# SURFACE WATER CHARACTERIZATION STUDY OF THE WHARF BOSTON EXPANSION PROJECT

## REVISION 3 TOPICAL REPORT RSI-3138

PREPARED FOR
Coeur Wharf
10928 Wharf Road
Lead, South Dakota 57754

SEPTEMBER 2022

RESPEC

RESPEC.COM

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Project Number M0025.21001

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# 1.0 INTRODUCTION

Coeur Wharf (Wharf) has proposed to expand its existing gold mine operations in the area known as the Boston Expansion, which is located on the southern edge of the Wharf Mine along the Portland Ridgeline. This area is approximately 4 miles west of Lead, South Dakota, in Lawrence County. The proposed permit area consists of approximately 47.4 acres of private land located in Sections 2 and 3, Township 4 North, Range 2 East. Figure 1-1 shows the Boston Expansion Project study area. The blue outline represents the current permitted mine boundaries for Wharf and Golden Reward, and the fuchsia outline represents the proposed Boston Expansion permit area.

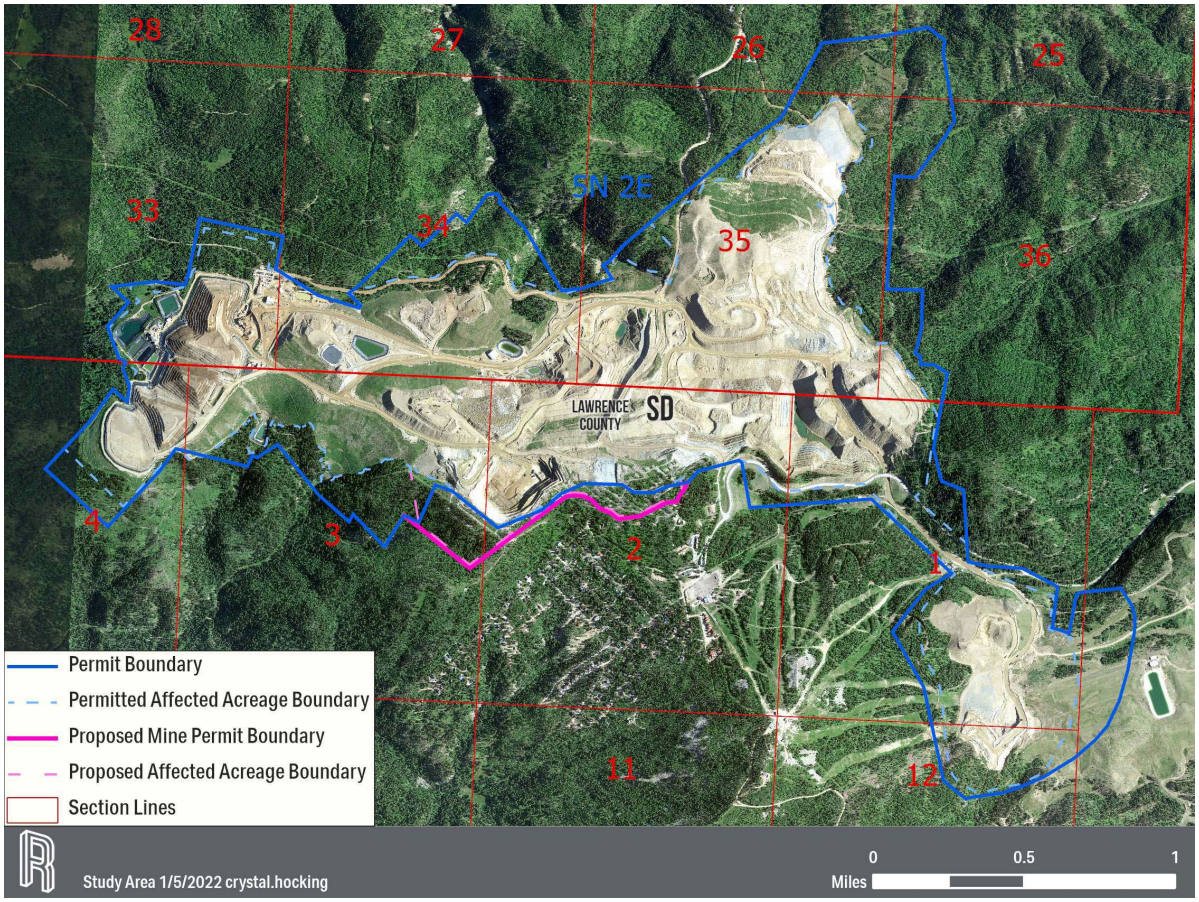


Figure 1-1. Boston Expansion Baseline Study Area Map.

A baseline environmental study in the Boston Expansion Area has been completed per the South Dakota Department of Agriculture and Natural Resources (SD DANR). The SD DANR mining rules, Administrative Rules of South Dakota (ARSD) 74:29, and statute South Dakota Codified Law (SDCL) 45-6B-7 require a baseline sampling plan to include the baseline water quality of all of the areas potentially affected by the proposed mining operation. In compliance with ARSD 74:29:02:07, surface waterbodies, which includes streams (perennial or ephemeral), must be sampled monthly for at least 1 year unless otherwise justified. Permit requirements also include measuring water level data for at least 1 year.

The following descriptions, analysis, and sampling methods are required for surface water by South Dakota law for mine permit applicants:

1. SDCL 45-6B-7 (9) (a-mm) and ARSD 74:29:02:07: Baseline water quality (Appendix D and Section 3.3)
2. ARSD 74:29:02:11: Effect on hydrologic balance on surface water (Section 4.0)
3. ARSD 74:29:02:11(1): Baseline surface water report (entire report)
4. ARSD 74:29:02:11(3): Surface water inventory map (Appendix G)
5. ARSD 74:29:02:11(7): Surface water monitoring plan for life of mine (Appendix C)
6. SDCL 45-6B-41 and ARSD 74:29:07:08: Hydrologic balance – surface water (Section 4.0).

The purpose of this report is to summarize the condition of the surface water environment near the proposed mining operation based on available water quality data because no surface water features are located within the Boston Expansion Area. This report provides the data and analyses to support a permit application for the proposed Boston Expansion Area. A statistical analysis of the water quality for 1 year of baseline data (January 1, 2020, to December 31, 2020) and a 5 year data summary (January 1, 2015, to December 31, 2020) are also included in this report.

This report is organized to optimize available information and understand the surface water quality near the Boston Expansion Area. Chapter 2.0 provides information regarding the physical characteristics near the expansion area. A summary of the water quality information is provided in Chapter 3.0, and Chapter 4.0 summarizes any potential impacts to the surface water as a result of conducting mining activities in the Boston Expansion Area. References are provided in Chapter 5.0. The report concludes with several appendices. Appendix A includes site-specific parameter lists, Appendix B provides a sampling site map, and Appendix C includes the sampling methods. Water quality results and water quality statistics for each site are provided in Appendices D and E, respectively. Time series of water quality parameters for each site are shown in Appendix F, and Appendix G provides a surface water inventory map.

# 2.0 SURFACE WATER INVENTORY

## 2.1 HYDROLOGIC UNITS

The Wharf Mine and Boston Expansion Area are located approximately 4 miles west of Lead, South Dakota, in Lawrence County and situated within the Lower Belle Fourche (Hydrologic Unit Code [HUC] 10120202) and Redwater (HUC 10120203) subbasins within the Belle Fourche Basin (HUC 101202). The Belle Fourche Basin is primarily located in Wyoming and South Dakota with a small portion in southeastern Montana. The basin drains approximately 7,230 square miles, and land elevations range from approximately 2,030 feet to 7,113 feet above mean sea level (amsl).

The Boston Expansion Area occurs within the Annie Creek, Lost Camp Gulch, and Nevada Gulch Creek drainages. Land elevations of the Boston Expansion Area range from 6,320 to 6,560 feet amsl. The area drains into the Redwater (HUC 10120203) and Lower Belle Fourche (HUC 10120202) subbasins, as shown in Figure 2-1 and Appendix G. Within these subbasins, the Boston Expansion Area occurs within the Spearfish Creek Watershed (HUC 1012020302) and Middle Belle Fourche River Watershed (HUC 1012020205). Within these watersheds, the Boston Expansion Area occurs within the Middle Spearfish Creek subwatershed (HUC 101202030203) and Upper Whitewood Creek subwatershed (HUC 101202020506).

## 2.2 STREAMS

Three small tributaries (i.e., Annie Creek, Lost Camp Gulch, and Nevada Gulch Creek) are adjacent to the Boston Expansion Area. The Lost Camp Gulch tributary drains into Annie Creek, Spearfish Creek, and Redwater Creek before entering the Belle Fourche River near Belle Fourche, South Dakota, approximately 23 miles north of the Boston Expansion Area. The Nevada Gulch Creek drains into Whitetail Creek, which drains into Whitewood Creek south of Lead, South Dakota. Whitewood Creek enters the Belle Fourche River near Vale, South Dakota, approximately 30 miles northeast of the Boston Expansion Area.

Annie Creek is a perennial stream located approximately 0.3 miles west of the Boston Expansion Area that flows south-southwest into Spearfish Creek. Annie Creek has five baseline sampling sites (Annie Creek II, CP001/NPDES001, CP005/NPDES005, Annie Creek at United States Geological Survey [USGS], and 46MN31). The Wharf site of Annie Creek at USGS and the SD DANR site of 46MN31 are located near the USGS 06430800 gage station. Lost Camp Gulch is a perennial stream that flows west to its confluence with Annie Creek. Lost Camp Gulch has one baseline surface water monitoring site (Lost Camp) located approximately 0.8 mile southwest of the Boston Expansion Area near the confluence with Annie Creek. Nevada Gulch Creek is located approximately 0.3 mile east of the Boston Expansion Area and flows east to its confluence with Fantail Creek and then enters Whitetail Creek. Nevada Gulch Creek is an ephemeral stream at the upper baseline surface water monitoring site (SS-20) and is a perennial stream at the lower baseline near the surface water monitoring site (SS-04).

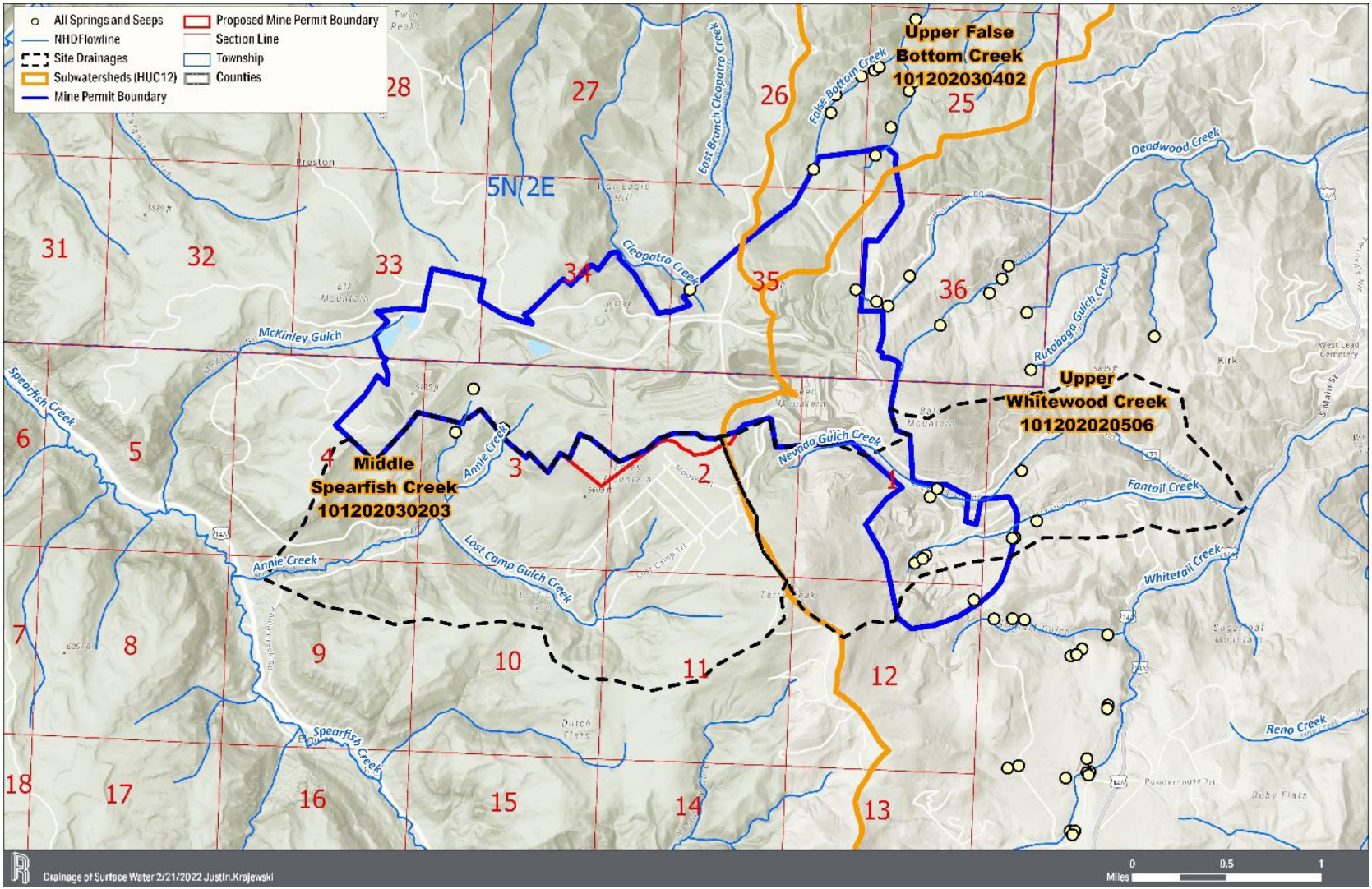


Figure 2-1. Drainage of Surface Water From the Wharf Mine and Proposed Boston Expansion Area.

The local subwatersheds and topographical map indicate that Annie Creek, Lost Camp Gulch, and Nevada Gulch Creek have proposed surface disturbance within their drainages. The proposed surface disturbance would occur primarily within the drainages of Annie Creek (approximately 27.3 acres), Lost Camp Gulch (approximately 18.1 acres), and a small area within Nevada Gulch Creek (approximately 2 acres). Surface disturbances within the Boston Expansion Area will not directly overlie any streams, and the existing pit would capture most precipitation within the area.

## 2.3 BENEFICIAL USES

As included in ARSD 74:51:02 and 74:51:03, all South Dakota lakes and streams are designated as one or more of the following beneficial uses:

1. Domestic water supply waters
2. Cold-water permanent fish life propagation waters
3. Cold-water marginal fish life propagation waters
4. Warm-water permanent fish life propagation waters
5. Warm-water semipermanent fish life propagation waters
6. Warm-water marginal fish life propagation waters
7. Immersion recreation waters
8. Limited-contact recreation waters
9. Fish and wildlife propagation, recreation, and stock-watering waters
10. Irrigation waters
11. Commerce and industry waters.

All South Dakota streams are assigned the beneficial uses of (9) fish and wildlife propagation, recreation, and stock watering, and (10) irrigation. All South Dakota lakes are assigned the beneficial uses of (9) fish and wildlife propagation, recreation, and stock watering. Table 2-1 lists the beneficial uses assigned to Annie Creek, Lost Camp Gulch, and Nevada Gulch Creek located within the drainages in or near the Boston Expansion Area [ARSD 74:51:03:02; ARSD 74:51:03:10].

Table 2-1. Beneficial Uses of Streams Within Drainages in and Near the Proposed Boston Expansion Area [South Dakota Legislature Administrative Rules, 2021]

| Waterbody | From | To | Beneficial Uses | County |
|---|---|---|---|---|
| Annie Creek | Spearfish Creek | Sec 3, T4N, R2E | 3, 8, 9, and 10 | Lawrence |
| Lost Camp Gulch | | | 9 and 10 | Lawrence |
| Nevada Gulch Creek | The Confluence With Fantail Creek | Sec 6, T4N, R3E | 3, 8, 9, and 10 | Lawrence |

Water quality standards associated with the beneficial uses of Annie Creek, Lost Camp Gulch, and Nevada Gulch Creek are shown in Table 2-2. The South Dakota 2022 Integrated Report (IR) lists Annie Creek as fully supporting the stream's designated beneficial uses; however, Lost Camp Gulch and Nevada Gulch Creek were not listed as to the status of their beneficial uses [South Dakota Department of Agriculture and Natural Resources, 2022]. Whitetail Creek, which Nevada Gulch Creek flows into, is

listed as fully supporting its designated beneficial uses. None of these streams were listed as impaired or not supporting their designated beneficial uses in the 2022 IR [South Dakota Department of Agriculture and Natural Resources, 2022].

Table 2-2. Numeric Criteria Assigned to Beneficial Uses of Surface Waters of the State [South Dakota Legislature Administrative Rules, 2021]

| Parameters | Unit of Measure[a] | (3) Cold-Water Marginal Fish Life Propagation | (8) Limited-Contact Recreation | (9) Fish and Wildlife Propagation, Recreation, and Stock Watering | (10) Irrigation |
|---|---|---|---|---|---|
| Alkalinity ($CaCO_3$) | mg/L | | | 750[b]/1,313[c] | |
| Barium | mg/L | | | | |
| Chloride | mg/L | | | | |
| Coliform, total | per 100mL | | | | |
| *Escherichia coli*[d] | per 100mL | | 6,306/1,178[c] | | |
| Conductivity (umhos/cm at 25°C) | µmhos/cm | | | 4,000[b]/7,000[c] | 2,500[b]/4,375[c] |
| Fluoride | mg/L | | | | |
| Hydrogen sulfide, undissociated | mg/L | 0.002 | | | |
| Nitrogen, total ammonia as N | mg/L | Equation-based standard[c] | | | |
| Nitrogen, nitrates as N | mg/L | | | 50[b]/88[c] | |
| Oxygen, dissolved[e] | mg/L | ≥ 5.0 | ≥ 5.0 | | |
| pH (standard units) | Units | 6.5–9.0 | | 6.0–9.5 | |
| Sodium Adsorption Ratio | | | | | 10 |
| Solids, total suspended | mg/L | 90[b]/158[c] | | | |
| Solids, total dissolved | mg/L | | | 2,500[b]/4,375[c] | |
| Sulfate | mg/L | | | | |
| Temperature | °F (°C) | 75°F (23.9°C) | | | |
| Total Petroleum, Hydrocarbons | mg/L | | | ≤ 10 | |
| Oil and Grease | mg/L | | | ≤ 10 | |

(a) Except where noted.
(b) 30-day average as defined in ARSD 74:51:01:01.
(c) Daily maximum.
(d) May 1 through September 30.
(e) Dissolved oxygen is measured anywhere in the water column of a nonstratified waterbody or the epilimnion of a stratified waterbody.
mg/L = milligrams per liter
mL = milliliter
µmhos/cm = micromhos per centimeter
°C = degrees Celsius
°F = degrees Fahrenheit

## 2.4 SPRINGS

No springs or seeps are located within the proposed Boston Expansion Area. Several springs are located around the Wharf Mine area and are provided in Table 2-3 and shown in Figure 2-2. Because these springs are fed by groundwater sources but feed surface water, they are summarized in this document and discussed more in detail in the groundwater characterization report [Walega and Hocking, 2022]. A few springs may be the result of perched water zones while others may be the expression of the regional water table [Walega and Hocking, 2022].

As part of the Boston Expansion and at the request of the SD DANR, Wharf conducted a field inventory for springs in May 2021. The inventory involved walking up the Lost Camp drainage from its confluence with Annie Creek to search for a water source. A small spring, Lost Camp Headwaters, was identified. The Lost Camp Headwaters spring was sampled while flowing in May 2021, but the site was dry between June and December 2021. The field inventory also identified a stormwater outfall from the subdivision, which was contributing flow to the drainage. Wharf acknowledges that another source of flow to Lost Camp Creek may exist but has yet to be identified, which includes but is not limited to additional springs or gaining stream conditions. RESPEC hydrologists conducted an additional inventory of the Lost Camp drainage in May 2022 to attempt to identify additional sources of flow within the drainage (see Appendix H).

Seven spring localities are currently sampled as part of Wharf's ongoing water quality monitoring program: False Bottom Spring, Ross Spring, Beaver Springs, War Eagle, Annie Creek II, Ross Valley French Drain, and Lost Camp Headwaters (see Figure 2-2). Measured flows at these seven springs range from 1 to 2,010 gallons per minute (gpm) with higher flows occurring in the spring and early summer and low to no flows occurring in the later summer and fall. False Bottom Spring is located at the headwaters of False Bottom Creek, War Eagle is located on Cleopatra Creek, Lost Camp Headwaters is at the upper reach of Lost Camp Gulch, and the other four monitored springs are located on tributaries of Annie Creek [Walega and Hocking, 2022].

