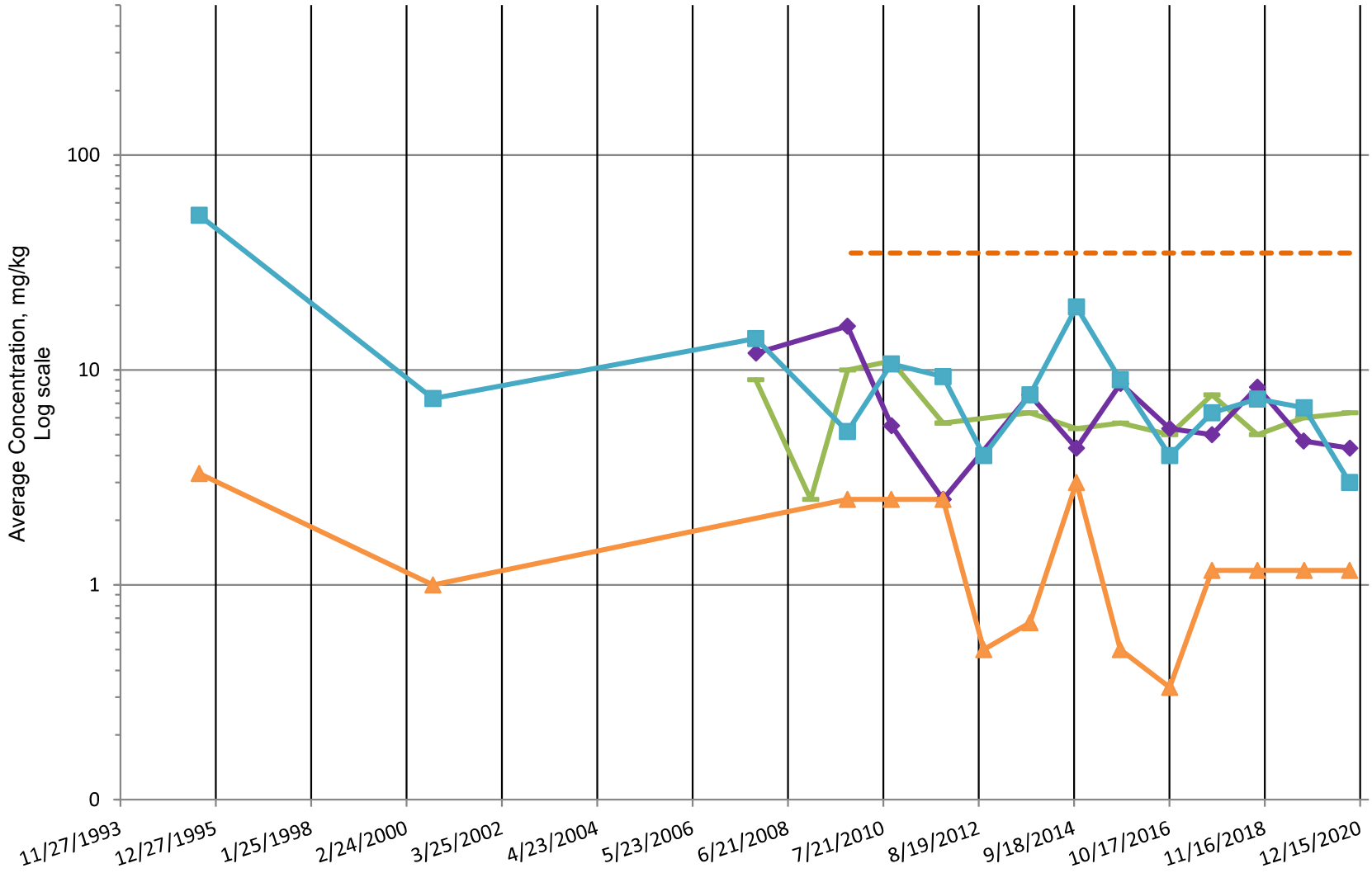
943-1595-011.3066

Table 4-2_and_Figure 4-1a-c to Figure 4-5a-c_011321.xlsx

Golder Associates



LEGEND

- BDSED-01
- BDSED-02
- BDSED-03
- BDSED-04
- As Cleanup Level (35 mg/kg)

GOLDER

FIGURE **4-5a**

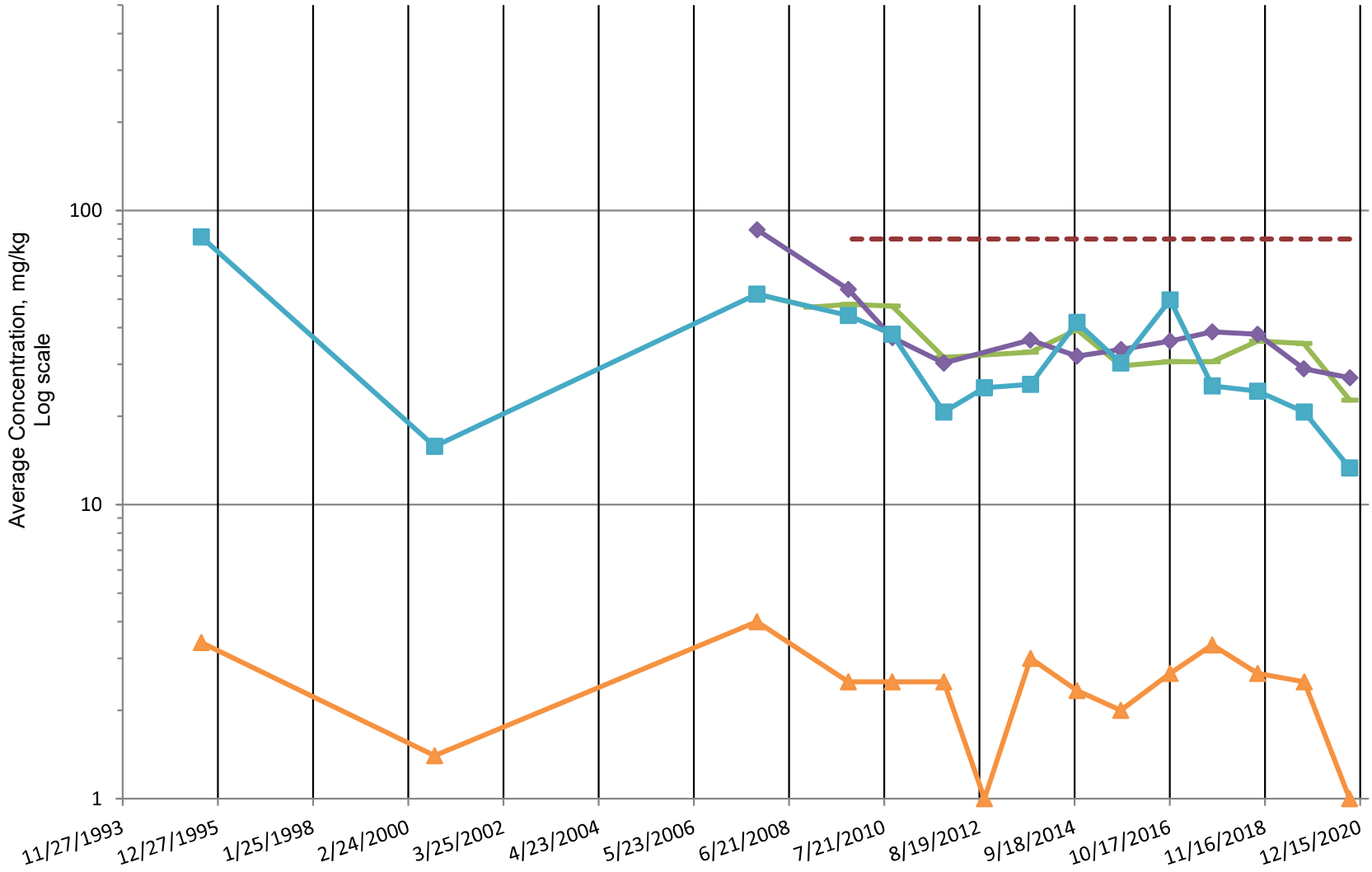
IN-STREAM SEDIMENTS - BIG DEER CREEK, AVERAGE TOTAL ARSENIC CONCENTRATION

BMSG/ 2020 Monitoring Report/ID

943-1595-011.3066

Table 4-2_and_Figure 4-1a-c to Figure 4-5a-c_011321.xlsx

Golder Associates



GOLDER

LEGEND

- BDSED-01
- BDSED-02
- BDSED-03
- BDSED-04
- Co Cleanup Level (80 mg/kg)

FIGURE **4-5b**

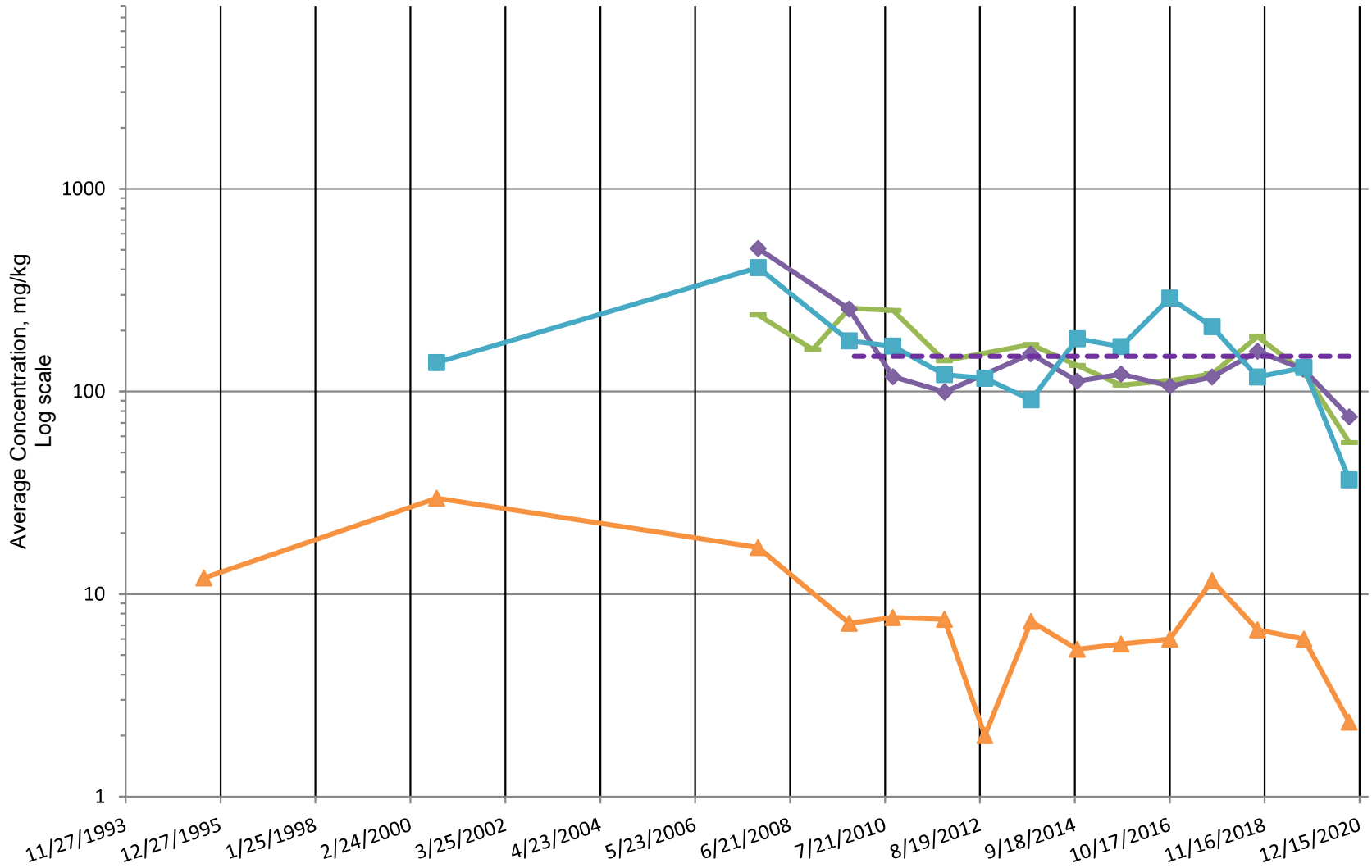
IN-STREAM SEDIMENTS - BIG DEER CREEK, AVERAGE TOTAL COBALT CONCENTRATION

BMSG/ 2020 Monitoring Report/ID

943-1595-011.3066

Table 4-2_and_Figure 4-1a-c to Figure 4-5a-c_011321.xlsx

Golder Associates



LEGEND

- BDSED-01
- BDSED-02
- BDSED-03
- BDSED-04
- Cu Cleanup Level (149 mg/kg)

GOLDER

FIGURE **4-5c**

IN-STREAM SEDIMENTS - BIG DEER CREEK, AVERAGE TOTAL COPPER CONCENTRATION

BMSG/ 2020 Monitoring Report/ID

943-1595-011.3066

APPENDIX A

2020 Meteorology and Hydrology

REPORT

Appendix A

2020 Meteorology and Hydrology

Submitted to:

Blackbird Mine Site Group

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943-1595-011.3066

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List of Acronyms and Abbreviations

°C	Celsius
BMSG	Blackbird Mine Site Group
EPA	United States Environmental Protection Agency
cfs	cubic feet per second
Golder	Golder Associates Inc.
msl	mean sea level
NRCS	National Resource Conservation Service
PMP	Performance Monitoring Plan
POR	period of record
RI	Remedial Investigation
SNOTEL	Snowpack Telemetry
SWE	snow water equivalent
USDA	United States Department of Agriculture
USGS	United States Geological Survey

1.0 METEOROLOGY, SNOWPACK, AND HYDROLOGY

This section provides a summary of the meteorological, snowpack, and hydrological data collected in 2020. Figures A-1 through A-4 provide the snowpack and meteorological data. Figures A-5 through A-9 summarize the flows obtained from transducer readings or the United States Geological Survey (USGS) gages along with manual flow measurements. Tables A-1 through A-4 summarize the data collected at BDSW-03 and BTSW-01 as well as the rating curves for BDSW-03. No rating curve was calculated for BTSW-01 because a weir equation was used to calculate flows from the transducer.

1.1 Meteorology

Meteorological conditions at the Blackbird Mine site during 2020 are reported using the representative Snowpack Telemetry (SNOTEL) site at Morgan Creek operated by the United States Department of Agriculture (USDA) National Resources Conservation Service (NRCS). Meteorological data recorded at the mine site was compared to the Morgan Creek SNOTEL data and review indicated the values in the two datasets were similar. The use of the Morgan Creek SNOTEL meteorological data was agreed upon by the United States Environmental Protection Agency (EPA), Blackbird Mine Site Group (BMSG), State, and Trustees to be an acceptable surrogate for site meteorological data.

During the 2019/2020 winter season, temperature data were recorded at the Morgan Creek SNOTEL site. Average minimum and maximum temperatures reported at Morgan Creek SNOTEL were generally comparable to historical averages at the Blackbird Mine site. Based on nine years of temperature data (1951 to 1960) at the Blackbird Mine site, the historical average minimum and maximum temperatures for January are -15 degrees Celsius (°C) and -3.9°C and the average minimum and maximum for July are 5.6°C and 23.9°C (ERT 1982). The average Morgan Creek minimum and maximum temperatures in January were -9.85°C and -1.06°C, which were both warmer than historic average. In addition, the average minimum temperature in July (6.00°C) was above the historical average while the average maximum temperature in July (21.74°C) was below the average maximum of the historic 1950s period of reference. Figure A-1 illustrates minimum, maximum, and average daily air temperatures in comparison to the period of record (POR) 7-day average minimum and maximum temperatures at Morgan Creek.

More than half of the total precipitation in this region falls during the winter and spring months with an average annual precipitation at the mine site (based on a nine-year period) of 20 inches (ERT 1982). The highest daily mean precipitation generally occurs in June, while the lowest occurs in September. In 2020, the highest mean daily precipitation occurred in June and the lowest occurred in August. Figure A-2 illustrates precipitation at the Morgan Creek SNOTEL site during the 2020 water year.

1.2 Snowpack

The Blackbird Mine snow course site has been sampled annually since 1995. The snow course site is located east of the Blacktail Pit (behind the “Bone Yard”) at approximately 7,900 feet mean sea level (msl) in elevation. The Morgan Creek SNOTEL station is located at an elevation of 7,600 feet msl and data recorded at this site has historically correlated well with snow course data recorded at the Blackbird Mine. This data is included graphically in Figures A-3 and A-4. In 2020, the snowpack measurements (snow water equivalent [SWE]) at the Morgan Creek station were higher than the Blackbird Mine snow course by an average of 1.1 inches. The 2020 peak-measured snow pack at Blackbird Mine was 8.5 inches, while at Morgan Creek the peak was 9.8 inches, which was 84% of the average annual peak (or maximum) of the daily SWE for the period of 1981 to 2020 (11.7 inches,

Figure A-3). In summary, the SWE at Morgan Creek was slightly higher than that measured at the Blackbird Mine and was below the historical average annual peak.

1.3 Hydrology

The Blackbird Mine Site is drained primarily by two streams: Bucktail Creek to the north, which is part of the Big Deer Creek basin; and Meadow Creek to the south, which is part of the Blackbird Creek basin. Both Blackbird Creek and Big Deer Creek discharge to Panther Creek, one of seven major tributaries to the Salmon River.

Stream gauging has been conducted from 1995 through 2020 as part of Early Action, Remedial Investigation (RI; Golder 2001), and post RI activities at stations along Blackbird Creek, Panther Creek, South Fork Big Deer Creek, and Big Deer Creek. Stream gauging was conducted during the 2020 sampling events when conditions allowed flows to be safely measured. The goal of stream gaging is to evaluate metals loading from streams, whose source areas discharge to Big Deer Creek and Panther Creek. Fixed gauging stations (with transducers and data loggers) were established at several locations to obtain continuous flow measurements. Stream gage stations consist of a staff gage for manual water-level measurements, a stilling basin to house a pressure transducer for continuous water-level measurements, and a data logger to collect and store the pressure transducer data.

The USGS established two flow monitoring stations at the Site – BBSW-02 (USGS 13306336) and PASW-09 (USGS 13306370). These gages began operation on November 4, 2011. Safety concerns in recent monitoring years required additional considerations and revised flow measurement requirements (Golder 2020). Flow data included in this report at BBSW-02 and PASW-09 were recorded at the USGS stations. The USGS decommissioned the station at BBSW-02 at the beginning of July with data being collected through June 30, 2020. At PASW-09, the USGS flow records are used for all sampling events. Streamflow records at PASW-09 extend from January through December 2020, but data through late March are estimated daily mean flows and data from July through December are provisional daily mean flows or marked as “Ice” (Figure A-8). Per the project Performance Monitoring Plan (PMP), the USGS gage at BBSW-02 was to be used to document flows for BBSW-01A for monthly sampling events and this was completed for the March, May and June events. However, flow records at BBSW-01A were not recorded for the remaining monthly events (i.e., July through November) in 2020. A manually measured flow at BBSW-01A was completed during the spring synoptic sampling event, per the PMP.

The PMP includes all sampling and flow monitoring details. The PMP was updated as a 2019 revision of the PMP (PMP– 2019 Revision) and includes some additional safety considerations and revised flow measurement requirements.

Flow measurements were taken in accordance with the requirements outlined in the PMP revisions. Application of safety considerations by the sampling crews and / or exceptions to PMP flow monitoring requirements are as follows:

- Synoptic sampling on Bucktail/Big Deer Creeks: May 5 at PASW-05 and PASW-04X (unsafe conditions); May 28 at PASW-05 and PASW-04X (unsafe conditions).

Streamflow measurements were collected at the Blackbird Mine beginning approximately in June through mid-October of 2020 at two BMSG operated gauging stations. The BMSG operated stations include one location on Lower Bucktail Creek (BTSW-01) and one location on Big Deer Creek (BDSW-03). During 2020, transducer instrumentation malfunction at BDSW-03 and BTSW-01 was realized during the initial deployment in early May 2020 and required offsite instrumentation troubleshooting. Therefore, reinstallation was delayed until early June

2020, and data collection for the average daily hydrograph commenced after the peak runoff had already occurred. USGS gages 13306336 at BBSW-02 and 13306370 at PASW-09 replaced the gauging stations that were previously maintained by BMSG. All stream gauging locations are shown in Figure 1-1 of the attached 2019 Monitoring Report. Transducers recorded water depth for the following periods:

- BTSW-01: June 11 through October 21, 2020.
- BBSW-02 (USGS 13306336): January 1 through June 2020, upon decommissioning late June 2020.
- BDSW-03: June 11 through October 21, 2020.
- PASW-09 (USGS 13306370): Year-Round, conditions permitting.

Hydrographs of mean daily flows were produced for BBSW-02, BTSW-01, BDSW-03, and PASW-09 for the dates when useable data were available. In June 2019, the BTSW-01 transducer was replaced, and a new transducer was installed and set to correspond with the v-notch weir elevation. In 2020, this transducer had an average 0.01 foot offset from the staff gage based on two days in September 2020 where the data could be compared to a manual measurement from the same time (Figure A-9).

At BDSW-03 a beaver dam located immediately downstream resulted in elevated measured stage in late 2019 and as of mid-May 2020 the beaver dam was still in place. Later during the fall of 2020, additional beaver activity was observed downstream, further disrupting reliable manual flow and stage data collection for the monitoring year. Although a rating curve for BDSW-03 was developed from manual flow measurements recorded in 2018 through 2019, this rating curve was not utilized or updated because the two data points collected in September 2020 were impacted by the beaver activity (Figure A-6). A comparison between the transducer and manual gage heights resulted in an average offset of -0.05 feet (the transducer reads a slightly higher surface elevation than the staff gage). Measured discharge data was plotted against transducer gage height to show relative seasonal variation in flows as an alternative to presenting a hydrograph (Figure A-7).

1.4 Hydrologic Review

The Panther Creek hydrograph from PASW-09 shows that peak seasonal stream flow occurred on May 31, 2020 with a peak recorded discharge of 799 cubic feet per second (cfs) (Figure A-8). The highest manually recorded flow on Big Deer Creek was 87.8 cfs on May 26, 2020 (Figure A-7). Event-driven peak discharges were observed to occur potentially (as Big Deer peak may not have been captured) within days of each other for Big Deer Creek and Panther Creek and appear to be driven by both precipitation events and periods of higher temperatures. Historically, the annual peak flow occurred within a few days of each other on Panther and Big Deer Creeks, with annual peak flows in Big Deer Creek occurring later than Panther Creek.

Morgan Creek snowmelt concluded in the beginning of May, approximately 27 days before the Panther Creek annual peak stream flow occurred on May 31, 2020. Snowpack measurements (as SWE) at the Blackbird Mine snow course (Figure A-3) followed a similar trend to Morgan creek snowpack and corresponded to peak stream flows between Blackbird and Panther Creeks.

The 2020 Big Deer Creek hydrograph did not capture the peak. Historically the drainage has a double peak that has been attributed to later season precipitation events but may also be associated with Big Deer Creek having a contributing basin area at higher elevations. Blackbird Peak, which is part of the basin area, is above 9,000 feet. Higher basin elevations thereby extend the snowmelt period as compared with both the Blackbird Mine and

Morgan Creek stations. Similar lagging and prolonged snow melt have been observed when comparing measurements between the Blackbird snow course site and the Morgan Creek SNOTEL station.

During April, May and June, the average temperatures were 1.06°C, 5.97°C, and 9.07°C, respectively (Figure A-1). The available data suggest that the measured peak stream flows were driven by a combination of rainfall and snowmelt for Panther Creek and Blackbird Creek. Panther Creek was observed to have a double peak runoff and it appears that as temperatures dropped between early May and early June 2020 additional snow precipitation occurred at higher elevations (Figure A-8). Being lower in elevation, Blackbird Creek basin appears to have experienced these precipitation events as rain and had a corresponding single peak in the runoff hydrograph (Figure A-5). A comparison of Big Deer Creek to Panther and Blackbird Creeks runoff hydrographs could not be made as the BDSW-03 transducer was installed after the peak event.

2.0 REFERENCES

Environmental Research and Technology (ERT). 1982- Final Environmental Impact Statement, Blackbird Cobalt-Copper Project, Salmon National Forest, Lemhi County Idaho. Salmon, Idaho. Prepared by Environmental Research & Technology, Inc. for U.S. Forest Service, Salmon National Forest, Region 4.

Golder Associates Inc. (Golder). 2001. Blackbird Mine Site Remedial Investigation Report – Lemhi County, Idaho (2 volumes). Prepared for the Blackbird Mine Site Group, November 2001.

Golder. 2020. Performance Monitoring Plan – 2019 Revision. Blackbird Mine Site, Lemhi County, Idaho. Submitted to Blackbird Mine Site Group, January 10.

Tables

Table A-1: Station BDSW-03 Summary

Date	Time	Gage height (feet)	Transducer depth (feet)	Stream flow (cfs)	Offset (feet)	Notes
7/30/1995	10:20	4.56	1.78	25.78	-2.78	install data logger and staff gage
8/23/1995	11:10	4.32	1.51	10.46	-2.81	
9/19/1995	15:06	4.23	1.42	8.47	-2.81	
11/1/1995	13:00	4.15	1.33	6.56	-2.82	
5/30/1996	12:40	5.48	2.56	116.45	-2.92	
6/27/1996	15:40	5.39	2.52	104.64	-2.87	
7/16/1996	14:55	4.78	1.90	33.30	-2.88	
9/4/1996	16:11	4.20	1.34	12.22	-2.86	
10/22/1996	11:30	4.20	1.32	10.85	-2.88	
4/29/1997	14:15	4.81	1.95	40.61	-2.86	
7/1/1997	11:00	5.09	2.38	84.23	-2.71	
7/1/1997	11:25	5.09	2.37	82.19	-2.72	
7/29/1997	16:00	P	1.72	24.44	#VALUE!	
9/9/1997	15:40	4.20	1.35	11.17	-2.85	
10/8/1997	13:10	4.20	1.35		-2.85	problem with current meter
4/15/1998	14:40	4.16		9.82		
5/27/1998	9:45	5.23		93.68		no transducer data 5/7/98 to 6/19/98
6/23/1998	15:30	5.22	2.34	82.47	-2.88	swaffer intermittently recording half counts
7/22/1998	14:30	4.49	1.60	22.38	-2.89	delayed trans recovery, after recov trans=1.62
9/17/1998	10:30	4.19	1.30	11.76	-2.89	no comments
10/12/1998	16:00	4.17	1.28	8.66	-2.89	field book indicates s.g.=1.17, should be 4.17
10/17/1998	14:15	4.15		10.05		synopsis, station closed
5/5/1999	16:35	4.67	1.78	20.33	-2.89	transducer installed (4.67/4.66, 1.78/1.79)
5/28/1999	16:45	5.94	3.14	205.00	-2.80	(5.94 +/- 0.1) too swift, flow = SF01+BD04+50gpm
8/13/1999	15:00	4.36	1.48	15.85	-2.88	Storm Event Sampling
9/22/1999	18:45	4.14	1.33	8.34	-2.81	Fall Synoptic Sampling
4/6/2000	11:00	4.40	1.23	15.84	-3.17	
4/27/2000	17:00	4.7	1.54	27.24	-3.16	entered in field book as 0.70
4/28/2000	12:00	4.98	1.79		-3.19	transducer reset (reset offset)
4/28/2000	12:20	4.98	2.07		-2.91	
5/3/2000	10:00	5.19	2.28	85.43	-2.91	
5/16/2000	19:50	4.87	1.98	42.31	-2.89	Spring synoptic
5/18/2000	8:00	5.23	2.34	90.41	-2.89	
5/23/2000	13:00	5.58	2.69	128.81	-2.89	read 5.58 to 5.6
5/23/2000	16:00	5.59	2.67	150.76	-2.92	
5/23/2000	20:00	5.59	2.68	140.96	-2.91	
5/24/2000	0:15	5.6	2.71		-2.89	read 5.60 to 5.61 (jumping)
5/24/2000	4:00	5.62	2.7	158.95	-2.92	read 5.62 to 5.63
5/24/2000	8:00	5.58	2.68	138.37	-2.90	read 5.56 to 5.60 (jumping)
5/24/2000	12:00	5.58	2.66	140.99	-2.92	
9/19/2000	18:20	4.12		6.99	-4.12	transducer burned in fire
5/1/2001	15:40	4.95	1.89		-3.06	
5/17/2001	17:30	5.25	2.16	89	-3.09	
7/19/2001	12:05	4.26	1.19		-3.07	
9/20/2001	15:40	4.14	1.05	7.47	-3.09	
4/10/2002	12:23:00	4.56	1.46		-3.10	
5/21/2002	15:22	5.90	2.8		-3.10	collected by p. conrecode
5/21/2002	17:00	5.60	2.77	45.92	-2.83	collected by j. ford
6/20/2002	14:50	5.30	2.27		-3.03	
9/19/2002	14:37		-1.05	8.82	-1.05	trans data looks anomalous - omitted
4/11/2003	12:30			23.365		no gage reading
4/23/2003	12:50			43.346		no gage reading
6/16/2003	12:00	4.64	1.11	71.283	-3.53	New gage installed
6/17/2003	12:20	4.63	1.09	69.65	-3.54	
9/23/2003	12:15	3.98	0.45	8.295	-3.53	
4/8/2004	9:40	4.39		38.22		no transducer data
4/14/2004	12:30	4.39		42.12		no transducer data
4/21/2004	12:10	4.22		26.7		no transducer data
4/28/2004	13:55	4.4		45.14		no transducer data
5/5/2004	12:15	4.75		90.689		no transducer data
5/19/2004	13:35	4.59		69.3		no transducer data
5/26/2004	11:00	4.65		69.258		no transducer data
6/2/2004	10:50	4.64		68.752		no transducer data
6/9/2004	10:40	4.68		83.07		no transducer data
6/15/2004	12:30	4.56	1.00	59.361	-3.56	
9/24/2004	9:00			14.068		no gage data
3/21/2005	10:00	3.98		9.54		no transducer. data before 3/21/2005 11:07
3/22/2005	13:30	3.95	0.49		-3.46	
4/27/2005	11:45	4.3	0.8		-3.50	
5/9/2005	17:35	4.53	1.02	61.59	-3.51	
5/18/2005	12:30	4.7	1.21		-3.49	
5/25/2005	13:30	4.85	1.31	91.55	-3.54	
9/14/2005	10:45	4		10.47		no transducer data
5/2/2006	13:20	5.06	1.337	79.41	-3.72	
5/23/2006	8:30	5.3	1.598	183.32	-3.70	
5/30/2006	11:55	4.75	0.976	92.52	-3.77	
10/20/2006	14:15	4.1	0.36	11.9	-3.74	
4/25/2007	13:10	4.37	0.68	25.6	-3.69	
5/8/2007	13:05	4.62	0.92	55.34	-3.70	
5/21/2007	15:45	4.86	1.12	87.64	-3.74	
10/8/2007	14:15	0.8	0.37	10.43	-0.43	
5/15/2008	12:00	4.95	1.02	56.87	-3.93	
5/30/2008	14:25	5.12	1.47	124.8	-3.65	
6/4/2008	15:40		1.41	135.29		no gage data
6/12/2008	11:20	4.8	1.63	78.2	-3.17	
6/19/2008	12:30	5.24	1.62	138.53	-3.62	
6/24/2008	13:50	5.1	1.52	130.45	-3.58	

Table A-1: Station BDSW-03 Summary

Date	Time	Gage height (feet)	Transducer depth (feet)	Stream flow (cfs)	Offset (feet)	Notes
6/25/2008	13:50	4.98	1.44	96.71	-3.54	
9/30/2008	15:20	4.07	0.51	7.94	-3.56	
4/24/2009	10:50	1.39	0.03	60.4	-1.36	
4/29/2009	15:00	1.16	0.95	34.13	-0.21	
5/14/2009	14:30	1.31	1.10	35.01	-0.21	
5/21/2009	8:45	2.47	2.35	203.56	-0.12	
6/2/2009	14:00	2.68	2.30	176.7	-0.38	
9/29/2009	14:20	0.88	0.61	10.43	-0.27	
4/7/2010	12:55	0.83	0.65	6.81	-0.18	
4/7/2010	15:10	0.89	0.68	6.81	-0.21	
4/13/2010	13:05	0.89	0.67	6.43	-0.22	
4/19/2010	13:00	1.06	0.83	18.87	-0.23	
4/27/2010	13:20	1.31	1.09	33.73	-0.22	
5/6/2010	14:00	1.17	0.94	20.25	-0.23	
5/11/2010	16:05	1.19	0.96	15.31	-0.23	data appear anomalous - omitted from rating curve
5/13/2010	13:00	1.17	0.94	11.25	-0.23	data appear anomalous - omitted from rating curve
5/19/2010	12:15	1.82	1.61	82.61	-0.21	
5/26/2010	14:40	1.44	1.23	47.74	-0.21	
6/4/2010	13:25	2.23	2.09	134.83	-0.14	
6/8/2010	15:10	2.35	2.13	142.65	-0.22	
6/15/2010	14:40	2.00	1.89	127.06	-0.11	data appear anomalous - omitted from rating curve
8/5/2010	12:55	1.00	0.76	16.8	-0.24	
9/22/2010	15:55	0.93	0.69	11.65	-0.24	
4/26/2011	11:15	1.02		18.13		no transducer data
5/3/2011	13:10	1.07	0.83	20.74	-0.24	
5/10/2011	12:35	1.41	1.18	23.97	-0.23	potentially anomalous
5/17/2011	11:50	2.35	2.02	128.25	-0.33	
6/14/2011	14:35	2.78	2.42	236.81	-0.36	
9/20/2011	15:10	0.88	0.63	13.72	-0.25	
9/23/2011	13:50	0.86	0.62	15.06	-0.24	
10/12/2011	13:00	0.90	0.59	14.25	-0.31	
11/8/2011	14:50	0.95		15.85		no transducer data
4/4/2012	10:15	0.92	0.52	13.38	-0.40	
4/10/2012	10:45	0.90	0.50	13.33	-0.40	
4/18/2012	10:30	1.09	0.68	21.56	-0.41	
4/25/2012	10:20	2.02	1.68	95.17	-0.34	
5/2/2012	14:00	1.52	1.09	61.01	-0.43	data appear anomalous - omitted from rating curve
5/16/2012	12:50	2.34	1.88	82.36	-0.46	data appear anomalous - omitted from rating curve
5/23/2012	16:50	2.25	1.86	88.13	-0.39	data appear anomalous - omitted from rating curve
6/6/2012	13:35	2.25	1.76	128.74	-0.49	data appear anomalous - omitted from rating curve
6/14/2012	10:35	1.80	1.36	76.67	-0.44	
7/12/2012	11:30	1.04	0.60	25.98	-0.44	
9/20/2012	15:25	0.79	0.35	8.66	-0.44	
9/25/2012	7:35	0.81	0.36	9.00	-0.45	
10/10/2012	13:20	0.81	0.37	8.46	-0.44	
4/3/2013	10:15	0.94	0.54	6.93	-0.40	
4/10/2013	10:15	0.91	0.56	18.63	-0.35	
4/17/2013	10:15	0.89	0.46	15.90	-0.43	
4/24/2013	11:15	0.87	0.50	13.15	-0.37	
5/1/2013	11:45	1.13	0.72	28.11	-0.41	
5/9/2013	13:00	1.82	1.41	75.16	-0.41	
5/13/2013	14:00	2.55	2.13	146.74	-0.42	data appear anomalous - omitted from rating curve
5/15/2013	12:25	2.45	1.82	149.02	-0.63	
5/22/2013	11:00	1.80	1.41	89.76	-0.39	
5/29/2013	13:30	1.55	1.16	65.66	-0.40	
6/5/2013	9:50	1.49	1.14	64.32	-0.35	
6/12/2013	9:55	1.52	1.18	69.54	-0.34	
7/15/2013	14:40		0.53	17.91		no gage height recorded
10/9/2013	15:00	1.00	0.60	17.70	-0.40	
11/11/2013	12:30	0.96	0.47	10.92	-0.49	
4/2/2014	10:05	0.90	-0.02	12.73	-0.92	
4/9/2014	10:00	1.06	0.65	20.93	-0.41	
4/16/2014	9:30	1.20	0.79	49.99	-0.41	data appear anomalous - omitted from rating curve
4/23/2014	10:35	1.43	1.05	54.70	-0.38	
4/30/2014	13:30	1.25	0.80	35.72	-0.45	
5/7/2014	9:30	1.81	1.46	92.63	-0.35	
5/14/2014	13:20	1.51	1.10	62.71	-0.41	
5/20/2014	14:30	2.30	1.80	139.20	-0.50	
6/4/2014	10:30	2.80	2.05	194.80	-0.75	
9/15/2014	12:40	0.89	0.45	12.32	-0.44	
10/2/2014	14:50	0.89	0.45	12.43	-0.44	
4/1/2015	9:45	1.19		38.68		no transducer data
4/8/2015	9:55	1.06		24.81		no transducer data
4/15/2015	10:05	1.00		21.25		no transducer data
4/22/2015	13:30	1.20		42.29		no transducer data
4/29/2015	15:10	1.29		44.72		no transducer data
5/6/2015	14:00	1.80		94.27		no transducer data, data appear anomalous - omitted from rating curve
5/12/2015	12:50	1.62		59.29		no transducer data
5/20/2015	13:00	1.81	2.23	88.55	0.42	
5/27/2015	13:20	1.97	2.33	95.23	0.36	data appear anomalous - omitted from rating curve
6/3/2015	9:50	1.80	2.26	90.79	0.46	
6/10/2015	9:20	1.55	2.04	68.42	0.49	
6/17/2015	9:30	1.21	1.73	36.79	0.52	
9/9/2015	12:00	0.80	0.51	8.75	-0.29	
10/2/2015	9:20	0.87	0.55	8.13	-0.32	
4/6/2016	10:10	1.02		20.74		no transducer data
4/13/2016	9:55	1.58		71.95		no transducer data

Table A-1: Station BDSW-03 Summary

Date	Time	Gage height (feet)	Transducer depth (feet)	Stream flow (cfs)	Offset (feet)	Notes
4/20/2016	12:20	1.42		48.05		no transducer data
4/27/2016	11:30	1.48		57.39		no transducer data
5/4/2016	12:15	1.60		68.97		no transducer data
5/10/2016	12:30	2.05		111.70		no transducer data
5/18/2016	12:40	1.95		105.20		no transducer data
5/25/2016	12:00	1.58		76.50		no transducer data
6/1/2016	7:00	1.70	1.32	81.05	-0.38	
6/8/2016	9:50	2.00	1.59	112.50	-0.41	
6/15/2016	9:30	1.41	1.06	53.09	-0.35	
6/22/2016	9:40	1.27	0.85	35.78	-0.42	
9/13/2016	11:00	0.88	0.49	8.98	-0.39	
10/5/2016	15:00	0.85	0.51	9.76	-0.34	
4/3/2017	10:00	1.14	0.78	24.00	-0.36	transducer data is first reading of the year from 4/4/2017 at 1:37 PM
4/10/2017	9:55	1.18	0.79	25.92	-0.39	
4/17/2017	12:25	1.12	0.80	27.26	-0.32	
4/24/2017	14:50	1.23	0.89	36.82	-0.34	
5/1/2017	9:50	1.18	0.82	30.49	-0.36	
5/9/2017	13:50	2.20	1.80	138.20	-0.40	
5/15/2017	12:15	2.10	1.73	136.00	-0.37	
5/22/2017	9:30	1.68	1.32	83.01	-0.36	
5/29/2017	9:50	2.55	1.99	166.40	-0.56	
6/12/2017	13:45		0.52	109.50		gage and transducer decommissioned
6/19/2017	10:00	1.42	0.01	121.40		gage replaced, no transducer data
9/25/2017	12:35	0.53	0.50	12.99	-0.03	Transducer reestablished with new offset
10/2/2017	10:50	0.56	0.52	14.75	-0.04	
4/9/2018	10:30	0.72		20.71		No transducer data, not yet re-installed
4/23/2018	14:30	1.00	0.88	42.32	-0.12	
5/8/2018	13:45	2.20	1.78	165.80	-0.42	
5/14/2018	13:40	1.55	1.34	119.57	-0.21	
5/21/2018	13:30	2.45	1.94	240.70	-0.51	
6/4/2018	13:45	1.70	1.46	138.90	-0.24	
6/11/2018	14:10	1.58	1.42	107.20	-0.16	
6/18/2018	10:00	1.25	1.16	82.29	-0.09	
9/24/2018	12:20	0.53	0.40	10.72	-0.13	
10/1/2018	11:00	0.50	0.40	11.67	-0.10	
4/1/2019	9:55			22.15		no gage height recorded
4/28/2019	21:30	1.00				no data collected for most of spring
4/29/2019	12:30	0.98		50.90		no transducer data available for offset calculation
4/29/2019	7:05	1.00				
4/29/2019	21:15	0.96				
4/30/2019	14:10	0.97				
4/30/2019	21:15	0.97				
4/30/2019	7:05	0.98				
5/1/2019	14:05	0.98				
5/1/2019	21:05	0.95				
5/1/2019	7:10	0.98				
5/2/2019	7:05	0.91				
5/2/2019	14:10	0.88				
5/12/2019	14:20	1.25				
5/12/2019	21:10	1.42				
5/13/2019	9:00	1.59		119.70		no transducer data available for offset calculation
5/13/2019	21:05	1.68				
5/13/2019	14:20	1.62				
5/14/2019	21:05	1.87				
5/14/2019	7:00	1.75				
5/14/2019	14:25	1.65				
5/15/2019	7:10	1.95				
5/15/2019	14:10	1.88				
5/15/2019	21:05	1.92				
5/16/2019	7:05	1.90				data collection with new Level TROLL 500 logger 6/14 - 11/6/19, although it appears data collection stops ~10/17/19
9/23/2019	14:30	0.92		8.88		beaver dam likely disrupted transducer data
9/23/2019	9:50	0.88				
9/24/2019	15:30	1.60				
9/24/2019	10:00	1.57				
9/25/2019	9:50	1.99				
9/25/2019	15:20	1.20				
9/26/2019	14:20	2.18				
9/26/2019	10:00	2.14				
5/5/2020	15:20			66.51		no transducer data until 6/11/2020
5/7/2020	14:05			66.81		
5/26/2020	11:45			87.76		
9/9/2020	12:20	1.00	1.02	11.72	-0.02	beaver activity interfered with surface water elevation data in fall 2020
9/21/2020	15:30	1.02	1.06		-0.04	
9/21/2020	10:05	1.03	1.06		-0.03	
9/22/2020	13:20	0.95	1.04		-0.09	
9/22/2020	9:55	0.99	1.03		-0.04	
9/23/2020	14:25	0.98	1.02		-0.04	
9/23/2020	9:50	0.98	1.02		-0.04	
9/24/2020	14:05	0.97	1.02	9.60	-0.05	
9/24/2020	9:40	0.97	1.01		-0.04	
9/28/2020	12:00	0.98	1.07	9.22	-0.09	

Table A-2: Rating Curves for Station BDSW-03

2020 Flow								
Date	Time	Gage height, g (feet)	Measured flow (cfs)	Fitted flow q=c(g-a)^r (cfs)	c= a= r=		F Test= R= Chi-test=	
9/24/2020	14:05	0.97	9.6	NA	See Note 1			
9/28/2020	12:00	0.98	9.2	NA	See Note 1			
9/9/2020	12:20	1.00	11.7	NA	See Note 1			

1. Consistent beaver activity near the staff gage and transducer makes the rating curve unreliable.
No curve was generated for 2020.

2018-2019 Flow								
Date	Time	Gage height, g (feet)	Measured flow (cfs)	Fitted flow q=c(g-a)^r (cfs)	c= a= r=	87.71418 0.345 1.27	F Test= R= Chi-test=	0.96961 0.98784 0.4544
10/1/2018	11:00	0.50	11.67	8.20				
9/24/2018	12:20	0.53	10.72	10.27				
4/1/2019	9:55	0.72	20.71	25.21				
4/29/2019	12:30	0.98	50.90	49.24				
4/23/2018	14:30	1.00	42.32	51.22				
6/18/2018	10:00	1.25	82.29	77.25				
5/14/2018	13:40	1.55	119.57	111.15				
6/11/2018	14:10	1.58	107.20	114.68				
5/13/2019	9:00	1.59	119.70	115.86				
6/4/2018	13:45	1.70	138.90	129.02				
5/8/2018	13:45	2.20	165.80	192.30				
5/21/2018	13:30	2.45	240.70	225.81				
Fall 2017 Flow								
Date	Time	Gage height, g (feet)	Measured flow (cfs)	Fitted flow q=c(g-a)^r (cfs)	c= a= r=	49.98508 0.372 0.73	F Test= R= Chi-test=	0.99970 1.00000 0.9999
10/2/2017	10:50	0.56	14.75	14.75				
9/25/2017	12:35	0.53	12.99	12.99				
2014 - Spring 2017 Flow								
Date	Time	Gage height, g (feet)	Measured flow (cfs)	Fitted flow q=c(g-a)^r (cfs)	c= a= r=	83.38337 0.722 1.18	F Test= R= Chi-test=	0.99244 0.99711 0.9952
9/9/2015	12:00	0.8	8.75	4.08				
10/5/2016	15:00	0.85	9.76	7.33				
10/2/2015	9:20	0.87	8.13	8.70				
9/13/2016	11:00	0.88	8.98	9.40				
9/15/2014	12:40	0.89	12.32	10.10				
10/2/2014	14:50	0.89	12.43	10.10				
4/2/2014	10:05	0.90	12.73	10.82				
4/9/2014	10:00	1.06	20.93	23.10				
4/17/2017	12:25	1.12	27.26	28.03				
4/10/2017	9:55	1.18	25.92	33.09				
5/1/2017	9:50	1.18	30.49	33.09				
6/17/2015	9:30	1.21	36.79	35.68				
4/24/2017	14:50	1.23	36.82	37.41				
4/30/2014	13:30	1.25	35.72	39.16				
6/22/2016	9:40	1.27	35.78	40.92				
6/15/2016	9:30	1.41	53.09	53.57				
4/23/2014	10:35	1.43	54.7	55.42				
5/14/2014	13:20	1.51	62.71	62.91				
6/10/2015	9:20	1.55	68.42	66.71				
5/22/2017	9:30	1.68	83.01	79.28				
6/1/2016	7:00	1.70	81.05	81.24				
6/3/2015	9:50	1.80	90.79	91.17				
5/7/2014	9:30	1.81	92.63	92.17				
5/20/2015	13:00	1.81	88.55	92.17				
6/8/2016	9:50	2.0	112.5	111.52				
5/15/2017	12:15	2.1	136	121.93				
5/9/2017	13:50	2.2	138.2	132.48				
5/20/2014	14:30	2.3	139.2	143.16				
5/29/2017	9:50	2.55	166.4	170.39				
6/4/2014	10:30	2.8	194.8	198.32				

Table A-2: Rating Curves for Station BDSW-03

2020 Flow								
Date	**Time**	**Gage height, g (feet)**	**Measured flow (cfs)**	**Fitted flow q=c(g-a)^r (cfs)**	**c= a= r=**		**F Test= R= Chi-test=**	
9/24/2020	14:05	0.97	9.6	NA	See Note 1			
2009 - 2013 Flow								
Date	**Time**	**Gage height, g (feet)**	**Measured flow (cfs)**	**Fitted flow q=c(g-a)^r (cfs)**	**c= a= r=**	**38.24205 0.327 1.89**	**F Test= R= Chi-test=**	**0.93420 0.98942 0.4342**
9/20/2012	15:25	0.79	8.66	8.89				
9/25/2012	7:35	0.81	9	9.64				
10/10/2012	13:20	0.81	8.46	9.64				
4/7/2010	12:55	0.83	6.81	10.41				
9/23/2011	13:50	0.86	15.06	11.61				
4/24/2013	11:15	0.87	13.15	12.03				
9/29/2009	14:20	0.88	10.43	12.45				
9/20/2011	15:10	0.88	13.72	12.45				
4/13/2010	13:05	0.89	6.43	12.88				
4/7/2010	15:10	0.89	6.81	12.88				
10/12/2011	13:00	0.9	14.25	13.32				
4/10/2012	10:45	0.9	13.33	13.32				
4/10/2013	10:15	0.91	18.63	13.76				
4/4/2012	10:15	0.92	13.38	14.21				
9/22/2010	15:55	0.93	11.65	14.67				
4/3/2013	10:15	0.94	6.93	15.13				
11/8/2011	14:50	0.95	15.85	15.60				
11/11/2013	12:30	0.96	10.92	16.08				
8/5/2010	12:55	1	16.8	18.06				
10/9/2013	15:00	1	17.7	18.06				
4/26/2011	11:15	1.02	18.13	19.09				
7/12/2012	11:30	1.04	25.98	20.14				
4/19/2010	13:00	1.06	18.87	21.23				
5/3/2011	13:10	1.07	20.74	21.78				
4/18/2012	10:30	1.09	21.56	22.90				
5/1/2013	11:45	1.13	28.11	25.23				
4/29/2009	15:00	1.16	34.13	27.04				
5/6/2010	14:00	1.17	20.25	27.66				
4/27/2010	13:20	1.31	33.73	37.00				
5/14/2009	14:30	1.31	35.01	37.00				
5/26/2010	14:40	1.44	47.74	46.80				
6/5/2013	9:50	1.49	64.32	50.86				
6/12/2013	9:55	1.52	69.54	53.37				
5/29/2013	13:30	1.55	65.66	55.94				
6/14/2012	10:35	1.8	76.67	79.55				
5/22/2013	11:00	1.8	89.76	79.55				
5/19/2010	12:15	1.82	82.61	81.61				
5/9/2013	13:00	1.82	75.16	81.61				
4/25/2012	10:20	2.02	95.17	103.53				
6/4/2010	13:25	2.23	134.83	129.17				
5/17/2011	11:50	2.35	128.25	145.02				
6/8/2010	15:10	2.35	142.65	145.02				
5/15/2013	12:25	2.45	149.02	158.89				
6/2/2009	14:20	2.68	176.7	193.03				
6/14/2011	14:35	2.78	236.81	208.85				

Table A-2: Rating Curves for Station BDSW-03

2020 Flow								
Date	**Time**	**Gage height, g (feet)**	**Measured flow (cfs)**	**Fitted flow q=c(g-a)^r (cfs)**	**c= a= r=**		**F Test= R= Chi-test=**	
9/24/2020	14:05	0.97	9.6	NA	See Note 1			
2003 - 2008 Flow								
Date	**Time**	**Gage height, g (feet)**	**Measured flow (cfs)**	**Fitted flow q=c(g-a)^r (cfs)**	**c= a= r=**	**91.01232 3.81 1.44**	**F Test= R= Chi-test=**	**0.93555 0.98334 0.6671**
9/23/2003	12:15	3.98	8.3	6.94				
3/21/2005	10:00	3.98	9.5	6.94				
9/14/2005	10:45	4	10.5	8.16				
10/20/2006	14:15	4.1	11.2	15.11				
4/21/2004	12:10	4.22	26.7	24.97				
7/14/2006	12:00	4.23	19.4	25.86				
4/25/2007	13:10	4.37	25.6	39.22				
4/8/2004	9:40	4.39	38.2	41.27				
4/14/2004	12:30	4.39	42.1	41.27				
4/28/2004	13:55	4.4	45.1	42.30				
5/9/2005	17:35	4.53	61.6	56.43				
6/15/2004	12:30	4.56	59.4	59.86				
5/19/2004	13:35	4.59	69.3	63.35				
6/17/2003	12:20	4.63	70.0	68.10				
6/16/2003	12:00	4.64	71.3	69.31				
5/26/2004	11:00	4.65	69.3	70.52				
6/9/2004	10:40	4.68	83.1	74.19				
5/5/2004	12:15	4.75	90.7	82.97				
5/30/2006	11:55	4.75	92.5	82.97				
5/25/2005	13:30	4.85	91.6	96.02				
6/25/2008	13:50	4.98	96.7	113.83				
6/24/2008	13:50	5.1	130.5	131.08				
5/30/2008	14:25	5.12	124.8	134.02				
6/19/2008	12:30	5.24	138.5	152.11				
5/23/2006	8:30	5.3	183.3	161.41				

Table A-2: Rating Curves for Station BDSW-03

2020 Flow								
Date	**Time**	**Gage height, g (feet)**	**Measured flow (cfs)**	**Fitted flow q=c(g-a)^r (cfs)**	**c= a= r=**		**F Test= R= Chi-test=**	
9/24/2020	14:05	0.97	9.6	NA	See Note 1			
1996-2002 Low Flow Curve								
Date	**Time**	**Gage height, g (feet)**	**Measured flow (cfs)**	**Fitted flow q=c(g-a)^r (cfs)**	**c= a= r=**	**0.00007 0.77 9.57**	**F Test= R= Chi-test=**	**0.97012 0.98491 0.72**
9/20/2001		4.14	7.47	7.37				
9/22/1999		4.14	8.34	7.37				
10/17/2009		4.15	10.05	7.58				
4/15/1998		4.16	9.82	7.80				
10/12/1998		4.17	8.66	8.02				
9/17/1998		4.19	11.76	8.48				
9/4/1996		4.20	12.22	8.72				
10/22/1996		4.20	10.85	8.72				
9/9/1997		4.20	11.17	8.72				
8/13/1999		4.36	15.85	13.48				
4/6/2000		4.40	15.84	14.99				
7/22/1998		4.49	22.38	18.94				
7/29/1997		4.50	24.44	19.44				
5/5/1999		4.67	20.33	29.76				
4/27/2000		4.7	27.24	32.02				
7/16/1996		4.78	33.30	38.82				
4/29/1997		4.81	40.61	41.69				
5/16/2000		4.87	42.31	48.00				
7/1/1997		5.09	84.23	79.11				
7/1/1997		5.09	82.19	79.11				
1996-2002 High Flow Curve								
Date	**Time**	**Gage height, g (feet)**	**Measured flow (cfs)**	**Fitted flow q=c(g-a)^r (cfs)**	**c= a= r=**	**0.00008 -1.38 7.36**	**F Test= R= Chi-test=**	**0.31744621 0.78324522 0.0000**
7/1/1997		5.09	84.23	76.12				
7/1/1997		5.09	82.19	76.12				
5/3/2000		5.19	85.43	85.21				
6/23/1998		5.22	82.47	88.12				
5/27/1998		5.23	93.68	89.10				
5/18/2000		5.23	90.41	89.10				
5/17/2001		5.25	89.00	91.11				
6/27/1996		5.39	104.64	106.25				
5/24/2000		5.58	138.37	130.24				
5/24/2000		5.58	140.99	130.24				
5/23/2000		5.59	150.76	131.62				
5/23/2000		5.59	140.96	131.62				
5/21/2002		5.60	45.92	133.02				
5/24/2000		5.62	158.95	135.85				
5/28/1999		5.94	205	188.74				

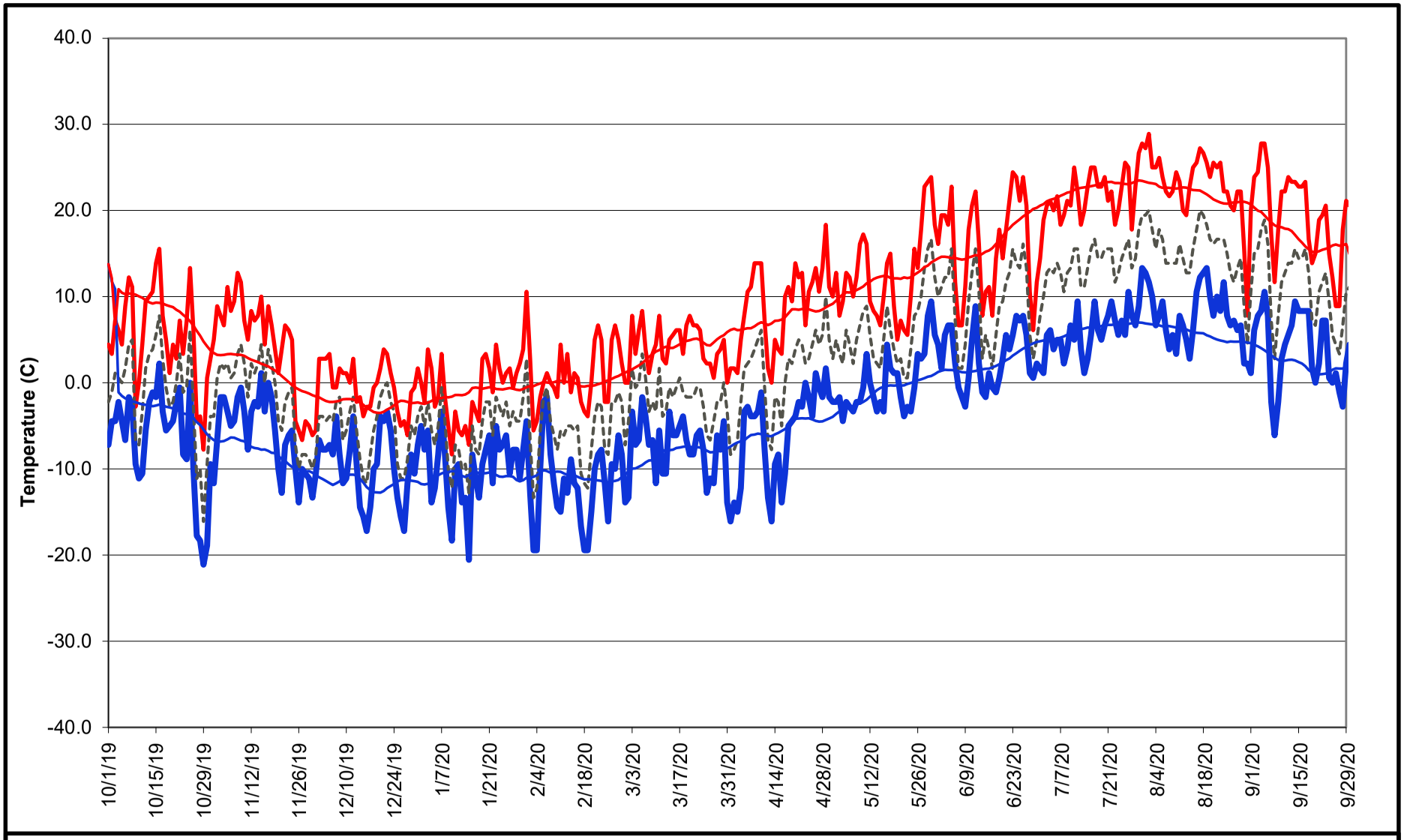
Table A-3: Station BDSW-03 2020 Gage Height and Streamflow

Date	Time	Gage height (feet)	Stream flow (cfs)
5/5/2020	15:20		66.51
5/7/2020	14:05		66.81
5/26/2020	11:45		87.76
9/9/2020	12:20	1.00	11.72
9/21/2020	15:30	1.02	
9/21/2020	10:05	1.03	
9/22/2020	13:20	0.95	
9/22/2020	9:55	0.99	
9/23/2020	14:25	0.98	
9/23/2020	9:50	0.98	
9/24/2020	14:05	0.97	9.6
9/24/2020	9:40	0.97	
9/28/2020	12:00	0.98	9.22

Table A-4: Station BTSW-01 Summary

Date	Time	Gage Height (feet)	Gage Discharge (cfs)	Transducer Depth (feet)	Transducer Discharge (cfs)	Offset (feet)	Adjusted Transducer Stage (feet)	Adjusted Transducer Discharge (cfs)	Notes
5/5/2020	1:00:00 PM	0.47	0.38	-	-	-	-	-	*No transducer data was collected*
5/26/2020	9:55:00 AM	0.59	0.77	-	-	-	-	-	*No transducer data was collected*
9/9/2020	10:25:00 AM	0.37	0.21	0.37	0.18	0.00	0.39	0.23	
9/28/2020	9:45:00 AM	0.38	0.22	0.35	0.18	0.03	0.37	0.20	
						0.01			Average Offset

Figures



LEGEND

- Maximum Temperature
- Minimum Temperature
- Average Temperature
- POR (1981-2020) 7-Day Average Min. Temperature
- POR (1981-2020) 7-Day Average Max. Temperature

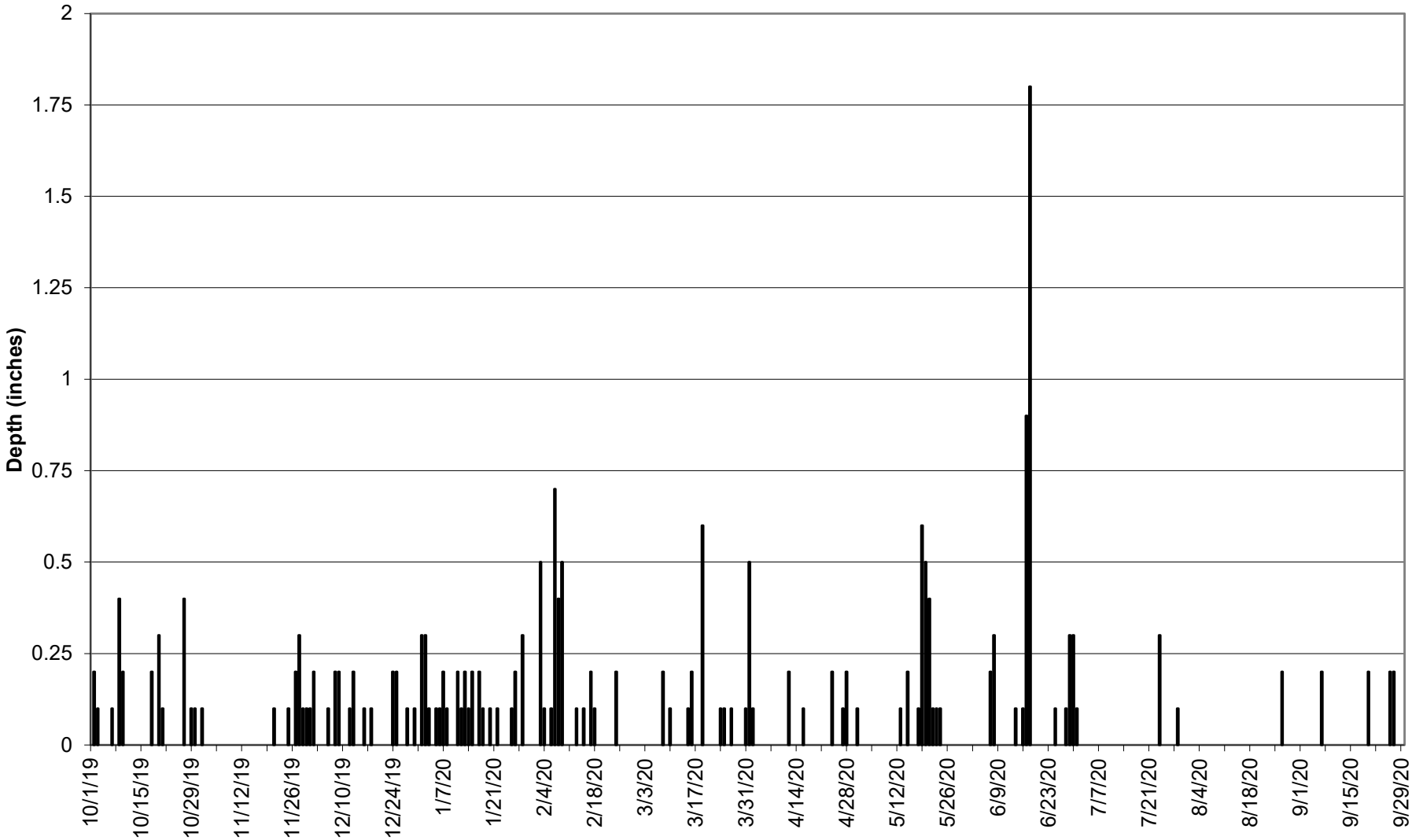
GOLDER

FIGURE **A-1**

PLOT OF MORGAN CREEK TEMPERATURES, 2020 WATER YEAR

BMSG/2020 Monitoring Report/ID

943-1595-011.3066



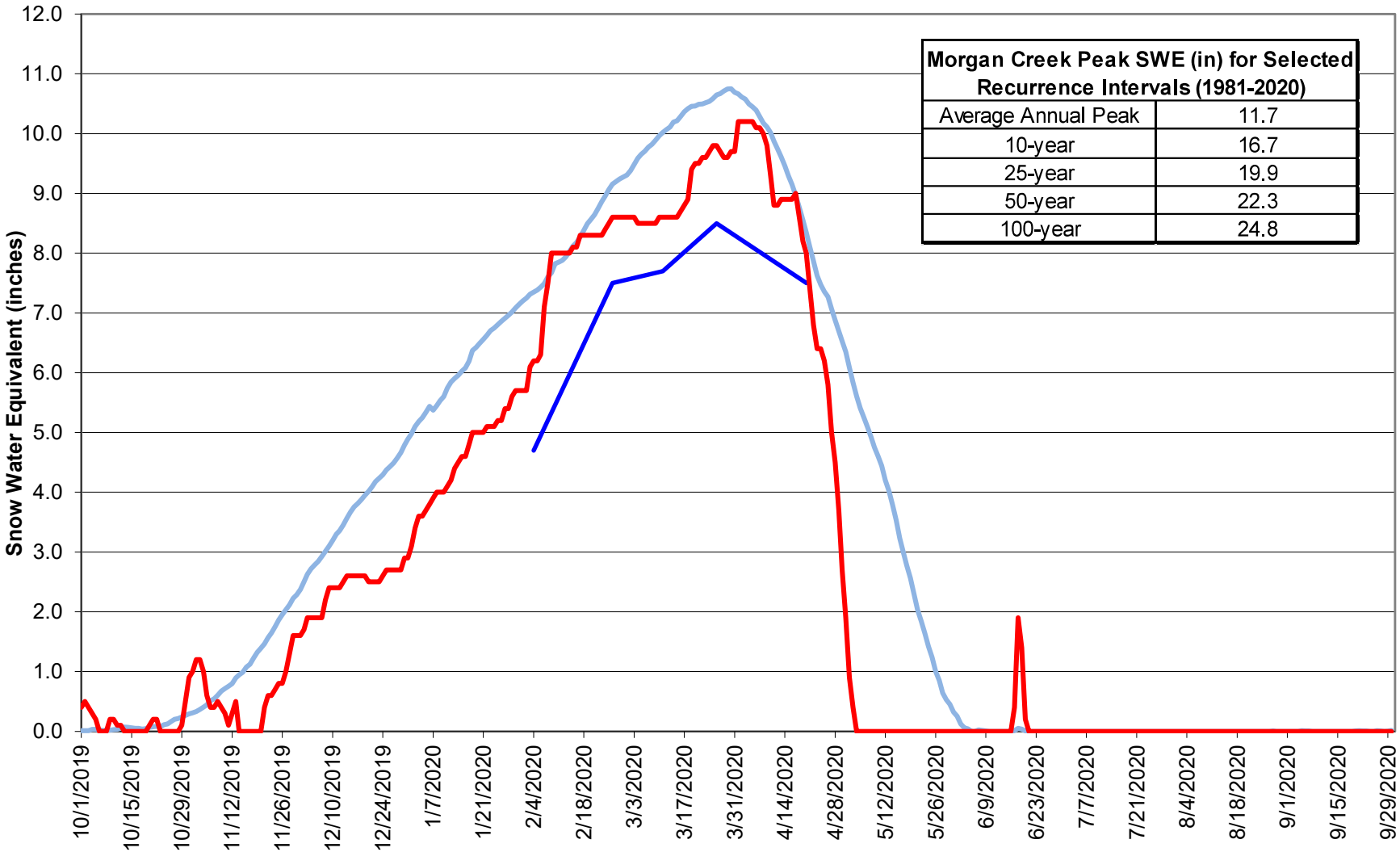
GOLDER

FIGURE **A-2**

PLOT OF MORGAN CREEK TEMPERATURES, 2020 WATER YEAR

BMSG/2020 Monitoring Report/ID

943-1595-011.3066



Morgan Creek Peak SWE (in) for Selected Recurrence Intervals (1981-2020)	
Average Annual Peak	11.7
10-year	16.7
25-year	19.9
50-year	22.3
100-year	24.8

LEGEND

- Morgan Creek SWE Average (1981 - 2020)
- Blackbird Creek
- Morgan Creek

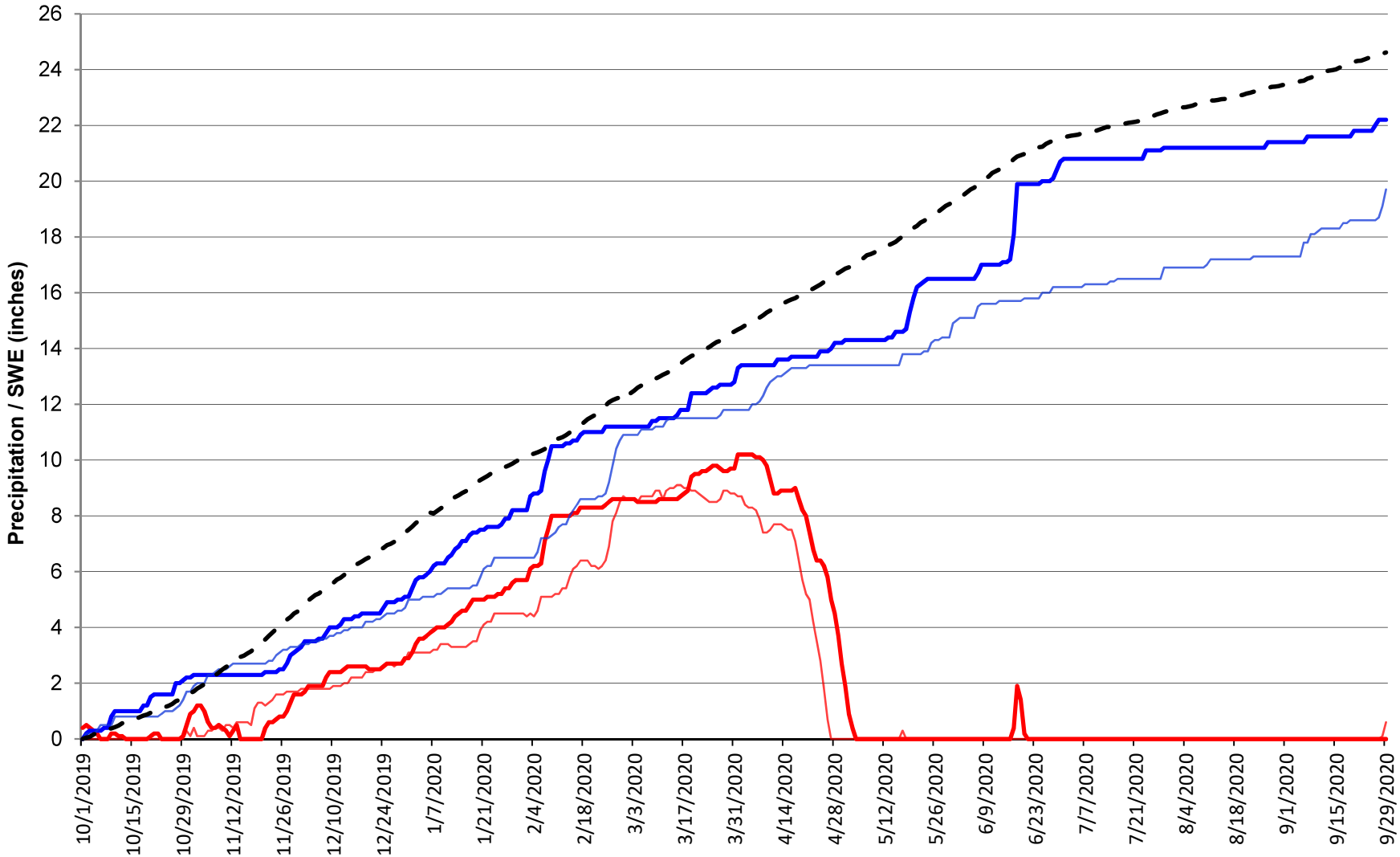
GOLDER

FIGURE **A-3**

MORGAN CREEK SNOTEL SNOW WATER EQUIVALENT
SPRING 2020 SNOW MELT

BMSG/2020 Monitoring Report/ID

943-1595-011.3066



LEGEND

- Morgan Creek SWE (2020)
- Morgan Creek SWE (2019)
- Total Precipitation (2020)
- Total Precipitation (2019)
- Average Total Precipitation (1981-2020)

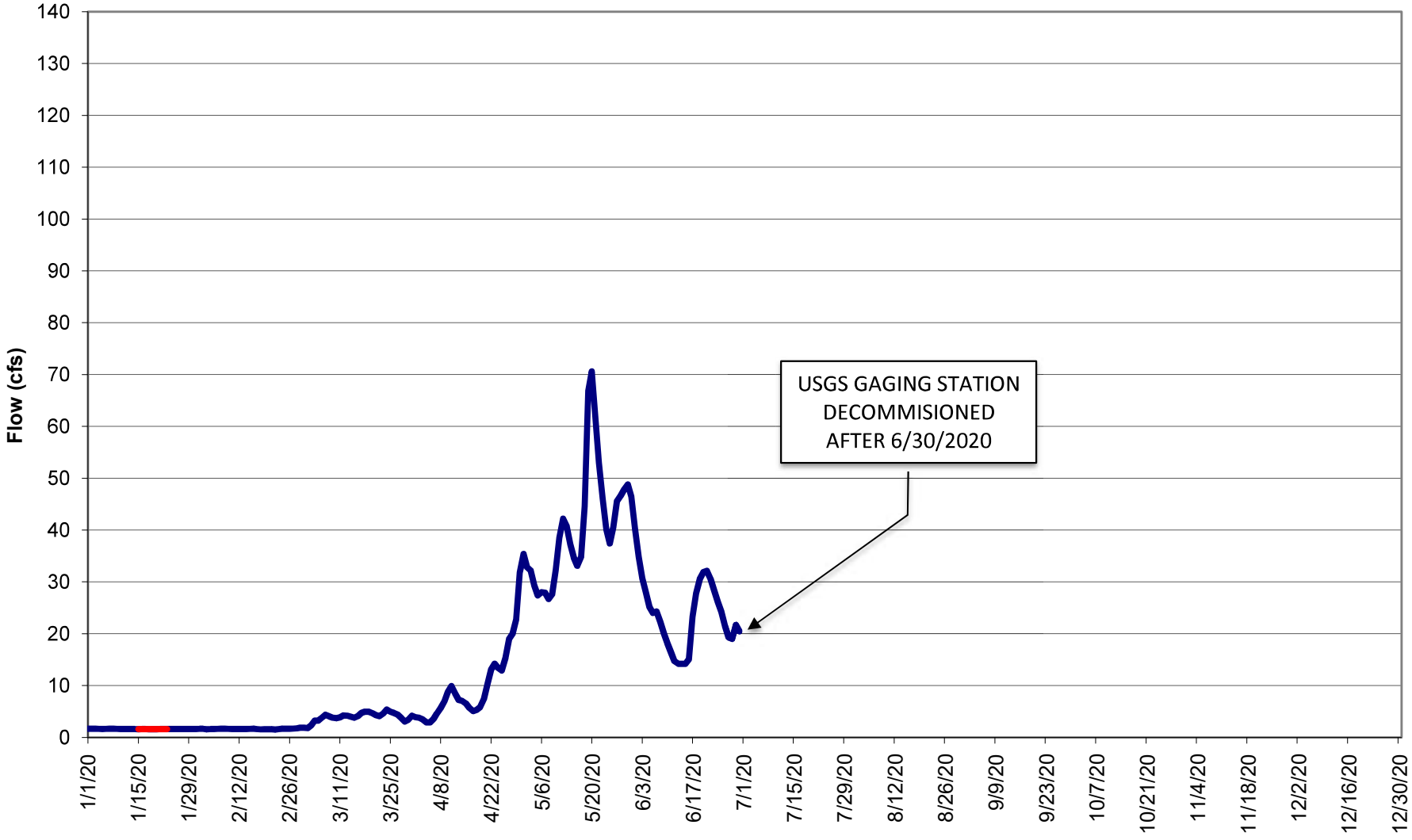
GOLDER

FIGURE **A-4**

MORGAN CREEK SNOTEL TOTAL PRECIPITATION AND SNOW WATER EQUIVALENT 2019 & 2020 WATER YEARS

BMSG/2020 Monitoring Report/ID

943-1595-011.3066



GOLDER

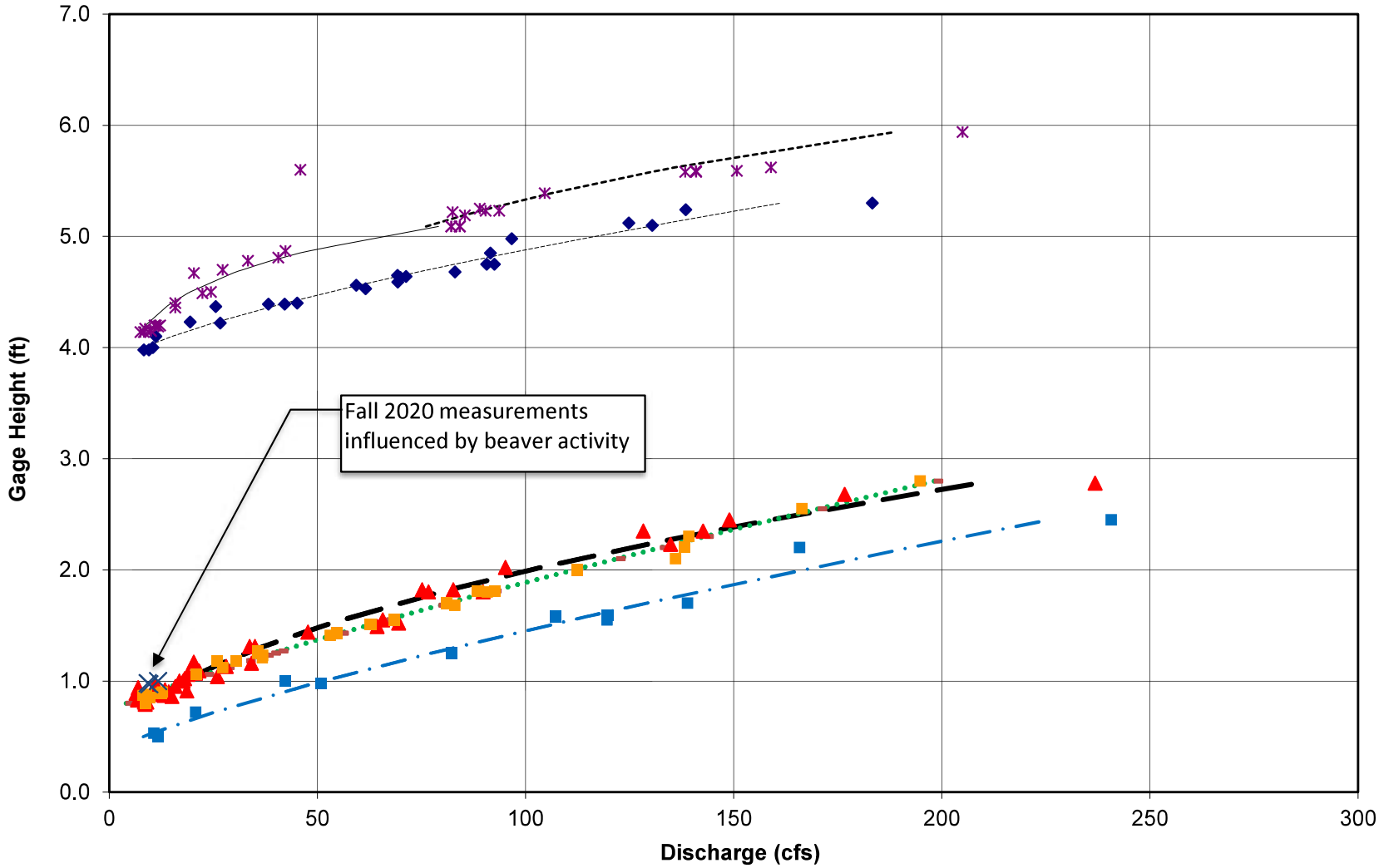
Notes:
1. Hydrograph is the calculated average daily flow available from the USGS website.
2. Some data in February are approved estimated means (calculated by USGS). Estimated values are shown in red.
3. USGS decommisioned the gaging station and data was unavailable after 6/30/2020.

