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# WEST ELK MINE
## WATER YEAR 2023 ANNUAL HYDROLOGY REPORT

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# WEST ELK MINE

## SUMMARY OF WATER YEAR 2022 SURFACE WATER AND GROUNDWATER QUANTITY AND QUALITY DATA

### Table of Contents

## LIST OF FIGURES



## LIST OF TABLES



## LIST OF APPENDICES

# 1.0 INTRODUCTION

This Mountain Coal Company, LLC (MCC) West Elk Mine Water Year 2023 Annual Hydrology Report summarizes Hydrogeology Solutions Inc.'s (HSI's) hydrologic monitoring activities and pertinent data associated with the West Elk Mine mining operations for the Water Year (WY) 2023 (October 1, 2022 through September 30, 2023). The hydrologic monitoring activities were performed in accordance with the Colorado Division of Reclamation, Mining and Safety (CDRMS) Permit C-1980-007.

## 1.1 OVERVIEW OF MINING OPERATIONS

The West Elk Mine is an underground coal mining operation that produces bituminous coal and conducts other mining activities including surface crushing, washing, conveying, and load-out operations. MCC has utilized two chemicals in their treatment process: aluminum sulfate for flocculation in sedimentation ponds and sodium hypochlorite for drinking water treatment.

During WY 2023, mining was completed in Longwall mining was completed in the E-Seam Longwall Panel 15 from crosscut 13 to crosscut 11. In the E –Seam, development mining was completed in the Longwall Panel 12 Headgate to crosscuts 15 and 11. In the B-Seam, development mining was completed to 5 crosscut of the B Southwest Mains.

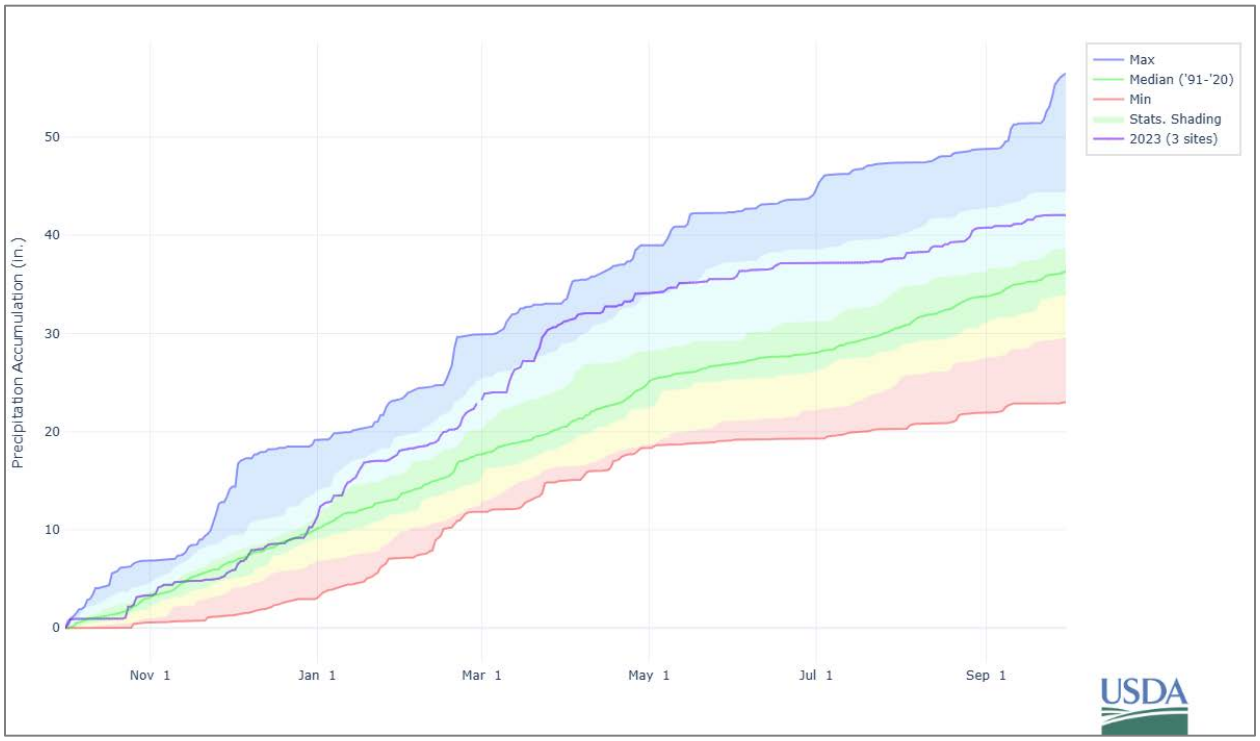
# 2.0 HYDROLOGIC SUMMARY OF WATER YEAR 2023

During WY 2023, the total annual precipitation and snow water equivalent (SWE) in the North Fork of the Gunnison River (NFG) Basin were well above average. Data from the McClure Pass, Overland Reservoir, and Schofield Pass SNOTEL stations indicate that WY 2023 was exceptionally wet, following drought years in WYs 2018, 2020, 2021, and 2022 (NIDIS, 2024; NRCS, 2024). As a result, stream and spring flows in the NFG Basin, including the West Elk Mine Monitoring Network were generally above average.

## 2.1 CLIMATOLOGICAL DATA

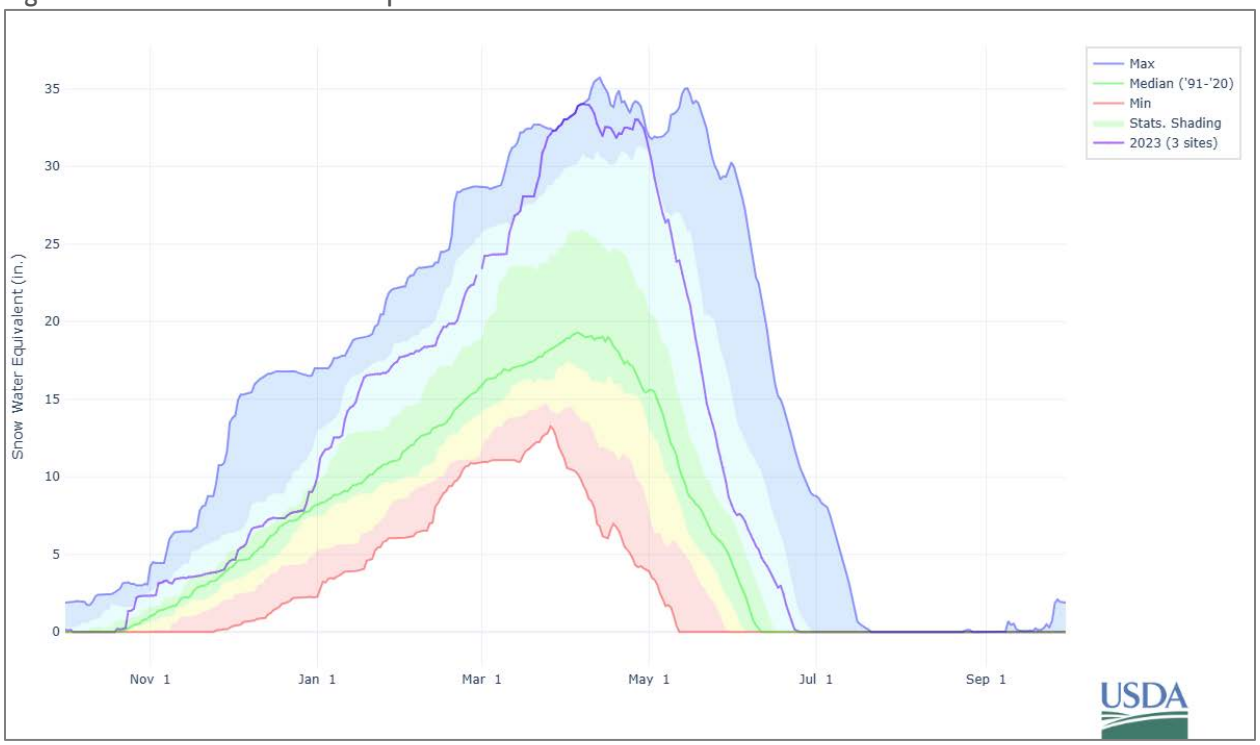
Precipitation and SWE data for the permit area for WY 2023 were derived from the following SNOTEL stations: Schofield, McClure Pass, and Overland Reservoir (NRCS, 2024). Figure 1 depicts the WY 2023 cumulative precipitation totals at the three stations in WY 2023. Total precipitation at the three stations in WY 2023 was 42.1 inches, compared to the 30-year median of 36.3 inches. Figure 2 depicts the WY 2023 SWE totals at the three stations throughout WY 2023. The peak SWE in WY 2023 was 34.0 inches on April 9, compared to the 30-year median peak SWE of 19.3 inches on April 5.

Figure 1. WY 2023 Accumulated Precipitation in the NFG Basin




Source: NRCS, 2024.

Figure 2. WY 2023 Snow Water Equivalent in the NFG Basin




Source: NRCS, 2024.

## 2.2 WY 2023 STREAMFLOW

The North Fork of the Gunnison River (North Fork) and Minnesota Creek are the major surface water resources in the MCC permit area. The U.S. Geological Survey (USGS) maintains a gaging station on the North Fork (USGS 09132500). The USGS maintained a gaging station at Minnesota Creek (USGS 09134000) from 1986 to 2013. Since 2014, HSI has maintained a gaging station at the same location (Lower Minnesota Creek).

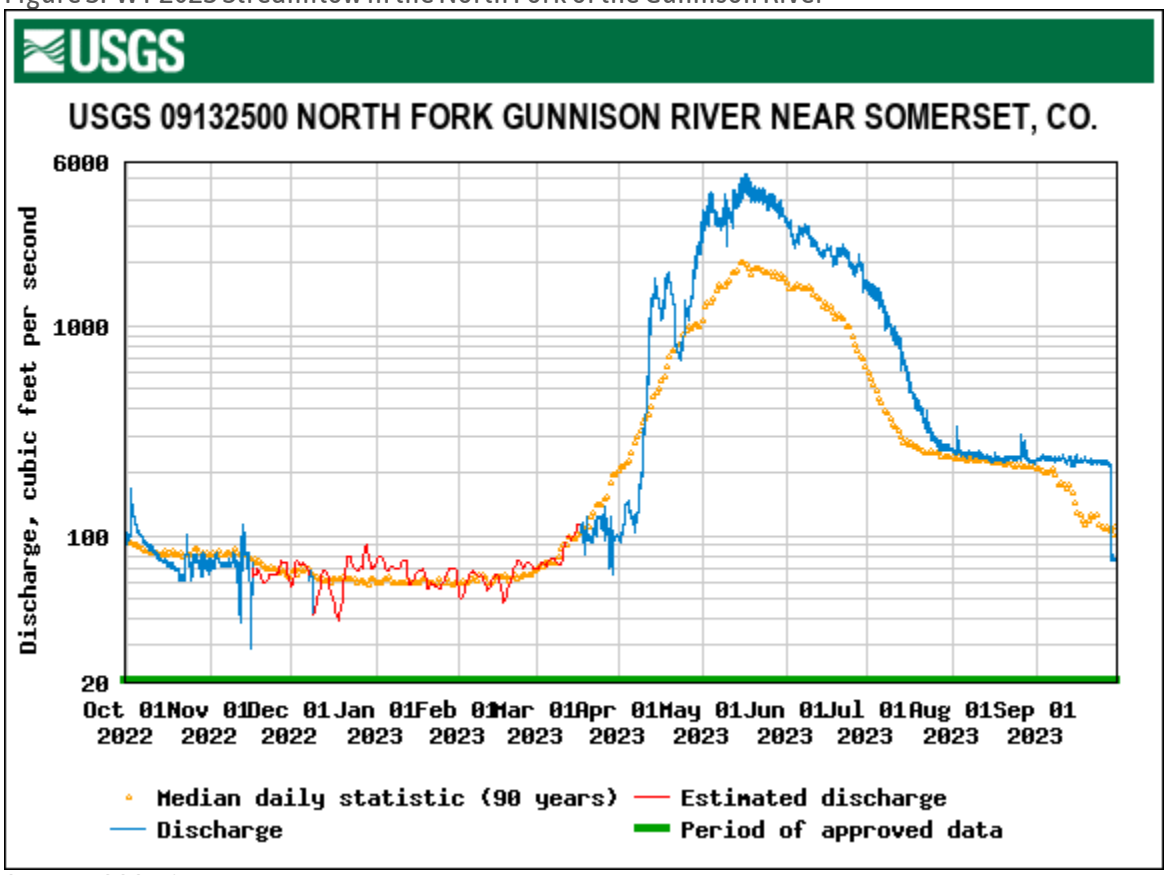
Flows in the North Fork and Minnesota Creek are dominated by snowmelt from upland areas, but are also affected by small upstream diversions for irrigation, and by storage and releases from upstream reservoirs. The average daily flows in the North Fork and Minnesota Creek in WY 2023 were above historical averages (USGS, 2024).

### 2.2.1 *FLOWS IN THE NORTH FORK OF THE GUNNISON RIVER*

Average daily flows for the North Fork for WY 2023 ranged from 40.4 cubic feet per second (cfs) (December 18, 2022) to 4,670 cfs (May 17, 2023) (USGS, 2024). The mean annual flow at the North Fork in WY 2023 was about 730 cfs, corresponding to 163% of the historical annual mean of about 447 cfs for WYs 1934 through 2022 (USGS, 2024). The historical mean annual flows in the North Fork have ranged from 114 cfs in 1977 to 829 cfs in 1984 (USGS, 2024). The highest daily mean flow for the North Fork WY 2023 was 4,670 cfs on May 17, 2023 and the maximum-recorded peak flow in WY 2023 was 5,250 cfs on May 17, 2023 (USGS, 2024).

Flows in the North Fork can be influenced by upstream releases and storage in the Overland and Paonia reservoirs (since February 1962), small diversions for irrigation in nearby drainage areas, and irrigation of about 3,000 acres upstream from station 09132500 (USGS, 2024). Figure 3 shows the daily discharge in the North Fork in WY 2023 compared to the historical median. Flows were near average from October 2022 to mid-April 2023 and in August 2023, and well above average from mid-April 2023 through July 2023, and in September 2023.

Figure 3. WY 2023 Streamflow in the North Fork of the Gunnison River



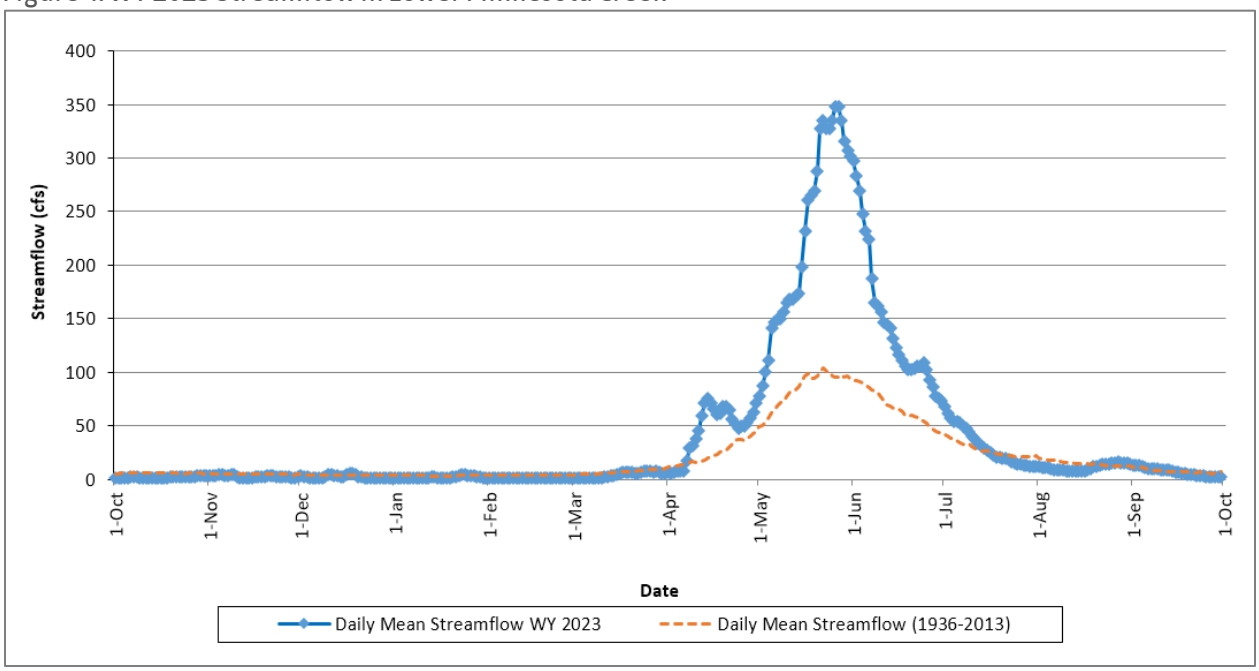

Source: USGS, 2024.

### 2.2.2 *FLOWS IN MINNESOTA CREEK*

As noted above, the USGS gaging station at Minnesota Creek near Paonia (USGS 09134000) was decommissioned in April 2014. From 2014 to present, HSI has maintained a continuous stream depth recorder and gaging station. Average daily flows for Lower Minnesota Creek for WY 2023 ranged from 0.8 cfs (multiple days in December 2022 and January 2023) to 348 cfs (May 26, 2023). The mean annual flow at Lower Minnesota Creek in WY 2023 was about 40.5 cfs, corresponding to 190% of the historical annual mean of about 21.3 cfs for WYs 1937 through 2013 (USGS, 2024).

Natural stream flow in Minnesota Creek can be affected by two small storage reservoirs (Beaver and Minnesota Reservoirs), small trans-basin diversions from Coal Creek into Minnesota Creek, and diversions upstream from the station for irrigation of about 100 acres (USGS, 2024). Figure 4 shows the average daily discharge in Lower Minnesota Creek in WY 2023 compared to the historical mean (1937-2013). Flows were below to near average from October 2022 through March 2023, well above average from April 2023 through mid-July 2023, and near average from mid-July 2023 through September 2023.

Figure 4. WY 2023 Streamflow in Lower Minnesota Creek




Source: USGS, 2024.

## 3.0 HYDROLOGIC MONITORING PLAN

The MCC hydrologic monitoring program is designed to collect the monitoring data needed to assess mining related impacts on hydrologic resources. CDRMS approved a revised hydrologic monitoring plan for the West Elk Mine permit area in June 2006 (CDRMS, 2006), that was implemented from the latter months of WY 2006 through WY 2016. The hydrologic monitoring plan was again revised (Technical Revision No. 139), was approved by CDRMS in October 2016 (CDRMS, 2016) and was implemented in WYs 2017 to 2023. The Sunset Trail hydrology monitoring plan was added with Permit Revision No. PR-15 in 2018.

The hydrologic monitoring plan for the permit area includes monitoring surface water resources, springs and seeps, groundwater resources, the coal refuse pile underdrains, and pertinent mine water resources. The locations of these hydrologic resources are shown on Permit Map 34 (CDRMS, 2016). Routine monitoring, i.e., subsequent to the baseline monitoring period, includes collecting field water quality data (pH, electrical conductivity [EC], and temperature) and collecting a sample for independent laboratory analysis annually. Flow or water level measurements are collected three times per year corresponding with the rising limb period between April 3rd and May 13th; the peak flow period between April 21st and June 26th; and the low flow period between July 10th and October 8th, as shown on Table 1. The chemical analyte suite for the first five years of sampling for both groundwater and surface water samples, including one year of baseline sampling, is presented in Table 2.

The current hydrologic monitoring plan for MCC incorporates a separate baseline monitoring schedule for all new monitoring sites for approximately one year prior to the time when mine development operations expand into new potentially affected areas. The baseline monitoring schedule protocols stipulate collecting monthly field water quality data, flow or water level

measurements, and collecting samples for laboratory analysis for the year prior to initiation of mining and potential impacts (Table 2). Site-specific baseline schedules are dependent on site accessibility and mine development timing. In general, baseline monitoring is conducted for at least six months, usually from April through September, in order to provide adequate data to show seasonal variations in water quality and quantity. Winter access to most sites within the MCC permit area is impractical and not feasible, so baseline monthly monitoring is generally not performed from October through March. A summary of the approved baseline and routine monitoring program frequencies is presented in Table 1.

Table 1. Baseline and Routine Monitoring Frequencies

| Routine Monitoring | Baseline Monitoring | | | |
|---|---|---|---|---|
| | Month | Flow / Level | Field Parameters | Laboratory |
| Rising Limb<br>April 3 to May 13 | January | | | |
| | February | | | |
| | March | | | |
| | April | X | X | X |
| Peak Flow<br>April 21 to June 26 | May | X | X | X |
| | June | X | X | X |
| | July | X | X | X |
| Low Flow<br>July 10 to October 8 | August | X | X | X |
| | September | X | X | X |
| | October | | | |
| | November | | | |
| | December | | | |

Adapted from CDRMS (2006)

After sites have been monitored for five years (including approximately one year of baseline monitoring), the analytical parameter suite list is typically reduced and samples are submitted for laboratory analysis of total suspended solids (TSS), total dissolved solids (TDS), EC, pH, dissolved iron, and total iron. Field parameters (pH, EC, temperature, and flow or water level) are also recorded.

The Upper and Lower North Fork and Middle Sylvester Gulch monitoring sites have expanded analytical parameter suite lists, in order to provide data for the on-going characterization of the North Fork of the Gunnison River (North Fork). The North Fork and Middle Sylvester Gulch lab parameters include those listed in Table 2, plus chromium, nickel, silver (total), cyanide (total), iron (total recoverable), alkalinity (total $CaCO_3$), bicarbonate, carbonate, hydroxide, nitrogen (ammonia), ortho-phosphorus (dissolved), and sodium adsorption ratio (SAR).

Table 2. Laboratory Parameters for First Five Years of Monitoring (including Baseline Period)

| **Springs/Surface Water[3,4]** | |
|---|---|
| pH (lab and field)[1] | Sodium ($Na^{+}$) |
| Electrical conductivity at $25^{0}$ C (lab and field) | Sulfate ($SO_{4}$-) |
| Temperature (field)[1] | Aluminum (Al) |
| Total Dissolved Solids[1] (TDS) | Arsenic (As) (Total Recoverable) |
| Total Suspended Solids[1] (TSS) | Cadmium (Cd) |
| Sodium Adsorption Ratio (SAR) | Copper (Cu) |
| Bicarbonate ($HCO_3^-$) | Iron (Fe)[1] (Total and Dissolved) |
| Calcium ($Ca^{+2}$) | Lead (Pb) |
| Chloride ($Cl^-$) | Manganese (Mn)[1] (Total and Dissolved) |
| Hardness[2] | Mercury (Hg) (Total Recoverable) |
| Magnesium ($Mg^{+2}$) | Molybdenum (Mo) |
| Nitrate/Nitrite | Selenium (Se) (Total Recoverable) |
| Phosphate ($PO_4^{-3}$ as P) | Zinc (Zn) |
| Potassium | Boron (B) |
| **Groundwater[3]** | |
| pH (lab and field)[1] | Nitrate/Nitrite |
| Electrical conductivity at $25^{0}$C (lab and field)[1] | Phosphate ($PO_4^{-3}$ as P) |
| Temperature (field)[1] | Potassium |
| Total Dissolved Solids[1] | Turbidity[1] |
| Sodium Adsorption Ratio (SAR) | Sodium (Na) |
| Bicarbonate ($HCO_3^-$) | Sulfate ($SO_4^-$) |
| Calcium ($Ca^{+2}$) | Arsenic (As) |
| Carbonate ($CO_3^-$) | Cadmium (Cd) |
| Chloride ($Cl^-$) | Iron (Fe)[1] (Total and Dissolved) |
| Hardness[2] | Manganese (Mn)[1] (Total and Dissolved) |
| Magnesium ($Mg^{+2}$) | Lead (Pb) |
| Ammonia ($NH_3$) | Mercury (Hg) |
| Selenium (Se) | Zinc (Zn) |
| | Boron (B) |

Adapted from CDRMS (2006)

1. Parameters monitored as a result of PR-10
2. Added to baseline analyses in 1996, not for analyses completed prior to 1996.
3. All metals analyzed for their dissolved form unless noted otherwise.
4. North Fork of the Gunnison and Middle Sylvester Gulch expanded parameters include those listed in Table 2 for surface water, plus chromium, nickel, silver (total), cyanide (total), iron (total recoverable), alkalinity (Total $CaCO_3$), bicarbonate, carbonate, hydroxide; nitrogen (ammonia), ortho-phosphorus (dissolved), and sodium adsorption ratio (SAR).

## 3.1 SURFACE WATER MONITORING PROGRAM

The surface water monitoring program for the permit area includes 27 stations comprised of 11 stream stations with continuous recording devices, 11 stream stations where flow is recorded instantaneously, two stream stations where flow is not measured by HSI, and three ponds. A detailed discussion of monitored surface water stations can be found in the 2014 Annual Hydrology Report (HydroGeo, 2015), and their locations are shown on Permit Map 34 (CDRMS, 2016). A summary of the surface water monitoring program details is presented in Table 3. The surface water flow data and surface water hydrographs for the period of record are presented in Appendix A and B, respectively. The water quality data for the period of record for all of the surface water monitoring stations are presented in Appendix C.

In July 2018, four stream monitoring locations, three ponds, and one spring in the Sunset Trail Lease Modification Area of the Minnesota Creek Drainage Basin were added to the monitoring program. These new monitoring stations underwent monthly baseline sampling from July through September 2018, and May through July 2019 (the sites are inaccessible between October and April). Beginning in WY 2020, these sites are sampled at the routine monitoring frequency (Table 1). A detailed description of the Sunset Trail area monitoring sites can be found in the Sunset Trail Lease Area Baseline Monitoring Recommendations Technical Memo (HSI, 2018), and a summary of the Sunset Trail monitoring station location details is presented in Table 4.

There are eight temperature data loggers in Sylvester Gulch and in the North Fork, in order to monitor the effects of mine discharge from Sylvester Gulch on the water temperature of the North Fork of the Gunnison. Details of the temperature monitoring program can be found in the 2014 Annual Hydrology Report (HydroGeo, 2015). The temperature monitoring data and graphs are presented in Appendices I and J, respectively.

Table 3. Summary of the Surface Water Monitoring Program

| Monitoring Station [1] | Monitored Area | Flow Measurement | Field WQ (pH, EC, T) | Annual Lab Water Quality | Period of Record |
|---|---|---|---|---|---|
| ***Surface Water Stations Upper North Fork of the Gunnison River Drainage Basin*** | | | | | |
| Upper Deep Creek | Up-gradient of SE mine panels; down-gradient of SOD mine panels area | Instantaneous, 3 x Year | 3 x Year | Peak Flow Period [1] | 1996 to present |
| Lower Deep Creek | Down-gradient of SE mine panels area | Instantaneous, 3 x Year | 3 x Year | Peak Flow Period [1] | 1996 to present |
| Box Canyon | Down-gradient of Box Canyon mine panels area | Instantaneous, 3 x Year | 3 x Year | Peak Flow Period [1] | 1999 to present |
| North Fork Upper (USGS 09132500) | Up-gradient of mine facilities and mine discharge points | Continuous | 3 x Year | Low Flow Period, Peak Irrigation Season [3] | 1977 to present |
| Upper Sylvester Gulch | Up-gradient of mine surface facilities area and NE mine panels | Instantaneous, 3 x Year | 3 x Year | Peak Flow Period [1] | 1977 to present |
| Middle Sylvester Gulch | Down-gradient of mine water discharge point and NE mine panels | Continuous | 3 x Year | Peak Flow Period [3] | 1977 to present |
| Lower Sylvester Gulch | Down-gradient of mine surface facilities area and NE mine panels | Not Measured | 3 x Year | Peak Flow Period [1] | 1977 to present |
| ***Surface Water Stations Lower North Fork of the Gunnison River Drainage Basin*** | | | | | |
| North Fork Lower | Down-gradient of mine facilities and mine discharge. | Not Measured | 3 x Year | Low Flow Period, Peak Irrigation Season [3] | 1935-present |
| ***Surface Water Stations Minnesota Creek Drainage Basin*** | | | | | |
| Lick Creek Flume | Up-gradient of SOD mine panels area | Continuous | 3 x Year | Peak Flow Period [1] | 1977 to present |
| Upper Dry Fork Flume | SOD mine panels area | Continuous | 3 x Year | Peak Flow Period [1] | 1977 to present |
| Middle Dry Fork Flume | SOD mine panels area | Continuous | 3 x Year | Peak Flow Period [1] | 1977 to present |
| Lower Dry Fork Flume | Down-gradient of SW and SOD mine panels area | Continuous | 3 x Year | Peak Flow Period [1] | 1977 to present |
| Minnesota Reservoir Flume | Down-gradient of SW and SOD mine panels area | Continuous | 3 x Year | Peak Flow Period [1] | 2006 to present |
| Deep Creek Ditch Flume | Up-gradient of SOD mine panels area | Continuous | 3 x Year | Peak Flow Period [1] | 2006 to present |
| Poison Gulch | SOD mine panels area | Instantaneous, 3 x Year | 3 x Year | Peak Flow Period [1] | 2005 to present |
| Deer Creek | SOD mine panels area | Instantaneous, 3 x Year | 3 x Year | Peak Flow Period [1] | 2005 to present |
| Horse Gulch | Down-gradient of the SW mine panels area | Instantaneous, 3 x Year | 3 x Year | Peak Flow Period [1] | 1977 to present |
| East Gulch, East of Horse Gulch | SOD and SW mine panels area | Instantaneous, 3 x Year | 3 x Year | Peak Flow Period [1 | 1977 to present |
| Upper Minnesota Creek (USFS) | SOD mine panels area | Continuous | 3 x Year | Peak Flow Period [1] | 1977 to present |
| Lower Minnesota Creek (USGS) | Down-gradient of SOD and SW mine panels area | Continuous | 3 x Year | Peak Flow Period [1] | 1937-1947 and 1985 to April 2, 2014 |
| Lower Minnesota Creek (CDWR) | Down-gradient of SOD and SW mine panels area | Continuous | 3 x Year | Peak Flow Period [1] | April 30, 2014 to present |
| South Prong Creek | Mouth of South Prong Creek | Continuous | 6 x Year | Peak Flow Period [2] | July 2018 to Present |
| North Fork of South Prong Creek | Sunset Trail Area | Instantaneous, 6 x Year | 6 x Year | Peak Flow Period [2] | July 2018 to Present |
| South Fork of South Prong Creek | Sunset Trail Area | Instantaneous, 6 x Year | 6 x Year | Peak Flow Period [2] | July 2018 to Present |
| Stream ST-SW-1 | Sunset Trail Area | Instantaneous, 6 x Year | 6 x Year | Peak Flow Period [2] | July 2018 to Present |
| Pond ST-P-1 | Sunset Trail Area | Water Level, 6 x Year | 6 x Year | Peak Flow Period [2] | August 2018 to Present |
| Pond ST-P-2 | Sunset Trail Area | Water Level, 6 x Year | 6 x Year | Peak Flow Period [2] | July 2018 to Present |

Table 3. Summary of the Surface Water Monitoring Program (continued)

| | | | | | |
|---|---|---|---|---|---|
| Pond ST-P-3 | Sunset Trail Area | Water Level, 6 x Year | 6 x Year | Peak Flow Period [2] | July 2018 to Present |

SW mine panels area – southwest B-seam longwall panels; SE mine panels area - southeast B-seam longwall panels
Box Canyon mine panels area - Box Canyon B-seam longwall panels; West Flatiron mine panels area - West Flatiron B-seam longwall panels
SOD mine panels area - South of the Divide E-seam longwall panels

1. For sites with more than 5 years of data, lab parameters include TSS, TDS, EC, pH, and Fe (dissolved & total)
2. For sites with 5 years or less data see Table 2
3. North Fork of the Gunnison and Middle Sylvester Gulch expanded parameters include those listed in Table 2 for surface water, plus chromium, nickel, silver (total), cyanide (total), iron (total recoverable), nitrate/nitrite (as N), alkalinity (Total CaCO3), bicarbonate, carbonate, hydroxide; nitrogen (ammonia), phosphorous-ortho (dissolved), and sodium adsorption ratio (SAR).

Table 4. Summary of Sunset Trail Area Surface Water Monitoring Stations

| Monitoring Station | Location Description | Latitude (NAD 83 dd) | Longitude (NAD 83 dd) |
|---|---|---|---|
| South Prong Creek | Upstream of Confluence with Minnesota Creek | 38.839794 | -107.451729 |
| North Fork of South Prong Creek | About ½ mile upstream of South Prong Creek Station | 38.839970 | -107.444520 |
| South Fork of South Prong Creek | About ½ mile upstream of South Prong Creek Station | 38.839974 | -107.444393 |
| Stream ST-SW-1 | Unnamed Tributary to South Prong Creek. About 1.5 miles upstream of So South Prong Creek Station | 38.833121 | -107.426038 |
| Pond ST-P-1 | Headwaters of Unnamed Tributary to Lick Creek | 38.848707 | -107.424765 |
| Pond ST-P-2 | Upland Area to the North of South Prong Creek | 38.842051 | -107.426975 |
| Pond ST-P-3 | Upland Area to the North of South Prong Creek | 38.841420 | -107.424671 |
| Spring ST-S-1 | Located in the N. Fork of South Prong Drainage, about one mile upstream of the NFSPC Station | 38.847033 | -107.434802 |

## 3.2 SPRING AND SEEP MONITORING PROGRAM

The spring monitoring program for the permit area includes 28 spring and seep locations. A detailed discussion of monitored springs and seeps can be found in the 2014 Annual Hydrology Report (HydroGeo, 2015), and their locations are shown on Permit Map 34 (CDRMS, 2016). A summary of the spring and seep monitoring program details is presented in Table 5. Spring hydrographs and water quality data for the period of record are presented in Appendix D and E, respectively.

Table 5. Summary of the Spring and Seep Monitoring Program

| Monitoring Station | Monitored Area | Flow Measurement | Field WQ (pH, EC, T) | Annual Lab Water Quality | Period of Record |
|---|---|---|---|---|---|
| ***Springs above the F-seam in the North Fork of the Gunnison River Drainage Basin*** | | | | | |
| Spring 26-1 | Deep Creek, SE mine panels area | 3 x Year | 3 x Year | Peak Flow Period (1) | 1996 to present |
| Spring 27-1 (two ponds) | Upper Syl. Gulch, SE mine panels area | 3 x Year | 3 x Year | Peak Flow Period (1) | 1996 to present |
| Spring G-7 | Upper Syl. Gulch, NE and SW mine panels areas | 3 x Year | 3 x Year | Peak Flow Period (1) | 1977 to present |
| Spring G-16 | Syl. Gulch, east of NE mine panels area | 3 x Year | 3 x Year | Peak Flow Period (1) | 1979 to present |
| Spring G-24 (decreed spring #8) | Syl. Gulch, east of NE mine panels area | 3 x Year | 3 x Year | Peak Flow Period (1) | 1979 to present |
| Spring G-14 (decreed spring #7) | Syl. Gulch, east of NE mine panels area | 3 x Year | 3 x Year | Peak Flow Period (1) | 1977 to present |
| Spring G-22 (decreed spring #3) | Syl. Gulch, north of NE mine panels area | 3 x Year | 3 x Year | Peak Flow Period (1) | 1977 to present |
| Spring 35-3 | U. Deep Creek, east of SOD mine panels area | 3 x Year | 3 x Year | Peak Flow Period (1) | 2006 to present |
| 96-2-2 Area Spring | U Deep Creek, SOD mine panels area | 3 x Year | 3 x Year | Peak Flow Period (1) | 2007 to present |
| Deep Creek Spring # 2 | U Deep Creek, SOD mine panels area | 3 x Year | 3 x Year | Peak Flow Period (1 | 2007 to present |
| Deep Creek Trail Spring | U Deep Creek, south of SE mine panels area and east of SOD mine panels area | 3 x Year | 3 x Year | Peak Flow Period (1) | 2007 to present |
| Spring 2012-1 | U Deep Creek, south of SE mine panels area and east of SOD mine panels area | 3 x Year | 3 x Year | Peak Flow Period (2) | 2013 to present |
| Spring 2012-2 | U Deep Creek, south of SE mine panels area and east of SOD mine panels area | 3 x Year | 3 x Year | Peak Flow Period (2) | 2013 to present |
| Spring 2012-3 | U Deep Creek, south of SE mine panels area and east of SOD mine panels area | 3 x Year | 3 x Year | Peak Flow Period (2) | 2013 to present |
| Spring 2012-4 | U Deep Creek, south of SE mine panels area and east of SOD mine panels area | 3 x Year | 3 x Year | Peak Flow Period (2) | 2013 to present |
| ***Springs in or below the F-seam in the North Fork of the Gunnison River Drainage Basin*** | | | | | |
| Spring 11-2 | Unnamed drainage east of Box Canyon, north of Box Canyon mine panels area | 3 x Year | 3 x Year | Peak Flow Period (1) | 2000 to present |
| Spring 10-1 | Lower Box Canyon, north of Box Canyon mine panels area | 3 x Year | 3 x Year | Peak Flow Period (1) | 1999 to present |
| Spring E10-2 | Unnamed drainage east of Syl. Gulch, north of Box Canyon mine panels area | 3 x Year | 3 x Year | Peak Flow Period (1) | 1996 to present |
| Spring 15-1 | Unnamed drainage east of Syl. Gulch, north of Box Canyon mine panels area | 3 x Year | 3 x Year | Peak Flow Period (1) | 1996 to present |
| Spring G-1a | Syl. Gulch, north of NE mine panels area | 3 x Year | 3 x Year | Peak Flow Period (1) | 1983 to present |
| Spring G-20 | Middle Syl. Gulch, east of mine facilities | 3 x Year | 3 x Year | Peak Flow Period (1) | 1979 to present |
| ***Springs above the E-seam in the Dry Fork Drainage Basin*** | | | | | |
| Spring J-4 | M. Dry Fork, SOD mine panels area | 3 x Year | 3 x Year | Peak Flow Period (1) | 1981 to present |
| Deer Creek Spring | Deer Creek, SOD mine panels area | 3 x Year | 3 x Year | Peak Flow Period (1) | 2006 to present |
| Spring WCC-24 | Lower Dry Fork, west of SOD mine panels area | 3 x Year | 3 x Year | Peak Flow Period (1) | 2006 to present |
| Spring J-2 | Lick Creek, south of SOD mine panels area | 3 x Year | 3 x Year | Peak Flow Period (1) | 2006 to present |

Table 5. Summary of the Spring and Seep Monitoring Program (continued)

| Monitoring Station | Monitored Area | Flow Measurement | Field WQ (pH, EC, T) | Annual Lab Water Quality | Period of Record |
|---|---|---|---|---|---|
| Spring J-7 | Poison Gulch, SOD mine panels area | 3 x Year | 3 x Year | Peak Flow Period (1) | 2006 to present |
| Spring J-10 | Dry Fork, west of SOD mine panels area | 3 x Year | 3 x Year | Peak Flow Period (1) | 2011 to present |
| Spring ST-S-1 | N. Fork of S. Prong Creek area | 6 x Year | 6 x Year | Peak Flow Period (2) | July 2018 to present |

SW mine panels area – southwest B-seam longwall panels; SE mine panels area – southeast B-seam longwall panels
Box Canyon mine panels area – Box Canyon B-seam longwall panels; W. Flatiron mine panels area – West Flatiron B-seam longwall panels
SOD mine panels area – South of the Divide E-seam longwall panels

1. For sites with more than 5 years of data, lab parameters include TSS, TDS, EC, pH, and Fe (dissolved & total).
2. For sites with 5 or less years of data, see Table 2

## 3.3 GROUNDWATER MONITORING PROGRAM

In WY 2023, 13 wells were monitored as part of the MCC groundwater monitoring program (Tables 6 and 7).

A detailed discussion of the groundwater monitoring wells can be found in the 2014 Annual Hydrology Report (HydroGeo, 2015), and their locations are shown on Permit Map 34 (CDRMS, 2016). A summary of the groundwater monitoring well characteristics is presented in Table 6, and a summary of the groundwater monitoring program, including mining areas monitored is presented in Table 7. The water level elevation graphs and water quality data for the period of record for all of the groundwater monitoring wells are summarized in Appendix F and G, respectively.

Table 6. Summary of the Groundwater Monitoring Well Characteristics

| Monitoring Well | Location | Ground Elevation (Toc, ft.) | Screened Interval Depth (ft) | Total Depth (ft) | Formation of Completion |
|---|---|---|---|---|---|
| ***Facility Area Wells and Alluvial Wells*** | | | | | |
| GP-3 (MW-8) | T13S, R90W, Sec. 10, SW,SW | 6145.5 | 25-30 | 33.8 | Colluvium |
| GP-4 (MW-9) | T13S, R90W, Sec. 10, SW,SW | 6147.5 | 25-30 | 33.0 | Colluvium |
| GP-6 | T13S, R90W, Sec. 10, SW,SW | 6204.8 | 78-83 | 83.0 | Alluvium (Syl. Gulch) |
| GP-7 | T13S, R90W, Sec. 15, SW,SW | 6205.7 | 50-55 | 55 | Alluvium (Syl. Gulch) |
| RPE-1 | T13S, R90W, Sec. 10, SW,SE | 6187.0 | n.a. | 30.0 | Colluvium |
| RPE-7 | T13S, R90W, Sec. 10, SE,SW | 6116.3 | 12-32 | 32.0 | Colluvium |
| Upper Dry Fork Alluvial | T14S, R90W, Sec. 2, SW,NW | 8100 | 24-29 | 29 | Alluvium |
| Lower Dry Fork Alluvial | T13S, R90W, Sec. 33, NE,NW | 7640 | 17.5-22.5 | 22.5 | Alluvium |
| ***Permit Area Wells Completed in the Barren Member above F-Seam*** | | | | | |
| SOM-80 | T13S, R90W, Sec. 21, NW,NE | 6854.4 | 50-90 | 142.5 | Barren Mbr. Mesa Verde Fm. |
| SOM-45-H1 | T13S, R90W, Sec. 29, NE,SW | 7703.8 | 160-260 | 260.0 | Barren Mbr. Mesa Verde Fm. |
| ***Permit Area Wells Completed in the F-Seam*** | | | | | |
| SOM C-76 | T13S, R90W, Sec. 33, NW,NE | 7579.6 | 444-457 | 457.0 | F-Seam |
| ***Permit Area Wells Completed in the E-Seam*** | | | | | |
| 03-11-1 | T13S, R90W, Sec. 11, SE,SE | 6281 | 240-250 | 250 | E-Seam |
| ***Permit Area Wells Completed in B-Seam*** | | | | | |
| 01-11-1 | T13S, R90W, Sec. 11, SE,NE | 6281.3 | 489-499 | 509.0 | B-Seam |

toc – top of casing

Table 7. Summary of the Groundwater Monitoring Program

| Monitored Station | Monitored Area | Water Level Measurement | Field WQ (pH, EC, temp) | Annual Lab Water Quality | Period of Record |
|---|---|---|---|---|---|
| ***Facility Area Wells and Alluvial Wells*** | | | | | |
| GP-3 (MW-8) | Mine facility area | 3 x Year | 3 x Year | Low Flow Period (1) | 1985 to present |
| GP-4 (MW-9) | Mine facility area | 3 x Year | 3 x Year | Low Flow Period (1) | 1985 to present |
| GP-6 | Mine facility area | 3 x Year | 3 x Year | Low Flow Period (1) | 1997 to present |
| GP-7 | Mine facility area | 3 x Year | 3 x Year | Low Flow Period (1) | 1997 to present |
| RPE-1 | Mine facility area | 3 x Year | 3 x Year | Low Flow Period (1) | 1996 to present |
| RPE-7 | Mine facility area | 3 x Year | 3 x Year | Low Flow Period (1) | 1999 to present |
| Upper Dry Fork Alluvial (1) | SOD mine panels area | 3 x Year | 3 x Year | Low Flow Period (1) | 2003 to present |
| Lower Dry Fork Alluvial (1) | SOD mine panels area | 3 x Year | 3 x Year | Low Flow Period (1) | 2003 to present |
| ***Wells Completed in the Barren Member above F-Seam*** | | | | | |
| SOM-80 | NE mine panels area | 3 x Year | 3 x Year | Low Flow Period (1) | 1979 to present |
| SOM-45-H1 | SW mine panels area | 3 x Year | 3 x Year | Low Flow Period (1) | 1979 to present |
| ***Wells Completed in the F-Seam*** | | | | | |
| SOM-C-76 | SOD mine panels area | 3 x Year | 3 x Year | Low Flow Period (1) | 1978 to present |
| ***Wells Completed in the E-Seam*** | | | | | |
| 03-11-1 | North of Box Canyon mine panels area | 3 x Year | 3 x Year | Low Flow Period (1) | 2003 to present |
| ***Wells Completed in –B-Seam*** | | | | | |
| 01-11-1 | North of Box Canyon mine panels area | 3 x Year | 3 x Year | Low Flow Period (1) | 2001 to present |

SW mine panels area – southwest B-seam longwall panels
SE mine panels area – southeast B-seam longwall panels
Box Canyon mine panels area – Box Canyon B-seam longwall panels
W. Flatiron mine panels area – West Flatiron B-seam longwall panels
SOD mine panels area – South of the Divide E-seam longwall panels
Shaded cells indicate wells with compromised, blocked, or collapsed casing.

1. For sites with >5 years of data, lab parameters include TSS, TDS, EC, pH, and Fe (dissolved & total).

## 3.4 UNDERDRAIN AND MINE WATER MONITORING

Two underdrains were monitored in WY 2023. The underdrains are located at the lower refuse pile (LRP) and at the refuse pile expansion (RPE) area. The LRP underdrain is located above the sediment ditch at the base of the pile, east of the stacktube #5 coal stockpile. The RPE underdrain is located just south of, and drains into the westernmost RPE sediment pond.

Mine inflows are monitored and sampled at sites in the mine where discernible flows are greater than 5 gallons per minute (gpm) and/or where flows are present for more than seven consecutive days. If mine inflows are continuous, they are sampled for laboratory analysis at least annually. In WY 2023, no mine inflows met the monitoring and sampling criteria (MCC, 2024). The underdrain monitoring program details are summarized in Table 8 and the underdrain water quality data are presented in Appendix H.

Table 8. Summary of the Underdrain and Mine Inflow Monitoring Program

| Monitoring Site | Flow Measurement | Field WQ (pH, EC, temp) | Annual Lab Water Quality |
|---|---|---|---|
| **Underdrains** | | | |
| LRP | 3 x Year | 3 x Year | Low Flow Period (1) |
| RPE | 3 x Year | 3 x Year | Low Flow Period (1) |
| **Mine Inflows (if sampling criteria are met)(2)** | | | |

**(1)** Lab parameters include TDS, EC, pH, Ca, Mg, Na, K, SAR, hardness, bicarbonate, Cl, Nitrite/Nitrate, PO4, SO4, Fe (tot & dissolved), Mn (tot & dissolved), Al, As (tot), Cd, Cu, Pb, Hg (tot), Mb, Se (tot), Bo, Zn.

**(2)** See Section 3.4 of the WY 2014 AHR (HydroGeo, 2015) for mine inflow sampling criteria.

## 3.5 US FOREST SERVICE WATER RESOURCES

MCC and the USFS District office in Paonia, Colorado jointly monitor the USFS-appropriated water resources that are located over mined and planned longwall panels and within the angle-of-draw of potential surface impacts of the mining operations. Observations are reported in the annual Fall Subsidence Reports submitted to the CDRMS (MCC, 2024). The applicable appropriated water resources are listed in Table 9 and shown on Map 37 in the Mine Permit document.

Table 9. Summary of the U.S. Forest Service Water Resources

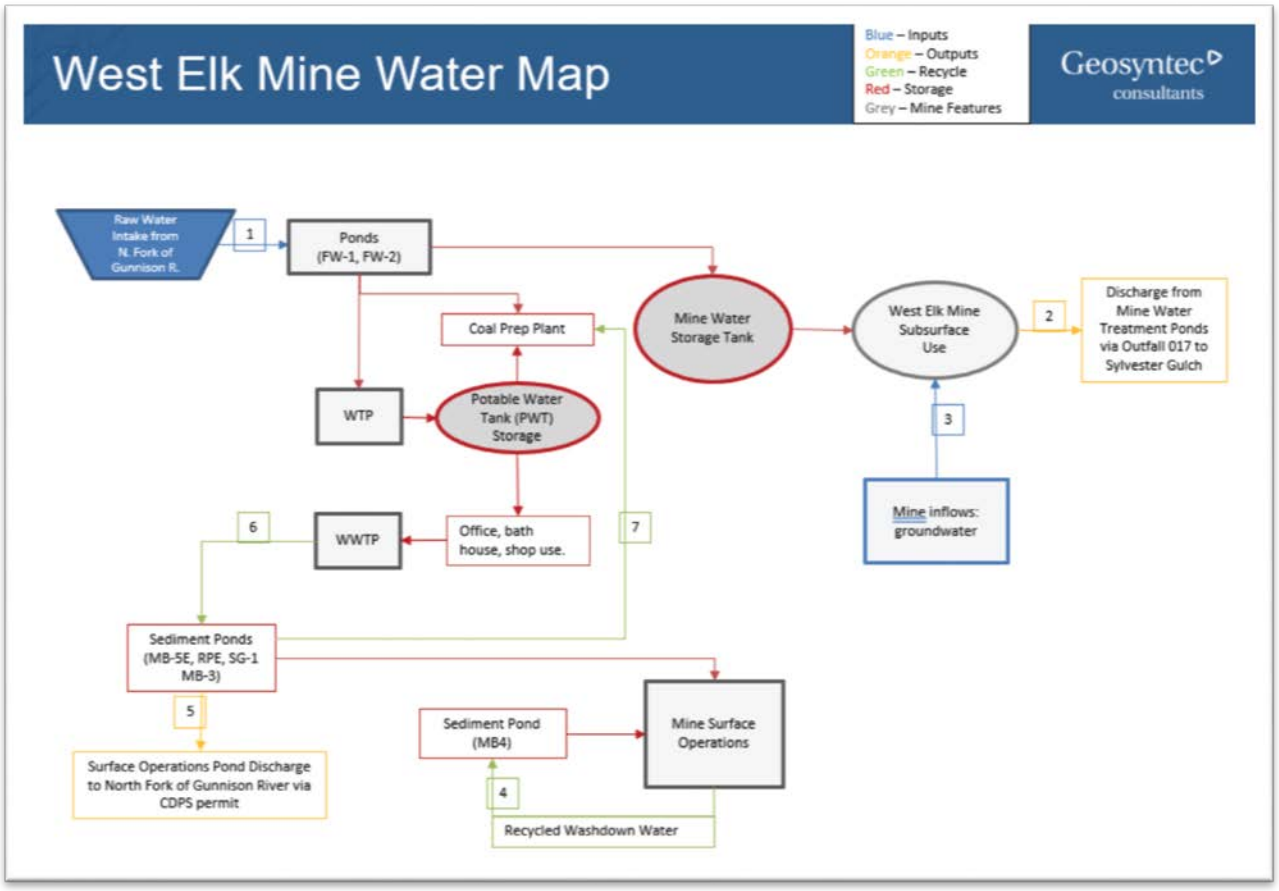
| Resource Number | Name | Source | Appropriated Use |
|---|---|---|---|
| 131 | Dry Fork 44 | Gribble Gulch | 0.5 a-f |
| 132 | Dry Fork 42 | Minnesota Creek | 0.5 a-f |
| 133 | Dry Fork 43 | Minnesota Creek | 0.5 a-f |
| 134 | Dry Fork 41 | Minnesota Creek | 0.5 a-f |
| 135 | Dry Fork 26 | Minnesota Creek | 0.5 a-f |
| 136 | Dry Fork 40 | Minnesota Creek | 0.5 a-f |
| 137 | Dry Fork 13 | Minnesota Creek | 0.5 a-f |
| 138 | Dry Fork 17 | Minnesota Creek | 0.5 a-f |
| 139 | Dry Fork 37 | Minnesota Creek | 0.5 a-f |
| 140 | Dry Fork 16 | Minnesota Creek | 0.5 a-f |
| 141 | Dry Fork 38 | Minnesota Creek | 0.5 a-f |
| 142 | Dry Fork 4 | Minnesota Creek | 0.5 a-f |
| 143 | Dry Fork 39 | Minnesota Creek | 0.5 a-f |
| 144 | Dry Fork 7 | Minnesota Creek | 0.5 a-f |
| 145 | Dry Fork 32 | Minnesota Creek | 0.5 a-f |
| 146 | Dry Fork 8 | Sylvester Gulch | 0.5 a-f |
| 147 | Dry Fork 49 | Sylvester Gulch | 0.5 a-f |
| 148 | Dry Fork 36 | Minnesota Creek | 0.5 a-f |
| 149 | Dry Fork 9 | Minnesota Creek | 0.5 a-f |
| 150 | Dry Fork 22 | Minnesota Creek | 0.5 a-f |
| 151 | Dry Fork 23 | Minnesota Creek | 0.5 a-f |
| 152 | Dry Fork 18 | Minnesota Creek | 0.5 a-f |
| 153 | Dry Fork 28 | Minnesota Creek | 0.5 a-f |
| 154 | Dry Fork 48 | Sylvester Gulch | 0.5 a-f |
| 155 | Dry Fork 47 | Deep Creek | 0.5 a-f |
| 156 | Dry Fork 45 | Minnesota Creek | 0.5 a-f |
| 157 | Dry Fork 46 | Deep Creek | 0.5 a-f |
| 158 | Dry Fork 27 | Deep Creek | 0.5 a-f |
| 159 | Dry Fork 24 | Deep Creek | 0.5 a-f |
| 179 | Cow Camp | Spring | 0.001 cfs |
| 180 | Dry Fork 84 | Raven Gulch | 0.1 a-f |
| 181 | Dry Fork 82 | Raven Gulch | 0.5 a-f |
| 182 | Dry Fork 83 | Deep Creek | 0.5 a-f |
| 185 | Dry Fork 79 | Sylvester Gulch | 0.5 a-f |
| 186 | Dry Fork 98 | Sylvester Gulch | 0.5 a-f |
| 187 | Dry Fork 78 | Sylvester Gulch | 0.5 a-f |
| 188 | Dry Fork 77 | Sylvester Gulch | 0.5 a-f |
| 200 (1) | Cowboy | Sylvester Gulch | 1.0 a-f |
| 201(1) | Indian | Sylvester Gulch | 1.0 a-f |
| 260 | Dry Fork 99 | Long Draw | 0.3 a-f |
| 261 | Dry Fork 100 | Sylvester Gulch | 0.3 a-f |
| 265 | n.a | Sylvester Gulch | n.a. |
| 266 | n.a. | Sylvester Gulch | n.a. |
| 279 | n.a. | Minnesota Creek | n.a. |
| 280 | n.a. | Minnesota Creek | n.a. |
| 281 | n.a. | n.a. | n.a. |
| 282 | n.a. | Sylvester Gulch | n.a. |

Source: CDRMS Permit C-1980-007
(1) Future Foreseeable Use
a-f – acre-feet (storage right); cfs – cubic feet per second (flow right); n.a. – Information not available
All resources, except 185 and 186 have a June through October use. Resources 185 and 186 have a May through October use.

# 4.0 MINE WATER MANAGEMENT ACTIVITIES

The mine water management activities pertain to the water flows into and out of the mine and mine site, and include fresh water intake (appropriated diversions) from the North Fork, and discharges of treated sanitary wastewater, sedimentation ponds, and mine water inflows. The individual components associated with water usage at the mine are discussed below, and illustrated in Figure 5, and month-by-month and total flows are shown in Table 10.

Figure 5. West Elk Mine WY 2023 Water Map




Source: MCC, 2024

Table 10. Water Year 2023 Mine Water Inflows, Outflows, and Recycling

| Month | 01 - N. Fork Gunnison River to Pond FW-1 (gallons) | 02 - MWTP to Sylvester Gulch (gallons) | 03 - GW Inflows to Mine (gallons) | 04 - Recycled Washdown Water (gallons used in washdown) | 05 - Surface Ops Ponds to N. Fork Gunnison River (gallons) | 06 - WWTP to Sediment Ponds (gallons) | 07 - Sediment Ponds to Coal Prep Plant (gallons) |
|---|---|---|---|---|---|---|---|
| October 2022 | 7,790,600 | 0 | 500,000 | 268,000 | 0 | 266,450 | 1,001,518 |
| November 2022 | 7,614,300 | 0 | 500,000 | 8,000 | 0 | 250,550 | 2,936 |
| December 2022 | 263,300 | 0 | 500,000 | 0 | 0 | 213,280 | 1,791 |
| January 2023 | 9,061,900 | 0 | 500,000 | 0 | 0 | 248,190 | 857,383 |
| February 2023 | 7,512,000 | 0 | 500,000 | 0 | 0 | 230,790 | 1,384,864 |
| March 2023 | 6,477,700 | 0 | 500,000 | 0 | 0 | 363,210 | 1,227,220 |
| April 2023 | 6,560,500 | 0 | 500,000 | 428,000 | 0 | 408,500 | 896,561 |
| May 2023 | 6,052,400 | 0 | 500,000 | 860,000 | 0 | 301,800 | 1,255,774 |
| June 2023 | 7,028,400 | 0 | 500,000 | 1,224,000 | 0 | 239,540 | 1,218,316 |
| July 2023 | 6,215,700 | 0 | 500,000 | 1,388,000 | 0 | 216,170 | 772,139 |
| August 2023 | 7,265,500 | 0 | 500,000 | 904,000 | 0 | 306,190 | 1,067,750 |
| September 2023 | 6,443,000 | 0 | 500,000 | 600,000 | 0 | 240,600 | 1,155,315 |
| **Total WY 2023** | **78,285,300** | **0** | **6,000,000** | **5,680,000** | **0** | **3,285,270** | **10,841,567** |
| **Total ac-ft WY 2023** | **240.2** | **0** | **18.4** | **17.4** | **0** | **10.1** | **33.3** |

Source: MCC, 2024

## 4.1 INFLOWS

MCC diverts water from the North Fork via the Mt. Gunnison Pipeline (Structure ID: 1882) water right for surface and in-mine processes and potable uses. In WY 2023, raw water intake from the North Fork of the Gunnison River totaled 240.2 ac-ft. Because the Mt. Gunnison Pipeline is a relatively junior water right, it may be called out of priority during the late summer and early fall. MCC's out-of-priority diversions from the North Fork are augmented using releases from MCC's mine water right to Sylvester Gulch and/or leased water released from East Beckwith Reservoir (a.k.a. Lost Lake Slough). Inflows into the mine from faults coal partings, and the roof and walls totaled about 18.4 ac-ft. (MCC, 2024)

## 4.2 SEDIMENTATION AND FRESHWATER PONDS

The sedimentation and treatment ponds (Figure 5) at the mine site are utilized to manage groundwater collected in the mine, storm water runoff, and wastewater treatment effluent. All of the ponds are lined with high-density polyethylene (HDPE) materials, except ponds MB-5E and MB-3 that are clay-lined and pond MB-4 that is a concrete basin. Water from Sediment Ponds MB-5E, RPE, SG-1, and MB-3 is recycled and used in the coal prep plant. In WY 2023, 33.3 ac-feet of water from the sedimentation ponds was used in the coal prep plant. Two "freshwater" ponds (FW-1 and FW-2) are used to equalize diversions from the North Fork and provide water storage. These ponds serve as the raw fresh water supply for the mine's domestic water use and surface and in-mine water needs.

### 4.2.1 *PONDS MB-5E, MB-3 AND MB-4*

MCC's sediment ponds are designed to retain water over a period of time so settling of sediment occurs prior to discharge (batch mode). Pond MB-5E collects storm water runoff and effluent from the wastewater treatment pond (WWTP). Ponds MB-3 and MB-4 also receive storm water runoff, and Pond MB4 receives recycled washdown water. In WY 2023, Pond MB4 received about 17.4 ac-ft. of washdown water. In WY 2023, no water was discharged to the North Fork from ponds MB-3, MB-4, or MB-5E (MCC, 2024).

### 4.2.2 *PONDS FW-1 AND FW-2*

Freshwater ponds FW-1 and FW-2 store raw fresh water from the North Fork diversion intake gallery. Water from these ponds is pumped to the mine water storage tank and the water treatment plant and potable water storage system. If the ponds overfill, excess water is discharged back to the North Fork.

### 4.2.3 *RPE POND*

The RPE Pond collects storm water runoff and underdrain flows from the RPE and RPEE refuse pile areas. There was no discharge from the RPE pond in WY 2023. (MCC, 2024).

### 4.2.4 *POND SG-1*

Pond SG-1 collects storm water runoff from the mine ventilation shaft bench areas. Discharge from pond SG-1 is routed to Sylvester Gulch. In WY 2023 there was no discharge from pond SG-1 to Sylvester Gulch (MCC, 2024).

### 4.2.5 *MINE WATER TREATMENT PONDS*

Underground fault water (MCC's non-tributary water right) is pumped from the B-seam sumps through the mine water pumping facility (MWPF) and is directed to the mine water treatment ponds for aeration (if needed) and settling prior to discharge. Once treated, the water is discharged to Sylvester Gulch through Outfall 017A. No water was discharged from this outfall in WY 2023 (MCC, 2024).

### 4.2.6 *WWTP POLISHING*

Effluent from MCC's WWTP is further treated (polished) in a buried vault prior to discharge. After retention in the polishing vault, the water is discharged through Outfall 007A and flows to

pond MB-5E. 10.1 ac-ft of water were discharged from the WWTP to Pond MB-5E in WY 2023 (MCC, 2024).

### 4.3 CDPS DISCHARGE PERMIT CO-0038776

The latest version of MCC's Colorado Department of Public Health and Environment, Colorado Discharge Permit System (CDPS) Permit (CO-0038776) was issued in August 2019, and last modified in March 2022. The Permit authorization expires on September 30, 2024. CDPS Discharge Monitoring Reports (dmr) are submitted to the State once a month, and annual reports are submitted once a year by March 1st.

## 5.0 ASSESSMENT OF MINE-INDUCED HYDROLOGIC IMPACTS IN WY 2023 AND ANTICIPATED IMPACTS IN WY 2024

### 5.1 SURFACE WATER

MCC maintains a network of 22 stream flow gauging stations, 3 ponds, and eight temperature monitoring stations throughout the permit and lease areas (Table 3). Daily mean and measured surface water flow summary tables are presented in Appendix A. Surface water flow hydrographs are presented in Appendix B and the field and laboratory surface water quality data are summarized in Appendix C. Tables and graphs of the Sylvester Gulch and North Fork temperature monitoring data are presented in Appendix I and Appendix J, respectively.

#### 5.1.1 *IMPACTS TO AREA SURFACE WATER QUALITY*

Surface water quality data are collected for permit-specified parameters at monitoring stations throughout the permit area, in order to detect potential impacts of mining activities to surface water resources. Potential impacts to water quality in area streams are determined by comparing recent water quality and flow data to baseline values while considering the effects of seasonal variation and climatological factors, such as drought or high precipitation in areas near mining activity. Monitoring sites with values greater than 10 percent over comparable baseline maximums (or outside of 6.0-9.5 standard units for pH) are noted in Table 9. Field pH values are used for comparison when they are available, as the holding time for lab pH is typically exceeded, due to the shipping time required for samples to reach the analytical lab. In general, water quality parameters that are above 10 percent over baseline maximums are likely due to natural variations in climate or flow conditions on the day the sample was collected. Impacts that appear to be directly linked to mining activities are noted. It should also be noted that baseline values are based on limited data and only give a general indication of seasonal variability. The surface water quality data for stream monitoring stations in WY 2023 are presented in Appendix C.

In WY 2023 none of the tested parameters were elevated 10 percent or more above maximum baseline values at the following surface water monitoring locations: Upper North Fork, Lower North Fork, Upper Sylvester Gulch, Middle Sylvester Gulch, Lower Sylvester Gulch, Middle Dry Fork, East Gulch east of Horse Gulch, Lower Deep Creek, Box Canyon, Deer Creek, Poison Gulch, South Prong Creek, South Fork of South Prong Creek, North Fork of South Prong Creek, ST-SW-1, and Pond ST-P-1. There are no baseline data for comparison for Upper Minnesota Creek (WWE, 2001).

Surface water monitoring sites where tested parameters were elevated 10 percent or more above maximum baseline values are summarized in Table 9. These exceedances are not likely mining related, since mining discharges have not and are not occurring in the vicinity of the monitoring sites. The elevated measurements are likely due to natural physical and or seasonal variations.

Table 11. Summary of Surface Water Quality Parameters Elevated 10 Percent or More above Baseline Maximum Values

| Site Name | Sample Date | Parameter | Units | Result | Baseline Maximum |
|---|---|---|---|---|---|
| Upper North Fork | 6/6/2023 | Manganese, dissolved | mg/L | 0.022 | 0.009 |
| | 9/5/2023 | Magnesium, dissolved | mg/L | 4.07 | 3.4 |
| | 9/5/2023 | Sodium, dissolved | mg/L | 6.72 | 5.7 |
| Lower North Fork | 9/5/2023 | Iron, total | mg/L | 5.44 | 3.8 |
| Upper Sylvester Gulch | 5/10/2023 | Conductivity (Field) | µmhos/cm | 442 | 380 |
| | 6/6/2023 | Conductivity @25C | µmhos/cm | 573 | 462 |
| | 6/6/2023 | Iron, total | mg/L | 0.145 | 0.07 |
| | 6/6/2023 | Residue, Filterable (TDS) @180C | mg/L | 352 | 260 |
| Middle Sylvester Gulch | 6/6/2023 | Chloride | mg/L | 16.6 | 10 |
| | | | | 17.4 | |
| | 6/6/2023 | Sulfate | mg/L | 97.4 | 80 |
| | | | | 94.5 | |
| Lower Sylvester Gulch | 6/6/2023 | Conductivity (Field) | µmhos/cm | 829 | 700 |
| | 6/6/2023 | Conductivity @25C | µmhos/cm | 795 | 597 |
| | 6/6/2023 | Iron, total | mg/L | 0.285 | 0.17 |
| | 6/6/2023 | Residue, Filterable (TDS) @180C | mg/L | 484 | 430 |
| Middle Dry Fork Flume | 6/7/2023 | Conductivity @25C | µmhos/cm | 296 | 76 |
| | | | | 297 | |
| | 6/7/2023 | Iron, dissolved | mg/L | 0.220 | 0.11 |
| | | | | 0.256 | |
| East Gulch, E. of Horse Gulch | 6/7/2023 | Conductivity (Field) | µmhos/cm | 541 | 480 |
| | 6/7/2023 | Conductivity @25C | µmhos/cm | 518 | 453 |
| | 6/7/2023 | Residue, Filterable (TDS) @180C | mg/L | 330 | 290 |
| Lower Deep Creek | 6/8/2023 | Iron, total | mg/L | 6.94 | 5.83 |
| Box Canyon | 5/10/2023 | Conductivity (Field) | µmhos/cm | 1,645 | 1,020 |
| | 6/6/2023 | | | 2,310 | |
| | 6/6/2023 | Conductivity @25C | µmhos/cm | 2,100 | 968 |
| | 6/6/2023 | Residue, Filterable (TDS) @180C | mg/L | 1,500 | 620 |
| Deer Creek | 6/7/2023 | Conductivity @25C | µmhos/cm | 753 | 547 |
| | 6/7/2023 | Iron, dissolved | mg/L | 0.130 | 0.11 |
| | 6/7/2023 | Residue, Filterable (TDS) @180C | mg/L | 468 | 330 |
| Poison Gulch | 6/8/2023 | Conductivity (Field) | µmhos/cm | 761 | 479 |
| | 6/8/2023 | Conductivity @25C | µmhos/cm | 747 | 295 |
| | 6/8/2023 | Iron, total | mg/L | 0.575 | 0.43 |
| | 6/8/2023 | Residue, Filterable (TDS) @180C | mg/L | 478 | 170 |
| South Prong Creek | 5/9/2023 | Conductivity (Field) | µmhos/cm | 232 | 178.0 |
| | 6/5/2023 | Iron, dissolved | mg/L | 0.206 | 0.05 |
| S. Fork of South Prong Ck. | 6/5/2023 | Iron, dissolved | mg/L | 0.319 | 0.04 |
| | 6/5/2023 | Iron, total | mg/L | 1.45 | 0.62 |
| | 6/5/2023 | Residue, Non-Filterable (TSS) @105C | mg/L | 38.0 | 17.0 |
| N. Fork of South Prong Ck. | 6/5/2023 | Iron, dissolved | mg/L | 0.335 | < 0.03 |
| | 6/5/2023 | Iron, total | mg/L | 1.37 | 0.65 |
| | 6/5/2023 | Residue, Non-Filterable (TSS) @105C | mg/L | 39.0 | 23.0 |
| | 9/4/2023 | Conductivity (Field) | µmhos/cm | 566 | 460 |
| Stream ST-SW-1 | 6/5/2023 | Iron, dissolved | mg/L | 0.166 | 0.07 |
| Pond ST-P-1 | 6/8/2023 | Conductivity @25C | µmhos/cm | 252 | 217 |

### 5.1.2 IMPACTS TO AREA STREAM WATER QUANTITY

Stream flows at the monitoring sites for the Upper North Fork (USGS), Middle Sylvester Gulch, Lower Minnesota Creek, Upper Minnesota Creek Flume (USGS), Upper, Lower and Middle Dry Fork Flume, Lick Creek Flume, Deep Creek Ditch, Minnesota Reservoir Flume, and the South Prong Creek stations are measured with data loggers that collect data continuously. Stream flows of the other monitored streams (Upper and Lower Sylvester Gulch, Horse Gulch; East Gulch east of Horse Gulch, Upper and Lower Deep Creek. Box Canyon, Deer Creek, Poison Gulch, South Fork of South Prong Creek, North Fork of South Prong Creek, and ST-SW-1) are measured as instantaneous flow three times per year, corresponding with rising limb, peak flow, and low flow monitoring periods. No specific flow data are available for the Lower North Fork, although no mining related stream flow impacts are expected. Flow at Lower Sylvester Gulch is not measured, because of its close proximity to the Middle Sylvester Gulch Flume. Water depth is estimated three times per year at the monitored ponds (ST-P-1, ST-P-2, ST-P-3). Potential mining related impacts to stream flows and pond volume are based on dramatic decreases or total loss of stream flow due to subsidence.

Based on the flow monitoring data in WY 2023 (Appendices A and B), there were no mining induced impacts to the water quantity of any of the monitored streams. Most of the monitored streams had higher than long-term average flows in WY 2023 because of high snowpack and precipitation.

## 5.2 SPRINGS AND SEEPS

MCC currently monitors 28 springs and seeps (Table 5). Hydrographs of the spring and seep flows are presented in Appendix D and spring and seep water quality data are presented in Appendix E.

### 5.2.1 IMPACTS TO SPRING AND SEEP WATER QUALITY

Spring water quality data are collected for permit-specified parameters at monitored springs and seeps throughout the permit area, in order to detect potential impacts of mining activities. Typically, underground coal mining does not impact spring water quality, but it can reduce or eliminate flows due to subsidence or dewatering.

Water quality data from WY 2023 do not indicate significant changes from baseline conditions for most of the monitored springs. However, some of the springs had elevated TDS/TSS, and/or conductivity values that were also noted in WYs 2004 through 2022. These elevated values are generally consistent with trends from previous years, and are likely the result of physical and or seasonal variations and are not related to mining operations.

Potential mining impacts to area spring and seep water quality are determined by comparing current water quality data to maximum baseline values and climatological conditions such as drought or high precipitation periods at monitored sites hydraulically connected to areas with mining activities. Field pH values are used for comparison when they were available, as the holding time for the lab pH is typically exceeded due to the shipping time required for samples to reach the analytical lab. The discussion below includes monitoring locations where one or more parameters had values 10 percent or higher than comparable maximum (or outside of 6.0-9.5 standard units for pH) baseline values. Spring water quality parameters that are 10 percent or more above the baseline maximum are typically the result of natural variations in climate or flow

conditions the day the sample was collected. It should also be noted that baseline values are derived from limited data and only give a general indication of seasonal variability.

Springs 26-1, G-16, 35-3, WCC-24, 2012-1, 2012-3, 2012-4, ST-S-1, Deep Creek Trail Spring, and 96-2-2 Area Spring did not have any parameters elevated 10 percent or more over baseline maximums in WY 2023. Springs G-20 and Deep Creek Spring # 2 were dry, and Spring J-10 was covered by a beaver pond and could not be accessed. There are no baseline water quality data for comparison for springs 11-2, 10-1, and E10-2 (WWE, 2001; HydroGeo, 2015).

Several springs had one or more parameters that were 10 percent or higher than the comparable maximum baseline value in WY 2023 (Table 10).

Table 12. Summary of Spring and Seep Water Quality Parameters Elevated 10 Percent or More above Baseline Maximum Values

| Site Name | Sample Date | Parameter | Units | Result | Baseline Maximum Value |
|---|---|---|---|---|---|
| Spring 27-1 | 6/7/2023 | Conductivity (Field) | µmhos/cm | 566 | 460 |
| | 9/5/2023 | | | 819 | |
| | 6/7/2023 | Conductivity @25C | µmhos/cm | 522 | 437 |
| Spring G-7 | 6/7/2023 | Residue, Filterable (TDS) @180C | mg/L | 256 | 230 |
| Spring G-24 | 6/7/2023 | Conductivity @25C | µmhos/cm | 859 | 564 |
| Spring G-14 | 6/7/2023 | Conductivity @25C | µmhos/cm | 993 | 682 |
| Spring G-22 | 6/7/2023 | Conductivity @25C | µmhos/cm | 1,040 | 640 |
| | | Residue, Filterable (TDS) @180C | mg/L | 640 | 516 |
| Spring 15-1 | 5/12/2023 | Conductivity (Field) | µmhos/cm | 2,370 | 1,240 |
| | 6/6/2023 | | | 2,320 | |
| | 6/6/2023 | Conductivity @25C | µmhos/cm | 2,100 | 1,120 |
| | 6/6/2023 | Residue, Filterable (TDS) @180C | mg/L | 1,490 | 730 |
| Spring G-1A | 6/6/2023 | Conductivity @25C | µmhos/cm | 1,110 | 672 |
| | 6/6/2023 | Residue, Filterable (TDS) @180C | mg/L | 696 | 550 |
| Spring J-4 | 5/9/2023 | Conductivity (Field) | µmhos/cm | 599 | 480 |
| | 6/7/2023 | | | 590 | |
| | 6/7/2023 | Conductivity @25C | µmhos/cm | 564 | 429 |
| | 6/7/2023 | Residue, Filterable (TDS) @180C | mg/L | 346 | 300 |
| Deer Creek Spring | 5/9/2023 | Conductivity (Field) | µmhos/cm | 1,039 | 889 |
| | 6/7/2023 | | | 987 | |
| | 9/4/2023 | | | 1,038 | |
| | 6/7/2023 | Conductivity @25C | µmhos/cm | 933 | 660 |
| | 6/7/2023 | Residue, Filterable (TDS) @180C | mg/L | 588 | 360 |
| Spring J-2 | 6/5/2023 | Conductivity @25C | µmhos/cm | 1,680 | 1,190 |
| | 6/5/2023 | Residue, Filterable (TDS) @180C | mg/L | 1,170 | 910 |
| Spring J-7 | 6/8/2023 | Conductivity (Field) | µmhos/cm | 763 | 496 |
| | 9/6/2023 | | | 914 | |
| | 6/8/2023 | Conductivity @25C | µmhos/cm | 727 | 426 |
| | 6/8/2023 | Residue, Filterable (TDS) @180C | mg/L | 458 | 270 |
| Spring 2012-2 | 6/8/2023 | Residue, Non-Filterable (TSS) @105C | mg/L | 8.0 | < 5 |

### 5.2.2 IMPACTS TO SPRING AND SEEP WATER QUANTITY

Routine (post-baseline) monitoring of spring and seep flow is conducted three times per year, corresponding with rising limb, peak flow, and low flow periods. As a result, spring and seep flows may be highly variable from year to year. However, subsidence associated with coal mining can reduce or eliminate spring flows, or alter spring locations due to stratigraphic changes.

The spring flow hydrographs are presented in Appendix D. In general, spring and seep flows in WY 2023 were higher than long-term averages, due to above average snowpack and precipitation. Springs G-20 and Deep Creek Spring # 2 have been continuously dry or damp at the time of monitoring for multiple years, including WY 2023, and may have been impacted by mining.

## 5.3 GROUNDWATER

In WY 2023, MCC's groundwater monitoring program included 13 monitoring wells throughout the permit and lease areas. Field water quality and the depth to water are recorded three times annually, corresponding to the rising limb, peak flow, and low flow sampling rounds. The Lower and Upper Dry Fork Alluvial Wells are equipped with continuous water level loggers. Routine monitoring (post-baseline) includes collecting a sample for laboratory analysis one time per year during the low flow monitoring round. The well water elevation and depth to water data are presented in Appendix F and the groundwater quality data are presented in Appendix G.

### 5.3.1 IMPACTS TO GROUNDWATER QUALITY

Groundwater quality data are collected for permit-specified parameters at monitoring wells throughout the permit area, in order to detect potential impacts of mining activities to groundwater resources. Potential impacts to groundwater are determined by comparison to baseline values and consideration of climatic conditions. Field pH values were used for comparison when they were available, as the holding time for the lab pH is typically exceeded, due to the shipping time required for samples to reach the analytical lab. Overall, there were only minor notable water quality changes in a few of the groundwater monitoring wells during WY 2023 (Appendix G). These changes are likely the result of sediment in the wells, and not related to mining induced effects.

No water quality data are available in WY 2023 for the following wells because they were dry or did not have enough water to collect samples during the low flow sampling period: GP-3, GP-4, RPE-1, RPE-7, and SOM-C76. Wells GP-6 and GP-7 do not have baseline data for comparison (WWE, 2001).

Wells 01-11-1, 03-11-1 and the Lower Dry Fork Alluvial Well did not have any parameters elevated 10 percent or more over baseline maximums in WY 2023. Wells where tested parameters were elevated 10 percent or more above maximum baseline values are summarized in Table 11.

Table 13. Summary of Well Water Quality Parameters Elevated 10 Percent or More above Baseline Maximum Values

| Site Name | Sample Date | Parameter | Units | Result | Baseline Maximum Value |
|---|---|---|---|---|---|
| Upper Dry Fork Alluvial Well | 9/6/2023 | Conductivity @25C | µmhos/cm | 748 | 509 |
| | 9/6/2023 | Residue, Filterable (TDS) @180C | mg/L | 466 | 390 |
| Well SOM-80 | 9/5/2023 | Conductivity @25C | µmhos/cm | 1,130 | 897 |
| Well SOM-45-H-1 | 5/20/2023 | Conductivity (Field) | µmhos/cm | 1,922 | 1,626 |
| | 6/7/2023 | | | 1,950 | |
| | 9/6/2023 | | | 1,792 | |
| | 9/6/2023 | Conductivity @25C | µmhos/cm | 1,760 | 1,390 |

### 5.3.2 IMPACTS TO GROUNDWATER QUANTITY

Routine (post-baseline) monitoring of groundwater levels in the monitoring wells is conducted three times per year, corresponding with rising limb, peak flow, and low flow periods. Groundwater level and elevation data for the monitoring wells for the period of record are summarized in Appendix F.

Mining operations appear to have impacted long-term groundwater levels in wells SOM 45-H-1, SOM C-76, and 03-11-1. In WY 2023, water levels in shallower alluvial and colluvial wells were higher than average due to high snowpack and precipitation. Wells GP-3, GP-4, and RPE-7 have been dry or nearly dry through the period of record due to the intentional up-gradient diversion of surface water runoff.

## 6.0 ADEQUACY OF THE MONITORING PROGRAM

MCC's hydrologic monitoring program operates in accordance with CDRMS Permit No. C-1980-007, as revised by Permit Revision Nos. PR-10 and PR-15, and Technical Revision No. TR-139. PR-10 included a revised comprehensive hydrologic monitoring plan for the entire permit area including the SOD mine plan area. PR-15 included the monitoring plan for the Sunset Trail mining area. The plan is presented in Exhibits 71 and 71A in the permit document (CDRMS, 2006; CDRMS 2016; CDRMS 2018).

### 6.1 MINING RELATED HYDROLOGIC IMPACTS

In WY 2023 the West Elk Mine hydrologic monitoring program was conducted in accordance with all permit requirements. The data collected in WY 2023 from sites in the current monitoring program were adequate to assess potential mine-induced impacts to the area's hydrologic system. These potential impacts are summarized in the previous sections.

During WY 2023, MCC operations were in compliance with Permit CO-0038776 requirements (Section 4.6.1). There are no anticipated mining related impacts in WY 2024.

# 7.0 REFERENCES

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## APPENDICES (Attached)

| | |
|---|---|
| APPENDIX A | SURFACE WATER - FLOW DATA |
| APPENDIX B | SURFACE WATER - HYDROGRAPHS |
| APPENDIX C | SURFACE WATER - LABORATORY AND FIELD WATER QUALITY DATA |
| APPENDIX D | SPRINGS - HYDROGRAPHS |
| APPENDIX E | SPRINGS - LABORATORY AND FIELD WATER QUALITY DATA |
| APPENDIX F | WELLS - WATER LEVEL ELEVATION GRAPHS |
| APPENDIX G | WELLS - LABORATORY AND FIELD WATER QUALITY DATA |
| APPENDIX H | MINE WATER – LABORATORY AND FIELD WATER QUALITY DATA |
| APPENDIX I | SURFACE WATER - TEMPERATURE DATA |
| APPENDIX J | SURFACE WATER - TEMPERATURE GRAPHS |

# APPENDIX A

## SURFACE WATER - FLOW DATA

# Upper North Fork (USGS)
# Daily Mean Discharge Values
# (cubic feet per second)

| Day | Oct-22 | Q[1] | Nov-22 | Q[1] | Dec-22 | Q[1] | Jan-23 | Q[1] | Feb-23 | Q[1] | Mar-23 | Q[1] | Apr-23 | Q[1] | May-23 | Q[1] | Jun-23 | Q[1] | Jul-23 | Q[1] | Aug-23 | Q[1] | Sep-23 | Q[1] |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 92.4 | A | 71.4 | A | 58.9 | A:e | 76.3 | A:e | 50.2 | A:e | 69.2 | A:e | 97.8 | A | 2940.0 | A | 3140.0 | A | 1530.0 | A | 256.0 | A | 230.0 | A |
| 2 | 102.0 | A | 71.3 | A | 70.4 | A:e | 78.9 | A:e | 52.5 | A:e | 71.6 | A:e | 115.0 | A | 3220.0 | A | 3070.0 | A | 1500.0 | A | 251.0 | A | 233.0 | A |
| 3 | 140.0 | A | 80.1 | A | 74.8 | A:e | 78.3 | A:e | 58.2 | A:e | 74.4 | A:e | 140.0 | A | 3480.0 | A | 2670.0 | A | 1450.0 | A | 281.0 | A | 235.0 | A |
| 4 | 120.0 | A | 76.7 | A | 73.6 | A:e | 72.0 | A:e | 63.2 | A:e | 72.5 | A:e | 137.0 | A | 3890.0 | A | 2480.0 | A | 1430.0 | A | 246.0 | A | 234.0 | A |
| 5 | 107.0 | A | 72.4 | A | 73.9 | A:e | 68.7 | A:e | 66.4 | A:e | 74.4 | A:e | 122.0 | A | 3640.0 | A | 2630.0 | A | 1360.0 | A | 245.0 | A | 233.0 | A |
| 6 | 101.0 | A | 72.1 | A | 72.2 | A:e | 70.0 | A:e | 67.3 | A:e | 77.3 | A:e | 115.0 | A | 3250.0 | A | 2870.0 | A | 1290.0 | A | 241.0 | A | 233.0 | A |
| 7 | 96.7 | A | 72.2 | A | 67.7 | A:e | 71.3 | A:e | 65.1 | A:e | 77.5 | A:e | 128.0 | A | 3140.0 | A | 2820.0 | A | 1140.0 | A | 245.0 | A | 230.0 | A |
| 8 | 92.9 | A | 75.3 | A | 65.1 | A | 69.8 | A:e | 64.6 | A:e | 75.3 | A:e | 176.0 | A | 3160.0 | A | 2880.0 | A | 1080.0 | A | 242.0 | A | 231.0 | A |
| 9 | 88.9 | A | 75.6 | A | 44.6 | A:e | 69.7 | A:e | 62.9 | A:e | 72.6 | A:e | 225.0 | A | 3500.0 | A | 2810.0 | A | 1000.0 | A | 244.0 | A | 233.0 | A |
| 10 | 86.3 | A | 75.2 | A | 48.2 | A:e | 72.2 | A:e | 57.6 | A:e | 74.3 | A:e | 386.0 | A | 3630.0 | A | 2520.0 | A | 936.0 | A | 242.0 | A | 233.0 | A |
| 11 | 84.4 | A | 67.9 | A | 54.0 | A:e | 75.6 | A:e | 55.5 | A:e | 84.7 | A:e | 678.0 | A | 3370.0 | A | 2520.0 | A | 894.0 | A | 243.0 | A | 234.0 | A |
| 12 | 81.2 | A | 65.9 | A | 64.0 | A:e | 73.5 | A:e | 58.1 | A:e | 98.3 | A:e | 1100.0 | A | 3390.0 | A | 2410.0 | A | 852.0 | A | 237.0 | A | 225.0 | A |
| 13 | 78.5 | A | 90.5 | A | 68.4 | A:e | 60.4 | A:e | 62.3 | A:e | 97.7 | A:e | 1410.0 | A | 4010.0 | A | 2270.0 | A | 755.0 | A | 237.0 | A | 233.0 | A |
| 14 | 76.5 | A | 84.9 | A | 64.9 | A:e | 60.0 | A:e | 64.9 | A:e | 96.8 | A:e | 1470.0 | A | 4090.0 | A | 2180.0 | A | 684.0 | A | 237.0 | A | 225.0 | A |
| 15 | 74.8 | A | 70.5 | A | 56.9 | A:e | 63.1 | A:e | 63.0 | A:e | 103.0 | A:e | 1250.0 | A | 4450.0 | A | 2230.0 | A | 611.0 | A | 232.0 | A | 226.0 | A |
| 16 | 74.0 | A | 48.4 | A | 49.1 | A:e | 66.5 | A:e | 55.2 | A:e | 113.0 | A:e | 1140.0 | A | 4560.0 | A | 2360.0 | A | 543.0 | A | 232.0 | A | 228.0 | A |
| 17 | 72.2 | A | 65.7 | A:e | 43.5 | A:e | 68.5 | A:e | 48.9 | A:e | 108.0 | A:e | 1370.0 | A | 4670.0 | A | 2290.0 | A | 488.0 | A | 235.0 | A | 228.0 | A |
| 18 | 71.1 | A | 67.5 | A:e | 40.4 | A:e | 69.3 | A:e | 52.2 | A:e | 102.0 | A | 1650.0 | A | 4630.0 | A | 2040.0 | A | 449.0 | A | 232.0 | A | 228.0 | A |
| 19 | 69.7 | A | 65.9 | A:e | 46.6 | A:e | 64.2 | A:e | 58.2 | A:e | 98.1 | A | 1600.0 | A | 4250.0 | A | 2090.0 | A | 425.0 | A | 231.0 | A | 231.0 | A |
| 20 | 66.6 | A | 61.8 | A:e | 59.0 | A:e | 56.7 | A:e | 65.4 | A:e | 98.4 | A | 1350.0 | A | 4240.0 | A | 2240.0 | A | 409.0 | A | 233.0 | A | 227.0 | A |
| 21 | 62.7 | A | 60.2 | A:e | 74.2 | A:e | 59.5 | A:e | 71.1 | A:e | 95.7 | A | 989.0 | A | 4260.0 | A | 2260.0 | A | 384.0 | A | 235.0 | A | 225.0 | A |
| 22 | 62.8 | A | 61.9 | A:e | 78.9 | A:e | 58.8 | A:e | 75.2 | A:e | 105.0 | A | 748.0 | A | 4170.0 | A | 2290.0 | A | 352.0 | A | 234.0 | A | 225.0 | A |
| 23 | 84.2 | A | 64.9 | A:e | 74.3 | A:e | 57.7 | A:e | 74.0 | A:e | 112.0 | A | 735.0 | A | 4140.0 | A | 2220.0 | A | 341.0 | A | 234.0 | A | 225.0 | A |
| 24 | 76.7 | A | 65.1 | A:e | 70.0 | A:e | 56.6 | A:e | 70.6 | A:e | 122.0 | A | 922.0 | A | 4130.0 | A | 2060.0 | A | 307.0 | A | 231.0 | A | 225.0 | A |
| 25 | 68.8 | A | 65.2 | A:e | 69.0 | A:e | 58.5 | A:e | 72.6 | A:e | 118.0 | A | 1220.0 | A | 3880.0 | A | 1890.0 | A | 294.0 | A | 234.0 | A | 224.0 | A |
| 26 | 76.8 | A | 66.9 | A:e | 70.0 | A:e | 61.2 | A:e | 74.3 | A:e | 112.0 | A | 1150.0 | A | 3990.0 | A | 1860.0 | A | 283.0 | A | 240.0 | A | 222.0 | A |
| 27 | 78.0 | A | 75.2 | A:e | 71.8 | A:e | 65.7 | A:e | 72.3 | A:e | 108.0 | A | 1460.0 | A | 3930.0 | A | 1950.0 | A | 272.0 | A | 248.0 | A | 223.0 | A |
| 28 | 70.8 | A | 75.0 | A:e | 87.0 | A:e | 69.0 | A:e | 70.2 | A:e | 93.2 | A | 1870.0 | A | 3740.0 | A | 1970.0 | A | 269.0 | A | 252.0 | A | 157.0 | A |
| 29 | 72.5 | A | 70.7 | A:e | 84.5 | A:e | 70.0 | A:e | -- | -- | 96.1 | A | 2110.0 | A | 3570.0 | A | 1710.0 | A | 263.0 | A | 231.0 | A | 77.1 | A |
| 30 | 73.0 | A | 60.0 | A:e | 71.9 | A:e | 69.3 | A:e | -- | -- | 98.0 | A | 2500.0 | A | 3580.0 | A | 1580.0 | A | 262.0 | A | 227.0 | A | 76.7 | A |
| 31 | 70.7 | A | -- | -- | 71.4 | A:e | 60.3 | A:e | -- | -- | 97.7 | A | -- | -- | 3340.0 | A | -- | -- | 262.0 | A | 227.0 | A | -- | -- |
| Mean | 83.0 | -- | 69.9 | -- | 65.1 | -- | 66.8 | -- | 63.3 | -- | 93.4 | -- | 945.5 | -- | 3814.2 | -- | 2343.7 | -- | 713.4 | -- | 239.8 | -- | 216.3 | -- |
| Min | 62.7 | -- | 48.4 | -- | 40.4 | -- | 56.6 | -- | 48.9 | -- | 69.2 | -- | 97.8 | -- | 2940.0 | -- | 1580.0 | -- | 262.0 | -- | 227.0 | -- | 76.7 | -- |
| Max | 140.0 | -- | 90.5 | -- | 87.0 | -- | 78.9 | -- | 75.2 | -- | 122.0 | -- | 2500.0 | -- | 4670.0 | -- | 3140.0 | -- | 1530.0 | -- | 281.0 | -- | 235.0 | -- |

[1] USGS Qualifiers: A = Period of approved data, e = Estimated value

# Lower Minnesota Creek
# Streamflow
# (cubic feet per second)

**Daily Mean Streamflow (cfs)**

| Day | Oct-22 | Nov-22 | Dec-22 | Jan-23 | Feb-23 | Mar-23 | Apr-23 | May-23 | Jun-23 | Jul-23 | Aug-23 | Sep-23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.9 | 3.3 | **3.1** | **0.8** | **1.5** | **1.2** | **6.3** | 78.0 | 297.0 | 68.0 | 12.0 | 13.0 |
| 2 | 1.1 | 3.3 | **2.0** | **0.8** | **1.4** | **1.3** | **6.0** | 87.0 | 283.0 | 62.0 | 11.0 | 13.0 |
| 3 | 1.4 | 3.5 | **1.9** | **0.9** | **1.5** | **1.3** | **6.6** | 100.0 | 269.0 | 57.0 | 11.0 | 13.0 |
| 4 | 1.6 | 4.1 | **1.5** | **1.0** | **1.3** | **1.3** | **7.5** | 111.0 | 248.0 | 54.0 | 11.0 | 12.0 |
| 5 | 1.6 | 4.1 | **1.3** | **1.2** | **1.3** | **1.2** | **7.8** | 141.0 | 232.0 | 54.0 | 10.0 | 11.0 |
| 6 | 1.8 | 3.5 | **1.2** | **1.3** | **1.0** | **1.3** | **7.8** | 147.0 | 224.0 | 53.0 | 9.2 | 10.0 |
| 7 | 1.8 | 3.5 | **1.1** | **1.4** | **1.1** | **1.3** | **17.0** | 150.0 | 187.0 | 50.0 | 8.9 | 10.0 |
| 8 | 1.8 | 3.9 | **1.2** | **1.4** | **1.2** | **1.3** | 29.0 | 150.0 | 165.0 | 48.0 | 8.5 | 9.6 |
| 9 | 1.6 | 3.9 | **1.8** | **1.3** | **1.1** | **1.3** | 31.0 | 156.0 | 162.0 | 44.0 | 8.5 | 9.6 |
| 10 | 1.6 | 2.0 | **3.9** | **1.2** | **1.3** | **1.6** | 38.0 | 165.0 | 156.0 | 40.0 | 7.8 | 8.9 |
| 11 | 1.5 | 1.2 | **4.3** | **0.9** | **1.4** | **2.2** | 45.0 | 168.0 | 147.0 | 38.0 | 8.1 | 8.9 |
| 12 | 1.5 | 1.3 | **3.3** | **1.3** | **1.3** | **2.8** | 59.0 | 168.0 | 144.0 | 34.0 | 8.1 | 8.5 |
| 13 | 1.6 | 1.2 | **3.0** | **1.9** | **1.4** | **3.1** | 71.0 | 171.0 | 141.0 | 31.0 | 7.8 | 8.5 |
| 14 | 1.5 | 1.1 | **2.5** | **1.8** | **1.3** | **3.5** | 75.0 | 174.0 | 131.0 | 29.0 | 7.8 | 7.5 |
| 15 | 1.5 | 1.3 | **2.5** | **1.3** | **1.1** | **3.9** | 71.0 | 198.0 | 123.0 | 27.0 | 8.1 | 6.9 |
| 16 | 1.5 | **2.0** | **4.1** | **1.3** | **1.5** | **5.2** | 66.0 | 232.0 | 116.0 | 25.0 | 8.1 | 6.6 |
| 17 | 1.6 | **2.5** | **5.2** | **1.2** | **1.6** | **6.9** | 60.0 | 261.0 | 111.0 | 23.0 | 8.9 | 5.7 |
| 18 | 1.6 | **2.1** | **5.0** | **1.1** | **1.5** | **6.9** | 62.0 | 265.0 | 106.0 | 21.0 | 10.0 | 5.2 |
| 19 | 1.8 | **2.7** | **3.9** | **1.3** | **1.3** | **6.9** | 68.0 | 269.0 | 102.0 | 21.0 | 12.0 | 4.5 |
| 20 | 1.8 | **3.0** | **2.8** | **1.8** | **1.3** | **6.3** | 68.0 | 288.0 | 102.0 | 20.0 | 12.0 | 4.3 |
| 21 | 1.8 | **3.0** | **1.9** | **2.7** | **1.4** | **5.7** | 65.0 | 327.0 | 104.0 | 19.0 | 13.0 | 3.9 |
| 22 | 1.9 | **3.0** | **1.5** | **3.1** | **1.0** | **5.7** | 56.0 | 335.0 | 106.0 | 18.0 | 14.0 | 3.7 |
| 23 | 2.0 | **2.8** | **1.5** | **4.7** | **1.1** | **6.6** | 52.0 | 327.0 | 106.0 | 16.0 | 14.0 | 3.3 |
| 24 | 2.7 | **2.5** | **1.2** | **4.1** | **1.1** | **7.2** | 48.0 | 327.0 | 109.0 | 15.0 | 14.0 | 3.0 |
| 25 | 2.7 | **2.7** | **1.3** | **3.3** | **1.1** | **7.5** | 50.0 | 335.0 | 102.0 | 14.0 | 15.0 | 2.8 |
| 26 | 2.7 | **2.2** | **1.0** | **3.3** | **1.1** | **7.2** | 50.0 | 348.0 | 93.0 | 14.0 | 15.0 | 2.7 |
| 27 | 2.7 | **1.8** | **0.9** | **3.1** | **1.2** | **6.9** | 53.0 | 348.0 | 86.0 | 13.0 | 16.0 | 2.4 |
| 28 | 3.5 | **1.6** | **0.8** | **2.2** | **1.1** | **7.2** | 57.0 | 335.0 | 78.0 | 13.0 | 15.0 | 2.1 |
| 29 | 3.5 | **1.4** | **1.0** | **1.9** | -- | **6.3** | 63.0 | 316.0 | 75.0 | 12.0 | 15.0 | 1.9 |
| 30 | 3.5 | **2.8** | **1.0** | **1.6** | -- | **6.0** | 71.0 | 307.0 | 73.0 | 12.0 | 15.0 | 1.8 |
| 31 | 3.5 | -- | **0.8** | **1.6** | -- | **5.7** | -- | 302.0 | -- | 12.0 | 14.0 | -- |
| Mean | 2.0 | 2.6 | 2.3 | 1.8 | 1.3 | 4.2 | 45.6 | 226.1 | 145.9 | 30.9 | 11.3 | 6.8 |
| Min | 0.9 | 1.1 | 0.8 | 0.8 | 1.0 | 1.2 | 6.0 | 78.0 | 73.0 | 12.0 | 7.8 | 1.8 |
| Max | 3.5 | 4.1 | 5.2 | 4.7 | 1.6 | 7.5 | 75.0 | 348.0 | 297.0 | 68.0 | 16.0 | 13.0 |

**Measured Streamflow**

| Date | Streamflow (cfs) |
|---|---|
| 10/4/2022 | 5.7 |
| 11/10/2022 | 5.0 |
| 12/9/2022 | **3.0** |
| 1/9/2023 | **5.7** |
| 2/9/2023 | **7.5** |
| 3/10/2023 | **5.2** |
| 4/7/2023 | **7.8** |
| 5/9/2023 | 156.0 |
| 6/7/2023 | 228.0 |
| 7/12/2023 | 27.0 |
| 8/9/2023 | 19.0 |
| 9/4/2023 | 13.0 |

**0.01** Stream Ice Affected or Frozen.

# Upper Minnesota Creek (USFS)
# Streamflow
# (cubic feet per second)

**Daily Mean Streamflow (CFS)**

| Day | Oct-22 | Nov-22 | Dec-22 | Jan-23 | Feb-23 | Mar-23 | Apr-23 | May-23 | Jun-23 | Jul-23 | Aug-23 | Sep-23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1.36 | 1.39 | 1.78 | **1.14** | **1.94** | **ND1** | **ND1** | 48.70 | ND | ND | ND | 24.51 |
| 2 | 1.52 | 1.40 | 1.32 | **1.15** | **2.01** | **ND1** | **ND1** | 52.99 | ND | ND | ND | 24.10 |
| 3 | 3.41 | 1.40 | 1.48 | **1.31** | **2.43** | **ND1** | **ND1** | 51.12 | ND | ND | ND | 22.93 |
| 4 | 1.53 | 1.47 | 1.46 | **1.37** | **2.10** | **ND1** | **ND1** | 43.20 | ND | ND | ND | 21.33 |
| 5 | 1.48 | 1.41 | 1.39 | **1.47** | **1.81** | **ND1** | **ND1** | 42.39 | ND | ND | ND | 20.50 |
| 6 | 1.52 | 1.18 | 1.41 | **1.23** | **1.54** | **ND1** | **ND1** | 43.18 | ND | ND | ND | 19.72 |
| 7 | 1.50 | 1.19 | 1.48 | **1.38** | **1.65** | **ND1** | 12.66 | 41.00 | ND | ND | ND | 20.43 |
| 8 | 1.51 | 1.31 | **1.76** | **1.54** | **1.77** | **ND1** | 11.99 | 46.53 | ND | ND | ND | 21.25 |
| 9 | 1.44 | 1.35 | **2.17** | **1.33** | **1.00** | **ND1** | 16.91 | 47.89 | ND | ND | ND | 20.97 |
| 10 | 1.46 | 1.89 | **2.33** | **1.10** | **0.76** | **ND1** | 23.39 | 58.92 | ND | ND | ND | 21.40 |
| 11 | 1.34 | 2.34 | **2.01** | **0.92** | **0.71** | **ND1** | 29.34 | 74.06 | ND | ND | 23.74 | 20.55 |
| 12 | 1.39 | 3.66 | **1.86** | **2.20** | **0.53** | **ND1** | 36.91 | 71.25 | ND | ND | 23.32 | 19.20 |
| 13 | 1.40 | 2.26 | **2.04** | **4.61** | **0.71** | **ND1** | 42.83 | 74.58 | ND | ND | 22.30 | 13.78 |
| 14 | 1.36 | 2.03 | **2.08** | **2.29** | **0.57** | **ND1** | 43.88 | 79.33 | ND | ND | 23.49 | 7.78 |
| 15 | 1.27 | 2.32 | **2.33** | **1.95** | **0.41** | **ND1** | 35.25 | 83.51 | ND | ND | 24.19 | 7.69 |
| 16 | 1.29 | 3.00 | **3.50** | **1.87** | **0.52** | **ND1** | 24.95 | ND | ND | ND | 23.03 | 7.52 |
| 17 | 1.30 | 2.72 | **3.81** | **1.86** | **0.65** | **ND1** | 28.88 | ND | ND | ND | 23.48 | 6.95 |
| 18 | 1.24 | 2.19 | **4.67** | **1.80** | **0.60** | **ND1** | 38.31 | ND | ND | ND | 21.86 | 7.29 |
| 19 | 1.29 | 2.56 | **8.42** | **2.03** | **0.51** | **ND1** | 39.73 | ND | ND | ND | 20.57 | 6.97 |
| 20 | 1.25 | 2.41 | **7.37** | **2.08** | **0.51** | **ND1** | 31.19 | ND | ND | ND | 20.62 | 7.21 |
| 21 | 1.20 | 2.23 | **1.68** | **2.07** | **0.62** | **ND1** | 23.83 | ND | ND | ND | 20.35 | 7.78 |
| 22 | 1.24 | 2.23 | **1.56** | **2.27** | **0.31** | **ND1** | 18.74 | ND | ND | ND | 22.42 | 7.41 |
| 23 | 2.79 | 2.12 | **1.65** | **2.34** | **0.36** | **ND1** | 17.23 | ND | ND | ND | 25.17 | 7.18 |
| 24 | 1.73 | 2.01 | **1.43** | **2.21** | **0.35** | **ND1** | 21.91 | ND | ND | ND | 25.20 | 7.00 |
| 25 | 1.63 | 2.27 | **1.63** | **2.08** | **0.37** | **ND1** | 30.46 | ND | ND | ND | 26.24 | 6.74 |
| 26 | 1.55 | 1.98 | **1.47** | **2.36** | **ND1** | **ND1** | 29.05 | ND | ND | ND | 27.13 | 6.61 |
| 27 | 1.35 | 1.77 | **1.55** | **2.31** | **ND1** | **ND1** | 30.81 | ND | ND | ND | 25.38 | 6.50 |
| 28 | 1.63 | 1.91 | **1.24** | **1.94** | **ND1** | **ND1** | 35.49 | ND | ND | ND | 25.51 | 6.39 |
| 29 | 1.60 | 1.85 | **1.50** | **1.80** | -- | **ND1** | 39.60 | ND | ND | ND | 24.40 | 6.28 |
| 30 | 1.57 | 2.38 | **1.48** | **1.77** | -- | **ND1** | 44.58 | ND | ND | ND | 23.80 | 6.19 |
| 31 | 1.48 | -- | **1.19** | **1.81** | -- | **ND1** | -- | ND | -- | ND | 23.62 | -- |
| Mean | 1.54 | 2.01 | 2.29 | 1.86 | 0.99 | ND1 | 29.50 | 57.24 | ND | ND | 23.61 | 13.01 |
| Min | 1.20 | 1.18 | 1.19 | 0.92 | 0.31 | ND1 | 11.99 | 41.00 | ND | ND | 20.35 | 6.19 |
| Max | 3.41 | 3.66 | 8.42 | 4.61 | 2.43 | ND1 | 44.58 | 83.51 | ND | ND | 27.13 | 24.51 |

**Measured Streamflow**

| Date | Streamflow (CFS) |
|---|---|
| 10/4/2022 | 4.22 |
| 11/10/2022 | 1.80 |
| 12/9/2022 | **2.03** |
| 1/9/2023 | **1.68** |
| 2/9/2023 | **1.16** |
| 3/10/2023 | **1.68** |
| 4/7/2023 | 7.72 |
| 5/10/2023 | flooded |
| 6/7/2023 | flooded |
| 7/12/2023 | blocked |
| 8/9/2023 | blocked |
| 9/4/2023 | 20.77 |

**0.01** Flume Ice Affected or Frozen.
ND No Data. Flume blocked by logjam and gravel bar.
ND1 No Data. Logger Full.
Note: When height of water in flume is above 1.57 feet (32.60 cfs), bypass spillways overflow and flow through flume is less than total flow in stream.