Most of the area springs and seeps identified in previous investigations are typically dry with intermittent periods of low flows. Based on historical surveys presented in the Golden Reward Mining Permit Application [Hydrometrics, Inc., 1988] and Wharf's Clinton Application [Wharf Resources (USA) Inc., 1997], other minor, unnamed springs in the area are located in the drainages of False Bottom Creek, Deadwood Creek, Nevada Gulch, Fantail Creek, and Stewart Gulch. A map of springs is presented in Figure 2-2. The majority of these springs produce only a few gallons of water per minute during the wet springtime of the year.

## 2.5 IMPOUNDMENTS

No impoundments are located within the Boston Expansion Area. Process ponds and water treatment ponds are located in the Wharf Mine and are approximately 1 mile northeast of the Boston Expansion Area. No additional impoundments, process ponds, or reservoirs are planned for the Boston Expansion.

Table 2-3. Springs and Seeps in the Expansion Project Vicinity (Page 1 of 2)

| Map I.D. | Name or Previous Identifier | Source[a] | Flowing | Latitude | Longitude |
|---|---|---|---|---|---|
| 1 | — | 1 | | 44.3343 | –103.809997 |
| 2 | FI 16 | 1 | | 44.331298 | –103.820999 |
| 3 | FI 14 | 1 | | 44.331001 | –103.821998 |
| 4 | SI 8 | 1 | | 44.326698 | –103.809997 |
| 5 | SI 11 | 1 | | 44.3246 | –103.804 |
| 6 | SI 12 | 1 | | 44.324199 | –103.805 |
| 7 | LI 2 | 1 | | 44.320098 | –103.801002 |
| 8 | AI 1 | 1 | | 44.3152 | –103.803001 |
| 9 | AI 1 | 1 | | 44.315101 | –103.803001 |
| 10 | AI 1 | 1 | | 44.314998 | –103.803001 |
| 11 | AI 4 | 1 | | 44.314701 | –103.805 |
| 12 | AI 2 | 1 | | 44.3106 | –103.805 |
| 13 | AI 2 | 1 | | 44.3106 | –103.804 |
| 14 | AI 2 | 1 | | 44.310298 | –103.804 |
| 15 | SP-4 | 2 | | 44.367599 | –103.824996 |
| 16 | SP-5 | 2 | | 44.366901 | –103.824996 |
| 17 | SP-7<br>False Bottom Spring | 2 | | 44.3619 | –103.828002 |
| 18 | SP-8 | 2 | | 44.366401 | –103.833 |
| 19 | SP-1 | 2 | | 44.360599 | –103.834999 |
| 20 | SP-9 | 2 | | 44.3684 | –103.829002 |
| 21 | SP-10 | 2 | | 44.368598 | –103.828002 |
| 22 | SP-14 | 2 | | 44.348999 | –103.820999 |
| 23 | SP-15 | 2 | | 44.350601 | –103.828002 |
| 24 | SP-17 | 2 | | 44.351501 | –103.830001 |
| 25 | SP-20 | 2 | | 44.345901 | –103.810997 |
| 26 | FI 10 | 1 | | 44.332901 | –103.811996 |
| 27 | FI 10 | 1 | | 44.332901 | –103.811996 |
| 28 | NI 9 | 1 | | 44.3358 | –103.820999 |
| 29 | FI 1 | 1 | | 44.330699 | –103.821998 |
| 30 | SI 1 | 1 | | 44.327999 | –103.816001 |
| 31 | AI 7 | 1 | | 44.3152 | –103.811996 |
| 32 | AI 6 | 1 | | 44.315498 | –103.809997 |
| 33 | SP-6 | 2 | X | 44.364101 | –103.827003 |
| 34 | SP-13 | 2 | X | 44.3516 | –103.816001 |
| 35 | SP-18 | 2 | X | 44.350299 | –103.811996 |

Table 2-3. Springs and Seeps in the Expansion Project Vicinity (Page 2 of 2)

| Map I.D. | Name or Previous Identifier | Source[(a)] | Flowing | Latitude | Longitude |
|---|---|---|---|---|---|
| 36 | NI 13 | 1 | X | 44.3381 | –103.810997 |
| 37 | SI 7 | 1 | X | 44.326698 | –103.811996 |
| 38 | — | 1 | X | 44.325801 | –103.801002 |
| 39 | SI 13 | 1 | X | 44.324001 | –103.805 |
| 40 | LI 1 | 1 | X | 44.3204 | –103.801002 |
| 41 | Ross Spring | 3 | X | 44.339199 | –103.872001 |
| 42 | Beaver Springs | 3 | X | 44.339698 | –103.866996 |
| 43 | — | 3 | X | 44.365001 | –103.833 |
| 44 | — | 3 | X | 44.3679 | –103.830001 |
| 45 | — | 3 | X | 44.352699 | –103.823997 |
| 46 | — | 3 | X | 44.326599 | –103.814002 |
| 47 | — | 3 | X | 44.3162 | –103.803001 |
| 48 | — | 3 | X | 44.336399 | –103.819999 |
| 49 | War Eagle | 3 | X | 44.350898 | –103.847999 |
| 50 | Ross Valley French Drain | 3 | X | 44.342601 | –103.870002 |
| 51 | Annie Creek II | 3 | X | 44.339599 | –103.866996 |
| 52 | Lost Camp Headwater | 3 | X | 44.3323 | –103.8474 |

(a) 1—Golden Reward Application, 1896 Exhibit
2—Clinton Expansion Application, Exhibit 3-6.2
3—Wharf Resources.

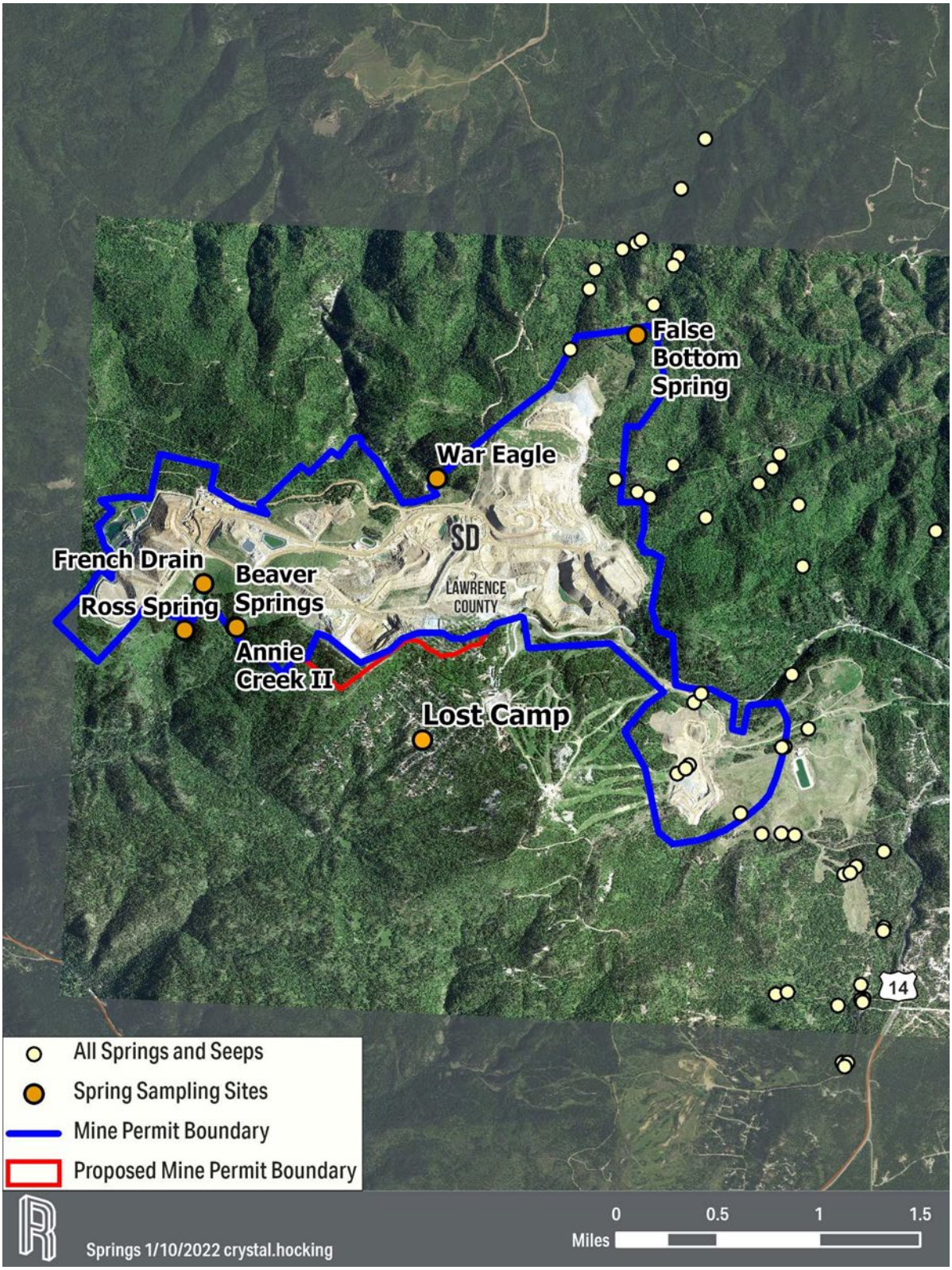


Figure 2-2. Springs and Spring Sampling Sites Map.

# 3.0 SURFACE WATER QUALITY

## 3.1 SAMPLING SITES

The existing Wharf surface water monitoring programs were evaluated to determine which sites were applicable to the Boston Expansion Area. Seven existing Wharf surface water monitoring sites (Annie Creek at USGS, Annie Creek II, Lost Camp, CP001/NPDES001, CP005/NPDES005, SS-20, and SS-04) were chosen based on proximity to the Boston Expansion Area and SD DANR recommendations. In addition to the Wharf monitoring sites, Monitoring Site 46MN31 (Annie Creek near Elmore), which is sampled by the SD DANR, was selected for evaluation. These monitoring sites are listed in Table 3-1 and Figure 3-1. The chemical parameters analyzed in the sampling program were derived from SDCL 45-6B-7(9) and those parameters currently required by the SD DANR for the water quality program at the existing Wharf Mine. These eight sites (Annie Creek at USGS, Annie Creek II, Lost Camp, CP001/NPDES001, CP005/NPDES005, SS-20, SS-04, and 46MN31) are considered baseline monitoring sites for the Boston Expansion Area. The past 5 years of data for these sites are discussed in Sections 3.3 and 3.4, and the water quality result tables and water quality summary statistics tables are included in Appendices D and E, respectively. Time series of the water quality analyses and field measurements are included in Appendix F.

Table 3-1. Existing Surface Water Monitoring Sites Applicable to the Boston Expansion Area

| Site | Drainage | Sampling Frequency | Parameter List[(a)] | Latitude | Longitude |
|---|---|---|---|---|---|
| Annie Creek at USGS | Annie Creek | 4 Times per Year | 1 | 44.32725 | -103.89458 |
| Annie Creek II | Annie Creek | 4 Times per Year | 1 | 44.33920 | -103.86668 |
| CP001/NPDES001 | Annie Creek | 26 Times per Year | 5 | 44.33387 | -103.87272 |
| CP005/NPDES005 | Annie Creek | 26 Times per Year | 5 | 44.33234 | -103.87399 |
| 46MN31 | Annie Creek | 4 Times per Year | 4 | 44.33034 | -103.87719 |
| Lost Camp | Lost Camp | 4 Times per Year | 3 | 44.33231 | -103.87315 |
| TSS-04 | Nevada Gulch Creek | 4 Times per Year | 2 | 44.33605 | -103.81994 |
| SS-20 | Nevada Gulch Creek | 4 Times per Year | 2 | 44.33783 | -103.82499 |

(a) Parameter lists or groups are provided in Appendix A. (b) (c)

Midcontinent Testing Laboratories, Inc. in Rapid City, South Dakota, analyzed the water quality samples from all sites. Please note that the following surface water sites (Annie Creek at USGS, Annie Creek II, Lost Camp, SS-20, and SS-04) are sampled for total metals while the CP001/NPDES001, CP005/NPDES005, and 46MN31 are sampled for total recoverable metals.

The Annie Creek at USGS site was sampled four times per year from 2015 through 2019, five times in 2020, and four times in 2021 for the following parameters:

- conductivity
- pH
- Total Dissolved Solids (TDS)
- nitrate
- nitrite
- sulfate

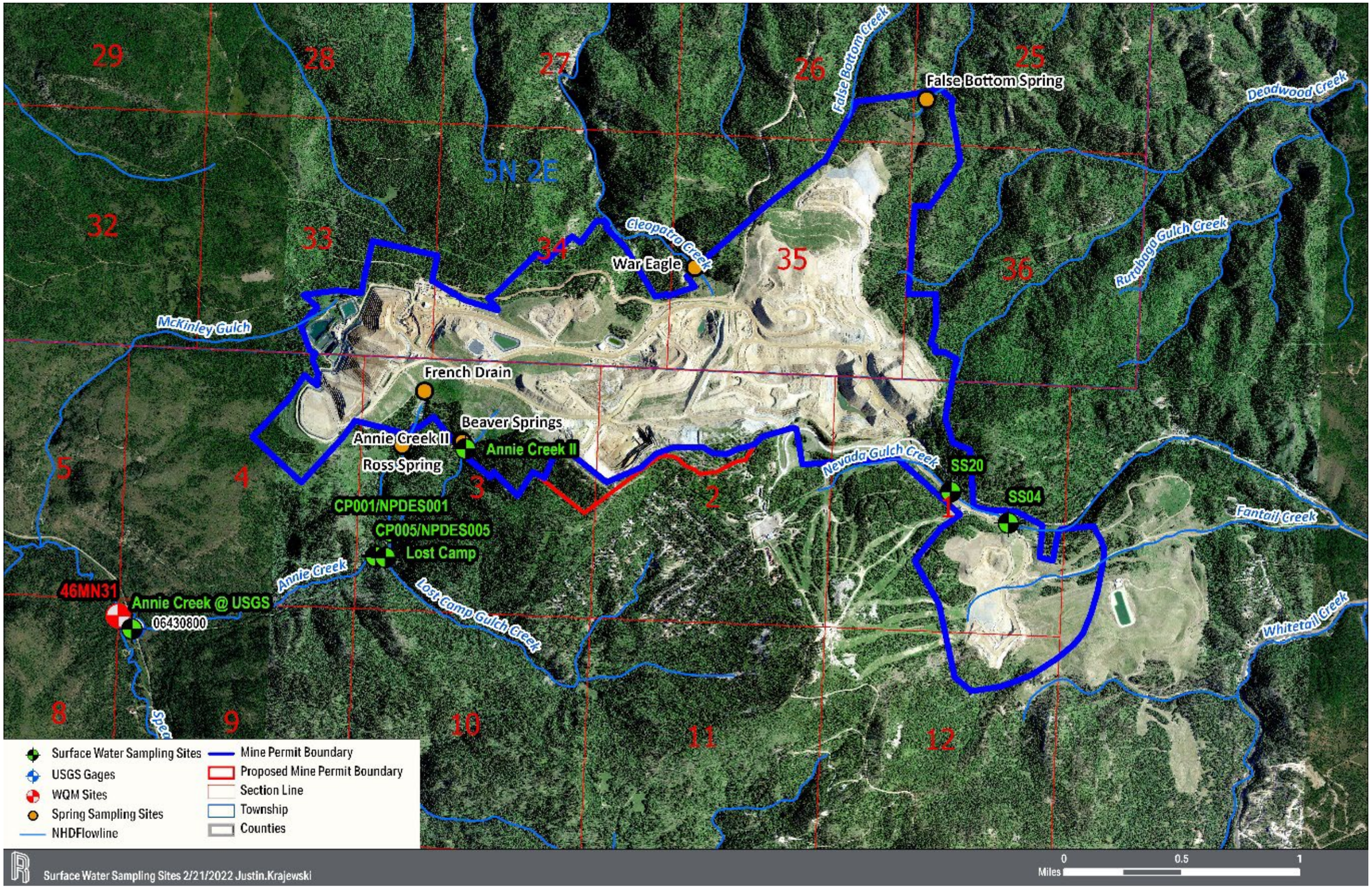


Figure 3-1. Locations of Surface Water Sampling Sites at the Wharf Mine Applicable to the Boston Expansion Area.

- Total Suspended Solids (TSS)
- bicarbonate
- cyanide (CN) (total and Weak Acid Dissociable [WAD])
- fluoride
- ammonia
- arsenic
- gold
- mercury
- selenium
- dissolved sodium.

Field measurements were also collected for conductivity, oxygen reduction potential (ORP), dissolved oxygen (DO), pH, water temperature, and flow rate during the same period.

The Annie Creek II was sampled four times per year from 2015 through 2017, five times in 2018, and four times per year from 2019 through 2021 for the following parameters:

- conductivity
- pH
- TDS
- TSS
- bicarbonate
- CN and WAD
- fluoride
- ammonia
- nitrate
- nitrite
- sulfate
- arsenic
- gold
- mercury
- selenium
- dissolved sodium.

Field measurements were also collected for conductivity, ORP, DO, pH, water temperature, and flow rate during the same period.

The CP001/NPDES001 site was sampled 27 times per year in 2015 and 2016, 28 times per year in 2017 and 2020, and 26 times per year in 2018, 2019, and 2021 for the following parameters:

- conductivity
- pH
- TDS
- TSS
- BOD, 5-day
- CN WAD
- hardness
- ammonia
- nitrate
- sulfate
- arsenic
- cadmium
- chromium
- copper
- lead
- mercury
- selenium
- silver
- zinc
- dissolved calcium
- dissolved magnesium
- dissolved phosphorus.

Additionally, CP001/NPDES001 was sampled for CN WAD eight times in 2018 and two times in 2019. In 2017, CP001/NPDES001 was sampled once each for BOD, 5-Day, and ammonia. Field measurements were also collected for conductivity, ORP, DO, pH, water temperature, and flow rate during the same period.

The CP005/NPDES005 site was sampled 27 times per year in 2015 and 2016, 29 times in 2017, 30 times in 2018, 28 times in 2020, and 26 times in 2019 and 2021, for the following parameters:

- conductivity
- pH
- TDS
- TSS
- BOD, 5-day
- CN WAD
- hardness
- ammonia
- nitrate
- sulfate
- arsenic
- cadmium
- chromium
- copper
- lead
- mercury
- selenium
- silver
- zinc
- dissolved calcium
- dissolved magnesium
- dissolved phosphorus.

Additionally, CP005/NPDES005 was sampled for BOD, 5-day once in 2017. Field measurements were also collected for conductivity, ORP, DO, pH, water temperature, and flow rate during the same period.

The Lost Camp site was sampled once in 2015, nine times in 2016, eleven times in 2017, seven times in 2018, four times each in 2019 and 2020, and five times in 2021 for the following parameters:

- conductivity
- pH
- TDS
- TSS
- bicarbonate
- CN (total and WAD)
- fluoride
- ammonia
- nitrate
- nitrite
- sulfate
- arsenic
- gold
- mercury
- selenium
- dissolved sodium.

Field measurements were also collected for conductivity, ORP, DO, pH, water temperature, and flow rate during the same period.

The SS-20 site was sampled three times per year in 2015 and 2018, two times per year in 2016, 2017, 2019, and 2020, and one time in 2021 for the following parameters:

- conductivity
- pH
- TSS
- bicarbonate
- nitrate
- nitrite
- sulfate
- arsenic
- mercury
- selenium
- dissolved sodium.

Field measurements were also collected for conductivity, pH, water temperature, and flow rate during the same period.

The SS-04 site was sampled four times each year from 2015 through 2021 for the following parameters:

- conductivity
- sulfate

- pH
- TSS
- bicarbonate
- nitrate
- nitrite
- arsenic
- mercury
- selenium
- dissolved sodium.

Field measurements were also collected for conductivity, ORP, DO, pH, water temperature, and flow rate during the same period.

The 46MN31 site was sampled four times per year from 2015 through 2020 and three times in 2021 for the following parameters:

- ammonia
- arsenic
- bicarbonate
- cadmium
- calcium
- chromium
- CN (WAD)
- copper
- gold
- hardness
- Kjeldahl nitrogen
- lead
- magnesium
- mercury
- nickel
- nitrate
- organic carbon
- phosphorus
- selenium
- silver
- TDS
- TSS
- zinc.