FIGURE **A-5**

BBSW-02 (USGS 13306336) 2020 AVERAGE DAILY HYDROGRAPH

BMSG/2020 Monitoring Report/ID

943-1595-011.3066



LEGEND

1996-2002 Low Flow Curve	1996-2002 High Flow Curve
2003-2008 Curve	2009 - 2013 Curve
2014 - 2017 Curve	2018-2019 Curve
2020 Data (Outliers)	

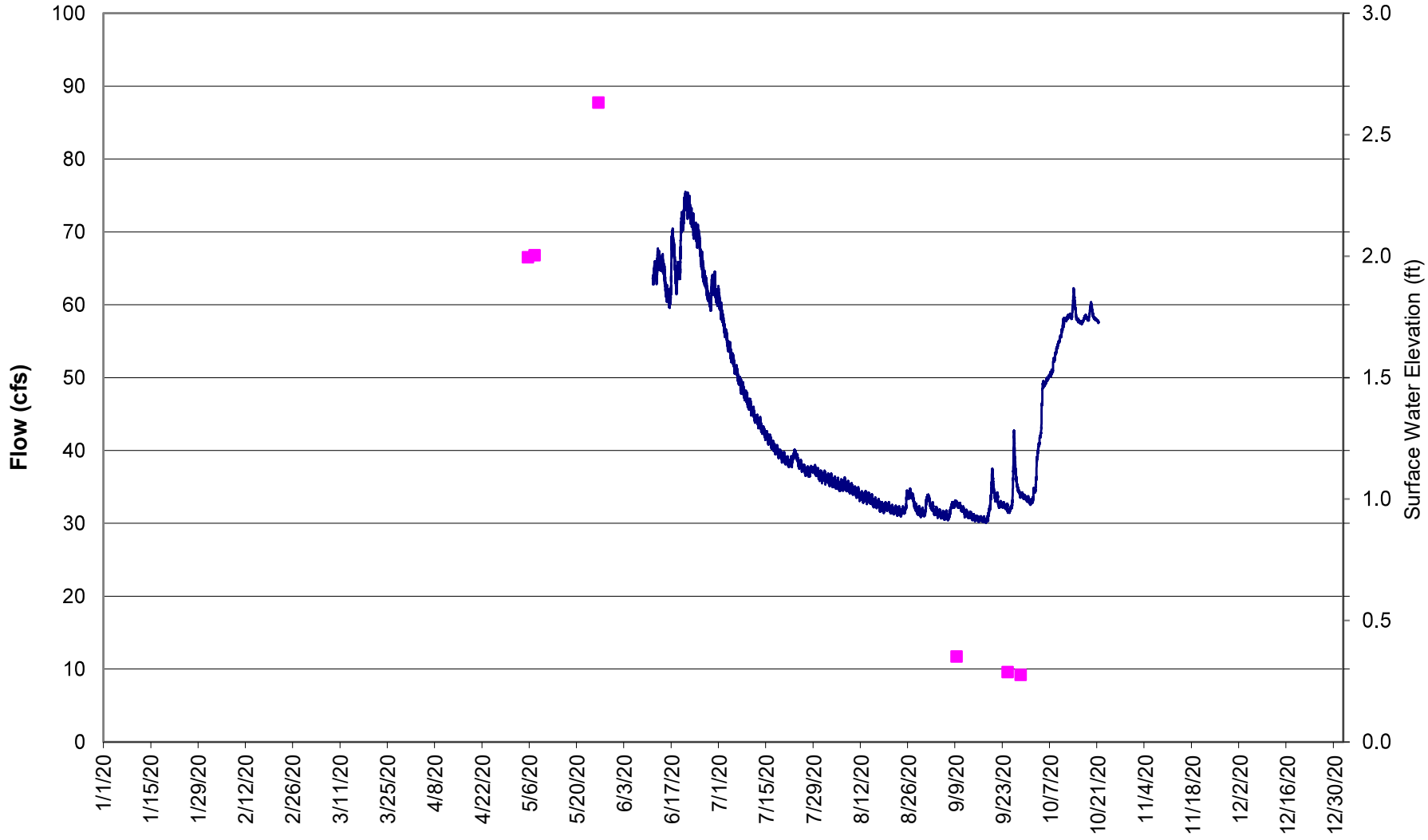
GOLDER

FIGURE **A-6**

RATING CURVE BDSW-03

BMSG/2020 Monitoring Report/ID

943-1595-011.3066



LEGEND

- Manual Stream Flow Measurement (cfs)
- Corrected Tranducer Stage Elevation (ft)

Note: Data was only collected between June and October of 2020.

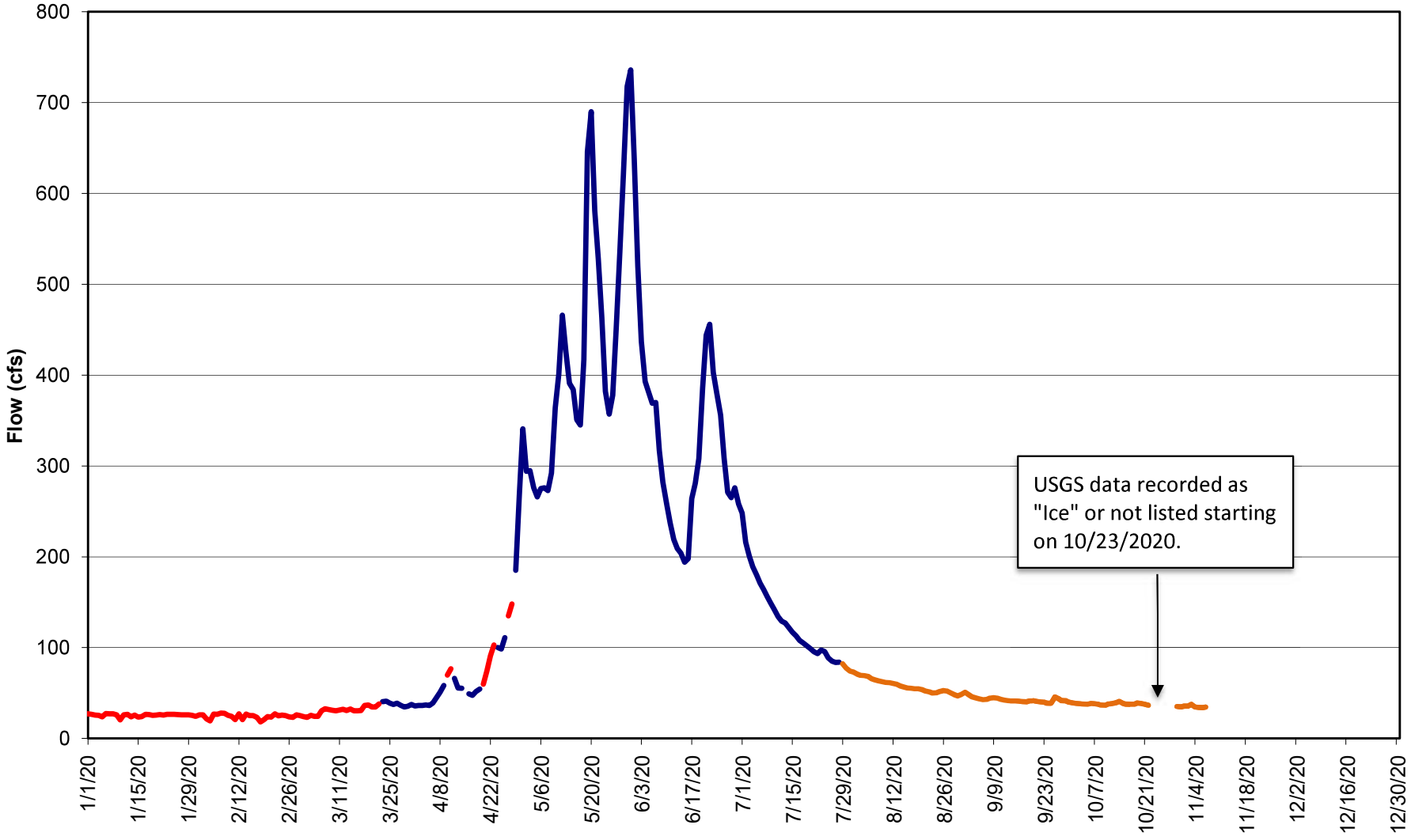
GOLDER

FIGURE **A-7**

RATING CURVE BDSW-03

BMSG/2020 Monitoring Report/ID

943-1595-011.3066



GOLDER

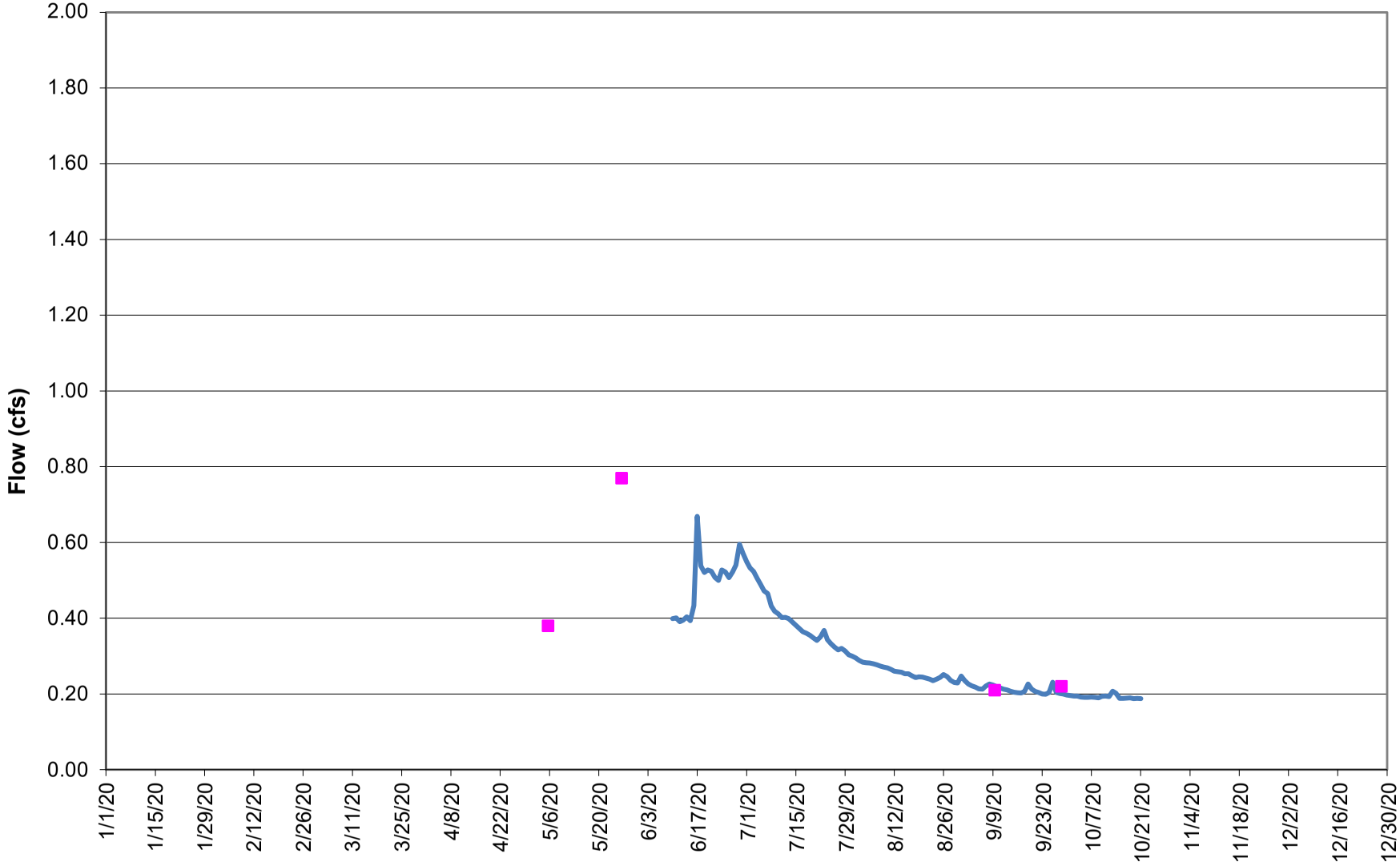
Notes:
1. Hydrograph is the calculated average daily flow available from the USGS website.
2. Data from January to late March are provisional/estimated values (calculated by USGS) and are shown in red. Data in orange were identified by USGS as provisional.

FIGURE **A-8**

PASW-09 (USGS 13306370) 2020 AVERAGE DAILY HYDROGRAPH

BMSG/2020 Monitoring Report/ID

943-1595-011.3066



LEGEND

- Offset Corrected Transducer Hydrograph
- BTSW-01 Weir Calculated Flows

GOLDER

FIGURE **A-9**

RATING CURVE BTSW-01

BMSG/2020 Monitoring Report/ID

943-1595-011.3066

APPENDIX B

2020 Data Validation Summary Assessment of Objectives and Criteria for Measurement Data

REPORT

Appendix B

2020 Data Validation Summary Assessment of Objectives and Criteria for Measurement Data

Submitted to:

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Submitted by:

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943-1595-011.3066

February 4, 2021

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FIGURES

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Figure B-1B 2020 Copper Field Control Standard Batch ‘B’ Analytical Response

Figure B-2A 2020 Cobalt Field Control Standard Batch ‘A’ Analytical Response

Figure B-2B 2020 Cobalt Field Control Standard Batch ‘B’ Analytical Response

Figure B-3A 2020 Arsenic Field Control Standard Batch ‘A’ Analytical Response

Figure B-3B 2020 Arsenic Field Control Standard Batch ‘B’ Analytical Response

List of Acronyms and Abbreviations

ºC	degrees Celsius
%R	percent recoveries
ALK-T	Total alkalinity as CaCO3
As-D, As-T	Arsenic dissolved, arsenic total
BMSG	Blackbird Mine Site Group
Co-D, Co-T	Cobalt dissolved, cobalt total
COCs	Chain of custody
Cu-D, Cu-T	Copper dissolved, copper total
DOC	dissolved organic carbon
EPA	United States Environmental Protection Agency
FCS	field control standards
Fe-D, Fe-T	Iron dissolved, iron total
FS	Feasibility Study
Golder	Golder Associates Inc.
J	estimated value
J+	estimated value with a high bias
LCS	laboratory control standards
MDL	method detection limit
mg/L	milligrams per liter
Mn-D, Mn-T	Manganese dissolved, manganese total
MS	matrix spike
MSD	matrix spike duplicate
NFG	National Functional Guidelines
PARCC	precision, accuracy, representativeness, completeness, and comparability
PMP	Performance Monitoring Plan
QC	quality control
RL	Reporting Limit
RI	Remedial Investigation
RPD	relative percent difference
QAPP	Quality Assurance Project Plan
SO4-T	Sulfate total
SDG	sample delivery group
TDS	total dissolved solids
TSS	total suspended solids
UJ	value is estimated and below the reporting limit
U	non-detect
WTP	Water Treatment Plant

1.0 INTRODUCTION

This section reports the data quality evaluation performed on the sample data generated for the 2020 Annual Monitoring Report. The process used for validating data is outlined in the Quality Assurance Project Plan (QAPP) for Performance Monitoring Field Investigations (Revision 3 [Golder 2020a]).

Both sampling and analyses were evaluated during the validation process. The Blackbird Mine Site Group (BMSG) and scientists from Salmon Environmental Services collected samples in accordance with Focused Remedial Investigation / Feasibility Study (RI/FS) Work Plan procedures (Golder 1995) and the 2019 revision of the PMP (Golder 2020b). Laboratory analyses were performed by Energy Laboratories Inc. of Billings, Montana, for monitoring well groundwater samples and for monthly or periodic (i.e. storm event), 96-hour, and synoptic surface water sampling. Energy Laboratories Inc. utilizes United States Environmental Protection Agency (EPA) Contract Laboratory Program Statement of Work, ISM01.2 procedures for metal analyses and appropriate EPA methodology for general chemistry parameters. Table B-1 provides a summary of analytical chemistry and field parameter methods, limits, precision and accuracy criteria. Sample container requirements, holding times, preservatives, and special handling are specified in Table B-2.

Data were evaluated using EPA Contract Laboratory Program National Functional Guidelines for Inorganic Data Review- Final, EPA 540-R-2017-001 (NFG; EPA 2017). Criteria for precision, accuracy, representativeness, completeness, and comparability (PARCC parameters) are monitored to ensure that the data were evaluated systematically. Precision and accuracy are assured by critical review of laboratory calibration recoveries, quality control results for laboratory duplicates and matrix spike (MS) / matrix spike duplicates (MSD), by comparison of field duplicate data, and by tracking recovery of periodic control standards. Data representativeness was achieved in the field by the determination of specific sampling locations as stated in the PMP (Golder 2020b) and collection of sample matrices appropriate for this investigation. Objectives for completeness for this investigation require 90 percent of the total number of requested determinations be valid. Rejected data may be present, but the data is not used, and results that are rejected are clearly indicated with an ‘R’ next to the data result on laboratory report pages, and summary report tables if necessary. Reporting requirements and units specified in the EPA Functional Guidelines and other applicable reference methods were used to ensure comparability of data. No 2020 data were rejected, and all of the PARCC parameter objectives were met with only minor exceptions as outlined in the following sections.

2.0 DATA QUALITY

The data evaluation completed for each sample delivery group (SDG) was recorded on individual validation checklists, which are kept in Golder Associates Inc.’s (Golder’s) archive files and provided electronically as Appendix C of the 2020 Monitoring Report. Select sample results have been qualified from the 2020 water quality laboratory data reports because of quality control deficiencies, which are identified by letter code qualifiers recorded on the data validation checklists, in the Blackbird database, and next to tabular results found within the tables for this report. Definitions of data qualifiers applied to affected samples are provided in Table B-3. A summary of qualified data for identified sample stations and analytes is provided in Table B-4.

Data quality was acceptable for every SDG associated with the 2020 laboratory data deliverables, resulting in no rejected sample results. This meets the work plan objectives for completeness for the 2020 sample collection and analysis. A total of 66 analytical results, comprising 58 separate samples were qualified as estimated (U, UJ, J, or J+) due to minor quality control deficiencies. Of these, 21 analytical results are qualified as estimated with a high bias (J+) due to a condition of method blank contamination detects in laboratory preparation blanks.

2.1 Laboratory Blanks

Laboratory blanks, and qualification of associated sample results as a result of ambient detections, are recorded on the SDG validation check-sheets, recorded in the Blackbird database, presented in report tables, and are discussed in the following paragraphs.

2.1.1 EPA Method Detection Limit Update Rule Applied

The lowering of the reporting limit (RL) for Cu-D and Cu-T (0.0001 milligrams per liter [mg/L]) occurred during the early part of the 2012 sampling season and has been the standard RL for both cobalt and copper from this period in 2012 through 2017. Over recent years there was a method detection limit (MDL) update to 40CFR Part 136 with the Definition and Procedure for the Determination of the Method Detection Limit (EPA 2016). The MDL is now defined as the minimum measured concentration of a substance that can be reported with 99 percent confidence that the measured concentration is distinguishable from method blank results. Following the MDL update guideline, Energy Laboratories Inc. will periodically update these MDLs and any resulting modifications to RLs will be summarized in the annual reporting documentation. In early 2018, Energy Laboratories Inc. followed this revised EPA procedure, which resulted in slight modifications to the RLs for Cu-D and Cu-T. For the 2020 monitoring year, the RLs for Cu-D and Cu-T were 0.0003 and 0.0008 mg/L, respectively. The MDL update did not affect RLs for any other project analytes for the 2020 monitoring period.

2.1.2 Laboratory Blank Summary

In 2020, there were 13 sample results affected by method blank contamination associated with dissolved copper (filtered; Cu-D). Although over the previous two consecutive years, in 2018 and 2019, there was no method blank contamination associated with dissolved copper detections, this analyte historically has been the most common of any associated with method blank contamination over the last approximately 10 monitoring years. The affected Cu-D results observed in 2020 are qualified as estimated with a high bias (J+) due to trace contamination in the two laboratory blanks associated with the second spring Big Deer Creek 96-hour sampling event that occurred on May 27 and 28, 2020 and the West Fork monitoring well groundwater quality annual sampling event on September 16, 2020. Two sample results are affected by method blank contamination associated with total copper (unfiltered; Cu-T) results. The observed levels of contamination associated with Cu-D and Cu-T found in preparation blanks for the 2020 events were at trace amounts at 0.0002 mg/L and 0.0004 mg/L for Cu-D, and at 0.0009 mg/L for Cu-T.

During two separate fall synoptic sampling events, a single sample result affected by contamination associated with dissolved cobalt (filtered; Co-D) was qualified as estimated with a J+, while a ‘U’ qualifier is applied to a single total cobalt (unfiltered; Co-T) result due the sample result being less than 10 times the blank contamination level. Similar to recent monitoring years, there was no method blank contamination associated with either dissolved arsenic (As-D) and total arsenic (As-T).

There were five other sampling events where three total iron results (unfiltered; Fe-T) of samples collected during separate sampling events and two total calcium results (unfiltered; Ca-T) of samples collected during two spring sampling events were all observed to be affected by method blank contamination respectively, resulting in a J+ qualifications of each result.

Contaminant levels are at low to trace levels and a trend or chronic condition of contamination is not seen for these analytes. There is no certainty that qualified results are affected by the laboratory preparation blank contamination, rather data validation guidelines require qualification to alert the data user to the potential for sample results to be impacted.

2.2 Storage Temperatures and Holding Times

Consistent with the previous three monitoring years (2017-2019), in 2020 there were no instances of samples being qualified for exceeding the industry acceptance limit for holding temperature (less than 6 degrees Celsius [ºC], but not frozen) when samples are received at the laboratory. Holding time outliers were limited for samples submitted, due to otherwise good sample handling and shipment practices. This continues to demonstrate marked improvement in sample handling and packing with no holding temperature exceedances observed over the last four monitoring years, nor were there third-party shipper issues that resulted in storage temperature or holding time exceedances.

For other inorganic analytes, qualification is warranted due to the non-preserved nature of the sample matrix. Elevated storage temperatures and short term holding time exceedances that normally do not affect metal analytes are considered to bias general chemistry parameter results; however, the direction of bias is not established. For example, pH values recorded beyond the 15 minute maximum may fluctuate, but beginning conditions do not assure an increase or decrease of pH when finally tested.

Laboratory pH analysis for 34 sample results were subject to qualification as estimated (J), since the recommended 15 minute holding period for this parameter could not be met. The laboratory pH test was requested to corroborate results from existing field pH meters, and to support implementation of a newer pH meter dedicated to select streams at the mine site. Therefore, the qualification of laboratory results was expected by the BMSG.

Laboratory pH values were compared to selected field measurements, and especially associated with synoptic events on Blackbird Creek, Bucktail, South Fork, and Big Deer Creeks. Comparisons for these locations to the field pH values recorded in field notes were generally good. Despite the lag time for laboratory analysis (two to six days in 2020), pH results from field instruments and laboratory analysis agreed within 1 pH unit for all locations. After reviewing a total of 24 pairs of field and laboratory pH values (see Tables 2-2a-h of the 2020 Monitoring Report), the average absolute difference of 0.20 pH units and average percent difference of 2.6% was observed between paired results.

2.3 Matrix Spike / Matrix Spike Duplicates & Relative Percent Difference

Laboratory batch quality control (QC) was maintained for most conditions by the application of blank spikes, continuing calibration standards, and MS / MSD analyses (quality control indicators for accuracy). When samples were subject to MS/MSD analysis, the response is unique to the sample matrix being spiked. Therefore, not all associated samples are qualified if recovery of the spike amount is out-of-limit. In 2020, there was a single sample collected during the early fall BT/SF/BD synoptic sampling event where the corresponding analytical laboratory data package reported an out-of-limit percent recovery (%R) for MS / MSD analysis. The calcium and copper concentrations resulting from the MS / MSD analysis both exceeded the acceptable %R range of 75 to 125 percent, respectively at 133% and 141%. The out of limit %R's resulted in J+ qualifications of the associated Ca-T and Cu-T results.

2.4 Laboratory Duplicates

Laboratory duplicate analysis was performed on randomly selected samples chosen by the laboratory as part of its QC regimen. Precision was acceptable and within agreement for RPD % comparisons (RPD <20%) for all laboratory duplicate analysis during 2020.

3.0 FIELD PRECISION

A summary of field duplicates associated with the 2020 sampling events, and a calculation of RPD for field duplicate pairs is provided in Table B-5. Beyond standard laboratory measures of precision, field duplicates were generated generally during each round of sampling at surface water and groundwater locations to track precision in sample collection and handling. RPD between the field duplicate pairs were within recommended guidelines of +/- 20% at 24 of 26 station events sampled, comprising 202 valid precision comparisons out of 207 comparison pairs. The following out-of-limit conditions were recorded with frequencies listed in parentheses: Cu-D (2), As-D (1), K-T (1), and NA-T (1). These outliers were observed during two separate sampling events, including the Blackbird/Panther Creek spring synoptic event on May 12 and the fall Big Deer Creek 96-hour sampling event on September 22, 2020.

A single Cu-D concentration of 0.0068 mg/L, measured at BDSW-03 on September 22 at 13:20, appears to be anomalous. The field duplicate sampled at 13:30 had a Cu-D concentration of 0.0025 mg/L and the preceding and subsequent samples collected at this location on September 22 at 09:55 and early on September 23 at 09:50 were more similar to the field duplicate concentration, with results of 0.0024 and 0.0034 mg/L, respectfully. The associated laboratory sample delivery group notes the laboratory reanalyzed the sample and confirmed the original sample result, therefore the potentially anomalous result may be attributed to isolated fugitive dust contamination during field sample collection.

Field precision was maintained during the eight monthly sampling events on the Blackbird and Panther Creek drainages, in three of the four 96-hour sampling events, during each of the monthly WTP monitoring events, during each annual groundwater monitoring events, and during all four synoptic events in the Big Deer drainage. Two field duplicate pairs did not meet field precision during the spring Blackbird Creek full synoptic event and a single field duplicate pair was out of range during the fall Big Deer 96-hour event. Out-of-limit RPDs for these field duplicate pairs ranged from 32.9 and 92.5 percent. Two field duplicate pair comparisons for K-T and Na-T at BBSW-01A and PASW-09, respectively, during the spring Blackbird Creek full synoptic event resulted in an RPD %'s of 66.7 and 40.0, however additional QC criteria was met, and field precision was deemed acceptable. Qualification of results based upon field duplicate comparisons was not applied according to historical data validation application; rather the data are reported as advisory.

4.0 ACCURACY

A summary of field control standards (FCS) submitted to the certified laboratory as an independent check of laboratory performance is provided in Table B-6. A graphical presentation of the FCS as recovery trends for dissolved Cu, Co, and As is provided in Figures B-1A through B-3B. In addition to the FCS, the laboratory tracks instrument response in each SDG with laboratory control standards (LCS or blank spikes) for all metal analyses and most general chemistry parameters. Recovery criteria for each of the LCS in all SDGs associated with the 2020 sample testing were met.

The FCS consists of a certified standard spiked with Cu, Co, and As, generated by an independent laboratory and provided with published acceptance limits. The FCS were represented by production batches 02272001.1A and 02272002.2B. The standard spike concentration for all analytes was modified slightly for the FCS batches from year to year to remove any potential analytical laboratory bias, should the laboratory become familiar with FCS analyte concentrations from previous batches. While the certification for these control standards cites a holding time of six months, metals concentrations are not known to vary significantly when holding time is exceeded. Certificates of production and accuracy for the FCS products are kept on file in Golder archives and identified with

the certified batch numbers. Batch numbers apply to the graphical representation of the certified concentrations as shown in Figures B-1A through B-3B and listed in Table B-6.

The FCS is similar in function to an LCS, subject to similar sample preparation and handling by the testing laboratory (Energy Laboratory Inc. of Billings, Montana), and analyzed just prior to client sample analyses. Therefore, it is appropriate that identical recovery acceptance limits would be applied to either type of standard. Acceptance limits (70 to 130%), as provided in Figures B-1A through B-3B and Table B-6, are based upon NFG (EPA 2017) standard limits as applied to LCS standards and broaden the published acceptance limits provided by the production laboratory (ERA of Golden, Colorado) for the FCS standards. The FCS is provided to Energy Laboratories Inc. in identical sample bottles and included with the sample delivery groups selected by the field crew. There was a total of 11 submittals of FCS for analysis throughout the 2020 surface sample collection events. FCS submittals for all analytes were tested and fell within the acceptance limits for the 2020 monitoring year.

Based upon LCS % recoveries meeting acceptance criteria, all the associated LCS data during this period was acceptable for each SDG, confirming validity of corresponding analytical results as deemed by the data validator. Therefore, no results have not been qualified for the performance evaluation.

5.0 FIELD BLANKS

A summary of field blanks prepared with the 2020 sampling events, with status of any detected quantities, is provided in Table B-7. Field blanks were generated by processing and storing commercially purchased distilled water through the same materials used for samples (filters, tubing, and bottles) at the sampling location and under field conditions. There was a total of 26 field blanks generated during the 2020 sampling events. There was a total of 11 detections found in 9 of the 26 field blanks, associated with a total of 206 analytical results. There are 4 HARD-T detects, 2 Co-D detects, 2 Ca-T detects, and single detections in both Cu-D, Cu-T, and ALK-B blank results. Field blanks are especially subject to fugitive contamination being detected at such low levels, despite the rigorous clean handling procedures used by the field crews. In 2020, the number of field blank detections decreased compared to 2019 with no observable trend in field blank contamination observed by analyte. Field blank detections will be monitored closely in future monitoring years for any associated trend. Overall, the field blank summary indicates that sample collection procedures used at Blackbird Mine drainages and wells remain effective and valid. Application of qualifiers as a result of field blank contamination was not performed according to historical data validation application, rather the data are reported as advisory.

6.0 REFERENCES

Environmental Protection Agency, United States. (EPA). 2016. USEPA Definition and Procedure for the Determination of the Method Detection Limit, Revision 2. US Environmental Protection Agency, Washington, DC. Office of Water. EPA-540-R-2017-001. December.

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Tables

Table B-1: Analytical Chemistry and Field Parameter Methods, Limits, Precision and Accuracy Requirements

Parameter	Matrix [a]	Method Reference	Reporting Limit	Method Detection Limit [l]	Precision RPD (%)	Accuracy % Recovery
Hardness	SW	SM 2340B[c]	1 mg/L as CaCO3	0.5 mg/L	<20	NA
Alkalinity	SW	EPA 310.1 [d]	4 mg/L	0.8 mg/L	<20	NA
pH	SW	A4500-H B	0.1 s.u.	NA	<20	± 0.1 pH
Arsenic, total & dissolved, & Field Control Standards[g]	SW, GW [e,f]	EPA 200.7 / 200.8[d,e]	0.001 mg/L	0.0001 mg/L	<20	75-125, (70-130 for FCS)[h]
Arsenic, by XRF	Soil, Sediment [b]	EPA 6200	100 mg/kg	NA	<35	80-120
Calcium	SW	EPA 200.7	0.5 mg/L	0.06 mg/L (total) / 0.07mg/L (dissolved)	<20	75-125
Cobalt, total & dissolved, & Field Control Standards[g]	SW,GW [e,f]	EPA 200.7 / 200.8[d,e]	0.0001 mg/L	0.0001 mg/L	<20	75-125, (70-130 for FCS)[h]
Copper, total & dissolved, & Field Control Standards[g]	SW,GW [e,f]	EPA 200.7 / 200.8[d,e]	0.0001 mg/L	0.0008 mg/L (total) / 0.0003 mg/L (dissolved)	<20	75-125, (70-130 for FCS)[h]
Arsenic, Cobalt, Copper	Soil, Sediment [b]	EPA 6010B, 3050B	1 mg/kg	0.05 mg/kg	<35	75-125
Iron, total and dissolved	SW, GW	EPA 200.7	0.03 mg/L	0.003 mg/L (total) / 0.001mg/L (dissolved)	<20	75-125
Magnesium	SW	EPA 200.7	0.5 mg/L	0.007 mg/L	<20	75-125
Manganese, total and dissolved	SW	EPA 200.7	0.001 mg/L	0.0001 mg/L	<20	75-125
Potassium, total	SW	EPA 200.7 / 200.8[d,e]	1 mg/L	0.03 mg/L	<20	75-125
Sodium, total	SW	EPA 200.7 / 200.8[d,e]	1 mg/L	0.02 mg/L	<20	75-125
Chloride	SW	EPA 300.0[d]	1 mg/L	0.02 mg/L	<20	75-125
Sulfate	SW	EPA 300.0[d]	1 mg/L	0.07 mg/L	<20	75-125

Table B-1: Analytical Chemistry and Field Parameter Methods, Limits, Precision and Accuracy Requirements

Parameter	Matrix [a]	Method Reference	Reporting Limit	Method Detection Limit [i]	Precision RPD (%)	Accuracy % Recovery
Dissolved Organic Carbon (DOC)	SW	A5310C	0.5 mg/L	0.039 mg/L	<20	75-125
TDS	SW,GW	SM 2540 C[c]	10 mg/L	3.2 mg/L	<20	NA
TSS	SW	SM 2540 D[c]	10 mg/L	0.5 mg/L	<10	NA
Field Parameters						
pH	SW, GW	EPA 150.1	NA	NA	<20	± 0.1 pH
Temperature	SW, GW	EPA 170.1	NA	NA	<20	0.1°C
Specific Conductance	SW, GW	EPA 120.1	NA	NA	<20	±10 µmhos/cm
Dissolved Oxygen	SW, GW	EPA 360.1	NA	NA	<20	±0.1 mg/l
Water Level	GW	USGS	NA	NA	NA	0.01 Ft.
Flow Rate	SW	USGS	NA	NA	NA	±5%

Notes:

[a] EPA Contract Laboratory Program, Statement of Work for Inorganic Analyses, ISM02.1.

[b] EPA 2007. Test Methods for Evaluating Solid Waste, SW-846, Third Edition, Final Updates, February, 2007, Office of Solid Waste and Emergency Response, Washington, DC 20460.

[c] StdM 2006. Standard Methods for the Examination of Water and Wastewater, 22nd Edition, American Public Health Association, Washington, DC 2005.

[d] EPA 1983. Methods for Chemical Analysis of Water and Wastes, Revised March 1983, EPA-600/4-79-020, EMSL, Cincinnati OH 45268.

[e] The laboratory has stated that all samples are tested using both the 200.7 and 200.8 methods. Data is reported based upon the level of impact that is indicated from the test results.

[f] Only dissolved arsenic, cobalt, copper and iron will be analyzed from groundwater samples. TDS will be analyzed from a non-filtered, and non-acidified fraction.

[g] 'Field Control Standard' samples provided by third party laboratory vendor are prepared in conditioned water at third party laboratory, and analyzed by EPA methodologies commonly used to determine these parameters for "low level" metals detection to a minimum of four (4) significant figures for As, Co, and Cu.

[h] The FCS are similar in function to a Laboratory Control Sample (LCS), as they are a matrix spiked at a known concentration, subject to similar sample preparation and handling by the testing laboratory and analyzed using the same analytical methods as the other water quality samples. Therefore, it is deemed appropriate that the identical recovery acceptance limits are applied to each standard. During the 2010 revision of the EPA National Functional Guidelines (NFG), the LCS % recovery acceptance limits were broadened to 70 to 130%.

[i] New method detection limits (MDL) were calculated per the update to 40CFR Part 136 with the Definition and Procedure for the Determination of the Method Detection Limit (EPA 2016). The 0.0001 milligrams per liter (mg/L) reporting limit (RL) will be requested for copper, and analysis by EPA Method 200.8 at all locations on Panther Creek, Big Deer Creek and SFSW-04. However, strict adherence to the lower RL by the project laboratory may not be possible, as result of the EPA MDL update.

Glossary: NA (Not Applicable), RPD (Relative Percent Difference), mg/l (milligrams per liter), NTU (nephelometric testing units), U.S. Environmental Protection Agency (EPA), SM (Standard Methods), SW (Surface Water and Springs), GW (Groundwater), FCS (field control standard), < (less than).

Table B-2: Sample Preparation and Handling Requirements

Analytical Category	Matrix	Container Type	Special Handling[a]	Preservation[b]	Maximum Holding Time
Metals, Total And Hardness	Water	250 ml polyethylene, Teflon-lined cap	NA	pH<2 with HNO3	6 months
Metals, Dissolved	Water	250 ml polyethylene, Teflon-lined cap	0.45µm Filter	pH<2 with HNO3	6 Months
pH [c,d]	Water	250 ml polyethylene, Teflon-lined cap	NA	Cool 4°C ± 2°	15 minutes
Alkalinity [c, d]	Water	250 ml polyethylene, Teflon-lined cap	NA	Cool 4°C ± 2°	14 Days
Chloride [c,d]	Water	250 ml polyethylene, Teflon-lined cap	NA	NA	28 Days
Dissolved Organic Carbon (DOC)	Water	250 ml polyethylene, Teflon-lined cap	0.45µm Filter	H_3PO_4 to pH <2, Cool 4°C ± 2°	28 Days
Sulfate [c,d]	Water	250 ml polyethylene, Teflon-lined cap	NA	Cool 4°C ± 2°	28 Days
TDS[c,d]	Water	1000 ml polyethylene, Teflon-lined cap	NA	Cool 4°C ± 2°	7 Days
TSS[e]	Water	1000 ml polyethylene, Teflon-lined cap	NA	Cool 4°C ± 2°	7 Days
Metals, Total	Soil	Clean sample bag /container	NA	NA	6 months
Metals, Total	Sediment	4 oz. glass jar, Teflon-lined cap	NA	NA	6 months

Notes:
a. Selected locations require 'Clean Hands' procedure; See Data Summary Report Table 1-1.
b. Preservation performed in the field.
c. Alkalinity, chloride, pH, and sulfate may be combined with the 1000 milliliter (ml) volume if required with TDS analyses.
d. Alkalinity, chloride, pH, and sulfate may be combined in a 500 ml volume if required with one another.
f. Sample preparation and handling requirements are as provided by Energy Laboratories, Inc., located at P.O. Box 30916, 1120 S. 27th Street, Billings, MT 59107-0916, (800) 735-4489.

Table B-3: Data Qualifier Definitions Data Validation

Qualifier	Definition
U	The analyte was analyzed for, but was not detected above the level of the reported sample quantitation limit.
J	The result is an estimated quantity. The associated numerical value is the approximate concentration of the analyte in the sample.
J+	The result is an estimated quantity, but the result may be biased high.
J-	The result is an estimated quantity, but the result may be biased low.
R	The data are unusable. The sample results are rejected due to serious deficiencies in meeting Quality Control (QC) criteria. The analyte may or may not be present in the sample.
UJ	The analyte was analyzed for, but was not detected. The reported quantitation limit is approximate and may be inaccurate or imprecise.
The above definitions provide explanation of the qualifiers assigned in the data review process as applied by the NFG guidance document (EPA 2017).	

Table B-4: 2020 Monitoring Report / Analytical Qualification Summary

Station Code	Sample Event / Type [1]	Collection Date & Time	Filter Status	Parameter Code [1]	Result	Units	Result Quality	Description
SFSW-02	SYN	5/5/20 1:40 PM	U	PH-L	8	pH unit	J	Holding time exceeds 15 min. acceptance limit; (2 days)
SFSW-01	SYN	5/5/20 2:10 PM	U	PH-L	8.1	pH unit	J	Holding time exceeds 15 min. acceptance limit; (2 days)
BDSW-03	SYN	5/5/20 3:20 PM	U	PH-L	7.5	pH unit	J	Holding time exceeds 15 min. acceptance limit; (2 days)
BDSW-03	DUP	5/5/20 3:30 PM	U	PH-L	7.4	pH unit	J	Holding time exceeds 15 min. acceptance limit; (2 days)
BDSW-03	BLNK	5/5/20 3:40 PM	U	PH-L	5.8	pH unit	J	Holding time exceeds 15 min. acceptance limit; (2 days)
BDSW-01	SYN	5/5/20 5:30 PM	U	PH-L	7.5	pH unit	J	Holding time exceeds 15 min. acceptance limit; (2 days)
BDSW-03+200	INV	5/7/20 1:50 PM	U	PH-L	7.5	pH unit	J	Holding time exceeds 15 min. acceptance limit; (6 days)
BDSW-03	INV	5/7/20 2:05 PM	U	PH-L	7.4	pH unit	J	Holding time exceeds 15 min. acceptance limit; (6 days)
BDSW-03-200	INV	5/7/20 2:30 PM	U	PH-L	7.4	pH unit	J	Holding time exceeds 15 min. acceptance limit; (6 days)
BDSW-03-1425	INV	5/7/20 3:00 PM	U	PH-L	7.4	pH unit	J	Holding time exceeds 15 min. acceptance limit; (6 days)
HGSW-01	SYN	5/12/20 9:35 AM	U	CA-T	1.8	mg/L	J+	Contaminant detected in Preparation Blank (0.2 mg/L)
BBSW-01A	SYN	5/12/20 12:20 PM	F	AS-D	0.007	mg/L	J	Field duplicate RPD outside of QC criteria; (55%)
BBSW-01A	SYN	5/12/20 12:20 PM	F	CU-D	0.0092	mg/L	J	Field duplicate RPD outside of QC criteria; (33%)
BBSW-01A	SYN	5/12/20 12:20 PM	U	PH-L	7.4	pH unit	J	Holding time exceeds 15 min. acceptance limit; 3 days)
BBSW-01A	DUP	5/12/20 12:35 PM	F	AS-D	0.004	mg/L	J	Field duplicate RPD outside of QC criteria; (55%)
BBSW-01A	DUP	5/12/20 12:35 PM	F	CU-D	0.0066	mg/L	J	Field duplicate RPD outside of QC criteria; (33%)
BBSW-01A	DUP	5/12/20 12:35 PM	U	PH-L	7.3	pH unit	J	Holding time exceeds 15 min. acceptance limit; 3 days)
BBSW-01A	BLNK	5/12/20 12:45 PM	U	PH-L	5.8	pH unit	J	Holding time exceeds 15 min. acceptance limit; 3 days)
PASW-09	SYN	5/12/20 1:15 PM	U	PH-L	7.7	pH unit	J	Holding time exceeds 15 min. acceptance limit; 3 days)
PASW-09	DUP	5/12/20 1:30 PM	U	PH-L	7.7	pH unit	J	Holding time exceeds 15 min. acceptance limit; 3 days)
PASW-09	BLNK	5/12/20 1:45 PM	U	PH-L	6	pH unit	J	Holding time exceeds 15 min. acceptance limit; 3 days)
BDSW-03	BLNK	5/25/20 1:40 PM	U	CA-T	1	mg/L	J+	Contaminant detected in Preparation Blank (0.2 mg/L)
SFSW-02	SYN	5/26/20 10:35 AM	U	PH-L	8	pH unit	J	Holding time exceeds 15 min. acceptance limit; 2 days)
SFSW-01	SYN	5/26/20 10:50 AM	U	PH-L	8	pH unit	J	Holding time exceeds 15 min. acceptance limit; 2 days)
BDSW-03	SYN	5/26/20 11:45 AM	U	PH-L	7.5	pH unit	J	Holding time exceeds 15 min. acceptance limit; 2 days)
BDSW-01	SYN	5/26/20 2:10 PM	U	PH-L	7.6	pH unit	J	Holding time exceeds 15 min. acceptance limit; 2 days)
BDSW-03	96HR	5/27/20 9:40 AM	F	CU-D	0.0016	mg/L	J+	Contaminant detected in Preparation Blank (0.0002 mg/L)
BDSW-04	96HR	5/27/20 4:40 PM	F	CU-D	0.0003	mg/L	J+	Contaminant detected in Preparation Blank (0.0002 mg/L)
BDSW-03	96HR	5/27/20 5:00 PM	F	CU-D	0.0017	mg/L	J+	Contaminant detected in Preparation Blank (0.0002 mg/L)
BDSW-03	DUP	5/27/20 5:10 PM	F	CU-D	0.0016	mg/L	J+	Contaminant detected in Preparation Blank (0.0002 mg/L)
BDSW-04	96HR	5/28/20 9:40 AM	F	CU-D	0.0003	mg/L	J+	Contaminant detected in Preparation Blank (0.0002 mg/L)
BDSW-03	96HR	5/28/20 10:00 AM	F	CU-D	0.0016	mg/L	J+	Contaminant detected in Preparation Blank (0.0002 mg/L)
BDSW-04	96HR	5/28/20 2:50 PM	F	CU-D	0.0003	mg/L	J+	Contaminant detected in Preparation Blank (0.0002 mg/L)
BDSW-03	96HR	5/28/20 3:10 PM	F	CU-D	0.0017	mg/L	J+	Contaminant detected in Preparation Blank (0.0002 mg/L)
BDSW-03	DUP	5/28/20 3:20 PM	F	CU-D	0.0017	mg/L	J+	Contaminant detected in Preparation Blank (0.0002 mg/L)
WTP-003	M	7/21/20 12:00 PM	U	FE-T	0.08	mg/L	J+	Contaminant detected in Preparation Blank (0.02 mg/L)
BT-SEEP	SYN	9/9/20 9:40 AM	U	CA-T	33.5	mg/L	J+	MS/MSD %Recovery exceeds acceptance limits (133%)
BT-SEEP	SYN	9/9/20 9:40 AM	U	CU-T	2.27	mg/L	J+	MS/MSD %Recovery exceeds acceptance limits (141%)
SFSW-04	SYN	9/9/20 10:45 AM	U	CO-T	0.0001	mg/L	U	Contaminant detected in Preparation Blank (0.0001 mg/L), result <10x blank.
SFSW-02	SYN	9/9/20 11:10 AM	U	PH-L	8.1	pH unit	J	Holding time exceeds 15 min. acceptance limit; 5 days)
SFSW-01	SYN	9/9/20 11:30 AM	U	PH-L	8	pH unit	J	Holding time exceeds 15 min. acceptance limit; 5 days)
BDSW-03	SYN	9/9/20 12:20 PM	U	PH-L	7.8	pH unit	J	Holding time exceeds 15 min. acceptance limit; 5 days)
BDSW-03	DUP	9/9/20 12:30 PM	U	PH-L	7.7	pH unit	J	Holding time exceeds 15 min. acceptance limit; 5 days)
BDSW-03	BLNK	9/9/20 12:40 PM	U	PH-L	5.8	pH unit	J	Holding time exceeds 15 min. acceptance limit; 5 days)
BDSW-01	SYN	9/9/20 2:30 PM	U	PH-L	7.9	pH unit	J	Holding time exceeds 15 min. acceptance limit; 5 days)
PASW-04X	SYN	9/9/20 3:00 PM	U	PH-L	8.2	pH unit	J	Holding time exceeds 15 min. acceptance limit; 5 days)
WFMW-09	M	9/16/20 10:00 AM	F	CU-D	0.0006	mg/L	J+	Contaminant detected in Preparation Blank (0.0004 mg/L); Field duplicate RPD outside of QC criteria; (50%)
WFMW-09	M	9/16/20 10:00 AM	F	FE-D	0.03	mg/L	UJ	Result < 5X RL & absolute difference between original and duplicate is > RL
WFMW-09	M	9/16/20 10:10 AM	F	CU-D	0.001	mg/L	J+	Contaminant detected in Preparation Blank (0.0004 mg/L); Field duplicate RPD outside of QC criteria; (50%)
WFMW-09	M	9/16/20 10:10 AM	F	FE-D	0.07	mg/L	J	Result < 5X RL & absolute difference between original and duplicate is > RL
WFMW-02	M	9/16/20 11:00 AM	F	CU-D	0.0024	mg/L	J+	Contaminant detected in Preparation Blank (0.0004 mg/L);
WFMW-01S	M	9/16/20 12:30 PM	F	CU-D	0.0034	mg/L	J+	Contaminant detected in Preparation Blank (0.0004 mg/L);
BDSW-03	96HR	9/21/20 10:05 AM	U	CU-T	0.0027	mg/L	J+	Contaminant detected in Preparation Blank (0.0009 mg/L)
BDSW-01	96HR	9/21/20 11:25 AM	U	CU-T	0.0041	mg/L	J+	Contaminant detected in Preparation Blank (0.0009 mg/L)
BDSW-03	96HR	9/22/20 1:20 PM	F	CU-D	0.0068	mg/L	J	Field duplicate RPD outside of QC criteria; (92%)
BDSW-03	DUP	9/22/20 1:30 PM	F	CU-D	0.0025	mg/L	J	Field duplicate RPD outside of QC criteria; (92%)
WTP-003	M	9/23/20 10:00 AM	U	FE-T	0.08	mg/L	J+	Contaminant detected in Preparation Blank (0.009 mg/L)
SFSW-04	SYN	9/28/20 10:10 AM	F	CO-D	0.0002	mg/L	J+	Contaminant detected in Preparation Blank (0.0007 mg/L)
SFSW-02	SYN	9/28/20 10:40 AM	U	PH-L	8.1	pH unit	J	Holding time exceeds 15 min. acceptance limit; 3 days)
SFSW-01	SYN	9/28/20 11:00 AM	U	PH-L	8.1	pH unit	J	Holding time exceeds 15 min. acceptance limit; 3 days)
BDSW-03	SYN	9/28/20 12:00 PM	U	PH-L	7.8	pH unit	J	Holding time exceeds 15 min. acceptance limit; 3 days)
BDSW-03	DUP	9/28/20 12:10 PM	U	PH-L	7.8	pH unit	J	Holding time exceeds 15 min. acceptance limit; 3 days)
BDSW-03	BLNK	9/28/20 12:20 PM	U	PH-L	5.8	pH unit	J	Holding time exceeds 15 min. acceptance limit; 3 days)
PASW-05	SYN	9/28/20 2:00 PM	U	FE-T	0.1	mg/L	J+	Contaminant detected in Preparation Blank (0.02 mg/L)
BDSW-01	SYN	9/28/20 2:30 PM	U	PH-L	7.9	pH unit	J	Holding time exceeds 15 min. acceptance limit; 3 days)
PASW-04X	SYN	9/28/20 2:55 PM	U	PH-L	8	pH unit	J	Holding time exceeds 15 min. acceptance limit; 3 days)

Table B-5: 2020 Monitoring Report / Field Duplicate Comparison Summary

Station	Sample Event / Type	Collection Date	Analyte	Original & Duplicate Result	Units	Result Quality	Analyte	RPD (%)[1,2]	Status
BDSW-03	SYN	5/5/20 3:20 PM	ALK-B	23	mg/L		ALK-B	0.0	Accept
BDSW-03	DUP	5/5/20 3:30 PM	ALK-B	23	mg/L				
BBSW-01A	SYN	5/12/20 12:20 PM	ALK-B	18	mg/L		ALK-B	0.0	Accept
BBSW-01A	DUP	5/12/20 12:35 PM	ALK-B	18	mg/L				
PASW-09	SYN	5/12/20 1:15 PM	ALK-B	30	mg/L		ALK-B	3.3	Accept
PASW-09	DUP	5/12/20 1:30 PM	ALK-B	31	mg/L				
BDSW-03	SYN	9/9/20 12:20 PM	ALK-B	51	mg/L		ALK-B	0.0	Accept
BDSW-03	DUP	9/9/20 12:30 PM	ALK-B	51	mg/L				
BDSW-03	SYN	9/28/20 12:00 PM	ALK-B	52	mg/L		ALK-B	1.9	Accept
BDSW-03	DUP	9/28/20 12:10 PM	ALK-B	53	mg/L				
BDSW-03	SYN	5/5/20 3:20 PM	ALK-C	4	mg/L	U	ALK-C	0.0	Accept
BDSW-03	DUP	5/5/20 3:30 PM	ALK-C	4	mg/L	U			
BBSW-01A	SYN	5/12/20 12:20 PM	ALK-C	4	mg/L	U	ALK-C	0.0	Accept
BBSW-01A	DUP	5/12/20 12:35 PM	ALK-C	4	mg/L	U			
PASW-09	SYN	5/12/20 1:15 PM	ALK-C	4	mg/L	U	ALK-C	0.0	Accept
PASW-09	DUP	5/12/20 1:30 PM	ALK-C	4	mg/L	U			
BDSW-03	SYN	9/9/20 12:20 PM	ALK-C	4	mg/L	U	ALK-C	0.0	Accept
BDSW-03	DUP	9/9/20 12:30 PM	ALK-C	4	mg/L	U			
BDSW-03	SYN	9/28/20 12:00 PM	ALK-C	4	mg/L	U	ALK-C	0.0	Accept
BDSW-03	DUP	9/28/20 12:10 PM	ALK-C	4	mg/L	U			
BDSW-03	SYN	5/5/20 3:20 PM	ALK-T	19	mg/L		ALK-T	0.0	Accept
BDSW-03	DUP	5/5/20 3:30 PM	ALK-T	19	mg/L				
BBSW-01A	SYN	5/12/20 12:20 PM	ALK-T	15	mg/L		ALK-T	0.0	Accept
BBSW-01A	DUP	5/12/20 12:35 PM	ALK-T	15	mg/L				
PASW-09	SYN	5/12/20 1:15 PM	ALK-T	25	mg/L		ALK-T	0.0	Accept
PASW-09	DUP	5/12/20 1:30 PM	ALK-T	25	mg/L				
BDSW-03	SYN	9/9/20 12:20 PM	ALK-T	42	mg/L		ALK-T	0.0	Accept
BDSW-03	DUP	9/9/20 12:30 PM	ALK-T	42	mg/L				
BDSW-03	SYN	9/28/20 12:00 PM	ALK-T	43	mg/L		ALK-T	0.0	Accept
BDSW-03	DUP	9/28/20 12:10 PM	ALK-T	43	mg/L				
PASW-09	MTHY	3/26/20 10:20 AM	AS-D	0.001	mg/L		AS-D	0.0	Accept
PASW-09	DUP	3/26/20 10:30 AM	AS-D	0.001	mg/L				
BDSW-03	SYN	5/5/20 3:20 PM	AS-D	0.001	mg/L	U	AS-D	0.0	Accept
BDSW-03	DUP	5/5/20 3:30 PM	AS-D	0.001	mg/L	U			
BDSW-03	96HR	5/7/20 1:20 PM	AS-D	0.001	mg/L	U	AS-D	0.0	Accept
BDSW-03	DUP	5/7/20 1:30 PM	AS-D	0.001	mg/L	U			
BBSW-01A	SYN	5/12/20 12:20 PM	AS-D	0.007	mg/L	J	AS-D	54.5	Advisory
BBSW-01A	DUP	5/12/20 12:35 PM	AS-D	0.004	mg/L	J			
PASW-09	SYN	5/12/20 1:15 PM	AS-D	0.001	mg/L		AS-D	0.0	Accept
PASW-09	DUP	5/12/20 1:30 PM	AS-D	0.001	mg/L				
BBMW-06A	M	5/27/20 2:25 PM	AS-D	0.074	mg/L		AS-D	1.4	Accept
BBMW-06A	DUP	5/27/20 2:35 PM	AS-D	0.073	mg/L				
PASW-09	MTHY	6/27/20 2:20 PM	AS-D	0.001	mg/L		AS-D	0.0	Accept
PASW-09	DUP	6/27/20 2:30 PM	AS-D	0.001	mg/L				
PASW-09	MTHY	7/24/20 4:20 PM	AS-D	0.001	mg/L		AS-D	0.0	Accept
PASW-09	DUP	7/24/20 4:30 PM	AS-D	0.001	mg/L				
PASW-09	MTHY	8/19/20 3:20 PM	AS-D	0.001	mg/L		AS-D	0.0	Accept
PASW-09	DUP	8/19/20 3:30 PM	AS-D	0.001	mg/L				
BDSW-03	SYN	9/9/20 12:20 PM	AS-D	0.001	mg/L	U	AS-D	0.0	Accept
BDSW-03	DUP	9/9/20 12:30 PM	AS-D	0.001	mg/L	U			
BDSW-03	SYN	9/28/20 12:00 PM	AS-D	0.001	mg/L	U	AS-D	0.0	Accept
BDSW-03	DUP	9/28/20 12:10 PM	AS-D	0.001	mg/L	U			
BBSW-01A	MTHY	10/26/20 8:30 AM	AS-D	0.001	mg/L		AS-D	0.0	Accept
BBSW-01A	DUP	10/26/20 8:40 AM	AS-D	0.001	mg/L				

Table B-5: 2020 Monitoring Report / Field Duplicate Comparison Summary

Station	Sample Event / Type	Collection Date	Analyte	Original & Duplicate Result	Units	Result Quality	Analyte	RPD (%)[1,2]	Status
PASW-09	MTHY	11/16/20 11:00 AM	AS-D	0.001	mg/L	U	AS-D	0.0	Accept
PASW-09	DUP	11/16/20 11:10 AM	AS-D	0.001	mg/L	U			
PASW-09	MTHY	3/26/20 10:20 AM	AS-T	0.003	mg/L		AS-T	0.0	Accept
PASW-09	DUP	3/26/20 10:30 AM	AS-T	0.003	mg/L				
BDSW-03	SYN	5/5/20 3:20 PM	AS-T	0.001	mg/L	U	AS-T	0.0	Accept
BDSW-03	DUP	5/5/20 3:30 PM	AS-T	0.001	mg/L	U			
BDSW-03	96HR	5/7/20 1:20 PM	AS-T	0.001	mg/L	U	AS-T	0.0	Accept
BDSW-03	DUP	5/7/20 1:30 PM	AS-T	0.001	mg/L	U			
BBSW-01A	SYN	5/12/20 12:20 PM	AS-T	0.01	mg/L		AS-T	10.5	Accept
BBSW-01A	DUP	5/12/20 12:35 PM	AS-T	0.009	mg/L				
PASW-09	SYN	5/12/20 1:15 PM	AS-T	0.003	mg/L		AS-T	0.0	Accept
PASW-09	DUP	5/12/20 1:30 PM	AS-T	0.003	mg/L				
PASW-09	MTHY	6/27/20 2:20 PM	AS-T	0.002	mg/L		AS-T	0.0	Accept
PASW-09	DUP	6/27/20 2:30 PM	AS-T	0.002	mg/L				
PASW-09	MTHY	7/24/20 4:20 PM	AS-T	0.002	mg/L		AS-T	0.0	Accept
PASW-09	DUP	7/24/20 4:30 PM	AS-T	0.002	mg/L				
PASW-09	MTHY	8/19/20 3:20 PM	AS-T	0.002	mg/L		AS-T	0.0	Accept
PASW-09	DUP	8/19/20 3:30 PM	AS-T	0.002	mg/L				
BDSW-03	SYN	9/9/20 12:20 PM	AS-T	0.001	mg/L	U	AS-T	0.0	Accept
BDSW-03	DUP	9/9/20 12:30 PM	AS-T	0.001	mg/L	U			
BDSW-03	SYN	9/28/20 12:00 PM	AS-T	0.001	mg/L	U	AS-T	0.0	Accept
BDSW-03	DUP	9/28/20 12:10 PM	AS-T	0.001	mg/L	U			
BBSW-01A	MTHY	10/26/20 8:30 AM	AS-T	0.008	mg/L		AS-T	13.3	Accept
BBSW-01A	DUP	10/26/20 8:40 AM	AS-T	0.007	mg/L				
PASW-09	MTHY	11/16/20 11:00 AM	AS-T	0.001	mg/L		AS-T	0.0	Accept
PASW-09	DUP	11/16/20 11:10 AM	AS-T	0.0	mg/L				
BDSW-03	SYN	5/5/20 3:20 PM	CA-D	6.1	mg/L		CA-D	0.0	Accept
BDSW-03	DUP	5/5/20 3:30 PM	CA-D	6.1	mg/L				
BBSW-01A	SYN	5/12/20 12:20 PM	CA-D	7.6	mg/L		CA-D	1.3	Accept
BBSW-01A	DUP	5/12/20 12:35 PM	CA-D	7.5	mg/L				
PASW-09	SYN	5/12/20 1:15 PM	CA-D	7.5	mg/L		CA-D	0.0	Accept
PASW-09	DUP	5/12/20 1:30 PM	CA-D	7.5	mg/L				
BDSW-03	SYN	9/9/20 12:20 PM	CA-D	13.4	mg/L		CA-D	0.0	Accept
BDSW-03	DUP	9/9/20 12:30 PM	CA-D	13.4	mg/L				
BDSW-03	SYN	9/28/20 12:00 PM	CA-D	13.6	mg/L		CA-D	0.7	Accept
BDSW-03	DUP	9/28/20 12:10 PM	CA-D	13.5	mg/L				
BDSW-03	96HR	5/4/20 2:30 PM	CA-T	6	mg/L		CA-T	1.7	Accept
BDSW-03	DUP	5/4/20 2:40 PM	CA-T	5.9	mg/L				
BDSW-03	SYN	5/5/20 3:20 PM	CA-T	6.1	mg/L		CA-T	1.6	Accept
BDSW-03	DUP	5/5/20 3:30 PM	CA-T	6.2	mg/L				
BDSW-03	96HR	5/6/20 2:30 PM	CA-T	5.4	mg/L		CA-T	1.9	Accept
BDSW-03	DUP	5/6/20 2:40 PM	CA-T	5.3	mg/L				
BDSW-03	96HR	5/7/20 1:20 PM	CA-T	5.4	mg/L		CA-T	1.9	Accept
BDSW-03	DUP	5/7/20 1:30 PM	CA-T	5.3	mg/L				
PASW-09	96HR	5/11/20 2:35 PM	CA-T	8.2	mg/L		CA-T	1.2	Accept
PASW-09	DUP	5/11/20 2:45 PM	CA-T	8.1	mg/L				
BBSW-01A	SYN	5/12/20 12:20 PM	CA-T	7.4	mg/L		CA-T	2.7	Accept
BBSW-01A	DUP	5/12/20 12:35 PM	CA-T	7.6	mg/L				
PASW-09	SYN	5/12/20 1:15 PM	CA-T	7.6	mg/L		CA-T	9.7	Accept
PASW-09	DUP	5/12/20 1:30 PM	CA-T	6.9	mg/L				
PASW-09	96HR	5/13/20 2:20 PM	CA-T	7.8	mg/L		CA-T	1.3	Accept
PASW-09	DUP	5/13/20 2:30 PM	CA-T	7.7	mg/L				
PASW-09	96HR	5/14/20 2:20 PM	CA-T	8	mg/L		CA-T	0.0	Accept
PASW-09	DUP	5/14/20 2:30 PM	CA-T	8	mg/L				

Table B-5: 2020 Monitoring Report / Field Duplicate Comparison Summary

Station	Sample Event / Type	Collection Date	Analyte	Original & Duplicate Result	Units	Result Quality	Analyte	RPD (%)[1,2]	Status
BDSW-03	96HR	5/25/20 1:20 PM	CA-T	7.9	mg/L		CA-T	15.0	Accept
BDSW-03	DUP	5/25/20 1:30 PM	CA-T	6.8	mg/L				
BDSW-03	96HR	5/26/20 4:00 PM	CA-T	6.6	mg/L		CA-T	1.5	Accept
BDSW-03	DUP	5/26/20 4:10 PM	CA-T	6.7	mg/L				
BDSW-03	96HR	5/27/20 5:00 PM	CA-T	6.2	mg/L		CA-T	14.9	Accept
BDSW-03	DUP	5/27/20 5:10 PM	CA-T	7.2	mg/L				
BDSW-03	96HR	5/28/20 3:10 PM	CA-T	7.9	mg/L		CA-T	3.9	Accept
BDSW-03	DUP	5/28/20 3:20 PM	CA-T	7.6	mg/L				
BDSW-03	SYN	9/9/20 12:20 PM	CA-T	14.1	mg/L		CA-T	0.7	Accept
BDSW-03	DUP	9/9/20 12:30 PM	CA-T	14.2	mg/L				
BDSW-03	96HR	9/21/20 3:30 PM	CA-T	13.6	mg/L		CA-T	1.5	Accept
BDSW-03	DUP	9/21/20 3:40 PM	CA-T	13.4	mg/L				
BDSW-03	96HR	9/22/20 1:20 PM	CA-T	13.6	mg/L		CA-T	1.5	Accept
BDSW-03	DUP	9/22/20 1:30 PM	CA-T	13.8	mg/L				
BDSW-03	96HR	9/23/20 2:25 PM	CA-T	13.4	mg/L		CA-T	0.7	Accept
BDSW-03	DUP	9/23/20 2:35 PM	CA-T	13.5	mg/L				
BDSW-03	96HR	9/24/20 2:05 PM	CA-T	13.6	mg/L		CA-T	0.0	Accept
BDSW-03	DUP	9/24/20 2:15 PM	CA-T	13.6	mg/L				
BDSW-03	SYN	9/28/20 12:00 PM	CA-T	14.2	mg/L		CA-T	2.1	Accept
BDSW-03	DUP	9/28/20 12:10 PM	CA-T	13.9	mg/L				
BDSW-03	SYN	5/5/20 3:20 PM	CL-T	1	mg/L	U	CL-T	0.0	Accept
BDSW-03	DUP	5/5/20 3:30 PM	CL-T	1	mg/L	U			
BBSW-01A	SYN	5/12/20 12:20 PM	CL-T	1	mg/L		CL-T	0.0	Accept
BBSW-01A	DUP	5/12/20 12:35 PM	CL-T	1	mg/L				
PASW-09	SYN	5/12/20 1:15 PM	CL-T	1	mg/L	U	CL-T	0.0	Accept
PASW-09	DUP	5/12/20 1:30 PM	CL-T	1	mg/L	U			
BDSW-03	SYN	9/9/20 12:20 PM	CL-T	1	mg/L	U	CL-T	0.0	Accept
BDSW-03	DUP	9/9/20 12:30 PM	CL-T	1	mg/L	U			
BDSW-03	SYN	9/28/20 12:00 PM	CL-T	1	mg/L	U	CL-T	0.0	Accept
BDSW-03	DUP	9/28/20 12:10 PM	CL-T	1	mg/L	U			
BDSW-03	SYN	5/5/20 3:20 PM	CO-D	0.0008	mg/L		CO-D	11.8	Accept
BDSW-03	DUP	5/5/20 3:30 PM	CO-D	0.0009	mg/L				
BDSW-03	96HR	5/7/20 1:20 PM	CO-D	0.0009	mg/L		CO-D	0.0	Accept
BDSW-03	DUP	5/7/20 1:30 PM	CO-D	0.0009	mg/L				
PASW-09	96HR	5/11/20 2:35 PM	CO-D	0.0079	mg/L		CO-D	0.0	Accept
PASW-09	DUP	5/11/20 2:45 PM	CO-D	0.0079	mg/L				
BBSW-01A	SYN	5/12/20 12:20 PM	CO-D	0.052	mg/L		CO-D	10.0	Accept
BBSW-01A	DUP	5/12/20 12:35 PM	CO-D	0.0575	mg/L				
PASW-09	SYN	5/12/20 1:15 PM	CO-D	0.0072	mg/L		CO-D	1.4	Accept
PASW-09	DUP	5/12/20 1:30 PM	CO-D	0.0073	mg/L				
PASW-09	96HR	5/13/20 2:20 PM	CO-D	0.008	mg/L		CO-D	1.3	Accept
PASW-09	DUP	5/13/20 2:30 PM	CO-D	0.0079	mg/L				
PASW-09	96HR	5/14/20 2:20 PM	CO-D	0.0084	mg/L		CO-D	1.2	Accept
PASW-09	DUP	5/14/20 2:30 PM	CO-D	0.0085	mg/L				
BBMW-06A	M	5/27/20 2:25 PM	CO-D	5.32	mg/L		CO-D	1.9	Accept
BBMW-06A	DUP	5/27/20 2:35 PM	CO-D	5.42	mg/L				
BDSW-03	SYN	9/9/20 12:20 PM	CO-D	0.0036	mg/L		CO-D	8.7	Accept
BDSW-03	DUP	9/9/20 12:30 PM	CO-D	0.0033	mg/L				
BDSW-03	SYN	9/28/20 12:00 PM	CO-D	0.0028	mg/L		CO-D	3.6	Accept
BDSW-03	DUP	9/28/20 12:10 PM	CO-D	0.0027	mg/L				
BDSW-03	SYN	5/5/20 3:20 PM	CO-T	0.0009	mg/L		CO-T	0.0	Accept
BDSW-03	DUP	5/5/20 3:30 PM	CO-T	0.0009	mg/L				
BDSW-03	96HR	5/7/20 1:20 PM	CO-T	0.0009	mg/L		CO-T	11.8	Accept
BDSW-03	DUP	5/7/20 1:30 PM	CO-T	0.0008	mg/L				