# Middle Sylvester Gulch
# Streamflow
# (cubic feet per second)

**Daily Mean Streamflow (CFS)**

| Day | Oct-22 | Nov-22 | Dec-22 | Jan-23 | Feb-23 | Mar-23 | Apr-23 | May-23 | Jun-23 | Jul-23 | Aug-23 | Sep-23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.00 | 0.00 | 0.00 | **0.00** | **ND** | **0.04** | 0.80 | 3.07 | 1.44 | 0.13 | 0.00 | 0.00 |
| 2 | 0.02 | 0.00 | 0.00 | **0.00** | **ND** | **0.01** | 1.14 | 4.07 | 1.52 | 0.13 | 0.02 | 0.00 |
| 3 | 0.00 | 0.00 | 0.00 | **0.00** | **ND** | **0.01** | 1.07 | 4.91 | 1.28 | 0.11 | 0.09 | 0.00 |
| 4 | 0.00 | 0.00 | 0.00 | **0.00** | **ND** | **0.01** | 0.82 | 5.99 | 1.17 | 0.10 | 0.07 | 0.00 |
| 5 | 0.00 | 0.00 | 0.00 | **0.00** | **ND** | **0.00** | 0.63 | 6.08 | 1.09 | 0.10 | 0.06 | 0.00 |
| 6 | 0.00 | 0.00 | 0.00 | **0.00** | **ND** | **0.00** | 0.81 | 6.01 | 0.85 | 0.10 | 0.05 | 0.00 |
| 7 | 0.00 | 0.00 | 0.00 | **0.00** | **ND** | **0.03** | 0.97 | 6.20 | 0.67 | 0.09 | 0.05 | 0.00 |
| 8 | 0.00 | 0.00 | 0.00 | **0.00** | **ND** | **0.07** | 0.98 | 5.96 | 0.62 | 0.08 | 0.05 | 0.00 |
| 9 | 0.00 | 0.00 | **0.00** | **0.00** | **ND** | **0.00** | 1.32 | 5.81 | 0.59 | 0.06 | 0.04 | 0.00 |
| 10 | 0.00 | 0.00 | **0.00** | **0.00** | **ND** | 0.89 | 1.62 | 5.63 | 0.53 | 0.05 | 0.02 | 0.00 |
| 11 | 0.00 | 0.00 | **0.00** | **0.00** | **ND** | 1.55 | 2.06 | 5.23 | 0.52 | 0.05 | 0.02 | 0.00 |
| 12 | 0.00 | 0.00 | **0.00** | **0.00** | **ND** | 1.40 | 2.32 | 4.72 | 0.50 | 0.03 | 0.03 | 0.00 |
| 13 | 0.00 | 0.00 | **0.00** | **0.00** | **ND** | 1.39 | 2.38 | 4.47 | 0.48 | 0.00 | 0.03 | 0.00 |
| 14 | 0.00 | 0.00 | **0.00** | **0.00** | **ND** | 1.26 | 2.54 | 4.21 | 0.43 | 0.00 | 0.02 | 0.00 |
| 15 | 0.00 | 0.00 | **0.00** | **0.00** | **ND** | 1.65 | 1.93 | 4.00 | 0.48 | 0.00 | 0.03 | 0.00 |
| 16 | 0.00 | 0.00 | **ND** | **0.00** | **ND** | 1.96 | 1.73 | 3.82 | 0.47 | 0.00 | 0.03 | 0.00 |
| 17 | 0.00 | 0.00 | **ND** | **0.00** | **ND** | 0.93 | 1.87 | 3.66 | 0.61 | 0.00 | 0.03 | 0.00 |
| 18 | 0.00 | 0.00 | **ND** | **0.00** | **ND** | 0.67 | 1.95 | 3.45 | 0.37 | 0.00 | 0.04 | 0.00 |
| 19 | 0.00 | 0.00 | **ND** | **0.00** | **ND** | 0.71 | 1.72 | 3.16 | 0.30 | 0.00 | 0.03 | 0.00 |
| 20 | 0.00 | 0.00 | **ND** | **0.00** | **ND** | 0.61 | 1.41 | 3.03 | 0.28 | 0.00 | 0.03 | 0.00 |
| 21 | 0.00 | 0.00 | **ND** | **0.00** | **ND** | 0.54 | 1.21 | 2.85 | 0.28 | 0.00 | 0.02 | 0.00 |
| 22 | 0.00 | 0.00 | **ND** | **0.00** | **0.06** | 1.00 | 1.10 | 2.67 | 0.25 | 0.00 | 0.04 | 0.00 |
| 23 | 0.01 | 0.00 | **ND** | **0.00** | **0.08** | 0.83 | 1.17 | 2.46 | 0.23 | 0.00 | 0.03 | 0.00 |
| 24 | 0.00 | 0.00 | **ND** | **0.00** | **0.06** | 0.73 | 1.46 | 2.32 | 0.24 | 0.00 | 0.04 | 0.00 |
| 25 | 0.00 | 0.00 | **ND** | **0.00** | **0.07** | 0.67 | 2.13 | 2.20 | 0.19 | 0.00 | 0.04 | 0.00 |
| 26 | 0.00 | 0.00 | **ND** | **0.00** | **0.04** | 0.76 | 2.28 | 2.04 | 0.15 | 0.00 | 0.27 | 0.00 |
| 27 | 0.00 | 0.00 | **0.00** | **0.00** | **0.05** | 0.54 | 2.18 | 1.90 | 0.12 | 0.00 | 0.16 | 0.00 |
| 28 | 0.00 | 0.00 | **0.00** | **0.00** | **0.04** | 0.66 | 2.25 | 1.76 | 0.14 | 0.00 | 6.66 | 0.00 |
| 29 | 0.00 | 0.00 | **0.00** | **0.00** | -- | 0.55 | 2.23 | 1.62 | 0.13 | 0.00 | 0.44 | 0.00 |
| 30 | 0.00 | 0.00 | **0.00** | **0.00** | -- | 0.53 | 2.60 | 1.52 | 0.13 | 0.00 | 0.01 | 0.00 |
| 31 | 0.00 | -- | **0.00** | **0.00** | -- | 0.51 | -- | 1.45 | -- | 0.00 | 0.00 | -- |
| Mean | 0.00 | 0.00 | 0.00 | 0.00 | 0.06 | 0.66 | 1.62 | 3.75 | 0.54 | 0.03 | 0.27 | 0.00 |
| Min | 0.00 | 0.00 | 0.00 | 0.00 | 0.04 | 0.00 | 0.63 | 1.45 | 0.12 | 0.00 | 0.00 | 0.00 |
| Max | 0.02 | 0.00 | 0.00 | 0.00 | 0.08 | 1.96 | 2.60 | 6.20 | 1.52 | 0.13 | 6.66 | 0.00 |

**Measured Streamflow**

| Date | Streamflow (CFS) |
|---|---|
| 10/2/2022 | 0.00 |
| 11/10/2022 | 0.00 |
| 12/9/2022 | **0.00** |
| 1/9/2023 | **0.00** |
| 2/9/2023 | **0.00** |
| 3/10/2023 | **0.01** |
| 4/7/2023 | 0.46 |
| 5/10/2023 | 5.55 |
| 6/6/2023 | 0.99 |
| 7/12/2023 | 0.01 |
| 8/9/2023 | 0.00 |
| 9/5/2023 | 0.00 |

**0.01** Flume Ice Affected or Frozen.
ND No Data. Stilling Well Frozen.
Note: Water Level in flume below 0.02 feet not connected to stilling well.

# Lower Dry Fork
# Streamflow
# (cubic feet per second)

**Daily Mean Streamflow (CFS)**

| Day | Oct-22 | Nov-22 | Dec-22 | Jan-23 | Feb-23 | Mar-23 | Apr-23 | May-23 | Jun-23 | Jul-23 | Aug-23 | Sep-23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.71 | 1.14 | | | | | | | 0.46 | 0.48 | 9.00 | 1.44 |
| 2 | 0.48 | 1.15 | | | | | **0.41** | | 1.57 | 0.47 | 9.06 | 1.53 |
| 3 | 0.62 | 1.52 | | | | | **1.13** | | 1.66 | 0.48 | 9.11 | 1.53 |
| 4 | 0.74 | 1.31 | | | | | **1.01** | 0.74 | 1.73 | 1.43 | 8.92 | 1.42 |
| 5 | 1.15 | 1.10 | | | | | **0.43** | 10.89 | 1.68 | 2.41 | 9.49 | 1.33 |
| 6 | 1.13 | 1.11 | | | | | | 12.41 | 1.84 | 2.72 | 10.71 | 1.22 |
| 7 | 1.11 | 1.18 | | | | | | 14.11 | 1.94 | 2.73 | 11.26 | 1.21 |
| 8 | 1.08 | 1.24 | | | | | **0.30** | 12.33 | 1.86 | 2.81 | 11.20 | 1.13 |
| 9 | 1.11 | 1.36 | | | | | **0.42** | 11.38 | 1.69 | 2.61 | 11.05 | 1.09 |
| 10 | 1.03 | 0.56 | | | | | **0.33** | 12.35 | 1.62 | 2.48 | 10.54 | 1.16 |
| 11 | 1.11 | | | | | **ND** | **0.35** | 11.58 | 1.51 | 2.40 | 10.68 | 1.36 |
| 12 | 1.09 | | | | | **ND** | **0.37** | 11.32 | 1.85 | 2.51 | 10.42 | 1.15 |
| 13 | 1.09 | | | | | **ND** | | 11.15 | 2.21 | 2.54 | 10.19 | 1.13 |
| 14 | 1.04 | | | | | **ND** | 0.40 | 11.21 | 1.57 | 2.50 | 10.09 | 1.14 |
| 15 | 0.97 | | | | | **ND** | 0.33 | 10.97 | 1.23 | 2.43 | 9.89 | 1.35 |
| 16 | 1.00 | | | | | **ND** | 0.45 | 10.88 | 1.12 | 2.31 | 9.61 | 1.38 |
| 17 | 1.01 | | | | | **ND** | 0.61 | 10.63 | 1.07 | 2.15 | 9.40 | 1.03 |
| 18 | 1.02 | | | | | **0.63** | 0.63 | 9.90 | 1.75 | 2.63 | 9.37 | 1.01 |
| 19 | 1.00 | | | | | **0.48** | 0.53 | 9.85 | 2.36 | 3.82 | 8.82 | 1.01 |
| 20 | 1.03 | | | | | **0.46** | 0.33 | 9.80 | 1.02 | 4.44 | 8.38 | 1.02 |
| 21 | 0.99 | | | | | **0.41** | | 2.44 | 1.15 | 4.40 | 8.05 | 1.03 |
| 22 | 1.09 | | | | | **0.87** | | | 1.10 | 4.10 | 4.20 | 0.97 |
| 23 | 1.61 | | | | | **0.93** | | | 0.79 | 3.79 | 1.82 | 0.91 |
| 24 | 1.23 | | | | | **0.88** | 0.42 | 1.09 | 0.63 | 4.35 | 1.81 | 0.93 |
| 25 | 0.91 | | | | | **0.99** | 0.29 | 2.95 | 0.50 | 4.37 | 1.87 | 0.87 |
| 26 | 1.21 | | | | | **0.62** | | 2.69 | 0.45 | 5.78 | 1.83 | 0.81 |
| 27 | 1.42 | | | | | **0.44** | 0.40 | 3.06 | 0.49 | 8.26 | 2.08 | 0.80 |
| 28 | 1.28 | | **ND** | | | | 0.38 | 2.64 | 0.43 | 9.23 | 2.65 | 0.79 |
| 29 | 1.20 | | | | -- | | | 2.54 | 0.42 | 9.06 | 2.76 | 0.73 |
| 30 | 1.24 | | | | -- | | 0.37 | 1.87 | 0.48 | 9.06 | 2.23 | 0.73 |
| 31 | 1.18 | -- | | | -- | | -- | | -- | 9.04 | 1.43 | -- |
| Mean | 1.06 | 1.17 | | | | 0.67 | 0.47 | 8.03 | 1.27 | 3.80 | 7.35 | 1.11 |
| Min | 0.48 | 0.56 | | | | 0.41 | 0.29 | 0.74 | 0.42 | 0.47 | 1.43 | 0.73 |
| Max | 1.61 | 1.52 | | | | 0.99 | 1.13 | 14.11 | 2.36 | 9.23 | 11.26 | 1.53 |

**Measured Streamflow**

| Date | Streamflow (CFS) |
|---|---|
| 10/4/2022 | 1.78 |
| 11/10/2022 | 0.47 |
| 12/9/2022 | **0.00** |
| 1/9/2023 | **0.00** |
| 2/9/2023 | **0.00** |
| 3/10/2023 | **0.00** |
| 4/7/2023 | **0.07** |
| 5/10/2023 | 16.15 |
| 6/6/2023 | 2.12 |
| 7/12/2023 | 2.30 |
| 8/9/2023 | 10.95 |
| 9/4/2023 | 1.45 |

**0.01** - Flume likely ice affected or frozen.

- Indicates daily average flow less than 0.28 cfs. Stilling well inlet is 0.10 feet above flume bottom, and data logger does not record flows between 0.00 (dry) and 0.28 cfs.

ND - No Data. Stilling well frozen.

# Middle Dry Fork
# Streamflow
# (cubic feet per second)

**Daily Mean Streamflow (CFS)**

| Day | Oct-22 | Nov-22 | Dec-22 | Jan-23 | Feb-23 | Mar-23 | Apr-23 | May-23 | Jun-23 | Jul-23 | Aug-23 | Sep-23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1.25 | 0.81 | **ND** | **ND** | **ND** | **ND** | **ND** | **ND** | 4.54 | 0.03 | 3.14 | 2.04 |
| 2 | 1.20 | 0.89 | **ND** | **ND** | **ND** | **ND** | **ND** | ND | 4.63 | 4.50 | 3.16 | 2.04 |
| 3 | 1.98 | 0.80 | **ND** | **ND** | **ND** | **ND** | **ND** | ND | 4.08 | 4.52 | 3.12 | 2.06 |
| 4 | 1.63 | 0.53 | **ND** | **ND** | **ND** | **ND** | **ND** | ND | 3.70 | 4.59 | 2.84 | 1.97 |
| 5 | 1.08 | 0.62 | **ND** | **ND** | **ND** | **ND** | **ND** | ND | 3.58 | 4.43 | 2.62 | 1.84 |
| 6 | 0.96 | 0.78 | **ND** | **ND** | **ND** | **ND** | **ND** | ND | 3.42 | 4.25 | 2.71 | 1.76 |
| 7 | 0.85 | 0.88 | **ND** | **ND** | **ND** | **ND** | **ND** | ND | 2.90 | 4.12 | 2.55 | 1.64 |
| 8 | 0.82 | 0.92 | **ND** | **ND** | **ND** | **ND** | **ND** | ND | 2.59 | 4.06 | 2.50 | 1.58 |
| 9 | 0.80 | 0.82 | **ND** | **ND** | **ND** | **ND** | **ND** | ND | 2.35 | 3.79 | 2.51 | 1.51 |
| 10 | 0.82 | 0.55 | **ND** | **ND** | **ND** | **ND** | **ND** | 12.38 | 2.16 | 3.65 | 2.74 | 1.47 |
| 11 | 0.82 | 0.54 | **ND** | **ND** | **ND** | **ND** | **ND** | 10.90 | 1.96 | 3.59 | 2.73 | 1.59 |
| 12 | 0.72 | 0.61 | **ND** | **ND** | **ND** | **ND** | **ND** | 9.78 | 1.79 | 2.86 | 2.62 | 1.52 |
| 13 | 0.76 | 0.63 | **ND** | **ND** | **ND** | **ND** | **ND** | 9.85 | 1.60 | 2.05 | 2.53 | 1.51 |
| 14 | 0.76 | **0.49** | **ND** | **ND** | **ND** | **ND** | **ND** | 10.28 | 1.41 | 1.93 | 2.43 | 1.49 |
| 15 | 0.76 | **0.57** | **ND** | **ND** | **ND** | **ND** | **ND** | 11.38 | 1.36 | 1.81 | 2.37 | 1.56 |
| 16 | 0.66 | **0.67** | **ND** | **ND** | **ND** | **ND** | **ND** | 12.13 | 1.24 | 1.74 | 2.40 | 1.51 |
| 17 | 0.69 | **0.71** | **ND** | **ND** | **ND** | **ND** | **ND** | 12.37 | 1.37 | 1.72 | 2.61 | 1.43 |
| 18 | 0.64 | **0.56** | **ND** | **ND** | **ND** | **ND** | **ND** | 12.43 | 1.17 | 3.71 | 2.59 | 1.39 |
| 19 | 0.71 | **ND** | **ND** | **ND** | **ND** | **ND** | **ND** | 11.40 | 0.96 | 4.24 | 2.56 | 1.38 |
| 20 | 0.75 | **ND** | **ND** | **ND** | **ND** | **ND** | **ND** | 11.92 | 0.82 | 4.51 | 2.36 | 1.41 |
| 21 | 0.74 | **ND** | **ND** | **ND** | **ND** | **ND** | **ND** | 10.91 | 0.79 | 4.72 | 2.22 | 1.40 |
| 22 | 1.07 | **ND** | **ND** | **ND** | **ND** | **ND** | **ND** | 7.72 | 0.71 | 4.91 | 2.16 | 1.30 |
| 23 | 0.90 | **ND** | **ND** | **ND** | **ND** | **ND** | **ND** | 7.48 | 0.51 | 5.22 | 2.16 | 1.26 |
| 24 | 0.42 | **ND** | **ND** | **ND** | **ND** | **ND** | **ND** | 7.67 | 0.43 | 5.76 | 2.13 | 1.26 |
| 25 | 0.53 | **ND** | **ND** | **ND** | **ND** | **ND** | **ND** | 7.11 | 0.40 | 6.02 | 2.28 | 1.25 |
| 26 | 0.77 | **ND** | **ND** | **ND** | **ND** | **ND** | **ND** | 6.74 | 0.38 | 5.35 | 2.39 | 1.20 |
| 27 | 0.54 | **ND** | **ND** | **ND** | **ND** | **ND** | **ND** | 6.24 | 0.14 | 3.73 | 3.45 | 1.19 |
| 28 | 0.63 | **ND** | **ND** | **ND** | **ND** | **ND** | **ND** | 5.79 | 0.22 | 3.34 | 2.89 | 1.16 |
| 29 | 0.69 | **ND** | **ND** | **ND** | -- | **ND** | **ND** | 5.57 | 0.09 | 3.31 | 2.24 | 1.13 |
| 30 | 0.75 | **ND** | **ND** | **ND** | -- | **ND** | **ND** | 5.34 | 0.09 | 3.35 | 2.10 | 1.11 |
| 31 | 0.74 | -- | **ND** | **ND** | -- | **ND** | -- | 4.91 | -- | 3.03 | 2.07 | -- |
| Mean | 0.85 | 0.69 | ND | ND | ND | ND | ND | 9.11 | 1.71 | 3.70 | 2.55 | 1.50 |
| Min | 0.42 | 0.49 | ND | ND | ND | ND | ND | 4.91 | 0.09 | 0.03 | 2.07 | 1.11 |
| Max | 1.98 | 0.92 | ND | ND | ND | ND | ND | 12.43 | 4.63 | 6.02 | 3.45 | 2.06 |

**Measured Streamflow**

| Date | Streamflow (CFS) |
|---|---|
| 10/4/2022 | 1.61 |
| 11/10/2022 | 0.47 |
| 5/10/2023 | 12.43 |
| 6/7/2023 | 3.19 |
| 7/12/2023 | 3.61 |
| 8/9/2023 | 2.78 |
| 9/6/2023 | 1.86 |

**0.01** Flume Ice Affected or Frozen.
ND No Data. Logger Memory Fll or Frozen Stilling Well.

# Upper Dry Fork
# Streamflow
# (cubic feet per second)

**Daily Mean Streamflow (CFS)**

| Day | Oct-22 | Nov-22 | Dec-22 | Jan-23 | Feb-23 | Mar-23 | Apr-23 | May-23 | Jun-23 | Jul-23 | Aug-23 | Sep-23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 1.75 | 2.04 | **0.13** | **0.03** | **ND** | **ND** | **0.22** | **ND** | 3.99 | 1.25 | 5.34 | 3.62 |
| 2 | 1.85 | 1.13 | **0.12** | **ND** | **ND** | **ND** | **0.43** | 8.30 | 3.95 | 6.71 | 4.94 | 3.51 |
| 3 | 2.34 | 0.85 | **0.09** | **ND** | **ND** | **ND** | **0.45** | 9.02 | 3.34 | 6.98 | 4.99 | 3.54 |
| 4 | 2.03 | 1.39 | **0.01** | **ND** | **ND** | **ND** | **0.23** | 11.40 | 3.12 | 7.02 | 4.63 | 3.44 |
| 5 | 1.74 | 1.55 | **0.00** | **ND** | **ND** | **ND** | **0.09** | 11.24 | 3.04 | 6.67 | 4.47 | 3.19 |
| 6 | 1.64 | 1.15 | **0.00** | **ND** | **ND** | **ND** | **0.10** | 9.60 | 2.93 | 6.43 | 4.37 | 3.54 |
| 7 | 1.59 | 2.60 | **0.00** | **ND** | **ND** | **ND** | **0.27** | 8.47 | 2.47 | 6.16 | 4.18 | 3.81 |
| 8 | 1.52 | 2.36 | **0.00** | **ND** | **ND** | **ND** | **0.40** | 8.93 | 2.34 | 6.00 | 3.85 | 3.74 |
| 9 | 1.42 | 2.13 | **0.00** | **ND** | **ND** | **ND** | **ND** | 9.94 | 2.09 | 5.82 | 3.86 | 3.64 |
| 10 | 1.37 | 0.92 | **0.00** | **ND** | **ND** | **ND** | **ND** | 8.76 | 1.92 | 5.69 | 4.14 | 3.64 |
| 11 | 1.39 | 0.90 | **0.01** | **ND** | **ND** | **ND** | **ND** | 6.89 | 1.78 | 5.60 | 4.01 | 3.58 |
| 12 | 1.34 | 0.63 | **0.00** | **ND** | **ND** | **ND** | **ND** | 6.85 | 1.57 | 5.53 | 3.82 | 3.50 |
| 13 | 1.28 | 0.85 | **0.00** | **ND** | **ND** | **ND** | **ND** | 7.79 | 1.31 | 5.22 | 3.71 | 3.45 |
| 14 | 1.26 | **1.01** | **0.00** | **ND** | **ND** | **ND** | **0.35** | 8.97 | 1.18 | 5.06 | 3.55 | 3.35 |
| 15 | 1.30 | **0.84** | **0.01** | **ND** | **ND** | **ND** | **0.16** | 10.55 | 1.09 | 4.73 | 3.48 | 3.36 |
| 16 | 1.22 | **1.06** | **0.13** | **ND** | **ND** | **ND** | **0.30** | 11.11 | 0.88 | 4.60 | 3.54 | 3.32 |
| 17 | 1.18 | **2.65** | **0.30** | **ND** | **ND** | **ND** | **1.35** | 11.07 | 0.96 | 4.57 | 3.72 | 3.34 |
| 18 | 1.15 | **2.57** | **0.29** | **ND** | **ND** | **0.15** | **1.09** | 11.50 | 0.83 | 9.32 | 3.58 | 3.30 |
| 19 | 1.15 | **1.83** | **0.22** | **ND** | **ND** | **0.15** | **0.50** | 10.95 | 0.78 | 9.66 | 3.59 | 3.24 |
| 20 | 1.17 | **2.16** | **0.08** | **ND** | **ND** | **0.20** | **0.28** | 11.56 | 0.72 | 9.63 | 3.38 | 3.30 |
| 21 | 1.18 | **2.57** | **0.01** | **ND** | **ND** | **0.17** | **0.25** | 10.20 | 0.70 | 9.28 | 3.26 | 3.32 |
| 22 | 1.28 | **1.73** | **0.01** | **ND** | **ND** | **0.20** | **0.23** | 6.92 | 0.58 | 8.54 | 3.16 | 3.13 |
| 23 | 1.06 | **1.56** | **0.00** | **ND** | **ND** | **0.13** | **0.38** | 7.16 | 0.48 | 8.09 | 3.09 | 2.98 |
| 24 | 0.94 | **1.24** | **0.00** | **ND** | **ND** | **0.12** | **0.74** | 7.65 | 0.34 | 8.04 | 3.03 | 3.02 |
| 25 | 0.99 | **0.42** | **0.00** | **ND** | **ND** | **0.07** | **0.61** | 7.00 | 0.37 | 7.83 | 3.11 | 2.91 |
| 26 | 0.91 | **0.00** | **0.01** | **ND** | **ND** | **0.07** | **0.59** | 6.86 | 0.40 | 6.86 | 4.05 | 3.02 |
| 27 | 1.35 | **0.00** | **0.06** | **ND** | **ND** | **0.02** | **ND** | 6.32 | 0.43 | 6.62 | 5.02 | 3.02 |
| 28 | 1.68 | **0.00** | **0.04** | **ND** | **ND** | **0.07** | **ND** | 5.79 | 0.32 | 6.26 | 4.52 | 3.06 |
| 29 | 1.50 | **0.00** | **0.03** | **ND** | -- | **0.24** | **ND** | 5.43 | 0.30 | 5.85 | 3.74 | 2.98 |
| 30 | 1.98 | **0.00** | **0.03** | **ND** | -- | **0.23** | **ND** | 5.18 | 0.24 | 5.84 | 3.61 | 2.97 |
| 31 | 2.04 | -- | **0.04** | **ND** | -- | **0.13** | -- | 4.60 | -- | 5.63 | 3.68 | -- |
| Mean | 1.44 | 1.27 | 0.05 | 0.03 | ND | 0.14 | 0.43 | 8.53 | 1.48 | 6.50 | 3.92 | 3.33 |
| Min | 0.91 | 0.00 | 0.00 | 0.03 | ND | 0.02 | 0.09 | 4.60 | 0.24 | 1.25 | 3.03 | 2.91 |
| Max | 2.34 | 2.65 | 0.30 | 0.03 | ND | 0.24 | 1.35 | 11.56 | 3.99 | 9.66 | 5.34 | 3.81 |

**Measured Streamflow**

| Date | Streamflow (CFS) |
|---|---|
| 10/4/2022 | 2.03 |
| 5/16/2023 | 9.54 |
| 6/8/2023 | 2.59 |
| 7/12/2023 | 5.61 |
| 8/9/2023 | 3.83 |
| 9/6/2023 | 3.19 |

**0.01** Flume Ice Affected or Frozen.
ND No Data. Stilling Well Frozen.

# Lick Creek
# Streamflow
# (cubic feet per second)

**Daily Mean Streamflow (CFS)**

| Day | Oct-22 | Nov-22 | Dec-22 | Jan-23 | Feb-23 | Mar-23 | Apr-23 | May-23 | Jun-23 | Jul-23 | Aug-23 | Sep-23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.02 | 0.00 | **ND** | **0.00** | **0.00** | **0.00** | **0.00** | 0.69 | 2.91 | 0.02 | 0.00 | 0.01 |
| 2 | 0.02 | 0.00 | **0.03** | **0.00** | **0.00** | **0.00** | **0.00** | 0.88 | 2.65 | 0.03 | 0.00 | 0.01 |
| 3 | 0.01 | 0.00 | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | 1.83 | 2.42 | 0.02 | 0.00 | 0.01 |
| 4 | 0.00 | 0.00 | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | 2.69 | 2.26 | 0.03 | 0.00 | 0.01 |
| 5 | 0.00 | 0.00 | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | 2.66 | 1.80 | 0.03 | 0.00 | 0.00 |
| 6 | 0.00 | 0.00 | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | 2.40 | 1.40 | 0.03 | 0.00 | 0.00 |
| 7 | 0.00 | 0.00 | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | 2.34 | 1.20 | 0.03 | 0.00 | 0.00 |
| 8 | 0.00 | 0.00 | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | 2.66 | 1.04 | 0.03 | 0.00 | 0.00 |
| 9 | 0.00 | 0.00 | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | 4.31 | 0.95 | 0.02 | 0.00 | 0.00 |
| 10 | 0.00 | 0.00 | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | 5.27 | 0.87 | 0.02 | 0.00 | 0.00 |
| 11 | 0.00 | 0.00 | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | 4.51 | 0.73 | 0.02 | 0.00 | 0.00 |
| 12 | 0.00 | 0.00 | **0.00** | **0.00** | **0.00** | **0.00** | **0.06** | 4.33 | 0.64 | 0.01 | 0.00 | 0.00 |
| 13 | 0.00 | 0.00 | **0.00** | **0.00** | **0.00** | **0.00** | **0.11** | 4.82 | 0.51 | 0.00 | 0.00 | 0.00 |
| 14 | 0.00 | **0.00** | **ND** | **0.00** | **0.00** | **0.00** | **0.03** | 5.01 | 0.40 | 0.00 | 0.00 | 0.00 |
| 15 | 0.00 | **0.00** | **ND** | **0.00** | **0.00** | **0.00** | **0.00** | 5.58 | 0.37 | 0.00 | 0.00 | 0.00 |
| 16 | 0.00 | **0.00** | **ND** | **0.00** | **0.00** | **0.00** | **0.01** | 6.15 | 0.23 | 0.00 | 0.00 | 0.00 |
| 17 | 0.00 | **0.01** | **ND** | **0.00** | **0.00** | **0.00** | **0.05** | 6.44 | 0.23 | 0.00 | 0.00 | 0.00 |
| 18 | 0.00 | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | **0.09** | 6.87 | 0.20 | 0.00 | 0.00 | 0.00 |
| 19 | 0.00 | **0.02** | **0.00** | **0.00** | **0.00** | **0.00** | **0.02** | 6.40 | 0.08 | 0.00 | 0.00 | 0.00 |
| 20 | 0.00 | **ND** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | 6.05 | 0.05 | 0.00 | 0.00 | 0.00 |
| 21 | 0.00 | **ND** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | 5.71 | 0.04 | 0.00 | 0.00 | 0.00 |
| 22 | 0.00 | **ND** | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | 5.28 | 0.04 | 0.00 | 0.00 | 0.00 |
| 23 | 0.00 | **ND** | **0.00** | **0.00** | **0.00** | **0.00** | **0.01** | 5.26 | 0.03 | 0.00 | 0.00 | 0.00 |
| 24 | 0.00 | **ND** | **0.00** | **0.00** | **0.00** | **0.00** | **0.03** | 5.18 | 0.02 | 0.00 | 0.00 | 0.00 |
| 25 | 0.00 | **ND** | **0.00** | **0.00** | **0.00** | **0.00** | **0.02** | 4.87 | 0.02 | 0.00 | 0.00 | 0.00 |
| 26 | 0.00 | **ND** | **0.00** | **0.00** | **0.00** | **0.00** | **0.02** | 4.84 | 0.03 | 0.00 | 0.00 | 0.00 |
| 27 | 0.00 | **ND** | **0.00** | **0.00** | **0.00** | **0.00** | **0.10** | 4.77 | 0.05 | 0.00 | 0.00 | 0.00 |
| 28 | 0.00 | **0.00** | **0.00** | **0.00** | **0.00** | **0.00** | 0.17 | 4.25 | 0.03 | 0.00 | 0.00 | 0.00 |
| 29 | 0.00 | **0.00** | **0.00** | **0.00** | -- | **0.00** | 0.36 | 4.15 | 0.02 | 0.00 | 0.00 | 0.00 |
| 30 | 0.00 | **0.02** | **0.00** | **0.00** | -- | **0.00** | 0.67 | 4.01 | 0.01 | 0.00 | 0.01 | 0.00 |
| 31 | 0.00 | -- | **0.00** | **0.00** | -- | **0.00** | -- | 3.60 | -- | 0.00 | 0.01 | -- |
| Mean | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.06 | 4.34 | 0.71 | 0.01 | 0.00 | 0.00 |
| Min | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.69 | 0.01 | 0.00 | 0.00 | 0.00 |
| Max | 0.02 | 0.02 | 0.03 | 0.00 | 0.00 | 0.00 | 0.67 | 6.87 | 2.91 | 0.03 | 0.01 | 0.01 |

**Measured Streamflow**

| Date | Streamflow (CFS) |
|---|---|
| 10/4/2022 | 0.00 |
| 5/9/2023 | 3.62 |
| 6/5/2023 | 2.19 |
| 7/12/2023 | 0.03 |
| 8/9/2023 | 0.00 |
| 9/4/2023 | 0.00 |

**0.01** Flume Ice Affected or Frozen.
ND - No Data. Sitlling well frozen.
Note: Water Level below 0.02 feet not connected to stilling well. Flows below 0.02 cfs are approximate.

# Deep Creek Ditch
# Streamflow
# (cubic feet per second)

**Daily Mean Streamflow (CFS)**

| Day | Oct-22 | Nov-22 | Dec-22 | Jan-23 | Feb-23 | Mar-23 | Apr-23 | May-23 | Jun-23 | Jul-23 | Aug-23 | Sep-23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.30 | **0.23** | **ND** | **0.06** | **0.04** | **0.10** | **0.07** | 1.62 | 0.36 | 0.20 | 0.81 | 0.48 |
| 2 | 0.33 | **0.27** | **ND** | **0.06** | **0.07** | **0.11** | **0.11** | 1.29 | 0.32 | 0.87 | 0.85 | 0.44 |
| 3 | 0.42 | **0.15** | **ND** | **0.04** | **0.10** | **0.09** | **0.14** | 1.33 | 0.32 | 0.86 | 0.86 | 0.45 |
| 4 | 0.38 | **0.07** | **0.06** | **0.03** | **0.13** | **0.10** | **0.05** | 1.64 | 0.35 | 0.94 | 0.84 | 0.43 |
| 5 | 0.35 | **0.12** | **0.06** | **0.05** | **0.15** | **0.13** | **0.01** | 1.62 | 0.38 | 0.90 | 0.83 | 0.38 |
| 6 | 0.34 | **0.20** | **0.02** | **0.05** | **0.10** | **0.15** | **0.01** | 1.44 | 0.34 | 0.84 | 0.82 | 0.39 |
| 7 | 0.33 | **0.26** | **0.02** | **0.04** | **0.05** | **0.15** | **0.26** | 1.36 | 0.29 | 0.85 | 0.78 | 0.36 |
| 8 | 0.31 | **0.27** | **0.01** | **0.08** | **0.07** | **0.14** | **0.57** | 1.69 | 0.28 | 0.82 | 0.78 | 0.28 |
| 9 | 0.29 | **0.20** | **0.06** | **0.07** | **0.04** | **0.10** | **0.59** | 2.07 | 0.24 | 0.77 | 0.70 | 0.28 |
| 10 | 0.28 | **0.20** | **0.08** | **0.08** | **0.04** | **0.13** | **0.75** | 1.67 | 0.22 | 0.77 | 0.61 | 0.27 |
| 11 | 0.30 | **0.19** | **0.11** | **0.05** | **0.13** | **0.15** | 0.99 | 1.34 | 0.20 | 0.77 | 0.60 | 0.24 |
| 12 | 0.27 | **ND** | **0.07** | **0.06** | **0.14** | **0.12** | 1.24 | 1.43 | 0.16 | 0.79 | 0.57 | 0.23 |
| 13 | 0.26 | **ND** | **0.04** | **0.12** | **0.13** | **0.13** | 1.32 | 1.45 | 0.10 | 0.80 | 0.57 | 0.22 |
| 14 | 0.26 | **ND** | **0.03** | **0.13** | **0.14** | **0.13** | 0.98 | 1.52 | 0.10 | 0.79 | 0.55 | 0.19 |
| 15 | 0.28 | **ND** | **0.04** | **0.10** | **0.07** | **0.15** | 0.70 | 1.66 | 0.09 | 0.74 | 0.55 | 0.17 |
| 16 | 0.25 | **ND** | **0.11** | **0.08** | **0.00** | **0.11** | 0.76 | 1.02 | 0.04 | 0.73 | 0.59 | 0.17 |
| 17 | 0.23 | **ND** | **0.18** | **0.08** | **0.03** | **0.07** | 1.03 | 0.76 | 0.05 | 0.80 | 0.59 | 0.18 |
| 18 | 0.21 | **ND** | **0.19** | **0.05** | **0.09** | **0.02** | 1.22 | 0.73 | 0.05 | 1.22 | 0.57 | 0.18 |
| 19 | 0.21 | **ND** | **0.15** | **0.04** | **0.11** | **0.04** | 0.97 | 0.75 | 0.04 | 1.42 | 0.59 | 0.17 |
| 20 | 0.23 | **ND** | **0.08** | **0.06** | **0.12** | **0.07** | 0.71 | 0.84 | 0.03 | 1.36 | 0.57 | 0.19 |
| 21 | 0.23 | **ND** | **0.03** | **0.03** | **0.19** | **0.05** | 0.65 | 0.66 | 0.04 | 1.18 | 0.55 | 0.21 |
| 22 | 0.27 | **ND** | **0.04** | **0.07** | **0.14** | **0.06** | 0.62 | 0.50 | 0.02 | 1.16 | 0.51 | 0.17 |
| 23 | 0.15 | **ND** | **0.04** | **0.11** | **0.06** | **0.04** | 0.68 | 0.56 | 0.00 | 1.13 | 0.48 | 0.13 |
| 24 | **0.14** | **ND** | **0.02** | **0.06** | **0.07** | **0.03** | 0.81 | 0.56 | 0.00 | 1.18 | 0.47 | 0.13 |
| 25 | **0.16** | **ND** | **0.04** | **0.04** | **0.12** | **0.01** | 0.78 | 0.54 | 0.00 | 1.11 | 0.47 | 0.13 |
| 26 | **0.14** | **ND** | **0.04** | **0.04** | **0.15** | **0.01** | 0.69 | 0.55 | 0.00 | 1.07 | 0.57 | 0.15 |
| 27 | **0.10** | **ND** | **0.08** | **0.09** | **0.08** | **0.00** | 0.85 | 0.53 | 0.01 | 1.04 | 0.63 | 0.16 |
| 28 | **ND** | **ND** | **0.06** | **0.10** | **0.08** | **0.01** | 0.96 | 0.50 | 0.00 | 0.99 | 0.56 | 0.17 |
| 29 | **ND** | **ND** | **0.04** | **0.10** | -- | **0.09** | 1.16 | 0.54 | 0.00 | 0.92 | 0.47 | 0.17 |
| 30 | **0.24** | **ND** | **0.04** | **0.09** | -- | **0.08** | 1.50 | 0.53 | 0.00 | 0.87 | 0.48 | 0.18 |
| 31 | **0.17** | -- | **0.05** | **0.02** | -- | **0.04** | -- | 0.47 | -- | 0.84 | 0.51 | -- |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mean | 0.26 | 0.20 | 0.06 | 0.07 | 0.09 | 0.08 | 0.71 | 1.07 | 0.13 | 0.93 | 0.62 | 0.24 |
| Min | 0.10 | 0.07 | 0.01 | 0.02 | 0.00 | 0.00 | 0.01 | 0.47 | 0.00 | 0.20 | 0.47 | 0.13 |
| Max | 0.42 | 0.27 | 0.19 | 0.13 | 0.19 | 0.15 | 1.50 | 2.07 | 0.38 | 1.42 | 0.86 | 0.48 |

**Measured Streamflow**

| Date | Streamflow (CFS) |
|---|---|
| 10/4/2022 | 0.37 |
| 5/16/2023 | 1.50 |
| 6/8/2023 | 0.37 |
| 7/12/2023 | 0.83 |
| 8/9/2023 | 0.87 |
| 9/7/2023 | 0.49 |

**0.01** Flume Ice Affected or Frozen.
ND No Data. Stilling Well Frozen.

# Minnesota Reservoir Flume
# Streamflow
# (cubic feet per second)

**Daily Mean Streamflow (CFS)**

| Day | Oct-22 | Nov-22 | Dec-22 | Jan-23 | Feb-23 | Mar-23 | Apr-23 | May-23 | Jun-23 | Jul-23 | Aug-23 | Sep-23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.63 | 1.06 | **0.29** | **ND** | | | | 5.75 | 4.38 | 0.29 | 1.82 | 0.87 |
| 2 | 0.66 | 1.09 | | **ND** | | | | 5.49 | 4.47 | 2.54 | 1.80 | 0.77 |
| 3 | 0.77 | 1.16 | | **ND** | | | | 5.70 | 3.96 | 3.34 | 1.96 | 0.78 |
| 4 | 1.01 | 0.86 | | **ND** | | | | 6.11 | 3.61 | 3.29 | 1.59 | 0.84 |
| 5 | 0.72 | 0.60 | | **ND** | | | | 5.30 | 3.44 | 3.22 | 1.45 | 0.65 |
| 6 | 0.70 | 0.59 | | **ND** | | | | 4.66 | 3.31 | 3.05 | 1.42 | 0.60 |
| 7 | 0.68 | 0.64 | | **ND** | | | | 4.25 | 2.96 | 2.84 | 1.46 | 0.62 |
| 8 | 0.67 | 0.69 | | **ND** | | | | 4.32 | 2.52 | 2.80 | 1.22 | 0.61 |
| 9 | 0.69 | 0.68 | | **ND** | | | | 4.53 | 1.87 | 2.53 | 1.26 | 0.63 |
| 10 | 0.68 | 0.69 | | **ND** | | | | 9.65 | 1.71 | 2.45 | 1.30 | 0.60 |
| 11 | 0.72 | 0.65 | | **ND** | | | | 12.75 | 1.41 | 2.25 | 1.45 | 0.62 |
| 12 | 0.74 | 0.62 | | **ND** | | | | 10.71 | 1.30 | 2.50 | 1.29 | 0.62 |
| 13 | 0.67 | 0.59 | | **ND** | | | | 10.58 | 1.06 | 2.22 | 1.25 | 0.62 |
| 14 | 0.66 | 0.45 | | **ND** | | | **0.29** | 10.68 | 0.67 | 2.15 | 1.16 | 0.57 |
| 15 | 0.66 | 0.44 | | **ND** | | | **0.29** | 11.80 | 0.66 | 1.95 | 1.06 | 0.56 |
| 16 | 0.63 | 0.50 | | **ND** | | | **0.33** | 12.33 | 0.66 | 1.63 | 0.97 | 0.60 |
| 17 | 0.62 | 0.50 | | **ND** | | | **0.62** | 12.27 | 0.83 | 1.63 | 1.34 | 0.63 |
| 18 | 0.63 | 0.41 | | **ND** | | | **1.71** | 12.54 | 0.49 | 2.94 | 1.29 | 0.62 |
| 19 | 0.64 | 0.48 | | **ND** | | | **1.43** | 11.68 | 0.48 | 3.24 | 1.32 | 0.61 |
| 20 | 0.66 | 0.47 | | **ND** | | | **0.90** | 11.90 | 0.50 | 3.28 | 1.19 | 0.67 |
| 21 | 0.70 | 0.43 | | | | | **0.82** | 11.22 | 0.49 | 2.88 | 1.18 | 0.67 |
| 22 | 0.87 | 0.40 | | | | | **0.81** | 7.82 | 0.52 | 2.48 | 0.96 | 0.68 |
| 23 | 1.05 | 0.39 | **0.20** | | | | **0.85** | 7.46 | 0.49 | 2.26 | 0.96 | 0.61 |
| 24 | 0.72 | **0.34** | **0.15** | | | | **1.14** | 7.67 | 0.40 | 2.28 | 1.05 | 0.62 |
| 25 | 0.63 | **0.34** | **ND** | | | | **1.42** | 7.07 | 0.38 | 2.25 | 1.20 | 0.60 |
| 26 | 0.95 | **0.34** | **ND** | | | | 1.32 | 6.67 | 0.38 | 2.41 | 1.18 | 0.59 |
| 27 | 0.91 | | **ND** | | | | 2.38 | 6.17 | 0.41 | 2.29 | 1.88 | 0.60 |
| 28 | 0.83 | **0.28** | **ND** | | | | 2.92 | 5.64 | 0.33 | 2.12 | 1.49 | 0.60 |
| 29 | 0.96 | | **ND** | | -- | | 3.60 | 5.40 | 0.31 | 1.99 | 1.08 | 0.61 |
| 30 | 1.07 | **0.38** | **ND** | | -- | | 4.93 | 5.15 | 0.28 | 1.95 | 0.93 | 0.60 |
| 31 | 1.00 | -- | **ND** | | -- | | -- | 4.73 | -- | 1.90 | 0.88 | -- |
| Mean | 0.76 | 0.57 | 0.21 | **ND** | | | 1.51 | 8.00 | 1.48 | 2.42 | 1.30 | 0.64 |
| Min | 0.62 | 0.28 | 0.15 | **ND** | | | 0.29 | 4.25 | 0.28 | 0.29 | 0.88 | 0.56 |
| Max | 1.07 | 1.16 | 0.29 | **ND** | | | 4.93 | 12.75 | 4.47 | 3.34 | 1.96 | 0.87 |

**Measured Streamflow**

| Date | Streamflow (CFS) |
|---|---|
| 10/4/2022 | 0.75 |
| 11/10/2022 | 0.42 |
| 5/10/2023 | 14.16 |
| 6/8/2023 | 2.59 |
| 7/12/2023 | 2.40 |
| 8/9/2023 | 1.22 |
| 9/4/2023 | 0.69 |

**0.01** Flume Ice Affected or Frozen.
ND No Data. Stilling Well Frozen.
Indicates daily average flow less than 0.28 cfs. Stilling well inlet is 0.10 feet above flume. bottom, and data logger does not record flows between 0.00 (dry) and 0.28 cfs.
Note: A portion of total streamflow diverted around flume by beaver activity.

# South Prong Creek
# Streamflow
# (cubic feet per second)

**Daily Mean Streamflow (CFS)**

| Day | Oct-22 | Nov-22 | Dec-22 | Jan-23 | Feb-23 | Mar-23 | Apr-23 | May-23 | Jun-23 | Jul-23 | Aug-23 | Sep-23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 0.65 | 0.43 | **ND1** | **ND1** | **ND1** | **ND1** | **ND1** | ND1 | ND1 | 7.33 | 0.43 | 0.93 |
| 2 | 0.56 | 0.46 | **ND1** | **ND1** | **ND1** | **ND1** | **ND1** | ND1 | ND1 | 7.16 | 0.39 | 0.89 |
| 3 | 0.57 | 0.43 | **ND1** | **ND1** | **ND1** | **ND1** | **ND1** | ND1 | ND1 | 6.89 | 0.42 | 0.89 |
| 4 | 0.53 | 0.43 | **ND1** | **ND1** | **ND1** | **ND1** | **ND1** | ND1 | ND1 | 7.08 | 0.35 | 0.83 |
| 5 | 0.35 | 0.50 | **ND1** | **ND1** | **ND1** | **ND1** | **ND1** | ND1 | 8.62 | 7.09 | 0.37 | 0.74 |
| 6 | 0.32 | 0.44 | **ND1** | **ND1** | **ND1** | **ND1** | **ND1** | ND1 | 10.36 | 6.78 | 0.45 | 0.68 |
| 7 | 0.27 | 0.50 | **ND1** | **ND1** | **ND1** | **ND1** | **ND1** | ND1 | 9.97 | 6.20 | 0.51 | 0.69 |
| 8 | 0.24 | **0.53** | **ND1** | **ND1** | **ND1** | **ND1** | **ND1** | ND1 | 9.58 | 5.70 | 0.48 | 0.66 |
| 9 | 0.23 | **0.49** | **ND1** | **ND1** | **ND1** | **ND1** | **ND1** | ND1 | 9.66 | 5.41 | 0.56 | 0.64 |
| 10 | 0.24 | **0.53** | **ND1** | **ND1** | **ND1** | **ND1** | **ND1** | ND1 | 9.08 | 5.09 | 0.89 | 0.66 |
| 11 | 0.28 | **ND1** | **ND1** | **ND1** | **ND1** | **ND1** | **ND1** | ND1 | 9.81 | 5.01 | 0.90 | 0.66 |
| 12 | 0.29 | **ND1** | **ND1** | **ND1** | **ND1** | **ND1** | **ND1** | ND1 | 10.09 | 3.81 | 0.87 | 0.65 |
| 13 | 0.28 | **ND1** | **ND1** | **ND1** | **ND1** | **ND1** | **ND1** | ND1 | 9.01 | 2.95 | 0.85 | 0.66 |
| 14 | 0.30 | **ND1** | **ND1** | **ND1** | **ND1** | **ND1** | **ND1** | ND1 | 8.02 | 2.60 | 0.80 | 0.70 |
| 15 | 0.29 | **ND1** | **ND1** | **ND1** | **ND1** | **ND1** | **ND1** | ND1 | 9.26 | 2.24 | 0.79 | 0.76 |
| 16 | 0.28 | **ND1** | **ND1** | **ND1** | **ND1** | **ND1** | **ND1** | ND1 | 9.14 | 1.94 | 0.77 | 0.75 |
| 17 | 0.28 | **ND1** | **ND1** | **ND1** | **ND1** | **ND1** | **ND1** | ND1 | 8.53 | 1.71 | 0.78 | 0.71 |
| 18 | 0.26 | **ND1** | **ND1** | **ND1** | **ND1** | **ND1** | **ND1** | ND1 | 7.79 | 1.65 | 0.85 | 0.70 |
| 19 | 0.26 | **ND1** | **ND1** | **ND1** | **ND1** | **ND1** | **ND1** | ND1 | 9.22 | 1.53 | 0.88 | 0.67 |
| 20 | 0.26 | **ND1** | **ND1** | **ND1** | **ND1** | **ND1** | **ND1** | ND1 | 10.02 | 1.48 | 0.79 | 0.72 |
| 21 | 0.25 | **ND1** | **ND1** | **ND1** | **ND1** | **ND1** | **ND1** | ND1 | 10.00 | 1.38 | 0.73 | 0.71 |
| 22 | 0.31 | **ND1** | **ND1** | **ND1** | **ND1** | **ND1** | **ND1** | ND1 | 10.52 | 1.18 | 0.81 | 0.69 |
| 23 | 0.53 | **ND1** | **ND1** | **ND1** | **ND1** | **ND1** | **ND1** | ND1 | 10.15 | 0.98 | 0.95 | 0.64 |
| 24 | 0.32 | **ND1** | **ND1** | **ND1** | **ND1** | **ND1** | **ND1** | ND1 | 9.30 | 0.93 | 0.96 | 0.64 |
| 25 | 0.54 | **ND1** | **ND1** | **ND1** | **ND1** | **ND1** | **ND1** | ND1 | 8.28 | 0.88 | 0.96 | 0.64 |
| 26 | 0.36 | **ND1** | **ND1** | **ND1** | **ND1** | **ND1** | **ND1** | ND1 | 8.44 | 0.78 | 1.15 | 0.64 |
| 27 | 0.33 | **ND1** | **ND1** | **ND1** | **ND1** | **ND1** | ND1 | ND1 | 9.21 | 0.72 | 1.31 | 0.64 |
| 28 | 0.59 | **ND1** | **ND1** | **ND1** | **ND1** | **ND1** | ND1 | ND1 | 9.43 | 0.63 | 1.34 | 0.64 |
| 29 | 0.44 | **ND1** | **ND1** | **ND1** | -- | **ND1** | ND1 | ND1 | 8.44 | 0.56 | 1.12 | 0.62 |
| 30 | 0.35 | **ND1** | **ND1** | **ND1** | -- | **ND1** | ND1 | ND1 | 7.26 | 0.53 | 1.18 | 0.62 |
| 31 | 0.38 | -- | **ND1** | **ND1** | -- | **ND1** | -- | ND1 | -- | 0.48 | 0.99 | -- |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mean | 0.36 | 0.47 | ND1 | ND1 | ND1 | ND1 | ND1 | ND1 | 9.20 | 3.18 | 0.79 | 0.70 |
| Min | 0.23 | 0.43 | ND1 | ND1 | ND1 | ND1 | ND1 | ND1 | 7.26 | 0.48 | 0.35 | 0.62 |
| Max | 0.65 | 0.53 | ND1 | ND1 | ND1 | ND1 | ND1 | ND1 | 10.52 | 7.33 | 1.34 | 0.93 |

**Measured Streamflow**

| Date | Streamflow (CFS) |
|---|---|
| 10/4/2022 | 0.64 |
| 5/9/2023 | 6.96 |
| 6/5/2023 | 9.81 |
| 7/12/2023 | 5.17 |
| 8/9/2023 | 0.97 |
| 9/4/2023 | 0.78 |

**0.01** Flume Ice Affected or Frozen.
ND No Data. Stilling Well Frozen.
ND1 No Data. Logger Malfunction.
Note: Water Level below 0.02 feet not connected to stilling well. Flows below 0.02 cfs are approximate.
Note: When height of water in flume is above 1.50 feet (11.19 cfs), bypass spillways overflow and flow through flume is less than total flow in stream.

# Upper Sylvester Gulch
# Measured Flow

| Date | GPM | CFS | Comments |
|---|---|---|---|
| 4/30/2000 | 0.00 | 0.00 | Dry |
| 9/19/2000 | 0.00 | 0.00 | Dry |
| 4/28/2001 | 0.00 | 0.00 | Dry |
| 6/24/2001 | 0.00 | 0.00 | Dry |
| 9/28/2001 | 0.00 | 0.00 | Dry |
| 4/29/2002 | 0.00 | 0.00 | Dry |
| 6/18/2002 | 0.00 | 0.00 | Dry |
| 9/9/2002 | 0.00 | 0.00 | Dry |
| 4/10/2003 | 0.00 | 0.00 | Dry |
| 6/2/2003 | 0.00 | 0.00 | Dry |
| 9/18/2003 | 0.00 | 0.00 | Dry |
| 4/25/2004 | 0.00 | 0.00 | Dry |
| 5/29/2004 | 0.00 | 0.00 | Dry |
| 8/31/2004 | 0.00 | 0.00 | Dry |
| 5/3/2005 | 0.00 | 0.00 | Dry |
| 6/4/2005 | 0.00 | 0.00 | No flow |
| 9/20/2005 | 0.00 | 0.00 | Dry |
| 5/1/2006 | 0.00 | 0.00 | Dry |
| 5/16/2006 | 0.00 | 0.00 | Dry |
| 9/12/2006 | 0.00 | 0.00 | Dry |
| 5/30/2007 | 0.00 | 0.00 | Dry |
| 8/24/2007 | 0.00 | 0.00 | Dry |
| 4/25/2007 | 136 | 0.30 | |
| 5/30/2007 | 0.00 | 0.00 | Dry |
| 8/24/2007 | 0.00 | 0.00 | Dry |
| 5/9/2008 | 887.29 | 1.98 | |
| 6/6/2008 | 155.22 | 0.35 | |
| 8/20/2008 | 0.00 | 0.00 | Dry |
| 5/7/2009 | 155.22 | 0.35 | |
| 5/24/2009 | 75.62 | 0.17 | |
| 8/10/2009 | 0.00 | 0.00 | Dry |
| 5/4/2010 | 0.00 | 0.00 | Dry |
| 6/1/2010 | 0.00 | 0.00 | Dry |
| 9/1/2010 | 0.00 | 0.00 | Dry |
| 5/10/2011 | 365.42 | 0.81 | |
| 6/1/2011 | 175.44 | 0.39 | |
| 8/10/2011 | 1.20 | 0.003 | |
| 4/30/2012 | 0.00 | 0.00 | Dry |
| 5/15/2012 | 0.00 | 0.00 | Dry |
| 8/20/2012 | 0.00 | 0.00 | Dry |
| 5/2/2013 | 0.00 | 0.00 | Dry |
| 5/23/2013 | 0.00 | 0.00 | Dry |
| 8/20/2013 | 0.00 | 0.00 | Dry |
| 5/1/2014 | 0.00 | | |
| 5/21/2014 | 18.46 | 0.04 | |
| 9/23/2014 | 0.00 | 0.00 | Dry |
| 4/24/2015 | 0.00 | 0.00 | Dry |
| 5/27/2015 | 2.24 | 0.01 | |
| 8/29/2015 | 2.24 | 0.01 | |
| 5/5/2016 | 34.70 | 0.08 | |
| 5/25/2016 | 23.62 | 0.05 | |
| 9/7/2016 | 14.12 | 0.03 | |
| 5/12/2017 | 18.66 | 0.04 | |
| 6/6/2017 | 3.47 | 0.01 | |
| 9/5/2017 | 0.00 | 0.00 | Dry |
| 5/12/2018 | 0.00 | 0.00 | Dry |
| 6/10/2018 | 0.00 | 0.00 | Dry |
| 9/29/2018 | 0.00 | 0.00 | Dry |
| 5/7/2019 | 28.98 | 0.06 | |
| 6/20/2019 | 1.20 | 0.00 | |
| 9/12/2019 | 0.00 | 0.00 | Dry |
| 5/11/2020 | 0.00 | 0.00 | Dry |
| 6/8/2020 | 0.00 | 0.00 | Dry |
| 9/23/2020 | 0.00 | 0.00 | Dry |
| 5/6/2021 | 0.00 | 0.00 | Dry |
| 6/7/2021 | 0.00 | 0.00 | Dry |
| 9/28/2021 | 0.00 | 0.00 | Dry |
| 5/4/2022 | 0.00 | 0.00 | Dry |
| 5/27/2022 | 0.00 | 0.00 | Dry |
| 9/6/2022 | 0.00 | 0.00 | Dry |
| 5/10/2023 | 853.56 | 1.90 | |
| 6/6/2023 | 34.70 | 0.08 | |
| 9/5/2023 | 0.00 | 0.00 | Dry |

Non-data logger site
GPM - gallons per minute
CFS - cubic feet per second

# Horse Gulch
# Measured Flow

| Date | GPM | CFS | Comments |
|---|---|---|---|
| 5/7/2000 | 0.00 | 0.00 | Dry |
| 6/14/2000 | 0.00 | 0.00 | Dry |
| 9/17/2000 | 0.00 | 0.00 | Dry |
| 5/2/2001 | 0.00 | 0.00 | Dry |
| 6/25/2001 | 0.00 | 0.00 | Dry |
| 9/26/2001 | 0.00 | 0.00 | Dry |
| 4/25/2002 | 0.00 | 0.00 | Dry |
| 6/17/2002 | 0.00 | 0.00 | Dry |
| 9/10/2002 | 0.00 | 0.00 | Dry |
| 4/12/2003 | 0.00 | 0.00 | Dry |
| 6/2/2003 | 0.00 | 0.00 | Dry |
| 9/18/2003 | 0.00 | 0.00 | Dry |
| 4/25/2004 | 0.00 | 0.00 | Dry |
| 5/30/2004 | 0.00 | 0.00 | Dry |
| 9/2/2004 | 0.00 | 0.00 | Dry |
| 5/10/2005 | 0.00 | 0.00 | Dry |
| 6/5/2005 | 0.00 | 0.00 | Dry |
| 9/13/2005 | 0.00 | 0.00 | Dry |
| 5/1/2006 | 0.00 | 0.00 | Dry |
| 5/24/2006 | 0.00 | 0.00 | Dry |
| 9/6/2006 | 0.00 | 0.00 | Dry |
| 4/27/2007 | 0.00 | 0.00 | Dry |
| 5/30/2007 | 0.00 | 0.00 | Dry |
| 8/24/2007 | 0.00 | 0.00 | Dry |
| 5/5/2008 | 275 | 0.61 | |
| 6/7/2008 | 0.00 | 0.00 | Dry |
| 8/23/2008 | 0.00 | 0.00 | Dry |
| 5/8/2009 | 0.00 | 0.00 | Dry |
| 6/2/2009 | 0.00 | 0.00 | Dry |
| 8/11/2009 | 0.00 | 0.00 | Dry |
| 5/6/2010 | 0.00 | 0.00 | Dry |
| 6/2/2010 | 0.00 | 0.00 | Dry |
| 9/1/2010 | 0.00 | 0.00 | Dry |
| 5/5/2011 | 0.00 | 0.00 | Dry |
| 6/1/2011 | 0.00 | 0.00 | Dry |
| 8/11/2011 | 0.00 | 0.00 | Dry |
| 4/24/2012 | 0.00 | 0.00 | Dry |
| 5/15/2012 | 0.00 | 0.00 | Dry |
| 8/22/2012 | 0.00 | 0.00 | Dry |
| 5/2/2013 | 0.00 | 0.00 | Dry |
| 5/21/2013 | 0.00 | 0.00 | Dry |
| 8/23/2013 | 0.00 | 0.00 | Dry |
| 4/30/2014 | 0.00 | 0.00 | Dry |
| 5/21/2014 | 0.00 | 0.00 | Dry |
| 9/23/2014 | 0.00 | 0.00 | Dry |
| 4/25/2015 | 0.00 | 0.00 | Dry |
| 5/25/2015 | 0.00 | 0.00 | Dry |
| 8/18/2015 | 0.00 | 0.00 | Dry |
| 5/5/2016 | 0.00 | 0.00 | Dry |
| 5/24/2016 | 0.00 | 0.00 | Dry |
| 9/5/2016 | 0.00 | 0.00 | Dry |
| 5/10/2017 | 0.00 | 0.00 | Dry |
| 6/8/2017 | 0.00 | 0.00 | Dry |
| 9/7/2017 | 0.00 | 0.00 | Dry |
| 5/11/2018 | 0.00 | 0.00 | Dry |
| 6/11/2018 | 0.00 | 0.00 | Dry |
| 9/27/2018 | 0.00 | 0.00 | Dry |
| 5/1/2019 | 0.00 | 0.00 | Dry |
| 6/20/2019 | 0.00 | 0.00 | Dry |
| 9/11/2019 | 0.00 | 0.00 | Dry |
| 5/11/2020 | 0.00 | 0.00 | Dry |
| 6/8/2020 | 0.00 | 0.00 | Dry |
| 9/3/2020 | 0.00 | 0.00 | Dry |
| 5/7/2021 | 0.00 | 0.00 | Dry |
| 6/10/2021 | 0.00 | 0.00 | Dry |
| 9/21/2021 | 0.00 | 0.00 | Dry |
| 5/6/2022 | 0.00 | 0.00 | Dry |
| 5/26/2022 | 0.00 | 0.00 | Dry |
| 9/6/2022 | 0.00 | 0.00 | Dry |
| 5/9/2023 | 262 | 0.58 | |
| 6/8/2023 | 0.00 | 0.00 | Dry |
| 9/4/2023 | 0.00 | 0.00 | Dry |

Non-data logger site
GPM - gallons per minute
CFS - cubic feet per second

# East Gulch East of Horse Gulch
# Measured Flow

| Date | GPM | CFS | Comments |
|---|---|---|---|
| 5/7/2000 | 3.00 | 0.01 | |
| 6/14/2000 | 2.50 | 0.01 | |
| 9/17/2000 | 0.00 | 0.00 | Seep |
| 5/2/2001 | 3.75 | 0.01 | |
| 6/25/2001 | 3.75 | 0.01 | |
| 9/26/2001 | 0.00 | 0.00 | Dry |
| 4/25/2002 | 0.00 | 0.00 | Dry |
| 6/17/2002 | 0.00 | 0.00 | Dry |
| 9/10/2002 | 0.00 | 0.00 | Dry |
| 4/12/2003 | 0.00 | 0.00 | Dry |
| 6/3/2003 | 0.00 | 0.00 | Dry |
| 9/18/2003 | 0.00 | 0.00 | Dry |
| 4/25/2004 | 0.00 | 0.00 | Dry |
| 5/29/2004 | 0.00 | 0.00 | Dry |
| 9/2/2004 | 0.00 | 0.00 | Dry |
| 5/1/2005 | 45 | 0.10 | |
| 6/5/2005 | 0.68 | 0.002 | |
| 10/2/2005 | 0.00 | 0.00 | Wet |
| 5/4/2006 | 0.00 | 0.00 | Dry |
| 5/23/2006 | 0.00 | 0.00 | Dry |
| 9/6/2006 | 0.00 | 0.00 | Dry |
| 4/27/2007 | 0.00 | 0.00 | Dry |
| 5/30/2007 | 0.00 | 0.00 | Dry |
| 8/24/2007 | 0.00 | 0.00 | Dry |
| 5/5/2008 | 0.00 | 0.00 | Dry |
| 6/7/2008 | 0.00 | 0.00 | Dry |
| 8/23/2008 | 0.00 | 0.00 | Dry |
| 5/8/2009 | 0.00 | 0.00 | Dry |
| 6/2/2009 | 0.00 | 0.00 | Dry |
| 8/11/2009 | 0.00 | 0.00 | Dry |
| 5/6/2010 | 0.00 | 0.00 | Dry |
| 6/2/2010 | 0.10 | 0.0002 | Trickle |
| 9/1/2010 | 0.00 | 0.00 | Dry |
| 5/5/2011 | 88.42 | 0.20 | |
| 6/3/2011 | 43.55 | 0.10 | |
| 8/12/2011 | 0.10 | 0.0002 | Trickle |
| 4/30/2012 | 0.00 | 0.00 | Dry |
| 5/14/2012 | 0.00 | 0.00 | Dry |
| 8/22/2012 | 0.00 | 0.00 | Dry |
| 5/1/2013 | 0.00 | 0.00 | Dry |
| 5/21/2013 | 0.00 | 0.00 | Dry |
| 8/23/2013 | 0.00 | 0.00 | Dry |
| 5/2/2014 | 4.04 | 0.01 | Dry |
| 5/19/2014 | 0.00 | 0.00 | Wet |
| 9/23/2014 | 0.00 | 0.00 | Dry |
| 5/28/2015 | 0.00 | 0.00 | Dry |
| 8/18/2015 | 0.00 | 0.00 | Dry |
| 4/25/2015 | 0.00 | 0.00 | Dry |
| 5/2/2016 | 25.28 | 0.06 | |
| 5/24/2016 | 2.45 | 0.01 | |
| 9/6/2016 | 0.00 | 0.00 | Dry |
| 5/10/2017 | 25.96 | 0.06 | |
| 6/8/2017 | 0.62 | 0.00 | |
| 9/5/2017 | 0.00 | 0.00 | Dry |
| 5/11/2018 | 0.00 | 0.00 | Dry |
| 6/11/2018 | 0.00 | 0.00 | Dry |
| 9/27/2018 | 0.00 | 0.00 | Dry |
| 5/1/2019 | 119 | 0.27 | |
| 6/20/2019 | 0.00 | 0.00 | Dry |
| 9/11/2019 | 0.00 | 0.00 | Dry |
| 5/12/2020 | 0.00 | 0.00 | Dry |
| 6/8/2020 | 0.00 | 0.00 | Dry |
| 9/4/2020 | 0.00 | 0.00 | Dry |
| 5/6/2021 | 0.00 | 0.00 | Dry |
| 6/11/2021 | 0.00 | 0.00 | Dry |
| 9/21/2021 | 0.00 | 0.00 | Dry |
| 5/4/2022 | 0.00 | 0.00 | Dry |
| 5/27/2022 | 0.00 | 0.00 | Dry |
| 9/6/2022 | 0.00 | 0.00 | Dry |
| 5/9/2023 | 412 | 0.92 | |
| 6/7/2023 | 5.69 | 0.01 | |
| 9/6/2023 | 0.00 | 0.00 | Dry |

Non-data logger site
GPM - gallons per minute
CFS - cubic feet per second

# Upper Deep Creek
# Measured Flow

| Date | GPM | CFS | Comments |
|---|---|---|---|
| 5/4/2006 | 5,251 | 11.70 | |
| 5/24/2006 | 2,567 | 5.72 | |
| 8/17/2006 | 1,634 | 3.64 | |
| 4/28/2007 | 5,332 | 11.88 | |
| 5/29/2007 | 1,400 | 3.12 | |
| 9/11/2007 | 353 | 0.79 | |
| 5/11/2008 | 17,504 | 39 | |
| 6/8/2008 | 7,181 | 16 | |
| 8/21/2008 | 368 | 0.82 | |
| 5/9/2009 | 5,911 | 13.17 | |
| 6/4/2009 | 1,445 | 3.22 | |
| 8/9/2009 | 49.37 | 0.11 | |
| 5/7/2010 | 2,249 | 5.01 | |
| 6/3/2010 | 1,014 | 2.26 | |
| 8/31/2010 | 35.91 | 0.08 | |
| 5/9/2011 | 8,209 | 18.29 | |
| 6/1/2011 | 8,824 | 19.66 | |
| 8/11/2011 | 130 | 0.29 | |
| 4/26/2012 | 730 | 1.63 | |
| 5/16/2012 | 321 | 0.72 | |
| 8/22/2012 | 15.83 | 0.04 | |
| 5/3/2013 | 1,549 | 3.45 | |
| 5/21/2013 | 1,582 | 3.53 | |
| 8/21/2013 | 603 | 1.34 | |
| 5/3/2014 | 1,773 | 3.95 | |
| 5/20/2014 | 2,869 | 6.40 | |
| 9/24/2014 | 147 | 0.33 | |
| 4/23/2015 | 801 | 1.79 | |
| 5/27/2015 | 2,568 | 5.73 | |
| 8/19/2015 | 132 | 0.30 | |
| 5/4/2016 | 2,720 | 6.07 | |
| 5/24/2016 | 1,627 | 3.63 | |
| 9/5/2016 | 113 | 0.25 | |
| 5/11/2017 | 2,029 | 4.52 | |
| 6/7/2017 | 1,367 | 3.05 | |
| 9/7/2017 | 116 | 0.26 | |
| 5/10/2018 | 643 | 1.43 | |
| 6/11/2018 | 95 | 0.21 | |
| 9/28/2018 | 51 | 0.11 | |
| 5/6/2019 | 3,214 | 7.17 | |
| 6/17/2019 | 1,585 | 3.53 | |
| 9/11/2019 | 54 | 0.12 | |
| 5/13/2020 | 971 | 2.17 | |
| 6/7/2020 | 179 | 0.40 | |
| 9/25/2020 | 31.8 | 0.07 | |
| 5/6/2021 | 650 | 1.45 | |
| 6/10/2021 | 92 | 0.21 | |
| 9/21/2021 | 32.7 | 0.07 | |
| 5/6/2022 | 1,748 | 3.90 | |
| 5/26/2022 | 1,012 | 2.26 | |
| 9/5/2022 | 23.9 | 0.05 | |
| 5/16/2023 | 8,625 | 19.23 | |
| 6/8/2023 | 6,215 | 13.86 | |
| 9/7/2023 | 98.9 | 0.22 | |

Non-data logger site
GPM - gallons per minute
CFS - cubic feet per second

## Lower Deep Creek
## Measured Flow

| Date | GPM | CFS | Comments |
|---|---|---|---|
| 5/4/2006 | 5,745 | 12.80 | |
| 5/24/2006 | 2,437 | 5.43 | |
| 8/17/2006 | 1,557 | 3.47 | |
| 4/28/2007 | 8,039 | 17.91 | |
| 5/29/2007 | 2,298 | 5.12 | |
| 9/11/2007 | 467 | 1.04 | |
| 5/11/2008 | 16,607 | 37.00 | |
| 6/8/2008 | 8,079 | 18.00 | |
| 8/21/2008 | 368 | 0.82 | |
| 5/9/2009 | 3,793 | 8.45 | |
| 6/4/2009 | 1,423 | 3.17 | |
| 8/9/2009 | 53.86 | 0.12 | |
| 5/7/2010 | 3,039 | 6.77 | |
| 6/3/2010 | 1,346 | 3.00 | |
| 8/31/2010 | 67.32 | 0.15 | |
| 5/9/2011 | 11,800 | 26.29 | |
| 6/1/2011 | 10,067 | 22.43 | |
| 8/11/2011 | 171 | 0.38 | |
| 4/28/2012 | 1,061 | 2.37 | |
| 5/16/2012 | 437 | 0.97 | |
| 8/22/2012 | 13.44 | 0.03 | |
| 5/3/2013 | 2,401 | 5.35 | |
| 5/22/2013 | 1,547 | 3.45 | |
| 8/21/2013 | 983 | 2.19 | |
| 5/3/2014 | 2,933 | 6.54 | |
| 5/20/2014 | 3,283 | 7.32 | |
| 9/24/2014 | 157 | 0.35 | |
| 4/23/2015 | 849 | 1.89 | |
| 5/26/2015 | 2,456 | 5.48 | |
| 8/19/2015 | 100 | 0.22 | |
| 5/4/2016 | 2,846 | 6.35 | |
| 5/25/2016 | 3,670 | 8.18 | |
| 9/5/2016 | 143 | 0.32 | |
| 5/11/2017 | 2,939 | 6.55 | |
| 6/7/2017 | 1,397 | 3.12 | |
| 9/7/2017 | 119 | 0.27 | |
| 5/10/2018 | 1,065 | 2.37 | |
| 6/11/2018 | 90 | 0.20 | |
| 9/28/2018 | 53 | 0.12 | |
| 5/6/2019 | 5,840 | 13.02 | |
| 6/17/2019 | 2,222 | 4.96 | |
| 9/11/2019 | 149 | 0.33 | |
| 5/13/2020 | 708 | 1.58 | |
| 6/7/2020 | 506 | 1.13 | |
| 9/25/2020 | 22.6 | 0.05 | |
| 5/6/2021 | 467 | 1.04 | |
| 6/10/2021 | 118 | 0.26 | |
| 9/21/2021 | 19.1 | 0.04 | |
| 5/6/2022 | 1,812 | 4.04 | |
| 5/26/2022 | 1,101 | 2.46 | |
| 9/5/2022 | 38.9 | 0.09 | |
| 5/16/2023 | 10,480 | 23.37 | |
| 6/8/2023 | 5,842 | 13.03 | |
| 9/7/2023 | 129.6 | 0.29 | |

Non-data logger site
GPM - gallons per minute
CFS - cubic feet per second

# Box Canyon
# Measured Flow

| Date | GPM | CFS | Comments |
|---|---|---|---|
| 5/6/2000 | 0.00 | 0.00 | Damp |
| 6/12/2000 | 0.00 | 0.00 | No Flow |
| 9/18/2000 | 0.00 | 0.00 | Dry |
| 4/28/2001 | 0.00 | 0.00 | Dry |
| 6/24/2001 | 0.00 | 0.00 | Dry |
| 9/30/2001 | 0.00 | 0.00 | Dry |
| 4/23/2002 | 0.00 | 0.00 | Dry |
| 6/18/2002 | 0.00 | 0.00 | Dry |
| 9/9/2002 | 0.00 | 0.00 | Dry |
| 4/10/2003 | 0.00 | 0.00 | Dry |
| 6/4/2003 | 0.00 | 0.00 | Dry |
| 9/18/2003 | 0.00 | 0.00 | Dry |
| 4/25/2004 | 0.00 | 0.00 | Dry |
| 5/29/2004 | 0.00 | 0.00 | Dry |
| 8/31/2004 | 0.00 | 0.00 | Dry |
| 5/2/2005 | 0.00 | 0.00 | Dry |
| 6/4/2005 | 0.00 | 0.00 | Dry |
| 9/20/2005 | 0.00 | 0.00 | Dry |
| 4/29/2006 | 0.00 | 0.00 | Dry |
| 5/15/2006 | 0.00 | 0.00 | Dry |
| 9/6/2006 | 0.00 | 0.00 | Dry |
| 4/26/2007 | 0.00 | 0.00 | Dry |
| 5/24/2007 | 0.00 | 0.00 | Dry |
| 8/24/2007 | 0.00 | 0.00 | Dry |
| 5/6/2008 | 4.40 | 0.01 | 4.40 |
| 6/6/2008 | 9.60 | 0.02 | 9.60 |
| 8/23/2008 | 0.00 | 0.00 | Trickle |
| 5/7/2009 | 5.74 | 0.01 | 5.74 |
| 5/24/2009 | 1.08 | 0.00 | 1.08 |
| 8/10/2009 | 0.23 | 0.00 | 0.23 |
| 5/4/2010 | 0.00 | 0.00 | Dry |
| 6/1/2010 | 0.00 | 0.00 | Dry |
| 8/29/2010 | 0.00 | 0.00 | Dry |
| 5/6/2011 | 0.00 | 0.00 | Dry |
| 6/2/2011 | 0.00 | 0.00 | Dry |
| 8/12/2011 | 0.00 | 0.00 | Dry |
| 4/25/2012 | 0.00 | 0.00 | Dry |
| 5/15/2012 | 0.00 | 0.00 | Dry |
| 8/19/2012 | 0.00 | 0.00 | Dry |
| 5/1/2013 | 0.00 | 0.00 | Dry |
| 5/22/2013 | 0.00 | 0.00 | Dry |
| 8/23/2013 | 0.00 | 0.00 | Dry |
| 5/1/2014 | 0.00 | 0.00 | Dry |
| 5/21/2014 |  | 0.00 | Dry |
| 9/23/2014 | 0.00 | 0.00 | Dry |
| 4/26/2015 | 0.00 | 0.00 | Dry |
| 5/29/2015 | 0.00 | 0.00 | Dry |
| 8/29/2015 | 0.00 | 0.00 | Dry |
| 5/3/2016 | 0.00 | 0.00 | Dry |
| 5/26/2016 | 0.00 | 0.00 | Dry |
| 9/8/2016 | 0.00 | 0.00 | Dry |
| 5/12/2017 | 0.00 | 0.00 | Dry |
| 6/6/2017 | 0.00 | 0.00 | Dry |
| 9/7/2017 | 0.00 | 0.00 | Dry |
| 5/12/2018 | 0.00 | 0.00 | Dry |
| 6/10/2018 | 0.00 | 0.00 | Dry |
| 9/29/2018 | 0.00 | 0.00 | Dry |
| 5/2/2019 | 0.00 | 0.00 | Dry |
| 6/22/2019 | 0.00 | 0.00 | Dry |
| 9/10/2019 | 0.00 | 0.00 | Dry |
| 5/12/2020 | 0.00 | 0.00 | Dry |
| 6/8/2020 | 0.00 | 0.00 | Dry |
| 9/25/2020 | 0.00 | 0.00 | Dry |
| 5/5/2021 | 0.00 | 0.00 | Dry |
| 6/7/2021 | 0.00 | 0.00 | Dry |
| 9/27/2021 | 0.00 | 0.00 | Dry |
| 5/4/2022 | 0.00 | 0.00 | Dry |
| 5/31/2022 | 0.00 | 0.00 | Dry |
| 9/6/2022 | 0.00 | 0.00 | Dry |
| 5/10/2023 | 6.50 | 0.01 |  |
| 6/6/2023 | 4.94 | 0.01 |  |
| 9/5/2023 | 0.00 | 0.00 | Dry |

Non-data logger site
GPM - gallons per minute
CFS - cubic feet per second

# Deer Creek
# Measured Flow

| Date | GPM | CFS | Comments |
|---|---|---|---|
| 5/3/2005 | 53 | 0.12 | |
| 5/9/2005 | 114 | 0.25 | |
| 6/6/2005 | 11.2 | 0.02 | |
| 7/5/2005 | 0.72 | 0.00 | |
| 8/4/2005 | 0.00 | 0.00 | Damp |
| 9/6/2005 | 0.00 | 0.00 | Dry |
| 10/2/2005 | 0.00 | 0.00 | Dry |
| 5/1/2006 | 0.00 | 0.00 | Dry |
| 7/22/2006 | 0.00 | 0.00 | Dry |
| 8/18/2006 | 0.00 | 0.00 | Dry |
| 4/27/2007 | 22.20 | 0.05 | |
| 5/30/2007 | 46.98 | 0.10 | |
| 8/23/2007 | 0.00 | 0.00 | Dry |
| 4/27/2007 | 22.20 | 0.05 | |
| 5/30/2007 | 46.98 | 0.10 | |
| 8/23/2007 | 0.00 | 0.00 | Dry |
| 5/5/2008 | 550 | 1.23 | |
| 6/8/2008 | 92 | 0.21 | |
| 8/22/2008 | 0 | 0.00 | Dry |
| 5/8/2009 | 0.00 | 0.00 | Dry |
| 6/3/2009 | 25.98 | 0.06 | |
| 8/10/2009 | 0.00 | 0.00 | Dry |
| 5/6/2010 | 0.00 | 0.00 | Dry |
| 6/2/2010 | 0.00 | 0.00 | Dry |
| 8/31/2010 | 0.00 | 0.00 | Dry |
| 5/5/2011 | 155 | 0.35 | |
| 6/3/2011 | 122 | 0.27 | |
| 8/12/2011 | 0.00 | 0.00 | Dry |
| 4/24/2012 | 0.00 | 0.00 | Dry |
| 5/17/2012 | 0.00 | 0.00 | Dry |
| 8/22/2012 | 0.00 | 0.00 | Dry |
| 5/1/2013 | 0.00 | 0.00 | Dry |
| 5/21/2013 | 0.00 | 0.00 | Dry |
| 8/23/2013 | 0.00 | 0.00 | Dry |
| 5/2/2014 | 3.66 | 0.01 | |
| 5/19/2014 | 12.20 | 0.03 | |
| 9/23/2014 | 0.00 | 0.00 | Dry |
| 4/24/2015 | 0.00 | 0.00 | Dry |
| 5/25/2015 | 0.00 | 0.00 | Dry |
| 8/19/2015 | 0.00 | 0.00 | Dry |
| 5/2/2016 | 83.48 | 0.19 | |
| 5/24/2016 | 33.05 | 0.07 | |
| 9/7/2016 | 0.00 | 0.00 | Dry |
| 5/10/2017 | 0.00 | 0.00 | Dry |
| 6/8/2017 | 0.00 | 0.00 | Dry |
| 9/7/2017 | 0.00 | 0.00 | Dry |
| 5/11/2018 | 0.00 | 0.00 | Dry |
| 6/12/2018 | 0.00 | 0.00 | Dry |
| 9/27/2018 | 0.00 | 0.00 | Dry |
| 5/1/2019 | 269 | 0.60 | |
| 6/20/2019 | 0.25 | 0.00 | |
| 9/11/2019 | 0.00 | 0.00 | Dry |
| 5/12/2020 | 0.00 | 0.00 | Dry |
| 6/8/2020 | 0.00 | 0.00 | Dry |
| 9/3/2020 | 0.00 | 0.00 | Dry |
| 5/6/2021 | 0.00 | 0.00 | Dry |
| 6/8/2021 | 0.00 | 0.00 | Dry |
| 9/6/2021 | 0.00 | 0.00 | Dry |
| 5/6/2022 | 0.00 | 0.00 | Dry |
| 5/27/2022 | 0.00 | 0.00 | Dry |
| 9/6/2022 | 0.00 | 0.00 | Dry |
| 5/9/2023 | 491 | 1.09 | |
| 6/7/2023 | 44.04 | 0.10 | |
| 9/4/2023 | 0.00 | 0.00 | Dry |

Non-data logger site
GPM - gallons per minute
CFS - cubic feet per second

# Poison Gulch
# Measured Flow

| Date | GPM | CFS | Comments |
|---|---|---|---|
| 5/9/2005 | 97 | 0.22 | |
| 6/6/2005 | 12.5 | 0.03 | |
| 7/5/2005 | 0.00 | 0.00 | Wet |
| 8/4/2005 | 0.00 | 0.00 | Dry |
| 9/6/2005 | 0.00 | 0.00 | Dry |
| 10/2/2005 | 0.00 | 0.00 | Dry |
| 5/1/2006 | 31.33 | 0.07 | |
| 5/22/2006 | 4.01 | 0.01 | |
| 8/18/2006 | 0.00 | 0.00 | Dry |
| 4/27/2007 | 15 | 0.03 | |
| 5/30/2007 | 60 | 0.13 | |
| 8/23/2007 | 0.00 | 0.00 | Dry |
| 4/27/2007 | 15 | 0.03 | |
| 5/30/2007 | 60 | 0.13 | |
| 8/23/2007 | 0.00 | 0.00 | Dry |
| 5/5/2008 | 530 | 1.18 | |
| 6/8/2008 | 56 | 0.12 | |
| 8/22/2008 | 0.1 | 0.00 | Trickle |
| 5/9/2009 | 65.81 | 0.15 | |
| 6/3/2009 | 75 | 0.17 | |
| 8/9/2009 | 0.00 | 0.00 | Dry |
| 5/6/2010 | 38.89 | 0.09 | |
| 6/2/2010 | 5.39 | 0.01 | |
| 8/31/2010 | 0.00 | 0.00 | Damp |
| 5/9/2011 | 351 | 0.78 | |
| 6/1/2011 | 145 | 0.32 | |
| 8/11/2011 | 1.26 | 0.00 | |
| 4/30/2012 | 5.53 | 0.01 | |
| 5/16/2012 | 3.24 | 0.01 | |
| 8/22/2012 | 0.00 | 0.00 | Dry |
| 5/1/2013 | 22.40 | 0.05 | |
| 5/21/2013 | 0.78 | 0.00 | |
| 8/23/2013 | 0.00 | 0.00 | Dry |
| 5/2/2014 | 12.04 | 0.03 | |
| 5/19/2014 | 6.71 | 0.01 | |
| 9/24/2014 | 0.00 | 0.00 | Dry |
| 4/25/2015 | 0.00 | 0.00 | Seep |
| 5/28/2015 | 0.00 | 0.00 | Seep |
| 8/19/2015 | 0.00 | 0.00 | Dry |
| 5/4/2016 | 27.75 | 0.06 | |
| 5/24/2016 | 18.75 | 0.04 | |
| 9/5/2016 | 0.00 | 0.00 | Dry |
| 5/11/2017 | 16.29 | 0.04 | |
| 6/7/2017 | 0.80 | 0.00 | |
| 9/7/2017 | 0.00 | 0.00 | Dry |
| 5/11/2018 | 0.00 | 0.00 | Dry |
| 6/11/2018 | 0.00 | 0.00 | Dry |
| 9/27/2018 | 0.00 | 0.00 | Dry |
| 5/6/2019 | 45.2 | 0.10 | |
| 6/20/2019 | 0.00 | 0.00 | Dry |
| 9/11/2019 | 0.00 | 0.00 | Dry |
| 5/13/2020 | 0.00 | 0.00 | Dry |
| 6/7/2020 | 0.00 | 0.00 | Dry |
| 9/4/2020 | 0.00 | 0.00 | Dry |
| 5/6/2021 | 0.00 | 0.00 | Dry |
| 6/11/2021 | 0.00 | 0.00 | Dry |
| 9/21/2021 | 0.00 | 0.00 | Dry |
| 5/6/2022 | 0.00 | 0.00 | Dry |
| 5/27/2022 | 0.00 | 0.00 | Dry |
| 9/6/2022 | 0.00 | 0.00 | Dry |
| 5/9/2023 | 413.00 | 0.92 | |
| 6/8/2023 | 22.80 | 0.05 | |
| 9/7/2023 | 0.00 | 0.00 | Dry |

Non-data logger site
GPM - gallons per minute
CFS - cubic feet per second

## South Fork of South Prong Creek
## Measured Flow

| Date | GPM | CFS | Comments |
|---|---|---|---|
| 7/19/2018 | 236.9 | 0.53 | |
| 8/30/2018 | 100.9 | 0.23 | |
| 9/25/2018 | 117.9 | 0.26 | |
| 5/8/2019 | 1,603 | 3.57 | |
| 6/19/2019 | 5,147 | 11.48 | |
| 7/30/2019 | 1,322 | 2.95 | |
| 9/9/2019 | 345.5 | 0.77 | |
| 5/14/2020 | 1,418 | 3.16 | |
| 6/11/2020 | 1,031 | 2.30 | |
| 9/3/2020 | 175 | 0.39 | |
| 5/7/2021 | 436 | 0.97 | |
| 6/8/2021 | 2,269 | 5.06 | |
| 9/6/2021 | 172 | 0.38 | |
| 5/9/2022 | 1,497 | 3.34 | |
| 5/30/2022 | 2,030 | 4.53 | |
| 9/2/2022 | 322 | 0.72 | |
| 6/5/2023 | 5,472 | 12.20 | |
| 9/4/2023 | 511 | 1.14 | |

Non-data logger site
GPM - gallons per minute
CFS - cubic feet per second

## North Fork of South Prong Creek
## Measured Flow

| Date | GPM | CFS | Comments |
|---|---|---|---|
| 7/19/2018 | 0.00 | 0.00 | Dry |
| 8/30/2018 | 0.00 | 0.00 | Dry |
| 9/25/2018 | 0.00 | 0.00 | Dry |
| 5/8/2019 | 27.99 | 0.06 | |
| 6/19/2019 | 134.14 | 0.30 | |
| 7/30/2019 | 9.95 | 0.02 | |
| 9/9/2019 | 0.00 | 0.00 | Dry |
| 5/14/2020 | 21.58 | 0.05 | |
| 6/11/2020 | 7.64 | 0.02 | |
| 9/3/2020 | 0.00 | 0.00 | Dry |
| 5/7/2021 | 0.00 | 0.00 | Dry |
| 6/8/2021 | 0.00 | 0.00 | Dry |
| 9/6/2021 | 0.00 | 0.00 | Dry |
| 5/9/2022 | 78.33 | 0.17 | |
| 5/30/2022 | 24.26 | 0.05 | |
| 9/2/2022 | 0.00 | 0.00 | Dry |
| 6/5/2023 | 169 | 0.38 | |
| 9/4/2023 | 14.83 | 0.03 | |

Non-data logger site
GPM - gallons per minute
CFS - cubic feet per second

## Stream ST-SW-1
## Measured Flow

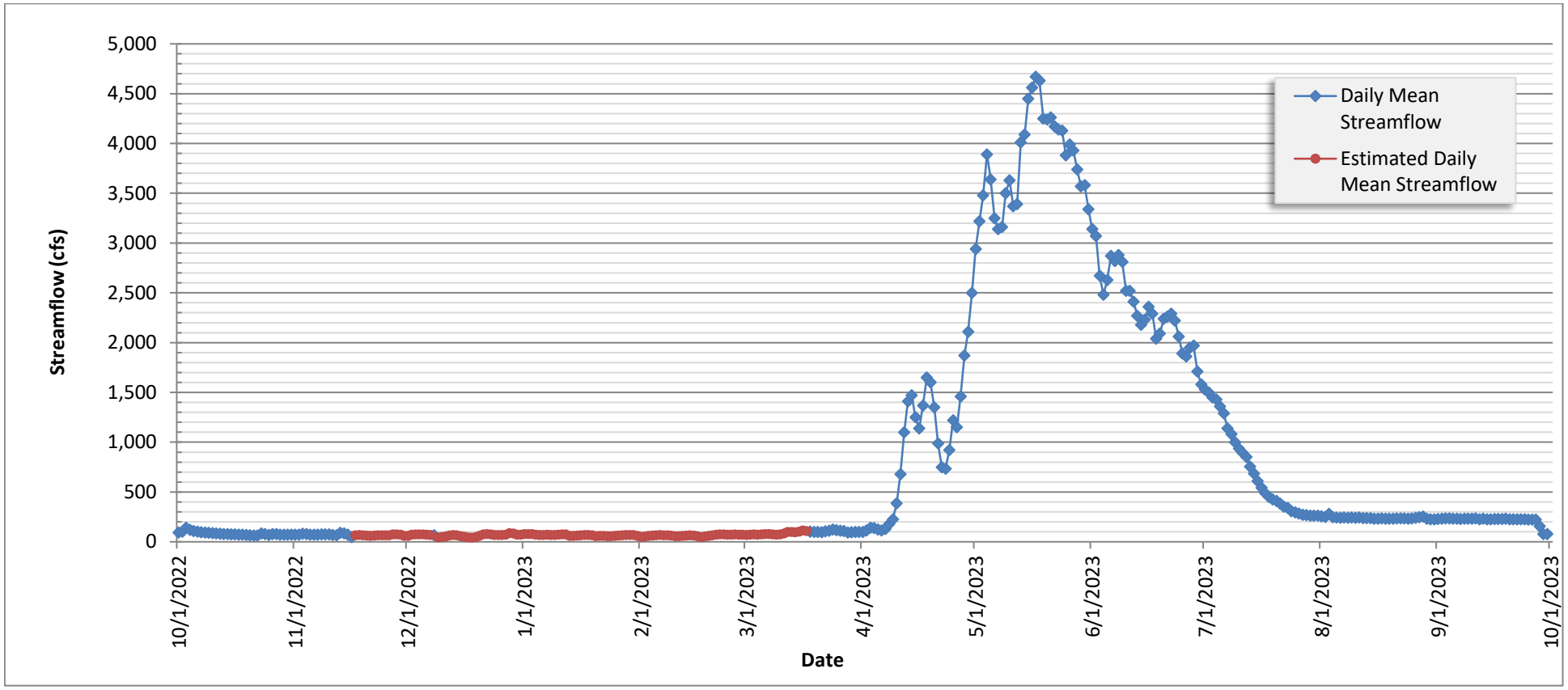
| Date | GPM | CFS | Comments |
|---|---|---|---|
| 7/18/2018 | 7.75 | 0.02 | |
| 8/29/2018 | 8.75 | 0.02 | |
| 9/25/2018 | 12.98 | 0.03 | |
| 6/19/2019 | 77.97 | 0.17 | |
| 7/30/2019 | 174.7 | 0.39 | |
| 9/9/2019 | 48.87 | 0.11 | |
| 5/14/2020 | 60.18 | 0.13 | |
| 6/11/2020 | 35.94 | 0.08 | |
| 9/3/2020 | 11.03 | 0.02 | |
| 5/7/2021 | 47.40 | 0.11 | |
| 6/8/2021 | 16.89 | 0.04 | |
| 9/6/2021 | 8.90 | 0.02 | |
| 5/9/2022 | 191.50 | 0.43 | |
| 5/30/2022 | 56.71 | 0.13 | |
| 9/2/2022 | 12.97 | 0.03 | |
| 6/5/2023 | 194.00 | 0.43 | |
| 9/4/2023 | 10.60 | 0.02 | |

Non-data logger site
GPM - gallons per minute
CFS - cubic feet per second

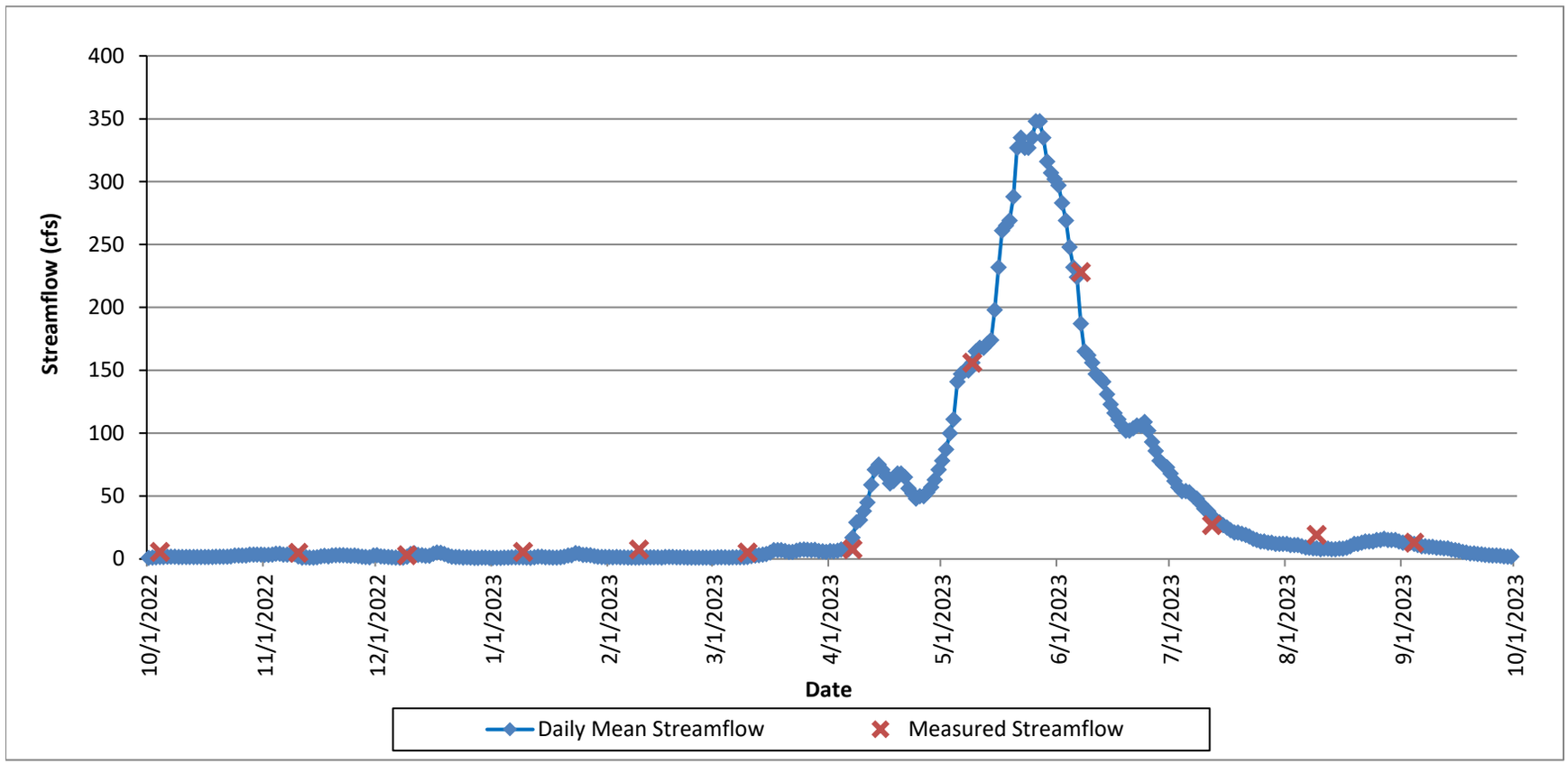
# APPENDIX B

## SURFACE WATER - HYDROGRAPHS

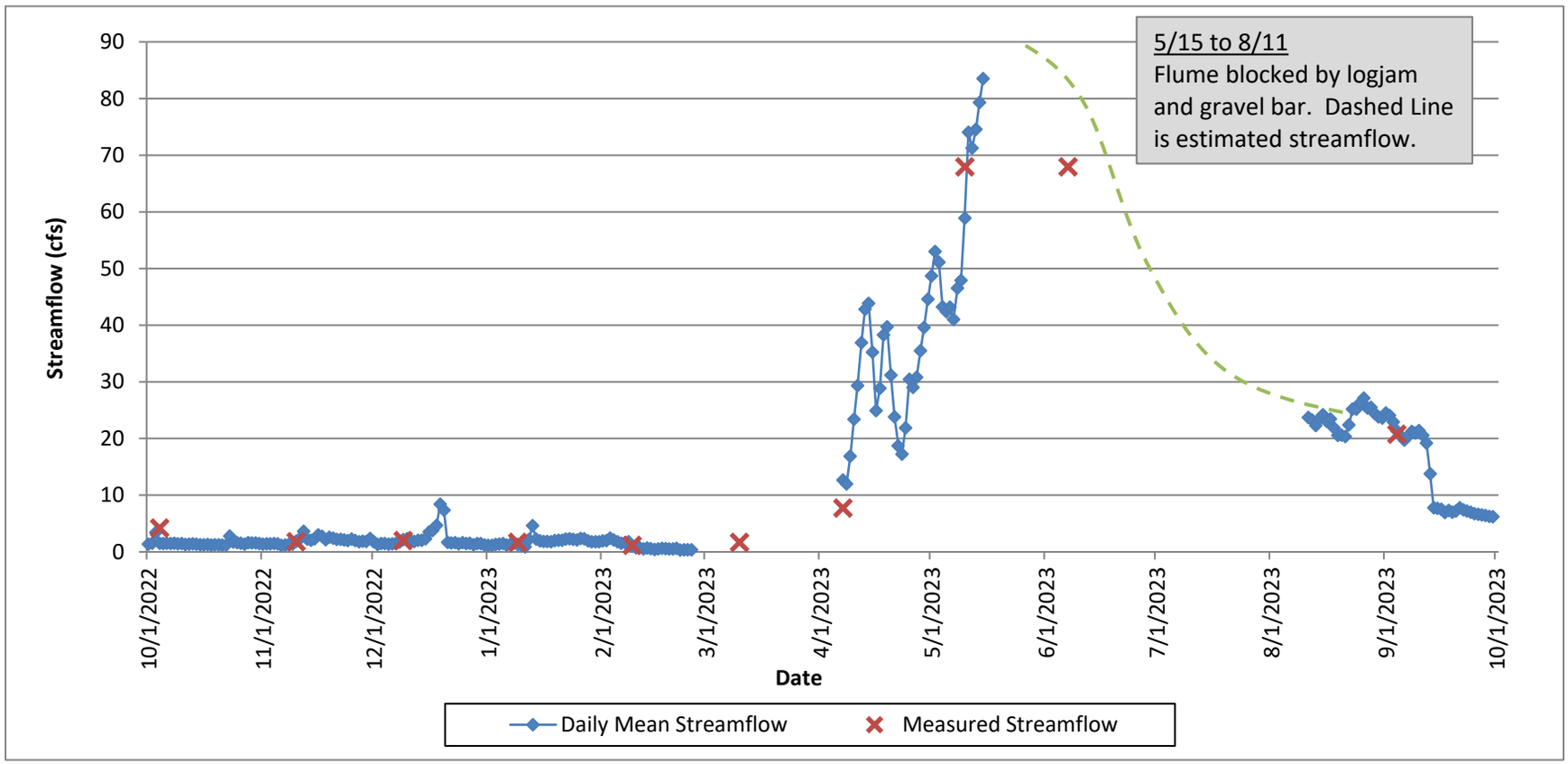
# Upper North Fork (USGS) Hydrograph
# WY 2023