Alkalinity was sampled once in 2015. Total CN was sampled three times in 2021 and aluminum was sampled three times each in 2020 and 2021. Field measurements were also collected for conductivity, depth, width, DO, pH, and water temperature during the water quality sampling dates at the 46MN31 site from 2015 through 2021. Air temperature was also recorded from 2015 through 2019.

The USGS has operated a surface water data collection site since 2006 in the vicinity of the proposed permit area. USGS 06430800 (Annie Creek near Lead, South Dakota) is located approximately 1 mile downstream of the confluence of Annie Creek and Lost Camp Gulch, as shown in Figure 3-1. Discharge data are available for the Annie Creek at USGS site from October 1988 through November 2018 as well as gage height data from October 2017 through November 2018, which can be downloaded from the USGS website (https://waterdata.usgs.gov/nwis/inventory?agency_code=USGS&site_no=06430800) [U.S. Geological Survey, 2021].

## 3.2 SAMPLING METHODS

Wharf collected samples at the Annie Creek at USGS, Annie Creek II, Lost Camp, CP001/NPDES001, CP005/NPDES005, SS-20, and SS-04 monitoring sites following Wharf's sampling protocols (Appendix C). The SD DANR collected samples at the 46MN31 site in accordance with the *Surface Water Quality Program & Feedlot Permit Program, Standard Operating Procedures, Field Water Quality Sampling* available at (https://danr.sd.gov/OfficeOfWater/SurfaceWaterQuality/docs/DANR_SOPrev3.pdf) [SD DANR, 2022] and are also provided in Appendix C.

## 3.3 DATA RESULTS

Raw water quality data for each surface water sampling site relevant to Wharf's Boston Expansion Project plans are included in Appendix D. Appendix E contains statistical summaries of the parameters by each site from 2015 through 2021. Table 3-2 provides the summary statistics for six baseline sites (Annie Creek at USGS, Annie Creek II, Lost Camp, CP001/NPDES001, CP005/NPDES005, and 46MN31) by parameter in the Annie Creek drainage. Table 3-3 displays the summary statistics for two baseline sites (SS-20 and SS-04) in the Nevada Gulch drainage. If a water quality result was reported as less than the method detection limit (MDL) value in the raw data, that result was included in the statistical analyses as the MDL value. A standard ANOVA statistical analyses for the eight baseline sampling sites is included in Appendix E and contain the number of samples analyzed, number detected, mean, standard deviation, quartile one (Q1), median, quartile three (Q3), minimum, and maximum values. Time-series graphs were generated for sampling parameters for the six sites in the Annie Creek drainage as well as the two sites in the Nevada Gulch drainage and are included in Appendix F.

If a water quality result was reported as less than the practical quantitation limit (PQL) value in the raw data, that result was included in the statistical analyses as one-half of the PQL value. If a PQL was not listed for some of a single constituent's results but was listed for other results of the same constituent, the listed PQL value was used for all the constituent's results. Also, if a result was reported as zero in the raw data for a constituent having a specified PQL, one-half of the specified PQL was used in the statistical analyses instead of the zero value.

## 3.4 AQUATIC RESOURCES

Annual aquatic species and habitat surveys have been conducted by GEI Consultants, Inc. (GEI), formerly Chadwick Ecological Consultants, Inc. (CEC) and Chadwick & Associates, Inc. (C&A), since the early 1990s on streams that flow through or have drainages within the Wharf and Golden Reward Mines as required in their National Pollution Discharge Elimination System Permit [GEI, 2021]. The 2020 study evaluated habitat, fish, benthic macroinvertebrates, and periphyton in Annie Creek, Ross Valley, Lost Camp Gulch, Deadwood Creek, False Bottom Creek, McKinley Gulch, Cleopatra Creek, Fantail Creek, Nevada Gulch, Stewart Gulch, Reno Creek, and Labrador Gulch [GEI, 2021]. The 2020 study is discussed in detail in the *Wharf Boston Expansion Project Request for Determination of Special, Exceptional, Critical, or Unique Lands and Notice of Intent to Operate* [Wharf, 2021].

There are no aquatic sites located within the Boston Expansion Area [Wharf, 2021]. Overall, aquatic monitoring in 2020 on streams near the Wharf Mine and Boston Expansion Area indicates healthy fish, benthic macroinvertebrate, and periphyton communities. The absence of fish in some streams is related to low flows, and sedimentation from nearby roads has led to decreased macroinvertebrate and periphyton population metrics in some streams [GEI, 2021]. However, the 2020 aquatic report concludes that mining activities at the Wharf Mine did not directly impact aquatic resources in the study streams [GEI, 2021].

Table 3-2. Summary Statistics for Water Quality Parameters for the Annie Creek at USGS, Annie Creek II, Lost Camp, CP001/NPDES001, CP005/NPDES005, and 46MN31 Sites Near the Boston Expansion Area (2015–2021) (Page 1 of 3)

| Parameter | Count | MDL | Percent Below MDL | Average | Standard Deviation | Minimum | 25th Percentile | 50th Percentile (Median) | 75th Percentile | Maximum |
|---|---|---|---|---|---|---|---|---|---|---|
| Field Conductivity (µmhos/cm) | 485 | NA | NA | 437.28 | 162.35 | 80 | 330 | 460 | 510 | 1030 |
| Field Depth (feet) | 27 | NA | NA | 0.45 | 0.28 | 0.1 | 0.3 | 0.4 | 0.5 | 1.2 |
| Field Width (feet) | 27 | NA | NA | 6.41 | 1.74 | 3 | 5 | 7 | 8 | 10 |
| Field ORP (mV) | 218 | NA | NA | 151.20 | 68.62 | -55 | 116 | 165.5 | 203.25 | 264 |
| Field Dissolved Oxygen (DO) (mg/L) | 485 | NA | NA | 10.50 | 1.71 | 0.87 | 9.45 | 10.5 | 11.4 | 15.8 |
| Field pH (SU) | 488 | NA | NA | 8.36 | 0.37 | 7.18 | 8.1975 | 8.46 | 8.62 | 10.3 |
| Field Water Temperature (°C) | 488 | NA | NA | 6.35 | 5.12 | –5 | 1.8 | 5.3 | 10.1 | 19.8 |
| Field Air Temperature (°C) | 18 | NA | NA | 10.61 | 9.33 | –6 | 4.5 | 9.5 | 18.25 | 26 |
| Field Flow Rate (gal/min) | 433 | NA | NA | 464.85 | 1,311.34 | 0.175 | 70.46 | 120 | 325.6 | 18600 |
| Arsenic (As), Dissolved (µg/L) | 27 | 0.01 | 0 | 12.46 | 4.56 | 6 | 10 | 10 | 16 | 20 |
| Cadmium (Cd), Dissolved (mg/L) | 27 | 0.00 | 0 | 0.00 | 0.00 | 0.0005 | 0.0005 | 0.0005 | 0.0005 | 0.0005 |
| Calcium (Ca), Dissolved (mg/L) | 223 | 1.00 | 0 | 48.67 | 14.16 | 11.3 | 39.25 | 53.8 | 59.3 | 71.9 |
| Chromium (Cr), Dissolved (mg/L) | 27 | 0.00 | 0 | 0.00 | 0.00 | 0.0005 | 0.0005 | 0.0005 | 0.0005 | 0.0005 |
| Copper (Cu), Dissolved (mg/L) | 27 | 0.01 | 0 | 0.00 | 0.00 | 0.0025 | 0.0025 | 0.0025 | 0.0025 | 0.0025 |
| Lead (Pb), Dissolved (mg/L) | 27 | 0.00 | 0 | 0.00 | 0.00 | 0.0005 | 0.0005 | 0.0005 | 0.0005 | 0.0005 |
| Magnesium (Mg), Dissolved (mg/L) | 223 | 0.50 | 0 | 20.80 | 7.46 | 3.26 | 15.3 | 22.8 | 26.8 | 42.5 |
| Mercury (Hg), Dissolved (mg/L) | 27 | 0.01 | 0 | 0.00 | 0.00 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 |
| Nickel (Ni), Dissolved (mg/L) | 27 | 0.01 | 0 | 0.00 | 0.00 | 0.0025 | 0.0025 | 0.0025 | 0.0025 | 0.0025 |
| Selenium (Se), Dissolved (mg/L) | 27 | 0.00 | 0 | 0.00 | 0.00 | 0.00131 | 0.0025 | 0.0025 | 0.0025 | 0.0025 |
| Silver (Ag), Dissolved (mg/L) | 27 | 0.00 | 0 | 0.00 | 0.00 | 0.0005 | 0.0005 | 0.0005 | 0.0005 | 0.0005 |
| Sodium (Na), Dissolved (mg/L) | 100 | 0.02 | 0 | 8.88 | 5.73 | 3.07 | 4.23 | 5.93 | 14.8 | 21.2 |
| Zinc (Zn), Dissolved (mg/L) | 27 | 0.0005 | 0 | 0.04 | 0.02 | 0.00 | 0.05 | 0.05 | 0.05 | 0.05 |

Table 3-2. Summary Statistics for Water Quality Parameters for the Annie Creek at USGS, Annie Creek II, Lost Camp, CP001/NPDES001, CP005/NPDES005, and 46MN31 Sites Near the Boston Expansion Area (2015–2021) (Page 2 of 3)

| Parameter | Count | MDL | Percent Below MDL | Average | Standard Deviation | Minimum | 25th Percentile | 50th Percentile (Median) | 75th Percentile | Maximum |
|---|---|---|---|---|---|---|---|---|---|---|
| Mercury (Hg), Total (mg/L) | 309 | 0.00 | 0 | 0.00 | 0.00 | 0.00005 | 0.0001 | 0.0001 | 0.0001 | 0.0002 |
| Aluminum (Al), Total Recoverable (µg/L) | 6 | 0.00 | 0 | 363.58 | 464.84 | 28.7 | 53 | 139.85 | 776.75 | 1190 |
| Arsenic (As), Total (mg/L) | 101 | 0.00 | 0 | 0.02 | 0.02 | 0.0025 | 0.006 | 0.013 | 0.0515 | 0.081 |
| Arsenic (As), Total Recoverable (mg/L) | 374 | 0.00 | 0 | 0.01 | 0.00 | 0.0025 | 0.01 | 0.012 | 0.014 | 0.038 |
| Cadmium (Cd), Total Recoverable (mg/L) | 184 | 0.00 | 0 | 0.00 | 0.00 | 0.0005 | 0.0005 | 0.0005 | 0.0005 | 0.0005 |
| Chromium (Cr), Total Recoverable (mg/L) | 75 | 0.00 | 0 | 0.00 | 0.00 | 0.0005 | 0.0005 | 0.0005 | 0.0005 | 0.022 |
| Copper (Cu), Total Recoverable (mg/L) | 184 | 0.00 | 0 | 0.00 | 0.00 | 0.0025 | 0.0025 | 0.0025 | 0.0025 | 0.009 |
| Gold (Au), Total (mg/L) | 99 | 0.00 | 0.050505051 | 0.00 | 0.00 | 0.00028 | 0.00028 | 0.0005 | 0.002 | 0.011 |
| Iron (Fe), Total Recoverable (mg/L) | 10 | 0.00 | 0 | 0.15 | 0.16 | 0.0005 | 0.015625 | 0.084 | 0.298 | 0.437 |
| Lead (Pb), Total Recoverable (mg/L) | 189 | 0.00 | 0 | 0.00 | 0.00 | 0.0005 | 0.0005 | 0.0005 | 0.0005 | 0.009 |
| Nickel (Ni), Total Recoverable (mg/L) | 11 | 0.00 | 0 | 0.00 | 0.00 | 0.0025 | 0.0025 | 0.0025 | 0.0025 | 0.0025 |
| Selenium (Se), Total (mg/L) | 99 | 0.00 | 0 | 0.01 | 0.00 | 0.0025 | 0.0025 | 0.0025 | 0.01 | 0.017 |
| Selenium (Se), Total Recoverable (mg/L) | 376 | 0.00 | 0 | 0.00 | 0.00 | 0.0025 | 0.0025 | 0.0025 | 0.0025 | 0.007 |
| Silver (Ag), Total Recoverable (mg/L) | 75 | 0.00 | 0 | 0.00 | 0.00 | 0.0005 | 0.0005 | 0.0005 | 0.0005 | 0.001 |
| Zinc (Zn), Total Recoverable (mg/L) | 186 | 0.01 | 0 | 0.03 | 0.04 | 0.025 | 0.025 | 0.025 | 0.025 | 0.349 |
| Bicarbonate (mg/L) | 100 | 0.51 | 0 | 151.79 | 51.89 | 50.6 | 117 | 148.5 | 192 | 261 |
| Cyanide, Total (mg/L) | 102 | 0.00 | 0 | 0.01 | 0.00 | 0.005 | 0.005 | 0.005 | 0.005 | 0.018 |
| Biochemical Oxygen Demand, 5 Day (mg/L) | 375 | NA | 0 | 1.53 | 0.25 | 1.5 | 1.5 | 1.5 | 1.5 | 3.6 |
| Cyanide, WAD (mg/L) | 512 | 0.00 | 0 | 0.00 | 0.00 | 0.002 | 0.005 | 0.005 | 0.005 | 0.016 |
| Fluoride (mg/L) | 100 | 0.00 | 0 | 0.21 | 0.11 | 0.077 | 0.12125 | 0.1655 | 0.321 | 0.446 |
| Nitrogen, Ammonia (NH3) (mg/L) | 501 | 0.01 | 0 | 0.02 | 0.01 | 0 | 0.025 | 0.025 | 0.025 | 0.056 |
| Nitrogen, Nitrate (NO3)+Nitrite (NO2) (mg/L) | 27 | | 0 | 4.52 | 2.04 | 0.754 | 2.64 | 5.1 | 6.01 | 7.21 |
| Nitrogen, Nitrate (NO3) (mg/L) | 283 | 0.06 | 0 | 4.81 | 5.56 | 0.025 | 1.25 | 2.76 | 5.97 | 26.5 |

Table 3-2. Summary Statistics for Water Quality Parameters for the Annie Creek at USGS, Annie Creek II, Lost Camp, CP001/NPDES001, CP005/NPDES005, and 46MN31 Sites Near the Boston Expansion Area (2015–2021) (Page 3 of 3)

| Parameter | Count | MDL | Percent Below MDL | Average | Standard Deviation | Minimum | 25th Percentile | 50th Percentile (Median) | 75th Percentile | Maximum |
|---|---|---|---|---|---|---|---|---|---|---|
| Nitrogen, Nitrite (NO2) (mg/L) | 100 | 0.01 | 0 | 0.09 | 0.10 | 0.025 | 0.025 | 0.025 | 0.25 | 0.25 |
| Kjeldahl Nitrogen (mg/L) | 25 | 0.50 | 0 | 0.05 | 0.13 | 0.025 | 0.025 | 0.025 | 0.025 | 0.67 |
| Phosphorus, Total (mg/L) | 27 | 0.01 | 0 | 0.06 | 0.03 | 0.033 | 0.045 | 0.049 | 0.057 | 0.197 |
| Phosphorus, Dissolved (mg/L) | 100 | 0.00 | 0 | 0.03 | 0.01 | 0.005 | 0.026 | 0.0325 | 0.038 | 0.104 |
| Sulfate (SO4) (mg/L) | 102 | 0.68 | 0 | 72.26 | 103.71 | 0.5 | 0.5 | 14.8 | 188.25 | 299 |
| Alkalinity (mg/L) | 1 | NA | 0 | 170.00 | | 170 | 170 | 170 | | 170 |
| Electrical Conductivity (µmhos/cm) | 263 | 0.15 | 0 | 444.49 | 184.47 | 84.4 | 300.5 | 456 | 518 | 1010 |
| Hardness (mg/L) | 223 | 5.00 | 0 | 207.20 | 65.06 | 41.6 | 159 | 229 | 257 | 308 |
| Organic Carbon, Dissolved (mg/L) | 25 | 0.20 | 0 | 2.04 | 0.71 | 1.03 | 1.52 | 1.84 | 2.665 | 3.41 |
| pH (SU) | 474 | NA | 0 | 8.31 | 0.22 | 7.61 | 8.22 | 8.385 | 8.4625 | 8.68 |
| Total Dissolved Solids (mg/L) | 315 | 17.60 | 0 | 244.46 | 119.63 | 79 | 157.5 | 231 | 277 | 682 |
| Total Suspended Solids (mg/L) | 501 | 3.49 | 0 | 8.00 | 20.05 | 0 | 5 | 5 | 5 | 300 |

MDL = method detection limit
mV = millivolts
mg/L = milligrams per liter
SU = standard units
°C = degrees Celsius
gal/min = gallons per minute
µg/L = micrograms per liter

Table 3-3. Summary Statistics for Water Quality Parameters for the SS-04 and SS-20 Sites Near the Boston Expansion Area (2015–2021)

| Parameter | Count | MDL | Percent Below MDL | Average | Standard Deviation | Minimum | 25th Percentile | 50th Percentile (Median) | 75th Percentile | Maximum |
|---|---|---|---|---|---|---|---|---|---|---|
| Field Conductivity (µmhos/cm) | 43 | NA | NA | 611.86 | 256.54 | 200 | 415 | 570 | 820 | 1170 |
| Field ORP (mV) | 28 | NA | NA | 20.46 | 66.90 | –63 | –28.75 | 3.5 | 50.5 | 172 |
| Field Dissolved Oxygen (DO) (mg/L) | 28 | NA | NA | 9.55 | 1.42 | 7.46 | 8.4525 | 9.575 | 10.0875 | 14.04 |
| Field pH (SU) | 43 | NA | NA | 7.29 | 0.28 | 6.75 | 7.065 | 7.33 | 7.5 | 7.97 |
| Field Water Temperature (°C) | 43 | NA | NA | 8.12 | 4.27 | 1.4 | 4.1 | 8.3 | 11 | 16.3 |
| Field Flow Rate (gal/min) | 43 | NA | NA | 163.09 | 317.50 | 7 | 30 | 45 | 110 | 1510 |
| Sodium (Na), Dissolved (mg/L) | 43 | 0.02 | 0 | 31.38 | 14.51 | 9.93 | 20.85 | 26.1 | 43.1 | 69 |
| Mercury (Hg), Total (mg/L) | 43 | 0.000035 | 0 | 0.00 | 0.00 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 |
| Arsenic (As), Total (mg/L) | 43 | 0.0005 | 0 | 0.02 | 0.01 | 0.007 | 0.014 | 0.017 | 0.02 | 0.071 |
| Selenium (Se), Total (mg/L) | 43 | 0.001 | 0 | 0.00 | 0.00 | 0.0025 | 0.0025 | 0.0025 | 0.0025 | 0.0025 |
| Bicarbonate (mg/L) | 43 | 0.513 | 0 | 68.81 | 20.25 | 36.2 | 54.15 | 67.1 | 88.5 | 113 |
| Nitrogen, Nitrate (NO3) (mg/L) | 43 | 0.056 | 0 | 1.51 | 1.13 | 0.114 | 0.7465 | 1.06 | 2.14 | 4.52 |
| Nitrogen, Nitrite (NO2) (mg/L) | 43 | 0.005 | 0 | 0.03 | 0.00 | 0.025 | 0.025 | 0.025 | 0.025 | 0.025 |
| Sulfate (SO4) (mg/L) | 43 | 0.679 | 0 | 110.74 | 136.40 | 0.5 | 19.1 | 35.7 | 179 | 473 |
| Electrical Conductivity (µmhos/cm) | 43 | 0.153 | 0 | 599.72 | 261.69 | 196 | 406 | 565 | 811 | 1190 |
| pH (SU) | 43 | NA | 0 | 7.35 | 0.30 | 6.61 | 7.15 | 7.41 | 7.56 | 7.92 |
| Total Suspended Solids (mg/L) | 43 | 3.49 | 0 | 16.09 | 35.20 | 5 | 5 | 5 | 19 | 234 |
| Total Suspended Solids (mg/L) | 501 | 3.49 | 0 | 8.00 | 20.05 | 0 | 5 | 5 | 5 | 300 |

MDL = method detection limit
mV = millivolts
mg/L = milligrams per liter
SU = standard units
°C = degrees Celsius
gal/min = gallons per minute
µg/L = micrograms per liter

## 3.5 ANALYSIS OF SURFACE WATER QUALITY DATA

The objective of the sampling program was to develop a baseline database from evaluating surface water quality data collected at locations near the area before the expansion. Water quality sample results were analyzed from eight surface water monitoring sites (Annie Creek at USGS, Annie Creek II, Lost Camp, CP001/NPDES001, CP005/NPDES005, SS-20, SS-04, and 46MN31). More detailed water quality results and statistics for each site are provided in Appendices D and E, respectively. Time series of water quality parameters for each site are shown in Appendix F. The water quality results at these eight baseline surface water sampling sites include the following.