Table B-5: 2020 Monitoring Report / Field Duplicate Comparison Summary

Station	Sample Event / Type	Collection Date	Analyte	Original & Duplicate Result	Units	Result Quality	Analyte	RPD (%)[1,2]	Status
BBSW-01A	SYN	5/12/20 12:20 PM	CO-T	0.0554	mg/L		CO-T	13.5	Accept
BBSW-01A	DUP	5/12/20 12:35 PM	CO-T	0.0634	mg/L				
PASW-09	SYN	5/12/20 1:15 PM	CO-T	0.0099	mg/L		CO-T	4.0	Accept
PASW-09	DUP	5/12/20 1:30 PM	CO-T	0.0103	mg/L				
BDSW-03	SYN	9/9/20 12:20 PM	CO-T	0.0028	mg/L		CO-T	3.5	Accept
BDSW-03	DUP	9/9/20 12:30 PM	CO-T	0.0029	mg/L				
BDSW-03	SYN	9/28/20 12:00 PM	CO-T	0.0029	mg/L		CO-T	3.5	Accept
BDSW-03	DUP	9/28/20 12:10 PM	CO-T	0.0028	mg/L				
BDSW-03	96HR	5/4/20 2:30 PM	CU-D	0.0014	mg/L		CU-D	0.0	Accept
BDSW-03	DUP	5/4/20 2:40 PM	CU-D	0.0014	mg/L				
BDSW-03	SYN	5/5/20 3:20 PM	CU-D	0.0014	mg/L		CU-D	0.0	Accept
BDSW-03	DUP	5/5/20 3:30 PM	CU-D	0.0014	mg/L				
BDSW-03	96HR	5/6/20 2:30 PM	CU-D	0.0018	mg/L		CU-D	0.0	Accept
BDSW-03	DUP	5/6/20 2:40 PM	CU-D	0.0018	mg/L				
BDSW-03	96HR	5/7/20 1:20 PM	CU-D	0.0015	mg/L		CU-D	0.0	Accept
BDSW-03	DUP	5/7/20 1:30 PM	CU-D	0.0015	mg/L				
PASW-09	96HR	5/11/20 2:35 PM	CU-D	0.0018	mg/L		CU-D	5.4	Accept
PASW-09	DUP	5/11/20 2:45 PM	CU-D	0.0019	mg/L				
BBSW-01A	SYN	5/12/20 12:20 PM	CU-D	0.0092	mg/L	J	CU-D	32.9	Advisory
BBSW-01A	DUP	5/12/20 12:35 PM	CU-D	0.0066	mg/L	J			
PASW-09	SYN	5/12/20 1:15 PM	CU-D	0.0017	mg/L		CU-D	6.1	Accept
PASW-09	DUP	5/12/20 1:30 PM	CU-D	0.0016	mg/L				
PASW-09	96HR	5/13/20 2:20 PM	CU-D	0.0018	mg/L		CU-D	0.0	Accept
PASW-09	DUP	5/13/20 2:30 PM	CU-D	0.0018	mg/L				
PASW-09	96HR	5/14/20 2:20 PM	CU-D	0.0018	mg/L		CU-D	10.5	Accept
PASW-09	DUP	5/14/20 2:30 PM	CU-D	0.002	mg/L				
BDSW-03	96HR	5/25/20 1:20 PM	CU-D	0.0018	mg/L		CU-D	0.0	Accept
BDSW-03	DUP	5/25/20 1:30 PM	CU-D	0.0018	mg/L				
BDSW-03	96HR	5/26/20 4:00 PM	CU-D	0.0018	mg/L		CU-D	5.7	Accept
BDSW-03	DUP	5/26/20 4:10 PM	CU-D	0.0017	mg/L				
BBMW-06A	M	5/27/20 2:25 PM	CU-D	6.72	mg/L		CU-D	2.3	Accept
BBMW-06A	DUP	5/27/20 2:35 PM	CU-D	6.57	mg/L				
BDSW-03	96HR	5/27/20 5:00 PM	CU-D	0.0017	mg/L	J+	CU-D	6.1	Accept
BDSW-03	DUP	5/27/20 5:10 PM	CU-D	0.0016	mg/L	J+			
BDSW-03	96HR	5/28/20 3:10 PM	CU-D	0.0017	mg/L	J+	CU-D	0.0	Accept
BDSW-03	DUP	5/28/20 3:20 PM	CU-D	0.0017	mg/L	J+			
BDSW-03	SYN	9/9/20 12:20 PM	CU-D	0.0022	mg/L		CU-D	4.4	Accept
BDSW-03	DUP	9/9/20 12:30 PM	CU-D	0.0023	mg/L				
BDSW-03	96HR	9/21/20 3:30 PM	CU-D	0.0025	mg/L		CU-D	0.0	Accept
BDSW-03	DUP	9/21/20 3:40 PM	CU-D	0.0025	mg/L				
BDSW-03	96HR	9/22/20 1:20 PM	CU-D	0.0068	mg/L	J	CU-D	92.5	Advisory
BDSW-03	DUP	9/22/20 1:30 PM	CU-D	0.0025	mg/L	J			
BDSW-03	96HR	9/23/20 2:25 PM	CU-D	0.0026	mg/L		CU-D	7.4	Accept
BDSW-03	DUP	9/23/20 2:35 PM	CU-D	0.0028	mg/L				
BDSW-03	96HR	9/24/20 2:05 PM	CU-D	0.0029	mg/L		CU-D	0.0	Accept
BDSW-03	DUP	9/24/20 2:15 PM	CU-D	0.0029	mg/L				
BDSW-03	SYN	9/28/20 12:00 PM	CU-D	0.0029	mg/L		CU-D	3.4	Accept
BDSW-03	DUP	9/28/20 12:10 PM	CU-D	0.003	mg/L				
BDSW-03	SYN	5/5/20 3:20 PM	CU-T	0.0017	mg/L		CU-T	0.0	Accept
BDSW-03	DUP	5/5/20 3:30 PM	CU-T	0.0017	mg/L				
BDSW-03	96HR	5/7/20 1:20 PM	CU-T	0.0017	mg/L		CU-T	5.7	Accept
BDSW-03	DUP	5/7/20 1:30 PM	CU-T	0.0018	mg/L				
BBSW-01A	SYN	5/12/20 12:20 PM	CU-T	0.0114	mg/L		CU-T	3.6	Accept
BBSW-01A	DUP	5/12/20 12:35 PM	CU-T	0.011	mg/L				

Table B-5: 2020 Monitoring Report / Field Duplicate Comparison Summary

Station	Sample Event / Type	Collection Date	Analyte	Original & Duplicate Result	Units	Result Quality	Analyte	RPD (%)[1,2]	Status
PASW-09	SYN	5/12/20 1:15 PM	CU-T	0.0032	mg/L		CU-T	3.1	Accept
PASW-09	DUP	5/12/20 1:30 PM	CU-T	0.0033	mg/L				
BDSW-03	SYN	9/9/20 12:20 PM	CU-T	0.003	mg/L		CU-T	3.4	Accept
BDSW-03	DUP	9/9/20 12:30 PM	CU-T	0.0029	mg/L				
BDSW-03	SYN	9/28/20 12:00 PM	CU-T	0.0037	mg/L		CU-T	2.7	Accept
BDSW-03	DUP	9/28/20 12:10 PM	CU-T	0.0038	mg/L				
BDSW-03	SYN	5/5/20 3:20 PM	DOC	3.9	mg/L		DOC	2.5	Accept
BDSW-03	DUP	5/5/20 3:30 PM	DOC	4	mg/L				
BBSW-01A	SYN	5/12/20 12:20 PM	DOC	3.5	mg/L		DOC	0.0	Accept
BBSW-01A	DUP	5/12/20 12:35 PM	DOC	3.5	mg/L				
PASW-09	SYN	5/12/20 1:15 PM	DOC	4.8	mg/L		DOC	2.1	Accept
PASW-09	DUP	5/12/20 1:30 PM	DOC	4.9	mg/L				
BDSW-03	SYN	9/9/20 12:20 PM	DOC	1.5	mg/L		DOC	6.9	Accept
BDSW-03	DUP	9/9/20 12:30 PM	DOC	1.4	mg/L				
BDSW-03	SYN	9/28/20 12:00 PM	DOC	1.5	mg/L		DOC	0.0	Accept
BDSW-03	DUP	9/28/20 12:10 PM	DOC	1.5	mg/L				
BBMW-06A	M	5/27/20 2:25 PM	FE-D	7.9	mg/L		FE-D	2.1	Accept
BBMW-06A	DUP	5/27/20 2:35 PM	FE-D	8.07	mg/L				
BDSW-03	96HR	5/4/20 2:30 PM	HARD-T	18.1	mg/L		HARD-T	2.2	Accept
BDSW-03	DUP	5/4/20 2:40 PM	HARD-T	17.7	mg/L				
BDSW-03	SYN	5/5/20 3:20 PM	HARD-T	18	mg/L		HARD-T	0.0	Accept
BDSW-03	DUP	5/5/20 3:30 PM	HARD-T	18	mg/L				
BDSW-03	96HR	5/6/20 2:30 PM	HARD-T	16.1	mg/L		HARD-T	1.3	Accept
BDSW-03	DUP	5/6/20 2:40 PM	HARD-T	15.9	mg/L				
BDSW-03	96HR	5/7/20 1:20 PM	HARD-T	16.5	mg/L		HARD-T	2.5	Accept
BDSW-03	DUP	5/7/20 1:30 PM	HARD-T	16.1	mg/L				
PASW-09	96HR	5/11/20 2:35 PM	HARD-T	26	mg/L		HARD-T	0.0	Accept
PASW-09	DUP	5/11/20 2:45 PM	HARD-T	26	mg/L				
BBSW-01A	SYN	5/12/20 12:20 PM	HARD-T	27	mg/L		HARD-T	3.8	Accept
BBSW-01A	DUP	5/12/20 12:35 PM	HARD-T	26	mg/L				
PASW-09	SYN	5/12/20 1:15 PM	HARD-T	25	mg/L		HARD-T	0.0	Accept
PASW-09	DUP	5/12/20 1:30 PM	HARD-T	25	mg/L				
PASW-09	96HR	5/13/20 2:20 PM	HARD-T	25.3	mg/L		HARD-T	1.6	Accept
PASW-09	DUP	5/13/20 2:30 PM	HARD-T	25.7	mg/L				
PASW-09	96HR	5/14/20 2:20 PM	HARD-T	26.7	mg/L		HARD-T	0.4	Accept
PASW-09	DUP	5/14/20 2:30 PM	HARD-T	26.6	mg/L				
BDSW-03	96HR	5/25/20 1:20 PM	HARD-T	22.7	mg/L		HARD-T	12.1	Accept
BDSW-03	DUP	5/25/20 1:30 PM	HARD-T	20.1	mg/L				
BDSW-03	96HR	5/26/20 4:00 PM	HARD-T	19.1	mg/L		HARD-T	1.6	Accept
BDSW-03	DUP	5/26/20 4:10 PM	HARD-T	19.4	mg/L				
BDSW-03	96HR	5/27/20 5:00 PM	HARD-T	18.3	mg/L		HARD-T	12.8	Accept
BDSW-03	DUP	5/27/20 5:10 PM	HARD-T	20.8	mg/L				
BDSW-03	96HR	5/28/20 3:10 PM	HARD-T	22.4	mg/L		HARD-T	3.2	Accept
BDSW-03	DUP	5/28/20 3:20 PM	HARD-T	21.7	mg/L				
BDSW-03	SYN	9/9/20 12:20 PM	HARD-T	39	mg/L		HARD-T	0.0	Accept
BDSW-03	DUP	9/9/20 12:30 PM	HARD-T	39	mg/L				
BDSW-03	96HR	9/21/20 3:30 PM	HARD-T	40.1	mg/L		HARD-T	1.3	Accept
BDSW-03	DUP	9/21/20 3:40 PM	HARD-T	39.6	mg/L				
BDSW-03	96HR	9/22/20 1:20 PM	HARD-T	40.2	mg/L		HARD-T	1.0	Accept
BDSW-03	DUP	9/22/20 1:30 PM	HARD-T	40.6	mg/L				
BDSW-03	96HR	9/23/20 2:25 PM	HARD-T	39.9	mg/L		HARD-T	0.5	Accept
BDSW-03	DUP	9/23/20 2:35 PM	HARD-T	40.1	mg/L				
BDSW-03	96HR	9/24/20 2:05 PM	HARD-T	40.2	mg/L		HARD-T	0.2	Accept
BDSW-03	DUP	9/24/20 2:15 PM	HARD-T	40.3	mg/L				

Table B-5: 2020 Monitoring Report / Field Duplicate Comparison Summary

Station	Sample Event / Type	Collection Date	Analyte	Original & Duplicate Result	Units	Result Quality	Analyte	RPD (%)[1,2]	Status
BDSW-03	SYN	9/28/20 12:00 PM	HARD-T	40	mg/L		HARD-T	0.0	Accept
BDSW-03	DUP	9/28/20 12:10 PM	HARD-T	40	mg/L				
BDSW-03	SYN	5/5/20 3:20 PM	K-D	1	mg/L	U	K-D	0.0	Accept
BDSW-03	DUP	5/5/20 3:30 PM	K-D	1	mg/L	U			
BBSW-01A	SYN	5/12/20 12:20 PM	K-D	2	mg/L		K-D	0.0	Accept
BBSW-01A	DUP	5/12/20 12:35 PM	K-D	2	mg/L				
PASW-09	SYN	5/12/20 1:15 PM	K-D	1	mg/L		K-D	0.0	Accept
PASW-09	DUP	5/12/20 1:30 PM	K-D	1	mg/L				
BDSW-03	SYN	9/9/20 12:20 PM	K-D	1	mg/L		K-D	0.0	Accept
BDSW-03	DUP	9/9/20 12:30 PM	K-D	1	mg/L				
BDSW-03	SYN	9/28/20 12:00 PM	K-D	1	mg/L		K-D	0.0	Accept
BDSW-03	DUP	9/28/20 12:10 PM	K-D	1	mg/L				
BDSW-03	SYN	5/5/20 3:20 PM	K-T	1	mg/L	U	K-T	0.0	Accept
BDSW-03	DUP	5/5/20 3:30 PM	K-T	1	mg/L	U			
BBSW-01A	SYN	5/12/20 12:20 PM	K-T	2	mg/L		K-T	66.7	Accept
BBSW-01A	DUP	5/12/20 12:35 PM	K-T	1	mg/L				
PASW-09	SYN	5/12/20 1:15 PM	K-T	1	mg/L		K-T	0.0	Accept
PASW-09	DUP	5/12/20 1:30 PM	K-T	1	mg/L				
BDSW-03	SYN	9/9/20 12:20 PM	K-T	1	mg/L		K-T	0.0	Accept
BDSW-03	DUP	9/9/20 12:30 PM	K-T	1	mg/L				
BDSW-03	SYN	9/28/20 12:00 PM	K-T	1	mg/L		K-T	0.0	Accept
BDSW-03	DUP	9/28/20 12:10 PM	K-T	1	mg/L				
BDSW-03	SYN	5/5/20 3:20 PM	MG-D	0.7	mg/L		MG-D	0.0	Accept
BDSW-03	DUP	5/5/20 3:30 PM	MG-D	0.7	mg/L				
BBSW-01A	SYN	5/12/20 12:20 PM	MG-D	1.8	mg/L		MG-D	0.0	Accept
BBSW-01A	DUP	5/12/20 12:35 PM	MG-D	1.8	mg/L				
PASW-09	SYN	5/12/20 1:15 PM	MG-D	1.4	mg/L		MG-D	0.0	Accept
PASW-09	DUP	5/12/20 1:30 PM	MG-D	1.4	mg/L				
BDSW-03	SYN	9/9/20 12:20 PM	MG-D	1.4	mg/L		MG-D	0.0	Accept
BDSW-03	DUP	9/9/20 12:30 PM	MG-D	1.4	mg/L				
BDSW-03	SYN	9/28/20 12:00 PM	MG-D	1.5	mg/L		MG-D	0.0	Accept
BDSW-03	DUP	9/28/20 12:10 PM	MG-D	1.5	mg/L				
BDSW-03	96HR	5/4/20 2:30 PM	MG-T	0.8	mg/L		MG-T	13.3	Accept
BDSW-03	DUP	5/4/20 2:40 PM	MG-T	0.7	mg/L				
BDSW-03	SYN	5/5/20 3:20 PM	MG-T	0.8	mg/L		MG-T	0.0	Accept
BDSW-03	DUP	5/5/20 3:30 PM	MG-T	0.8	mg/L				
BDSW-03	96HR	5/6/20 2:30 PM	MG-T	0.7	mg/L		MG-T	0.0	Accept
BDSW-03	DUP	5/6/20 2:40 PM	MG-T	0.7	mg/L				
BDSW-03	96HR	5/7/20 1:20 PM	MG-T	0.7	mg/L		MG-T	0.0	Accept
BDSW-03	DUP	5/7/20 1:30 PM	MG-T	0.7	mg/L				
PASW-09	96HR	5/11/20 2:35 PM	MG-T	1.7	mg/L		MG-T	0.0	Accept
PASW-09	DUP	5/11/20 2:45 PM	MG-T	1.7	mg/L				
BBSW-01A	SYN	5/12/20 12:20 PM	MG-T	1.8	mg/L		MG-T	0.0	Accept
BBSW-01A	DUP	5/12/20 12:35 PM	MG-T	1.8	mg/L				
PASW-09	SYN	5/12/20 1:15 PM	MG-T	1.5	mg/L		MG-T	6.5	Accept
PASW-09	DUP	5/12/20 1:30 PM	MG-T	1.6	mg/L				
PASW-09	96HR	5/13/20 2:20 PM	MG-T	1.6	mg/L		MG-T	6.5	Accept
PASW-09	DUP	5/13/20 2:30 PM	MG-T	1.5	mg/L				
PASW-09	96HR	5/14/20 2:20 PM	MG-T	1.6	mg/L		MG-T	0.0	Accept
PASW-09	DUP	5/14/20 2:30 PM	MG-T	1.6	mg/L				
BDSW-03	96HR	5/25/20 1:20 PM	MG-T	0.7	mg/L		MG-T	0.0	Accept
BDSW-03	DUP	5/25/20 1:30 PM	MG-T	0.7	mg/L				
BDSW-03	96HR	5/26/20 4:00 PM	MG-T	0.6	mg/L		MG-T	0.0	Accept
BDSW-03	DUP	5/26/20 4:10 PM	MG-T	0.6	mg/L				

Table B-5: 2020 Monitoring Report / Field Duplicate Comparison Summary

Station	Sample Event / Type	Collection Date	Analyte	Original & Duplicate Result	Units	Result Quality	Analyte	RPD (%)[1,2]	Status
BDSW-03	96HR	5/27/20 5:00 PM	MG-T	0.6	mg/L		MG-T	15.4	Accept
BDSW-03	DUP	5/27/20 5:10 PM	MG-T	0.7	mg/L				
BDSW-03	96HR	5/28/20 3:10 PM	MG-T	0.6	mg/L		MG-T	0.0	Accept
BDSW-03	DUP	5/28/20 3:20 PM	MG-T	0.6	mg/L				
BDSW-03	SYN	9/9/20 12:20 PM	MG-T	1.6	mg/L		MG-T	6.5	Accept
BDSW-03	DUP	9/9/20 12:30 PM	MG-T	1.5	mg/L				
BDSW-03	96HR	9/21/20 3:30 PM	MG-T	1.5	mg/L		MG-T	0.0	Accept
BDSW-03	DUP	9/21/20 3:40 PM	MG-T	1.5	mg/L				
BDSW-03	96HR	9/22/20 1:20 PM	MG-T	1.5	mg/L		MG-T	0.0	Accept
BDSW-03	DUP	9/22/20 1:30 PM	MG-T	1.5	mg/L				
BDSW-03	96HR	9/23/20 2:25 PM	MG-T	1.5	mg/L		MG-T	0.0	Accept
BDSW-03	DUP	9/23/20 2:35 PM	MG-T	1.5	mg/L				
BDSW-03	96HR	9/24/20 2:05 PM	MG-T	1.5	mg/L		MG-T	0.0	Accept
BDSW-03	DUP	9/24/20 2:15 PM	MG-T	1.5	mg/L				
BDSW-03	SYN	9/28/20 12:00 PM	MG-T	1.6	mg/L		MG-T	0.0	Accept
BDSW-03	DUP	9/28/20 12:10 PM	MG-T	1.6	mg/L				
BDSW-03	SYN	5/5/20 3:20 PM	NA-D	2	mg/L		NA-D	0.0	Accept
BDSW-03	DUP	5/5/20 3:30 PM	NA-D	2	mg/L				
BBSW-01A	SYN	5/12/20 12:20 PM	NA-D	2	mg/L		NA-D	0.0	Accept
BBSW-01A	DUP	5/12/20 12:35 PM	NA-D	2	mg/L				
PASW-09	SYN	5/12/20 1:15 PM	NA-D	2	mg/L		NA-D	0.0	Accept
PASW-09	DUP	5/12/20 1:30 PM	NA-D	2	mg/L				
BDSW-03	SYN	9/9/20 12:20 PM	NA-D	4	mg/L		NA-D	0.0	Accept
BDSW-03	DUP	9/9/20 12:30 PM	NA-D	4	mg/L				
BDSW-03	SYN	9/28/20 12:00 PM	NA-D	4	mg/L		NA-D	0.0	Accept
BDSW-03	DUP	9/28/20 12:10 PM	NA-D	4	mg/L				
BDSW-03	SYN	5/5/20 3:20 PM	NA-T	2	mg/L		NA-T	0.0	Accept
BDSW-03	DUP	5/5/20 3:30 PM	NA-T	2	mg/L				
BBSW-01A	SYN	5/12/20 12:20 PM	NA-T	2	mg/L		NA-T	0.0	Accept
BBSW-01A	DUP	5/12/20 12:35 PM	NA-T	2	mg/L				
PASW-09	SYN	5/12/20 1:15 PM	NA-T	2	mg/L		NA-T	40.0	Accept
PASW-09	DUP	5/12/20 1:30 PM	NA-T	3	mg/L				
BDSW-03	SYN	9/9/20 12:20 PM	NA-T	4	mg/L		NA-T	0.0	Accept
BDSW-03	DUP	9/9/20 12:30 PM	NA-T	4	mg/L				
BDSW-03	SYN	9/28/20 12:00 PM	NA-T	4	mg/L		NA-T	0.0	Accept
BDSW-03	DUP	9/28/20 12:10 PM	NA-T	4	mg/L				
BDSW-03	SYN	5/5/20 3:20 PM	PH-L	7.5	pH unit	J	PH-L	1.3	Accept
BDSW-03	DUP	5/5/20 3:30 PM	PH-L	7.4	pH unit	J			
BBSW-01A	SYN	5/12/20 12:20 PM	PH-L	7.4	pH unit	J	PH-L	1.4	Accept
BBSW-01A	DUP	5/12/20 12:35 PM	PH-L	7.3	pH unit	J			
PASW-09	SYN	5/12/20 1:15 PM	PH-L	7.7	pH unit	J	PH-L	0.0	Accept
PASW-09	DUP	5/12/20 1:30 PM	PH-L	7.7	pH unit	J			
BDSW-03	SYN	9/9/20 12:20 PM	PH-L	7.8	pH unit	J	PH-L	1.3	Accept
BDSW-03	DUP	9/9/20 12:30 PM	PH-L	7.7	pH unit	J			
BDSW-03	SYN	9/28/20 12:00 PM	PH-L	7.8	pH unit	J	PH-L	0.0	Accept
BDSW-03	DUP	9/28/20 12:10 PM	PH-L	7.8	pH unit	J			
BDSW-03	SYN	5/5/20 3:20 PM	SO4-T	2	mg/L		SO4-T	0.0	Accept
BDSW-03	DUP	5/5/20 3:30 PM	SO4-T	2	mg/L				
BBSW-01A	SYN	5/12/20 12:20 PM	SO4-T	13	mg/L		SO4-T	0.0	Accept
BBSW-01A	DUP	5/12/20 12:35 PM	SO4-T	13	mg/L				
PASW-09	SYN	5/12/20 1:15 PM	SO4-T	4	mg/L		SO4-T	0.0	Accept
PASW-09	DUP	5/12/20 1:30 PM	SO4-T	4	mg/L				
BDSW-03	SYN	9/9/20 12:20 PM	SO4-T	4	mg/L		SO4-T	0.0	Accept
BDSW-03	DUP	9/9/20 12:30 PM	SO4-T	4	mg/L				

Table B-5: 2020 Monitoring Report / Field Duplicate Comparison Summary

Station	Sample Event / Type	Collection Date	Analyte	Original & Duplicate Result	Units	Result Quality	Analyte	RPD (%)[1,2]	Status
BDSW-03	SYN	9/28/20 12:00 PM	SO4-T	5	mg/L		SO4-T	0.0	Accept
BDSW-03	DUP	9/28/20 12:10 PM	SO4-T	5	mg/L				
BDSW-03	SYN	5/5/20 3:20 PM	TDS-L	45	mg/L		TDS-L	2.2	Accept
BDSW-03	DUP	5/5/20 3:30 PM	TDS-L	46	mg/L				
BBSW-01A	SYN	5/12/20 12:20 PM	TDS-L	58	mg/L		TDS-L	1.7	Accept
BBSW-01A	DUP	5/12/20 12:35 PM	TDS-L	57	mg/L				
PASW-09	SYN	5/12/20 1:15 PM	TDS-L	61	mg/L		TDS-L	15.9	Accept
PASW-09	DUP	5/12/20 1:30 PM	TDS-L	52	mg/L				
BBMW-06A	M	5/27/20 2:25 PM	TDS-L	302	mg/L		TDS-L	1.3	Accept
BBMW-06A	DUP	5/27/20 2:35 PM	TDS-L	298	mg/L				
BDSW-03	SYN	9/9/20 12:20 PM	TDS-L	69	mg/L		TDS-L	1.5	Accept
BDSW-03	DUP	9/9/20 12:30 PM	TDS-L	68	mg/L				
BDSW-03	SYN	9/28/20 12:00 PM	TDS-L	75	mg/L		TDS-L	0.0	Accept
BDSW-03	DUP	9/28/20 12:10 PM	TDS-L	75	mg/L				
PASW-09	MTHY	3/26/20 10:20 AM	TSS	10	mg/L	U	TSS	0.0	Accept
PASW-09	DUP	3/26/20 10:30 AM	TSS	10	mg/L	U			
BDSW-03	SYN	5/5/20 3:20 PM	TSS	10	mg/L	U	TSS	0.0	Accept
BDSW-03	DUP	5/5/20 3:30 PM	TSS	10	mg/L	U			
BBSW-01A	SYN	5/12/20 12:20 PM	TSS	10	mg/L	U	TSS	0.0	Accept
BBSW-01A	DUP	5/12/20 12:35 PM	TSS	10	mg/L	U			
PASW-09	SYN	5/12/20 1:15 PM	TSS	20	mg/L		TSS	10.5	Accept
PASW-09	DUP	5/12/20 1:30 PM	TSS	18	mg/L				
PASW-09	MTHY	6/27/20 2:20 PM	TSS	10	mg/L	U	TSS	0.0	Accept
PASW-09	DUP	6/27/20 2:30 PM	TSS	10	mg/L	U			
PASW-09	MTHY	7/24/20 4:20 PM	TSS	10	mg/L	U	TSS	0.0	Accept
PASW-09	DUP	7/24/20 4:30 PM	TSS	10	mg/L	U			
PASW-09	MTHY	8/19/20 3:20 PM	TSS	10	mg/L	U	TSS	0.0	Accept
PASW-09	DUP	8/19/20 3:30 PM	TSS	10	mg/L	U			
BDSW-03	SYN	9/9/20 12:20 PM	TSS	10	mg/L	U	TSS	0.0	Accept
BDSW-03	DUP	9/9/20 12:30 PM	TSS	10	mg/L	U			
BDSW-03	SYN	9/28/20 12:00 PM	TSS	10	mg/L	U	TSS	0.0	Accept
BDSW-03	DUP	9/28/20 12:10 PM	TSS	10	mg/L	U			
BBSW-01A	MTHY	10/26/20 8:30 AM	TSS	10	mg/L	U	TSS	0.0	Accept
BBSW-01A	DUP	10/26/20 8:40 AM	TSS	10	mg/L	U			
PASW-09	MTHY	11/16/20 11:00 AM	TSS	10	mg/L	U	TSS	0.0	Accept

Table B-6: 2020 Monitoring Report / Field Control Standard Summary

Associated ERA Batch#	Analytical Laboratory[2]	Sample Event	Associated Drainage	Collection Date	Analyte	Certified Concentration	FCS Dissolved Fraction Result	FCS Total Fraction Result	Units	70-130% Acceptance Limits of Certified Concentration	Acceptance Status[3]
02272001.1A	ELI	96HR	BD	7-May-20	Arsenic	0.00460	0.005	0.005	mg/L	0.00322 - 0.00598	Accept
	ELI	96HR	BD	26-May-20	Arsenic	0.00460	0.005	0.005	mg/L	0.00322 - 0.00598	Accept
	ELI	96HR	BD	28-May-20	Arsenic	0.00460	0.005	0.004	mg/L	0.00322 - 0.00598	Accept
	ELI	96HR	BD	24-Sep-20	Arsenic	0.00460	0.004	0.004	mg/L	0.00322 - 0.00598	Accept
	ELI	Synoptic	BD / SF	28-Sep-20	Arsenic	0.00460	0.004	0.004	mg/L	0.00322 - 0.00598	Accept
02272002.2B	ELI	Synoptic / 96HR	BD / SF	5-May-20	Arsenic	0.00350	0.003	0.003	mg/L	0.00245 - 0.00455	Accept
	ELI	Synoptic	BD / SF / BT	8-May-20	Arsenic	0.00350	0.004	0.004	mg/L	0.00245 - 0.00455	Accept
	ELI	96HR	PA	12-May-20	Arsenic	0.00350	0.003	0.003	mg/L	0.00245 - 0.00455	Accept
	ELI	96HR	PA	14-May-20	Arsenic	0.00350	0.003	0.004	mg/L	0.00245 - 0.00455	Accept
	ELI	Annual MW Monitoring	BB	27-May-20	Arsenic	0.00350	0.003	0.004	mg/L	0.00245 - 0.00455	Accept
	ELI	Synoptic	BD / SF	9-Sep-20	Arsenic	0.00350	0.003	0.003	mg/L	0.00245 - 0.00455	Accept
02272001.1A	ELI	96HR	BD	7-May-20	Cobalt	0.0500	0.0558	0.0575	mg/L	0.0350 - 0.0650	Accept
	ELI	96HR	BD	26-May-20	Cobalt	0.0500	0.0527	0.0560	mg/L	0.0350 - 0.0650	Accept
	ELI	96HR	BD	28-May-20	Cobalt	0.0500	0.0548	0.0555	mg/L	0.0350 - 0.0650	Accept
	ELI	96HR	BD	24-Sep-20	Cobalt	0.0500	0.0502	0.0520	mg/L	0.0350 - 0.0650	Accept
	ELI	Synoptic	BD / SF	28-Sep-20	Cobalt	0.0500	0.0548	0.0537	mg/L	0.0350 - 0.0650	Accept
02272002.2B	ELI	Synoptic / 96HR	BD / SF	5-May-20	Cobalt	0.00420	0.0043	0.0043	mg/L	0.02940 - 0.05460	Accept
	ELI	Synoptic	BD / SF / BT	8-May-20	Cobalt	0.00420	0.0045	0.0046	mg/L	0.02940 - 0.05460	Accept
	ELI	96HR	PA	12-May-20	Cobalt	0.00420	0.0044	0.0045	mg/L	0.02940 - 0.05460	Accept
	ELI	96HR	PA	14-May-20	Cobalt	0.00420	0.0046	0.0048	mg/L	0.02940 - 0.05460	Accept
	ELI	Annual MW Monitoring	BB	27-May-20	Cobalt	0.00420	0.0045	0.0046	mg/L	0.02940 - 0.05460	Accept
	ELI	Synoptic	BD / SF	9-Sep-20	Cobalt	0.00420	0.0044	0.0054	mg/L	0.02940 - 0.05460	Accept
02272001.1A	ELI	96HR	BD	7-May-20	Copper	0.00300	0.0031	0.0033	mg/L	0.00210 - 0.00390	Accept
	ELI	96HR	BD	26-May-20	Copper	0.00300	0.0029	0.0032	mg/L	0.00210 - 0.00390	Accept
	ELI	96HR	BD	28-May-20	Copper	0.00300	0.0030	0.0029	mg/L	0.00210 - 0.00390	Accept
	ELI	96HR	BD	24-Sep-20	Copper	0.00300	0.0030	0.0031	mg/L	0.00210 - 0.00390	Accept
	ELI	Synoptic	BD / SF	28-Sep-20	Copper	0.00300	0.0032	0.0037	mg/L	0.00210 - 0.00390	Accept
02272002.2B	ELI	Synoptic / 96HR	BD / SF	5-May-20	Copper	0.00450	0.0042	0.0043	mg/L	0.00315 - 0.00585	Accept
	ELI	Synoptic	BD / SF / BT	8-May-20	Copper	0.00450	0.0046	0.0047	mg/L	0.00315 - 0.00585	Accept
	ELI	96HR	PA	12-May-20	Copper	0.00450	0.0044	0.0042	mg/L	0.00315 - 0.00585	Accept
	ELI	96HR	PA	14-May-20	Copper	0.00450	0.0047	0.0048	mg/L	0.00315 - 0.00585	Accept
	ELI	Annual MW Monitoring	BB	27-May-20	Copper	0.00450	0.0045	0.0044	mg/L	0.00315 - 0.00585	Accept
	ELI	Synoptic	BD / SF	9-Sep-20	Copper	0.00450	0.0043	0.0053	mg/L	0.00315 - 0.00585	Accept

Notes: BB: Blackbird; PA: Panther; BT: Bucktail; SF: South Fork; BD: Big Deer; NA: Not Applicable; n/a: analyzed, but at a reporting limit higher than useable for FCS results comparison.

1 - ERA - Environmental Resource Associates; Source laboratory for Field Control Standards (FCSs).

2 - ELI: Energy Laboratories Inc. located in Billings, MT.

3 - Acceptance status is determined by comparison of the dissolved fraction results to the 70 - 130 % acceptance limits of the certified concentrations for each analyte.

Table B-7: 2020 Monitoring Report / Field Blank Summary

Station Code	Sample Event	Collection Date & Time	Filter Status	Parameter Code [1]	Result	Units	Result Quality[2]	Detects
PASW-09	Monthly	3/26/20 10:40 AM	F	AS-D	0.001	mg/L	U	
PASW-09	Monthly	3/26/20 10:40 AM	U	AS-T	0.001	mg/L	U	
PASW-09	Monthly	3/26/20 10:40 AM	U	TSS	10	mg/L	U	
BDSW-03	96HR	5/4/20 2:50 PM	U	CA-T	0.5	mg/L	U	
BDSW-03	96HR	5/4/20 2:50 PM	F	CU-D	0.0003	mg/L	U	
BDSW-03	96HR	5/4/20 2:50 PM	U	HARD-T	0.5	mg/L	U	
BDSW-03	96HR	5/4/20 2:50 PM	U	MG-T	0.5	mg/L	U	
BDSW-03	Synoptic / 96HR	5/5/20 3:40 PM	U	ALK-B	4	mg/L	U	
BDSW-03	Synoptic / 96HR	5/5/20 3:40 PM	U	ALK-C	4	mg/L	U	
BDSW-03	Synoptic / 96HR	5/5/20 3:40 PM	U	ALK-T	4	mg/L	U	
BDSW-03	Synoptic / 96HR	5/5/20 3:40 PM	F	AS-D	0.001	mg/L	U	
BDSW-03	Synoptic / 96HR	5/5/20 3:40 PM	U	AS-T	0.001	mg/L	U	
BDSW-03	Synoptic / 96HR	5/5/20 3:40 PM	F	CA-D	0.5	mg/L	U	
BDSW-03	Synoptic / 96HR	5/5/20 3:40 PM	U	CA-T	0.5	mg/L	U	
BDSW-03	Synoptic / 96HR	5/5/20 3:40 PM	U	CL-T	1	mg/L	U	
BDSW-03	Synoptic / 96HR	5/5/20 3:40 PM	F	CO-D	0.0001	mg/L	U	
BDSW-03	Synoptic / 96HR	5/5/20 3:40 PM	U	CO-T	0.0001	mg/L	U	
BDSW-03	Synoptic / 96HR	5/5/20 3:40 PM	F	CU-D	0.0003	mg/L	U	
BDSW-03	Synoptic / 96HR	5/5/20 3:40 PM	U	CU-T	0.0008	mg/L	U	
BDSW-03	Synoptic / 96HR	5/5/20 3:40 PM	U	DOC	0.5	mg/L	U	
BDSW-03	Synoptic / 96HR	5/5/20 3:40 PM	U	HARD-T	1	mg/L	U	
BDSW-03	Synoptic / 96HR	5/5/20 3:40 PM	F	K-D	1	mg/L	U	
BDSW-03	Synoptic / 96HR	5/5/20 3:40 PM	U	K-T	1	mg/L	U	
BDSW-03	Synoptic / 96HR	5/5/20 3:40 PM	F	MG-D	0.5	mg/L	U	
BDSW-03	Synoptic / 96HR	5/5/20 3:40 PM	U	MG-T	0.5	mg/L	U	
BDSW-03	Synoptic / 96HR	5/5/20 3:40 PM	F	NA-D	1	mg/L	U	
BDSW-03	Synoptic / 96HR	5/5/20 3:40 PM	U	NA-T	1	mg/L	U	
BDSW-03	Synoptic / 96HR	5/5/20 3:40 PM	U	PH-L	5.8	pH unit	J	
BDSW-03	Synoptic / 96HR	5/5/20 3:40 PM	U	SO4-T	1	mg/L	U	
BDSW-03	Synoptic / 96HR	5/5/20 3:40 PM	U	TDS-L	10	mg/L	U	
BDSW-03	Synoptic / 96HR	5/5/20 3:40 PM	U	TSS	10	mg/L	U	
BDSW-03	96HR	5/6/20 2:50 PM	U	CA-T	0.5	mg/L	U	
BDSW-03	96HR	5/6/20 2:50 PM	F	CU-D	0.0003	mg/L	U	
BDSW-03	96HR	5/6/20 2:50 PM	U	HARD-T	0.5	mg/L	U	
BDSW-03	96HR	5/6/20 2:50 PM	U	MG-T	0.5	mg/L	U	
BDSW-03	96HR	5/7/20 1:40 PM	F	AS-D	0.001	mg/L	U	
BDSW-03	96HR	5/7/20 1:40 PM	U	AS-T	0.001	mg/L	U	
BDSW-03	96HR	5/7/20 1:40 PM	U	CA-T	0.5	mg/L	U	
BDSW-03	96HR	5/7/20 1:40 PM	F	CO-D	0.0001	mg/L	U	
BDSW-03	96HR	5/7/20 1:40 PM	U	CO-T	0.0001	mg/L	U	
BDSW-03	96HR	5/7/20 1:40 PM	F	CU-D	0.0003	mg/L	U	
BDSW-03	96HR	5/7/20 1:40 PM	U	CU-T	0.0008	mg/L	U	
BDSW-03	96HR	5/7/20 1:40 PM	U	HARD-T	0.5	mg/L	U	
BDSW-03	96HR	5/7/20 1:40 PM	U	MG-T	0.5	mg/L	U	
PASW-09	96HR	5/11/20 2:55 PM	U	CA-T	0.5	mg/L	U	
PASW-09	96HR	5/11/20 2:55 PM	F	CO-D	0.0001	mg/L	U	
PASW-09	96HR	5/11/20 2:55 PM	F	CU-D	0.0003	mg/L	U	
PASW-09	96HR	5/11/20 2:55 PM	U	HARD-T	0.5	mg/L	U	
PASW-09	96HR	5/11/20 2:55 PM	U	MG-T	0.5	mg/L	U	

Table B-7: 2020 Monitoring Report / Field Blank Summary

Station Code	Sample Event	Collection Date & Time	Filter Status	Parameter Code [1]	Result	Units	Result Quality[2]	Detects
BBSW-01A	Synoptic / 96HR	5/12/20 12:45 PM	U	ALK-B	4	mg/L	U	
BBSW-01A	Synoptic / 96HR	5/12/20 12:45 PM	U	ALK-C	4	mg/L	U	
BBSW-01A	Synoptic / 96HR	5/12/20 12:45 PM	U	ALK-T	4	mg/L	U	
BBSW-01A	Synoptic / 96HR	5/12/20 12:45 PM	F	AS-D	0.001	mg/L	U	
BBSW-01A	Synoptic / 96HR	5/12/20 12:45 PM	U	AS-T	0.001	mg/L	U	
BBSW-01A	Synoptic / 96HR	5/12/20 12:45 PM	F	CA-D	0.5	mg/L	U	
BBSW-01A	Synoptic / 96HR	5/12/20 12:45 PM	U	CA-T	0.5	mg/L	U	
BBSW-01A	Synoptic / 96HR	5/12/20 12:45 PM	U	CL-T	1	mg/L	U	
BBSW-01A	Synoptic / 96HR	5/12/20 12:45 PM	F	CO-D	0.0001	mg/L	U	
BBSW-01A	Synoptic / 96HR	5/12/20 12:45 PM	U	CO-T	0.0001	mg/L	U	
BBSW-01A	Synoptic / 96HR	5/12/20 12:45 PM	F	CU-D	0.0003	mg/L	U	
BBSW-01A	Synoptic / 96HR	5/12/20 12:45 PM	U	CU-T	0.0015	mg/L		Detect
BBSW-01A	Synoptic / 96HR	5/12/20 12:45 PM	U	DOC	0.5	mg/L	U	
BBSW-01A	Synoptic / 96HR	5/12/20 12:45 PM	U	HARD-T	1	mg/L	U	
BBSW-01A	Synoptic / 96HR	5/12/20 12:45 PM	F	K-D	1	mg/L	U	
BBSW-01A	Synoptic / 96HR	5/12/20 12:45 PM	U	K-T	1	mg/L	U	
BBSW-01A	Synoptic / 96HR	5/12/20 12:45 PM	F	MG-D	0.5	mg/L	U	
BBSW-01A	Synoptic / 96HR	5/12/20 12:45 PM	U	MG-T	0.5	mg/L	U	
BBSW-01A	Synoptic / 96HR	5/12/20 12:45 PM	F	NA-D	1	mg/L	U	
BBSW-01A	Synoptic / 96HR	5/12/20 12:45 PM	U	NA-T	1	mg/L	U	
BBSW-01A	Synoptic / 96HR	5/12/20 12:45 PM	U	PH-L	5.8	pH unit	J	
BBSW-01A	Synoptic / 96HR	5/12/20 12:45 PM	U	SO4-T	1	mg/L	U	
BBSW-01A	Synoptic / 96HR	5/12/20 12:45 PM	U	TDS-L	10	mg/L	U	
BBSW-01A	Synoptic / 96HR	5/12/20 12:45 PM	U	TSS	10	mg/L	U	
PASW-09	Synoptic / 96HR	5/12/20 1:45 PM	U	ALK-B	4	mg/L	U	
PASW-09	Synoptic / 96HR	5/12/20 1:45 PM	U	ALK-C	4	mg/L	U	
PASW-09	Synoptic / 96HR	5/12/20 1:45 PM	U	ALK-T	4	mg/L	U	
PASW-09	Synoptic / 96HR	5/12/20 1:45 PM	F	AS-D	0.001	mg/L	U	
PASW-09	Synoptic / 96HR	5/12/20 1:45 PM	U	AS-T	0.001	mg/L	U	
PASW-09	Synoptic / 96HR	5/12/20 1:45 PM	F	CA-D	0.5	mg/L	U	
PASW-09	Synoptic / 96HR	5/12/20 1:45 PM	U	CA-T	0.5	mg/L	U	
PASW-09	Synoptic / 96HR	5/12/20 1:45 PM	U	CL-T	1	mg/L	U	
PASW-09	Synoptic / 96HR	5/12/20 1:45 PM	F	CO-D	0.0001	mg/L	U	
PASW-09	Synoptic / 96HR	5/12/20 1:45 PM	U	CO-T	0.0001	mg/L	U	
PASW-09	Synoptic / 96HR	5/12/20 1:45 PM	F	CU-D	0.0003	mg/L	U	
PASW-09	Synoptic / 96HR	5/12/20 1:45 PM	U	CU-T	0.0004	mg/L	U	
PASW-09	Synoptic / 96HR	5/12/20 1:45 PM	U	DOC	0.5	mg/L	U	
PASW-09	Synoptic / 96HR	5/12/20 1:45 PM	U	HARD-T	1	mg/L	U	
PASW-09	Synoptic / 96HR	5/12/20 1:45 PM	F	K-D	1	mg/L	U	
PASW-09	Synoptic / 96HR	5/12/20 1:45 PM	U	K-T	1	mg/L	U	
PASW-09	Synoptic / 96HR	5/12/20 1:45 PM	F	MG-D	0.5	mg/L	U	
PASW-09	Synoptic / 96HR	5/12/20 1:45 PM	U	MG-T	0.5	mg/L	U	
PASW-09	Synoptic / 96HR	5/12/20 1:45 PM	F	NA-D	1	mg/L	U	
PASW-09	Synoptic / 96HR	5/12/20 1:45 PM	U	NA-T	1	mg/L	U	
PASW-09	Synoptic / 96HR	5/12/20 1:45 PM	U	PH-L	6	pH unit	J	
PASW-09	Synoptic / 96HR	5/12/20 1:45 PM	U	SO4-T	1	mg/L	U	
PASW-09	Synoptic / 96HR	5/12/20 1:45 PM	U	TDS-L	10	mg/L	U	
PASW-09	Synoptic / 96HR	5/12/20 1:45 PM	U	TSS	10	mg/L	U	
PASW-09	96HR	5/13/20 2:40 PM	U	CA-T	0.5	mg/L	U	
PASW-09	96HR	5/13/20 2:40 PM	F	CO-D	0.0001	mg/L	U	
PASW-09	96HR	5/13/20 2:40 PM	F	CU-D	0.0012	mg/L		Detect
PASW-09	96HR	5/13/20 2:40 PM	U	HARD-T	0.5	mg/L	U	
PASW-09	96HR	5/13/20 2:40 PM	U	MG-T	0.5	mg/L	U	
PASW-09	96HR	5/14/20 2:40 PM	U	CA-T	0.5	mg/L	U	
PASW-09	96HR	5/14/20 2:40 PM	F	CO-D	0.0001	mg/L	U	
PASW-09	96HR	5/14/20 2:40 PM	F	CU-D	0.0003	mg/L	U	
PASW-09	96HR	5/14/20 2:40 PM	U	HARD-T	0.5	mg/L	U	
PASW-09	96HR	5/14/20 2:40 PM	U	MG-T	0.5	mg/L	U	

Table B-7: 2020 Monitoring Report / Field Blank Summary

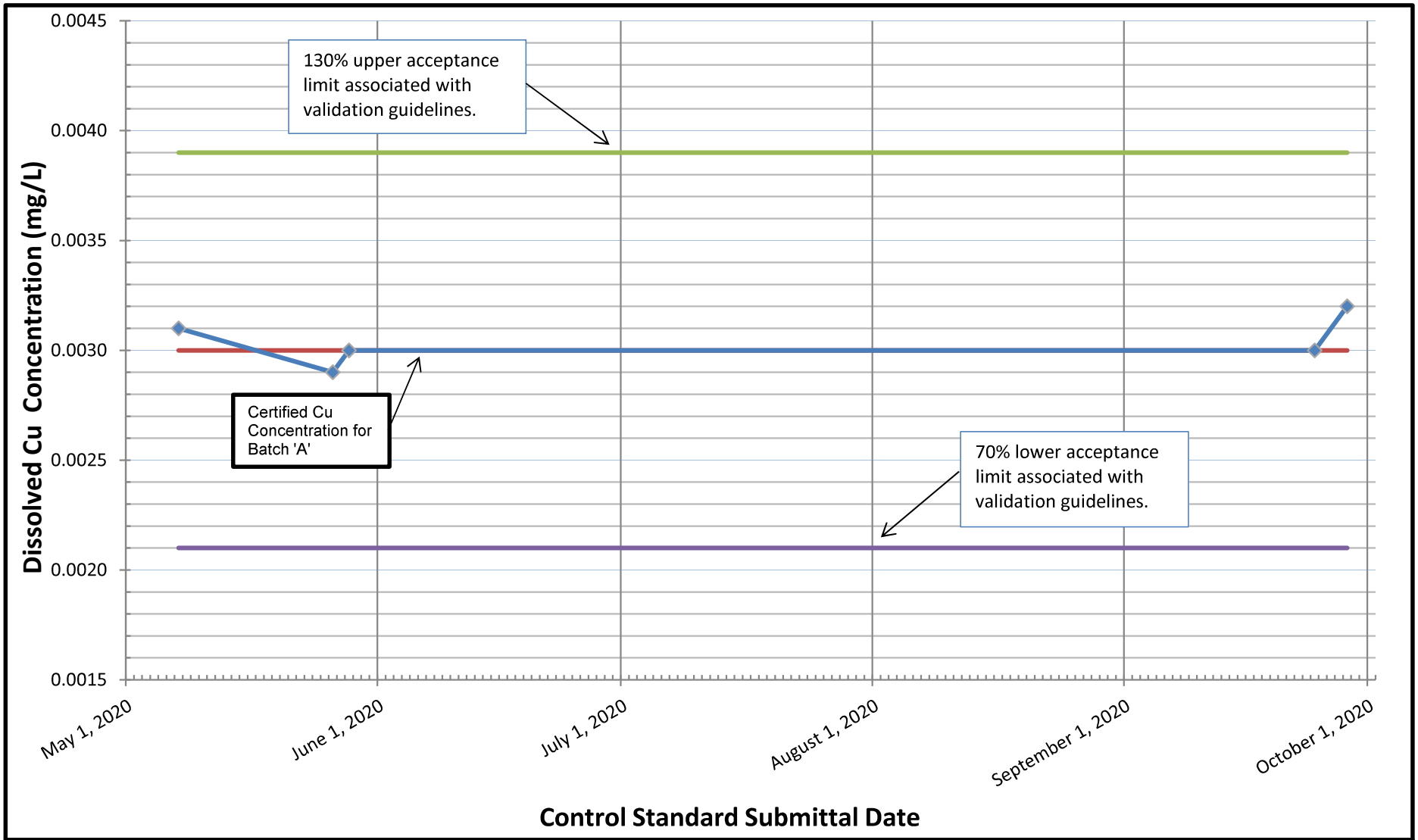
Station Code	Sample Event	Collection Date & Time	Filter Status	Parameter Code [1]	Result	Units	Result Quality[2]	Detects
BDSW-03	96HR	5/25/20 1:40 PM	U	CA-T	1	mg/L	J+	Detect
BDSW-03	96HR	5/25/20 1:40 PM	F	CU-D	0.0003	mg/L	U	
BDSW-03	96HR	5/25/20 1:40 PM	U	HARD-T	2.6	mg/L		Detect
BDSW-03	96HR	5/25/20 1:40 PM	U	MG-T	0.5	mg/L	U	
BDSW-03	96HR	5/26/20 4:20 PM	U	CA-T	0.5	mg/L	U	
BDSW-03	96HR	5/26/20 4:20 PM	F	CU-D	0.0003	mg/L	U	
BDSW-03	96HR	5/26/20 4:20 PM	U	HARD-T	0.5	mg/L		Detect
BDSW-03	96HR	5/26/20 4:20 PM	U	MG-T	0.5	mg/L	U	
BBMW-06A	Monitoring	5/27/20 2:45 PM	F	AS-D	0.001	mg/L	U	
BBMW-06A	Monitoring	5/27/20 2:45 PM	F	CO-D	0.0002	mg/L		Detect
BBMW-06A	Monitoring	5/27/20 2:45 PM	F	CU-D	0.0003	mg/L	U	
BBMW-06A	Monitoring	5/27/20 2:45 PM	F	FE-D	0.03	mg/L	U	
BBMW-06A	Monitoring	5/27/20 2:45 PM	U	TDS-L	10	mg/L	U	
BDSW-03	96HR	5/27/20 5:20 PM	U	CA-T	0.5	mg/L	U	
BDSW-03	96HR	5/27/20 5:20 PM	F	CU-D	0.0003	mg/L	U	
BDSW-03	96HR	5/27/20 5:20 PM	U	HARD-T	0.5	mg/L		Detect
BDSW-03	96HR	5/27/20 5:20 PM	U	MG-T	0.5	mg/L	U	
BDSW-03	96HR	5/28/20 3:30 PM	U	CA-T	1.9	mg/L		Detect
BDSW-03	96HR	5/28/20 3:30 PM	F	CU-D	0.0003	mg/L	U	
BDSW-03	96HR	5/28/20 3:30 PM	U	HARD-T	4.9	mg/L		Detect
BDSW-03	96HR	5/28/20 3:30 PM	U	MG-T	0.5	mg/L	U	
PASW-09	Monthly	6/27/20 2:40 PM	F	AS-D	0.001	mg/L	U	
PASW-09	Monthly	6/27/20 2:40 PM	U	AS-T	0.001	mg/L	U	
PASW-09	Monthly	6/27/20 2:40 PM	U	TSS	10	mg/L	U	
PASW-09	Monthly	7/24/20 4:40 PM	F	AS-D	0.001	mg/L	U	
PASW-09	Monthly	7/24/20 4:40 PM	U	AS-T	0.001	mg/L	U	
PASW-09	Monthly	7/24/20 4:40 PM	U	TSS	10	mg/L	U	
PASW-09	Monthly	8/19/20 3:40 PM	F	AS-D	0.001	mg/L	U	
PASW-09	Monthly	8/19/20 3:40 PM	U	AS-T	0.001	mg/L	U	
PASW-09	Monthly	8/19/20 3:40 PM	U	TSS	10	mg/L	U	
BDSW-03	Synoptic	9/9/20 12:40 PM	U	ALK-B	4	mg/L	U	
BDSW-03	Synoptic	9/9/20 12:40 PM	U	ALK-C	4	mg/L	U	
BDSW-03	Synoptic	9/9/20 12:40 PM	U	ALK-T	4	mg/L	U	
BDSW-03	Synoptic	9/9/20 12:40 PM	F	AS-D	0.001	mg/L	U	
BDSW-03	Synoptic	9/9/20 12:40 PM	U	AS-T	0.001	mg/L	U	
BDSW-03	Synoptic	9/9/20 12:40 PM	F	CA-D	0.5	mg/L	U	
BDSW-03	Synoptic	9/9/20 12:40 PM	U	CA-T	0.5	mg/L	U	
BDSW-03	Synoptic	9/9/20 12:40 PM	U	CL-T	1	mg/L	U	
BDSW-03	Synoptic	9/9/20 12:40 PM	F	CO-D	0.0002	mg/L		Detect
BDSW-03	Synoptic	9/9/20 12:40 PM	U	CO-T	0.0001	mg/L	U	
BDSW-03	Synoptic	9/9/20 12:40 PM	F	CU-D	0.0004	mg/L	U	
BDSW-03	Synoptic	9/9/20 12:40 PM	U	CU-T	0.0004	mg/L	U	
BDSW-03	Synoptic	9/9/20 12:40 PM	U	DOC	0.5	mg/L	U	
BDSW-03	Synoptic	9/9/20 12:40 PM	U	HARD-T	1	mg/L	U	
BDSW-03	Synoptic	9/9/20 12:40 PM	F	K-D	1	mg/L	U	
BDSW-03	Synoptic	9/9/20 12:40 PM	U	K-T	1	mg/L	U	
BDSW-03	Synoptic	9/9/20 12:40 PM	F	MG-D	0.5	mg/L	U	
BDSW-03	Synoptic	9/9/20 12:40 PM	U	MG-T	0.5	mg/L	U	
BDSW-03	Synoptic	9/9/20 12:40 PM	F	NA-D	1	mg/L	U	
BDSW-03	Synoptic	9/9/20 12:40 PM	U	NA-T	1	mg/L	U	
BDSW-03	Synoptic	9/9/20 12:40 PM	U	PH-L	5.8	pH unit	J	
BDSW-03	Synoptic	9/9/20 12:40 PM	U	SO4-T	1	mg/L	U	
BDSW-03	Synoptic	9/9/20 12:40 PM	U	TDS-L	10	mg/L	U	
BDSW-03	Synoptic	9/9/20 12:40 PM	U	TSS	10	mg/L	U	
BDSW-03	96HR	9/21/20 3:50 PM	U	CA-T	0.5	mg/L	U	
BDSW-03	96HR	9/21/20 3:50 PM	F	CU-D	0.0003	mg/L	U	
BDSW-03	96HR	9/21/20 3:50 PM	U	HARD-T	0.5	mg/L	U	
BDSW-03	96HR	9/21/20 3:50 PM	U	MG-T	0.5	mg/L	U	

Table B-7: 2020 Monitoring Report / Field Blank Summary

Station Code	Sample Event	Collection Date & Time	Filter Status	Parameter Code [1]	Result	Units	Result Quality[2]	Detects
BDSW-03	96HR	9/22/20 1:40 PM	U	CA-T	0.5	mg/L	U	
BDSW-03	96HR	9/22/20 1:40 PM	F	CU-D	0.0003	mg/L	U	
BDSW-03	96HR	9/22/20 1:40 PM	U	HARD-T	0.5	mg/L	U	
BDSW-03	96HR	9/22/20 1:40 PM	U	MG-T	0.5	mg/L	U	
BDSW-03	96HR	9/23/20 2:45 PM	U	CA-T	0.5	mg/L	U	
BDSW-03	96HR	9/23/20 2:45 PM	F	CU-D	0.0003	mg/L	U	
BDSW-03	96HR	9/23/20 2:45 PM	U	HARD-T	0.5	mg/L	U	
BDSW-03	96HR	9/23/20 2:45 PM	U	MG-T	0.5	mg/L	U	
BDSW-03	96HR	9/24/20 2:25 PM	U	CA-T	0.5	mg/L	U	
BDSW-03	96HR	9/24/20 2:25 PM	F	CU-D	0.0003	mg/L	U	
BDSW-03	96HR	9/24/20 2:25 PM	U	HARD-T	0.5	mg/L	U	
BDSW-03	96HR	9/24/20 2:25 PM	U	MG-T	0.5	mg/L	U	
BDSW-03	Synoptic	9/28/20 12:20 PM	U	ALK-B	4	mg/L		Detect
BDSW-03	Synoptic	9/28/20 12:20 PM	U	ALK-C	4	mg/L	U	
BDSW-03	Synoptic	9/28/20 12:20 PM	U	ALK-T	4	mg/L	U	
BDSW-03	Synoptic	9/28/20 12:20 PM	F	AS-D	0.001	mg/L	U	
BDSW-03	Synoptic	9/28/20 12:20 PM	U	AS-T	0.001	mg/L	U	
BDSW-03	Synoptic	9/28/20 12:20 PM	F	CA-D	0.5	mg/L	U	
BDSW-03	Synoptic	9/28/20 12:20 PM	U	CA-T	0.5	mg/L	U	
BDSW-03	Synoptic	9/28/20 12:20 PM	U	CL-T	1	mg/L	U	
BDSW-03	Synoptic	9/28/20 12:20 PM	F	CO-D	0.0001	mg/L	U	
BDSW-03	Synoptic	9/28/20 12:20 PM	U	CO-T	0.0001	mg/L	U	
BDSW-03	Synoptic	9/28/20 12:20 PM	F	CU-D	0.0003	mg/L	U	
BDSW-03	Synoptic	9/28/20 12:20 PM	U	CU-T	0.0004	mg/L	U	
BDSW-03	Synoptic	9/28/20 12:20 PM	U	DOC	0.5	mg/L	U	
BDSW-03	Synoptic	9/28/20 12:20 PM	U	HARD-T	1	mg/L	U	
BDSW-03	Synoptic	9/28/20 12:20 PM	F	K-D	1	mg/L	U	
BDSW-03	Synoptic	9/28/20 12:20 PM	U	K-T	1	mg/L	U	
BDSW-03	Synoptic	9/28/20 12:20 PM	F	MG-D	0.5	mg/L	U	
BDSW-03	Synoptic	9/28/20 12:20 PM	U	MG-T	0.5	mg/L	U	
BDSW-03	Synoptic	9/28/20 12:20 PM	F	NA-D	1	mg/L	U	
BDSW-03	Synoptic	9/28/20 12:20 PM	U	NA-T	1	mg/L	U	
BDSW-03	Synoptic	9/28/20 12:20 PM	U	PH-L	5.8	pH unit	J	
BDSW-03	Synoptic	9/28/20 12:20 PM	U	SO4-T	1	mg/L	U	
BDSW-03	Synoptic	9/28/20 12:20 PM	U	TDS-L	10	mg/L	U	
BDSW-03	Synoptic	9/28/20 12:20 PM	U	TSS	10	mg/L	U	
BBSW-01A	Monthly	10/26/20 8:50 AM	F	AS-D	0.001	mg/L	U	
BBSW-01A	Monthly	10/26/20 8:50 AM	U	AS-T	0.001	mg/L	U	
PASW-09	Monthly	11/16/20 11:20 AM	F	AS-D	0.001	mg/L	U	
PASW-09	Monthly	11/16/20 11:20 AM	U	AS-T	0.001	mg/L	U	
PASW-09	Monthly	11/16/20 11:20 AM	U	TSS	10	mg/L	U	

Notes:
n/a - not applicable
1. Parameter code suffix includes '-T' for total fraction (non-filtered), and '-D' for dissolved fraction.
2. "U" indicates non-detect for the analyte indicated. A "blank cell" indicates a detect as identified in the detect column.
"UJ" indicates an analyte was not detected, but the reported quantitation limit is approximate and may be inaccurate or imprecise.
"J" indicates a an estimated quantity.
"J+" indicates a an estimated quantity maybe biased high, and in this case also a detect potentially present due to a laboratory contaminant.

Figures



LEGEND

- 70% of Certified Value
- 130% of Certified Value
- Certified Concentration
- FCS Result

GOLDER

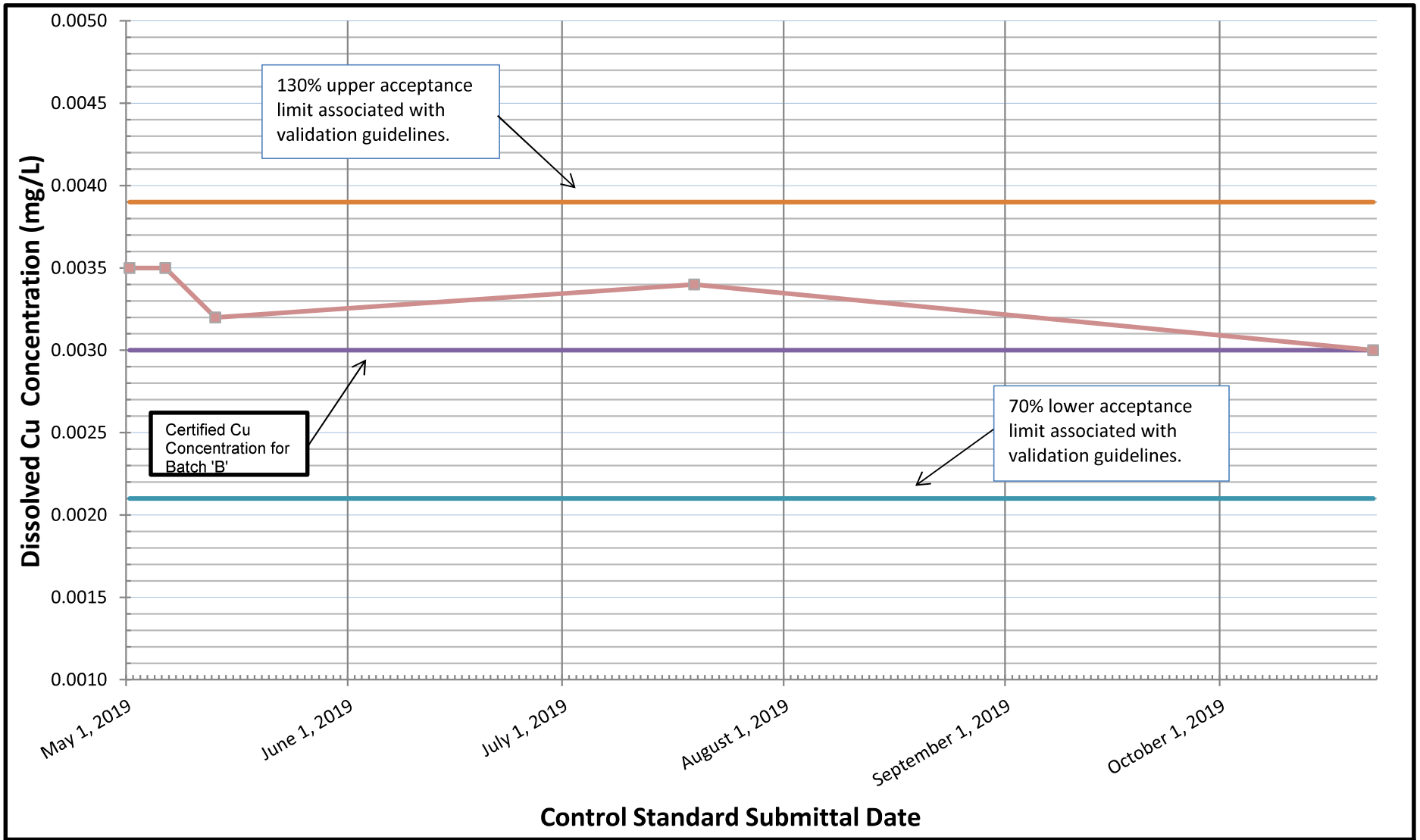
FIGURE **B-1A**

2020 COPPER FIELD CONTROL STANDARD BATCH 'A' ANALYTICAL RESPONSE

BMSG/2020 Monitoring Report/ID

943-1595-011.3066

Note: Copper Field Control Standards ID #02272001.1A (Inclusive dates 5/7 thru 9/28/2020) From ERA, Golden, CO.



LEGEND

- 70% of Certified Value
- 130% of Certified Value
- Certified Concentration
- FCS Result

GOLDER

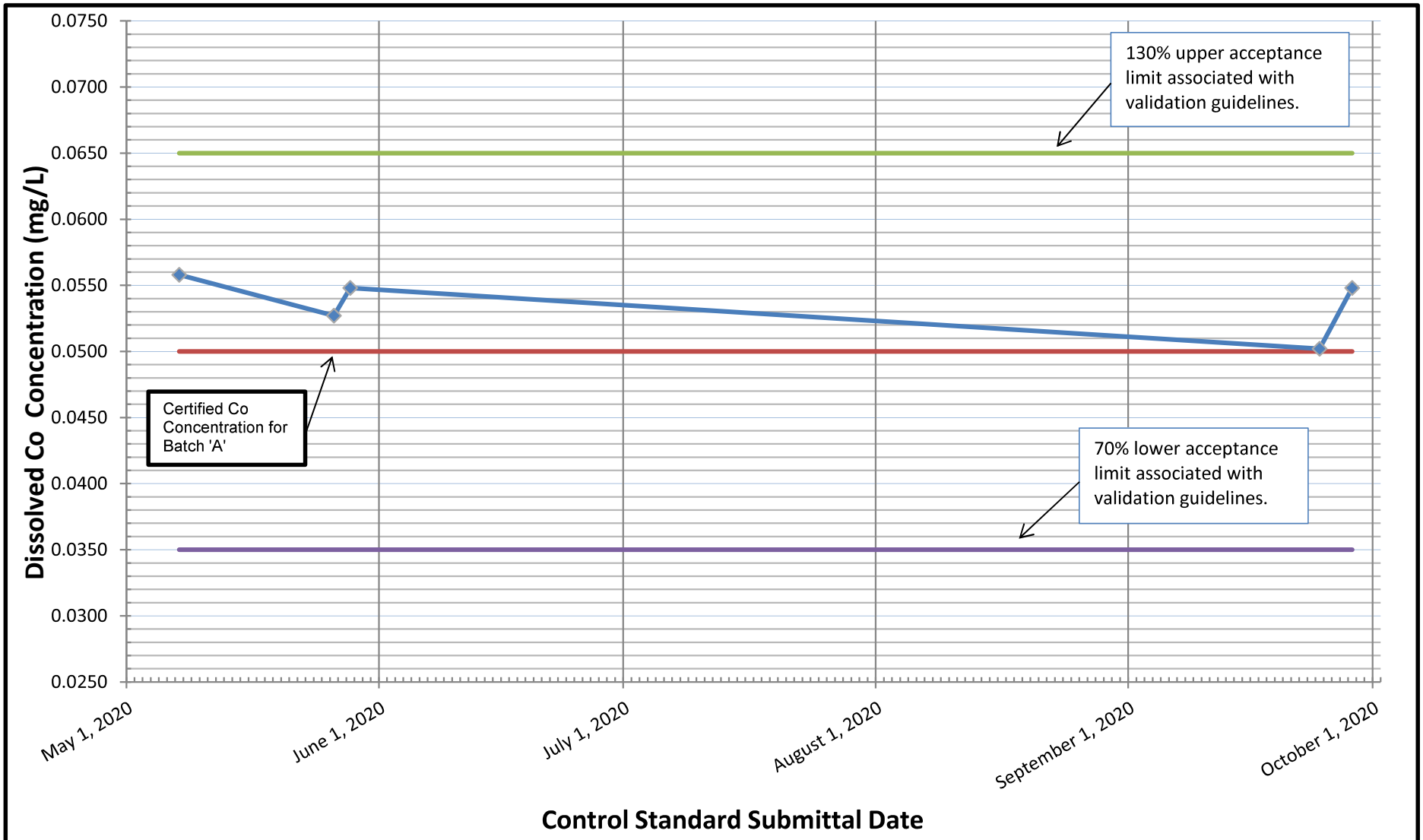
FIGURE **B-1B**

2020 COPPER FIELD CONTROL STANDARD BATCH 'B' ANALYTICAL RESPONSE

BMSG/2020 Monitoring Report/ID

943-1595-011.3066

Note: Copper Field Control Standards ID #02272002.2B (Inclusive dates 5/5 thru 9/9/2020) From ERA, Golden, CO.



LEGEND

- 70% of Certified Value
- 130% of Certified Value
- Certified Concentration
- FCS Result

GOLDER

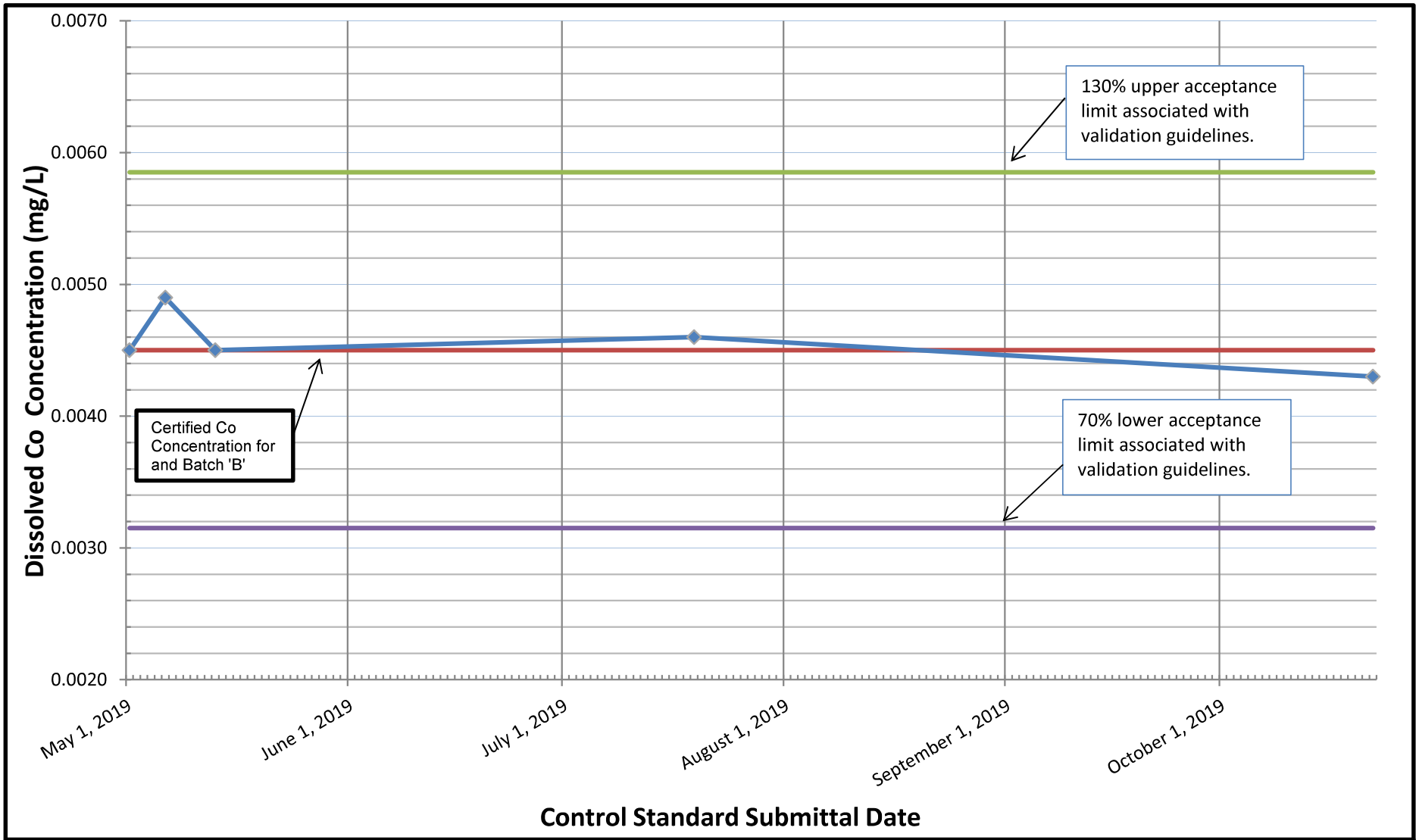
FIGURE **B-2A**

2020 COBALT FIELD CONTROL STANDARD BATCH 'A' ANALYTICAL RESPONSE

BMSG/2020 Monitoring Report/ID

943-1595-011.3066

Note: Cobalt Field Control Standards ID #02272001.1A (Inclusive dates 5/7 thru 9/28/2020) From ERA, Golden, CO.