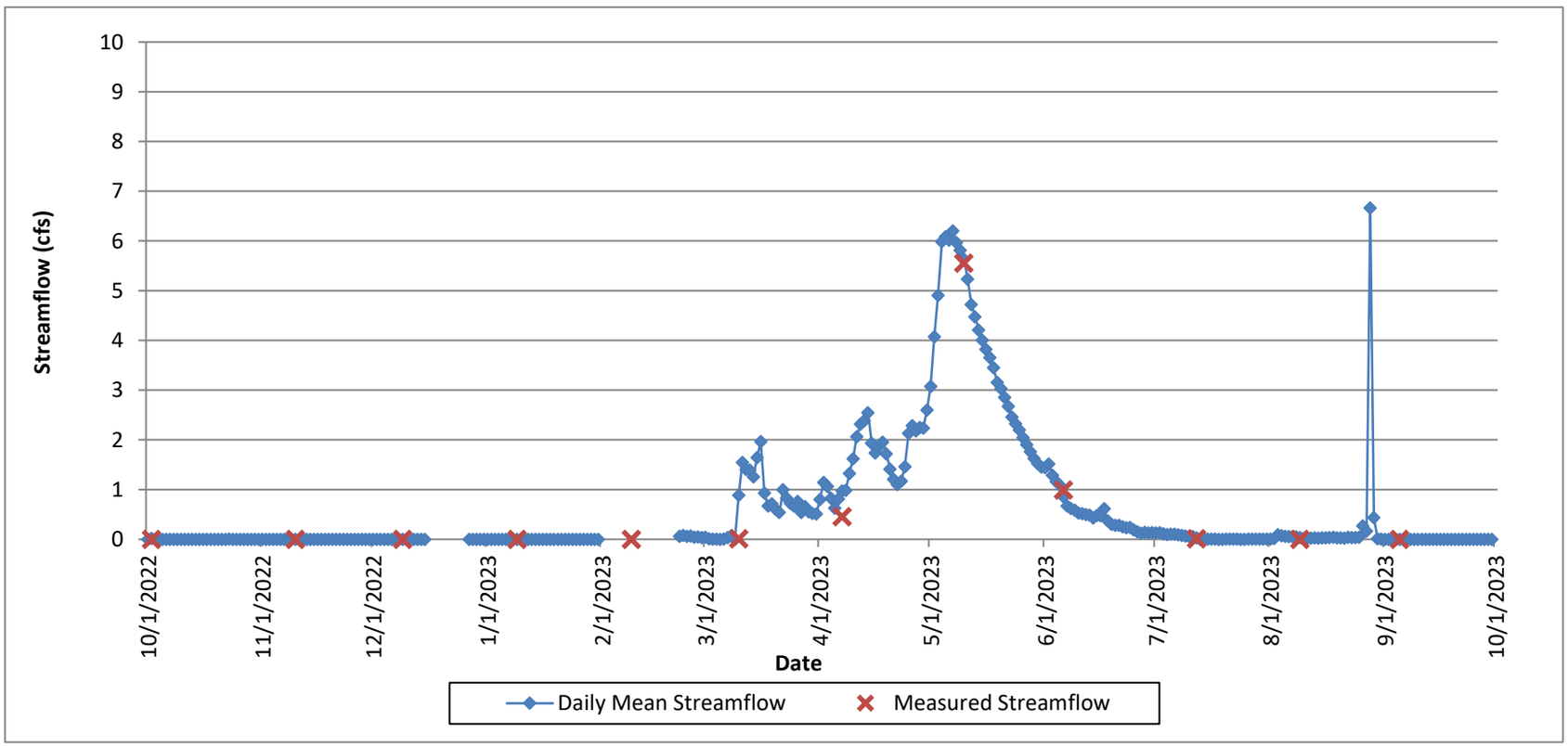
## Lower Minnesota Creek Hydrograph
## WY 2023



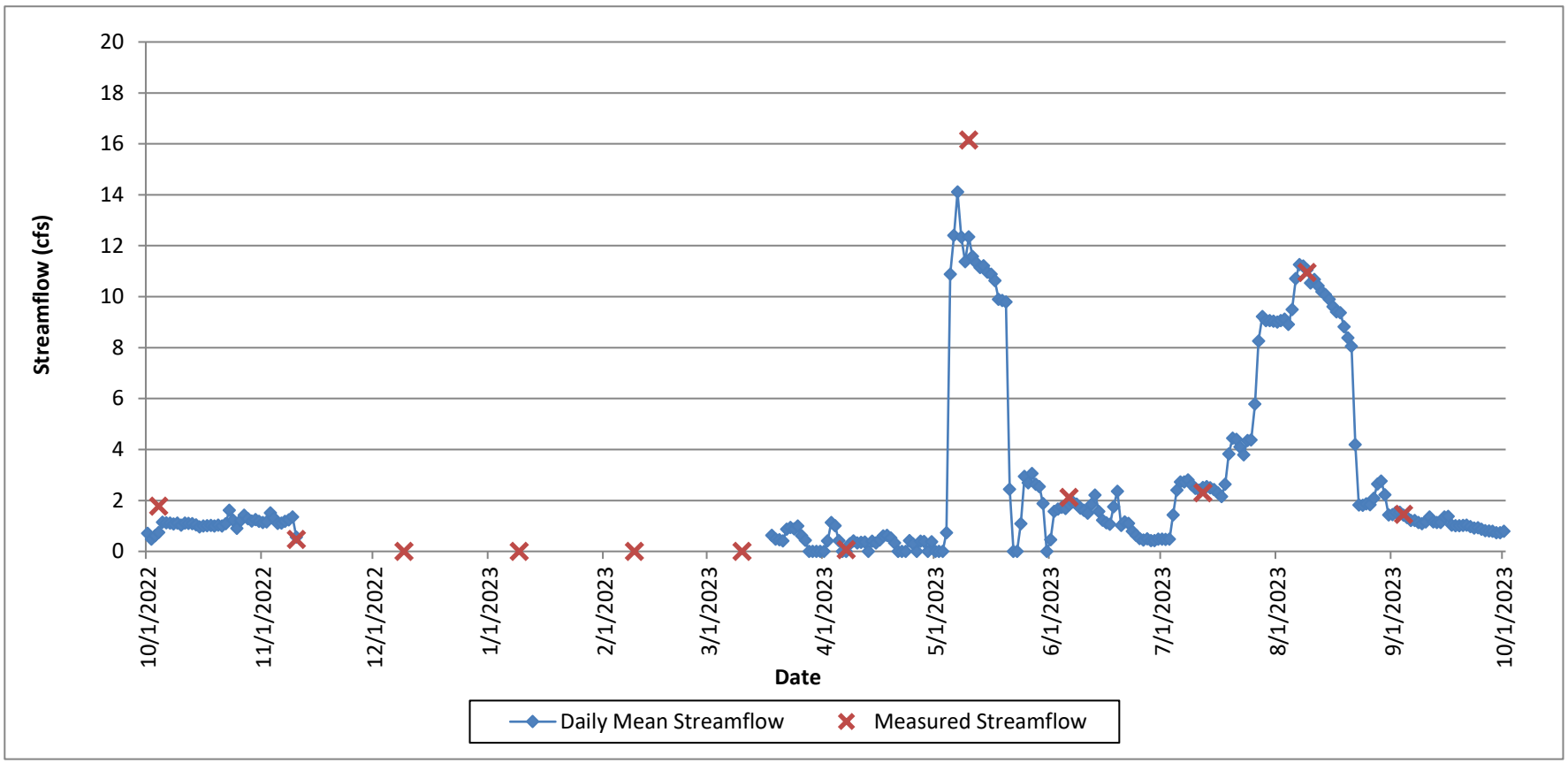
## Upper Minnesota Creek Hydrograph
## WY 2023



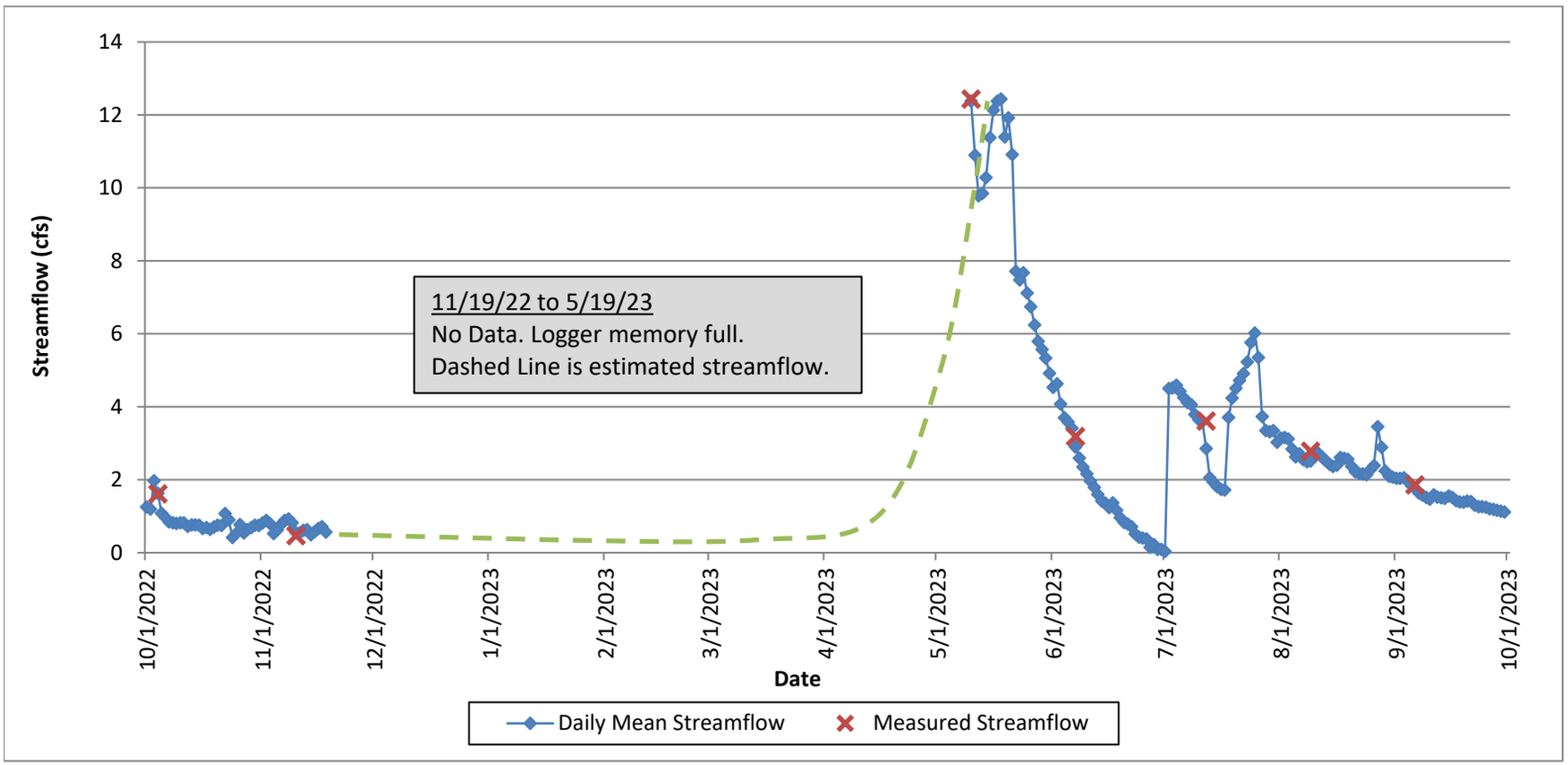
## Middle Sylvester Gulch Hydrograph
## WY 2023



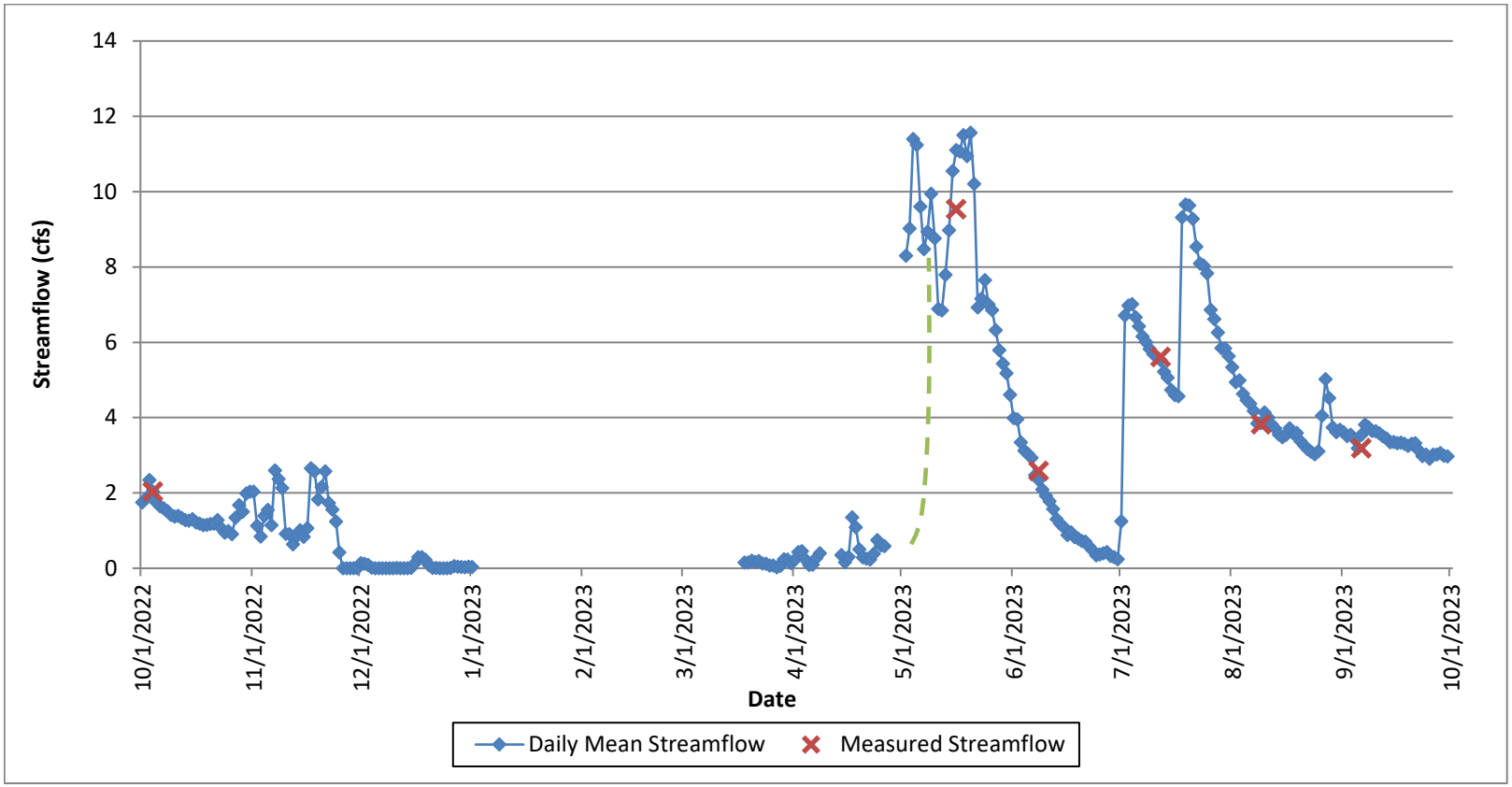
## Lower Dry Fork Hydrograph
## WY 2023



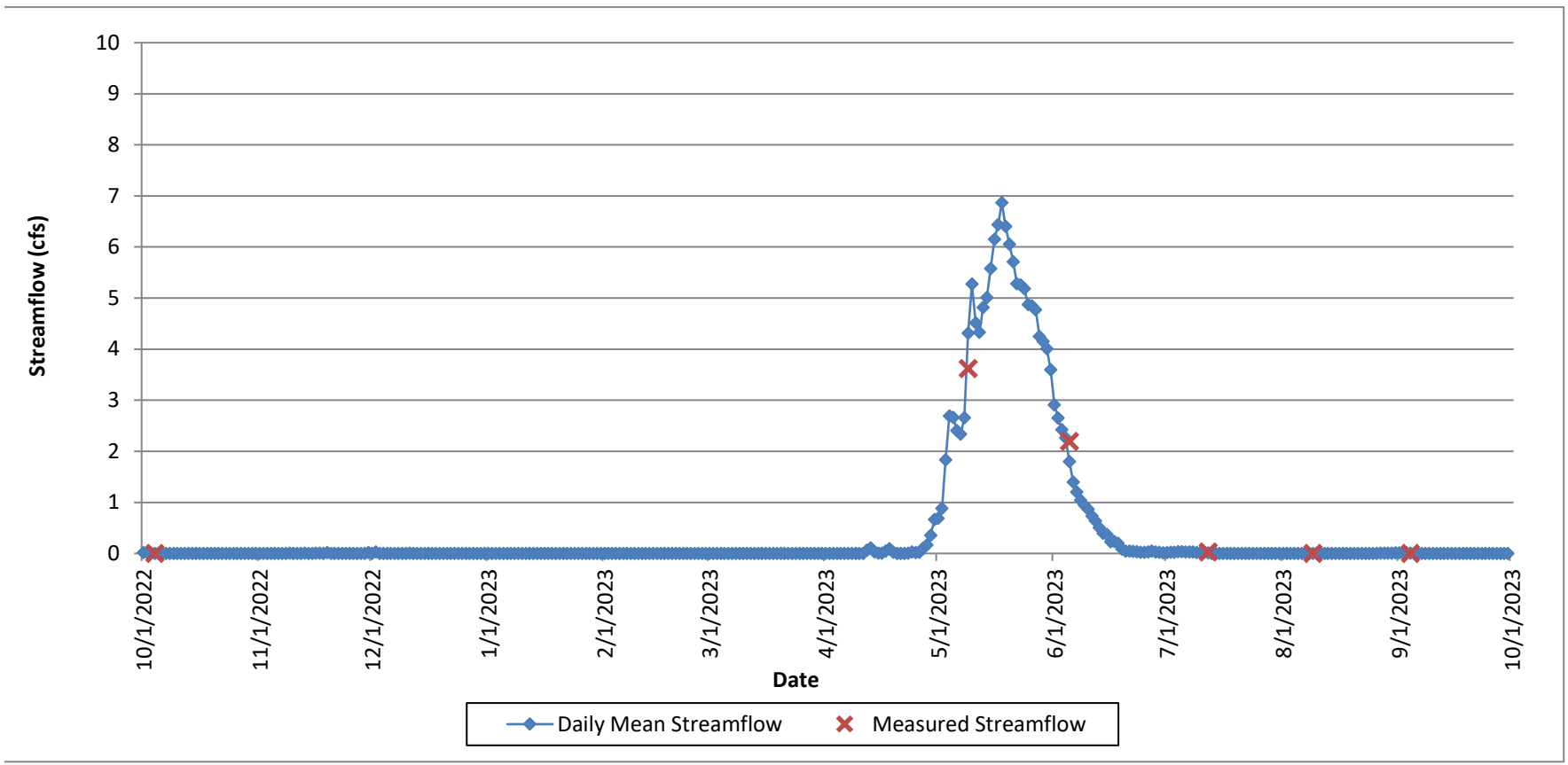
# Middle Dry Fork Hydrograph
# WY 2023



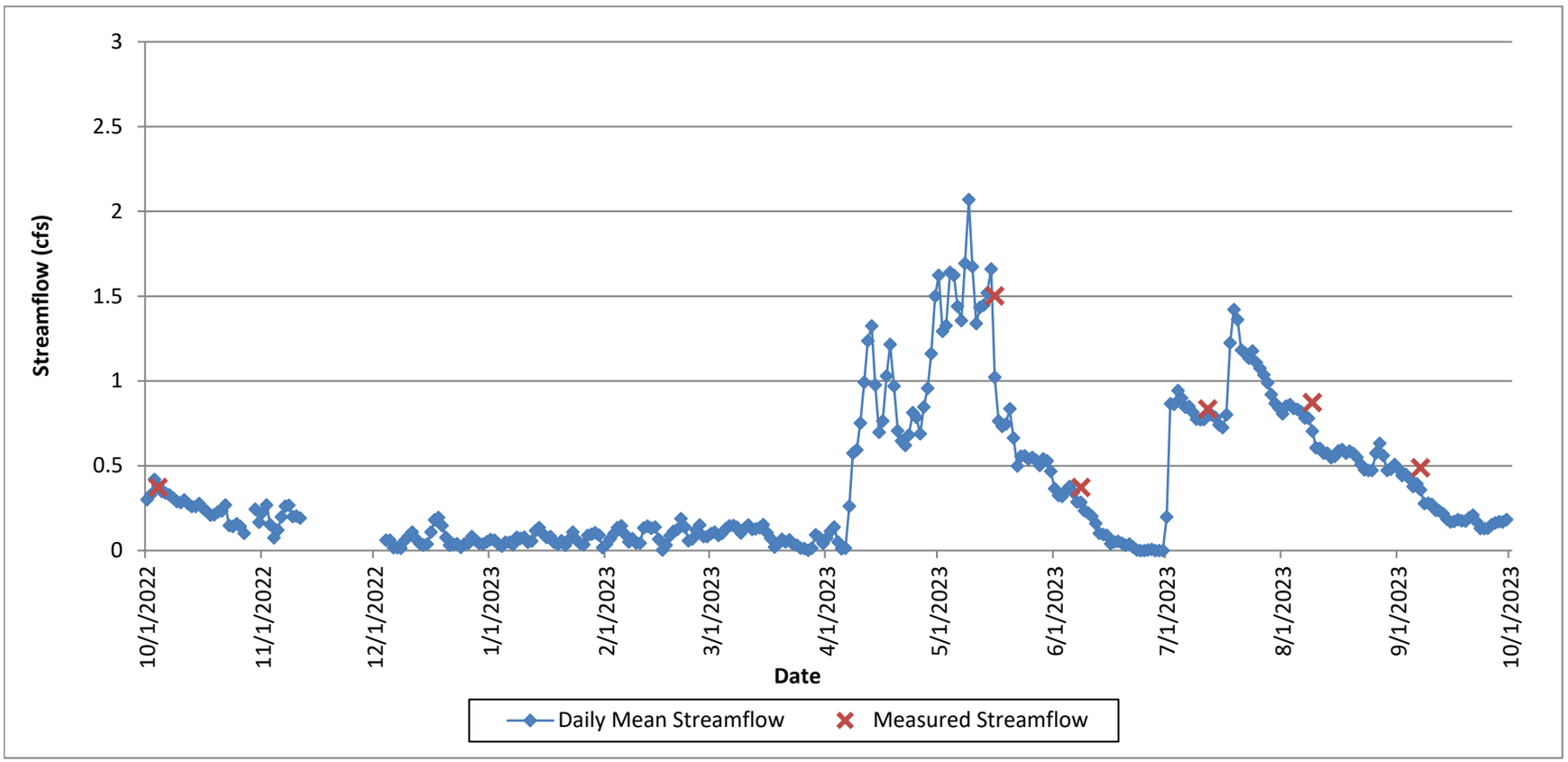
**Upper Dry Fork Hydrograph**
**WY 2023**



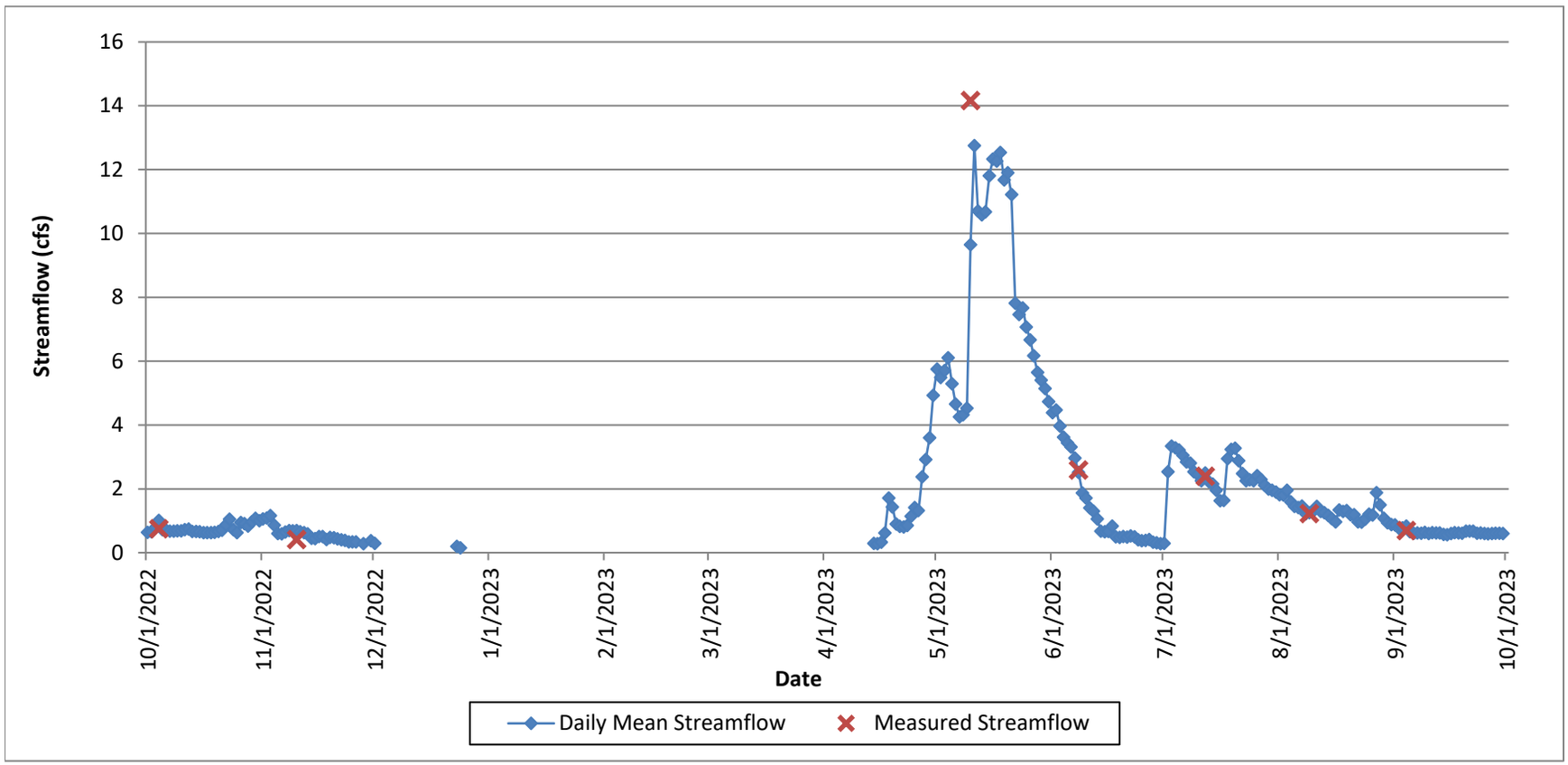
## Lick Creek Hydrograph
## WY 2023



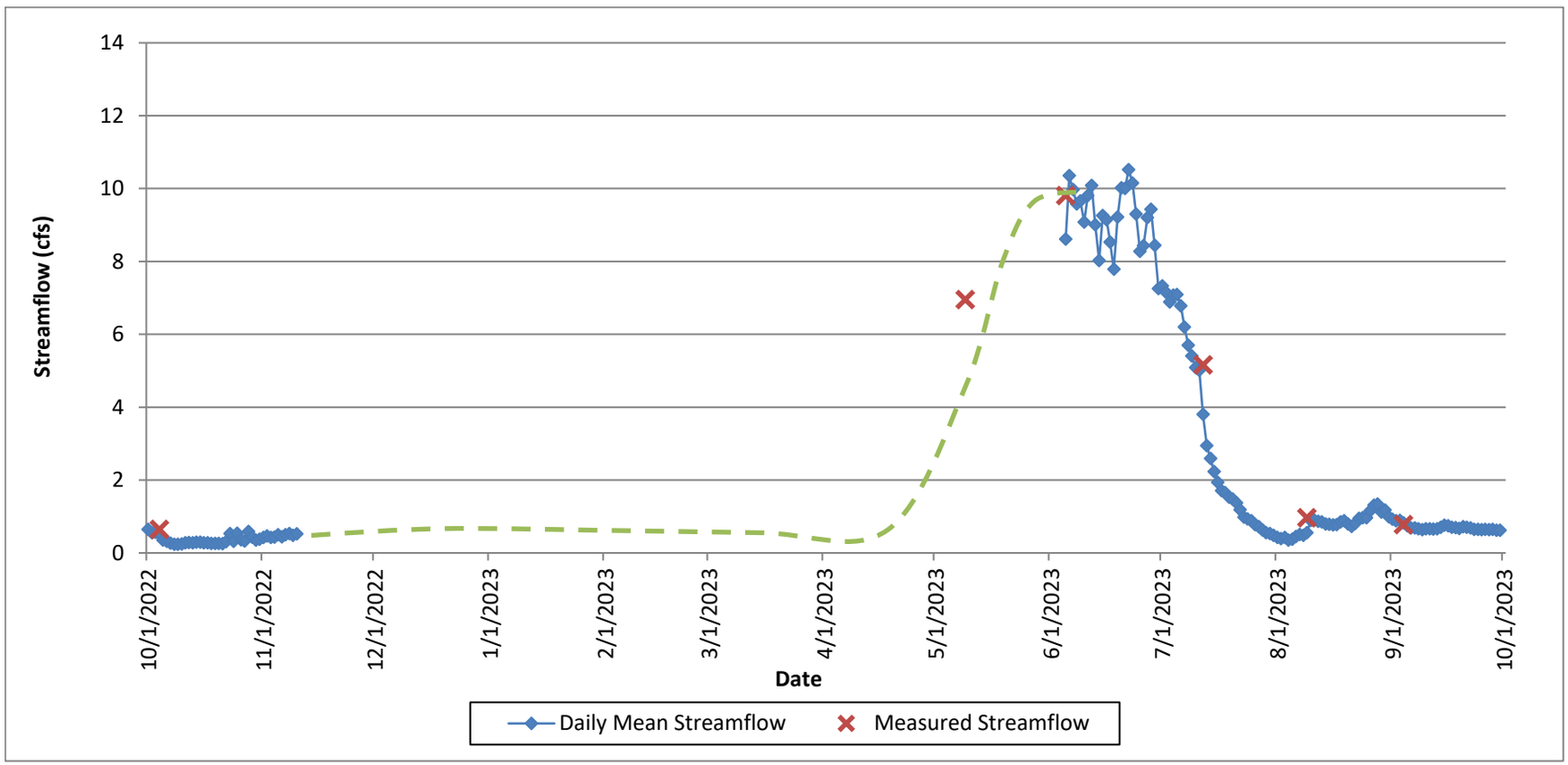
**Deep Creek Ditch Hydrograph**
**WY 2023**



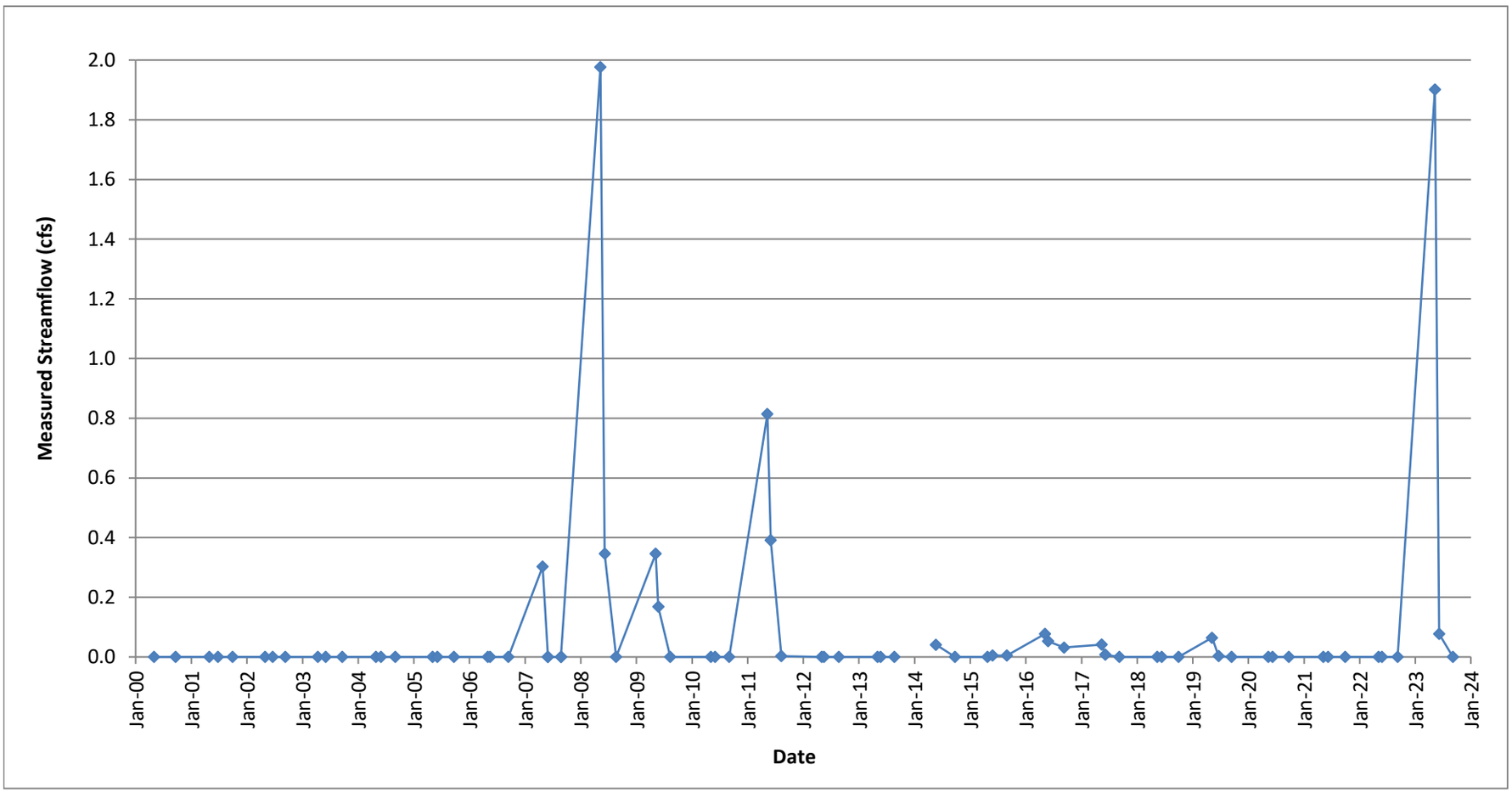
## Minnesota Reservoir Flume Hydrograph
## WY 2023



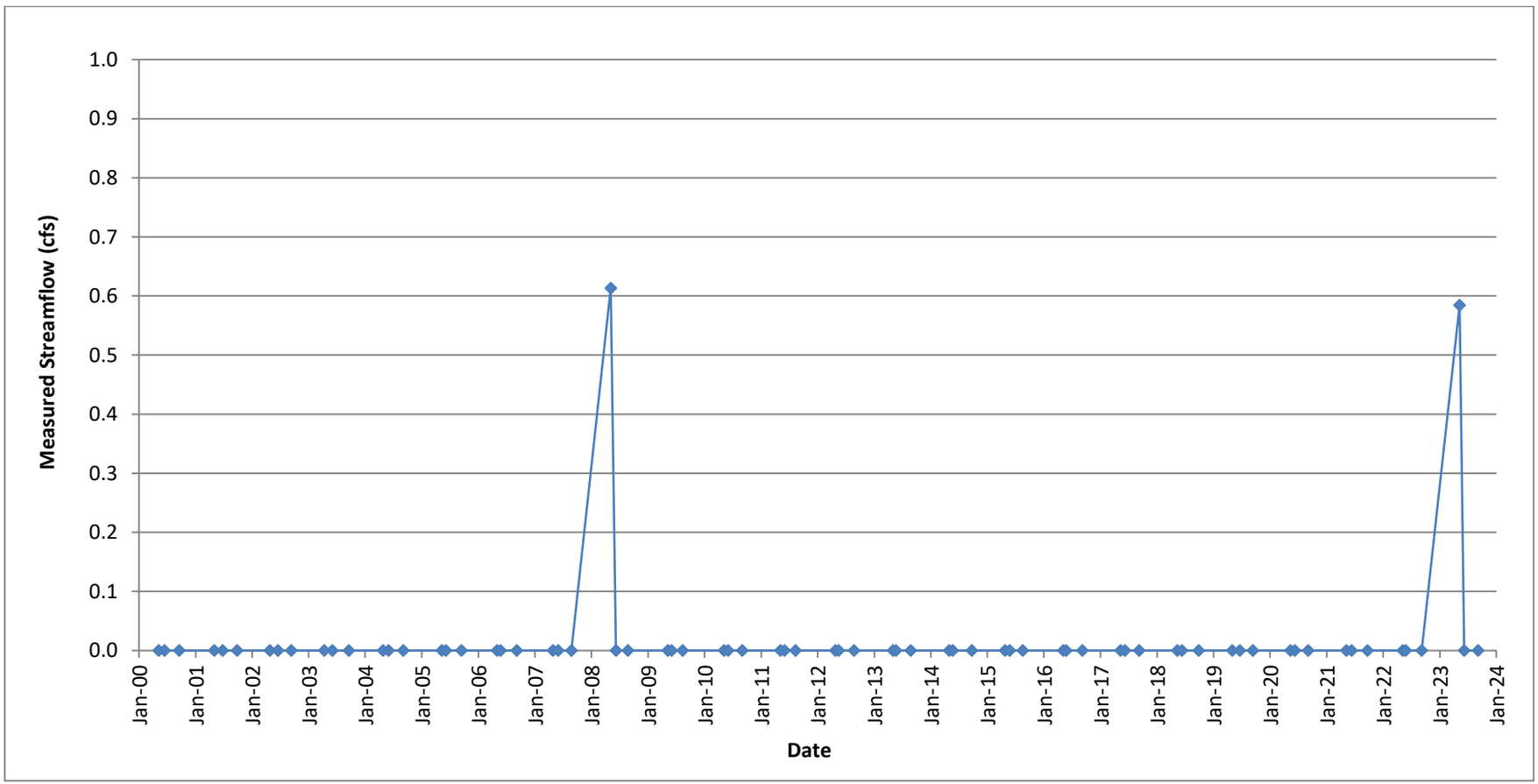
## South Prong Creek Hydrograph
## WY 2023



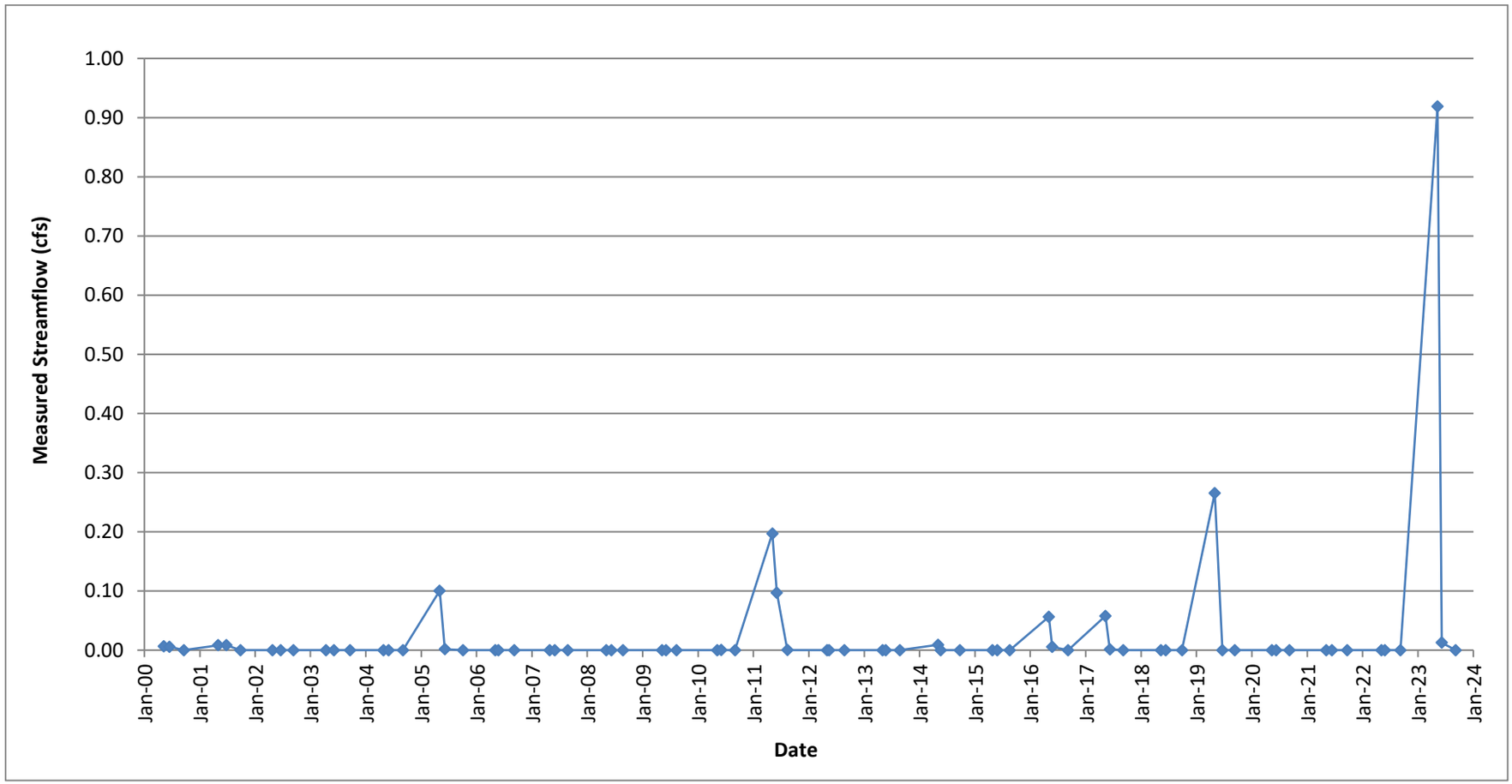
## Upper Sylvester Gulch Flume
## Hydrograph



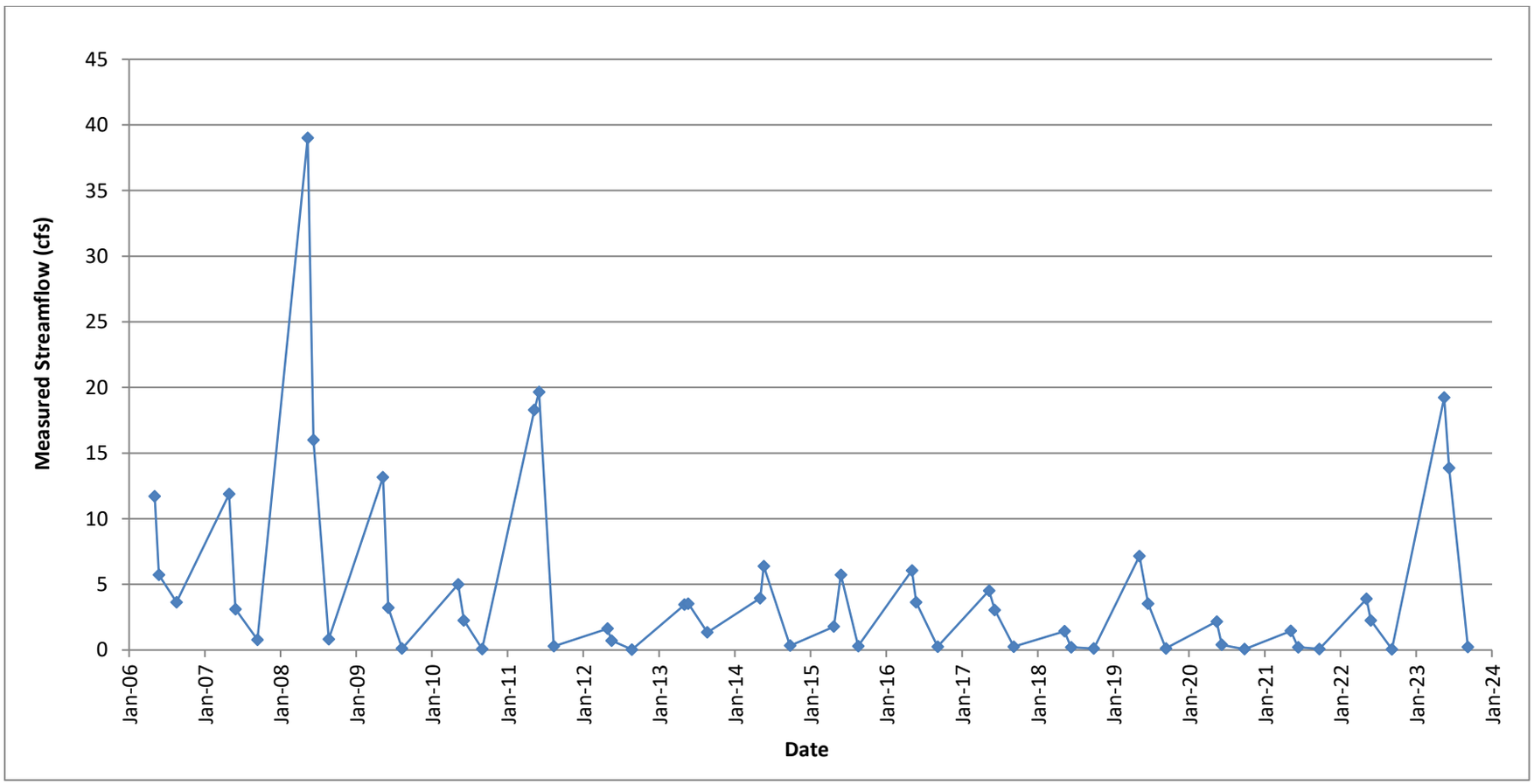
## Horse Gulch
## Hydrograph



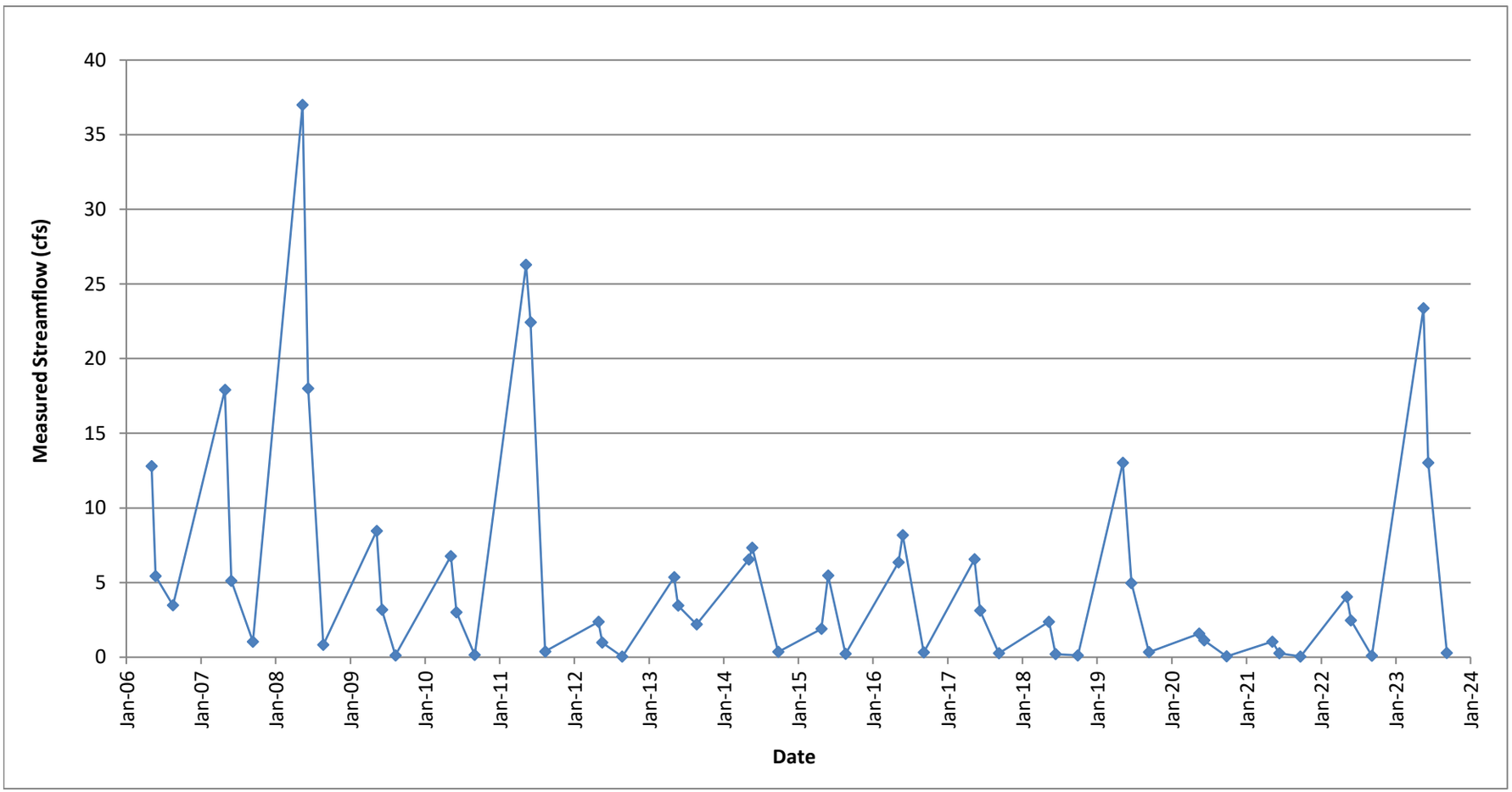
## East Gulch east of Horse Gulch
## Hydrograph



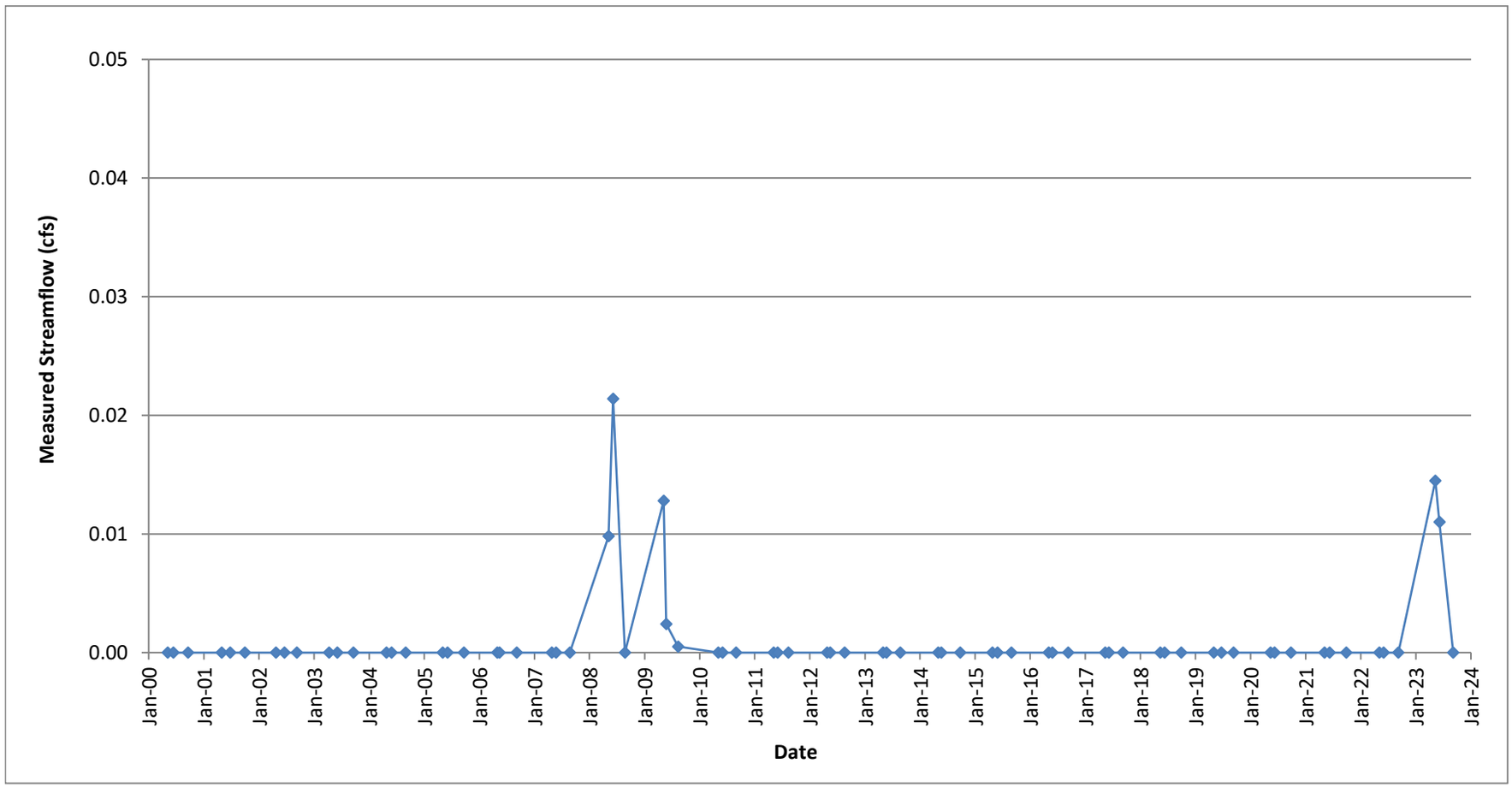
## Upper Deep Creek
## Hydrograph



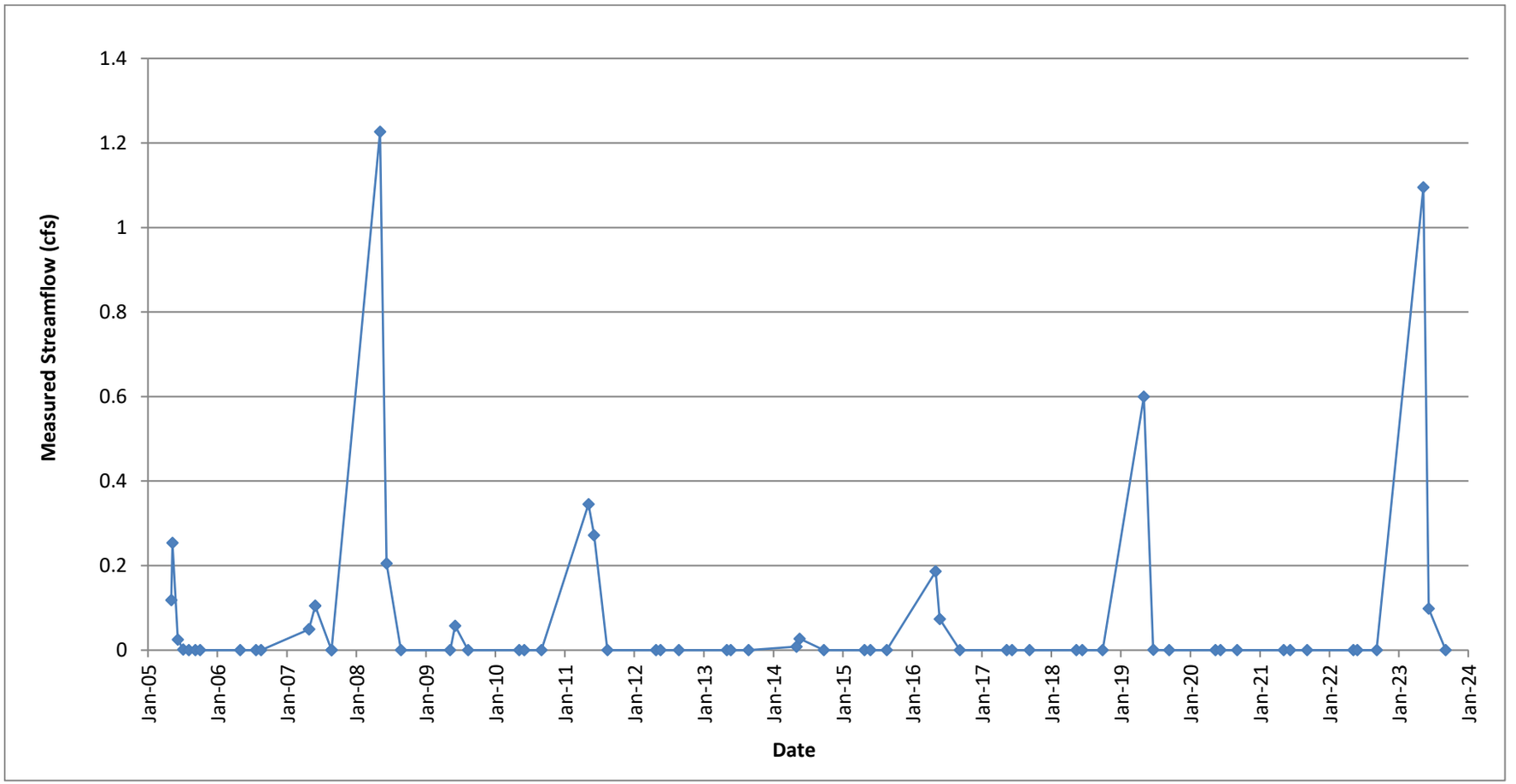
## Lower Deep Creek
## Hydrograph



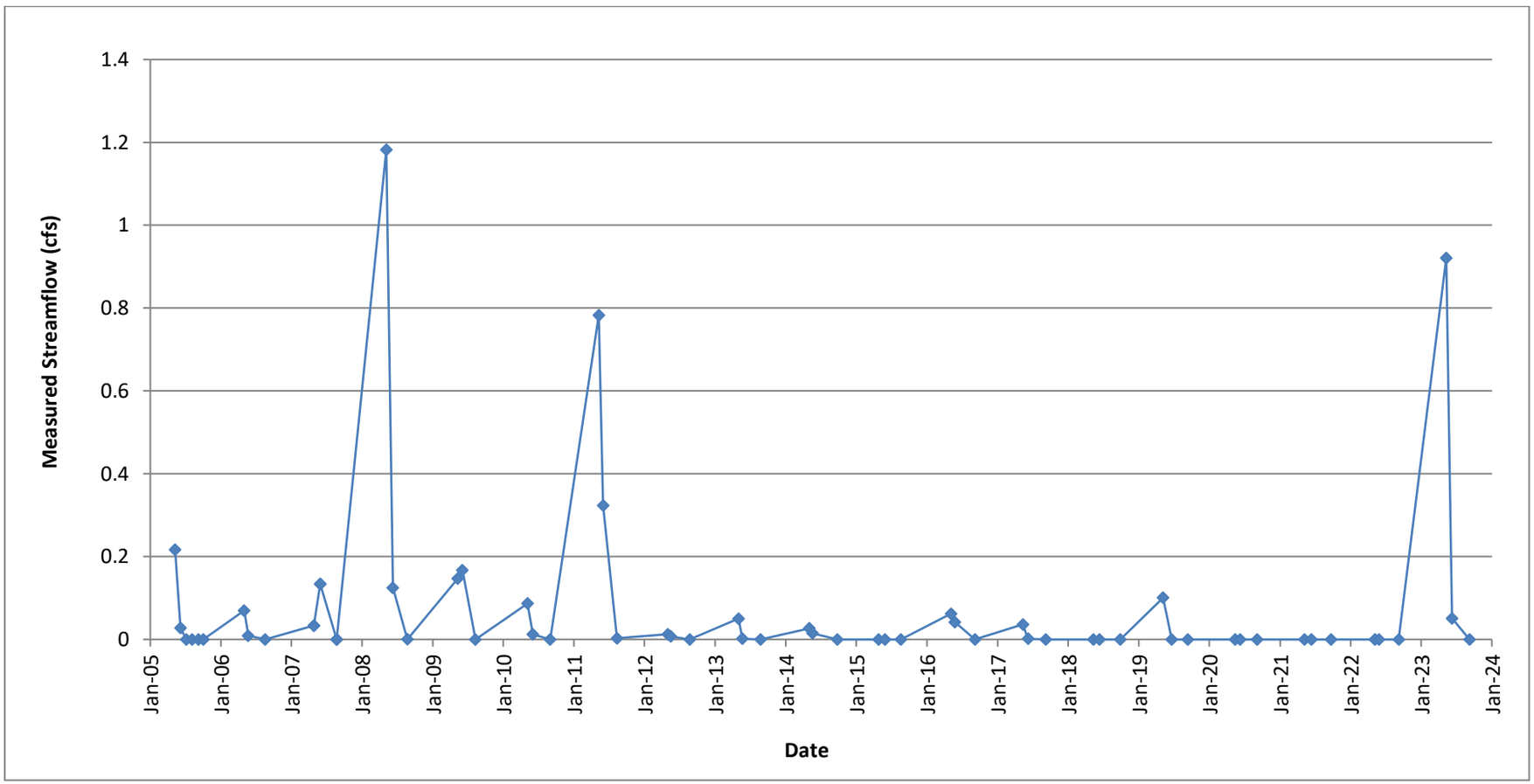
**Box Canyon**
**Hydrograph**



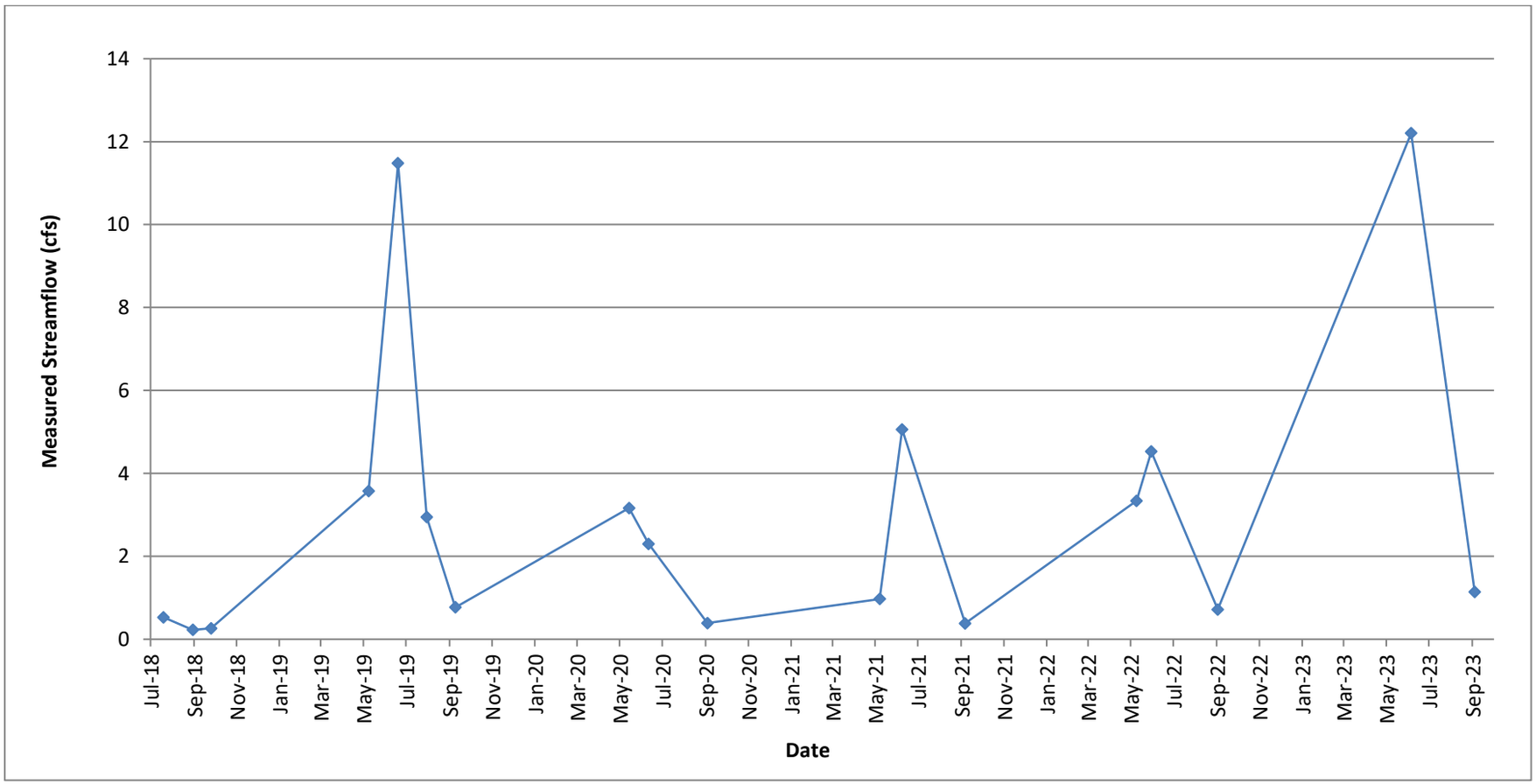
**Deer Creek**
**Hydrograph**



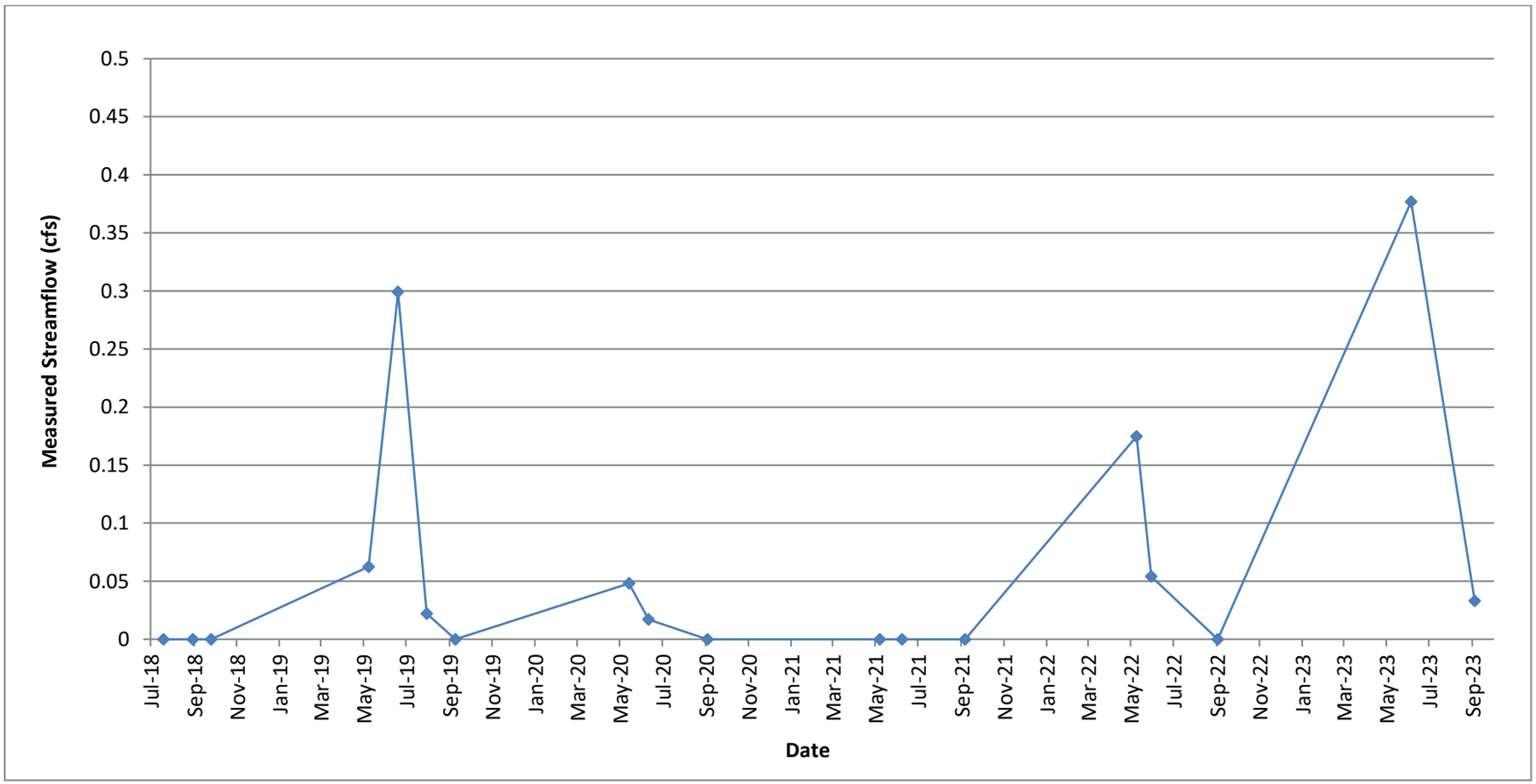
**Poison Gulch**
**Hydrograph**



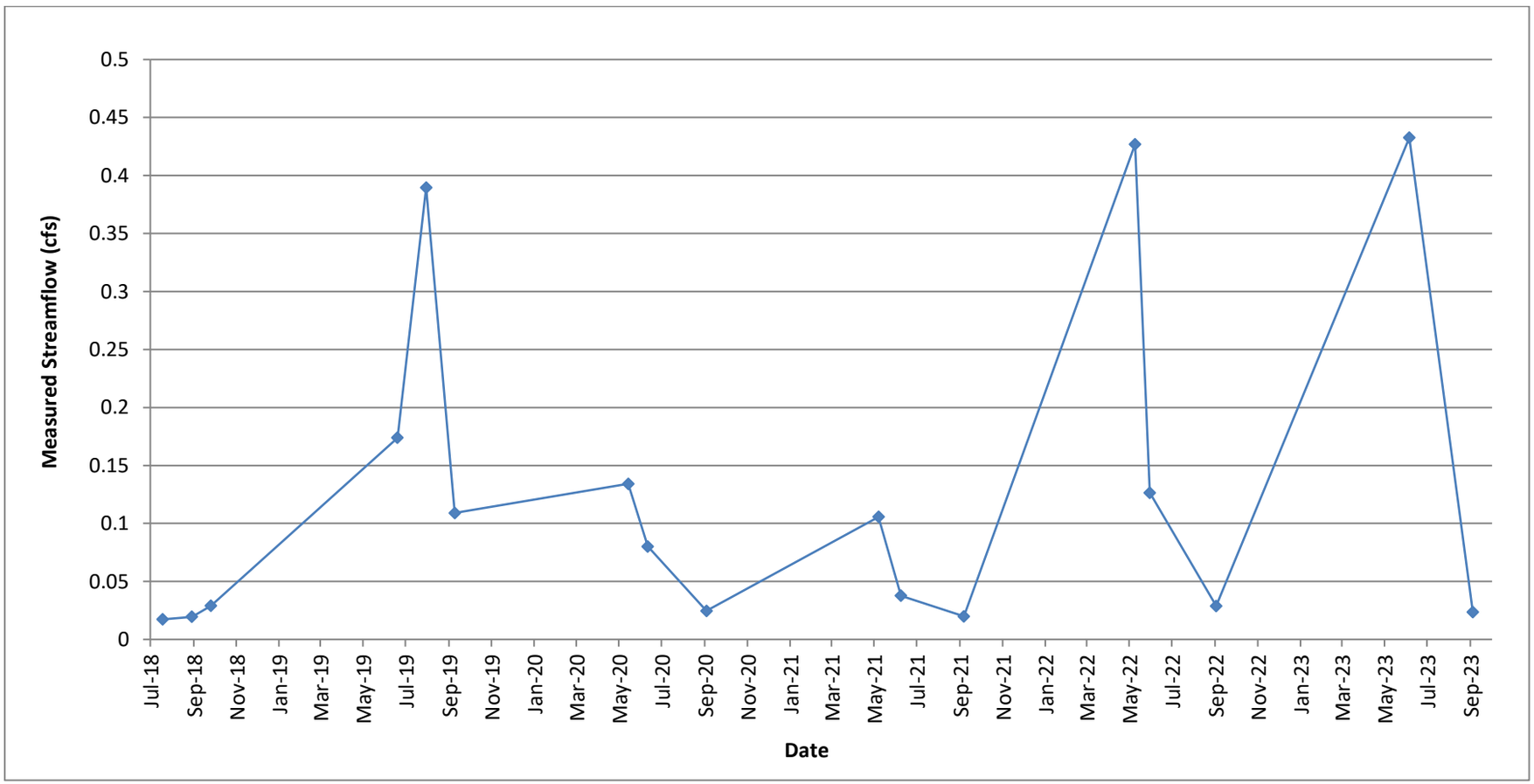
## South Fork of South Prong Creek
## Hydrograph



## North Fork of South Prong Creek
## Hydrograph



**Stream ST-SW-1**
**Hydrograph**



# APPENDIX C

## SURFACE WATER - LABORATORY AND FIELD WATER QUALITY DATA

# Upper North Fork (USGS)
# Surface Water Quality and Field Parameters

| Mountain Coal West Elk Mine - Water Year 2023 | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| **Monitoring Location: Upper North Fork (USGS)** | | **Baseline [1]** | | | **Water Year 2023** | | | | |
| Description | Units | Minimum | Maximum | Mean | 5/10/2023 | 6/6/2023 | Q[4] | 9/5/2023 | Q[4] |
| **Field Parameters** | | | | | | | | | |
| Flow | staff gage | | | | NA | NA | | NA | |
| pH (Field) | SU | | | | 8.27 | 8.11 | | 8.02 | |
| Conductivity (Field) | µmhos/cm | | | | 123.2 | 95.0 | | 179.1 | |
| Temperature (Field) | °C | | | | 7.7 | 9.2 | | 15.0 | |
| Comment | | | | | | | | | |
| **Laboratory Parameters [2]** | | | | | | | | | |
| Name of Certified Lab [3] | | | | | | ACZ | | ACZ | |
| Lab Reference # | | | | | | L80946-02 | | L82933-03 | |
| Sample Date | | | | | | 6/6/2023 | | 9/5/2023 | |
| Lab Test Date | | | | | | 6/9-6/23 | | 9/9-9/27 | |
| Sampled By | | | | | | PH | | PH | |
| Alkalinity (Total CaCO3) | mg/L | | | | | 47.5 | | 109 | |
| Aluminum, dissolved | mg/L | | | | | 0.100 | B | -0.05 | U |
| Arsenic, dissolved | meq/L | | | | | 0.00028 | B | 0.00046 | B |
| Arsenic, total recoverable | mg/L | 0.001 | 0.001 | 0.001 | | 0.00069 | B | 0.00094 | B |
| Bicarbonate as CaCO3 | mg/L | 40.9 | 167 | 81.3 | | 47.5 | | 109 | |
| Boron, dissolved | mg/L | | | | | -0.03 | U | -0.03 | U |
| Boron, total | mg/L | | | | | -0.03 | U | -0.03 | U |
| Cadmium, dissolved | mg/L | | | | | -0.008 | U | -0.008 | U |
| Cadmium, potentially dissolved | mg/L | | | | | -0.008 | U | -0.008 | U |
| Calcium, dissolved | mg/L | | | | | 13.2 | | 25.2 | |
| Carbonate as CaCO3 | mg/L | | | | | -2 | U | -2 | U |
| Cation - Anion Balance | mg/L | | | | | 0.0 | | -11.6 | |
| Chloride | % | | 10 | 3 | | -1.0 | U | 1.50 | B |
| Chromium, total | meq/L | | | | | -0.02 | U | -0.02 | U |
| Conductivity @25C | mg/L | 76 | 241 | 169 | | 94 | | 182 | |
| Copper, dissolved | mg/L | 0.01 | 0.01 | 0.01 | | -0.01 | U | -0.01 | U |
| Cyanide, total | µmhos/cm | | | | | -0.003 | U | -0.003 | UH |
| Hardness as CaCO3 | mg/L | 40 | 107 | 70 | | 42 | | 80 | |
| Hydroxide as CaCO3 | mg/L | | | | | -2 | U | -2 | U |
| Iron, dissolved | mg/L | | 0.38 | 0.09 | | 0.094 | B | -0.06 | U |
| Iron, total | mg/L | | 26.3 | 1.6 | | 2.05 | | 3.58 | |
| Iron, total recoverable | mg/L | | | | | 2.53 | | 3.51 | |
| Lead, dissolved | mg/L | | 0.02 | 0.01 | | -0.03 | U | -0.03 | U |
| Magnesium, dissolved | mg/L | 2 | 3.4 | 2.9 | | 2.09 | | 4.07 | |
| Manganese, dissolved | mg/L | | 0.009 | 0.006 | | 0.022 | B | -0.01 | U |
| Manganese, total | mg/L | | 0.19 | 0.04 | | 0.039 | B | 0.074 | |
| Mercury, total | mg/L | | | | | -0.0002 | U | -0.0002 | U |
| Molybdenum, dissolved | mg/L | | | | | -0.02 | U | -0.02 | U |
| Nickel, dissolved or potentially dissolved | mg/L | | | | | -0.008 | U | -0.008 | U |
| Nickel, total | mg/L | | | | | -0.008 | U | -0.008 | U |
| Nitrate/Nitrite (as N) | mg/L | | 0.19 | 0.06 | | 0.067 | B | -0.02 | U |
| Nitrogen, ammonia | mg/L | | | | | -0.1 | U | -0.1 | U |
| pH | mg/L | 6.7 | 9.0 | 7.8 | | 8.1 | H | 7.8 | H |
| Phosphate | mg/L | | | | | .0496 | B | .0558 | B |
| Phosphorus, ortho dissolved | SU | | 1.61 | 0.12 | | 0.016 | BH | 0.018 | BH |
| Potassium, dissolved | mg/L | | | | | 0.54 | B | 1.16 | |
| Residue, Filterable (TDS) @180C | mg/L | 30 | 650 | 109 | | 86 | | 136 | |
| Residue, Non-Filterable (TSS) @105C | mg/L | | 636 | 55 | | 96.0 | | 72.0 | |
| Silver, total | mg/L | | | | | -0.0001 | U | -0.0001 | U |
| Sodium Adsorption Ratio (SAR) | mg/L | 0.2 | 1.62 | 0.5 | | 0.22 | | 0.33 | |
| Sodium, dissolved | calc. | 3.4 | 5.7 | 4.6 | | 3.29 | | 6.72 | |
| Sulfate | mg/L | | 70 | 10 | | -1 | U | 6.4 | |
| Sum of Anions | mg/L | | | | | 1 | | 2.4 | |
| Sum of Cations | mg/L | | | | | 1.0 | | 1.9 | |
| TDS (calculated) | calc. | | | | | 48.3 | | 112 | |
| TDS (ratio - measured/calculated) | mg/L | | | | | 1.78 | | 1.21 | |
| Zinc, dissolved | mg/L | | | | | -0.02 | U | -0.02 | U |

[1] Baseline and WY 2000 data adapted from WWE (2001).

[2] Negative values denote readings below lab detection levels.

[3] ACZ Laboratory, Steamboat Springs, CO.

[4] ACZ Lab Qualifiers: U - Analyte was analyzed for but not detected at the indicated MDL.

H - Holding time exceeded; pH is a field test with an immediate hold time.

B - Analyte concentration detected at a value between method detection limit (MDL) and practical quantitation limit (PQL). The associated value is an estimated quantity.

Shaded cells indicate parameters elevated greater than ten percent above the maximum baseline value.

# Lower North Fork
# Surface Water Quality and Field Parameters

| Mountain Coal West Elk Mine - Water Year 2023 | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Monitoring Location: Lower North Fork** | | **Baseline [1]** | | | **Water Year 2023** | | | | | | |
| Description | Units | Minimum | Maximum | Mean | 5/10/2023 | 6/6/2023 | Q [4] | 9/5/2023 | Q [4] | 9/5/2023 (duplicate) | Q [4] |
| **Field Parameters** | | | | | | | | | | | |
| Flow | staff gage | | | | not measured | not measured | | not measured | | not measured | |
| pH (Field) | SU | | | | 8.27 | 8.31 | | 8.02 | | -- | |
| Conductivity (Field) | µmhos/cm | | | | 122.3 | 94.2 | | 169.7 | | -- | |
| Temperature (Field) | °C | | | | 7.7 | 8.9 | | 14.8 | | -- | |
| Comment | | | | | | | | | | | |
| **Laboratory Parameters 2** | | | | | | | | | | | |
| Name of Certified Lab 3 | | | | | | ACZ | | ACZ | | ACZ | |
| Lab Reference # | | | | | | L80946-01 | | L82933-01 | | | |
| Sample Date | | | | | | 6/6/2023 | | 9/27/2021 | | 9/27/2021 | |
| Lab Test Date | | | | | | 6/9-6/23 | | 9/9-9/27 | | 9/9-9/27 | |
| Sampled By | | | | | | PH | | PH | | PH | |
| Alkalinity (Total CaCO3) | mg/L | | | | | 47.4 | | 95.1 | | 99.3 | |
| Aluminum, dissolved | mg/L | | | | | 0.063 | B | -0.05 | U | -0.05 | U |
| Arsenic, dissolved | mg/L | | | | | 0.00023 | B | 0.00051 | B | 0.00044 | B |
| Arsenic, total recoverable | mg/L | | | | | 0.00064 | B | 0.00095 | B | 0.001 | |
| Bicarbonate as CaCO3 | mg/L | 41 | 138 | 78 | | 47.4 | | 95.1 | | 99.3 | |
| Boron, dissolved | mg/L | | | | | -0.03 | U | -0.03 | U | -0.03 | U |
| Boron, total | mg/L | | | | | -0.03 | U | -0.03 | U | -0.03 | U |
| Cadmium, dissolved | mg/L | | | | | -0.008 | U | -0.008 | U | -0.008 | U |
| Cadmium, potentially dissolved | mg/L | | | | | -0.008 | U | -0.008 | U | -0.008 | U |
| Calcium, dissolved | mg/L | | | | | 12.9 | | 26.2 | | 25.1 | |
| Carbonate as CaCO3 | mg/L | | | | | -2 | U | -2 | U | -2 | U |
| Cation - Anion Balance | % | | | | | 1.7 | | -2.4 | | -5.0 | |
| Chloride | mg/L | 1.6 | 8 | 3.8 | | -1 | U | 1.00 | B | 1.25 | B |
| Chromium, total | mg/L | | | | | -0.02 | U | -0.02 | U | -0.02 | U |
| Conductivity @25C | µmhos/cm | | | | | 93 | | 185 | | 181 | |
| Copper, dissolved | mg/L | | | | | -0.01 | U | -0.01 | U | -0.01 | U |
| Cyanide, total | mg/L | | | | | -0.003 | U | -0.003 | UH | -0.003 | UH |
| Hardness as CaCO3 | mg/L | 39.3 | 109 | 68.7 | | 41 | | 83 | | 79 | |
| Hydroxide as CaCO3 | mg/L | | | | | -2 | U | -2 | U | -2 | U |
| Iron, dissolved | mg/L | | 0.126 | 0.065 | | -0.06 | U | -0.06 | U | -0.06 | U |
| Iron, total | mg/L | 0.09 | 3.8 | 0.92 | | 2.63 | | 5.44 | | 3.75 | |
| Iron, total recoverable | mg/L | | | | | 2.61 | | 3.64 | | 3.69 | |
| Lead, dissolved | mg/L | | | | | -0.03 | U | -0.03 | U | -0.03 | U |
| Magnesium, dissolved | mg/L | | | | | 2.12 | | 4.23 | | 4.04 | |
| Manganese, dissolved | mg/L | 0.0002 | 0.05 | 0.01 | | -0.01 | U | -0.01 | U | -0.01 | U |
| Manganese, total | mg/L | | | | | 0.043 | B | 0.087 | | 0.071 | |
| Mercury, total | mg/L | | | | | -0.0002 | U | -0.0002 | U | -0.0002 | U |
| Molybdenum, dissolved | mg/L | | | | | -0.02 | U | -0.02 | U | -0.02 | U |
| Nickel, dissolved or potentially dissolved | mg/L | | | | | -0.008 | U | -0.008 | U | -0.008 | U |
| Nickel, total | mg/L | | | | | -0.008 | U | -0.008 | U | -0.008 | U |
| Nitrate/Nitrite (as N) | mg/L | | | | | 0.061 | B | -0.02 | U | -0.02 | U |
| Nitrogen, ammonia | mg/L | | | | | -0.1 | U | -0.1 | U | -0.1 | U |
| pH | SU | 7 | 8.8 | 8.1 | | 8.1 | H | 7.8 | H | 7.9 | H |
| Phosphate | mg/L | | | | | .0527 | B | .0682 | B | .0589 | B |
| Phosphorus, ortho dissolved | mg/L | | 2.74 | 0.25 | | 0.017 | BH | 0.022 | BH | 0.019 | BH |
| Potassium, dissolved | mg/L | | | | | 0.50 | B | 1.21 | | 1.16 | |
| Residue, Filterable (TDS) @180C | mg/L | 36 | 180 | 101 | | 84 | | 138 | | 140 | |
| Residue, Non-Filterable (TSS) @105C | mg/L | 6.4 | 107 | 36 | | 59.0 | | 78.0 | | 80.0 | |
| Selenium, total recoverable | mg/L | | | | | 0.00020 | B | 0.00024 | B | 0.00017 | B |
| Silver, total | mg/L | | | | | -0.0001 | U | -0.0001 | U | -0.0001 | U |
| Sodium Adsorption Ratio (SAR) | calc. | | | | | 0.22 | | 0.34 | | 0.32 | |
| Sodium, dissolved | mg/L | | | | | 3.22 | | 6.94 | | 6.46 | |
| Sulfate | mg/L | 4 | 25 | 12 | | -1 | U | 6.6 | | 5.3 | |
| Sum of Anions | meq/L | | | | | .948 | | 2.1 | | 2.1 | |
| Sum of Cations | meq/L | | | | | .981 | | 2 | | 1.9 | |
| TDS (calculated) | calc. | | | | | 47.7 | | 104 | | 104 | |
| TDS (ratio - measured/calculated) | mg/L | | | | | 1.76 | | 1.33 | | 1.35 | |
| Zinc, dissolved | mg/L | | | | | -0.02 | U | -0.02 | U | -0.02 | U |

[1] Baseline and WY 2000 data adapted from WWE (2001).

[2] Negative values denote readings below lab detection levels.

[3] ACZ Laboratory, Steamboat Springs, CO.

[4] ACZ Lab Qualifiers: U - Analyte was analyzed for but not detected at the indicated MDL.

H - Holding time exceeded; pH is a field test with an immediate hold time.

B - Analyte concentration detected at a value between method detection limit (MDL) and practical quantitation limit (PQL). The associated value is an estimated quantity.

Shaded cells indicate parameters elevated greater than ten percent above the maximum baseline value.

## Upper Sylvester Gulch
## Surface Water Quality and Field Parameters

| Mountain Coal West Elk Mine - Water Year 2023 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Monitoring Location: Upper Sylvester Gulch** | | **Baseline [1]** | | | **Water Year 2023** | | | |
| Description | Units | Minimum | Maximum | Mean | 5/10/2023 | 6/6/2023 | Q [4] | 9/5/2023 |
| **Field Parameters** | | | | | | | | |
| Flow | staff gage | 0.26' | 0.64' | 0.45' | 0.73' | 0.09' | | dry |
| pH (Field) | SU | 8.1 | 8.3 | 8.2 | 7.86 | 8.09 | | |
| Conductivity (Field) | µmhos/cm | 300 | 380 | 340 | 442 | 340 | | |
| Temperature (Field) | °C | 8.4 | 9.5 | 9.0 | 9.0 | 9 | | |
| Comment | | | | | | | | |
| **Laboratory Parameters [2]** | | | | | | | | |
| Name of Certified Lab [3] | | | | | | ACZ | | |
| Lab Reference # | | | | | | L81056-06 | | |
| Sample Date | | | | | | 6/6/2023 | | |
| Lab Test Date | | | | | | 6/13-6/24 | | |
| Sampled By | | | | | | PH | | |
| Conductivity @25C | µmhos/cm | 462 | 462 | 462 | | 573 | | |
| Iron, dissolved | mg/L | 0.01 | 0.01 | 0.01 | | -0.06 | U | |
| Iron, total | mg/L | 0.07 | 0.07 | 0.07 | | 0.145 | B | |
| pH | SU | | | | | 8.7 | H | |
| Residue, Filterable (TDS) @180C | mg/L | 250 | 260 | 255 | | 352 | | |
| Residue, Non-Filterable (TSS) @105C | mg/L | 8 | 20 | 14 | | 9.0 | B | |

[1] Baseline and WY 2000 data adapted from WWE (2001).

[2] Negative values denote readings below lab detection levels.

[3] ACZ Laboratory, Steamboat Springs, CO.

[4] ACZ Lab Qualifiers: U - Analyte was analyzed for but not detected at the indicated MDL.

H - Holding time exceeded; pH is a field test with an immediate hold time.

B - Analyte concentration detected at a value between method detection limit (MDL) and practical quantitation limit (PQL). The associated value is an estimated quantity.

Shaded cells indicate parameters elevated greater than ten percent above the maximum baseline value.

# Middle Sylvester Gulch
# Surface Water Quality and Field Parameters

| Mountain Coal West Elk Mine - Water Year 2023 | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|
| **Monitoring Location: Middle Sylvester Gulch** | | **Baseline [1]** | | | **Water Year 2023** | | | | | | |
| Description | Units | Minimum | Maximum | Mean | 5/10/2023 | 6/6/2023 | Q[4] | 6/6/2023 (Duplicate) | Q[4] | 9/5/2023 |
| **Field Parameters** | | | | | | | | -- | | |
| Flow | staff gage | | | | 1.24' | 0.40' | | -- | | dry |
| pH (Field) | SU | | | | 8.36 | 8.41 | | -- | | |
| Conductivity (Field) | µmhos/cm | | | | 656 | 859 | | -- | | |
| Temperature (Field) | °C | | | | 12.0 | 13.4 | | -- | | |
| Comment | | | | | | | | | | |
| **Laboratory Parameters [2]** | | | | | | | | | | |
| Name of Certified Lab [3] | | | | | | ACZ | | ACZ | | |
| Lab Reference # | | | | | | L80946-03 | | L80946-04 | | |
| Sample Date | | | | | | 6/6/2023 | | 6/6/2023 | | |
| Lab Test Date | | | | | | 6/9-6/23 | | 6/9-6/23 | | |
| Sampled By | | | | | | PH | | PH | | |
| Alkalinity (Total CaCO3) | mg/L | | | | | 362 | | 377 | | |
| Aluminum, dissolved | mg/L | | | | | -0.05 | U | -0.05 | U | |
| Arsenic, dissolved | mg/L | | | | | 0.00032 | B | 0.00036 | B | |
| Arsenic, total recoverable | mg/L | | | | | 0.00033 | B | 0.00037 | B | |
| Bicarbonate as CaCO3 | mg/L | | 448 | 310 | | 338 | | 350 | | |
| Boron, dissolved | mg/L | | | | | 0.101 | | 0.102 | | |
| Boron, total | mg/L | | | | | 0.091 | B | 0.095 | B | |
| Cadmium, dissolved | mg/L | | | | | -0.008 | U | -0.008 | U | |
| Cadmium, potentially dissolved | mg/L | | | | | -0.008 | U | -0.008 | U | |
| Calcium, dissolved | mg/L | | | | | 57.0 | | 57.4 | | |
| Carbonate as CaCO3 | mg/L | | | | | 24.4 | | 27.2 | | |
| Cation - Anion Balance | % | | | | | -1.6 | | -2.6 | | |
| Chloride | mg/L | 3 | 10 | 5 | | 16.6 | | 17.4 | | |
| Chromium, total | mg/L | | | | | -0.02 | U | -0.02 | U | |
| Conductivity @25C | µmhos/cm | 480 | 800 | 606 | | 814 | | 814 | | |
| Copper, dissolved | mg/L | | | | | -0.01 | U | -0.01 | U | |
| Cyanide, total | mg/L | | | | | 0 | U | 0 | U | |
| Hardness as CaCO3 | mg/L | 159 | 234 | 194 | | 234 | | 236 | | |
| Hydroxide as CaCO3 | mg/L | | | | | -2 | U | -2 | U | |
| Iron, dissolved | mg/L | | 0.4 | 0.1 | | -0.06 | U | -0.06 | U | |
| Iron, total | mg/L | 0.05 | 10.5 | 2.0 | | 0.262 | | 0.274 | | |
| Iron, total recoverable | mg/L | | | | | 0.259 | | 0.350 | | |
| Lead, dissolved | mg/L | | | | | -0.03 | U | -0.03 | U | |
| Magnesium, dissolved | mg/L | | | | | 22.2 | | 22.4 | | |
| Manganese, dissolved | mg/L | | | | | 0.016 | B | 0.017 | B | |
| Manganese, total | mg/L | | 0.56 | 0.05 | | 0.025 | B | 0.026 | B | |
| Mercury, total | mg/L | | | | | -0.0002 | U | -0.0002 | U | |
| Molybdenum, dissolved | mg/L | | | | | -0.02 | U | -0.02 | U | |
| Nickel, dissolved or potentially dissolved | mg/L | | | | | -0.008 | U | -0.008 | U | |
| Nickel, total | mg/L | | | | | -0.008 | U | -0.008 | U | |
| Nitrate/Nitrite (as N) | mg/L | | 0.08 | 0.02 | | 0.056 | B | 0.048 | B | |
| Nitrogen, ammonia | mg/L | | | | | -0.1 | U | -0.1 | U | |
| pH | SU | 7.35 | 8.70 | 8.08 | | 8.5 | H | 8.5 | H | |
| Phosphate | mg/L | | | | | .0465 | B | .0341 | B | |
| Phosphorus, ortho dissolved | mg/L | | 0.875 | 0.110 | | 0.015 | BH | 0.011 | BH | |
| Potassium, dissolved | mg/L | | | | | 2.70 | | 2.63 | | |
| Residue, Filterable (TDS) @180C | mg/L | 3.68 | 584 | 381 | | 522 | | 518 | | |
| Residue, Non-Filterable (TSS) @105C | mg/L | 4.2 | 5,740 | 419 | | 15.0 | B | 13.0 | B | |
| Selenium, total recoverable | mg/L | | | | | 0.00092 | | 0.00097 | | |
| Silver, total | mg/L | | | | | -0.0001 | U | -0.0001 | U | |
| Sodium Adsorption Ratio (SAR) | calc. | 2.29 | 3.02 | 2.70 | | 3.1 | | 3.1 | | |
| Sodium, dissolved | mg/L | | | | | 107 | | 107 | | |
| Sulfate | mg/L | 28.2 | 80 | 46.1 | | 97.4 | | 94.5 | | |
| Sum of Anions | meq/L | | | | | 9.8 | | 10.0 | | |
| Sum of Cations | meq/L | | | | | 9.5 | | 9.5 | | |
| TDS (calculated) | calc. | | | | | 524 | | 531 | | |
| TDS (ratio - measured/calculated) | mg/L | | | | | 1.00 | | 0.98 | | |
| Zinc, dissolved | mg/L | | | | | -0.02 | U | -0.02 | U | |

[1] Baseline and WY 2000 data adapted from WWE (2001).

[2] Negative values denote readings below lab detection levels.

[3] ACZ Laboratory, Steamboat Springs, CO.

[4] ACZ Lab Qualifiers: U - Analyte was analyzed for but not detected at the indicated MDL.

H - Holding time exceeded; pH is a field test with an immediate hold time.

B - Analyte concentration detected at a value between method detection limit (MDL) and practical quantitation limit (PQL). The associated value is an estimated quantity.

Shaded cells indicate parameters elevated greater than ten percent above the maximum baseline value.

## Lower Sylvester Gulch
## Surface Water Quality and Field Parameters

| Mountain Coal West Elk Mine - Water Year 2023 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Monitoring Location: Lower Sylvester Gulch** | | **Baseline [1]** | | | **Water Year 2023** | | | |
| Description | Units | Minimum | Maximum | Mean | 5/10/2023 | 6/6/2023 | Q[4] | 9/5/2023 |
| **Field Parameters** | | | | | | | | |
| Flow | staff gage | 0.07 | 0.07 | 0.07 | not measured | not measured | | dry |
| pH (Field) | SU | 8.50 | 9.70 | 8.90 | 8.40 | 8.42 | | |
| Conductivity (Field) | µmhos/cm | 620 | 700 | 653 | 653 | 829 | | |
| Temperature (Field) | °C | 7.9 | 10.2 | 9 | 12.0 | 17.1 | | |
| Comment | | | | | | | | |
| **Laboratory Parameters [2]** | | | | | | | | |
| Name of Certified Lab [3] | | | | | | ACZ | | |
| Lab Reference # | | | | | | L81056-05 | | |
| Sample Date | | | | | | 6/6/2023 | | |
| Lab Test Date | | | | | | 6/13-6/24 | | |
| Sampled By | | | | | | PH | | |
| Alkalinity (Total CaCO3) | mg/L | 323 | 323 | 323 | | | | |
| Aluminum, dissolved | mg/L | 0.03 | 0.03 | 0.03 | | | | |
| Arsenic, total recoverable | mg/L | 0.001 | 0.001 | 0.001 | | | | |
| Bicarbonate as CaCO3 | mg/L | 315 | 315 | 315 | | | | |
| Cadmium, dissolved | mg/L | 0.003 | 0.003 | 0.003 | | | | |
| Calcium, dissolved | mg/L | 41 | 41 | 41 | | | | |
| Carbonate as CaCO3 | mg/L | 8 | 8 | 8 | | | | |
| Cation - Anion Balance | % | -3.2 | -3.2 | -3.2 | | | | |
| Chloride | mg/L | 4 | 4 | 4 | | | | |
| Conductivity @25C | µmhos/cm | 597 | 597 | 597 | | 795 | | |
| Copper, dissolved | mg/L | 0.01 | 0.01 | 0.01 | | | | |
| Hardness as CaCO3 | mg/L | 179 | 179 | 179 | | | | |
| Hydroxide as CaCO3 | mg/L | 2 | 2 | 2 | | | | |
| Iron, dissolved | mg/L | 0.05 | 0.05 | 0.05 | | -0.06 | U | |
| Iron, total | mg/L | 0.17 | 0.17 | 0.17 | | 0.285 | | |
| Lead, dissolved | mg/L | 0.04 | 0.04 | 0.04 | | | | |
| Magnesium, dissolved | mg/L | 18.7 | 18.7 | 18.7 | | | | |
| Manganese, dissolved | mg/L | 0.007 | 0.007 | 0.007 | | | | |
| Manganese, total | mg/L | 0.005 | 0.005 | 0.005 | | | | |
| Mercury, total | mg/L | 0.0002 | 0.0002 | 0.0002 | | | | |
| Molybdenum, dissolved | mg/L | 0.01 | 0.01 | 0.01 | | | | |
| Nitrate/Nitrite (as N) | mg/L | 0.05 | 0.05 | 0.05 | | | | |
| pH | SU | 8.3 | 8.3 | 8.3 | | 8.7 | H | |
| Phosphate | mg/L | 0.09 | 0.09 | 0.09 | | | | |
| Phosphorus, ortho dissolved | mg/L | 0.031 | 0.031 | 0.031 | | | | |
| Potassium, dissolved | mg/L | 2.2 | 2.2 | 2.2 | | | | |
| Residue, Filterable (TDS) @180C | mg/L | 400 | 430 | 410 | | 484 | | |
| Residue, Non-Filterable (TSS) @105C | mg/L | 5 | 120 | 74 | | 14.0 | B | |
| Selenium, total recoverable | mg/L | 0.04 | 0.04 | 0.04 | | | | |
| Sodium Adsorption Ratio (SAR) | calc. | 2.89 | 2.89 | 2.89 | | | | |
| Sodium, dissolved | mg/L | 87.8 | 87.8 | 87.8 | | | | |
| Sulfate | mg/L | 70 | 70 | 70 | | | | |
| Sum of Cations | meq/L | 7.5 | 7.5 | 7.5 | | | | |
| Zinc, dissolved | mg/L | 0.01 | 0.01 | 0.01 | | | | |

[1] Baseline and WY 2000 data adapted from WWE (2001).

[2] Negative values denote readings below lab detection levels.

[3] ACZ Laboratory, Steamboat Springs, CO.

[4] ACZ Lab Qualifiers: U - Analyte was analyzed for but not detected at the indicated MDL.

H - Holding time exceeded; pH is a field test with an immediate hold time.

B - Analyte concentration detected at a value between method detection limit (MDL) and practical quantitation limit (PQL). The associated value is an estimated quantity.

Shaded cells indicate parameters elevated greater than ten percent above the maximum baseline value.