- pH values ranged from 7.61 to 8.68 and the median value among the sites was 8.385 for sites in the Annie Creek drainage
- pH values ranged from 6.61 to 7.92 and the median value among the sites was 7.41 for sites in the Nevada Gulch drainage
- Field conductivity values ranged from 80 to 1,030 micromhos per centimeter (µmhos/cm) and the median value among the sites was 460 µmhos/cm for sites in the Annie Creek drainage
- Field conductivity values ranged from 200 to 1,170 µmhos/cm and the median value among the sites was 570 µmhos/cm for sites in the Nevada Gulch drainage.

Baseline data for evaluating surface water quality in potentially disturbed drainages were obtained at eight existing surface water monitoring sites that were chosen based on their proximity to the Boston Expansion Area and the SD DANR recommendations. Seven of the sites were Wharf monitoring sites and one was SD DANR monitoring site 46MN31 (Annie Creek near Elmore). These sites were sampled from 2015 through 2021 and will continue to be sampled on an established schedule. Between 11 and 23 set chemical parameters were analyzed at each site and the required frequency of sampling events varied from site to site. Parameters sampled are the same as those required for the existing Wharf water quality program and required by SDCL 45-6B-7(9). Any changes to the sites, sample frequency, or sample parameters will be established in conjunction with the SD DANR.

An analysis of field parameters compared to the South Dakota state criteria showed none of the collected data exceeded the criteria for the cold-water marginal fish life propagation use of 75°F (23.9°C). All but three (3 of 513) dissolved oxygen (DO) readings were below the criteria for the cold-water marginal fish life propagation use of 5 mg/L. Two of these DO readings were recorded at the CP001/NPDES001 site on December 29, 2015, and December 10, 2018. The other DO reading was recorded at the CP005/NPDES005 site on December 10, 2018. The cause of the low DO readings is unknown and other DO readings recorded on those sample dates were normal. All but one (1 of 531) field pH readings were within the South Dakota state criteria for the cold-water marginal fish life propagation (6.5–9.0) and fish and wildlife propagation, recreation, and stock watering (6.0–9.5) beneficial uses. A pH reading of 10.3 was recorded at the CP005/NPDES005 site on December 19, 2016; however, the cause of this pH reading is unknown, and the other pH reading recorded on this sample date at the Lost Camp site was normal.

All the samples collected and analyzed were below the South Dakota and/or Environmental Protection Agency (EPA) criteria for conductivity, water temperature, nitrate, arsenic, cyanide, TDS, and no exceedances of the criteria were detected at the eight sampling sites within the past 6 years. All of the

samples collected and analyzed were below the SD daily maximum nitrate criteria of 88 mg/L and the EPA's freshwater-recommended limit for arsenic of 0.340 mg/L.

An analysis of the TSS sample results indicated that 541 (all but three) of the samples collected were below the TSS limit of 158 mg/L for cold-water marginal fish life propagation beneficial use. Two TSS samples exceeded the limit at the CP005/NPDES005 sampling site, which included a TSS sample result of 300 mg/L that was collected on August 19, 2016, and a TSS sample of 266 mg/L that was collected on June 18, 2018. In both cases, upgradient Wharf sample sites were less than 10 mg/L, and the adjacent feeder stream to site CP005/NPDES005 was identified as the source of elevated TSS, likely from ATV traffic and erosion impacts as noted in State correspondence for those times. The other TSS sample of 234 mg/L was collected at the SS04 sampling site on August 24, 2018, and the cause is unknown because other parameters at this sampling site were normal on this date.

As shown in the time-series graphs in Appendix F, there appear to be differences in field conductivity, field pH, sodium, arsenic, selenium, cyanide, fluoride, nitrates, sulfate, electrical conductivity, pH, and TDS parameters at Annie Creek II in comparison to downstream sites (Annie Creek at USGS, CP001/NPDES001, Lost Camp, CP005/NPDES005, and 46MN31). Furthermore, the time-series graphs of the above-mentioned parameters at Annie Creek II also show that these parameters appear to have remained stable from 2015 through 2021. Moreover, the above-mentioned parameters at Annie Creek II showed no exceedances except for selenium, which is discussed further in the following paragraph.

All of the samples collected at the Annie Creek at USGS, Lost Camp, CP001/NPDES001, CP005/NPDES005, SS-20, SS-04, and 46MN31during the past 6 years were below the EPA-recommended criteria selenium of 0.005 mg/L or 5 micrograms per liter (µg/L). The selenium results at Annie Creek II have been above the criteria of 0.005 mg/L from 2015 through 2021. Although these samples exceeded the selenium criteria, the sample site is for surveillance only and not a compliance point. These selenium levels appear to have remained level from 2015 through 2021 as shown in the selenium time series graph included in Appendix F. Moreover, the selenium levels from 2015 through 2021 at the downstream sites (Annie Creek at USGS, CP001/NPDES001, Lost Camp, CP005/NPDES005) showed no exceedances and are similar to the baseline water quality selenium results from 2006 through 2010 analyzed for the current permit.

All of the samples collected at the Annie Creek at USGS, CP001/NPDES001, Lost Camp, CP005/NPDES005, SS-20, SS-04, and 46MN31 in the past 6 years were also below the EPA-recommended criteria for WAD cyanide of 0.022 mg/L. There have been only 5 WAD cyanide detections out of the 512 total samples collected from 2015 through 2021. All five of these samples were collected at CP001/NPDES001 and all five were below the WAD cyanide criteria. Moreover, the WAD cyanide levels from 2015 through 2021 at other monitoring sites in the drainage (Annie Creek at USGS, Annie Creek II, Lost Camp, CP005/NPDES005) showed no detections of WAD cyanide.

# 4.0 PROJECT IMPACTS

No impacts are expected to surface water quality and the surface water hydrologic balance as a result of mining in the Boston Expansion Area. Current Wharf mining operations are in accordance with policies for controlling sedimentation and erosion with drainage structures and would continue to be applicable for stormwater management in the proposed Boston Expansion Area. Surface disturbances within the Boston Expansion Area will not directly overlie any streams and are not expected to impact surface water flow or water quality in the Annie Creek, Lost Camp, and Nevada Gulch Creek drainages because the existing pit would capture most precipitation within the area.

The SD DANR did not request a detailed hydrologic modeling effort for the proposed Boston Expansion. No potential impacts of surface water hydrology were noted because the proposed Boston Expansion would involve a small area of approximately 47.4 acres and is predominantly situated on a ridge between the existing mine pit and the Annie Creek and Lost Camp Gulch drainages. Any changes to surface water runoff flow resulting from the proposed expansion would be insignificant and probably incalculable at the Annie Creek and Lost Camp surface water sampling sites.

Current plans do not include the spent ore disposal in the Boston Expansion Area. Policies for sedimentation, erosion, and drainage structures would apply to the proposed Boston Expansion, and control structures would be in place to prevent downstream sedimentation before any disturbance occurs. These structures would remain in place until suitable vegetation is established. Periodic inspections of the structures would occur, and operation and maintenance would be performed as considered necessary during the postclosure period.

An analysis of both field and laboratory results from eight surface water monitoring sites were compared to the state and federal water quality criteria for samples collected from 2015 through 2021. The water quality results at these surface water monitoring sites are similar to the Wharf baseline water quality results from 2006 through 2010 analyzed as part of the existing permit. As discussed in Section 3.5, all of the samples analyzed were below the criteria for conductivity, water temperature, nitrate, arsenic, cyanide, and TDS. Only 3 of the 541 TSS samples were above the criteria.

Surface water quality exceedances will not likely occur at these sites downstream of the proposed Boston Expansion Area and are not a concern. This determination is based on no exceedances being observed for several of the surface water parameters and because of the very low frequency of South Dakota and EPA criteria exceedances detected at the surface water quality sites downstream of Wharf within the past 6 years. These findings, combined with the 2020 aquatic monitoring on streams near the Wharf Mine and Boston Expansion Area indicating healthy fish, benthic macroinvertebrate, and periphyton communities, help further support the results.

# 5.0 REFERENCES


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# APPENDIX A
## PARAMETER LISTS

Table A-1. Water Quality Parameter List 1 for Quarterly Sampling at Wharf Site Annie Creek at USGS (2015–2021)

| Parameter | Annie Creek at USGS |
|---|---|
| Conductivity, Field | X |
| ORP, Field | X |
| DO, Field | X |
| pH, Field | X |
| Water Temp, Field | X |
| Flow Rate, Field | X |
| Arsenic | T |
| Gold | T |
| Mercury | T |
| Sodium | D |
| Bicarbonate | X |
| CN, Total | X |
| CN, WAD | X |
| Fluoride | X |
| N, Ammonia | X |
| N, Nitrate | X |
| N, Nitrite | X |
| Selenium | T |
| Sulfate | X |
| Conductivity, Electrical | X |
| pH | X |
| TDS | X |
| TSS | X |

Notes:
X = sample measured or analyzed for parameter
ORP = oxygen reduction potential
DO = dissolved oxygen
T = sample measured or analyzed for total parameter
D = sample measured or analyzed for dissolved parameter
CN = cyanide
WAD = Weak Acid Dissociable
N = nitrogen
TDS = total dissolved solids
TSS = total suspended solids
Please note that the Annie Creek at USGS site is sampled for total metals.
All units are milligrams per liter with the following exceptions: conductivity (micromhos per centimeter), ORP (millivolts), pH (standard units), temperature (degrees Celsius), and flow rate (gallon per minute).

Table A-2. Water Quality Parameter List 2 for Quarterly Sampling at Wharf Sites SS-20 and SS-04 (2015–2021)

| Parameter | SS-20 and SS-04 |
|---|---|
| Conductivity, Field | X |
| pH, Field | X |
| Water Temp, Field | X |
| Flow Rate, Field | X |
| Arsenic | T |
| Mercury | T |
| Sodium | D |
| Bicarbonate | X |
| N, Nitrate | X |
| N, Nitrite | X |
| Selenium | T |
| Sulfate | X |
| Conductivity, Electrical | X |
| pH | X |
| TSS | X |

Notes:
X = sample measured or analyzed for parameter
T = sample measured or analyzed for total parameter
D = sample measured or analyzed for dissolved parameter
N = nitrogen
TSS = total suspended solids
Please note that the SS 20 and SS-04 sites are sampled for total metals.
All units are milligrams per liter with the following exceptions: conductivity (micromhos per centimeter), pH (standard units), temperature (degrees Celsius), and flow rate (gallon per minute).

Table A-3. Water Quality Parameter List 3 for Monthly Quarterly Sampling at Wharf Sites Lost Camp and Annie Creek II (2015–2021)

| Parameter | Lost Camp and Annie Creek II |
|---|---|
| Conductivity, Field | X |
| ORP, Field | X |
| DO, Field | X |
| pH, Field | X |
| Water Temp, Field | X |
| Flow Rate, Field | X |
| Arsenic | T |
| Gold | T |
| Mercury | T |
| Sodium | D |
| Bicarbonate | X |
| CN, Total | X |
| CN, WAD | X |
| Fluoride | X |
| N, Ammonia | X |
| N, Nitrate | X |
| N, Nitrite | X |
| Selenium | T |
| Sulfate | X |
| Conductivity, Electrical | X |
| pH | X |
| TDS | X |
| TSS | X |

Notes:
X - sample measured or analyzed for parameter
ORP = oxygen reduction potential
DO = dissolved oxygen
T = sample measured or analyzed for total parameter
D = sample measured or analyzed for dissolved parameter
CN = cyanide
WAD = Weak Acid Dissociable
N = nitrogen
TDS = total dissolved solids
TSS = total suspended solids
Please note that the Annie Creek II and Lost Camp sites are sampled for total metals.
All units are milligrams per liter with the following exceptions: conductivity (micromhos per centimeter), ORP (millivolts), pH (standard units), temperature (degrees Celsius), and flow rate (gallon per minute).

Table A-4. Water Quality Parameter List 4 for Quarterly Sampling at South Dakota Department of Agriculture and Natural Resources Site 46MN31 (2015–2021)

| SD DANR Analysis Group 5 | SD DANR Site 46MN31 |
|---|---|
| *Field Analysis Parameters* | |
| Water Temp | X |
| Air Temp | X |
| DO | D |
| Conductivity | X |
| pH | X |
| Depth, Waterbody | X |
| Width, Waterbody | X |
| *Laboratory Analysis Parameters* | |
| Hardness | X |
| TDS | X |
| TSS | X |
| Phosphorous | T |
| N, Ammonia) | X |
| N, Nitrate | X |
| Kjeldahl N | X |
| CN, WAD | X |
| Arsenic | D |
| Cadmium | D |
| Chromium | D |
| Copper | D |
| Lead | D |
| Mercury | D, T |
| Nickel | D, T |
| Selenium | D |
| Silver | D, T |
| Zinc | D, T |
| Organic Carbon | D |

Notes:
X - sample measured or analyzed for parameter
T = sample measured or analyzed for total parameter
D = sample measured or analyzed for dissolved parameter
CN = cyanide
N = nitrogen
TDS = total dissolved solids
TSS = total suspended solids
WAD = Weak Acid Dissociable
DO = dissolved oxygen
Please note that the 46MN31 site is sampled for total recoverable metals.
All units are milligrams per liter with the following exceptions: temperature (degrees Celsius), conductivity (micromhos per centimeter), pH (standard units), depth and width (feet), Aluminum, total recoverable (micrograms per liter), and Lead, total recoverable (micrograms per liter).

Table A-5. Additional Water Quality Parameters to Parameter List 4 Sampled at South Dakota Department of Agriculture and Natural Resources Site 46MN31 (February 10, 2015)

| Parameter | SD DANR Site 46MN31 (2/10/2015) |
|---|---|
| Arsenic | T |
| Cadmium | TR |
| Chromium | TR |
| Copper | TR |
| Lead | TR |
| Nickel | TR |
| Silver | TR |
| Zinc | TR |
| Cyanide | T |
| Selenium | T |
| Alkalinity | X |

Note:
X - sample measured or analyzed for parameter
T =sample measure or analyzed for total parameter
TR = sample measured or analyzed for total recoverable parameter
Please note that the 46MN31 site is sampled for total recoverable metals.
All units are milligrams per liter with the following exception: Lead, total recoverable (micrograms per liter).

Table A-6. Water Quality Parameter List 5 for Biweekly Sampling at Wharf Sites CP001/NPDES001 and CP005/NPDES005 (2015–2021)

| Parameter | CP001/NPDES001 and CP005/NPDES005 |
|---|---|
| *Field Analysis Parameters* | |
| Water Temp | X |
| Air Temp | X |
| DO | D |
| Conductivity | X |
| pH | X |
| Depth, Waterbody | X |
| Width, Waterbody | X |
| *Laboratory Analysis Parameters* | |
| Hardness | X |
| TDS | X |
| TSS | X |
| Phosphorous | T |
| N, Ammonia) | X |
| N, Nitrate | X |
| Kjeldahl N | X |
| CN, WAD | X |
| Arsenic | D |
| Cadmium | D |
| Chromium | D |
| Copper | D |
| Lead | D |
| Mercury | D, T |
| Nickel | D, T |
| Selenium | D |
| Silver | D, T |
| Zinc | D, T |
| Organic Carbon | D |

Notes:
X - sample measured or analyzed for parameter
T = sample measured or analyzed for total parameter
D = sample measured or analyzed for dissolved parameter
CN = cyanide
N = nitrogen
TDS = total dissolved solids
TSS = total suspended solids
WAD = Weak Acid Dissociable
DO = dissolved oxygen
Please note that the CP001/NPDES001 and CP005/NPDES005 sites are sampled for total recoverable metals.
All units are milligrams per liter with the following exceptions: temperature (degrees Celsius), conductivity (micromhos per centimeter), pH (standard units), depth and width (feet), Aluminum, total recoverable (micrograms per liter), and Lead, total recoverable (micrograms per liter).

Table A-7. Contingency Water Quality Parameter List 5 for Biweekly Sampling at Wharf Sites CP001/NPDES001 and CP005/NPDES005 (2015–2021) (Page 1 of 2)

| Parameter | Sampled | CP001 Chronic Limit (µg/L) | CP001 Acute Limit (µg/L) | CP005 Chronic Limit (µg/L) | CP005 Acute Limit (µg/L) | Sampling Conditions |
|---|---|---|---|---|---|---|
| Silver Total Recoverable | Quarterly | None | None | Hardness based | Hardness based | |
| Arsenic Total Recoverable | Biweekly | 150 | 340 | 150 | 340 | |
| Cadmium Total Recoverable | Monthly | 50 | 100 | Hardness based | Hardness based | |
| Chromium Total Recoverable | Quarterly | None | None | 11 | 16 | If above standard, can use ionic forms with hardness equations to determine if in compliance |
| Copper Total Recoverable | Monthly | 150 | 300 | Hardness based | Hardness based | |
| Mercury Total | Monthly | 1 | 2 | 0.012 | 1.6 | |
| Nickel Total Recoverable | Yearly | | | | | If sites are used for Yearly Biomonitoring sampling |
| Iron Total Recoverable | Yearly | | | | | If sites are used for Yearly Biomonitoring sampling |
| Lead Total Recoverable | Monthly | 300 | 600 | Hardness based | Hardness based | |
| Selenium Total Recoverable | Biweekly | 4.6 | 12.8* | 4.6 | 12.8* | *Speciation is used to determine if compliant with standard |
| Zinc Total Recoverable | Monthly | 750 | 1500 | Hardness based | Hardness based | |
| Nitrates | Monthly | 50 mg/L | 88 mg/L | 50 mg/L | 88 mg/L | |
| Ammonia | Biweekly | 1.0 mg/L | 1.75 mg/L | 1.0 mg/L | 1.75 mg/L | |
| Cyanide (WAD) | Biweekly | 5.2 | 22 | 5.2 | 22 | |
| pH | Biweekly | 6.0 min | 9.0 max | 6.5 min | 8.8 max | |
| Total Suspended Solids | Biweekly | 90 | 158 | 90 | 158 | |
| Total Dissolved Solids | Monthly | None | None | None | None | |
| Hardness | Monthly | None | None | None | None | |
| Total Residual Chlorine | As needed | | 19 | | 19 | Not currently using Chlorine for treatment |
| Dissolved Oxygen | Biweekly | | 5.0 min | | 5.0 min | |
| Biochemical Oxygen Demand (5-day) | Biweekly | 10 mg/L | 17.5 mg/L | 10 mg/L | 17.5 mg/L | |
| W.E.T. Acute | Quarterly | | Pass | | Pass | Alternate quarters between Ceriodaphnia and Pimephales Promelas |

Table A-7. Contingency Water Quality Parameter List 5 for Biweekly Sampling at Wharf Sites CP001/NPDES001 and CP005/NPDES005 (2015–2021) (Page 2 of 2)

| Parameter | Sampled | CP001 Chronic Limit (µg/L) | CP001 Acute Limit (µg/L) | CP005 Chronic Limit (µg/L) | CP005 Acute Limit (µg/L) | Sampling Conditions |
|---|---|---|---|---|---|---|
| Total Petroleum Hydrogen | As needed | | 10 | | 10 | Sampled for only if visible sheen on water |
| Dissolved Phosphorus | | | | None | None | Monthly at CP005 only and yearly for both sites if they are used for Biomonitoring sampling |
| Flow (MGD) | Biweekly | None | None | None | None | |
| Temperature (°C) | Biweekly | None | None | None | None | |
| Visible Pollutants | Biweekly | No pollutants visible | No pollutants visible | No pollutants visible | No pollutants visible | |

Table A-8. Water Quality Parameter Lists for All of the Sites (2015–2021) (Page 1 of 2)

| Parameter | Annie Creek at USGS | 46MN31 | Lost Camp and Annie Creek II | SS20 and SS-04 |
|---|---|---|---|---|
| Sampling Frequency | Quarterly | Quarterly | Quarterly | Quarterly |
| Conductivity, Field | X | X | X | X |
| Depth, Field | | X | | |
| Width, Field | | X | | |
| ORP, Field | X | | X | |
| DO, Field | X | X | X | |
| pH, Field | X | X | X | X |
| Water Temp, Field | X | X | X | X |
| Air Temp, Field | | X | | |
| Flow Rate, Field | X | | X | X |
| Aluminum | | TR | | |
| Arsenic | T | D | T | T |
| Cadmium | | D | | |
| Calcium | | D | | |
| Chromium | | D | | |
| Copper | | D | | |
| Gold | T | | T | |
| Lead | | D | | |
| Magnesium | | D | | |
| Mercury | T | D, T | T | T |
| Nickel | | D | | |
| Silver | | D | | |
| Sodium | D | | D | D |
| Zinc | | D | | |
| Bicarbonate | X | | X | X |
| CN, Total | X | | X | |
| CN, WAD | X | X | X | |
| Fluoride | X | | X | |
| N, Ammonia | X | X | X | |
| N, Nitrate | X | X | X | X |
| N, Nitrite | X | | X | X |
| Kjeldahl N | | X | | |
| Phosphorus | | T | | |