LEGEND

- 70% of Certified Value
- 130% of Certified Value
- Certified Concentration
- FCS Result

GOLDER

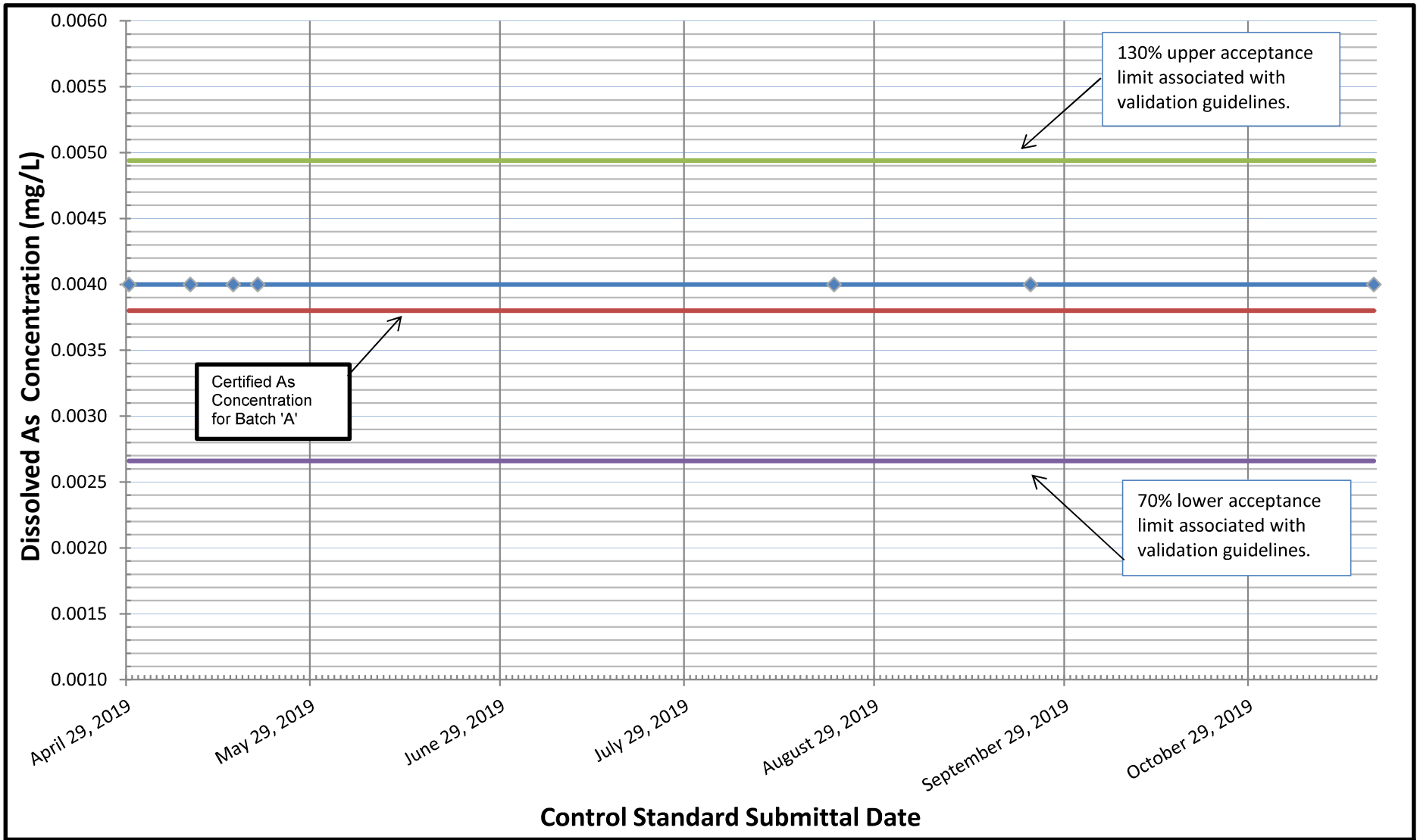
FIGURE **B-2B**

2020 COBALT FIELD CONTROL STANDARD BATCH 'B' ANALYTICAL RESPONSE

BMSG/2020 Monitoring Report/ID

943-1595-011.3066

Note: Cobalt Field Control Standards ID #02272002.2B (Inclusive dates 5/5 thru 9/9/2020) From ERA, Golden, CO.



LEGEND

- 70% of Certified Value
- 130% of Certified Value
- Certified Concentration
- FCS Result

GOLDER

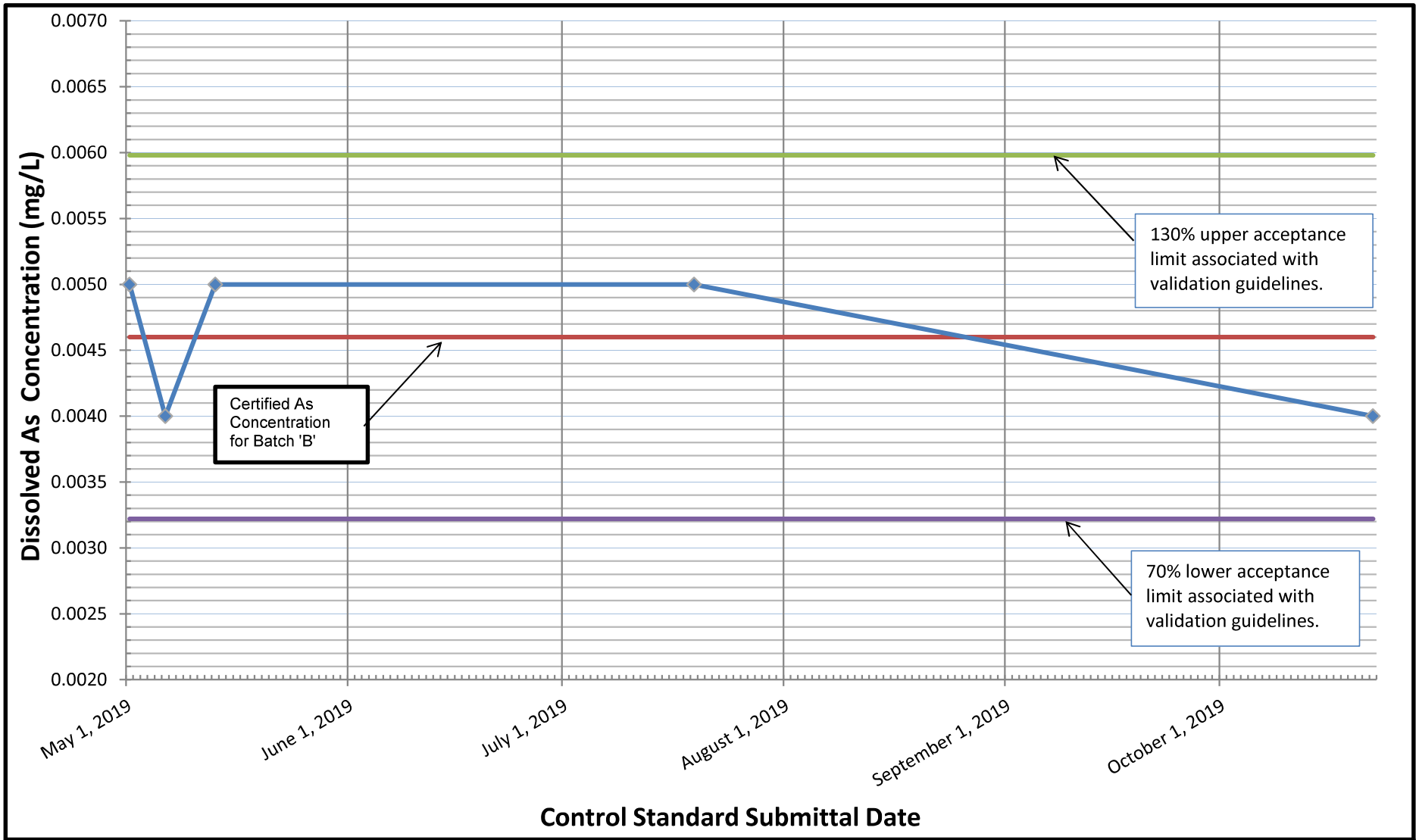
FIGURE **B-3A**

2020 ARSENIC FIELD CONTROL STANDARD BATCH 'A' ANALYTICAL RESPONSE

BMSG/2020 Monitoring Report/ID

943-1595-011.3066

Note: Arsenic Field Control Standards ID #02272001.1A (Inclusive dates 5/7 thru 9/28/2020) From ERA, Golden, CO.



LEGEND

- 70% of Certified Value
- 130% of Certified Value
- Certified Concentration
- FCS Result

GOLDER

FIGURE **B-3B**

2020 ARSENIC FIELD CONTROL STANDARD BATCH 'B' ANALYTICAL RESPONSE

BMSG/2020 Monitoring Report/ID

943-1595-011.3066

Note: Arsenic Field Control Standards ID #02272002.2B (Inclusive dates 5/5 thru 9/9/2020) From ERA, Golden, CO.

APPENDIX C

2020 Data Validation Reports (electronic version only)

2020 Spring Data Packages

METALS & INORGANIC / Tier I & II Data Validation Summary Checklist

GOLDER PROJECT #: 943-1595.011 ph 3100	SITE: BLACKBIRD MINE SITE, SALMON, ID
LABORATORY: ENERGY LABORATORY, BILLINGS	SDG: B20032035

SAMPLES (Total # =)	COLLECTED (Date/Time)	MATRIX
See Table 1		

DATA ASSESSMENT SUMMARY

REVIEW ITEM	ICP/ AES EPA200.7	ICP/ MS EPA200.8	TDS A2540C TSS A2540D	Hardness A2340B Alkalinity A2320B	Anions (ex Cl^-, F^-, SO_4^{-2}) E300.0	OTHER pH A4500-H-B DOC A5310C
1. Data Package Completeness	O	O	NA	NA	NA	NA
2. Holding Temperatures & Times	Θ	Θ	NA	NA	NA	NA
3. Calibration	O	O	NA	NA	NA	NA
4. Lab Blanks, Field Blanks	O	Θ	NA	NA	NA	NA
5. Lab Duplicate, Field Duplicate RPD	NA	NA	NA	NA	NA	NA
6. LCS, LFB, Blank Spike	O	O	NA	NA	NA	NA
7. Interference Checks	NA	NA	NA	NA	NA	NA
8. Matrix Spike Recovery (MS/MSD)	NA	NA	NA	NA	NA	NA
9. MSA and Serial Dilutions	NA	NA	NA	NA	NA	NA
10. Detection Limits, Other QC	O	O	NA	NA	NA	NA
11. Data Verification, Overall Summary	O	O	NA	NA	NA	NA

O = Data had no problems Θ = Problems, but do not affect data NA = Not applicable to this data set.
X = Data qualified due to minor problems [typically estimated data (J/UJ)].
M = Data qualified due to major problems [typically more than 50% qualified (J/UJ)].
Z = Data unacceptable [typically data rejected (R).

Acceptable: YES NO

1. Date Package Completeness (Check if present)…… √ ☐

_x_Case narrative
_/_Chain of Custody
_/_Sample Results
_/_ICV/CCV Results
_/_Blank Results
_o_ICP Interference Check Results
_o_Spike Recovery Results
_x_Duplicate Results
_/_LCS Results
_o_Standard Addition Results
_o_ICP Serial Dilution
_o_Instrument Det. Limits
__Other_____

/ Acceptable
x Absent
o Not required

Comments/Qualified Results: No case narrative provided.

Validated by: Samantha DiCenso **Date:** 05/14/2020
Reviewed by: Ann Muehlfarth **Date:** 06/01/2020

Acceptable: YES NO

2. Holding Temperatures & Times (Check all that apply)…… √ ☐

_x_Recommended Hold Temp. of Cool, ≤6°C met (√ - Yes / x – No)
__TDS / TSS analysis completed in <7 days from collection
__Acidity / Alkalinity completed in <14 days from collection
_/_ICP metals completed in <6 months from collection
__Anions (Cl^-, F^-, SO_4^-), DOC analyzed in <28 days from collection
__pH analysis completed in <15 minutes from collection

Comments/Qualified Results: The cooler temperature upon receipt was recorded at 17.7°C. Using professional judgement and following project-specific requirements qualification of metals results was not required because the samples were preserved to pH<2.

3. Calibrations (Check all that apply)…….. √ ☐

_/_ICV/CCV %R for ICP/AA, 90%-110%, acceptable
__ICV/CCV %R for ICP/AA, 75%-89% or 111%-125%, results estimated (J/UJ)
__ICV/CCV %R for ICP/AA, <75% or >125%, reject positive results (R)

Comments/Qualified Results: None.

4. Lab Blanks, Field Blanks (Check all that apply)…….. √ ☐

__Detects reported in ICB/CCB list: Field Blank ID: _____
_/_ Detects in preparation blanks, results >10x contamination level or ND (no qualifier) Field Blank ID: _____
__Detects in preparation blanks, results ≤10x contamination level (J+)
__Detects in field blanks (Note: Advisory condition only and no qualifier)

Comments/Qualified Results: Copper detected in method blank (MB-143183 at 0.002 mg/L) associated with the total metals results. Result is >10x the method blank concentration; no qualification is required.

5. Lab Duplicates, Field Duplicates (Check all that apply)……... √ ☐

__Duplicate RPD ≤20% for waters (≤35% for soils) for results >5X CRDL Field Duplicate ID: _____
__Duplicate RPD >20% for waters (>35% for soils) for results >5X CRDL (J) Field Duplicate ID: _____
__Duplicate range is within ±CRDL (± 2X CRDL for soils) for results <5X CRDL (no qualifier)

Comments/Qualified Results: No duplicates listed.

Acceptable: YES NO

6. Laboratory Control Samples* (Check all that apply)……..… √ ☐

_/_LCS %R 70-130%: ACCEPTED
__LCS %R 40-69% or >130%, results >MDL: estimated (J-/J+)
__LCS %R 40-69% and results <MDL: estimated (UJ)
__LCS %R <40% and all results rejected (R/UR)
__LCS %R >150% and all results rejected (R)
*Lab Control Samples/Lab Control Sample Duplicates (LCS/LCSD)
*Lab Fortified Blanks (LFB)
*Blank Spike / Blank Spike Duplicates (BS/BSD)

Comments/Qualified Results: None.

7. Interference Checks (Check all that apply)…….. √ ☐

__ICS A/B Recoveries Acceptable
__Al, Ca, Fe, Mg sample concentrations > ICS concentrations
__ICS %R > 120%, results >IDL estimated (J)
__ICS %R 50-79%, results >IDL estimated (J)
__ICS %R 50-79%, results <IDL estimated (UJ)
__ICS %R <50%, results >IDL and <IDL rejected (R/UR)

Comments/Qualified Results: IC check is not required as part of Tier IIA Validation.

8. Matrix Spike Recovery (MS/MSD) (Check all that apply)……. √ ☐

_/_Spike %R with 75-125%: ACCEPTED
__MS and PDS %R 30-74%, results > MDL est. (J-), ND=(UJ)
__MS <75% and PDS >75%, results > MDL est. (J), ND=(UJ)
__ MS and PDS %R >125%, detects > MDL est. (J+)
__ MS >125% and PDS <125%, detects > MDL est. (J)
__MS and PDS %R <30% and <75%: results >MDL (J-) ND=(UR)
__Field blanks used for spike analysis?
__Post digest spk rqrd when %R <75, >125%, excpt Ag

Comments/Qualified Results: MS/MSDs were for unrelated samples.

Acceptable: YES NO

9. Method of Standard Addition (MSA) and Serial Dilutions (SD)….. √ ☐

__Analytical spike %R 85-115%
__Analytical spike %R 40-85%, results > IDL estimated (J)
__Analytical spike %R 10-40%, results <IDL estimated (UJ)
__Analytical spike %R <10%, results <IDL rejected (R)

__SD Analytes >50X MDL ?
__ SD % Diff < 10%
__ SD % Diff > 10%: J results >MDL, UJ for Non-detects

Comments/Qualified Results: NA

10. Detection Limits, Other QC…… √ ☐

WATER:

Inorganics-	**Metals-**	
__pH = 0.1 s.u.	__Al = 0.1 mg/L	__Cd = 0.01 mg/L
__TDS/TSS = 10 mg/L	__As = 0.001 mg/L	__Cr = 0.05 mg/L
__Alkalinity = 4 mg/L	__Co = 0.0001 mg/L	__Pb = 0.05 mg/L
__Anions (i.e. Cl^-, SO_4^-) = 1 mg/L	__Cu = 0.0003/0.0008mg/L	__Hg = 0.001 mg/L
__Anions (i.e. F^-) = 0.1 mg/L	__/__Co (WTP) = 0.001 mg/L	__Ni = 0.05 mg/L
__DOC = 0.5 mg/L	__/__Cu (WTP) = 0.001 mg/L	__K = 1 mg/L
__Nitrogen, Ammonia = 0.05 mg/L	__/__Fe = 0.03 mg/L	__Se = 0.001 mg/L
__Phosphorus, Total = 0.005 mg/L	__Ca = 0.5 mg/L	__Si = 0.1 mg/L
	__Mg = 0.5 mg/L	__Ag = 0.01 mg/L
	__HARD-T = 0.5 mg/L	__Na = 1 mg/L
	__Mn = 0.001 mg/L	__Zn = 0.01 mg/L

SOIL:

Metals-	
__As = 1 mg/kg	__ = mg/kg
__Co = 1 mg/kg	__ = mg/kg
__Cu = 1 mg/kg	__ = mg/kg

Comments/Qualified Results: The reporting limit for Total Metals – Copper was increased (0.002 mg/L) due to sample dilution.

11. Data Verification and Overall Assessment…… √ ☐

Comments/Qualified Results: See Table 2 for summary of qualifiers.

Table 1
Sample Collection and Analysis Summary
Blackbird Mine Sampling - March 2020

							Analysis		
SDG	**Field Identification**	**Collection Date & Time**	**Location**	**Lab Identification**	**Matrix**	**QC Samples**	**Total Dissolved Solids**	**Dissolved Metals[1]**	**Total Metals[1]**
B20032035	WTP-C	3/25/20 8:00	WTP-C	B20032035-001	Aqueous	--		X	X

[1]See laboratory data package for list of metals analyzed

Notes:
All analyses performed by Energy Laboratories

Abbreviations:
SDG - Sample Delivery Group

Table 2
Qualifier Summary Table
Blackbird Mine Sampling - March 2020

SDG	Sample Name	Constituent	New Result	New RL	Qualifier	Reason	PDF Page Number
None							

Abbreviations
RL - Reporting Limit
SDG - Sample Delivery Group

METALS & INORGANIC / Tier I & II Data Validation Summary Checklist

GOLDER PROJECT #: 943-1595.011 ph 3100	SITE: BLACKBIRD MINE SITE, SALMON, ID
LABORATORY: ENERGY LABORATORY, BILLINGS	SDG: B20032134

SAMPLES (Total # =)	COLLECTED (Date/Time)	MATRIX
See Table 1		

DATA ASSESSMENT SUMMARY

REVIEW ITEM	ICP/ AES EPA200.7	ICP/ MS EPA200.8	TDS A2540C TSS A2540D	Hardness A2340B Alkalinity A2320B	Anions (ex Cl^-, F^-, SO_4^{-3}) E300.0	OTHER pH A4500-H-B DOC A5310C
1. Data Package Completeness	NA	Θ	Θ	NA	NA	NA
2. Holding Temperatures & Times	NA	O	O	NA	NA	NA
3. Calibration	NA	O	O	NA	NA	NA
4. Lab Blanks, Field Blanks	NA	O	O	NA	NA	NA
5. Lab Duplicate, Field Duplicate RPD	NA	O	O	NA	NA	NA
6. LCS, LFB, Blank Spike	NA	O	O	NA	NA	NA
7. Interference Checks	NA	NA	NA	NA	NA	NA
8. Matrix Spike Recovery (MS/MSD)	NA	O	O	NA	NA	NA
9. MSA and Serial Dilutions	NA	NA	NA	NA	NA	NA
10. Detection Limits, Other QC	NA	O	O	NA	NA	NA
11. Data Verification, Overall Summary	NA	O	O	NA	NA	NA

O = Data had no problems Θ = Problems, but do not affect data NA = Not applicable to this data set.
X = Data qualified due to minor problems [typically estimated data (J/UJ)].
M = Data qualified due to major problems [typically more than 50% qualified (J/UJ)].
Z = Data unacceptable [typically data rejected (R).

Acceptable: YES NO

1. Date Package Completeness (Check if present)…… √ ☐

_x_Case narrative
_/_Chain of Custody
_/_Sample Results
_/_ICV/CCV Results
_/_Blank Results
_o_ICP Interference Check Results
_o_Spike Recovery Results
_/_Duplicate Results
_/_LCS Results
_o_Standard Addition Results
_o_ICP Serial Dilution
_o_Instrument Det. Limits
__Other_____

/ Acceptable
x Absent
o Not required

Comments/Qualified Results: No case narrative provided. The Work Order Receipt Checklist indicates the sample dates on the COC and sample bottles do not match. Collection date on sample bottles was used.

Validated by: Samantha DiCenso **Date:** 05/14/2020
Reviewed by: Ann Muehlfarth **Date:** 06/02/2020

METALS & INORGANIC / Tier I & II Data Validation Summary Checklist

Acceptable: YES NO

2. Holding Temperatures & Times (Check all that apply)…… √ ☐

_/_Recommended Hold Temp. of Cool, ≤6°C met (√ - Yes / x – No)
_/_TDS / TSS analysis completed in <7 days from collection
__Acidity / Alkalinity completed in <14 days from collection
_/_ICP metals completed in <6 months from collection
__Anions (Cl^-, F^-, SO_4^-), DOC analyzed in <28 days from collection
__pH analysis completed in <15 minutes from collection

Comments/Qualified Results: None.

3. Calibrations (Check all that apply)……. √ ☐

_/_ICV/CCV %R for ICP/AA, 90%-110%, acceptable
__ICV/CCV %R for ICP/AA, 75%-89% or 111%-125%, results estimated (J/UJ)
__ICV/CCV %R for ICP/AA, <75% or >125%, reject positive results (R)

Comments/Qualified Results: None.

4. Lab Blanks, Field Blanks (Check all that apply)…….. √ ☐

__Detects reported in ICB/CCB list:
__ Detects in preparation blanks, results >10x contamination level or ND (no qualifier)
__Detects in preparation blanks, results ≤10x contamination level (J+)
__Detects in field blanks (Note: Advisory condition only and no qualifier)

Field Blank ID: ___PASW-29_____
Field Blank ID: _____

Comments/Qualified Results: None.

5. Lab Duplicates, Field Duplicates (Check all that apply)……... √ ☐

_/_Duplicate RPD ≤20% for waters (≤35% for soils) for results >5X CRDL
__Duplicate RPD >20% for waters (>35% for soils) for results >5X CRDL (J)
__Duplicate range is within ±CRDL (± 2X CRDL for soils) for results <5X CRDL (no qualifier)

Field Duplicate ID: ____ PASW-19_____
Field Duplicate ID: _____

Comments/Qualified Results: None.

Acceptable: YES NO

6. Laboratory Control Samples* (Check all that apply)……..… √ ☐

_/_LCS %R 70-130%: ACCEPTED
__LCS %R 40-69% or >130%, results >MDL: estimated (J-/J+)
__LCS %R 40-69% and results <MDL: estimated (UJ)
__LCS %R <40% and all results rejected (R/UR)
__LCS %R >150% and all results rejected (R)
*Lab Control Samples/Lab Control Sample Duplicates (LCS/LCSD)
*Lab Fortified Blanks (LFB)
*Blank Spike / Blank Spike Duplicates (BS/BSD)

Comments/Qualified Results: None.

7. Interference Checks (Check all that apply)…….. √ ☐

__ICS A/B Recoveries Acceptable
__Al, Ca, Fe, Mg sample concentrations > ICS concentrations
__ICS %R > 120%, results >IDL estimated (J)
__ICS %R 50-79%, results >IDL estimated (J)
__ICS %R 50-79%, results <IDL estimated (UJ)
__ICS %R <50%, results >IDL and <IDL rejected (R/UR)

Comments/Qualified Results: IC check is not required as part of Tier IIA Validation.

8. Matrix Spike Recovery (MS/MSD) (Check all that apply)……. √ ☐

_/_Spike %R with 75-125%: ACCEPTED
__MS and PDS %R 30-74%, results > MDL est. (J-), ND=(UJ)
__MS <75% and PDS >75%, results > MDL est. (J), ND=(UJ)
__ MS and PDS %R >125%, detects > MDL est. (J+)
__ MS >125% and PDS <125%, detects > MDL est. (J)
__MS and PDS %R <30% and <75%: results >MDL (J-) ND=(UR)
__Field blanks used for spike analysis?
__Post digest spk rqrd when %R <75, >125%, excpt Ag

Comments/Qualified Results: MS/MSD associated with PASW-09.

Acceptable: YES NO

9. Method of Standard Addition (MSA) and Serial Dilutions (SD)….. √ ☐

__Analytical spike %R 85-115%
__Analytical spike %R 40-85%, results > IDL estimated (J)
__Analytical spike %R 10-40%, results <IDL estimated (UJ)
__Analytical spike %R <10%, results <IDL rejected (R)

__SD Analytes >50X MDL ?
__ SD % Diff < 10%
__ SD % Diff > 10%: J results >MDL, UJ for Non-detects

Comments/Qualified Results: NA

10. Detection Limits, Other QC…… √ ☐

WATER:

Inorganics-	**Metals-**	
__pH = 0.1 s.u.	__Al = 0.1 mg/L	__Cd = 0.01 mg/L
_/_ TDS/TSS = 10 mg/L	_/_ As = 0.001 mg/L	__Cr = 0.05 mg/L
__Alkalinity = 4 mg/L	__Co = 0.0001 mg/L	__Pb = 0.05 mg/L
__Anions (i.e. Cl^-, SO_4^-) = 1 mg/L	__Cu = 0.0003/0.0008mg/L	__Hg = 0.001 mg/L
__Anions (i.e. F^-) = 0.1 mg/L	__Co (WTP) = 0.001 mg/L	__Ni = 0.05 mg/L
__ DOC = 0.5 mg/L	__Cu (WTP) = 0.001 mg/L	__K = 1 mg/L
__Nitrogen, Ammonia = 0.05 mg/L	__Fe = 0.03 mg/L	__Se = 0.001 mg/L
__Phosphorus, Total = 0.005 mg/L	__Ca = 0.5 mg/L	__Si = 0.1 mg/L
	__Mg = 0.5 mg/L	__Ag = 0.01 mg/L
	__HARD-T = 0.5 mg/L	__Na = 1 mg/L
	__Mn = 0.001 mg/L	__Zn = 0.01 mg/L

SOIL:

Metals-	
__ As = 1 mg/kg	__ = mg/kg
__ Co = 1 mg/kg	__ = mg/kg
__ Cu = 1 mg/kg	__ = mg/kg

Comments/Qualified Results: None.

11. Data Verification and Overall Assessment…… √ ☐

Comments/Qualified Results: See Table 2 for summary of qualifiers.

Table 1
Sample Collection and Analysis Summary
Blackbird Mine Sampling - March 2020

							Analysis		
SDG	**Field Identification**	**Collection Date & Time**	**Location**	**Lab Identification**	**Matrix**	**QC Samples**	**Total Dissolved Solids**	**Dissolved Metals[1]**	**Total Metals[1]**
B20032134	BBSW-01A	3/26/20 9:55	BBSW-01A	B20032134-001	Aqueous	--	X	X	X
B20032134	PASW-09	3/26/20 10:20	PASW-09	B20032134-002	Aqueous	--	X	X	X
B20032134	PASW-19	3/26/20 10:30	PASW-09	B20032134-003	Aqueous	Field 'Duplicate	X	X	X
B20032134	PASW-29	3/26/20 10:40	PASW-09	B20032134-004	Aqueous	Field Blank	X	X	X

[1]See laboratory data package for list of metals analyzed

Notes:
All analyses performed by Energy Laboratories

Abbreviations:
SDG - Sample Delivery Group

Table 2
Qualifier Summary Table
Blackbird Mine Sampling - March 2020

SDG	Sample Name	Constituent	New Result	New RL	Qualifier	Reason	PDF Page Number
None							

Abbreviations
RL - Reporting Limit
SDG - Sample Delivery Group

METALS & INORGANIC / Tier I & II Data Validation Summary Checklist

GOLDER PROJECT #: 943-1595.011 ph 3100	SITE: BLACKBIRD MINE SITE, SALMON, ID
LABORATORY: ENERGY LABORATORY, BILLINGS	SDG: B20041991

SAMPLES (Total # =)	COLLECTED (Date/Time)	MATRIX
See Table 1		

DATA ASSESSMENT SUMMARY

REVIEW ITEM	ICP/ AES EPA200.7	ICP/ MS EPA200.8	TDS A2540C TSS A2540D	Hardness A2340B Alkalinity A2320B	Anions (ex Cl^-, F^-, SO_4^{-2}) E300.0	OTHER pH A4500-H-B DOC A5310C
1. Data Package Completeness	NA	O	NA	NA	NA	NA
2. Holding Temperatures & Times	NA	Θ	NA	NA	NA	NA
3. Calibration	NA	O	NA	NA	NA	NA
4. Lab Blanks, Field Blanks	NA	O	NA	NA	NA	NA
5. Lab Duplicate, Field Duplicate RPD	NA	NA	NA	NA	NA	NA
6. LCS, LFB, Blank Spike	NA	O	NA	NA	NA	NA
7. Interference Checks	NA	NA	NA	NA	NA	NA
8. Matrix Spike Recovery (MS/MSD)	NA	NA	NA	NA	NA	NA
9. MSA and Serial Dilutions	NA	NA	NA	NA	NA	NA
10. Detection Limits, Other QC	NA	O	NA	NA	NA	NA
11. Data Verification, Overall Summary	NA	O	NA	NA	NA	NA

O = Data had no problems Θ = Problems, but do not affect data NA = Not applicable to this data set.
X = Data qualified due to minor problems [typically estimated data (J/UJ)].
M = Data qualified due to major problems [typically more than 50% qualified (J/UJ)].
Z = Data unacceptable [typically data rejected (R).

	Acceptable: YES	NO
1. Date Package Completeness (Check if present)……	√	☐

_x_Case narrative
_/_Chain of Custody
_/_Sample Results
_/_ICV/CCV Results
_/_Blank Results
_o_ICP Interference Check Results
_o_Spike Recovery Results
_x_Duplicate Results
_/_LCS Results
_o_Standard Addition Results
_o_ICP Serial Dilution
_o_Instrument Det. Limits
__Other_____

/ Acceptable
x Absent
o Not required

Comments/Qualified Results: No case narrative provided.

Validated by: Samantha DiCenso **Date:** 05/14/2020
Reviewed by: Ann Muehlfarth **Date:** 06/02/2020

METALS & INORGANIC / Tier I & II Data Validation Summary Checklist

Acceptable: YES NO

2. Holding Temperatures & Times (Check all that apply)…… √ ☐

_x_Recommended Hold Temp. of Cool, ≤6°C met (√ - Yes / x – No)
__TDS / TSS analysis completed in <7 days from collection
__Acidity / Alkalinity completed in <14 days from collection
_/_ICP metals completed in <6 months from collection
__Anions (Cl^-, F^-, SO_4^-), DOC analyzed in <28 days from collection
__pH analysis completed in <15 minutes from collection

Comments/Qualified Results: The cooler temperature upon receipt was recorded at 18.9°C. Using professional judgement and following project-specific requirements qualification of metals results was not required because the samples were preserved to pH<2.

3. Calibrations (Check all that apply)…….. √ ☐

_/_ICV/CCV %R for ICP/AA, 90%-110%, acceptable
__ICV/CCV %R for ICP/AA, 75%-89% or 111%-125%, results estimated (J/UJ)
__ICV/CCV %R for ICP/AA, <75% or >125%, reject positive results (R)

Comments/Qualified Results: None.

4. Lab Blanks, Field Blanks (Check all that apply)…….. √ ☐

__Detects reported in ICB/CCB list: Field Blank ID: _____
__ Detects in preparation blanks, results >10x contamination level or ND (no qualifier) Field Blank ID: _____
__Detects in preparation blanks, results ≤10x contamination level (J+)
__Detects in field blanks (Note: Advisory condition only and no qualifier)

Comments/Qualified Results: None.

5. Lab Duplicates, Field Duplicates (Check all that apply)……... √ ☐

__Duplicate RPD ≤20% for waters (≤35% for soils) for results >5X CRDL Field Duplicate ID: _____
__Duplicate RPD >20% for waters (>35% for soils) for results >5X CRDL (J) Field Duplicate ID: _____
__Duplicate range is within ±CRDL (± 2X CRDL for soils) for results <5X CRDL (no qualifier)

Comments/Qualified Results: No duplicates listed.

Acceptable: YES NO

6. Laboratory Control Samples* (Check all that apply)……..… √ ☐

_/_LCS %R 70-130%: ACCEPTED
__LCS %R 40-69% or >130%, results >MDL: estimated (J-/J+)
__LCS %R 40-69% and results <MDL: estimated (UJ)
__LCS %R <40% and all results rejected (R/UR)
__LCS %R >150% and all results rejected (R)
*Lab Control Samples/Lab Control Sample Duplicates (LCS/LCSD)
*Lab Fortified Blanks (LFB)
*Blank Spike / Blank Spike Duplicates (BS/BSD)

Comments/Qualified Results: None.

7. Interference Checks (Check all that apply)…….. √ ☐

__ICS A/B Recoveries Acceptable
__Al, Ca, Fe, Mg sample concentrations > ICS concentrations
__ICS %R > 120%, results >IDL estimated (J)
__ICS %R 50-79%, results >IDL estimated (J)
__ICS %R 50-79%, results <IDL estimated (UJ)
__ICS %R <50%, results >IDL and <IDL rejected (R/UR)

Comments/Qualified Results: IC check is not required as part of Tier IIA Validation.

8. Matrix Spike Recovery (MS/MSD) (Check all that apply)……. √ ☐

_/_Spike %R with 75-125%: ACCEPTED
__MS and PDS %R 30-74%, results > MDL est. (J-), ND=(UJ)
__MS <75% and PDS >75%, results > MDL est. (J), ND=(UJ)
__ MS and PDS %R >125%, detects > MDL est. (J+)
__ MS >125% and PDS <125%, detects > MDL est. (J)
__MS and PDS %R <30% and <75%: results >MDL (J-) ND=(UR)
__Field blanks used for spike analysis?
__Post digest spk rqrd when %R <75, >125%, excpt Ag

Comments/Qualified Results: MS/MSDs were for unrelated samples.

Acceptable: YES NO

9. Method of Standard Addition (MSA) and Serial Dilutions (SD)….. √ ☐

__Analytical spike %R 85-115%
__Analytical spike %R 40-85%, results > IDL estimated (J)
__Analytical spike %R 10-40%, results <IDL estimated (UJ)
__Analytical spike %R <10%, results <IDL rejected (R)

__SD Analytes >50X MDL ?
__ SD % Diff < 10%
__ SD % Diff > 10%: J results >MDL, UJ for Non-detects

Comments/Qualified Results: NA

10. Detection Limits, Other QC…… √ ☐

WATER:

Inorganics-	**Metals-**	
__pH = 0.1 s.u.	__Al = 0.1 mg/L	__Cd = 0.01 mg/L
__TDS/TSS = 10 mg/L	__As = 0.001 mg/L	__Cr = 0.05 mg/L
__Alkalinity = 4 mg/L	__Co = 0.0001 mg/L	__Pb = 0.05 mg/L
__Anions (i.e. Cl^-, SO_4^-) = 1 mg/L	__Cu = 0.0003/0.0008mg/L	__Hg = 0.001 mg/L
__Anions (i.e. F^-) = 0.1 mg/L	__/__Co (WTP) = 0.001 mg/L	__Ni = 0.05 mg/L
__DOC = 0.5 mg/L	__/__Cu (WTP) = 0.001 mg/L	__K = 1 mg/L
__Nitrogen, Ammonia = 0.05 mg/L	__/__Fe = 0.03 mg/L	__Se = 0.001 mg/L
__Phosphorus, Total = 0.005 mg/L	__Ca = 0.5 mg/L	__Si = 0.1 mg/L
	__Mg = 0.5 mg/L	__Ag = 0.01 mg/L
	__HARD-T = 0.5 mg/L	__Na = 1 mg/L
	__Mn = 0.001 mg/L	__Zn = 0.01 mg/L

SOIL:

Metals-	
__As = 1 mg/kg	__ = mg/kg
__Co = 1 mg/kg	__ = mg/kg
__Cu = 1 mg/kg	__ = mg/kg

Comments/Qualified Results: None,

11. Data Verification and Overall Assessment…… √ ☐

Comments/Qualified Results: See Table 2 for summary of qualifiers.

Table 1
Sample Collection and Analysis Summary
Blackbird Mine Sampling - April 2020

							Analysis		
SDG	**Field Identification**	**Collection Date & Time**	**Location**	**Lab Identification**	**Matrix**	**QC Samples**	**Total Dissolved Solids**	**Dissolved Metals[1]**	**Total Metals[1]**
B20041991	WTP-C	4/28/20 12:00	WTP-C	B20041991-001	Aqueous	--		X	X

[1]See laboratory data package for list of metals analyzed

Notes:
All analyses performed by Energy Laboratories

Abbreviations:
SDG - Sample Delivery Group

Table 2
Qualifier Summary Table
Blackbird Mine Sampling - April 2020

SDG	Sample Name	Constituent	New Result	New RL	Qualifier	Reason	PDF Page Number
None							

Abbreviations
RL - Reporting Limit
SDG - Sample Delivery Group

METALS & INORGANIC / Tier I & II Data Validation Summary Checklist

GOLDER PROJECT #: 943-1595.011 ph 3100	SITE: BLACKBIRD MINE SITE, SALMON, ID
LABORATORY: ENERGY LABORATORY, BILLINGS	SDG: B200504095

SAMPLES (Total # =)	COLLECTED (Date/Time)	MATRIX
See Table 1		

DATA ASSESSMENT SUMMARY

REVIEW ITEM	ICP/ AES EPA200.7	ICP/ MS EPA200.8	TDS A2540C TSS A2540D	Hardness A2340B Alkalinity A2320B	Anions (ex Cl^-, F^-, SO_4^{-2}) E300.0	OTHER pH A4500-H-B DOC A5310C
1. Data Package Completeness	O	O	O	O	O	O
2. Holding Temperatures & Times	Θ	Θ	Θ	Θ	Θ	X
3. Calibration	O	O	O	O	O	O
4. Lab Blanks, Field Blanks	O	O	O	O	O	O
5. Lab Duplicate, Field Duplicate RPD	O	O	O	O	O	O
6. LCS, LFB, Blank Spike	O	O	O	O	O	O
7. Interference Checks	NA	NA	NA	NA	NA	NA
8. Matrix Spike Recovery (MS/MSD)	O	O	O	O	O	O
9. MSA and Serial Dilutions	NA	NA	NA	NA	NA	NA
10. Detection Limits, Other QC	O	O	O	O	O	O
11. Data Verification, Overall Summary	O	O	O	O	O	O

O = Data had no problems Θ = Problems, but do not affect data NA = Not applicable to this data set.
X = Data qualified due to minor problems [typically estimated data (J/UJ)].
M = Data qualified due to major problems [typically more than 50% qualified (J/UJ)].
Z = Data unacceptable [typically data rejected (R).

Acceptable: YES NO

1. Date Package Completeness (Check if present)…… √ ☐

_/_Case narrative
_/_Chain of Custody
_/_Sample Results
_/_ICV/CCV Results
_/_Blank Results
_o_ICP Interference Check Results
_o_Spike Recovery Results
_/_Duplicate Results
_/_LCS Results
_o_Standard Addition Results
_o_ICP Serial Dilution
_o_Instrument Det. Limits
__Other_____

/ Acceptable
x Absent
o Not required

Comments/Qualified Results: The case narrative states tests associated with analyst identified as ELI-CA were subcontracted to Energy Laboratories in Casper, Wyoming. The Work Order Receipt Checklist indicates the sample dates/times on the COC and sample bottles do not match. Collection information on sample bottles was used. The Work Order Receipt Checklist indicates that a sample ID was changed per Golder's request (BDSW-31B).

Validated by: Samantha DiCenso **Date:** 05/26/2020
Reviewed by: Ann Muehlfarth **Date:** 06/02/2020

METALS & INORGANIC / Tier I & II Data Validation Summary Checklist

Acceptable: YES NO

2. Holding Temperatures & Times (Check all that apply)…… √ ☐

_x_Recommended Hold Temp. of Cool, ≤6°C met (√ - Yes / x – No)
_/_TDS / TSS analysis completed in <7 days from collection
_/_Acidity / Alkalinity completed in <14 days from collection
_/_ICP metals completed in <6 months from collection
_/_Anions (Cl^-, F^-, SO_4^-), DOC analyzed in <28 days from collection
_x_pH analysis completed in <15 minutes from collection

Comments/Qualified Results: The cooler temperature upon receipt was recorded at 16.9°C. Using professional judgement and following project-specific requirements qualification of metals results was not required because the samples were preserved to pH<2. pH analysis was not completed within 15 minutes of sample collection; therefore, results are qualified as estimated values.

3. Calibrations (Check all that apply)…….. √ ☐

_/_ICV/CCV %R for ICP/AA, 90%-110%, acceptable
__ICV/CCV %R for ICP/AA, 75%-89% or 111%-125%, results estimated (J/UJ)
__ICV/CCV %R for ICP/AA, <75% or >125%, reject positive results (R)

Comments/Qualified Results: None.

4. Lab Blanks, Field Blanks (Check all that apply)…….. √ ☐

__Detects reported in ICB/CCB list:
__ Detects in preparation blanks, results >10x contamination level or ND (no qualifier)
__Detects in preparation blanks, results ≤10x contamination level (J+)
__Detects in field blanks (Note: Advisory condition only and no qualifier)

Field Blank ID: ____ BDSW-23B_____
Field Blank ID: _____

Comments/Qualified Results: pH reading for Field Blank BDSW-23B was 5.8.

5. Lab Duplicates, Field Duplicates (Check all that apply)……... √ ☐

_/_Duplicate RPD ≤20% for waters (≤35% for soils) for results >5X CRDL
__Duplicate RPD >20% for waters (>35% for soils) for results >5X CRDL (J)
__Duplicate range is within ±CRDL (± 2X CRDL for soils) for results <5X CRDL (no qualifier)

Field Duplicate ID: ____BDSW-13B_____
Field Duplicate ID: _____

Comments/Qualified Results: None.

Acceptable: YES NO

6. Laboratory Control Samples* (Check all that apply)……..… √ ☐

_/_LCS %R 70-130%: ACCEPTED
__LCS %R 40-69% or >130%, results >MDL: estimated (J-/J+)
__LCS %R 40-69% and results <MDL: estimated (UJ)
__LCS %R <40% and all results rejected (R/UR)
__LCS %R >150% and all results rejected (R)
*Lab Control Samples/Lab Control Sample Duplicates (LCS/LCSD)
*Lab Fortified Blanks (LFB)
*Blank Spike / Blank Spike Duplicates (BS/BSD)

Comments/Qualified Results: None.

7. Interference Checks (Check all that apply)…….. √ ☐

__ICS A/B Recoveries Acceptable
__Al, Ca, Fe, Mg sample concentrations > ICS concentrations
__ICS %R > 120%, results >IDL estimated (J)
__ICS %R 50-79%, results >IDL estimated (J)
__ICS %R 50-79%, results <IDL estimated (UJ)
__ICS %R <50%, results >IDL and <IDL rejected (R/UR)

Comments/Qualified Results: IC check is not required as part of Tier IIA Validation.

8. Matrix Spike Recovery (MS/MSD) (Check all that apply)……. √ ☐

_/_Spike %R with 75-125%: ACCEPTED
__MS and PDS %R 30-74%, results > MDL est. (J-), ND=(UJ)
__MS <75% and PDS >75%, results > MDL est. (J), ND=(UJ)
__ MS and PDS %R >125%, detects > MDL est. (J+)
__ MS >125% and PDS <125%, detects > MDL est. (J)
__MS and PDS %R <30% and <75%: results >MDL (J-) ND=(UR)
__Field blanks used for spike analysis?
__Post digest spk rqrd when %R <75, >125%, excpt Ag

Comments/Qualified Results: None.

Acceptable: YES NO

9. Method of Standard Addition (MSA) and Serial Dilutions (SD)….. √ ☐

__Analytical spike %R 85-115%
__Analytical spike %R 40-85%, results > IDL estimated (J)
__Analytical spike %R 10-40%, results <IDL estimated (UJ)
__Analytical spike %R <10%, results <IDL rejected (R)

__SD Analytes >50X MDL ?
__ SD % Diff < 10%
__ SD % Diff > 10%: J results >MDL, UJ for Non-detects

Comments/Qualified Results: NA

10. Detection Limits, Other QC…… √ ☐

WATER:

Inorganics-	**Metals-**	
_/_pH = 0.1 s.u.	__Al = 0.1 mg/L	__Cd = 0.01 mg/L
_/_TDS/TSS = 10 mg/L	_/_As = 0.001 mg/L	__Cr = 0.05 mg/L
_/_Alkalinity = 4 mg/L	_/_Co = 0.0001 mg/L	__Pb = 0.05 mg/L
_/_Anions (i.e. Cl^-, SO_4^-) = 1 mg/L	/_Cu = 0.0003/0.0008mg/L	__Hg = 0.001 mg/L
__Anions (i.e. F^-) = 0.1 mg/L	__Co (WTP) = 0.001 mg/L	__Ni = 0.05 mg/L
/_DOC = 0.5 mg/L	__Cu (WTP) = 0.001 mg/L	/_K = 1 mg/L
__Nitrogen, Ammonia = 0.05 mg/L	_/_Fe = 0.03 mg/L	__Se = 0.001 mg/L
__Phosphorus, Total = 0.005 mg/L	_/_Ca = 0.5 mg/L	__Si = 0.1 mg/L
	_/_Mg = 0.5 mg/L	__Ag = 0.01 mg/L
	_/_HARD-T = 0.5 mg/L	_/_Na = 1 mg/L
	__Mn = 0.001 mg/L	__Zn = 0.01 mg/L

SOIL:

Metals-	
__ As = 1 mg/kg	__ = mg/kg
__ Co = 1 mg/kg	__ = mg/kg
__ Cu = 1 mg/kg	__ = mg/kg

Comments/Qualified Results: None.

11. Data Verification and Overall Assessment…… √ ☐

Comments/Qualified Results: See Table 2 for summary of qualifiers.

Table 1
Sample Collection and Analysis Summary
Blackbird Mine Sampling - May 2020

							Analysis						
SDG	**Field Identification**	**Collection Date & Time**	**Location**	**Lab Identification**	**Matrix**	**QC Samples**	**Total Dissolved Solids**	**Total Suspended Solids**	**Anions**	**Alkalinity and/or Hardness (as CaCO3)**	**Dissolved Metals[1]**	**Total Metals[1]**	**Other (pH, DOC)**
B20050495	BDSW-04A	5/4/20 9:25	BDSW-04A	B20050495-001	Aqueous	--				X	X	X	
B20050495	BDSW-03A	5/4/20 9:40	BDSW-03A	B20050495-002	Aqueous	--				X	X	X	
B20050495	BDSW-01A	5/4/20 11:10	BDSW-01A	B20050495-003	Aqueous	--				X	X	X	
B20050495	BDSW-04B	5/5/20 14:10	BDSW-04B	B20050495-004	Aqueous	--				X	X	X	
B20050495	BDSW-03B	5/4/20 14:30	BDSW-03B	B20050495-005	Aqueous	--				X	X	X	
B20050495	BDSW-13B	5/4/20 14:40	BDSW-13B	B20050495-006	Aqueous	Field Duplicate				X	X	X	
B20050495	BDSW-23B	5/4/20 14:50	BDSW-23B	B20050495-007	Aqueous	Field Blank				X	X	X	
B20050495	BDSW-01B	5/4/20 16:00	BDSW-01B	B20050495-008	Aqueous	--				X	X	X	
B20050495	BDSW-04A	5/5/20 9:20	BDSW-04A	B20050495-009	Aqueous	--				X	X	X	
B20050495	BDSW-03A	5/4/20 9:40	BDSW-03A	B20050495-010	Aqueous	--				X	X	X	
B20050495	BDSW-01A	5/5/20 11:10	BDSW-01A	B20050495-011	Aqueous	--				X	X	X	
B20050495	BTSW-1.6	5/5/20 12:40	BTSW-1.6	B20050495-012	Aqueous	--		X	X	X	X	X	
B20050495	BTSW-01	5/5/20 13:00	BTSW-01	B20050495-013	Aqueous	--		X	X	X	X	X	
B20050495	SFSW-04	5/5/20 13:20	SFSW-04	B20050495-014	Aqueous	--		X	X	X	X	X	
B20050495	SFSW-02	5/5/20 13:40	SFSW-02	B20050495-015	Aqueous	--	X	X	X	X	X	X	X
B20050495	SFSW-01	5/5/20 14:10	SFSW-01	B20050495-016	Aqueous	--	X	X	X	X	X	X	X
B20050495	BDSW-04B	5/5/20 14:40	BDSW-04B	B20050495-017	Aqueous	--		X	X	X	X	X	
B20050495	BDSW-03B	5/5/20 15:20	BDSW-03B	B20050495-018	Aqueous	--	X	X	X	X	X	X	X
B20050495	BDSW-13B	5/5/20 15:30	BDSW-13B	B20050495-019	Aqueous	Field Duplicate	X	X	X	X	X	X	X
B20050495	BDSW-23B	5/5/20 15:40	BDSW-23B	B20050495-020	Aqueous	Field Blank	X	X	X	X	X	X	X
B20050495	PASW-05	5/5/20 17:10	PASW-05	B20050495-021	Aqueous	--		X	X	X	X	X	
B20050495	BDSW-01B	5/5/20 17:30	BDSW-01B	B20050495-022	Aqueous	--	X	X	X	X	X	X	X
B20050495	BDSW-31B	5/5/20 17:40	BDSW-31B	B20050495-023	Aqueous	FCS				X	X	X	

[1]See laboratory data package for list of metals analyzed

Notes:
All analyses performed by Energy Laboratories

Abbreviations:
SDG - Sample Delivery Group
FCS - Field Control Sample

Table 2
Qualifier Summary Table
Blackbird Mine Sampling - May 2020

SDG	Sample Name	Constituent	New Result	New RL	Qualifier	Reason	PDF Page Number
B20050495	SFSW-02	pH	8.0	0.1	J	Analyzed outside hold time	18
B20050495	SFSW-01	pH	8.1	0.1	J	Analyzed outside hold time	19
B20050495	BDSW-03B	pH	7.5	0.1	J	Analyzed outside hold time	21
B20050495	BDSW-13B	pH	7.4	0.1	J	Analyzed outside hold time	22
B20050495	BDSW-23B	pH	5.8	0.1	J	Analyzed outside hold time	23
B20050495	BDSW-01B	pH	7.5	0.1	J	Analyzed outside hold time	25

Abbreviations
RL - Reporting Limit
SDG - Sample Delivery Group

METALS & INORGANIC / Tier I & II Data Validation Summary Checklist

GOLDER PROJECT #: 943-1595.011 ph 3100	SITE: BLACKBIRD MINE SITE, SALMON, ID
LABORATORY: ENERGY LABORATORY, BILLINGS	SDG: B20050865

SAMPLES (Total # =)	COLLECTED (Date/Time)	MATRIX
See Table 1		

DATA ASSESSMENT SUMMARY

REVIEW ITEM	ICP/ AES EPA200.7	ICP/ MS EPA200.8	TDS A2540C TSS A2540D	Hardness A2340B Alkalinity A2320B	Anions (ex Cl^-, F^-, SO_4^{2-}) E300.0	OTHER pH A4500-H-B DOC A5310C
1. Data Package Completeness	O	O	O	O	O	O
2. Holding Temperatures & Times	Θ	Θ	Θ	Θ	Θ	X
3. Calibration	O	O	O	O	O	O
4. Lab Blanks, Field Blanks	O	O	O	O	O	O
5. Lab Duplicate, Field Duplicate RPD	O	O	O	O	O	O
6. LCS, LFB, Blank Spike	O	O	O	O	O	O
7. Interference Checks	NA	NA	NA	NA	NA	NA
8. Matrix Spike Recovery (MS/MSD)	O	O	O	O	O	O
9. MSA and Serial Dilutions	NA	NA	NA	NA	NA	NA
10. Detection Limits, Other QC	O	O	O	Θ	O	O
11. Data Verification, Overall Summary	O	O	O	O	O	O

O = Data had no problems Θ = Problems, but do not affect data NA = Not applicable to this data set.
X = Data qualified due to minor problems [typically estimated data (J/UJ)].
M = Data qualified due to major problems [typically more than 50% qualified (J/UJ)].
Z = Data unacceptable [typically data rejected (R).

Acceptable: YES NO

1. Date Package Completeness (Check if present)..... √ ☐

_/_Case narrative
_/_Chain of Custody
_/_Sample Results
_/_ICV/CCV Results
_/_Blank Results
_o_ICP Interference Check Results
_o_Spike Recovery Results

_/_Duplicate Results
_/_LCS Results
_o_Standard Addition Results
_o_ICP Serial Dilution
_o_Instrument Det. Limits
__Other_____

/ Acceptable
x Absent
o Not required

Comments/Qualified Results: The Work Order Receipt Checklist indicates the sample dates/times on the COC and sample bottles do not match. Collection information on COC was used. The case narrative states that tests associated with analyst identified as ELI-CA were subcontracted to Energy Laboratories in Casper, Wyoming. Sample ID changed from BBDSW-01B to BDSW-01B and dissolved copper re-run at Golder's request. The two reanalysis results were 0.0056 mg/L and 0.0057 mg/L, and 0.0056 mg/L is now reported (to replace original 0.0006 mg/L result).

Validated by: Samantha DiCenso **Date:** 07/01/2020
Reviewed by: Ann Muehlfarth **Date:** 07/01/2020

METALS & INORGANIC / Tier I & II Data Validation Summary Checklist

Acceptable: YES NO

2. Holding Temperatures & Times (Check all that apply)…… √ ☐

_x_Recommended Hold Temp. of Cool, ≤6°C met (√ - Yes / x – No)
_/_TDS / TSS analysis completed in <7 days from collection
_/_Acidity / Alkalinity completed in <14 days from collection
_/_ICP metals completed in <6 months from collection
_/_Anions (Cl^-, F^-, SO_4^-), DOC analyzed in <28 days from collection
_x_pH analysis completed in <15 minutes from collection

Comments/Qualified Results: The cooler temperature upon receipt was recorded at 15.9°C. Using professional judgement and following project-specific requirements qualification of metals results was not required because the samples were preserved to pH<2. pH analysis was not completed within 15 minutes of sample collection; therefore, results are qualified as estimated values.

3. Calibrations (Check all that apply)…….. √ ☐

_/_ICV/CCV %R for ICP/AA, 90%-110%, acceptable
__ICV/CCV %R for ICP/AA, 75%-89% or 111%-125%, results estimated (J/UJ)
__ICV/CCV %R for ICP/AA, <75% or >125%, reject positive results (R)

Comments/Qualified Results: None.

4. Lab Blanks, Field Blanks (Check all that apply)…….. √ ☐

__Detects reported in ICB/CCB list: Field Blank ID: ____BDSW-23B_____
__ Detects in preparation blanks, results >10x contamination level or ND (no qualifier) Field Blank ID: _____
__Detects in preparation blanks, results ≤10x contamination level (J+)
__Detects in field blanks (Note: Advisory condition only and no qualifier)

Comments/Qualified Results: None.

5. Lab Duplicates, Field Duplicates (Check all that apply)……... √ ☐

_/_Duplicate RPD ≤20% for waters (≤35% for soils) for results >5X CRDL Field Duplicate ID: ____BDSW-13B_____
__Duplicate RPD >20% for waters (>35% for soils) for results >5X CRDL (J) Field Duplicate ID: _____
__Duplicate range is within ±CRDL (± 2X CRDL for soils) for results <5X CRDL (no qualifier)

Comments/Qualified Results: None.

Acceptable: YES NO

6. Laboratory Control Samples* (Check all that apply)……..… √ ☐

_/_LCS %R 70-130%: ACCEPTED
__LCS %R 40-69% or >130%, results >MDL: estimated (J-/J+)
__LCS %R 40-69% and results <MDL: estimated (UJ)
__LCS %R <40% and all results rejected (R/UR)
__LCS %R >150% and all results rejected (R)
*Lab Control Samples/Lab Control Sample Duplicates (LCS/LCSD)
*Lab Fortified Blanks (LFB)
*Blank Spike / Blank Spike Duplicates (BS/BSD)

Comments/Qualified Results: None.

7. Interference Checks (Check all that apply)…….. √ ☐

__ICS A/B Recoveries Acceptable
__Al, Ca, Fe, Mg sample concentrations > ICS concentrations
__ICS %R > 120%, results >IDL estimated (J)
__ICS %R 50-79%, results >IDL estimated (J)
__ICS %R 50-79%, results <IDL estimated (UJ)
__ICS %R <50%, results >IDL and <IDL rejected (R/UR)

Comments/Qualified Results: IC check is not required as part of Tier IIA Validation.

8. Matrix Spike Recovery (MS/MSD) (Check all that apply)……. √ ☐

_/_Spike %R with 75-125%: ACCEPTED
__MS and PDS %R 30-74%, results > MDL est. (J-), ND=(UJ)
__MS <75% and PDS >75%, results > MDL est. (J), ND=(UJ)
__ MS and PDS %R >125%, detects > MDL est. (J+)
__ MS >125% and PDS <125%, detects > MDL est. (J)
__MS and PDS %R <30% and <75%: results >MDL (J-) ND=(UR)
__Field blanks used for spike analysis?
__Post digest spk rqrd when %R <75, >125%, excpt Ag

Comments/Qualified Results: MS/MSD for unrelated samples.

Acceptable: YES NO

9. Method of Standard Addition (MSA) and Serial Dilutions (SD)….. √ ☐

__Analytical spike %R 85-115%
__Analytical spike %R 40-85%, results > IDL estimated (J)
__Analytical spike %R 10-40%, results <IDL estimated (UJ)
__Analytical spike %R <10%, results <IDL rejected (R)

__SD Analytes >50X MDL ?
__ SD % Diff < 10%
__ SD % Diff > 10%: J results >MDL, UJ for Non-detects

Comments/Qualified Results: NA

10. Detection Limits, Other QC…… √ ☐

WATER:

Inorganics-	Metals-	
_/_pH = 0.1 s.u.	__Al = 0.1 mg/L	__Cd = 0.01 mg/L
_/_TDS/TSS = 10 mg/L	_/_As = 0.001 mg/L	__Cr = 0.05 mg/L
_/_Alkalinity = 4 mg/L	_/_Co = 0.0001 mg/L	__Pb = 0.05 mg/L
_/_Anions (i.e. Cl^-, SO_4^-) = 1 mg/L	/_Cu = 0.0003/0.0008mg/L	__Hg = 0.001 mg/L
__Anions (i.e. F^-) = 0.1 mg/L	__Co (WTP) = 0.001 mg/L	__Ni = 0.05 mg/L
/_DOC = 0.5 mg/L	__Cu (WTP) = 0.001 mg/L	/_K = 1 mg/L
__Nitrogen, Ammonia = 0.05 mg/L	__Fe = 0.03 mg/L	__Se = 0.001 mg/L
__Phosphorus, Total = 0.005 mg/L	_/_Ca = 0.5 mg/L	__Si = 0.1 mg/L
	_/_Mg = 0.5 mg/L	__Ag = 0.01 mg/L
	_/_HARD-T = 0.5 mg/L	_/_Na = 1 mg/L
	__Mn = 0.001 mg/L	__Zn = 0.01 mg/L

SOIL:

Metals-		
__ As = 1 mg/kg	__ = mg/kg	
__ Co = 1 mg/kg	__ = mg/kg	
__ Cu = 1 mg/kg	__ = mg/kg	

Comments/Qualified Results: Reporting limit for Hardness as CaCO3 in samples BDSW-03+200, BDSW-03, BDSW-03-200, and BDSW-03-1425 was 1 instead of 0.5. Results were all greater than the RL; therefore, no qualification was necessary.

11. Data Verification and Overall Assessment…… √ ☐

Comments/Qualified Results: See Table 2 for summary of qualifiers.

Table 1
Sample Collection and Analysis Summary
Blackbird Mine Sampling - May 2020

							Analysis						
SDG	**Field Identification**	**Collection Date & Time**	**Location**	**Lab Identification**	**Matrix**	**QC Samples**	**Total Dissolved Solids**	**Total Suspended Solids**	**Anions**	**Alkalinity and/or Hardness (as CaCO3)**	**Dissolved Metals[1]**	**Total Metals[1]**	**Other (pH, DOC)**
B20050865	BDSW-04A	5/6/20 9:25	BDSW-04A	B20050865-001	Aqueous	--				X	X	X	
B20050865	BDSW-03A	5/6/20 9:45	BDSW-03A	B20050865-002	Aqueous	--				X	X	X	
B20050865	BDSW-01A	5/6/20 11:15	BDSW-01A	B20050865-003	Aqueous	--				X	X	X	
B20050865	BDSW-04B	5/6/20 14:40	BDSW-04B	B20050865-004	Aqueous	--				X	X	X	
B20050865	BDSW-03B	5/6/20 14:10	BDSW-03B	B20050865-005	Aqueous	--				X	X	X	
B20050865	BDSW-13B	5/6/20 14:30	BDSW-13B	B20050865-006	Aqueous	Field Duplicate				X	X	X	
B20050865	BDSW-23B	5/6/20 14:40	BDSW-23B	B20050865-007	Aqueous	Field Blank				X	X	X	
B20050865	BDSW-01B	5/6/20 16:00	BDSW-01B	B20050865-008	Aqueous	--				X	X	X	
B20050865	BDSW-04A	5/7/20 9:00	BDSW-04A	B20050865-009	Aqueous	--				X	X	X	
B20050865	BDSW-03A	5/7/20 9:20	BDSW-03A	B20050865-010	Aqueous	--				X	X	X	
B20050865	BDSW-01A	5/7/20 10:55	BDSW-01A	B20050865-011	Aqueous	--				X	X	X	
B20050865	BDSW-04B	5/7/20 13:00	BDSW-04B	B20050865-012	Aqueous	--				X	X	X	
B20050865	BDSW-03B	5/7/20 13:20	BDSW-03B	B20050865-013	Aqueous	--				X	X	X	
B20050865	BDSW-13B	5/7/20 13:30	BDSW-13B	B20050865-014	Aqueous	Field Duplicate				X	X	X	
B20050865	BDSW-23B	5/7/20 13:40	BDSW-23B	B20050865-013	Aqueous	Field Blank				X	X	X	
B20050865	BDSW-01B	5/7/20 15:50	BDSW-01B	B20050865-014	Aqueous	--				X	X	X	
B20050865	BDSW-03+200	5/7/20 13:50	BDSW-03+200	B20050865-014	Aqueous	--	X	X	X	X	X	X	X
B20050865	BDSW-03	5/7/20 14:05	BDSW-03	B20050865-013	Aqueous	--	X	X	X	X	X	X	X
B20050865	BDSW-03-200	5/7/20 14:30	BDSW-03-200	B20050865-014	Aqueous	--	X	X	X	X	X	X	X
B20050865	BDSW-03-1425	5/7/20 15:00	BDSW-03-1425	B20050865-013	Aqueous	--	X	X	X	X	X	X	X
B20050865	BDSW-31B	5/7/20 16:00	BDSW-31B	B20050865-014	Aqueous	FCS				X	X	X	

[1]See laboratory data package for list of metals analyzed

Notes:
All analyses performed by Energy Laboratories

Abbreviations:
SDG - Sample Delivery Group
FCS - Field Control Sample

Table 2
Qualifier Summary Table
Blackbird Mine Sampling - May 2020

SDG	Sample Name	Constituent	New Result	New RL	Qualifier	Reason	PDF Page Number
None	BDSW-03+200	pH	7.5	0.1	J	Analyzed outside hold time	20
None	BDSW-03	pH	7.4	0.1	J	Analyzed outside hold time	21
None	BDSW-03-200	pH	7.4	0.1	J	Analyzed outside hold time	22
None	BDSW-03-1425	pH	7.4	0.1	J	Analyzed outside hold time	23

Abbreviations
RL - Reporting Limit
SDG - Sample Delivery Group

METALS & INORGANIC / Tier I & II Data Validation Summary Checklist

GOLDER PROJECT #: 943-1595.011 ph 3100	SITE: BLACKBIRD MINE SITE, SALMON, ID
LABORATORY: ENERGY LABORATORY, BILLINGS	SDG: B20050877

SAMPLES (Total # =)	COLLECTED (Date/Time)	MATRIX
See Table 1		

DATA ASSESSMENT SUMMARY

REVIEW ITEM	ICP/ AES EPA200.7	ICP/ MS EPA200.8	TDS A2540C TSS A2540D	Hardness A2340B Alkalinity A2320B	Anions (ex Cl^-, F^-, SO_4^{-3}) E300.0	OTHER pH A4500-H-B DOC A5310C
1. Data Package Completeness	Θ	Θ	NA	Θ	NA	NA
2. Holding Temperatures & Times	Θ	Θ	NA	Θ	NA	NA
3. Calibration	O	O	NA	O	NA	NA
4. Lab Blanks, Field Blanks	O	O	NA	O	NA	NA
5. Lab Duplicate, Field Duplicate RPD	NA	NA	NA	NA	NA	NA
6. LCS, LFB, Blank Spike	O	O	NA	O	NA	NA
7. Interference Checks	NA	NA	NA	NA	NA	NA
8. Matrix Spike Recovery (MS/MSD)	O	O	NA	O	NA	NA
9. MSA and Serial Dilutions	NA	NA	NA	NA	NA	NA
10. Detection Limits, Other QC	O	O	NA	O	NA	NA
11. Data Verification, Overall Summary	O	O	NA	O	NA	NA

O = Data had no problems Θ = Problems, but do not affect data NA = Not applicable to this data set.
X = Data qualified due to minor problems [typically estimated data (J/UJ)].
M = Data qualified due to major problems [typically more than 50% qualified (J/UJ)].
Z = Data unacceptable [typically data rejected (R).

Acceptable: YES NO

1. Date Package Completeness (Check if present)…… √ ϒ

_x_Case narrative
_/_Chain of Custody
_/_Sample Results
_/_ICV/CCV Results
_/_Blank Results
_o_ICP Interference Check Results
_o_Spike Recovery Results
_x_Duplicate Results
_/_LCS Results
_o_Standard Addition Results
_o_ICP Serial Dilution
_o_Instrument Det. Limits
__Other_____

/ Acceptable
x Absent
o Not required

Comments/Qualified Results: No case narrative provided.

Validated by: Samantha DiCenso **Date:** 05/26/2020
Reviewed by: Ann Muehlfarth **Date:** 06/02/2020

METALS & INORGANIC / Tier I & II Data Validation Summary Checklist

Acceptable: YES NO

2. Holding Temperatures & Times (Check all that apply)…… √ ϒ

_x_Recommended Hold Temp. of Cool, ≤6°C met (√ - Yes / x – No)
_/_ICP metals completed in <6 months from collection
__TDS / TSS analysis completed in <7 days from collection
__Anions (Cl^-, F^-, SO_4^-), DOC analyzed in <28 days from collection
__Acidity / Alkalinity completed in <14 days from collection
__pH analysis completed in <15 minutes from collection

Comments/Qualified Results: The cooler temperature upon receipt was recorded at 16.1°C. Using professional judgement and following project-specific requirements qualification of metals results was not required because the samples were preserved to pH<2.

3. Calibrations (Check all that apply)…….. √ ϒ

_/_ICV/CCV %R for ICP/AA, 90%-110%, acceptable
__ICV/CCV %R for ICP/AA, 75%-89% or 111%-125%, results estimated (J/UJ)
__ICV/CCV %R for ICP/AA, <75% or >125%, reject positive results (R)

Comments/Qualified Results: None.

4. Lab Blanks, Field Blanks (Check all that apply)…….. √ ϒ

__Detects reported in ICB/CCB list: Field Blank ID: _____
__ Detects in preparation blanks, results >10x contamination level or ND (no qualifier) Field Blank ID: _____
__Detects in preparation blanks, results ≤10x contamination level (J+)
__Detects in field blanks (Note: Advisory condition only and no qualifier)

Comments/Qualified Results: No field blanks analyzed.

5. Lab Duplicates, Field Duplicates (Check all that apply)……... √ ϒ

__Duplicate RPD ≤20% for waters (≤35% for soils) for results >5X CRDL Field Duplicate ID: _____
__Duplicate RPD >20% for waters (>35% for soils) for results >5X CRDL (J) Field Duplicate ID: _____
__Duplicate range is within ±CRDL (± 2X CRDL for soils) for results <5X CRDL (no qualifier)

Comments/Qualified Results: No duplicates analyzed.

Acceptable: YES NO

6. Laboratory Control Samples* (Check all that apply)……..… √ ϒ

_/_LCS %R 70-130%: ACCEPTED
__LCS %R 40-69% or >130%, results >MDL: estimated (J-/J+)
__LCS %R 40-69% and results <MDL: estimated (UJ)
__LCS %R <40% and all results rejected (R/UR)
__LCS %R >150% and all results rejected (R)
*Lab Control Samples/Lab Control Sample Duplicates (LCS/LCSD)
*Lab Fortified Blanks (LFB)
*Blank Spike / Blank Spike Duplicates (BS/BSD)

Comments/Qualified Results: None.

7. Interference Checks (Check all that apply)…….. √ ϒ

__ICS A/B Recoveries Acceptable
__Al, Ca, Fe, Mg sample concentrations > ICS concentrations
__ICS %R > 120%, results >IDL estimated (J)
__ICS %R 50-79%, results >IDL estimated (J)
__ICS %R 50-79%, results <IDL estimated (UJ)
__ICS %R <50%, results >IDL and <IDL rejected (R/UR)

Comments/Qualified Results: IC check is not required as part of Tier IIA Validation.

8. Matrix Spike Recovery (MS/MSD) (Check all that apply)……. √ ϒ

_/_Spike %R with 75-125%: ACCEPTED
__MS and PDS %R 30-74%, results > MDL est. (J-), ND=(UJ)
__MS <75% and PDS >75%, results > MDL est. (J), ND=(UJ)
__ MS and PDS %R >125%, detects > MDL est. (J+)
__ MS >125% and PDS <125%, detects > MDL est. (J)
__MS and PDS %R <30% and <75%: results >MDL (J-) ND=(UR)
__Field blanks used for spike analysis?
__Post digest spk rqrd when %R <75, >125%, excpt Ag

Comments/Qualified Results: None.

Acceptable: YES NO

9. Method of Standard Addition (MSA) and Serial Dilutions (SD)….. √ ϒ

__Analytical spike %R 85-115%
__Analytical spike %R 40-85%, results > IDL estimated (J)
__Analytical spike %R 10-40%, results <IDL estimated (UJ)
__Analytical spike %R <10%, results <IDL rejected (R)

__SD Analytes >50X MDL ?
__ SD % Diff < 10%
__ SD % Diff > 10%: J results >MDL, UJ for Non-detects

Comments/Qualified Results: NA

10. Detection Limits, Other QC…… √ ϒ

WATER:

Inorganics-	**Metals-**	
__pH = 0.1 s.u.	__Al = 0.1 mg/L	__Cd = 0.01 mg/L
__TDS/TSS = 10 mg/L	_/_As = 0.001 mg/L	__Cr = 0.05 mg/L
__Alkalinity = 4 mg/L	_/_Co = 0.0001 mg/L	__Pb = 0.05 mg/L
__Anions (i.e. Cl^-, SO_4^{--}) = 1 mg/L	/_Cu = 0.0003/0.0008mg/L	__Hg = 0.001 mg/L
__Anions (i.e. F^-) = 0.1 mg/L	__Co (WTP) = 0.001 mg/L	__Ni = 0.05 mg/L
__DOC = 0.5 mg/L	__Cu (WTP) = 0.001 mg/L	__K = 1 mg/L
__Nitrogen, Ammonia = 0.05 mg/L	__Fe = 0.03 mg/L	__Se = 0.001 mg/L
__Phosphorus, Total = 0.005 mg/L	_/_Ca = 0.5 mg/L	__Si = 0.1 mg/L
	_/_Mg = 0.5 mg/L	__Ag = 0.01 mg/L
	_/_HARD-T = 0.5 mg/L	__Na = 1 mg/L
	__Mn = 0.001 mg/L	__Zn = 0.01 mg/L

SOIL:

Metals-		
__As = 1 mg/kg	__ = mg/kg	
__Co = 1 mg/kg	__ = mg/kg	
__Cu = 1 mg/kg	__ = mg/kg	

Comments/Qualified Results: None.

11. Data Verification and Overall Assessment…… √ ϒ

Comments/Qualified Results: See Table 2 for summary of qualifiers.