**Lower Minnesota Creek**
**Surface Water Quality and Field Parameters**

| Mountain Coal West Elk Mine - Water Year 2023 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Monitoring Location: Lower Minnesota Creek** | | **Baseline [1]** | | | **Water Year 2023** | | | |
| Description | Units | Minimum | Maximum | Mean | 5/9/2023 | 6/7/2023 | Q[4] | 9/4/2023 |
| **Field Parameters** | | | | | | | | |
| Flow | staff gage | | | | 1.58' | 1.79' | | 0.62' |
| pH (Field) | SU | | | | 8.06 | 7.97 | | 8.09 |
| Conductivity (Field) | µmhos/cm | | | | 329 | 159.9 | | 156.1 |
| Temperature (Field) | °C | | | | 5.1 | 9.2 | | 15.2 |
| Comment | | | | | | | | |
| **Laboratory Parameters [2]** | | | | | | | | |
| Name of Certified Lab [3] | | | | | | ACZ | | |
| Lab Reference # | | | | | | L81055-27 | | |
| Sample Date | | | | | | 6/7/2023 | | |
| Lab Test Date | | | | | | 6/13-6/24 | | |
| Sampled By | | | | | | PH | | |
| Bicarbonate as CaCO3 | mg/L | 46 | 75 | 60 | | | | |
| Calcium, dissolved | mg/L | 19.6 | 19.6 | 19.6 | | | | |
| Chloride | mg/L | | 2 | 1 | | | | |
| Conductivity @25C | µmhos/cm | 152 | 803 | 350 | | 167 | | |
| Hardness as CaCO3 | mg/L | 65 | 106 | 82 | | | | |
| Iron, dissolved | mg/L | 0.23 | 0.58 | 0.41 | | 0.092 | B | |
| Iron, total | mg/L | 0.45 | 82 | 8.9 | | 6.29 | | |
| Magnesium, dissolved | mg/L | 6.1 | 8.7 | 7.4 | | | | |
| Manganese, dissolved | mg/L | 0.013 | 0.015 | 0.014 | | | | |
| Manganese, total | mg/L | 0.018 | 1.83 | 0.188 | | | | |
| pH | SU | | | | | 8.3 | H | |
| Residue, Filterable (TDS) @180C | mg/L | 100 | 584 | 231 | | 140 | | |
| Residue, Non-Filterable (TSS) @105C | mg/L | 16 | 1,300 | 292 | | 259 | | |
| Sodium Adsorption Ratio (SAR) | calc. | 0.3 | 0.5 | 0.4 | | | | |
| Sodium, dissolved | mg/L | 7.7 | 7.7 | 7.7 | | | | |
| Sulfate | mg/L | 20 | 50 | 40 | | | | |

[1] Baseline and WY 2000 data adapted from WWE (2001).

[2] Negative values denote readings below lab detection levels.

[3] ACZ Laboratory, Steamboat Springs, CO.

[4] ACZ Lab Qualifiers: U - Analyte was analyzed for but not detected at the indicated MDL.

H - Holding time exceeded; pH is a field test with an immediate hold time.

B - Analyte concentration detected at a value between method detection limit (MDL) and practical quantitation limit (PQL). The associated value is an estimated quantity.

Shaded cells indicate parameters elevated greater than ten percent above the maximum baseline value.

## Upper Minnesota Creek Flume (USFS)
## Surface Water Quality and Field Parameters

| Mountain Coal West Elk Mine - Water Year 2023 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Monitoring Location: U. Minnesota Ck Flume (USFS)** | | **Baseline [1]** | | | **Water Year 2023** | | | |
| Description | Units | Minimum | Maximum | Mean | 5/10/2023 | 6/7/2023 | Q[4] | 9/4/2023 |
| **Field Parameters** | | | | | | | | |
| Flow | staff gage | | | | flooded | flooded | | 1.18' |
| pH (Field) | SU | | | | 8.18 | 7.95 | | 8.16 |
| Conductivity (Field) | µmhos/cm | | | | 293 | 153.1 | | 141.1 |
| Temperature (Field) | °C | | | | 5.9 | 9.4 | | 15.8 |
| Comment | | | | | | | | |
| **Laboratory Parameters [2]** | | | | | | | | |
| Name of Certified Lab [3] | | | | | | ACZ | | |
| Lab Reference # | | | | | | L81055-02 | | |
| Sample Date | | | | | | 6/7/2023 | | |
| Lab Test Date | | | | | | 6/13-6/24 | | |
| Sampled By | | | | | | PH | | |
| Conductivity @25C | µmhos/cm | | | | | 157 | | |
| Iron, dissolved | mg/L | | | | | 0.219 | | |
| Iron, total | mg/L | | | | | 3.23 | | |
| pH | SU | | | | | 8.3 | H | |
| Residue, Filterable (TDS) @180C | mg/L | | | | | 124 | | |
| Residue, Non-Filterable (TSS) @105C | mg/L | | | | | 173 | | |

[1] No baseline data.

[2] Negative values denote readings below lab detection levels.

[3] ACZ Laboratory, Steamboat Springs, CO.

[4] ACZ Lab Qualifiers: U - Analyte was analyzed for but not detected at the indicated MDL.

H - Holding time exceeded; pH is a field test with an immediate hold time.

B - Analyte concentration detected at a value between method detection limit (MDL) and practical quantitation limit (PQL). The associated value is an estimated quantity.

Shaded cells indicate parameters elevated greater than ten percent above the maximum baseline value.

**Lower Dry Fork Flume**
**Surface Water Quality and Field Parameters**

| Mountain Coal West Elk Mine - Water Year 2023 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Monitoring Location: Lower Dry Fork Flume** | | **Baseline [1]** | | | **Water Year 2023** | | | |
| Description | Units | Minimum | Maximum | Mean | 5/10/2023 | 6/6/2023 | Q[4] | 9/4/2023 |
| **Field Parameters** | | | | | | | | |
| Flow | staff gage | | | | 1.36' | 0.37' | | 0.29' |
| pH (Field) | SU | | | | 8.13 | 8.20 | | 8.15 |
| Conductivity (Field) | µmhos/cm | | | | 344 | 427 | | 318 |
| Temperature (Field) | °C | | | | 7.0 | 14.1 | | 15.6 |
| Comment | | | | | | | | |
| **Laboratory Parameters [2]** | | | | | | | | |
| Name of Certified Lab [3] | | | | | | ACZ | | |
| Lab Reference # | | | | | | L80946-05 | | |
| Sample Date | | | | | | 6/6/2023 | | |
| Lab Test Date | | | | | | 6/12-6/19 | | |
| Sampled By | | | | | | PH | | |
| Bicarbonate as CaCO3 | mg/L | 118 | 324 | 220 | | | | |
| Calcium, dissolved | mg/L | 87.9 | 87.9 | 87.9 | | | | |
| Chloride | mg/L | | 8.4 | 4.2 | | | | |
| Conductivity @25C | µmhos/cm | 207 | 1,920 | 755 | | 409 | | |
| Hardness as CaCO3 | mg/L | 125 | 726 | 360 | | | | |
| Iron, dissolved | mg/L | | 0.178 | 0.049 | | -0.06 | U | |
| Iron, total | mg/L | 0.02 | 84 | 5.6 | | 0.723 | | |
| Magnesium, dissolved | mg/L | 9.8 | 49 | 29 | | | | |
| Manganese, dissolved | mg/L | 0.008 | 0.013 | 0.011 | | | | |
| Manganese, total | mg/L | | 46.4 | 1.4 | | | | |
| Nitrate/Nitrite (as N) | mg/L | 0.1 | 0.3 | 0.2 | | | | |
| pH | SU | 6.9 | 9 | 8.2 | | 8.5 | H | |
| Phosphorus, ortho dissolved | mg/L | | 0.763 | 0.048 | | | | |
| Sodium Adsorption Ratio (SAR) | calc. | 0.71 | 1.48 | 1.11 | | | | |
| Sodium, dissolved | mg/L | 69 | 69 | 69 | | | | |
| Sulfate | mg/L | 35 | 613 | 249 | | | | |
| Residue, Filterable (TDS) @180C | mg/L | 158 | 1,388 | 581 | | 264 | | |
| Residue, Non-Filterable (TSS) @105C | mg/L | 1.2 | 1,098 | 144 | | 14.0 | B | |

[1] Baseline and WY 2000 data adapted from WWE (2001).

[2] Negative values denote readings below lab detection levels.

[3] ACZ Laboratory, Steamboat Springs, CO.

[4] ACZ Lab Qualifiers: U - Analyte was analyzed for but not detected at the indicated MDL.

H - Holding time exceeded; pH is a field test with an immediate hold time.

B - Analyte conc detected at a value between method detection limit (MDL) and practical quantitation limit (PQL). The associated value is an estimated quantity.

Shaded cells indicate parameters elevated greater than ten percent above the maximum baseline value.

## Middle Dry Fork Flume
## Surface Water Quality and Field Parameters

| Mountain Coal West Elk Mine - Water Year 2023 | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Monitoring Location: Middle Dry Fork Flume** | | **Baseline [1]** | | | **Water Year 2023** | | | | | |
| Description | Units | Minimum | Maximum | Mean | 5/10/2023 | 6/7/2023 | Q[4] | 6/7/2023 (Duplicate) | Q[4] | 9/6/2023 |
| **Field Parameters** | | | | | | | | | | |
| Flow | staff gage | | | | 1.15' | 0.48' | | -- | | 0.34' |
| pH (Field) | SU | 7.80 | 8.50 | 8.20 | 8.13 | 8.16 | | -- | | 8.25 |
| Conductivity (Field) | µmhos/cm | 30 | 480 | 213 | 316 | 316 | | -- | | 137.7 |
| Temperature (Field) | °C | 3.6 | 19.8 | 12 | 9.2 | 12.9 | | -- | | 13.3 |
| Comment | | | | | | | | | | |
| **Laboratory Parameters [2]** | | | | | | | | | | |
| Name of Certified Lab [3] | | | | | | ACZ | | ACZ | | |
| Lab Reference # | | | | | | L81055-26 | | L81055-16 | | |
| Sample Date | | | | | | 6/7/2023 | | 6/7/2023 | | |
| Lab Test Date | | | | | | 6/13-6/24 | | 6/13-6/24 | | |
| Sampled By | | | | | | PH | | PH | | |
| Alkalinity (Total CaCO3) | mg/L | 34 | 270 | 142 | | | | | | |
| Aluminum, dissolved | mg/L | 0.07 | 0.07 | 0.07 | | | | | | |
| Arsenic, total recoverable | mg/L | 0.002 | 0.002 | 0.002 | | | | | | |
| Bicarbonate as CaCO3 | mg/L | 34 | 270 | 142 | | | | | | |
| Calcium, dissolved | mg/L | 6.6 | 56.6 | 31.96 | | | | | | |
| Cation - Anion Balance | % | -22.2 | -22.2 | -22.2 | | | | | | |
| Chloride | mg/L | | 4 | 1 | | | | | | |
| Conductivity @25C | µmhos/cm | 76 | 76 | 76 | | 296 | | 297 | | |
| Hardness as CaCO3 | mg/L | 23 | 208 | 115 | | | | | | |
| Iron, dissolved | mg/L | 0.11 | 0.11 | 0.11 | | 0.220 | | 0.256 | | |
| Iron, total | mg/L | 0.16 | 14.2 | 3.14 | | 2.54 | | 2.72 | | |
| Magnesium, dissolved | mg/L | 1.5 | 17.6 | 8.7 | | | | | | |
| Manganese, dissolved | mg/L | 0.029 | 0.029 | 0.029 | | | | | | |
| Manganese, total | mg/L | 0.01 | 0.432 | 0.11 | | | | | | |
| Nitrate (as N), dissolved | mg/L | | 0.57 | 0.10 | | | | | | |
| Nitrate/Nitrite (as N) | mg/L | | 0.57 | 0.12 | | | | | | |
| Nitrite (as N), dissolved | mg/L | | 0.1 | 0.02 | | | | | | |
| pH | SU | 6.7 | 6.7 | 6.7 | | 8.4 | H | 8.4 | H | |
| Phosphate | mg/L | 0.33 | 0.33 | 0.33 | | | | | | |
| Phosphorus, ortho dissolved | mg/L | | 0.166 | 0.041 | | | | | | |
| Potassium, dissolved | mg/L | 0.5 | 0.5 | 0.5 | | | | | | |
| Residue, Filterable (TDS) @180C | mg/L | 50 | 300 | 172 | | 196 | | 210 | | |
| Residue, Non-Filterable (TSS) @105C | mg/L | | 278 | 72 | | 56.0 | | 53.0 | | |
| Sodium Adsorption Ratio (SAR) | calc. | 0.47 | 1.19 | 0.78 | | | | | | |
| Sodium, dissolved | mg/L | 5.9 | 38.8 | 19.9 | | | | | | |
| Sulfate | mg/L | | 50 | 25 | | | | | | |
| Sum of Anions | meq/L | 1.1 | 1.1 | 1.1 | | | | | | |
| Sum of Cations | meq/L | 0.7 | 0.7 | 0.7 | | | | | | |

[1] Baseline and WY 2000 data adapted from WWE (2001).

[2] Negative values denote readings below lab detection levels.

[3] ACZ Laboratory, Steamboat Springs, CO.

[4] ACZ Lab Qualifiers: U - Analyte was analyzed for but not detected at the indicated MDL.

H - Holding time exceeded; pH is a field test with an immediate hold time.

B - Analyte conc detected at a value between method detection limit (MDL) and practical quantitation limit (PQL). The associated value is an estimated quantity.

Shaded cells indicate parameters elevated greater than ten percent above the maximum baseline value.

# Upper Dry Fork Flume
# Surface Water Quality and Field Parameters

| Mountain Coal West Elk Mine - Water Year 2023 | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Monitoring Location: Upper Dry Fork Flume** | | **Baseline[1]** | | | **Water Year 2023** | | | | | |
| Description | Units | Minimum | Maximum | Mean[5] | 5/16/2023 | 6/8/2023 | Q[4] | 6/8/2023 (Duplicate) | Q[4] | 9/6/2023 |
| **Field Parameters** | | | | | | | | | | |
| Flow | staff gage | 0.08' | 0.58' | 0.28' | 0.97' | 0.42' | | -- | | 0.48' |
| pH (Field) | SU | 7.01 | 8.42 | 7.76 | 8.33 | 7.98 | | -- | | 7.34 |
| Conductivity (Field) | µmhos/cm | 114 | 699 | 310 | 112.9 | 103.6 | | -- | | 57.3 |
| Temperature (Field) | °C | 11.9 | 16.0 | 13.5 | 4.5 | 14.9 | | -- | | 10.5 |
| Comment | | | | | | | | | | |
| **Laboratory Parameters [2]** | | | | | | | | | | |
| Name of Certified Lab [3] | | | | | | ACZ | | ACZ | | |
| Lab Reference # | | | | | | L81055-11 | | L81055-14 | | |
| Sample Date | | | | | | 6/8/2023 | | 6/8/2023 | | |
| Lab Test Date | | | | | | 6/13-6/24 | | 6/13-6/24 | | |
| Sampled By | | | | | | PH | | PH | | |
| Alkalinity (Total CaCO3) | mg/L | 24 | 100 | 57 | | | | | | |
| Aluminum, dissolved | mg/L | 0.04 | 0.34 | 0.13 | | | | | | |
| Arsenic, total recoverable | mg/L | 0.0005 | 0.0012 | 0.0008 | | | | | | |
| Bicarbonate as CaCO3 | mg/L | 24 | 100 | 57 | | | | | | |
| Boron, dissolved | mg/L | -0.01 | -0.01 | -0.01 | | | | | | |
| Cadmium, dissolved | mg/L | -0.005 | -0.005 | -0.005 | | | | | | |
| Calcium, dissolved | mg/L | 4.6 | 20.1 | 11.5 | | | | | | |
| Carbonate as CaCO3 | mg/L | -2 | -2 | -2 | | | | | | |
| Cation - Anion Balance | % | -11.1 | 4.3 | -5.2 | | | | | | |
| Chloride | mg/L | 1 | 8 | 3 | | | | | | |
| Conductivity @25C | µmhos/cm | 47 | 246 | 135 | | 106 | | 106 | | |
| Copper, dissolved | mg/L | -0.01 | -0.01 | -0.01 | | | | | | |
| Hardness as CaCO3 | mg/L | 16 | 67 | 39 | | | | | | |
| Hydroxide as CaCO3 | mg/L | -2 | -2 | -2 | | | | | | |
| Iron, dissolved | mg/L | 0.06 | 0.32 | 0.20 | | 0.106 | B | 0.064 | B | |
| Iron, total | mg/L | 1.70 | 3.64 | 2.75 | | 2.05 | | 2.13 | | |
| Lead, dissolved | mg/L | -0.04 | -0.04 | -0.04 | | | | | | |
| Magnesium, dissolved | mg/L | 1.1 | 4.0 | 2.4 | | | | | | |
| Manganese, dissolved | mg/L | 0.007 | 0.035 | 0.017 | | | | | | |
| Manganese, total | mg/L | 0.047 | 0.103 | 0.078 | | | | | | |
| Mercury, total | mg/L | -0.0002 | -0.0002 | -0.0002 | | | | | | |
| Molybdenum, dissolved | mg/L | -0.01 | -0.01 | -0.01 | | | | | | |
| Nitrate/Nitrite (as N) | mg/L | -0.02 | 0.15 | 0.04 | | | | | | |
| pH | SU | 7.8 | 8.2 | 8.0 | | 8.1 | H | 8.2 | H | |
| Phosphate | mg/L | 0.06 | 0.12 | 0.08 | | | | | | |
| Phosphorus, ortho dissolved | mg/L | 0.02 | 0.04 | 0.03 | | | | | | |
| Potassium, dissolved | mg/L | -0.3 | 1.1 | 0.6 | | | | | | |
| Residue, Filterable (TDS) @180C | mg/L | 40 | 160 | 105 | | 96 | | 88 | | |
| Residue, Non-Filterable (TSS) @105C | mg/L | 24 | 88 | 42 | | 52.0 | | 54.0 | | |
| Selenium, total recoverable | mg/L | -0.001 | -0.001 | -0.001 | | | | | | |
| Sodium Adsorption Ratio (SAR) | calc. | 0.20 | 1.36 | 0.80 | | | | | | |
| Sodium, dissolved | mg/L | 1.9 | 25.2 | 12.5 | | | | | | |
| Sulfate | mg/L | -10 | 20 | 3 | | | | | | |
| Sum of Anions | meq/L | 0.5 | 2.2 | 1.4 | | | | | | |
| Sum of Cations | meq/L | 0.4 | 2.4 | 1.3 | | | | | | |
| TDS (calculated) | calc. | 23 | 123 | 73 | | | | | | |
| TDS (ratio - measured/calculated) | mg/L | 1.22 | 1.74 | 1.52 | | | | | | |
| Zinc, dissolved | mg/L | 0.01 | 0.02 | 0.02 | | | | | | |

[1] Baseline 2006.

[2] Negative values denote readings below lab detection levels.

[3] ACZ Laboratory, Steamboat Springs, CO.

[4] ACZ Lab Qualifiers: U - Analyte was analyzed for but not detected at the indicated MDL.
H - Holding time exceeded; pH is a field test with an immediate hold time.
B - Analyte conc detected at a value between method detection limit (MDL) and practical quantitation limit (PQL). The associated value is an estimated quantity.

[5] Average (mean) value calc using 1/2 of detection limit for readings below lab detection limits unless all readings are below lab detection limit.
Shaded cells indicate parameters elevated greater than ten percent above the maximum baseline value.

## Lick Creek Flume
## Surface Water Quality and Field Parameters

| Mountain Coal West Elk Mine - Water Year 2023 | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Monitoring Location: Lick Creek Flume** | | **Baseline [1]** | | | **Water Year 2023** | | | | | |
| Description | Units | Minimum | Maximum | Mean | 5/9/2023 | 6/5/2023 | Q[4] | 6/5/2023 (Duplicate) | Q[4] | 9/4/2023 |
| **Field Parameters** | | | | | | | | | | |
| Flow | staff gage | | | | 0.72' | 0.52' | | -- | | 0.005' |
| pH (Field) | SU | | | | 8.09 | 8.15 | | -- | | 8.05 |
| Conductivity (Field) | µmhos/cm | | | | 283 | 223 | | -- | | 1,861 |
| Temperature (Field) | °C | | | | 4.7 | 10.5 | | -- | | 16.1 |
| Comment | | | | | | | | | | |
| **Laboratory Parameters [2]** | | | | | | | | | | |
| Name of Certified Lab [3] | | | | | | ACZ | | ACZ | | |
| Lab Reference # | | | | | | L81021-07 | | L81021-02 | | |
| Sample Date | | | | | | 6/5/2023 | | 6/5/2023 | | |
| Lab Test Date | | | | | | 6/12-6/24 | | 6/12-6/24 | | |
| Sampled By | | | | | | PH | | PH | | |
| Aluminum, dissolved | mg/L | 0.12 | 0.12 | 0.12 | | | | | | |
| Arsenic, dissolved | mg/L | 0.001 | 0.001 | 0.001 | | | | | | |
| Bicarbonate as CaCO3 | mg/L | 56 | 229 | 111 | | | | | | |
| Calcium, dissolved | mg/L | 25.5 | 25.5 | 25.5 | | | | | | |
| Chloride | mg/L | | 8 | 4 | | | | | | |
| Conductivity @25C | µmhos/cm | 118 | 481 | 238 | | 208 | | 204 | | |
| Hardness as CaCO3 | mg/L | 45 | 169 | 87 | | | | | | |
| Iron, dissolved | mg/L | | 0.56 | 0.13 | | 0.333 | | 0.168 | | |
| Iron, total | mg/L | 0.49 | 11.3 | 4.06 | | 1.21 | | 1.24 | | |
| Magnesium, dissolved | mg/L | 5.3 | 6.9 | 6.1 | | | | | | |
| Manganese, dissolved | mg/L | 0.007 | 0.015 | 0.012 | | | | | | |
| Manganese, total | mg/L | 0.003 | 0.39 | 0.11 | | | | | | |
| Molybdenum, dissolved | mg/L | | 0.01 | 0.005 | | | | | | |
| Nitrate/Nitrite (as N) | mg/L | | 0.13 | 0.04 | | | | | | |
| pH | SU | 7.1 | 8.75 | 7.85 | | 8.3 | H | 8.5 | H | |
| Phosphorus, ortho dissolved | mg/L | | 1.67 | 0.19 | | | | | | |
| Residue, Filterable (TDS) @180C | mg/L | 90 | 552 | 169 | | 142 | | 140 | | |
| Residue, Non-Filterable (TSS) @105C | mg/L | 4 | 614 | 157 | | 30.0 | | 32.0 | | |
| Sodium Adsorption Ratio (SAR) | calc. | 0.59 | 1.08 | 0.86 | | | | | | |
| Sodium, dissolved | mg/L | 23.6 | 23.6 | 23.6 | | | | | | |
| Sulfate | mg/L | 8.5 | 47.2 | 21.03 | | | | | | |

[1] Baseline and WY 2000 data adapted from WWE (2001).

[2] Negative values denote readings below lab detection levels.

[3] ACZ Laboratory, Steamboat Springs, CO.

[4] ACZ Lab Qualifiers: U - Analyte was analyzed for but not detected at the indicated MDL.

H - Holding time exceeded; pH is a field test with an immediate hold time.

B - Analyte conc detected at a value between method detection limit (MDL) and practical quantitation limit (PQL). The associated value is an estimated quantity.

Shaded cells indicate parameters elevated greater than ten percent above the maximum baseline value.

## Horse Gulch
## Surface Water Quality and Field Parameters

| Mountain Coal West Elk Mine - Water Year 2023 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Monitoring Location: Horse Gulch** | | **Baseline [1]** | | | **Water Year 2023** | | |
| Description | Units | Minimum | Maximum | Mean | 5/9/2023 | 6/8/2023 | 9/4/2023 |
| **Field Parameters** | | | | | | | |
| Flow | gpm | | | | 262 | dry | dry |
| pH (Field) | SU | 8.2 | 8.5 | 8.3 | 7.91 | | |
| Conductivity (Field) | µmhos/cm | 240 | 740 | 542 | 296 | | |
| Temperature (Field) | °C | 5.1 | 14.7 | 10.0 | 13.9 | | |
| Comment | | | | | | | |
| **Laboratory Parameters [2]** | | | | | | | |
| Name of Certified Lab [3] | | | | | | | |
| Lab Reference # | | | | | | | |
| Sample Date | | | | | | | |
| Lab Test Date | | | | | | | |
| Sampled By | | | | | | | |
| Alkalinity (Total CaCO3) | mg/L | 128 | 332 | 270 | | | |
| Aluminum, dissolved | mg/L | 0.04 | 0.04 | 0.04 | | | |
| Arsenic, total recoverable | mg/L | 0.001 | 0.001 | 0.001 | | | |
| Bicarbonate as CaCO3 | mg/L | 128 | 331 | 268 | | | |
| Calcium, dissolved | mg/L | | 0.004 | 0.000 | | | |
| Carbonate as CaCO3 | mg/L | | 9 | 2 | | | |
| Cation - Anion Balance | % | -4.8 | -4.8 | -4.8 | | | |
| Chloride | mg/L | 1 | 5 | 3 | | | |
| Conductivity @25C | µmhos/cm | 780 | 780 | 780 | | | |
| Hardness as CaCO3 | mg/L | 89 | 324 | 255 | | | |
| Iron, dissolved | mg/L | 0.05 | 0.05 | 0.05 | | | |
| Iron, total | mg/L | 0.1 | 3.09 | 0.83 | | | |
| Magnesium, dissolved | mg/L | 7 | 29.4 | 22.7 | | | |
| Manganese, dissolved | mg/L | 0.007 | 0.007 | 0.007 | | | |
| Manganese, total | mg/L | | 0.34 | 0.04 | | | |
| Nitrate/Nitrite (as N) | mg/L | | 0.36 | 0.12 | | | |
| pH | SU | 8.3 | 8.3 | 8.30 | | | |
| Phosphate | mg/L | 0.11 | 0.11 | 0.11 | | | |
| Phosphorus, ortho dissolved | mg/L | | 0.037 | 0.011 | | | |
| Potassium, dissolved | mg/L | 3.6 | 3.6 | 3.6 | | | |
| Residue, Filterable (TDS) @180C | mg/L | 170 | 440 | 354 | | | |
| Residue, Non-Filterable (TSS) @105C | mg/L | | | | | | |
| Sodium Adsorption Ratio (SAR) | calc. | 0.72 | 1.35 | 1.2 | | | |
| Sodium, dissolved | mg/L | 15.5 | 54 | 41.1 | | | |
| Sulfate | mg/L | 10 | 90 | 66 | | | |
| Sum of Anions | meq/L | 6.5 | 6.5 | 6.5 | | | |
| Sum of Cations | meq/L | 5.9 | 5.9 | 5.9 | | | |

[1] Baseline and WY 2000 data adapted from WWE (2001).

[2] Negative values denote readings below lab detection levels.

[3] ACZ Laboratory, Steamboat Springs, CO.

**East Gulch, East of Horse Gulch**
**Surface Water Quality and Field Parameters**

| Mountain Coal West Elk Mine - Water Year 2023 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Monitoring Location: E. Gulch, E. of Horse Gulch** | | **Baseline [1]** | | | **Water Year 2023** | | | |
| Description | Units | Minimum | Maximum | Mean | 5/9/2023 | 6/7/2023 | Q[4] | 9/6/2023 |
| **Field Parameters** | | | | | | | | |
| Flow | gpm | | | | 412 | 5.69 | | dry |
| pH (Field) | SU | 7.7 | 8.4 | 8.0 | 7.85 | 7.93 | | |
| Conductivity (Field) | µmhos/cm | 260 | 480 | 402 | 409 | 541 | | |
| Temperature (Field) | °C | 4.8 | 14.8 | 10.0 | 12.3 | 14.5 | | |
| Comment | | | | | | | | |
| **Laboratory Parameters [2]** | | | | | | | | |
| Name of Certified Lab [3] | | | | | | ACZ | | |
| Lab Reference # | | | | | | L81055-18 | | |
| Sample Date | | | | | | 6/7/2023 | | |
| Lab Test Date | | | | | | 6/13-6/24 | | |
| Sampled By | | | | | | PH | | |
| Alkalinity (Total CaCO3) | mg/L | 135 | 245 | 202 | | | | |
| Aluminum, dissolved | mg/L | 0.03 | 0.03 | 0.03 | | | | |
| Bicarbonate as CaCO3 | mg/L | 135 | 245 | 202 | | | | |
| Calcium, dissolved | mg/L | 26.8 | 53.6 | 42.6 | | | | |
| Carbonate as CaCO3 | mg/L | | 6 | 0.5 | | | | |
| Chloride | mg/L | 1 | 4 | 2 | | | | |
| Conductivity @25C | µmhos/cm | 453 | 453 | 453 | | 518 | | |
| Hardness as CaCO3 | mg/L | 95 | 190 | 156 | | | | |
| Iron, dissolved | mg/L | 0.05 | 0.05 | 0.05 | | -0.06 | U | |
| Iron, total | mg/L | 0.41 | 3.59 | 1.07 | | -0.06 | U | |
| Magnesium, dissolved | mg/L | 6.9 | 13.7 | 11.6 | | | | |
| Manganese, dissolved | mg/L | 0.012 | 0.012 | 0.012 | | | | |
| Manganese, total | mg/L | 0.01 | 0.094 | 0.068 | | | | |
| Nitrate/Nitrite (as N) | mg/L | 0.04 | 0.23 | 0.13 | | | | |
| pH | SU | 8 | 8 | 8 | | 8.5 | H | |
| Phosphate | mg/L | 0.2 | 0.2 | 0.2 | | | | |
| Phosphorus, ortho dissolved | mg/L | | 0.066 | 0.018 | | | | |
| Potassium, dissolved | mg/L | 1.8 | 1.8 | 1.8 | | | | |
| Residue, Filterable (TDS) @180C | mg/L | 170 | 290 | 252 | | 330 | | |
| Residue, Non-Filterable (TSS) @105C | mg/L | | 50 | 17 | | -5.0 | U | |
| Sodium Adsorption Ratio (SAR) | calc. | 0.94 | 1.65 | 1.5 | | | | |
| Sodium, dissolved | mg/L | 20.9 | 47.8 | 40.2 | | | | |
| Sum of Anions | meq/L | 4.9 | 4.9 | 4.9 | | | | |
| Sum of Cations | meq/L | 4.9 | 4.9 | 4.9 | | | | |

[1] Baseline and WY 2000 data adapted from WWE (2001).

[2] Negative values denote readings below lab detection levels.

[3] ACZ Laboratory, Steamboat Springs, CO.

[4] ACZ Lab Qualifiers: U - Analyte was analyzed for but not detected at the indicated MDL.

H - Holding time exceeded; pH is a field test with an immediate hold time.

B - Analyte conc detected at a value between method detection limit (MDL) and practical quantitation limit (PQL). The associated value is an estimated quantity.

Shaded cells indicate parameters elevated greater than ten percent above the maximum baseline value.

**Upper Deep Creek**
**Surface Water Quality and Field Parameters**

| Mountain Coal West Elk Mine - Water Year 2023 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Monitoring Location: Upper Deep Creek** | | **Baseline [1]** | | | **Water Year 2023** | | | |
| Description | Units | Minimum | Maximum | Mean | 5/16/2023 | 6/8/2023 | Q[4] | 9/7/2023 |
| **Field Parameters** | | | | | | | | |
| Flow | gpm | | | | 8,625 | 6,215 | | 98.9 |
| pH (Field) | SU | 8.10 | 8.80 | 8.50 | 7.78 | 7.80 | | 7.81 |
| Conductivity (Field) | µmhos/cm | 80 | 310 | 192 | 188.9 | 141.8 | | nm[5] |
| Temperature (Field) | °C | 0.2 | 18.6 | 10.0 | 6.6 | 10.0 | | nm[5] |
| Comment | | | | | | | | |
| **Laboratory Parameters [2]** | | | | | | | | |
| Name of Certified Lab [3] | | | | | | ACZ | | |
| Lab Reference # | | | | | | L81055-31 | | |
| Sample Date | | | | | | 6/8/2023 | | |
| Lab Test Date | | | | | | 6/13-6/24 | | |
| Sampled By | | | | | | PH | | |
| Alkalinity (Total CaCO3) | mg/L | | 160 | 103.4 | | | | |
| Bicarbonate as CaCO3 | mg/L | 53 | 153 | 106.3 | | | | |
| Calcium, dissolved | mg/L | 14 | 44.4 | 28.7 | | | | |
| Carbonate as CaCO3 | mg/L | | 9 | 1.3 | | | | |
| Cation - Anion Balance | % | -3.4 | -2 | -2.7 | | | | |
| Chloride | mg/L | | 2 | 0.2 | | | | |
| Conductivity @25C | µmhos/cm | 139 | 242 | 191 | | 146 | | |
| Hardness as CaCO3 | mg/L | 47 | 138 | 91 | | | | |
| Iron, dissolved | mg/L | 0.02 | 0.04 | 0 | | -0.06 | U | |
| Iron, total | mg/L | 0.14 | 9.43 | 2.63 | | 6.82 | | |
| Magnesium, dissolved | mg/L | 2.6 | 6.6 | 4.6 | | | | |
| Manganese, dissolved | mg/L | | 0.007 | 0.004 | | | | |
| Manganese, total | mg/L | 0.005 | 0.282 | 0 | | | | |
| Nitrate/Nitrite (as N) | mg/L | | 0.05 | 0.01 | | | | |
| pH | SU | 6.9 | 8 | 7.5 | | 8.2 | H | |
| Phosphate | mg/L | 0.12 | 0.2 | 0.16 | | | | |
| Phosphorus, ortho dissolved | mg/L | | 0.065 | 0.013 | | | | |
| Potassium, dissolved | mg/L | 0.7 | 1.2 | 1.0 | | | | |
| Residue, Filterable (TDS) @180C | mg/L | 60 | 210 | 133 | | 138 | | |
| Residue, Non-Filterable (TSS) @105C | mg/L | | | | | 256 | | |
| Sodium Adsorption Ratio (SAR) | calc. | 0.32 | 0.77 | 0.6 | | | | |
| Sodium, dissolved | mg/L | 7.9 | 20 | 13.8 | | | | |
| Sulfate | mg/L | | 30 | 10.8 | | | | |
| Sum of Anions | meq/L | 1.5 | 2.6 | 2.1 | | | | |
| Sum of Cations | meq/L | 1.4 | 2.5 | 2.0 | | | | |

[1] Baseline and WY 2000 data adapted from WWE (2001).

[2] Negative values denote readings below lab detection levels.

[3] ACZ Laboratory, Steamboat Springs, CO.

[4] ACZ Lab Qualifiers: U - Analyte was analyzed for but not detected at the indicated MDL.

H - Holding time exceeded; pH is a field test with an immediate hold time.

B - Analyte conc detected at a value between method detection limit (MDL) and practical quantitation limit (PQL). The associated value is an estimated quantity.

Shaded cells indicate parameters elevated greater than ten percent above the maximum baseline value.

[5] Not Measured - Equipment malfunction.

**Lower Deep Creek**
**Surface Water Quality and Field Parameters**

| Mountain Coal West Elk Mine - Water Year 2023 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Monitoring Location: Lower Deep Creek** | | **Baseline [1]** | | | **Water Year 2023** | | | |
| Description | Units | Minimum | Maximum | Mean | 5/16/2023 | 6/8/2023 | Q[4] | 9/7/2023 |
| **Field Parameters** | | | | | | | | |
| Flow | gpm | | | | 10,480 | 5,842 | | 129.6 |
| pH (Field) | SU | 8.10 | 8.80 | 8.50 | 7.86 | 7.83 | | 8.33 |
| Conductivity (Field) | µmhos/cm | 120 | 380 | 246 | 248 | 161 | | nm[5] |
| Temperature (Field) | °C | 0.1 | 16.4 | 10.0 | 7.6 | 11.3 | | nm[5] |
| Comment | | | | | | | | |
| **Laboratory Parameters [2]** | | | | | | | | |
| Name of Certified Lab [3] | | | | | | ACZ | | |
| Lab Reference # | | | | | | L81055-13 | | |
| Sample Date | | | | | | 6/8/2023 | | |
| Lab Test Date | | | | | | 6/13-6/24 | | |
| Sampled By | | | | | | PH | | |
| Alkalinity (Total CaCO3) | mg/L | 61 | 183 | 126 | | | | |
| Aluminum, dissolved | mg/L | | 0.03 | 0.02 | | | | |
| Bicarbonate as CaCO3 | mg/L | 65 | 173 | 132 | | | | |
| Calcium, dissolved | mg/L | 18.6 | 46.8 | 31.9 | | | | |
| Carbonate as CaCO3 | mg/L | | 12 | 2 | | | | |
| Cation - Anion Balance | % | -6.7 | -2.9 | -4.8 | | | | |
| Chloride | mg/L | | 2 | 1 | | | | |
| Conductivity @25C | µmhos/cm | 162 | 270 | 216 | | 166 | | |
| Iron, dissolved | mg/L | 0.03 | 0.43 | 0.23 | | 0.061 | B | |
| Iron, total | mg/L | 0.11 | 5.83 | 1.68 | | 6.94 | | |
| Magnesium, dissolved | mg/L | 3.1 | 7.5 | 5.4 | | | | |
| Manganese, dissolved | mg/L | | 0.009 | 0.005 | | | | |
| Manganese, total | mg/L | | 0.16 | 0.04 | | | | |
| Nitrate/Nitrite (as N) | mg/L | | 0.10 | 0.03 | | | | |
| pH | SU | 6.5 | 8.2 | 7.4 | | 8.4 | H | |
| Phosphate | mg/L | 0.08 | 0.09 | 0.09 | | | | |
| Phosphorus, ortho dissolved | mg/L | | 0.32 | 0.007 | | | | |
| Potassium, dissolved | mg/L | 0.8 | 1.1 | 1.0 | | | | |
| Residue, Filterable (TDS) @180C | mg/L | 90 | 250 | 165 | | 140 | | |
| Residue, Non-Filterable (TSS) @105C | mg/L | | 448 | 93 | | 230 | | |
| Sodium Adsorption Ratio (SAR) | calc. | 0.59 | 1.32 | 0.94 | | | | |
| Sodium, dissolved | mg/L | 12.3 | 31.4 | 21.6 | | | | |
| Sulfate | mg/L | | 30 | 19 | | | | |
| Sum of Anions | meq/L | 1.8 | 3.2 | 2.5 | | | | |
| Sum of Cations | meq/L | 1.7 | 2.8 | 2.25 | | | | |

[1] Baseline and WY 2000 data adapted from WWE (2001).

[2] Negative values denote readings below lab detection levels.

[3] ACZ Laboratory, Steamboat Springs, CO.

[4] ACZ Lab Qualifiers: U - Analyte was analyzed for but not detected at the indicated MDL.
H - Holding time exceeded; pH is a field test with an immediate hold time.
B - Analyte conc detected at a value between method detection limit (MDL) and practical quantitation limit (PQL). The associated value is an estimated quantity.

Shaded cells indicate parameters elevated greater than ten percent above the maximum baseline value.

[5] Not Measured - Equipment malfunction.

## Box Canyon
## Surface Water Quality and Field Parameters

| Mountain Coal West Elk Mine - Water Year 2023 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Monitoring Location: Box Canyon** | | **Baseline [1]** | | | **Water Year 2023** | | | |
| Description | Units | Minimum | Maximum | Mean | 5/10/2023 | 6/6/2023 | Q[5] | 9/5/2023 |
| **Field Parameters** | | | | | | | | |
| Flow | gpm | | | | 6.5 | 4.94 | | dry |
| pH (Field) | SU | 7.9 | 8.9 | 8.3 | 8.02 | 8.1 | | |
| Conductivity (Field) | µmhos/cm | 840 | 1,020 | 916 | 1,645 | 2,310 | | |
| Temperature (Field) | °C | 2.0 | 15.9 | 10.0 | 9.4 | 13.3 | | |
| Comment | | | | | | | | |
| **Laboratory Parameters [2]** | | | | | | | | |
| Name of Certified Lab [3] | | | | | | ACZ | | |
| Lab Reference # | | | | | | L81056-03 | | |
| Sample Date | | | | | | 6/6/2023 | | |
| Lab Test Date | | | | | | 6/13-6/24 | | |
| Sampled By | | | | | | PH | | |
| Alkalinity (Total CaCO3) | mg/L | 401 | 447 | 427 | | | | |
| Aluminum, dissolved | mg/L | 0[4] | 0.07[4] | 0.03[4] | | | | |
| Arsenic, dissolved | mg/L | 0 | 0 | 0 | | | | |
| Arsenic, total recoverable | mg/L | 0 | 0.006 | 0.001 | | | | |
| Bicarbonate as CaCO3 | mg/L | 398 | 447 | 425 | | | | |
| Cadmium, dissolved | mg/L | 0 | 0.003 | 0.0008 | | | | |
| Calcium, dissolved | mg/L | 40.2 | 67.9 | 58.0 | | | | |
| Carbonate as CaCO3 | mg/L | 0 | 12 | 2 | | | | |
| Cation - Anion Balance | % | -4 | 3.6 | 0.02 | | | | |
| Chloride | mg/L | 2 | 6 | 5 | | | | |
| Conductivity @25C | µmhos/cm | 868 | 968 | 921 | | 2,100 | | |
| Hardness as CaCO3 | mg/L | 195 | 283 | 255 | | | | |
| Hydroxide as CaCO3 | mg/L | 0 | 0 | 0 | | | | |
| Iron, dissolved | mg/L | 0 | 0.02 | 0.01 | | -0.06 | U | |
| Iron, total | mg/L | 0.02 | 0.44 | 0.16 | | -0.06 | U | |
| Magnesium, dissolved | mg/L | 23 | 28 | 27 | | | | |
| Manganese, total | mg/L | 0 | 0.009 | 0.002 | | | | |
| Nitrate (as N), dissolved | mg/L | 0.13 | 0.48 | 0.30 | | | | |
| Nitrate/Nitrite (as N) | mg/L | 0.13 | 0.48 | 0.30 | | | | |
| pH | SU | 8 | 8.2 | 8.1 | | 8.7 | H | |
| Phosphate | mg/L | 0 | 0.03 | 0.01 | | | | |
| Phosphorus, ortho dissolved | mg/L | 0 | 0.007 | 0.002 | | | | |
| Potassium, dissolved | mg/L | 2.6 | 3.3 | 3.0 | | | | |
| Residue, Filterable (TDS) @180C | mg/L | 540 | 620 | 586 | | 1,500 | | |
| Residue, Non-Filterable (TSS) @105C | mg/L | 0 | 38 | 19 | | -5 | U | |
| Selenium, dissolved | mg/L | 0.001 | 0.002 | 0.002 | | | | |
| Selenium, total recoverable | mg/L | 0 | 0.003 | 0.001 | | | | |
| Sodium Adsorption Ratio (SAR) | calc. | 3.43 | 4.26 | 3.91 | | | | |
| Sodium, dissolved | mg/L | 127 | 154 | 141 | | | | |
| Sulfate | mg/L | 100 | 140 | 118 | | | | |
| Sum of Anions | meq/L | 10.3 | 12.1 | 11.1 | | | | |
| Sum of Cations | meq/L | 9.5 | 12.23 | 11.1 | | | | |
| Zinc, dissolved | mg/L | 0 | 0.01 | 0.002 | | | | |

[1] Baseline and WY 2000 data adapted from WWE (2001).

[2] Negative values denote readings below lab detection levels.

[3] ACZ Laboratory, Steamboat Springs, CO.

[4] Baseline value is for total Aluminum.

[5] ACZ Lab Qualifiers: U - Analyte was analyzed for but not detected at the indicated MDL.

H - Holding time exceeded; pH is a field test with an immediate hold time.

B - Analyte conc detected at a value between method detection limit (MDL) and practical quantitation limit (PQL). The associated value is an estimated quantity.

Shaded cells indicate parameters elevated greater than ten percent above the maximum baseline value.

# Deer Creek
## Surface Water Quality and Field Parameters

| Mountain Coal West Elk Mine - Water Year 2023 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Monitoring Location: Deer Creek** | | **Baseline [1]** | | | **Water Year 2023** | | | |
| Description | Units | Minimum | Maximum | Mean [5] | 5/9/2023 | 6/7/2023 | Q[4] | 9/4/2023 |
| **Field Parameters** | | | | | | | | |
| Flow | gpm | 0.72 | 114 | 44.7 | 491 | 44.04 | | dry |
| pH (Field) | SU | 8.3 | 8.4 | 8.4 | 8.23 | 7.44 | | |
| Conductivity (Field) | µmhos/cm | 537 | 796 | 659 | 535 | 768 | | |
| Temperature (Field) | °C | 11.2 | 16.9 | 13.1 | 14.9 | 16.9 | | |
| Comment | | | | | | | | |
| **Laboratory Parameters [2]** | | | | | | | | |
| Name of Certified Lab [3] | | | | | | ACZ | | |
| Lab Reference # | | | | | | L81055-01 | | |
| Sample Date | | | | | | 6/7/2023 | | |
| Lab Test Date | | | | | | 6/13-6/24 | | |
| Sampled By | | | | | | PH | | |
| Alkalinity (Total CaCO3) | mg/L | 247 | 274 | 263 | | | | |
| Aluminum, dissolved | mg/L | -0.03 | -0.03 | -0.03 | | | | |
| Arsenic, dissolved | mg/L | -0.0005 | -0.0005 | -0.0005 | | | | |
| Arsenic, total recoverable | mg/L | -0.0005 | 0.0009 | 0.0006 | | | | |
| Bicarbonate as CaCO3 | mg/L | 218 | 249 | 235 | | | | |
| Boron, dissolved | mg/L | 0.03 | 0.03 | 0.03 | | | | |
| Cadmium, dissolved | mg/L | -0.005 | -0.005 | -0.005 | | | | |
| Calcium, dissolved | mg/L | 47.0 | 64.5 | 56.5 | | | | |
| Carbonate as CaCO3 | mg/L | 25 | 30 | 28 | | | | |
| Cation - Anion Balance | % | -5.7 | 4.6 | 3.7 | | | | |
| Chloride | mg/L | 3 | 3 | 3 | | | | |
| Conductivity @25C | µmhos/cm | 487 | 547 | 517 | | 753 | | |
| Copper, dissolved | mg/L | -0.01 | -0.01 | -0.01 | | | | |
| Hardness as CaCO3 | mg/L | 176 | 245 | 211 | | | | |
| Hydroxide as CaCO3 | mg/L | -2 | -2 | -2 | | | | |
| Iron, dissolved | mg/L | 0.09 | 0.11 | 0.10 | | 0.130 | B | |
| Iron, total | mg/L | 0.36 | 2.92 | 1.64 | | 1.04 | | |
| Lead, dissolved | mg/L | -0.04 | -0.04 | -0.04 | | | | |
| Magnesium, dissolved | mg/L | 14.3 | 20.4 | 18.3 | | | | |
| Manganese, dissolved | mg/L | -0.005 | 0.009 | 0.005 | | | | |
| Manganese, total | mg/L | -0.005 | 0.049 | 0.026 | | | | |
| Mercury, total | mg/L | -0.0002 | -0.0002 | -0.0002 | | | | |
| Molybdenum, dissolved | mg/L | -0.01 | -0.01 | -0.01 | | | | |
| Nitrate/Nitrite (as N) | mg/L | 0.88 | 2.07 | 1.50 | | | | |
| pH | SU | 8.5 | 8.6 | 8.6 | | 8.6 | H | |
| Phosphate | mg/L | 0.03 | 0.12 | 0.08 | | | | |
| Phosphorus, ortho dissolved | mg/L | 0.01 | 0.04 | 0.03 | | | | |
| Potassium, dissolved | mg/L | 3.2 | 3.6 | 3.4 | | | | |
| Residue, Filterable (TDS) @180C | mg/L | 280 | 330 | 310 | | 468 | | |
| Residue, Non-Filterable (TSS) @105C | mg/L | 16 | 68 | 42 | | 45.0 | | |
| Selenium, total recoverable | mg/L | -0.001 | -0.001 | -0.001 | | | | |
| Sodium Adsorption Ratio (SAR) | calc. | 1.09 | 1.21 | 1.15 | | | | |
| Sodium, dissolved | mg/L | 32.8 | 43.9 | 39.9 | | | | |
| Sulfate | mg/L | 30 | 50 | 40 | | | | |
| Sum of Anions | meq/L | 5.6 | 6.2 | 5.9 | | | | |
| Sum of Cations | meq/L | 5.0 | 6.8 | 5.9 | | | | |
| TDS (calculated) | calc. | 292 | 346 | 319 | | | | |
| TDS (ratio - measured/calculated) | mg/L | 0.92 | 0.96 | 0.94 | | | | |
| Zinc, dissolved | mg/L | -0.01 | 0.02 | 0.01 | | | | |

[1] Baseline 2005.

[2] Negative values denote readings below lab detection levels.

[3] ACZ Laboratory, Steamboat Springs, CO.

[4] ACZ Lab Qualifiers: U - Analyte was analyzed for but not detected at the indicated MDL.

H - Holding time exceeded; pH is a field test with an immediate hold time.

B - Analyte conc detected at a value between method detection limit (MDL) and practical quantitation limit (PQL). The associated value is an estimated quantity.

[5] Average (mean) value calc using 1/2 of detection limit for readings below lab detection limits unless all readings are below lab detection limit.

Shaded cells indicate parameters elevated greater than ten percent above the maximum baseline value.

## Poison Gulch
## Surface Water Quality and Field Parameters

| Mountain Coal West Elk Mine - Water Year 2023 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Monitoring Location: Poison Gulch** | | **Baseline [1]** | | | **Water Year 2023** | | | |
| Description | Units | Minimum | Maximum | Mean[5] | 5/9/2023 | 6/8/2023 | Q[4] | 9/7/2023 |
| **Field Parameters** | | | | | | | | |
| Flow | gpm | | | | 413.0 | 22.80 | | dry |
| pH (Field) | SU | 6.56 | 7.08 | 6.74 | 7.69 | 8.20 | | |
| Conductivity (Field) | µmhos/cm | 271 | 479 | 383 | 253 | 761 | | |
| Temperature (Field) | °C | 10.9 | 12.9 | 12.2 | 13.2 | 19.7 | | |
| Comment | | | | | | | | |
| **Laboratory Parameters [2]** | | | | | | | | |
| Name of Certified Lab [3] | | | | | | ACZ | | |
| Lab Reference # | | | | | | L81055-23 | | |
| Sample Date | | | | | | 6/8/2023 | | |
| Lab Test Date | | | | | | 6/13-6/24 | | |
| Sampled By | | | | | | PH | | |
| Alkalinity (Total CaCO3) | mg/L | 119 | 152 | 136 | | | | |
| Aluminum, dissolved | mg/L | -0.03 | -0.03 | -0.03 | | | | |
| Arsenic, total recoverable | mg/L | -0.0005 | 0.0007 | 0.0005 | | | | |
| Bicarbonate as CaCO3 | mg/L | 119 | 152 | 136 | | | | |
| Boron, dissolved | mg/L | 0.02 | 0.03 | 0.03 | | | | |
| Cadmium, dissolved | mg/L | -0.005 | -0.005 | -0.005 | | | | |
| Calcium, dissolved | mg/L | 22.0 | 35.5 | 28.8 | | | | |
| Carbonate as CaCO3 | mg/L | -2 | -2 | -2 | | | | |
| Cation - Anion Balance | % | -2.1 | 7.7 | 4.4 | | | | |
| Chloride | mg/L | 1 | 1 | 1 | | | | |
| Conductivity @25C | µmhos/cm | 240 | 295 | 268 | | 747 | | |
| Copper, dissolved | mg/L | -0.01 | -0.01 | -0.01 | | | | |
| Hardness as CaCO3 | mg/L | 78 | 124 | 101 | | | | |
| Hydroxide as CaCO3 | mg/L | -2 | -2 | -2 | | | | |
| Iron, dissolved | mg/L | 0.07 | 0.11 | 0.09 | | 0.066 | B | |
| Iron, total | mg/L | 0.41 | 0.43 | 0.42 | | 0.575 | | |
| Lead, dissolved | mg/L | -0.04 | -0.04 | -0.04 | | | | |
| Magnesium, dissolved | mg/L | 5.6 | 8.6 | 7.1 | | | | |
| Manganese, dissolved | mg/L | -0.005 | -0.005 | -0.005 | | | | |
| Manganese, total | mg/L | -0.005 | 0.010 | 0.006 | | | | |
| Mercury, total | mg/L | -0.0002 | -0.0002 | -0.0002 | | | | |
| Molybdenum, dissolved | mg/L | -0.01 | -0.01 | -0.01 | | | | |
| pH | SU | 7.8 | 8.1 | 8.0 | | 8.5 | H | |
| Phosphate | mg/L | 0.21 | 0.21 | 0.21 | | | | |
| Phosphorus, ortho dissolved | mg/L | 0.07 | 0.07 | 0.07 | | | | |
| Potassium, dissolved | mg/L | 2.9 | 2.9 | 2.9 | | | | |
| Residue, Filterable (TDS) @180C | mg/L | 130 | 170 | 150 | | 478 | | |
| Residue, Non-Filterable (TSS) @105C | mg/L | -5 | 28 | 15 | | 19.0 | B | |
| Selenium, total recoverable | mg/L | -0.001 | -0.001 | -0.001 | | | | |
| Sodium Adsorption Ratio (SAR) | calc. | 0.82 | 0.92 | 0.87 | | | | |
| Sodium, dissolved | mg/L | 16.6 | 23.3 | 20.0 | | | | |
| Sulfate | mg/L | -10 | -10 | -10 | | | | |
| Sum of Anions | meq/L | 2.4 | 3.0 | 2.7 | | | | |
| Sum of Cations | meq/L | 2.3 | 3.5 | 2.9 | | | | |
| TDS (calculated) | calc. | 120 | 163 | 142 | | | | |
| TDS (ratio - measured/calculated) | mg/L | 1.04 | 1.08 | 1.06 | | | | |
| Zinc, dissolved | mg/L | -0.01 | -0.01 | -0.01 | | | | |

[1] Baseline 2005.

[2] Negative values denote readings below lab detection levels.

[3] ACZ Laboratory, Steamboat Springs, CO.

[4] ACZ Lab Qualifiers: U - Analyte was analyzed for but not detected at the indicated MDL.
H - Holding time exceeded; pH is a field test with an immediate hold time.

[5] Average (mean) value calc using 1/2 of detection limit for readings below lab detection limits unless all readings are below lab detection limit.

Shaded cells indicate parameters elevated greater than ten percent above the maximum baseline value.

# Deep Creek Ditch
## Surface Water Quality and Field Parameters

| Mountain Coal West Elk Mine - Water Year 2023 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Monitoring Location: Deep Creek Ditch** | | **Baseline [1]** | | | **Water Year 2023** | | | |
| Description | Units | Minimum | Maximum | Mean [5] | 5/16/2023 | 6/8/2023 | Q[4] | 9/7/2023 |
| **Field Parameters** | | | | | | | | |
| Flow | gpm / staff | 70 | 1,527 | 563 | 0.51' | 0.22' | | 0.26' |
| pH (Field) | SU | 6.32 | 8.20 | 7.27 | 8.07 | 8.23 | | 8.11 |
| Conductivity (Field) | µmhos/cm | 75.9 | 131 | 107 | 62.6 | 60.3 | | nm[6] |
| Temperature (Field) | °C | 5.0 | 11.9 | 9.6 | 3.6 | 10.9 | | nm[6] |
| Comment | | | | | | | | |
| **Laboratory Parameters [2]** | | | | | | | | |
| Name of Certified Lab [3] | | | | | | ACZ | | |
| Lab Reference # | | | | | | L81055-17 | | |
| Sample Date | | | | | | 6/8/2023 | | |
| Lab Test Date | | | | | | 6/13-6/24 | | |
| Sampled By | | | | | | PH | | |
| Alkalinity (Total CaCO3) | mg/L | 25 | 60 | 45 | | | | |
| Aluminum, dissolved | mg/L | 0.05 | 0.15 | 0.10 | | | | |
| Arsenic, total recoverable | mg/L | -0.0005 | 0.0006 | 0.0003 | | | | |
| Bicarbonate as CaCO3 | mg/L | 25 | 60 | 45 | | | | |
| Boron, dissolved | mg/L | -0.01 | -0.01 | -0.01 | | | | |
| Cadmium, dissolved | mg/L | -0.005 | -0.005 | -0.005 | | | | |
| Calcium, dissolved | mg/L | 4.6 | 13.7 | 10.1 | | | | |
| Carbonate as CaCO3 | mg/L | -2 | -2 | -2 | | | | |
| Cation - Anion Balance | % | -11.1 | 6.7 | -3.0 | | | | |
| Chloride | mg/L | 1 | 9 | 3 | | | | |
| Conductivity @25C | µmhos/cm | 50 | 113 | 88 | | 57 | | |
| Copper, dissolved | mg/L | -0.01 | -0.01 | -0.01 | | | | |
| Hardness as CaCO3 | mg/L | 16 | 47 | 35 | | | | |
| Hydroxide as CaCO3 | mg/L | -2 | -2 | -2 | | | | |
| Iron, dissolved | mg/L | 0.04 | 0.14 | 0.09 | | 0.082 | B | |
| Iron, total | mg/L | 1.19 | 2.59 | 1.83 | | 1.13 | | |
| Lead, dissolved | mg/L | -0.04 | -0.04 | -0.04 | | | | |
| Magnesium, dissolved | mg/L | 1.1 | 3.1 | 2.3 | | | | |
| Manganese, dissolved | mg/L | -0.005 | 0.013 | 0.005 | | | | |
| Manganese, total | mg/L | 0.032 | 0.090 | 0.064 | | | | |
| Mercury, total | mg/L | -0.0002 | -0.0002 | -0.0002 | | | | |
| Molybdenum, dissolved | mg/L | -0.01 | -0.01 | -0.01 | | | | |
| Nitrate/Nitrite (as N) | mg/L | -0.02 | 3.39 | 0.90 | | | | |
| pH | SU | 7.8 | 8.1 | 8.0 | | 8.1 | H | |
| Phosphate | mg/L | 0.06 | 0.09 | 0.08 | | | | |
| Phosphorus, ortho dissolved | mg/L | 0.02 | 0.03 | 0.03 | | | | |
| Potassium, dissolved | mg/L | -0.3 | 0.7 | 0.5 | | | | |
| Residue, Filterable (TDS) @180C | mg/L | 40 | 100 | 75 | | 54 | | |
| Residue, Non-Filterable (TSS) @105C | mg/L | 8 | 76 | 32 | | 33.0 | | |
| Selenium, total recoverable | mg/L | -0.001 | -0.001 | -0.001 | | | | |
| Sodium Adsorption Ratio (SAR) | calc. | 0.19 | 0.33 | 0.28 | | | | |
| Sodium, dissolved | mg/L | 1.8 | 5.2 | 3.9 | | | | |
| Sulfate | mg/L | -10 | -10 | -10 | | | | |
| Sum of Anions | meq/L | 0.5 | 1.4 | 0.9 | | | | |
| Sum of Cations | meq/L | 0.4 | 1.2 | 0.9 | | | | |
| TDS (calculated) | calc. | 24 | 68 | 47 | | | | |
| TDS (ratio - measured/calculated) | mg/L | 1.38 | 2.05 | 1.64 | | | | |
| Zinc, dissolved | mg/L | -0.01 | 0.03 | 0.02 | | | | |

[1] Baseline 2006.

[2] Negative values denote readings below lab detection levels.

[3] ACZ Laboratory, Steamboat Springs, CO.

[4] ACZ Lab Qualifiers: U - Analyte was analyzed for but not detected at the indicated MDL.

H - Holding time exceeded; pH is a field test with an immediate hold time.

B - Analyte conc detected at a value between method detection limit (MDL) and practical quantitation limit (PQL). The associated value is an estimated quantity.

[5] Average (mean) value calc using 1/2 of detection limit for readings below lab detection limits unless all readings are below lab detection limit.

Shaded cells indicate parameters elevated greater than ten percent above the maximum baseline value.

[6] Not Measured - Equipment malfunction.

# Minnesota Reservoir Flume
## Surface Water Quality and Field Parameters

| Mountain Coal West Elk Mine - Water Year 2023 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Monitoring Location: Minnesota Reservoir Flume** | | **Baseline [1]** | | | **Water Year 2023** | | | |
| Description | Units | Minimum | Maximum | Mean[5] | 5/10/2023 | 6/8/2023 | Q[4] | 9/4/2023 |
| **Field Parameters** | | | | | | | | |
| Flow | gpm / staff | 83 | 3,591 | 1,364 | 1.25' | 0.42' | | 0.18' |
| pH (Field) | SU | 7.97 | 8.75 | 8.29 | 8.16 | 8.33 | | 8.09 |
| Conductivity (Field) | µmhos/cm | 114 | 682 | 360 | 339 | 352 | | 159.3 |
| Temperature (Field) | °C | 14.8 | 24.1 | 18.5 | 6.4 | 14.3 | | 15.7 |
| Comment | | | | | | | | |
| **Laboratory Parameters [2]** | | | | | | | | |
| Name of Certified Lab [3] | | | | | | ACZ | | |
| Lab Reference # | | | | | | L81055-24 | | |
| Sample Date | | | | | | 6/8/2023 | | |
| Lab Test Date | | | | | | 6/13-6/24 | | |
| Sampled By | | | | | | PH | | |
| Alkalinity (Total CaCO3) | mg/L | 46 | 230 | 140 | | | | |
| Aluminum, dissolved | mg/L | -0.03 | 0.08 | 0.05 | | | | |
| Arsenic, dissolved | mg/L | -0.001 | 0.001 | 0.001 | | | | |
| Bicarbonate as CaCO3 | mg/L | 46 | 213 | 134 | | | | |
| Boron, dissolved | mg/L | -0.01 | 0.02 | 0.01 | | | | |
| Cadmium, dissolved | mg/L | -0.01 | -0.01 | -0.01 | | | | |
| Calcium, dissolved | mg/L | 8.9 | 53.7 | 31.2 | | | | |
| Carbonate as CaCO3 | mg/L | -2 | 18 | 8 | | | | |
| Cation - Anion Balance | % | -5.9 | 2.1 | -1.1 | | | | |
| Chloride | mg/L | 1.00 | 3.00 | 1.86 | | | | |
| Conductivity @25C | µmhos/cm | 95 | 456 | 295 | | 325 | | |
| Copper, dissolved | mg/L | -0.01 | -0.01 | -0.01 | | | | |
| Hardness as CaCO3 | mg/L | 31 | 192 | 111 | | | | |
| Hydroxide as CaCO3 | mg/L | -2 | -2 | -2 | | | | |
| Iron, dissolved | mg/L | 0.03 | 0.26 | 0.10 | | 0.219 | | |
| Iron, total | mg/L | 0.36 | 3.62 | 1.58 | | 2.10 | | |
| Lead, dissolved | mg/L | -0.04 | -0.04 | -0.04 | | | | |
| Magnesium, dissolved | mg/L | 2.1 | 14.1 | 8.1 | | | | |
| Manganese, dissolved | mg/L | -0.01 | 0.09 | 0.03 | | | | |
| Manganese, total | mg/L | 0.031 | 0.397 | 0.136 | | | | |
| Mercury, total | mg/L | -0.0002 | -0.0002 | -0.0002 | | | | |
| Molybdenum, dissolved | mg/L | -0.01 | -0.01 | -0.01 | | | | |
| Nitrate (as N), dissolved | mg/L | -0.02 | 0.64 | 0.22 | | | | |
| pH | SU | 8.0 | 8.5 | 8.3 | | 8.5 | H | |
| Phosphate | mg/L | -0.03 | 0.40 | 0.12 | | | | |
| Phosphorus, ortho dissolved | mg/L | -0.01 | 0.13 | 0.04 | | | | |
| Potassium, dissolved | mg/L | 0.6 | 2.0 | 1.3 | | | | |
| Residue, Filterable (TDS) @180C | mg/L | 70 | 250 | 176 | | 212 | | |
| Residue, Non-Filterable (TSS) @105C | mg/L | -5 | 60 | 26 | | 29.0 | | |
| Selenium, dissolved | mg/L | -0.001 | -0.001 | -0.001 | | | | |
| Sodium Adsorption Ratio (SAR) | calc. | 0.38 | 1.16 | 0.72 | | | | |
| Sodium, dissolved | mg/L | 4.8 | 32.4 | 17.3 | | | | |
| Sulfate | mg/L | -10 | 30 | 6 | | | | |
| Sum of Anions | meq/L | 0.90 | 4.80 | 3.06 | | | | |
| Sum of Cations | meq/L | 0.8 | 4.7 | 3.0 | | | | |
| TDS (calculated) | calc. | 46 | 244 | 158 | | | | |
| TDS (ratio - measured/calculated) | mg/L | 0.99 | 1.74 | 1.24 | | | | |
| Zinc, dissolved | mg/L | -0.01 | 0.02 | 0.01 | | | | |

[1] Baseline 2006.

[2] Negative values denote readings below lab detection levels.

[3] ACZ Laboratory, Steamboat Springs, CO.

[4] ACZ Lab Qualifiers: U - Analyte was analyzed for but not detected at the indicated MDL.
H - Holding time exceeded; pH is a field test with an immediate hold time.
B - Analyte conc detected at a value between method detection limit (MDL) and practical quantitation limit (PQL). The associated value is an estimated quantity.

[5] Average (mean) value calc using 1/2 of detection limit for readings below lab detection limits unless all readings are below lab detection limit.

Shaded cells indicate parameters elevated greater than ten percent above the maximum baseline value.

# South Prong Creek
# Surface Water Quality and Field Parameters

| Mountain Coal West Elk Mine - Water Year 2023 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Monitoring Location: South Prong Creek** | | **Baseline [1]** | | | **Water Year 2023** | | | |
| Description | Units | Minimum | Maximum | Mean [5] | 5/9/2023 | 6/5/2023 | Q[4] | 9/4/2023 |
| **Field Parameters** | | | | | | | | |
| Flow | staff | -- | -- | -- | 1.08' | 1.35' | | 0.26' |
| pH (Field) | SU | 7.5 | 9 | 8.5 | 7.82 | 8.68 | | 8.19 |
| Conductivity (Field) | µmhos/cm | 64.9 | 178.0 | 109.2 | 232 | 107.5 | | 154.5 |
| Temperature (Field) | °C | 4.9 | 16.1 | 10.6 | 4.3 | 8.1 | | 11.7 |
| Comment | | | | | | | | |
| **Laboratory Parameters [2]** | | | | | | | | |
| Name of Certified Lab [3] | | | | | | ACZ | | |
| Lab Reference # | | | | | | L81021-05 | | |
| Sample Date | | | | | | 6/5/2023 | | |
| Lab Test Date | | | | | | 6/12-6/24 | | |
| Sampled By | | | | | | PH | | |
| Alkalinity (Total CaCO3) | mg/L | 31.9 | 64.6 | 50.4 | | | | |
| Aluminum, dissolved | mg/L | -0.05 | 0.04 | 0.03 | | | | |
| Arsenic, total recoverable | mg/L | 0.0003 | 0.0011 | 0.0005 | | | | |
| Bicarbonate as CaCO3 | mg/L | 31.9 | 63.6 | 50.3 | | | | |
| Boron, dissolved | mg/L | -0.02 | 0.01 | 0.01 | | | | |
| Cadmium, dissolved | mg/L | -0.008 | -0.005 | -0.005 | | | | |
| Calcium, dissolved | mg/L | 7.7 | 14.4 | 11.5 | | | | |
| Carbonate as CaCO3 | mg/L | -10 | -2 | -2 | | | | |
| Cation-Anion Balance | calc. | -4.8 | 0.0 | -2.7 | | | | |
| Chloride | mg/L | -0.5 | 1.0 | 0.4 | | | | |
| Conductivity @25C | umhos/cm | 66 | 146 | 103 | | 103 | | |
| Copper, dissolved | mg/L | -0.01 | 0.03 | 0.01 | | | | |
| Hardness as CaCO3 (dissolved) | mg/L | 25 | 50 | 39 | | | | |
| Hydroxide as CaCO3 | mg/L | -10 | -2 | -2.0 | | | | |
| Iron, dissolved | mg/L | -0.03 | 0.05 | 0.03 | | 0.206 | | |
| Iron, total | mg/L | 0.60 | 4.01 | 1.64 | | 1.25 | | |
| Lead, dissolved | mg/L | -0.03 | 0.04 | 0.02 | | | | |
| Magnesium, dissolved | mg/L | 1.5 | 3.5 | 2.6 | | | | |
| Manganese, dissolved | mg/L | -0.01 | 0.01 | 0.00 | | | | |
| Manganese, total | mg/L | 0.02 | 0.08 | 0.04 | | | | |
| Mercury, total | mg/L | -0.0002 | -0.0002 | -0.0002 | | | | |
| Molybdenum, dissolved | mg/L | -0.02 | -0.02 | -0.02 | | | | |
| Nitrate/Nitrite as N | mg/L | -0.02 | 0.15 | 0.04 | | | | |
| pH | units | 7.8 | 8.3 | 8.1 | | 8.2 | H | |
| Phosphate | mg/L | -0.06 | 0.12 | 0.08 | | | | |
| Phosphorus, ortho dissolved | mg/L | -0.02 | 0.04 | 0.03 | | | | |
| Potassium, dissolved | mg/L | 0.2 | 0.9 | 0.5 | | | | |
| Residue, Filterable (TDS) @180C | mg/L | 52 | 128 | 82 | | 80 | | |
| Residue, Non-Filterable (TSS) @105C | mg/L | 18.0 | 140.0 | 57.5 | | 38.0 | | |
| Selenium, total recoverable | mg/L | -0.0001 | 0.0003 | 0.0001 | | | | |
| Sodium Adsorption Ratio in Water | calc. | 0.26 | 0.58 | 0.32 | | | | |
| Sodium, dissolved | mg/L | 3.3 | 9.4 | 4.6 | | | | |
| Sulfate | mg/L | -1 | 7.7 | 2.0 | | | | |
| Sum of Anions | meq/L | 0.7 | 1.5 | 1.059 | | | | |
| Sum of Cations | meq/L | 0.658 | 1.4 | 1.006 | | | | |
| TDS (calculated) | mg/L | 34.0 | 75.4 | 52.0 | | | | |
| TDS (ratio - measured/calculated) | calc. | 1.36 | 1.78 | 1.57 | | | | |
| Zinc, dissolved | mg/L | -0.01 | -0.01 | -0.01 | | | | |

[1] Baseline period is July 2018 through July 2019.

[2] Negative values denote readings below lab detection levels.

[3] ACZ Laboratory, Steamboat Springs, CO.

[4] ACZ Lab Qualifiers: U - Analyte was analyzed for but not detected at the indicated MDL.

H - Holding time exceeded; pH is a field test with an immediate hold time.

B - Analyte concentration detected at a value between method detection limit (MDL) and practical quantitation limit (PQL). The associated value

[5] Average (mean) value calc using 1/2 of detection limit for readings below lab detection limits unless all readings are below lab detection limit.

Shaded cells indicate parameters elevated greater than ten percent above the maximum baseline value.

# South Fork of South Prong Creek
# Surface Water Quality and Field Parameters

| Mountain Coal West Elk Mine - Water Year 2023 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Monitoring Location: South Fork of South Prong Creek** | | **Baseline [1]** | | | **Water Year 2023** | | | |
| Description | Units | Minimum | Maximum | Mean [5] | 5/20/2023 | 6/5/2023 | Q[4] | 9/4/2023 |
| **Field Parameters** | | | | | | | | |
| Flow | gpm | -- | -- | -- | -- | 5,472 | | 511 |
| pH (Field) | SU | 7.5 | 8.4 | 8.0 | -- | 7.75 | | 8.2 |
| Conductivity (Field) | µmhos/cm | 55.9 | 144.0 | 96.7 | -- | 86.9 | | 117.3 |
| Temperature (Field) | °C | 4.5 | 13.0 | 9.8 | -- | 9.4 | | 12.4 |
| Comment | | | | | No Site Access. Too much snow. | | | |
| **Laboratory Parameters [2]** | | | | | | | | |
| Name of Certified Lab [3] | | | | | | ACZ | | |
| Lab Reference # | | | | | | L81021-03 | | |
| Sample Date | | | | | | 6/5/2023 | | |
| Lab Test Date | | | | | | 6/12-6/24 | | |
| Sampled By | | | | | | PH | | |
| Alkalinity (Total CaCO3) | mg/L | 28.9 | 56.1 | 45.5 | | | | |
| Aluminum, dissolved | mg/L | -0.05 | -0.03 | -0.03 | | | | |
| Arsenic, total recoverable | mg/L | 0.0002 | 0.0003 | 0.0002 | | | | |
| Bicarbonate as CaCO3 | mg/L | 28.9 | 56.1 | 45.5 | | | | |
| Boron, dissolved | mg/L | -0.02 | 0.01 | 0.01 | | | | |
| Cadmium, dissolved | mg/L | -0.008 | -0.005 | -0.005 | | | | |
| Calcium, dissolved | mg/L | 6.6 | 14.1 | 10.6 | | | | |
| Carbonate as CaCO3 | mg/L | -10 | -2 | -2 | | | | |
| Cation-Anion Balance | calc. | -10.8 | 9.1 | -2.1 | | | | |
| Chloride | mg/L | -0.5 | 0.6 | 0.4 | | | | |
| Conductivity @25C | umhos/cm | 58 | 120 | 90 | | 76 | | |
| Copper, dissolved | mg/L | -0.01 | -0.01 | -0.01 | | | | |
| Hardness as CaCO3 (dissolved) | mg/L | 22 | 47 | 37 | | | | |
| Hydroxide as CaCO3 | mg/L | -10 | -2 | -2 | | | | |
| Iron, dissolved | mg/L | -0.03 | 0.04 | 0.03 | | 0.319 | | |
| Iron, total | mg/L | 0.33 | 0.62 | 0.49 | | 1.45 | | |
| Lead, dissolved | mg/L | -0.03 | 0.03 | 0.02 | | | | |
| Magnesium, dissolved | mg/L | 1.3 | 3.0 | 2.4 | | | | |
| Manganese, dissolved | mg/L | -0.01 | 0.01 | 0.004 | | | | |
| Manganese, total | mg/L | 0.01 | 0.02 | 0.02 | | | | |
| Mercury, total | mg/L | -0.0002 | -0.0002 | -0.0002 | | | | |
| Molybdenum, dissolved | mg/L | -0.02 | -0.02 | -0.02 | | | | |
| Nitrate/Nitrite as N | mg/L | -0.02 | 0.14 | 0.05 | | | | |
| pH | units | 7.6 | 8.2 | 8.0 | | 8.1 | H | |
| Phosphate | mg/L | -0.06 | 0.06 | 0.05 | | | | |
| Phosphorus, ortho dissolved | mg/L | -0.02 | 0.02 | 0.02 | | | | |
| Potassium, dissolved | mg/L | -0.2 | 0.7 | 0.4 | | | | |
| Residue, Filterable (TDS) @180C | mg/L | 46 | 104 | 69 | | 64 | | |
| Residue, Non-Filterable (TSS) @105C | mg/L | 8.0 | 17.0 | 14.2 | | 38.0 | | |
| Selenium, total recoverable | mg/L | -0.0001 | 0.0002 | 0.0001 | | | | |
| Sodium Adsorption Ratio in Water | calc. | 0.24 | 0.45 | 0.30 | | | | |
| Sodium, dissolved | mg/L | 2.6 | 6.7 | 4.1 | | | | |
| Sulfate | mg/L | -1.0 | 5.2 | 2.0 | | | | |
| Sum of Anions | meq/L | 0.685 | 1.2 | 0.946 | | | | |
| Sum of Cations | meq/L | 0.551 | 1.2 | 0.926 | | | | |
| TDS (calculated) | mg/L | 33.0 | 62.0 | 47.1 | | | | |
| TDS (ratio - measured/calculated) | calc. | 1.23 | 1.68 | 1.44 | | | | |
| Zinc, dissolved | mg/L | -0.01 | -0.01 | -0.01 | | | | |

[1] Baseline period is July 2018 through July 2019.

[2] Negative values denote readings below lab detection levels.

[3] ACZ Laboratory, Steamboat Springs, CO.

[4] ACZ Lab Qualifiers: U - Analyte was analyzed for but not detected at the indicated MDL.

H - Holding time exceeded; pH is a field test with an immediate hold time.

B - Analyte concentration detected at a value between method detection limit (MDL) and practical quantitation limit (PQL). The associated value is an estimated quantity.

[5] Average (mean) value calc using 1/2 of detection limit for readings below lab detection limits unless all readings are below lab detection limit.

Shaded cells indicate parameters elevated greater than ten percent above the maximum baseline value.

# North Fork of South Prong Creek
# Surface Water Quality and Field Parameters

| Mountain Coal West Elk Mine - Water Year 2023 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Monitoring Location: North Fork of South Prong Creek** | | **Baseline [1]** | | | **Water Year 2023** | | | |
| Description | Units | Minimum | Maximum | Mean [5] | 5/20/2023 | 6/5/2023 | Q[4] | 9/4/2023 |
| **Field Parameters** | | | | | | | | |
| Flow | gpm | -- | -- | -- | -- | 169 | | 14.83 |
| pH (Field) | SU | 7.50 | 8.88 | 8.20 | -- | 8.06 | | 8.27 |
| Conductivity (Field) | µmhos/cm | 301 | 460 | 356 | -- | 367 | | 566 |
| Temperature (Field) | °C | 5.7 | 15.5 | 11.5 | -- | 13.8 | | 15.1 |
| Comment | | | | | No Site Access. Too much snow. | | | |
| **Laboratory Parameters [2]** | | | | | | | | |
| Name of Certified Lab [3] | | | | | | ACZ | | |
| Lab Reference # | | | | | | L81021-04 | | |
| Sample Date | | | | | | 6/5/2023 | | |
| Lab Test Date | | | | | | 6/12-6/24 | | |
| Sampled By | | | | | | PH | | |
| Alkalinity (Total CaCO3) | mg/L | 120 | 199 | 152 | | | | |
| Aluminum, dissolved | mg/L | -0.05 | -0.05 | -0.05 | | | | |
| Arsenic, total recoverable | mg/L | 0.0003 | 0.0004 | 0.0004 | | | | |
| Bicarbonate as CaCO3 | mg/L | 115 | 187 | 144 | | | | |
| Boron, dissolved | mg/L | -0.02 | 0.04 | 0.02 | | | | |
| Cadmium, dissolved | mg/L | -0.008 | -0.008 | -0.008 | | | | |
| Calcium, dissolved | mg/L | 23.1 | 40.5 | 29.5 | | | | |
| Carbonate as CaCO3 | mg/L | -10 | 11.7 | 7.2 | | | | |
| Cation-Anion Balance | calc. | 0.0 | 1.6 | 0.9 | | | | |
| Chloride | mg/L | 1.7 | 2.3 | 2.1 | | | | |
| Conductivity @25C | umhos/cm | 282 | 405 | 328 | | 344 | | |
| Copper, dissolved | mg/L | -0.01 | -0.01 | -0.01 | | | | |
| Hardness as CaCO3 (dissolved) | mg/L | 82 | 145 | 105 | | | | |
| Hydroxide as CaCO3 | mg/L | -10 | -2 | 4 | | | | |
| Iron, dissolved | mg/L | -0.03 | -0.03 | -0.03 | | 0.335 | | |
| Iron, total | mg/L | 0.33 | 0.65 | 0.47 | | 1.37 | | |
| Lead, dissolved | mg/L | -0.03 | -0.03 | -0.03 | | | | |
| Magnesium, dissolved | mg/L | 6.0 | 10.6 | 7.6 | | | | |
| Manganese, dissolved | mg/L | -0.01 | -0.01 | -0.01 | | | | |
| Manganese, total | mg/L | -0.01 | -0.01 | -0.01 | | | | |
| Mercury, total | mg/L | -0.0002 | -0.0002 | -0.0002 | | | | |
| Molybdenum, dissolved | mg/L | -0.02 | -0.02 | 0.01 | | | | |
| Nitrate/Nitrite as N | mg/L | -0.02 | 0.18 | 0.07 | | | | |
| pH | units | 8.4 | 8.4 | 8.4 | | 8.5 | H | |
| Phosphate | mg/L | 0.12 | 0.12 | 0.12 | | | | |
| Phosphorus, ortho dissolved | mg/L | 0.04 | 0.04 | 0.04 | | | | |
| Potassium, dissolved | mg/L | 1.2 | 1.8 | 1.4 | | | | |
| Residue, Filterable (TDS) @180C | mg/L | 174 | 254 | 207 | | 222 | | |
| Residue, Non-Filterable (TSS) @105C | mg/L | 10.0 | 23.0 | 15.0 | | 39.0 | | |
| Selenium, total recoverable | mg/L | 0.0002 | 0.0005 | 0.0003 | | | | |
| Sodium Adsorption Ratio in Water | calc. | 1.3 | 1.5 | 1.4 | | | | |
| Sodium, dissolved | mg/L | 27.2 | 41.1 | 32.6 | | | | |
| Sulfate | mg/L | 19.6 | 30.9 | 24.8 | | | | |
| Sum of Anions | meq/L | 2.9 | 4.7 | 3.5 | | | | |
| Sum of Cations | meq/L | 2.9 | 4.8 | 3.6 | | | | |
| TDS (calculated) | mg/L | 154 | 248 | 188 | | | | |
| TDS (ratio - measured/calculated) | calc. | 1.02 | 1.26 | 1.12 | | | | |
| Zinc, dissolved | mg/L | -0.01 | 0.01 | 0.01 | | | | |

[1] Baseline period is July 2018 through July 2019.

[2] Negative values denote readings below lab detection levels.

[3] ACZ Laboratory, Steamboat Springs, CO.

[4] ACZ Lab Qualifiers: U - Analyte was analyzed for but not detected at the indicated MDL.

H - Holding time exceeded; pH is a field test with an immediate hold time.

B - Analyte concentration detected at a value between method detection limit (MDL) and practical quantitation limit (PQL). The associated value is an estimated quantity.

[5] Average (mean) value calc using 1/2 of detection limit for readings below lab detection limits unless all readings are below lab detection limit.

Shaded cells indicate parameters elevated greater than ten percent above the maximum baseline value.

# Stream ST-SW-1
# Surface Water Quality and Field Parameters

| Mountain Coal West Elk Mine - Water Year 2023 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Monitoring Location: Stream ST-SW-1** | | **Baseline [1]** | | | **Water Year 2023** | | | |
| Description | Units | Minimum | Maximum | Mean [5] | 5/20/2023 | 6/5/2023 | Q[4] | 9/4/2023 |
| **Field Parameters** | | | | | | | | |
| Flow | gpm | -- | -- | -- | -- | 194 | | 10.6 |
| pH (Field) | SU | 7.99 | 8.75 | 8.42 | -- | 7.88 | | 7.79 |
| Conductivity (Field) | µmhos/cm | 97.6 | 118.1 | 108.4 | -- | 91.6 | | 96.4 |
| Temperature (Field) | °C | 7.3 | 14.1 | 10.8 | -- | 11.7 | | 11.9 |
| Comment | | | | | No Site Access. Too much snow. | | | |
| **Laboratory Parameters [2]** | | | | | | | | |
| Name of Certified Lab [3] | | | | | | ACZ | | |
| Lab Reference # | | | | | | L81021-09 | | |
| Sample Date | | | | | | 6/5/2023 | | |
| Lab Test Date | | | | | | 6/12-6/24 | | |
| Sampled By | | | | | | PH | | |
| Alkalinity (Total CaCO3) | mg/L | 45.8 | 53.4 | 49.2 | | | | |
| Aluminum, dissolved | mg/L | -0.05 | -0.03 | -0.04 | | | | |
| Arsenic, total recoverable | mg/L | 0.0002 | 0.0005 | 0.0003 | | | | |
| Bicarbonate as CaCO3 | mg/L | 45.8 | 53.4 | 49.2 | | | | |
| Boron, dissolved | mg/L | -0.02 | 0.02 | 0.01 | | | | |
| Cadmium, dissolved | mg/L | -0.008 | -0.005 | -0.006 | | | | |
| Calcium, dissolved | mg/L | 10.9 | 12.6 | 11.6 | | | | |
| Carbonate as CaCO3 | mg/L | -10.0 | -2.0 | -3.6 | | | | |
| Cation-Anion Balance | calc. | -12.0 | 24.6 | 0.2 | | | | |
| Chloride | mg/L | -0.5 | 0.9 | 0.5 | | | | |
| Conductivity @25C | umhos/cm | 98 | 111 | 104 | | 90 | | |
| Copper, dissolved | mg/L | -0.01 | -0.01 | -0.01 | | | | |
| Hardness as CaCO3 (dissolved) | mg/L | 38 | 61 | 44 | | | | |
| Hydroxide as CaCO3 | mg/L | -10 | -2 | -2 | | | | |
| Iron, dissolved | mg/L | -0.03 | 0.07 | 0.04 | | 0.166 | | |
| Iron, total | mg/L | 0.64 | 2.71 | 1.29 | | 1.04 | | |
| Lead, dissolved | mg/L | -0.03 | 0.03 | 0.01 | | | | |
| Magnesium, dissolved | mg/L | 2.4 | 8.1 | 3.6 | | | | |
| Manganese, dissolved | mg/L | -0.010 | -0.005 | -0.005 | | | | |
| Manganese, total | mg/L | 0.02 | 0.08 | 0.04 | | | | |
| Mercury, total | mg/L | -0.0002 | -0.0002 | -0.0002 | | | | |
| Molybdenum, dissolved | mg/L | -0.02 | -0.02 | -0.02 | | | | |
| Nitrate/Nitrite as N | mg/L | -0.02 | 0.11 | 0.05 | | | | |
| pH | units | 7.9 | 8.1 | 8.0 | | 8.1 | H | |
| Phosphate | mg/L | 0.06 | 0.16 | 0.09 | | | | |
| Phosphorus, ortho dissolved | mg/L | 0.02 | 0.05 | 0.03 | | | | |
| Potassium, dissolved | mg/L | 0.4 | 1.0 | 0.6 | | | | |
| Residue, Filterable (TDS) @180C | mg/L | 70 | 86 | 79 | | 84 | | |
| Residue, Non-Filterable (TSS) @105C | mg/L | 13.0 | 72.0 | 31.8 | | 25.0 | | |
| Selenium, total recoverable | mg/L | -0.0001 | 0.0001 | 0.0001 | | | | |
| Sodium Adsorption Ratio in Water | calc. | 0.32 | 0.41 | 0.36 | | | | |
| Sodium, dissolved | mg/L | 4.5 | 7.3 | 5.5 | | | | |
| Sulfate | mg/L | -1.0 | 15.7 | 5.8 | | | | |
| Sum of Anions | meq/L | 1.0 | 1.4 | 1.1 | | | | |
| Sum of Cations | meq/L | 0.964 | 1.6 | 1.1 | | | | |
| TDS (calculated) | mg/L | 51.1 | 70.5 | 57.9 | | | | |
| TDS (ratio - measured/calculated) | calc. | 1.22 | 1.57 | 1.37 | | | | |
| Zinc, dissolved | mg/L | -0.01 | -0.01 | -0.01 | | | | |

[1] Baseline period is July 2018 through August 2019.

[2] Negative values denote readings below lab detection levels.

[3] ACZ Laboratory, Steamboat Springs, CO.

[4] ACZ Lab Qualifiers: U - Analyte was analyzed for but not detected at the indicated MDL.

H - Holding time exceeded; pH is a field test with an immediate hold time.

B - Analyte concentration detected at a value between method detection limit (MDL) and practical quantitation limit (PQL). The associated value is an estimated quantity.

[5] Average (mean) value calc using 1/2 of detection limit for readings below lab detection limits unless all readings are below lab detection limit.

Shaded cells indicate parameters elevated greater than ten percent above the maximum baseline value.

# Pond ST-P-1
## Surface Water Quality and Field Parameters

| Mountain Coal West Elk Mine - Water Year 2023 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Monitoring Location: Pond ST-P-1** | | **Baseline [1]** | | | **Water Year 2023** | | | |
| Description | Units | Minimum | Maximum | Mean [5] | 5/20/2023 | 6/8/2023 | Q[4] | 9/7/2023 |
| **Field Parameters** | | | | | | | | |
| Water Depth | feet | -- | -- | -- | -- | full | | dry |
| pH (Field) | SU | 7.88 | 8.99 | 8.27 | -- | 7.74 | | |
| Conductivity (Field) | µmhos/cm | 164.3 | 314 | 222 | -- | 268 | | |
| Temperature (Field) | °C | 9.8 | 22.3 | 18.0 | -- | 22.8 | | |
| Comment | | | | | No Site Access. Too much snow. | Outlet flowing about 0.5 gpm. | | |
| **Laboratory Parameters [2]** | | | | | | | | |
| Name of Certified Lab [3] | | | | | | ACZ | | |
| Lab Reference # | | | | | | L81055-03 | | |
| Sample Date | | | | | | 6/8/2023 | | |
| Lab Test Date | | | | | | 6/13-6/24 | | |
| Sampled By | | | | | | PH | | |
| Alkalinity (Total CaCO3) | mg/L | 47.9 | 103 | 81 | | | | |
| Aluminum, dissolved | mg/L | -0.05 | 0.12 | 0.05 | | | | |
| Arsenic, total recoverable | mg/L | 0.0003 | 0.0080 | 0.0037 | | | | |
| Bicarbonate as CaCO3 | mg/L | 47.9 | 103 | 81 | | | | |
| Boron, dissolved | mg/L | -0.02 | 0.06 | 0.03 | | | | |
| Cadmium, dissolved | mg/L | -0.008 | -0.005 | -0.005 | | | | |
| Calcium, dissolved | mg/L | 9.8 | 22.3 | 16.0 | | | | |
| Carbonate as CaCO3 | mg/L | -10 | -2 | -2 | | | | |
| Cation-Anion Balance | calc. | -2.2 | 12.0 | 3.4 | | | | |
| Chloride | mg/L | 1.7 | 17.4 | 6.9 | | | | |
| Conductivity @25C | umhos/cm | 148 | 217 | 187 | | 252 | | |
| Copper, dissolved | mg/L | -0.01 | 0.02 | 0.01 | | | | |
| Hardness as CaCO3 (dissolved) | mg/L | 38 | 74 | 53 | | | | |
| Hydroxide as CaCO3 | mg/L | -10 | -2 | -2 | | | | |
| Iron, dissolved | mg/L | 0.04 | 1.52 | 0.65 | | -0.06 | U | |
| Iron, total | mg/L | 0.18 | 13.6 | 4.5 | | 0.089 | B | |
| Lead, dissolved | mg/L | -0.03 | -0.03 | -0.03 | | | | |
| Magnesium, dissolved | mg/L | 2.4 | 4.4 | 3.2 | | | | |
| Manganese, dissolved | mg/L | -0.01 | 0.32 | 0.16 | | | | |
| Manganese, total | mg/L | -0.01 | 0.65 | 0.30 | | | | |
| Mercury, total | mg/L | -0.0002 | -0.0002 | -0.0002 | | | | |
| Molybdenum, dissolved | mg/L | -0.02 | -0.02 | -0.02 | | | | |
| Nitrate/Nitrite as N | mg/L | -0.02 | 3.85 | 0.78 | | | | |
| pH | units | 7.8 | 8.1 | 7.9 | | 8.3 | H | |
| Phosphate | mg/L | -0.06 | 0.22 | 0.13 | | | | |
| Phosphorus, ortho dissolved | mg/L | -0.02 | 0.07 | 0.04 | | | | |
| Potassium, dissolved | mg/L | 3.6 | 7.1 | 5.5 | | | | |
| Residue, Filterable (TDS) @180C | mg/L | 122 | 420 | 200 | | 156 | | |
| Residue, Non-Filterable (TSS) @105C | mg/L | 5.0 | 300.0 | 78.8 | | 6.0 | B | |
| Selenium, total recoverable | mg/L | 0.0002 | 0.0007 | 0.0004 | | | | |
| Sodium Adsorption Ratio in Water | calc. | 0.49 | 1.90 | 1.03 | | | | |
| Sodium, dissolved | mg/L | 7.5 | 26.7 | 16.0 | | | | |
| Sulfate | mg/L | -1 | 6.1 | 3.1 | | | | |
| Sum of Anions | meq/L | 1.1 | 2.3 | 1.9 | | | | |
| Sum of Cations | meq/L | 1.4 | 2.3 | 2.0 | | | | |
| TDS (calculated) | mg/L | 66 | 121 | 101 | | | | |
| TDS (ratio - measured/calculated) | calc. | 1.15 | 3.96 | 1.98 | | | | |
| Zinc, dissolved | mg/L | -0.01 | -0.01 | -0.01 | | | | |

[1] Baseline period is August 2018 through August 2019.

[2] Negative values denote readings below lab detection levels.

[3] ACZ Laboratory, Steamboat Springs, CO.

[4] ACZ Lab Qualifiers: U - Analyte was analyzed for but not detected at the indicated MDL.

H - Holding time exceeded; pH is a field test with an immediate hold time.

B - Analyte concentration detected at a value between method detection limit (MDL) and practical quantitation limit (PQL). The associated value is an estimated quantity.

[5] Average (mean) value calc using 1/2 of detection limit for readings below lab detection limits unless all readings are below lab detection limit.

Shaded cells indicate parameters elevated greater than ten percent above the maximum baseline value.

# Pond ST-P-2
## Surface Water Quality and Field Parameters

| Mountain Coal West Elk Mine - Water Year 2023 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Monitoring Location: Pond ST-P-2** | | **Baseline [1]** | | | **Water Year 2023** | | | |
| Description | Units | Minimum | Maximum | Mean [5] | 5/20/2023 | 6/5/2023 | Q[4] | 9/4/2023 |
| **Field Parameters** | | | | | | | | |
| Water Depth | feet | -- | -- | -- | -- | full | | dry |
| pH (Field) | SU | 6.55 | 8.27 | 7.45 | -- | 7.43 | | |
| Conductivity (Field) | µmhos/cm | 111.0 | 190.8 | 138.1 | -- | 104.0 | | |
| Temperature (Field) | $^{o}$C | 7.5 | 22.7 | 15.6 | -- | 12.9 | | |
| Comment | | | | | No Site Access. Too much snow. | Outlet flowing about 5 gpm. | | |
| **Laboratory Parameters [2]** | | | | | | | | |
| Name of Certified Lab [3] | | | | | | ACZ | | |
| Lab Reference # | | | | | | L81021-10 | | |
| Sample Date | | | | | | 6/5/2023 | | |
| Lab Test Date | | | | | | 6/12-6/24 | | |
| Sampled By | | | | | | PH | | |
| Alkalinity (Total CaCO3) | mg/L | 42.6 | 91.8 | 64.6 | | | | |
| Aluminum, dissolved | mg/L | -0.05 | 0.19 | 0.08 | | | | |
| Arsenic, total recoverable | mg/L | 0.000 | 0.001 | 0.000 | | | | |
| Bicarbonate as CaCO3 | mg/L | 42.6 | 91.8 | 64.6 | | | | |
| Boron, dissolved | mg/L | -0.02 | -0.02 | -0.02 | | | | |
| Cadmium, dissolved | mg/L | -0.008 | -0.008 | -0.008 | | | | |
| Calcium, dissolved | mg/L | 10.2 | 25.8 | 17.1 | | | | |
| Carbonate as CaCO3 | mg/L | -10 | -2 | -2 | | | | |
| Cation-Anion Balance | calc. | 2.1 | 4.8 | 3.6 | | | | |
| Chloride | mg/L | 1.0 | 4.9 | 2.4 | | | | |
| Conductivity @25C | umhos/cm | 90 | 201 | 136 | | 101 | | |
| Copper, dissolved | mg/L | -0.01 | -0.01 | -0.01 | | | | |
| Hardness as CaCO3 (dissolved) | mg/L | 36 | 89 | 59 | | | | |
| Hydroxide as CaCO3 | mg/L | -10 | -2 | -2 | | | | |
| Iron, dissolved | mg/L | 0.05 | 0.85 | 0.35 | | -0.06 | U | |
| Iron, total | mg/L | 0.13 | 1.68 | 0.72 | | 0.205 | | |
| Lead, dissolved | mg/L | -0.03 | -0.03 | -0.03 | | | | |
| Magnesium, dissolved | mg/L | 2.6 | 5.9 | 4.0 | | | | |
| Manganese, dissolved | mg/L | -0.01 | 0.04 | 0.02 | | | | |
| Manganese, total | mg/L | -0.01 | 0.11 | 0.04 | | | | |
| Mercury, total | mg/L | -0.0002 | -0.0002 | -0.0002 | | | | |
| Molybdenum, dissolved | mg/L | -0.02 | -0.02 | -0.02 | | | | |
| Nitrate/Nitrite as N | mg/L | -0.02 | -0.02 | -0.02 | | | | |
| pH | units | 7.7 | 7.9 | 7.8 | | 7.9 | H | |
| Phosphate | mg/L | 0.06 | 2.23 | 0.83 | | | | |
| Phosphorus, ortho dissolved | mg/L | 0.02 | 0.72 | 0.27 | | | | |
| Potassium, dissolved | mg/L | 0.6 | 7.0 | 2.9 | | | | |
| Residue, Filterable (TDS) @180C | mg/L | 88 | 172 | 121 | | 88 | | |
| Residue, Non-Filterable (TSS) @105C | mg/L | -2 | 7.0 | 5.7 | | -5.0 | U | |
| Selenium, total recoverable | mg/L | -0.0001 | 0.0006 | 0.0003 | | | | |
| Sodium Adsorption Ratio in Water | calc. | 0.22 | 0.24 | 0.23 | | | | |
| Sodium, dissolved | mg/L | 3.3 | 4.7 | 4.0 | | | | |
| Sulfate | mg/L | -1 | -1 | -1 | | | | |
| Sum of Anions | meq/L | 0.9 | 2.0 | 1.4 | | | | |
| Sum of Cations | meq/L | 0.9 | 2.2 | 1.5 | | | | |
| TDS (calculated) | mg/L | 45 | 105 | 70 | | | | |
| TDS (ratio - measured/calculated) | calc. | 1.64 | 1.96 | 1.77 | | | | |
| Zinc, dissolved | mg/L | -0.01 | -0.01 | -0.01 | | | | |

[1] Baseline period is August 2018 through August 2019.

[2] Negative values denote readings below lab detection levels.

[3] ACZ Laboratory, Steamboat Springs, CO.

[4] ACZ Lab Qualifiers: U - Analyte was analyzed for but not detected at the indicated MDL.

H - Holding time exceeded; pH is a field test with an immediate hold time.

B - Analyte concentration detected at a value between method detection limit (MDL) and practical quantitation limit (PQL). The associated value is an estimated quantity.

[5] Average (mean) value calc using 1/2 of detection limit for readings below lab detection limits unless all readings are below lab detection limit.

Shaded cells indicate parameters elevated greater than ten percent above the maximum baseline value.

# Pond ST-P-3
## Surface Water Quality and Field Parameters

| Mountain Coal West Elk Mine - Water Year 2023 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Monitoring Location: Pond ST-P-3** | | **Baseline [1]** | | | **Water Year 2023** | | | |
| Description | Units | Minimum | Maximum | Mean [5] | 5/20/2023 | 6/5/2023 | Q[4] | 9/4/2023 |
| **Field Parameters** | | | | | | | | |
| Water Depth | feet | -- | -- | -- | -- | full | | damp soil |
| pH (Field) | SU | 7.19 | 7.29 | 7.24 | -- | 6.97 | | |
| Conductivity (Field) | µmhos/cm | 95.0 | 124.0 | 111.8 | -- | 127.0 | | |
| Temperature (Field) | $^{o}$C | 7.3 | 20.4 | 15.6 | -- | 15.4 | | |
| Comment | | | | | No Site Access. Too much snow. | Outlet flowing about 1 gpm. | | |
| **Laboratory Parameters [2]** | | | | | | | | |
| Name of Certified Lab [3] | | | | | | ACZ | | |
| Lab Reference # | | | | | | L81021-06 | | |
| Sample Date | | | | | | 6/5/2023 | | |
| Lab Test Date | | | | | | 6/12-6/24 | | |
| Sampled By | | | | | | PH | | |
| Alkalinity (Total CaCO3) | mg/L | 38.9 | 64.1 | 54.4 | | | | |
| Aluminum, dissolved | mg/L | -0.05 | 0.19 | 0.07 | | | | |
| Arsenic, total recoverable | mg/L | -0.0002 | 0.0004 | 0.0003 | | | | |
| Bicarbonate as CaCO3 | mg/L | 38.9 | 64.1 | 54.4 | | | | |
| Boron, dissolved | mg/L | -0.02 | -0.02 | -0.02 | | | | |
| Cadmium, dissolved | mg/L | -0.008 | -0.008 | -0.008 | | | | |
| Calcium, dissolved | mg/L | 8.9 | 15.1 | 12.7 | | | | |
| Carbonate as CaCO3 | mg/L | -10 | -2 | -2 | | | | |
| Cation-Anion Balance | calc. | 0.8 | 4.0 | 2.8 | | | | |
| Chloride | mg/L | 1.0 | 1.0 | 1.0 | | | | |
| Conductivity @25C | umhos/cm | 80 | 133 | 112 | | 124 | | |
| Copper, dissolved | mg/L | -0.01 | -0.01 | -0.01 | | | | |
| Hardness as CaCO3 (dissolved) | mg/L | 32 | 56 | 47 | | | | |
| Hydroxide as CaCO3 | mg/L | -10 | -2 | -2 | | | | |
| Iron, dissolved | mg/L | 0.13 | 0.84 | 0.37 | | -0.06 | U | |
| Iron, total | mg/L | 0.43 | 1.33 | 0.73 | | 0.076 | B | |
| Lead, dissolved | mg/L | -0.03 | -0.03 | -0.03 | | | | |
| Magnesium, dissolved | mg/L | 2.4 | 5.0 | 3.7 | | | | |
| Manganese, dissolved | mg/L | -0.01 | 0.04 | 0.02 | | | | |
| Manganese, total | mg/L | -0.01 | 0.07 | 0.04 | | | | |
| Mercury, total | mg/L | -0.0002 | -0.0002 | -0.0002 | | | | |
| Molybdenum, dissolved | mg/L | -0.02 | -0.02 | -0.02 | | | | |
| Nitrate/Nitrite as N | mg/L | -0.02 | -0.02 | -0.02 | | | | |
| pH | units | 7.4 | 7.9 | 7.7 | | 7.9 | H | |
| Phosphate | mg/L | 0.12 | 0.40 | 0.28 | | | | |
| Phosphorus, ortho dissolved | mg/L | 0.04 | 0.13 | 0.09 | | | | |
| Potassium, dissolved | mg/L | 0.8 | 1.4 | 1.1 | | | | |
| Residue, Filterable (TDS) @180C | mg/L | 94 | 110 | 102 | | 98 | | |
| Residue, Non-Filterable (TSS) @105C | mg/L | -5 | 15.0 | 6 | | -5 | U | |
| Selenium, total recoverable | mg/L | 0.0001 | 0.0003 | 0.0002 | | | | |
| Sodium Adsorption Ratio in Water | calc. | 0.23 | 0.27 | 0.25 | | | | |
| Sodium, dissolved | mg/L | 2.9 | 4.5 | 3.8 | | | | |
| Sulfate | mg/L | -1 | -1 | -1 | | | | |
| Sum of Anions | meq/L | 0.8 | 1.3 | 1.1 | | | | |
| Sum of Cations | meq/L | 0.8 | 1.4 | 1.2 | | | | |
| TDS (calculated) | mg/L | 40 | 66 | 56 | | | | |
| TDS (ratio - measured/calculated) | calc. | 1.65 | 2.34 | 1.89 | | | | |
| Zinc, dissolved | mg/L | -0.01 | 0.01 | 0.01 | | | | |

[1] Baseline period is August 2018 through August 2019.