Table A-8. Water Quality Parameter Lists for All Sites (2015–2020) (Page 2 of 2)

| Parameter | Annie Creek at USGS | 46MN31 | Lost Camp and Annie Creek II | SS20 and SS-04 |
|---|---|---|---|---|
| Selenium | T | D | T | T |
| Sulfate | X | | X | X |
| Conductivity, Electrical | X | | X | X |
| Hardness | | X | | |
| Organic Carbon | | D | | |
| pH | X | | X | X |
| TDS | X | X | X | |
| TSS | X | X | X | X |

Notes:

X = sample measured or analyzed for parameter

D = sample measured or analyzed for dissolved parameter

T = sample measured or analyzed for total parameter

TR = sample measured or analyzed for total recoverable parameter

DO = dissolved oxygen

N = nitrogen

TDS = total dissolved solids

TSS = total suspended solids

CN = cyanide

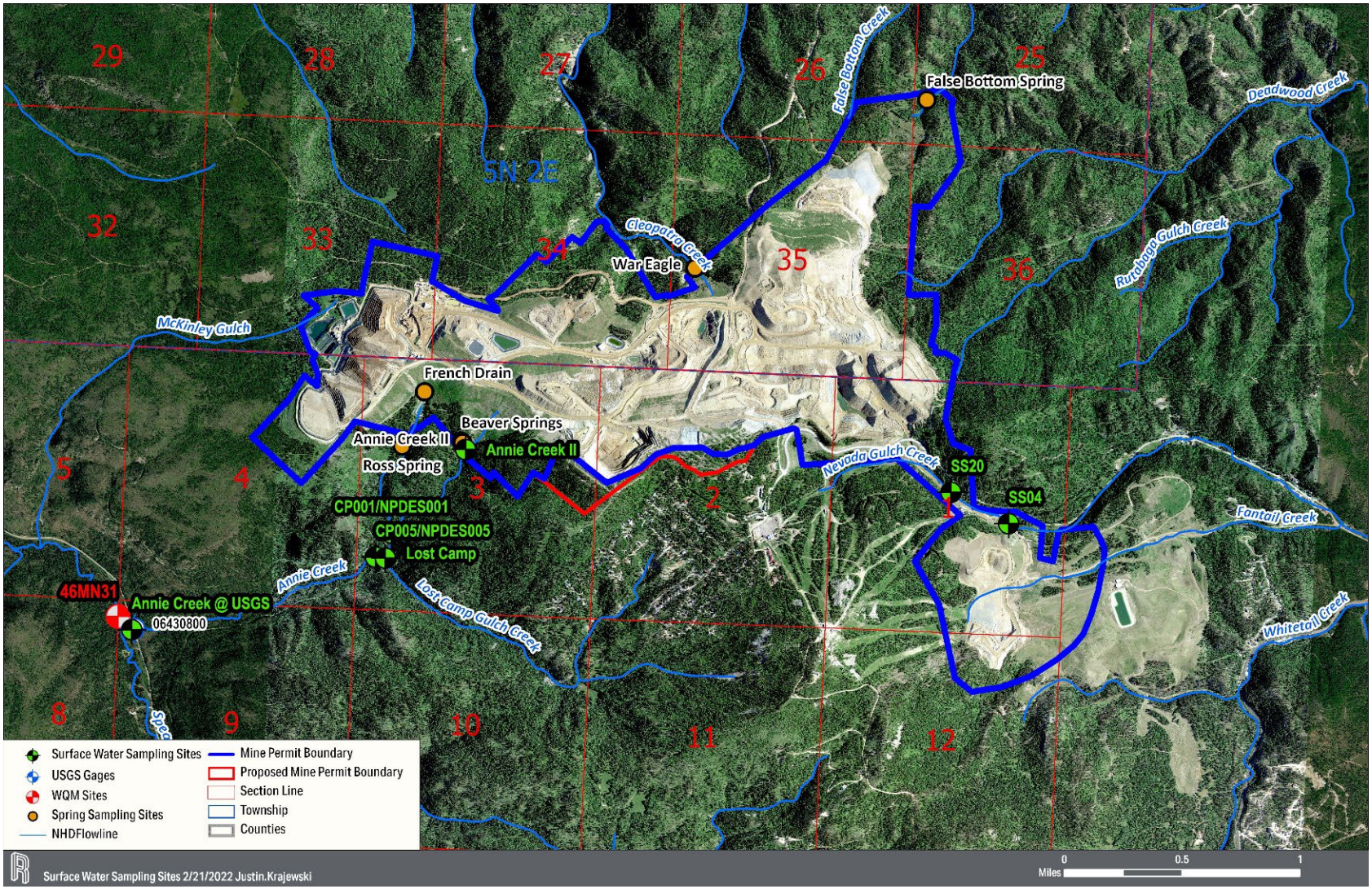
WAD = Weak Acid Dissociable

Please note that the surface water sites (Annie Creek at USGS, Annie Creek II, Lost Camp, SS-20, and SS-04) are sampled for total metals while the CP001/NPDES001, CP005/NPDES005, and 46MN31 are sampled for total recoverable metals.

All units are milligrams per liter with the following exceptions: conductivity (micromhos per centimeter), depth and width (feet), flow rate (gallon per minute), ORP (millivolts), pH (standard units), temperature (degrees Celsius), Aluminum, total recoverable (micrograms per liter), and Lead, total recoverable (micrograms per liter).

# APPENDIX B

## SURFACE WATER SAMPLING MAP


29
28
27
26
25
32
33
34
35
36
5N 2E
5
4
3
2
1
8
9
10
11
12
False Bottom Spring
False Bottom Creek
Deadwood Creek
Cleopatra Creek
War Eagle
Rutabaga Gulch Creek
McKinley Gulch
French Drain
Beaver Springs
Annie Creek II
Annie Creek II
Ross Spring
Nevada Gulch Creek
SS20
SS04
Fantail Creek
CP001/NPDES001
CP005/NPDES005
Lost Camp
Annie Creek
Lost Camp Gulch Creek
46MN31
Annie Creek @ USGS
06430800
Whitetail Creek
Surface Water Sampling Sites
USGS Gages
WQM Sites
Spring Sampling Sites
NHDFlowline
Mine Permit Boundary
Proposed Mine Permit Boundary
Section Line
Township
Counties
Surface Water Sampling Sites 2/21/2022 Justin.Krajewski
0
0.5
1
Miles

# APPENDIX C
## SAMPLING METHODS

# APPENDIX C-1: WHARF SURFACE WATER SITES (ANNIE CREEK AT USGS, CP001/NPDES001, CP005/NPDES005, LOST CAMP, ANNIE CREEK II, SS-04, AND SS-20)

# *WATER SAMPLING PROTOCOL FOR WHARF RESOURCES AND GOLDEN REWARD MINING COMPANIES*

**Preparation:**

1. Always take the following equipment:
   - Bottles (Clean, laboratory supplied, the proper size and number)
   - Coolers w/ ice or snow
   - pH meters
   - Conductivity meters
   - Temperature meters
   - Water Level Indicator
   - Flow Meter
   - Tape Measure
   - Watch
   - Field Book
   - Pen
   - Felt Tip Marker
   - Keys for Well Cap Locks
   - Lubricant for Locks
   - Bailer
   - Bottle of Deionized Water
   - Waterproof Gloves
   - Two-Way Radio

2. Take the following equipment when weather conditions and vehicle capacity allow:
   - Paper Towels
   - Bottle Labels
   - Water Filter Barrel and Filters
   - Air Pump (Foot Pump)
   - Chain-of-Custody Forms
   - Sampling List Forms
   - Appropriate Preservatives
   - Portable Flume

3. Calibrate the pH and conductivity meters each morning prior to sampling. Please refer to calibration manuals supplied with the meters.

4. If sampling at the Surface Water Discharge Compliance Points or Outfalls and if hypochlorite is being utilized and the treated water is being discharged and flowing past any Compliance Point or Outfall to be sampled, check the calibration of the chlorine meter and take the kit with you.

**Surface Water and Surface Water Discharge Permit (SWD) Sampling:**

1. Always start at the furtherst downstream location and work your way upstream.

2. Record in field book sample location, date, and sample code (if using one).

3. Check the area around the surface site for any changes from nature or vandalism. Record any changes in the field book. In case of vandalism, report to supervisor or department head.

4. SWD: Take air temperature and record in field book.

5. SWD: Observe the sky conditions and record in field book. (cloudy, clear, etc.)

6. SWD: Observe wind conditions and record in field book. (calm, 0-5 mph, steady, gusty, etc.)

7. SWD: Observe is there is a visible sheen on the water and record in field book.

8. SWD: Observe the turbidity and record in the field book.

9. SWD: Record in the field book the precipitation conditions for the past 24 hours.

10. SWD: Observe the flow conditions and record in the field book. (high, low, average, etc.)

11. SWD: If hypochlorite is being utilized and the treated water is being discharged and flowing past this site, analyze a sample of the water for Total Residual Chlorine and record in field book. (Use the instructions included in the kit.)

12. Label the sample bottles with a permanent marker. List:
    a. Location
    b. Site Name or Code Number
    c. Date
    d. Time

13. Triple rinse all sample bottles with sample solution. To do this:
    a. partially fill the bottles
    b. replace the cap and shake bottle vigorously
    c. remove the lid and pour the water out
    d. repeat steps a. through c.
    e. repeat steps a. through c. again
    f. once the bottles and caps are rinsed, be careful not to touch the inside of the bottles and caps, or the tops of the bottles where the caps screw on

14. Take the pH of the sample solution and record in field book.

15. Take conductivity of the sample solution and record in the field book.

16.. Take temperature of the sample solution and record in the field book.

17. Collect sample in the rinsed bottles within the same minute and cap immediately.
    a. If safe, collect the sample from the middle of the stream. If unsafe, collect the sample while standing on the bank and reach out into the stream.
    b. Collect the sample facing upstream, so that the sample entering the bottle has not been influenced by any of your actions.
    c. Plunge the bottle to just below the surface of the water and allow to fill.
    d. Do not stir up sediment from the stream bottom when sampling.

18. Once the samples are obtained, immediately place them in an iced cooler.

19. Record the time of sampling in the field book.

20. Use the flow meter or portable flume to obtain flow according to its respective instruction manual.

21. Record the flow measurements in the field book.

22. Refer to section "**Sample Preparation**" below.

# APPENDIX C-2: SD DANR SURFACE WATER SITE (46MN31)

SURFACE WATER QUALITY PROGRAM
&
FEEDLOT PERMIT PROGRAM

STANDARD OPERATING PROCEDURES

# FIELD WATER QUALITY SAMPLING

Revision III

Steven M. Pirner, Secretary,
Department of Environment and Natural Resources

Kelli Buscher, Administrator,
Surface Water Quality Program

Kent Woodmansey, Administrator,
Feedlot Permit Program

Jan 2016

# Table of Contents



# List of Figures

# 1.0 SURFACE WATER QUALITY PROGRAM AND FEEDLOT PERMIT PROGRAM DESCRIPTIONS

This document describes standard operating procedures for field water quality sampling for the Surface Water Quality Program (SWQP) and the Feedlot Permit Program (FPP).

The SWQP standards and monitoring section routinely monitors a network of South Dakota rivers and streams called the Water Quality Monitoring (WQM) network. In addition, the standards and monitoring team may collect water samples during Use Attainability Analyses (UAAs), fish kill investigations, complaint investigations, and special short-term monitoring projects. The surface water discharge permit section and the Feedlot Permit Program may also collect water quality samples during routine facility inspections, compliance sampling, and complaint investigations.

Environmental data collected by the SWQP and FPP may be used to determine 1) trends in water quality, 2) support of beneficial uses and water quality standards, 3) compliance with permit conditions, and/or 4) causes/sources of pollution. More information regarding SWQP and FPP sampling activities is available in the Quality Assurance Project Plan for the Surface Water Quality Program and Feedlot Permit Program (SWQ/FPP QAPP).

# 2.0 PRE-SAMPLING PROCEDURES

SWQP and FPP personnel conduct sampling work to meet a variety of goals/purposes. All sampling work requires pre-planning. During the planning stage, the scope of sampling to be performed is modified for the purpose of obtaining data necessary for meeting a specific and desired goal or purpose. Pre-planning procedures common to all sampling include the following:

1. Identify the objectives for sampling;
2. Review any existing data for the site/waterbody to be sampled;
3. Identify additional data requirements, including types of samples/characteristics and sampling frequency;
4. Examine maps and diagrams of the area/waterbody to be sampled;
5. Make a list of proposed sampling sites;
6. Check the operation of all required sampling equipment;
7. Load all required sampling equipment and obtain all required sample bottles, forms, documents, and field books;

A. Sample bottles may be obtained from the laboratory that will do the analysis

B. Deionized (DI) and "Polished" water may be obtained from the laboratory that will do the analysis.

8. Notify all stakeholders, including landowners, businesses, and city, state, federal, or tribal agencies;
9. Procure permission to access private property;
10. Perform reconnaissance (as necessary) of the proposed sampling sites and the general area/waterbody to be sampled;
11. Determine if the plan for sampling requires revision; and
12. Proceed with sampling activities.

## 3.0 DOCUMENTATION AND REPORTING

### A. Documentation

Field recordkeeping activities are required. Recordkeeping is accomplished using either a field notebook or pre-printed project forms. It is recommended that all field notebooks and pre-preprinted project forms be waterproof. A standard format for field notebook recordkeeping is not required. All field records should include the following:

#### 1. Field Notebook

a. Date and time;

b. Station ID (unique identification);

c. Station location (street number, avenue number, driving directions, WQM number, or GPS location);

d. Types of meters being used;

e. Meter calibration readings IF a meter calibration logbook is not kept with the meter (most meters will have an accompanying logbook for recording calibration activities);

f. Comments regarding any meter damage or difficulty in operation or calibration;

g. Weather conditions that could impact water quality (high wind, rainfall and runoff, temperature);

h. Velocity or discharge measurements (if flow measurements are taken);

i. The following field measurements are recorded for every sample site based on equipment used (if a measurement is not recorded, the rational should be stated in the notebook):

   i. air temperature;

   ii. water temperature;

   iii. pH;

   iv. specific conductance; and

   v. dissolved oxygen.

j. Fish size, length, species, and visual condition (if fish are collected);

k. Method of fish collection (net type, time and date set, length of stream segment, etc.);

l. Method of biological sample collection (net type, sampling equipment type, depth, etc.);

m. Discuss and identify all photographs;

n. Document site conditions/visual observations (riparian vegetation, bank and stream bottom, stream incision and definition, water appearance, flow, public access);

o. Document the name of any individual encountered during sampling and summarize the conversation along with any pertinent information.

## 2. Pre-printed project sheets

a. Completely fill out all applicable “blanks” on any pre-printed project forms;

b. All the information discussed in the section (1. Field Notebooks) must be gathered for each site.

3. Laboratory sheets

A SDDENR Water Quality Data Sheet (see SWQ/FPP QAPP) must be completely filled out and submitted with all laboratory samples. This provides the laboratory with information about the water sample and directs the laboratory on which analyses are requested.

4. Bottle labels

All bottles must be labeled prior to sample collection. At a minimum, the label must include the station identification, sample date, sample time, and bottle identification (Bottle "A"). The bottle will get wet, so ensure that bottle labels and marking pen are water resistant so the label stays affixed and the pen ink does not run.

B. Reporting

Data collected as a result of sampling is recorded in the following ways:

1. Recorded in appropriate database, hard copies of data are also maintained;
2. Recorded in reports;
3. Hard copies filed.

## 4.0 INSTRUMENT/EQUIPMENT CALIBRATION, CARE, AND OPERATION

Each field instrument must be inspected prior to use, calibrated, and operated according to manufacturer specifications. If problems with any field instrument are encountered, the user should consult the manufacturer's manual, the project manager, and/or call the manufacturer. Calibrations and instrument observations must be recorded in the calibration log book prior to field use.

General calibration procedures and necessary instrument inspections are presented below:

A. Dissolved Oxygen (DO) Meter - YSI 200

Inspect the DO membrane. It should be free of scratches, tarnish, and bubbles. Otherwise the membrane needs to be replaced and/or probe cleaned.

Make sure the sponge in the calibration chamber (Plastic Probe Holder) is moist. If the sponge is dry, wet it with water. Pour excess water out of the

calibration chamber and place over probe. Keep meter from extremes in temperature such as freezing and extreme heat (do not leave in vehicle!).

1. Turn meter on by pressing the Green Button. The display screen will read “ovEr"; this is a self-diagnostic test. Wait for meter readings to stabilize. Stabilization may take up to10 minutes.
2. Write the Date and Time in the meter’s calibration log book.
3. When the meter readings have stabilized Press the “CAL” button. Cal will appear in lower left of screen.
4. Meter prompts for mBar data. Arrow up or down to enter the correct Barometric pressure in mBars. (To get mBars data, use a smartphone or call the SWQP & FPP secretary and ask for the barometric pressure for your location. This can be found on the NOAA internet site, http://www.weather.gov/. When at this site enter the nearest Zip Code and press “Enter”. A weather report for that town with the current conditions will appear which includes the Barometric pressure in inches with the Barometric pressure in mBar following in parenthesis. Convert Barometric pressure from inches Hg to mBars (inches Hg x 33.85=mBars).
5. Press “Enter”. The meter should give you the DO in percent.

   Press “Mode” and you should have a salinity value of 0.0 ppt for deionized (DI) water. (If not 0.0, arrow up or down to 0.0).

   Press “Enter”. “Cal” will no longer be visible on the screen. Write the DO% and temperature in log book. The DO% will typically range between 80-120%. Values above 120% are suspect and the DO membrane should be inspected or changed, or the DO probe may need to be replaced.
6. The DO meter is calibrated and ready for use. Press the Mode key to toggle between DO percentage and ppm. SDDENR uses mg/L or ppm (which are equivalent units).
7. Place the DO probe in the water being measured. Take care that the probe is not placed in mud. Gently swirl the probe and allow the meter time to stabilize. Record the DO reading in mg/L or ppm in the field log book or pre-printed project sheets.
8. To clean the DO probe and replace the membrane, unscrew and discard the blue, black, or yellow membrane cap.
9. Rinse the probe with water. Wet the sandpaper disc provided in the tool kit with water and GENTLY polish the metal anode (only enough to the remove any tarnish). Repeat rinsing the probe.

10. Invert the blue, black, or yellow membrane cap and fill using the potassium chloride solution available in the tool kit. Thread the cap back onto the probe. It is ok for the potassium chloride solution to overspill. Ensure that there are no air bubbles trapped. If there are air bubbles visible, remove the cap, refill with potassium chloride solution, tap the cap to dislodge bubbles, and thread the cap onto the probe.

The YSI 200 DO meter calibration is based on barometric pressure. Recalibrate as often as necessary as the barometric pressure may change over time or distance.
Important: When collecting a DO measurement, the water must be moving past the DO probe at a speed of ½ foot per second to overcome oxygen consumption; otherwise, move the probe in a swirling motion to compensate!

## B. pH Meter – YSI 100

Write date and time in the pH meter calibration log book. Connect pH and temperature probes to the meter. Inspect the buffer and electrode solutions for dirt or slime. Change out the buffer and electrode solutions as often as necessary to maintain clean solutions. Keep the meter from extremes in temperature such as freezing and extreme heat (do not leave in your vehicle). For typical field sampling a 2-point calibration is used. You should use calibration solutions that bracket the expected pH of the water you will be testing. If the pH is expected to be acidic, use pH 4.00 and pH 7.00 buffer solution. If the pH is expected to be neutral or basic, use pH 7.00 and pH 10.00 buffer solutions.

1. Turn the meter ON and unscrew the electrode storage solution.
2. Rinse the pH probe in distilled water.***
3. Place the probe in the 7 pH buffer solution.
4. Allow temp readings to stabilize.
   Then press and hold “STAND” for 3 seconds to calibrate.
5. “WAIT” flashes until the meter detects a stable reading. Then “SLOPE” will start flashing. This means the first point has been calibrated.
6. Rinse the pH probe in distilled water.***
7. Place the probe in the 10 pH buffer solution.
8. Allow temp readings to stabilize. Then press “SLOPE”.
9. “WAIT” flashes until the meter detects a stable reading. When the meter calibrates the second point it will beep twice. “STAND” and “SLOPE” display steady.