Table 1
Sample Collection and Analysis Summary
Blackbird Mine Sampling - May 2020

							Analysis		
SDG	**Field Identification**	**Collection Date & Time**	**Location**	**Lab Identification**	**Matrix**	**QC Samples**	**Alkalinity and/or Hardness (as CaCO3)**	**Dissolved Metals[1]**	**Total Metals[1]**
B20050877	SFBD-1L-B	5/10/20 11:40	SFBD-1L-B	B20050877-001	Aqueous	--	X	X	X

[1]See laboratory data package for list of metals analyzed

Notes:
All analyses performed by Energy Laboratories

Abbreviations:
SDG - Sample Delivery Group

Table 2
Qualifier Summary Table
Blackbird Mine Sampling - May 2020

SDG	Sample Name	Constituent	New Result	New RL	Qualifier	Reason	PDF Page Number
None							

Abbreviations
RL - Reporting Limit
SDG - Sample Delivery Group

METALS & INORGANIC / Tier I & II Data Validation Summary Checklist

GOLDER PROJECT #: 943-1595.011 ph 3100	SITE: BLACKBIRD MINE SITE, SALMON, ID
LABORATORY: ENERGY LABORATORY, BILLINGS	SDG: B20050879

SAMPLES (Total # =)	COLLECTED (Date/Time)	MATRIX
See Table 1		

DATA ASSESSMENT SUMMARY

REVIEW ITEM	ICP/ AES EPA200.7	ICP/ MS EPA200.8	TDS A2540C TSS A2540D	Hardness A2340B Alkalinity A2320B	Anions (ex Cl^-, F^-, SO_4^{-2}) E300.0	OTHER pH A4500-H-B DOC A5310C
1. Data Package Completeness	Θ	Θ	NA	Θ	NA	NA
2. Holding Temperatures & Times	Θ	Θ	NA	Θ	NA	NA
3. Calibration	O	O	NA	O	NA	NA
4. Lab Blanks, Field Blanks	O	O	NA	O	NA	NA
5. Lab Duplicate, Field Duplicate RPD	NA	NA	NA	NA	NA	NA
6. LCS, LFB, Blank Spike	O	O	NA	O	NA	NA
7. Interference Checks	NA	NA	NA	NA	NA	NA
8. Matrix Spike Recovery (MS/MSD)	O	O	NA	O	NA	NA
9. MSA and Serial Dilutions	NA	NA	NA	NA	NA	NA
10. Detection Limits, Other QC	O	O	NA	O	NA	NA
11. Data Verification, Overall Summary	O	O	NA	O	NA	NA

O = Data had no problems Θ = Problems, but do not affect data NA = Not applicable to this data set.
X = Data qualified due to minor problems [typically estimated data (J/UJ)].
M = Data qualified due to major problems [typically more than 50% qualified (J/UJ)].
Z = Data unacceptable [typically data rejected (R).

Acceptable: YES NO

1. Date Package Completeness (Check if present)…… √ ☐

_x_Case narrative
_/_Chain of Custody
_/_Sample Results
_/_ICV/CCV Results
_/_Blank Results
_o_ICP Interference Check Results
_o_Spike Recovery Results
_x_Duplicate Results
_/_LCS Results
_o_Standard Addition Results
_o_ICP Serial Dilution
_o_Instrument Det. Limits
__Other_____

/ Acceptable
x Absent
o Not required

Comments/Qualified Results: No case narrative provided.

Validated by: Samantha DiCenso **Date:** 05/26/2020
Reviewed by: Ann Muehlfarth **Date:** 06/02/2020

Acceptable: YES NO

2. Holding Temperatures & Times (Check all that apply)…… √ ☐

_x_Recommended Hold Temp. of Cool, ≤6°C met (√ - Yes / x – No)
_/_ICP metals completed in <6 months from collection
__TDS / TSS analysis completed in <7 days from collection
__Anions (Cl^-, F^-, SO_4^-), DOC analyzed in <28 days from collection
__Acidity / Alkalinity completed in <14 days from collection
__pH analysis completed in <15 minutes from collection

Comments/Qualified Results: The cooler temperature upon receipt was recorded at 15.9°C. Using professional judgement and following project-specific requirements qualification of metals results was not required because the samples were preserved to pH<2.

3. Calibrations (Check all that apply)…….. √ ☐

_/_ICV/CCV %R for ICP/AA, 90%-110%, acceptable
__ICV/CCV %R for ICP/AA, 75%-89% or 111%-125%, results estimated (J/UJ)
__ICV/CCV %R for ICP/AA, <75% or >125%, reject positive results (R)

Comments/Qualified Results:

4. Lab Blanks, Field Blanks (Check all that apply)…….. √ ☐

__Detects reported in ICB/CCB list: Field Blank ID: _____
__ Detects in preparation blanks, results >10x contamination level or ND (no qualifier) Field Blank ID: _____
__Detects in preparation blanks, results ≤10x contamination level (J+)
__Detects in field blanks (Note: Advisory condition only and no qualifier)

Comments/Qualified Results: No field blanks analyzed.

5. Lab Duplicates, Field Duplicates (Check all that apply)……... √ ☐

__Duplicate RPD ≤20% for waters (≤35% for soils) for results >5X CRDL Field Duplicate ID: _____
__Duplicate RPD >20% for waters (>35% for soils) for results >5X CRDL (J) Field Duplicate ID: _____
__Duplicate range is within ±CRDL (± 2X CRDL for soils) for results <5X CRDL (no qualifier)

Comments/Qualified Results: No duplicates analyzed.

Acceptable: YES NO

6. Laboratory Control Samples* (Check all that apply)……..… √ ☐

_/_LCS %R 70-130%: ACCEPTED
__LCS %R 40-69% or >130%, results >MDL: estimated (J-/J+)
__LCS %R 40-69% and results <MDL: estimated (UJ)
__LCS %R <40% and all results rejected (R/UR)
__LCS %R >150% and all results rejected (R)
*Lab Control Samples/Lab Control Sample Duplicates (LCS/LCSD)
*Lab Fortified Blanks (LFB)
*Blank Spike / Blank Spike Duplicates (BS/BSD)

Comments/Qualified Results: None.

7. Interference Checks (Check all that apply)…….. √ ☐

__ICS A/B Recoveries Acceptable
__Al, Ca, Fe, Mg sample concentrations > ICS concentrations
__ICS %R > 120%, results >IDL estimated (J)
__ICS %R 50-79%, results >IDL estimated (J)
__ICS %R 50-79%, results <IDL estimated (UJ)
__ICS %R <50%, results >IDL and <IDL rejected (R/UR)

Comments/Qualified Results: IC check is not required as part of Tier IIA Validation.

8. Matrix Spike Recovery (MS/MSD) (Check all that apply)……. √ ☐

_/_Spike %R with 75-125%: ACCEPTED
__MS and PDS %R 30-74%, results > MDL est. (J-), ND=(UJ)
__MS <75% and PDS >75%, results > MDL est. (J), ND=(UJ)
__ MS and PDS %R >125%, detects > MDL est. (J+)
__ MS >125% and PDS <125%, detects > MDL est. (J)
__MS and PDS %R <30% and <75%: results >MDL (J-) ND=(UR)
__Field blanks used for spike analysis?
__Post digest spk rqrd when %R <75, >125%, excpt Ag

Comments/Qualified Results: None.

Acceptable: YES NO

9. Method of Standard Addition (MSA) and Serial Dilutions (SD)….. √ ☐

__Analytical spike %R 85-115%
__Analytical spike %R 40-85%, results > IDL estimated (J)
__Analytical spike %R 10-40%, results <IDL estimated (UJ)
__Analytical spike %R <10%, results <IDL rejected (R)

__SD Analytes >50X MDL ?
__ SD % Diff < 10%
__ SD % Diff > 10%: J results >MDL, UJ for Non-detects

Comments/Qualified Results: NA

10. Detection Limits, Other QC…… √ ☐

WATER:

Inorganics-	**Metals-**	
__pH = 0.1 s.u.	__Al = 0.1 mg/L	__Cd = 0.01 mg/L
__TDS/TSS = 10 mg/L	_/_As = 0.001 mg/L	__Cr = 0.05 mg/L
__Alkalinity = 4 mg/L	_/_Co = 0.0001 mg/L	__Pb = 0.05 mg/L
__Anions (i.e. Cl^-, SO_4^-) = 1 mg/L	/_Cu = 0.0003/0.0008mg/L	__Hg = 0.001 mg/L
__Anions (i.e. F^-) = 0.1 mg/L	__Co (WTP) = 0.001 mg/L	__Ni = 0.05 mg/L
__DOC = 0.5 mg/L	__Cu (WTP) = 0.001 mg/L	__K = 1 mg/L
__Nitrogen, Ammonia = 0.05 mg/L	__Fe = 0.03 mg/L	__Se = 0.001 mg/L
__Phosphorus, Total = 0.005 mg/L	_/_Ca = 0.5 mg/L	Si = 0.1 mg/L
	_/_Mg = 0.5 mg/L	__Ag = 0.01 mg/L
	_/_HARD-T = 0.5 mg/L	__Na = 1 mg/L
	__Mn = 0.001 mg/L	__Zn = 0.01 mg/L

SOIL:

Metals-		
__As = 1 mg/kg	__ = mg/kg
__Co = 1 mg/kg	__ = mg/kg
__Cu = 1 mg/kg	__ = mg/kg

Comments/Qualified Results: None.

11. Data Verification and Overall Assessment…… √ ☐

Comments/Qualified Results: See Table 2 for summary of qualifiers.

Table 1
Sample Collection and Analysis Summary
Blackbird Mine Sampling - May 2020

							Analysis		
SDG	**Field Identification**	**Collection Date & Time**	**Location**	**Lab Identification**	**Matrix**	**QC Samples**	**Alkalinity and/or Hardness (as CaCO3)**	**Dissolved Metals[1]**	**Total Metals[1]**
B20050879	SFSW-31	5/8/20 18:00	SFSW-31	B20050879-001	Aqueous	FCS	X	X	X

[1]See laboratory data package for list of metals analyzed

Notes:
All analyses performed by Energy Laboratories

Abbreviations:
SDG - Sample Delivery Group
FCS - Field Control Sample

Table 2
Qualifier Summary Table
Blackbird Mine Sampling - May 2020

SDG	Sample Name	Constituent	New Result	New RL	Qualifier	Reason	PDF Page Number
None							

Abbreviations
RL - Reporting Limit
SDG - Sample Delivery Group

METALS & INORGANIC / Tier I & II Data Validation Summary Checklist

GOLDER PROJECT #: 943-1595.011 ph 3100	SITE: BLACKBIRD MINE SITE, SALMON, ID
LABORATORY: ENERGY LABORATORY, BILLINGS	SDG: B20051181

SAMPLES (Total # =)	COLLECTED (Date/Time)	MATRIX
See Table 1		

DATA ASSESSMENT SUMMARY

REVIEW ITEM	ICP/ AES EPA200.7	ICP/ MS EPA200.8	TDS A2540C TSS A2540D	Hardness A2340B Alkalinity A2320B	Anions (ex Cl^-, F^-, SO_4^{-2}) E300.0	OTHER pH A4500-H-B DOC A5310C
1. Data Package Completeness	O	O	O	O	O	O
2. Holding Temperatures & Times	Θ	Θ	Θ	Θ	Θ	X
3. Calibration	O	O	O	O	O	O
4. Lab Blanks, Field Blanks	X	Θ	O	O	O	O
5. Lab Duplicate, Field Duplicate RPD	O	X	O	O	O	O
6. LCS, LFB, Blank Spike	O	O	O	O	O	O
7. Interference Checks	NA	NA	NA	NA	NA	NA
8. Matrix Spike Recovery (MS/MSD)	O	O	O	O	O	O
9. MSA and Serial Dilutions	NA	NA	NA	NA	NA	NA
10. Detection Limits, Other QC	O	Θ	O	Θ	O	O
11. Data Verification, Overall Summary	O	O	O	O	O	O

O = Data had no problems Θ = Problems, but do not affect data NA = Not applicable to this data set.
X = Data qualified due to minor problems [typically estimated data (J/UJ)].
M = Data qualified due to major problems [typically more than 50% qualified (J/UJ)].
Z = Data unacceptable [typically data rejected (R).

Acceptable: YES NO

1. Date Package Completeness (Check if present)…… √ ☐

_/_Case narrative
_/_Chain of Custody
_/_Sample Results
_/_ICV/CCV Results
_/_Blank Results
_o_ICP Interference Check Results
_/_Spike Recovery Results
_/_Duplicate Results
_/_LCS Results
_o_Standard Addition Results
_o_ICP Serial Dilution
_o_Instrument Det. Limits
__Other_____

/ Acceptable
x Absent
o Not required

Comments/Qualified Results: The case narrative states tests associated with analyst ELI-CA were subcontracted to Energy Laboratories in Casper, Wyoming. BBSW-07a was re-analyzed on 7/9, as requested, and results from the two reanalysis runs provided detections (reported as non-detects in original run). Reanalysis results are reported. Work Order Receipt Checklist indicates PASW-39 was the only sample not requested for alkalinity, anions, TSS, TDS, and pH analysis and only a one liter unpreserved bottle was received; however, per Energy Laboratories PM they proceeded with analysis.

Validated by: Samantha DiCenso **Date:** 07/15/2020
Reviewed by: Ann Muehlfarth **Date:** 01/18/2021

Acceptable: YES NO

2. Holding Temperatures & Times (Check all that apply)…… √ ☐

_x_Recommended Hold Temp. of Cool, ≤6°C met (√ - Yes / x – No)
_/_TDS / TSS analysis completed in <7 days from collection
_/_Acidity / Alkalinity completed in <14 days from collection
_/_ICP metals completed in <6 months from collection
_/_Anions (Cl^-, F^-, SO_4^-), DOC analyzed in <28 days from collection
_x_pH analysis completed in <15 minutes from collection

Comments/Qualified Results: The cooler temperature upon receipt was recorded at 16.3°C. Using professional judgement and following project-specific requirements qualification of metals results was not required because the samples were preserved to pH<2. pH analysis was not completed within 15 minutes of sample collection; therefore, results are qualified as estimated values.

3. Calibrations (Check all that apply)…….. √ ☐

_/_ICV/CCV %R for ICP/AA, 90%-110%, acceptable
__ICV/CCV %R for ICP/AA, 75%-89% or 111%-125%, results estimated (J/UJ)
__ICV/CCV %R for ICP/AA, <75% or >125%, reject positive results (R)

Comments/Qualified Results: None.

4. Lab Blanks, Field Blanks (Check all that apply)…….. √ ☐

__Detects reported in ICB/CCB list:
__ Detects in preparation blanks, results >10x contamination level or ND (no qualifier)
_/_Detects in preparation blanks, results ≤10x contamination level (J+)
_/_Detects in field blanks (Note: Advisory condition only and no qualifier)

Field Blank ID: ____PASW-29A_____
Field Blank ID: ____BBSW-21a_____

Comments/Qualified Results: pH reading for field blank PASW-29A was 6.0, pH reading for field blank BBSW-29a was 5.8. Total copper detected in field blank BBSW-21a at 0.0015 mg/L (advisory condition only, no qualification necessary).
MB-144659 (Method E200.7 and Method E200.8 in batch 144659) detection of calcium (0.2 mg/L), some qualification necessary.
MB-LRB (Method 200.8 in batch R342919) detection of copper (0.002 mg/L); however, qualification was not necessary as analyte was not detected in associated sample.
MB-144659 (Method 200.7 in batch 144659 on 5/15) detection of calcium (0.2 mg/L); however, qualification was not necessary as no samples were run with this batch.
MB-144659 (Method 200.8 in batch 144659 on 5/15) detection of calcium (0.2 mg/L)); however, qualification was not necessary as no samples were run with this batch.
MB-144666 (Method 200.8 in batch 144666 on 5/15) detection of calcium (0.05 mg/L)); however, qualification was not necessary as no samples were run with this batch.

5. Lab Duplicates, Field Duplicates (Check all that apply)……... √ ☐

__Duplicate RPD ≤20% for waters (≤35% for soils) for results >5X CRDL
_/_Duplicate RPD >20% for waters (>35% for soils) for results >5X CRDL (J)
_/_Duplicate range is within ±CRDL (± 2X CRDL for soils) for results <5X CRDL (no qualifier)

Field Duplicate ID: ____PASW-19A_____
Field Duplicate ID: ____BBSW-11a_____

Comments/Qualified Results: RPD for total sodium (40%) outside limits for PASW-09A / PASW-19A, and RPD for total potassium outside limits for BBSW-01A / BBSW-11a; however, results are <5x CRDL so no qualification is necessary. RPD for dissolved arsenic (54.5%) and dissolved copper (32.9%) outside limits for BBSW-01A / BBSW-11a, and results are >5x CRDL; therefore, data was qualified as estimated (J).
Some laboratory duplicates did not meet RPD limits; however, the difference between the results for sample and duplicate were less than the reporting limit and the RPD variance is not considered significant.

Acceptable: YES NO

6. Laboratory Control Samples* (Check all that apply)……..… √ ☐

_/_LCS %R 70-130%: ACCEPTED
__LCS %R 40-69% or >130%, results >MDL: estimated (J-/J+)
__LCS %R 40-69% and results <MDL: estimated (UJ)
__LCS %R <40% and all results rejected (R/UR)
__LCS %R >150% and all results rejected (R)
*Lab Control Samples/Lab Control Sample Duplicates (LCS/LCSD)
*Lab Fortified Blanks (LFB)
*Blank Spike / Blank Spike Duplicates (BS/BSD)

Comments/Qualified Results: None.

7. Interference Checks (Check all that apply)…….. √ ☐

__ICS A/B Recoveries Acceptable
__Al, Ca, Fe, Mg sample concentrations > ICS concentrations
__ICS %R > 120%, results >IDL estimated (J)
__ICS %R 50-79%, results >IDL estimated (J)
__ICS %R 50-79%, results <IDL estimated (UJ)
__ICS %R <50%, results >IDL and <IDL rejected (R/UR)

Comments/Qualified Results: IC check is not required as part of Tier IIA Validation

8. Matrix Spike Recovery (MS/MSD) (Check all that apply)……. √ ☐

_/_Spike %R with 75-125%: ACCEPTED
__MS and PDS %R 30-74%, results > MDL est. (J-), ND=(UJ)
__MS <75% and PDS >75%, results > MDL est. (J), ND=(UJ)
__ MS and PDS %R >125%, detects > MDL est. (J+)
__ MS >125% and PDS <125%, detects > MDL est. (J)
__MS and PDS %R <30% and <75%: results >MDL (J-) ND=(UR)
__Field blanks used for spike analysis?
__Post digest spk rqrd when %R <75, >125%, excpt Ag

Comments/Qualified Results: None.

Acceptable: YES NO

9. Method of Standard Addition (MSA) and Serial Dilutions (SD)….. √ ☐

__Analytical spike %R 85-115%
__Analytical spike %R 40-85%, results > IDL estimated (J)
__Analytical spike %R 10-40%, results <IDL estimated (UJ)
__Analytical spike %R <10%, results <IDL rejected (R)

__SD Analytes >50X MDL ?
__ SD % Diff < 10%
__ SD % Diff > 10%: J results >MDL, UJ for Non-detects

Comments/Qualified Results: NA

10. Detection Limits, Other QC…… √ ☐

WATER:

Inorganics-	Metals-	
_/_pH = 0.1 s.u.	__Al = 0.1 mg/L	__Cd = 0.01 mg/L
_/_TDS/TSS = 10 mg/L	_/_As = 0.001 mg/L	__Cr = 0.05 mg/L
_/_Alkalinity = 4 mg/L	_x_Co = 0.0001 mg/L	__Pb = 0.05 mg/L
_/_Anions (i.e. Cl^-, SO_4^-) = 1 mg/L	x_Cu = 0.0003/0.0008mg/L	__Hg = 0.001 mg/L
__Anions (i.e. F^-) = 0.1 mg/L	__Co (WTP) = 0.001 mg/L	__Ni = 0.05 mg/L
_/_DOC = 0.5 mg/L	__Cu (WTP) = 0.001 mg/L	_/_K = 1 mg/L
__Nitrogen, Ammonia = 0.05 mg/L	_x_Fe = 0.03 mg/L	__Se = 0.001 mg/L
__Phosphorus, Total = 0.005 mg/L	_/_Ca = 0.5 mg/L	__Si = 0.1 mg/L
	_/_Mg = 0.5 mg/L	__Ag = 0.01 mg/L
	_x_HARD-T = 0.5 mg/L	_/_Na = 1 mg/L
	__Mn = 0.001 mg/L	__Zn = 0.01 mg/L

SOIL:

Metals-		
__ As = 1 mg/kg	__ = mg/kg	
__ Co = 1 mg/kg	__ = mg/kg	
__ Cu = 1 mg/kg	__ = mg/kg	

Comments/Qualified Results: Cobalt and iron reporting limits increased in some samples due to dilution.
Total copper was analyzed with a reporting limit of 0.0004 mg/L. Hardness was analyzed with a reporting limit of 1 mg/L in BBSW-01A, PASW-09A, PASW-19A, PASW-29A, BBSW-11a, and BBSW-21a. No further action is necessary.

11. Data Verification and Overall Assessment…… √ ☐

Comments/Qualified Results: See Table 2 for summary of qualifiers.

Table 1
Sample Collection and Analysis Summary
Blackbird Mine Sampling - May 2020

							Analysis						
SDG	**Field Identification**	**Collection Date & Time**	**Location**	**Lab Identification**	**Matrix**	**QC Samples**	**Total Dissolved Solids**	**Total Suspended Solids**	**Anions**	**Alkalinity and/or Hardness (as CaCO3)**	**Dissolved Metals[1]**	**Total Metals[1]**	**Other (pH, DOC)**
B20051181	MCSW-01	5/12/20 8:45	MCSW-01	B20051181-001	Aqueous	--		X	X	X	X	X	
B20051181	BBSW-08	5/12/20 9:00	BBSW-08	B20051181-002	Aqueous	--		X	X	X	X	X	
B20051181	BBSW-07a	5/12/20 9:15	BBSW-07a	B20051181-003	Aqueous	--		X	X	X	X	X	
B20051181	WTP-003	5/12/20 9:25	WTP-003	B20051181-004	Aqueous	--		X	X	X	X	X	
B20051181	HGSW-01	5/12/20 9:35	HGSW-01	B20051181-005	Aqueous	--		X	X	X	X	X	
B20051181	BBSW-07	5/12/20 9:50	BBSW-07	B20051181-006	Aqueous	--		X	X	X	X	X	
B20051181	BBSW-05	5/12/20 10:05	BBSW-05	B20051181-007	Aqueous	--		X	X	X	X	X	
B20051181	WFSW-02	5/12/20 10:20	WFSW-02	B20051181-008	Aqueous	--		X	X	X	X	X	
B20051181	WFSW-03	5/12/20 10:40	WFSW-03	B20051181-009	Aqueous	--		X	X	X	X	X	
B20051181	WFSW-02	5/12/20 11:00	WFSW-02	B20051181-010	Aqueous	--		X	X	X	X	X	
B20051181	WFIDSW-01	5/12/20 11:10	WFIDSW-01	B20051181-011	Aqueous	--		X	X	X	X	X	
B20051181	WFTTSW-01	5/12/20 11:35	WFTTSW-01	B20051181-012	Aqueous	--		X	X	X	X	X	
B20051181	WFSW-01	5/12/20 11:25	WFSW-01	B20051181-013	Aqueous	--		X	X	X	X	X	
B20051181	BBSW-02	5/12/20 11:55	BBSW-02	B20051181-014	Aqueous	--		X	X	X	X	X	
B20051181	BBSW-01A	5/12/20 12:20	BBSW-01A	B20051181-015	Aqueous	--	X	X	X	X	X	X	X
B20051181	PASW-11A	5/12/20 12:55	PASW-11A	B20051181-016	Aqueous	--		X	X	X	X	X	
B20051181	PASW-09A	5/12/20 13:15	PASW-09A	B20051181-017	Aqueous	--	X	X	X	X	X	X	X
B20051181	PASW-19A	5/12/20 13:30	PASW-19A	B20051181-018	Aqueous	Field Duplicate	X	X	X	X	X	X	X
B20051181	PASW-29A	5/12/20 13:45	PASW-29A	B20051181-019	Aqueous	Field Blank	X	X	X	X	X	X	X
B20051181	PASW-39A	5/12/20 13:55	PASW-39A	B20051181-020	Aqueous	FCS				X	X	X	
B20051181	BBSW-11a	5/12/20 12:35	BBSW-11a	B20051181-021	Aqueous	Field Duplicate	X	X	X	X	X	X	X
B20051181	BBSW-21a	5/12/20 12:45	BBSW-21a	B20051181-022	Aqueous	Field Blank	X	X	X	X	X	X	X

[1]See laboratory data package for list of metals analyzed

Notes:
All analyses performed by Energy Laboratories

Abbreviations:
SDG - Sample Delivery Group
FCS - Field Control Sample

Table 2
Qualifier Summary Table
Blackbird Mine Sampling - May 2020

SDG	Sample Name	Constituent	New Result	New RL	Qualifier	Reason	PDF Page Number
B20051181	BBSW-01A	pH	7.4	0.1	J	Analyzed outside hold time	18
B20051181	PASW-09A	pH	7.7	0.1	J	Analyzed outside hold time	20
B20051181	PASW-19A	pH	7.7	0.1	J	Analyzed outside hold time	21
B20051181	PASW-29A	pH	6.0	0.1	J	Analyzed outside hold time	22
B20051181	BBSW-11a	pH	7.3	0.1	J	Analyzed outside hold time	24
B20051181	BBSW-21a	pH	5.8	0.1	J	Analyzed outside hold time	25
B20051181	BBSW-01A	dissolved arsenic	0.007	0.001	J	RPD outside limits between sample and duplicate	18
B20051181	BBSW-01A	dissolved copper	0.0092	3E-04	J	RPD outside limits between sample and duplicate	18
B20051181	BBSW-11a	dissolved arsenic	0.004	0.001	J	RPD outside limits between sample and duplicate	24
B20051181	BBSW-11a	dissolved copper	0.0066	3E-04	J	RPD outside limits between sample and duplicate	24
B20051181	HGSW-01	total calcium	1.8	0.5	J+	detected in blank	8

Abbreviations
RL - Reporting Limit
SDG - Sample Delivery Group

Qualifier Definitions
J Result is an estimated value
J+ Result is an estimated value (estimated high)

METALS & INORGANIC / Tier I & II Data Validation Summary Checklist

GOLDER PROJECT #: 943-1595.011 ph 3100	SITE: BLACKBIRD MINE SITE, SALMON, ID
LABORATORY: ENERGY LABORATORY, BILLINGS	SDG: B20051568_Revised

SAMPLES (Total # =)	COLLECTED (Date/Time)	MATRIX
See Table 1		

DATA ASSESSMENT SUMMARY

REVIEW ITEM	ICP/ AES EPA200.7	ICP/ MS EPA200.8	TDS A2540C TSS A2540D	Hardness A2340B Alkalinity A2320B	Anions (ex Cl^-, F^-, SO_4^{-2}) E300.0	OTHER pH A4500-H-B DOC A5310C
1. Data Package Completeness	Θ	Θ	NA	Θ	NA	NA
2. Holding Temperatures & Times	Θ	Θ	NA	Θ	NA	NA
3. Calibration	O	O	NA	O	NA	NA
4. Lab Blanks, Field Blanks	O	Θ	NA	O	NA	NA
5. Lab Duplicate, Field Duplicate RPD	O	O	NA	O	NA	NA
6. LCS, LFB, Blank Spike	O	O	NA	O	NA	NA
7. Interference Checks	NA	NA	NA	NA	NA	NA
8. Matrix Spike Recovery (MS/MSD)	O	O	NA	O	NA	NA
9. MSA and Serial Dilutions	NA	NA	NA	NA	NA	NA
10. Detection Limits, Other QC	O	O	NA	O	NA	NA
11. Data Verification, Overall Summary	O	O	NA	O	NA	NA

O = Data had no problems Θ = Problems, but do not affect data NA = Not applicable to this data set.
X = Data qualified due to minor problems [typically estimated data (J/UJ)].
M = Data qualified due to major problems [typically more than 50% qualified (J/UJ)].
Z = Data unacceptable [typically data rejected (R).

	Acceptable: YES	NO
1. Date Package Completeness (Check if present)……	√	☐

_x_Case narrative
_/_Chain of Custody
_/_Sample Results
_/_ICV/CCV Results
_/_Blank Results
_o_ICP Interference Check Results
_/_Spike Recovery Results

_/_Duplicate Results
_/_LCS Results
_o_Standard Addition Results
_o_ICP Serial Dilution
_0_Instrument Det. Limits
__Other_____

/ Acceptable
x Absent
o Not required

Comments/Qualified Results: The case narrative indicates that at the request of Aaron Rydecki (Salmon Environmental), the Hardness Value was corrected for PASW-09B. The Work Order Receipt Checklist indicates collection time on container label does not match the time on COC for PASW-11B (on 5/11/20), the time on COC was used. Sample PASW-04XB (unfiltered) does not match the filtered sample or the COC. The sample ID on the unfiltered sample is PASW-11B. The samples were received bagged together and dates/times match each other and the COC.

Validated by: Samantha DiCenso **Date:** 06/09/2020
Reviewed by: Annie Muehlfarth **Date:** 06/24/2020

METALS & INORGANIC / Tier I & II Data Validation Summary Checklist

Acceptable: YES NO

2. Holding Temperatures & Times (Check all that apply)…… √ ☐

_x_Recommended Hold Temp. of Cool, ≤6°C met (√ - Yes / x – No)
__TDS / TSS analysis completed in <7 days from collection
__Acidity / Alkalinity completed in <14 days from collection
_/_ICP metals completed in <6 months from collection
__Anions (Cl^-, F^-, SO_4^-), DOC analyzed in <28 days from collection
__pH analysis completed in <15 minutes from collection

Comments/Qualified Results: The cooler temperature upon receipt was recorded at 18.1°C. Using professional judgement and following project-specific requirements qualification of metals results was not required because the samples were preserved to pH<2.

3. Calibrations (Check all that apply)…….. √ ☐

_/_ICV/CCV %R for ICP/AA, 90%-110%, acceptable
__ICV/CCV %R for ICP/AA, 75%-89% or 111%-125%, results estimated (J/UJ)
__ICV/CCV %R for ICP/AA, <75% or >125%, reject positive results (R)

Comments/Qualified Results: None.

4. Lab Blanks, Field Blanks (Check all that apply)…….. √ ☐

__Detects reported in ICB/CCB list:
__ Detects in preparation blanks, results >10x contamination level or ND (no qualifier)
__Detects in preparation blanks, results ≤10x contamination level (J+)
_/_Detects in field blanks (Note: Advisory condition only and no qualifier)

Field Blank ID: _____PASW-29B_____
Field Blank ID: _____

Comments/Qualified Results: Dissolved copper detected in field blank PASW-29B (collected 5/13/20) at 0.0012 mg/L, and result was confirmed by laboratory re-analysis. No qualification necessary (advisory condition only).

5. Lab Duplicates, Field Duplicates (Check all that apply)……... √ ☐

_/_Duplicate RPD ≤20% for waters (≤35% for soils) for results >5X CRDL
__Duplicate RPD >20% for waters (>35% for soils) for results >5X CRDL (J)
__Duplicate range is within ±CRDL (± 2X CRDL for soils) for results <5X CRDL (no qualifier)

Field Duplicate ID: _____PASW-19B_____
Field Duplicate ID: _____

Comments/Qualified Results: None.

Acceptable: YES NO

6. Laboratory Control Samples* (Check all that apply)……..… √ ☐

_/_LCS %R 70-130%: ACCEPTED
__LCS %R 40-69% or >130%, results >MDL: estimated (J-/J+)
__LCS %R 40-69% and results <MDL: estimated (UJ)
__LCS %R <40% and all results rejected (R/UR)
__LCS %R >150% and all results rejected (R)
*Lab Control Samples/Lab Control Sample Duplicates (LCS/LCSD)
*Lab Fortified Blanks (LFB)
*Blank Spike / Blank Spike Duplicates (BS/BSD)

Comments/Qualified Results: None.

7. Interference Checks (Check all that apply)…….. √ ☐

__ICS A/B Recoveries Acceptable
__Al, Ca, Fe, Mg sample concentrations > ICS concentrations
__ICS %R > 120%, results >IDL estimated (J)
__ICS %R 50-79%, results >IDL estimated (J)
__ICS %R 50-79%, results <IDL estimated (UJ)
__ICS %R <50%, results >IDL and <IDL rejected (R/UR)

Comments/Qualified Results: IC check is not required as part of Tier IIA Validation.

8. Matrix Spike Recovery (MS/MSD) (Check all that apply)……. √ ☐

_/_Spike %R with 75-125%: ACCEPTED
__MS and PDS %R 30-74%, results > MDL est. (J-), ND=(UJ)
__MS <75% and PDS >75%, results > MDL est. (J), ND=(UJ)
__ MS and PDS %R >125%, detects > MDL est. (J+)
__ MS >125% and PDS <125%, detects > MDL est. (J)
__MS and PDS %R <30% and <75%: results >MDL (J-) ND=(UR)
__Field blanks used for spike analysis?
__Post digest spk rqrd when %R <75, >125%, excpt Ag

Comments/Qualified Results: None.

Acceptable: YES NO

9. Method of Standard Addition (MSA) and Serial Dilutions (SD)….. √ ☐

__Analytical spike %R 85-115%
__Analytical spike %R 40-85%, results > IDL estimated (J)
__Analytical spike %R 10-40%, results <IDL estimated (UJ)
__Analytical spike %R <10%, results <IDL rejected (R)

__SD Analytes >50X MDL ?
__ SD % Diff < 10%
__ SD % Diff > 10%: J results >MDL, UJ for Non-detects

Comments/Qualified Results: NA

10. Detection Limits, Other QC…… √ ☐

WATER:			SOIL:	
Inorganics-	**Metals-**		**Metals-**	
__pH = 0.1 s.u.	__Al = 0.1 mg/L	__Cd = 0.01 mg/L	__ As = 1 mg/kg	__ = mg/kg
__TDS/TSS = 10 mg/L	_/_As = 0.001 mg/L	__Cr = 0.05 mg/L	__ Co = 1 mg/kg	__ = mg/kg
__Alkalinity = 4 mg/L	_/_Co = 0.0001 mg/L	__Pb = 0.05 mg/L	__ Cu = 1 mg/kg	__ = mg/kg
__Anions (i.e. Cl^-, SO_4^-) = 1 mg/L	/_Cu = 0.0003/0.0008mg/L	__Hg = 0.001 mg/L		
__Anions (i.e. F^-) = 0.1 mg/L	__Co (WTP) = 0.001 mg/L	__Ni = 0.05 mg/L		
__ DOC = 0.5 mg/L	__Cu (WTP) = 0.001 mg/L	__K = 1 mg/L		
__Nitrogen, Ammonia = 0.05 mg/L	__Fe = 0.03 mg/L	__Se = 0.001 mg/L		
__Phosphorus, Total = 0.005 mg/L	_/_Ca = 0.5 mg/L	__Si = 0.1 mg/L		
	_/_Mg = 0.5 mg/L	__Ag = 0.01 mg/L		
	_/_HARD-T = 0.5 mg/L	__Na = 1 mg/L		
	__Mn = 0.001 mg/L	__Zn = 0.01 mg/L		

Comments/Qualified Results: None.

11. Data Verification and Overall Assessment…… √ ☐

Comments/Qualified Results: See Table 2 for summary of qualifiers.

Table 1
Sample Collection and Analysis Summary
Blackbird Mine Sampling - May 2020

							Analysis		
SDG	**Field Identification**	**Collection Date & Time**	**Location**	**Lab Identification**	**Matrix**	**QC Samples**	**Alkalinity and/or Hardness (as CaCO3)**	**Dissolved Metals[1]**	**Total Metals[1]**
B20051568	PASW-11A	5/11/20 10:20	PASW-11A	B20051568-001	Aqueous	--	X	X	X
B20051568	PASW-09A	5/11/20 10:40	PASW-09A	B20051568-002	Aqueous	--	X	X	X
B20051568	PASW-05A	5/11/20 11:05	PASW-05A	B20051568-003	Aqueous	--	X	X	X
B20051568	PASW-04XA	5/11/20 11:25	PASW-04XA	B20051568-004	Aqueous	--	X	X	X
B20051568	PAWS-11B	5/11/20 14:15	PAWS-11B	B20051568-005	Aqueous	--	X	X	X
B20051568	PASW-09B	5/11/20 14:35	PASW-09B	B20051568-006	Aqueous	--	X	X	X
B20051568	PASW-19B	5/11/20 14:45	PASW-19B	B20051568-007	Aqueous	Field duplicate	X	X	X
B20051568	PASW-29B	5/11/20 14:55	PASW-29B	B20051568-008	Aqueous	Field blank	X	X	X
B20051568	PASW-05B	5/11/20 15:00	PASW-05B	B20051568-009	Aqueous	--	X	X	X
B20051568	PASW-04XB	5/11/20 15:20	PASW-04XB	B20051568-010	Aqueous	--	X	X	X
B20051568	PAWS-11B	5/12/20 16:00	PAWS-11B	B20051568-011	Aqueous	--	X	X	X
B20051568	PASW-09B	5/12/20 16:20	PASW-09B	B20051568-012	Aqueous	--	X	X	X
B20051568	PASW-05B	5/12/20 16:50	PASW-05B	B20051568-013	Aqueous	--	X	X	X
B20051568	PASW-04XB	5/12/20 17:10	PASW-04XB	B20051568-014	Aqueous	--	X	X	X
B20051568	PASW-11A	5/13/20 8:30	PASW-11A	B20051568-015	Aqueous	--	X	X	X
B20051568	PASW-09A	5/13/20 8:50	PASW-09A	B20051568-016	Aqueous	--	X	X	X
B20051568	PASW-05A	5/13/20 9:20	PASW-05A	B20051568-017	Aqueous	--	X	X	X
B20051568	PASW-04XA	5/13/20 9:40	PASW-04XA	B20051568-018	Aqueous	--	X	X	X
B20051568	PASW-11B	5/13/20 14:00	PASW-11B	B20051568-019	Aqueous	--	X	X	X
B20051568	PASW-09B	5/13/20 14:20	PASW-09B	B20051568-020	Aqueous	--	X	X	X
B20051568	PASW-19B	5/13/20 14:30	PASW-19B	B20051568-021	Aqueous	Field duplicate	X	X	X
B20051568	PASW-29B	5/13/20 14:40	PASW-29B	B20051568-022	Aqueous	Field blank	X	X	X
B20051568	PASW-05B	5/13/20 15:00	PASW-05B	B20051568-023	Aqueous	--	X	X	X
B20051568	PASW-04XB	5/13/20 15:20	PASW-04XB	B20051568-024	Aqueous	--	X	X	X
B20051568	PASW-11A	5/14/20 8:35	PASW-11A	B20051568-025	Aqueous	--	X	X	X
B20051568	PASW-09A	5/14/20 8:55	PASW-09A	B20051568-026	Aqueous	--	X	X	X
B20051568	PASW-05A	5/14/20 9:30	PASW-05A	B20051568-027	Aqueous	--	X	X	X
B20051568	PASW-04XA	5/14/20 9:50	PASW-04XA	B20051568-028	Aqueous	--	X	X	X
B20051568	PASW-11B	5/14/20 14:00	PASW-11B	B20051568-029	Aqueous	--	X	X	X
B20051568	PASW-09B	5/14/20 14:20	PASW-09B	B20051568-030	Aqueous	--	X	X	X
B20051568	PASW-19B	5/14/20 14:30	PASW-19B	B20051568-031	Aqueous	Field duplicate	X	X	X
B20051568	PASW-29B	5/14/20 14:40	PASW-29B	B20051568-032	Aqueous	Field blank	X	X	X
B20051568	PASW-05B	5/14/20 15:10	PASW-05B	B20051568-033	Aqueous	--	X	X	X
B20051568	PASW-04XB	5/14/20 15:30	PASW-04XB	B20051568-034	Aqueous	--	X	X	X
B20051568	PASW-34XB	5/14/20 15:40	PASW-34XB	B20051568-035	Aqueous	FCS	X	X	X
B20051568	PASW-05A	5/12/20 14:30	PASW-05A	B20051568-036	Aqueous	--	X	X	X
B20051568	PASW-04XA	5/12/20 14:40	PASW-04XA	B20051568-037	Aqueous	--	X	X	X

[1]See laboratory data package for list of metals analyzed

Notes:
All analyses performed by Energy Laboratories

Abbreviations:
SDG - Sample Delivery Group
FCS - Field Control Sample

Table 2
Qualifier Summary Table
Blackbird Mine Sampling - May 2020

SDG	Sample Name	Constituent	New Result	New RL	Qualifier	Reason	PDF Page Number
None							

Abbreviations
RL - Reporting Limit
SDG - Sample Delivery Group

METALS & INORGANIC / Tier I & II Data Validation Summary Checklist

GOLDER PROJECT #: 943-1595.011 ph 3100	SITE: BLACKBIRD MINE SITE, SALMON, ID
LABORATORY: ENERGY LABORATORY, BILLINGS	SDG: B20052141

SAMPLES (Total # =)	COLLECTED (Date/Time)	MATRIX
See Table 1		

DATA ASSESSMENT SUMMARY

REVIEW ITEM	ICP/ AES EPA200.7	ICP/ MS EPA200.8	TDS A2540C TSS A2540D	Hardness A2340B Alkalinity A2320B	Anions (ex Cl^-, F^-, SO_4^{-2}) E300.0	OTHER pH A4500-H-B DOC A5310C
1. Data Package Completeness	O	O	O	O	O	O
2. Holding Temperatures & Times	Θ	Θ	Θ	Θ	Θ	X
3. Calibration	O	O	O	O	O	O
4. Lab Blanks, Field Blanks	X	Θ	O	Θ	O	O
5. Lab Duplicate, Field Duplicate RPD	Θ	Θ	Θ	Θ	Θ	Θ
6. LCS, LFB, Blank Spike	O	O	O	O	O	O
7. Interference Checks	NA	NA	NA	NA	NA	NA
8. Matrix Spike Recovery (MS/MSD)	Θ	Θ	Θ	Θ	Θ	Θ
9. MSA and Serial Dilutions	NA	NA	NA	NA	NA	NA
10. Detection Limits, Other QC	O	Θ	O	Θ	O	O
11. Data Verification, Overall Summary	O	O	O	O	O	O

O = Data had no problems Θ = Problems, but do not affect data NA = Not applicable to this data set.
X = Data qualified due to minor problems [typically estimated data (J/UJ)].
M = Data qualified due to major problems [typically more than 50% qualified (J/UJ)].
Z = Data unacceptable [typically data rejected (R).

	Acceptable: YES	NO
1. Date Package Completeness (Check if present)……	√	☐

_/_Case narrative
_/_Chain of Custody
_/_Sample Results
_/_ICV/CCV Results
_/_Blank Results
__o _ICP Interference Check Results
_/_Spike Recovery Results

_/_Duplicate Results
_/ _LCS Results
_o _Standard Addition Results
_o _ICP Serial Dilution
_o _Instrument Det. Limits
__Other_____

/ Acceptable
x Absent
o Not required

Comments/Qualified Results: The case narrative states tests associated with analyst identified as ELI-CA were subcontracted to Energy Laboratories in Casper, Wyoming.

Validated by: Annie Muehlfarth **Date:** 06/30/2020
Reviewed by: Samantha DiCenso **Date:** 07/01/2020

Acceptable: YES NO

2. Holding Temperatures & Times (Check all that apply)…… √ ☐

_x_ Recommended Hold Temp. of Cool, ≤6°C met (√ - Yes / x – No)
_/_ TDS / TSS analysis completed in <7 days from collection
_/_ Acidity / Alkalinity completed in <14 days from collection
_/_ICP metals completed in <6 months from collection
_/_Anions (Cl^-, F^-, SO_4^-), DOC analyzed in <28 days from collection
_x_pH analysis completed in <15 minutes from collection

Comments/Qualified Results: Cooler temperature upon receipt was recorded at 18.5°C (no ice) for one of the coolers. Using professional judgement and following project-specific requirements qualification of metals results was not required because associated samples were preserved to pH<2. pH analysis was not completed within 15 minutes of sample collection; therefore, results are qualified as estimated values.

3. Calibrations (Check all that apply)…….. √ ☐

_/_ICV/CCV %R for ICP/AA, 90%-110%, acceptable
__ICV/CCV %R for ICP/AA, 75%-89% or 111%-125%, results estimated (J/UJ)
__ICV/CCV %R for ICP/AA, <75% or >125%, reject positive results (R)

Comments/Qualified Results: None.

4. Lab Blanks, Field Blanks (Check all that apply)…….. √ ☐

__Detects reported in ICB/CCB list:
_/_ Detects in preparation blanks, results >10x contamination level or ND (no qualifier)
_/__Detects in preparation blanks, results ≤10x contamination level (J+)
_/_Detects in field blanks (Note: Advisory condition only and no qualifier)

Field Blank ID: BDSW-23B (05/25/2020)
Field Blank ID: BDSW-23B (05/26/2020)

Comments/Qualified Results: Hardness as CaCO3 (2.6 mg/L) and Total Calcium (1.0 mg/L) detected in field blank BDSW-23B collected on 05/25/2020 (advisory condition only, no qualification necessary).
Hardness as CaCO3 (0.5 mg/L) was detected in field blank BDSW-23B collected on 05/26/2020 (advisory condition only, no qualification necessary).
MB-145064 (Method E200.7 in batch 145064) detection of calcium (0.2 mg/L), detections in samples are greater than 10x the blank result or non-detect, no qualification necessary.
MB-145433 (Method E200.7 in batch 145433) detection of calcium (0.2 mg/L), some qualification necessary.
MB-6500DIS200601A (Method E200.7 in batch R342848) detection of calcium (0.09 mg/L) detections in samples are greater than 10x the blank result, no qualification necessary.
MB LRB (Method E200.8 in batch R342919) detection of copper (0.002 mg/L) detections in samples are greater than 10x the blank result or non-detect, no qualification necessary.
MB LRB (Method E200.8 in batch R342994) detection of copper (0.0004 mg/L) detections in samples are greater than 10x the blank result or non-detect, no qualification necessary.

Acceptable: YES NO

5. Lab Duplicates, Field Duplicates (Check all that apply)……... √ ☐

_/_Duplicate RPD ≤20% for waters (≤35% for soils) for results >5X CRDL — Field Duplicate ID: BDSW-13B (05/25/2020)
__Duplicate RPD >20% for waters (>35% for soils) for results >5X CRDL (J) — Field Duplicate ID: BDSW-13B (05/26/2020)
__Duplicate range is within ±CRDL (± 2X CRDL for soils) for results <5X CRDL (no qualifier)

Comments/Qualified Results: Lab duplicates associated with batches 145060 and 145062 were outside limits; however, these duplicates were associated with unrelated samples.

6. Laboratory Control Samples* (Check all that apply)……..… √ ☐

_/_LCS %R 70-130%: ACCEPTED
__LCS %R 40-69% or >130%, results >MDL: estimated (J-/J+)
__LCS %R 40-69% and results <MDL: estimated (UJ)
__LCS %R <40% and all results rejected (R/UR)
__LCS %R >150% and all results rejected (R)
*Lab Control Samples/Lab Control Sample Duplicates (LCS/LCSD)
*Lab Fortified Blanks (LFB)
*Blank Spike / Blank Spike Duplicates (BS/BSD)

Comments/Qualified Results: None.

7. Interference Checks (Check all that apply)…….. √ ☐

_/_ICS A/B Recoveries Acceptable
__Al, Ca, Fe, Mg sample concentrations > ICS concentrations
__ICS %R > 120%, results >IDL estimated (J)
__ICS %R 50-79%, results >IDL estimated (J)
__ICS %R 50-79%, results <IDL estimated (UJ)
__ICS %R <50%, results >IDL and <IDL rejected (R/UR)

Comments/Qualified Results: IC check is not required as part of Tier IIA Validation.

8. Matrix Spike Recovery (MS/MSD) (Check all that apply)……. √ ☐

_/_Spike %R with 75-125%: ACCEPTED
__MS and PDS %R 30-74%, results > MDL est. (J-), ND=(UJ)
__MS <75% and PDS >75%, results > MDL est. (J), ND=(UJ)
__ MS and PDS %R >125%, detects > MDL est. (J+)
__ MS >125% and PDS <125%, detects > MDL est. (J)
__MS and PDS %R <30% and <75%: results >MDL (J-) ND=(UR)
__Field blanks used for spike analysis?
__Post digest spk rqrd when %R <75, >125%, excpt Ag

Comments/Qualified Results: MS/MSD samples in batch C_R259013 had recovery outside limits; however, this MS/MSD is associated with an unrelated sample.

Acceptable: YES NO

9. Method of Standard Addition (MSA) and Serial Dilutions (SD)….. √ ☐

__Analytical spike %R 85-115%
__Analytical spike %R 40-85%, results > IDL estimated (J)
__Analytical spike %R 10-40%, results <IDL estimated (UJ)
__Analytical spike %R <10%, results <IDL rejected (R)

__SD Analytes >50X MDL ?
__ SD % Diff < 10%
__ SD % Diff > 10%: J results >MDL, UJ for Non-detects

Comments/Qualified Results: NA

10. Detection Limits, Other QC…… √ ☐

WATER:

Inorganics-	Metals-	
_/_ pH = 0.1 s.u.	__Al = 0.1 mg/L	__Cd = 0.01 mg/L
_/_ TDS/TSS = 10 mg/L	_/_ As = 0.001 mg/L	__Cr = 0.05 mg/L
_/_ Alkalinity = 4 mg/L	_/_ Co = 0.0001 mg/L	__Pb = 0.05 mg/L
_/_ Anions (i.e. Cl^-, SO_4^-) = 1 mg/L	x Cu = 0.0003/0.0008mg/L	__Hg = 0.001 mg/L
__Anions (i.e. F^-) = 0.1 mg/L	__Co (WTP) = 0.001 mg/L	__Ni = 0.05 mg/L
_/_ DOC = 0.5 mg/L	__Cu (WTP) = 0.001 mg/L	_/_ K = 1 mg/L
__Nitrogen, Ammonia = 0.05 mg/L	_/_ Fe = 0.03 mg/L	__Se = 0.001 mg/L
__Phosphorus, Total = 0.005 mg/L	_/_ Ca = 0.5 mg/L	__Si = 0.1 mg/L
	_/_ Mg = 0.5 mg/L	__Ag = 0.01 mg/L
	_x_ HARD-T = 0.5 mg/L	_/_ Na = 1 mg/L
	__Mn = 0.001 mg/L	__Zn = 0.01 mg/L

SOIL:

Metals-	
__ As = 1 mg/kg	__ = mg/kg
__ Co = 1 mg/kg	__ = mg/kg
__ Cu = 1 mg/kg	__ = mg/kg

Comments/Qualified Results: Total Copper was analyzed with reporting limit 0.0004 mg/L in in some samples (BTSW-1.6, BTSW-01, SFSW-04, SFSW-02, SFSW-01, BDSW-04A, BDSW-03A, PASW-05, BDSW-01A, BDSW-31B).
Hardness as CaCO3 was analyzed with reporting limit 1 mg/L in some samples (SFSW-02, SFSW-01, BDSW-03A, BDSW-01A).

11. Data Verification and Overall Assessment…… √ ☐

Comments/Qualified Results: See Table 2 for summary of qualifiers.

Table 1
Sample Collection and Analysis Summary
Blackbird Mine Sampling - May 2020

							Analysis						
SDG	**Field Identification**	**Collection Date & Time**	**Location**	**Lab Identification**	**Matrix**	**QC Samples**	**Anions**	**Alkalinity and/or Hardness (as CaCO3)**	**Dissolved Metals[1]**	**Total Metals[1]**	**Total Suspended Solids**	**Total Dissolved Solids**	**Other (pH, DOC)**
B20052141	BDSW-04A	5/25/20 9:40	BDSW-04A	B20052141-001	Aqueous	--		X	X	X			
B20052141	BDSW-03A	5/25/20 10:00	BDSW-03A	B20052141-002	Aqueous	--		X	X	X			
B20052141	BDSW-01A	5/25/20 11:20	BDSW-01A	B20052141-003	Aqueous	--		X	X	X			
B20052141	BDSW-04B	5/25/20 13:00	BDSW-04B	B20052141-004	Aqueous	--		X	X	X			
B20052141	BDSW-03B	5/25/20 13:20	BDSW-03B	B20052141-005	Aqueous	--		X	X	X			
B20052141	BDSW-13B	5/25/20 13:30	BDSW-03B	B20052141-006	Aqueous	Field Duplicate		X	X	X			
B20052141	BDSW-23B	5/25/20 13:40	BDSW-03B	B20052141-007	Aqueous	Field Blank		X	X	X			
B20052141	BBSW-01a	5/25/20 14:10	BBSW-01a	B20052141-008	Aqueous	--			X	X	X		
B20052141	PASW-09	5/25/20 14:25	PASW-09	B20052141-009	Aqueous	--			X	X	X		
B20052141	BDSW-01B	5/25/20 15:00	BDSW-01B	B20052141-010	Aqueous	--		X	X	X			
B20052141	BTSW-1.6	5/26/20 9:30	BTSW-1.6	B20052141-011	Aqueous	--	X	X	X	X	X		
B20052141	BTSW-01	5/26/20 9:55	BTSW-01	B20052141-012	Aqueous	--	X	X	X	X	X		
B20052141	SFSW-04	5/26/20 10:15	SFSW-04	B20052141-013	Aqueous	--	X	X	X	X	X		
B20052141	SFSW-02	5/26/20 10:35	SFSW-02	B20052141-014	Aqueous	--	X	X	X	X	X	X	X
B20052141	SFSW-01	5/26/20 10:50	SFSW-01	B20052141-015	Aqueous	--	X	X	X	X	X	X	X
B20052141	BDSW-04A	5/26/20 11:10	BDSW-04A	B20052141-016	Aqueous	--	X	X	X	X	X		
B20052141	BDSW-03A	5/26/20 11:45	BDSW-03A	B20052141-017	Aqueous	--	X	X	X	X	X	X	X
B20052141	PASW-05	5/26/20 13:50	PASW-05	B20052141-018	Aqueous	--	X	X	X	X	X		
B20052141	BDSW-01A	5/26/20 14:10	BDSW-01A	B20052141-019	Aqueous	--	X	X	X	X	X	X	X
B20052141	BDSW-04B	5/26/20 15:40	BDSW-04B	B20052141-020	Aqueous	--		X	X	X			
B20052141	BDSW-03B	5/26/20 16:00	BDSW-03B	B20052141-021	Aqueous	--		X	X	X			
B20052141	BDSW-13B	5/26/20 16:10	BDSW-03B	B20052141-022	Aqueous	Field Duplicate		X	X	X			
B20052141	BDSW-23B	5/26/20 16:20	BDSW-03B	B20052141-023	Aqueous	Field Blank		X	X	X			
B20052141	BDSW-01B	5/26/20 17:20	BDSW-01B	B20052141-024	Aqueous	--		X	X	X			
B20052141	BDSW-31B	5/26/20 17:30	BDSW-01B	B20052141-025	Aqueous	Field Control Sample		X	X	X			

[1]See laboratory data package for list of metals analyzed

Notes:
All analyses performed by Energy Laboratories

Abbreviations:
DOC - Dissolved Organic Carbon
SDG - Sample Delivery Group

Table 2
Qualifier Summary Table
Blackbird Mine Sampling - May 2020

SDG	Sample Name	Constituent	New Result	New RL	Qualifier	Reason	PDF Page Number
B20052141	SFSW-02	pH	8.0	0.1	J	Analyzed outside hold time	18
B20052141	SFSW-01	pH	8.0	0.1	J	Analyzed outside hold time	19
B20052141	BDSW-03A	pH	7.5	0.1	J	Analyzed outside hold time	21
B20052141	BDSW-01A	pH	7.6	0.1	J	Analyzed outside hold time	23
B20052141	BDSW-23B	Total Calcium	1.0	0.5	J+	Detected in method blank	11

Abbreviations
RL - Reporting Limit
SDG - Sample Delivery Group

Qualifier Definitions
J+ Result is an estimated value (estimated high)

METALS & INORGANIC / Tier I & II Data Validation Summary Checklist

GOLDER PROJECT #: 943-1595.011 ph 3100	SITE: BLACKBIRD MINE SITE, SALMON, ID
LABORATORY: ENERGY LABORATORY, BILLINGS	SDG: B20052240

SAMPLES (Total # =)	COLLECTED (Date/Time)	MATRIX
See Table 1		

DATA ASSESSMENT SUMMARY

REVIEW ITEM	ICP/ AES EPA200.7	ICP/ MS EPA200.8	TDS A2540C TSS A2540D	Hardness A2340B Alkalinity A2320B	Anions (ex Cl^-, F^-, SO_4^{-3}) E300.0	OTHER pH A4500-H-B DOC A5310C
1. Data Package Completeness	Θ	Θ	NA	Θ	NA	NA
2. Holding Temperatures & Times	O	O	NA	O	NA	NA
3. Calibration	O	O	NA	O	NA	NA
4. Lab Blanks, Field Blanks	O	Θ	NA	O	NA	NA
5. Lab Duplicate, Field Duplicate RPD	O	O	NA	O	NA	NA
6. LCS, LFB, Blank Spike	O	O	NA	O	NA	NA
7. Interference Checks	NA	NA	NA	NA	NA	NA
8. Matrix Spike Recovery (MS/MSD)	O	O	NA	O	NA	NA
9. MSA and Serial Dilutions	NA	NA	NA	NA	NA	NA
10. Detection Limits, Other QC	O	Θ	NA	O	O	NA
11. Data Verification, Overall Summary	O	O	NA	O	NA	NA

O = Data had no problems Θ = Problems, but do not affect data NA = Not applicable to this data set.
X = Data qualified due to minor problems [typically estimated data (J/UJ)].
M = Data qualified due to major problems [typically more than 50% qualified (J/UJ)].
Z = Data unacceptable [typically data rejected (R).

	Acceptable: YES	NO
1. Date Package Completeness (Check if present)……	√	☐

_x_ Case narrative
_/_ Chain of Custody
_/_ Sample Results
_/_ ICV/CCV Results
_/_ Blank Results
_o_ ICP Interference Check Results
_/_ Spike Recovery Results
_/_ Duplicate Results
_/_ LCS Results
_o_ Standard Addition Results
_o_ ICP Serial Dilution
_o_ Instrument Det. Limits
__Other_____

/ Acceptable
x Absent
o Not required

Comments/Qualified Results: No case narrative provided.

Validated by: Annie Muehlfarth **Date:** 06/30/2020
Reviewed by: Samantha DiCenso **Date:** 07/01/2020

Acceptable: YES NO

2. Holding Temperatures & Times (Check all that apply)…… √ ☐

_/_Recommended Hold Temp. of Cool, ≤6°C met (√ - Yes / x – No)
_/_TDS / TSS analysis completed in <7 days from collection
__Acidity / Alkalinity completed in <14 days from collection
_/_ICP metals completed in <6 months from collection
__Anions (Cl^-, F^-, SO_4^-), DOC analyzed in <28 days from collection
__pH analysis completed in <15 minutes from collection

Comments/Qualified Results: None.

3. Calibrations (Check all that apply)…….. √ ☐

_/_ICV/CCV %R for ICP/AA, 90%-110%, acceptable
__ICV/CCV %R for ICP/AA, 75%-89% or 111%-125%, results estimated (J/UJ)
__ICV/CCV %R for ICP/AA, <75% or >125%, reject positive results (R)

Comments/Qualified Results: None.

4. Lab Blanks, Field Blanks (Check all that apply)…….. √ ☐

__Detects reported in ICB/CCB list:
__ Detects in preparation blanks, results >10x contamination level or ND (no qualifier)
__Detects in preparation blanks, results ≤10x contamination level (J+)
_/_Detects in field blanks (Note: Advisory condition only and no qualifier)

Field Blank ID: MW-26A
Field Blank ID: _____

Comments/Qualified Results: Cobalt (0.0002 mg/L) was detected in field blank MW-26A (advisory condition only, no qualification necessary).

5. Lab Duplicates, Field Duplicates (Check all that apply)……... √ ☐

_/_Duplicate RPD ≤20% for waters (≤35% for soils) for results >5X CRDL
__Duplicate RPD >20% for waters (>35% for soils) for results >5X CRDL (J)
__Duplicate range is within ±CRDL (± 2X CRDL for soils) for results <5X CRDL (no qualifier)

Field Duplicate ID: MW-16A
Field Duplicate ID: _____

Comments/Qualified Results: None.

Acceptable: YES NO

6. Laboratory Control Samples* (Check all that apply)……..… √ ☐

_/_LCS %R 70-130%: ACCEPTED
__LCS %R 40-69% or >130%, results >MDL: estimated (J-/J+)
__LCS %R 40-69% and results <MDL: estimated (UJ)
__LCS %R <40% and all results rejected (R/UR)
__LCS %R >150% and all results rejected (R)
*Lab Control Samples/Lab Control Sample Duplicates (LCS/LCSD)
*Lab Fortified Blanks (LFB)
*Blank Spike / Blank Spike Duplicates (BS/BSD)

Comments/Qualified Results: None.

7. Interference Checks (Check all that apply)…….. √ ☐

__ICS A/B Recoveries Acceptable
__Al, Ca, Fe, Mg sample concentrations > ICS concentrations
__ICS %R > 120%, results >IDL estimated (J)
__ICS %R 50-79%, results >IDL estimated (J)
__ICS %R 50-79%, results <IDL estimated (UJ)
__ICS %R <50%, results >IDL and <IDL rejected (R/UR)

Comments/Qualified Results: IC check is not required as part of Tier IIA Validation.

8. Matrix Spike Recovery (MS/MSD) (Check all that apply)……. √ ☐

_/_Spike %R with 75-125%: ACCEPTED
__MS and PDS %R 30-74%, results > MDL est. (J-), ND=(UJ)
__MS <75% and PDS >75%, results > MDL est. (J), ND=(UJ)
__ MS and PDS %R >125%, detects > MDL est. (J+)
__ MS >125% and PDS <125%, detects > MDL est. (J)
__MS and PDS %R <30% and <75%: results >MDL (J-) ND=(UR)
__Field blanks used for spike analysis?
__Post digest spk rqrd when %R <75, >125%, excpt Ag

Comments/Qualified Results: None.

Acceptable: YES NO

9. Method of Standard Addition (MSA) and Serial Dilutions (SD)….. √ ☐

__Analytical spike %R 85-115%
__Analytical spike %R 40-85%, results > IDL estimated (J)
__Analytical spike %R 10-40%, results <IDL estimated (UJ)
__Analytical spike %R <10%, results <IDL rejected (R)

__SD Analytes >50X MDL ?
__ SD % Diff < 10%
__ SD % Diff > 10%: J results >MDL, UJ for Non-detects

Comments/Qualified Results: NA

10. Detection Limits, Other QC…… √ ☐

WATER:

Inorganics-	**Metals-**	
__pH = 0.1 s.u.	__Al = 0.1 mg/L	__Cd = 0.01 mg/L
/_TDS/TSS = 10 mg/L	/_As = 0.001 mg/L	__Cr = 0.05 mg/L
__Alkalinity = 4 mg/L	x Co = 0.0001 mg/L	__Pb = 0.05 mg/L
__Anions (i.e. Cl^-, SO_4^{2-}) = 1 mg/L	x Cu = 0.0003/0.0008mg/L	__Hg = 0.001 mg/L
__Anions (i.e. F^-) = 0.1 mg/L	__Co (WTP) = 0.001 mg/L	__Ni = 0.05 mg/L
__DOC = 0.5 mg/L	__Cu (WTP) = 0.001 mg/L	__K = 1 mg/L
__Nitrogen, Ammonia = 0.05 mg/L	/_Fe = 0.03 mg/L	__Se = 0.001 mg/L
__Phosphorus, Total = 0.005 mg/L	/_Ca = 0.5 mg/L	__Si = 0.1 mg/L
	/_Mg = 0.5 mg/L	__Ag = 0.01 mg/L
	/_HARD-T = 0.5 mg/L	__Na = 1 mg/L
	__Mn = 0.001 mg/L	__Zn = 0.01 mg/L

SOIL:

Metals-	
__As = 1 mg/kg	__ = mg/kg
__Co = 1 mg/kg	__ = mg/kg
__Cu = 1 mg/kg	__ = mg/kg

Comments/Qualified Results: Cobaltwas analyzed with reporting limit 0.0002 mg/L (MW-06A), 0.0004 mg/L (MW-05A, MW-08A, MW-16A), 0.0001 mg/L, results were greater than the reporting limit, no qualification necessary.
Copper was analyzed with reporting limit 0.0005 mg/L (MW-03A, MW-07A), 0.003 mg/L (MW-06A), 0.005 mg/L (MW-05A, MW-08A, MW-16A), results were greater than the reporting limit or non-detect, no qualification necessary.

11. Data Verification and Overall Assessment…… √ ☐

Comments/Qualified Results: None.

Table 1
Sample Collection and Analysis Summary
Blackbird Mine Sampling - May 2020

							Analysis			
SDG	**Field Identification**	**Collection Date & Time**	**Location**	**Lab Identification**	**Matrix**	**QC Samples**	**Total Dissolved Solids**	**Dissolved Metals[1]**	**Total Metals[1]**	**Hardness (as CaCO3)**
B20052240	MW-03A	5/27/20 13:30	MW-03A	B20052240-001	Aqueous	--	X	X		
B20052240	MW-07A	5/27/20 12:45	MW-07A	B20052240-002	Aqueous	--	X	X		
B20052240	MW-06A	5/27/20 14:25	MW-06A	B20052240-003	Aqueous	--	X	X		
B20052240	MW-05A	5/27/20 16:15	MW-05A	B20052240-004	Aqueous	--	X	X		
B20052240	MW-08A	5/27/20 15:15	MW-08A	B20052240-005	Aqueous	--	X	X		
B20052240	MW-16A	5/27/20 14:35	MW-06A	B20052240-006	Aqueous	Field Duplicate	X	X		
B20052240	MW-26A	5/27/20 14:45	MW-06A	B20052240-007	Aqueous	Field Blank	X	X		
B20052240	MW-36A	5/27/20 14:55	MW-06A	B20052240-008	Aqueous	Field Control Sample		X	X	X

[1]See laboratory data package for list of metals analyzed

Notes:
All analyses performed by Energy Laboratories

Abbreviations:
SDG - Sample Delivery Group

Table 2
Qualifier Summary Table
Blackbird Mine Sampling - May 2020

SDG	Sample Name	Constituent	New Result	New RL	Qualifier	Reason	PDF Page Number
None							

Abbreviations
RL - Reporting Limit
SDG - Sample Delivery Group

METALS & INORGANIC / Tier I & II Data Validation Summary Checklist

GOLDER PROJECT #: 943-1595.011 ph 3100	SITE: BLACKBIRD MINE SITE, SALMON, ID
LABORATORY: ENERGY LABORATORY, BILLINGS	SDG: B20052260

SAMPLES (Total # =)	COLLECTED (Date/Time)	MATRIX
See Table 1		

DATA ASSESSMENT SUMMARY

REVIEW ITEM	ICP/ AES EPA200.7	ICP/ MS EPA200.8	TDS A2540C TSS A2540D	Hardness A2340B Alkalinity A2320B	Anions (ex Cl^-, F^-, SO_4^{-3}) E300.0	OTHER pH A4500-H-B DOC A5310C
1. Data Package Completeness	NA	Θ	NA	NA	NA	NA
2. Holding Temperatures & Times	NA	Θ	NA	NA	NA	NA
3. Calibration	NA	O	NA	NA	NA	NA
4. Lab Blanks, Field Blanks	NA	Θ	NA	NA	NA	NA
5. Lab Duplicate, Field Duplicate RPD	NA	O	NA	NA	NA	NA
6. LCS, LFB, Blank Spike	NA	O	NA	NA	NA	NA
7. Interference Checks	NA	NA	NA	NA	NA	NA
8. Matrix Spike Recovery (MS/MSD)	NA	O	NA	NA	NA	NA
9. MSA and Serial Dilutions	NA	NA	NA	NA	NA	NA
10. Detection Limits, Other QC	NA	Θ	NA	NA	NA	NA
11. Data Verification, Overall Summary	NA	O	NA	NA	NA	NA

O = Data had no problems Θ = Problems, but do not affect data NA = Not applicable to this data set.
X = Data qualified due to minor problems [typically estimated data (J/UJ)].
M = Data qualified due to major problems [typically more than 50% qualified (J/UJ)].
Z = Data unacceptable [typically data rejected (R).

Acceptable: YES NO

1. Date Package Completeness (Check if present)…… √ ☐

x _Case narrative
/_Chain of Custody
/_Sample Results
_/_ICV/CCV Results
_/_Blank Results
__o _ICP Interference Check Results
_/_Spike Recovery Results

_o_Duplicate Results
_/_LCS Results
_o_Standard Addition Results
_o_ICP Serial Dilution
_o_Instrument Det. Limits
__Other_____

/ Acceptable
x Absent
o Not required

Comments/Qualified Results: No case narrative provided.

Validated by: Annie Muehlfarth **Date:** 07/01/2020
Reviewed by: Samantha DiCenso **Date:** 07/01/2020

METALS & INORGANIC / Tier I & II Data Validation Summary Checklist

Acceptable: YES NO

2. Holding Temperatures & Times (Check all that apply)…… √ ☐

_x_Recommended Hold Temp. of Cool, ≤6°C met (√ - Yes / x – No)
__TDS / TSS analysis completed in <7 days from collection
__Acidity / Alkalinity completed in <14 days from collection
_/_ICP metals completed in <6 months from collection
__Anions (Cl^-, F^-, SO_4^-), DOC analyzed in <28 days from collection
__pH analysis completed in <15 minutes from collection

Comments/Qualified Results: The cooler temperature upon receipt was recorded at 19.1°C (no ice). Using professional judgement and following project-specific requirements qualification of metals results was not required because the samples were preserved to pH<2.

3. Calibrations (Check all that apply)…….. √ ☐

_/_ICV/CCV %R for ICP/AA, 90%-110%, acceptable
__ICV/CCV %R for ICP/AA, 75%-89% or 111%-125%, results estimated (J/UJ)
__ICV/CCV %R for ICP/AA, <75% or >125%, reject positive results (R)

Comments/Qualified Results: None.

4. Lab Blanks, Field Blanks (Check all that apply)…….. √ ☐

__Detects reported in ICB/CCB list: Field Blank ID: _____
_/_ Detects in preparation blanks, results >10x contamination level or ND (no qualifier) Field Blank ID: _____
__Detects in preparation blanks, results ≤10x contamination level (J+)
__Detects in field blanks (Note: Advisory condition only and no qualifier)

Comments/Qualified Results: MB: LRB (Method E200.8 in batch R342971) detection of copper (0.0006 mg/L), no qualification necessary.

5. Lab Duplicates, Field Duplicates (Check all that apply)……... √ ☐

__Duplicate RPD ≤20% for waters (≤35% for soils) for results >5X CRDL Field Duplicate ID: _____
__Duplicate RPD >20% for waters (>35% for soils) for results >5X CRDL (J) Field Duplicate ID: _____
__Duplicate range is within ±CRDL (± 2X CRDL for soils) for results <5X CRDL (no qualifier)

Comments/Qualified Results: No field duplicates were collected, no laboratory duplicates were analyzed.

Acceptable: YES NO

6. Laboratory Control Samples* (Check all that apply)……..… √ ☐

_/_LCS %R 70-130%: ACCEPTED
__LCS %R 40-69% or >130%, results >MDL: estimated (J-/J+)
__LCS %R 40-69% and results <MDL: estimated (UJ)
__LCS %R <40% and all results rejected (R/UR)
__LCS %R >150% and all results rejected (R)
*Lab Control Samples/Lab Control Sample Duplicates (LCS/LCSD)
*Lab Fortified Blanks (LFB)
*Blank Spike / Blank Spike Duplicates (BS/BSD)

Comments/Qualified Results: None.

7. Interference Checks (Check all that apply)…….. √ ☐

__ICS A/B Recoveries Acceptable
__Al, Ca, Fe, Mg sample concentrations > ICS concentrations
__ICS %R > 120%, results >IDL estimated (J)
__ICS %R 50-79%, results >IDL estimated (J)
__ICS %R 50-79%, results <IDL estimated (UJ)
__ICS %R <50%, results >IDL and <IDL rejected (R/UR)

Comments/Qualified Results: IC check is not required as part of Tier IIA Validation.

8. Matrix Spike Recovery (MS/MSD) (Check all that apply)……. √ ☐

_/_Spike %R with 75-125%: ACCEPTED
__MS and PDS %R 30-74%, results > MDL est. (J-), ND=(UJ)
__MS <75% and PDS >75%, results > MDL est. (J), ND=(UJ)
__ MS and PDS %R >125%, detects > MDL est. (J+)
__ MS >125% and PDS <125%, detects > MDL est. (J)
__MS and PDS %R <30% and <75%: results >MDL (J-) ND=(UR)
__Field blanks used for spike analysis?
__Post digest spk rqrd when %R <75, >125%, excpt Ag

Comments/Qualified Results: None.