[2] Negative values denote readings below lab detection levels.

[3] ACZ Laboratory, Steamboat Springs, CO.

[4] ACZ Lab Qualifiers: U - Analyte was analyzed for but not detected at the indicated MDL.

H - Holding time exceeded; pH is a field test with an immediate hold time.

B - Analyte concentration detected at a value between method detection limit (MDL) and practical quantitation limit (PQL). The associated value is an estimated quantity.

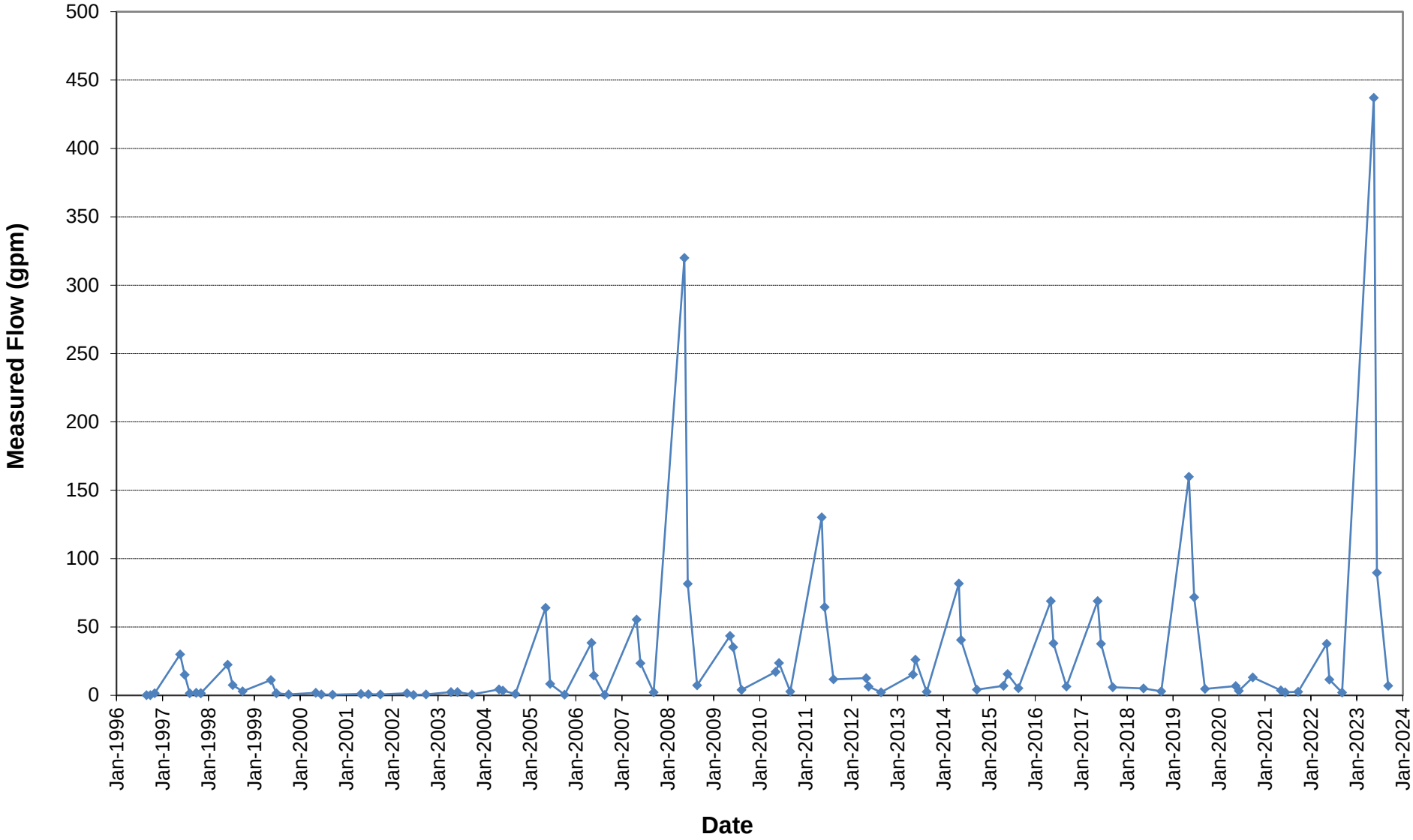
[5] Average (mean) value calc using 1/2 of detection limit for readings below lab detection limits unless all readings are below lab detection limit.

Shaded cells indicate parameters elevated greater than ten percent above the maximum baseline value.

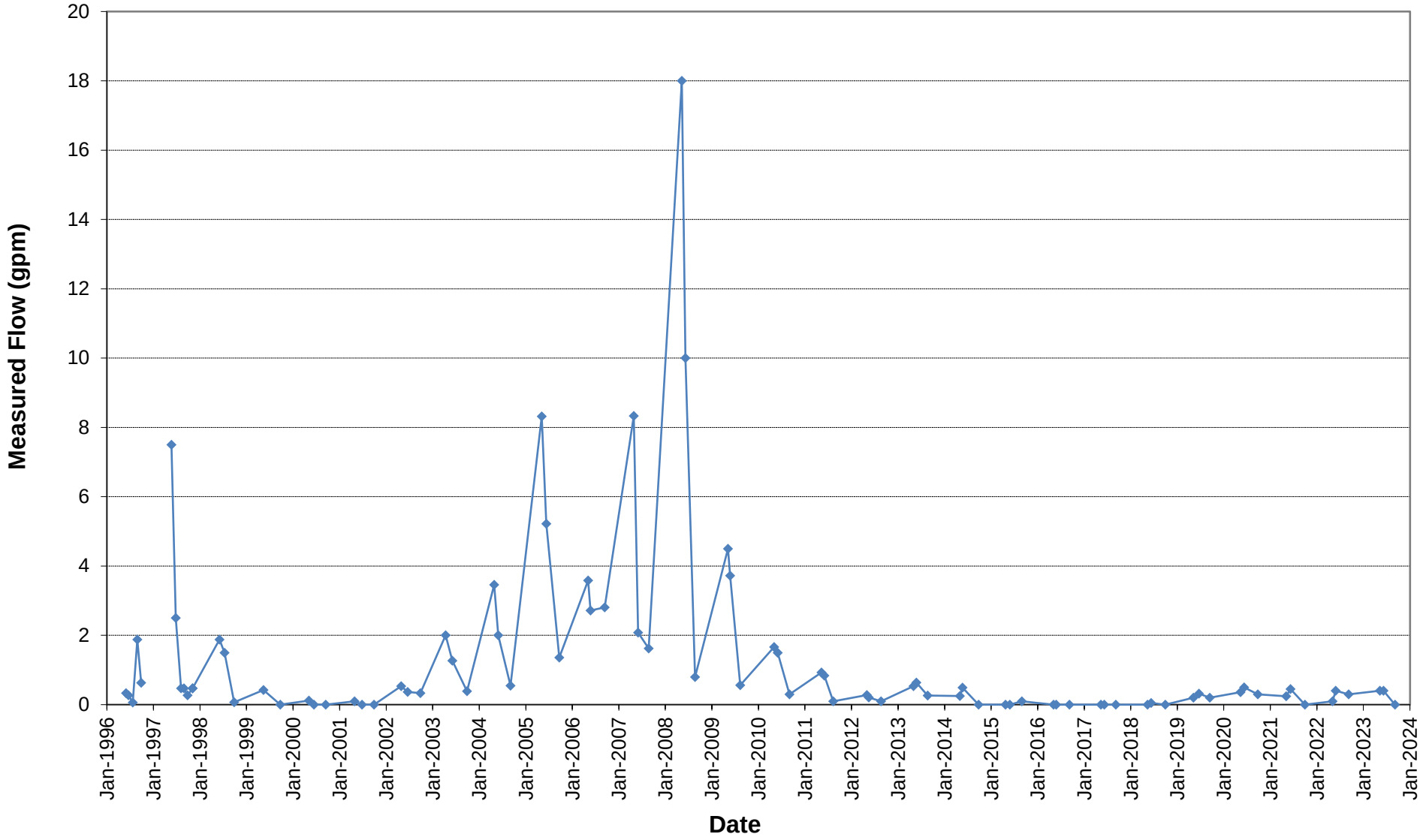
# APPENDIX D

## SPRINGS - HYDROGRAPHS

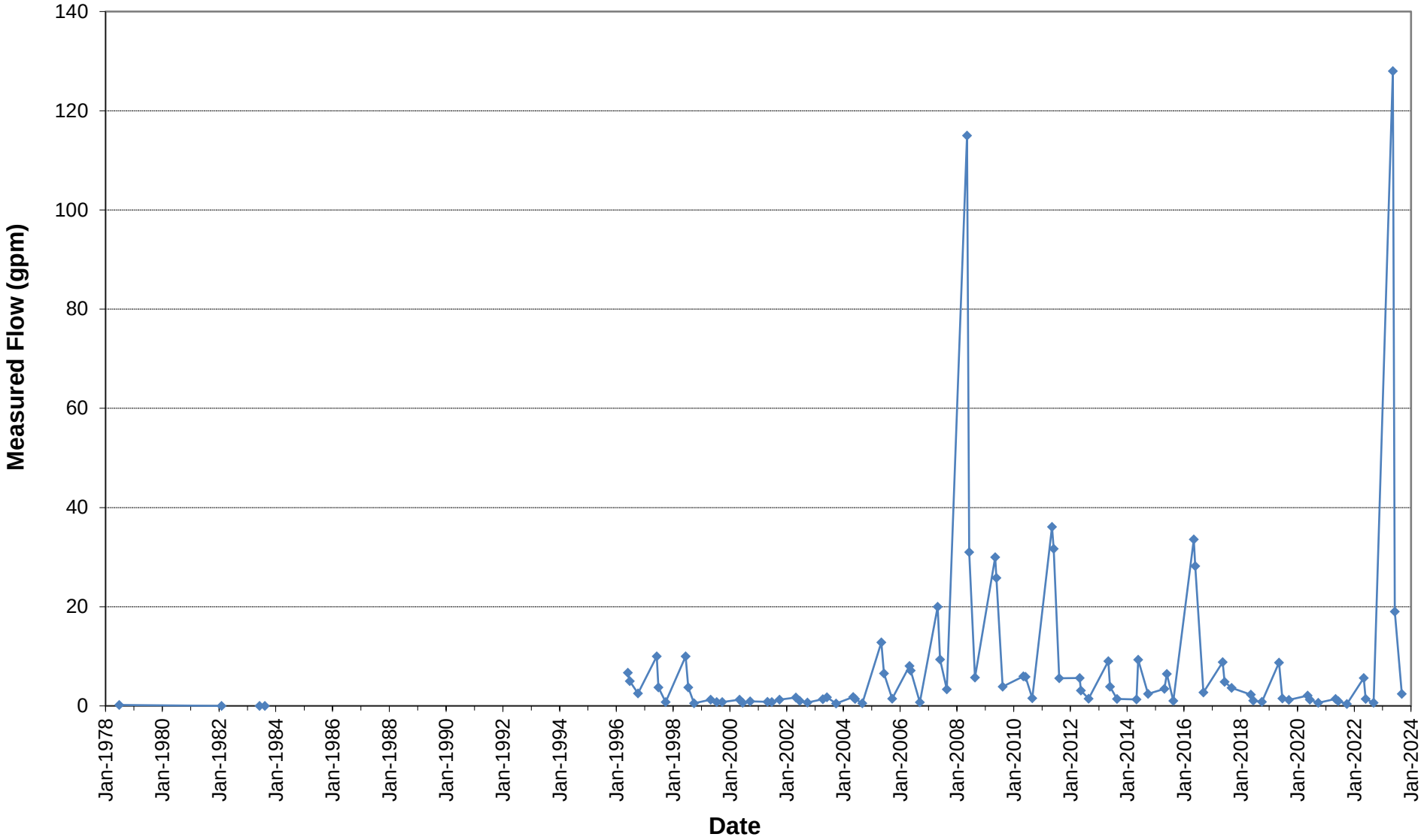
## Spring 26-1
## Source: Above F-Seam



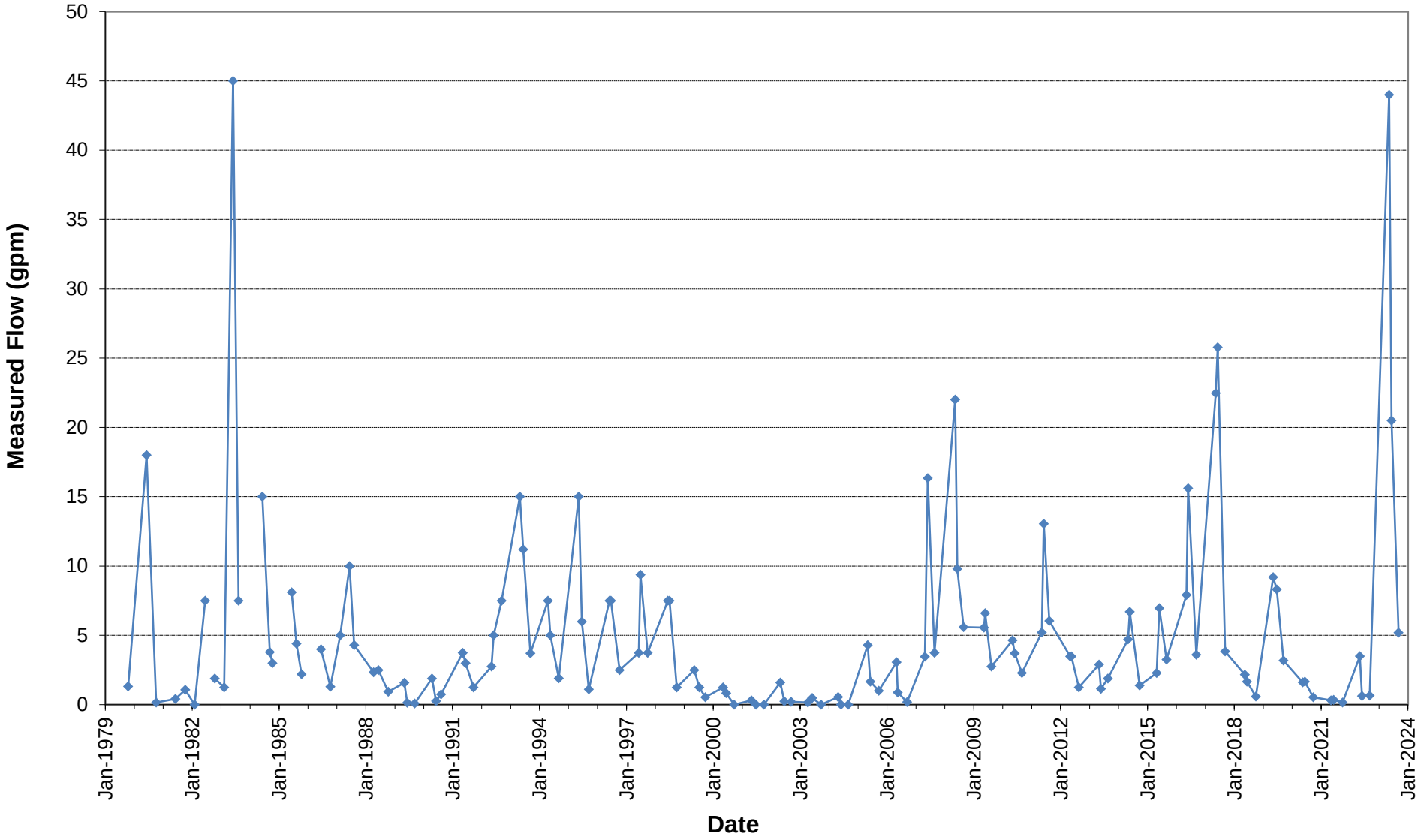
## Spring 27-1
## Source: Above F-Seam



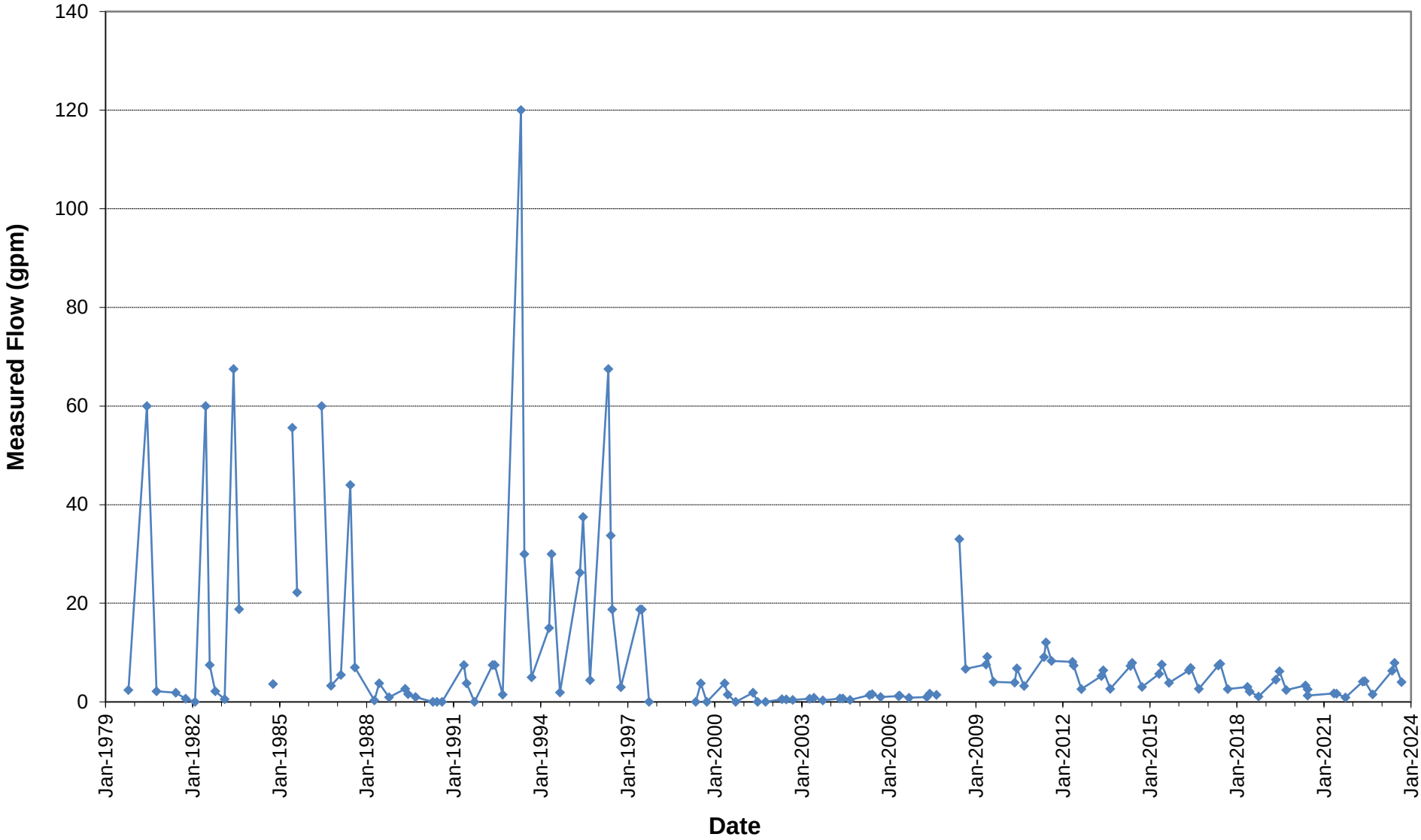
## Spring G-7
## Source: Above F-Seam



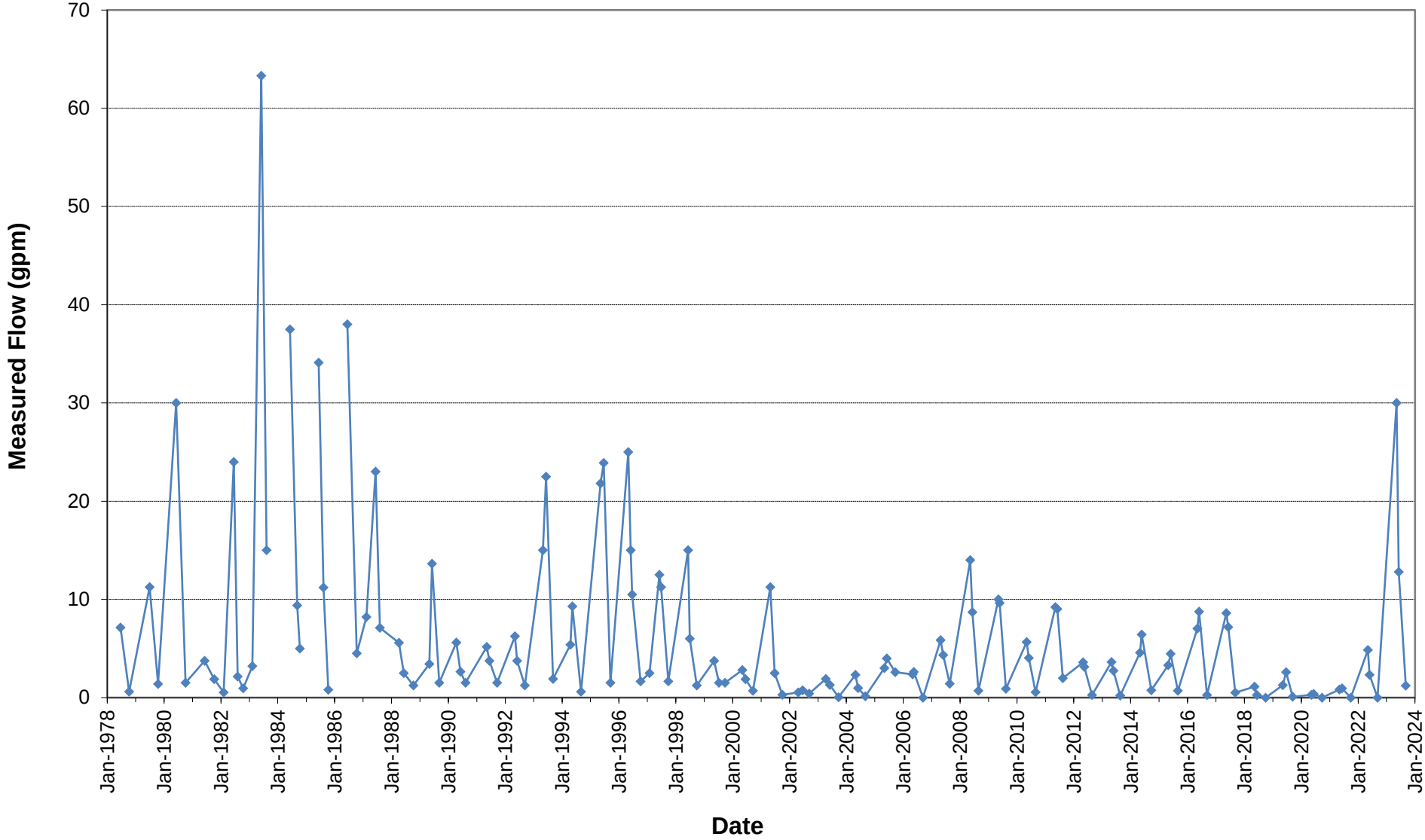
## Spring G-16
## Source: Above F-Seam

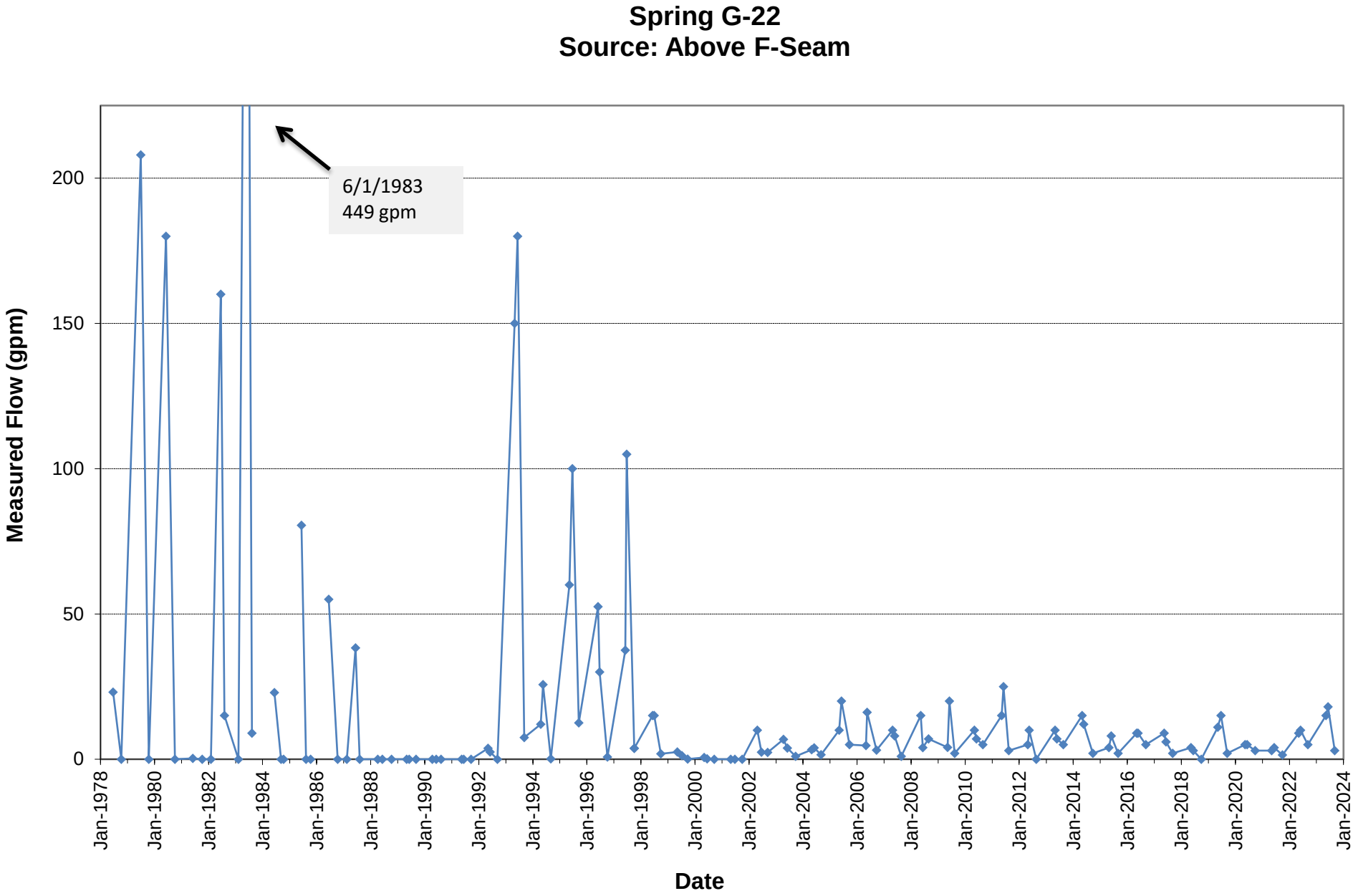


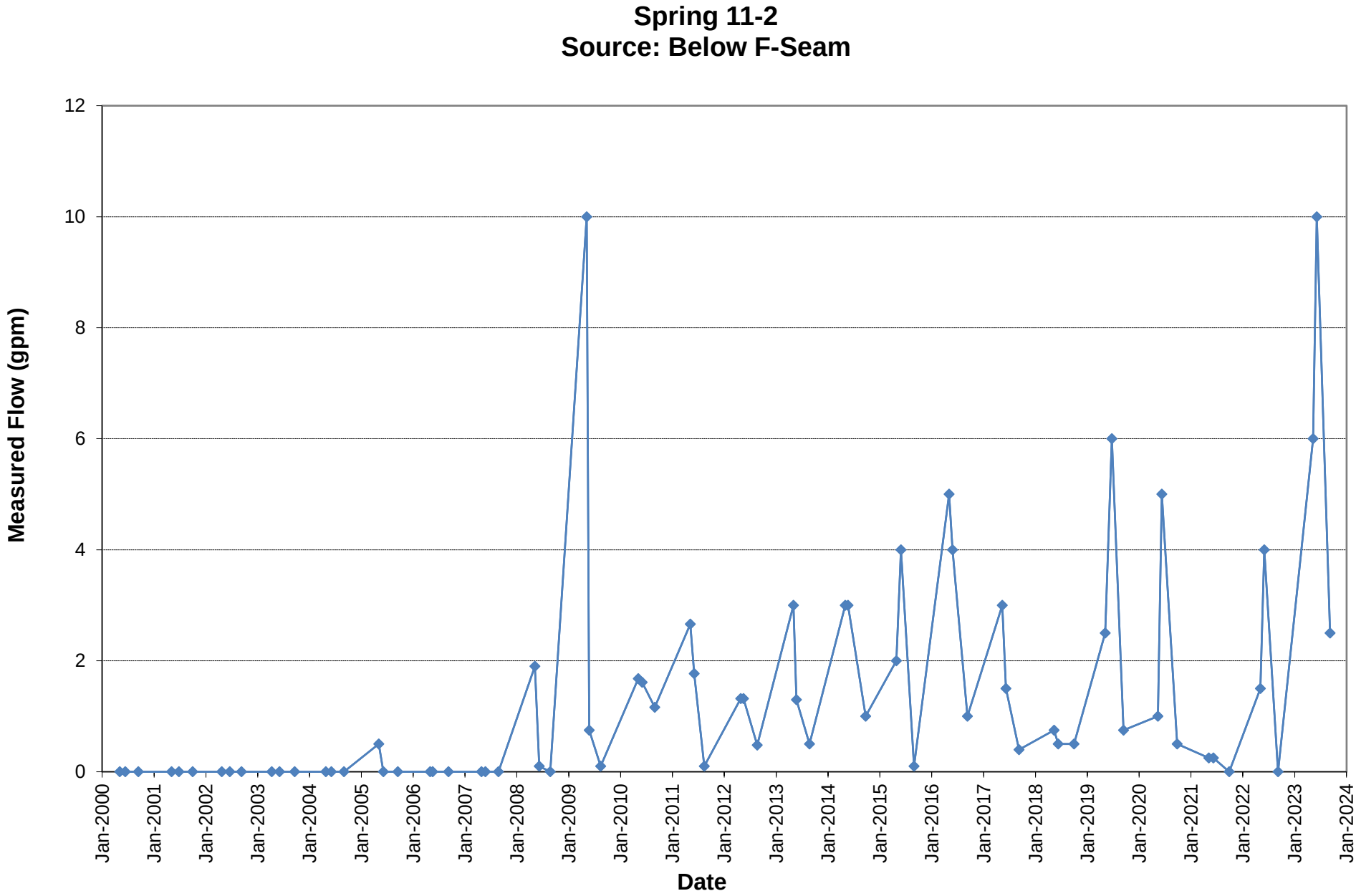
## Spring G-24
## Source: Above F-Seam

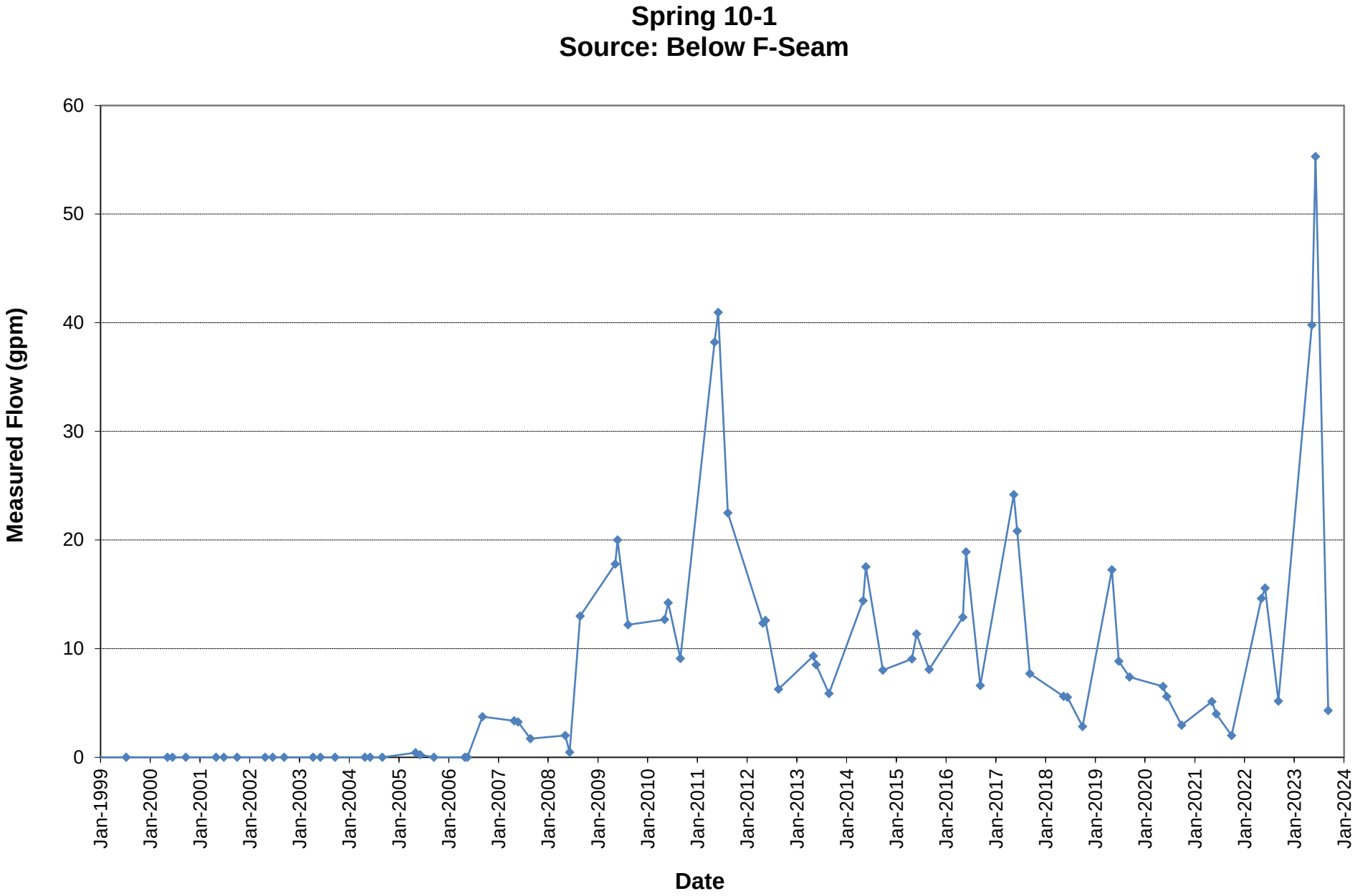


## Spring G-14
## Source: Above F-Seam

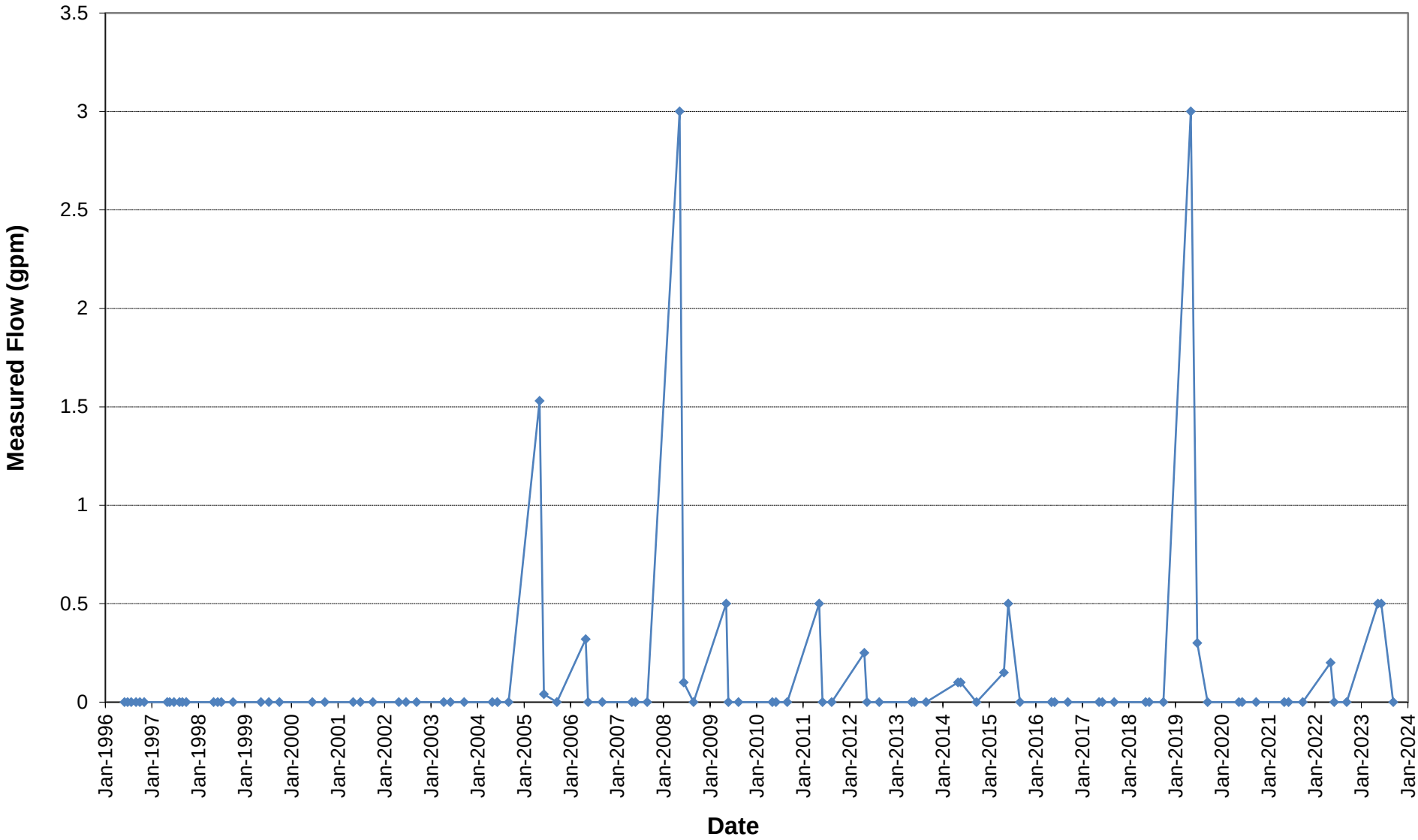



Spring G-22
Source: Above F-Seam
6/1/1983
449 gpm
Measured Flow (gpm)
0
50
100
150
200
Jan-1978
Jan-1980
Jan-1982
Jan-1984
Jan-1986
Jan-1988
Jan-1990
Jan-1992
Jan-1994
Jan-1996
Jan-1998
Jan-2000
Jan-2002
Jan-2004
Jan-2006
Jan-2008
Jan-2010
Jan-2012
Jan-2014
Jan-2016
Jan-2018
Jan-2020
Jan-2022
Jan-2024
Date

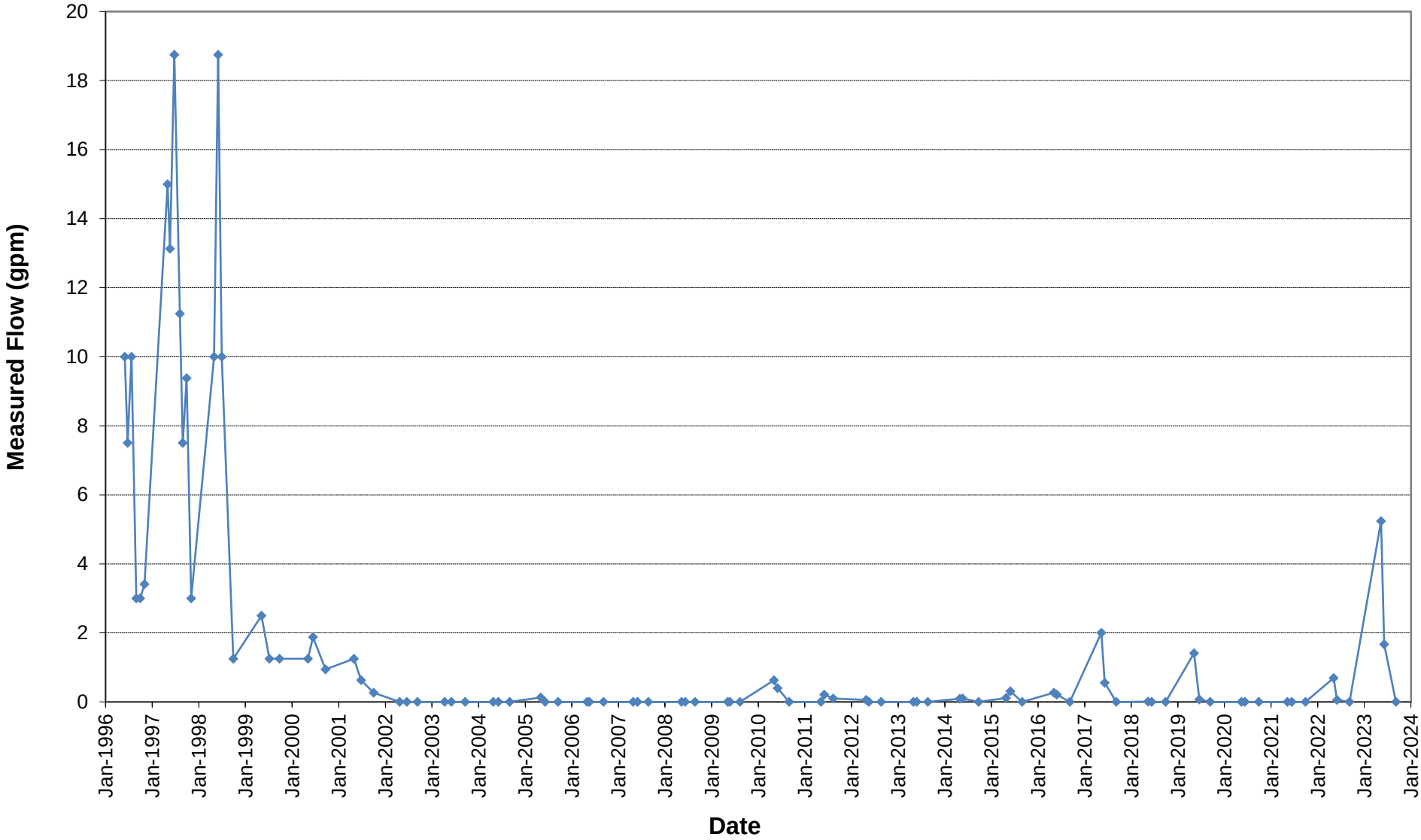

Spring 11-2
Source: Below F-Seam
Measured Flow (gpm)
12
10
8
6
4
2
0
Jan-2000
Jan-2001
Jan-2002
Jan-2003
Jan-2004
Jan-2005
Jan-2006
Jan-2007
Jan-2008
Jan-2009
Jan-2010
Jan-2011
Jan-2012
Jan-2013
Jan-2014
Jan-2015
Jan-2016
Jan-2017
Jan-2018
Jan-2019
Jan-2020
Jan-2021
Jan-2022
Jan-2023
Jan-2024
Date


Spring 10-1
Source: Below F-Seam
Measured Flow (gpm)
60
50
40
30
20
10
0
Jan-1999
Jan-2000
Jan-2001
Jan-2002
Jan-2003
Jan-2004
Jan-2005
Jan-2006
Jan-2007
Jan-2008
Jan-2009
Jan-2010
Jan-2011
Jan-2012
Jan-2013
Jan-2014
Jan-2015
Jan-2016
Jan-2017
Jan-2018
Jan-2019
Jan-2020
Jan-2021
Jan-2022
Jan-2023
Jan-2024
Date

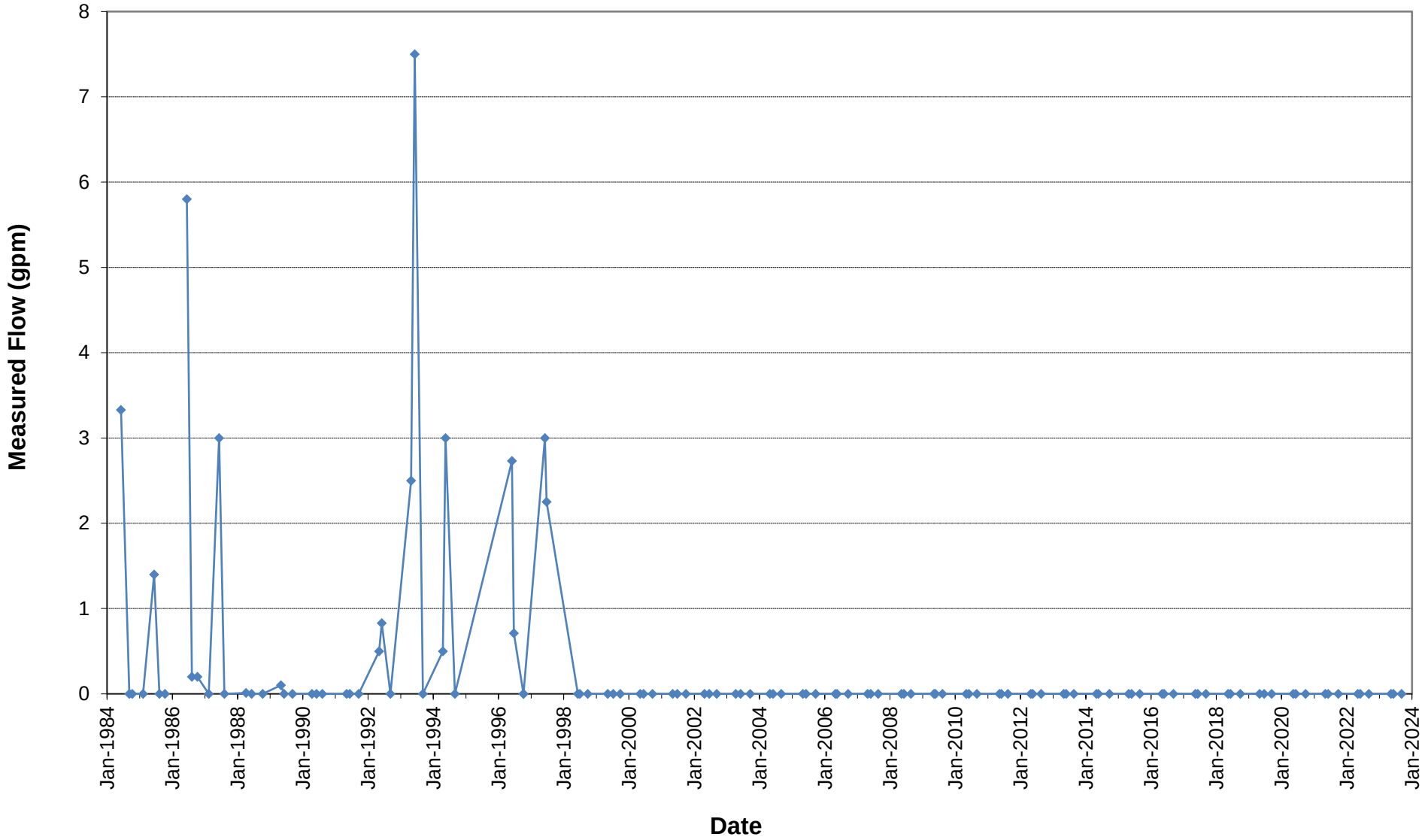
## Spring E10-2
## Source: Below F-Seam



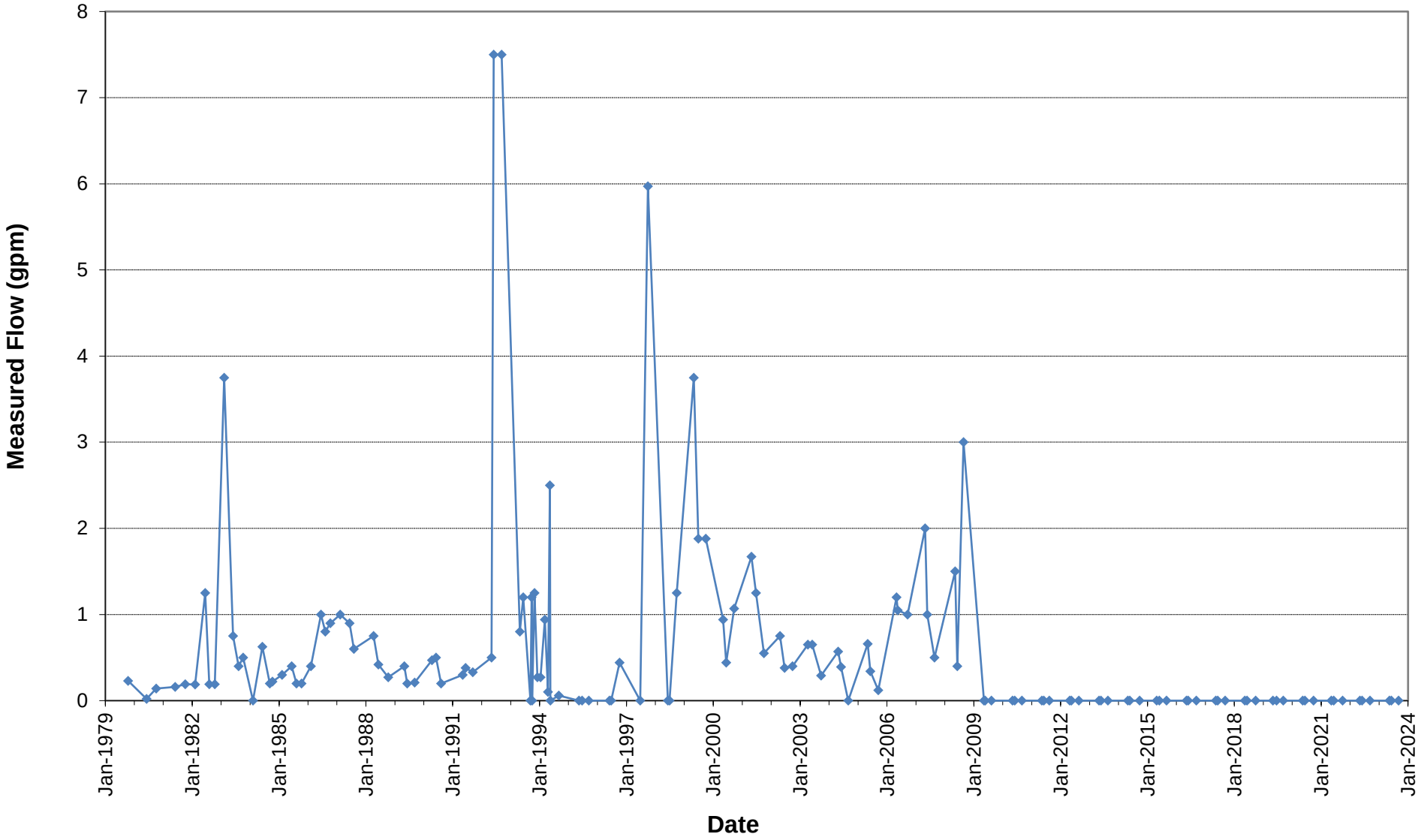
## Spring 15-1
## Source: Below F-Seam



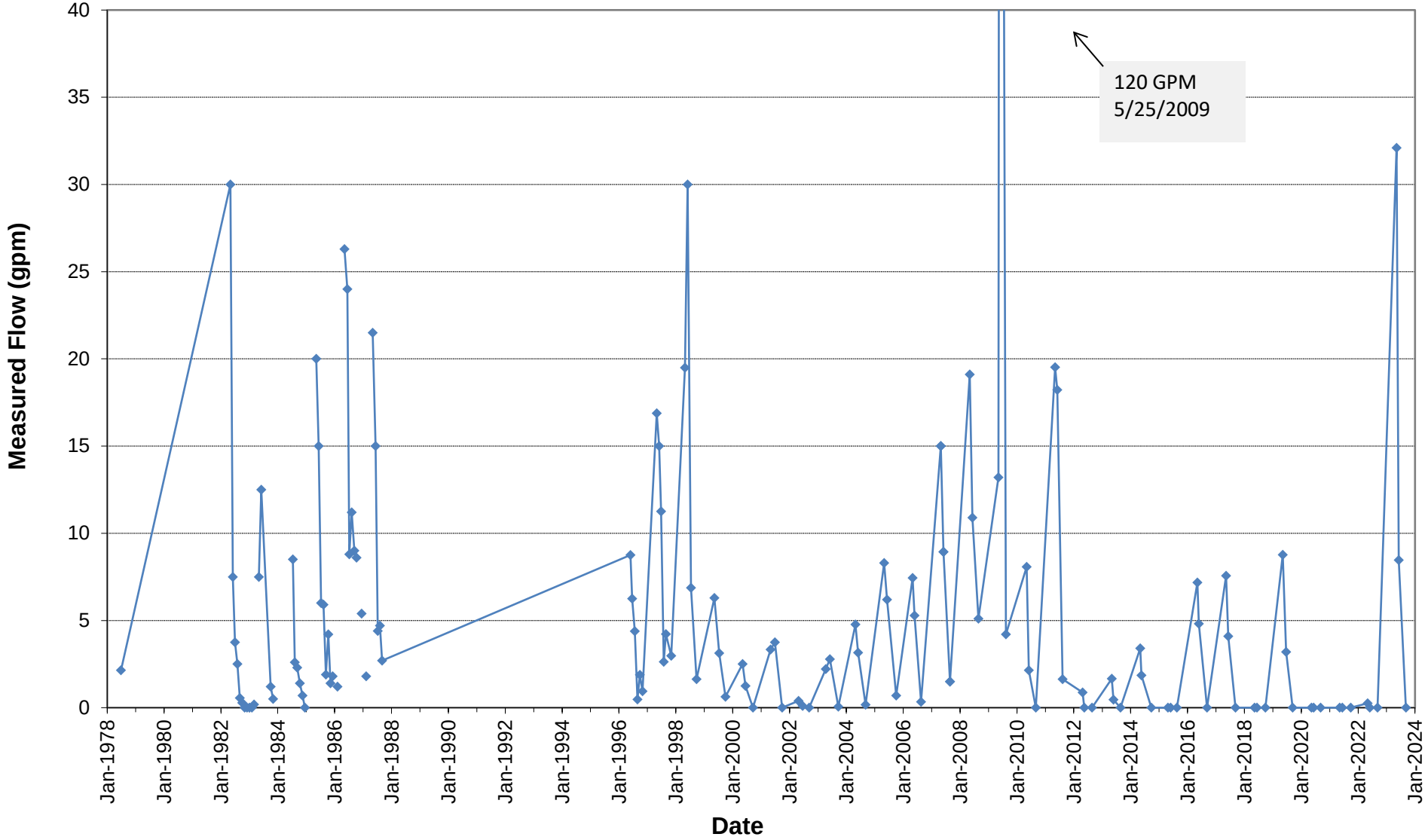
## Spring G-1a
## Source: Below F-Seam



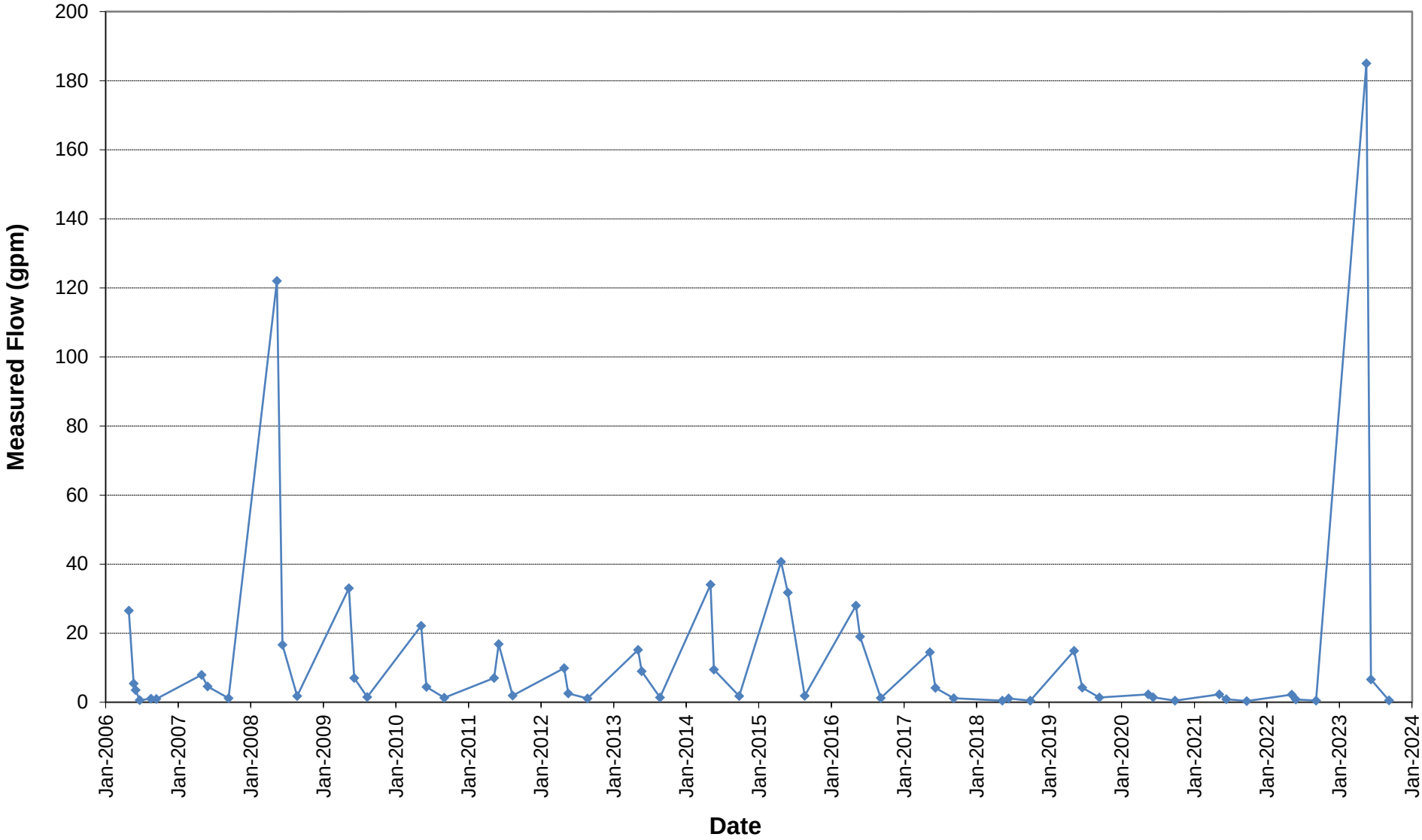
## Spring G-20
## Source: Below F-Seam

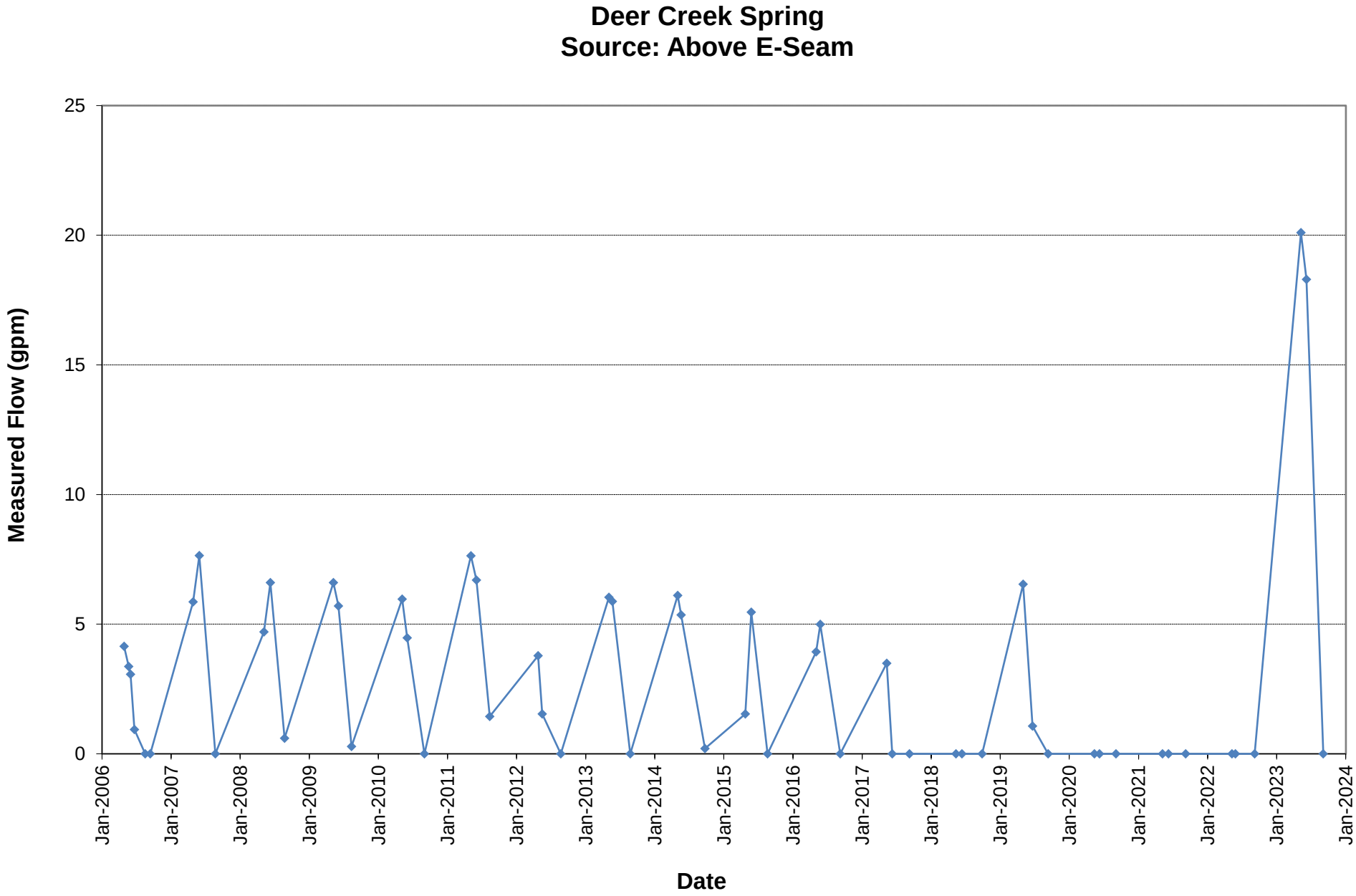


## Spring J-4
## Source: Above E-Seam

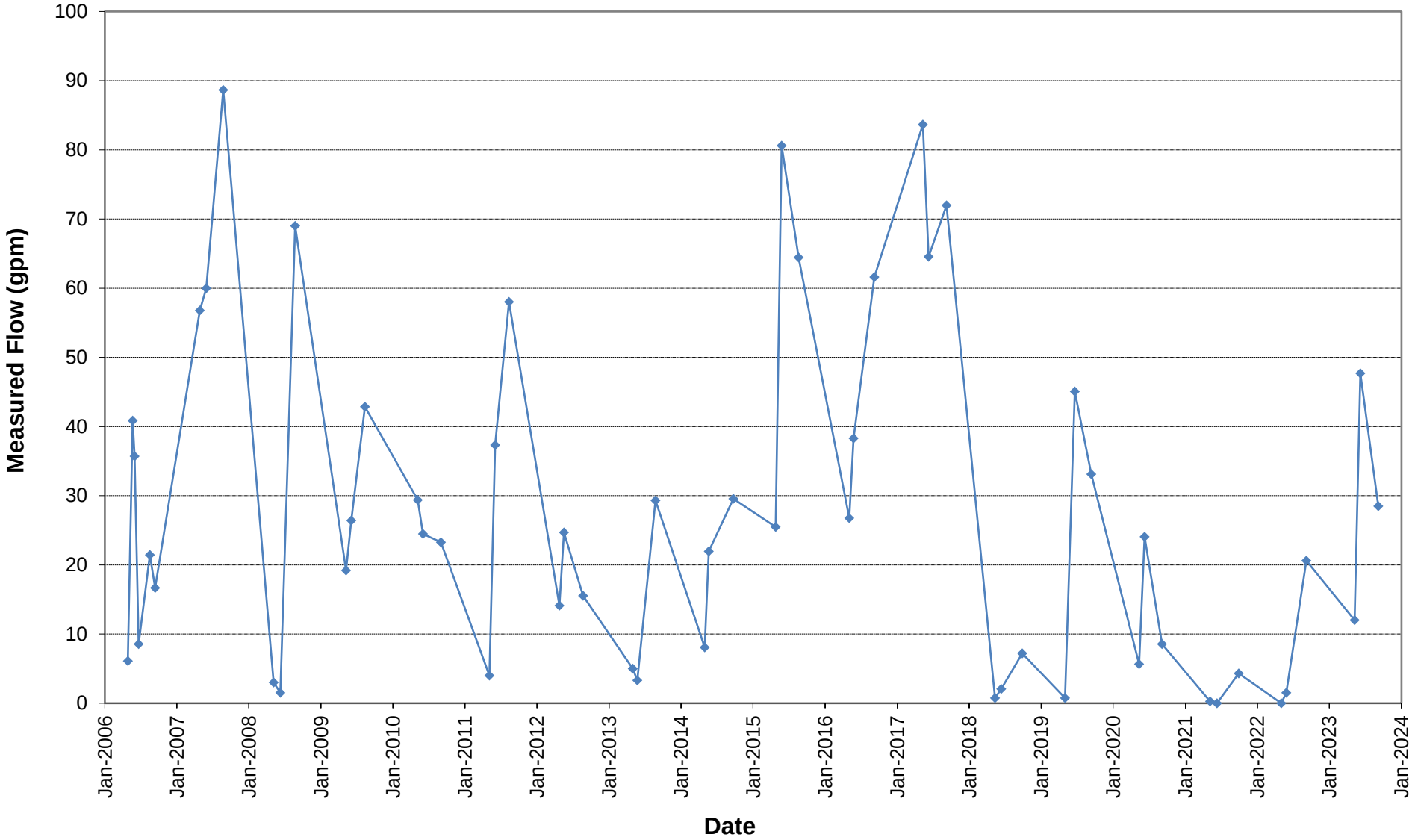


## Spring 35-3
## Source: Above F-Seam

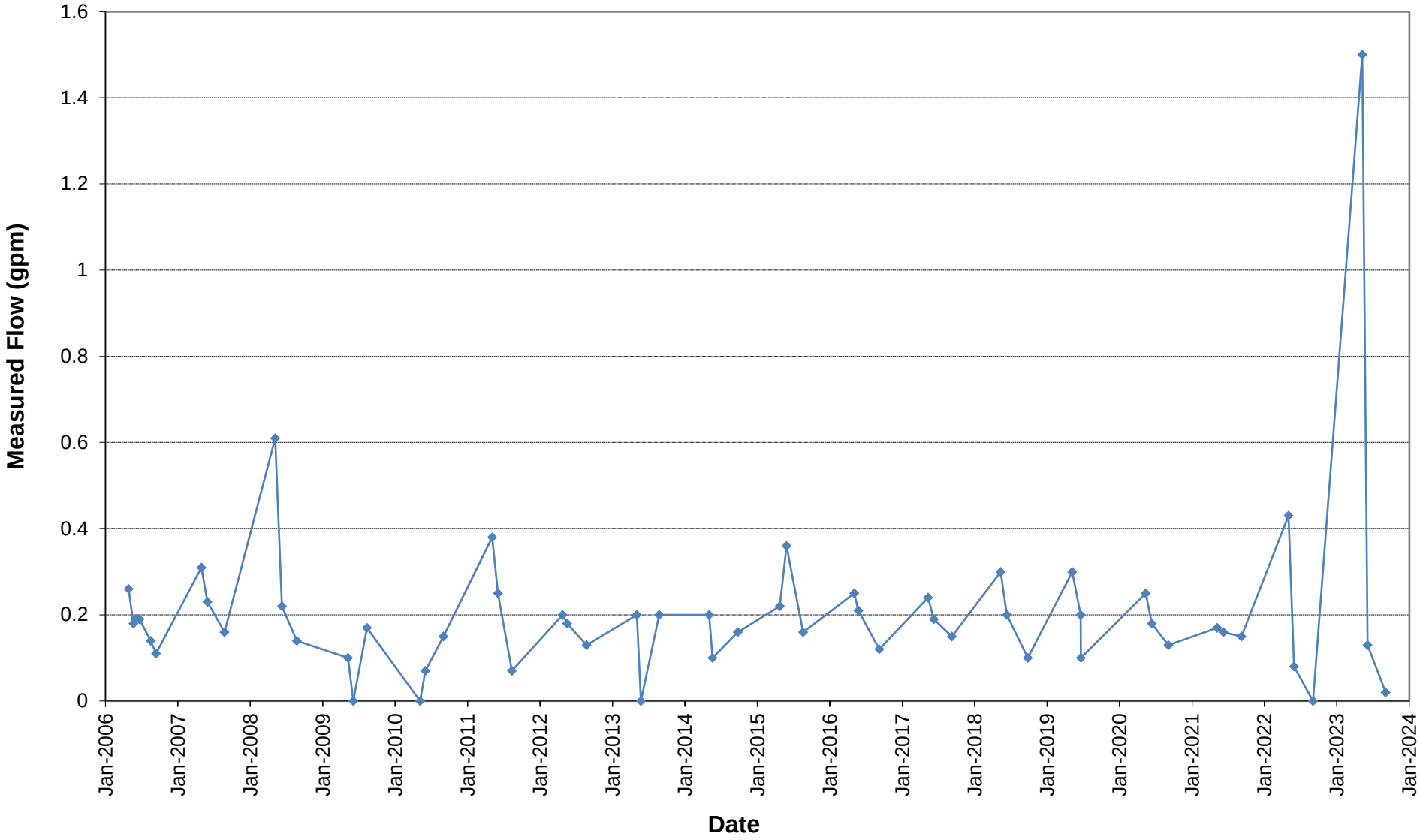



Deer Creek Spring
Source: Above E-Seam
Measured Flow (gpm)
25
20
15
10
5
0
Jan-2006
Jan-2007
Jan-2008
Jan-2009
Jan-2010
Jan-2011
Jan-2012
Jan-2013
Jan-2014
Jan-2015
Jan-2016
Jan-2017
Jan-2018
Jan-2019
Jan-2020
Jan-2021
Jan-2022
Jan-2023
Jan-2024
Date

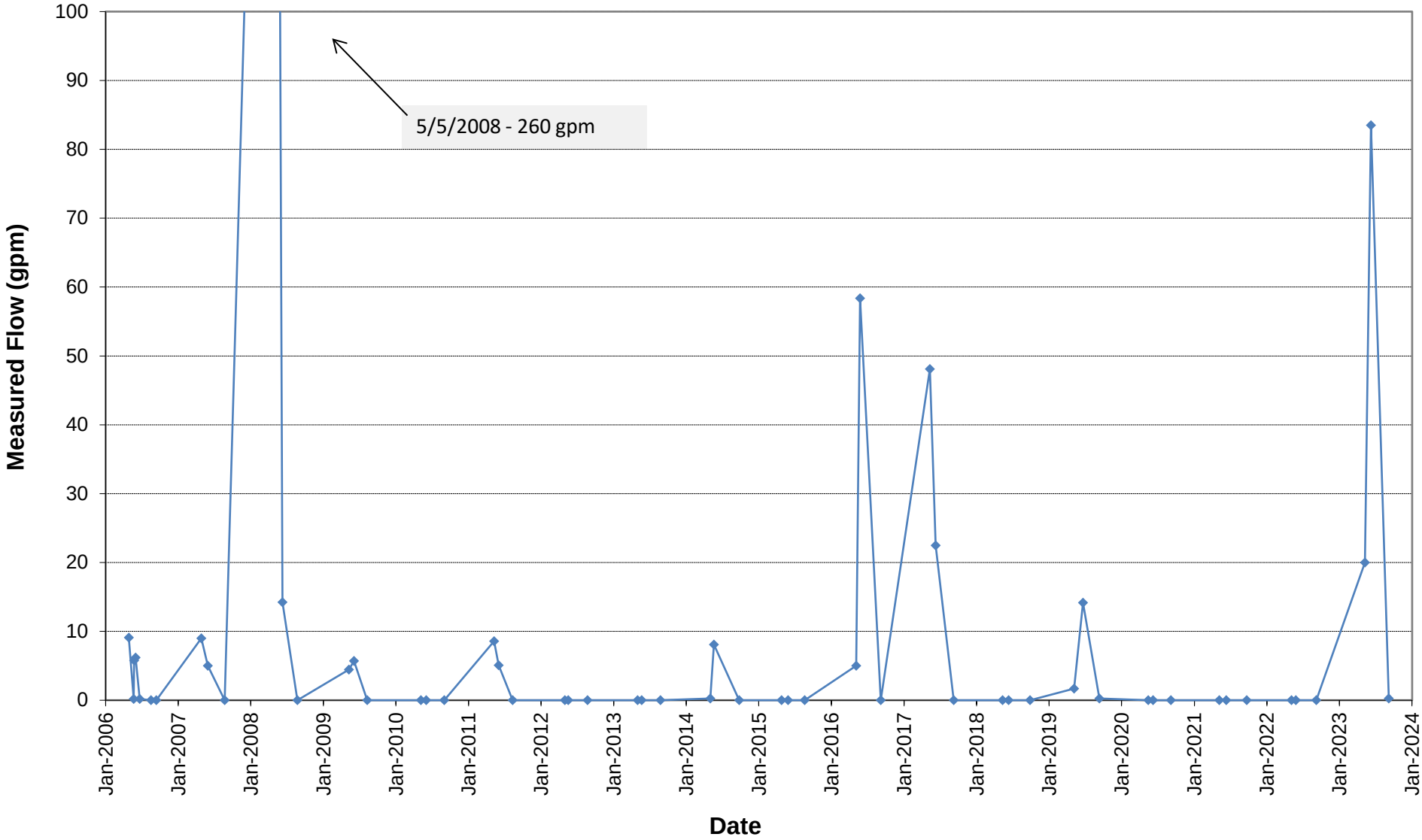
## Spring WCC-24
## Source: Above E-Seam



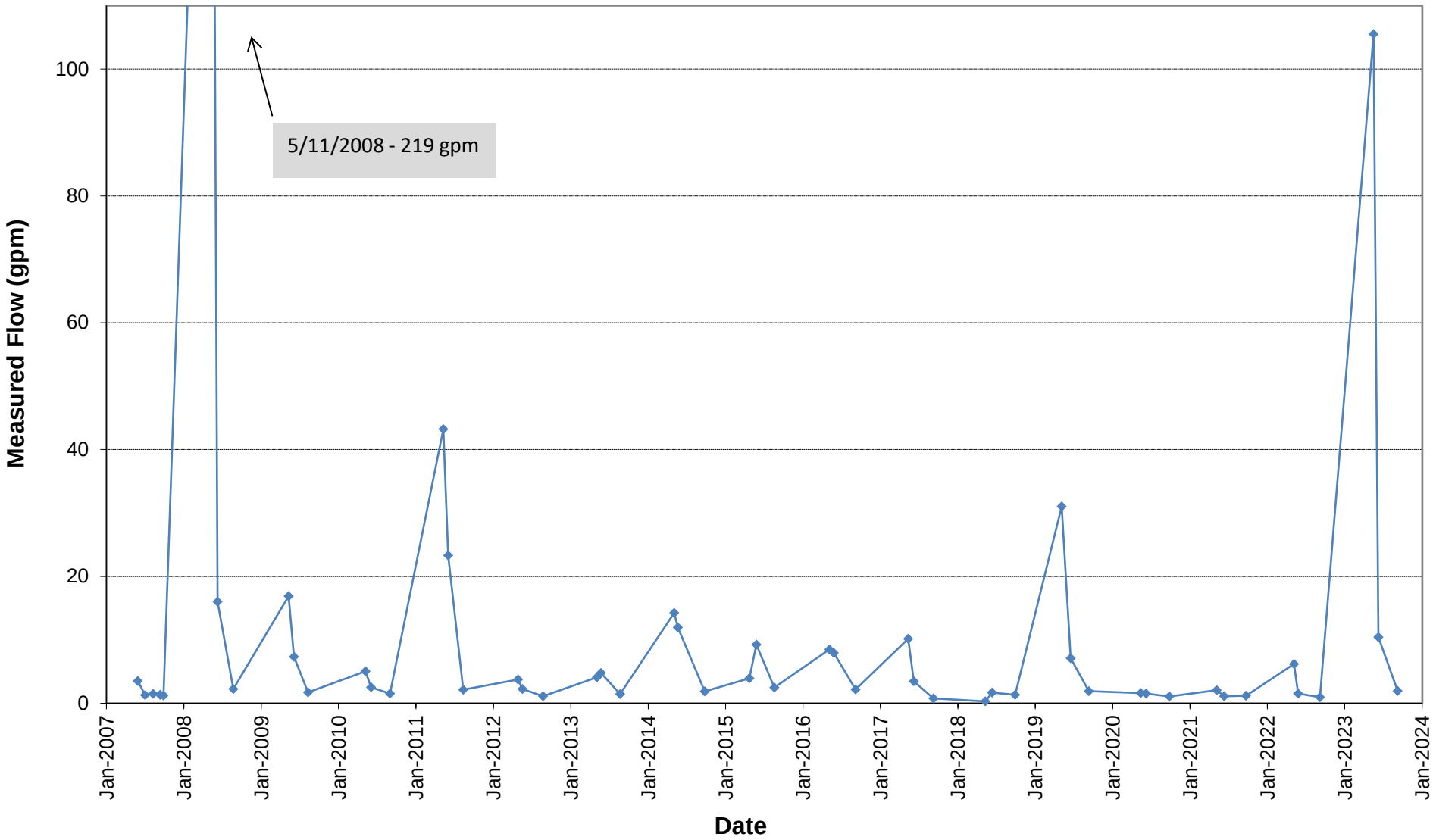
## Spring J-2
## Source: Above E-Seam

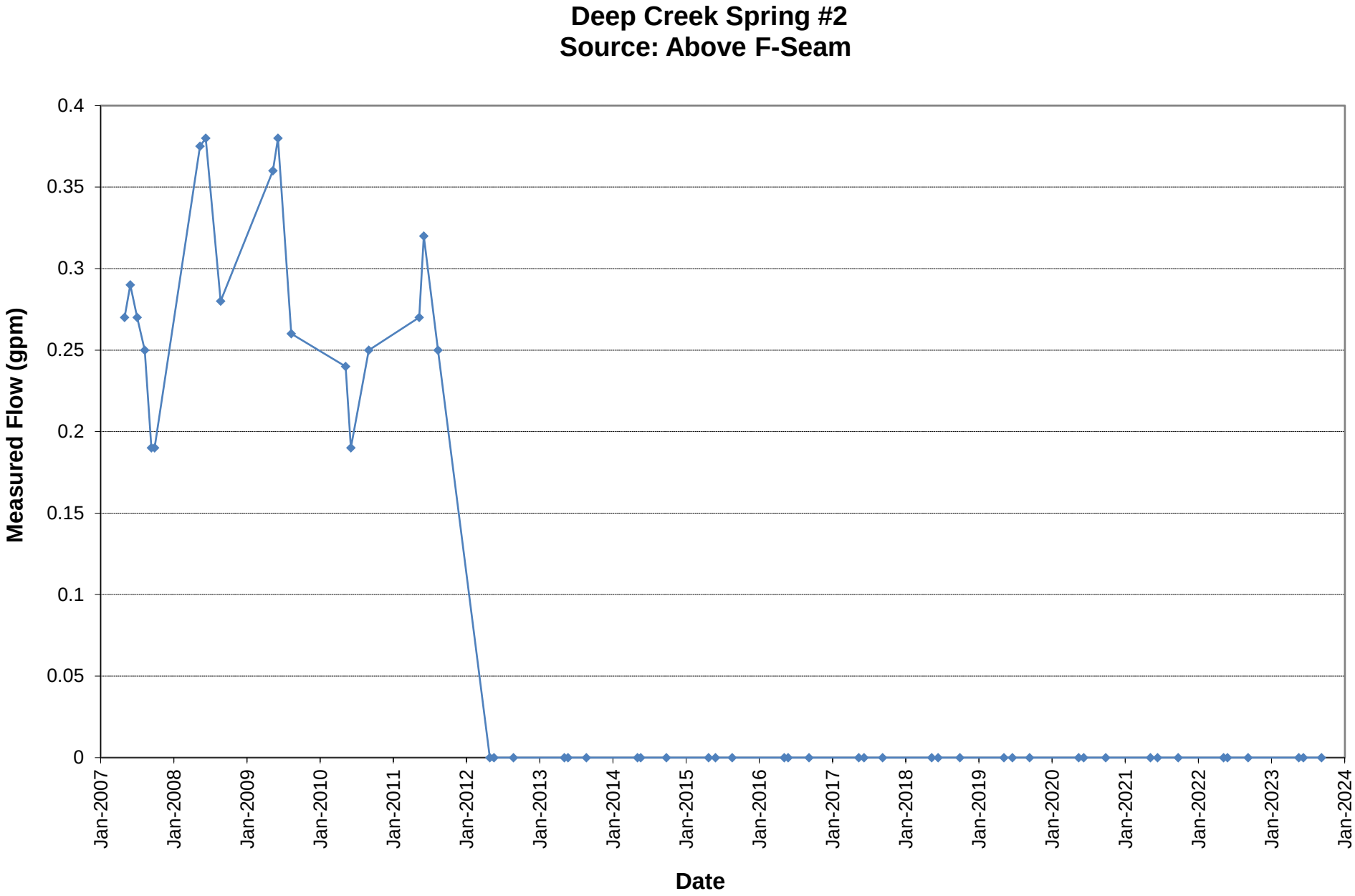


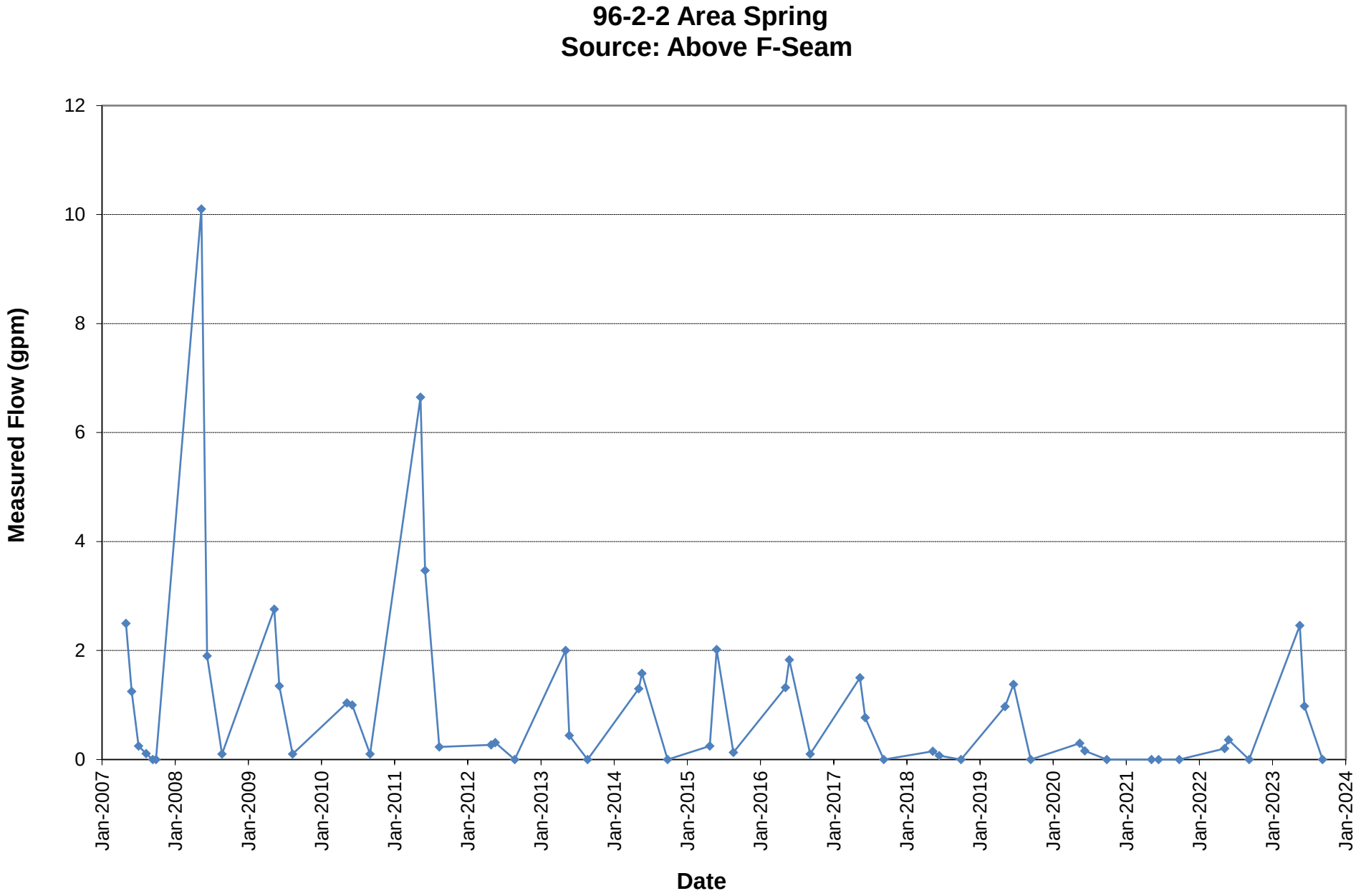
## Spring J-7
## Source: Above E-Seam



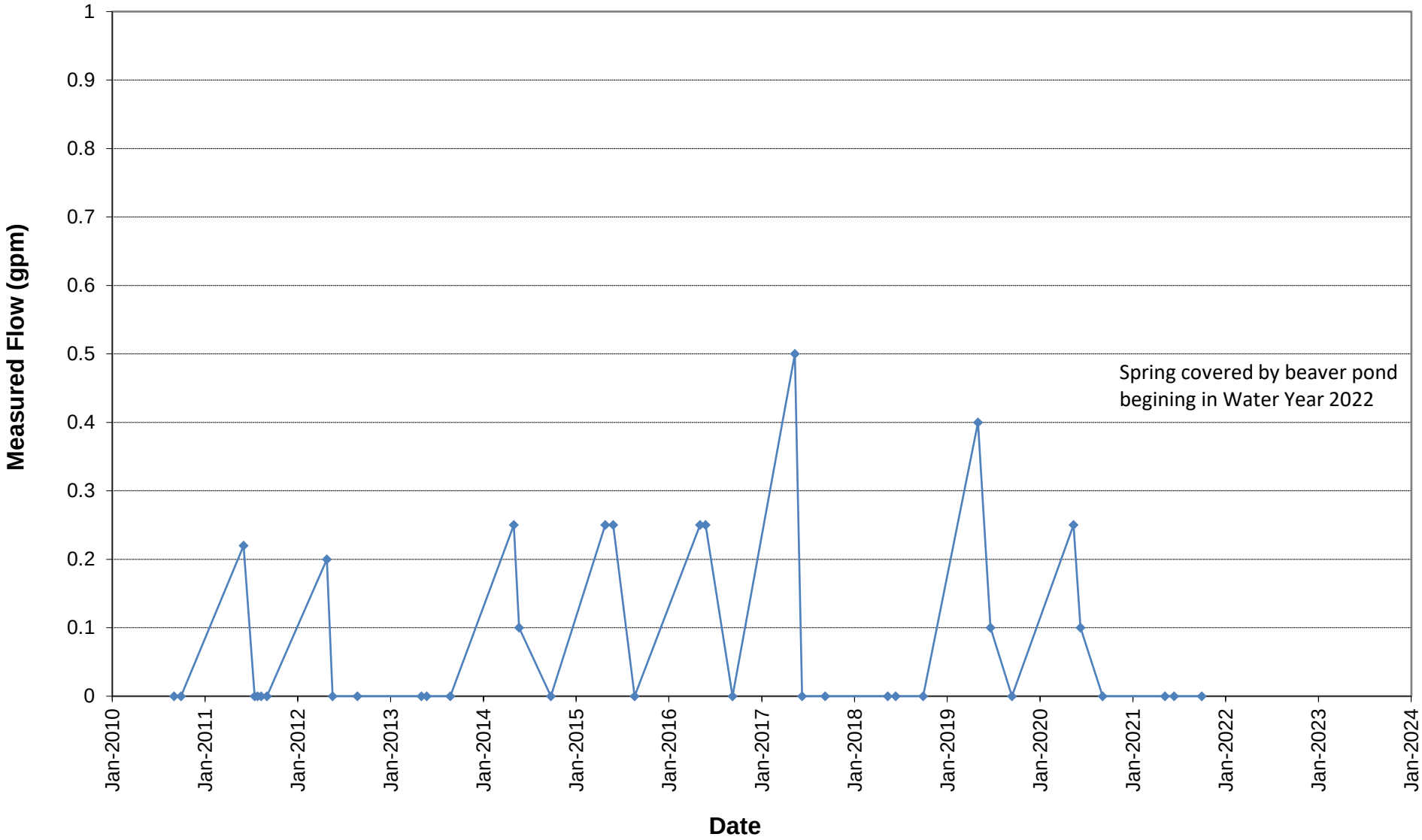
## Deep Creek Trail Spring
## Source: Above F-Seam

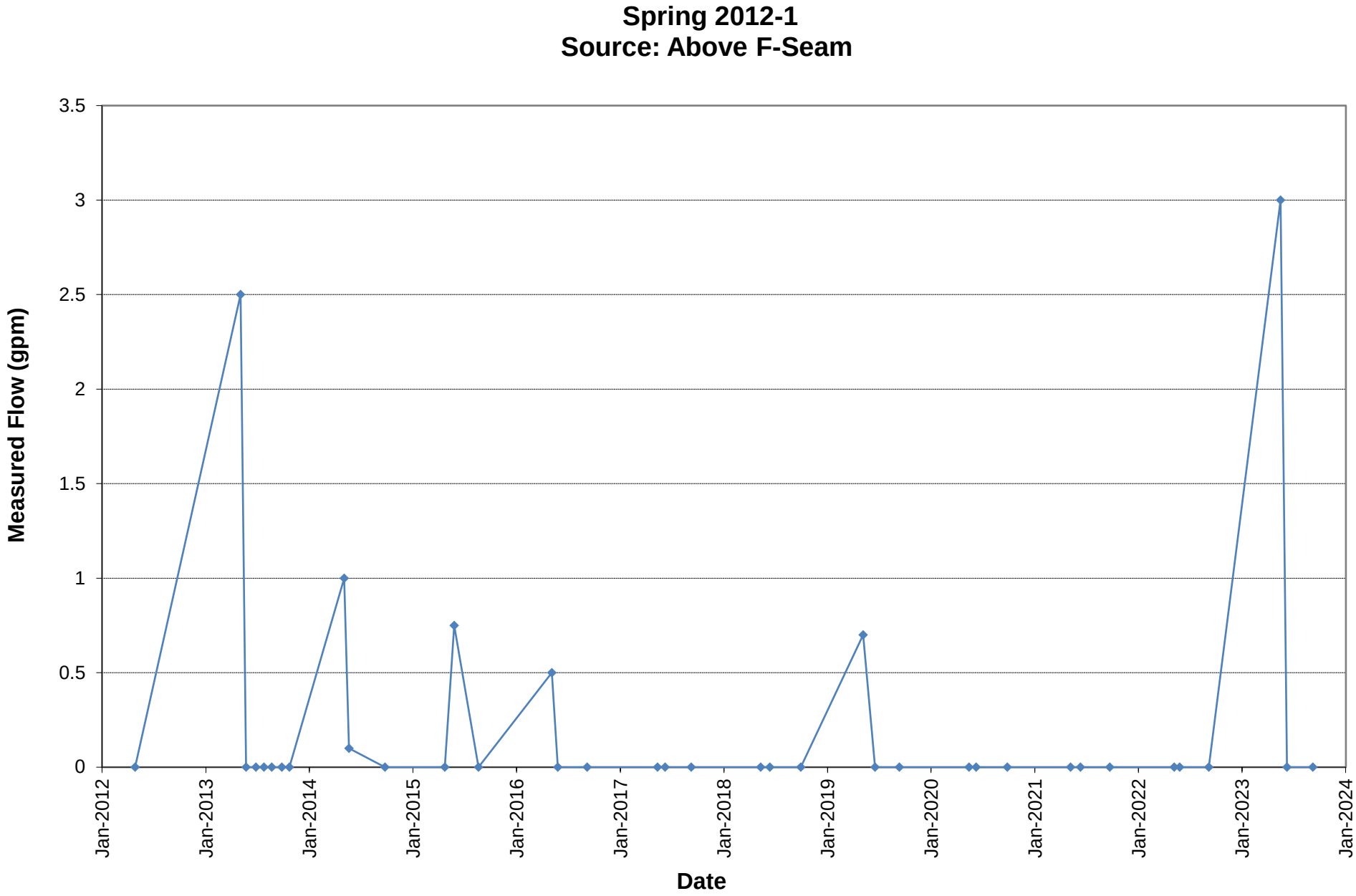



Deep Creek Spring #2
Source: Above F-Seam
Measured Flow (gpm)
0.4
0.35
0.3
0.25
0.2
0.15
0.1
0.05
0
Jan-2007
Jan-2008
Jan-2009
Jan-2010
Jan-2011
Jan-2012
Jan-2013
Jan-2014
Jan-2015
Jan-2016
Jan-2017
Jan-2018
Jan-2019
Jan-2020
Jan-2021
Jan-2022
Jan-2023
Jan-2024
Date

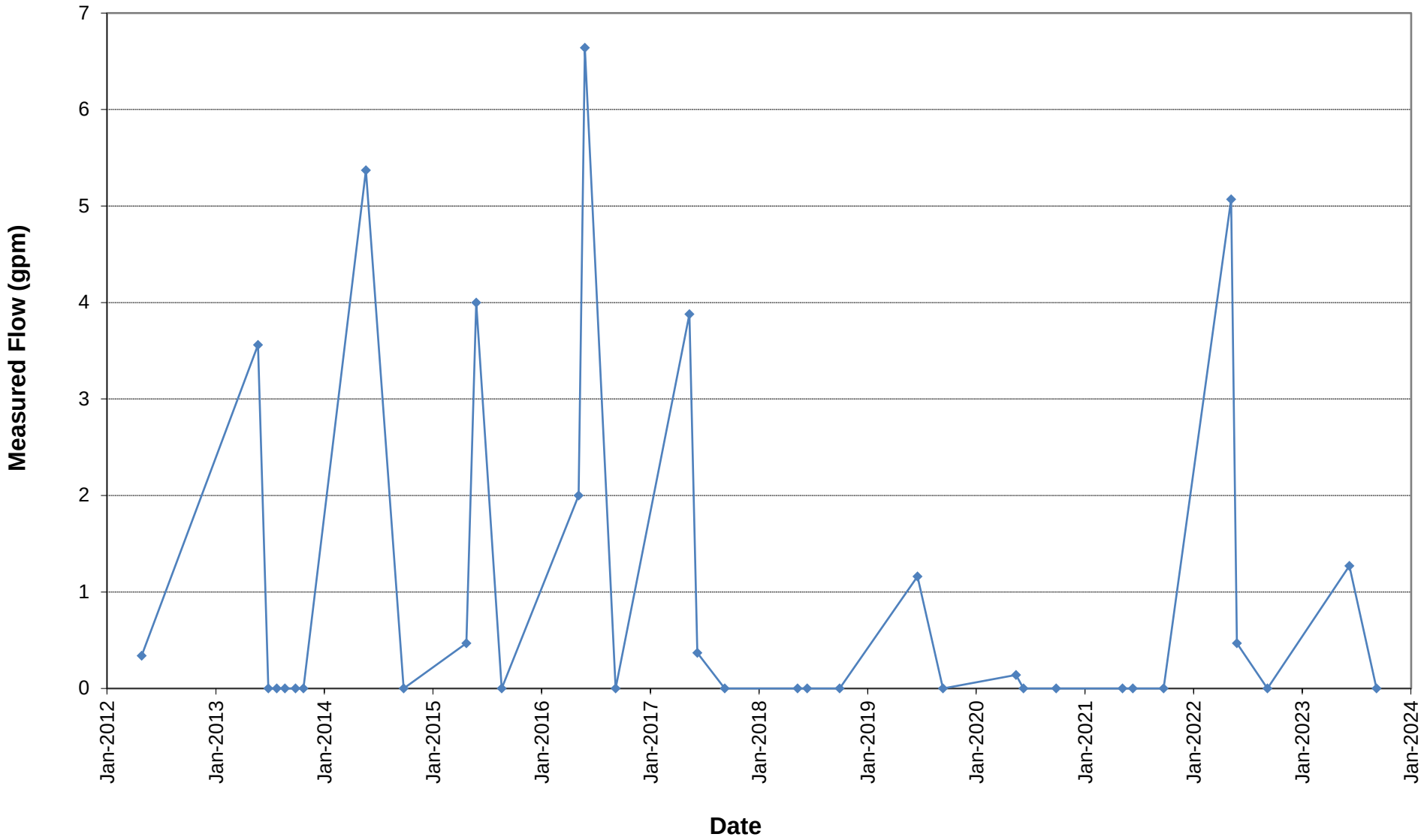

96-2-2 Area Spring
Source: Above F-Seam
Measured Flow (gpm)
12
10
8
6
4
2
0
Jan-2007
Jan-2008
Jan-2009
Jan-2010
Jan-2011
Jan-2012
Jan-2013
Jan-2014
Jan-2015
Jan-2016
Jan-2017
Jan-2018
Jan-2019
Jan-2020
Jan-2021
Jan-2022
Jan-2023
Jan-2024
Date

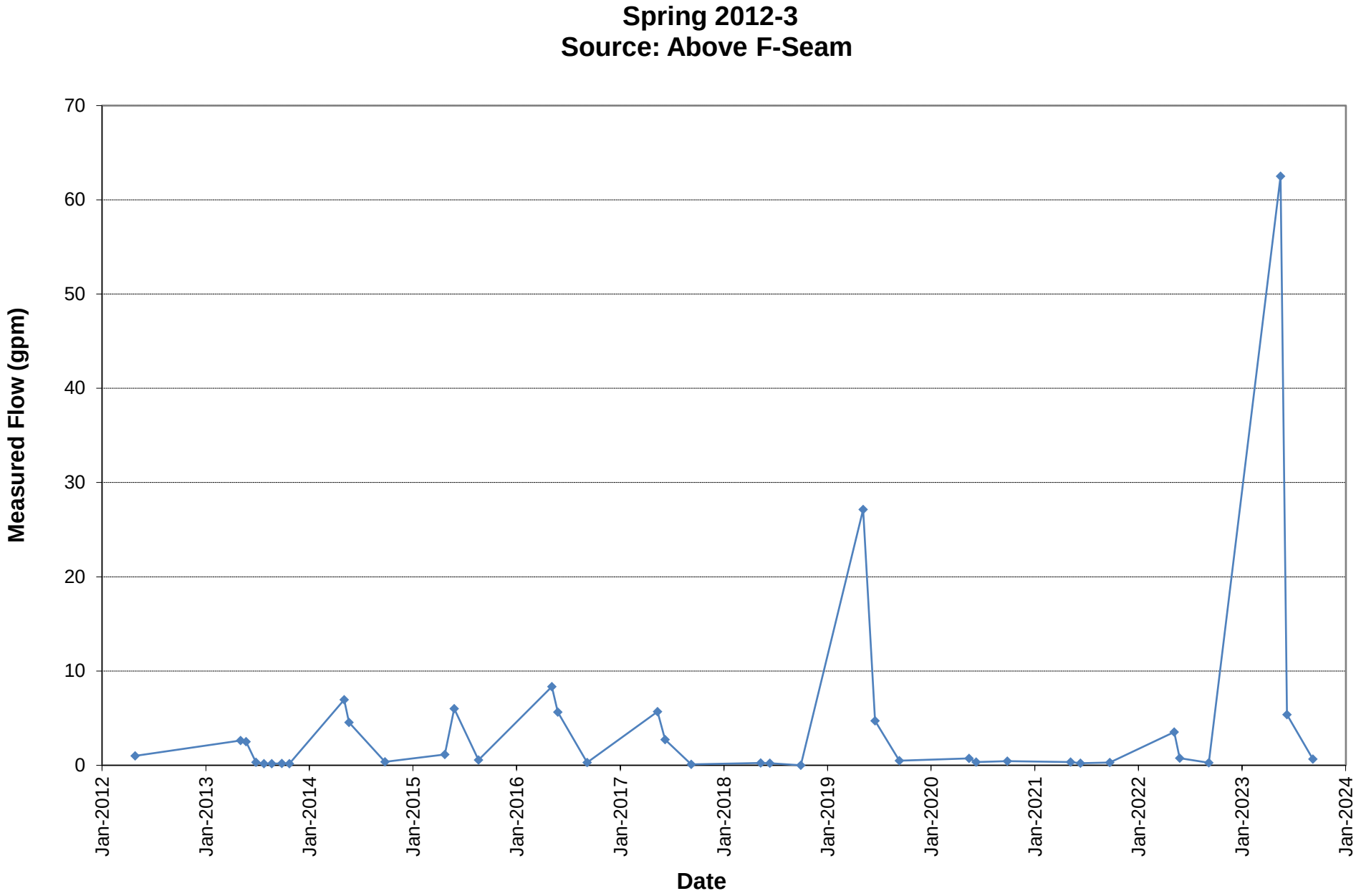
## Spring J-10
## Source: Above E-Seam

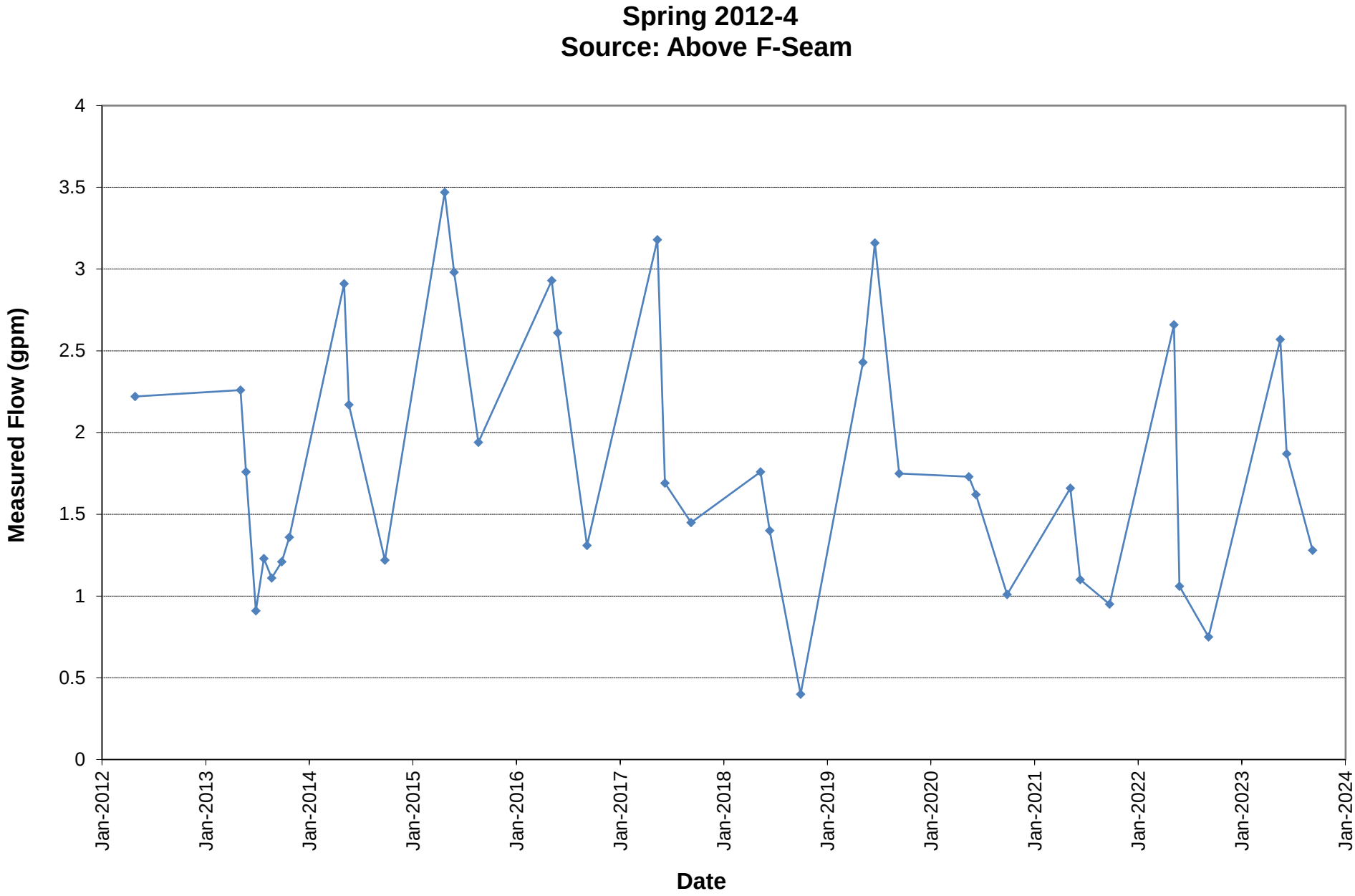


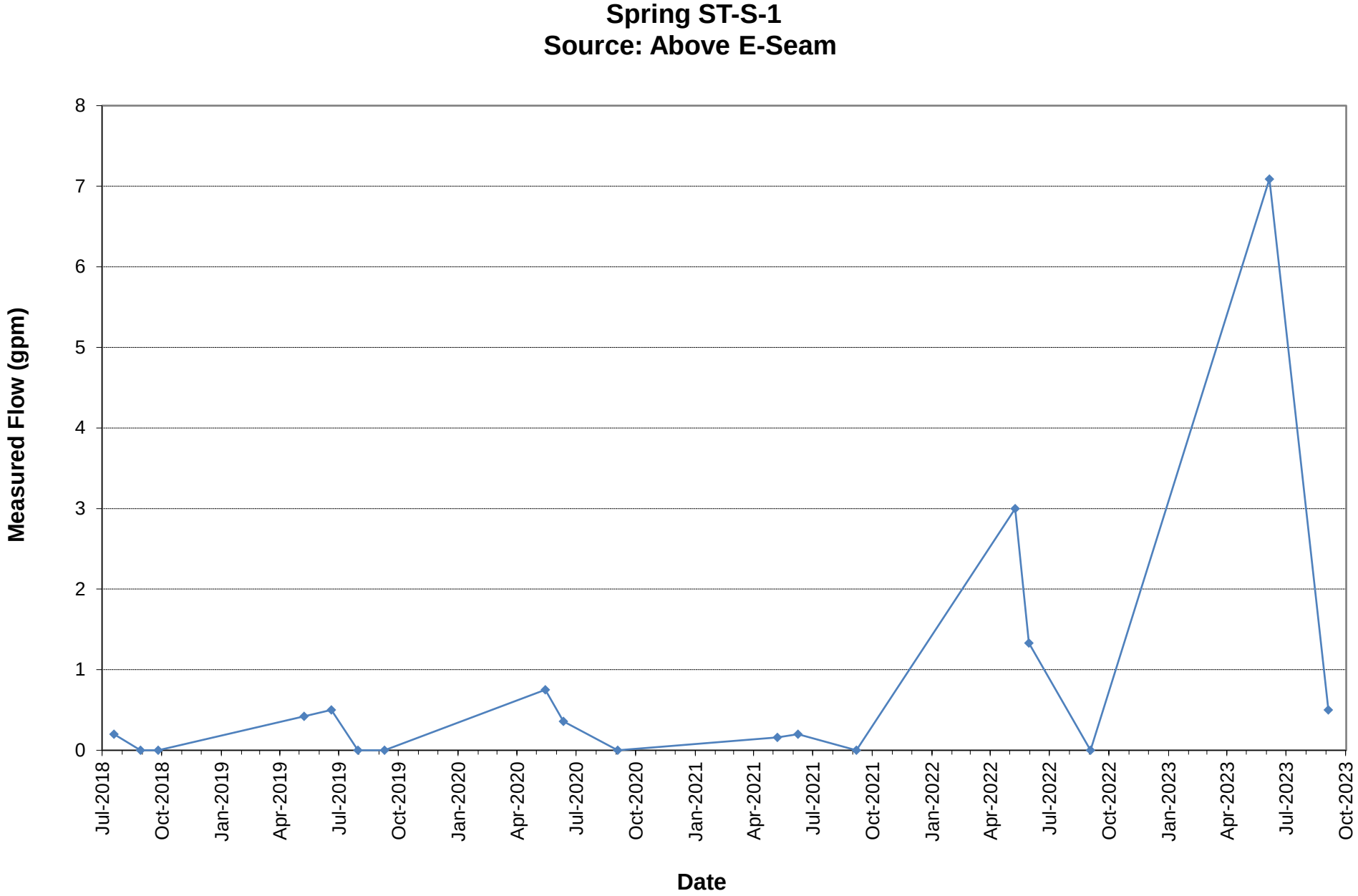

Spring 2012-1
Source: Above F-Seam
Measured Flow (gpm)
3.5
3
2.5
2
1.5
1
0.5
0
Jan-2012
Jan-2013
Jan-2014
Jan-2015
Jan-2016
Jan-2017
Jan-2018
Jan-2019
Jan-2020
Jan-2021
Jan-2022
Jan-2023
Jan-2024
Date

## Spring 2012-2
## Source: Above F-Seam




Spring 2012-3
Source: Above F-Seam
Measured Flow (gpm)
70
60
50
40
30
20
10
0
Jan-2012
Jan-2013
Jan-2014
Jan-2015
Jan-2016
Jan-2017
Jan-2018
Jan-2019
Jan-2020
Jan-2021
Jan-2022
Jan-2023
Jan-2024
Date


Spring 2012-4
Source: Above F-Seam
Measured Flow (gpm)
4
3.5
3
2.5
2
1.5
1
0.5
0
Jan-2012
Jan-2013
Jan-2014
Jan-2015
Jan-2016
Jan-2017
Jan-2018
Jan-2019
Jan-2020
Jan-2021
Jan-2022
Jan-2023
Jan-2024
Date


Spring ST-S-1
Source: Above E-Seam
Measured Flow (gpm)
0
1
2
3
4
5
6
7
8
Jul-2018
Oct-2018
Jan-2019
Apr-2019
Jul-2019
Oct-2019
Jan-2020
Apr-2020
Jul-2020
Oct-2020
Jan-2021
Apr-2021
Jul-2021
Oct-2021
Jan-2022
Apr-2022
Jul-2022
Oct-2022
Jan-2023
Apr-2023
Jul-2023
Oct-2023
Date

# APPENDIX E

## SPRINGS - LABORATORY AND FIELD WATER QUALITY DATA

**Spring 26-1**
**Water Quality and Field Parameters**

| Mountain Coal West Elk Mine - Water Year 2023 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Monitoring Location: Spring 26-1** | | **Baseline[1]** | | | **Water Year 2023** | | | |
| Description | Units | Minimum | Maximum | Mean | 5/16/2023 | 6/8/2023 | Q[4] | 9/7/2023 |
| **Field Parameters** | | | | | | | | |
| Flow | gpm | | | | 437 | 89.7 | | 6.98 |
| pH (Field) | SU | 7.3 | 8.1 | 7.7 | 7.58 | 7.58 | | 7.79 |
| Conductivity (Field) | µmhos/cm | 240 | 640 | 482 | 448 | 513 | | nm[5] |
| Temperature (Field) | °C | | | | 6.7 | 6.8 | | nm[5] |
| Comment | | | | | | | | |
| **Laboratory Parameters [2]** | | | | | | | | |
| Name of Certified Lab [3] | | | | | | ACZ | | |
| Lab Reference # | | | | | | L81055-22 | | |
| Sample Date | | | | | | 6/8/2023 | | |
| Lab Test Date | | | | | | 6/13-6/24 | | |
| Sampled By | | | | | | PH | | |
| Alkalinity (Total CaCO3) | mg/L | 151 | 284 | 222 | | | | |
| Bicarbonate as CaCO3 | mg/L | 151 | 284 | 222 | | | | |
| Calcium, dissolved | mg/L | 24 | 37.2 | 31.5 | | | | |
| Cation - Anion Balance | mg/L | 1 | 3.3 | 2.15 | | | | |
| Chloride | mg/L | 2 | 6 | 4.4 | | | | |
| Conductivity @25C | µmhos/cm | 480 | 548 | 514 | | 479 | | |
| Hardness as CaCO3 | mg/L | 81 | 126 | 105 | | | | |
| Iron, dissolved | mg/L | | | | | -0.06 | U | |
| Iron, total | mg/L | | 1.45 | 0.24 | | -0.06 | U | |
| Magnesium, dissolved | mg/L | 5.1 | 8 | 6.7 | | | | |
| Manganese, total | mg/L | | 0.028 | 0.004 | | | | |
| Nitrate/Nitrite (as N) | mg/L | 0.14 | 0.31 | 0.19 | | | | |
| pH | SU | 7.1 | 7.7 | 7.4 | | 8.4 | H | |
| Phosphorus, ortho dissolved | mg/L | | 0.007 | 0.001 | | | | |
| Potassium, dissolved | mg/L | 1.2 | 1.4 | 1.3 | | | | |
| Residue, Filterable (TDS) @180C | mg/L | 220 | 410 | 327 | | 294 | | |
| Residue, Non-Filterable (TSS) @105C | mg/L | | 16 | 4 | | -5.0 | U | |
| Selenium, total | mg/L | | 0.001 | 0.001 | | | | |
| Sodium Adsorption Ratio (SAR) | calc. | 2.8 | 4.96 | 3.96 | | | | |
| Sodium, dissolved | mg/L | 57.2 | 125 | 94.5 | | | | |
| Sulfate | mg/L | 40 | 80 | 63.1 | | | | |
| Sum of Anions | meq/L | 5.1 | 5.9 | 5.5 | | | | |
| Sum of Cations | meq/L | 5.2 | 6.3 | 5.75 | | | | |
| Zinc, dissolved | mg/L | | 0.02 | 0.01 | | | | |

[1] Baseline pre -2000 data, adapted from WWE (2001).