10. The meter is now dual point calibrated and ready for use.

When done sampling rinse the pH probe with distilled water.***
If taking more than one sample rinse the probe between samples.

Turn meter OFF and return probe to electrode storage solution.

***Failure to rinse probe contaminates pH buffer and electrode storage solution which leads to poor calibration and data!

## C. Conductivity Meter – YSI

Write the date and time in the conductivity meter calibration log book. Keep the meter from extremes in temperature such as freezing and extreme heat (do not leave in your vehicle).

1. Turn the instrument on and allow it to complete its self-test procedure.
2. Place at least 3 inches of conductivity calibration solution in clean beaker.
3. Insert the probe into the beaker deep enough to completely cover the oval shaped hole on the side of the probe.

a. DO NOT rest the probe on the bottom of the container - suspend it off the bottom at least ¼ inches.

4. Press the “MODE” button until the instrument is reading specific conductance.
5. Allow at least 60 Seconds for the temperature reading to become stable.

a. Swirl the probe to dislodge any air bubbles from the electrode.

6. Press and release both the UP arrow and DOWN arrow buttons at the same time to enter the calibration mode.
7. Use the UP arrow or DOWN arrow key to adjust the reading on the display until it matches the value of the calibration solution you are using.
8. Once this display reads the exact value of calibration solution being used (the instrument will make the appropriate compensation for temperature variation from 25°C), press the “ENTER” key. The word “SAVE” will flash across the display for a second indicating that the calibration has been accepted.
9. Record the calibration information in the calibration log book.

10. Rinse the probe with water. The meter is calibrated and now ready for use.

11. Place the specific conductance probe in the water being measured. Ensure the probe is not placed in the mud. Allow adequate time for the meter to stabilize. Record the specific conductance value in the field log book or on pre-printed project sheets.

## D. Multimeter – YSI 556

Write the date and time in the multimeter calibration log book. The meter should always stay connected to the probe bulkhead. Use fresh calibration solutions with each calibration. Keep the meter from extremes in temperature such as freezing and extreme heat (do not leave in your vehicle).

*Accessing the Calibration Screen*

1. Press the “ON/OFF” button to display the run screen.
2. Press the “Escape” button to display the main menu screen.
3. Use the arrow keys to highlight the Calibrate selection.
4. Press the “ENTER” button. The calibration screen will be displayed.

*Specific Conductance Calibration*

This procedure calibrates specific conductance (recommended), conductivity and salinity. Calibrating any conductivity option automatically calibrates the other two options. The specific conductance calibration affects calibration of other parameters and should always be completed first.

1. From the calibration screen, use the arrow keys to highlight the Conductivity selection.
2. Press “ENTER”. The conductivity calibration selection screen is displayed.
3. Use the arrow keys to highlight the Specific Conductance selection.
4. Press “ENTER”. The Conductivity Calibration Entry Screen is displayed.
5. Place a small amount of conductivity solution in the calibration cup. Thread the calibration cup onto the bulkhead and gently swirl to rinse. Discard the used solution.
6. Fill the calibration cup about ¾ full of conductivity solution. If possible, the conductivity standard should be within the same range

as the samples you plan to measure. Conductivity solution is prepared for SDDENR by the Department of Health Laboratory.

7. Carefully immerse the sensor end of the probe module into the solution. Thread the calibration cup onto the bulkhead. Gently swirl to remove any bubbles from the conductivity cell. The sensor must be completely immersed past its vent hole.
8. Use the keypad to enter the calibration value of the standard you are using. The last value used will automatically appear on the screen.
9. Press “ENTER”. The Conductivity Calibration Screen is displayed.
10. Allow at least one minute for temperature equilibration before proceeding. The current values of all enabled sensors will appear on the screen and will change with time as they stabilize.
11. Observe the reading under Specific Conductance. When the reading shows no significant change for approximately 30 seconds, press “ENTER”. The screen will indicate that the calibration has been accepted and prompt you to press “ENTER” again to continue.
12. Press “ENTER.” If you fail to press “ENTER” the second time, specific conductance will not calibrate. You will be returned to the Conductivity Calibrate Selection Screen.
13. Press “Escape” to return to the calibrate menu.
14. Rinse the probe sensors.

*pH Calibration*

1. In the calibration menu, use the arrow keys to highlight the pH selection.
2. Press “ENTER.” The pH calibration screen will be displayed.
3. Select the 1-point option only if you are adjusting a previous calibration. If a 2-point or 3-point calibration has been performed previously, you can adjust the calibration by carrying out a one point calibration. The procedure for this calibration is the same as for a 2-point calibration, but the software will prompt you to select only one pH buffer.
4. Select the 2-point option to calibrate the pH sensor using only two calibration standards. Use this option if the media being monitored is known to be either basic or acidic. Use two buffers that bracket the expected pH of the media. **You will typically do a 2-point calibration.**
5. Select the 3-point option to calibrate the pH sensor using three calibration solutions. In this procedure, the pH sensor is calibrated with a pH 7 buffer and two additional buffers. The 3-point calibration method assures maximum accuracy when the pH of the media to be monitored cannot be anticipated. The procedure for this calibration is the same as for a 2-point calibration, but the software will prompt you to select a third pH buffer.
6. Use the arrow keys to highlight the 2-point selection.
7. Press “ENTER.” The pH entry screen will be displayed.
8. Starting with the lowest pH buffer, pour a small amount of the buffer solution into the calibration cup, thread the calibration cup onto the bulkhead and gently shake to thoroughly rinse the cup and probe. Discard the buffer solution. This buffer is used as a rinse at this step.
9. Fill the calibration cup about half full with the lowest pH buffer solution (pH 4.00 or 7.00). Thread the calibration cup onto the bulkhead. Ensure that there is enough solution that the glass ball on the pH probe is submerged.
10. Gently swirl the probe to remove any bubbles from the pH sensor and to ensure good contact between the pH probe and buffer solution.
11. Use the keypad to enter the value of the buffer (pH 4.00 or 7.00) you are using at the current temperature.
12. Press “ENTER.” The pH calibration screen is displayed.

13. Allow the temperature to stabilize before proceeding. The current values of all enabled sensors will appear on the screen and will change with time as they stabilize.
14. Observe the reading under pH, when the reading shows no significant change for approximately 30 seconds, press “ENTER”. The screen will indicate that the calibration has been accepted and prompt you to press “ENTER” again to continue.
15. Press “ENTER”. This returns you to the specified pH calibration screen.
16. Rinse the probe module, transport/calibration cup and sensors in tap or purified water and dry.
17. Repeat steps 5 through 13 above using the second pH buffer (pH 7.00 or 10.00).
18. Press “ENTER”. This returns you to the pH calibration screen.
19. Press “Escape” to return to the calibrate menu.
20. Rinse the probe module and sensors in tap or purified water.
21. To clean the pH probe, place dilute hydrochloric acid solution (10 to 20% - you may need to mix the solution in-house) in the calibration cup for approximately 10 minutes. Using a bottle brush, GENTLY brush the glass probe to dislodge any accumulated debris. Thoroughly rinse with water and calibrate prior to use.

*Dissolved Oxygen Calibration*

Important: The instrument must be powered on for at least 20 minutes to polarize the DO sensor before calibrating.

1. In the calibration screen, use the arrow keys to highlight the Dissolved Oxygen selection.
2. Press “ENTER”. The dissolved oxygen calibration screen will be displayed.
3. Use the arrow keys to highlight the DO% selection.
4. Press “ENTER.” The DO Barometric Pressure Entry Screen will be displayed.
5. Place approximately 1/4 inch of water in the bottom of the transport/calibration cup.
6. Place the sensor module into the transport/calibration cup. Make sure that the DO sensor is not submerged in the water.

7. Engage only 1 or 2 threads of the transport/calibration cup to ensure the DO sensor is vented to the atmosphere. This is necessary to replenish oxygen as the probe consumes it.

8. Press “ENTER”. The DO% saturation calibration screen will be displayed.

9. Allow sufficient time for the air in the transport/calibration cup to become water saturated and for the temperature to reach equilibrium before proceeding. The current values of the all enabled sensors will appear on the screen and will change with time as they stabilize.

10. Observe the reading under DO%. When the reading shows no significant change for approximately 30 seconds, press “ENTER”. The screen will indicate that the calibration has been accepted and prompt you to press “ENTER” again to continue.

    Important: If you do not press “ENTER” the second time the DO will not be calibrated.

11. Press “ENTER”. This returns you to the DO calibration screen.

12. Press “Escape” to return to the calibration menu and rinse the sensors.

13. To clean the DO probe and replace the membrane, unscrew and discard the blue, black, or yellow membrane cap.

14. Rinse the probe with water. Wet the sandpaper disc provided in the tool kit with water and GENTLY polish the metal anode (only enough to the remove any tarnish). Repeat rinsing the probe.

15. Fill the blue, black, or yellow membrane cap using the potassium chloride solution available in the tool kit. Thread the cap back onto the probe. It is ok for the potassium chloride solution to overspill. Ensure that there are no air bubbles trapped. If there are air bubbles visible, remove the cap, refill with potassium chloride solution, tap the cap to dislodge bubbles, and thread the cap onto the probe. Recalibrate prior to use.

*Taking a Measurement*

After calibrating all parameters, the YSI 556 is now ready for use. To take a water quality measurement:

1. Press “Escape” to return to the Run Menu or arrow up or down to highlight “Run” on the main screen menu.

2. Place the sensors into the water. Take care to ensure the sensors are not placed in mud and that the flow of water is sufficient to

overcome oxygen consumption by the DO probe (swirl the probe in the water if flow is inadequate).

3. Allow the meter sufficient time to stabilize. You may electronically record the measurements by pressing "ENTER." This will store the measurement in a data file in the YSI 556. Manually record the measurements in the field log book or on pre-printed project sheets. If a water quality sample is also being submitted, record the measurement information on the lab sheet.

## E. Flow meter – SonTek FlowTracker

This flow meter is used to calculate stream flow or discharge. This meter uses sonar to detect water velocity. The operator inputs the location (on the tape line) and depth so the unit may calculate discharge. For best results and to reduce errors, select an area of the stream with minimal water turbulence and minimal underwater obstacles (rocks, algae, plants). A slow moving segment of the stream with a flat bottom is ideal. Take care not to disturb sediment on the bottom of the stream bed as this will cause sonar errors. Refer to Figure 1.

1. Attach the sonar probe to the wading rod and tighten the set screw.
2. Set up a tape line. While standing in the water facing downstream, the "right bank" is on your right side. This is the side where you will start.
3. On the right bank, use a stake to place the start of the tape line. Stake the tape line high enough up the bank so that the tape does not get swept by the stream and place in soil secure enough so that the line may be taunt.
4. Cross the stream to the left bank allowing tape to reel out. Secure the end of the tape line to the left bank with a stake. Note the measurement of the tapeline at the edge of the left bank. Subtract the measurement of the starting edge on the right bank to determine the stream width. It is ideal to measure 10 to 20 stations (locations) at equal intervals so that no more than 10% of stream discharge is represented at any one stream location. This may not be possible on very narrow streams. At a minimum, measurements may be made every 3 inches. For example, the tape line measures 6.5 feet at the right bank shore and 32 feet at the left bank shore. Subtracting 6.5 from 32 results in a stream width of 25.5 feet. In order to prevent greater than 10% stream discharge in any one stream location, at least 10 stations should be the measured. 25.5 feet divided by 10 stations would result in increments of 2.5 feet. However to prevent greater than 10% discharge in any one station

measurement, increments of 1.5 or 2 feet may be more appropriate. Determine the station intervals based on stream width.

5. Turn on the FlowTracker meter. The startup screen will appear.
6. Press the “ENTER” button. The Main Menu will display.
7. Press the “3” button to start the data run. This will take you to the data file name screen.
8. Press the “1” button to input the station name (StationID if it fits). Input a unique name. The name can only be 8 characters maximum, so you may need to abbreviate. Press the “ENTER” button once the name is input.
9. Press the “9” button to accept the name.
10. Press the “9” button again to start the data run. At this time the display message will read “Press QC Menu at any time for Gauge data Enter to continue.” Press “ENTER.”
11. The Automatic QC Test will appear. A QC test must be conducted once each day that the flow meter is used. Press “1” to run test or “2” to skip the test. If running the test, a message will display to “Put probe in moving water away from any underwater objects. Press enter to start.” Following those instructions, place the probe/wading rod in the water so that the direction of the flowing water is perpendicular to the direction of the sonar. Make sure there are no underwater objects such as plants, rocks, or debris. Hold the probe/wading rod still and upright. Press the “ENTER” button. The meter will begin a self-diagnostic QC test. Only proceed if the QC test passes.
12. The Starting Edge screen will appear. At the right bank, locate the measurement on the tapeline of the edge of the water. Press the blue “Set Location” button and use the numeric keys to enter the measurement of the tapeline at the edge of the water.
13. Press the gray “Next Station” button. This will take you to Station 1 – which correlates with the location on the tape line. The location of Station 1 may need to be adjusted based on the stream width. The first station (Station 1) and the last station measured on the left bank must be half the interval of the rest of the stations. This is to accommodate for slope of the stream from the stream edge to the first and last station. To adjust the location of Station 1, Press the blue “Set Location” button and manually enter the appropriate location. Go to that location on the tape line.

14. Press the blue “Set Depth” button and use the numeric keys to enter the depth of the water based on the stream depth measurement on the wading rod at Station 1.

15. Holding the meter still and upright, press the blue “Measure” button. The meter will begin taking measurements or “pings.” If there are any errors, correct the source of the error if possible and repeat the measurement. It may take several attempts per station. Press “1” to accept the measurement or “2” to repeat the measurement.

16. Once you accept the measurement, the meter will go to Station 2 and so forth. At each station, you must verify you are at the appropriate location on the tape line and enter the appropriate depth based on the measurement on the wading rod.

17. After the last station has been recorded, press the gray “End Section” button. The screen will display a prompt to press “End Section” again to end the section. The Ending Edge screen will display. Press the blue “Set Location” button and key in the corresponding location of the left edge on the tapeline.

18. Press the gray “Calculate Disch.” button. The screen will display a prompt to press the Calculate Discharge button again to confirm. Press the “Calculate Disch.” button again.

19. The meter will display information. Press the “Enter” button to continue viewing data. Press the “0” button to exit. Important: After viewing the data, you must press the “0” button to exit in order for your data to be saved.

20. Record the flow discharge measurement in cubic feet per second in the field log book or pre-printed project sheet.

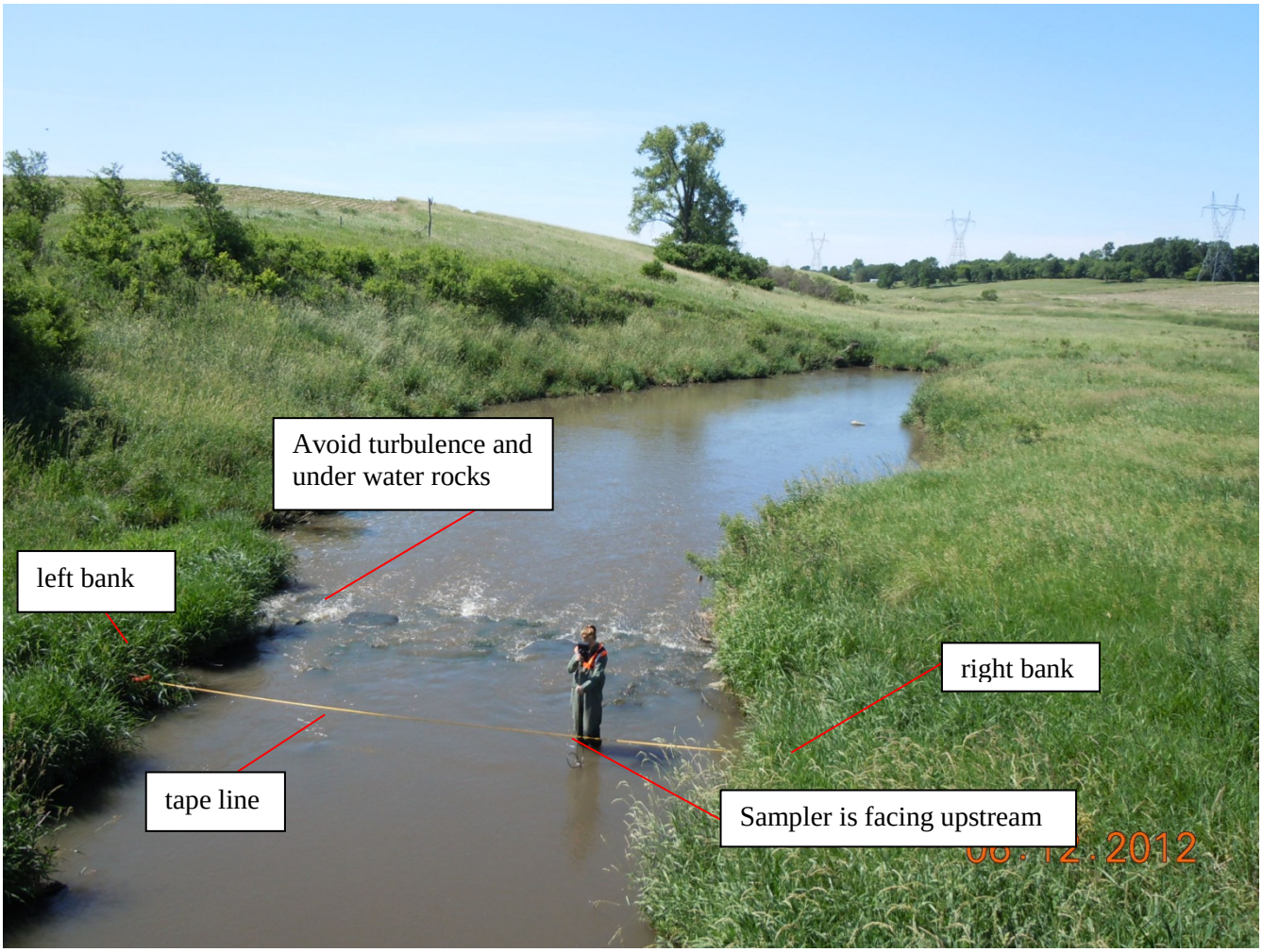



**Figure 1. Taking a flow measurement with SonTek FlowTracker.**

## F. Van Dorn sampler

The Van Dorn sampler may be used to collect water from a lake or wetland. It may be used to collect a grab sample at a specified depth or a composite sample at multiple depths (surface, middle, and bottom). Rinse the sampling apparatus thoroughly with water from the sampling site prior to collection of samples. Surface samples should be collected approximately 1 meter below the surface of the water. Bottom samples should be collected from 0.5 meter above the lake bottom. Care must be taken not to come in contact with the lake bottom, as this may result in suspended bottom sediment in the sampler. Refer to Figure 2.

1. Make sure the pin release mechanism is in good working order.

2. Press down the pin release and pull plunger from the end nearest the trip release and hook the cable loop of the plunger into the appropriate slot in the pin release mechanism.
3. Release the pin release and ensure the cable loop is completely around the pin (not pinched by the pin).
4. Pull the plunger and cable from the opposite end and hook the cable loop to the opposite pin on the pin release. The Van Dorn sampler is now ready to be used to collect a water sample.
5. Lower the sampler into the water and stop the sampler at the appropriate depth. Send the messenger down the line to trip the sampler.
6. Pull the filled sampler up from the lake. When the bottom sample is collected, check for an excessive amount of bottom sediment or turbidity. If the sample appears turbid, discard the sample and repeat steps 2 through 6.
7. Once the sample is acquired, fill the sample bottles appropriately.
8. Before lengthy storage, rinse the Van Dorn sampler with distilled water.