Acceptable: YES NO

9. Method of Standard Addition (MSA) and Serial Dilutions (SD)….. √ ☐

__Analytical spike %R 85-115%
__Analytical spike %R 40-85%, results > IDL estimated (J)
__Analytical spike %R 10-40%, results <IDL estimated (UJ)
__Analytical spike %R <10%, results <IDL rejected (R)

__SD Analytes >50X MDL ?
__ SD % Diff < 10%
__ SD % Diff > 10%: J results >MDL, UJ for Non-detects

Comments/Qualified Results: NA

10. Detection Limits, Other QC…… √ ☐

WATER:

Inorganics-	Metals-	
__pH = 0.1 s.u.	__Al = 0.1 mg/L	__Cd = 0.01 mg/L
__TDS/TSS = 10 mg/L	__As = 0.001 mg/L	__Cr = 0.05 mg/L
__Alkalinity = 4 mg/L	_x_Co = 0.0001 mg/L	__Pb = 0.05 mg/L
__Anions (i.e. Cl^-, SO_4^{--}) = 1 mg/L	x Cu = 0.0003/0.0008mg/L	__Hg = 0.001 mg/L
__Anions (i.e. F^-) = 0.1 mg/L	__Co (WTP) = 0.001 mg/L	__Ni = 0.05 mg/L
__ DOC = 0.5 mg/L	__Cu (WTP) = 0.001 mg/L	__K = 1 mg/L
__Nitrogen, Ammonia = 0.05 mg/L	_/_ Fe = 0.03 mg/L	__Se = 0.001 mg/L
__Phosphorus, Total = 0.005 mg/L	__Ca = 0.5 mg/L	__Si = 0.1 mg/L
	__Mg = 0.5 mg/L	__Ag = 0.01 mg/L
	__HARD-T = 0.5 mg/L	__Na = 1 mg/L
	__Mn = 0.001 mg/L	__Zn = 0.01 mg/L

SOIL:

Metals-	
__ As = 1 mg/kg	__ = mg/kg
__ Co = 1 mg/kg	__ = mg/kg
__ Cu = 1 mg/kg	__ = mg/kg

Comments/Qualified Results: Total and dissolved Cobalt was analyzed with reporting limit 0.001 mg/L, results were greater than the reporting limit, no qualification necessary. Total copper was analyzed with reporting limit 0.001 mg/L, results were greater than the reporting limit, no qualification necessary.

11. Data Verification and Overall Assessment…… √ ☐

Comments/Qualified Results: None.

Table 1
Sample Collection and Analysis Summary
Blackbird Mine Sampling - May 2020

							Analysis	
SDG	**Field Identification**	**Collection Date & Time**	**Location**	**Lab Identification**	**Matrix**	**QC Samples**	**Dissolved Metals[1]**	**Total Metals[1]**
B20052260	WTP-C	5/27/20 9:30	WTP-C	B20052260-001	Aqueous	--	X	X

[1]See laboratory data package for list of metals analyzed

Notes:
All analyses performed by Energy Laboratories

Abbreviations:
SDG - Sample Delivery Group

Table 2
Qualifier Summary Table
Blackbird Mine Sampling - May 2020

SDG	Sample Name	Constituent	New Result	New RL	Qualifier	Reason	PDF Page Number
None							

Abbreviations
RL - Reporting Limit
SDG - Sample Delivery Group

METALS & INORGANIC / Tier I & II Data Validation Summary Checklist

GOLDER PROJECT #: 943-1595.011 ph 3100	SITE: BLACKBIRD MINE SITE, SALMON, ID
LABORATORY: ENERGY LABORATORY, BILLINGS	SDG: B20060218

SAMPLES (Total # =)	COLLECTED (Date/Time)	MATRIX
See Table 1		

DATA ASSESSMENT SUMMARY

REVIEW ITEM	ICP/ AES EPA200.7	ICP/ MS EPA200.8	TDS A2540C TSS A2540D	Hardness A2340B Alkalinity A2320B	Anions (ex Cl^-, F^-, SO_4^{-2}) E300.0	OTHER pH A4500-H-B DOC A5310C
1. Data Package Completeness	Θ	Θ	NA	Θ	NA	NA
2. Holding Temperatures & Times	Θ	Θ	NA	Θ	NA	NA
3. Calibration	O	O	NA	O	NA	NA
4. Lab Blanks, Field Blanks	Θ	X	NA	Θ	NA	NA
5. Lab Duplicate, Field Duplicate RPD	O	O	NA	O	NA	NA
6. LCS, LFB, Blank Spike	O	O	NA	O	NA	NA
7. Interference Checks	NA	NA	NA	NA	NA	NA
8. Matrix Spike Recovery (MS/MSD)	O	O	NA	O	NA	NA
9. MSA and Serial Dilutions	NA	NA	NA	NA	NA	NA
10. Detection Limits, Other QC	O	O	NA	O	NA	NA
11. Data Verification, Overall Summary	O	O	NA	O	NA	NA

O = Data had no problems Θ = Problems, but do not affect data NA = Not applicable to this data set.
X = Data qualified due to minor problems [typically estimated data (J/UJ)].
M = Data qualified due to major problems [typically more than 50% qualified (J/UJ)].
Z = Data unacceptable [typically data rejected (R).

Acceptable: YES NO

1. Date Package Completeness (Check if present)…… √ ☐

x _Case narrative
_/_Chain of Custody
_/_Sample Results
_/_ICV/CCV Results
_/_Blank Results
__o _ICP Interference Check Results
_/_Spike Recovery Results

_/_Duplicate Results
_/_LCS Results
_o _Standard Addition Results
_o _ICP Serial Dilution
_o_Instrument Det. Limits
__Other_____

/ Acceptable
x Absent
o Not required

Comments/Qualified Results: No case narrative provided.

Validated by: Annie Muehlfarth **Date:** 07/01/2020
Reviewed by: Samantha DiCenso **Date:** 07/01/2020

METALS & INORGANIC / Tier I & II Data Validation Summary Checklist

Acceptable: YES NO

2. Holding Temperatures & Times (Check all that apply)…… √ ☐

_x_Recommended Hold Temp. of Cool, ≤6°C met (√ - Yes / x – No)
__TDS / TSS analysis completed in <7 days from collection
__Acidity / Alkalinity completed in <14 days from collection
_/_ICP metals completed in <6 months from collection
__Anions (Cl^-, F^-, SO_4^-), DOC analyzed in <28 days from collection
__pH analysis completed in <15 minutes from collection

Comments/Qualified Results: The cooler temperature upon receipt was recorded at 20.1°C (no ice). Using professional judgement and following project-specific requirements qualification of metals results was nor required because the samples were preserved to pH<2.

3. Calibrations (Check all that apply)…….. √ ☐

_/_ICV/CCV %R for ICP/AA, 90%-110%, acceptable
__ICV/CCV %R for ICP/AA, 75%-89% or 111%-125%, results estimated (J/UJ)
__ICV/CCV %R for ICP/AA, <75% or >125%, reject positive results (R)

Comments/Qualified Results: None.

4. Lab Blanks, Field Blanks (Check all that apply)…….. √ ☐

__Detects reported in ICB/CCB list:
_/_ Detects in preparation blanks, results >10x contamination level or ND (no qualifier)
_/_Detects in preparation blanks, results ≤10x contamination level (J+)
_/_Detects in field blanks (Note: Advisory condition only and no qualifier)

Field Blank ID: BDSW-23B (05/27/2020)
Field Blank ID: BDSW-23B (05/28/2020)

Comments/Qualified Results: Hardness detected in BDSW-23B (05/27/2020) at 0.5 mg/L (advisory condition only, no qualification necessary).
Hardness (4.9 mg/L) and Calcium (1.9 mg/L) were detected in BDSW-23B (05/28/2020) (advisory condition only, no qualification necessary).
MB-145191 (method E200.7 batch 145191) detection of calcium (0.1 mg/L), detections in sample are >10x the blank result or non-detect, no qualification necessary.
MB-LRB (method E200.8 batch R343131) detection of copper (0.0002 mg/L), some qualification necessary.

5. Lab Duplicates, Field Duplicates (Check all that apply)……... √ ☐

_/_ Duplicate RPD ≤20% for waters (≤35% for soils) for results >5X CRDL
__Duplicate RPD >20% for waters (>35% for soils) for results >5X CRDL (J)
__Duplicate range is within ±CRDL (± 2X CRDL for soils) for results <5X CRDL (no qualifier)

Field Duplicate ID: _____
Field Duplicate ID: _____

Comments/Qualified Results: None.

Acceptable: YES NO

6. Laboratory Control Samples* (Check all that apply)……..… √ ☐

_/_LCS %R 70-130%: ACCEPTED
__LCS %R 40-69% or >130%, results >MDL: estimated (J-/J+)
__LCS %R 40-69% and results <MDL: estimated (UJ)
__LCS %R <40% and all results rejected (R/UR)
__LCS %R >150% and all results rejected (R)
*Lab Control Samples/Lab Control Sample Duplicates (LCS/LCSD)
*Lab Fortified Blanks (LFB)
*Blank Spike / Blank Spike Duplicates (BS/BSD)

Comments/Qualified Results: None.

7. Interference Checks (Check all that apply)…….. √ ☐

__ICS A/B Recoveries Acceptable
__Al, Ca, Fe, Mg sample concentrations > ICS concentrations
__ICS %R > 120%, results >IDL estimated (J)
__ICS %R 50-79%, results >IDL estimated (J)
__ICS %R 50-79%, results <IDL estimated (UJ)
__ICS %R <50%, results >IDL and <IDL rejected (R/UR)

Comments/Qualified Results: IC check is not required as part of Tier IIA Validation.

8. Matrix Spike Recovery (MS/MSD) (Check all that apply)……. √ ☐

_/_Spike %R with 75-125%: ACCEPTED
__MS and PDS %R 30-74%, results > MDL est. (J-), ND=(UJ)
__MS <75% and PDS >75%, results > MDL est. (J), ND=(UJ)
__ MS and PDS %R >125%, detects > MDL est. (J+)
__ MS >125% and PDS <125%, detects > MDL est. (J)
__MS and PDS %R <30% and <75%: results >MDL (J-) ND=(UR)
__Field blanks used for spike analysis?
__Post digest spk rqrd when %R <75, >125%, excpt Ag

Comments/Qualified Results: None.

Acceptable: YES NO

9. Method of Standard Addition (MSA) and Serial Dilutions (SD)….. √ ☐

__Analytical spike %R 85-115%
__Analytical spike %R 40-85%, results > IDL estimated (J)
__Analytical spike %R 10-40%, results <IDL estimated (UJ)
__Analytical spike %R <10%, results <IDL rejected (R)

__SD Analytes >50X MDL ?
__ SD % Diff < 10%
__ SD % Diff > 10%: J results >MDL, UJ for Non-detects

Comments/Qualified Results: NA

10. Detection Limits, Other QC…… √ ☐

WATER:

Inorganics-	**Metals-**	
__pH = 0.1 s.u.	__Al = 0.1 mg/L	__Cd = 0.01 mg/L
__TDS/TSS = 10 mg/L	_/_ As = 0.001 mg/L	__Cr = 0.05 mg/L
__Alkalinity = 4 mg/L	_/_ Co = 0.0001 mg/L	__Pb = 0.05 mg/L
__Anions (i.e. Cl^-, SO_4^-) = 1 mg/L	_/_Cu = 0.0003/0.0008mg/L	__Hg = 0.001 mg/L
__Anions (i.e. F^-) = 0.1 mg/L	__Co (WTP) = 0.001 mg/L	__Ni = 0.05 mg/L
__ DOC = 0.5 mg/L	__Cu (WTP) = 0.001 mg/L	__K = 1 mg/L
__Nitrogen, Ammonia = 0.05 mg/L	__Fe = 0.03 mg/L	__Se = 0.001 mg/L
__Phosphorus, Total = 0.005 mg/L	_/_ Ca = 0.5 mg/L	__Si = 0.1 mg/L
	_/_ Mg = 0.5 mg/L	__Ag = 0.01 mg/L
	_/_ HARD-T = 0.5 mg/L	__Na = 1 mg/L
	__Mn = 0.001 mg/L	__Zn = 0.01 mg/L

SOIL:

Metals-		
__ As = 1 mg/kg	__ = mg/kg
__ Co = 1 mg/kg	__ = mg/kg
__ Cu = 1 mg/kg	__ = mg/kg

Comments/Qualified Results: None.

11. Data Verification and Overall Assessment…… √ ☐

Comments/Qualified Results: See Table 2 for summary of qualifiers.

Table 1
Sample Collection and Analysis Summary
Blackbird Mine Sampling - May 2020

							Analysis		
SDG	**Field Identification**	**Collection Date & Time**	**Location**	**Lab Identification**	**Matrix**	**QC Samples**	**Hardness (as CaCO3)**	**Dissolved Metals[1]**	**Total Metals[1]**
B20060218	BDSW-04A	5/27/20 9:20	BDSW-04A	B20060218-001	Aqueous	--	X	X	X
B20060218	BDSW-03A	5/27/20 9:40	BDSW-03A	B20060218-002	Aqueous	--	X	X	X
B20060218	BDSW-01A	5/27/20 11:00	BDSW-01A	B20060218-003	Aqueous	--	X	X	X
B20060218	BDSW-04B	5/27/20 16:40	BDSW-04B	B20060218-004	Aqueous	--	X	X	X
B20060218	BDSW-03B	5/27/20 17:00	BDSW-03B	B20060218-005	Aqueous	--	X	X	X
B20060218	BDSW-13B	5/27/20 17:10	BDSW-03B	B20060218-006	Aqueous	Field Duplicate	X	X	X
B20060218	BDSW-23B	5/27/20 17:20	BDSW-03B	B20060218-007	Aqueous	Field Blank	X	X	X
B20060218	BDSW-01B	5/27/20 18:40	BDSW-01B	B20060218-008	Aqueous	--	X	X	X
B20060218	BDSW-04A	5/28/20 9:40	BDSW-04A	B20060218-009	Aqueous	--	X	X	X
B20060218	BDSW-03A	5/28/20 10:00	BDSW-03A	B20060218-010	Aqueous	--	X	X	X
B20060218	BDSW-01A	5/28/20 11:50	BDSW-01A	B20060218-011	Aqueous	--	X	X	X
B20060218	BDSW-04B	5/28/20 14:50	BDSW-04B	B20060218-012	Aqueous	--	X	X	X
B20060218	BDSW-03B	5/28/20 15:10	BDSW-03B	B20060218-013	Aqueous	--	X	X	X
B20060218	BDSW-13B	5/28/20 15:20	BDSW-03B	B20060218-014	Aqueous	Field Duplicate	X	X	X
B20060218	BDSW-23B	5/28/20 15:30	BDSW-03B	B20060218-015	Aqueous	Field Blank	X	X	X
B20060218	BDSW-01B	5/28/20 16:40	BDSW-01B	B20060218-016	Aqueous	--	X	X	X
B20060218	BDSW-31B	5/28/20 16:50	BDSW-01B	B20060218-017	Aqueous	Field Control Sample	X	X	X

[1]See laboratory data package for list of metals analyzed

Notes:
All analyses performed by Energy Laboratories

Abbreviations:
SDG - Sample Delivery Group

Table 2
Qualifier Summary Table
Blackbird Mine Sampling - May 2020

SDG	Sample Name	Constituent	New Result	New RL	Qualifier	Reason	PDF Page Number
B20060218	BDSW-03A	Dissolved Copper	0.0016	0.0003	J+	Detected in method blank	3
B20060218	BDSW-04B	Dissolved Copper	0.0003	0.0003	J+	Detected in method blank	5
B20060218	BDSW-03B	Dissolved Copper	0.0017	0.0003	J+	Detected in method blank	6
B20060218	BDSW-13B	Dissolved Copper	0.0016	0.0003	J+	Detected in method blank	7
B20060218	BDSW-04A	Dissolved Copper	0.0003	0.0003	J+	Detected in method blank	10
B20060218	BDSW-03A	Dissolved Copper	0.0016	0.0003	J+	Detected in method blank	11
B20060218	BDSW-04B	Dissolved Copper	0.0003	0.0003	J+	Detected in method blank	13
B20060218	BDSW-03B	Dissolved Copper	0.0017	0.0003	J+	Detected in method blank	14
B20060218	BDSW-13B	Dissolved Copper	0.0017	0.0003	J+	Detected in method blank	15

Abbreviations
RL - Reporting Limit
SDG - Sample Delivery Group

Qualifier Definitions
J+ Result is an estimated value (estimated high)

METALS & INORGANIC / Tier I & II Data Validation Summary Checklist

GOLDER PROJECT #: 943-1595.011 ph 3100	SITE: BLACKBIRD MINE SITE, SALMON, ID
LABORATORY: ENERGY LABORATORY, BILLINGS	SDG: B20061987

SAMPLES (Total # =)	COLLECTED (Date/Time)	MATRIX
See Table 1		

DATA ASSESSMENT SUMMARY

REVIEW ITEM	ICP/ AES EPA200.7	ICP/ MS EPA200.8	TDS A2540C TSS A2540D	Hardness A2340B Alkalinity A2320B	Anions (ex Cl^-, F^-, SO_4^{-3}) E300.0	OTHER pH A4500-H-B DOC A5310C
1. Data Package Completeness	NA	O	NA	O	NA	NA
2. Holding Temperatures & Times	NA	Θ	NA	Θ	NA	NA
3. Calibration	NA	O	NA	O	NA	NA
4. Lab Blanks, Field Blanks	NA	Θ	NA	O	NA	NA
5. Lab Duplicate, Field Duplicate RPD	NA	NA	NA	NA	NA	NA
6. LCS, LFB, Blank Spike	NA	O	NA	O	NA	NA
7. Interference Checks	NA	NA	NA	NA	NA	NA
8. Matrix Spike Recovery (MS/MSD)	NA	O	NA	O	NA	NA
9. MSA and Serial Dilutions	NA	NA	NA	NA	NA	NA
10. Detection Limits, Other QC	NA	Θ	NA	O	NA	NA
11. Data Verification, Overall Summary	NA	O	NA	O	NA	NA

O = Data had no problems Θ = Problems, but do not affect data NA = Not applicable to this data set.
X = Data qualified due to minor problems [typically estimated data (J/UJ)].
M = Data qualified due to major problems [typically more than 50% qualified (J/UJ)].
Z = Data unacceptable [typically data rejected (R).

Acceptable: YES NO

1. Date Package Completeness (Check if present)…… √ ☐

_/_Case narrative
_/_Chain of Custody
_/_Sample Results
_/_ICV/CCV Results
_/_Blank Results
_o_ICP Interference Check Results
_o_Spike Recovery Results

_x_Duplicate Results
_/_LCS Results
_o_Standard Addition Results
_o_ICP Serial Dilution
_o_Instrument Det. Limits
__Other_____

/ Acceptable
x Absent
o Not required

Comments/Qualified Results: The case narrative states that for BDSW-03-Bottle 1 the dissolved cobalt and copper results were greater than the total cobalt and copper results. Results were re-analyzed and verified. On 7/27/20 lab re-analyzed the results for total calcium, total manganese, and hardness, per Golder's request. The re-analysis result confirmed the original result.

Validated by: Samantha DiCenso **Date:** 08/05/2020
Reviewed by: Ann Muehlfarth **Date:** 08/06/2020

METALS & INORGANIC / Tier I & II Data Validation Summary Checklist

Acceptable: YES NO

2. Holding Temperatures & Times (Check all that apply)…… √ ☐

_x_Recommended Hold Temp. of Cool, ≤6°C met (√ - Yes / x – No)
__TDS / TSS analysis completed in <7 days from collection
_/_Acidity / Alkalinity completed in <14 days from collection
_/_ICP metals completed in <6 months from collection
__Anions (Cl^-, F^-, SO_4^-), DOC analyzed in <28 days from collection
_x_pH analysis completed in <15 minutes from collection

Comments/Qualified Results: The cooler temperature upon receipt was recorded at 20.5°C (no ice). Using professional judgement and following project-specific requirements qualification of metals results was not required because the samples were preserved to pH<2.

3. Calibrations (Check all that apply)…….. √ ☐

_/_ICV/CCV %R for ICP/AA, 90%-110%, acceptable
__ICV/CCV %R for ICP/AA, 75%-89% or 111%-125%, results estimated (J/UJ)
__ICV/CCV %R for ICP/AA, <75% or >125%, reject positive results (R)

Comments/Qualified Results: None.

4. Lab Blanks, Field Blanks (Check all that apply)…….. √ ☐

__Detects reported in ICB/CCB list: Field Blank ID: _____
_/_ Detects in preparation blanks, results >10x contamination level or ND (no qualifier) Field Blank ID: _____
_/_Detects in preparation blanks, results ≤10x contamination level (J+)
__Detects in field blanks (Note: Advisory condition only and no qualifier)

Comments/Qualified Results: Method blank (MB-145897) run on 6/24/20 at 19:47 was observed to have a detection of copper 0.001 mg/L, however another MB was run on 6/25/20 at 22:29 with a non-detect copper result. All associated samples had Cu-D analyzed on 6/25/20 after the MB with observed ND copper result. Therefore, no data qualification is needed.

5. Lab Duplicates, Field Duplicates (Check all that apply)……... √ ☐

__Duplicate RPD ≤20% for waters (≤35% for soils) for results >5X CRDL Field Duplicate ID: _____
__Duplicate RPD >20% for waters (>35% for soils) for results >5X CRDL (J) Field Duplicate ID: _____
__Duplicate range is within ±CRDL (± 2X CRDL for soils) for results <5X CRDL (no qualifier)

Comments/Qualified Results: No duplicates listed.

Acceptable: YES NO

6. Laboratory Control Samples* (Check all that apply)……..… √ ☐

_/_LCS %R 70-130%: ACCEPTED
__LCS %R 40-69% or >130%, results >MDL: estimated (J-/J+)
__LCS %R 40-69% and results <MDL: estimated (UJ)
__LCS %R <40% and all results rejected (R/UR)
__LCS %R >150% and all results rejected (R)
*Lab Control Samples/Lab Control Sample Duplicates (LCS/LCSD)
*Lab Fortified Blanks (LFB)
*Blank Spike / Blank Spike Duplicates (BS/BSD)

Comments/Qualified Results: None.

7. Interference Checks (Check all that apply)…….. √ ☐

__ICS A/B Recoveries Acceptable
__Al, Ca, Fe, Mg sample concentrations > ICS concentrations
__ICS %R > 120%, results >IDL estimated (J)
__ICS %R 50-79%, results >IDL estimated (J)
__ICS %R 50-79%, results <IDL estimated (UJ)
__ICS %R <50%, results >IDL and <IDL rejected (R/UR)

Comments/Qualified Results: IC check is not required as part of Tier IIA Validation.

8. Matrix Spike Recovery (MS/MSD) (Check all that apply)……. √ ☐

_/_Spike %R with 75-125%: ACCEPTED
__MS and PDS %R 30-74%, results > MDL est. (J-), ND=(UJ)
__MS <75% and PDS >75%, results > MDL est. (J), ND=(UJ)
__ MS and PDS %R >125%, detects > MDL est. (J+)
__ MS >125% and PDS <125%, detects > MDL est. (J)
__MS and PDS %R <30% and <75%: results >MDL (J-) ND=(UR)
__Field blanks used for spike analysis?
__Post digest spk rqrd when %R <75, >125%, excpt Ag

Comments/Qualified Results: None.

Acceptable: YES NO

9. Method of Standard Addition (MSA) and Serial Dilutions (SD)….. √ ☐

__Analytical spike %R 85-115%
__Analytical spike %R 40-85%, results > IDL estimated (J)
__Analytical spike %R 10-40%, results <IDL estimated (UJ)
__Analytical spike %R <10%, results <IDL rejected (R)

__SD Analytes >50X MDL ?
__ SD % Diff < 10%
__ SD % Diff > 10%: J results >MDL, UJ for Non-detects

Comments/Qualified Results: NA

10. Detection Limits, Other QC…… √ ☐

WATER:

Inorganics-	**Metals-**	
__pH = 0.1 s.u.	__Al = 0.1 mg/L	__Cd = 0.01 mg/L
__TDS/TSS = 10 mg/L	_/_As = 0.001 mg/L	__Cr = 0.05 mg/L
__Alkalinity = 4 mg/L	_/_Co = 0.0001 mg/L	__Pb = 0.05 mg/L
__Anions (i.e. Cl^-, SO_4^{--}) = 1 mg/L	x_Cu = 0.0003/0.0008mg/L	__Hg = 0.001 mg/L
__Anions (i.e. F^-) = 0.1 mg/L	__Co (WTP) = 0.001 mg/L	__Ni = 0.05 mg/L
__DOC = 0.5 mg/L	__Cu (WTP) = 0.001 mg/L	__K = 1 mg/L
__Nitrogen, Ammonia = 0.05 mg/L	__Fe = 0.03 mg/L	__Se = 0.001 mg/L
__Phosphorus, Total = 0.005 mg/L	_/_Ca = 0.5 mg/L	__Si = 0.1 mg/L
	_/_Mg = 0.5 mg/L	__Ag = 0.01 mg/L
	_/_HARD-T = 0.5 mg/L	__Na = 1 mg/L
	__Mn = 0.001 mg/L	__Zn = 0.01 mg/L

SOIL:

Metals-	
__ As = 1 mg/kg	__ = mg/kg
__ Co = 1 mg/kg	__ = mg/kg
__ Cu = 1 mg/kg	__ = mg/kg

Comments/Qualified Results: Total Copper was analyzed with Reporting Limit 0.0004 mg/L, results were greater than the reporting limit, no qualification necessary.

11. Data Verification and Overall Assessment…… √ ☐

Comments/Qualified Results: See Table 2 for summary of qualifiers.

Table 1
Sample Collection and Analysis Summary
Blackbird Mine Sampling - June 2020

SDG	Field Identification	Collection Date & Time	Location	Lab Identification	Matrix	QC Samples	Alkalinity and/or Hardness (as CaCO3)	Dissolved Metals[1]	Total Metals[1]
B20061987	BDSW-03-Bottle 1	6/17/20 2:51	BDSW-03	B20061987-001	Aqueous	--	X	X	X
B20061987	BDSW-03-Bottle 3	6/17/20 4:51	BDSW-03	B20061987-003	Aqueous	--	X	X	X
B20061987	BDSW-03-Bottle 5	6/17/20 6:51	BDSW-03	B20061987-005	Aqueous	--	X	X	X
B20061987	BDSW-03-Bottle 7	6/17/20 8:51	BDSW-03	B20061987-007	Aqueous	--	X	X	X
B20061987	BDSW-03-Bottle 9	6/17/20 10:51	BDSW-03	B20061987-009	Aqueous	--	X	X	X
B20061987	BDSW-03-Bottle 11	6/17/20 12:51	BDSW-03	B20061987-011	Aqueous	--	X	X	X
B20061987	BDSW-03-Bottle 13	6/17/20 14:51	BDSW-03	B20061987-013	Aqueous	--	X	X	X
B20061987	BDSW-03-Bottle 15	6/17/20 16:51	BDSW-03	B20061987-015	Aqueous	--	X	X	X
B20061987	BDSW-03-Bottle 17	6/17/20 18:51	BDSW-03	B20061987-017	Aqueous	--	X	X	X
B20061987	BDSW-03-Bottle 19	6/17/20 20:51	BDSW-03	B20061987-019	Aqueous	--	X	X	X
B20061987	BDSW-03-Bottle 21	6/17/20 22:51	BDSW-03	B20061987-021	Aqueous	--	X	X	X
B20061987	BDSW-03-Bottle 23	6/18/20 0:51	BDSW-03	B20061987-023	Aqueous	--	X	X	X

[1]See laboratory data package for list of metals analyzed

Notes:
All analyses performed by Energy Laboratories

Abbreviations:
SDG - Sample Delivery Group
FCS - Field Control Sample

Table 2
Qualifier Summary Table
Blackbird Mine Sampling - June 2020

SDG	Sample Name	Constituent	New Result	New RL	Qualifier	Reason	PDF Page Number
None							

Abbreviations
RL - Reporting Limit
SDG - Sample Delivery Group

METALS & INORGANIC / Tier I & II Data Validation Summary Checklist

GOLDER PROJECT #: 943-1595.011 ph 3100	SITE: BLACKBIRD MINE SITE, SALMON, ID
LABORATORY: ENERGY LABORATORY, BILLINGS	SDG: B20062344

SAMPLES (Total # =)	COLLECTED (Date/Time)	MATRIX
See Table 1		

DATA ASSESSMENT SUMMARY

REVIEW ITEM	ICP/ AES EPA200.7	ICP/ MS EPA200.8	TDS A2540C TSS A2540D	Hardness A2340B Alkalinity A2320B	Anions (ex Cl^-, F^-, SO_4^{-3}) E300.0	OTHER pH A4500-H-B DOC A5310C
1. Data Package Completeness	NA	Θ	NA	NA	NA	NA
2. Holding Temperatures & Times	NA	Θ	NA	NA	NA	NA
3. Calibration	NA	O	NA	NA	NA	NA
4. Lab Blanks, Field Blanks	NA	Θ	NA	NA	NA	NA
5. Lab Duplicate, Field Duplicate RPD	NA	NA	NA	NA	NA	NA
6. LCS, LFB, Blank Spike	NA	O	NA	NA	NA	NA
7. Interference Checks	NA	NA	NA	NA	NA	NA
8. Matrix Spike Recovery (MS/MSD)	NA	NA	NA	NA	NA	NA
9. MSA and Serial Dilutions	NA	NA	NA	NA	NA	NA
10. Detection Limits, Other QC	NA	O	NA	NA	NA	NA
11. Data Verification, Overall Summary	NA	O	NA	NA	NA	NA

O = Data had no problems Θ = Problems, but do not affect data NA = Not applicable to this data set.
X = Data qualified due to minor problems [typically estimated data (J/UJ)].
M = Data qualified due to major problems [typically more than 50% qualified (J/UJ)].
Z = Data unacceptable [typically data rejected (R).

	Acceptable: YES	NO
1. Date Package Completeness (Check if present)……	√	☐

_x_Case narrative
_/_Chain of Custody
_/_Sample Results
_/_ICV/CCV Results
_/_Blank Results
_o_ICP Interference Check Results
_o_Spike Recovery Results
_x_Duplicate Results
_/_LCS Results
_o_Standard Addition Results
_o_ICP Serial Dilution
_o_Instrument Det. Limits
__Other_____

/ Acceptable
x Absent
o Not required

Comments/Qualified Results: No case narrative provided.

Validated by: Samantha DiCenso **Date:** 07/09/2020
Reviewed by: Ann Muehlfarth **Date:** 07/13/2020

Acceptable: YES NO

2. Holding Temperatures & Times (Check all that apply)…… √ ☐

_x_Recommended Hold Temp. of Cool, ≤6°C met (√ - Yes / x – No)
__TDS / TSS analysis completed in <7 days from collection
__Acidity / Alkalinity completed in <14 days from collection
_/_ICP metals completed in <6 months from collection
__Anions (Cl^-, F^-, SO_4^-), DOC analyzed in <28 days from collection
__pH analysis completed in <15 minutes from collection

Comments/Qualified Results: The cooler temperature upon receipt was recorded at 20.9°C. Using professional judgement and following project-specific requirements qualification of metals results was not required because the samples were preserved to pH<2.

3. Calibrations (Check all that apply)…….. √ ☐

_/_ICV/CCV %R for ICP/AA, 90%-110%, acceptable
__ICV/CCV %R for ICP/AA, 75%-89% or 111%-125%, results estimated (J/UJ)
__ICV/CCV %R for ICP/AA, <75% or >125%, reject positive results (R)

Comments/Qualified Results: None.

4. Lab Blanks, Field Blanks (Check all that apply)…….. √ ☐

__Detects reported in ICB/CCB list: Field Blank ID: _____
_/_ Detects in preparation blanks, results >10x contamination level or ND (no qualifier) Field Blank ID: _____
__Detects in preparation blanks, results ≤10x contamination level (J+)
__Detects in field blanks (Note: Advisory condition only and no qualifier)

Comments/Qualified Results: Iron detected in method blank (LRB at 0.0006 mg/L) associated with the dissolved metals results. Not detected in associated sample; no qualification is required.

5. Lab Duplicates, Field Duplicates (Check all that apply)……... √ ☐

__Duplicate RPD ≤20% for waters (≤35% for soils) for results >5X CRDL Field Duplicate ID: _____
__Duplicate RPD >20% for waters (>35% for soils) for results >5X CRDL (J) Field Duplicate ID: _____
__Duplicate range is within ±CRDL (± 2X CRDL for soils) for results <5X CRDL (no qualifier)

Comments/Qualified Results: No duplicates listed.

Acceptable: YES NO

6. Laboratory Control Samples* (Check all that apply)……..… √ ☐

_/_LCS %R 70-130%: ACCEPTED
__LCS %R 40-69% or >130%, results >MDL: estimated (J-/J+)
__LCS %R 40-69% and results <MDL: estimated (UJ)
__LCS %R <40% and all results rejected (R/UR)
__LCS %R >150% and all results rejected (R)
*Lab Control Samples/Lab Control Sample Duplicates (LCS/LCSD)
*Lab Fortified Blanks (LFB)
*Blank Spike / Blank Spike Duplicates (BS/BSD)

Comments/Qualified Results: None.

7. Interference Checks (Check all that apply)…….. √ ☐

__ICS A/B Recoveries Acceptable
__Al, Ca, Fe, Mg sample concentrations > ICS concentrations
__ICS %R > 120%, results >IDL estimated (J)
__ICS %R 50-79%, results >IDL estimated (J)
__ICS %R 50-79%, results <IDL estimated (UJ)
__ICS %R <50%, results >IDL and <IDL rejected (R/UR)

Comments/Qualified Results: IC check is not required as part of Tier IIA Validation.

8. Matrix Spike Recovery (MS/MSD) (Check all that apply)……. √ ☐

_/_Spike %R with 75-125%: ACCEPTED
__MS and PDS %R 30-74%, results > MDL est. (J-), ND=(UJ)
__MS <75% and PDS >75%, results > MDL est. (J), ND=(UJ)
__ MS and PDS %R >125%, detects > MDL est. (J+)
__ MS >125% and PDS <125%, detects > MDL est. (J)
__MS and PDS %R <30% and <75%: results >MDL (J-) ND=(UR)
__Field blanks used for spike analysis?
__Post digest spk rqrd when %R <75, >125%, excpt Ag

Comments/Qualified Results: MS/MSDs were for unrelated samples.

Acceptable: YES NO

9. Method of Standard Addition (MSA) and Serial Dilutions (SD)….. √ ☐

__Analytical spike %R 85-115%
__Analytical spike %R 40-85%, results > IDL estimated (J)
__Analytical spike %R 10-40%, results <IDL estimated (UJ)
__Analytical spike %R <10%, results <IDL rejected (R)

__SD Analytes >50X MDL ?
__ SD % Diff < 10%
__ SD % Diff > 10%: J results >MDL, UJ for Non-detects

Comments/Qualified Results: NA

10. Detection Limits, Other QC…… √ ☐

WATER:

Inorganics-	Metals-	
__pH = 0.1 s.u.	__Al = 0.1 mg/L	__Cd = 0.01 mg/L
__TDS/TSS = 10 mg/L	__As = 0.001 mg/L	__Cr = 0.05 mg/L
__Alkalinity = 4 mg/L	__Co = 0.0001 mg/L	__Pb = 0.05 mg/L
__Anions (i.e. Cl^-, SO_4^{2-}) = 1 mg/L	__Cu = 0.0003/0.0008mg/L	__Hg = 0.001 mg/L
__Anions (i.e. F^-) = 0.1 mg/L	__/__Co (WTP) = 0.001 mg/L	__Ni = 0.05 mg/L
__DOC = 0.5 mg/L	__/__Cu (WTP) = 0.001 mg/L	__K = 1 mg/L
__Nitrogen, Ammonia = 0.05 mg/L	__/__Fe = 0.03 mg/L	__Se = 0.001 mg/L
__Phosphorus, Total = 0.005 mg/L	__Ca = 0.5 mg/L	__Si = 0.1 mg/L
	__Mg = 0.5 mg/L	__Ag = 0.01 mg/L
	__HARD-T = 0.5 mg/L	__Na = 1 mg/L
	__Mn = 0.001 mg/L	__Zn = 0.01 mg/L

SOIL:

Metals-	
__As = 1 mg/kg	__ = mg/kg
__Co = 1 mg/kg	__ = mg/kg
__Cu = 1 mg/kg	__ = mg/kg

Comments/Qualified Results: None.

11. Data Verification and Overall Assessment…… √ ☐

Comments/Qualified Results: See Table 2 for summary of qualifiers.

Table 1
Sample Collection and Analysis Summary
Blackbird Mine Sampling - June 2020

							Analysis		
SDG	**Field Identification**	**Collection Date & Time**	**Location**	**Lab Identification**	**Matrix**	**QC Samples**	**Total Dissolved Solids**	**Dissolved Metals[1]**	**Total Metals[1]**
B20062344	WTP-C	6/24/20 10:00	WTP-C	B20062344-001	Aqueous	--		X	X

[1]See laboratory data package for list of metals analyzed

Notes:
All analyses performed by Energy Laboratories

Abbreviations:
SDG - Sample Delivery Group

Table 2
Qualifer Summary Table
Blackbird Mine Sampling - June 2020

SDG	Sample Name	Constituent	New Result	New RL	Qualifier	Reason	PDF Page Number
None							

Abbreviations
RL - Reporting Limit
SDG - Sample Delivery Group

METALS & INORGANIC / Tier I & II Data Validation Summary Checklist

GOLDER PROJECT #: 943-1595.011 ph 3100	SITE: BLACKBIRD MINE SITE, SALMON, ID
LABORATORY: ENERGY LABORATORY, BILLINGS	SDG: B20062589

SAMPLES (Total # =)	COLLECTED (Date/Time)	MATRIX
See Table 1		

DATA ASSESSMENT SUMMARY

REVIEW ITEM	ICP/ AES EPA200.7	ICP/ MS EPA200.8	TDS A2540C TSS A2540D	Hardness A2340B Alkalinity A2320B	Anions (ex Cl^-, F^-, SO_4^{-3}) E300.0	OTHER pH A4500-H-B DOC A5310C
1. Data Package Completeness	Θ	Θ	Θ	NA	NA	NA
2. Holding Temperatures & Times	O	O	O	NA	NA	NA
3. Calibration	O	O	O	NA	NA	NA
4. Lab Blanks, Field Blanks	O	O	O	NA	NA	NA
5. Lab Duplicate, Field Duplicate RPD	O	O	O	NA	NA	NA
6. LCS, LFB, Blank Spike	O	O	O	NA	NA	NA
7. Interference Checks	NA	NA	NA	NA	NA	NA
8. Matrix Spike Recovery (MS/MSD)	O	O	O	NA	NA	NA
9. MSA and Serial Dilutions	NA	NA	NA	NA	NA	NA
10. Detection Limits, Other QC	O	O	O	NA	NA	NA
11. Data Verification, Overall Summary	O	O	O	NA	NA	NA

O = Data had no problems Θ = Problems, but do not affect data NA = Not applicable to this data set.
X = Data qualified due to minor problems [typically estimated data (J/UJ)].
M = Data qualified due to major problems [typically more than 50% qualified (J/UJ)].
Z = Data unacceptable [typically data rejected (R).

	Acceptable: YES	NO
1. Date Package Completeness (Check if present)……	√	☐

_x_ Case narrative
_/_ Chain of Custody
_/_ Sample Results
_/_ ICV/CCV Results
_/_ Blank Results
_o_ ICP Interference Check Results
_/_ Spike Recovery Results

_/_ Duplicate Results
_/_ LCS Results
_o_ Standard Addition Results
_o_ ICP Serial Dilution
_o_ Instrument Det. Limits
__Other_____

/ Acceptable
x Absent
o Not required

Comments/Qualified Results: No case narrative provided.

Validated by: Ann Muehlfarth **Date:** 07/15/2020
Reviewed by: Samantha DiCenso **Date:** 07/15/2020

METALS & INORGANIC / Tier I & II Data Validation Summary Checklist

Acceptable: YES NO

2. Holding Temperatures & Times (Check all that apply)…… √ ☐

_/_Recommended Hold Temp. of Cool, ≤6°C met (√ - Yes / x – No)
_/_TDS / TSS analysis completed in <7 days from collection
__Acidity / Alkalinity completed in <14 days from collection
_/_ICP metals completed in <6 months from collection
__Anions (Cl^-, F^-, SO_4^-), DOC analyzed in <28 days from collection
__pH analysis completed in <15 minutes from collection

Comments/Qualified Results: None.

3. Calibrations (Check all that apply)…….. √ ☐

_/_ICV/CCV %R for ICP/AA, 90%-110%, acceptable
__ICV/CCV %R for ICP/AA, 75%-89% or 111%-125%, results estimated (J/UJ)
__ICV/CCV %R for ICP/AA, <75% or >125%, reject positive results (R)

Comments/Qualified Results: None.

4. Lab Blanks, Field Blanks (Check all that apply)…….. √ ☐

__Detects reported in ICB/CCB list:
__ Detects in preparation blanks, results >10x contamination level or ND (no qualifier)
__Detects in preparation blanks, results ≤10x contamination level (J+)
__Detects in field blanks (Note: Advisory condition only and no qualifier)

Field Blank ID: PASW-29
Field Blank ID: _____

Comments/Qualified Results: None.

5. Lab Duplicates, Field Duplicates (Check all that apply)……... √ ☐

_/_Duplicate RPD ≤20% for waters (≤35% for soils) for results >5X CRDL
__Duplicate RPD >20% for waters (>35% for soils) for results >5X CRDL (J)
__Duplicate range is within ±CRDL (± 2X CRDL for soils) for results <5X CRDL (no qualifier)

Field Duplicate ID: PASW-19
Field Duplicate ID: _____

Comments/Qualified Results: None.

Acceptable: YES NO

6. Laboratory Control Samples* (Check all that apply)……..… √ ☐

_/_LCS %R 70-130%: ACCEPTED
__LCS %R 40-69% or >130%, results >MDL: estimated (J-/J+)
__LCS %R 40-69% and results <MDL: estimated (UJ)
__LCS %R <40% and all results rejected (R/UR)
__LCS %R >150% and all results rejected (R)
*Lab Control Samples/Lab Control Sample Duplicates (LCS/LCSD)
*Lab Fortified Blanks (LFB)
*Blank Spike / Blank Spike Duplicates (BS/BSD)

Comments/Qualified Results: None.

7. Interference Checks (Check all that apply)…….. √ ☐

__ICS A/B Recoveries Acceptable
__Al, Ca, Fe, Mg sample concentrations > ICS concentrations
__ICS %R > 120%, results >IDL estimated (J)
__ICS %R 50-79%, results >IDL estimated (J)
__ICS %R 50-79%, results <IDL estimated (UJ)
__ICS %R <50%, results >IDL and <IDL rejected (R/UR)

Comments/Qualified Results: IC check is not required as part of Tier IIA Validation.

8. Matrix Spike Recovery (MS/MSD) (Check all that apply)……. √ ☐

_/_Spike %R with 75-125%: ACCEPTED
__MS and PDS %R 30-74%, results > MDL est. (J-), ND=(UJ)
__MS <75% and PDS >75%, results > MDL est. (J), ND=(UJ)
__ MS and PDS %R >125%, detects > MDL est. (J+)
__ MS >125% and PDS <125%, detects > MDL est. (J)
__MS and PDS %R <30% and <75%: results >MDL (J-) ND=(UR)
__Field blanks used for spike analysis?
__Post digest spk rqrd when %R <75, >125%, excpt Ag

Comments/Qualified Results: None.

Acceptable: YES NO

9. Method of Standard Addition (MSA) and Serial Dilutions (SD)….. √ ☐

__Analytical spike %R 85-115%
__Analytical spike %R 40-85%, results > IDL estimated (J)
__Analytical spike %R 10-40%, results <IDL estimated (UJ)
__Analytical spike %R <10%, results <IDL rejected (R)

__SD Analytes >50X MDL ?
__ SD % Diff < 10%
__ SD % Diff > 10%: J results >MDL, UJ for Non-detects

Comments/Qualified Results: NA

10. Detection Limits, Other QC…… √ ☐

WATER:

Inorganics-	**Metals-**	
__pH = 0.1 s.u.	__Al = 0.1 mg/L	__Cd = 0.01 mg/L
/ TDS/TSS = 10 mg/L	/ As = 0.001 mg/L	__Cr = 0.05 mg/L
__Alkalinity = 4 mg/L	__Co = 0.0001 mg/L	__Pb = 0.05 mg/L
__Anions (i.e. Cl^-, SO_4^-) = 1 mg/L	__Cu = 0.0003/0.0008mg/L	__Hg = 0.001 mg/L
__Anions (i.e. F^-) = 0.1 mg/L	__Co (WTP) = 0.001 mg/L	__Ni = 0.05 mg/L
__ DOC = 0.5 mg/L	__Cu (WTP) = 0.001 mg/L	__K = 1 mg/L
__Nitrogen, Ammonia = 0.05 mg/L	__Fe = 0.03 mg/L	__Se = 0.001 mg/L
__Phosphorus, Total = 0.005 mg/L	__Ca = 0.5 mg/L	__Si = 0.1 mg/L
	__Mg = 0.5 mg/L	__Ag = 0.01 mg/L
	__HARD-T = 0.5 mg/L	__Na = 1 mg/L
	__Mn = 0.001 mg/L	__Zn = 0.01 mg/L

SOIL:

Metals-	
__ As = 1 mg/kg	__ = mg/kg
__ Co = 1 mg/kg	__ = mg/kg
__ Cu = 1 mg/kg	__ = mg/kg

Comments/Qualified Results: None.

11. Data Verification and Overall Assessment…… √ ☐

Comments/Qualified Results: None.

Table 1
Sample Collection and Analysis Summary
Blackbird Mine Sampling - June 2020

							Analysis		
SDG	**Field Identification**	**Collection Date & Time**	**Location**	**Lab Identification**	**Matrix**	**QC Samples**	**Total Suspended Solids**	**Dissolved Metals[1]**	**Total Metals[1]**
B20062589	BBSW-01A	6/27/20 14:00	BBSW-01A	B20062589-001	Aqueous	--	X	X	X
B20062589	PASW-09	6/27/20 14:20	PASW-09	B20062589-002	Aqueous	--	X	X	X
B20062589	PASW-19	6/27/20 14:30	PASW-09	B20062589-003	Aqueous	Field Duplicate	X	X	X
B20062589	PASW-29	6/27/20 14:40	PASW-09	B20062589-004	Aqueous	Field Blank	X	X	X

[1]See laboratory data package for list of metals analyzed

Notes:
All analyses performed by Energy Laboratories

Abbreviations:
SDG - Sample Delivery Group

Table 2
Qualifier Summary Table
Blackbird Mine Sampling - June 2020

SDG	Sample Name	Constituent	New Result	New RL	Qualifier	Reason	PDF Page Number
None							

Abbreviations
RL - Reporting Limit
SDG - Sample Delivery Group

METALS & INORGANIC / Tier I & II Data Validation Summary Checklist

GOLDER PROJECT #: 943-1595.011 ph 3100	SITE: BLACKBIRD MINE SITE, SALMON, ID
LABORATORY: ENERGY LABORATORY, BILLINGS	SDG: B20072089

SAMPLES (Total # =)	COLLECTED (Date/Time)	MATRIX
See Table 1		

DATA ASSESSMENT SUMMARY

REVIEW ITEM	ICP/ AES EPA200.7	ICP/ MS EPA200.8	TDS A2540C TSS A2540D	Hardness A2340B Alkalinity A2320B	Anions (ex Cl^-, F^-, SO_4^{-3}) E300.0	OTHER pH A4500-H-B DOC A5310C
1. Data Package Completeness	NA	Θ	NA	NA	NA	NA
2. Holding Temperatures & Times	NA	Θ	NA	NA	NA	NA
3. Calibration	NA	O	NA	NA	NA	NA
4. Lab Blanks, Field Blanks	NA	X	NA	NA	NA	NA
5. Lab Duplicate, Field Duplicate RPD	NA	NA	NA	NA	NA	NA
6. LCS, LFB, Blank Spike	NA	O	NA	NA	NA	NA
7. Interference Checks	NA	NA	NA	NA	NA	NA
8. Matrix Spike Recovery (MS/MSD)	NA	O	NA	NA	NA	NA
9. MSA and Serial Dilutions	NA	NA	NA	NA	NA	NA
10. Detection Limits, Other QC	NA	O	NA	NA	NA	NA
11. Data Verification, Overall Summary	NA	O	NA	NA	NA	NA

O = Data had no problems Θ = Problems, but do not affect data NA = Not applicable to this data set.
X = Data qualified due to minor problems [typically estimated data (J/UJ)].
M = Data qualified due to major problems [typically more than 50% qualified (J/UJ)].
Z = Data unacceptable [typically data rejected (R).

Acceptable: YES NO

1. Date Package Completeness (Check if present)…… √ ☐

_x_Case narrative
_/_Chain of Custody
_/_Sample Results
_/_ICV/CCV Results
_/_Blank Results
_o_ICP Interference Check Results
_o_Spike Recovery Results
_x_Duplicate Results
_/_LCS Results
_o_Standard Addition Results
_o_ICP Serial Dilution
_o_Instrument Det. Limits
__Other_____

/ Acceptable
x Absent
o Not required

Comments/Qualified Results: No case narrative provided.

Validated by: Samantha DiCenso **Date:** 08/05/2020
Reviewed by: Ann Muehlfarth **Date:** 08/06/2020

METALS & INORGANIC / Tier I & II Data Validation Summary Checklist

Acceptable: YES NO

2. Holding Temperatures & Times (Check all that apply)…… √ ☐

_x_Recommended Hold Temp. of Cool, ≤6°C met (√ - Yes / x – No)
__TDS / TSS analysis completed in <7 days from collection
__Acidity / Alkalinity completed in <14 days from collection
_/_ICP metals completed in <6 months from collection
__Anions (Cl^-, F^-, SO_4^-), DOC analyzed in <28 days from collection
__pH analysis completed in <15 minutes from collection

Comments/Qualified Results: The cooler temperature upon receipt was recorded at 20.8°C. Using professional judgement and following project-specific requirements qualification of metals results was not required because the samples were preserved to pH<2.

3. Calibrations (Check all that apply)…….. √ ☐

_/_ICV/CCV %R for ICP/AA, 90%-110%, acceptable
__ICV/CCV %R for ICP/AA, 75%-89% or 111%-125%, results estimated (J/UJ)
__ICV/CCV %R for ICP/AA, <75% or >125%, reject positive results (R)

Comments/Qualified Results: None.

4. Lab Blanks, Field Blanks (Check all that apply)…….. √ ☐

__Detects reported in ICB/CCB list: Field Blank ID: _____
_/_ Detects in preparation blanks, results >10x contamination level or ND (no qualifier) Field Blank ID: _____
_/_Detects in preparation blanks, results ≤10x contamination level (J+)
__Detects in field blanks (Note: Advisory condition only and no qualifier)

Comments/Qualified Results: Cobalt and iron detected in method blank (MB-146902 at 0.00003 mg/L and 0.02 mg/L, respectively) associated with the total metals results (batch 146902). Cobalt result is greater than 10x contamination level (no qualification); however, qualification is required for iron.
Iron detected in method blank (LRB at 0.003 mg/L) associated with the dissolved metals results (batch R345908). Result is greater than 10x contamination level, no qualification is required.

5. Lab Duplicates, Field Duplicates (Check all that apply)……... √ ☐

__Duplicate RPD ≤20% for waters (≤35% for soils) for results >5X CRDL Field Duplicate ID: _____
__Duplicate RPD >20% for waters (>35% for soils) for results >5X CRDL (J) Field Duplicate ID: _____
__Duplicate range is within ±CRDL (± 2X CRDL for soils) for results <5X CRDL (no qualifier)

Comments/Qualified Results: No duplicates listed.

Acceptable: YES NO

6. Laboratory Control Samples* (Check all that apply)……..… √ ☐

_/_LCS %R 70-130%: ACCEPTED
__LCS %R 40-69% or >130%, results >MDL: estimated (J-/J+)
__LCS %R 40-69% and results <MDL: estimated (UJ)
__LCS %R <40% and all results rejected (R/UR)
__LCS %R >150% and all results rejected (R)
*Lab Control Samples/Lab Control Sample Duplicates (LCS/LCSD)
*Lab Fortified Blanks (LFB)
*Blank Spike / Blank Spike Duplicates (BS/BSD)

Comments/Qualified Results: None.

7. Interference Checks (Check all that apply)…….. √ ☐

__ICS A/B Recoveries Acceptable
__Al, Ca, Fe, Mg sample concentrations > ICS concentrations
__ICS %R > 120%, results >IDL estimated (J)
__ICS %R 50-79%, results >IDL estimated (J)
__ICS %R 50-79%, results <IDL estimated (UJ)
__ICS %R <50%, results >IDL and <IDL rejected (R/UR)

Comments/Qualified Results: IC check is not required as part of Tier IIA Validation.

8. Matrix Spike Recovery (MS/MSD) (Check all that apply)……. √ ☐

_/_Spike %R with 75-125%: ACCEPTED
__MS and PDS %R 30-74%, results > MDL est. (J-), ND=(UJ)
__MS <75% and PDS >75%, results > MDL est. (J), ND=(UJ)
__ MS and PDS %R >125%, detects > MDL est. (J+)
__ MS >125% and PDS <125%, detects > MDL est. (J)
__MS and PDS %R <30% and <75%: results >MDL (J-) ND=(UR)
__Field blanks used for spike analysis?
__Post digest spk rqrd when %R <75, >125%, excpt Ag

Comments/Qualified Results: MS/MSD performed for dissolved metals only, additional MS/MSD analyses were for unrelated samples.

Acceptable: YES NO

9. Method of Standard Addition (MSA) and Serial Dilutions (SD)….. √ ☐

__Analytical spike %R 85-115%
__Analytical spike %R 40-85%, results > IDL estimated (J)
__Analytical spike %R 10-40%, results <IDL estimated (UJ)
__Analytical spike %R <10%, results <IDL rejected (R)

__SD Analytes >50X MDL ?
__ SD % Diff < 10%
__ SD % Diff > 10%: J results >MDL, UJ for Non-detects

Comments/Qualified Results: NA

10. Detection Limits, Other QC…… √ ☐

WATER:

Inorganics-	**Metals-**	
__pH = 0.1 s.u.	__Al = 0.1 mg/L	__Cd = 0.01 mg/L
__TDS/TSS = 10 mg/L	__As = 0.001 mg/L	__Cr = 0.05 mg/L
__Alkalinity = 4 mg/L	__Co = 0.0001 mg/L	__Pb = 0.05 mg/L
__Anions (i.e. Cl^-, SO_4^-) = 1 mg/L	__Cu = 0.0003/0.0008mg/L	__Hg = 0.001 mg/L
__Anions (i.e. F^-) = 0.1 mg/L	__/__Co (WTP) = 0.001 mg/L	__Ni = 0.05 mg/L
__ DOC = 0.5 mg/L	__/ Cu (WTP) = 0.001 mg/L	__K = 1 mg/L
__ Nitrogen, Ammonia = 0.05 mg/L	__/ Fe = 0.03 mg/L	__Se = 0.001 mg/L
__Phosphorus, Total = 0.005 mg/L	__Ca = 0.5 mg/L	__Si = 0.1 mg/L
	__Mg = 0.5 mg/L	__Ag = 0.01 mg/L
	__HARD-T = 0.5 mg/L	__Na = 1 mg/L
	__Mn = 0.001 mg/L	__Zn = 0.01 mg/L

SOIL:

Metals-	
__ As = 1 mg/kg	__ = mg/kg
__ Co = 1 mg/kg	__ = mg/kg
__ Cu = 1 mg/kg	__ = mg/kg

Comments/Qualified Results: None.

11. Data Verification and Overall Assessment…… √ ☐

Comments/Qualified Results: See Table 2 for summary of qualifiers.

Table 1
Sample Collection and Analysis Summary
Blackbird Mine Sampling - July 2020

							Analysis		
SDG	**Field Identification**	**Collection Date & Time**	**Location**	**Lab Identification**	**Matrix**	**QC Samples**	**Total Dissolved Solids**	**Dissolved Metals[1]**	**Total Metals[1]**
B20072089	WTP-C	7/21/20 12:00	WTP-C	B20072089-001	Aqueous	--		X	X

[1]See laboratory data package for list of metals analyzed

Notes:
All analyses performed by Energy Laboratories

Abbreviations:
SDG - Sample Delivery Group

Table 2
Qualifier Summary Table
Blackbird Mine Sampling - July 2020

SDG	Sample Name	Constituent	New Result	New RL	Qualifier	Reason	PDF Page Number
B20072089	WTP-C	Total Iron	0.08	0.03	J+	Detected in Method Blank	2

Abbreviations
RL - Reporting Limit
SDG - Sample Delivery Group

METALS & INORGANIC / Tier I & II Data Validation Summary Checklist

GOLDER PROJECT #: 943-1595.011 ph 3100	SITE: BLACKBIRD MINE SITE, SALMON, ID
LABORATORY: ENERGY LABORATORY, BILLINGS	SDG: B20072279

SAMPLES (Total # =)	COLLECTED (Date/Time)	MATRIX
See Table 1		

DATA ASSESSMENT SUMMARY

REVIEW ITEM	ICP/ AES EPA200.7	ICP/ MS EPA200.8	TDS A2540C TSS A2540D	Hardness A2340B Alkalinity A2320B	Anions (ex Cl^-, F^-, SO_4^{-3}) E300.0	OTHER pH A4500-H-B DOC A5310C
1. Data Package Completeness	Θ	Θ	Θ	NA	NA	NA
2. Holding Temperatures & Times	O	O	O	NA	NA	NA
3. Calibration	O	O	O	NA	NA	NA
4. Lab Blanks, Field Blanks	O	O	O	NA	NA	NA
5. Lab Duplicate, Field Duplicate RPD	O	O	O	NA	NA	NA
6. LCS, LFB, Blank Spike	O	O	O	NA	NA	NA
7. Interference Checks	NA	NA	NA	NA	NA	NA
8. Matrix Spike Recovery (MS/MSD)	O	O	O	NA	NA	NA
9. MSA and Serial Dilutions	NA	NA	NA	NA	NA	NA
10. Detection Limits, Other QC	O	O	O	NA	NA	NA
11. Data Verification, Overall Summary	O	O	O	NA	NA	NA

O = Data had no problems Θ = Problems, but do not affect data NA = Not applicable to this data set.
X = Data qualified due to minor problems [typically estimated data (J/UJ)].
M = Data qualified due to major problems [typically more than 50% qualified (J/UJ)].
Z = Data unacceptable [typically data rejected (R).

	Acceptable: YES	NO
1. Date Package Completeness (Check if present)……	√	☐

_x_ Case narrative
_/_ Chain of Custody
_/_ Sample Results
_/_ ICV/CCV Results
_/_ Blank Results
_o_ ICP Interference Check Results
_/_ Spike Recovery Results

_/_ Duplicate Results
_/_ LCS Results
_o_ Standard Addition Results
_o_ ICP Serial Dilution
_o_ Instrument Det. Limits
__Other_____

/ Acceptable
x Absent
o Not required

Comments/Qualified Results: No case narrative provided.

Validated by: Samantha DiCenso **Date:** 08/11/2020
Reviewed by: Ann Muehlfarth **Date:** 08/11/2020

METALS & INORGANIC / Tier I & II Data Validation Summary Checklist

Acceptable: YES NO

2. Holding Temperatures & Times (Check all that apply)…… √ ☐

_/_Recommended Hold Temp. of Cool, ≤6°C met (√ - Yes / x – No)
_/_TDS / TSS analysis completed in <7 days from collection
__Acidity / Alkalinity completed in <14 days from collection
_/_ICP metals completed in <6 months from collection
__Anions (Cl^-, F^-, SO_4^-), DOC analyzed in <28 days from collection
__pH analysis completed in <15 minutes from collection

Comments/Qualified Results: None.

3. Calibrations (Check all that apply)…….. √ ☐

_/_ICV/CCV %R for ICP/AA, 90%-110%, acceptable
__ICV/CCV %R for ICP/AA, 75%-89% or 111%-125%, results estimated (J/UJ)
__ICV/CCV %R for ICP/AA, <75% or >125%, reject positive results (R)

Comments/Qualified Results: None.

4. Lab Blanks, Field Blanks (Check all that apply)…….. √ ☐

__Detects reported in ICB/CCB list:
__ Detects in preparation blanks, results >10x contamination level or ND (no qualifier)
__Detects in preparation blanks, results ≤10x contamination level (J+)
__Detects in field blanks (Note: Advisory condition only and no qualifier)

Field Blank ID: PASW-29
Field Blank ID: _____

Comments/Qualified Results: None.

5. Lab Duplicates, Field Duplicates (Check all that apply)……... √ ☐

_/_Duplicate RPD ≤20% for waters (≤35% for soils) for results >5X CRDL
__Duplicate RPD >20% for waters (>35% for soils) for results >5X CRDL (J)
__Duplicate range is within ±CRDL (± 2X CRDL for soils) for results <5X CRDL (no qualifier)

Field Duplicate ID: PASW-19
Field Duplicate ID: _____

Comments/Qualified Results: None.

Acceptable: YES NO

6. Laboratory Control Samples* (Check all that apply)……..… √ ☐

_/_LCS %R 70-130%: ACCEPTED
__LCS %R 40-69% or >130%, results >MDL: estimated (J-/J+)
__LCS %R 40-69% and results <MDL: estimated (UJ)
__LCS %R <40% and all results rejected (R/UR)
__LCS %R >150% and all results rejected (R)
*Lab Control Samples/Lab Control Sample Duplicates (LCS/LCSD)
*Lab Fortified Blanks (LFB)
*Blank Spike / Blank Spike Duplicates (BS/BSD)

Comments/Qualified Results: None.

7. Interference Checks (Check all that apply)…….. √ ☐

__ICS A/B Recoveries Acceptable
__Al, Ca, Fe, Mg sample concentrations > ICS concentrations
__ICS %R > 120%, results >IDL estimated (J)
__ICS %R 50-79%, results >IDL estimated (J)
__ICS %R 50-79%, results <IDL estimated (UJ)
__ICS %R <50%, results >IDL and <IDL rejected (R/UR)

Comments/Qualified Results: IC check is not required as part of Tier IIA Validation.

8. Matrix Spike Recovery (MS/MSD) (Check all that apply)……. √ ☐

_/_Spike %R with 75-125%: ACCEPTED
__MS and PDS %R 30-74%, results > MDL est. (J-), ND=(UJ)
__MS <75% and PDS >75%, results > MDL est. (J), ND=(UJ)
__ MS and PDS %R >125%, detects > MDL est. (J+)
__ MS >125% and PDS <125%, detects > MDL est. (J)
__MS and PDS %R <30% and <75%: results >MDL (J-) ND=(UR)
__Field blanks used for spike analysis?
__Post digest spk rqrd when %R <75, >125%, excpt Ag

Comments/Qualified Results: None.

Acceptable: YES NO

9. Method of Standard Addition (MSA) and Serial Dilutions (SD)….. √ ☐

__Analytical spike %R 85-115%
__Analytical spike %R 40-85%, results > IDL estimated (J)
__Analytical spike %R 10-40%, results <IDL estimated (UJ)
__Analytical spike %R <10%, results <IDL rejected (R)

__SD Analytes >50X MDL ?
__ SD % Diff < 10%
__ SD % Diff > 10%: J results >MDL, UJ for Non-detects

Comments/Qualified Results: NA

10. Detection Limits, Other QC…… √ ☐

WATER:

Inorganics-	**Metals-**	
__pH = 0.1 s.u.	__Al = 0.1 mg/L	__Cd = 0.01 mg/L
/ TDS/TSS = 10 mg/L	/ As = 0.001 mg/L	__Cr = 0.05 mg/L
__Alkalinity = 4 mg/L	__Co = 0.0001 mg/L	__Pb = 0.05 mg/L
__Anions (i.e. Cl^-, SO_4^-) = 1 mg/L	__Cu = 0.0003/0.0008mg/L	__Hg = 0.001 mg/L
__Anions (i.e. F^-) = 0.1 mg/L	__Co (WTP) = 0.001 mg/L	__Ni = 0.05 mg/L
__ DOC = 0.5 mg/L	__Cu (WTP) = 0.001 mg/L	__K = 1 mg/L
__Nitrogen, Ammonia = 0.05 mg/L	__Fe = 0.03 mg/L	__Se = 0.001 mg/L
__Phosphorus, Total = 0.005 mg/L	__Ca = 0.5 mg/L	__Si = 0.1 mg/L
	__Mg = 0.5 mg/L	__Ag = 0.01 mg/L
	__HARD-T = 0.5 mg/L	__Na = 1 mg/L
	__Mn = 0.001 mg/L	__Zn = 0.01 mg/L

SOIL:

Metals-	
__ As = 1 mg/kg	__ = mg/kg
__ Co = 1 mg/kg	__ = mg/kg
__ Cu = 1 mg/kg	__ = mg/kg

Comments/Qualified Results: None.

11. Data Verification and Overall Assessment…… √ ☐

Comments/Qualified Results: None.

Table 1
Sample Collection and Analysis Summary
Blackbird Mine Sampling - July 2020

							Analysis		
SDG	**Field Identification**	**Collection Date & Time**	**Location**	**Lab Identification**	**Matrix**	**QC Samples**	**Total Suspended Solids**	**Dissolved Metals[1]**	**Total Metals[1]**
B20072279	BBSW-01A	7/24/20 16:00	BBSW-01A	B20072279-001	Aqueous	--	X	X	X
B20072279	PASW-09	7/24/20 16:20	PASW-09	B20072279-002	Aqueous	--	X	X	X
B20072279	PASW-19	7/24/20 16:30	PASW-09	B20072279-003	Aqueous	Field Duplicate	X	X	X
B20072279	PASW-29	7/24/20 16:40	PASW-09	B20072279-004	Aqueous	Field Blank	X	X	X

[1]See laboratory data package for list of metals analyzed

Notes:
All analyses performed by Energy Laboratories

Abbreviations:
SDG - Sample Delivery Group

Table 2
Qualfier Summary Table
Blackbird Mine Sampling - July 2020

SDG	Sample Name	Constituent	New Result	New RL	Qualifier	Reason	PDF Page Number
None							

Abbreviations
RL - Reporting Limit
SDG - Sample Delivery Group

METALS & INORGANIC / Tier I & II Data Validation Summary Checklist

GOLDER PROJECT #: 943-1595.011 ph 3100	SITE: BLACKBIRD MINE SITE, SALMON, ID
LABORATORY: ENERGY LABORATORY, BILLINGS	SDG: B20082061

SAMPLES (Total # =)	COLLECTED (Date/Time)	MATRIX
See Table 1		

DATA ASSESSMENT SUMMARY

REVIEW ITEM	ICP/ AES EPA200.7	ICP/ MS EPA200.8	TDS A2540C TSS A2540D	Hardness A2340B Alkalinity A2320B	Anions (ex Cl^-, F^-, SO_4^{-3}) E300.0	OTHER pH A4500-H-B DOC A5310C
1. Data Package Completeness	NA	Θ	Θ	NA	NA	NA
2. Holding Temperatures & Times	NA	O	O	NA	NA	NA
3. Calibration	NA	O	O	NA	NA	NA
4. Lab Blanks, Field Blanks	NA	O	O	NA	NA	NA
5. Lab Duplicate, Field Duplicate RPD	NA	O	O	NA	NA	NA
6. LCS, LFB, Blank Spike	NA	O	O	NA	NA	NA
7. Interference Checks	NA	NA	NA	NA	NA	NA
8. Matrix Spike Recovery (MS/MSD)	NA	O	O	NA	NA	NA
9. MSA and Serial Dilutions	NA	NA	NA	NA	NA	NA
10. Detection Limits, Other QC	NA	O	O	NA	NA	NA
11. Data Verification, Overall Summary	NA	O	O	NA	NA	NA

O = Data had no problems Θ = Problems, but do not affect data NA = Not applicable to this data set.
X = Data qualified due to minor problems [typically estimated data (J/UJ)].
M = Data qualified due to major problems [typically more than 50% qualified (J/UJ)].
Z = Data unacceptable [typically data rejected (R).

Acceptable: YES NO

1. Date Package Completeness (Check if present)…… √ ☐

_x_ Case narrative
_/_ Chain of Custody
_/_ Sample Results
_/_ ICV/CCV Results
_/_ Blank Results
_o_ ICP Interference Check Results
_/_ Spike Recovery Results
_/_ Duplicate Results
_/_ LCS Results
_o_ Standard Addition Results
_o_ ICP Serial Dilution
_o_ Instrument Det. Limits
__Other_____

/ Acceptable
x Absent
o Not required

Comments/Qualified Results: No case narrative provided.

Validated by: Samantha DiCenso **Date:** 09/02/2020
Reviewed by: Ann Muehlfarth **Date:** 09/02/2020

METALS & INORGANIC / Tier I & II Data Validation Summary Checklist

Acceptable: YES NO

2. Holding Temperatures & Times (Check all that apply)…… √ ☐

_/_Recommended Hold Temp. of Cool, ≤6°C met (√ - Yes / x – No)
_/_TDS / TSS analysis completed in <7 days from collection
__Acidity / Alkalinity completed in <14 days from collection
_/_ICP metals completed in <6 months from collection
__Anions (Cl^-, F^-, SO_4^-), DOC analyzed in <28 days from collection
__pH analysis completed in <15 minutes from collection

Comments/Qualified Results: None.

3. Calibrations (Check all that apply)…….. √ ☐

_/_ICV/CCV %R for ICP/AA, 90%-110%, acceptable
__ICV/CCV %R for ICP/AA, 75%-89% or 111%-125%, results estimated (J/UJ)
__ICV/CCV %R for ICP/AA, <75% or >125%, reject positive results (R)

Comments/Qualified Results: None.

4. Lab Blanks, Field Blanks (Check all that apply)…….. √ ☐

__Detects reported in ICB/CCB list:
__ Detects in preparation blanks, results >10x contamination level or ND (no qualifier)
__Detects in preparation blanks, results ≤10x contamination level (J+)
__Detects in field blanks (Note: Advisory condition only and no qualifier)

Field Blank ID: PASW-29
Field Blank ID: _____

Comments/Qualified Results: None.

5. Lab Duplicates, Field Duplicates (Check all that apply)……... √ ☐

_/_Duplicate RPD ≤20% for waters (≤35% for soils) for results >5X CRDL
__Duplicate RPD >20% for waters (>35% for soils) for results >5X CRDL (J)
__Duplicate range is within ±CRDL (± 2X CRDL for soils) for results <5X CRDL (no qualifier)

Field Duplicate ID: PASW-19
Field Duplicate ID: _____

Comments/Qualified Results: None.

Acceptable: YES NO

6. Laboratory Control Samples* (Check all that apply)……..… √ ☐

_/_LCS %R 70-130%: ACCEPTED
__LCS %R 40-69% or >130%, results >MDL: estimated (J-/J+)
__LCS %R 40-69% and results <MDL: estimated (UJ)
__LCS %R <40% and all results rejected (R/UR)
__LCS %R >150% and all results rejected (R)
*Lab Control Samples/Lab Control Sample Duplicates (LCS/LCSD)
*Lab Fortified Blanks (LFB)
*Blank Spike / Blank Spike Duplicates (BS/BSD)

Comments/Qualified Results: None.

7. Interference Checks (Check all that apply)…….. √ ☐

__ICS A/B Recoveries Acceptable
__Al, Ca, Fe, Mg sample concentrations > ICS concentrations
__ICS %R > 120%, results >IDL estimated (J)
__ICS %R 50-79%, results >IDL estimated (J)
__ICS %R 50-79%, results <IDL estimated (UJ)
__ICS %R <50%, results >IDL and <IDL rejected (R/UR)

Comments/Qualified Results: IC check is not required as part of Tier IIA Validation.

8. Matrix Spike Recovery (MS/MSD) (Check all that apply)……. √ ☐

_/_Spike %R with 75-125%: ACCEPTED
__MS and PDS %R 30-74%, results > MDL est. (J-), ND=(UJ)
__MS <75% and PDS >75%, results > MDL est. (J), ND=(UJ)
__ MS and PDS %R >125%, detects > MDL est. (J+)
__ MS >125% and PDS <125%, detects > MDL est. (J)
__MS and PDS %R <30% and <75%: results >MDL (J-) ND=(UR)
__Field blanks used for spike analysis?
__Post digest spk rqrd when %R <75, >125%, excpt Ag

Comments/Qualified Results: None.

Acceptable: YES NO

9. Method of Standard Addition (MSA) and Serial Dilutions (SD)….. √ ☐

__Analytical spike %R 85-115%
__Analytical spike %R 40-85%, results > IDL estimated (J)
__Analytical spike %R 10-40%, results <IDL estimated (UJ)
__Analytical spike %R <10%, results <IDL rejected (R)

__SD Analytes >50X MDL ?
__ SD % Diff < 10%
__ SD % Diff > 10%: J results >MDL, UJ for Non-detects

Comments/Qualified Results: NA

10. Detection Limits, Other QC…… √ ☐

WATER:

Inorganics-	**Metals-**	
__pH = 0.1 s.u.	__Al = 0.1 mg/L	__Cd = 0.01 mg/L
_/_ TDS/TSS = 10 mg/L	_/_ As = 0.001 mg/L	__Cr = 0.05 mg/L
__Alkalinity = 4 mg/L	__Co = 0.0001 mg/L	__Pb = 0.05 mg/L
__Anions (i.e. Cl^-, SO_4^-) = 1 mg/L	__Cu = 0.0003/0.0008mg/L	__Hg = 0.001 mg/L
__Anions (i.e. F^-) = 0.1 mg/L	__Co (WTP) = 0.001 mg/L	__Ni = 0.05 mg/L
__ DOC = 0.5 mg/L	__Cu (WTP) = 0.001 mg/L	__K = 1 mg/L
__Nitrogen, Ammonia = 0.05 mg/L	__Fe = 0.03 mg/L	__Se = 0.001 mg/L
__Phosphorus, Total = 0.005 mg/L	__Ca = 0.5 mg/L	__Si = 0.1 mg/L
	__Mg = 0.5 mg/L	__Ag = 0.01 mg/L
	__HARD-T = 0.5 mg/L	__Na = 1 mg/L
	__Mn = 0.001 mg/L	__Zn = 0.01 mg/L

SOIL:

Metals-	
__ As = 1 mg/kg	__ = mg/kg
__ Co = 1 mg/kg	__ = mg/kg
__ Cu = 1 mg/kg	__ = mg/kg

Comments/Qualified Results: None.

11. Data Verification and Overall Assessment…… √ ☐

Comments/Qualified Results: None.