[2] Negative values denote readings below lab detection levels.

[3] ACZ Laboratory, Steamboat Springs, CO.

[4] ACZ Lab Qualifiers: U - Analyte was analyzed for but not detected at the indicated MDL.
H - Holding time exceeded; pH is a field test with an immediate hold time.
B - Analyte concentration detected at a value between method detection limit (MDL) and practical quantitation limit (PQL). The associated value is an estimated quantity.

Shaded cells indicate parameters elevated greater than ten percent above the maximum baseline value.

[5] Not Measured - Equipment malfunction.

**Spring 27-1**
**Water Quality and Field Parameters**

| Mountain Coal West Elk Mine - Water Year 2023 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Monitoring Location: Spring 27-1** | | **Baseline[1]** | | | **Water Year 2023** | | | |
| Description | Units | Minimum | Maximum | Mean | 5/10/2023 | 6/7/2023 | Q[4] | 9/5/2023 |
| **Field Parameters** | | | | | | | | |
| Flow | gpm | | | | 0.4 | 0.4 | | seep |
| pH (Field) | SU | 7.9 | 8.6 | 8.2 | 7.70 | 7.78 | | 7.15 |
| Conductivity (Field) | µmhos/cm | 290 | 460 | 364 | 469 | 566 | | 819 |
| Temperature (Field) | °C | | | | 7.4 | 9.6 | | 25.2 |
| Comment | | | | | flow estimated | | | |
| **Laboratory Parameters [2]** | | | | | | | | |
| Name of Certified Lab [3] | | | | | | ACZ | | |
| Lab Reference # | | | | | | L81055-10 | | |
| Sample Date | | | | | | 6/7/2023 | | |
| Lab Test Date | | | | | | 6/13-6/24 | | |
| Sampled By | | | | | | PH | | |
| Alkalinity (Total CaCO3) | mg/L | 136 | 290 | 169 | | | | |
| Bicarbonate as CaCO3 | mg/L | 136 | 290 | 168 | | | | |
| Calcium, dissolved | mg/L | 19.9 | 29.4 | 24.4 | | | | |
| Carbonate as CaCO3 | mg/L | | 7 | 0.9 | | | | |
| Cation - Anion Balance | mg/L | 1.3 | 4.3 | 2.8 | | | | |
| Chloride | mg/L | 2 | 6 | 3 | | | | |
| Conductivity @25C | µmhos/cm | 368 | 437 | 403 | | 522 | | |
| Hardness as CaCO3 | mg/L | 64 | 122 | 85 | | | | |
| Iron, dissolved | mg/L | | 0.02 | 0.01 | | -0.06 | U | |
| Iron, total | mg/L | 0.16 | 9.15 | 1.68 | | 0.157 | | |
| Magnesium, dissolved | mg/L | 4.5 | 7.8 | 5.77 | | | | |
| Manganese, total | mg/L | | 0.192 | 0.037 | | | | |
| Nitrate (as N), dissolved | mg/L | | 0.4 | 0.08 | | | | |
| Nitrate/Nitrite (as N) | mg/L | | 0.4 | 0.08 | | | | |
| pH | SU | 7.6 | 8.2 | 7.9 | | 8.5 | H | |
| Phosphorus, ortho dissolved | mg/L | | 0.022 | 0.003 | | | | |
| Potassium, dissolved | mg/L | 1 | 1.2 | 1.1 | | | | |
| Residue, Filterable (TDS) @180C | mg/L | 210 | 300 | 252 | | 320 | | |
| Residue, Non-Filterable (TSS) @105C | mg/L | | 96 | 42 | | -5 | U | |
| Sodium Adsorption Ratio (SAR) | calc. | 2.91 | 4.98 | 3.4 | | | | |
| Sodium, dissolved | mg/L | 57.2 | 74.5 | 66.1 | | | | |
| Sulfate | mg/L | 30 | 80 | 57 | | | | |
| Sum of Anions | meq/L | 3.9 | 4.5 | 4.2 | | | | |
| Sum of Cations | meq/L | 4 | 4.9 | 4.45 | | | | |

[1] Baseline pre -2000 data, adapted from WWE (2001).

[2] Negative values denote readings below lab detection levels.

[3] ACZ Laboratory, Steamboat Springs, CO.

[4] ACZ Lab Qualifiers: U - Analyte was analyzed for but not detected at the indicated MDL.

H - Holding time exceeded; pH is a field test with an immediate hold time.

B - Analyte concentration detected at a value between method detection limit (MDL) and practical quantitation limit (PQL). The associated value is an estimated quantity.

Shaded cells indicate parameters elevated greater than ten percent above the maximum baseline value.

**Spring G-7**
**Water Quality and Field Parameters**

| Mountain Coal West Elk Mine - Water Year 2023 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Monitoring Location: Spring G-7** | | **Baseline[1]** | | | **Water Year 2023** | | | |
| Description | Units | Minimum | Maximum | Mean | 5/12/2023 | 6/7/2023 | Q[4] | 9/5/2023 |
| **Field Parameters** | | | | | | | | |
| Flow | gpm | | | | 128 | 19.0 | | 2.41 |
| pH (Field) | SU | | | | 7.69 | 7.48 | | 7.52 |
| Conductivity (Field) | µmhos/cm | | | | 363 | 471 | | 607 |
| Temperature (Field) | °C | | | | 7.1 | 7.3 | | 8.4 |
| Comment | | | | | | | | |
| **Laboratory Parameters[2]** | | | | | | | | |
| Name of Certified Lab[3] | | | | | | ACZ | | |
| Lab Reference # | | | | | | L81055-08 | | |
| Sample Date | | | | | | 6/7/2023 | | |
| Lab Test Date | | | | | | 6/13-6/24 | | |
| Sampled By | | | | | | PH | | |
| Aluminum, dissolved | mg/L | 0.05 | 0.05 | 0.05 | | | | |
| Bicarbonate as CaCO3 | mg/L | 177 | 184 | 180.5 | | | | |
| Calcium, dissolved | mg/L | 41.8 | 41.8 | 41.8 | | | | |
| Chloride | mg/L | | 1 | 0.5 | | | | |
| Conductivity @25C | µmhos/cm | 387 | 414 | 400.5 | | 431 | | |
| Hardness as CaCO3 | mg/L | 134 | 142 | 138 | | | | |
| Iron, dissolved | mg/L | 0.04 | 0.07 | 0 | | -0.06 | U | |
| Iron, total | mg/L | 0.35 | 0.4 | 0.375 | | -0.06 | U | |
| Lead, dissolved | mg/L | | 0.02 | 0.01 | | | | |
| Magnesium, dissolved | mg/L | 6.8 | 7.2 | 7 | | | | |
| Manganese, total | mg/L | 0.005 | 0.006 | 0 | | | | |
| Nitrate/Nitrite (as N) | mg/L | 0.08 | 0.1 | 0.09 | | | | |
| pH | SU | 7.8 | 8.1 | 7.95 | | 8.4 | H | |
| Phosphorus, ortho dissolved | mg/L | | 0.014 | 0.007 | | | | |
| Residue, Filterable (TDS) @180C | mg/L | 230 | 230 | 230 | | 256 | | |
| Residue, Non-Filterable (TSS) @105C | mg/L | 10 | 30 | 20 | | -5 | U | |
| Sodium Adsorption Ratio (SAR) | calc. | 1.54 | 1.63 | 1.6 | | | | |
| Sodium, dissolved | mg/L | 42.8 | 42.8 | 42.8 | | | | |
| Sulfate | mg/L | 40 | 50 | 45 | | | | |

[1] Baseline pre -2000 data, adapted from WWE (2001).

[2] Negative values denote readings below lab detection levels.

[3] ACZ Laboratory, Steamboat Springs, CO.

[4] ACZ Lab Qualifiers: U - Analyte was analyzed for but not detected at the indicated MDL.

H - Holding time exceeded; pH is a field test with an immediate hold time.

B - Analyte concentration detected at a value between method detection limit (MDL) and practical quantitation limit (PQL). The associated value is an estimated quantity.

Shaded cells indicate parameters elevated greater than ten percent above the maximum baseline value.

**Spring G-16**
**Water Quality and Field Parameters**

| Mountain Coal West Elk Mine - Water Year 2023 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Monitoring Location: Spring G-16** | | **Baseline[1]** | | | **Water Year 2023** | | | |
| Description | Units | Minimum | Maximum | Mean | 5/10/2023 | 6/7/2023 | Q[4] | 9/5/2023 |
| **Field Parameters** | | | | | | | | |
| Flow | gpm | | | | 44.0 | 20.5 | | 5.19 |
| pH (Field) | SU | | | | 7.65 | 7.88 | | 7.63 |
| Conductivity (Field) | µmhos/cm | | | | 419 | 690 | | 759 |
| Temperature (Field) | °C | | | | 7.1 | 7.7 | | 8.2 |
| Comment | | | | | | | | |
| **Laboratory Parameters[2]** | | | | | | | | |
| Name of Certified Lab[3] | | | | | | ACZ | | |
| Lab Reference # | | | | | | L81055-12 | | |
| Sample Date | | | | | | 6/7/2023 | | |
| Lab Test Date | | | | | | 6/13-6/24 | | |
| Sampled By | | | | | | PH | | |
| Bicarbonate as CaCO3 | mg/L | 241 | 441 | 307 | | | | |
| Calcium, dissolved | mg/L | 55.2 | 55.9 | 55.6 | | | | |
| Chloride | mg/L | 2 | 12 | 5 | | | | |
| Conductivity @25C | µmhos/cm | 529 | 1,120 | 691 | | 643 | | |
| Hardness as CaCO3 | mg/L | 160 | 453 | 220 | | | | |
| Iron, dissolved | mg/L | | 0.08 | 0.01 | | -0.06 | U | |
| Iron, total | mg/L | | 4.63 | 0.56 | | -0.06 | U | |
| Magnesium, dissolved | mg/L | 15.1 | 15.8 | 15.3 | | | | |
| Manganese, total | mg/L | | 0.07 | 0.01 | | | | |
| Nitrate/Nitrite (as N) | mg/L | 0.07 | 0.16 | 0.1 | | | | |
| pH | SU | 7.1 | 8.2 | 7.7 | | 8.6 | H | |
| Phosphorus, ortho dissolved | mg/L | | 0.19 | 0.04 | | | | |
| Residue, Filterable (TDS) @180C | mg/L | 274 | 700 | 349 | | 402 | | |
| Residue, Non-Filterable (TSS) @105C | mg/L | | 194 | 21 | | -5 | U | |
| Sodium Adsorption Ratio (SAR) | calc. | 1.4 | 2 | 1.8 | | | | |
| Sodium, dissolved | mg/L | 58.1 | 64.5 | 61.3 | | | | |
| Sulfate | mg/L | 18.2 | 200 | 51.6 | | | | |

[1] Baseline pre -2000 data, adapted from WWE (2001).

[2] Negative values denote readings below lab detection levels.

[3] ACZ Laboratory, Steamboat Springs, CO.

[4] ACZ Lab Qualifiers: U - Analyte was analyzed for but not detected at the indicated MDL.

H - Holding time exceeded; pH is a field test with an immediate hold time.

B - Analyte concentration detected at a value between method detection limit (MDL) and practical quantitation limit (PQL). The associated value is an estimated quantity.

Shaded cells indicate parameters elevated greater than ten percent above the maximum baseline value.

**Spring G-24**
**Water Quality and Field Parameters**

| Mountain Coal West Elk Mine - Water Year 2023 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Monitoring Location: Spring G-24** | | **Baseline[1]** | | | **Water Year 2023** | | | |
| Description | Units | Minimum | Maximum | Mean | 5/10/2023 | 6/7/2023 | Q[4] | 9/5/2023 |
| **Field Parameters** | | | | | | | | |
| Flow | gpm | | | | 6.32 | 7.90 | | 4.00 |
| pH (Field) | SU | | | | 7.17 | 7.22 | | 7.34 |
| Conductivity (Field) | µmhos/cm | | | | 1044 | 921 | | 865 |
| Temperature (Field) | °C | | | | 9.0 | 9.4 | | 10.0 |
| Comment | | Decreed Spring #8 | | | | | | |
| **Laboratory Parameters[2]** | | | | | | | | |
| Name of Certified Lab[3] | | | | | | ACZ | | |
| Lab Reference # | | | | | | L81055-05 | | |
| Sample Date | | | | | | 6/7/2023 | | |
| Lab Test Date | | | | | | 6/13-6/24 | | |
| Sampled By | | | | | | PH | | |
| Aluminum, dissolved | mg/L | | 0.08 | 0.04 | | | | |
| Arsenic, total | mg/L | 0.001 | 0.001 | 0.001 | | | | |
| Bicarbonate as CaCO3 | mg/L | 267 | 376 | 307 | | | | |
| Calcium, dissolved | mg/L | 56.4 | 56.4 | 56.4 | | | | |
| Chloride | mg/L | 1.2 | 10 | 4.4 | | | | |
| Conductivity @25C | µmhos/cm | 550 | 564 | 557 | | 859 | | |
| Hardness as CaCO3 | mg/L | 176 | 233 | 203 | | | | |
| Iron, dissolved | mg/L | | 0.1 | 0.03 | | -0.06 | U | |
| Iron, total | mg/L | | 2.28 | 0.45 | | -0.06 | U | |
| Magnesium, dissolved | mg/L | 15.9 | 16.5 | 16.2 | | | | |
| Manganese, dissolved | mg/L | | 0.006 | 0.002 | | | | |
| Manganese, total | mg/L | | 0.048 | 0.005 | | | | |
| Nitrate/Nitrite (as N) | mg/L | 0.05 | 0.1 | 0.08 | | | | |
| pH | SU | 7.2 | 8.3 | 7.9 | | 8.4 | H | |
| Phosphorus, ortho dissolved | mg/L | | 0.105 | 0.027 | | | | |
| Residue, Filterable (TDS) @180C | mg/L | 214 | 520 | 362 | | 512 | | |
| Residue, Non-Filterable (TSS) @105C | mg/L | | 102 | 21 | | -5 | U | |
| Sodium Adsorption Ratio (SAR) | calc. | 1.8 | 1.8 | 1.8 | | | | |
| Sodium, dissolved | mg/L | 58.9 | 58.9 | 58.9 | | | | |
| Sulfate | mg/L | 21.2 | 70 | 30.5 | | | | |

[1] Baseline pre -2000 data, adapted from WWE (2001).

[2] Negative values denote readings below lab detection levels.

[3] ACZ Laboratory, Steamboat Springs, CO.

[4] ACZ Lab Qualifiers: U - Analyte was analyzed for but not detected at the indicated MDL.

H - Holding time exceeded; pH is a field test with an immediate hold time.

B - Analyte concentration detected at a value between method detection limit (MDL) and practical quantitation limit (PQL). The associated value is an estimated quantity.

Shaded cells indicate parameters elevated greater than ten percent above the maximum baseline value.

**Spring G-14**
**Water Quality and Field Parameters**

| Mountain Coal West Elk Mine - Water Year 2023 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Monitoring Location: Spring G-14** | | **Baseline[1]** | | | **Water Year 2023** | | | |
| Description | Units | Minimum | Maximum | Mean | 5/10/2023 | 6/7/2023 | Q[4] | 9/5/2023 |
| **Field Parameters** | | | | | | | | |
| Flow | gpm | | | | 30.0 | 12.8 | | 1.2 |
| pH (Field) | SU | | | | 7.75 | 7.57 | | 7.56 |
| Conductivity (Field) | µmhos/cm | | | | 1,092 | 1,066 | | 1,168 |
| Temperature (Field) | °C | | | | 6.8 | 7.4 | | 9.5 |
| Comment | | Decreed Spring #7 | | | | | | |
| **Laboratory Parameters[2]** | | | | | | | | |
| Name of Certified Lab[3] | | | | | | ACZ | | |
| Lab Reference # | | | | | | L81055-15 | | |
| Sample Date | | | | | | 6/7/2023 | | |
| Lab Test Date | | | | | | 6/13-6/24 | | |
| Sampled By | | | | | | PH | | |
| Arsenic, total | mg/L | 0.001 | 0.001 | 0.001 | | | | |
| Bicarbonate as CaCO3 | mg/L | 325 | 484 | 406 | | | | |
| Calcium, dissolved | mg/L | 54.9 | 61.4 | 58.2 | | | | |
| Chloride | mg/L | 2 | 14 | 6 | | | | |
| Conductivity @25C | µmhos/cm | 553 | 682 | 637 | | 993 | | |
| Hardness as CaCO3 | mg/L | 215 | 307 | 257 | | | | |
| Iron, dissolved | mg/L | | 0.11 | 0.02 | | -0.06 | U | |
| Iron, total | mg/L | | 3 | 0.1 | | -0.06 | U | |
| Magnesium, dissolved | mg/L | 21.5 | 29.8 | 24.6 | | | | |
| Manganese, total | mg/L | | 0.03 | 0.003 | | | | |
| Nitrate/Nitrite (as N) | mg/L | 0.12 | 0.21 | 0.16 | | | | |
| pH | SU | 7.1 | 8.2 | 7.7 | | 8.5 | H | |
| Phosphorus, ortho dissolved | mg/L | | 2.08 | 0.15 | | | | |
| Residue, Filterable (TDS) @180C | mg/L | 324 | 708 | 499 | | 634 | | |
| Residue, Non-Filterable (TSS) @105C | mg/L | | 107 | 5 | | -5 | U | |
| Selenium, total | mg/L | 0.001 | 0.001 | 0.001 | | | | |
| Sodium Adsorption Ratio (SAR) | calc. | 2.22 | 3.11 | 2.53 | | | | |
| Sodium, dissolved | mg/L | 81.3 | 114 | 97.7 | | | | |
| Sulfate | mg/L | 40 | 150 | 88 | | | | |

[1] Baseline pre -2000 data, adapted from WWE (2001).

[2] Negative values denote readings below lab detection levels.

[3] ACZ Laboratory, Steamboat Springs, CO.

[4] ACZ Lab Qualifiers: U - Analyte was analyzed for but not detected at the indicated MDL.

H - Holding time exceeded; pH is a field test with an immediate hold time.

B - Analyte concentration detected at a value between method detection limit (MDL) and practical quantitation limit (PQL). The associated value is an estimated quantity.

Shaded cells indicate parameters elevated greater than ten percent above the maximum baseline value.

**Spring G-22**
**Water Quality and Field Parameters**

| Mountain Coal West Elk Mine - Water Year 2023 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Monitoring Location: Spring G-22** | | **Baseline[1]** | | | **Water Year 2023** | | | |
| Description | Units | Minimum | Maximum | Mean | 5/10/2023 | 6/7/2023 | Q[4] | 9/5/2023 |
| **Field Parameters** | | | | | | | | |
| Flow[5] | gpm | | | | 15 | 18 | | 3 |
| pH (Field) | SU | | | | 7.35 | 7.19 | | 7.14 |
| Conductivity (Field) | µmhos/cm | | | | 1,076 | 1,089 | | 1,143 |
| Temperature (Field) | °C | | | | 10.1 | 9.1 | | 10.5 |
| Comment | | Decreed Spring #3 | | | flow dispersed, estimated | | | |
| **Laboratory Parameters [2]** | | | | | | | | |
| Name of Certified Lab [3] | | | | | | ACZ | | |
| Lab Reference # | | | | | | L81055-20 | | |
| Sample Date | | | | | | 6/7/2023 | | |
| Lab Test Date | | | | | | 6/13-6/24 | | |
| Sampled By | | | | | | PH | | |
| Bicarbonate as CaCO3 | mg/L | 287 | 359 | 332 | | | | |
| Calcium, dissolved | mg/L | 64.9 | 64.9 | 64.9 | | | | |
| Chloride | mg/L | 3 | 18 | 7 | | | | |
| Conductivity @25C | µmhos/cm | 633 | 640 | 637 | | 1,040 | | |
| Hardness as CaCO3 | mg/L | 180 | 270 | 234 | | | | |
| Iron, dissolved | mg/L | | 0.05 | 0.01 | | -0.06 | U | |
| Iron, total | mg/L | | 0.2 | 0.08 | | -0.06 | U | |
| Lead, dissolved | mg/L | 0.02 | 0.02 | 0.02 | | | | |
| Magnesium, dissolved | mg/L | 19 | 19.9 | 19.5 | | | | |
| Manganese, total | mg/L | | 0.85 | 0.11 | | | | |
| Nitrate/Nitrite (as N) | mg/L | 0.08 | 0.08 | 0.08 | | | | |
| pH | SU | 7 | 7.9 | 7.6 | | 8.4 | H | |
| Phosphorus, ortho dissolved | mg/L | | 0.044 | 0.019 | | | | |
| Residue, Filterable (TDS) @180C | mg/L | 300 | 516 | 388 | | 640 | | |
| Residue, Non-Filterable (TSS) @105C | mg/L | | 24 | 5 | | -5 | U | |
| Sodium Adsorption Ratio (SAR) | calc. | 1.78 | 1.92 | 1.85 | | | | |
| Sodium, dissolved | mg/L | 66.1 | 66.1 | 66.1 | | | | |
| Sulfate | mg/L | 24 | 80 | 41 | | | | |

[1] Baseline pre -2000 data, adapted from WWE (2001).

[2] Negative values denote readings below lab detection levels.

[3] ACZ Laboratory, Steamboat Springs, CO.

[4] ACZ Lab Qualifiers: U - Analyte was analyzed for but not detected at the indicated MDL.

H - Holding time exceeded; pH is a field test with an immediate hold time.

B - Analyte concentration detected at a value between method detection limit (MDL) and practical quantitation limit (PQL). The associated value is an estimated quantity.

[5] Visual flow estimate.

Shaded cells indicate parameters elevated greater than ten percent above the maximum baseline value.

**Spring 11-2**
**Water Quality and Field Parameters**

| Mountain Coal West Elk Mine - Water Year 2023 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Monitoring Location: Spring 11-2** | | **Baseline[1]** | | | **Water Year 2023** | | | |
| Description | Units | Minimum | Maximum | Mean | 5/10/2023 | 6/6/2023 | Q[4] | 9/7/2023 |
| **Field Parameters** | | | | | | | | |
| Flow[5] | gpm | | | | 6 | 10 | | 2.5 |
| pH (Field) | SU | | | | 8.15 | 8.05 | | 8.42 |
| Conductivity (Field) | µmhos/cm | | | | 1,605 | 1,797 | | 2,540 |
| Temperature (Field) | °C | | | | 11.8 | 14.1 | | 11.1 |
| Comment | | | | | flow dispersed, estimated | | | |
| **Laboratory Parameters [2]** | | | | | | | | |
| Name of Certified Lab [3] | | | | | | ACZ | | |
| Lab Reference # | | | | | | L81056-07 | | |
| Sample Date | | | | | | 6/6/2023 | | |
| Lab Test Date | | | | | | 6/13-6/24 | | |
| Sampled By | | | | | | PH | | |
| Conductivity @25C | µmhos/cm | | | | | 1820 | | |
| Iron, dissolved | mg/L | | | | | -0.06 | U | |
| Iron, total | mg/L | | | | | 0.370 | | |
| pH | SU | | | | | 8.7 | H | |
| Residue, Filterable (TDS) @180C | mg/L | | | | | 1240 | | |
| Residue, Non-Filterable (TSS) @105C | mg/L | | | | | 21.0 | | |

[1] Insufficient flows for baseline measurements and sampling.

[2] Negative values denote readings below lab detection levels.

[3] ACZ Laboratory, Steamboat Springs, CO.

[4] ACZ Lab Qualifiers: U - Analyte was analyzed for but not detected at the indicated MDL.
H - Holding time exceeded; pH is a field test with an immediate hold time.
B - Analyte concentration detected at a value between method detection limit (MDL) and practical quantitation limit (PQL). The associated value is an estimated quantity.

[5] Visual flow estimate.

**Spring 10-1**
**Water Quality and Field Parameters**

| Mountain Coal West Elk Mine - Water Year 2023 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Monitoring Location: Spring 10-1** | | **Baseline[1]** | | | **Water Year 2023** | | | |
| Description | Units | Minimum | Maximum | Mean | 5/10/2023 | 6/6/2023 | Q[4] | 9/7/2023 |
| **Field Parameters** | | | | | | | | |
| Flow | gpm | | | | 39.8 | 55.3 | | 4.31 |
| pH (Field) | SU | | | | 7.90 | 7.74 | | 7.95 |
| Conductivity (Field) | µmhos/cm | | | | 1,696 | 1,646 | | 1,640 |
| Temperature (Field) | °C | | | | 9.8 | 10.2 | | 9.3 |
| Comment | | | | | | | | |
| **Laboratory Parameters[2]** | | | | | | | | |
| Name of Certified Lab[3] | | | | | | ACZ | | |
| Lab Reference # | | | | | | L81056-02 | | |
| Sample Date | | | | | | 6/6/2023 | | |
| Lab Test Date | | | | | | 6/13-6/24 | | |
| Sampled By | | | | | | PH | | |
| Conductivity @25C | µmhos/cm | | | | | 1,600 | | |
| Iron, dissolved | mg/L | | | | | -0.06 | U | |
| Iron, total | mg/L | | | | | -0.06 | U | |
| pH | SU | | | | | 8.6 | H | |
| Residue, Filterable (TDS) @180C | mg/L | | | | | 1,050 | | |
| Residue, Non-Filterable (TSS) @105C | mg/L | | | | | -5 | U | |

[1] Insufficient flows for baseline measurements and sampling.

[2] Negative values denote readings below lab detection levels.

[3] ACZ Laboratory, Steamboat Springs, CO.

[4] ACZ Lab Qualifiers: U - Analyte was analyzed for but not detected at the indicated MDL.

H - Holding time exceeded; pH is a field test with an immediate hold time.

B - Analyte concentration detected at a value between method detection limit (MDL) and practical quantitation limit (PQL). The associated value is an estimated quantity.

**Spring E10-2**
**Water Quality and Field Parameters**

| Mountain Coal West Elk Mine - Water Year 2023 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Monitoring Location: Spring E10-2** | | **Baseline[1]** | | | **Water Year 2023** | | | |
| Description | Units | Minimum | Maximum | Mean | 5/10/2023 | 6/6/2023 | Q[4] | 9/7/2023 |
| **Field Parameters** | | | | | | | | |
| Flow | gpm | | | | 0.5 | 0.5 | | dry |
| pH (Field) | SU | | | | 7.77 | 7.93 | | |
| Conductivity (Field) | µmhos/cm | | | | 1,672 | 1,794 | | |
| Temperature (Field) | $^{o}$C | | | | 11.1 | 18.8 | | |
| Comment | | | | | | | | |
| **Laboratory Parameters[2]** | | | | | | | | |
| Name of Certified Lab[3] | | | | | | ACZ | | |
| Lab Reference # | | | | | | L81056-04 | | |
| Sample Date | | | | | | 6/6/2023 | | |
| Lab Test Date | | | | | | 6/13-6/24 | | |
| Sampled By | | | | | | PH | | |
| Conductivity @25C | µmhos/cm | | | | | 1,850 | | |
| Iron, dissolved | mg/L | | | | | -0.06 | U | |
| Iron, total | mg/L | | | | | 0.361 | | |
| pH | SU | | | | | 8.6 | H | |
| Residue, Filterable (TDS) @180C | mg/L | | | | | 1,250 | | |
| Residue, Non-Filterable (TSS) @105C | mg/L | | | | | 43.0 | | |

[1] Insufficient flows for baseline measurements and sampling.

[2] Negative values denote readings below lab detection levels.

[3] ACZ Laboratory, Steamboat Springs, CO.

[4] ACZ Lab Qualifiers: U - Analyte was analyzed for but not detected at the indicated MDL.

H - Holding time exceeded; pH is a field test with an immediate hold time.

B - Analyte concentration detected at a value between method detection limit (MDL) and practical quantitation limit (PQL). The associated value is an estimated quantity.

[5] Visual estimate of flow.

## Spring 15-1
## Water Quality and Field Parameters

| Mountain Coal West Elk Mine - Water Year 2023 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Monitoring Location: Spring 15-1** | | **Baseline[1]** | | | **Water Year 2023** | | | |
| Description | Units | Minimum | Maximum | Mean | 5/12/2023 | 6/6/2023 | Q[4] | 9/5/2023 |
| **Field Parameters** | | | | | | | | |
| Flow | gpm | | | | 5.24 | 1.67 | | dry |
| pH (Field) | SU | 7.4 | 8.6 | 8.2 | 7.33 | 7.66 | | |
| Conductivity (Field) | µmhos/cm | 1,060 | 1,240 | 1,137 | 2,370 | 2,320 | | |
| Temperature (Field) | °C | 1.1 | 12.8 | 8 | 19.1 | 19.7 | | |
| Comment | | | | | | | | |
| **Laboratory Parameters[2]** | | | | | | | | |
| Name of Certified Lab[3] | | | | | | ACZ | | |
| Lab Reference # | | | | | | L81055-04 | | |
| Sample Date | | | | | | 6/6/2023 | | |
| Lab Test Date | | | | | | 6/13-6/24 | | |
| Sampled By | | | | | | PH | | |
| Alkalinity (Total CaCO3) | mg/L | 375 | 520 | 480 | | | | |
| Arsenic, total | mg/L | | 0.001 | 0.001 | | | | |
| Bicarbonate as CaCO3 | mg/L | 364 | 520 | 477 | | | | |
| Cadmium, dissolved | mg/L | | 0.004 | 0.0005 | | | | |
| Calcium, dissolved | mg/L | 44.9 | 67.8 | 58.3 | | | | |
| Carbonate as CaCO3 | mg/L | | 12 | 2.2 | | | | |
| Cation - Anion Balance | mg/L | -5.8 | 3.8 | -1 | | | | |
| Chloride | mg/L | 4 | 9 | 6.3 | | | | |
| Conductivity @25C | µmhos/cm | 1,080 | 1,120 | 1,100 | | 2,100 | | |
| Copper, dissolved | mg/L | | 0.01 | 0.01 | | | | |
| Hardness as CaCO3 | mg/L | 222 | 307 | 271 | | | | |
| Iron, dissolved | mg/L | | 0.01 | 0.01 | | -0.06 | U | |
| Iron, total | mg/L | 0.01 | 0.73 | 0.12 | | -0.06 | U | |
| Magnesium, dissolved | mg/L | 25.8 | 33.4 | 30 | | | | |
| Manganese, total | mg/L | | 0.022 | 0.001 | | | | |
| Nitrate/Nitrite (as N) | mg/L | 0.08 | 0.18 | 0.11 | | | | |
| pH | SU | 7.9 | 8.2 | 8.1 | | 8.5 | H | |
| Phosphorus, ortho dissolved | mg/L | | 0.009 | 0.001 | | | | |
| Potassium, dissolved | mg/L | 2.8 | 3.2 | 3 | | | | |
| Residue, Filterable (TDS) @180C | mg/L | 660 | 730 | 701 | | 1,490 | | |
| Residue, Non-Filterable (TSS) @105C | mg/L | | 26 | 9 | | -5 | U | |
| Selenium, total | mg/L | | 0.002 | 0.001 | | | | |
| Sodium Adsorption Ratio (SAR) | calc. | 4.61 | 5.39 | 4.99 | | | | |
| Sodium, dissolved | mg/L | 163 | 200 | 185 | | | | |
| Sulfate | mg/L | 140 | 180 | 151 | | | | |
| Sum of Anions | meq/L | | 0.5 | 0.09 | | | | |
| Sum of Cations | meq/L | 12.1 | 14.4 | 13.3 | | | | |
| Zinc, dissolved | mg/L | | 0.01 | 0.01 | | | | |
| Zinc, total | mg/L | | 0.05 | 0.02 | | | | |

[1] Baseline pre -2000 data, adapted from WWE (2001).

[2] Negative values denote readings below lab detection levels.

[3] ACZ Laboratory, Steamboat Springs, CO.

[4] ACZ Lab Qualifiers: U - Analyte was analyzed for but not detected at the indicated MDL.

H - Holding time exceeded; pH is a field test with an immediate hold time.

B - Analyte concentration detected at a value between method detection limit (MDL) and practical quantitation limit (PQL). The associated value is an estimated quantity.

Shaded cells indicate parameters elevated greater than ten percent above the maximum baseline value.

**Spring G-1A**
**Water Quality and Field Parameters**

| Mountain Coal West Elk Mine - Water Year 2023 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Monitoring Location: Spring G-1A** | | **Baseline[1]** | | | **Water Year 2023** | | | |
| Description | Units | Minimum | Maximum | Mean | 5/10/2023 | 6/6/2023 | Q[4] | 9/5/2023 |
| **Field Parameters** | | | | | | | | |
| Flow | gpm | | | | seep | seep | | dry |
| pH (Field) | SU | | | | 7.49 | 7.54 | | |
| Conductivity (Field) | µmhos/cm | | | | 1,391 | 1,148 | | |
| Temperature (Field) | °C | | | | 12.0 | 13.9 | | |
| Comment | | | | | | | | |
| **Laboratory Parameters[2]** | | | | | | | | |
| Name of Certified Lab[3] | | | | | | ACZ | | |
| Lab Reference # | | | | | | L81056-01 | | |
| Sample Date | | | | | | 6/6/2023 | | |
| Lab Test Date | | | | | | 6/13-6/24 | | |
| Sampled By | | | | | | PH | | |
| Bicarbonate as CaCO3 | mg/L | 288 | 501 | 342 | | | | |
| Calcium, dissolved | mg/L | 69.4 | 69.4 | 69.4 | | | | |
| Chloride | mg/L | 4 | 17 | 8 | | | | |
| Conductivity @25C | µmhos/cm | 570 | 672 | 621 | | 1,110 | | |
| Hardness as CaCO3 | mg/L | 266 | 271 | 269 | | | | |
| Iron, dissolved | mg/L | | | | | -0.06 | U | |
| Iron, total | mg/L | | 1.18 | 0.2 | | -0.06 | U | |
| Magnesium, dissolved | mg/L | 23.7 | 25.9 | 24.8 | | | | |
| Manganese, dissolved | mg/L | 0.005 | 0.005 | 0.005 | | | | |
| Manganese, total | mg/L | | 0.03 | 0.004 | | | | |
| Nitrate/Nitrite (as N) | mg/L | | 0.23 | 0.08 | | | | |
| pH | SU | 7.9 | 8.5 | 8.17 | | 8.5 | H | |
| Phosphorus, ortho dissolved | mg/L | | 0.04 | 0.01 | | | | |
| Residue, Filterable (TDS) @180C | mg/L | 312 | 550 | 396 | | 696 | | |
| Residue, Non-Filterable (TSS) @105C | mg/L | | 66 | 10 | | 8.0 | B | |
| Sodium Adsorption Ratio (SAR) | calc. | 1.22 | 1.61 | 1.37 | | | | |
| Sodium, dissolved | mg/L | 50.4 | 50.4 | 50.4 | | | | |
| Sulfate | mg/L | 40 | 207 | 83 | | | | |

[1] Baseline pre -2000 data, adapted from WWE (2001).

[2] Negative values denote readings below lab detection levels.

[3] ACZ Laboratory, Steamboat Springs, CO.

[4] ACZ Lab Qualifiers: U - Analyte was analyzed for but not detected at the indicated MDL.

H - Holding time exceeded; pH is a field test with an immediate hold time.

B - Analyte concentration detected at a value between method detection limit (MDL) and practical quantitation limit (PQL). The associated value is an estimated quantity.

Shaded cells indicate parameters elevated greater than ten percent above the maximum baseline value.

**Spring G-20**
**Water Quality and Field Parameters**

| **Mountain Coal West Elk Mine - Water Year 2023** | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Monitoring Location: Spring G-20** | | **Baseline[1]** | | | **Water Year 2023** | | |
| Description | Units | Minimum | Maximum | Mean | 5/12/2023 | 6/6/2023 | 9/5/2023 |
| **Field Parameters** | | | | | | | |
| Flow | gpm | | | | dry | dry | dry |
| pH (Field) | SU | | | | | | |
| Conductivity (Field) | µmhos/cm | | | | | | |
| Temperature (Field) | °C | | | | | | |
| Comment | | | | | | | |
| **Laboratory Parameters** | | | | | | | |
| Name of Certified Lab | | | | | | | |
| Lab Reference # | | | | | | | |
| Sample Date | | | | | | | |
| Lab Test Date | | | | | | | |
| Sampled By | | | | | | | |
| Bicarbonate as CaCO3 | mg/L | 452 | 657 | 539 | | | |
| Calcium, dissolved | mg/L | 81 | 81 | 81 | | | |
| Chloride | mg/L | 1.2 | 10 | 5.3 | | | |
| Conductivity @25C | µmhos/cm | 970 | 1,090 | 1,023 | | | |
| Hardness as CaCO3 | mg/L | 193 | 416 | 318 | | | |
| Iron, dissolved | mg/L | | 0.05 | 0.01 | | | |
| Iron, total | mg/L | | 0.32 | 0.05 | | | |
| Magnesium, dissolved | mg/L | 33.3 | 33.3 | 33.3 | | | |
| Manganese, dissolved | mg/L | 0.002 | 0.002 | 0.002 | | | |
| Manganese, total | mg/L | | 0.06 | 0.005 | | | |
| Nitrate/Nitrite (as N) | mg/L | 0.01 | 0.05 | 0.03 | | | |
| pH | SU | 7 | 8.1 | 7.7 | | | |
| Phosphorus, ortho dissolved | mg/L | | 0.15 | 0.02 | | | |
| Residue, Filterable (TDS) @180C | mg/L | 502 | 686 | 598 | | | |
| Residue, Non-Filterable (TSS) @105C | mg/L | | 19.6 | 3.5 | | | |
| Sodium Adsorption Ratio (SAR) | calc. | 2.31 | 2.73 | 2.52 | | | |
| Sodium, dissolved | mg/L | 102 | 102 | 102 | | | |
| Sulfate | mg/L | 16 | 117 | 81 | | | |

[1] Baseline pre -2000 data, adapted from WWE (2001).

## Spring J-4
## Water Quality and Field Parameters

| Mountain Coal West Elk Mine - Water Year 2023 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Monitoring Location: Spring J-4** | | **Baseline[1]** | | | **Water Year 2023** | | | |
| Description | Units | Minimum | Maximum | Mean | 5/9/2023 | 6/7/2023 | Q[4] | 9/6/2023 |
| **Field Parameters** | | | | | | | | |
| Flow | gpm | | | | 32.10 | 8.47 | | damp soil |
| pH (Field) | SU | 7.5 | 8.2 | 7.8 | 7.63 | 7.67 | | |
| Conductivity (Field) | µmhos/cm | 340 | 480 | 392 | 599 | 590 | | |
| Temperature (Field) | °C | | | | 10.7 | 10.1 | | |
| Comment | | | | | | | | |
| **Laboratory Parameters[2]** | | | | | | | | |
| Name of Certified Lab[3] | | | | | | ACZ | | |
| Lab Reference # | | | | | | L81055-09 | | |
| Sample Date | | | | | | 6/7/2023 | | |
| Lab Test Date | | | | | | 6/13-6/24 | | |
| Sampled By | | | | | | PH | | |
| Alkalinity (Total CaCO3) | mg/L | 109 | 262 | 195 | | | | |
| Aluminum, dissolved | mg/L | | 0.05 | 0.02 | | | | |
| Arsenic, dissolved | mg/L | | 0.001 | 0 | | | | |
| Bicarbonate as CaCO3 | mg/L | 169 | 262 | 195 | | | | |
| Calcium, dissolved | mg/L | 34.2 | 54.4 | 43 | | | | |
| Cation - Anion Balance | mg/L | 1.1 | 3.2 | 2.3 | | | | |
| Chloride | mg/L | | 3 | 1.9 | | | | |
| Conductivity @25C | µmhos/cm | 412 | 429 | 423 | | 564 | | |
| Copper, dissolved | mg/L | | 0.01 | 0 | | | | |
| Hardness as CaCO3 | mg/L | 125 | 191 | 156 | | | | |
| Iron, dissolved | mg/L | | 0.06 | 0.02 | | -0.06 | U | |
| Iron, total | mg/L | 0.03 | 6.75 | 0.82 | | -0.06 | U | |
| Magnesium, dissolved | mg/L | 9.6 | 13.4 | 11.4 | | | | |
| Manganese, total | mg/L | | 0.066 | 0.009 | | | | |
| Nitrate (as N), dissolved | mg/L | 0.02 | 0.37 | 0.14 | | | | |
| Nitrate/Nitrite (as N) | mg/L | 0.05 | 0.37 | 0.13 | | | | |
| Nitrite (as N), dissolved | mg/L | | 0.03 | 0.003 | | | | |
| pH | SU | 7.1 | 8.1 | 7.5 | | 8.5 | H | |
| Phosphorus, ortho dissolved | mg/L | | 0.025 | 0.005 | | | | |
| Potassium, dissolved | mg/L | 1.3 | 1.3 | 1.3 | | | | |
| Residue, Filterable (TDS) @180C | mg/L | 230 | 300 | 254 | | 346 | | |
| Residue, Non-Filterable (TSS) @105C | mg/L | | 26 | 6 | | -5 | U | |
| Selenium, total | mg/L | | 0.002 | 0 | | | | |
| Sodium Adsorption Ratio (SAR) | calc. | 1.08 | 1.8 | 1.3 | | | | |
| Sodium, dissolved | mg/L | 29.6 | 51.5 | 36.7 | | | | |
| Sulfate | mg/L | 30 | 60 | 45 | | | | |
| Sum of Anions | meq/L | 4.5 | 4.7 | 4.6 | | | | |
| Sum of Cations | meq/L | 4.6 | 4.91 | 4.8 | | | | |
| Zinc, dissolved | mg/L | | 0.01 | 0 | | | | |

[1] Baseline pre -2000 data, adapted from WWE (2001).

[2] Negative values denote readings below lab detection levels.

[3] ACZ Laboratory, Steamboat Springs, CO.

[4] ACZ Lab Qualifiers: U - Analyte was analyzed for but not detected at the indicated MDL.

H - Holding time exceeded; pH is a field test with an immediate hold time.

B - Analyte concentration detected at a value between method detection limit (MDL) and practical quantitation limit (PQL). The associated value is an estimated quantity.

Shaded cells indicate parameters elevated greater than ten percent above the maximum baseline value.

# Spring 35-3
# Water Quality and Field Parameters

| Mountain Coal West Elk Mine - Water Year 2023 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Monitoring Location: Spring 35-3** | | **Baseline [1]** | | | **Water Year 2023** | | | |
| Description | Units | Minimum | Maximum | Mean [5] | 5/16/2023 | 6/8/2023 | Q[4] | 9/7/2023 |
| **Field Parameters** | | | | | | | | |
| Flow | gpm | 0.63 | 26.5 | 6.3 | 185 | 6.59 | | 0.52 |
| pH (Field) | SU | 6.53 | 8.74 | 7.48 | 7.59 | 7.57 | | 7.92 |
| Conductivity (Field) | µmhos/cm | 223 | 560 | 428 | 253 | 395 | | nm[5] |
| Temperature (Field) | °C | 5.9 | 12.1 | 8.9 | 5.5 | 6.2 | | nm[5] |
| Comment | | | | | | | | |
| **Laboratory Parameters [2]** | | | | | | | | |
| Name of Certified Lab [3] | | | | | | ACZ | | |
| Lab Reference # | | | | | | L81055-30 | | |
| Sample Date | | | | | | 6/8/2023 | | |
| Lab Test Date | | | | | | 6/13-6/24 | | |
| Sampled By | | | | | | PH | | |
| Alkalinity (Total CaCO3) | mg/L | 102 | 217 | 170 | | | | |
| Aluminum, dissolved | mg/L | -0.03 | 0.09 | 0.04 | | | | |
| Arsenic, total | mg/L | 0.0009 | 0.0130 | 0.0039 | | | | |
| Bicarbonate as CaCO3 | mg/L | 102 | 212 | 169 | | | | |
| Boron, dissolved | mg/L | -0.01 | -0.01 | -0.01 | | | | |
| Cadmium, dissolved | mg/L | -0.005 | -0.005 | -0.005 | | | | |
| Calcium, dissolved | mg/L | 18.2 | 47.2 | 34.3 | | | | |
| Carbonate as CaCO3 | mg/L | -2 | 4 | 2 | | | | |
| Cation - Anion Balance | mg/L | -8.6 | -2.1 | -4.4 | | | | |
| Chloride | mg/L | 1 | 11 | 3 | | | | |
| Conductivity @25C | µmhos/cm | 216 | 451 | 351 | | 360 | | |
| Copper, dissolved | mg/L | -0.01 | -0.01 | -0.01 | | | | |
| Hardness as CaCO3 | mg/L | 59 | 142 | 105 | | | | |
| Hydroxide as CaCO3 | mg/L | -2 | -2 | -2 | | | | |
| Iron, dissolved | mg/L | -0.02 | 0.12 | 0.06 | | -0.06 | U | |
| Iron, total | mg/L | 0.19 | 42.50 | 9.14 | | -0.06 | U | |
| Lead, dissolved | mg/L | -0.04 | -0.04 | -0.04 | | | | |
| Magnesium, dissolved | mg/L | 3.3 | 5.8 | 4.8 | | | | |
| Manganese, dissolved | mg/L | -0.005 | 0.272 | 0.055 | | | | |
| Manganese, total | mg/L | 0.021 | 1.280 | 0.325 | | | | |
| Mercury, total | mg/L | -0.0002 | 0.0003 | 0.0001 | | | | |
| Molybdenum, dissolved | mg/L | -0.01 | -0.01 | -0.01 | | | | |
| Nitrate/Nitrite (as N) | mg/L | -0.02 | 0.17 | 0.08 | | | | |
| pH | SU | 7.8 | 8.3 | 8.2 | | 8.3 | H | |
| Phosphate | mg/L | -0.03 | 0.15 | 0.07 | | | | |
| Phosphorus, ortho dissolved | mg/L | -0.01 | 0.05 | 0.02 | | | | |
| Potassium, dissolved | mg/L | 0.7 | 1.4 | 0.9 | | | | |
| Residue, Filterable (TDS) @180C | mg/L | 160 | 250 | 210 | | 222 | | |
| Residue, Non-Filterable (TSS) @105C | mg/L | -5 | 510 | 133 | | -5 | U | |
| Selenium, total | mg/L | -0.001 | -0.001 | -0.001 | | | | |
| Sodium Adsorption Ratio (SAR) | calc. | 1.27 | 1.60 | 1.45 | | | | |
| Sodium, dissolved | mg/L | 25.7 | 42.5 | 33.4 | | | | |
| Sulfate | mg/L | 10 | 30 | 20 | | | | |
| Sum of Anions | meq/L | 2.5 | 4.8 | 3.9 | | | | |
| Sum of Cations | meq/L | 2.3 | 4.6 | 3.6 | | | | |
| TDS (calculated) | mg/L | 131 | 248 | 199 | | | | |
| TDS (ratio - measured/calculated) | calc. | 0.09 | 1.22 | 0.93 | | | | |
| Zinc, dissolved | mg/L | -0.01 | 0.02 | 0.01 | | | | |

[1] Baseline 2006.

[2] Negative values denote readings below lab detection levels.

[3] ACZ Laboratory, Steamboat Springs, CO.

[4] ACZ Lab Qualifiers: U - Analyte was analyzed for but not detected at the indicated MDL.

H - Holding time exceeded; pH is a field test with an immediate hold time.

B - Analyte concentration detected at a value between method detection limit (MDL) and practical quantitation limit (PQL). The associated value is an estimated quantity.

[5] Average (mean) value calc using 1/2 of detection limit for readings below lab detection limits unless all readings are below lab detection limit.

Shaded cells indicate parameters elevated greater than ten percent above the maximum baseline value.

[5] Not Measured - Equipment malfunction.

# Deer Creek Spring
# Water Quality and Field Parameters

| Mountain Coal West Elk Mine - Water Year 2023 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Monitoring Location: Deer Creek Spring** | | **Baseline [1]** | | | **Water Year 2023** | | | |
| Description | Units | Minimum | Maximum | Mean [5] | 5/9/2023 | 6/7/2023 | Q[4] | 9/4/2023 |
| **Field Parameters** | | | | | | | | |
| Flow | gpm | 0.94 | 4.15 | 2.88 | 20.1 | 18.30 | | seep |
| pH (Field) | SU | 6.72 | 7.77 | 7.10 | 7.57 | 7.49 | | 8.11 |
| Conductivity (Field) | µmhos/cm | 574 | 889 | 735 | 1,039 | 987 | | 1,038 |
| Temperature (Field) | °C | 7.1 | 17.4 | 10.9 | 7.6 | 7.9 | | 17.9 |
| Comment | | | | | | | | |
| **Laboratory Parameters [2]** | | | | | | | | |
| Name of Certified Lab [3] | | | | | | ACZ | | |
| Lab Reference # | | | | | | L81055-07 | | |
| Sample Date | | | | | | 6/7/2023 | | |
| Lab Test Date | | | | | | 6/13-6/24 | | |
| Sampled By | | | | | | PH | | |
| Alkalinity (Total CaCO3) | mg/L | 294 | 302 | 298 | | | | |
| Aluminum, dissolved | mg/L | -0.03 | -0.03 | -0.03 | | | | |
| Arsenic, total | mg/L | -0.005 | -0.005 | -0.005 | | | | |
| Bicarbonate as CaCO3 | mg/L | 294 | 302 | 298 | | | | |
| Boron, dissolved | mg/L | -0.01 | -0.01 | -0.01 | | | | |
| Cadmium, dissolved | mg/L | -0.005 | -0.005 | -0.005 | | | | |
| Calcium, dissolved | mg/L | 64.8 | 68.6 | 66.8 | | | | |
| Carbonate as CaCO3 | mg/L | -2 | -2 | -2 | | | | |
| Cation - Anion Balance | mg/L | -5.3 | 0.0 | -2.1 | | | | |
| Chloride | mg/L | 3 | 4 | 3 | | | | |
| Conductivity @25C | µmhos/cm | 587 | 660 | 611 | | 933 | | |
| Copper, dissolved | mg/L | -0.01 | -0.01 | -0.01 | | | | |
| Hardness as CaCO3 | mg/L | 241 | 255 | 249 | | | | |
| Hydroxide as CaCO3 | mg/L | -2 | -2 | -2 | | | | |
| Iron, dissolved | mg/L | -0.02 | -0.02 | -0.02 | | -0.06 | U | |
| Iron, total | mg/L | -0.02 | 0.20 | 0.10 | | -0.06 | U | |
| Lead, dissolved | mg/L | -0.04 | -0.04 | -0.04 | | | | |
| Magnesium, dissolved | mg/L | 19.1 | 20.4 | 20.0 | | | | |
| Manganese, dissolved | mg/L | -0.005 | -0.005 | -0.005 | | | | |
| Manganese, total | mg/L | -0.005 | 0.005 | 0.003 | | | | |
| Mercury, total | mg/L | -0.0002 | -0.0002 | -0.0002 | | | | |
| Molybdenum, dissolved | mg/L | -0.01 | -0.01 | -0.01 | | | | |
| Nitrate/Nitrite (as N) | mg/L | 1.92 | 2.33 | 2.16 | | | | |
| pH | SU | 7.9 | 8.2 | 8.1 | | 8.5 | H | |
| Phosphate | mg/L | -0.03 | 0.03 | 0.02 | | | | |
| Phosphorus, ortho dissolved | mg/L | -0.01 | 0.01 | 0.02 | | | | |
| Potassium, dissolved | mg/L | 1.9 | 2.1 | 2.0 | | | | |
| Residue, Filterable (TDS) @180C | mg/L | 320 | 360 | 343 | | 588 | | |
| Residue, Non-Filterable (TSS) @105C | mg/L | -5 | 14 | 5 | | -5 | U | |
| Selenium, total | mg/L | -0.001 | -0.001 | -0.001 | | | | |
| Sodium Adsorption Ratio (SAR) | calc. | 0.87 | 0.95 | 0.92 | | | | |
| Sodium, dissolved | mg/L | 31.1 | 34.7 | 33.0 | | | | |
| Sulfate | mg/L | 30 | 40 | 33 | | | | |
| Sum of Anions | meq/L | 6.6 | 6.9 | 6.7 | | | | |
| Sum of Cations | meq/L | 6.2 | 6.6 | 6.425 | | | | |
| TDS (calculated) | mg/L | 329 | 341 | 336 | | | | |
| TDS (ratio - measured/calculated) | calc. | 0.95 | 1.06 | 1.02 | | | | |
| Zinc, dissolved | mg/L | 0.02 | 0.02 | 0.02 | | | | |

[1] Baseline 2006.

[2] Negative values denote readings below lab detection levels.

[3] ACZ Laboratory, Steamboat Springs, CO.

[4] ACZ Lab Qualifiers: U - Analyte was analyzed for but not detected at the indicated MDL.

H - Holding time exceeded; pH is a field test with an immediate hold time.

B - Analyte concentration detected at a value between method detection limit (MDL) and practical quantitation limit (PQL). The associated value is an estimated quantity.

[5] Average (mean) value calc using 1/2 of detection limit for readings below lab detection limits unless all readings are below lab detection limit.

Shaded cells indicate parameters elevated greater than ten percent above the maximum baseline value.

# Spring WCC-24
# Water Quality and Field Parameters

| Mountain Coal West Elk Mine - Water Year 2023 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Monitoring Location: Spring WCC-24** | | **Baseline [1]** | | | **Water Year 2023** | | | |
| Description | Units | Minimum | Maximum | Mean [5] | 5/9/2023 | 6/7/2023 | Q[4] | 9/6/2023 |
| **Field Parameters** | | | | | | | | |
| Flow | gpm | 6.12 | 40.85 | 23.36 | 12 | 47.7 | | 28.49 |
| pH (Field) | SU | 7.30 | 8.64 | 8.05 | 8.03 | 8.11 | | 8.02 |
| Conductivity (Field) | µmhos/cm | 1,778 | 3,240 | 2,319 | 1,742 | 1,795 | | 1,667 |
| Temperature (Field) | °C | 11.4 | 19.0 | 13.1 | 10.8 | 11.5 | | 11.2 |
| Comment | | | | | Flow estimated. Overrun by snowmelt. | | | |
| **Laboratory Parameters [2]** | | | | | | | | |
| Name of Certified Lab [3] | | | | | | ACZ | | |
| Lab Reference # | | | | | | L81055-19 | | |
| Sample Date | | | | | | 6/7/2023 | | |
| Lab Test Date | | | | | | 6/13-6/25 | | |
| Sampled By | | | | | | PH | | |
| Alkalinity (Total CaCO3) | mg/L | 323 | 406 | 368 | | | | |
| Aluminum, dissolved | mg/L | -0.03 | 0.04 | 0.02 | | | | |
| Arsenic, total | mg/L | 0.00079 | 0.0086 | 0.0070 | | | | |
| Bicarbonate as CaCO3 | mg/L | 321 | 406 | 364 | | | | |
| Boron, dissolved | mg/L | 0.74 | 0.86 | 0.79 | | | | |
| Cadmium, dissolved | mg/L | -0.005 | -0.005 | -0.005 | | | | |
| Calcium, dissolved | mg/L | 165 | 197 | 180 | | | | |
| Carbonate as CaCO3 | mg/L | -2 | 16 | 4 | | | | |
| Cation - Anion Balance | mg/L | -2 | 2 | -0.2 | | | | |
| Chloride | mg/L | 2 | 4 | 3 | | | | |
| Conductivity @25C | µmhos/cm | 1,710 | 2,070 | 1,925 | | 1,790 | | |
| Copper, dissolved | mg/L | -0.01 | -0.01 | -0.01 | | | | |
| Hardness as CaCO3 | mg/L | 856 | 969 | 905 | | | | |
| Hydroxide as CaCO3 | mg/L | -2 | -2 | -2 | | | | |
| Iron, dissolved | mg/L | -0.02 | 0.07 | 0.03 | | -0.06 | U | |
| Iron, total | mg/L | -0.02 | 0.53 | 0.20 | | -0.06 | U | |
| Lead, dissolved | mg/L | -0.04 | -0.04 | -0.04 | | | | |
| Magnesium, dissolved | mg/L | 106 | 116 | 111 | | | | |
| Manganese, dissolved | mg/L | -0.005 | 0.009 | 0.003 | | | | |
| Manganese, total | mg/L | -0.005 | 0.053 | 0.012 | | | | |
| Mercury, total | mg/L | -0.0002 | -0.0002 | -0.0002 | | | | |
| Molybdenum, dissolved | mg/L | -0.01 | 0.02 | 0.01 | | | | |
| Nitrate/Nitrite (as N) | mg/L | 2.39 | 2.97 | 2.62 | | | | |
| pH | SU | 8.1 | 8.4 | 8.2 | | 8.6 | H | |
| Phosphate | mg/L | 0.12 | 0.34 | 0.24 | | | | |
| Phosphorus, ortho dissolved | mg/L | 0.04 | 0.11 | 0.08 | | | | |
| Potassium, dissolved | mg/L | 22.9 | 26.9 | 25.0 | | | | |
| Residue, Filterable (TDS) @180C | mg/L | 1,460 | 1,630 | 1,561 | | 1,480 | | |
| Residue, Non-Filterable (TSS) @105C | mg/L | -5 | 48 | 12 | | -5 | U | |
| Selenium, total | mg/L | 0.014 | 0.019 | 0.016 | | | | |
| Sodium Adsorption Ratio (SAR) | calc. | 1.71 | 1.85 | 1.81 | | | | |
| Sodium, dissolved | mg/L | 116 | 131 | 123 | | | | |
| Sulfate | mg/L | 760 | 820 | 800 | | | | |
| Sum of Anions | meq/L | 22.5 | 25.3 | 24.2 | | | | |
| Sum of Cations | meq/L | 23.2 | 25.8 | 24.2 | | | | |
| TDS (calculated) | mg/L | 1,380 | 1,530 | 1,465 | | | | |
| TDS (ratio - measured/calculated) | calc. | 1.04 | 1.11 | 1.07 | | | | |
| Zinc, dissolved | mg/L | -0.01 | 0.03 | 0.02 | | | | |

[1] Baseline 2006.

[2] Negative values denote readings below lab detection levels.

[3] ACZ Laboratory, Steamboat Springs, CO.

[4] ACZ Lab Qualifiers: U - Analyte was analyzed for but not detected at the indicated MDL.
H - Holding time exceeded; pH is a field test with an immediate hold time.
B - Analyte concentration detected at a value between method detection limit (MDL) and practical quantitation limit (PQL). The associated value is an estimated quantity.

[5] Average (mean) value calc using 1/2 of detection limit for readings below lab detection limits unless all readings are below lab detection limit.
Shaded cells indicate parameters elevated greater than ten percent above the maximum baseline value.

# Spring J-2
# Water Quality and Field Parameters

| Mountain Coal West Elk Mine - Water Year 2023 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Monitoring Location: Spring J-2** | | **Baseline [1]** | | | **Water Year 2023** | | | |
| Description | Units | Minimum | Maximum | Mean [5] | 5/9/2023 | 6/5/2023 | Q[4] | 9/4/2023 |
| **Field Parameters** | | | | | | | | |
| Flow | gpm | 0.11 | 0.26 | 0.18 | 1.50 | 0.13 | | 0.02 |
| pH (Field) | SU | 8.26 | 9.10 | 8.59 | 8.15 | 8.45 | | 8.63 |
| Conductivity (Field) | µmhos/cm | 975 | 1,690 | 1,281 | 1,007 | 1,688 | | 1,750 |
| Temperature (Field) | °C | 9.6 | 19.6 | 14.4 | 4.5 | 11.9 | | 18.1 |
| Comment | | | | | | | | |
| **Laboratory Parameters [2]** | | | | | | | | |
| Name of Certified Lab [3] | | | | | | ACZ | | |
| Lab Reference # | | | | | | L81021-01 | | |
| Sample Date | | | | | | 6/5/2023 | | |
| Lab Test Date | | | | | | 6/12-6/24 | | |
| Sampled By | | | | | | PH | | |
| Alkalinity (Total CaCO3) | mg/L | 605 | 650 | 637 | | | | |
| Aluminum, dissolved | mg/L | -0.03 | 0.20 | 0.12 | | | | |
| Arsenic, total | mg/L | -0.005 | 0.010 | 0.003 | | | | |
| Bicarbonate as CaCO3 | mg/L | 557 | 614 | 584 | | | | |
| Boron, dissolved | mg/L | 0.45 | 0.59 | 0.54 | | | | |
| Cadmium, dissolved | mg/L | -0.005 | -0.005 | -0.005 | | | | |
| Calcium, dissolved | mg/L | 4.2 | 10.9 | 5.8 | | | | |
| Carbonate as CaCO3 | mg/L | 36 | 72 | 53 | | | | |
| Cation - Anion Balance | mg/L | -8.6 | 0.7 | -4.6 | | | | |
| Chloride | mg/L | 4 | 12 | 6 | | | | |
| Conductivity @25C | µmhos/cm | 1,090 | 1,190 | 1,145 | | 1,680 | | |
| Copper, dissolved | mg/L | -0.01 | -0.01 | -0.01 | | | | |
| Hardness as CaCO3 | mg/L | 21 | 47 | 28 | | | | |
| Hydroxide as CaCO3 | mg/L | -2 | -2 | -2 | | | | |
| Iron, dissolved | mg/L | 0.05 | 1.80 | 0.44 | | 0.202 | | |
| Iron, total | mg/L | 1.36 | 37.70 | 8.42 | | 1.64 | | |
| Lead, dissolved | mg/L | -0.04 | -0.04 | -0.04 | | | | |
| Magnesium, dissolved | mg/L | 2.4 | 4.7 | 3.2 | | | | |
| Manganese, dissolved | mg/L | 0.012 | 0.18 | 0.05 | | | | |
| Manganese, total | mg/L | 0.046 | 0.872 | 0.204 | | | | |
| Mercury, total | mg/L | -0.0002 | 0.0003 | 0.0002 | | | | |
| Molybdenum, dissolved | mg/L | -0.01 | -0.01 | -0.01 | | | | |
| Nitrate/Nitrite (as N) | mg/L | -0.02 | 1.14 | 0.24 | | | | |
| pH | SU | 8.4 | 8.8 | 8.6 | | 8.9 | H | |
| Phosphate | mg/L | 0.46 | 1.36 | 0.72 | | | | |
| Phosphorus, ortho dissolved | mg/L | 0.15 | 0.44 | 0.23 | | | | |
| Potassium, dissolved | mg/L | 1.4 | 5.0 | 2.1 | | | | |
| Residue, Filterable (TDS) @180C | mg/L | 650 | 910 | 742 | | 1,170 | | |
| Residue, Non-Filterable (TSS) @105C | mg/L | 20 | 754 | 192 | | 20.0 | | |
| Selenium, total | mg/L | -0.001 | -0.001 | -0.001 | | | | |
| Sodium Adsorption Ratio (SAR) | calc. | 16.30 | 27.60 | 23.03 | | | | |
| Sodium, dissolved | mg/L | 248 | 295 | 266 | | | | |
| Sulfate | mg/L | -10 | 60 | 27 | | | | |
| Sum of Anions | meq/L | 12.7 | 14.6 | 13.5 | | | | |
| Sum of Cations | meq/L | 11.4 | 13.5 | 12.3 | | | | |
| TDS (calculated) | mg/L | 664 | 752 | 715 | | | | |
| TDS (ratio - measured/calculated) | calc. | 0.96 | 1.21 | 1.04 | | | | |
| Zinc, dissolved | mg/L | -0.01 | 0.19 | 0.04 | | | | |

[1] Baseline 2006.

[2] Negative values denote readings below lab detection levels.

[3] ACZ Laboratory, Steamboat Springs, CO.

[4] ACZ Lab Qualifiers: U - Analyte was analyzed for but not detected at the indicated MDL.

H - Holding time exceeded; pH is a field test with an immediate hold time.

B - Analyte concentration detected at a value between method detection limit (MDL) and practical quantitation limit (PQL). The associated value is an estimated quantity.

[5] Average (mean) value calc using 1/2 of detection limit for readings below lab detection limits unless all readings are below lab detection limit.

Shaded cells indicate parameters elevated greater than ten percent above the maximum baseline value.

# Spring J-7
# Water Quality and Field Parameters

| Mountain Coal West Elk Mine - Water Year 2023 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Monitoring Location: Spring J-7** | | **Baseline [1]** | | | **Water Year 2023** | | | |
| Description | Units | Minimum | Maximum | Mean [5] | 5/9/2023 | 6/8/2023 | Q[4] | 9/6/2023 |
| **Field Parameters** | | | | | | | | |
| Flow | gpm | 0.19 | 9.09 | 4.29 | 20 | 83.5 | | 0.25 |
| pH (Field) | SU | 6.55 | 8.25 | 7.60 | 7.54 | 8.01 | | 7.91 |
| Conductivity (Field) | µmhos/cm | 242 | 496 | 376 | 528 | 763 | | 914 |
| Temperature (Field) | °C | 9.7 | 21.0 | 15.4 | 8.8 | 17.1 | | 19.3 |
| Comment | | | | | Flow Estimated. Overrun by snowmelt. | | | Flow Estimated. |
| **Laboratory Parameters [2]** | | | | | | | | |
| Name of Certified Lab [3] | | | | | | ACZ | | |
| Lab Reference # | | | | | | L81055-21 | | |
| Sample Date | | | | | | 6/8/2023 | | |
| Lab Test Date | | | | | | 6/13-6/24 | | |
| Sampled By | | | | | | PH | | |
| Alkalinity (Total CaCO3) | mg/L | 121 | 188 | 142 | | | | |
| Aluminum, dissolved | mg/L | -0.03 | 0.05 | 0.03 | | | | |
| Sum of Anions | meq/L | 2.7 | 4.4 | 3.8 | | | | |
| Arsenic, total | mg/L | -0.005 | 0.0008 | 0.002 | | | | |
| Bicarbonate as CaCO3 | mg/L | 116 | 188 | 140 | | | | |
| Boron, dissolved | mg/L | -0.01 | 0.02 | | | | | |
| Cadmium, dissolved | mg/L | -0.005 | -0.005 | | | | | |
| Calcium, dissolved | mg/L | 21.1 | 33.9 | 30.3 | | | | |
| Carbonate as CaCO3 | mg/L | -2 | 7 | 1 | | | | |
| Cation - Anion Balance | mg/L | -7.3 | 0 | -2.60 | | | | |
| Sum of Cations | meq/L | 2.6 | 4.3 | 3.6 | | | | |
| Chloride | mg/L | 2 | 4 | 3 | | | | |
| Conductivity @25C | µmhos/cm | 250 | 426 | 354 | | 727 | | |
| Copper, dissolved | mg/L | -0.01 | -0.01 | -0.01 | | | | |
| Hardness as CaCO3 | mg/L | 79 | 125 | 107 | | | | |
| Hydroxide as CaCO3 | mg/L | -2 | -2 | -2 | | | | |
| Iron, dissolved | mg/L | 0.02 | 0.11 | 0.05 | | 0.110 | B | |
| Iron, total | mg/L | 0.53 | 1.96 | 1.02 | | 0.638 | | |
| Lead, dissolved | mg/L | -0.04 | -0.04 | -0.04 | | | | |
| Magnesium, dissolved | mg/L | 6.3 | 9.9 | 7.5 | | | | |
| Manganese, dissolved | mg/L | -0.005 | -0.005 | -0.005 | | | | |
| Manganese, total | mg/L | -0.005 | 0.037 | 0.019 | | | | |
| Mercury, total | mg/L | -0.0002 | -0.0002 | -0.0002 | | | | |
| Molybdenum, dissolved | mg/L | -0.01 | -0.01 | -0.01 | | | | |
| Nitrate/Nitrite (as N) | mg/L | -0.02 | 0.33 | 0.16 | | | | |
| pH | SU | 7.6 | 8.4 | 8.2 | | 8.4 | H | |
| Phosphate | mg/L | -0.03 | 0.24 | 0.09 | | | | |
| Phosphorus, ortho dissolved | mg/L | -0.01 | 0.08 | 0.03 | | | | |
| Potassium, dissolved | mg/L | 1.2 | 2.2 | 1.62 | | | | |
| Selenium, total | mg/L | -0.001 | -0.001 | -0.001 | | | | |
| Sodium Adsorption Ratio (SAR) | calc. | 1.19 | 1.61 | 1.41 | | | | |
| Sodium, dissolved | mg/L | 23.9 | 41 | 33.2 | | | | |
| Sulfate | mg/L | 10 | 60 | 44 | | | | |
| TDS (ratio - measured/calculated) | calc. | 0.99 | 1.38 | 1.14 | | | | |
| TDS (calculated) | mg/L | 138 | 234 | 205 | | | | |
| Residue, Filterable (TDS) @180C | mg/L | 190 | 270 | 230 | | 458 | | |
| Residue, Non-Filterable (TSS) @105C | mg/L | -5 | 24 | 10 | | 26.0 | | |
| Zinc, dissolved | mg/L | -0.01 | 0.03 | 0 | | | | |

[1] Baseline 2006.

[2] Negative values denote readings below lab detection levels.

[3] ACZ Laboratory, Steamboat Springs, CO.

[4] ACZ Lab Qualifiers: U - Analyte was analyzed for but not detected at the indicated MDL.

H - Holding time exceeded; pH is a field test with an immediate hold time.

B - Analyte concentration detected at a value between method detection limit (MDL) and practical quantitation limit (PQL). The associated value is an estimated quantity.

[5] Average (mean) value calc using 1/2 of detection limit for readings below lab detection limits unless all readings are below lab detection limit.

Shaded cells indicate parameters elevated greater than ten percent above the maximum baseline value.

# Deep Creek Trail Spring
# Water Quality and Field Parameters

| Mountain Coal West Elk Mine - Water Year 2023 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Monitoring Location: Deep Creek Trail Spring** | | **Baseline[1]** | | | **Water Year 2023** | | | |
| Description | Units | Minimum | Maximum | Mean [5] | 5/16/2023 | 6/8/2023 | Q[4] | 9/7/2023 |
| **Field Parameters** | | | | | | | | |
| Flow | gpm | 1.24 | 3.51 | 1.77 | 105.5 | 10.43 | | 1.95 |
| pH (Field) | SU | 7.72 | 8.07 | 7.90 | 7.61 | 7.67 | | 7.79 |
| Conductivity (Field) | µmhos/cm | 400 | 479 | 455 | 300 | 396 | | nm[6] |
| Temperature (Field) | °C | 5.8 | 11.8 | 8.74 | 6.1 | 7.0 | | nm[6] |
| Comment | | | | | | | | |
| **Laboratory Parameters [2]** | | | | | | | | |
| Name of Certified Lab [3] | | | | | | ACZ | | |
| Lab Reference # | | | | | | L81055-25 | | |
| Sample Date | | | | | | 6/8/2023 | | |
| Lab Test Date | | | | | | 6/13-6/24 | | |
| Sampled By | | | | | | PH | | |
| Alkalinity (Total CaCO3) | mg/L | 161 | 236 | 211 | | | | |
| Aluminum, dissolved | mg/L | -0.03 | 0.11 | 0.04 | | | | |
| Arsenic, total | mg/L | -0.0005 | -0.0005 | -0.0005 | | | | |
| Bicarbonate as CaCO3 | mg/L | 156 | 232 | 208 | | | | |
| Boron, dissolved | mg/L | 0.02 | 0.02 | 0.02 | | | | |
| Cadmium, dissolved | mg/L | -0.005 | -0.005 | -0.005 | | | | |
| Calcium, dissolved | mg/L | 29.4 | 40.3 | 37.4 | | | | |
| Carbonate as CaCO3 | mg/L | -2 | 7 | 4 | | | | |
| Cation - Anion Balance | mg/L | -1.1 | 9.5 | 1.9 | | | | |
| Chloride | mg/L | 1 | 2 | 2 | | | | |
| Conductivity @25C | µmhos/cm | 357 | 463 | 440 | | 363 | | |
| Copper, dissolved | mg/L | -0.01 | 0.02 | 0.01 | | | | |
| Hardness as CaCO3 | mg/L | 96 | 123 | 116 | | | | |
| Hydroxide as CaCO3 | mg/L | -2 | -2 | -2 | | | | |
| Iron, dissolved | mg/L | -0.02 | 0.14 | 0.05 | | -0.06 | U | |
| Iron, total | mg/L | 0.14 | 1.63 | 0.79 | | 0.107 | B | |
| Lead, dissolved | mg/L | -0.04 | -0.04 | -0.04 | | | | |
| Magnesium, dissolved | mg/L | 5.2 | 6.0 | 5.6 | | | | |
| Manganese, dissolved | mg/L | -0.005 | -0.005 | -0.005 | | | | |
| Manganese, total | mg/L | -0.005 | 0.024 | 0.012 | | | | |
| Mercury, total | mg/L | -0.0002 | -0.0002 | -0.0002 | | | | |
| Molybdenum, dissolved | mg/L | -0.01 | -0.01 | -0.01 | | | | |
| Nitrate/Nitrite (as N) | mg/L | -0.02 | 1.51 | 0.66 | | | | |
| pH | SU | 8.3 | 8.4 | 8.4 | | 8.4 | H | |
| Phosphate | mg/L | -0.03 | 0.15 | 0.05 | | | | |
| Phosphorus, ortho dissolved | mg/L | -0.01 | 0.05 | 0.02 | | | | |
| Potassium, dissolved | mg/L | 1.0 | 1.1 | 1.0 | | | | |
| Residue, Filterable (TDS) @180C | mg/L | 230 | 270 | 253 | | 228 | | |
| Residue, Non-Filterable (TSS) @105C | mg/L | -5 | 60 | 20 | | 14.0 | B | |
| Selenium, total | mg/L | -0.001 | -0.001 | -0.001 | | | | |
| Sodium Adsorption Ratio (SAR) | calc. | 1.85 | 2.47 | 2.22 | | | | |
| Sodium, dissolved | mg/L | 41.2 | 62.0 | 54.6 | | | | |
| Sulfate | mg/L | 10 | 20 | 14 | | | | |
| Sum of Anions | meq/L | 3.7 | 4.9 | 5 | | | | |
| Sum of Cations | meq/L | 3.7 | 5.2 | 4.7 | | | | |
| TDS (calculated) | mg/L | 198 | 262 | 243 | | | | |
| TDS (ratio - measured/calculated) | calc. | 0.98 | 1.16 | 1.05 | | | | |
| Zinc, dissolved | mg/L | -0.01 | 0.02 | 0 | | | | |

[1] Baseline 2007.

[2] Negative values denote readings below lab detection levels.

[3] ACZ Laboratory, Steamboat Springs, CO.

[4] ACZ Lab Qualifiers: U - Analyte was analyzed for but not detected at the indicated MDL.

H - Holding time exceeded; pH is a field test with an immediate hold time.

B - Analyte concentration detected at a value between method detection limit (MDL) and practical quantitation limit (PQL). The associated value is an estimated quantity.

[5] Average (mean) value calc using 1/2 of detection limit for readings below lab detection limits unless all readings are below lab detection limit.

Shaded cells indicate parameters elevated greater than ten percent above the maximum baseline value.

[6] Not Measured - Equipment malfunction.

## Deep Creek Spring # 2
## Water Quality and Field Parameters

| Mountain Coal West Elk Mine - Water Year 2023 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Monitoring Location: Deep Creek Spring #2** | | **Baseline[1]** | | | **Water Year 2023** | | |
| Description | Units | Minimum | Maximum | Mean [2] | 5/16/2023 | 6/8/2023 | 9/7/2023 |
| **Field Parameters** | | | | | | | |
| Flow | gpm | 0.19 | 0.29 | 0.24 | dry | dry | dry |
| pH (Field) | SU | 7.97 | 8.19 | 8.09 | | | |
| Conductivity (Field) | µmhos/cm | 396 | 453 | 433 | | | |
| Temperature (Field) | °C | 7.1 | 13.4 | 10.4 | | | |
| Comment | | | | | | | |
| **Laboratory Parameters** | | | | | | | |
| Name of Certified Lab | | | | | | | |
| Lab Reference # | | | | | | | |
| Sample Date | | | | | | | |
| Lab Test Date | | | | | | | |
| Sampled By | | | | | | | |
| Alkalinity (Total CaCO3) | mg/L | 167 | 219 | 195 | | | |
| Aluminum, dissolved | mg/L | -0.03 | 0.09 | 0.06 | | | |
| Arsenic, total | mg/L | -0.0005 | 0.0012 | 0.0006 | | | |
| Bicarbonate as CaCO3 | mg/L | 159 | 211 | 185 | | | |
| Boron, dissolved | mg/L | 0.01 | 0.02 | 0.01 | | | |
| Cadmium, dissolved | mg/L | -0.005 | -0.005 | -0.005 | | | |
| Calcium, dissolved | mg/L | 41.6 | 47.8 | 44.2 | | | |
| Carbonate as CaCO3 | mg/L | 6 | 14 | 9 | | | |
| Cation - Anion Balance | mg/L | 0 | 4.9 | 1.8 | | | |
| Chloride | mg/L | 2 | 3 | 2 | | | |
| Conductivity @25C | µmhos/cm | 393 | 440 | 422 | | | |
| Copper, dissolved | mg/L | -0.01 | 0.03 | 0.01 | | | |
| Hardness as CaCO3 | mg/L | 127 | 147 | 136 | | | |
| Hydroxide as CaCO3 | mg/L | -2 | -2 | -2 | | | |
| Iron, dissolved | mg/L | 0.02 | 0.08 | 0.05 | | | |
| Iron, total | mg/L | 1.07 | 9.71 | 3.70 | | | |
| Lead, dissolved | mg/L | -0.04 | -0.04 | -0.04 | | | |
| Magnesium, dissolved | mg/L | 5.7 | 6.7 | 6.3 | | | |
| Manganese, dissolved | mg/L | -0.005 | 0.008 | 0.003 | | | |
| Manganese, total | mg/L | 0.018 | 0.146 | 0.057 | | | |
| Mercury, total | mg/L | -0.0002 | -0.0002 | -0.0002 | | | |
| Molybdenum, dissolved | mg/L | -0.01 | -0.01 | -0.01 | | | |
| Nitrate/Nitrite (as N) | mg/L | -0.02 | 0.25 | 0.08 | | | |
| pH | SU | 8.4 | 8.5 | 8.4 | | | |
| Phosphate | mg/L | -0.03 | 0.18 | 0.05 | | | |
| Phosphorus, ortho dissolved | mg/L | -0.01 | 0.06 | 0.02 | | | |
| Potassium, dissolved | mg/L | 0.9 | 1.4 | 1.2 | | | |
| Residue, Filterable (TDS) @180C | mg/L | 230 | 260 | 247 | | | |
| Residue, Non-Filterable (TSS) @105C | mg/L | 6 | 302 | 136 | | | |
| Selenium, total | mg/L | -0.001 | -0.001 | -0.001 | | | |
| Sodium Adsorption Ratio (SAR) | calc. | 1.37 | 1.63 | 1.49 | | | |
| Sodium, dissolved | mg/L | 35.1 | 44.8 | 39.5 | | | |
| Sulfate | mg/L | 20 | 20 | 20 | | | |
| Sum of Anions | meq/L | 3.8 | 4.8 | 4.3 | | | |
| Sum of Cations | meq/L | 4.1 | 4.9 | 4.5 | | | |
| TDS (calculated) | mg/L | 209 | 257 | 234 | | | |
| TDS (ratio - measured/calculated) | calc. | 1.01 | 1.16 | 1.06 | | | |
| Zinc, dissolved | mg/L | -0.01 | 0.03 | 0.01 | | | |

[1] Baseline 2007.

[2] Average (mean) value calc using 1/2 of detection limit for readings below lab detection limits unless all readings are below lab detection limit.

# 96-2-2 Area Spring
# Water Quality and Field Parameters

| Mountain Coal West Elk Mine - Water Year 2023 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Monitoring Location: 96-2-2 Area Spring** | | **Baseline [1]** | | | **Water Year 2023** | | | |
| Description | Units | Minimum | Maximum | Mean [5] | 5/16/2023 | 6/8/2023 | Q[4] | 9/7/2023 |
| **Field Parameters** | | | | | | | | |
| Flow | gpm | 0.11 | 2.5 | 0.75 | 2.5 | 0.98 | | dry |
| pH (Field) | SU | 7.78 | 8.18 | 7.88 | 7.86 | 7.92 | | |
| Conductivity (Field) | µmhos/cm | 348 | 430 | 399 | 318 | 403 | | |
| Temperature (Field) | $^{o}$C | 6.9 | 12.3 | 10.6 | 6.4 | 7.7 | | |
| Comment | | | | | | | | |
| **Laboratory Parameters [2]** | | | | | | | | |
| Name of Certified Lab [3] | | | | | | ACZ | | |
| Lab Reference # | | | | | | L81055-06 | | |
| Sample Date | | | | | | 6/8/2023 | | |
| Lab Test Date | | | | | | 6/13-6/24 | | |
| Sampled By | | | | | | PH | | |
| Alkalinity (Total CaCO3) | mg/L | 129 | 172 | 156 | | | | |
| Aluminum, dissolved | mg/L | -0.03 | 0.21 | 0.09 | | | | |
| Arsenic, total | mg/L | -0.0005 | 0.0012 | 0.0007 | | | | |
| Bicarbonate as CaCO3 | mg/L | 129 | 171 | 154 | | | | |
| Boron, dissolved | mg/L | 0.01 | 0.02 | 0.02 | | | | |
| Cadmium, dissolved | mg/L | -0.005 | -0.005 | -0.005 | | | | |
| Calcium, dissolved | mg/L | 11.8 | 18.3 | 16.2 | | | | |
| Carbonate as CaCO3 | mg/L | -2 | 10 | 4 | | | | |
| Cation - Anion Balance | mg/L | 0.0 | 5.6 | 2.2 | | | | |
| Chloride | mg/L | 2 | 3 | 2 | | | | |
| Conductivity @25C | µmhos/cm | 332 | 421 | 387 | | 367 | | |
| Copper, dissolved | mg/L | -0.01 | -0.01 | -0.01 | | | | |
| Hardness as CaCO3 | mg/L | 38 | 59 | 52 | | | | |
| Hydroxide as CaCO3 | mg/L | -2 | -2 | -2 | | | | |
| Iron, dissolved | mg/L | 0.05 | 0.30 | 0.13 | | -0.06 | U | |
| Iron, total | mg/L | 0.84 | 9.08 | 4.55 | | 0.236 | | |
| Lead, dissolved | mg/L | -0.04 | -0.04 | -0.04 | | | | |
| Magnesium, dissolved | mg/L | 2.1 | 3.3 | 2.9 | | | | |
| Manganese, dissolved | mg/L | -0.005 | 0.177 | 0.045 | | | | |
| Manganese, total | mg/L | 0.013 | 0.153 | 0.075 | | | | |
| Mercury, total | mg/L | -0.0002 | -0.0002 | -0.0002 | | | | |
| Molybdenum, dissolved | mg/L | -0.01 | 0.01 | 0.01 | | | | |
| Nitrate/Nitrite (as N) | mg/L | -0.02 | 0.04 | 0.03 | | | | |
| pH | SU | 8.2 | 8.5 | 8.4 | | 8.4 | H | |
| Phosphate | mg/L | 0.03 | 0.18 | 0.08 | | | | |
| Phosphorus, ortho dissolved | mg/L | 0.01 | 0.06 | 0.03 | | | | |
| Potassium, dissolved | mg/L | 0.7 | 1.4 | 1.2 | | | | |
| Residue, Filterable (TDS) @180C | mg/L | 190 | 240 | 220 | | 234 | | |
| Residue, Non-Filterable (TSS) @105C | mg/L | 22 | 510 | 175 | | -5 | U | |
| Selenium, total | mg/L | -0.001 | 0.002 | 0.0008 | | | | |
| Sodium Adsorption Ratio (SAR) | calc. | 3.93 | 4.17 | 4.09 | | | | |
| Sodium, dissolved | mg/L | 58.5 | 70.8 | 67.0 | | | | |
| Sulfate | mg/L | 30 | 30 | 30 | | | | |
| Sum of Anions | meq/L | 3.2 | 4 | 3.8 | | | | |
| Sum of Cations | meq/L | 3.3 | 4.3 | 4.0 | | | | |
| TDS (calculated) | mg/L | 183 | 231 | 216 | | | | |
| TDS (ratio - measured/calculated) | calc. | 0.97 | 1.04 | 1.02 | | | | |
| Zinc, dissolved | mg/L | -0.01 | 0.11 | 0.03 | | | | |

[1] Baseline 2007.

[2] Negative values denote readings below lab detection levels.

[3] ACZ Laboratory, Steamboat Springs, CO.

[4] ACZ Lab Qualifiers: U - Analyte was analyzed for but not detected at the indicated MDL.

H - Holding time exceeded; pH is a field test with an immediate hold time.

B - Analyte concentrationentration detected at a value between method detection limit (MDL) and practical quantitation limit (PQL). The associated value is an estimated quantity.

[5] Average (mean) value calc using 1/2 of detection limit for readings below lab detection limits unless all readings are below lab detection limit.

Shaded cells indicate parameters elevated greater than ten percent above the maximum baseline value.

# Spring J-10
# Water Quality and Field Parameters

| Mountain Coal West Elk Mine - Water Year 2023 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Monitoring Location: Spring J-10** | | **Baseline[1]** | | | **Water Year 2023** | | | |
| Description | Units | Minimum | Maximum | Mean[5] | 5/9/2023 | 6/8/2023 | Q[4] | 9/4/2023 |
| **Field Parameters** | | | | | | | | |
| Flow | gpm | dry | 0.22 | seep | | | | |
| pH (Field) | SU | 7.14 | 7.92 | 7.42 | | | | |
| Conductivity (Field) | µmhos/cm | 770 | 982 | 879 | | | | |
| Temperature (Field) | °C | 5.9 | 19.5 | 12.8 | | | | |
| Comment | | | | | site covered by beaver pond | | | |
| **Laboratory Parameters [2]** | | | | | | | | |
| Name of Certified Lab [3] | | | | | | | | |
| Lab Reference # | | | | | | | | |
| Sample Date | | | | | | | | |
| Lab Test Date | | | | | | | | |
| Sampled By | | | | | | | | |
| Alkalinity (Total CaCO3) | mg/L | 299 | 463 | 377 | | | | |
| Aluminum, dissolved | mg/L | -0.03 | -0.03 | -0.03 | | | | |
| Arsenic, total recoverable | mg/L | -0.0005 | 0.0055 | 0.0018 | | | | |
| Bicarbonate as CaCO3 | mg/L | 294 | 463 | 375 | | | | |
| Boron, dissolved | mg/L | 0.02 | 0.06 | 0.05 | | | | |
| Cadmium, dissolved | mg/L | -0.005 | -0.005 | -0.005 | | | | |
| Calcium, dissolved | mg/L | 70 | 118 | 92.8 | | | | |
| Carbonate as CaCO3 | mg/L | -2 | 15 | 3 | | | | |
| Cation - Anion Balance | mg/L | -7.4 | 4.7 | -1.3 | | | | |
| Chloride | mg/L | 10 | 19 | 14 | | | | |
| Conductivity @25C | µmhos/cm | 721 | 927 | 822 | | | | |
| Copper, dissolved | mg/L | -0.01 | -0.01 | -0.01 | | | | |
| Hardness as CaCO3 | mg/L | 273 | 447 | 360 | | | | |
| Hydroxide as CaCO3 | mg/L | -2 | -2 | -2 | | | | |
| Iron, dissolved | mg/L | -0.02 | 0.68 | 0.18 | | | | |
| Iron, total | mg/L | 0.44 | 10.9 | 3.45 | | | | |
| Lead, dissolved | mg/L | -0.04 | -0.04 | -0.04 | | | | |
| Magnesium, dissolved | mg/L | 23.5 | 36.9 | 31.0 | | | | |
| Manganese, dissolved | mg/L | 0.011 | 1.06 | 0.287 | | | | |
| Manganese, total | mg/L | 0.043 | 1.85 | 0.587 | | | | |
| Mercury, total | mg/L | -0.0002 | -0.0002 | -0.0002 | | | | |
| Molybdenum, dissolved | mg/L | -0.01 | -0.01 | -0.01 | | | | |
| Nitrate/Nitrite (as N) | mg/L | -0.02 | 0.04 | 0.02 | | | | |
| pH | SU | 8.2 | 8.3 | 8.2 | | | | |
| Phosphate | mg/L | -0.03 | 0.06 | -0.03 | | | | |
| Phosphorus, ortho dissolved | mg/L | -0.01 | 0.02 | -0.01 | | | | |
| Potassium, dissolved | mg/L | 1.7 | 2.5 | 2.0 | | | | |
| Residue, Filterable (TDS) @180C | mg/L | 450 | 600 | 512 | | | | |
| Residue, Non-Filterable (TSS) @105C | mg/L | 15 | 157 | 53 | | | | |
| Selenium, total recoverable | mg/L | 0.0002 | 0.0011 | 0.0005 | | | | |
| Sodium Adsorption Ratio (SAR) | calc. | 0.84 | 1.05 | 0.92 | | | | |
| Sodium, dissolved | mg/L | 31.9 | 47.6 | 39.8 | | | | |
| Sulfate | mg/L | 30 | 71 | 57 | | | | |
| Sum of Anions | meq/L | 8.0 | 10.4 | 9.2 | | | | |
| Sum of Cations | meq/L | 6.9 | 11.1 | 9.0 | | | | |
| TDS (calculated) | mg/L | 397 | 522 | 466 | | | | |
| TDS (ratio - measured/calculated) | calc. | 1.02 | 1.15 | 1.10 | | | | |
| Zinc, dissolved | mg/L | -0.01 | -0.01 | -0.01 | | | | |

[1] Baseline Monitoring WY 2011.

[2] Negative values denote readings below lab detection levels.

[3] ACZ Laboratory, Steamboat Springs, CO.

[4] ACZ Lab Qualifiers: U - Analyte was analyzed for but not detected at the indicated MDL.

H - Holding time exceeded; pH is a field test with an immediate hold time.

B - Analyte concentration detected at a value between method detection limit (MDL) and practical quantitation limit (PQL). The associated value is an estimated quantity.

[5] Average (mean) value calc using 1/2 of detection limit for readings below lab detection limits unless all readings are below lab detection limit.

Shaded cells indicate parameters elevated greater than ten percent above the maximum baseline value.