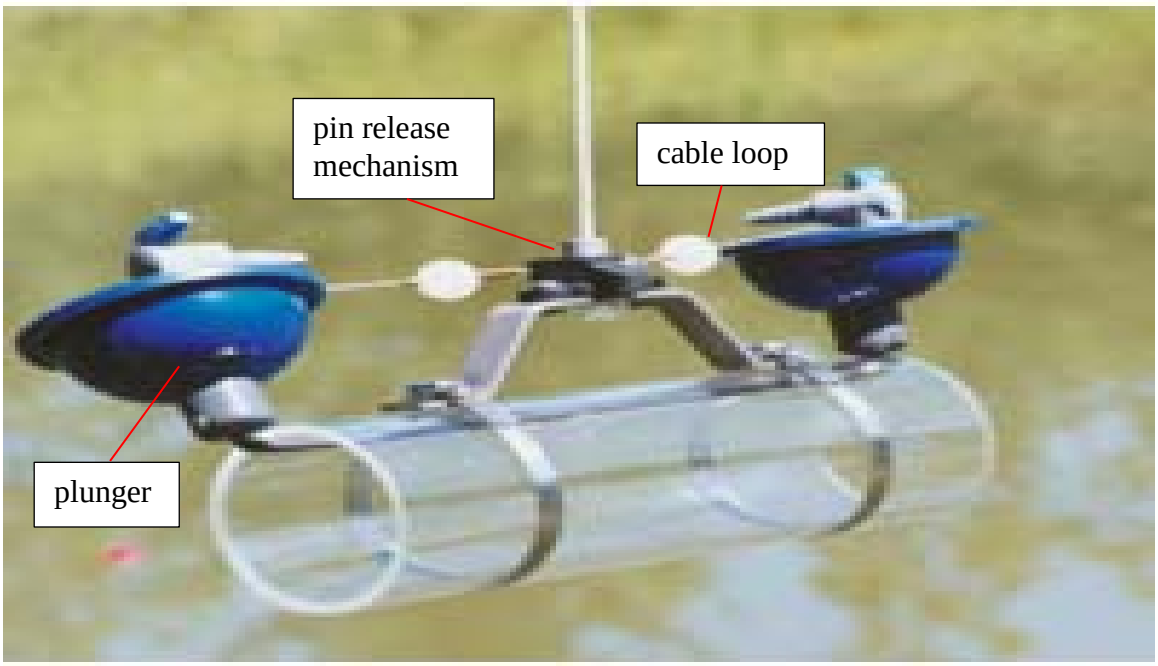



Figure 2. Van Dorn sampler.

## 5.0 LABORATORY SHEETS AND CHAIN-OF-CUSTODY

The majority of samples collected for ambient monitoring, fish kills, complaints, and other sampling projects do not need complete custody documentation. However, under certain conditions, such as compliance investigations, SDDENR must be able to prove that any analytical data offered into evidence accurately represent environmental conditions existing at the time of sample collection. Due to the evidentiary nature of such samples, possession must be traceable from the time the samples are collected until they are introduced as evidence in legal proceedings. It must be clearly demonstrated that none of the involved samples could have been tampered with during collection, transfer, storage, or analysis. SDDENR chain-of-custody protocols and procedures are described below.

### Documentation

To maintain and document sample possession, the following chain-of-custody procedures are followed:

1. Sample Custody - A sample is under custody under one of the following conditions:

    a. It is in your direct possession (you are holding it).

    b. It is in your direct line-of-sight after being in your possession (you can see it).

    c. It was in your possession; you locked it up or placed it in a sealed container to prevent tampering (no one can access the sample without leaving evidence of access, e.g. seal broken, tape removed, etc.).

    d. It is in a designated, secure area (typical evidence holding area).

### Field Custody

1. The project officer will advise laboratory personnel that a sample requiring chain-of-custody will be collected and will specify the approximate date and time that it will arrive at the laboratory. In instances where date and time are not known in advance of a field trip, the laboratory should be notified as soon as possible about the arrival of such samples.
2. The samples must be collected in accordance with required and established methods set forth in this SOP, the Quality Assurance Project Plan (SWQ/FPP QAPP), and 40 CFR Part 136 (or other applicable section).

## Transfer of Custody

1. To establish the documentation necessary to trace sample possession, a Chain-of-Custody Record (refer to SWQ/FPP QAPP) must be filled out and accompany each set of samples. The record should accompany the water quality data form and the samples to the laboratory. This record tracks sample custody transfers between the sampler and laboratory analysts. At a minimum, the record should contain:

    a. The StationID or sample identification;

    b. The signature of the collector and witnesses when present;

    c. The date and time of collection; place and address of collection;

    d. Substances sampled;

    e. Signatures of persons involved in the chain of possession; and, inclusive dates of possession.

All chemical water samples collected using this SOP utilize the SDDENR Water Quality Data Sheet (commonly referred to as the lab sheet), Fish Flesh Chain of Custody, or the SDDENR Chain of Custody form (refer to SWQ/FPP QAPP for all forms) as the laboratory data sheet and chain-of-custody document. When properly signed by all affected personnel, the SDDENR Water Quality Data Sheet and Fish Flesh forms comply with chain of custody requirements. The separate SDDENR Chain of Custody form is not additionally required. The SDDENR Chain of Custody form will only be used in special circumstances or in times when the other forms are not appropriate for the sample.

2. Samples will be packaged properly for shipment and dispatched to the appropriate laboratory for analysis. The samples for each shipping container shall be placed in the large plastic bags provided by the laboratory.

3. If samples are split with a source or government agency, it will be noted in the remarks section of the Chain-of-Custody Record. The note should indicate with whom the samples are being split and be signed by both the sampler and recipient.

4. Each transfer of sample custody must be documented on the Chain-of-Custody Record.

5. The Chain-of-Custody Record identifying its contents will accompany all shipments. The original record will accompany the shipment, and the project officer will retain a copy and place it in the project file.

6. The laboratory should have assigned laboratory custodians who are responsible for overseeing the reception of all controlled custody samples.

7. When the samples are not in the immediate possession of the individual having official custody, they must be kept in a locked enclosure.

8. After the laboratory has completed the sample analysis, the Water Quality Data form and the Chain-of-Custody record will be returned to the appropriate program. These items will be kept on file for at least five years. Access to the Chain-of-Custody file is limited to program personnel.

## Delivery or Shipment of Samples

Samples must be packed in coolers on loose ice for shipment or delivery to the laboratory. You must include appropriate paperwork. Make sure the container does not leak and all shipping or delivery labels are legible. Generally, samples need to be chilled to less than 6$^{o}$ Celsius. Make sure there is adequate ice in the cooler to keep samples chilled during transit.

1. Completely fill out a SDDENR Water Quality Data Sheet (see SWQ/FPP QAPP) for each sample station.

2. If the samples are being shipped or sent with the courier, place all sample containers in a large plastic bag. Add loose ice to the bag and tie closed. Place the bag inside the shipping cooler.

3. Make sure that all SDDENR Water Quality Data Sheets are filled out completely. Protect the documents from getting wet by placing them in a plastic bag and putting them in the shipping cooler.

4. Securely seal the cooler with packing tape.

5. Shipping coolers are shipped via mail (USPS, FedEx, etc.), delivered by the courier, or delivered by the sampler to the appropriate laboratory.

# 6.0 QUALITY ASSURANCE

## General Information and Handling Procedures

This section is supplemental to quality activities and requirements outlined in the SWQ/FPP QAPP. Refer to the SWQ/FPP QAPP for specific information on data quality objectives, quality activities, and corrective actions.

1. If several locations are to be sampled during one sample run, which includes both clean and polluted sites, sampling should progress from the clean areas to the polluted areas. This lessens the chance of unintentional contamination of cleaner samples through the use of contaminated sampling equipment (waders, meters).
2. Sampling equipment (meters, graduated cylinders, field bottles, etc.) should be triple rinsed with water from the waterbody being sampled prior to collecting the water sample.
3. The sample container and preservation must be appropriate to the sampled parameter. See figures 3, 5, and 6.
4. A regular schedule of calibration of field instrumentation must be followed. The field instrument calibration frequency is outlined in the SWQ/FPP QAPP. The calibration process is necessary to ensure that the instrument is working properly and within the range of acceptance as determined by the manufacturer. All instrumentation used in field activities must be calibrated prior to field use and as often as necessary thereafter, according to manufacturer instructions. All calibrations must be recorded in the meter's calibration log book.
5. In those instances where field equipment cannot be calibrated or is not functioning properly, the sampler will attempt to repair the affected equipment in the field. For field meters that are assigned to individuals, such as regional staff, that person is responsible for the maintenance and repair of their own equipment. For field meters that are not assigned to individuals and are available for general use, the SWQP designated sampler is responsible for maintenance and repair. The SWQP designated sampler is also responsible for ordering parts or service for all SWQP field equipment. The SWQP designated sampler is identified in the SWQ/FPP QAPP.
6. All SWQP field equipment will be examined for maintenance/repair recommendations and checked for proper operation by the SWQP designated sampler; this information is recorded in the calibration logbook. Any necessary maintenance will be performed immediately to assure instrumentation is in operating condition prior to the next use.

## 7.0 LABORATORY ANALYTICAL METHODS

Per Surface Water Quality Standards, tests or analytical procedures to determine conformity with surface water quality standards will be made in accordance with methods approved in 40 CFR Part 136. It is the responsibility of the project officer to specify and ensure that the laboratory uses approved analytical methods listed in 40 CFR Part 136 for all SWQP water quality samples.

## 8.0 SAMPLE CONTAINERS, PRESERVATION AND HOLDING TIMES

Appropriate sample containers, preservation techniques, and holding times for water quality samples are listed in 40 CFR Part 136. It is the responsibility of the project officer to ensure that the appropriate sample containers and preservation techniques are used during sample collection. It is the responsibility of the laboratory manager to ensure that the water quality sample is analyzed within the appropriate holding time. However, the project officer should verify that the holding time was met as a part of standard quality control practices (see SWQ/FPP QAPP).

In addition to sample container, preservation, and holding time information, 40 CFR Part 136 places additional requirements on some tests in the form of footnotes. These footnotes are important and are a required step in achieving meaningful results.

Figure 3 displays common test parameter suites used by the SWQP and FPP, and the appropriate container type, preservation requirement, and maximum holding time for the parameter with the shortest holding time in that bottle. For individual parameter holding times, refer to 40 CFR 146. As appropriate, footnotes are included and their action described at the bottom of the table.

## Figure 3. Sample Parameter Suites and Information

| Bottle | | Size & Material | Preservative | Parameters | Holding Time[4] |
|---|---|---|---|---|---|
| A | DOH | 1000 mL HDPE | Cool to 6°C | Alkalinity, total solids, TSS, volatile solids, TDS, BOD, CBOD, $CO_3$,Hardness, K, lab pH, lab conductivity, nitrate, chloride, fluoride, $HCO_3$, $SO_4$ | 48 hours |
| | Midco | 1000 mL polypropylene | | | |
| B | DOH | 1000 mL HDPE | 2 mL $H_2SO_4$ pH <2 Cool to 6°C | Ammonia, Nitrite+Nitrate, TKN, Total P, COD | 28 days |
| | Midco | 500 mL polypropylene | | | |
| C | DOH | 100 mL sterilized polystyrene | $Na_2SO_3$ if chlorinated Cool to 6°C | Fecal coliform, *E coli*, total coliform, enterococci, fecal PFG | 6 hours[1] |
| | Midco | 100 mL sterilized polystyrene | | | |
| D | DOH | 100 mL polystyrene | Field filter 0.25 mL $H_2SO_4$ pH <2 Cool to 6°C | Dissolved P, dissolved inorganic nitrogen | 28 days |
| | Midco | 250 mL polypropylene | | | |
| Metals – Dissolved | DOH | 100 mL polystyrene | Field filter 0.25 mL $HNO_3$ pH <2 Cool to 6°C | Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Cu, Hg, Pb, Mg, Mn, Ni, Se, Ag, Na, Ti, U, Vn, Zn, Fe, Mo, fluoride, K, Cl, silica | 28 days |
| | Midco | 250 mL polypropylene | | | |
| Metals – Total Recov | DOH | 100 mL polystyrene | 0.25 mL $HNO_3$ pH <2 Cool to 6°C | Al, Sb, As, Ba, Be, B, Cd, Ca, Cr, Cu, Hg, Pb, Mg, Mn, Ni, Se, Ag, Na, Ti, U, Vn, Zn, Fe, Mo | 28 days |
| | Midco | 250 mL polypropylene | | | |
| Oil & Grease | all | 1000 mL amber glass | 2 mL HCl pH <2 Cool to 6°C | Oil & Grease | 28 days |
| R | all | 1 gal cubitainer polypropylene | Cool to 6°C | Radium-226, radium-228 | 6 months |
| CN | DOH | 250 mL polypropylene | NaOH pH>10 Cool to 6°C | Total cyanide, WAD cyanide *Mitigate interferences as described in 40 CFR136 | 48 hours[2] |
| | Midco | 150 mL brown polypropylene | | | |
| H | all | 1000 mL amber glass | Cool to 6°C | TPH – diesel, caffeine | 14 days[3] |
| V | DOH | 40 mL amber glass vial | Cool to 6°C | VOC, TOC, DOC, TPH -gasoline | 14 days[3] |
| | Midco | 250 mL amber glass | | | |

**If you need to sample for an analyte that is not on this list – contact the laboratory for bottle, preservation, and holding time information.**

[1]The holding time for bottle C parameters is 6 hours for compliance samples. Noncompliance samples must be analyzed within 24 hours of collection. [2]The maximum holding time for total and WAD cyanide is 14 days as long as all interferences have been mitigated as described in 40 CFR 136. If interferences are unknown the maximum holding time is 6 hours. 40 CFR 136 may be viewed at http://www.ecfr.gov. [3]The holding time for bottles H and V is 14 days from the time of collection to laboratory extraction. [4]Maximum holding time is based on the analyte with the shortest hold time.

## 9.0 DECONTAMINATION OF SAMPLE CONTAINERS AND SAMPLING EQUIPMENT

The laboratory will provide new, clean containers or decontaminate previously used sample containers. Sample container decontamination by the laboratory involves detergent washing, rinsing with dilute chromic acid and final rinsing with laboratory-grade distilled water. Decontamination of sampling equipment (probes and instruments) will be accomplished through the use of distilled water by field personnel.

Field personnel do not need to triple rinse clean bottles supplied by the laboratory. However when a field sampler uses a field bottle to collect a sample then transports it to another container, the field bottle must be triple rinsed with the water being sampled prior to filling.

## 10.0 PROCEDURES FOR SURFACE WATER SAMPLING

### A. Field Observations

Comments and observations regarding the weather and sampling site information must be recorded. It is important to record all field observations of conditions at the sampling sites that could influence the water quality of the collected sample. These observations are recorded on pre-printed project sheets or a field log book. Examples of observations recorded under COMMENTS could include: "cloudy, heavy recent rainfall, windy, cattle grazing near sampling site, dense emergent aquatic vegetation present at sampling site, etc."

In addition to comments, specific observations should be recorded on the field data sheets as follows:

| | |
|---|---|
| Flow | Record in cubic feet per second (CFS) |
| Air Temperature | Record in degrees Celsius |
| Specific Conductance | Record in umho/cm |
| Dissolved Oxygen | Record in milligrams per Liter (mg/L) |
| Field pH | Record in standard units (su) |
| Water Temperature | Record in degrees Celsius |
| Secchi | Record in meters |

### B. Field Analyses

Calibrate all instruments prior to field use as described in Section 4.0. Record all field analysis data on pre-printed project sheets or field log notebook.

1. pH, DO, and specific conductance
   a. If water is static, provide stirring by gently and continuously agitating the probe.
   b. Allow sufficient time for the probe to stabilize.
   c. Record data in the field log book or on the pre-printed project sheet.

2. Temperature
   a. Air Temperature
      i. Always collect air temperature readings out of direct sunlight (record in °C).

   b. Water Temperature
      i. Water temperature may be measured using a bimetal thermometer or field meter. Do not use a mercury thermometer for field measurements due to the risk of breaking the thermometer and releasing mercury into the environment.
      ii. Place the thermometer into the stream and provide stirring or gentle agitation.
      iii. If you are unable to collect temperature directly from the waterbody, collect water in a field bottle and measure temperature as soon as possible.
      iv. Allow sufficient time for the thermometer to stabilize.
      v. Read the temperature (record in °C).

3. Total Depth and Width
   a. Record total depth at the maximum cross sectional depth (record in feet).
   b. Record width as an average distance between banks (record in feet).

4. Secchi Depth
   a. Lower the Secchi disk with calibrated rope into the waterbody from the shaded side of the boat.
   b. Drop the Secchi down until it is no longer visible.
   c. Bring the Secchi up until you can just barely make out the cross pattern.
   d. Record the depth of the Secchi Disk in meters.

Repeat the above procedure and average the two readings for the final Secchi depth reading.

5. Flow (SonTek)
   a. Calibrate and operate the meter using methods found in Section 4.0 of this manual.
   b. Record the stream discharge in cubic feet per second.

## C. Sample Collection

The types of samples collected during sampling activities depend on the parameters that are necessary for the project. Sample parameters must be determined prior to conducting sampling activities. This will ensure that samples are adequately collected, handled, preserved, and that the sampling will address the project objectives. Figure 3 displays the parameter groupings, preservation requirements, and bottle type and size information used by the SWQP and FPP. Figures 5 and 6 are depictions of bottle information and preservation requirements. Figure 4 is a depiction of the disposable filters used to field filter water samples.

In the event a sample needs to be collected and the necessary information is not contained in Figure 3, refer to 40 CFR 136 or other appropriate chapter for approved methods and information.

When collecting a water sample from a river, stream, lake, or wetland, follow these basic principles:

1. Use the appropriate sample bottle as directed in Figure 3. Affix a waterproof label that contains the station identification, sample date, and bottle identification.
2. If sampling a wadeable waterbody, wade into the waterbody to collect the sample. It is only acceptable to use a bucket from a bridge to collect a sample if it is unsafe to wade into the waterbody. Do not endanger yourself by wading into a waterbody with unsafe conditions (ice jams, high flows, etc.). Wade into the thalweg or deepest part of the channel to collect the sample.
3. If sampling a non-wadeable waterbody, access the waterbody by boat, boat dock, or by wading along the shore if possible.
4. Face upstream or into the flow when collecting a sample. Remove the bottle lid and submerge the bottle beneath the surface of the water taking care not to disturb the bottom sediment. It is imperative that surface debris or bottom sediment do not enter the bottle. After filling

the bottle, secure the bottle lid. Preserve according to Figure 3 and place in a cooler of loose ice (even during winter months).

5. If the bottle is pre-preserved, do not overfill the bottle or rinse the bottle prior to filling.

6. If using a field bottle to collect a sample that will be field filtered (dissolved phosphorus or dissolved metals), make sure you triple rinse the field bottle with water from the waterbody being sampled before filling the bottle.

7. For samples that require field filtering, use 45 micron disposable filters. See Figure 4 below. Attach the tube from the hand vacuum pump to the vacuum port on the disposable filter. Remove the filter lid to the filter apparatus and pour an appropriate amount of water into the top of the filter apparatus. Pump the hand vacuum to create negative pressure in the filter apparatus. This will result in water being vacuumed through the 45 micron filter into the receiving bottle. Field filtering must be done on site within 15 minutes of sample collection.

8. Preserve the sample as directed in Figure 3 immediately after sample collection and chemical preservation. If you are unfamiliar with the buffer capacity of the water being sampled (feedlot waste, point source discharges, mining wastewater, etc., may be highly buffered), make sure you verify the pH with pH paper to make sure enough preservative has been added. Place all samples in a cooler with loose ice immediately.