Table 1
Sample Collection and Analysis Summary
Blackbird Mine Sampling - August 2020

							Analysis		
SDG	**Field Identification**	**Collection Date & Time**	**Location**	**Lab Identification**	**Matrix**	**QC Samples**	**Total Suspended Solids**	**Dissolved Metals[1]**	**Total Metals[1]**
B20082061	BBSW-01A	8/19/20 15:00	BBSW-01A	B20082061-001	Aqueous	--	X	X	X
B20082061	PASW-09	8/19/20 15:20	PASW-09	B20082061-002	Aqueous	--	X	X	X
B20082061	PASW-19	8/19/20 15:30	PASW-09	B20082061-003	Aqueous	Field Duplicate	X	X	X
B20082061	PASW-29	8/19/20 15:40	PASW-09	B20082061-004	Aqueous	Field Blank	X	X	X

[1]See laboratory data package for list of metals analyzed

Notes:
All analyses performed by Energy Laboratories

Abbreviations:
SDG - Sample Delivery Group

Table 2
Qualifier Summary Table
Blackbird Mine Sampling - August 2020

SDG	Sample Name	Constituent	New Result	New RL	Qualifier	Reason	PDF Page Number
None							

Abbreviations
RL - Reporting Limit
SDG - Sample Delivery Group

METALS & INORGANIC / Tier I & II Data Validation Summary Checklist

GOLDER PROJECT #: 943-1595.011 ph 3100	SITE: BLACKBIRD MINE SITE, SALMON, ID
LABORATORY: ENERGY LABORATORY, BILLINGS	SDG: B20082658

SAMPLES (Total # =)	COLLECTED (Date/Time)	MATRIX
See Table 1		

DATA ASSESSMENT SUMMARY

REVIEW ITEM	ICP/ AES EPA200.7	ICP/ MS EPA200.8	TDS A2540C TSS A2540D	Hardness A2340B Alkalinity A2320B	Anions (ex Cl^-, F^-, SO_4^{-3}) E300.0	OTHER pH A4500-H-B DOC A5310C
1. Data Package Completeness	Θ	Θ	NA	NA	NA	NA
2. Holding Temperatures & Times	Θ	Θ	NA	NA	NA	NA
3. Calibration	O	O	NA	NA	NA	NA
4. Lab Blanks, Field Blanks	O	Θ	NA	NA	NA	NA
5. Lab Duplicate, Field Duplicate RPD	NA	NA	NA	NA	NA	NA
6. LCS, LFB, Blank Spike	O	O	NA	NA	NA	NA
7. Interference Checks	NA	NA	NA	NA	NA	NA
8. Matrix Spike Recovery (MS/MSD)	O	O	NA	NA	NA	NA
9. MSA and Serial Dilutions	NA	NA	NA	NA	NA	NA
10. Detection Limits, Other QC	O	O	NA	NA	NA	NA
11. Data Verification, Overall Summary	O	O	NA	NA	NA	NA

O = Data had no problems Θ = Problems, but do not affect data NA = Not applicable to this data set.
X = Data qualified due to minor problems [typically estimated data (J/UJ)].
M = Data qualified due to major problems [typically more than 50% qualified (J/UJ)].
Z = Data unacceptable [typically data rejected (R).

Acceptable: YES NO

1. Date Package Completeness (Check if present)…… √ ☐

_x_Case narrative
_/_Chain of Custody
_/_Sample Results
_/_ICV/CCV Results
_/_Blank Results
_o_ICP Interference Check Results
_o_Spike Recovery Results
_x_Duplicate Results
_/_LCS Results
_o_Standard Addition Results
_o_ICP Serial Dilution
_o_Instrument Det. Limits
__Other_____

/ Acceptable
x Absent
o Not required

Comments/Qualified Results: No case narrative provided.

Validated by: Samantha DiCenso **Date:** 09/11/2020
Reviewed by: Ann Muehlfarth **Date:** 09/15/2020

METALS & INORGANIC / Tier I & II Data Validation Summary Checklist

Acceptable: YES NO

2. Holding Temperatures & Times (Check all that apply)…… √ ☐

_x_Recommended Hold Temp. of Cool, ≤6°C met (√ - Yes / x – No)
__TDS / TSS analysis completed in <7 days from collection
__Acidity / Alkalinity completed in <14 days from collection
_/_ICP metals completed in <6 months from collection
__Anions (Cl^-, F^-, SO_4^-), DOC analyzed in <28 days from collection
__pH analysis completed in <15 minutes from collection

Comments/Qualified Results: The cooler temperature upon receipt was recorded at 19.7°C. Using professional judgement and following project-specific requirements qualification of metals results was not required because the samples were preserved to pH<2.

3. Calibrations (Check all that apply)…….. √ ☐

_/_ICV/CCV %R for ICP/AA, 90%-110%, acceptable
__ICV/CCV %R for ICP/AA, 75%-89% or 111%-125%, results estimated (J/UJ)
__ICV/CCV %R for ICP/AA, <75% or >125%, reject positive results (R)

Comments/Qualified Results: None.

4. Lab Blanks, Field Blanks (Check all that apply)…….. √ ☐

__Detects reported in ICB/CCB list: Field Blank ID: _____
_/_ Detects in preparation blanks, results >10x contamination level or ND (no qualifier) Field Blank ID: _____
__Detects in preparation blanks, results ≤10x contamination level (J+)
__Detects in field blanks (Note: Advisory condition only and no qualifier)

Comments/Qualified Results: Iron detected in method blank (LRB at 0.002 mg/L) associated with the dissolved metals results (batch R347970). Result is greater than 10x contamination level, no qualification is required.

5. Lab Duplicates, Field Duplicates (Check all that apply)……... √ ☐

__Duplicate RPD ≤20% for waters (≤35% for soils) for results >5X CRDL Field Duplicate ID: _____
__Duplicate RPD >20% for waters (>35% for soils) for results >5X CRDL (J) Field Duplicate ID: _____
__Duplicate range is within ±CRDL (± 2X CRDL for soils) for results <5X CRDL (no qualifier)

Comments/Qualified Results: No duplicates listed.

Acceptable: YES NO

6. Laboratory Control Samples* (Check all that apply)……..… √ ☐

_/_LCS %R 70-130%: ACCEPTED
__LCS %R 40-69% or >130%, results >MDL: estimated (J-/J+)
__LCS %R 40-69% and results <MDL: estimated (UJ)
__LCS %R <40% and all results rejected (R/UR)
__LCS %R >150% and all results rejected (R)
*Lab Control Samples/Lab Control Sample Duplicates (LCS/LCSD)
*Lab Fortified Blanks (LFB)
*Blank Spike / Blank Spike Duplicates (BS/BSD)

Comments/Qualified Results: None.

7. Interference Checks (Check all that apply)…….. √ ☐

__ICS A/B Recoveries Acceptable
__Al, Ca, Fe, Mg sample concentrations > ICS concentrations
__ICS %R > 120%, results >IDL estimated (J)
__ICS %R 50-79%, results >IDL estimated (J)
__ICS %R 50-79%, results <IDL estimated (UJ)
__ICS %R <50%, results >IDL and <IDL rejected (R/UR)

Comments/Qualified Results: IC check is not required as part of Tier IIA Validation.

8. Matrix Spike Recovery (MS/MSD) (Check all that apply)……. √ ☐

_/_Spike %R with 75-125%: ACCEPTED
__MS and PDS %R 30-74%, results > MDL est. (J-), ND=(UJ)
__MS <75% and PDS >75%, results > MDL est. (J), ND=(UJ)
__ MS and PDS %R >125%, detects > MDL est. (J+)
__ MS >125% and PDS <125%, detects > MDL est. (J)
__MS and PDS %R <30% and <75%: results >MDL (J-) ND=(UR)
__Field blanks used for spike analysis?
__Post digest spk rqrd when %R <75, >125%, excpt Ag

Comments/Qualified Results: MS/MSD analyses were for unrelated samples.

Acceptable: YES NO

9. Method of Standard Addition (MSA) and Serial Dilutions (SD)….. √ ☐

__Analytical spike %R 85-115%
__Analytical spike %R 40-85%, results > IDL estimated (J)
__Analytical spike %R 10-40%, results <IDL estimated (UJ)
__Analytical spike %R <10%, results <IDL rejected (R)

__SD Analytes >50X MDL ?
__ SD % Diff < 10%
__ SD % Diff > 10%: J results >MDL, UJ for Non-detects

Comments/Qualified Results: NA

10. Detection Limits, Other QC…… √ ☐

WATER:			SOIL:	
Inorganics-	**Metals-**		**Metals-**	
__pH = 0.1 s.u.	__Al = 0.1 mg/L	__Cd = 0.01 mg/L	__ As = 1 mg/kg	__ = mg/kg
__TDS/TSS = 10 mg/L	__As = 0.001 mg/L	__Cr = 0.05 mg/L	__ Co = 1 mg/kg	__ = mg/kg
__Alkalinity = 4 mg/L	__Co = 0.0001 mg/L	__Pb = 0.05 mg/L	__ Cu = 1 mg/kg	__ = mg/kg
__Anions (i.e. Cl^-, SO_4^-) = 1 mg/L	__Cu = 0.0003/0.0008mg/L	__Hg = 0.001 mg/L		
__Anions (i.e. F^-) = 0.1 mg/L	__/__Co (WTP) = 0.001 mg/L	__Ni = 0.05 mg/L		
__ DOC = 0.5 mg/L	__/ Cu (WTP) = 0.001 mg/L	__K = 1 mg/L		
__Nitrogen, Ammonia = 0.05 mg/L	__/ Fe = 0.03 mg/L	__Se = 0.001 mg/L		
__Phosphorus, Total = 0.005 mg/L	__Ca = 0.5 mg/L	__Si = 0.1 mg/L		
	__Mg = 0.5 mg/L	__Ag = 0.01 mg/L		
	__HARD-T = 0.5 mg/L	__Na = 1 mg/L		
	__Mn = 0.001 mg/L	__Zn = 0.01 mg/L		

Comments/Qualified Results: None.

11. Data Verification and Overall Assessment…… √ ☐

Comments/Qualified Results: None.

Table 1
Sample Collection and Analysis Summary
Blackbird Mine Sampling - August 2020

							Analysis		
SDG	**Field Identification**	**Collection Date & Time**	**Location**	**Lab Identification**	**Matrix**	**QC Samples**	**Total Dissolved Solids**	**Dissolved Metals[1]**	**Total Metals[1]**
B20082658	WTP-C	8/26/20 12:30	WTP-C	B20082658-001	Aqueous	--		X	X

[1]See laboratory data package for list of metals analyzed

Notes:
All analyses performed by Energy Laboratories

Abbreviations:
SDG - Sample Delivery Group

Table 2
Qualfier Summary Table
Blackbird Mine Sampling - August 2020

SDG	Sample Name	Constituent	New Result	New RL	Qualifier	Reason	PDF Page Number
None							

Abbreviations
RL - Reporting Limit
SDG - Sample Delivery Group

2020 Fall Data Packages

METALS & INORGANIC / Tier I & II Data Validation Summary Checklist

GOLDER PROJECT #: 943-1595.011 ph 3100	SITE: BLACKBIRD MINE SITE, SALMON, ID
LABORATORY: ENERGY LABORATORY, BILLINGS	SDG: B20091119

SAMPLES (Total # =)	COLLECTED (Date/Time)	MATRIX
See Table 1		

DATA ASSESSMENT SUMMARY

REVIEW ITEM	ICP/ AES EPA200.7	ICP/ MS EPA200.8	TDS A2540C TSS A2540D	Hardness A2340B Alkalinity A2320B	Anions (ex Cl^-, F^-, SO_4^{-2}) E300.0	OTHER pH A4500-H-B DOC A5310C
1. Data Package Completeness	O	O	O	O	O	O
2. Holding Temperatures & Times	Θ	Θ	Θ	Θ	Θ	X
3. Calibration	O	O	O	O	O	O
4. Lab Blanks, Field Blanks	X	Θ	O	O	O	O
5. Lab Duplicate, Field Duplicate RPD	O	O	O	O	O	O
6. LCS, LFB, Blank Spike	O	O	O	O	O	O
7. Interference Checks	NA	NA	NA	NA	NA	NA
8. Matrix Spike Recovery (MS/MSD)	X	X	O	O	O	O
9. MSA and Serial Dilutions	NA	NA	NA	NA	NA	NA
10. Detection Limits, Other QC	O	O	O	O	O	O
11. Data Verification, Overall Summary	O	O	O	O	O	O

O = Data had no problems Θ = Problems, but do not affect data NA = Not applicable to this data set.
X = Data qualified due to minor problems [typically estimated data (J/UJ)].
M = Data qualified due to major problems [typically more than 50% qualified (J/UJ)].
Z = Data unacceptable [typically data rejected (R).

	Acceptable: YES	NO
1. Date Package Completeness (Check if present)……	√	☐

_/_Case narrative
_/_Chain of Custody
_/_Sample Results
_/_ICV/CCV Results
_/_Blank Results
_o_ICP Interference Check Results
_/_Spike Recovery Results
_/_Duplicate Results
_/_LCS Results
_o_Standard Addition Results
_o_ICP Serial Dilution
_o_Instrument Det. Limits
__Other_____

/ Acceptable
x Absent
o Not required

Comments/Qualified Results: The case narrative states that tests associated with analyst identified as ELI-CA were subcontracted to Energy Laboratories in Casper, Wyoming. Dissolved cobalt results is greater than total cobalt result (confirmed by re-analysis of both results) in SFSW-04, BDSW-03, BDSW-13, BDSW-23, and BDSW-01.
TDS did not obtain the minimum residue requirement of 2.5 mg residue.

Validated by: Ann Muehlfarth **Date:** 10/05/2020
Reviewed by: Samantha DiCenso **Date:** 10/12/2020

METALS & INORGANIC / Tier I & II Data Validation Summary Checklist

Acceptable: YES NO

2. Holding Temperatures & Times (Check all that apply)…… √ ☐

_x_Recommended Hold Temp. of Cool, ≤6°C met (√ - Yes / x – No)
_/_TDS / TSS analysis completed in <7 days from collection
_/_Acidity / Alkalinity completed in <14 days from collection
_/_ICP metals completed in <6 months from collection
_/_Anions (Cl^-, F^-, SO_4^-), DOC analyzed in <28 days from collection
_x_pH analysis completed in <15 minutes from collection

Comments/Qualified Results: The cooler temperature upon receipt was recorded at 18.0°C. Using professional judgement and following project-specific requirements qualification of metals results was not required because the samples were preserved to pH<2. pH analysis was not completed within 15 minutes of sample collection; therefore, results are qualified as estimated values.

3. Calibrations (Check all that apply)…….. √ ☐

_/_ICV/CCV %R for ICP/AA, 90%-110%, acceptable
__ICV/CCV %R for ICP/AA, 75%-89% or 111%-125%, results estimated (J/UJ)
__ICV/CCV %R for ICP/AA, <75% or >125%, reject positive results (R)

Comments/Qualified Results: None.

4. Lab Blanks, Field Blanks (Check all that apply)…….. √ ☐

__Detects reported in ICB/CCB list:
_/_ Detects in preparation blanks, results >10x contamination level or ND (no qualifier)
__Detects in preparation blanks, results ≤10x contamination level (J+)
_/_Detects in field blanks (Note: Advisory condition only and no qualifier)

Field Blank ID: BDSW-23
Field Blank ID: _____

Comments/Qualified Results: Dissolved Cobalt was detected in Field Blank BDSW-23B at 0.0002 mg/L. (advisory condition only and no qualifier)
Method blank (MB-148484) detection of total cobalt 0.00010 mg/L associated with batch 148484.

5. Lab Duplicates, Field Duplicates (Check all that apply)……... √ ☐

_/_Duplicate RPD ≤20% for waters (≤35% for soils) for results >5X CRDL
__Duplicate RPD >20% for waters (>35% for soils) for results >5X CRDL (J)
__Duplicate range is within ±CRDL (± 2X CRDL for soils) for results <5X CRDL (no qualifier)

Field Duplicate ID: BDSW-13
Field Duplicate ID: _____

Comments/Qualified Results: None.

Acceptable: YES NO

6. Laboratory Control Samples* (Check all that apply)……..… √ ☐

_/_LCS %R 70-130%: ACCEPTED
__LCS %R 40-69% or >130%, results >MDL: estimated (J-/J+)
__LCS %R 40-69% and results <MDL: estimated (UJ)
__LCS %R <40% and all results rejected (R/UR)
__LCS %R >150% and all results rejected (R)
*Lab Control Samples/Lab Control Sample Duplicates (LCS/LCSD)
*Lab Fortified Blanks (LFB)
*Blank Spike / Blank Spike Duplicates (BS/BSD)

Comments/Qualified Results: None.

7. Interference Checks (Check all that apply)…….. √ ☐

__ICS A/B Recoveries Acceptable
__Al, Ca, Fe, Mg sample concentrations > ICS concentrations
__ICS %R > 120%, results >IDL estimated (J)
__ICS %R 50-79%, results >IDL estimated (J)
__ICS %R 50-79%, results <IDL estimated (UJ)
__ICS %R <50%, results >IDL and <IDL rejected (R/UR)

Comments/Qualified Results: IC check is not required as part of Tier IIA Validation.

8. Matrix Spike Recovery (MS/MSD) (Check all that apply)……. √ ☐

__Spike %R with 75-125%: ACCEPTED
__MS and PDS %R 30-74%, results > MDL est. (J-), ND=(UJ)
__MS <75% and PDS >75%, results > MDL est. (J), ND=(UJ)
_/_ MS and PDS %R >125%, detects > MDL est. (J+)
__ MS >125% and PDS <125%, detects > MDL est. (J)
__MS and PDS %R <30% and <75%: results >MDL (J-) ND=(UR)
__Field blanks used for spike analysis?
__Post digest spk rqrd when %R <75, >125%, excpt Ag

Comments/Qualified Results: MS % recovery high for calcium and copper in batch 148484, and MSD % recovery high from calcium in batch 148484.

Acceptable: YES NO

9. Method of Standard Addition (MSA) and Serial Dilutions (SD)….. √ □

__Analytical spike %R 85-115%
__Analytical spike %R 40-85%, results > IDL estimated (J)
__Analytical spike %R 10-40%, results <IDL estimated (UJ)
__Analytical spike %R <10%, results <IDL rejected (R)

__SD Analytes >50X MDL ?
__ SD % Diff < 10%
__ SD % Diff > 10%: J results >MDL, UJ for Non-detects

Comments/Qualified Results: NA

10. Detection Limits, Other QC…… √ □

WATER:

Inorganics-	Metals-	
_/_pH = 0.1 s.u.	__Al = 0.1 mg/L	__Cd = 0.01 mg/L
_/_TDS/TSS = 10 mg/L	_/_As = 0.001 mg/L	__Cr = 0.05 mg/L
_/_Alkalinity = 4 mg/L	_x_Co = 0.0001 mg/L	__Pb = 0.05 mg/L
_/_Anions (i.e. Cl^-, SO_4^-) = 1 mg/L	x_Cu = 0.0003/0.0008mg/L	__Hg = 0.001 mg/L
__Anions (i.e. F^-) = 0.1 mg/L	__Co (WTP) = 0.001 mg/L	__Ni = 0.05 mg/L
/_DOC = 0.5 mg/L	__Cu (WTP) = 0.001 mg/L	/_K = 1 mg/L
__Nitrogen, Ammonia = 0.05 mg/L	_/_Fe = 0.03 mg/L	__Se = 0.001 mg/L
__Phosphorus, Total = 0.005 mg/L	_/_Ca = 0.5 mg/L	__Si = 0.1 mg/L
	_/_Mg = 0.5 mg/L	__Ag = 0.01 mg/L
	_x_HARD-T = 0.5 mg/L	_/_Na = 1 mg/L
	__Mn = 0.001 mg/L	__Zn = 0.01 mg/L

SOIL:

Metals-		
__ As = 1 mg/kg	__ = mg/kg	
__ Co = 1 mg/kg	__ = mg/kg	
__ Cu = 1 mg/kg	__ = mg/kg	

Comments/Qualified Results: The reporting limit for total copper was 0.0004 mg/L in the following samples: BTSW-1.6, SFSW-04, SFSW-02, SFSW-01, BDSW-13, BDSW-23, PASW-05, PASW-04x, BTSW-01, BDSW-04, BDSW-01, and PASW-34x.
The reporting limit for dissolved copper was 0.0004 mg/L in the following samples: BDSW-03, BDSW-23, PASW-05, PASW-04x, BDSW-01, BTSEEP, and PASW-34x.
The reporting limit for total copper in PASW-05 and BTSEEP was 0.01 mg/L.
The reporting limit for total cobalt in BTSEEP was 0.003 mg/L.
The reporting limit for hardness in SFSW-02 was 1.

11. Data Verification and Overall Assessment…… √ □

Comments/Qualified Results: See Table 2.

Table 1
Sample Collection and Analysis Summary
Blackbird Mine Sampling - September 2020

							Analysis						
SDG	**Field Identification**	**Collection Date & Time**	**Location**	**Lab Identification**	**Matrix**	**QC Samples**	**Total Dissolved Solids**	**Total Suspended Solids**	**Anions**	**Alkalinity and/or Hardness (as CaCO3)**	**Dissolved Metals[1]**	**Total Metals[1]**	**Other (pH, DOC)**
B20091119	BTSW-1.6	9/9/20 10:00	BTSW-1.6	B20091119-001	Aqueous	NA		X	X	X	X	X	
B20091119	SFSW-04	9/9/20 10:45	SFSW-04	B20091119-002	Aqueous	NA		X	X	X	X	X	
B20091119	BTSW-01	9/9/20 10:25	BTSW-01	B20091119-003	Aqueous	NA		X	X	X	X	X	
B20091119	SFSW-02	9/9/20 11:10	SFSW-02	B20091119-004	Aqueous	NA	X	X	X	X	X	X	X
B20091119	BDSW-04	9/9/20 11:50	BDSW-04	B20091119-005	Aqueous	NA		X	X	X	X	X	
B20091119	SFSW-01	9/9/20 11:30	SFSW-01	B20091119-006	Aqueous	NA	X	X	X	X	X	X	X
B20091119	BDSW-03	9/9/20 12:20	BDSW-03	B20091119-007	Aqueous	NA	X	X	X	X	X	X	X
B20091119	BDSW-13	9/9/20 12:30	BDSW-03	B20091119-008	Aqueous	Field Duplicate	X	X	X	X	X	X	X
B20091119	BDSW-23	9/9/20 12:40	BDSW-03	B20091119-009	Aqueous	Field Blank	X	X	X	X	X	X	X
B20091119	PASW-05	9/9/20 14:00	PASW-05	B20091119-010	Aqueous	NA		X	X	X	X	X	
B20091119	PASW-04x	9/9/20 15:00	PASW-04x	B20091119-011	Aqueous	NA	X	X	X	X	X	X	X
B20091119	BDSW-01	9/9/20 14:30	BDSW-01	B20091119-012	Aqueous	NA	X	X	X	X	X	X	X
B20091119	BTSEEP	9/9/20 9:40	BTSEEP	B20091119-013	Aqueous	NA		X	X	X	X	X	
B20091119	PASW-34x	9/9/20 15:10	PASW-04x	B20091119-014	Aqueous	Field Control Sample				X	X	X	

[1]See laboratory data package for list of metals analyzed

Notes:
All analyses performed by Energy Laboratories

Abbreviations:
SDG - Sample Delivery Group

Table 2
Qualifier Summary Table
Blackbird Mine Sampling - September 2020

SDG	Sample Name	Constituent	New Result	New RL	Qualifier	Reason	PDF Page Number
B20091119	SFSW-02	pH	8.1	0.1	J	pH analyzed outside of hold time	7
B20091119	SFSW-01	pH	8.0	0.1	J	pH analyzed outside of hold time	9
B20091119	BDSW-03	pH	7.8	0.1	J	pH analyzed outside of hold time	10
B20091119	BDSW-13	pH	7.7	0.1	J	pH analyzed outside of hold time	11
B20091119	BDSW-23	pH	5.8	0.1	J	pH analyzed outside of hold time	12
B20091119	PASW-04x	pH	8.2	0.1	J	pH analyzed outside of hold time	14
B20091119	BDSW-01	pH	7.9	0.1	J	pH analyzed outside of hold time	15
B20091119	SFSW-04	Cobalt	0.0001	1E-04	U	Detected in MB, sample result <10x blank result	5
B20091119	BTSEEP	Calcium	33.5	0.5	J+	MS/MSD % recovery high	16
B20091119	BTSEEP	Copper	2.27	0.01	J+	MS/MSD % recovery high	16

Abbreviations
RL - Reporting Limit
SDG - Sample Delivery Group

Qualifier Definitions
J - Result is an estimated value
J+ Result is an estimated value (estimated high)
U - Result is non-detect

METALS & INORGANIC / Tier I & II Data Validation Summary Checklist

GOLDER PROJECT #: 943-1595.011 ph 3100	SITE: BLACKBIRD MINE SITE, SALMON, ID
LABORATORY: ENERGY LABORATORY, BILLINGS	SDG: B20091666

SAMPLES (Total # =)	COLLECTED (Date/Time)	MATRIX
See Table 1		

DATA ASSESSMENT SUMMARY

REVIEW ITEM	ICP/ AES EPA200.7	ICP/ MS EPA200.8	TDS A2540C TSS A2540D	Hardness A2340B Alkalinity A2320B	Anions (ex Cl^-, F^-, SO_4^{-2}) E300.0	OTHER pH A4500-H-B DOC A5310C
1. Data Package Completeness	Θ	Θ	Θ	NA	NA	NA
2. Holding Temperatures & Times	O	O	O	NA	NA	NA
3. Calibration	O	O	O	NA	NA	NA
4. Lab Blanks, Field Blanks	O	X	Θ	NA	NA	NA
5. Lab Duplicate, Field Duplicate RPD	O	X	O	NA	NA	NA
6. LCS, LFB, Blank Spike	O	O	O	NA	NA	NA
7. Interference Checks	NA	NA	NA	NA	NA	NA
8. Matrix Spike Recovery (MS/MSD)	O	O	O	NA	NA	NA
9. MSA and Serial Dilutions	NA	NA	NA	NA	NA	NA
10. Detection Limits, Other QC	O	O	O	NA	NA	NA
11. Data Verification, Overall Summary	O	O	O	NA	NA	NA

O = Data had no problems Θ = Problems, but do not affect data NA = Not applicable to this data set.
X = Data qualified due to minor problems [typically estimated data (J/UJ)].
M = Data qualified due to major problems [typically more than 50% qualified (J/UJ)].
Z = Data unacceptable [typically data rejected (R).

	Acceptable: YES	NO
1. Date Package Completeness (Check if present)……	√	☐

_x_Case narrative
_/_Chain of Custody
_/_Sample Results
_/_ICV/CCV Results
_/_Blank Results
_o_ICP Interference Check Results
_/_Spike Recovery Results

_/_Duplicate Results
_/_LCS Results
_o_Standard Addition Results
_o_ICP Serial Dilution
_o_Instrument Det. Limits
__Other_____

/ Acceptable
x Absent
o Not required

Comments/Qualified Results: No case narrative provided. Sample WFMW-1D was listed on the chain of custody however it was not received, it will be sent at a later date.

Validated by: Annie Muehlfarth **Date:** 10/13/2020
Reviewed by: Samantha DiCenso **Date:** 10/13/2020

METALS & INORGANIC / Tier I & II Data Validation Summary Checklist

Acceptable: YES NO

2. Holding Temperatures & Times (Check all that apply)…… √ ☐

_/_Recommended Hold Temp. of Cool, ≤6°C met (√ - Yes / x – No)
_/_TDS / TSS analysis completed in <7 days from collection
__Acidity / Alkalinity completed in <14 days from collection
_/_ICP metals completed in <6 months from collection
__Anions (Cl^-, F^-, SO_4^-), DOC analyzed in <28 days from collection
__pH analysis completed in <15 minutes from collection

Comments/Qualified Results: None.

3. Calibrations (Check all that apply)…….. √ ☐

_/_ICV/CCV %R for ICP/AA, 90%-110%, acceptable
__ICV/CCV %R for ICP/AA, 75%-89% or 111%-125%, results estimated (J/UJ)
__ICV/CCV %R for ICP/AA, <75% or >125%, reject positive results (R)

Comments/Qualified Results: None.

4. Lab Blanks, Field Blanks (Check all that apply)…….. √ ☐

__Detects reported in ICB/CCB list: Field Blank ID: _____
_/_ Detects in preparation blanks, results >10x contamination level or ND (no qualifier) Field Blank ID: _____
_/_Detects in preparation blanks, results ≤10x contamination level (J+)
__Detects in field blanks (Note: Advisory condition only and no qualifier)

Comments/Qualified Results: TSS detected in method blank (MB-148719) at 0.2 mg/L, result in associated sample non-detect, no qualification necessary.
TDS detected in method blank (MB-148783) at 1.0 mg/L, results in associated samples >10x blank result or non-detect, no qualification necessary.
Iron detected in method blank (LRB, batch R348838) at 0.001 mg/L, results in associated samples >10x blank result or non-detect, no qualification necessary.
Copper and Iron detected in method blank (MB-148610), associated with batch R348838, at 0.0004 and 0.001 mg/L, respectively. Results that required qualification were qualified with "J+".

5. Lab Duplicates, Field Duplicates (Check all that apply)……... √ ☐

__Duplicate RPD ≤20% for waters (≤35% for soils) for results >5X CRDL Field Duplicate ID: WFMW-19
_/_Duplicate RPD >20% for waters (>35% for soils) for results >5X CRDL (J) Field Duplicate ID: _____
__Duplicate range is within ±CRDL (± 2X CRDL for soils) for results <5X CRDL (no qualifier)

Comments/Qualified Results: Iron was detected in the field duplicate and non-detect in the associated sample and the results are < 5X RL and absolute difference between original and duplicate is > RL, therefore the detected result is qualified with a J and non-detect with a UJ, per NFG guidelines.
The sample/duplicate RPD for Copper is 50%.

METALS & INORGANIC / Tier I & II Data Validation Summary Checklist

Acceptable: YES NO

6. Laboratory Control Samples* (Check all that apply)……..… √ ☐

_/_LCS %R 70-130%: ACCEPTED
__LCS %R 40-69% or >130%, results >MDL: estimated (J-/J+)
__LCS %R 40-69% and results <MDL: estimated (UJ)
__LCS %R <40% and all results rejected (R/UR)
__LCS %R >150% and all results rejected (R)
*Lab Control Samples/Lab Control Sample Duplicates (LCS/LCSD)
*Lab Fortified Blanks (LFB)
*Blank Spike / Blank Spike Duplicates (BS/BSD)

Comments/Qualified Results: None.

7. Interference Checks (Check all that apply)…….. √ ☐

__ICS A/B Recoveries Acceptable
__Al, Ca, Fe, Mg sample concentrations > ICS concentrations
__ICS %R > 120%, results >IDL estimated (J)
__ICS %R 50-79%, results >IDL estimated (J)
__ICS %R 50-79%, results <IDL estimated (UJ)
__ICS %R <50%, results >IDL and <IDL rejected (R/UR)

Comments/Qualified Results: IC check is not required as part of Tier IIA Validation.

8. Matrix Spike Recovery (MS/MSD) (Check all that apply)……. √ ☐

_/_Spike %R with 75-125%: ACCEPTED
__MS and PDS %R 30-74%, results > MDL est. (J-), ND=(UJ)
__MS <75% and PDS >75%, results > MDL est. (J), ND=(UJ)
__ MS and PDS %R >125%, detects > MDL est. (J+)
__ MS >125% and PDS <125%, detects > MDL est. (J)
__MS and PDS %R <30% and <75%: results >MDL (J-) ND=(UR)
__Field blanks used for spike analysis?
__Post digest spk rqrd when %R <75, >125%, excpt Ag

Comments/Qualified Results: None.

Acceptable: YES NO

9. Method of Standard Addition (MSA) and Serial Dilutions (SD)….. √ ☐

__Analytical spike %R 85-115%
__Analytical spike %R 40-85%, results > IDL estimated (J)
__Analytical spike %R 10-40%, results <IDL estimated (UJ)
__Analytical spike %R <10%, results <IDL rejected (R)

__SD Analytes >50X MDL ?
__ SD % Diff < 10%
__ SD % Diff > 10%: J results >MDL, UJ for Non-detects

Comments/Qualified Results: NA

10. Detection Limits, Other QC…… √ ☐

WATER:

Inorganics-	Metals-	
__pH = 0.1 s.u.	__Al = 0.1 mg/L	__Cd = 0.01 mg/L
_/_ TDS/TSS = 10 mg/L	_/_ As = 0.001 mg/L	__Cr = 0.05 mg/L
__Alkalinity = 4 mg/L	_x_ Co = 0.0001 mg/L	__Pb = 0.05 mg/L
__Anions (i.e. Cl^-, SO_4^{2-}) = 1 mg/L	x_Cu = 0.0003/0.0008mg/L	__Hg = 0.001 mg/L
__Anions (i.e. F^-) = 0.1 mg/L	__Co (WTP) = 0.001 mg/L	__Ni = 0.05 mg/L
__ DOC = 0.5 mg/L	__Cu (WTP) = 0.001 mg/L	__K = 1 mg/L
__Nitrogen, Ammonia = 0.05 mg/L	_x_ Fe = 0.03 mg/L	__Se = 0.001 mg/L
__Phosphorus, Total = 0.005 mg/L	__Ca = 0.5 mg/L	__Si = 0.1 mg/L
	__Mg = 0.5 mg/L	__Ag = 0.01 mg/L
	__HARD-T = 0.5 mg/L	__Na = 1 mg/L
	__Mn = 0.001 mg/L	__Zn = 0.01 mg/L

SOIL:

Metals-		
__ As = 1 mg/kg	__ = mg/kg
__ Co = 1 mg/kg	__ = mg/kg
__ Cu = 1 mg/kg	__ = mg/kg

Comments/Qualified Results: The reporting limit for dissolved copper was increased (0.0004 mg/L) in the following samples: WFMW-09, WFMW-29, WFMW-02, and WFMW-1S.
The reporting limit for dissolved cobalt was increased (0.004 mg/L) in the following samples: WFMW-02 and WFMW-1S.
The reporting limit for dissolved iron was increased (0.1 mg/L) in the following samples: WFMW-02 and WFMW-1S

11. Data Verification and Overall Assessment…… √ ☐

Comments/Qualified Results: See table 2 for qualifiers.

Table 1
Sample Collection and Analysis Summary
Blackbird Mine Sampling - Septmeber 2020

							Analysis			
SDG	**Field Identification**	**Collection Date & Time**	**Location**	**Lab Identification**	**Matrix**	**QC Samples**	**Total Dissolved Solids**	**Total Suspended Solids**	**Dissolved Metals[1]**	**Total Metals[1]**
B20091666	BBSW-01A	9/16/20 8:50	BBSW-01A	B20091666-001	Aqueous	--		X	X	X
B20091666	PASW-09	9/16/20 9:10	PASW-09	B20091666-002	Aqueous	--		X	X	X
B20091666	WFMW-09	9/16/20 10:00	WFMW-09	B20091666-003	Aqueous	--	X		X	
B20091666	WFMW-19	9/16/20 10:10	PASW-09	B20091666-004	Aqueous	Field Duplicate	X		X	
B20091666	WFMW-29	9/16/20 10:20	PASW-09	B20091666-005	Aqueous	Field Blank	X		X	
B20091666	WFMW-02	9/16/20 11:00	WFMW-02	B20091666-006	Aqueous	--	X		X	
B20091666	WFMW-1S	9/16/20 0:30	WFMW-1S	B20091666-007	Aqueous	--	X		X	

[1]See laboratory data package for list of metals analyzed

Notes:
All analyses performed by Energy Laboratories

Abbreviations:
SDG - Sample Delivery Group

Table 2
Qualifier Summary Table
Blackbird Mine Sampling - Septmeber 2020

SDG	Sample Name	Constituent	New Result	New RL	Qualifier	Reason	PDF Page Number
B20091666	WFMW-09	Copper	--	--	J+	Detected in method blank, sample result <10x blank	4
B20091666	WFMW-19	Copper	--	--	J+	Detected in method blank, sample result <10x blank	5
B20091666	WFMW-02	Copper	--	--	J+	Detected in method blank, sample result <10x blank	7
B20091666	WFMW-1S	Copper	--	--	J+	Detected in method blank, sample result <10x blank	8
B20091666	WFMW-09	Iron	--	--	UJ	Result < 5X RL and absolute difference between original and duplicate is > RL;	4
B20091666	WFMW-19	Iron	--	--	J	Result < 5X RL and absolute difference between original and duplicate is > RL;	5
B20091666	WFMW-09	Copper	--	--	J	Sample/dup RPD exceeds limit	4
B20091666	WFMW-19	Copper	--	--	J	Sample/dup RPD exceeds limit	5

Abbreviations
RL - Reporting Limit
SDG - Sample Delivery Group

Qualifier Definitions
J - Result is an estimated value
J+ Result is an estimated value (estimated high)
UJ - Result is estimated non-detect

METALS & INORGANIC / Tier I & II Data Validation Summary Checklist

GOLDER PROJECT #: 943-1595.011 ph 3100	SITE: BLACKBIRD MINE SITE, SALMON, ID
LABORATORY: ENERGY LABORATORY, BILLINGS	SDG: B20092046

SAMPLES (Total # =)	COLLECTED (Date/Time)	MATRIX
See Table 1		

DATA ASSESSMENT SUMMARY

REVIEW ITEM	ICP/ AES EPA200.7	ICP/ MS EPA200.8	TDS A2540C TSS A2540D	Hardness A2340B Alkalinity A2320B	Anions (ex Cl^-, F^-, SO_4^{-3}) E300.0	OTHER pH A4500-H-B DOC A5310C
1. Data Package Completeness	Θ	Θ	Θ	NA	NA	NA
2. Holding Temperatures & Times	O	O	O	NA	NA	NA
3. Calibration	O	O	O	NA	NA	NA
4. Lab Blanks, Field Blanks	O	O	Θ	NA	NA	NA
5. Lab Duplicate, Field Duplicate RPD	O	O	O	NA	NA	NA
6. LCS, LFB, Blank Spike	O	O	O	NA	NA	NA
7. Interference Checks	NA	NA	NA	NA	NA	NA
8. Matrix Spike Recovery (MS/MSD)	NA	NA	NA	NA	NA	NA
9. MSA and Serial Dilutions	NA	NA	NA	NA	NA	NA
10. Detection Limits, Other QC	Θ	Θ	O	NA	NA	NA
11. Data Verification, Overall Summary	O	O	O	NA	NA	NA

O = Data had no problems Θ = Problems, but do not affect data NA = Not applicable to this data set.
X = Data qualified due to minor problems [typically estimated data (J/UJ)].
M = Data qualified due to major problems [typically more than 50% qualified (J/UJ)].
Z = Data unacceptable [typically data rejected (R).

Acceptable: YES NO

1. Date Package Completeness (Check if present)…… √ ☐

x _Case narrative
_/_Chain of Custody
_/_Sample Results
_/_ICV/CCV Results
_/_Blank Results
_o_ICP Interference Check Results
_/_Spike Recovery Results

_/_Duplicate Results
_/_LCS Results
_o_Standard Addition Results
_o_ICP Serial Dilution
_o_Instrument Det. Limits
__Other_____

/ Acceptable
x Absent
o Not required

Comments/Qualified Results: No case narrative provided.

Validated by: Annie Muehlfarth **Date:** 10/13/2020
Reviewed by: Samantha DiCenso **Date:** 10/13/2020

METALS & INORGANIC / Tier I & II Data Validation Summary Checklist

Acceptable: YES NO

2. Holding Temperatures & Times (Check all that apply)…… √ ☐

_/_Recommended Hold Temp. of Cool, ≤6°C met (√ - Yes / x – No)
_/_TDS / TSS analysis completed in <7 days from collection
__Acidity / Alkalinity completed in <14 days from collection
_/_ICP metals completed in <6 months from collection
__Anions (Cl^-, F^-, SO_4^-), DOC analyzed in <28 days from collection
__pH analysis completed in <15 minutes from collection

Comments/Qualified Results: None.

3. Calibrations (Check all that apply)…….. √ ☐

_/_ICV/CCV %R for ICP/AA, 90%-110%, acceptable
__ICV/CCV %R for ICP/AA, 75%-89% or 111%-125%, results estimated (J/UJ)
__ICV/CCV %R for ICP/AA, <75% or >125%, reject positive results (R)

Comments/Qualified Results: None.

4. Lab Blanks, Field Blanks (Check all that apply)…….. √ ☐

__Detects reported in ICB/CCB list: Field Blank ID: _____
_/_ Detects in preparation blanks, results >10x contamination level or ND (no qualifier) Field Blank ID: _____
__Detects in preparation blanks, results ≤10x contamination level (J+)
__Detects in field blanks (Note: Advisory condition only and no qualifier)

Comments/Qualified Results: TDS detected in method blank MB-148798 at 4 mg/L, detection in associated sample >10x blank result, no qualification necessary.

5. Lab Duplicates, Field Duplicates (Check all that apply)……... √ ☐

_/_Duplicate RPD ≤20% for waters (≤35% for soils) for results >5X CRDL Field Duplicate ID: _____
__Duplicate RPD >20% for waters (>35% for soils) for results >5X CRDL (J) Field Duplicate ID: _____
__Duplicate range is within ±CRDL (± 2X CRDL for soils) for results <5X CRDL (no qualifier)

Comments/Qualified Results: Greatest RPD for lab duplicate is 0.9% (<20%)

Acceptable: YES NO

6. Laboratory Control Samples* (Check all that apply)……..… √ ☐

_/_LCS %R 70-130%: ACCEPTED
__LCS %R 40-69% or >130%, results >MDL: estimated (J-/J+)
__LCS %R 40-69% and results <MDL: estimated (UJ)
__LCS %R <40% and all results rejected (R/UR)
__LCS %R >150% and all results rejected (R)
*Lab Control Samples/Lab Control Sample Duplicates (LCS/LCSD)
*Lab Fortified Blanks (LFB)
*Blank Spike / Blank Spike Duplicates (BS/BSD)

Comments/Qualified Results: None.

7. Interference Checks (Check all that apply)…….. √ ☐

__ICS A/B Recoveries Acceptable
__Al, Ca, Fe, Mg sample concentrations > ICS concentrations
__ICS %R > 120%, results >IDL estimated (J)
__ICS %R 50-79%, results >IDL estimated (J)
__ICS %R 50-79%, results <IDL estimated (UJ)
__ICS %R <50%, results >IDL and <IDL rejected (R/UR)

Comments/Qualified Results: IC check is not required as part of Tier IIA Validation.

8. Matrix Spike Recovery (MS/MSD) (Check all that apply)……. √ ☐

_/_Spike %R with 75-125%: ACCEPTED
__MS and PDS %R 30-74%, results > MDL est. (J-), ND=(UJ)
__MS <75% and PDS >75%, results > MDL est. (J), ND=(UJ)
__ MS and PDS %R >125%, detects > MDL est. (J+)
__ MS >125% and PDS <125%, detects > MDL est. (J)
__MS and PDS %R <30% and <75%: results >MDL (J-) ND=(UR)
__Field blanks used for spike analysis?
__Post digest spk rqrd when %R <75, >125%, excpt Ag

Comments/Qualified Results: None.

Acceptable: YES NO

9. Method of Standard Addition (MSA) and Serial Dilutions (SD)….. √ ☐

__Analytical spike %R 85-115%
__Analytical spike %R 40-85%, results > IDL estimated (J)
__Analytical spike %R 10-40%, results <IDL estimated (UJ)
__Analytical spike %R <10%, results <IDL rejected (R)

__SD Analytes >50X MDL ?
__ SD % Diff < 10%
__ SD % Diff > 10%: J results >MDL, UJ for Non-detects

Comments/Qualified Results: NA

10. Detection Limits, Other QC…… √ ☐

WATER:

Inorganics-	**Metals-**	
__pH = 0.1 s.u.	__Al = 0.1 mg/L	__Cd = 0.01 mg/L
_/_ TDS/TSS = 10 mg/L	_/_ As = 0.001 mg/L	__Cr = 0.05 mg/L
__Alkalinity = 4 mg/L	_x_ Co = 0.0001 mg/L	__Pb = 0.05 mg/L
__Anions (i.e. Cl^-, SO_4^{2-}) = 1 mg/L	x_Cu = 0.0003/0.0008mg/L	__Hg = 0.001 mg/L
__Anions (i.e. F^-) = 0.1 mg/L	__Co (WTP) = 0.001 mg/L	__Ni = 0.05 mg/L
__ DOC = 0.5 mg/L	__Cu (WTP) = 0.001 mg/L	__K = 1 mg/L
__Nitrogen, Ammonia = 0.05 mg/L	_/_ Fe = 0.03 mg/L	__Se = 0.001 mg/L
__Phosphorus, Total = 0.005 mg/L	__Ca = 0.5 mg/L	__Si = 0.1 mg/L
	__Mg = 0.5 mg/L	__Ag = 0.01 mg/L
	__HARD-T = 0.5 mg/L	__Na = 1 mg/L
	__Mn = 0.001 mg/L	__Zn = 0.01 mg/L

SOIL:

Metals-	
__ As = 1 mg/kg	__ = mg/kg
__ Co = 1 mg/kg	__ = mg/kg
__ Cu = 1 mg/kg	__ = mg/kg

Comments/Qualified Results: Reporting limit for cobalt was 0.004 mg/L for sample WFMW-1D.
Reporting limit for copper was 0.0004 mg/L for sample WFMW-1D.

11. Data Verification and Overall Assessment…… √ ☐

Comments/Qualified Results: None.

Table 1
Sample Collection and Analysis Summary
Blackbird Mine Sampling - September 2020

							Analysis	
SDG	**Field Identification**	**Collection Date & Time**	**Location**	**Lab Identification**	**Matrix**	**QC Samples**	**Total Dissolved Solids**	**Dissolved Metals[1]**
B20092046	WFMW-1D	9/16/20 11:50	WFMW-1D	B20092046-001	Aqueous	-	X	X

[1]See laboratory data package for list of metals analyzed

Notes:
All analyses performed by Energy Laboratories

Abbreviations:
SDG - Sample Delivery Group

Table 2
Qualifier Summary Table
Blackbird Mine Sampling - September 2020

SDG	Sample Name	Constituent	New Result	New RL	Qualifier	Reason	PDF Page Number
None							

Abbreviations
RL - Reporting Limit
SDG - Sample Delivery Group

METALS & INORGANIC / Tier I & II Data Validation Summary Checklist

GOLDER PROJECT #: 943-1595.011 ph 3100	SITE: BLACKBIRD MINE SITE, SALMON, ID
LABORATORY: ENERGY LABORATORY, BILLINGS	SDG: B20092310

SAMPLES (Total # =)	COLLECTED (Date/Time)	MATRIX
See Table 1		

DATA ASSESSMENT SUMMARY

REVIEW ITEM	ICP/ AES EPA200.7	ICP/ MS EPA200.8	TDS A2540C TSS A2540D	Hardness A2340B Alkalinity A2320B	Anions (ex Cl^-, F^-, SO_4^{-3}) E300.0	OTHER pH A4500-H-B DOC A5310C
1. Data Package Completeness	Θ	Θ	NA	NA	NA	NA
2. Holding Temperatures & Times	Θ	Θ	NA	NA	NA	NA
3. Calibration	O	O	NA	NA	NA	NA
4. Lab Blanks, Field Blanks	O	X	NA	NA	NA	NA
5. Lab Duplicate, Field Duplicate RPD	NA	NA	NA	NA	NA	NA
6. LCS, LFB, Blank Spike	O	O	NA	NA	NA	NA
7. Interference Checks	NA	NA	NA	NA	NA	NA
8. Matrix Spike Recovery (MS/MSD)	O	O	NA	NA	NA	NA
9. MSA and Serial Dilutions	NA	NA	NA	NA	NA	NA
10. Detection Limits, Other QC	O	O	NA	NA	NA	NA
11. Data Verification, Overall Summary	O	O	NA	NA	NA	NA

O = Data had no problems Θ = Problems, but do not affect data NA = Not applicable to this data set.
X = Data qualified due to minor problems [typically estimated data (J/UJ)].
M = Data qualified due to major problems [typically more than 50% qualified (J/UJ)].
Z = Data unacceptable [typically data rejected (R).

	Acceptable: YES	NO
1. Date Package Completeness (Check if present)……	√	☐

_x_Case narrative
_/_Chain of Custody
_/_Sample Results
_/_ICV/CCV Results
_/_Blank Results
_o_ICP Interference Check Results
_o_Spike Recovery Results
_x_Duplicate Results
_/_LCS Results
_o_Standard Addition Results
_o_ICP Serial Dilution
_o_Instrument Det. Limits
__Other_____

/ Acceptable
x Absent
o Not required

Comments/Qualified Results: No case narrative provided.

Validated by: Samantha DiCenso **Date:** 10/22/2020
Reviewed by: Ann Muehlfarth **Date:** 10/23/2020

METALS & INORGANIC / Tier I & II Data Validation Summary Checklist

Acceptable: YES NO

2. Holding Temperatures & Times (Check all that apply)…… √ ☐

_x_Recommended Hold Temp. of Cool, ≤6°C met (√ - Yes / x – No)
__TDS / TSS analysis completed in <7 days from collection
__Acidity / Alkalinity completed in <14 days from collection
_/_ICP metals completed in <6 months from collection
__Anions (Cl^-, F^-, SO_4^-), DOC analyzed in <28 days from collection
__pH analysis completed in <15 minutes from collection

Comments/Qualified Results: The cooler temperature upon receipt was recorded at 15.7°C. Using professional judgement and following project-specific requirements qualification of metals results was not required because the samples were preserved to pH<2.

3. Calibrations (Check all that apply)…….. √ ☐

_/_ICV/CCV %R for ICP/AA, 90%-110%, acceptable
__ICV/CCV %R for ICP/AA, 75%-89% or 111%-125%, results estimated (J/UJ)
__ICV/CCV %R for ICP/AA, <75% or >125%, reject positive results (R)

Comments/Qualified Results: None.

4. Lab Blanks, Field Blanks (Check all that apply)…….. √ ☐

__Detects reported in ICB/CCB list: Field Blank ID: _____
_/_ Detects in preparation blanks, results >10x contamination level or ND (no qualifier) Field Blank ID: _____
_/_Detects in preparation blanks, results ≤10x contamination level (J+)
__Detects in field blanks (Note: Advisory condition only and no qualifier)

Comments/Qualified Results: Cobalt detected at 0.00005 and Iron detected at 0.009 in method blank (MB-148970).

5. Lab Duplicates, Field Duplicates (Check all that apply)……... √ ☐

__Duplicate RPD ≤20% for waters (≤35% for soils) for results >5X CRDL Field Duplicate ID: _____
__Duplicate RPD >20% for waters (>35% for soils) for results >5X CRDL (J) Field Duplicate ID: _____
__Duplicate range is within ±CRDL (± 2X CRDL for soils) for results <5X CRDL (no qualifier)

Comments/Qualified Results: No duplicates listed.

Acceptable: YES NO

6. Laboratory Control Samples* (Check all that apply)……..… √ ☐

_/_LCS %R 70-130%: ACCEPTED
__LCS %R 40-69% or >130%, results >MDL: estimated (J-/J+)
__LCS %R 40-69% and results <MDL: estimated (UJ)
__LCS %R <40% and all results rejected (R/UR)
__LCS %R >150% and all results rejected (R)
*Lab Control Samples/Lab Control Sample Duplicates (LCS/LCSD)
*Lab Fortified Blanks (LFB)
*Blank Spike / Blank Spike Duplicates (BS/BSD)

Comments/Qualified Results: None.

7. Interference Checks (Check all that apply)…….. √ ☐

__ICS A/B Recoveries Acceptable
__Al, Ca, Fe, Mg sample concentrations > ICS concentrations
__ICS %R > 120%, results >IDL estimated (J)
__ICS %R 50-79%, results >IDL estimated (J)
__ICS %R 50-79%, results <IDL estimated (UJ)
__ICS %R <50%, results >IDL and <IDL rejected (R/UR)

Comments/Qualified Results: IC check is not required as part of Tier IIA Validation.

8. Matrix Spike Recovery (MS/MSD) (Check all that apply)……. √ ☐

_/_Spike %R with 75-125%: ACCEPTED
__MS and PDS %R 30-74%, results > MDL est. (J-), ND=(UJ)
__MS <75% and PDS >75%, results > MDL est. (J), ND=(UJ)
__ MS and PDS %R >125%, detects > MDL est. (J+)
__ MS >125% and PDS <125%, detects > MDL est. (J)
__MS and PDS %R <30% and <75%: results >MDL (J-) ND=(UR)
__Field blanks used for spike analysis?
__Post digest spk rqrd when %R <75, >125%, excpt Ag

Comments/Qualified Results: MS/MSD analyses were for unrelated samples.

Acceptable: YES NO

9. Method of Standard Addition (MSA) and Serial Dilutions (SD)….. √ ☐

__Analytical spike %R 85-115%
__Analytical spike %R 40-85%, results > IDL estimated (J)
__Analytical spike %R 10-40%, results <IDL estimated (UJ)
__Analytical spike %R <10%, results <IDL rejected (R)

__SD Analytes >50X MDL ?
__ SD % Diff < 10%
__ SD % Diff > 10%: J results >MDL, UJ for Non-detects

Comments/Qualified Results: NA

10. Detection Limits, Other QC…… √ ☐

WATER:

Inorganics-	**Metals-**	
__pH = 0.1 s.u.	__Al = 0.1 mg/L	__Cd = 0.01 mg/L
__TDS/TSS = 10 mg/L	__As = 0.001 mg/L	__Cr = 0.05 mg/L
__Alkalinity = 4 mg/L	__Co = 0.0001 mg/L	__Pb = 0.05 mg/L
__Anions (i.e. Cl^-, SO_4^-) = 1 mg/L	__Cu = 0.0003/0.0008mg/L	__Hg = 0.001 mg/L
__Anions (i.e. F^-) = 0.1 mg/L	__/__Co (WTP) = 0.001 mg/L	__Ni = 0.05 mg/L
__DOC = 0.5 mg/L	__/__Cu (WTP) = 0.001 mg/L	__K = 1 mg/L
__Nitrogen, Ammonia = 0.05 mg/L	__/__Fe = 0.03 mg/L	__Se = 0.001 mg/L
__Phosphorus, Total = 0.005 mg/L	__Ca = 0.5 mg/L	__Si = 0.1 mg/L
	__Mg = 0.5 mg/L	__Ag = 0.01 mg/L
	__HARD-T = 0.5 mg/L	__Na = 1 mg/L
	__Mn = 0.001 mg/L	__Zn = 0.01 mg/L

SOIL:

Metals-	
__ As = 1 mg/kg	__ = mg/kg
__ Co = 1 mg/kg	__ = mg/kg
__ Cu = 1 mg/kg	__ = mg/kg

Comments/Qualified Results: None.

11. Data Verification and Overall Assessment…… √ ☐

Comments/Qualified Results: None.

Table 1
Sample Collection and Analysis Summary
Blackbird Mine Sampling - September 2020

							Analysis		
SDG	**Field Identification**	**Collection Date & Time**	**Location**	**Lab Identification**	**Matrix**	**QC Samples**	**Total Dissolved Solids**	**Dissolved Metals[1]**	**Total Metals[1]**
B20092310	WTP-C	9/23/20 10:00	WTP-C	B20092310-001	Aqueous	--		X	X

[1]See laboratory data package for list of metals analyzed

Notes:
All analyses performed by Energy Laboratories

Abbreviations:
SDG - Sample Delivery Group

Table 2
Qualifier Summary Table
Blackbird Mine Sampling - September 2020

SDG	Sample Name	Constituent	New Result	New RL	Qualifier	Reason	PDF Page Number
B20092310	WTP-C	Total Iron	0.08	0.03	J+	Detected in method blank, sample result <10x blank result	2

Abbreviations
RL - Reporting Limit
SDG - Sample Delivery Group

METALS & INORGANIC / Tier I & II Data Validation Summary Checklist

GOLDER PROJECT #: 943-1595.011 ph 3100	SITE: BLACKBIRD MINE SITE, SALMON, ID
LABORATORY: ENERGY LABORATORY, BILLINGS	SDG: B20092570

SAMPLES (Total # =)	COLLECTED (Date/Time)	MATRIX
See Table 1		

DATA ASSESSMENT SUMMARY

REVIEW ITEM	ICP/ AES EPA200.7	ICP/ MS EPA200.8	TDS A2540C TSS A2540D	Hardness A2340B Alkalinity A2320B	Anions (ex Cl^-, F^-, SO_4^{-2}) E300.0	OTHER pH A4500-H-B DOC A5310C
1. Data Package Completeness	Θ	Θ	NA	Θ	NA	NA
2. Holding Temperatures & Times	Θ	Θ	NA	Θ	NA	NA
3. Calibration	O	O	NA	O	NA	NA
4. Lab Blanks, Field Blanks	O	X	NA	O	NA	NA
5. Lab Duplicate, Field Duplicate RPD	O	X	NA	O	NA	NA
6. LCS, LFB, Blank Spike	O	O	NA	O	NA	NA
7. Interference Checks	NA	NA	NA	NA	NA	NA
8. Matrix Spike Recovery (MS/MSD)	O	O	NA	O	NA	NA
9. MSA and Serial Dilutions	NA	NA	NA	NA	NA	NA
10. Detection Limits, Other QC	Θ	Θ	NA	O	NA	NA
11. Data Verification, Overall Summary	O	O	NA	O	NA	NA

O = Data had no problems Θ = Problems, but do not affect data NA = Not applicable to this data set.
X = Data qualified due to minor problems [typically estimated data (J/UJ)].
M = Data qualified due to major problems [typically more than 50% qualified (J/UJ)].
Z = Data unacceptable [typically data rejected (R).

	Acceptable: YES	NO
1. Date Package Completeness (Check if present)……	√	☐

_x_Case narrative
_/_Chain of Custody
_/_Sample Results
_/_ICV/CCV Results
_/_Blank Results
_o_ICP Interference Check Results
_/_Spike Recovery Results

_/_Duplicate Results
_/_LCS Results
_o_Standard Addition Results
_o_ICP Serial Dilution
_o_Instrument Det. Limits
__Other_____

/ Acceptable
x Absent
o Not required

Comments/Qualified Results: According to the Work Order Receipt Checklist, sample BDSW-04B was received and not listed on COC (not analyzed, per email with Golder), and sample names and sample times were revised, per emails with Golder. Dissolved cobalt results is greater than total cobalt result (confirmed by re-analysis of both results) in BDSW-04A (-001), and dissolved copper result was confirmed by re-analysis in BDSW-03B (-010), and BDSW-03A (-014).

Validated by: Samantha DiCenso **Date:** 10/22/2020
Reviewed by: Ann Muehlfarth **Date:** 11/04/2020

METALS & INORGANIC / Tier I & II Data Validation Summary Checklist

Acceptable: YES NO

2. Holding Temperatures & Times (Check all that apply)…… √ ☐

_x_Recommended Hold Temp. of Cool, ≤6°C met (√ - Yes / x – No)
__TDS / TSS analysis completed in <7 days from collection
__Acidity / Alkalinity completed in <14 days from collection
_/_ ICP metals completed in <6 months from collection
__ Anions (Cl^-, F^-, SO_4^-), DOC analyzed in <28 days from collection
__ pH analysis completed in <15 minutes from collection

Comments/Qualified Results: The cooler temperature upon receipt was recorded at 16.4°C. Using professional judgement and following project-specific requirements qualification of metals results was not required because the samples were preserved to pH<2.

3. Calibrations (Check all that apply)…….. √ ☐

_/_ICV/CCV %R for ICP/AA, 90%-110%, acceptable
__ICV/CCV %R for ICP/AA, 75%-89% or 111%-125%, results estimated (J/UJ)
__ICV/CCV %R for ICP/AA, <75% or >125%, reject positive results (R)

Comments/Qualified Results: None.

4. Lab Blanks, Field Blanks (Check all that apply)…….. √ ☐

__Detects reported in ICB/CCB list:
_/_ Detects in preparation blanks, results >10x contamination level or ND (no qualifier)
_/_Detects in preparation blanks, results ≤10x contamination level (J+)
__Detects in field blanks (Note: Advisory condition only and no qualifier)

Field Blank ID: BDSW-23
Field Blank ID: _____

Comments/Qualified Results: Method blank (MB-149067) detection of total copper 0.0009 mg/L associated with batch 149067.

5. Lab Duplicates, Field Duplicates (Check all that apply)……... √ ☐

_/_Duplicate RPD ≤20% for waters (≤35% for soils) for results >5X CRDL
_/_Duplicate RPD >20% for waters (>35% for soils) for results >5X CRDL (J)
__Duplicate range is within ±CRDL (± 2X CRDL for soils) for results <5X CRDL (no qualifier)

Field Duplicate ID: BDSW-13B
Field Duplicate ID: _____

Comments/Qualified Results: RPD > 20% for dissolved copper between BDSW-03B (-010) and BDSW-13B (-011), and both results were >5X CRDL.

Acceptable: YES NO

6. Laboratory Control Samples* (Check all that apply)……..… √ ☐

_/_LCS %R 70-130%: ACCEPTED
__LCS %R 40-69% or >130%, results >MDL: estimated (J-/J+)
__LCS %R 40-69% and results <MDL: estimated (UJ)
__LCS %R <40% and all results rejected (R/UR)
__LCS %R >150% and all results rejected (R)
*Lab Control Samples/Lab Control Sample Duplicates (LCS/LCSD)
*Lab Fortified Blanks (LFB)
*Blank Spike / Blank Spike Duplicates (BS/BSD)

Comments/Qualified Results: None.

7. Interference Checks (Check all that apply)…….. √ ☐

__ICS A/B Recoveries Acceptable
__Al, Ca, Fe, Mg sample concentrations > ICS concentrations
__ICS %R > 120%, results >IDL estimated (J)
__ICS %R 50-79%, results >IDL estimated (J)
__ICS %R 50-79%, results <IDL estimated (UJ)
__ICS %R <50%, results >IDL and <IDL rejected (R/UR)

Comments/Qualified Results: IC check is not required as part of Tier IIA Validation.

8. Matrix Spike Recovery (MS/MSD) (Check all that apply)……. √ ☐

_/_Spike %R with 75-125%: ACCEPTED
__MS and PDS %R 30-74%, results > MDL est. (J-), ND=(UJ)
__MS <75% and PDS >75%, results > MDL est. (J), ND=(UJ)
__ MS and PDS %R >125%, detects > MDL est. (J+)
__ MS >125% and PDS <125%, detects > MDL est. (J)
__MS and PDS %R <30% and <75%: results >MDL (J-) ND=(UR)
__Field blanks used for spike analysis?
__Post digest spk rqrd when %R <75, >125%, excpt Ag

Comments/Qualified Results: None.

Acceptable: YES NO

9. Method of Standard Addition (MSA) and Serial Dilutions (SD)….. √ ☐

__Analytical spike %R 85-115%
__Analytical spike %R 40-85%, results > IDL estimated (J)
__Analytical spike %R 10-40%, results <IDL estimated (UJ)
__Analytical spike %R <10%, results <IDL rejected (R)
__SD Analytes >50X MDL ?
__ SD % Diff < 10%
__ SD % Diff > 10%: J results >MDL, UJ for Non-detects

Comments/Qualified Results: NA

10. Detection Limits, Other QC…… √ ☐

WATER:

Inorganics-	Metals-		SOIL: Metals-	
__pH = 0.1 s.u.	__Al = 0.1 mg/L	__Cd = 0.01 mg/L	__ As = 1 mg/kg	__ = mg/kg
__TDS/TSS = 10 mg/L	_/_As = 0.001 mg/L	__Cr = 0.05 mg/L	__ Co = 1 mg/kg	__ = mg/kg
__Alkalinity = 4 mg/L	_/_Co = 0.0001 mg/L	__Pb = 0.05 mg/L	__ Cu = 1 mg/kg	__ = mg/kg
__Anions (i.e. Cl^-, SO_4^{--}) = 1 mg/L	/_Cu = 0.0003/0.0008mg/L	__Hg = 0.001 mg/L		
__Anions (i.e. F^-) = 0.1 mg/L	__Co (WTP) = 0.001 mg/L	__Ni = 0.05 mg/L		
__ DOC = 0.5 mg/L	__Cu (WTP) = 0.001 mg/L	__K = 1 mg/L		
__Nitrogen, Ammonia = 0.05 mg/L	__Fe = 0.03 mg/L	__Se = 0.001 mg/L		
__Phosphorus, Total = 0.005 mg/L	_/_Ca = 0.5 mg/L	__Si = 0.1 mg/L		
	_/_Mg = 0.5 mg/L	__Ag = 0.01 mg/L		
	_/_HARD-T = 0.5 mg/L	__Na = 1 mg/L		
	__Mn = 0.001 mg/L	__Zn = 0.01 mg/L		

Comments/Qualified Results: The reporting limit for total cobalt was 0.005 mg/L in BDSW-31B.
The reporting limit for total copper was 0.0004 mg/L in BDSW-31B.

11. Data Verification and Overall Assessment…… √ ☐

Comments/Qualified Results: See Table 2.

Table 1
Sample Collection and Analysis Summary
Blackbird Mine Sampling - September 2020

SDG	Field Identification	Collection Date & Time	Location	Lab Identification	Matrix	QC Samples	Alkalinity and/or Hardness (as CaCO3)	Dissolved Metals[1]	Total Metals[1]
B20092570	BDSW-04A	9/21/20 9:45	BDSW-04A	B20092570-001	Aqueous	NA	X	X	X
B20092570	BDSW-03A	9/21/20 10:05	BDSW-03A	B20092570-002	Aqueous	NA	X	X	X
B20092570	BDSW-01A	9/21/20 11:25	BDSW-01A	B20092570-003	Aqueous	NA	X	X	X
B20092570	BDSW-03B	9/21/20 15:30	BDSW-03B	B20092570-004	Aqueous	NA	X	X	X
B20092570	BDSW-13B	9/21/20 15:40	BDSW-03B	B20092570-005	Aqueous	Field Duplicate	X	X	X
B20092570	BDSW-23B	9/21/20 15:50	BDSW-03B	B20092570-006	Aqueous	Field Blank	X	X	X
B20092570	BDSW-01B	9/21/20 17:00	BDSW-01B	B20092570-007	Aqueous	NA	X	X	X
B20092570	BDSW-03A	9/22/20 9:55	BDSW-03A	B20092570-008	Aqueous	NA	X	X	X
B20092570	BDSW-01A	9/22/20 11:00	BDSW-01A	B20092570-009	Aqueous	NA	X	X	X
B20092570	BDSW-03B	9/22/20 13:20	BDSW-03B	B20092570-010	Aqueous	NA	X	X	X
B20092570	BDSW-13B	9/22/20 13:30	BDSW-03B	B20092570-011	Aqueous	Field Duplicate	X	X	X
B20092570	BDSW-23B	9/22/20 13:40	BDSW-03B	B20092570-012	Aqueous	Field Blank	X	X	X
B20092570	BDSW-01B	9/22/20 16:20	BDSW-01B	B20092570-013	Aqueous	NA	X	X	X
B20092570	BDSW-03A	9/23/20 9:50	BDSW-03A	B20092570-014	Aqueous	NA	X	X	X
B20092570	BDSW-01A	9/23/20 11:05	BDSW-01A	B20092570-015	Aqueous	NA	X	X	X
B20092570	BDSW-03B	9/23/20 14:25	BDSW-03B	B20092570-016	Aqueous	NA	X	X	X
B20092570	BDSW-13B	9/23/20 14:35	BDSW-03B	B20092570-017	Aqueous	Field Duplicate	X	X	X
B20092570	BDSW-23B	9/23/20 14:45	BDSW-03B	B20092570-018	Aqueous	Field Blank	X	X	X
B20092570	BDSW-01B	9/23/20 17:00	BDSW-01B	B20092570-019	Aqueous	NA	X	X	X
B20092570	BDSW-03A	9/24/20 9:40	BDSW-03A	B20092570-020	Aqueous	NA	X	X	X
B20092570	BDSW-01A	9/24/20 10:55	BDSW-01A	B20092570-021	Aqueous	NA	X	X	X
B20092570	BDSW-03B	9/24/20 14:05	BDSW-03B	B20092570-022	Aqueous	NA	X	X	X
B20092570	BDSW-13B	9/24/20 14:15	BDSW-03B	B20092570-023	Aqueous	Field Duplicate	X	X	X
B20092570	BDSW-23B	9/24/20 14:25	BDSW-03B	B20092570-024	Aqueous	Field Blank	X	X	X
B20092570	BDSW-01B	9/24/20 16:10	BDSW-01B	B20092570-025	Aqueous	NA	X	X	X
B20092570	BDSW-31B	9/24/20 16:20	BDSW-01B	B20092570-026	Aqueous	Field Control Sample	X	X	X
B20092570	SFSW-04	9/24/20 12:50	SFSW-04	B20092570-027	Aqueous	NA	X	X	X
B20092570	SFSW-01	9/24/20 13:15	SFSW-01	B20092570-028	Aqueous	NA	X	X	X

[1]See laboratory data package for list of metals analyzed

Notes:
All analyses performed by Energy Laboratories

Abbreviations:
SDG - Sample Delivery Group

Table 2
Qualifier Summary Table
Blackbird Mine Sampling - September 2020

SDG	Sample Name	Constituent	New Result	New RL	Qualifier	Reason	PDF Page Number
B20092570	BDSW-03A	Total Copper	0.0027	8E-04	J+	Detected in MB, sample result <10x blank result	4
B20092570	BDSW-01A	Total Copper	0.0041	8E-04	J+	Detected in MB, sample result <10x blank result	5
B20092570	BDSW-03B	Dissolved Copper	0.0068	3E-04	J	RPD >20% between sample and duplicate	12
B20092570	BDSW-13B	Dissolved Copper	0.0025	3E-04	J	RPD >20% between sample and duplicate	13

Abbreviations
RL - Reporting Limit
SDG - Sample Delivery Group

Qualifier Definitions
J - Result is an estimated value
J+ Result is an estimated value (estimated high)

METALS & INORGANIC / Tier I & II Data Validation Summary Checklist

GOLDER PROJECT #: 943-1595.011 ph 3100	SITE: BLACKBIRD MINE SITE, SALMON, ID
LABORATORY: ENERGY LABORATORY, BILLINGS	SDG: B20092579

SAMPLES (Total # =)	COLLECTED (Date/Time)	MATRIX
See Table 1		

DATA ASSESSMENT SUMMARY

REVIEW ITEM	ICP/ AES EPA200.7	ICP/ MS SW6020	TDS A2540C TSS A2540D	Hardness A2340B Alkalinity A2320B	Anions (ex Cl^-, F^-, SO_4^{-2}) E300.0	OTHER pH A4500-H-B DOC A5310C
1. Data Package Completeness	NA	Θ	NA	NA	NA	NA
2. Holding Temperatures & Times	NA	Θ	NA	NA	NA	NA
3. Calibration	NA	O	NA	NA	NA	NA
4. Lab Blanks, Field Blanks	NA	Θ	NA	NA	NA	NA
5. Lab Duplicate, Field Duplicate RPD	NA	O	NA	NA	NA	NA
6. LCS, LFB, Blank Spike	NA	NA	NA	NA	NA	NA
7. Interference Checks	NA	NA	NA	NA	NA	NA
8. Matrix Spike Recovery (MS/MSD)	NA	X	NA	NA	NA	NA
9. MSA and Serial Dilutions	NA	NA	NA	NA	NA	NA
10. Detection Limits, Other QC	NA	Θ	NA	NA	NA	NA
11. Data Verification, Overall Summary	NA	O	NA	NA	NA	NA

O = Data had no problems Θ = Problems, but do not affect data NA = Not applicable to this data set.
X = Data qualified due to minor problems [typically estimated data (J/UJ)].
M = Data qualified due to major problems [typically more than 50% qualified (J/UJ)].
Z = Data unacceptable [typically data rejected (R).

	Acceptable: YES	NO
1. Date Package Completeness (Check if present)……	√	☐

_x_Case narrative
_/_Chain of Custody
_/_Sample Results
_/_ICV/CCV Results
_/_Blank Results
_o_ICP Interference Check Results
_/_Spike Recovery Results

_/_ Duplicate Results
_/_ LCS Results
_o_ Standard Addition Results
_o_ ICP Serial Dilution
_o_ Instrument Det. Limits
___ Other_____

/ Acceptable
x Absent
o Not required

Comments/Qualified Results: According to the Work Order Receipt Checklist, sample BDSED-01 Bottle 2 was received cracked and was transferred to a new sample container at the laboratory.

Validated by: Samantha DiCenso **Date:** 10/22/2020
Reviewed by: Ann Muehlfarth **Date:** 11/4/2020

METALS & INORGANIC / Tier I & II Data Validation Summary Checklist

Acceptable: YES NO

2. Holding Temperatures & Times (Check all that apply)…… √ ☐

_x_Recommended Hold Temp. of Cool, ≤6°C met (√ - Yes / x – No)
__TDS / TSS analysis completed in <7 days from collection
__Acidity / Alkalinity completed in <14 days from collection
_/_ICP metals completed in <6 months from collection
__ Anions (Cl^-, F^-, SO_4^-), DOC analyzed in <28 days from collection
__ pH analysis completed in <15 minutes from collection

Comments/Qualified Results: The cooler temperature upon receipt was recorded at 17.9°C. Using professional judgement and following project-specific requirements qualification of metals results was not required because the samples were preserved to pH<2.

3. Calibrations (Check all that apply)…….. √ ☐

_/_ICV/CCV %R for ICP/AA, 90%-110%, acceptable
__ICV/CCV %R for ICP/AA, 75%-89% or 111%-125%, results estimated (J/UJ)
__ICV/CCV %R for ICP/AA, <75% or >125%, reject positive results (R)

Comments/Qualified Results: None.

4. Lab Blanks, Field Blanks (Check all that apply)…….. √ ☐

__Detects reported in ICB/CCB list: Field Blank ID: _____
_/_ Detects in preparation blanks, results >10x contamination level or ND (no qualifier) Field Blank ID: _____
__Detects in preparation blanks, results ≤10x contamination level (J+)
__Detects in field blanks (Note: Advisory condition only and no qualifier)

Comments/Qualified Results: Method blank (MB-149079) detection of cobalt 0.02 mg/L associated with batch 149079.