# Spring 2012-1
# Water Quality and Field Parameters

| Mountain Coal West Elk Mine - Water Year 2023 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Monitoring Location: Spring 2012-1** | | **Baseline [1]** | | | **Water Year 2023** | | |
| Description | Units | Minimum | Maximum | Mean[5] | 5/16/2023 | 6/8/2023 | 9/7/2023 |
| **Field Parameters** | | | | | | | |
| Flow | gpm | dry | 2.5 | NA | 3 | dry | dry |
| pH (Field) | SU | 7.79 | 7.79 | 7.79 | 7.95 | | |
| Conductivity (Field) | µmhos/cm | 123 | 123 | 123 | 72.7 | | |
| Temperature (Field) | °C | 7.3 | 7.3 | 7.3 | 9.9 | | |
| Comment | | | | | Flow estimated. Overrun by surface water. | | |
| **Laboratory Parameters[2]** | | | | | | | |
| Name of Certified Lab[3] | | | | | | | |
| Lab Reference # | | | | | | | |
| Sample Date | | | | | | | |
| Lab Test Date | | | | | | | |
| Sampled By | | | | | | | |
| Alkalinity (Total CaCO3) | mg/L | | | | | | |
| Aluminum, dissolved | mg/L | | | | | | |
| Arsenic, total recoverable | mg/L | | | | | | |
| Bicarbonate as CaCO3 | mg/L | | | | | | |
| Boron, dissolved | mg/L | | | | | | |
| Cadmium, dissolved | mg/L | | | | | | |
| Calcium, dissolved | mg/L | | | | | | |
| Carbonate as CaCO3 | mg/L | | | | | | |
| Cation - Anion Balance | mg/L | | | | | | |
| Chloride | mg/L | | | | | | |
| Conductivity @25C | µmhos/cm | | | | | | |
| Copper, dissolved | mg/L | | | | | | |
| Hardness as CaCO3 | mg/L | | | | | | |
| Hydroxide as CaCO3 | mg/L | | | | | | |
| Iron, dissolved | mg/L | | | | | | |
| Iron, total | mg/L | | | | | | |
| Lead, dissolved | mg/L | | | | | | |
| Magnesium, dissolved | mg/L | | | | | | |
| Manganese, dissolved | mg/L | | | | | | |
| Manganese, total | mg/L | | | | | | |
| Mercury, total | mg/L | | | | | | |
| Molybdenum, dissolved | mg/L | | | | | | |
| Nitrate/Nitrite (as N) | mg/L | | | | | | |
| pH | SU | | | | | | |
| Phosphate | mg/L | | | | | | |
| Phosphorus, ortho dissolved | mg/L | | | | | | |
| Potassium, dissolved | mg/L | | | | | | |
| Residue, Filterable (TDS) @180C | mg/L | | | | | | |
| Residue, Non-Filterable (TSS) @105C | mg/L | | | | | | |
| Selenium, total recoverable | mg/L | | | | | | |
| Sodium Adsorption Ratio (SAR) | calc. | | | | | | |
| Sodium, dissolved | mg/L | | | | | | |
| Sulfate | mg/L | | | | | | |
| Sum of Anions | meq/L | | | | | | |
| Sum of Cations | meq/L | | | | | | |
| TDS (calculated) | mg/L | | | | | | |
| TDS (ratio - measured/calculated) | calc. | | | | | | |
| Zinc, dissolved | mg/L | | | | | | |

[1] Baseline Monitoring May Through October 2013. Insufficient flow for lab samples. Field measurments only.

[2] Negative values denote readings below lab detection levels.

[3] ACZ Laboratory, Steamboat Springs, CO.

# Spring 2012-2
# Water Quality and Field Parameters

| Mountain Coal West Elk Mine - Water Year 2023 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Monitoring Location: Spring 2012-2** | | **Baseline[1]** | | | **Water Year 2023** | | | |
| Description | Units | Minimum | Maximum | Mean[5] | 5/16/2023 | 6/8/2023 | Q[4] | 9/7/2023 |
| **Field Parameters** | | | | | | | | |
| Flow | gpm | dry | 3.56 | 0.59 | -- | 1.27 | | dry |
| pH (Field) | SU | 8.00 | 8.32 | 8.16 | -- | 7.71 | | |
| Conductivity (Field) | µmhos/cm | 91 | 114 | 103 | -- | 92.5 | | |
| Temperature (Field) | °C | 4.8 | 6.6 | 5.7 | -- | 9.4 | | |
| Comment | | | | | No Site Access. Covered by surface water. | | | |
| **Laboratory Parameters [2]** | | | | | | | | |
| Name of Certified Lab [3] | | | | | | ACZ | | |
| Lab Reference # | | | | | | L81055-28 | | |
| Sample Date | | | | | | 6/8/2023 | | |
| Lab Test Date | | | | | | 6/13-6/24 | | |
| Sampled By | | | | | | PH | | |
| Alkalinity (Total CaCO3) | mg/L | 38.0 | 38.0 | 38.0 | | | | |
| Aluminum, dissolved | mg/L | 0.05 | 0.05 | 0.05 | | | | |
| Arsenic, total recoverable | mg/L | -0.0002 | -0.0002 | -0.0002 | | | | |
| Bicarbonate as CaCO3 | mg/L | 38.0 | 38.0 | 38.0 | | | | |
| Boron, dissolved | mg/L | -0.01 | -0.01 | -0.01 | | | | |
| Cadmium, dissolved | mg/L | -0.005 | -0.005 | -0.005 | | | | |
| Calcium, dissolved | mg/L | 7.5 | 7.5 | 7.5 | | | | |
| Carbonate as CaCO3 | mg/L | -2 | -2 | -2 | | | | |
| Cation - Anion Balance | mg/L | 6.3 | 6.3 | 6.3 | | | | |
| Chloride | mg/L | 2 | 2 | 2 | | | | |
| Conductivity @25C | µmhos/cm | 99 | 99 | 99 | | 91 | | |
| Copper, dissolved | mg/L | -0.01 | -0.01 | -0.01 | | | | |
| Hardness as CaCO3 | mg/L | 25 | 25 | 25 | | | | |
| Hydroxide as CaCO3 | mg/L | -2 | -2 | -2 | | | | |
| Iron, dissolved | mg/L | 0.11 | 0.11 | 0.11 | | -0.06 | U | |
| Iron, total | mg/L | 1.04 | 1.04 | 1.04 | | 0.713 | | |
| Lead, dissolved | mg/L | -0.04 | -0.04 | -0.04 | | | | |
| Magnesium, dissolved | mg/L | 1.6 | 1.6 | 1.6 | | | | |
| Manganese, dissolved | mg/L | -0.005 | -0.005 | -0.005 | | | | |
| Manganese, total | mg/L | 0.009 | 0.009 | 0.009 | | | | |
| Mercury, total | mg/L | -0.0002 | -0.0002 | -0.0002 | | | | |
| Molybdenum, dissolved | mg/L | -0.02 | -0.02 | -0.02 | | | | |
| Nitrate/Nitrite (as N) | mg/L | 0.41 | 0.41 | 0.41 | | | | |
| pH | SU | 7.9 | 7.9 | 7.9 | | 8.0 | H | |
| Phosphate | mg/L | -0.03 | -0.03 | -0.03 | | | | |
| Phosphorus, ortho dissolved | mg/L | -0.01 | -0.01 | -0.01 | | | | |
| Potassium, dissolved | mg/L | 0.7 | 0.7 | 0.7 | | | | |
| Residue, Filterable (TDS) @180C | mg/L | 80 | 80 | 80 | | 86 | | |
| Residue, Non-Filterable (TSS) @105C | mg/L | -5 | -5 | -5 | | 8.0 | B | |
| Selenium, total recoverable | mg/L | 0.0002 | 0.0002 | 0.0002 | | | | |
| Sodium Adsorption Ratio (SAR) | calc. | 0.82 | 0.82 | 0.82 | | | | |
| Sodium, dissolved | mg/L | 9.4 | 9.4 | 9.4 | | | | |
| Sulfate | mg/L | 1 | 1 | 1 | | | | |
| Sum of Anions | meq/L | 0.837 | 0.837 | 0.837 | | | | |
| Sum of Cations | meq/L | 0.949 | 0.949 | 0.949 | | | | |
| TDS (calculated) | mg/L | 45 | 45 | 45 | | | | |
| TDS (ratio - measured/calculated) | calc. | 1.78 | 1.78 | 1.78 | | | | |
| Zinc, dissolved | mg/L | -0.01 | -0.01 | -0.01 | | | | |

[1] Baseline Monitoring May Through October 2013. Only one laboratory sample was collected during the baseline period in May 2013. The spring was dry from June through October 2013.

[2] Negative values denote readings below lab detection levels.

[3] ACZ Laboratory, Steamboat Springs, CO.

[4] ACZ Lab Qualifiers: U - Analyte was analyzed for but not detected at the indicated MDL.

H - Holding time exceeded; pH is a field test with an immediate hold time.

B - Analyte concentration detected at a value between method detection limit (MDL) and practical quantitation limit (PQL). The associated value is an estimated quantity.

[5] Average (mean) value calc using 1/2 of detection limit for readings below lab detection limits unless all readings are below lab detection limit.

Shaded cells indicate parameters elevated greater than ten percent above the maximum baseline value.

# Spring 2012-3
# Water Quality and Field Parameters

| Mountain Coal West Elk Mine - Water Year 2023 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Monitoring Location: Spring 2012-3** | | **Baseline[1]** | | | **Water Year 2023** | | | |
| Description | Units | Minimum | Maximum | Mean[5] | 5/16/2023 | 6/8/2023 | Q[4] | 9/7/2023 |
| **Field Parameters** | | | | | | | | |
| Flow | gpm | 0.16 | 2.63 | 0.88 | 62.5 | 5.37 | | 0.65 |
| pH (Field) | SU | 7.51 | 8.63 | 8.13 | 8.07 | 7.54 | | 8.03 |
| Conductivity (Field) | µmhos/cm | 396 | 525 | 471 | 266 | 401 | | 491 |
| Temperature (Field) | °C | 2.0 | 9.1 | 6.2 | 6.4 | 6.8 | | 8.6 |
| Comment | | | | | | | | |
| **Laboratory Parameters [2]** | | | | | | | | |
| Name of Certified Lab [3] | | | | | | ACZ | | |
| Lab Reference # | | | | | | L81055-32 | | |
| Sample Date | | | | | | 6/8/2023 | | |
| Lab Test Date | | | | | | 6/13-6/24 | | |
| Sampled By | | | | | | PH | | |
| Alkalinity (Total CaCO3) | mg/L | 169 | 201 | 183 | | | | |
| Aluminum, dissolved | mg/L | -0.03 | 0.05 | 0.02 | | | | |
| Arsenic, total recoverable | mg/L | -0.0002 | 0.0013 | 0.0005 | | | | |
| Bicarbonate as CaCO3 | mg/L | 163 | 191 | 173 | | | | |
| Boron, dissolved | mg/L | -0.01 | 0.02 | 0.01 | | | | |
| Cadmium, dissolved | mg/L | -0.005 | -0.005 | 0.003 | | | | |
| Calcium, dissolved | mg/L | 29.3 | 39.7 | 37.2 | | | | |
| Carbonate as CaCO3 | mg/L | 6 | 17 | 11 | | | | |
| Cation - Anion Balance | mg/L | -4.2 | 2.3 | 1.5 | | | | |
| Chloride | mg/L | 1 | 2 | 2 | | | | |
| Conductivity @25C | µmhos/cm | 373 | 475 | 436 | | 363 | | |
| Copper, dissolved | mg/L | -0.01 | -0.01 | 0.01 | | | | |
| Hardness as CaCO3 | mg/L | 97 | 130 | 122 | | | | |
| Hydroxide as CaCO3 | mg/L | -2 | -2 | -2 | | | | |
| Iron, dissolved | mg/L | 0.02 | 0.27 | 0.07 | | -0.06 | U | |
| Iron, total | mg/L | 0.49 | 5.24 | 1.77 | | -0.06 | U | |
| Lead, dissolved | mg/L | -0.04 | -0.04 | -0.04 | | | | |
| Magnesium, dissolved | mg/L | 5.7 | 7.5 | 7.1 | | | | |
| Manganese, dissolved | mg/L | -0.005 | 0.032 | 0.010 | | | | |
| Manganese, total | mg/L | 0.017 | 0.124 | 0.052 | | | | |
| Mercury, total | mg/L | -0.0002 | -0.0002 | -0.0002 | | | | |
| Molybdenum, dissolved | mg/L | -0.02 | -0.02 | -0.02 | | | | |
| Nitrate/Nitrite (as N) | mg/L | 0.04 | 0.16 | 0.09 | | | | |
| pH | SU | 8.3 | 8.5 | 8.4 | | 8.4 | H | |
| Phosphate | mg/L | -0.03 | 0.16 | 0.07 | | | | |
| Phosphorus, ortho dissolved | mg/L | -0.01 | 0.05 | 0.02 | | | | |
| Potassium, dissolved | mg/L | 1.2 | 1.8 | 1.5 | | | | |
| Residue, Filterable (TDS) @180C | mg/L | 210 | 280 | 260 | | 218 | | |
| Residue, Non-Filterable (TSS) @105C | mg/L | 13 | 245 | 72 | | 6.0 | B | |
| Selenium, total recoverable | mg/L | 0.0003 | 0.0005 | 0.0004 | | | | |
| Sodium Adsorption Ratio (SAR) | calc. | 1.82 | 1.86 | 1.84 | | | | |
| Sodium, dissolved | mg/L | 41.5 | 48.2 | 46.2 | | | | |
| Sulfate | mg/L | 33 | 51.5 | 42 | | | | |
| Sum of Anions | meq/L | 4.1 | 5.0 | 4.6 | | | | |
| Sum of Cations | meq/L | 3.8 | 4.8 | 4.5 | | | | |
| TDS (calculated) | mg/L | 214 | 265 | 246 | | | | |
| TDS (ratio - measured/calculated) | calc. | 0.98 | 1.11 | 1.05 | | | | |
| Zinc, dissolved | mg/L | -0.01 | -0.01 | -0.01 | | | | |

[1] Baseline Monitoring May Through October 2013.

[2] Negative values denote readings below lab detection levels.

[3] ACZ Laboratory, Steamboat Springs, CO.

[4] ACZ Lab Qualifiers: U - Analyte was analyzed for but not detected at the indicated MDL.

H - Holding time exceeded; pH is a field test with an immediate hold time.

B - Analyte concentration detected at a value between method detection limit (MDL) and practical quantitation limit (PQL). The associated value is an estimated quantity.

[5] Average (mean) value calc using 1/2 of detection limit for readings below lab detection limits unless all readings are below lab detection limit.

Shaded cells indicate parameters elevated greater than ten percent above the maximum baseline value.

# Spring 2012-4
# Water Quality and Field Parameters

| Mountain Coal West Elk Mine - Water Year 2023 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Monitoring Location: Spring 2012-4** | | **Baseline[1]** | | | **Water Year 2023** | | | |
| Description | Units | Minimum | Maximum | Mean[5] | 5/16/2023 | 6/8/2023 | Q[4] | 9/7/2023 |
| **Field Parameters** | | | | | | | | |
| Flow | gpm | 0.91 | 2.26 | 1.41 | 2.57 | 1.87 | | 1.28 |
| pH (Field) | SU | 7.02 | 8.24 | 7.93 | 7.86 | 7.81 | | 7.85 |
| Conductivity (Field) | µmhos/cm | 444 | 538 | 507 | 346 | 441 | | nm[6] |
| Temperature (Field) | °C | 4.7 | 6.2 | 5.4 | 6.9 | 7.5 | | nm[6] |
| Comment | | | | | | | | |
| **Laboratory Parameters [2]** | | | | | | | | |
| Name of Certified Lab [3] | | | | | | ACZ | | |
| Lab Reference # | | | | | | L81055-29 | | |
| Sample Date | | | | | | 6/8/2023 | | |
| Lab Test Date | | | | | | 6/13-6/24 | | |
| Sampled By | | | | | | PH | | |
| Alkalinity (Total CaCO3) | mg/L | 173 | 209 | 196 | | | | |
| Aluminum, dissolved | mg/L | -0.03 | 0.07 | 0.03 | | | | |
| Arsenic, total recoverable | mg/L | -0.0002 | 0.0008 | 0.0003 | | | | |
| Bicarbonate as CaCO3 | mg/L | 169 | 204 | 189 | | | | |
| Boron, dissolved | mg/L | 0.01 | 0.02 | 0.02 | | | | |
| Cadmium, dissolved | mg/L | -0.005 | -0.005 | -0.005 | | | | |
| Calcium, dissolved | mg/L | 34.8 | 41.1 | 39.5 | | | | |
| Carbonate as CaCO3 | mg/L | -2 | 13 | 7 | | | | |
| Cation - Anion Balance | mg/L | -1.1 | 2.1 | 1.0 | | | | |
| Chloride | mg/L | 1 | 2 | 2 | | | | |
| Conductivity @25C | µmhos/cm | 422 | 496 | 469 | | 410 | | |
| Copper, dissolved | mg/L | -0.01 | -0.01 | -0.01 | | | | |
| Hardness as CaCO3 | mg/L | 113 | 134 | 128 | | | | |
| Hydroxide as CaCO3 | mg/L | -2 | -2 | -2 | | | | |
| Iron, dissolved | mg/L | -0.02 | 0.45 | 0.11 | | -0.06 | U | |
| Iron, total | mg/L | 0.09 | 2.99 | 0.92 | | 0.460 | | |
| Lead, dissolved | mg/L | -0.04 | -0.04 | -0.04 | | | | |
| Magnesium, dissolved | mg/L | 6.4 | 7.5 | 7.2 | | | | |
| Manganese, dissolved | mg/L | -0.005 | 0.013 | 0.004 | | | | |
| Manganese, total | mg/L | -0.005 | 0.05 | 0.02 | | | | |
| Mercury, total | mg/L | -0.0002 | -0.0002 | -0.0002 | | | | |
| Molybdenum, dissolved | mg/L | -0.02 | -0.02 | -0.02 | | | | |
| Nitrate/Nitrite (as N) | mg/L | -0.02 | 0.03 | 0.02 | | | | |
| pH | SU | 8.2 | 8.5 | 8.4 | | 8.5 | H | |
| Phosphate | mg/L | -0.03 | 0.09 | 0.05 | | | | |
| Phosphorus, ortho dissolved | mg/L | -0.01 | 0.03 | 0.02 | | | | |
| Potassium, dissolved | mg/L | 0.9 | 1.6 | 1.2 | | | | |
| Residue, Filterable (TDS) @180C | mg/L | 240 | 298 | 274 | | 254 | | |
| Residue, Non-Filterable (TSS) @105C | mg/L | -5 | 112 | 34 | | 22.0 | | |
| Selenium, total recoverable | mg/L | 0.0003 | 0.0004 | 0.0003 | | | | |
| Sodium Adsorption Ratio (SAR) | calc. | 1.93 | 2.03 | 2.01 | | | | |
| Sodium, dissolved | mg/L | 46.6 | 53.1 | 51.6 | | | | |
| Sulfate | mg/L | 37 | 45 | 40 | | | | |
| Sum of Anions | meq/L | 4.4 | 5.0 | 4.8 | | | | |
| Sum of Cations | meq/L | 4.3 | 5.06 | 4.9 | | | | |
| TDS (calculated) | mg/L | 234 | 268 | 259 | | | | |
| TDS (ratio - measured/calculated) | calc. | 1.03 | 1.12 | 1.06 | | | | |
| Zinc, dissolved | mg/L | -0.01 | 0.16 | 0.02 | | | | |

[1] Baseline Monitoring May Through October 2013.

[2] Negative values denote readings below lab detection levels.

[3] ACZ Laboratory, Steamboat Springs, CO.

[4] ACZ Lab Qualifiers: U - Analyte was analyzed for but not detected at the indicated MDL.

H - Holding time exceeded; pH is a field test with an immediate hold time.

B - Analyte concentration detected at a value between method detection limit (MDL) and practical quantitation limit (PQL). The associated value is an estimated quantity.

[5] Average (mean) value calc using 1/2 of detection limit for readings below lab detection limits unless all readings are below lab detection limit.

Shaded cells indicate parameters elevated greater than ten percent above the maximum baseline value.

[6] Not Measured - Equipment malfunction.

# Spring ST-S-1
# Water Quality and Field Parameters

| Mountain Coal West Elk Mine - Water Year 2023 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Monitoring Location: Spring ST-S-1** | | **Baseline[1]** | | | **Water Year 2023** | | | |
| Description | Units | Minimum | Maximum | Mean[5] | 5/20/2023 | 6/5/2023 | Q[4] | 9/4/2023 |
| **Field Parameters** | | | | | | | | |
| Flow | gpm | -- | -- | -- | -- | 7.09 | | 0.5 |
| pH (Field) | SU | 6.85 | 8.73 | 8.01 | -- | 7.88 | | 8.28 |
| Conductivity (Field) | µmhos/cm | 357 | 596 | 468 | -- | 409 | | 486 |
| Temperature (Field) | °C | 8.5 | 19.6 | 14.5 | -- | 10.6 | | 15.9 |
| Comment | | | | | No Site Access. Too much snow. | | | Flow estimated. |
| **Laboratory Parameters [2]** | | | | | | | | |
| Name of Certified Lab [3] | | | | | | ACZ | | |
| Lab Reference # | | | | | | L81021-08 | | |
| Sample Date | | | | | | 6/5/2023 | | |
| Lab Test Date | | | | | | 6/12-6/24 | | |
| Sampled By | | | | | | PH | | |
| Alkalinity (Total CaCO3) | mg/L | 163 | 266 | 206 | | | | |
| Aluminum, dissolved | mg/L | -0.05 | 0.21 | 0.09 | | | | |
| Arsenic, total recoverable | mg/L | 0.0004 | 0.0045 | 0.0022 | | | | |
| Bicarbonate as CaCO3 | mg/L | 161 | 266 | 203 | | | | |
| Boron, dissolved | mg/L | -0.02 | 0.04 | 0.03 | | | | |
| Cadmium, dissolved | mg/L | -0.008 | -0.005 | -0.005 | | | | |
| Calcium, dissolved | mg/L | 2.6 | 21.9 | 12.7 | | | | |
| Carbonate as CaCO3 | mg/L | -10 | 7 | 4 | | | | |
| Cation-Anion Balance | % | -5.8 | 3.7 | -1.3 | | | | |
| Chloride | mg/L | 1.6 | 7.2 | 3.3 | | | | |
| Conductivity @25C | umhos/cm | 374 | 526 | 430 | | 363 | | |
| Copper, dissolved | mg/L | -0.01 | 0.01 | 0.01 | | | | |
| Hardness as CaCO3 (dissolved) | mg/L | 9 | 82 | 47 | | | | |
| Hydroxide as CaCO3 | mg/L | -10 | -2 | -2 | | | | |
| Iron, dissolved | mg/L | -0.03 | 0.52 | 0.18 | | 0.254 | | |
| Iron, total | mg/L | 0.63 | 18.10 | 8.82 | | 0.991 | | |
| Lead, dissolved | mg/L | -0.03 | -0.03 | -0.03 | | | | |
| Magnesium, dissolved | mg/L | 0.7 | 6.5 | 3.8 | | | | |
| Manganese, dissolved | mg/L | -0.01 | 0.08 | 0.03 | | | | |
| Manganese, total | mg/L | -0.01 | 0.35 | 0.15 | | | | |
| Mercury, total | mg/L | -0.0002 | -0.0002 | -0.0002 | | | | |
| Molybdenum, dissolved | mg/L | -0.02 | -0.02 | -0.02 | | | | |
| Nitrate/Nitrite as N | mg/L | -0.02 | 0.77 | 0.17 | | | | |
| pH | units | 7.3 | 8.4 | 8.1 | | 8.5 | H | |
| Phosphate | mg/L | 0.06 | 0.19 | 0.11 | | | | |
| Phosphorus, ortho dissolved | mg/L | 0.02 | 0.06 | 0.04 | | | | |
| Potassium, dissolved | mg/L | 0.6 | 1.7 | 1.0 | | | | |
| Residue, Filterable (TDS) @180C | mg/L | 260 | 760 | 381 | | 230 | | |
| Residue, Non-Filterable (TSS) @105C | mg/L | 14.0 | 312.0 | 154.6 | | 35.0 | | |
| Selenium, total recoverable | mg/L | -0.0001 | 0.003 | 0.001 | | | | |
| Sodium Adsorption Ratio in Water | calc. | 3.5 | 13.0 | 7.0 | | | | |
| Sodium, dissolved | mg/L | 64.5 | 102.0 | 79.0 | | | | |
| Sulfate | mg/L | -1 | 38.9 | 21.1 | | | | |
| Sum of Anions | meq/L | 3.9 | 5.5 | 4.6 | | | | |
| Sum of Cations | meq/L | 4.1 | 5.0 | 4.5 | | | | |
| TDS (calculated) | mg/L | 213 | 280 | 246 | | | | |
| TDS (ratio - measured/calculated) | calc. | 1.12 | 2.71 | 1.50 | | | | |
| Zinc, dissolved | mg/L | -0.01 | 0.01 | 0.01 | | | | |

[1] Baseline period is July 2018 through July 2019.

[2] Negative values denote readings below lab detection levels.

[3] ACZ Laboratory, Steamboat Springs, CO.

[4] ACZ Lab Qualifiers: U - Analyte was analyzed for but not detected at the indicated MDL.
H - Holding time exceeded; pH is a field test with an immediate hold time.

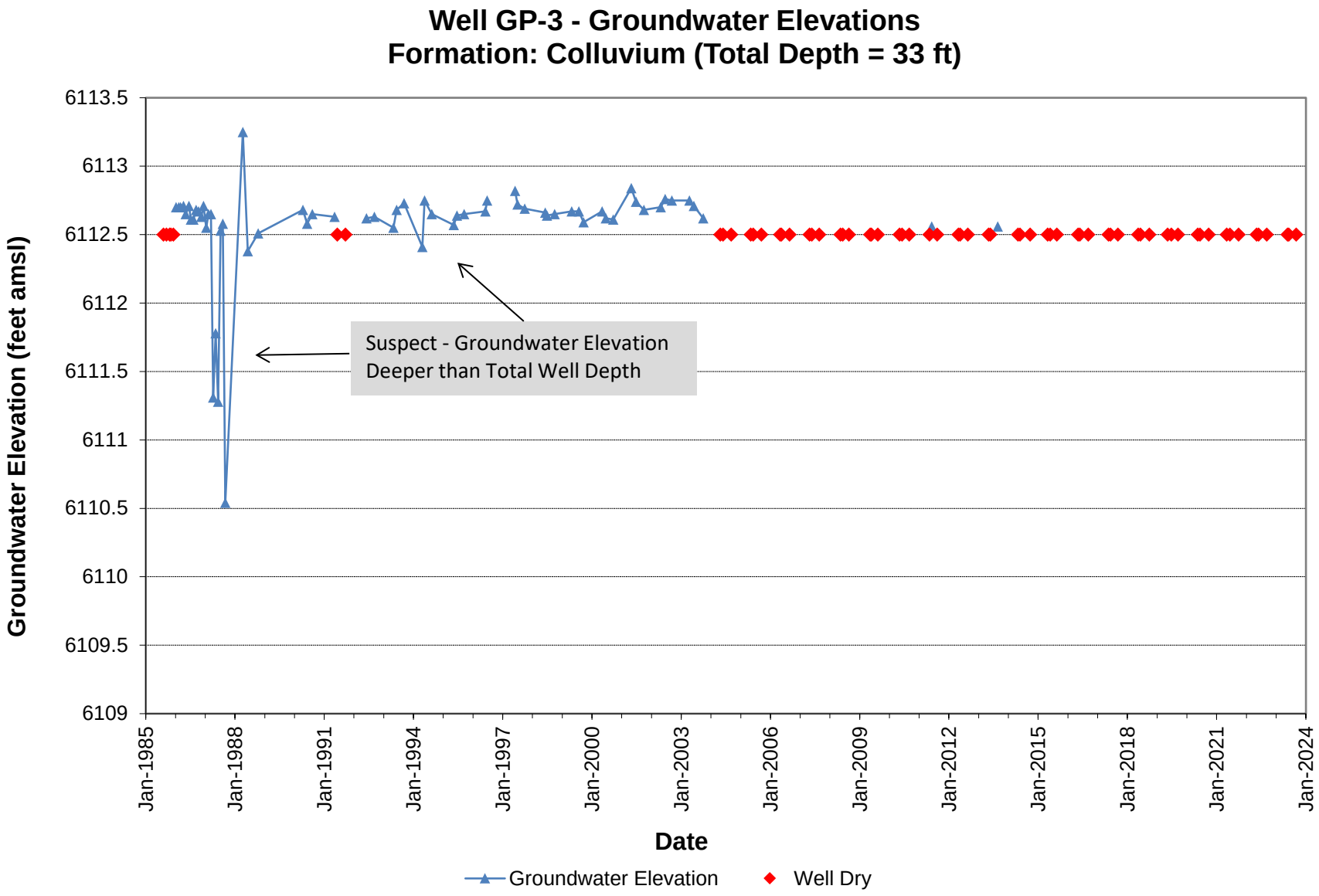
B - Analyte concentration detected at a value between method detection limit (MDL) and practical quantitation limit (PQL). The associated value is an estimated quantity.

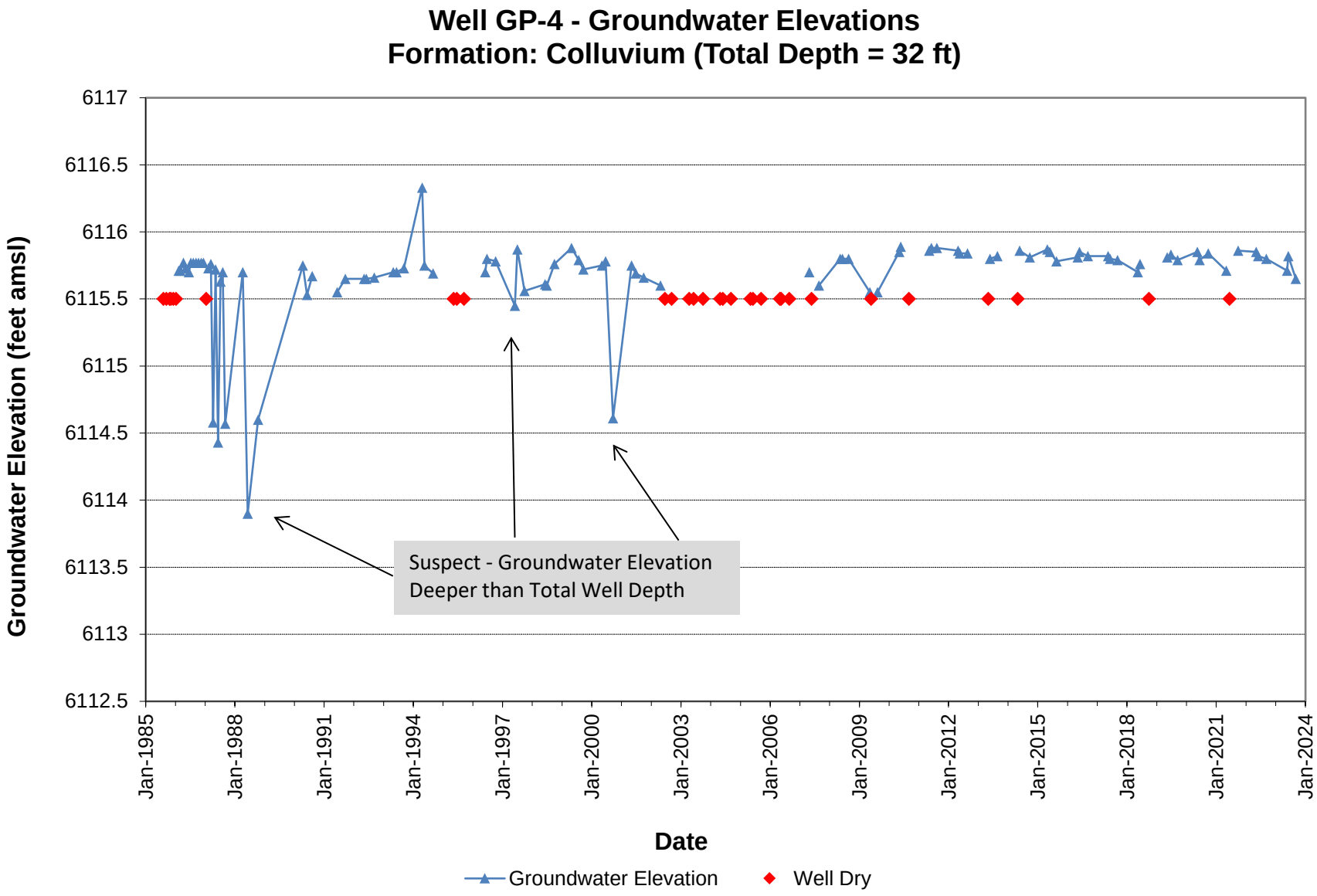
[5] Average (mean) value calc using 1/2 of detection limit for readings below lab detection limits unless all readings are below lab detection limit.

Shaded cells indicate parameters elevated greater than ten percent above the maximum baseline value.

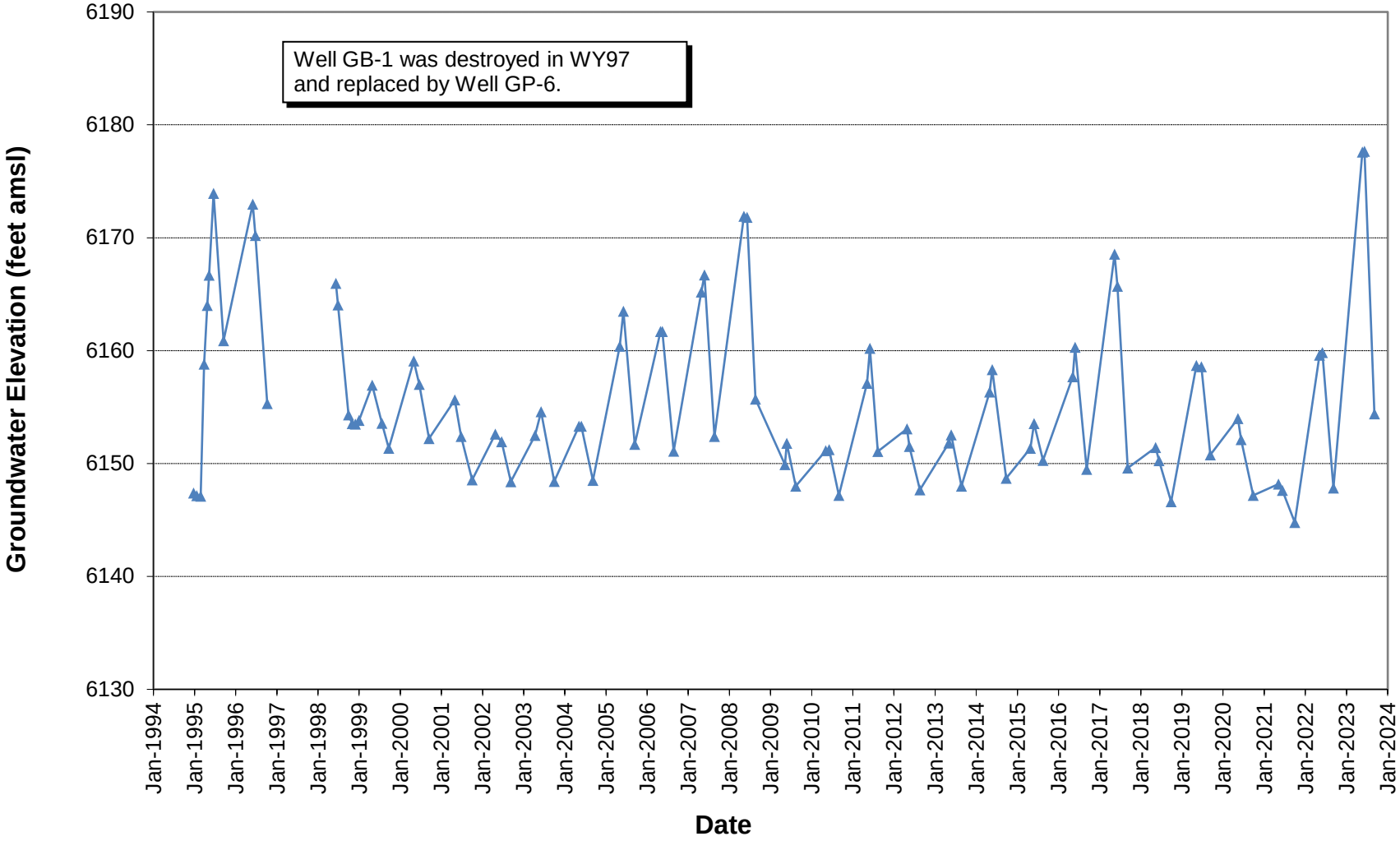
# APPENDIX F

## WELLS - WATER LEVEL ELEVATION GRAPHS

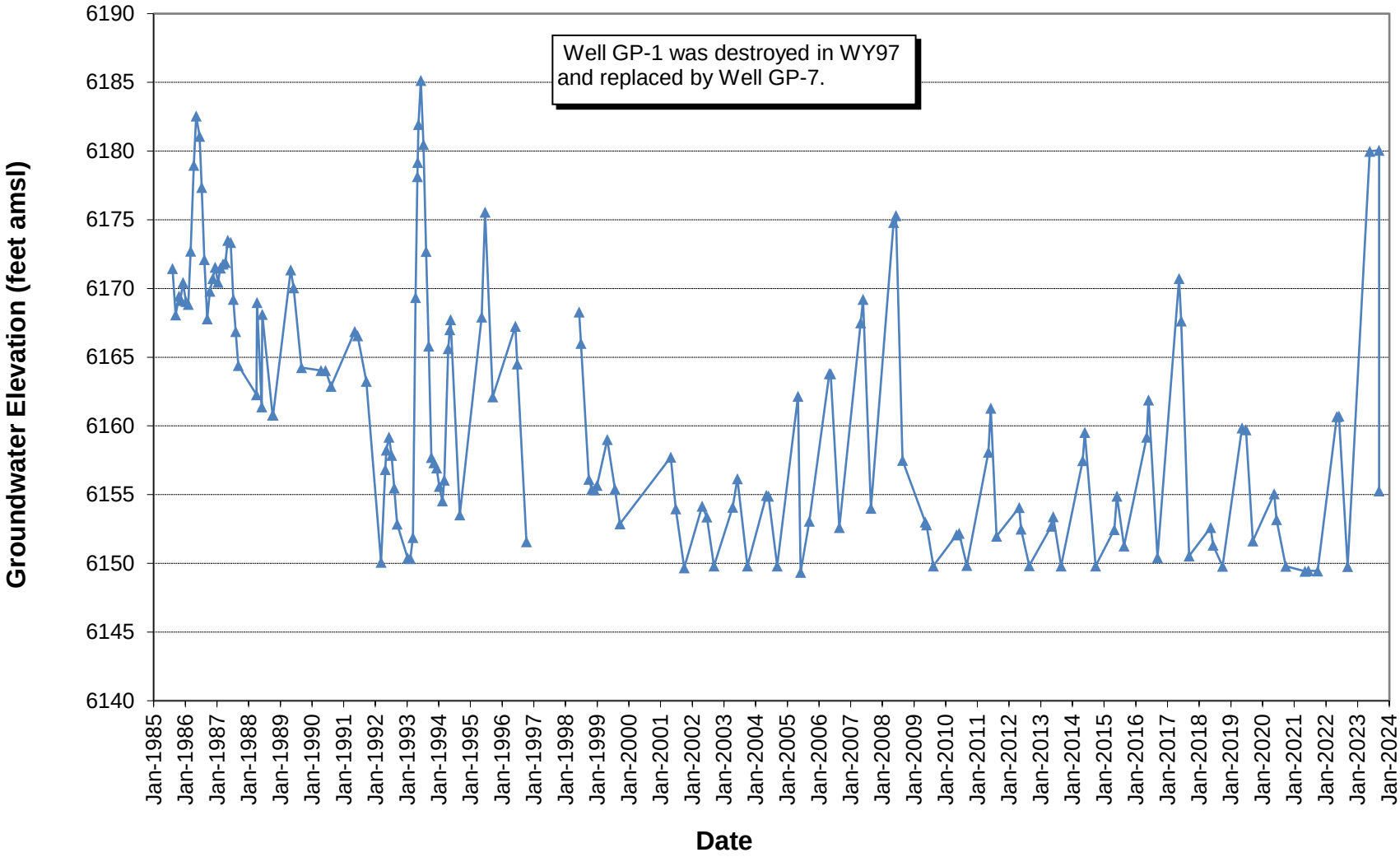

Well GP-3 - Groundwater Elevations
Formation: Colluvium (Total Depth = 33 ft)
Groundwater Elevation (feet amsl)
6113.5
6113
6112.5
6112
6111.5
6111
6110.5
6110
6109.5
6109
Jan-1985
Jan-1988
Jan-1991
Jan-1994
Jan-1997
Jan-2000
Jan-2003
Jan-2006
Jan-2009
Jan-2012
Jan-2015
Jan-2018
Jan-2021
Jan-2024
Date
Suspect - Groundwater Elevation
Deeper than Total Well Depth
Groundwater Elevation
Well Dry

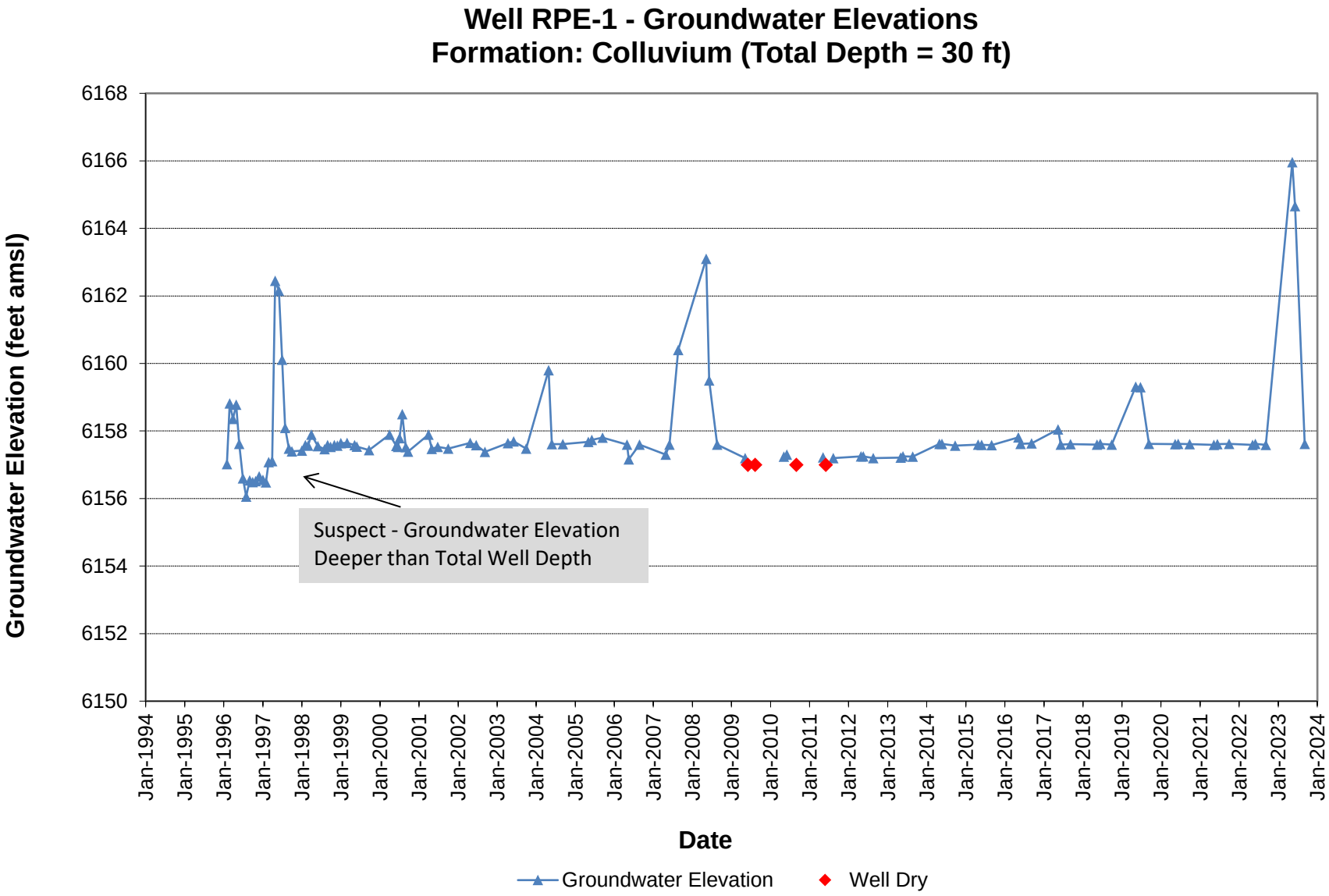

Well GP-4 - Groundwater Elevations
Formation: Colluvium (Total Depth = 32 ft)
Groundwater Elevation (feet amsl)
6117
6116.5
6116
6115.5
6115
6114.5
6114
6113.5
6113
6112.5
Jan-1985
Jan-1988
Jan-1991
Jan-1994
Jan-1997
Jan-2000
Jan-2003
Jan-2006
Jan-2009
Jan-2012
Jan-2015
Jan-2018
Jan-2021
Jan-2024
Date
Suspect - Groundwater Elevation
Deeper than Total Well Depth
Groundwater Elevation
Well Dry

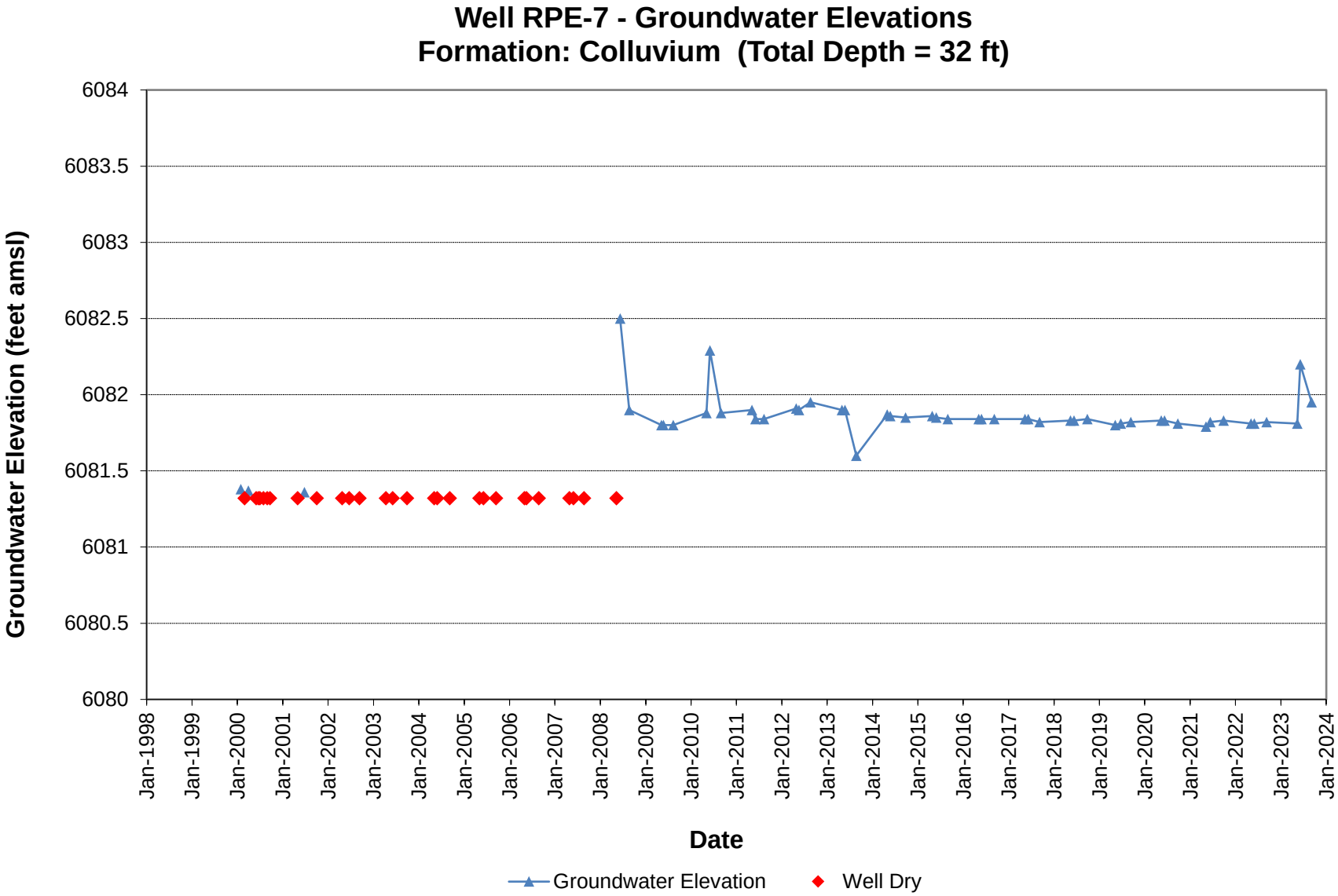
## Well GP-6 - Groundwater Elevations
## Formation: Sylvester Gulch Alluvium (Total Depth = 83 ft)

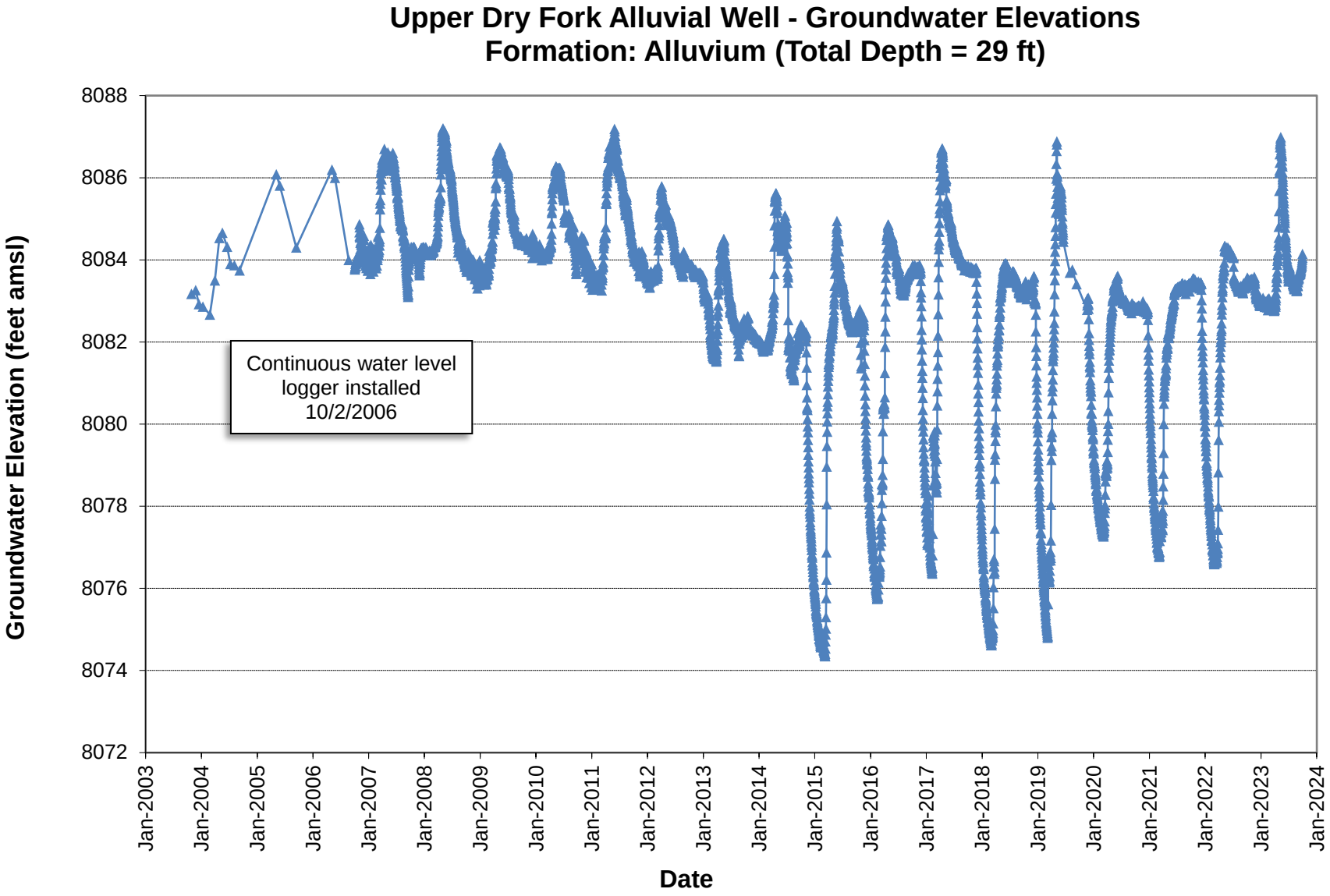


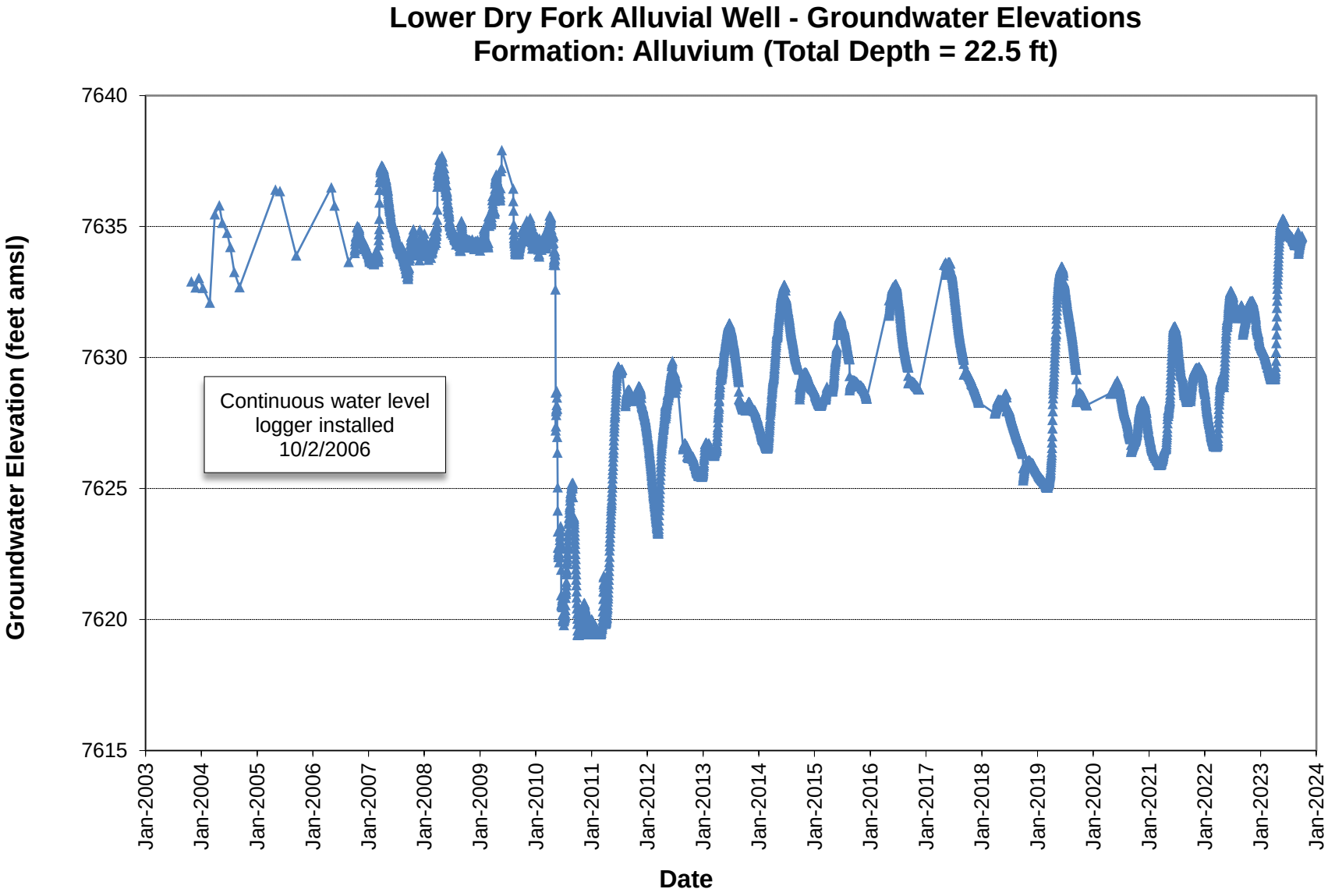
## Well GP-7 - Groundwater Elevations
## Formation: Sylvester Gulch Alluvium (Total Depth = 55 ft)

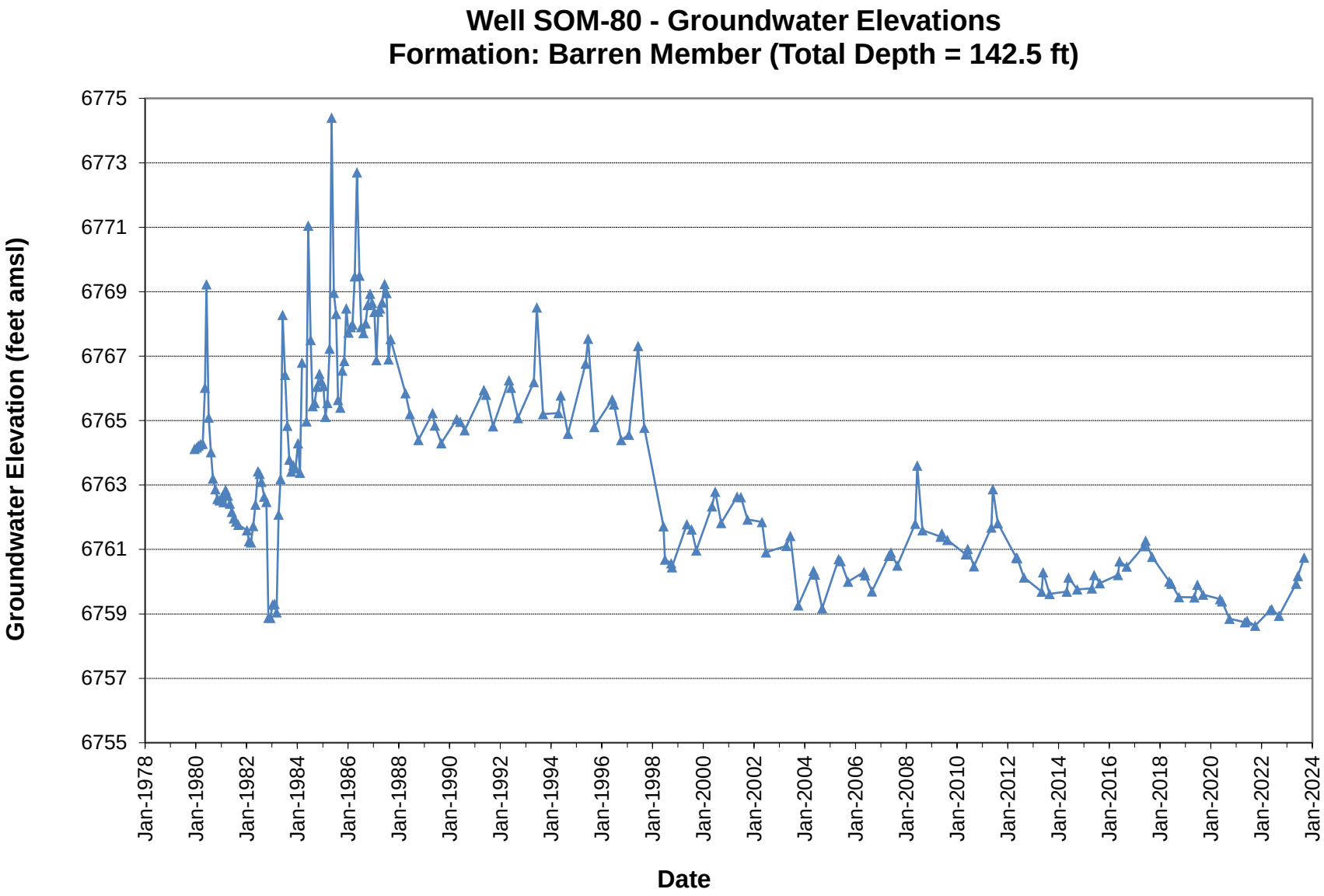


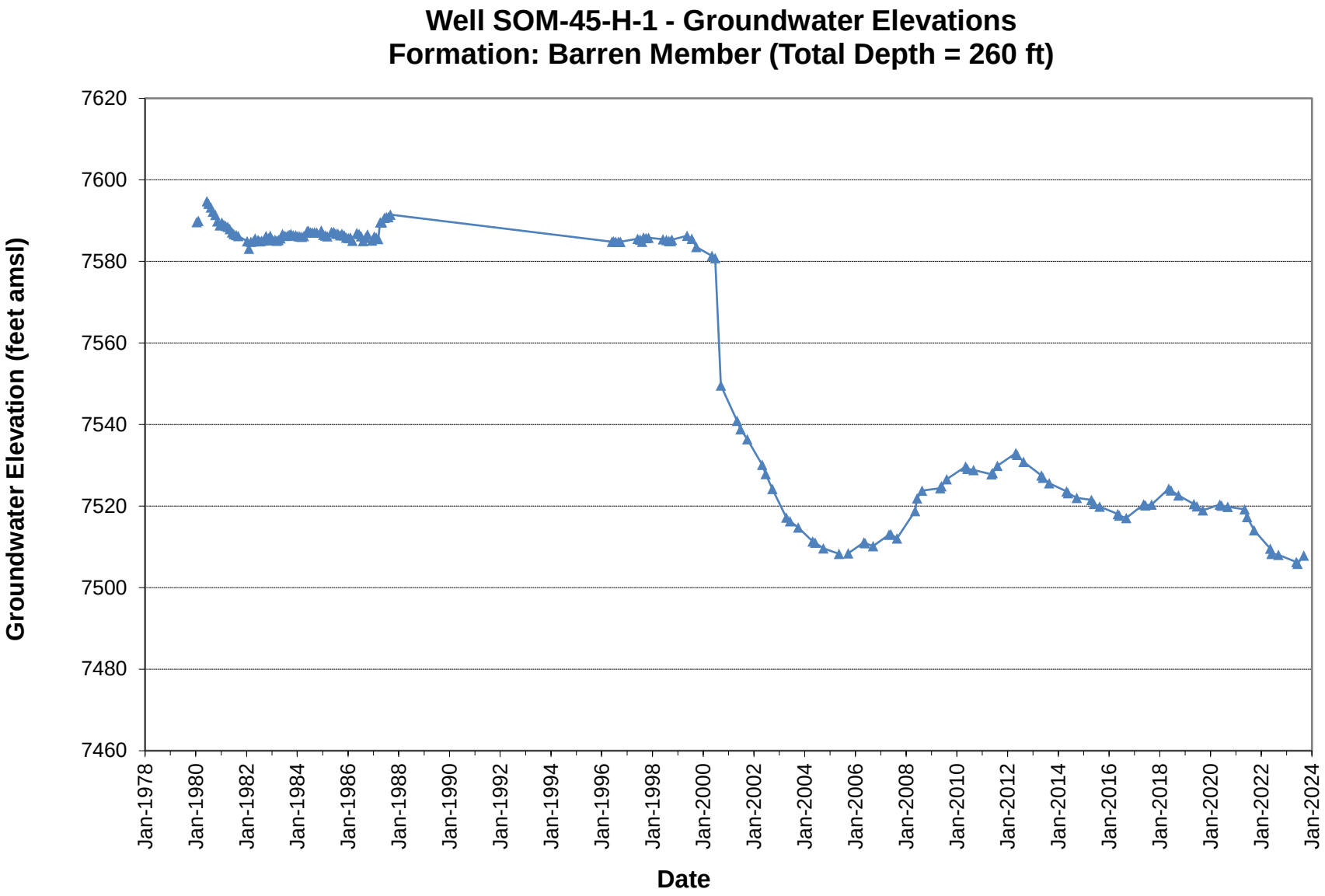

Well RPE-1 - Groundwater Elevations
Formation: Colluvium (Total Depth = 30 ft)
Groundwater Elevation (feet amsl)
6168
6166
6164
6162
6160
6158
6156
6154
6152
6150
Jan-1994
Jan-1995
Jan-1996
Jan-1997
Jan-1998
Jan-1999
Jan-2000
Jan-2001
Jan-2002
Jan-2003
Jan-2004
Jan-2005
Jan-2006
Jan-2007
Jan-2008
Jan-2009
Jan-2010
Jan-2011
Jan-2012
Jan-2013
Jan-2014
Jan-2015
Jan-2016
Jan-2017
Jan-2018
Jan-2019
Jan-2020
Jan-2021
Jan-2022
Jan-2023
Jan-2024
Suspect - Groundwater Elevation
Deeper than Total Well Depth
Date
Groundwater Elevation
Well Dry

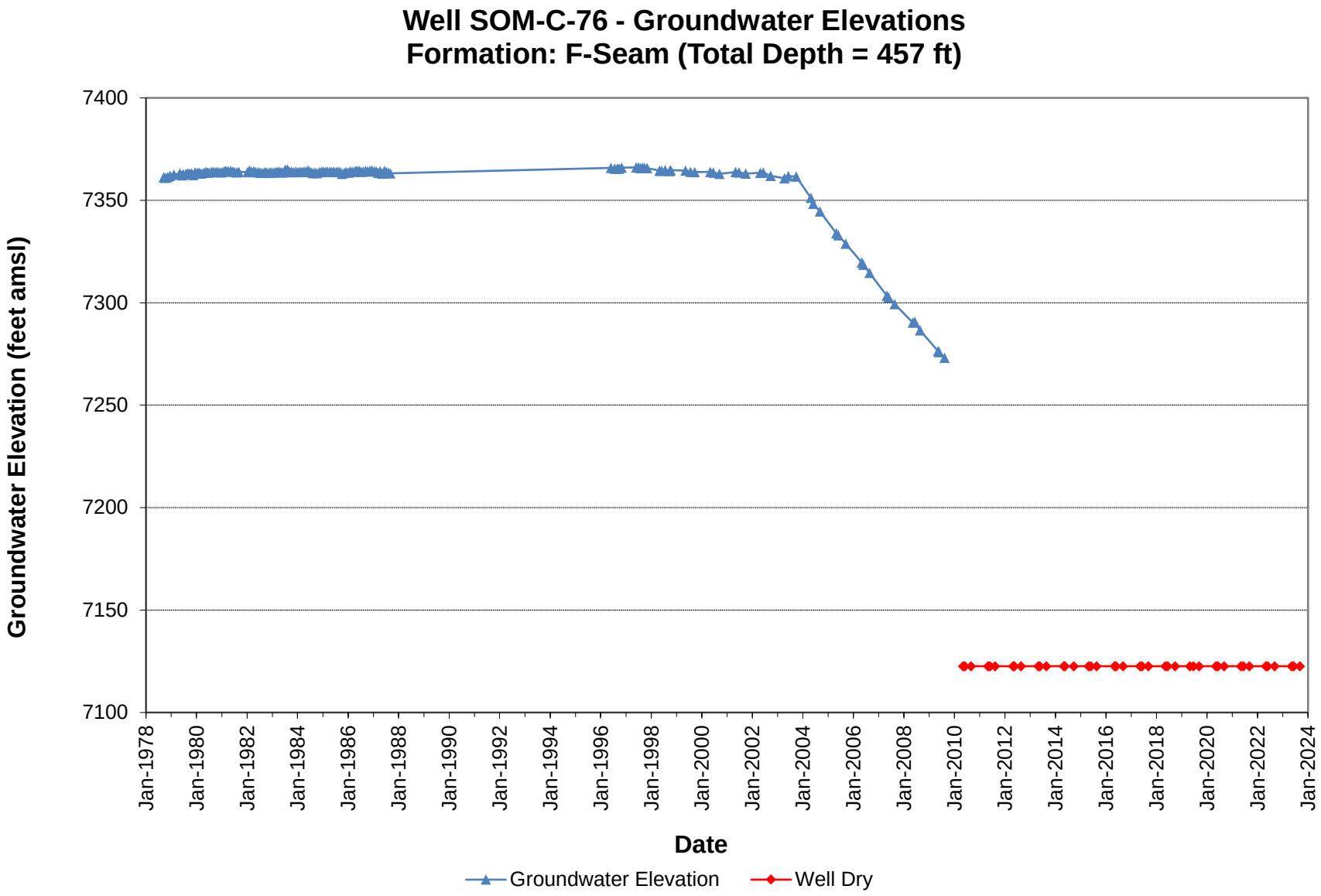

Well RPE-7 - Groundwater Elevations
Formation: Colluvium (Total Depth = 32 ft)
Groundwater Elevation (feet amsl)
6084
6083.5
6083
6082.5
6082
6081.5
6081
6080.5
6080
Jan-1998
Jan-1999
Jan-2000
Jan-2001
Jan-2002
Jan-2003
Jan-2004
Jan-2005
Jan-2006
Jan-2007
Jan-2008
Jan-2009
Jan-2010
Jan-2011
Jan-2012
Jan-2013
Jan-2014
Jan-2015
Jan-2016
Jan-2017
Jan-2018
Jan-2019
Jan-2020
Jan-2021
Jan-2022
Jan-2023
Jan-2024
Date
Groundwater Elevation
Well Dry

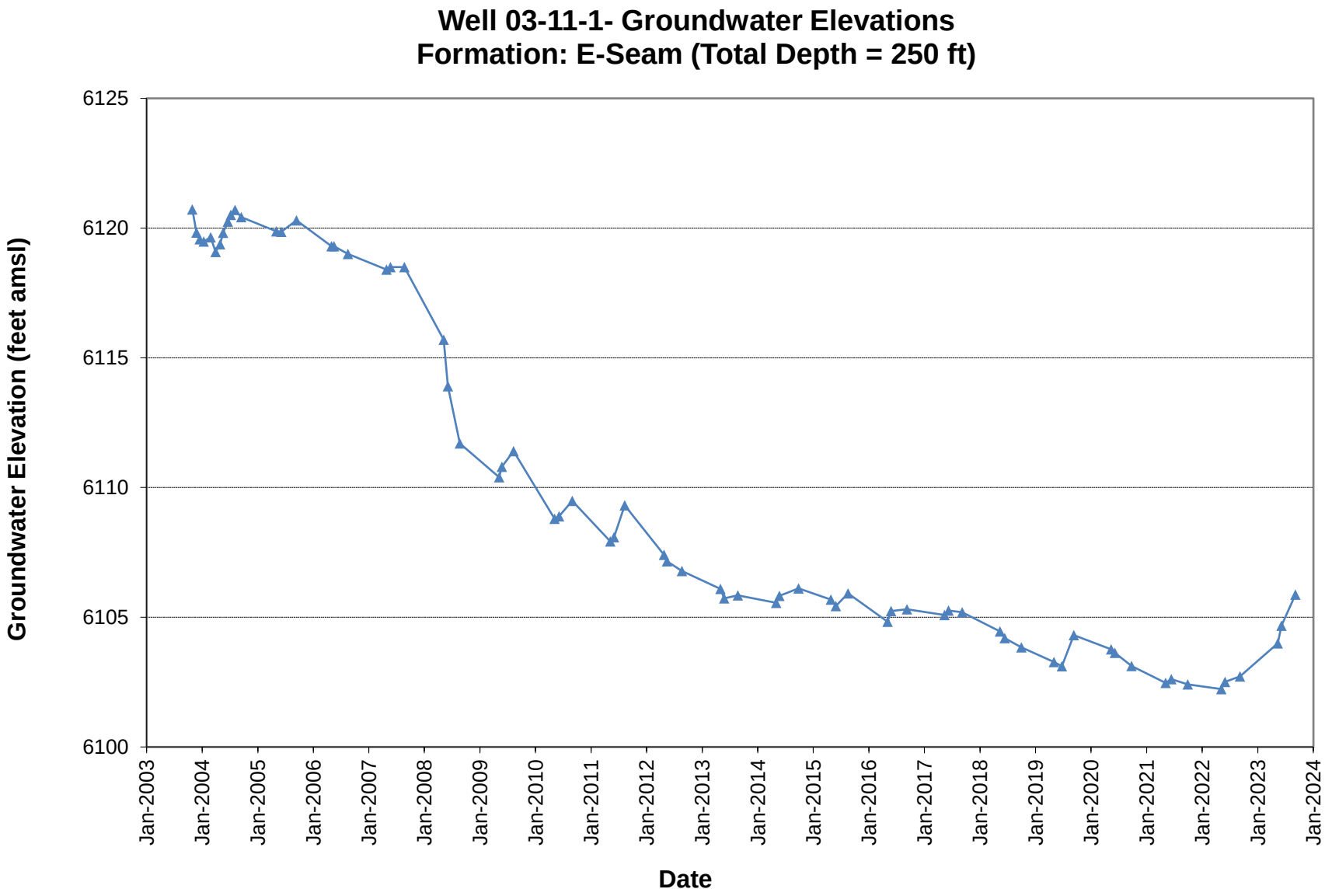

Upper Dry Fork Alluvial Well - Groundwater Elevations
Formation: Alluvium (Total Depth = 29 ft)
Groundwater Elevation (feet amsl)
8088
8086
8084
8082
8080
8078
8076
8074
8072
Continuous water level logger installed 10/2/2006
Jan-2003
Jan-2004
Jan-2005
Jan-2006
Jan-2007
Jan-2008
Jan-2009
Jan-2010
Jan-2011
Jan-2012
Jan-2013
Jan-2014
Jan-2015
Jan-2016
Jan-2017
Jan-2018
Jan-2019
Jan-2020
Jan-2021
Jan-2022
Jan-2023
Jan-2024
Date


Lower Dry Fork Alluvial Well - Groundwater Elevations
Formation: Alluvium (Total Depth = 22.5 ft)
Groundwater Elevation (feet amsl)
7640
7635
7630
7625
7620
7615
Continuous water level logger installed 10/2/2006
Jan-2003
Jan-2004
Jan-2005
Jan-2006
Jan-2007
Jan-2008
Jan-2009
Jan-2010
Jan-2011
Jan-2012
Jan-2013
Jan-2014
Jan-2015
Jan-2016
Jan-2017
Jan-2018
Jan-2019
Jan-2020
Jan-2021
Jan-2022
Jan-2023
Jan-2024
Date

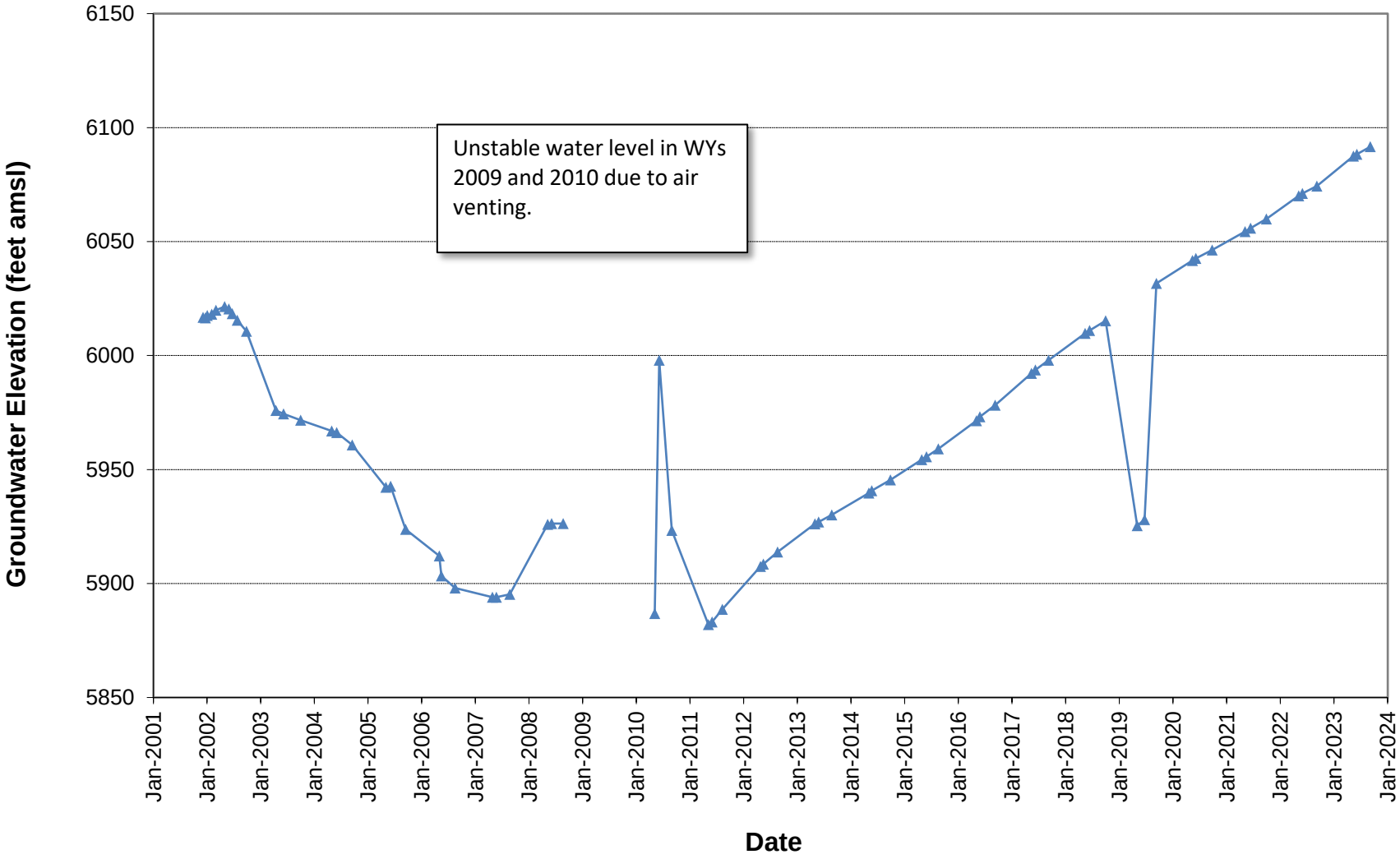

Well SOM-80 - Groundwater Elevations
Formation: Barren Member (Total Depth = 142.5 ft)
Groundwater Elevation (feet amsl)
6775
6773
6771
6769
6767
6765
6763
6761
6759
6757
6755
Jan-1978
Jan-1980
Jan-1982
Jan-1984
Jan-1986
Jan-1988
Jan-1990
Jan-1992
Jan-1994
Jan-1996
Jan-1998
Jan-2000
Jan-2002
Jan-2004
Jan-2006
Jan-2008
Jan-2010
Jan-2012
Jan-2014
Jan-2016
Jan-2018
Jan-2020
Jan-2022
Jan-2024
Date


Well SOM-45-H-1 - Groundwater Elevations
Formation: Barren Member (Total Depth = 260 ft)
Groundwater Elevation (feet amsl)
7620
7600
7580
7560
7540
7520
7500
7480
7460
Jan-1978
Jan-1980
Jan-1982
Jan-1984
Jan-1986
Jan-1988
Jan-1990
Jan-1992
Jan-1994
Jan-1996
Jan-1998
Jan-2000
Jan-2002
Jan-2004
Jan-2006
Jan-2008
Jan-2010
Jan-2012
Jan-2014
Jan-2016
Jan-2018
Jan-2020
Jan-2022
Jan-2024
Date


Well SOM-C-76 - Groundwater Elevations
Formation: F-Seam (Total Depth = 457 ft)
Groundwater Elevation (feet amsl)
7400
7350
7300
7250
7200
7150
7100
Jan-1978
Jan-1980
Jan-1982
Jan-1984
Jan-1986
Jan-1988
Jan-1990
Jan-1992
Jan-1994
Jan-1996
Jan-1998
Jan-2000
Jan-2002
Jan-2004
Jan-2006
Jan-2008
Jan-2010
Jan-2012
Jan-2014
Jan-2016
Jan-2018
Jan-2020
Jan-2022
Jan-2024
Date
Groundwater Elevation
Well Dry


Well 03-11-1- Groundwater Elevations
Formation: E-Seam (Total Depth = 250 ft)
Groundwater Elevation (feet amsl)
6125
6120
6115
6110
6105
6100
Jan-2003
Jan-2004
Jan-2005
Jan-2006
Jan-2007
Jan-2008
Jan-2009
Jan-2010
Jan-2011
Jan-2012
Jan-2013
Jan-2014
Jan-2015
Jan-2016
Jan-2017
Jan-2018
Jan-2019
Jan-2020
Jan-2021
Jan-2022
Jan-2023
Jan-2024
Date

## Well 01-11-1 - Groundwater Elevations
## Formation: B-Seam (Total Depth = 638 ft)



# APPENDIX G

## WELLS - LABORATORY AND FIELD WATER QUALITY DATA

**Well GP-3**
**Water Quality and Field Parameters**

| **Mountain Coal West Elk Mine - Water Year 2023** | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Monitoring Location: Well GP-3** | | **Baseline [1]** | | | **Water Year 2023** | | |
| Description | Units | Minimum | Maximum | Mean | 5/20/2023 | 6/6/2023 | 9/5/2023 |
| **Field Parameters** | | | | | | | |
| Water Level Depth | feet | | | | dry | dry | dry |
| pH (Field) | SU | | | | | | |
| Conductivity (Field) | µmhos/cm | | | | | | |
| Temperature (Field- F) | $^{o}$F | | | | | | |
| Temperature (Field) | $^{o}$C | | | | | | |
| Comment | | | | | | | |
| **Laboratory Parameters** | | | | | | | |
| Name of Certified Lab | | | | | | | |
| Lab Reference # | | | | | | | |
| Sample Date | | | | | | | |
| Lab Test Date | | | | | | | |
| Sampled By | | | | | | | |
| Conductivity @25C | µmhos/cm | | | | | | |
| Iron, dissolved | mg/L | | | | | | |
| Iron, total | mg/L | | | | | | |
| pH | SU | | | | | | |
| Residue, Filterable (TDS) @180C | mg/L | | | | | | |
| Residue, Non-Filterable (TSS) @105C | mg/L | | | | | | |

[1] No baseline data.

**Well GP-4**
**Water Quality and Field Parameters**

| Mountain Coal West Elk Mine - Water Year 2023 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Monitoring Location: Well GP-4** | | **Baseline [1]** | | | **Water Year 2023** | | |
| Description | Units | Minimum | Maximum | Mean | 5/20/2023 | 6/6/2023 | 9/5/2023 |
| **Field Parameters** | | | | | | | |
| Water Level Depth | feet | | | | 31.79 | 31.68 | 31.85 |
| pH (Field) | SU | | | | | | |
| Conductivity (Field) | µmhos/cm | | | | | | |
| Temperature (Field- F) | $^{o}$F | | | | | | |
| Temperature (Field) | $^{o}$C | | | | | | |
| Comment | | | | | Not enough water for sample. | Not enough water for sample. | Not enough water for sample. |
| **Laboratory Parameters** | | | | | | | |
| Name of Certified Lab | | | | | | | |
| Lab Reference # | | | | | | | |
| Sample Date | | | | | | | |
| Lab Test Date | | | | | | | |
| Sampled By | | | | | | | |
| Conductivity @25C | µmhos/cm | | | | | | |
| Iron, dissolved | mg/L | | | | | | |
| Iron, total | mg/L | | | | | | |
| pH | SU | | | | | | |
| Residue, Filterable (TDS) @180C | mg/L | | | | | | |
| Residue, Non-Filterable (TSS) @105C | mg/L | | | | | | |

[1] No baseline data.

## Well GP-6
## Water Quality and Field Parameters

| Mountain Coal West Elk Mine - Water Year 2023 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Monitoring Location Well GP-6** | | **Baseline [1]** | | | **Water Year 2023** | | | |
| Description | Units | Minimum | Maximum | Mean | 5/20/2023 | 6/9/2023 | 9/5/2023 | Q[4] |
| **Field Parameters** | | | | | | | | |
| Water Level Depth | feet | | | | 27.22 | 27.15 | 50.39 | |
| pH (Field) | SU | | | | 7.39 | 7.48 | 7.2 | |
| Conductivity (Field) | µmhos/cm | | | | 1,231 | 1,225 | 1,209 | |
| Temperature (Field) | °C | | | | 12.3 | 12.7 | 13.5 | |
| Comment | | | | | | | | |
| **Laboratory Parameters [2]** | | | | | | | | |
| Name of Certified Lab [3] | | | | | | | ACZ | |
| Lab Reference # | | | | | | | L82933-05 | |
| Sample Date | | | | | | | 9/5/2023 | |
| Lab Test Date | | | | | | | 9/11-9/26 | |
| Sampled By | | | | | | | PH | |
| Conductivity @25C | µmhos/cm | | | | | | 1,170 | |
| Iron, dissolved | mg/L | | | | | | -0.06 | U |
| Iron, total | mg/L | | | | | | 0.106 | B |
| pH | SU | | | | | | 8.1 | H |
| Residue, Filterable (TDS) @180C | mg/L | | | | | | 732 | |
| Residue, Non-Filterable (TSS) @105C | mg/L | | | | | | -5 | U |

[1] No baseline data.

[2] Negative values denote readings below lab detection levels.

[3] ACZ Laboratory, Steamboat Springs, CO.

[4] ACZ Lab Qualifiers: U - Analyte was analyzed for but not detected at the indicated MDL.
H - Holding time exceeded; pH is a field test with an immediate hold time.
B - Analyte conc detected at a value between method detection limit (MDL) and practical quantitation limit (PQL). The associated value is an estimated quantity.

## Well GP-7
## Water Quality and Field Parameters

| Mountain Coal West Elk Mine - Water Year 2023 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Monitoring Location: Well GP-7** | | **Baseline [1]** | | | **Water Year 2023** | | | |
| Description | Units | Minimum | Maximum | Mean | 5/20/2023 | 9/5/2023 | 9/5/2023 | Q[4] |
| **Field Parameters** | | | | | | | | |
| Water Level Depth | feet | | | | 25.71 | 25.65 | 50.42 | |
| pH (Field) | SU | | | | 7.01 | 7.18 | 6.90 | |
| Conductivity (Field) | µmhos/cm | | | | 1,551 | 1,520 | 1,665 | |
| Temperature (Field) | °C | | | | 11.7 | 12.2 | 12.6 | |
| Comment | | | | | | | | |
| **Laboratory Parameters [2]** | | | | | | | | |
| Name of Certified Lab [3] | | | | | | | ACZ | |
| Lab Reference # | | | | | | | L82933-06 | |
| Sample Date | | | | | | | 9/5/2023 | |
| Lab Test Date | | | | | | | 9/9-9/26 | |
| Sampled By | | | | | | | PH | |
| Conductivity @25C | µmhos/cm | | | | | | 1,600 | |
| Iron, dissolved | mg/L | | | | | | 0.060 | B |
| Iron, total | mg/L | | | | | | 0.219 | |
| pH | SU | | | | | | 7.9 | H |
| Residue, Filterable (TDS) @180C | mg/L | | | | | | 1,050 | |
| Residue, Non-Filterable (TSS) @105C | mg/L | | | | | | 10.0 | B |

[1] No baseline data.

[2] ACZ Laboratory, Steamboat Springs, CO.

[3] Negative values denote readings below lab detection levels.

[4] ACZ Lab Qualifiers: U - Analyte was analyzed for but not detected at the indicated MDL.
H - Holding time exceeded; pH is a field test with an immediate hold time.
B - Analyte conc detected at a value between method detection limit (MDL) and practical quantitation limit (PQL). The associated value is an estimated quantity.

**Well RPE-1**
**Water Quality and Field Parameters**

| Mountain Coal West Elk Mine - Water Year 2023 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Monitoring Location: Well RPE-1** | | **Baseline [1]** | | | **Water Year 2023** | | |
| Description | Units | Minimum | Maximum | Mean | 5/12/2023 | 6/6/2023 | 9/5/2023 |
| **Field Parameters** | | | | | | | |
| Water Level Depth | feet | | | | 21.04 | 22.34 | 29.38 |
| pH (Field) | SU | | | | 7.69 | 7.22 | |
| Conductivity (Field) | µmhos/cm | | | | 927 | 2,360 | |
| Temperature (Field) | °C | | | | 7.5 | 9.1 | |
| Comment | | | | | | | Not enough water for sample. |
| **Laboratory Parameters** | | | | | | | |
| Name of Certified Lab | | | | | | | |
| Lab Reference # | | | | | | | |
| Sample Date | | | | | | | |
| Lab Test Date | | | | | | | |
| Sampled By | | | | | | | |
| Conductivity @25C | µmhos/cm | | | | | | |
| Iron, dissolved | mg/L | | | | | | |
| Iron, total | mg/L | | | | | | |
| pH | SU | | | | | | |
| Residue, Filterable (TDS) @180C | mg/L | | | | | | |
| Residue, Non-Filterable (TSS) @105C | mg/L | | | | | | |

[1] No baseline data.

**Well RPE-7**
**Water Quality and Field Parameters**

| Mountain Coal West Elk Mine - Water Year 2023 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Monitoring Location: Well RPE-7** | | **Baseline [1]** | | | **Water Year 2023** | | |
| Description | Units | Minimum | Maximum | Mean | 5/12/2023 | 6/6/2023 | 9/5/2023 |
| **Field Parameters** | | | | | | | |
| Water Level Depth | feet | | | | 34.49 | 34.10 | 34.35 |
| pH (Field) | SU | | | | | | |
| Conductivity (Field) | µmhos/cm | | | | | | |
| Temperature (Field) | $^{o}$C | | | | | | |
| Comment | | | | | Not enough water for sample. | Not enough water for sample. | Not enough water for sample. |
| **Laboratory Parameters** | | | | | | | |
| Name of Certified Lab | | | | | | | |
| Lab Reference # | | | | | | | |
| Sample Date | | | | | | | |
| Lab Test Date | | | | | | | |
| Sampled By | | | | | | | |
| Conductivity @25C | µmhos/cm | | | | | | |
| Iron, dissolved | mg/L | | | | | | |
| Iron, total | mg/L | | | | | | |
| pH | SU | | | | | | |
| Residue, Filterable (TDS) @180C | mg/L | | | | | | |
| Residue, Non-Filterable (TSS) @105C | mg/L | | | | | | |

[1] No baseline data.

## Upper Dry Fork Alluvial Well
## Water Quality and Field Parameters

| Mountain Coal West Elk Mine - Water Year 2023 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Monitoring Location: Upper Dry Fk Alluvial Well** | | **Baseline [1]** | | | **Water Year 2023** | | | |
| Description | Units | Minimum | Maximum | Mean [5] | 5/16/2023 | 6/8/2023 | 9/6/2023 | Q[4] |
| **Field Parameters** | | | | | | | | |
| Water Level Depth | feet | | | | 13.36 | 15.18 | 16.31 | |
| pH (Field) | SU | | | | 7.66 | 7.55 | 7.09 | |
| Conductivity (Field) | µmhos/cm | | | | 835 | 820 | 800 | |
| Temperature (Field) | °C | | | | 8.9 | 7.8 | 10.8 | |
| Comment | | | | | | | | |
| **Laboratory Parameters [2]** | | | | | | | | |
| Name of Certified Lab [3] | | | | | | | ACZ | |
| Lab Reference # | | | | | | | L83003-03 | |
| Sample Date | | | | | | | 9/6/2023 | |
| Lab Test Date | | | | | | | 9/12-9/26 | |
| Sampled By | | | | | | | PH | |
| Alkalinity (Total CaCO3) | mg/L | 227 | 266 | 248 | | | | |
| Arsenic, dissolved | mg/L | -0.0005 | 0.0006 | 0.0002 | | | | |
| Bicarbonate as CaCO3 | mg/L | 227 | 266 | 248 | | | | |
| Cadmium, dissolved | mg/L | -0.005 | -0.005 | -0.005 | | | | |
| Calcium, dissolved | mg/L | 3.2 | 5.1 | 3.7 | | | | |
| Carbonate as CaCO3 | mg/L | -2 | -2 | -2 | | | | |
| Cation - Anion Balance | % | 0.9 | 3.9 | 1.9 | | | | |
| Chloride | mg/L | -1 | 6 | 4 | | | | |
| Conductivity @25C | µmhos/cm | 493 | 509 | 503 | | | 748 | |
| Hardness as CaCO3 | mg/L | 10 | 16 | 12 | | | | |
| Hydroxide as CaCO3 | mg/L | -2 | -2 | -2 | | | | |
| Iron, dissolved | mg/L | 0.03 | 0.49 | 0.19 | | | -0.06 | U |
| Iron, total | mg/L | 1.3 | 25.9 | 13.6 | | | 0.118 | B |
| Lead, dissolved | mg/L | -0.04 | -0.04 | -0.04 | | | | |
| Magnesium, dissolved | mg/L | -0.2 | 0.7 | 0.4 | | | | |
| Manganese, dissolved | mg/L | 0.067 | 0.101 | 0.081 | | | | |
| Manganese, total | mg/L | 0.109 | 0.349 | 0.229 | | | | |
| Mercury, dissolved | mg/L | -0.0002 | 0.0015 | 0.0002 | | | | |
| Nitrate/Nitrite (as N) | mg/L | 0.04 | 0.87 | 0.16 | | | | |
| Nitrogen, ammonia | mg/L | -0.05 | 0.20 | 0.10 | | | | |
| pH | SU | 8.0 | 8.1 | 8.0 | | | 8.0 | H |
| Phosphate | mg/L | 0.1 | 0.4 | 0.2 | | | | |
| Phosphorus, ortho dissolved | mg/L | 0.03 | 0.13 | 0.06 | | | | |
| Potassium, dissolved | mg/L | 0.9 | 2.7 | 1.8 | | | | |
| Residue, Filterable (TDS) @180C | mg/L | 290 | 390 | 326 | | | 466 | |
| Residue, Non-Filterable (TSS) @105C | mg/L | | | | | | 5.0 | B |
| Selenium, dissolved | mg/L | -0.0010 | 0.0003 | 0.0003 | | | | |
| Sodium Absorption Ratio (SAR) | calc. | 16 | 17 | 17 | | | | |
| Sodium, dissolved | mg/L | 113 | 144 | 126 | | | | |
| Sulfate | mg/L | 30 | 50 | 35 | | | | |
| Sum of Anions | meq/L | 5.6 | 6.2 | 5.8 | | | | |
| Sum of Cations | meq/L | 5.7 | 6.7 | 6.0 | | | | |
| TDS (calculated) | calc. | 313 | 313 | 313 | | | | |
| TDS (ratio - measured/calculated) | mg/L | 1 | 1 | 1 | | | | |
| Zinc, dissolved | mg/L | -0.01 | 0.04 | 0.02 | | | | |

[1] Baseline 2004.

[2] Negative values denote readings below lab detection levels.

[3] ACZ Laboratory, Steamboat Springs, CO.

[4] ACZ Lab Qualifiers: U - Analyte was analyzed for but not detected at the indicated MDL.
H - Holding time exceeded; pH is a field test with an immediate hold time.
B - Analyte conc detected at a value between method detection limit (MDL) and practical quantitation limit (PQL). The associated value is an estimated quantity.

[5] Average (mean) value calc using 1/2 of detection limit for readings below lab detection limits unless all readings are below lab detection limit.
Shaded cells indicate parameters elevated greater than ten percent above the maximum baseline value.

## Lower Dry Fork Alluvial Well
## Water Quality and Field Parameters

| Mountain Coal West Elk Mine - Water Year 2023 | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|
| **Monitoring Location: Lower Dry Fk Alluvial Well** | | **Baseline [1]** | | | **Water Year 2023** | | | | | |
| Description | Units | Minimum | Maximum | Mean [5] | 5/11/2023 | 6/7/2023 | 9/6/2023 | Q[4] | 9/6/2023 (Duplicate) | Q[4] |
| **Field Parameters** | | | | | | | | | | |
| Water Level Depth | feet | 4.19 | 7.90 | 6.27 | 4.87 | 4.82 | 5.14 | | -- | |
| pH (Field) | SU | 6.60 | 7.10 | 6.87 | 8.09 | 7.61 | 7.65 | | -- | |
| Conductivity (Field) | µmhos/cm | 575 | 693 | 626 | 548 | 539 | 517 | | -- | |
| Temperature (Field) | °C | 6.4 | 16.4 | 10.3 | 6.0 | 10.3 | 15.8 | | -- | |
| Comment | | | | | | | | | | |
| **Laboratory Parameters [2]** | | | | | | | | | | |
| Name of Certified Lab [3] | | | | | | | ACZ | | ACZ | |
| Lab Reference # | | | | | | | L83003-02 | | L83003-04 | |
| Sample Date | | | | | | | 9/6/2023 | | 9/6/2023 | |
| Lab Test Date | | | | | | | 9/12-9/26 | | 9/12-9/26 | |
| Sampled By | | | | | | | PH | | PH | |
| Alkalinity (Total CaCO3) | mg/L | 260 | 300 | 272 | | | | | | |
| Arsenic, dissolved | mg/L | -0.0005 | 0.0004 | 0.0003 | | | | | | |
| Bicarbonate as CaCO3 | mg/L | 260 | 300 | 272 | | | | | | |
| Cadmium, dissolved | mg/L | -0.005 | -0.005 | -0.005 | | | | | | |
| Calcium, dissolved | mg/L | 38.5 | 62.6 | 53.4 | | | | | | |
| Carbonate as CaCO3 | mg/L | -2 | -2 | -2 | | | | | | |
| Cation - Anion Balance | % | 0.9 | 3.3 | 1.7 | | | | | | |
| Chloride | mg/L | -1 | 3 | 2 | | | | | | |
| Conductivity @25C | µmhos/cm | 459 | 497 | 482 | | | 498 | | 492 | |
| Hardness as CaCO3 | mg/L | 186 | 208 | 200 | | | | | | |
| Hydroxide as CaCO3 | mg/L | -2 | -2 | -2 | | | | | | |
| Iron, dissolved | mg/L | -0.01 | 0.83 | 0.15 | | | -0.06 | U | -0.06 | U |
| Iron, total | mg/L | 0.08 | 0.51 | 0.26 | | | 0.082 | B | 0.074 | B |
| Lead, dissolved | mg/L | -0.04 | -0.04 | -0.04 | | | | | | |
| Magnesium, dissolved | mg/L | 10.2 | 16.0 | 13.8 | | | | | | |
| Manganese, dissolved | mg/L | -0.01 | 1.96 | 0.37 | | | | | | |
| Manganese, total | mg/L | 1.13 | 2.48 | 1.72 | | | | | | |
| Mercury, dissolved | mg/L | -0.0002 | 0.0014 | 0.0002 | | | | | | |
| Nitrate/Nitrite (as N) | mg/L | -0.02 | 0.71 | 0.13 | | | | | | |
| Nitrogen, ammonia | mg/L | -0.05 | 0.09 | 0.044 | | | | | | |
| pH | SU | 7.8 | 8.0 | 7.9 | | | 8.0 | H | 8.1 | H |
| Phosphate | mg/L | -0.030 | 0.030 | 0.02 | | | | | | |
| Phosphorus, ortho dissolved | mg/L | -0.05 | 0.01 | 0.01 | | | | | | |
| Potassium, dissolved | mg/L | 2.0 | 3.1 | 2.5 | | | | | | |
| Residue, Filterable (TDS) @180C | mg/L | 250 | 310 | 297 | | | 290 | | 290 | |
| Residue, Non-Filterable (TSS) @105C | mg/L | | | | | | -5.0 | U | -5.0 | U |
| Selenium, dissolved | mg/L | -0.0010 | 0.0001 | 0.0003 | | | | | | |
| Sodium Absorption Ratio (SAR) | calc. | 1.18 | 1.45 | 1.32 | | | | | | |
| Sodium, dissolved | mg/L | 35 | 46 | 41 | | | | | | |
| Sulfate | mg/L | 20 | 20 | 20 | | | | | | |
| Sum of Anions | meq/L | 5.8 | 5.8 | 5.8 | | | | | | |
| Sum of Cations | meq/L | 5.9 | 6.2 | 6.0 | | | | | | |
| Zinc, dissolved | mg/L | -0.01 | 0.03 | 0.02 | | | | | | |

[1] Baseline 2004.

[2] Negative values denote readings below lab detection levels.

[3] ACZ Laboratory, Steamboat Springs, CO.

[4] ACZ Lab Qualifiers: U - Analyte was analyzed for but not detected at the indicated MDL.
H - Holding time exceeded; pH is a field test with an immediate hold time.
B - Analyte conc detected at a value between method detection limit (MDL) and practical quantitation limit (PQL). The associated value is an estimated quantity.

[5] Average (mean) value calc using 1/2 of detection limit for readings below lab detection limits unless all readings are below lab detection limit.

Shaded cells indicate parameters elevated greater than ten percent above the maximum baseline value.

**Well SOM-80**
**Water Quality and Field Parameters**

| Mountain Coal West Elk Mine - Water Year 2023 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Monitoring Location: Well SOM-80** | | **Baseline [1]** | | | **Water Year 2023** | | | |
| Description | Units | Minimum | Maximum | Mean | 5/12/2023 | 6/7/2023 | 9/5/2023 | Q[4] |
| **Field Parameters** | | | | | | | | |
| Water Level Depth | feet | | | | 94.46 | 94.22 | 93.65 | |
| pH (Field) | SU | | | | 7.52 | 7.55 | 7.09 | |
| Conductivity (Field) | µmhos/cm | | | | 1,117 | 1,085 | 1,190 | |
| Temperature (Field) | °C | | | | 12.1 | 12.5 | 11.6 | |
| Comment | | | | | | | | |
| **Laboratory Parameters [2]** | | | | | . | | | |
| Name of Certified Lab [3] | | | | | | | ACZ | |
| Lab Reference # | | | | | | | L83003-05 | |
| Sample Date | | | | | | | 9/5/2023 | |
| Lab Test Date | | | | | | | 9/13-9/26 | |
| Sampled By | | | | | | | PH | |
| Ammonia | mg/L | 0 | 1.73 | 0.51 | | | | |
| Arsenic, dissolved | mg/L | 0 | 0 | 0 | | | | |
| Bicarbonate as CaCO3 | mg/L | 213 | 641 | 443 | | | | |
| Cadmium, dissolved | mg/L | 0 | 0 | 0 | | | | |
| Calcium, dissolved | mg/L | 60.2 | 60.2 | 60.2 | | | | |
| Chloride | mg/L | 3 | 17 | 7 | | | | |
| Conductivity @25C | µmhos/cm | 886 | 897 | 892 | | | 1,130 | |
| Hardness as CaCO3 | mg/L | 45 | 754 | 389 | | | | |
| Iron, dissolved | mg/L | 0 | 0.82 | 0.15 | | | -0.06 | U |
| Iron, total | mg/L | 0 | 6.8 | 0.71 | | | 0.070 | B |
| Lead, dissolved | mg/L | 0 | 0 | 0 | | | | |
| Magnesium, dissolved | mg/L | 17.6 | 17.6 | 17.6 | | | | |
| Manganese, dissolved | mg/L | 0.005 | 0.01 | 0.008 | | | | |
| Manganese, total | mg/L | 0 | 0.557 | 0.066 | | | | |
| Mercury, dissolved | mg/L | 0 | 0 | 0 | | | | |
| Nitrate/Nitrite (as N) | mg/L | 0.24 | 0.49 | 0.33 | | | | |
| pH | SU | 6.7 | 8.1 | 7.4 | | | 7.8 | H |
| Phosphorus, ortho dissolved | mg/L | 0 | 0.3 | 0.049 | | | | |
| Residue, Filterable (TDS) @180C | mg/L | 26.8 | 1,888 | 868 | | | 726 | |
| Residue, Non-Filterable (TSS) @105C | mg/L | | | | | | 6.0 | B |
| Selenium, dissolved | mg/L | 0 | 0 | 0 | | | | |
| Sodium Absorption Ratio (SAR) | calc. | 1.94 | 5.22 | 2.91 | | | | |
| Sodium, dissolved | mg/L | 129 | 129 | 129 | | | | |
| Sulfate | mg/L | 70 | 984 | 515 | | | | |
| Zinc, dissolved | mg/L | 0.02 | 0.02 | 0.02 | | | | |

[1] Baseline and WY 2000 data adapted from WWE (2001).

[2] Negative values denote readings below lab detection levels.

[3] ACZ Laboratory, Steamboat Springs, CO.

[4] ACZ Lab Qualifiers: U - Analyte was analyzed for but not detected at the indicated MDL.
H - Holding time exceeded; pH is a field test with an immediate hold time.
B - Analyte conc detected at a value between method detection limit (MDL) and practical quantitation limit (PQL). The associated value is an estimated quantity.

Shaded cells indicate parameters elevated greater than ten percent above the maximum baseline value.

## Well SOM-45-H-1
## Water Quality and Field Parameters

| Mountain Coal West Elk Mine - Water Year 2023 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Monitoring Location: Well SOM-45-H-1** | | **Baseline [1]** | | | **Water Year 2023** | | | |
| Description | Units | Minimum | Maximum | Mean | 5/20/2023 | 6/7/2023 | 9/6/2023 | Q[4] |
| **Field Parameters** | | | | | | | | |
| Water Level Depth | feet | | | | 197.54 | 197.92 | 195.96 | |
| pH (Field) | SU | 6.4 | 8.6 | 7.7 | 7.81 | 7.69 | 7.63 | |
| Conductivity (Field) | µmhos/cm | 1,073 | 1,626 | 1,285 | 1,922 | 1,950 | 1,792 | |
| Temperature (Field) | °C | | | | 13.2 | 13.5 | 11.6 | |
| Comment | | | | | | | | |
| **Laboratory Parameters [2]** | | | | | | | | |
| Name of Certified Lab [3] | | | | | | | ACZ | |
| Lab Reference # | | | | | | | L83003-01 | |
| Sample Date | | | | | | | 9/6/2023 | |
| Lab Test Date | | | | | | | 9/12-9/26 | |
| Sampled By | | | | | | | PH | |
| Alkalinity (Total CaCO3) | mg/L | 286 | 955 | 635 | | | | |
| Ammonia | mg/L | 0.03 | 2.35 | 0.69 | | | | |
| Arsenic, dissolved | mg/L | 0 | 0.002 | 0.001 | | | | |
| Bicarbonate as CaCO3 | mg/L | 0 | 1156 | 455 | | | | |
| Cadmium, dissolved | mg/L | 0 | 0 | 0 | | | | |
| Calcium, dissolved | mg/L | 4 | 6.9 | 5.6 | | | | |
| Carbonate as CaCO3 | mg/L | 0 | 218 | 17 | | | | |
| Cation - Anion Balance | % | -5.4 | 3.8 | -0.2 | | | | |
| Chloride | mg/L | 2 | 10 | 8 | | | | |
| Conductivity @25C | µmhos/cm | 1,310 | 1,390 | 1,350 | | | 1,760 | |
| Hardness as CaCO3 | mg/L | 15 | 882 | 215 | | | | |
| Hydroxide as CaCO3 | mg/L | 0 | 0 | 0 | | | | |
| Iron, dissolved | mg/L | 0 | 0.86 | 0.25 | | | 0.465 | |
| Iron, total | mg/L | 0.35 | 6.15 | 1.96 | | | 5.77 | |
| Lead, dissolved | mg/L | 0 | 0 | 0 | | | | |
| Magnesium, dissolved | mg/L | 1.3 | 5 | 2.1 | | | | |
| Manganese, dissolved | mg/L | 0.034 | 0.064 | 0.048 | | | | |
| Manganese, total | mg/L | 0.014 | 0.39 | 0.131 | | | | |
| Mercury, dissolved | mg/L | 0 | 0 | 0 | | | | |
| Nitrate/Nitrite (as N) | mg/L | 0 | 0.04 | 0.01 | | | | |
| Nitrogen, ammonia | mg/L | 0.1 | 1.04 | 0.61 | | | | |
| pH | SU | 7 | 8.2 | 7.6 | | | 8.2 | H |
| Phosphate | mg/L | 0.39 | 0.42 | 0.41 | | | | |
| Phosphorus, ortho dissolved | mg/L | 0 | 0.535 | 0.074 | | | | |
| Potassium, dissolved | mg/L | 2 | 2.5 | 2.3 | | | | |
| Residue, Filterable (TDS) @180C | mg/L | | | | | | 1,120 | |
| Residue, Non-Filterable (TSS) @105C | mg/L | | | | | | 129 | |
| Selenium, dissolved | mg/L | 0 | 0 | 0 | | | | |
| Sodium Absorption Ratio (SAR) | calc. | 14.9 | 37.9 | 32 | | | | |
| Sodium, dissolved | mg/L | 308 | 385 | 352 | | | | |
| Sulfate | mg/L | 20 | 526 | 161 | | | | |
| Sum of Anions | meq/L | 15 | 15.5 | 15.3 | | | | |
| Sum of Cations | meq/L | 13.9 | 16.4 | 15.3 | | | | |
| Zinc, dissolved | mg/L | 0 | 0.02 | 0.01 | | | | |

[1] Baseline and WY 2000 data adapted from WWE (2001).

[2] Negative values denote readings below lab detection levels.

[3] ACZ Laboratory, Steamboat Springs, CO.

[4] ACZ Lab Qualifiers: U - Analyte was analyzed for but not detected at the indicated MDL.
H - Holding time exceeded; pH is a field test with an immediate hold time.
B - Analyte conc detected at a value between method detection limit (MDL) and practical quantitation limit (PQL). The associated value is an estimated quantity.

Shaded cells indicate parameters elevated greater than ten percent above the maximum baseline value.

**Well SOM-C-76**
**Water Quality and Field Parameters**

| Mountain Coal West Elk Mine - Water Year 2023 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Monitoring Location: Well SOM-C-76** | | **Baseline [1]** | | | **Water Year 2023** | | |
| Description | Units | Minimum | Maximum | Mean [2] | 5/9/2023 | 6/7/2023 | 9/7/2023 |
| **Field Parameters** | | | | | | | |
| Water Level Depth | feet | | | | dry | dry | dry |
| pH (Field) | SU | 5.2 | 8.2 | 9.3 | | | |
| Conductivity (Field) | µmhos/cm | 1,910 | 2,500 | 2,970 | | | |
| Temperature (Field) | °C | | | | | | |
| Comment | | | | | | | |
| **Laboratory Parameters** | | | | | | | |
| Name of Certified Lab | | | | | | | |
| Lab Reference # | | | | | | | |
| Sample Date | | | | | | | |
| Lab Test Date | | | | | | | |
| Sampled By | | | | | | | |
| Alkalinity (Total CaCO3) | mg/L | 1,294 | 1,503 | 1,860 | | | |
| Ammonia | mg/L | 0.00 | 0.64 | 1.36 | | | |
| Arsenic, dissolved | mg/L | 0.000 | 0.000 | 0.001 | | | |
| Bicarbonate as CaCO3 | mg/L | 41 | 1,181 | 1,894 | | | |
| Cadmium, dissolved | mg/L | 0.000 | 0.000 | 0.000 | | | |
| Calcium, dissolved | mg/L | 1.6 | 2.0 | 2.3 | | | |
| Carbonate as CaCO3 | mg/L | 0 | 30 | 186 | | | |
| Cation - Anion Balance | % | -3.3 | -0.45 | 3.0 | | | |
| Chloride | mg/L | 0 | 4 | 17 | | | |
| Conductivity @25C | µmhos/cm | 2,300 | 2,487 | 2,650 | | | |
| Hardness as CaCO3 | mg/L | 6 | 15 | 43 | | | |
| Hydroxide as CaCO3 | mg/L | 0 | 0 | 0 | | | |
| Iron, dissolved | mg/L | 0.00 | 0.13 | 1.00 | | | |
| Iron, total | mg/L | 0.00 | 5.01 | 18.00 | | | |
| Lead, dissolved | mg/L | 0.00 | 0.00 | 0.00 | | | |
| Magnesium, dissolved | mg/L | 0.6 | 0.8 | 1.5 | | | |
| Manganese, dissolved | mg/L | 0.000 | 0.005 | 0.016 | | | |
| Manganese, total | mg/L | 0.000 | 0.017 | 0.145 | | | |
| Mercury, dissolved | mg/L | 0.0000 | 0.0000 | 0.0000 | | | |
| Nitrate/Nitrite (as N) | mg/L | 0.00 | 0.16 | 2.16 | | | |
| Nitrogen, ammonia | mg/L | 0.57 | 0.65 | 0.73 | | | |
| pH | SU | 7.9 | 8.4 | 9.3 | | | |
| Phosphate | mg/L | 0.06 | 0.06 | 0.06 | | | |
| Phosphorus, ortho dissolved | mg/L | 0.000 | 0.068 | 1.26 | | | |
| Potassium, dissolved | mg/L | 3.6 | 3.9 | 4.2 | | | |
| Residue, Filterable (TDS) @180C | mg/L | 1,530 | 1,642 | 2,590 | | | |
| Residue, Non-Filterable (TSS) @105C | mg/L | 7 | 37 | 226 | | | |
| Selenium, dissolved | mg/L | 0.000 | 0.000 | 0.000 | | | |
| Sodium Absorption Ratio (SAR) | calc. | 46.1 | 102.7 | 128.6 | | | |
| Sodium, dissolved | mg/L | 658 | 700 | 756 | | | |
| Sulfate | mg/L | 0 | 9 | 180 | | | |
| Sum of Anions | meq/L | 29.6 | 30.88 | 32.71 | | | |
| Sum of Cations | meq/L | 29.30 | 30.53 | 31.50 | | | |
| Zinc, dissolved | mg/L | 0.00 | 0.00 | 0.01 | | | |

[1] Baseline and WY 2000 data adapted from WWE (2001).

[2] Average (mean) value calc using 1/2 of detection limit for readings below lab detection limits unless all readings are below lab detection limit.

## Well 03-11-1
## Water Quality and Field Parameters

| Mountain Coal West Elk Mine - Water Year 2023 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Monitoring Location: Well 03-11-1** | | **Baseline [1]** | | | **Water Year 2023** | | | |
| Description | Units | Minimum | Maximum | Mean [5] | 5/12/2023 | 6/6/2023 | 9/5/2023 | Q[4] |
| **Field Parameters** | | | | | | | | |
| Water Level Depth | feet | | | | 177.01 | 176.33 | 175.13 | |
| pH (Field) | SU | | | | 7.45 | 7.45 | 7.34 | |
| Conductivity (Field) | µmhos/cm | | | | 3,330 | 3,320 | 3,280 | |
| Temperature (Field) | °C | | | | 14.3 | 15.6 | 14.7 | |
| Comment | | | | | | | | |
| **Laboratory Parameters [2]** | | | | | | | | |
| Name of Certified Lab [3] | | | | | | | ACZ | |
| Lab Reference # | | | | | | | L82933-08 | |
| Sample Date | | | | | | | 9/5/2023 | |
| Lab Test Date | | | | | | | 9/11-9/26 | |
| Sampled By | | | | | | | PH | |
| Alkalinity (Total CaCO3) | mg/L | 1,620 | 1,950 | 1,802 | | | | |
| Arsenic, dissolved | mg/L | -0.0030 | 0.0010 | -0.0007 | | | | |
| Bicarbonate as CaCO3 | mg/L | 1,620 | 1,950 | 1,802 | | | | |
| Cadmium, dissolved | mg/L | -0.010 | -0.005 | -0.008 | | | | |
| Calcium, dissolved | mg/L | 5.3 | 12.5 | 8.1 | | | | |
| Carbonate as CaCO3 | mg/L | -2 | -2 | -2 | | | | |
| Cation - Anion Balance | % | -3.8 | -2.5 | -3.2 | | | | |
| Chloride | mg/L | 66 | 177 | 89 | | | | |
| Conductivity @25C | µmhos/cm | 2,660 | 2,730 | 2,695 | | | 2,980 | |
| Hardness as CaCO3 | mg/L | 35 | 38 | 37 | | | | |
| Hydroxide as CaCO3 | mg/L | -2 | -2 | -2 | | | | |
| Iron, dissolved | mg/L | 0.02 | 0.82 | 0.31 | | | -0.06 | U |
| Iron, total | mg/L | 0.30 | 0.49 | 0.40 | | | 0.277 | |
| Magnesium, dissolved | mg/L | 1.2 | 3.0 | 1.8 | | | | |
| Manganese, dissolved | mg/L | 0.03 | 0.14 | 0.07 | | | | |
| Manganese, total | mg/L | 0.14 | 0.15 | 0.15 | | | | |
| Mercury, dissolved | mg/L | -0.0002 | 0.0006 | 0.0002 | | | | |
| Nitrate (as N), dissolved | mg/L | 0.03 | 0.21 | 0.10 | | | | |
| Nitrate/Nitrite (as N) | mg/L | -0.02 | 0.21 | 0.07 | | | | |
| Nitrite (as N), dissolved | mg/L | 0.06 | 0.06 | 0.06 | | | | |
| Nitrogen, ammonia | mg/L | 0.73 | 0.92 | 0.82 | | | | |
| pH | SU | 8.1 | 8.3 | 8.2 | | | 8.1 | H |
| Phosphate | mg/L | -0.03 | 0.09 | 0.01 | | | | |
| Phosphorus, ortho dissolved | mg/L | -0.01 | 0.03 | -0.01 | | | | |
| Potassium, dissolved | mg/L | 4.0 | 4.1 | 4.1 | | | | |
| Residue, Filterable (TDS) @180C | mg/L | 1,850 | 2,130 | 2,044 | | | 1,990 | |
| Residue, Non-Filterable (TSS) @105C | mg/L | | | | | | 8.0 | B |
| Selenium, dissolved | mg/L | -0.0050 | 0.0030 | -0.0010 | | | | |
| Sodium Absorption Ratio (SAR) | calc. | 52.6 | 54.5 | 53.6 | | | | |
| Sodium, dissolved | mg/L | 723 | 1,780 | 878 | | | | |
| Sulfate | mg/L | -10 | 40 | 1 | | | | |
| Sum of Anions | meq/L | 35 | 36 | 35 | | | | |
| Sum of Cations | meq/L | 33.0 | 33.4 | 33.2 | | | | |
| Zinc, dissolved | mg/L | -0.02 | 0.21 | 0.05 | | | | |

[1] Baseline 2004.

[2] Negative values denote readings below lab detection levels.

[3] ACZ Laboratory, Steamboat Springs, CO.

[4] ACZ Lab Qualifiers: U - Analyte was analyzed for but not detected at the indicated MDL.

H - Holding time exceeded; pH is a field test with an immediate hold time.

B - Analyte conc detected at a value between method detection limit (MDL) and practical quantitation limit (PQL). The associated value is an estimated quantity.

[5] Average (mean) value calc using 1/2 of detection limit for readings below lab detection limits unless all readings are below lab detection limit.

Shaded cells indicate parameters elevated greater than ten percent above the maximum baseline value.

## Well 01-11-1
## Water Quality and Field Parameters

| Mountain Coal West Elk Mine - Water Year 2023 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Monitoring Location: Well 01-11-1** | | **Baseline [1]** | | | **Water Year 2023** | | | |
| Description | Units | Minimum | Maximum | Mean [5] | 5/12/2023 | 6/6/2023 | 9/5/2023 | Q[4] |
| **Field Parameters** | | | | | | | | |
| Water Level Depth | feet | 259.85 | 295.39 | 268.40 | 193.85 | 192.96 | 189.68 | |
| pH (Field) | SU | 9.10 | 9.71 | 9.37 | 7.54 | 7.61 | 7.54 | |
| Conductivity (Field) | µmhos/cm | 5,010 | 6,820 | 5,880 | 4,230 | 4,270 | 4,170 | |
| Temperature (Field) | °C | 9.8 | 20.2 | 15.6 | 16.4 | 15.2 | 15.1 | |
| Comment | | | | | | | | |
| **Laboratory Parameters [2]** | | | | | | | | |
| Name of Certified Lab [3] | | | | | | | ACZ | |
| Lab Reference # | | | | | | | L82933-07 | |
| Sample Date | | | | | | | 9/5/2023 | |
| Lab Test Date | | | | | | | 9/11-9/26 | |
| Sampled By | | | | | | | PH | |
| Alkalinity (Total CaCO3) | mg/L | 629 | 1,880 | 1,602 | | | | |
| Ammonia | mg/L | 0.79 | 1.56 | 1.08 | | | | |
| Arsenic, dissolved | mg/L | -0.005 | 0.003 | -0.001 | | | | |
| Bicarbonate as CaCO3 | mg/L | 522 | 1300 | 768 | | | | |
| Boron, dissolved | mg/L | 1.11 | 1.25 | 1.18 | | | | |
| Cadmium, dissolved | mg/L | -0.0100 | -0.0002 | -0.0055 | | | | |
| Calcium, dissolved | mg/L | 1.3 | 6.3 | 3.3 | | | | |
| Carbonate as CaCO3 | mg/L | 389 | 1360 | 1075 | | | | |
| Cation - Anion Balance | % | -10.4 | 1.7 | -4.6 | | | | |
| Chloride | mg/L | 527 | 640 | 603 | | | | |
| Conductivity @25C | µmhos/cm | 4,060 | 5,740 | 5,115 | | | 3,920 | |
| Hardness as CaCO3 | mg/L | 3 | 32 | 12 | | | | |
| Hydroxide as CaCO3 | mg/L | -2 | -2 | -2 | | | | |
| Iron, dissolved | mg/L | -0.05 | 0.23 | 0.09 | | | -0.12 | U |
| Iron, total | mg/L | 0.16 | 0.99 | 0.57 | | | 0.199 | B |
| Lead, dissolved | mg/L | -0.080 | 0.081 | -0.040 | | | | |
| Magnesium, dissolved | mg/L | -0.4 | 4.1 | 0.8 | | | | |
| Manganese, dissolved | mg/L | -0.01 | 0.05 | 0.01 | | | | |
| Manganese, total | mg/L | -0.010 | 0.030 | 0.003 | | | | |
| Mercury, total | mg/L | -0.00020 | 0.00040 | -0.00003 | | | | |
| Nitrate/Nitrite (as N) | mg/L | -0.02 | 2.78 | 0.53 | | | | |
| Nitrogen, ammonia | mg/L | 2.21 | 4.09 | 3.17 | | | | |
| pH | SU | 9.4 | 10.1 | 9.8 | | | 8.2 | H |
| Phosphate | mg/L | -0.03 | 0.16 | 0.09 | | | | |
| Phosphorus, ortho dissolved | mg/L | 0.009 | 0.052 | 0.034 | | | | |
| Potassium, dissolved | mg/L | 159 | 291 | 217 | | | | |
| Residue, Filterable (TDS) @180C | mg/L | 2,910 | 3,300 | 3,180 | | | 2,680 | |
| Residue, Non-Filterable (TSS) @105C | mg/L | | | | | | 8.0 | B |
| Selenium, dissolved | mg/L | -0.001 | 0.002 | -0.001 | | | | |
| Sodium Absorption Ratio (SAR) | calc. | 72.6 | 212.0 | 150.5 | | | | |
| Sodium, dissolved | mg/L | 816 | 1,080 | 942 | | | | |
| Sulfate | mg/L | 40 | 50 | 48 | | | | |
| Sum of Anions | meq/L | 51.1 | 56.6 | 53.7 | | | | |
| Sum of Cations | meq/L | 43.4 | 54.0 | 47.7 | | | | |
| TDS (calculated) | calc. | 2,900 | 3,430 | 3,165 | | | | |
| TDS (ratio - measured/calculated) | mg/L | 0.91 | 1.00 | 0.96 | | | | |
| Zinc, dissolved | mg/L | 0.18 | 8.89 | 1.78 | | | | |

[1] Baseline WY 2004.

[2] Negative values denote readings below lab detection levels.

[3] ACZ Laboratory, Steamboat Springs, CO.

[4] ACZ Lab Qualifiers: U - Analyte was analyzed for but not detected at the indicated MDL.
H - Holding time exceeded; pH is a field test with an immediate hold time.
B - Analyte conc detected at a value between method detection limit (MDL) and practical quantitation limit (PQL). The associated value is an estimated quantity.

[5] Average (mean) value calc using 1/2 of detection limit for readings below lab detection limits unless all readings are below lab detection limit.

# APPENDIX H

## MINE WATER – LABORATORY AND FIELD WATER QUALITY DATA

## LRP Underdrain
## Water Quality and Field Parameters

| Mountain Coal West Elk Mine - Water Year 2023 | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Monitoring Location: LRP Underdrain** | | **Baseline[1]** | | | **Water Year 2023** | | |
| Description | Units | Minimum | Maximum | Mean | 5/20/2023 | 6/6/2023 | 9/5/2023 |
| **Field Parameters** | | | | | | | |
| Flow | gpm | | | | damp soil | damp soil | dry |
| Electrical Conductivity | mmhos/cm | | | | | | |
| pH | SU | | | | | | |
| Temperature ($^{o}$C) | $^{o}$C | | | | | | |
| Comment | | | | | | | |
| **Laboratory Parameters** | | | | | | | |
| Name of Certified Lab | | | | | | | |
| Lab Reference # | | | | | | | |
| Sample Date | | | | | | | |
| Lab Test Date | | | | | | | |
| Sampled By | | | | | | | |
| Alkalinity (Total CaCO3) | mg/l | | | | | | |
| Aluminum, dissolved | mg/l | | | | | | |
| Arsenic, total | mg/l | | | | | | |
| Bicarbonate as CaCO3 | mg/l | | | | | | |
| Boron, dissolved | mg/l | | | | | | |
| Calcium, dissolved | mg/l | | | | | | |
| Carbonate as CaCO3 | mg/l | | | | | | |
| Cation - Anion Balance | % | | | | | | |
| Chloride | mg/l | | | | | | |
| Conductivity @25C | µmhos/cm | | | | | | |
| Copper, dissolved | mg/l | | | | | | |
| Hardness as CaCO3 | mg/l | | | | | | |
| Hydroxide as CaCO3 | mg/l | | | | | | |
| Iron, dissolved | mg/l | | | | | | |
| Iron, total | mg/l | | | | | | |
| Lead, dissolved | mg/l | | | | | | |
| Magnesium, dissolved | mg/l | | | | | | |
| Manganese, dissolved | mg/l | | | | | | |
| Manganese, total | mg/l | | | | | | |
| Mercury, total | mg/l | | | | | | |
| Molybdenum, dissolved | mg/l | | | | | | |
| Nitrate/Nitrite (as N) | mg/l | | | | | | |
| pH | SU | | | | | | |
| Phosphate | mg/l | | | | | | |
| Phosphorus, ortho dissolved | mg/l | | | | | | |
| Potassium, dissolved | mg/l | | | | | | |
| Residue, Filterable (TDS) @180C | mg/l | | | | | | |
| Selenium, total | mg/l | | | | | | |
| Sodium Absorption Ratio (SAR) | calc. | | | | | | |
| Sodium, dissolved | mg/l | | | | | | |
| Sulfate | mg/l | | | | | | |
| Sum of Anions | meq/l | | | | | | |
| Sum of Cations | meq/l | | | | | | |
| TDS (calculated) | calc. | | | | | | |
| TDS (ratio - measured/calculated) | mg/l | | | | | | |
| Zinc, dissolved | mg/l | | | | | | |

[1] No baseline data.

# RPE Grate
## Water Quality and Field Parameters

| Mountain Coal West Elk Mine - Water Year 2023 | | | | | | | | |
|---|---|---|---|---|---|---|---|---|
| **Monitoring Location: RPE Underdrain** | | **Baseline [1]** | | | **Water Year 2023** | | | |
| Description | Units | Minimum | Maximum | Mean | 5/12/2023 | 6/6/2023 | 9/5/2023 | Q[4] |
| **Field Parameters** | | | | | | | | |
| Flow [5] | gpm | | | | 0.3 | 0.5 | 0.50 | |
| pH (Field) | SU | | | | 7.93 | 7.98 | 7.73 | |
| Conductivity (Field) | µmhos/cm | | | | 5,700 | 5,350 | 5,430 | |
| Temperature (Field) | °C | | | | 11.3 | 12.6 | 15.9 | |
| Comment | | | | | | | | |
| **Laboratory Parameters [3]** | | | | | | | | |
| Name of Certified Lab [2] | | | | | | | ACZ | |
| Lab Reference # | | | | | | | L82933-04 | |
| Sample Date | | | | | | | 9/5/2023 | |
| Lab Test Date | | | | | | | 9/9-9/27 | |
| Sampled By | | | | | | | PH | |
| Alkalinity (Total CaCO3) | mg/L | | | | | | 558 | |
| Aluminum, dissolved | mg/L | | | | | | -0.1 | U |
| Arsenic, total | mg/L | | | | | | 0.00139 | |
| Bicarbonate as CaCO3 | mg/L | | | | | | 528 | |
| Boron, dissolved | mg/L | | | | | | 0.982 | |
| Cadmium, dissolved | mg/L | | | | | | -0.016 | U |
| Calcium, dissolved | mg/L | | | | | | 118 | |
| Carbonate as CaCO3 | mg/L | | | | | | 29.8 | |
| Cation-Anion Balance | % | | | | | | -6.4 | |
| Chloride | mg/L | | | | | | 938 | |
| Conductivity @25C | umhos/cm | | | | | | 5,170 | |
| Copper, dissolved | mg/L | | | | | | -0.02 | U |
| Hardness as CaCO3 (dissolved) | mg/L | | | | | | 428 | |
| Hydroxide as CaCO3 | mg/L | | | | | | -2 | U |
| Iron, dissolved | mg/L | | | | | | -0.12 | U |
| Iron, total | mg/L | | | | | | -0.12 | U |
| Lead, dissolved | mg/L | | | | | | -0.06 | U |
| Magnesium, dissolved | mg/L | | | | | | 32.4 | |
| Manganese, dissolved | mg/L | | | | | | -0.02 | U |
| Manganese, total | mg/L | | | | | | -0.02 | U |
| Mercury, total | mg/L | | | | | | -0.0002 | U |
| Molybdenum, dissolved | mg/L | | | | | | 0.059 | B |
| Nitrate/Nitrite as N | mg/L | | | | | | 1.89 | |
| pH | units | | | | | | 8.3 | H |
| Phosphate | mg/L | | | | | | 0.0744 | B |
| Phosphorus, ortho dissolved | mg/L | | | | | | 0.024 | BH |
| Potassium, dissolved | mg/L | | | | | | 15.5 | |
| Residue, Filterable (TDS) @180C | mg/L | | | | | | 3,420 | |
| Selenium, total | mg/L | | | | | | 0.00437 | |
| Sodium Adsorption Ratio in Water | calc. | | | | | | 20 | |
| Sodium, dissolved | mg/L | | | | | | 943 | |
| Sulfate | mg/L | | | | | | 1,000 | |
| Sum of Anions | meq/L | | | | | | 58 | |
| Sum of Cations | meq/L | | | | | | 51 | |
| TDS (calculated) | mg/L | | | | | | 3,390 | |
| TDS (ratio - measured/calculated) | calc. | | | | | | 1.01 | |
| Zinc, dissolved | mg/L | | | | | | 0.149 | |

[1] No baseline data.

[2] ACZ Laboratory, Steamboat Springs, CO.

[3] Negative values denote readings below lab detection levels.

[4] ACZ Lab Qualifiers: U - Analyte was analyzed for but not detected at the indicated MDL.
H - Holding time exceeded; pH is a field test with an immediate hold time.
B - Analyte conc detected at a value between method detection limit (MDL) and practical quantitation limit (PQL). The associated value is an estimated quantity.

[5] Estimated flow.

# APPENDIX I

## SURFACE WATER - TEMPERATURE DATA

# NFG-1
# Daily Mean Temperature Values
# (Degrees Celsius)

| Day | Oct-22 | Nov-22 | Dec-22 | Jan-23 | Feb-23 | Mar-23 | Apr-23 | May-23 | Jun-23 | Jul-23 | Aug-23 | Sep-23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 11.78 | 2.75 | 0.10 | 0.08 | 0.10 | 0.10 | 3.30 | ND | ND | ND | ND | ND |
| 2 | 11.48 | 3.95 | 0.11 | 0.08 | 0.09 | 0.09 | 3.61 | ND | ND | ND | ND | ND |
| 3 | 10.73 | 3.74 | 0.10 | 0.08 | 0.08 | 0.09 | 2.71 | ND | ND | ND | ND | ND |
| 4 | 10.29 | 3.29 | 0.11 | 0.08 | 0.08 | 0.10 | 1.40 | ND | ND | ND | ND | ND |
| 5 | 10.25 | 3.04 | 0.11 | 0.09 | 0.08 | 0.10 | 1.92 | ND | ND | ND | ND | 18.02 |
| 6 | 10.85 | 3.84 | 0.10 | 0.08 | 0.08 | 0.10 | 2.72 | ND | ND | ND | ND | 16.79 |
| 7 | 10.71 | 4.50 | 0.41 | 0.08 | 0.09 | 0.10 | 0.68 | ND | ND | ND | ND | 16.91 |
| 8 | 9.75 | 3.87 | 0.62 | 0.10 | 0.09 | 0.09 | ND | ND | ND | ND | ND | 16.98 |
| 9 | 9.56 | 2.77 | 0.10 | 0.08 | 0.09 | 0.10 | ND | ND | ND | ND | ND | 16.84 |
| 10 | 9.02 | 2.08 | 0.09 | 0.09 | 0.11 | 0.10 | ND | ND | ND | ND | ND | 17.31 |
| 11 | 8.86 | 0.72 | 0.08 | 0.09 | 0.09 | 0.09 | ND | ND | ND | ND | ND | 17.38 |
| 12 | 8.73 | 0.11 | 0.08 | 0.10 | 0.09 | 0.08 | ND | ND | ND | ND | ND | 16.63 |
| 13 | 8.20 | 0.10 | 0.08 | 0.10 | 0.09 | 0.09 | ND | ND | ND | ND | ND | 16.66 |
| 14 | 7.74 | 0.52 | 0.08 | 0.09 | 0.09 | 0.09 | ND | ND | ND | ND | ND | 16.19 |
| 15 | 7.30 | 0.24 | 0.08 | 0.09 | 0.10 | 0.10 | ND | ND | ND | ND | ND | 15.84 |
| 16 | 6.88 | 0.10 | 0.08 | 0.09 | 0.10 | 0.30 | ND | ND | ND | ND | ND | 15.68 |
| 17 | 7.37 | 0.09 | 0.08 | 0.10 | 0.10 | 1.60 | ND | ND | ND | ND | ND | 15.21 |
| 18 | 7.20 | 0.10 | 0.08 | 0.11 | 0.08 | 1.59 | ND | ND | ND | ND | ND | 14.71 |
| 19 | 6.60 | 0.09 | 0.08 | 0.10 | 0.08 | 1.42 | ND | ND | ND | ND | ND | 14.62 |
| 20 | 6.42 | 0.10 | 0.09 | 0.10 | 0.08 | 1.13 | ND | ND | ND | ND | ND | 14.67 |
| 21 | 6.15 | 0.10 | 0.09 | 0.09 | 0.08 | 1.65 | ND | ND | ND | ND | ND | 14.54 |
| 22 | 6.43 | 0.10 | 0.08 | 0.10 | 0.08 | 1.16 | ND | ND | ND | ND | ND | 14.07 |
| 23 | 6.22 | 0.10 | 0.09 | 0.08 | 0.09 | 1.97 | ND | ND | ND | ND | ND | 13.86 |
| 24 | 3.66 | 0.11 | 0.09 | 0.09 | 0.08 | 1.92 | ND | ND | ND | ND | ND | 13.47 |
| 25 | 2.57 | 0.10 | 0.09 | 0.09 | 0.09 | 1.02 | ND | ND | ND | ND | ND | 12.79 |
| 26 | 3.95 | 0.10 | 0.09 | 0.10 | 0.09 | 0.80 | ND | ND | ND | ND | ND | 12.78 |
| 27 | 3.90 | 0.11 | 0.09 | 0.09 | 0.09 | 0.63 | ND | ND | ND | ND | ND | 12.80 |
| 28 | 3.26 | 0.10 | 0.09 | 0.09 | 0.10 | 1.33 | ND | ND | ND | ND | ND | 12.79 |
| 29 | 2.66 | 0.10 | 0.08 | 0.08 | -- | 1.64 | ND | ND | ND | ND | ND | 11.29 |
| 30 | 3.31 | 0.09 | 0.08 | 0.10 | -- | 2.18 | ND | ND | ND | ND | ND | 10.75 |
| 31 | 2.95 | -- | 0.08 | 0.10 | -- | 1.59 | -- | ND | -- | ND | ND | -- |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mean | 7.25 | 1.23 | 0.12 | 0.09 | 0.09 | 0.75 | 2.34 | ND | ND | ND | ND | 14.98 |
| Min | 2.57 | 0.09 | 0.08 | 0.08 | 0.08 | 0.08 | 0.68 | ND | ND | ND | ND | 10.75 |
| Max | 11.78 | 4.50 | 0.62 | 0.11 | 0.11 | 2.18 | 3.61 | ND | ND | ND | ND | 18.02 |

ND No Data. Logger washed away by high water.

# NFG-2
# Daily Mean Temperature Values
# (Degrees Celsius)

| Day | Oct-22 | Nov-22 | Dec-22 | Jan-23 | Feb-23 | Mar-23 | Apr-23 | May-23 | Jun-23 | Jul-23 | Aug-23 | Sep-23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 11.77 | 2.73 | 0.03 | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 2 | 11.44 | 3.99 | 0.03 | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 3 | 10.71 | 3.69 | 0.03 | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 4 | 10.30 | 3.29 | 0.04 | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 5 | 10.21 | 2.96 | 0.05 | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 6 | 10.83 | 3.76 | 0.05 | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 7 | 10.69 | 4.50 | 0.78 | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 8 | 9.74 | 3.91 | 0.65 | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 9 | 9.56 | 2.79 | 0.04 | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 10 | 9.00 | 2.10 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 11 | 8.86 | 0.76 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 12 | 8.75 | 0.08 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 13 | 8.24 | 0.07 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 14 | 7.79 | 0.58 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 15 | 7.35 | 0.22 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 16 | 6.84 | 0.07 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 17 | 7.42 | 0.10 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 18 | 7.26 | 0.07 | ND | ND | ND | ND | ND | ND | ND | ND | ND | ND |
| 19 | 6.66 | 0.06 | ND | ND | ND | ND | ND | ND | ND | ND | ND | 15.85 |
| 20 | 6.47 | 0.07 | ND | ND | ND | ND | ND | ND | ND | ND | ND | 14.67 |
| 21 | 6.20 | 0.08 | ND | ND | ND | ND | ND | ND | ND | ND | ND | 14.53 |
| 22 | 6.45 | 0.07 | ND | ND | ND | ND | ND | ND | ND | ND | ND | 14.08 |
| 23 | 6.19 | 0.05 | ND | ND | ND | ND | ND | ND | ND | ND | ND | 13.87 |
| 24 | 3.61 | 0.04 | ND | ND | ND | ND | ND | ND | ND | ND | ND | 13.48 |
| 25 | 2.48 | 0.04 | ND | ND | ND | ND | ND | ND | ND | ND | ND | 12.80 |
| 26 | 3.89 | 0.04 | ND | ND | ND | ND | ND | ND | ND | ND | ND | 12.78 |
| 27 | 3.82 | 0.04 | ND | ND | ND | ND | ND | ND | ND | ND | ND | 12.79 |
| 28 | 3.30 | 0.03 | ND | ND | ND | ND | ND | ND | ND | ND | ND | 12.79 |
| 29 | 2.65 | 0.03 | ND | ND | -- | ND | ND | ND | ND | ND | ND | 11.35 |
| 30 | 3.34 | 0.03 | ND | ND | -- | ND | ND | ND | ND | ND | ND | 10.78 |
| 31 | 3.00 | -- | ND | ND | -- | ND | -- | ND | -- | ND | ND | -- |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mean | 7.25 | 1.21 | 0.19 | ND | ND | ND | ND | ND | ND | ND | ND | 13.31 |
| Min | 2.48 | 0.03 | 0.03 | ND | ND | ND | ND | ND | ND | ND | ND | 10.78 |
| Max | 11.77 | 4.50 | 0.78 | ND | ND | ND | ND | ND | ND | ND | ND | 15.85 |

ND No Data. Logger washed away by high water.

# NFG-3
# Daily Mean Temperature Values
# (Degrees Celsius)

| Day | Oct-22 | Nov-22 | Dec-22 | Jan-23 | Feb-23 | Mar-23 | Apr-23 | May-23 | Jun-23 | Jul-23 | Aug-23 | Sep-23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 11.83 | 2.74 | -0.02 | -0.03 | -0.03 | -0.03 | 3.45 | 4.93 | 7.73 | 11.14 | 15.92 | 16.25 |
| 2 | 11.51 | 4.04 | -0.02 | -0.03 | -0.03 | -0.01 | 3.81 | 5.07 | 7.39 | 11.11 | 16.20 | 16.63 |
| 3 | 10.78 | 3.72 | -0.02 | -0.03 | -0.03 | -0.02 | 2.78 | 5.15 | 7.88 | 11.46 | 16.03 | 16.83 |
| 4 | 10.44 | 3.26 | 0.00 | -0.03 | -0.03 | -0.02 | 1.29 | 5.10 | 8.84 | 11.55 | 15.51 | 16.67 |
| 5 | 10.30 | 2.96 | 0.01 | -0.03 | -0.03 | 0.00 | 1.83 | 4.80 | 9.03 | 11.96 | 15.38 | 16.80 |
| 6 | 10.90 | 3.75 | -0.03 | -0.03 | -0.03 | 0.02 | 2.69 | 5.44 | 8.46 | 11.87 | 15.08 | 16.79 |
| 7 | 10.76 | 4.52 | 0.02 | -0.03 | -0.03 | 0.04 | 3.45 | 5.42 | 8.20 | 12.08 | 14.85 | 16.92 |
| 8 | 9.81 | 3.97 | 0.13 | -0.03 | -0.03 | 0.00 | 3.29 | 5.72 | 8.35 | 12.77 | 13.98 | 17.00 |
| 9 | 9.60 | 2.80 | 0.00 | -0.03 | -0.03 | 0.11 | 3.72 | 5.83 | 8.18 | 12.73 | 14.11 | 16.88 |
| 10 | 9.05 | 2.10 | 0.03 | -0.03 | -0.02 | -0.03 | 3.03 | 5.48 | 8.83 | 13.35 | 14.20 | 17.37 |
| 11 | 8.92 | 0.74 | -0.01 | -0.03 | -0.02 | 0.04 | 3.07 | 5.43 | 8.91 | 13.51 | 14.87 | 17.42 |
| 12 | 8.80 | 0.06 | -0.03 | -0.03 | -0.02 | 0.13 | 2.87 | 6.17 | 8.92 | 14.31 | 15.33 | 16.64 |
| 13 | 8.26 | 0.01 | -0.03 | -0.03 | -0.02 | 0.27 | 3.27 | 6.18 | 8.93 | 14.30 | 14.79 | 16.63 |
| 14 | 7.81 | 0.36 | -0.03 | -0.03 | -0.03 | 0.27 | 3.12 | 6.31 | 9.35 | 15.55 | 14.76 | 16.15 |
| 15 | 7.36 | 0.14 | -0.03 | -0.03 | -0.03 | 0.08 | 3.15 | 6.52 | 8.94 | 15.17 | 15.45 | 15.78 |
| 16 | 6.86 | 0.02 | -0.01 | -0.03 | -0.03 | 0.16 | 3.42 | 6.66 | 8.78 | 15.43 | 15.80 | 15.70 |
| 17 | 7.43 | 0.00 | -0.02 | -0.03 | -0.03 | 1.42 | 4.03 | 6.56 | 8.53 | 15.41 | 15.70 | 15.23 |
| 18 | 7.30 | -0.01 | -0.02 | -0.03 | -0.03 | 1.64 | 4.17 | 6.58 | 9.19 | 16.11 | 15.31 | 14.64 |
| 19 | 6.68 | -0.01 | -0.02 | -0.03 | -0.03 | 1.42 | 3.67 | 6.78 | 9.81 | 17.19 | 15.66 | 14.55 |
| 20 | 6.50 | -0.01 | -0.03 | -0.03 | -0.03 | 1.09 | 3.04 | 6.95 | 9.88 | 17.33 | 15.49 | 14.69 |
| 21 | 6.24 | -0.02 | -0.03 | -0.03 | -0.02 | 1.61 | 2.55 | 6.70 | 10.16 | 17.56 | 15.41 | 14.58 |
| 22 | 6.49 | -0.01 | -0.03 | -0.03 | -0.03 | 1.15 | 3.37 | 6.85 | 10.00 | 16.87 | 15.04 | 13.75 |
| 23 | 6.24 | -0.03 | -0.03 | -0.03 | -0.03 | 2.01 | 4.48 | 7.15 | 9.88 | 15.23 | 15.36 | 14.77 |
| 24 | 3.59 | -0.01 | -0.03 | -0.03 | -0.03 | 1.89 | 4.94 | 7.28 | 9.47 | 15.71 | 15.95 | 14.43 |
| 25 | 2.42 | -0.01 | -0.02 | -0.03 | -0.02 | 0.98 | 3.91 | 7.31 | 9.87 | 15.81 | 15.65 | 14.19 |
| 26 | 3.91 | -0.01 | -0.01 | -0.03 | -0.02 | 0.71 | 4.70 | 7.24 | 10.22 | 16.15 | 16.39 | 15.28 |
| 27 | 3.81 | -0.01 | -0.02 | -0.03 | -0.02 | 0.53 | 5.45 | 7.37 | 10.82 | 15.67 | 16.32 | 15.68 |
| 28 | 3.28 | -0.01 | -0.03 | -0.03 | -0.03 | 1.33 | 5.25 | 7.57 | 9.83 | 15.92 | 16.66 | 15.21 |
| 29 | 2.63 | -0.02 | -0.03 | -0.03 | -- | 1.66 | 5.09 | 8.05 | 9.88 | 15.38 | 16.15 | 14.70 |
| 30 | 3.37 | -0.02 | -0.03 | -0.03 | -- | 2.24 | 4.99 | 7.77 | 10.44 | 15.79 | 15.82 | 13.62 |
| 31 | 3.02 | -- | -0.03 | -0.03 | -- | 1.51 | -- | 7.89 | -- | 15.88 | 16.13 | -- |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mean | 7.29 | 1.17 | -0.01 | -0.03 | -0.03 | 0.72 | 3.60 | 6.40 | 9.16 | 14.53 | 15.46 | 15.73 |
| Min | 2.42 | -0.03 | -0.03 | -0.03 | -0.03 | -0.03 | 1.29 | 4.80 | 7.39 | 11.11 | 13.98 | 13.62 |
| Max | 11.83 | 4.52 | 0.13 | -0.03 | -0.02 | 2.24 | 5.45 | 8.05 | 10.82 | 17.56 | 16.66 | 17.42 |

# MCSG-1
# Daily Mean Temperature Values
# (Degrees Celsius)

| Day | Oct-22 | Nov-22 | Dec-22 | Jan-23 | Feb-23 | Mar-23 | Apr-23 | May-23 | Jun-23 | Jul-23 | Aug-23 | Sep-23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 9.32 | 0.54 | -2.05 | 0.02 | -0.92 | -0.60 | -0.02 | 7.33 | 11.09 | 14.40 | 19.22 | 13.87 |
| 2 | 9.96 | 1.46 | -0.82 | 0.02 | -1.04 | -0.43 | 0.00 | 8.27 | 9.41 | 14.18 | 18.89 | 14.26 |
| 3 | 8.98 | 2.05 | -0.81 | 0.00 | -1.04 | -0.20 | 0.02 | 8.56 | 9.63 | 14.78 | 16.90 | 14.38 |
| 4 | 8.00 | 1.61 | -0.41 | -0.03 | -0.95 | -0.53 | 0.02 | 8.91 | 10.74 | 15.62 | 16.79 | 13.73 |
| 5 | 7.83 | 1.61 | -0.05 | -0.08 | -0.81 | -0.39 | 0.01 | 8.18 | 12.35 | 15.93 | 17.22 | 12.24 |
| 6 | 8.27 | 2.48 | 0.01 | -0.14 | -0.60 | -0.14 | -0.02 | 9.85 | 12.76 | 15.52 | 17.09 | 11.61 |
| 7 | 8.00 | 2.82 | -0.02 | -0.16 | -0.76 | -0.14 | 0.05 | 8.48 | 12.95 | 15.42 | 17.26 | 11.55 |
| 8 | 7.41 | 2.04 | -0.03 | -0.22 | -0.90 | -0.10 | 0.10 | 9.54 | 12.55 | 15.28 | 16.42 | 11.37 |
| 9 | 7.17 | 1.72 | -0.09 | -0.26 | -0.82 | -0.18 | 0.22 | 10.74 | 12.08 | 14.97 | 15.88 | 11.28 |
| 10 | 6.70 | 1.03 | -0.34 | -0.22 | -1.14 | -0.14 | 0.35 | 10.67 | 12.44 | 16.01 | 15.11 | 12.99 |
| 11 | 7.27 | -1.73 | -0.60 | -0.15 | -1.11 | -0.09 | 0.26 | 8.30 | 12.83 | 16.32 | 16.46 | 12.71 |
| 12 | 6.75 | -2.11 | -0.50 | -0.17 | -0.80 | -0.04 | 0.40 | 9.08 | 12.98 | 17.88 | 17.35 | 11.57 |
| 13 | 5.92 | -1.76 | -0.41 | -0.26 | -0.71 | -0.03 | 0.53 | 9.92 | 12.31 | 17.63 | 16.71 | 11.99 |
| 14 | 5.51 | -0.87 | -0.48 | -0.28 | -0.56 | -0.03 | 0.64 | 10.30 | 12.45 | 17.51 | 16.76 | 11.48 |
| 15 | 5.30 | -2.25 | -0.60 | -0.23 | -0.54 | -0.02 | 0.53 | 11.18 | 13.04 | 16.71 | 16.98 | 11.60 |
| 16 | 5.83 | -3.77 | -0.87 | -0.17 | -1.00 | 0.00 | 0.50 | 11.26 | 11.97 | 16.48 | 17.67 | 9.90 |
| 17 | 5.49 | -3.89 | -1.32 | -0.14 | -1.46 | 0.00 | 0.60 | 10.76 | 10.83 | 16.88 | 17.33 | 9.65 |
| 18 | 5.08 | -2.80 | -1.48 | -0.14 | -1.36 | -0.01 | 0.69 | 10.28 | 11.28 | 17.59 | 16.06 | 9.69 |
| 19 | 4.60 | -4.73 | -1.55 | -0.21 | -1.06 | -0.03 | 0.72 | 11.23 | 12.47 | 18.32 | 15.67 | 9.79 |
| 20 | 4.49 | -4.79 | -1.54 | -0.35 | -0.93 | -0.02 | 0.46 | 11.35 | 13.12 | 18.55 | 15.31 | 9.66 |
| 21 | 4.44 | -4.64 | -1.08 | -0.39 | -0.62 | -0.03 | 0.25 | 10.95 | 13.34 | 18.55 | 15.36 | 10.13 |
| 22 | 4.98 | -4.50 | -0.85 | -0.53 | -0.31 | -0.01 | 0.35 | 10.91 | 13.63 | 17.62 | 15.30 | 8.93 |
| 23 | 5.17 | -3.99 | -0.92 | -0.56 | -0.43 | 0.02 | 0.62 | 10.99 | 13.63 | 17.51 | 15.70 | 8.46 |
| 24 | 2.77 | -3.54 | -0.82 | -0.57 | -0.59 | 0.02 | 0.99 | 11.61 | 12.66 | 18.75 | 16.36 | 7.75 |
| 25 | 1.73 | -4.28 | -0.68 | -0.57 | -0.57 | 0.01 | 1.11 | 10.96 | 12.92 | 19.18 | 16.13 | 7.25 |
| 26 | 2.30 | -3.48 | -0.65 | -0.79 | -0.40 | -0.09 | 1.69 | 11.47 | 13.51 | 19.35 | 16.15 | 7.65 |
| 27 | 2.33 | -1.24 | -0.46 | -0.68 | -0.50 | -0.11 | 3.42 | 11.88 | 15.59 | 19.14 | 15.81 | 8.11 |
| 28 | 1.14 | -1.35 | 0.05 | -0.50 | -0.48 | -0.26 | 4.07 | 11.72 | 14.37 | 19.39 | 15.25 | 8.01 |
| 29 | 0.53 | -0.98 | 0.02 | -0.40 | -- | -0.18 | 4.81 | 12.05 | 14.25 | 19.10 | 13.85 | 7.96 |
| 30 | 0.88 | -2.18 | -0.03 | -0.33 | -- | -0.07 | 6.15 | 12.14 | 14.43 | 18.76 | 13.36 | 8.30 |
| 31 | 0.57 | -- | -0.07 | -0.43 | -- | -0.03 | -- | 11.65 | -- | 18.90 | 13.46 | -- |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mean | 5.31 | -1.38 | -0.63 | -0.29 | -0.80 | -0.12 | 0.98 | 10.34 | 12.59 | 17.17 | 16.25 | 10.59 |
| Min | 0.53 | -4.79 | -2.05 | -0.79 | -1.46 | -0.60 | -0.02 | 7.33 | 9.41 | 14.18 | 13.36 | 7.25 |
| Max | 9.96 | 2.82 | 0.05 | 0.02 | -0.31 | 0.02 | 6.15 | 12.14 | 15.59 | 19.39 | 19.22 | 14.38 |

Red - Air/Soil Temp. (Stream Likely Dry)

# MCSG-2
# Daily Mean Temperature Values
# (Degrees Celsius)

| Day | Oct-22 | Nov-22 | Dec-22 | Jan-23 | Feb-23 | Mar-23 | Apr-23 | May-23 | Jun-23 | Jul-23 | Aug-23 | Sep-23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 10.47 | 3.32 | 0.74 | 0.99 | 1.45 | 1.13 | 1.90 | 6.85 | 10.18 | 12.86 | 16.84 | 15.47 |
| 2 | 10.79 | 3.70 | 1.24 | 1.06 | 1.47 | 1.01 | 2.01 | 7.29 | 9.80 | 12.96 | 17.56 | 15.71 |
| 3 | 10.43 | 3.99 | 1.33 | 1.14 | 1.48 | 1.00 | 2.01 | 7.49 | 9.93 | 13.45 | 16.44 | 15.35 |
| 4 | 9.40 | 3.57 | 1.74 | 1.28 | 1.40 | 1.04 | 1.37 | 7.94 | 10.42 | 13.84 | 16.20 | 14.64 |
| 5 | 9.15 | 3.84 | 1.24 | 1.31 | 1.30 | 1.03 | 1.26 | 7.45 | 11.05 | 14.13 | 16.47 | 13.20 |
| 6 | 9.02 | 4.43 | 1.29 | 1.45 | 1.33 | 0.93 | 1.42 | 7.94 | 11.07 | 14.02 | 16.28 | 12.76 |
| 7 | 8.69 | 4.60 | 1.35 | 1.48 | 1.25 | 0.96 | 2.16 | 7.90 | 11.17 | 13.99 | 16.17 | 12.44 |
| 8 | 8.16 | 4.18 | 0.95 | 1.39 | 1.12 | 1.00 | 2.48 | 8.08 | 11.18 | 14.02 | 15.20 | 12.11 |
| 9 | 7.79 | 3.82 | 0.87 | 1.50 | 1.16 | 0.97 | 2.80 | 8.47 | 10.92 | 13.88 | 15.07 | 11.93 |
| 10 | 7.55 | 2.86 | 0.81 | 1.56 | 1.11 | 1.10 | 3.32 | 8.09 | 11.03 | 14.43 | 15.05 | 12.72 |
| 11 | 7.74 | 1.45 | 0.98 | 1.57 | 1.09 | 1.00 | 3.67 | 7.99 | 11.22 | 14.67 | 15.61 | 13.04 |
| 12 | 7.22 | 1.25 | 1.35 | 1.46 | 0.97 | 0.87 | 3.67 | 8.48 | 11.23 | 15.39 | 16.45 | 12.35 |
| 13 | 6.79 | 1.38 | 1.43 | 1.45 | 0.99 | 0.97 | 3.32 | 8.76 | 11.06 | 15.37 | 15.81 | 12.66 |
| 14 | 6.37 | 2.02 | 1.49 | 1.51 | 1.22 | 1.18 | 3.14 | 9.05 | 11.27 | 15.26 | 15.57 | 12.45 |
| 15 | 5.97 | 1.31 | 1.47 | 1.60 | 1.29 | 1.18 | 3.17 | 9.47 | 11.88 | 14.85 | 15.75 | 12.47 |
| 16 | 6.29 | -0.14 | 1.18 | 1.63 | 1.21 | 1.27 | 3.31 | 9.53 | 11.61 | 14.84 | 16.12 | 11.92 |
| 17 | 6.07 | -0.31 | 0.99 | 1.67 | 1.00 | 1.27 | 3.56 | 9.50 | 11.39 | 14.93 | 16.11 | 11.51 |
| 18 | 5.88 | 0.10 | 0.98 | 1.66 | 0.96 | 1.17 | 3.67 | 9.49 | 11.18 | 15.43 | 16.60 | 11.39 |
| 19 | 5.57 | -0.13 | 0.95 | 1.59 | 0.96 | 1.18 | 3.36 | 9.75 | 11.54 | 16.04 | 16.88 | 11.35 |
| 20 | 5.41 | -0.14 | 1.00 | 1.53 | 1.02 | 1.35 | 3.10 | 10.13 | 11.74 | 16.28 | 16.11 | 11.17 |
| 21 | 5.28 | -0.25 | 1.29 | 1.52 | 0.90 | 1.45 | 2.82 | 9.96 | 11.83 | 16.37 | 15.86 | 11.22 |
| 22 | 5.56 | -0.77 | 1.34 | 1.44 | 1.04 | 1.21 | 3.65 | 10.14 | 11.90 | 15.60 | 16.12 | 10.74 |
| 23 | 6.00 | -0.78 | 1.29 | 1.47 | 1.08 | 1.57 | 4.26 | 10.43 | 11.93 | 15.89 | 16.25 | 10.29 |
| 24 | 4.97 | -0.72 | 1.42 | 1.51 | 1.02 | 1.63 | 4.51 | 10.69 | 11.55 | 16.72 | 16.94 | 9.84 |
| 25 | 4.62 | -1.10 | 1.41 | 1.53 | 0.98 | 1.26 | 3.56 | 10.54 | 11.63 | 16.91 | 16.90 | 9.39 |
| 26 | 4.96 | -1.00 | 1.44 | 1.43 | 1.04 | 1.16 | 4.75 | 10.69 | 11.92 | 17.16 | 16.24 | 9.16 |
| 27 | 4.71 | -0.23 | 1.38 | 1.51 | 1.09 | 1.16 | 5.21 | 10.57 | 12.93 | 16.81 | 17.35 | 9.11 |
| 28 | 4.02 | 0.44 | 1.12 | 1.58 | 1.19 | 0.97 | 5.49 | 10.55 | 12.53 | 17.24 | 15.85 | 9.01 |
| 29 | 3.58 | 0.89 | 1.16 | 1.62 | -- | 1.43 | 5.78 | 10.72 | 12.52 | 16.64 | 15.27 | 8.88 |
| 30 | 3.64 | 0.25 | 1.26 | 1.64 | -- | 1.64 | 6.40 | 10.46 | 12.62 | 16.87 | 15.44 | 8.93 |
| 31 | 3.31 | -- | 1.34 | 1.57 | -- | 1.46 | -- | 10.26 | -- | 16.88 | 15.33 | -- |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mean | 6.63 | 1.39 | 1.22 | 1.47 | 1.15 | 1.18 | 3.37 | 9.18 | 11.41 | 15.28 | 16.12 | 11.77 |
| Min | 3.31 | -1.10 | 0.74 | 0.99 | 0.90 | 0.87 | 1.26 | 6.85 | 9.80 | 12.86 | 15.05 | 8.88 |
| Max | 10.79 | 4.60 | 1.74 | 1.67 | 1.48 | 1.64 | 6.40 | 10.72 | 12.93 | 17.24 | 17.56 | 15.71 |

# MCSG-3
# Daily Mean Temperature Values
# (Degrees Celsius)

| Day | Oct-22 | Nov-22 | Dec-22 | Jan-23 | Feb-23 | Mar-23 | Apr-23 | May-23 | Jun-23 | Jul-23 | Aug-23 | Sep-23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 10.18 | 2.90 | ND | ND | ND | 0.59 | 1.25 | 6.51 | 8.57 | 11.86 | 15.50 | 13.78 |
| 2 | 10.57 | 3.72 | ND | ND | ND | 0.46 | 1.25 | 6.72 | 8.17 | 11.93 | 15.71 | 13.91 |
| 3 | 9.98 | 3.64 | ND | ND | ND | 0.50 | 1.40 | 6.61 | 8.84 | 12.71 | 15.16 | 13.87 |
| 4 | 9.18 | 3.19 | ND | ND | ND | 0.63 | 1.15 | 7.05 | 9.44 | 12.95 | 14.67 | 13.23 |
| 5 | 8.96 | 3.59 | ND | ND | ND | 1.11 | 1.36 | 6.15 | 9.82 | 13.28 | 14.68 | 12.18 |
| 6 | 9.08 | 4.49 | ND | ND | ND | 1.29 | 1.37 | 7.12 | 9.65 | 12.76 | 14.28 | 11.93 |
| 7 | 8.74 | 4.62 | ND | ND | ND | 1.66 | 1.35 | 6.88 | 9.70 | 12.89 | 14.00 | 11.62 |
| 8 | 8.15 | 3.80 | ND | ND | ND | 1.17 | 1.54 | 7.43 | 9.79 | 12.81 | 13.19 | 11.31 |
| 9 | 7.87 | 3.17 | ND | ND | -3.72 | 1.35 | 1.41 | 7.72 | 9.03 | 12.62 | 13.11 | 11.25 |
| 10 | 7.61 | 2.35 | ND | ND | -5.71 | 0.90 | 1.52 | 7.12 | 9.93 | 13.55 | 13.34 | 12.71 |
| 11 | 7.74 | ND | ND | ND | -3.08 | 0.85 | 1.72 | 7.12 | 9.46 | 13.69 | 14.02 | 12.63 |
| 12 | 7.02 | ND | ND | ND | -1.28 | 0.89 | 2.05 | 7.64 | 9.50 | 14.43 | 14.83 | 11.93 |
| 13 | 6.63 | ND | ND | ND | -1.98 | 0.61 | 2.29 | 8.00 | 9.51 | 14.23 | 14.07 | 11.94 |
| 14 | 6.18 | ND | ND | ND | 0.21 | 0.65 | 2.37 | 7.96 | 10.15 | 14.24 | 14.09 | 11.57 |
| 15 | 5.80 | ND | ND | ND | -0.41 | 0.46 | 3.00 | 8.65 | 10.43 | 13.79 | 14.40 | 11.72 |
| 16 | 6.27 | ND | ND | ND | -2.52 | 0.60 | 3.28 | 8.50 | 9.86 | 13.80 | 14.46 | 10.80 |
| 17 | 5.93 | ND | ND | ND | -1.67 | 0.72 | 3.60 | 8.30 | 9.62 | 13.87 | 14.89 | 10.69 |
| 18 | 5.62 | ND | ND | ND | -1.02 | 0.67 | 3.86 | 8.45 | 10.32 | 14.54 | 14.80 | 10.23 |
| 19 | 5.23 | ND | ND | ND | -1.15 | 0.74 | 3.50 | 8.81 | 10.79 | 15.22 | 14.72 | 10.30 |
| 20 | 5.10 | ND | ND | ND | -0.90 | 1.10 | 3.41 | 9.03 | 11.01 | 15.29 | 14.58 | 10.33 |
| 21 | 5.01 | ND | ND | ND | -0.34 | 1.18 | 3.04 | 8.56 | 10.97 | 15.11 | 14.53 | 10.85 |
| 22 | 5.53 | ND | ND | ND | 0.72 | 0.68 | 4.01 | 8.73 | 10.98 | 14.36 | 14.21 | 9.55 |
| 23 | 5.26 | ND | ND | ND | 0.41 | 1.13 | 5.02 | 9.31 | 10.88 | 14.53 | 14.68 | 9.18 |
| 24 | 3.36 | ND | ND | ND | 0.51 | 1.19 | 5.14 | 9.17 | 10.27 | 15.35 | 15.32 | 8.67 |
| 25 | 3.21 | ND | ND | ND | 0.63 | 0.95 | 3.50 | 8.82 | 10.65 | 15.45 | 14.86 | 8.30 |
| 26 | 4.32 | ND | ND | ND | 0.82 | 0.93 | 5.03 | 9.14 | 11.14 | 15.50 | 14.94 | 8.51 |
| 27 | 4.01 | ND | ND | ND | 0.41 | 0.99 | 5.44 | 9.09 | 12.26 | 15.09 | 15.04 | 8.83 |
| 28 | 2.96 | ND | ND | ND | 0.45 | 0.76 | 5.68 | 9.18 | 11.40 | 15.39 | 14.87 | 8.61 |
| 29 | 2.66 | ND | ND | ND | -- | 1.25 | 6.10 | 9.37 | 11.33 | 14.81 | 13.93 | 8.57 |
| 30 | 3.16 | ND | ND | ND | -- | 1.34 | 6.43 | 9.05 | 11.41 | 15.36 | 13.79 | 8.96 |
| 31 | 2.69 | -- | ND | ND | -- | 1.31 | -- | 8.82 | -- | 15.51 | 13.59 | -- |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mean | 6.26 | 3.55 | ND | ND | -0.98 | 0.92 | 3.07 | 8.10 | 10.16 | 14.09 | 14.46 | 10.93 |
| Min | 2.66 | 2.35 | ND | ND | -5.71 | 0.46 | 1.15 | 6.15 | 8.17 | 11.86 | 13.11 | 8.30 |
| Max | 10.57 | 4.62 | ND | ND | 0.82 | 1.66 | 6.43 | 9.37 | 12.26 | 15.51 | 15.71 | 13.91 |

ND No Data. Dead logger battery.

# MCSG-4
# Daily Mean Temperature Values
# (Degrees Celsius)

| Day | Oct-22 | Nov-22 | Dec-22 | Jan-23 | Feb-23 | Mar-23 | Apr-23 | May-23 | Jun-23 | Jul-23 | Aug-23 | Sep-23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 10.21 | 2.46 | -1.13 | -0.14 | 0.27 | 0.84 | 1.45 | 6.40 | 9.68 | 12.07 | 15.85 | 14.16 |
| 2 | 10.75 | 3.35 | -0.39 | -0.14 | 0.31 | 0.73 | 1.52 | 6.56 | 8.54 | 12.13 | 16.06 | 14.26 |
| 3 | 10.19 | 3.56 | -0.40 | -0.13 | 0.34 | 0.83 | 1.56 | 6.41 | 9.79 | 12.94 | 15.44 | 14.21 |
| 4 | 9.28 | 2.98 | -0.33 | -0.12 | 0.47 | 0.87 | 1.01 | 6.94 | 11.32 | 13.20 | 14.96 | 13.66 |
| 5 | 9.15 | 3.38 | -0.20 | -0.13 | 0.61 | 0.92 | 1.16 | 6.19 | 12.43 | 13.53 | 14.97 | 12.55 |
| 6 | 9.18 | 4.28 | -0.15 | -0.15 | 0.96 | 0.80 | 1.20 | 7.02 | 10.77 | 13.00 | 14.56 | 12.34 |
| 7 | 8.76 | 4.42 | -0.14 | -0.14 | 0.41 | 0.89 | 1.57 | 6.86 | 9.85 | 13.12 | 14.28 | 12.04 |
| 8 | 8.16 | 3.47 | -0.14 | -0.17 | 0.40 | 0.90 | 1.81 | 7.32 | 9.94 | 13.02 | 13.43 | 11.71 |
| 9 | 7.84 | 2.82 | -0.30 | -0.18 | 0.34 | 0.78 | 1.78 | 7.71 | 9.15 | 12.87 | 13.32 | 11.60 |
| 10 | 7.42 | 2.07 | -0.81 | -0.14 | 0.13 | 0.88 | 1.93 | 7.14 | 10.08 | 13.86 | 13.58 | 12.98 |
| 11 | 7.69 | 0.35 | -0.82 | -0.02 | 0.28 | 0.65 | 2.14 | 7.07 | 9.60 | 13.99 | 14.24 | 12.95 |
| 12 | 6.96 | 0.08 | -0.47 | 0.76 | 0.51 | 0.55 | 2.28 | 7.55 | 9.64 | 14.74 | 15.11 | 12.20 |
| 13 | 6.45 | 0.32 | -0.37 | 0.75 | 0.62 | 0.50 | 2.35 | 7.93 | 9.65 | 14.51 | 14.27 | 12.28 |
| 14 | 6.00 | 1.25 | -0.38 | 1.15 | 0.94 | 0.67 | 2.38 | 7.97 | 10.31 | 14.51 | 14.32 | 11.81 |
| 15 | 5.60 | 0.22 | -0.44 | 1.57 | 0.84 | 0.51 | 2.82 | 8.60 | 10.64 | 14.06 | 14.66 | 11.95 |
| 16 | 6.00 | -0.11 | -0.69 | 1.65 | 0.35 | 0.66 | 3.12 | 8.48 | 10.03 | 14.07 | 14.68 | 11.10 |
| 17 | 5.75 | -0.89 | -1.02 | 1.67 | 0.11 | 0.82 | 3.40 | 8.32 | 9.81 | 14.12 | 15.23 | 10.96 |
| 18 | 5.41 | -1.41 | -1.13 | 1.46 | 0.32 | 0.67 | 3.65 | 9.25 | 10.48 | 14.83 | 15.05 | 10.42 |
| 19 | 4.98 | -2.04 | -1.25 | 1.04 | 0.54 | 0.74 | 3.31 | 10.56 | 10.96 | 15.52 | 14.92 | 10.51 |
| 20 | 4.83 | -1.94 | -1.26 | 0.92 | 0.64 | 1.04 | 3.06 | 11.06 | 11.19 | 15.60 | 14.81 | 10.56 |
| 21 | 4.74 | -1.74 | -0.76 | 0.91 | 0.64 | 1.19 | 2.36 | 10.77 | 11.14 | 15.43 | 14.76 | 11.11 |
| 22 | 5.24 | -1.22 | -0.65 | 0.51 | 0.94 | 0.74 | 3.62 | 11.12 | 11.20 | 14.64 | 14.41 | 9.78 |
| 23 | 5.27 | -0.47 | -0.80 | 0.65 | 0.85 | 1.19 | 4.85 | 11.91 | 11.07 | 14.81 | 14.92 | 9.38 |
| 24 | 3.16 | -0.96 | -0.70 | 0.70 | 0.84 | 1.25 | 5.04 | 12.07 | 10.44 | 15.66 | 15.57 | 8.86 |
| 25 | 2.93 | -1.67 | -0.63 | 0.68 | 0.78 | 0.78 | 3.60 | 11.43 | 10.84 | 15.77 | 15.05 | 8.42 |
| 26 | 4.07 | -1.52 | -0.66 | 0.25 | 0.93 | 0.75 | 4.74 | 11.67 | 11.37 | 15.83 | 15.18 | 8.65 |
| 27 | 3.83 | -0.25 | -0.65 | 0.80 | 0.89 | 0.83 | 5.25 | 11.48 | 12.57 | 15.40 | 15.24 | 8.98 |
| 28 | 2.68 | -0.36 | -0.28 | 1.10 | 0.94 | 0.56 | 5.56 | 11.54 | 11.59 | 15.70 | 15.32 | 8.78 |
| 29 | 2.27 | -0.39 | -0.20 | 1.23 | -- | 1.19 | 5.80 | 11.74 | 11.54 | 15.08 | 14.40 | 8.73 |
| 30 | 2.81 | -1.17 | -0.16 | 1.30 | -- | 1.37 | 6.24 | 11.00 | 11.60 | 15.65 | 14.17 | 8.96 |
| 31 | 2.28 | -- | -0.15 | 0.79 | -- | 1.23 | -- | 10.48 | -- | 15.82 | 14.03 | -- |

| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mean | 6.12 | 0.63 | -0.56 | 0.59 | 0.58 | 0.85 | 3.02 | 9.05 | 10.57 | 14.37 | 14.73 | 11.20 |
| Min | 2.27 | -2.04 | -1.26 | -0.18 | 0.11 | 0.50 | 1.01 | 6.19 | 8.54 | 12.07 | 13.32 | 8.42 |
| Max | 10.75 | 4.42 | -0.14 | 1.67 | 0.96 | 1.37 | 6.24 | 12.07 | 12.57 | 15.83 | 16.06 | 14.26 |

# MCSG-5
# Daily Mean Temperature Values
# (Degrees Celsius)

| Day | Oct-22 | Nov-22 | Dec-22 | Jan-23 | Feb-23 | Mar-23 | Apr-23 | May-23 | Jun-23 | Jul-23 | Aug-23 | Sep-23 |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 1 | 10.03 | 2.99 | -2.19 | 0.03 | -6.29 | -0.45 | 0.39 | 6.87 | 9.69 | 13.03 | 19.69 | 18.27 |
| 2 | 10.63 | 4.62 | -0.11 | 0.02 | -6.09 | -0.38 | 0.42 | 7.25 | 9.06 | 13.38 | 19.73 | 17.66 |
| 3 | 9.90 | 2.92 | -0.76 | -0.12 | -5.64 | -0.36 | 0.60 | 7.23 | 10.10 | 14.14 | 17.23 | 17.90 |
| 4 | 9.52 | 1.33 | 0.04 | -0.51 | -4.20 | -0.51 | 0.36 | 7.89 | 11.07 | 14.91 | 16.92 | 17.98 |
| 5 | 9.34 | 2.29 | 0.18 | -1.06 | -2.35 | -0.24 | 0.30 | 6.52 | 11.86 | 14.97 | 17.13 | 16.24 |
| 6 | 9.73 | 3.82 | 0.07 | -0.27 | -1.61 | -0.05 | 0.22 | 7.93 | 11.67 | 14.20 | 16.95 | 14.56 |
| 7 | 9.42 | 4.20 | 0.34 | -0.32 | -5.36 | -0.03 | 0.39 | 7.59 | 11.70 | 13.84 | 16.31 | 14.67 |
| 8 | 8.44 | 3.07 | -0.12 | -1.02 | -4.26 | -0.03 | 0.73 | 8.27 | 11.66 | 13.78 | 15.20 | 14.61 |
| 9 | 8.37 | 2.50 | -2.73 | -0.51 | -4.43 | -0.02 | 0.80 | 8.65 | 10.56 | 13.47 | 15.57 | 14.75 |
| 10 | 8.05 | 0.37 | -3.10 | 0.16 | -6.98 | 0.00 | 1.03 | 7.75 | 11.56 | 14.63 | 18.06 | 16.61 |
| 11 | 8.54 | 0.34 | -1.82 | -0.17 | -3.40 | 0.00 | 1.32 | 7.72 | 11.31 | 15.15 | 19.03 | 14.63 |
| 12 | 7.65 | 0.16 | -0.56 | -2.70 | -0.99 | 0.00 | 1.73 | 8.48 | 11.33 | 16.12 | 20.39 | 14.19 |
| 13 | 7.09 | -0.01 | -1.38 | -2.89 | -0.22 | 0.01 | 2.21 | 8.89 | 10.97 | 15.85 | 20.56 | 14.40 |
| 14 | 6.96 | 0.27 | -1.66 | -1.07 | -0.33 | 0.02 | 2.38 | 9.06 | 11.86 | 16.04 | 20.87 | 13.70 |
| 15 | 6.84 | -0.68 | -2.68 | 0.18 | -0.61 | 0.02 | 2.41 | 9.80 | 12.54 | 15.24 | 21.54 | 13.34 |
| 16 | 7.42 | -1.88 | -5.82 | 0.08 | -1.24 | 0.02 | 2.91 | 9.78 | 11.76 | 15.36 | 21.90 | 10.97 |
| 17 | 6.95 | -1.97 | -6.82 | -0.09 | -1.76 | 0.02 | 3.57 | 9.48 | 10.97 | 15.67 | 21.61 | 10.72 |
| 18 | 6.88 | -1.38 | -6.22 | -1.53 | -1.56 | 0.02 | 3.79 | 9.55 | 11.81 | 16.65 | 17.43 | 10.48 |
| 19 | 6.79 | -2.56 | -6.27 | -4.08 | -1.20 | 0.02 | 3.14 | 10.10 | 12.41 | 17.58 | 19.16 | 10.85 |
| 20 | 6.93 | -2.89 | -4.73 | -3.72 | -1.11 | 0.03 | 2.30 | 10.58 | 12.58 | 17.80 | 19.31 | 10.82 |
| 21 | 6.84 | -2.74 | -1.80 | -4.59 | -0.48 | 0.09 | 1.62 | 9.93 | 12.54 | 17.65 | 20.16 | 11.17 |
| 22 | 8.11 | -2.75 | -2.54 | -5.89 | -0.03 | 0.06 | 3.30 | 10.20 | 12.66 | 16.42 | 19.24 | 10.23 |
| 23 | 5.16 | -2.98 | -3.14 | -4.72 | -0.30 | 0.14 | 4.85 | 10.83 | 12.31 | 16.67 | 20.36 | 10.64 |
| 24 | 1.70 | -2.42 | -1.42 | -4.85 | -0.62 | 0.34 | 5.14 | 10.76 | 11.21 | 18.01 | 20.74 | 10.33 |
| 25 | 1.52 | -2.65 | -1.67 | -5.11 | -0.62 | 0.12 | 3.03 | 10.27 | 11.60 | 18.46 | 18.56 | 10.18 |
| 26 | 3.27 | -1.95 | -1.11 | -7.53 | -0.39 | 0.09 | 4.98 | 10.71 | 12.07 | 19.21 | 20.66 | 11.19 |
| 27 | 2.42 | -0.38 | -0.83 | -2.83 | -0.07 | 0.12 | 5.83 | 10.70 | 14.17 | 18.56 | 16.84 | 11.81 |
| 28 | 1.24 | -0.70 | 0.14 | -2.01 | -0.07 | 0.04 | 6.02 | 10.63 | 12.55 | 18.74 | 16.95 | 11.82 |
| 29 | 1.47 | -1.13 | -0.31 | -1.17 | -- | 0.18 | 6.04 | 11.00 | 12.54 | 18.80 | 17.84 | 11.83 |
| 30 | 2.15 | -3.59 | -0.98 | -1.08 | -- | 0.46 | 6.87 | 10.49 | 12.73 | 18.45 | 17.00 | 12.19 |
| 31 | 1.84 | -- | -0.23 | -3.04 | -- | 0.54 | -- | 10.05 | -- | 19.13 | 18.10 | -- |

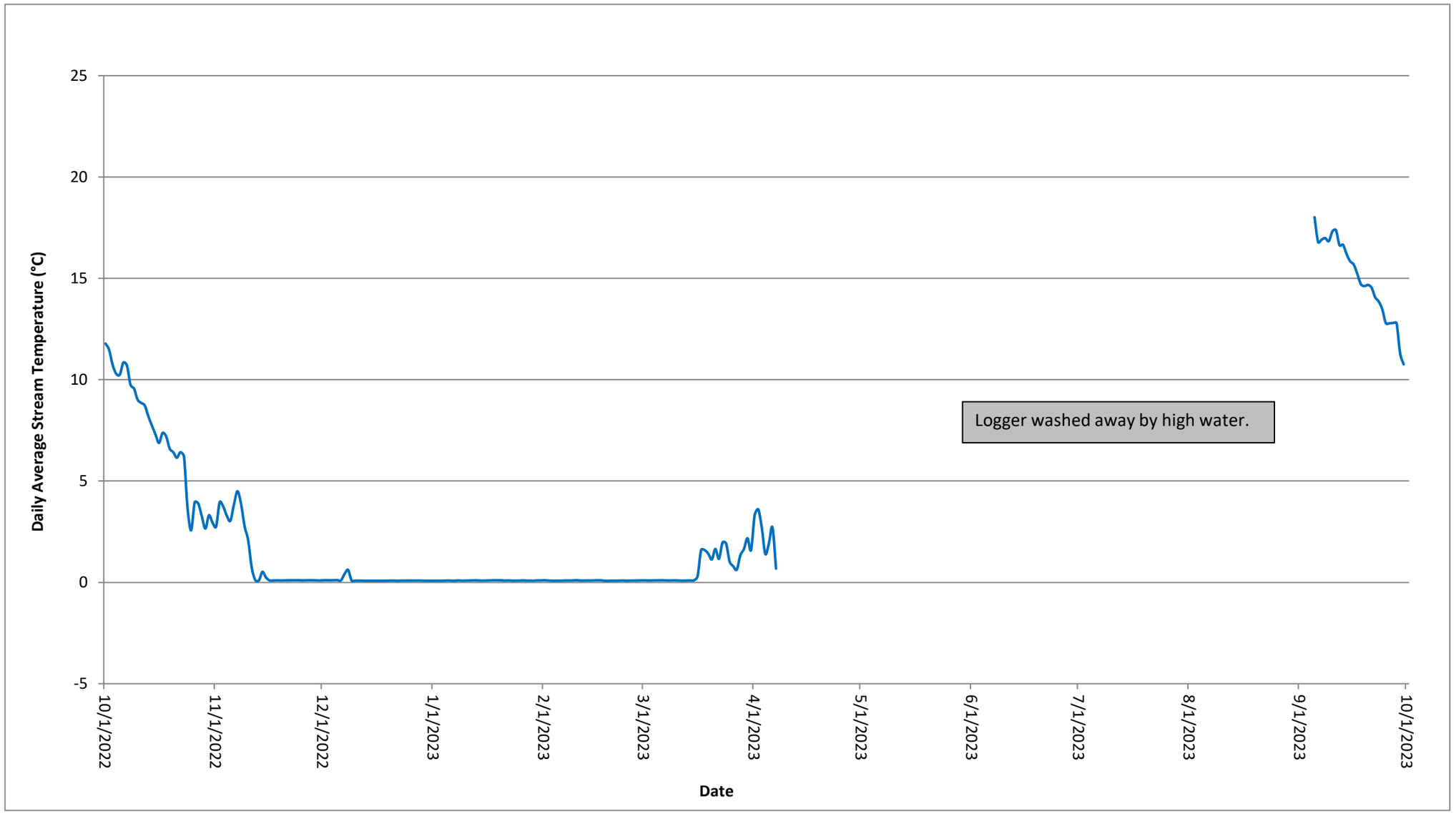
| | | | | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Mean | 6.49 | -0.13 | -1.94 | -2.01 | -2.22 | 0.01 | 2.62 | 9.19 | 11.70 | 16.19 | 18.74 | 13.29 |
| Min | 1.24 | -3.59 | -6.82 | -7.53 | -6.98 | -0.51 | 0.22 | 6.52 | 9.06 | 13.03 | 15.20 | 10.18 |
| Max | 10.63 | 4.62 | 0.34 | 0.18 | -0.03 | 0.54 | 6.87 | 11.00 | 14.17 | 19.21 | 21.90 | 18.27 |

Red - Air/Soil Temp. (Stream Likely Dry)

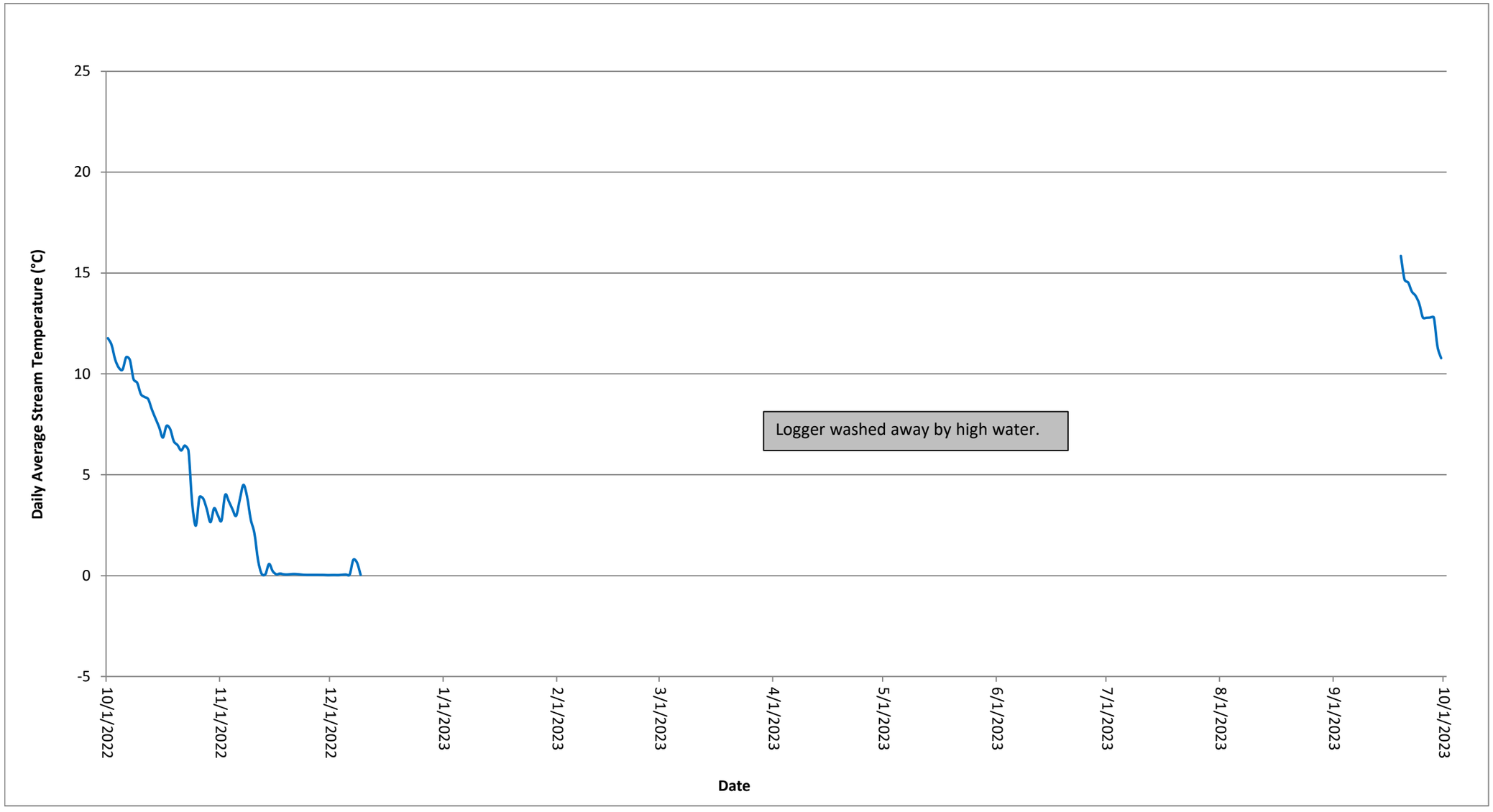
# APPENDIX J

## SURFACE WATER - TEMPERATURE GRAPHS

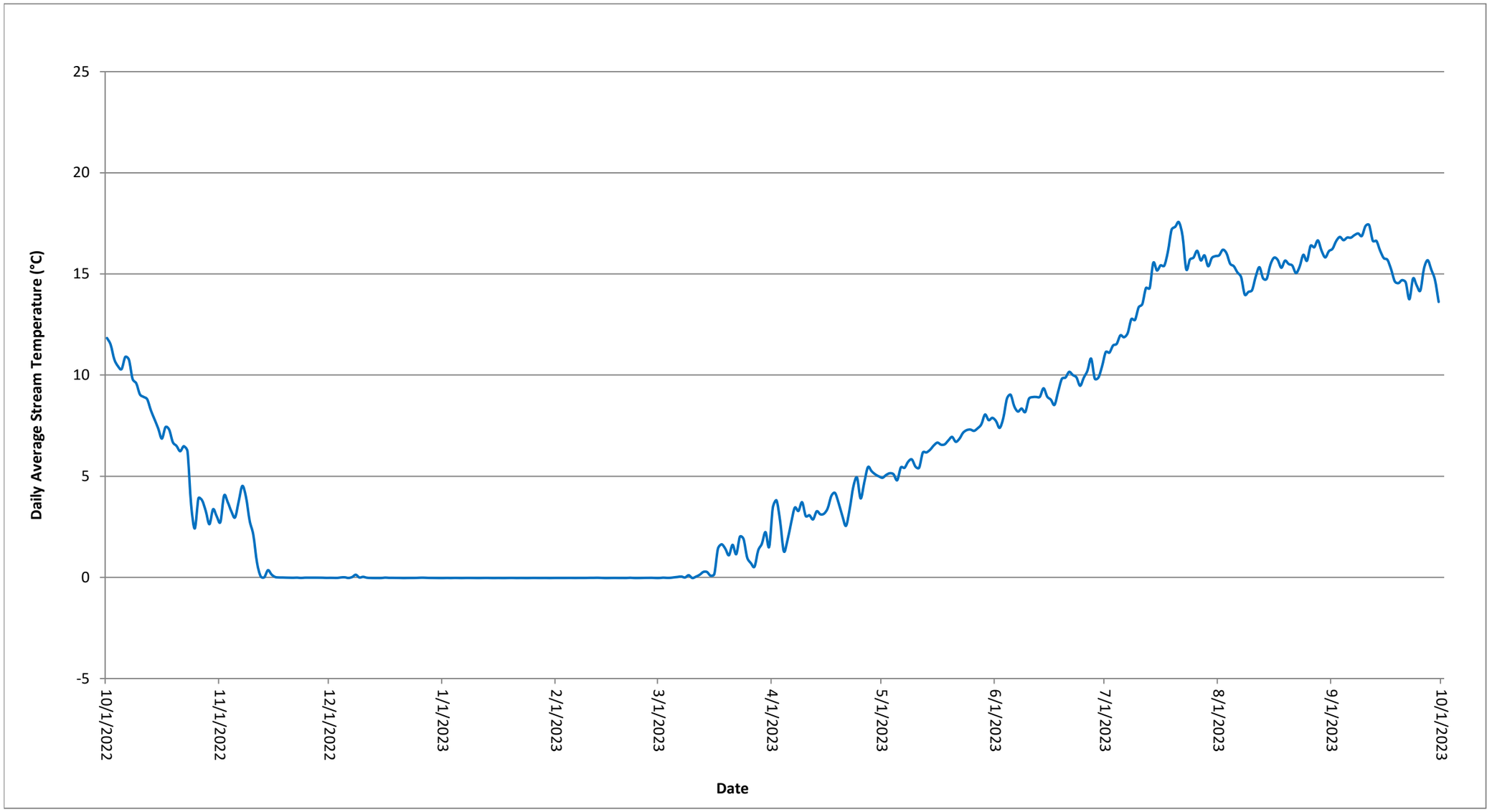
# NFG-1
# Daily Mean Temperature Graph



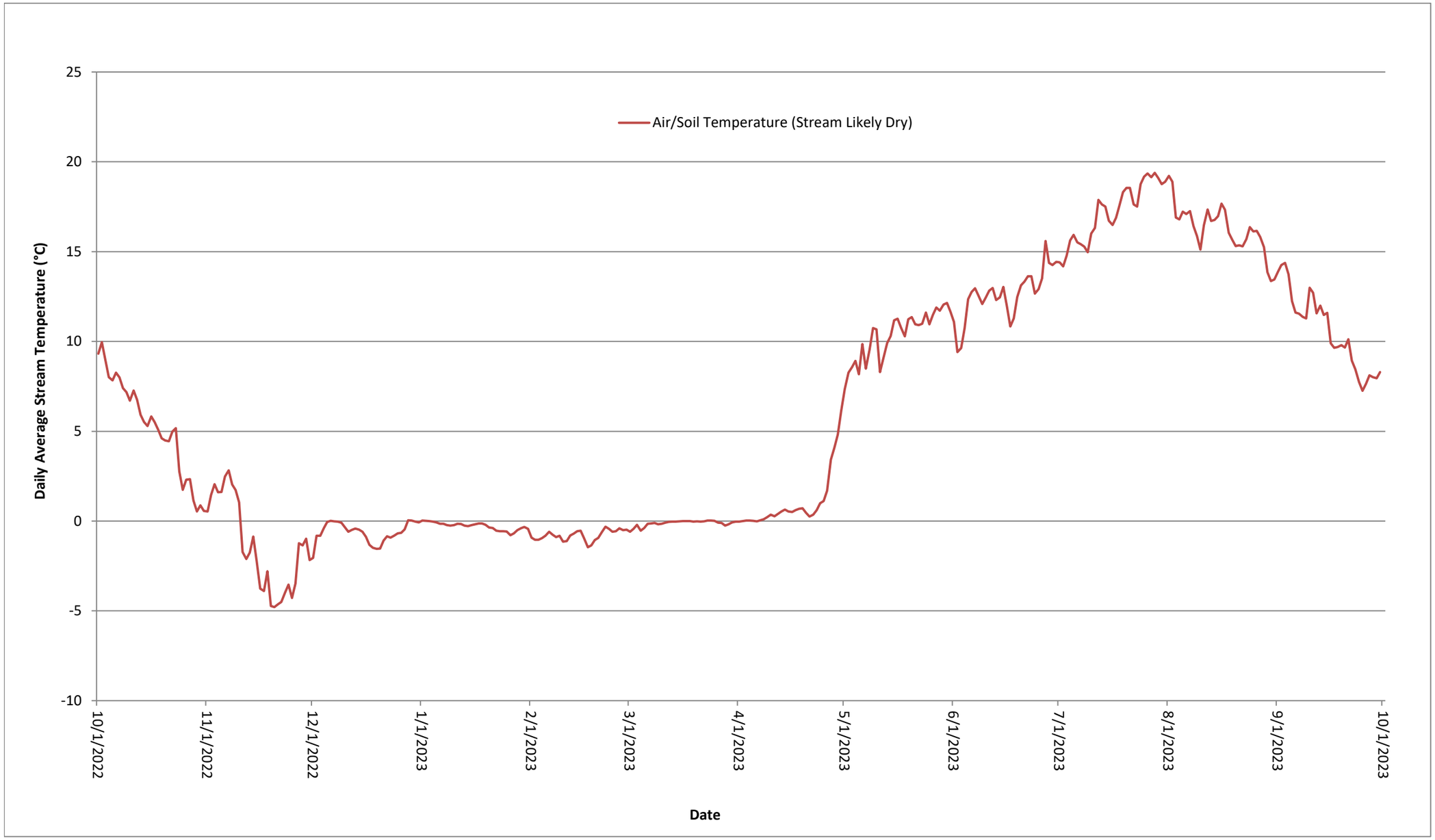
# NFG-2
# Daily Mean Temperature Graph



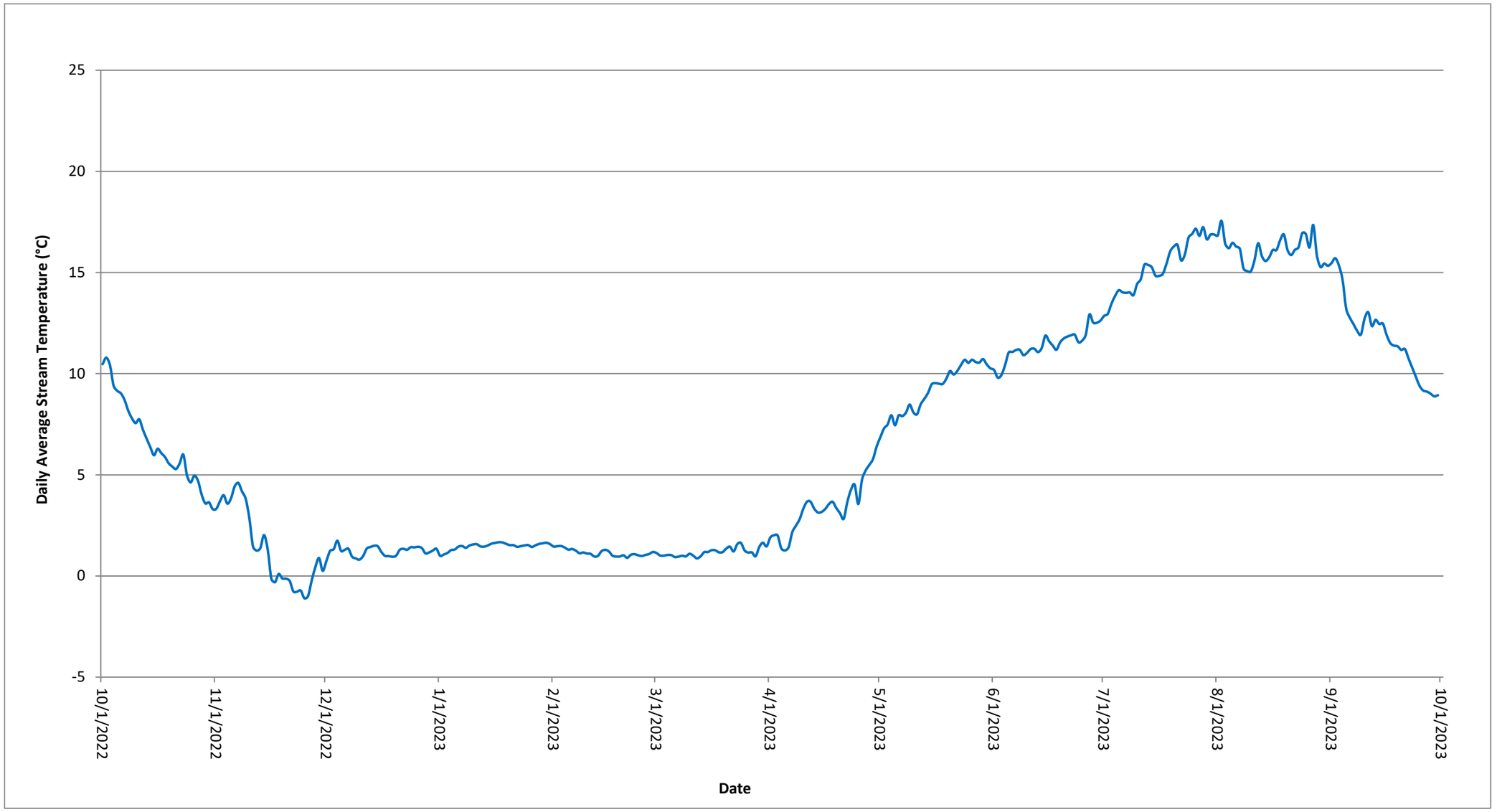
# NFG-3
# Daily Mean Temperature Graph



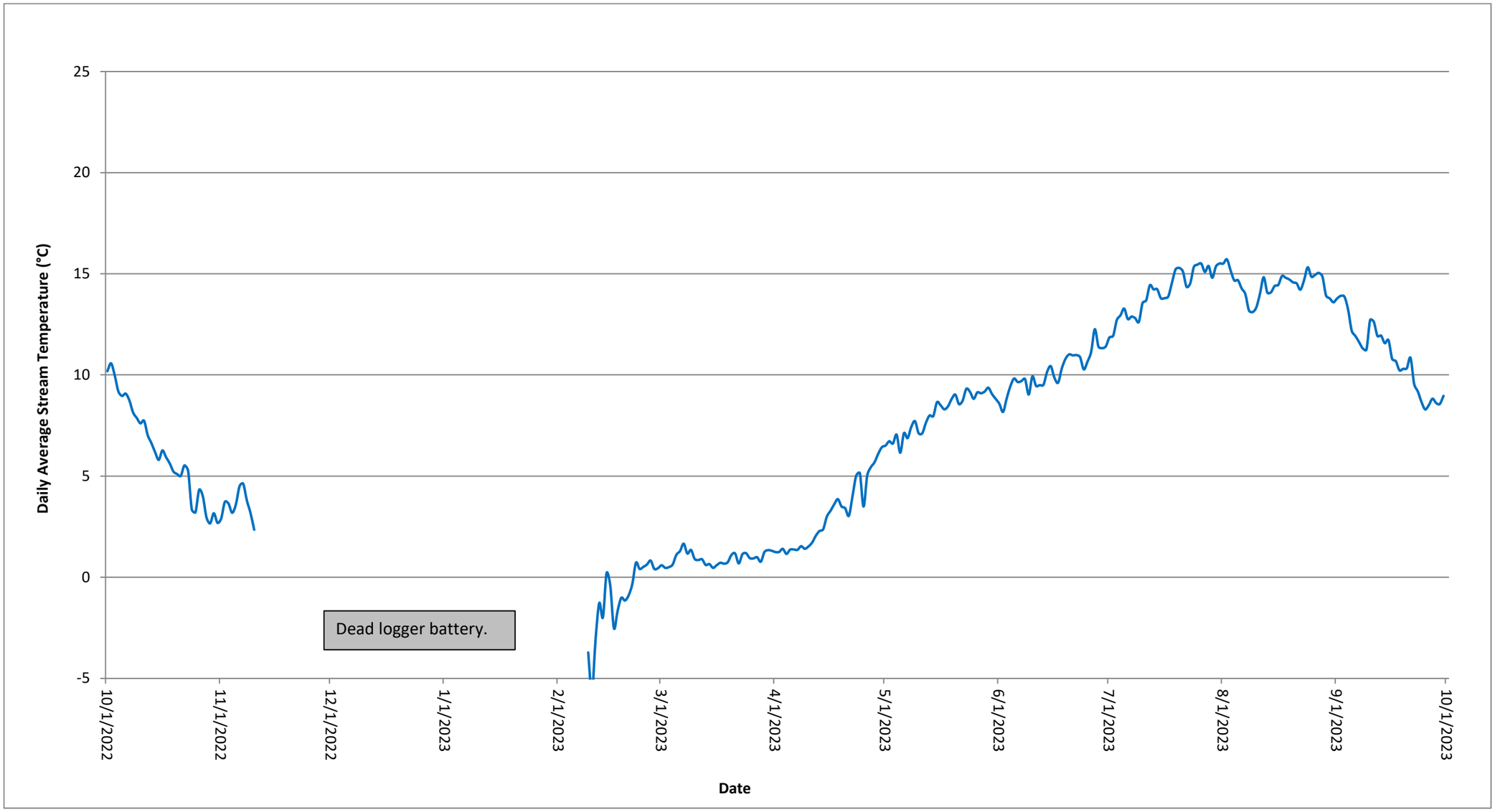
# MCSG-1
# Daily Mean Temperature Graph



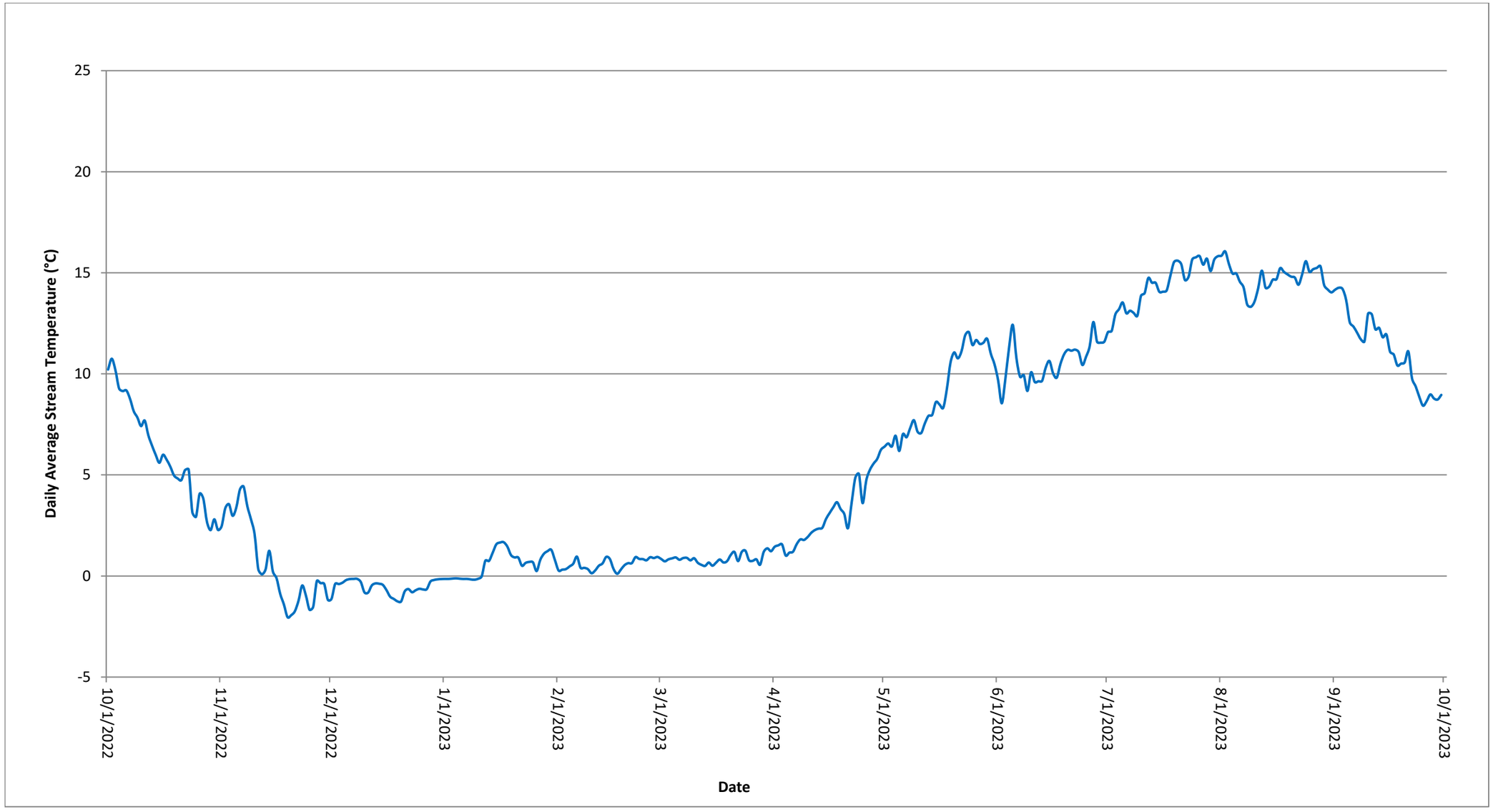
# MCSG-2
# Daily Mean Temperature Graph



# MCSG-3
# Daily Mean Temperature Graph



# MCSG-4
# Daily Mean Temperature Graph



# MCSG-5
# Daily Mean Temperature Graph