5. Lab Duplicates, Field Duplicates (Check all that apply)……... √ ☐

_/_Duplicate RPD ≤20% for waters (≤35% for soils) for results >5X CRDL Field Duplicate ID:_____
__Duplicate RPD >20% for waters (>35% for soils) for results >5X CRDL (J) Field Duplicate ID: _____
__Duplicate range is within ±CRDL (± 2X CRDL for soils) for results <5X CRDL (no qualifier)

Comments/Qualified Results: None.

Acceptable: YES NO

6. Laboratory Control Samples* (Check all that apply)……..… √ ☐

__LCS %R 70-130%: ACCEPTED
__LCS %R 40-69% or >130%, results >MDL: estimated (J-/J+)
__LCS %R 40-69% and results <MDL: estimated (UJ)
__LCS %R <40% and all results rejected (R/UR)
__LCS %R >150% and all results rejected (R)
*Lab Control Samples/Lab Control Sample Duplicates (LCS/LCSD)
*Lab Fortified Blanks (LFB)
*Blank Spike / Blank Spike Duplicates (BS/BSD)

Comments/Qualified Results: No LCS analysis was reported in SDG20092579.

7. Interference Checks (Check all that apply)…….. √ ☐

__ICS A/B Recoveries Acceptable
__Al, Ca, Fe, Mg sample concentrations > ICS concentrations
__ICS %R > 120%, results >IDL estimated (J)
__ICS %R 50-79%, results >IDL estimated (J)
__ICS %R 50-79%, results <IDL estimated (UJ)
__ICS %R <50%, results >IDL and <IDL rejected (R/UR)

Comments/Qualified Results: IC check is not required as part of Tier IIA Validation.

8. Matrix Spike Recovery (MS/MSD) (Check all that apply)……. √ ☐

_/_Spike %R with 75-125%: ACCEPTED
__MS and PDS %R 30-74%, results > MDL est. (J-), ND=(UJ)
__MS <75% and PDS >75%, results > MDL est. (J), ND=(UJ)
__ MS and PDS %R >125%, detects > MDL est. (J+)
_/_ MS >125% and PDS <125%, detects > MDL est. (J)
__MS and PDS %R <30% and <75%: results >MDL (J-) ND=(UR)
__Field blanks used for spike analysis?
__Post digest spk rqrd when %R <75, >125%, excpt Ag

Comments/Qualified Results: MS recovery above limits for copper associated with -020; PDS not calculated (analyte concentration >4x spike amount).
MS and MSD recovery above limits for copper associated with -021; PDS not calculated (analyte concentration >4x spike amount).
MS recovery and MS/MSD RPD above limits for copper associated with -060; PDS within limits.

Acceptable: YES NO

9. Method of Standard Addition (MSA) and Serial Dilutions (SD)….. √ ☐

__Analytical spike %R 85-115%
__Analytical spike %R 40-85%, results > IDL estimated (J)
__Analytical spike %R 10-40%, results <IDL estimated (UJ)
__Analytical spike %R <10%, results <IDL rejected (R)

__SD Analytes >50X MDL ?
__ SD % Diff < 10%
__ SD % Diff > 10%: J results >MDL, UJ for Non-detects

Comments/Qualified Results: NA

10. Detection Limits, Other QC…… √ ☐

WATER:

Inorganics-	Metals-	
__pH = 0.1 s.u.	__Al = 0.1 mg/L	__Cd = 0.01 mg/L
__TDS/TSS = 10 mg/L	__As = 0.001 mg/L	__Cr = 0.05 mg/L
__Alkalinity = 4 mg/L	__Co = 0.0001 mg/L	__Pb = 0.05 mg/L
__Anions (i.e. Cl^-, SO_4^{2-}) = 1 mg/L	__Cu = 0.0003/0.0008mg/L	__Hg = 0.001 mg/L
__Anions (i.e. F^-) = 0.1 mg/L	__Co (WTP) = 0.001 mg/L	__Ni = 0.05 mg/L
__DOC = 0.5 mg/L	__Cu (WTP) = 0.001 mg/L	__K = 1 mg/L
__Nitrogen, Ammonia = 0.05 mg/L	__Fe = 0.03 mg/L	__Se = 0.001 mg/L
__Phosphorus, Total = 0.005 mg/L	__Ca = 0.5 mg/L	__Si = 0.1 mg/L
	__Mg = 0.5 mg/L	__Ag = 0.01 mg/L
	__HARD-T = 0.5 mg/L	__Na = 1 mg/L
	__Mn = 0.001 mg/L	__Zn = 0.01 mg/L

SOIL:

Metals-	
_x_ As = 1 mg/kg	__ = mg/kg
_/_ Co = 1 mg/kg	__ = mg/kg
_x_ Cu = 1 mg/kg	__ = mg/kg

Comments/Qualified Results: The reporting limits for copper and arsenic were increased due to sample matrix in most samples.

11. Data Verification and Overall Assessment…… √ ☐

Comments/Qualified Results: See Table 2.

Table 1
Sample Collection and Analysis Summary
Blackbird Mine Sampling - September 2020

SDG	Field Identification	Collection Date & Time	Location	Lab Identification	Matrix	QC Samples	Moisture	Total Metals[1]
B20092579	BTSED-1.6 Bottle 1	9/21/20 14:00	BTSED-1.6	B20092579-001	Soil	NA	X	X
B20092579	BTSED-1.6 Bottle 2	9/21/20 14:00	BTSED-1.6	B20092579-002	Soil	NA	X	X
B20092579	BTSED-1.6 Bottle 3	9/21/20 14:00	BTSED-1.6	B20092579-003	Soil	NA	X	X
B20092579	SFSED-04 Bottle 1	9/21/20 14:30	BTSED-04	B20092579-004	Soil	NA	X	X
B20092579	SFSED-04 Bottle 2	9/21/20 14:30	BTSED-04	B20092579-005	Soil	NA	X	X
B20092579	SFSED-04 Bottle 3	9/21/20 14:30	BTSED-04	B20092579-006	Soil	NA	X	X
B20092579	BTSED-01 Bottle 1	9/21/20 14:15	BTSED-01	B20092579-007	Soil	NA	X	X
B20092579	BTSED-01 Bottle 2	9/21/20 14:15	BTSED-01	B20092579-008	Soil	NA	X	X
B20092579	BTSED-01 Bottle 3	9/21/20 14:15	BTSED-01	B20092579-009	Soil	NA	X	X
B20092579	SFSED-02 Bottle 1	9/21/20 14:45	SFSED-02	B20092579-010	Soil	NA	X	X
B20092579	SFSED-02 Bottle 2	9/21/20 14:45	SFSED-02	B20092579-011	Soil	NA	X	X
B20092579	SFSED-02 Bottle 3	9/21/20 14:45	SFSED-02	B20092579-012	Soil	NA	X	X
B20092579	SFSED-01 Bottle 1	9/21/20 15:00	SFSED-01	B20092579-013	Soil	NA	X	X
B20092579	SFSED-01 Bottle 2	9/21/20 15:00	SFSED-01	B20092579-014	Soil	NA	X	X
B20092579	SFSED-01 Bottle 3	9/21/20 15:00	SFSED-01	B20092579-015	Soil	NA	X	X
B20092579	BDSED-04 Bottle 1	9/22/20 13:00	BDSED-04	B20092579-016	Soil	NA	X	X
B20092579	BDSED-04 Bottle 2	9/22/20 13:00	BDSED-04	B20092579-017	Soil	NA	X	X
B20092579	BDSED-04 Bottle 3	9/22/20 13:00	BDSED-04	B20092579-018	Soil	NA	X	X
B20092579	BDSED-03 Bottle 1	9/22/20 13:20	BDSED-03	B20092579-019	Soil	NA	X	X
B20092579	BDSED-03 Bottle 2	9/22/20 13:20	BDSED-03	B20092579-020	Soil	NA	X	X
B20092579	BDSED-03 Bottle 3	9/22/20 13:20	BDSED-03	B20092579-021	Soil	NA	X	X
B20092579	BBSED-08 Bottle 1	9/22/20 14:15	BBSED-08	B20092579-022	Soil	NA	X	X
B20092579	BBSED-08 Bottle 2	9/22/20 14:15	BBSED-08	B20092579-023	Soil	NA	X	X
B20092579	BBSED-08 Bottle 3	9/22/20 14:15	BBSED-08	B20092579-024	Soil	NA	X	X
B20092579	BBSED-07 Bottle 1	9/22/20 14:35	BBSED-07	B20092579-025	Soil	NA	X	X
B20092579	BBSED-07 Bottle 2	9/22/20 14:35	BBSED-07	B20092579-026	Soil	NA	X	X
B20092579	BBSED-07 Bottle 3	9/22/20 14:35	BBSED-07	B20092579-027	Soil	NA	X	X
B20092579	BBSED-03 Bottle 1	9/22/20 14:50	BBSED-03	B20092579-028	Soil	NA	X	X
B20092579	BBSED-03 Bottle 2	9/22/20 14:50	BBSED-03	B20092579-029	Soil	NA	X	X
B20092579	BBSED-03 Bottle 3	9/22/20 14:50	BBSED-03	B20092579-030	Soil	NA	X	X
B20092579	BBSED-01a Bottle 1	9/22/20 15:15	BBSED-01a	B20092579-031	Soil	NA	X	X
B20092579	BBSED-01a Bottle 2	9/22/20 15:15	BBSED-01a	B20092579-032	Soil	NA	X	X
B20092579	BBSED-01a Bottle 3	9/22/20 15:15	BBSED-01a	B20092579-033	Soil	NA	X	X
B20092579	PASED-11 Bottle 1	9/22/20 15:30	PASED-11	B20092579-034	Soil	NA	X	X
B20092579	PASED-11 Bottle 2	9/22/20 15:30	PASED-11	B20092579-035	Soil	NA	X	X
B20092579	PASED-11 Bottle 3	9/22/20 15:30	PASED-11	B20092579-036	Soil	NA	X	X
B20092579	PASED-10 Bottle 1	9/22/20 15:45	PASED-10	B20092579-037	Soil	NA	X	X
B20092579	PASED-10 Bottle 2	9/22/20 15:45	PASED-10	B20092579-038	Soil	NA	X	X
B20092579	PASED-10 Bottle 3	9/22/20 15:45	PASED-10	B20092579-039	Soil	NA	X	X
B20092579	PASED-08 Bottle 1	9/22/20 16:35	PASED-08	B20092579-040	Soil	NA	X	X
B20092579	PASED-08 Bottle 2	9/22/20 16:35	PASED-08	B20092579-041	Soil	NA	X	X
B20092579	PASED-08 Bottle 3	9/22/20 16:35	PASED-08	B20092579-042	Soil	NA	X	X
B20092579	PASED-07 Bottle 1	9/22/20 17:00	PASED-07	B20092579-043	Soil	NA	X	X
B20092579	PASED-07 Bottle 2	9/22/20 17:00	PASED-07	B20092579-044	Soil	NA	X	X
B20092579	PASED-07 Bottle 3	9/22/20 17:00	PASED-07	B20092579-045	Soil	NA	X	X
B20092579	PASED-05 Bottle 1	9/23/20 15:50	PASED-05	B20092579-046	Soil	NA	X	X
B20092579	PASED-05 Bottle 2	9/23/20 15:50	PASED-05	B20092579-047	Soil	NA	X	X
B20092579	PASED-05 Bottle 3	9/23/20 15:50	PASED-05	B20092579-048	Soil	NA	X	X
B20092579	PASED-04 Bottle 1	9/23/20 17:30	PASED-04	B20092579-049	Soil	NA	X	X
B20092579	PASED-04 Bottle 2	9/23/20 17:30	PASED-04	B20092579-050	Soil	NA	X	X
B20092579	PASED-04 Bottle 3	9/23/20 17:30	PASED-04	B20092579-051	Soil	NA	X	X
B20092579	PASED-01 Bottle 1	9/23/20 18:00	PASED-01	B20092579-052	Soil	NA	X	X
B20092579	PASED-01 Bottle 2	9/23/20 18:00	PASED-01	B20092579-053	Soil	NA	X	X
B20092579	PASED-01 Bottle 3	9/23/20 18:00	PASED-01	B20092579-054	Soil	NA	X	X
B20092579	BDSED-01 Bottle 1	9/23/20 17:10	BDSED-01	B20092579-055	Soil	NA	X	X
B20092579	BDSED-01 Bottle 2	9/23/20 17:10	BDSED-01	B20092579-056	Soil	NA	X	X
B20092579	BDSED-01 Bottle 3	9/23/20 17:10	BDSED-01	B20092579-057	Soil	NA	X	X
B20092579	BDSED-02 Bottle 1	9/23/20 16:30	BDSED-02	B20092579-058	Soil	NA	X	X
B20092579	BDSED-02 Bottle 2	9/23/20 16:30	BDSED-02	B20092579-059	Soil	NA	X	X
B20092579	BDSED-02 Bottle 3	9/23/20 16:30	BDSED-02	B20092579-060	Soil	NA	X	X

[1]See laboratory data package for list of metals analyzed

Notes:
All analyses performed by Energy Laboratories

Abbreviations:
SDG - Sample Delivery Group

Table 2
Qualifier Summary Table
Blackbird Mine Sampling - September 2020

SDG	Sample Name	Constituent	New Result	New RL	Qualifier	Reason	PDF Page Number
B20092579	BDSED-03 Bottle 2	Total Copper	25	1	J	MS/MSD recovery above limits	23
B20092579	BDSED-03 Bottle 3	Total Copper	30	1	J	MS/MSD recovery above limits	24
B20092579	BDSED-02 Bottle 3	Total Copper	83	1	J	MS/MSD recovery above limits	63

Abbreviations
RL - Reporting Limit
SDG - Sample Delivery Group

Qualifier Definitions
J - Result is an estimated value

METALS & INORGANIC / Tier I & II Data Validation Summary Checklist

GOLDER PROJECT #: 943-1595.011 ph 3100	SITE: BLACKBIRD MINE SITE, SALMON, ID
LABORATORY: ENERGY LABORATORY, BILLINGS	SDG: B20092655

SAMPLES (Total # =)	COLLECTED (Date/Time)	MATRIX
See Table 1		

DATA ASSESSMENT SUMMARY

REVIEW ITEM	ICP/ AES EPA200.7	ICP/ MS EPA200.8	TDS A2540C TSS A2540D	Hardness A2340B Alkalinity A2320B	Anions (ex Cl^-, F^-, SO_4^{-2}) E300.0	OTHER pH A4500-H-B DOC A5310C
1. Data Package Completeness	O	O	O	O	O	O
2. Holding Temperatures & Times	Θ	Θ	Θ	Θ	Θ	X
3. Calibration	O	O	O	O	O	O
4. Lab Blanks, Field Blanks	O	X	O	O	O	O
5. Lab Duplicate, Field Duplicate RPD	O	O	O	O	O	O
6. LCS, LFB, Blank Spike	O	O	O	O	O	O
7. Interference Checks	NA	NA	NA	NA	NA	NA
8. Matrix Spike Recovery (MS/MSD)	O	O	O	O	O	O
9. MSA and Serial Dilutions	NA	NA	NA	NA	NA	NA
10. Detection Limits, Other QC	O	Θ	O	O	O	O
11. Data Verification, Overall Summary	O	O	O	O	O	O

O = Data had no problems Θ = Problems, but do not affect data NA = Not applicable to this data set.
X = Data qualified due to minor problems [typically estimated data (J/UJ)].
M = Data qualified due to major problems [typically more than 50% qualified (J/UJ)].
Z = Data unacceptable [typically data rejected (R).

	Acceptable: YES	NO
1. Date Package Completeness (Check if present)……	√	☐

_/_Case narrative
_/_Chain of Custody
_/_Sample Results
_/_ICV/CCV Results
_/_Blank Results
_o_ICP Interference Check Results
_/_Spike Recovery Results
_/_Duplicate Results
_/_LCS Results
_o_Standard Addition Results
_o_ICP Serial Dilution
_o_Instrument Det. Limits
__Other_____

/ Acceptable
x Absent
o Not required

Comments/Qualified Results: According to the Case Narrative; tests associated with analyst ELI-CA were subcontracted to Energy Laboratories in Casper, WY. Laboratory notes indicate TSS did not obtain the residue requirement of 2.5 mg residue for most samples.

Validated by: Samantha DiCenso **Date:** 10/22/2020
Reviewed by: Ann Muehlfarth **Date:** 10/23/2020

METALS & INORGANIC / Tier I & II Data Validation Summary Checklist

Acceptable: YES NO

2. Holding Temperatures & Times (Check all that apply)…… √ ☐

_x_Recommended Hold Temp. of Cool, ≤6°C met (√ - Yes / x – No)
_/_TDS / TSS analysis completed in <7 days from collection
__Acidity / Alkalinity completed in <14 days from collection
_/_ ICP metals completed in <6 months from collection
_/_ Anions (Cl^-, F^-, SO_4^-), DOC analyzed in <28 days from collection
__ pH analysis completed in <15 minutes from collection

Comments/Qualified Results: The cooler temperatures upon receipt were recorded at 2.4°C and 16.8°C. Using professional judgement and following project-specific requirements qualification of metals results was not required because the samples were preserved to pH<2. pH analysis was not completed within 15 minutes of sample collection; therefore, results are qualified as estimated values.

3. Calibrations (Check all that apply)…….. √ ☐

_/_ICV/CCV %R for ICP/AA, 90%-110%, acceptable
__ICV/CCV %R for ICP/AA, 75%-89% or 111%-125%, results estimated (J/UJ)
__ICV/CCV %R for ICP/AA, <75% or >125%, reject positive results (R)

Comments/Qualified Results: None.

4. Lab Blanks, Field Blanks (Check all that apply)…….. √ ☐

__Detects reported in ICB/CCB list:
_/_ Detects in preparation blanks, results >10x contamination level or ND (no qualifier)
_/_Detects in preparation blanks, results ≤10x contamination level (J+)
_/_Detects in field blanks (Note: Advisory condition only and no qualifier)

Field Blank ID: BDSW-23
Field Blank ID: _____

Comments/Qualified Results: Method blank (MB-149074) detection of cobalt at 0.00007 mg/L and iron at 0.02 mg/L associated with batch 149074.
Method blank (MB-149080) detection of TDS at 4 mg/L associated with batch 149080.
Method blank (MB-149108) detection of TSS at 0.1 mg/L associated with batch 149108.
Field Blank detection of bicarbonate at 4 mg/L (advisory condition only, no qualification).

5. Lab Duplicates, Field Duplicates (Check all that apply)……... √ ☐

_/_Duplicate RPD ≤20% for waters (≤35% for soils) for results >5X CRDL
__Duplicate RPD >20% for waters (>35% for soils) for results >5X CRDL (J)
__Duplicate range is within ±CRDL (± 2X CRDL for soils) for results <5X CRDL (no qualifier)

Field Duplicate ID: BDSW-13
Field Duplicate ID: _____

Comments/Qualified Results: None.

Acceptable: YES NO

6. Laboratory Control Samples* (Check all that apply)……..… √ ☐

_/_LCS %R 70-130%: ACCEPTED
__LCS %R 40-69% or >130%, results >MDL: estimated (J-/J+)
__LCS %R 40-69% and results <MDL: estimated (UJ)
__LCS %R <40% and all results rejected (R/UR)
__LCS %R >150% and all results rejected (R)
*Lab Control Samples/Lab Control Sample Duplicates (LCS/LCSD)
*Lab Fortified Blanks (LFB)
*Blank Spike / Blank Spike Duplicates (BS/BSD)

Comments/Qualified Results: None.

7. Interference Checks (Check all that apply)…….. √ ☐

__ICS A/B Recoveries Acceptable
__Al, Ca, Fe, Mg sample concentrations > ICS concentrations
__ICS %R > 120%, results >IDL estimated (J)
__ICS %R 50-79%, results >IDL estimated (J)
__ICS %R 50-79%, results <IDL estimated (UJ)
__ICS %R <50%, results >IDL and <IDL rejected (R/UR)

Comments/Qualified Results: IC check is not required as part of Tier IIA Validation.

8. Matrix Spike Recovery (MS/MSD) (Check all that apply)……. √ ☐

_/_Spike %R with 75-125%: ACCEPTED
__MS and PDS %R 30-74%, results > MDL est. (J-), ND=(UJ)
__MS <75% and PDS >75%, results > MDL est. (J), ND=(UJ)
__ MS and PDS %R >125%, detects > MDL est. (J+)
__ MS >125% and PDS <125%, detects > MDL est. (J)
__MS and PDS %R <30% and <75%: results >MDL (J-) ND=(UR)
__Field blanks used for spike analysis?
__Post digest spk rqrd when %R <75, >125%, excpt Ag

Comments/Qualified Results: None.

Acceptable: YES NO

9. Method of Standard Addition (MSA) and Serial Dilutions (SD)….. √ ☐

__Analytical spike %R 85-115%
__Analytical spike %R 40-85%, results > IDL estimated (J)
__Analytical spike %R 10-40%, results <IDL estimated (UJ)
__Analytical spike %R <10%, results <IDL rejected (R)

__SD Analytes >50X MDL ?
__ SD % Diff < 10%
__ SD % Diff > 10%: J results >MDL, UJ for Non-detects

Comments/Qualified Results: NA

10. Detection Limits, Other QC…… √ ☐

WATER:

Inorganics-	Metals-	
_/_pH = 0.1 s.u.	__Al = 0.1 mg/L	__Cd = 0.01 mg/L
_/_TDS/TSS = 10 mg/L	_/_As = 0.001 mg/L	__Cr = 0.05 mg/L
_/_Alkalinity = 4 mg/L	_/_Co = 0.0001 mg/L	__Pb = 0.05 mg/L
_/_Anions (i.e. Cl^-, SO_4^-) = 1 mg/L	x_Cu = 0.0003/0.0008mg/L	__Hg = 0.001 mg/L
__Anions (i.e. F^-) = 0.1 mg/L	__Co (WTP) = 0.001 mg/L	__Ni = 0.05 mg/L
_/_DOC = 0.5 mg/L	__Cu (WTP) = 0.001 mg/L	_/_K = 1 mg/L
__Nitrogen, Ammonia = 0.05 mg/L	_/_Fe = 0.03 mg/L	__Se = 0.001 mg/L
__Phosphorus, Total = 0.005 mg/L	_/_Ca = 0.5 mg/L	__Si = 0.1 mg/L
	_/_Mg = 0.5 mg/L	__Ag = 0.01 mg/L
	_/_HARD-T = 0.5 mg/L	_/_Na = 1 mg/L
	__Mn = 0.001 mg/L	__Zn = 0.01 mg/L

SOIL:

Metals-	
__As = 1 mg/kg	__ = mg/kg
__Co = 1 mg/kg	__ = mg/kg
__Cu = 1 mg/kg	__ = mg/kg

Comments/Qualified Results: The reporting limit for total copper was 0.0004 mg/L in BTSW-1.6, SFSW-04, BTSW-01, BDSW-04, BTSEEP, PASW-34x, SFSW-02, SFSW-01, BDSW-03, BDSW-23, PASW-04x, and BDSW-01.
The reporting limit for dissolved copper was 0.0004 mg/L in SFSW-04, BDSW-04, PASW-05, BTSEEP, PASW-34x, BDSW-03, BDSW-13, PASW-04x, and BDSW-01.

11. Data Verification and Overall Assessment…… √ ☐

Comments/Qualified Results: See Table 2.

Table 1
Sample Collection and Analysis Summary
Blackbird Mine Sampling - September 2020

SDG	Field Identification	Collection Date & Time	Location	Lab Identification	Matrix	QC Samples	Total Dissolved Solids	Total Suspended Solids	Anions	Alkalinity and/or Hardness (as CaCO3)	Dissolved Metals[1]	Total Metals[1]	Other (pH, DOC)
B20092655	BTSW-1.6	9/28/20 9:20	BTSW-1.6	B20092655-001	Aqueous	NA		X	X	X	X	X	
B20092655	SFSW-04	9/28/20 10:10	SFSW-04	B20092655-002	Aqueous	NA		X	X	X	X	X	
B20092655	BTSW-01	9/28/20 9:45	BTSW-01	B20092655-003	Aqueous	NA		X	X	X	X	X	
B20092655	SFSW-02	9/28/20 10:40	SFSW-02	B20092655-004	Aqueous	NA	X	X	X	X	X	X	X
B20092655	BDSW-04	9/28/20 11:30	BDSW-04	B20092655-005	Aqueous	NA		X	X	X	X	X	
B20092655	SFSW-01	9/28/20 11:00	SFSW-01	B20092655-006	Aqueous	NA	X	X	X	X	X	X	X
B20092655	BDSW-03	9/28/20 12:00	BDSW-03	B20092655-007	Aqueous	NA	X	X	X	X	X	X	X
B20092655	BDSW-13	9/28/20 12:10	BDSW-03	B20092655-008	Aqueous	Field Duplicate	X	X	X	X	X	X	X
B20092655	BDSW-23	9/28/20 12:20	BDSW-03	B20092655-009	Aqueous	Field Blank	X	X	X	X	X	X	X
B20092655	PASW-05	9/28/20 14:00	PASW-05	B20092655-010	Aqueous	NA		X	X	X	X	X	
B20092655	PASW-04x	9/28/20 14:55	PASW-04x	B20092655-011	Aqueous	NA	X	X	X	X	X	X	X
B20092655	BDSW-01	9/28/20 14:30	BDSW-01	B20092655-012	Aqueous	NA	X	X	X	X	X	X	X
B20092655	BTSEEP	9/28/20 9:00	BTSEEP	B20092655-013	Aqueous	NA		X	X	X	X	X	
B20092655	PASW-34x	9/28/20 15:05	PASW-04x	B20092655-014	Aqueous	Field Control Sample				X	X	X	

[1]See laboratory data package for list of metals analyzed

Notes:
All analyses performed by Energy Laboratories

Abbreviations:
SDG - Sample Delivery Group

Table 2
Qualifier Summary Table
Blackbird Mine Sampling - September 2020

SDG	Sample Name	Constituent	New Result	New RL	Qualifier	Reason	PDF Page Number
B20092655	SFSW-02	pH	n/a	0.1	J	Analyzed outside hold time	7
B20092655	SFSW-01	pH	n/a	0.1	J	Analyzed outside hold time	9
B20092655	BDSW-03	pH	n/a	0.1	J	Analyzed outside hold time	10
B20092655	BDSW-03	pH	n/a	0.1	J	Analyzed outside hold time	11
B20092655	BDSW-03	pH	n/a	0.1	J	Analyzed outside hold time	12
B20092655	BDSW-01	pH	n/a	0.1	J	Analyzed outside hold time	15
B20092655	PASW-04X	pH	n/a	0.1	J	Analyzed outside hold time	14
B20092655	SFSW-04	Total Cobalt	0.0002	1E-04	J+	Detected in MB, sample result <10x blank result	5
B20092655	PASW-05	Total Iron	0.10	0.03	J+	Detected in MB, sample result <10x blank result	13

Abbreviations
RL - Reporting Limit
SDG - Sample Delivery Group

Qualifier Definitions
J - Result is an estimated value
J+ Result is an estimated value (estimated high)

METALS & INORGANIC / Tier I & II Data Validation Summary Checklist

GOLDER PROJECT #: 943-1595.011 ph 3100	SITE: BLACKBIRD MINE SITE, SALMON, ID
LABORATORY: ENERGY LABORATORY, BILLINGS	SDG: B20102022

SAMPLES (Total # =)	COLLECTED (Date/Time)	MATRIX
See Table 1		

DATA ASSESSMENT SUMMARY

REVIEW ITEM	ICP/ AES EPA200.7	ICP/ MS EPA200.8	TDS A2540C TSS A2540D	Hardness A2340B Alkalinity A2320B	Anions (ex Cl^-, F^-, SO_4^{-2}) E300.0	OTHER pH A4500-H-B DOC A5310C
1. Data Package Completeness	Θ	Θ	Θ	NA	NA	NA
2. Holding Temperatures & Times	O	O	O	NA	NA	NA
3. Calibration	O	O	O	NA	NA	NA
4. Lab Blanks, Field Blanks	Θ	Θ	Θ	NA	NA	NA
5. Lab Duplicate, Field Duplicate RPD	O	O	O	NA	NA	NA
6. LCS, LFB, Blank Spike	O	O	O	NA	NA	NA
7. Interference Checks	NA	NA	NA	NA	NA	NA
8. Matrix Spike Recovery (MS/MSD)	O	O	O	NA	NA	NA
9. MSA and Serial Dilutions	NA	NA	NA	NA	NA	NA
10. Detection Limits, Other QC	O	O	O	NA	NA	NA
11. Data Verification, Overall Summary	O	O	O	NA	NA	NA

O = Data had no problems Θ = Problems, but do not affect data NA = Not applicable to this data set.
X = Data qualified due to minor problems [typically estimated data (J/UJ)].
M = Data qualified due to major problems [typically more than 50% qualified (J/UJ)].
Z = Data unacceptable [typically data rejected (R).

	Acceptable: YES	NO
1. Date Package Completeness (Check if present)……	√	☐

_x_Case narrative
_/_Chain of Custody
_/_Sample Results
_/_ICV/CCV Results
_/_Blank Results
_o_ICP Interference Check Results
_/_Spike Recovery Results

_/_Duplicate Results
_/_LCS Results
_o_Standard Addition Results
_o_ICP Serial Dilution
_o_Instrument Det. Limits
__Other_____

/ Acceptable
x Absent
o Not required

Comments/Qualified Results: According to the Work Order Receipt Checklist, the unpreserved container for sample BBSW-21A was received with the lid removed and the sample contents lost. The analysis for TSS was canceled per the phone call with Sean Bascom 10/27/2020. The unpreserved containers for samples BBSW-01A and BBSW-11A were received partially frozen. Laboratory notes indicate TSS did not obtain the residue requirement of 2.5 mg residue for PASW-09.

Validated by: Ann Muehlfarth **Date:** 11/18/2020
Reviewed by: Samantha DiCenso **Date:** 11/23/2020

METALS & INORGANIC / Tier I & II Data Validation Summary Checklist

Acceptable: YES NO

2. Holding Temperatures & Times (Check all that apply)…… √ ☐

_/_Recommended Hold Temp. of Cool, ≤6°C met (√ - Yes / x – No)
_/_TDS / TSS analysis completed in <7 days from collection
__Acidity / Alkalinity completed in <14 days from collection
_/_ICP metals completed in <6 months from collection
__Anions (Cl^-, F^-, SO_4^-), DOC analyzed in <28 days from collection
__pH analysis completed in <15 minutes from collection

Comments/Qualified Results: None.

3. Calibrations (Check all that apply)……. √ ☐

_/_ICV/CCV %R for ICP/AA, 90%-110%, acceptable
__ICV/CCV %R for ICP/AA, 75%-89% or 111%-125%, results estimated (J/UJ)
__ICV/CCV %R for ICP/AA, <75% or >125%, reject positive results (R)

Comments/Qualified Results: None.

4. Lab Blanks, Field Blanks (Check all that apply)…….. √ ☐

__Detects reported in ICB/CCB list:
Field Blank ID: BBSW-21A
_/_ Detects in preparation blanks, results >10x contamination level or ND (no qualifier)
__Detects in preparation blanks, results ≤10x contamination level (J+)
__Detects in field blanks (Note: Advisory condition only and no qualifier)

Comments/Qualified Results: Method blank (MB-149923) detection of TSS at 0.1 mg/L, associated with batch 149923.

5. Lab Duplicates, Field Duplicates (Check all that apply)……... √ ☐

_/_Duplicate RPD ≤20% for waters (≤35% for soils) for results >5X CRDL
Field Duplicate ID: BBSW-11A
__Duplicate RPD >20% for waters (>35% for soils) for results >5X CRDL (J)
__Duplicate range is within ±CRDL (± 2X CRDL for soils) for results <5X CRDL (no qualifier)

Comments/Qualified Results: None.

Acceptable: YES NO

6. Laboratory Control Samples* (Check all that apply)……..… √ ☐

_/_LCS %R 70-130%: ACCEPTED
__LCS %R 40-69% or >130%, results >MDL: estimated (J-/J+)
__LCS %R 40-69% and results <MDL: estimated (UJ)
__LCS %R <40% and all results rejected (R/UR)
__LCS %R >150% and all results rejected (R)
*Lab Control Samples/Lab Control Sample Duplicates (LCS/LCSD)
*Lab Fortified Blanks (LFB)
*Blank Spike / Blank Spike Duplicates (BS/BSD)

Comments/Qualified Results: None.

7. Interference Checks (Check all that apply)…….. √ ☐

__ICS A/B Recoveries Acceptable
__Al, Ca, Fe, Mg sample concentrations > ICS concentrations
__ICS %R > 120%, results >IDL estimated (J)
__ICS %R 50-79%, results >IDL estimated (J)
__ICS %R 50-79%, results <IDL estimated (UJ)
__ICS %R <50%, results >IDL and <IDL rejected (R/UR)

Comments/Qualified Results: IC check is not required as part of Tier IIA Validation.

8. Matrix Spike Recovery (MS/MSD) (Check all that apply)…… √ ☐

_/_Spike %R with 75-125%: ACCEPTED
__MS and PDS %R 30-74%, results > MDL est. (J-), ND=(UJ)
__MS <75% and PDS >75%, results > MDL est. (J), ND=(UJ)
__ MS and PDS %R >125%, detects > MDL est. (J+)
__ MS >125% and PDS <125%, detects > MDL est. (J)
__MS and PDS %R <30% and <75%: results >MDL (J-) ND=(UR)
__Field blanks used for spike analysis?
__Post digest spk rqrd when %R <75, >125%, excpt Ag

Comments/Qualified Results: None.

Acceptable: YES NO

9. Method of Standard Addition (MSA) and Serial Dilutions (SD)….. √ ☐

__Analytical spike %R 85-115%
__Analytical spike %R 40-85%, results > IDL estimated (J)
__Analytical spike %R 10-40%, results <IDL estimated (UJ)
__Analytical spike %R <10%, results <IDL rejected (R)

__SD Analytes >50X MDL ?
__ SD % Diff < 10%
__ SD % Diff > 10%: J results >MDL, UJ for Non-detects

Comments/Qualified Results: NA

10. Detection Limits, Other QC…… ☐ ☐

WATER:			SOIL:	
Inorganics-	**Metals-**		**Metals-**	
__pH = 0.1 s.u.	__Al = 0.1 mg/L	__Cd = 0.01 mg/L	__ As = 1 mg/kg	__ = mg/kg
_/_ TDS/TSS = 10 mg/L	_/_ As = 0.001 mg/L	__Cr = 0.05 mg/L	__ Co = 1 mg/kg	__ = mg/kg
__Alkalinity = 4 mg/L	__Co = 0.0001 mg/L	__Pb = 0.05 mg/L	__ Cu = 1 mg/kg	__ = mg/kg
__Anions (i.e. Cl^-, SO_4^{--}) = 1 mg/L	__Cu = 0.0003/0.0008mg/L	__Hg = 0.001 mg/L		
__Anions (i.e. F^-) = 0.1 mg/L	__Co (WTP) = 0.001 mg/L	__Ni = 0.05 mg/L		
__ DOC = 0.5 mg/L	__Cu (WTP) = 0.001 mg/L	__K = 1 mg/L		
__Nitrogen, Ammonia = 0.05 mg/L	__Fe = 0.03 mg/L	__Se = 0.001 mg/L		
__Phosphorus, Total = 0.005 mg/L	__Ca = 0.5 mg/L	__Si = 0.1 mg/L		
	__Mg = 0.5 mg/L	__Ag = 0.01 mg/L		
	__HARD-T = 0.5 mg/L	__Na = 1 mg/L		
	__Mn = 0.001 mg/L	__Zn = 0.01 mg/L		

Comments/Qualified Results: None.

11. Data Verification and Overall Assessment…… √ ☐

Comments/Qualified Results: None.

Table 1
Sample Collection and Analysis Summary
Blackbird Mine Sampling - October 2020

							Analysis		
SDG	**Field Identification**	**Collection Date & Time**	**Location**	**Lab Identification**	**Matrix**	**QC Samples**	**Total Suspended Solids**	**Dissolved Metals[1]**	**Total Metals[1]**
B20102022	BBSW-01A	10/26/20 8:30	BBSW-01A	B20102022-001	Aqueous	-	X	X	X
B20102022	BBSW-11A	10/26/20 8:40	BBSW-01A	B20102022-002	Aqueous	Field Duplicate	X	X	X
B20102022	BBSW-21A	10/26/20 8:50	BBSW-01A	B20102022-003	Aqueous	Field Blank		X	X
B20102022	PASW-09	10/26/20 9:00	PASW-09	B20102022-004	Aqueous	-	X	X	X

[1]See laboratory data package for list of metals analyzed

Notes:
All analyses performed by Energy Laboratories

Abbreviations:
SDG - Sample Delivery Group

Table 2
Qualifier Summary Table
Blackbird Mine Sampling - October 2020

SDG	Sample Name	Constituent	New Result	New RL	Qualifier	Reason	PDF Page Number
None							

Abbreviations
RL - Reporting Limit
SDG - Sample Delivery Group

METALS & INORGANIC / Tier I & II Data Validation Summary Checklist

GOLDER PROJECT #: 943-1595.011 ph 3100	SITE: BLACKBIRD MINE SITE, SALMON, ID
LABORATORY: ENERGY LABORATORY, BILLINGS	SDG: B20102343

SAMPLES (Total # =)	COLLECTED (Date/Time)	MATRIX
See Table 1		

DATA ASSESSMENT SUMMARY

REVIEW ITEM	ICP/ AES EPA200.7	ICP/ MS EPA200.8	TDS A2540C TSS A2540D	Hardness A2340B Alkalinity A2320B	Anions (ex Cl^-, F^-, SO_4^{-2}) E300.0	OTHER pH A4500-H-B DOC A5310C
1. Data Package Completeness	Θ	Θ	NA	NA	NA	NA
2. Holding Temperatures & Times	Θ	Θ	NA	NA	NA	NA
3. Calibration	O	O	NA	NA	NA	NA
4. Lab Blanks, Field Blanks	O	O	NA	NA	NA	NA
5. Lab Duplicate, Field Duplicate RPD	NA	NA	NA	NA	NA	NA
6. LCS, LFB, Blank Spike	O	O	NA	NA	NA	NA
7. Interference Checks	NA	NA	NA	NA	NA	NA
8. Matrix Spike Recovery (MS/MSD)	O	O	NA	NA	NA	NA
9. MSA and Serial Dilutions	NA	NA	NA	NA	NA	NA
10. Detection Limits, Other QC	O	O	NA	NA	NA	NA
11. Data Verification, Overall Summary	O	O	NA	NA	NA	NA

O = Data had no problems Θ = Problems, but do not affect data NA = Not applicable to this data set.
X = Data qualified due to minor problems [typically estimated data (J/UJ)].
M = Data qualified due to major problems [typically more than 50% qualified (J/UJ)].
Z = Data unacceptable [typically data rejected (R).

Acceptable: YES NO

1. Date Package Completeness (Check if present)…… √ ☐

_x_Case narrative
_/_Chain of Custody
_/_Sample Results
_/_ICV/CCV Results
_/_Blank Results
_o_ICP Interference Check Results
_/_Spike Recovery Results

_x_Duplicate Results
_/_LCS Results
_o_Standard Addition Results
_o_ICP Serial Dilution
_o_Instrument Det. Limits
__Other_____

/ Acceptable
x Absent
o Not required

Comments/Qualified Results: None.

Validated by: Ann Muehlfarth **Date:** 11/18/2020
Reviewed by: Samantha DiCenso **Date:** 11/23/2020

METALS & INORGANIC / Tier I & II Data Validation Summary Checklist

Acceptable: YES NO

2. Holding Temperatures & Times (Check all that apply)…… √ ☐

_x_Recommended Hold Temp. of Cool, ≤6°C met (√ - Yes / x – No)
__TDS / TSS analysis completed in <7 days from collection
__Acidity / Alkalinity completed in <14 days from collection
_/_ICP metals completed in <6 months from collection
__Anions (Cl^-, F^-, SO_4^-), DOC analyzed in <28 days from collection
__pH analysis completed in <15 minutes from collection

Comments/Qualified Results: The cooler temperature upon receipt was recorded at 13.9 °C. Using professional judgement and following project-specific requirements qualification of metals results was not required because the samples were preserved to pH<2.

3. Calibrations (Check all that apply)……. √ ☐

_/_ICV/CCV %R for ICP/AA, 90%-110%, acceptable
__ICV/CCV %R for ICP/AA, 75%-89% or 111%-125%, results estimated (J/UJ)
__ICV/CCV %R for ICP/AA, <75% or >125%, reject positive results (R)

Comments/Qualified Results: None.

4. Lab Blanks, Field Blanks (Check all that apply)…….. √ ☐

__Detects reported in ICB/CCB list: Field Blank ID: _____
__ Detects in preparation blanks, results >10x contamination level or ND (no qualifier) Field Blank ID: _____
__Detects in preparation blanks, results ≤10x contamination level (J+)
__Detects in field blanks (Note: Advisory condition only and no qualifier)

Comments/Qualified Results: None.

5. Lab Duplicates, Field Duplicates (Check all that apply)……... √ ☐

__Duplicate RPD ≤20% for waters (≤35% for soils) for results >5X CRDL Field Duplicate ID: _____
__Duplicate RPD >20% for waters (>35% for soils) for results >5X CRDL (J) Field Duplicate ID: _____
__Duplicate range is within ±CRDL (± 2X CRDL for soils) for results <5X CRDL (no qualifier)

Comments/Qualified Results: No duplicates listed.

Acceptable: YES NO

6. Laboratory Control Samples* (Check all that apply)……..… √ ☐

_/_LCS %R 70-130%: ACCEPTED
__LCS %R 40-69% or >130%, results >MDL: estimated (J-/J+)
__LCS %R 40-69% and results <MDL: estimated (UJ)
__LCS %R <40% and all results rejected (R/UR)
__LCS %R >150% and all results rejected (R)
*Lab Control Samples/Lab Control Sample Duplicates (LCS/LCSD)
*Lab Fortified Blanks (LFB)
*Blank Spike / Blank Spike Duplicates (BS/BSD)

Comments/Qualified Results: None.

7. Interference Checks (Check all that apply)…….. √ ☐

__ICS A/B Recoveries Acceptable
__Al, Ca, Fe, Mg sample concentrations > ICS concentrations
__ICS %R > 120%, results >IDL estimated (J)
__ICS %R 50-79%, results >IDL estimated (J)
__ICS %R 50-79%, results <IDL estimated (UJ)
__ICS %R <50%, results >IDL and <IDL rejected (R/UR)

Comments/Qualified Results: IC check is not required as part of Tier IIA Validation.

8. Matrix Spike Recovery (MS/MSD) (Check all that apply)……. √ ☐

_/_Spike %R with 75-125%: ACCEPTED
__MS and PDS %R 30-74%, results > MDL est. (J-), ND=(UJ)
__MS <75% and PDS >75%, results > MDL est. (J), ND=(UJ)
__ MS and PDS %R >125%, detects > MDL est. (J+)
__ MS >125% and PDS <125%, detects > MDL est. (J)
__MS and PDS %R <30% and <75%: results >MDL (J-) ND=(UR)
__Field blanks used for spike analysis?
__Post digest spk rqrd when %R <75, >125%, excpt Ag

Comments/Qualified Results: None.

Acceptable: YES NO

9. Method of Standard Addition (MSA) and Serial Dilutions (SD)….. √ ☐

__Analytical spike %R 85-115%
__Analytical spike %R 40-85%, results > IDL estimated (J)
__Analytical spike %R 10-40%, results <IDL estimated (UJ)
__Analytical spike %R <10%, results <IDL rejected (R)

__SD Analytes >50X MDL ?
__ SD % Diff < 10%
__ SD % Diff > 10%: J results >MDL, UJ for Non-detects

Comments/Qualified Results: NA.

10. Detection Limits, Other QC…… √ ☐

WATER:

Inorganics-	Metals-	
__pH = 0.1 s.u.	__Al = 0.1 mg/L	__Cd = 0.01 mg/L
__TDS/TSS = 10 mg/L	__As = 0.001 mg/L	__Cr = 0.05 mg/L
__Alkalinity = 4 mg/L	__Co = 0.0001 mg/L	__Pb = 0.05 mg/L
__Anions (i.e. Cl^-, SO_4^{--}) = 1 mg/L	__Cu = 0.0003/0.0008mg/L	__Hg = 0.001 mg/L
__Anions (i.e. F^-) = 0.1 mg/L	__/__Co (WTP) = 0.001 mg/L	__Ni = 0.05 mg/L
__ DOC = 0.5 mg/L	__/__Cu (WTP) = 0.001 mg/L	__K = 1 mg/L
__Nitrogen, Ammonia = 0.05 mg/L	__/__Fe = 0.03 mg/L	__Se = 0.001 mg/L
__Phosphorus, Total = 0.005 mg/L	__Ca = 0.5 mg/L	__Si = 0.1 mg/L
	__Mg = 0.5 mg/L	__Ag = 0.01 mg/L
	__HARD-T = 0.5 mg/L	__Na = 1 mg/L
	__Mn = 0.001 mg/L	__Zn = 0.01 mg/L

SOIL:

Metals-	
__ As = 1 mg/kg	__ = mg/kg
__ Co = 1 mg/kg	__ = mg/kg
__ Cu = 1 mg/kg	__ = mg/kg

Comments/Qualified Results: None.

11. Data Verification and Overall Assessment…… √ ☐

Comments/Qualified Results: None.

Table 1
Sample Collection and Analysis Summary
Blackbird Mine Sampling - October 2020

							Analysis	
SDG	**Field Identification**	**Collection Date & Time**	**Location**	**Lab Identification**	**Matrix**	**QC Samples**	**Dissolved Metals[1]**	**Total Metals[1]**
B20102343	WTP-C	10/28/20 10:00	WTP-C	B20102343-001	Aqueous	-	X	X

[1]See laboratory data package for list of metals analyzed

Notes:
All analyses performed by Energy Laboratories

Abbreviations:
SDG - Sample Delivery Group

Table 2
Qualifier Summary Table
Blackbird Mine Sampling - October 2020

SDG	Sample Name	Constituent	New Result	New RL	Qualifier	Reason	PDF Page Number
None							

Abbreviations
RL - Reporting Limit
SDG - Sample Delivery Group

METALS & INORGANIC / Tier I & II Data Validation Summary Checklist

GOLDER PROJECT #: 943-1595.011 ph 3100	SITE: BLACKBIRD MINE SITE, SALMON, ID
LABORATORY: ENERGY LABORATORY, BILLINGS	SDG: B20111377

SAMPLES (Total # =)	COLLECTED (Date/Time)	MATRIX
See Table 1		

DATA ASSESSMENT SUMMARY

REVIEW ITEM	ICP/ AES EPA200.7	ICP/ MS EPA200.8	TDS A2540C TSS A2540D	Hardness A2340B Alkalinity A2320B	Anions (ex Cl^-, F^-, SO_4^{-2}) E300.0	OTHER pH A4500-H-B DOC A5310C
1. Data Package Completeness	NA	Θ	Θ	NA	NA	NA
2. Holding Temperatures & Times	NA	O	O	NA	NA	NA
3. Calibration	NA	O	O	NA	NA	NA
4. Lab Blanks, Field Blanks	NA	O	O	NA	NA	NA
5. Lab Duplicate, Field Duplicate RPD	NA	O	O	NA	NA	NA
6. LCS, LFB, Blank Spike	NA	O	O	NA	NA	NA
7. Interference Checks	NA	NA	NA	NA	NA	NA
8. Matrix Spike Recovery (MS/MSD)	NA	O	O	NA	NA	NA
9. MSA and Serial Dilutions	NA	NA	NA	NA	NA	NA
10. Detection Limits, Other QC	NA	O	O	NA	NA	NA
11. Data Verification, Overall Summary	NA	O	O	NA	NA	NA

O = Data had no problems Θ = Problems, but do not affect data NA = Not applicable to this data set.
X = Data qualified due to minor problems [typically estimated data (J/UJ)].
M = Data qualified due to major problems [typically more than 50% qualified (J/UJ)].
Z = Data unacceptable [typically data rejected (R).

	Acceptable: YES	NO
1. Date Package Completeness (Check if present)……	√	☐

_x_Case narrative
_/_Chain of Custody
_/_Sample Results
_/_ICV/CCV Results
_/_Blank Results
__o _ICP Interference Check Results
_/_Spike Recovery Results

_/_Duplicate Results
_/_LCS Results
__o _Standard Addition Results
__o _ICP Serial Dilution
__o _Instrument Det. Limits
__Other_____

/ Acceptable
x Absent
o Not required

Comments/Qualified Results: None.

Validated by: Ann Muehlfarth **Date: 12/17/2020**
Reviewed by: Samantha DiCenso **Date: 12/18/2020**

METALS & INORGANIC / Tier I & II Data Validation Summary Checklist

Acceptable: YES NO

2. Holding Temperatures & Times (Check all that apply)…… √ ☐

_/_Recommended Hold Temp. of Cool, ≤6°C met (√ - Yes / x – No)
_/_TDS / TSS analysis completed in <7 days from collection
__Acidity / Alkalinity completed in <14 days from collection
_/_ICP metals completed in <6 months from collection
__Anions (Cl^-, F^-, SO_4^-), DOC analyzed in <28 days from collection
__pH analysis completed in <15 minutes from collection

Comments/Qualified Results: None.

3. Calibrations (Check all that apply)…….. √ ☐

_/_ICV/CCV %R for ICP/AA, 90%-110%, acceptable
__ICV/CCV %R for ICP/AA, 75%-89% or 111%-125%, results estimated (J/UJ)
__ICV/CCV %R for ICP/AA, <75% or >125%, reject positive results (R)

Comments/Qualified Results: None.

4. Lab Blanks, Field Blanks (Check all that apply)…….. √ ☐

__ Detects reported in ICB/CCB list:
Field Blank ID: PASW-29
__ Detects in preparation blanks, results >10x contamination level or ND (no qualifier)
__ Detects in preparation blanks, results ≤10x contamination level (J+)
__ Detects in field blanks (Note: Advisory condition only and no qualifier)

Comments/Qualified Results: None.

5. Lab Duplicates, Field Duplicates (Check all that apply)……... √ ☐

_/_Duplicate RPD ≤20% for waters (≤35% for soils) for results >5X CRDL
Field Duplicate ID: PASW-19
__Duplicate RPD >20% for waters (>35% for soils) for results >5X CRDL (J)
__Duplicate range is within ±CRDL (± 2X CRDL for soils) for results <5X CRDL (no qualifier)

Comments/Qualified Results: None.

Acceptable: YES NO

6. Laboratory Control Samples* (Check all that apply)……..… √ ☐

_/_LCS %R 70-130%: ACCEPTED
__LCS %R 40-69% or >130%, results >MDL: estimated (J-/J+)
__LCS %R 40-69% and results <MDL: estimated (UJ)
__LCS %R <40% and all results rejected (R/UR)
__LCS %R >150% and all results rejected (R)
*Lab Control Samples/Lab Control Sample Duplicates (LCS/LCSD)
*Lab Fortified Blanks (LFB)
*Blank Spike / Blank Spike Duplicates (BS/BSD)

Comments/Qualified Results: None.

7. Interference Checks (Check all that apply)…….. √ ☐

__ICS A/B Recoveries Acceptable
__Al, Ca, Fe, Mg sample concentrations > ICS concentrations
__ICS %R > 120%, results >IDL estimated (J)
__ICS %R 50-79%, results >IDL estimated (J)
__ICS %R 50-79%, results <IDL estimated (UJ)
__ICS %R <50%, results >IDL and <IDL rejected (R/UR)

Comments/Qualified Results: IC check is not required as part of Tier IIA Validation.

8. Matrix Spike Recovery (MS/MSD) (Check all that apply)……. √ ☐

_/_Spike %R with 75-125%: ACCEPTED
__MS and PDS %R 30-74%, results > MDL est. (J-), ND=(UJ)
__MS <75% and PDS >75%, results > MDL est. (J), ND=(UJ)
__ MS and PDS %R >125%, detects > MDL est. (J+)
__ MS >125% and PDS <125%, detects > MDL est. (J)
__MS and PDS %R <30% and <75%: results >MDL (J-) ND=(UR)
__Field blanks used for spike analysis?
__Post digest spk rqrd when %R <75, >125%, excpt Ag

Comments/Qualified Results: None.

Acceptable: YES NO

9. Method of Standard Addition (MSA) and Serial Dilutions (SD)….. √ ☐

__Analytical spike %R 85-115%
__Analytical spike %R 40-85%, results > IDL estimated (J)
__Analytical spike %R 10-40%, results <IDL estimated (UJ)
__Analytical spike %R <10%, results <IDL rejected (R)

__SD Analytes >50X MDL ?
__ SD % Diff < 10%
__ SD % Diff > 10%: J results >MDL, UJ for Non-detects

Comments/Qualified Results: NA.

10. Detection Limits, Other QC…… √ ☐

WATER:			SOIL:	
Inorganics-	**Metals-**		**Metals-**	
__pH = 0.1 s.u.	__Al = 0.1 mg/L	__Cd = 0.01 mg/L	__ As = 1 mg/kg	__ = mg/kg
_/_ TDS/TSS = 10 mg/L	_/_ As = 0.001 mg/L	__Cr = 0.05 mg/L	__ Co = 1 mg/kg	__ = mg/kg
__Alkalinity = 4 mg/L	__Co = 0.0001 mg/L	__Pb = 0.05 mg/L	__ Cu = 1 mg/kg	__ = mg/kg
__Anions (i.e. Cl^-, SO_4^-) = 1 mg/L	__Cu = 0.0003/0.0008mg/L	__Hg = 0.001 mg/L		
__Anions (i.e. F^-) = 0.1 mg/L	__Co (WTP) = 0.001 mg/L	__Ni = 0.05 mg/L		
__ DOC = 0.5 mg/L	__Cu (WTP) = 0.001 mg/L	__K = 1 mg/L		
__Nitrogen, Ammonia = 0.05 mg/L	__Fe = 0.03 mg/L	__Se = 0.001 mg/L		
__Phosphorus, Total = 0.005 mg/L	__Ca = 0.5 mg/L	__Si = 0.1 mg/L		
	__Mg = 0.5 mg/L	__Ag = 0.01 mg/L		
	__HARD-T = 0.5 mg/L	__Na = 1 mg/L		
	__Mn = 0.001 mg/L	__Zn = 0.01 mg/L		

Comments/Qualified Results: None.

11. Data Verification and Overall Assessment…… √ ☐

Comments/Qualified Results: None.

Table 1
Sample Collection and Analysis Summary
Blackbird Mine Sampling - November 2020

							Analysis		
SDG	**Field Identification**	**Collection Date & Time**	**Location**	**Lab Identification**	**Matrix**	**QC Samples**	**Total Suspended Solids**	**Dissolved Metals[1]**	**Total Metals[1]**
B20111377	BBSW-01A	11/16/20 10:30	BBSW-01A	B20111377-001	Aqueous	--	X	X	X
B20111377	PASW-09	11/16/20 11:00	PASW-09	B20111377-002	Aqueous	--	X	X	X
B20111377	PASW-19	11/16/20 11:10	PASW-09	B20111377-003	Aqueous	Field Duplicate	X	X	X
B20111377	PASW-29	11/16/20 11:20	PASW-09	B20111377-004	Aqueous	Field Blank	X	X	X

[1]See laboratory data package for list of metals analyzed

Notes:
All analyses performed by Energy Laboratories

Abbreviations:
SDG - Sample Delivery Group

Table 2
Qualifier Summary Table
Blackbird Mine Sampling - November 2020

SDG	Sample Name	Constituent	New Result	New RL	Qualifier	Reason	PDF Page Number
None							

Abbreviations
RL - Reporting Limit
SDG - Sample Delivery Group

METALS & INORGANIC / Tier I & II Data Validation Summary Checklist

GOLDER PROJECT #: 943-1595.011 ph 3100	SITE: BLACKBIRD MINE SITE, SALMON, ID
LABORATORY: ENERGY LABORATORY, BILLINGS	SDG: B20111982

SAMPLES (Total # =)	COLLECTED (Date/Time)	MATRIX
See Table 1		

DATA ASSESSMENT SUMMARY

REVIEW ITEM	ICP/ AES EPA200.7	ICP/ MS EPA200.8	TDS A2540C TSS A2540D	Hardness A2340B Alkalinity A2320B	Anions (ex Cl^-, F^-, SO_4^{-2}) E300.0	OTHER pH A4500-H-B DOC A5310C
1. Data Package Completeness	Θ	Θ	NA	NA	NA	NA
2. Holding Temperatures & Times	Θ	Θ	NA	NA	NA	NA
3. Calibration	O	O	NA	NA	NA	NA
4. Lab Blanks, Field Blanks	Θ	Θ	NA	NA	NA	NA
5. Lab Duplicate, Field Duplicate RPD	NA	NA	NA	NA	NA	NA
6. LCS, LFB, Blank Spike	O	O	NA	NA	NA	NA
7. Interference Checks	NA	NA	NA	NA	NA	NA
8. Matrix Spike Recovery (MS/MSD)	O	O	NA	NA	NA	NA
9. MSA and Serial Dilutions	NA	NA	NA	NA	NA	NA
10. Detection Limits, Other QC	Θ	Θ	NA	NA	NA	NA
11. Data Verification, Overall Summary	O	O	NA	NA	NA	NA

O = Data had no problems Θ = Problems, but do not affect data NA = Not applicable to this data set.
X = Data qualified due to minor problems [typically estimated data (J/UJ)].
M = Data qualified due to major problems [typically more than 50% qualified (J/UJ)].
Z = Data unacceptable [typically data rejected (R).

Acceptable: YES NO

1. Date Package Completeness (Check if present)…… √ ☐

_x_Case narrative
_/_Chain of Custody
_/_Sample Results
_/_ICV/CCV Results
_/_Blank Results
_o_ICP Interference Check Results
__Spike Recovery Results

_x_Duplicate Results
_/_LCS Results
_o_Standard Addition Results
_o_ICP Serial Dilution
_o_Instrument Det. Limits
__Other_____

/ Acceptable
x Absent
o Not required

Comments/Qualified Results: None.

Validated by: Ann Muehlfarth **Date: 12/17/2020**
Reviewed by: Samantha DiCenso **Date: 12/18/2020**

Acceptable: YES NO

2. Holding Temperatures & Times (Check all that apply)…… √ ☐

_x_Recommended Hold Temp. of Cool, ≤6°C met (√ - Yes / x – No)
__TDS / TSS analysis completed in <7 days from collection
__Acidity / Alkalinity completed in <14 days from collection
_/_ICP metals completed in <6 months from collection
__Anions (Cl^-, F^-, SO_4^-), DOC analyzed in <28 days from collection
__pH analysis completed in <15 minutes from collection

Comments/Qualified Results: The cooler temperature upon receipt was recorded at 14.0 °C. Using professional judgement and following project-specific requirements qualification of metals results was not required because the samples were preserved to pH<2.

3. Calibrations (Check all that apply)……. √ ☐

_/_ICV/CCV %R for ICP/AA, 90%-110%, acceptable
__ICV/CCV %R for ICP/AA, 75%-89% or 111%-125%, results estimated (J/UJ)
__ICV/CCV %R for ICP/AA, <75% or >125%, reject positive results (R)

Comments/Qualified Results: None.

4. Lab Blanks, Field Blanks (Check all that apply)…….. √ ☐

__Detects reported in ICB/CCB list: Field Blank ID: _____
_/_ Detects in preparation blanks, results >10x contamination level or ND (no qualifier) Field Blank ID: _____
__Detects in preparation blanks, results ≤10x contamination level (J+)
__Detects in field blanks (Note: Advisory condition only and no qualifier)

Comments/Qualified Results: Method blank (LRB) detection of iron at 0.0006 mg/L, associated with batch R352732.

Duplicates, Field Duplicates (Check all that apply)……..... √ ☐

__Duplicate RPD ≤20% for waters (≤35% for soils) for results >5X CRDL Field Duplicate ID: _____
__Duplicate RPD >20% for waters (>35% for soils) for results >5X CRDL (J) Field Duplicate ID: _____
__Duplicate range is within ±CRDL (± 2X CRDL for soils) for results <5X CRDL (no qualifier)

Comments/Qualified Results: No duplicates listed.

Acceptable: YES NO

6. Laboratory Control Samples* (Check all that apply)……..… √ ☐

_/_LCS %R 70-130%: ACCEPTED
__LCS %R 40-69% or >130%, results >MDL: estimated (J-/J+)
__LCS %R 40-69% and results <MDL: estimated (UJ)
__LCS %R <40% and all results rejected (R/UR)
__LCS %R >150% and all results rejected (R)
*Lab Control Samples/Lab Control Sample Duplicates (LCS/LCSD)
*Lab Fortified Blanks (LFB)
*Blank Spike / Blank Spike Duplicates (BS/BSD)

Comments/Qualified Results: None.

7. Interference Checks (Check all that apply)…….. √ ☐

__ICS A/B Recoveries Acceptable
__Al, Ca, Fe, Mg sample concentrations > ICS concentrations
__ICS %R > 120%, results >IDL estimated (J)
__ICS %R 50-79%, results >IDL estimated (J)
__ICS %R 50-79%, results <IDL estimated (UJ)
__ICS %R <50%, results >IDL and <IDL rejected (R/UR)

Comments/Qualified Results: IC check is not required as part of Tier IIA Validation.

8. Matrix Spike Recovery (MS/MSD) (Check all that apply)……. √ ☐

_/_Spike %R with 75-125%: ACCEPTED
__MS and PDS %R 30-74%, results > MDL est. (J-), ND=(UJ)
__MS <75% and PDS >75%, results > MDL est. (J), ND=(UJ)
__ MS and PDS %R >125%, detects > MDL est. (J+)
__ MS >125% and PDS <125%, detects > MDL est. (J)
__MS and PDS %R <30% and <75%: results >MDL (J-) ND=(UR)
__Field blanks used for spike analysis?
__Post digest spk rqrd when %R <75, >125%, excpt Ag

Comments/Qualified Results: None.

Acceptable: YES NO

9. Method of Standard Addition (MSA) and Serial Dilutions (SD)….. √ ☐

__Analytical spike %R 85-115%
__Analytical spike %R 40-85%, results > IDL estimated (J)
__Analytical spike %R 10-40%, results <IDL estimated (UJ)
__Analytical spike %R <10%, results <IDL rejected (R)

__SD Analytes >50X MDL ?
__ SD % Diff < 10%
__ SD % Diff > 10%: J results >MDL, UJ for Non-detects

Comments/Qualified Results: NA.

10. Detection Limits, Other QC…… √ ☐

WATER:

Inorganics-	Metals-	
__pH = 0.1 s.u.	__Al = 0.1 mg/L	__Cd = 0.01 mg/L
__TDS/TSS = 10 mg/L	__As = 0.001 mg/L	__Cr = 0.05 mg/L
__Alkalinity = 4 mg/L	__Co = 0.0001 mg/L	__Pb = 0.05 mg/L
__Anions (i.e. Cl^-, SO_4^{--}) = 1 mg/L	__Cu = 0.0003/0.0008mg/L	__Hg = 0.001 mg/L
__Anions (i.e. F^-) = 0.1 mg/L	__/__Co (WTP) = 0.001 mg/L	__Ni = 0.05 mg/L
__ DOC = 0.5 mg/L	__/__Cu (WTP) = 0.001 mg/L	__K = 1 mg/L
__Nitrogen, Ammonia = 0.05 mg/L	__/__Fe = 0.03 mg/L	__Se = 0.001 mg/L
__Phosphorus, Total = 0.005 mg/L	__Ca = 0.5 mg/L	__Si = 0.1 mg/L
	__Mg = 0.5 mg/L	__Ag = 0.01 mg/L
	__HARD-T = 0.5 mg/L	__Na = 1 mg/L
	__Mn = 0.001 mg/L	__Zn = 0.01 mg/L

SOIL:

Metals-	
__ As = 1 mg/kg	__ = mg/kg
__ Co = 1 mg/kg	__ = mg/kg
__ Cu = 1 mg/kg	__ = mg/kg

Comments/Qualified Results: The reporting limit for total copper was increased to 0.002 mg/L due to sample dilution.

11. Data Verification and Overall Assessment…… √ ☐

Comments/Qualified Results: None.

Table 1
Sample Collection and Analysis Summary
Blackbird Mine Sampling - November 2020

SDG	Field Identification	Collection Date & Time	Location	Lab Identification	Matrix	QC Samples	*Analysis* Dissolved Metals[1]	*Analysis* Total Metals[1]
B20111982	WTP-C	11/24/20 12:00	WTP-C	B20111982-001	Aqueous	--	X	X

[1]See laboratory data package for list of metals analyzed

Notes:
All analyses performed by Energy Laboratories

Abbreviations:
SDG - Sample Delivery Group

Table 2
Qualifier Summary Table
Blackbird Mine Sampling - November 2020

SDG	Sample Name	Constituent	New Result	New RL	Qualifier	Reason	PDF Page Number
None							

Abbreviations
RL - Reporting Limit
SDG - Sample Delivery Group

METALS & INORGANIC / Tier I & II Data Validation Summary Checklist

GOLDER PROJECT #: 943-1595.011 ph 3100	SITE: BLACKBIRD MINE SITE, SALMON, ID
LABORATORY: ENERGY LABORATORY, BILLINGS	SDG: B20121065

SAMPLES (Total # =)	COLLECTED (Date/Time)	MATRIX
See Table 1		

DATA ASSESSMENT SUMMARY

REVIEW ITEM	ICP/ AES EPA200.7	ICP/ MS EPA200.8	TDS A2540C TSS A2540D	Hardness A2340B Alkalinity A2320B	Anions (ex Cl^-, F^-, SO_4^{-2}) E300.0	OTHER pH A4500-H-B DOC A5310C
1. Data Package Completeness	Θ	Θ	NA	NA	NA	NA
2. Holding Temperatures & Times	Θ	Θ	NA	NA	NA	NA
3. Calibration	O	O	NA	NA	NA	NA
4. Lab Blanks, Field Blanks	O	O	NA	NA	NA	NA
5. Lab Duplicate, Field Duplicate RPD	NA	NA	NA	NA	NA	NA
6. LCS, LFB, Blank Spike	O	O	NA	NA	NA	NA
7. Interference Checks	NA	NA	NA	NA	NA	NA
8. Matrix Spike Recovery (MS/MSD)	Θ	Θ	NA	NA	NA	NA
9. MSA and Serial Dilutions	NA	NA	NA	NA	NA	NA
10. Detection Limits, Other QC	O	O	NA	NA	NA	NA
11. Data Verification, Overall Summary	O	O	NA	NA	NA	NA

O = Data had no problems Θ = Problems, but do not affect data NA = Not applicable to this data set.
X = Data qualified due to minor problems [typically estimated data (J/UJ)].
M = Data qualified due to major problems [typically more than 50% qualified (J/UJ)].
Z = Data unacceptable [typically data rejected (R).

	Acceptable: YES	NO
1. Date Package Completeness (Check if present)……	√	☐

_x_Case narrative
_/_Chain of Custody
_/_Sample Results
_/_ICV/CCV Results
_/_Blank Results
_o_ ICP Interference Check Results
_/_Spike Recovery Results

_x_Duplicate Results
_/_LCS Results
_o_Standard Addition Results
_o_ICP Serial Dilution
_o_Instrument Det. Limits
__Other_____

/ Acceptable
x Absent
o Not required

Comments/Qualified Results: None.

Validated by: Ann Muehlfarth **Date: 12/17/2020**
Reviewed by: Samantha DiCenso **Date: 12/18/2020**

Acceptable: YES NO

2. Holding Temperatures & Times (Check all that apply)…… √ ☐

_x_Recommended Hold Temp. of Cool, ≤6°C met (√ - Yes / x – No)
__TDS / TSS analysis completed in <7 days from collection
__Acidity / Alkalinity completed in <14 days from collection
_/_ICP metals completed in <6 months from collection
__Anions (Cl^-, F^-, SO_4^-), DOC analyzed in <28 days from collection
__pH analysis completed in <15 minutes from collection

Comments/Qualified Results: The cooler temperature upon receipt was recorded at 10.6°C. Using professional judgement and following project-specific requirements qualification of metals results was not required because the samples were preserved to pH<2.

3. Calibrations (Check all that apply)……. √ ☐

_/_ICV/CCV %R for ICP/AA, 90%-110%, acceptable
__ICV/CCV %R for ICP/AA, 75%-89% or 111%-125%, results estimated (J/UJ)
__ICV/CCV %R for ICP/AA, <75% or >125%, reject positive results (R)

Comments/Qualified Results: None.

4. Lab Blanks, Field Blanks (Check all that apply)…….. √ ☐

__Detects reported in ICB/CCB list: Field Blank ID: _____
__ Detects in preparation blanks, results >10x contamination level or ND (no qualifier) Field Blank ID: _____
__Detects in preparation blanks, results ≤10x contamination level (J+)
__Detects in field blanks (Note: Advisory condition only and no qualifier)

Comments/Qualified Results: None.

5. Lab Duplicates, Field Duplicates (Check all that apply)……... √ ☐

__Duplicate RPD ≤20% for waters (≤35% for soils) for results >5X CRDL Field Duplicate ID: _____
__Duplicate RPD >20% for waters (>35% for soils) for results >5X CRDL (J) Field Duplicate ID: _____
__Duplicate range is within ±CRDL (± 2X CRDL for soils) for results <5X CRDL (no qualifier)

Comments/Qualified Results: No duplicates listed

Acceptable: YES NO

6. Laboratory Control Samples* (Check all that apply)……..… √ ☐

_/_LCS %R 70-130%: ACCEPTED
__LCS %R 40-69% or >130%, results >MDL: estimated (J-/J+)
__LCS %R 40-69% and results <MDL: estimated (UJ)
__LCS %R <40% and all results rejected (R/UR)
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*Lab Fortified Blanks (LFB)
*Blank Spike / Blank Spike Duplicates (BS/BSD)

Comments/Qualified Results: None.

7. Interference Checks (Check all that apply)…….. √ ☐

__ICS A/B Recoveries Acceptable
__Al, Ca, Fe, Mg sample concentrations > ICS concentrations
__ICS %R > 120%, results >IDL estimated (J)
__ICS %R 50-79%, results >IDL estimated (J)
__ICS %R 50-79%, results <IDL estimated (UJ)
__ICS %R <50%, results >IDL and <IDL rejected (R/UR)

Comments/Qualified Results: IC check is not required as part of Tier IIA Validation.

8. Matrix Spike Recovery (MS/MSD) (Check all that apply)……. √ ☐

_/_Spike %R with 75-125%: ACCEPTED
__MS and PDS %R 30-74%, results > MDL est. (J-), ND=(UJ)
__MS <75% and PDS >75%, results > MDL est. (J), ND=(UJ)
__ MS and PDS %R >125%, detects > MDL est. (J+)
__ MS >125% and PDS <125%, detects > MDL est. (J)
__MS and PDS %R <30% and <75%: results >MDL (J-) ND=(UR)
__Field blanks used for spike analysis?
__Post digest spk rqrd when %R <75, >125%, excpt Ag

Comments/Qualified Results: MS/MSD % recovery not calculated for Iron in batch 151299 (analyte concentration >4x spike amount).

Acceptable: YES NO

9. Method of Standard Addition (MSA) and Serial Dilutions (SD)….. √ ☐

__Analytical spike %R 85-115%
__Analytical spike %R 40-85%, results > IDL estimated (J)
__Analytical spike %R 10-40%, results <IDL estimated (UJ)
__Analytical spike %R <10%, results <IDL rejected (R)

__SD Analytes >50X MDL ?
__ SD % Diff < 10%
__ SD % Diff > 10%: J results >MDL, UJ for Non-detects

Comments/Qualified Results: NA.

10. Detection Limits, Other QC…… √ ☐

WATER:

Inorganics-	**Metals-**	
__pH = 0.1 s.u.	__Al = 0.1 mg/L	__Cd = 0.01 mg/L
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__Alkalinity = 4 mg/L	__Co = 0.0001 mg/L	__Pb = 0.05 mg/L
__Anions (i.e. Cl^-, SO_4^{--}) = 1 mg/L	__Cu = 0.0003/0.0008mg/L	__Hg = 0.001 mg/L
__Anions (i.e. F^-) = 0.1 mg/L	__/__Co (WTP) = 0.001 mg/L	__Ni = 0.05 mg/L
__ DOC = 0.5 mg/L	__/__Cu (WTP) = 0.001 mg/L	__K = 1 mg/L
__Nitrogen, Ammonia = 0.05 mg/L	__/__Fe = 0.03 mg/L	__Se = 0.001 mg/L
__Phosphorus, Total = 0.005 mg/L	__Ca = 0.5 mg/L	__Si = 0.1 mg/L
	__Mg = 0.5 mg/L	__Ag = 0.01 mg/L
	__HARD-T = 0.5 mg/L	__Na = 1 mg/L
	__Mn = 0.001 mg/L	__Zn = 0.01 mg/L

SOIL:

Metals-	
__ As = 1 mg/kg	__ = mg/kg
__ Co = 1 mg/kg	__ = mg/kg
__ Cu = 1 mg/kg	__ = mg/kg

Comments/Qualified Results: None.

11. Data Verification and Overall Assessment…… √ ☐

Comments/Qualified Results: None.

Table 1
Sample Collection and Analysis Summary
Blackbird Mine Sampling - December 2020

SDG	Field Identification	Collection Date & Time	Location	Lab Identification	Matrix	QC Samples	*Analysis* Dissolved Metals[1]	*Analysis* Total Metals[1]
B20121065	WTP-C	12/1/20 12:30	WTP-C	B20121065-001	Aqueous	--	X	X

[1]See laboratory data package for list of metals analyzed

Notes:
All analyses performed by Energy Laboratories

Abbreviations:
SDG - Sample Delivery Group

Table 2
Qualifier Summary Table
Blackbird Mine Sampling - December 2020

SDG	Sample Name	Constituent	New Result	New RL	Qualifier	Reason	PDF Page Number
None							

Abbreviations
RL - Reporting Limit
SDG - Sample Delivery Group

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