Figure 4. Disposable Filter Apparatus

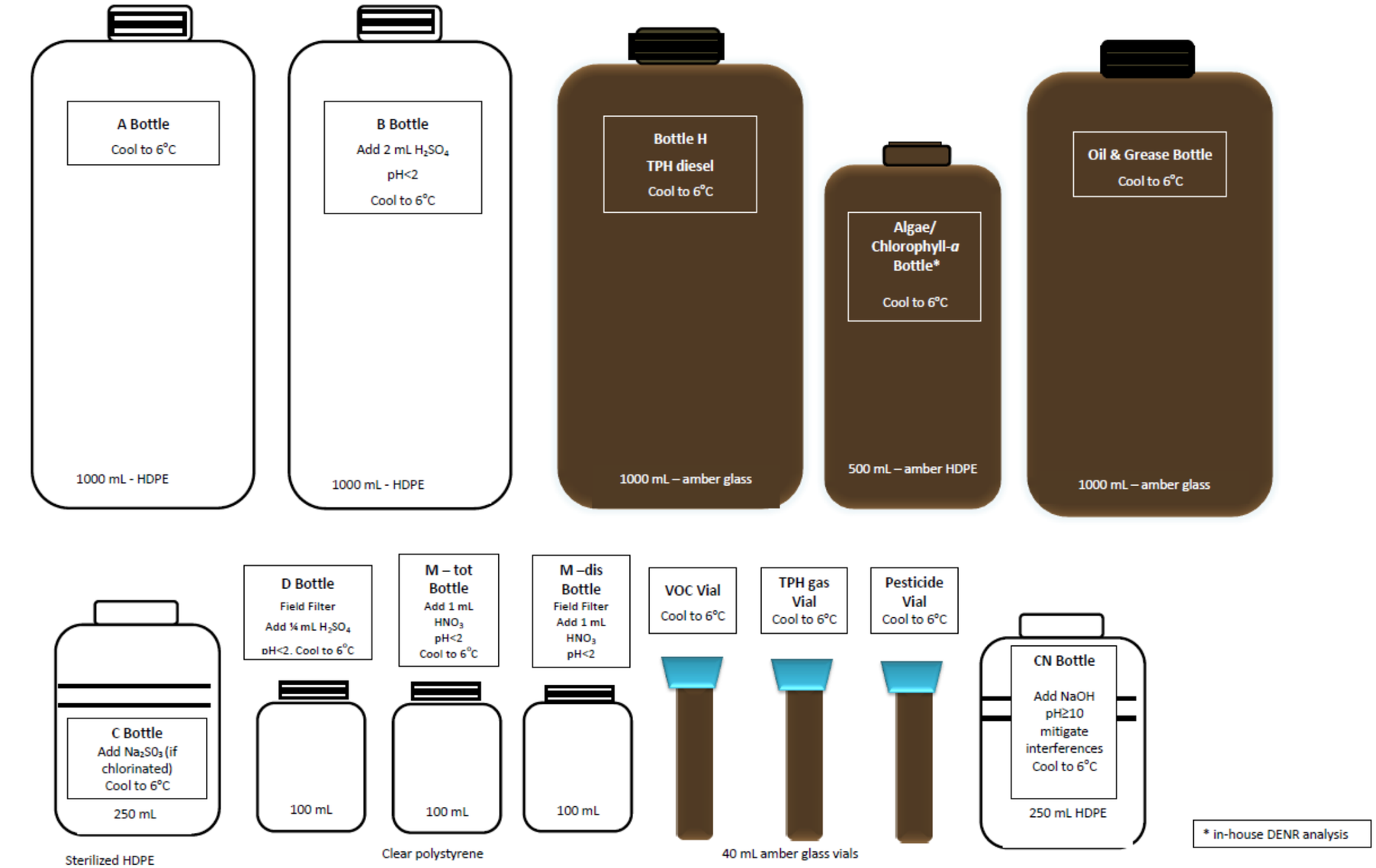



Figure 5. Sample Bottles for DOH laboratory.

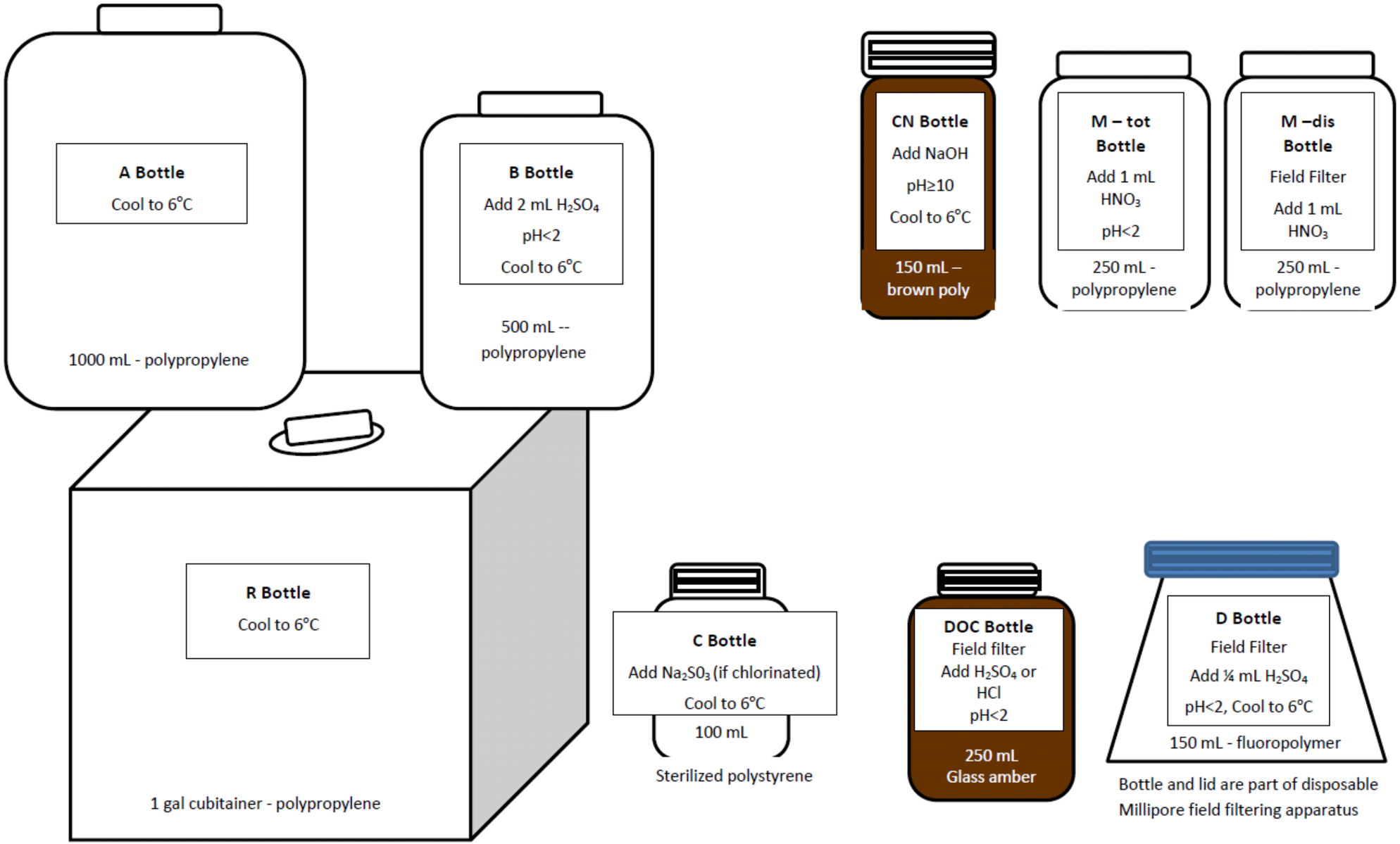



Figure 6. Sample Bottles for Midcontinent laboratory

## 1. Grab Sampling

### Collecting a Sample

Be careful not to contaminate the inside of the lid or mouth of the bottle with your fingers or introduce other sources of contamination.

**a. The "A" bottle –one liter bottle**

i. Position the open end of the bottle towards the current flow and away from the hand of the collector.

ii. Grasp the bottle securely at the base with one hand and plunge the bottle down into the water to avoid introducing surface scum. The sampling depth should be 6 inches to 1 foot below the water surface, if possible.

iii. Tip the bottle slightly upward to allow air to escape and the bottle to fill.

iv. The "A" sample bottle should be filled to the neck of the bottle and capped immediately.

v. Place sample container in a cooler on loose ice (6°C), no preservative is required for bottle “A.”

vi. Mail or deliver the “A” bottle to the laboratory.

**b. The "B" bottle –one liter bottle**

Follow collection procedures for filling bottle “A” to fill bottle "B." Preserve the sample using the following procedure below.

i. After the sample has been collected, **preserve this sample with 2 mL of concentrated sulfuric acid ($H_2SO_4$)** to lower the pH of the sample below 2 standard units. As necessary, use pH paper to verify the pH has been lowered to <2.

ii. After $H_2SO_4$ has been added, the sample bottle is inverted several times to ensure mixing of the preservative throughout the sample.

iii. Place sample container in a cooler on loose ice (6°C) for shipment or delivery to the laboratory.

**c. The “C” bottle -250 mL or 100 mL bacteriological sample**

The 250 mL bottle is used when the sample requires more than one bacteriological analysis. If the sample only requires one bacteriological analysis, the 100 mL bottle may be used.

i. The "C" bottle **should not be rinsed** with sampling site water.

ii. Position the open end of the bottle towards the current flow and away from the hand of the collector.

iii. Grasp the bottle securely at the base with one hand and plunge the bottle down into the water to avoid introducing surface scum.

iv. The sampling depth should be 6 inches to 1 foot below the water surface if possible. If it is not possible, the sample depth may be less, but the sampler should avoid surface debris and bottom sediment.

v. Tip the bottle slightly upward to allow air to escape and the bottle to fill. On the initial plunge, the "C" sample bottle should be filled completely. Immediately after obtaining the sample, pour off any excess sample water from the container until the sample volume is 250 mL or 100 mL and cap.

vi. If the sample bottle is not filled at least to the designated mark on the sampling bottle, discard the sample and sample bottle and repeat the process with a new "C" bottle. DO NOT **re-immerse the original bottle to add more sample volume**.

vii. Place sample container in a cooler on ice (6° C); **no preservative is required for bottle "C."**

viii. For compliance samples, bacteriological samples need to arrive at the laboratory within 6 hours after collection and processed within 2 hours. For all other types of samples the holding time is increased to 24 hours.

**d. The "CN" bottle – 250 mL or 150 mL**

i. Fill the bottle as directed for the "A" bottle.

ii. To preserve, add 1 to 3 pellets of sodium hydroxide (NaOH). Swirl the bottle until the pellets have dissolved.

iii. Using pH paper, verify the pH is greater than 10 but less than 12. If the pH is less than 10, add more pellets. If the pH is greater than 12, discard the sample and collect a new sample.

iv. Cap the bottle and place in a cooler with loose ice.

v. Mail or deliver the "CN" bottle to the laboratory.

**e. The "H" bottle – amber glass liter**

i. Fill the bottle as directed for the "A" bottle.

ii. The "H" bottle does not require any preservative.

iii. Cap the bottle and place in a cooler on loose ice.

iv. Mail or deliver the "H" bottle to the laboratory.

v. If being used for caffeine sampling, the sampler must abstain from all forms of caffeine for 24 hours prior to

sampling. Ensure your hands are clean and make sure you do not contaminate the inside of the bottle or lid.

f. The "Oil and Grease" bottle – amber glass liter

i. Fill the bottle as directed for the "A" bottle.
ii. Preserve the bottle by adding 2 mL of 50% hydrochloric acid (HCl). Using pH paper, verify the resulting pH is less than 2.
iii. Place the acidified "Oil and Grease" bottle into a cooler on loose ice.
iv. Mail or deliver the "Oil and Grease" bottle to the laboratory.

g. The "V" or "pesticide" bottle – 40 mL amber glass vial or 250 mL amber glass

The 'V" bottle is a 40 mL amber glass vial. It comes from the laboratory pre-preserved with ascorbic acid and hydrochloric acid. Do not rinse the vial. Do not use a marker to write on the vial – use a pencil or preprinted labels and allow the ink to fully cure before opening the vial (due to risk of VOC contamination from marker). Do not allow contamination (even airborne) from organic compounds such as vehicle exhaust or cleaning compounds. Do not allow the bottle cap, bottle threads, or inside of bottle to be touched or contaminated. For VOC analysis, the laboratory will also send 2 trip blanks. Do not open these trip blanks. They must accompany the vials at all times, including return to the laboratory. For pesticide analysis, trip blanks will not be included.

i. Open the vial and completely submerge to fill. Underwater, tip the vial vertically so that it will completely fill and create a convex meniscus.
ii. Gently tap the vial to dislodge any air bubbles.
iii. Cap the vial and invert to mix preservative and visually verify there are no air bubbles.
iv. The glass vials can easily break. Pack the vials in the packing material supplied by the laboratory or wrap each vial in bubble wrap. Securely place the vials in a cooler of loose ice and ship or deliver the vials to the laboratory.

h. The "R" bottle – 1 gal cubitainer

The cubitainer must be expanded before filling. Do not blow into or place fingers inside the cubitainer. To expand,

partially unscrew the lid to allow air to enter the cubitainer and gently pull at the seams.

i. Fill the cubitainer as directed for the "A" bottle.
ii. If you are unable to submerge the cubitainer without disturbing bottom sediment, use the "field" bottle to collect the sample and pour the water into the cubitainer.
iii. The "R" bottle is the only sample bottle that will be filtered and preserved by the laboratory. This is due to the large volume of filtered water that is required and the general difficulty in filtering that amount of water from "R" bottle sites.
iv. Cap the "R" bottle and place in a cooler on loose ice.
v. Mail or deliver the "R" bottle to the laboratory.

**i. The "Metals-Tot Recov bottle" – 100 mL or 250 mL**

i. Fill the bottle as directed for the "A" bottle.
ii. Preserve the bottle by adding 0.25 to 1 mL of concentrated Nitric Acid ($HNO_3$) based on bottle size. As needed, use pH paper to verify the resulting pH is less than 2.
iii. Place the acidified "Metals-Tot Recov" bottle into a cooler on loose ice.
iv. Mail or deliver the bottle to the laboratory.

**j. Collection of the "field bottle" - one liter bottle**

If collecting dissolved phosphorus and/or dissolved metals water to be filtered, the sample can be collected in a one-liter polypropylene "field" bottle. Thoroughly triple rinse the field bottle with water from the waterbody being sampled then follow steps 1(a)(i)-(iv).

**k. The "D" bottle -100 mL plastic bottle**

Water to be filtered for this sample comes from the field bottle. Procedure for field filtration and preservation of the total dissolved phosphorus sample are described below.

i. Assemble the disposable filters by attaching the filter unit to the receiving bottle. Attach the hand pump hose to the vacuum port.
ii. Pour approximately 120-150 mL of water from the field bottle into the filter unit and cap with the filter lid.
iii. Use the hand pump to create a vacuum in the filter unit. This will cause water to be filtered through the 45

micron filter and accumulate in the lower receiving bottle.

iv. After 100 mL has been filtered, unscrew the receiving bottle. This water may be transferred to the 100 mL "D" bottle (if going to the DOH lab) or it may remain in the receiving bottle (if going to Energy).

v. Add 0.25 mL of concentrated $H_2SO_4$. As needed, verify the pH with pH paper to ensure the pH is <2.

vi. Place the acidified bottle into a cooler on loose ice.

vii. Mail or deliver the bottle to the laboratory.

l. **The "Metals- Dissolved" bottle -100 mL or 250 mL plastic bottle**

Follow collection procedures for filtering and filling bottle "D" to fill bottle "F." Preserve the sample using the following procedure below.

i. 0.25 mL of concentrated Nitric Acid ($HNO_3$). As needed, use pH paper to verify the resulting pH is less than 2.

ii. Place the acidified "Metals-Dissolved" bottle into a cooler on loose ice. Mail or deliver the bottle to the laboratory.

m. **"Caffeine" bottle – 1000 mL amber glass with Teflon lid**

Caffeine sampling is conducted to provide information which may correlate contamination with human waste from septic leachate. **NOTE: Sampler must abstain from ingesting caffeine for 24 hours prior to sampling to minimize contamination due to low caffeine detection limits.**

i. Fill the bottle as directed for the "A" bottle taking care not to touch the inside of the lid, the threads of the bottle, or the inside of the bottle.

ii. If residual chlorine is present, add 80 mg of sodium thiosulfate per liter of water collected.

iii. Cap the sample and store in a cooler on loose ice.

iv. If the sample cannot be analyzed by the laboratory within 48 hours, freeze the sample to increase holding time to 7 days.

v. Mail or deliver the bottle to the laboratory.

n. **"Algae/Chlorophyll *a*" bottle – 500 mL amber plastic**

Algae or chlorophyll *a* are samples that may be collected during a complaint or fish kill to provide information on the

water quality. These samples may be analyzed internally or contracted with an outside laboratory.

i. Fill the bottle as directed for the "A" bottle.
ii. Cap the sample and store in a cooler on loose ice.
iii. Ship or deliver the sample to the laboratory or SDDENR personnel.

## 2. Composite Sampling

### Collecting a Sample

The sampling plan or project manager will determine which samples are to be composite samples. Unless specified, most samples will be grab samples.

a. Triple rinse a plastic graduated cylinder with sample site water.
b. Collect a sample in a rinsed Van Dorn sampler or other sampling device.
c. Calculate the amount of water needed from each sub-sample. Divide the size of your container (milliliters), by the number of sampling sites to be composited.

   Example: Compositing three sites and placing them in the "A" bottle (1,000 mL).

   **1000 mL/ 3 = 333 mL**

d. Pour the previously calculated amount (i.e. 333 mL) from one sub-sample into the graduated cylinder.
e. Pour the water from the graduated cylinder into each sample bottle.
f. Repeat procedures "a" through "e" on the remaining sub-sample sites.
g. Preserve each bottle following the procedures from the Grab sampling section.

## 11.0 PROCEDURES FOR LAKE SEDIMENT SAMPLING

Lake sediment is sampled and analyzed to provide information and test for contaminants that may affect the benthic community and water quality. When selecting sediment sampling sites, consider known flow patterns through the lake, locations of tributary inputs, and any other sources that may affect the content and distribution of the sediment contaminants.

### A. Sampling Equipment

1. Boat or Ice Auger and Chipping Bar
   a. Life jackets (use in boat or on ice)
   b. Other required safety equipment
   c. Waders may be necessary
2. Ponar-Petite sediment sampler with rope (see Figure 7)
3. One (1) 1000 mL glass jar (with Teflon-lined lids) and one (1) 250 mL polypropylene wide-mouth bottle per sampling site
4. One (1) 5 gallon bucket with stainless steel filter screen mesh on bottom
5. One (1) 5 gallon bucket
6. Stainless steel 2 gallon bucket and stainless steel scoop
7. 5 gallon jug waste container with lid
8. 10% nitric acid solution
9. 10% acetone solution

### B. Equipment Decontamination Procedure

1. The sampling equipment must be thoroughly cleaned between sample sites. If composite samples are collected, the equipment must be thoroughly cleaned between sampling groups (sets of composites).
2. Rinse the equipment with lake water, removing all sediment and debris.
3. Rinse the equipment with a 10% nitric acid solution. Collect the waste solution and pour into the 5 gallon jug waste container.
4. Rinse the equipment with lake water. Collect the lake water rinsate and pour into the 5 gallon jug waste container.
5. Rinse the equipment with 10% acetone solution. Collect the waste solution and pour into the 5 gallon jug waste container.
6. Rinse the equipment with lake water. Collect the lake water rinsate and pour into the 5 gallon jug waste container.

### C. Sampling Site Procedures

#### 1. Grab Sampling

a. Measure the in-lake depth with a depth finder, Secchi disk, or weight, and record the measurement in the field notebook or project sheet.
b. Label one (1) wide-mouth glass jar and one (1) polypropylene bottle (sediment samples) with the station identification and date.
c. Collect sediment samples with the Ponar-petite dredge sampler. Set the pinch-pin tripping mechanism on the dredge. Slowly lower the dredge through the water column. When you near the bottom, let the dredge drop. Upon impact with the bottom, the jaws will clamp shut and grab a sediment sample. Slowly lift the dredge to the surface of the water. Tilt slightly to pour off excess water.
d. Place the sediment into the pre-cleaned 5 gallon bucket (with mesh bottom). Excess water should drain through the mesh.
e. Mix the sediment in the pre-cleaned bucket with the stainless steel scoop to homogenize the sample and drain excess water.
f. Completely fill one (1) 1000 mL wide-mouth glass jar and one (1) 250 mL polypropylene bottle with sediment per sampling site. Make sure that containers are completely filled with sediment and that air bubbles are not trapped in the container. Carefully rinse the glass jar threads and the cap with sample water to clean the threads for a better seal. Securely cap with a Teflon-lined lid.
g. Place sediment samples into the sampling cooler on loose ice.

2. Composite Sediment Sampling

Composite sediment sampling is similar to grab sampling except sediment samples are collected at multiple locations in the lake and composited.

a. Label one (1) 1000 mL wide-mouth glass jar and one (1) 250 mL polypropylene bottle (sediment samples) with the station identification (for all composited sites) and the date.
b. At each sub-sampling site, measure in-lake depth with a depth finder, Secchi disk, or weight, and record each depth measurement in the field book or project sheet.
c. Collect a sediment sub-sample with a Ponar-petite as described above in C.1.c. Place the sediment collected from sampler grabs into the pre-cleaned 5 gallon bucket (with the mesh bottom).
d. With the stainless steel scoop, place approximately 3 large scoops of sediment in the stainless steel bucket.

e. Repeat procedures ‘a’ through ‘d’ at the remaining sub-sampling sites.
f. Mix the sediment composite sample in the stainless steel bucket with the stainless steel scoop to homogenize the sample.
g. Completely fill one (1) 1000 mL wide-mouth glass jar and one (1) 250 mL polypropylene bottle with sediment per sampling site. Make sure that the container is completely filled with sediment and that air bubbles are not trapped in the container. Carefully rinse the glass jar threads and the cap with sample water to clean the threads for a better seal. Securely cap with a Teflon-lined lid.
h. Place sediment samples into the sampling cooler on loose ice.

Figure 7. Ponar petite.

## 12.0 REFERENCES

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South Dakota Department of Environment and Natural Resources. 2016. Surface Water Quality Program and Feedlot Permit Program Quality Assurance Project Plan.

# APPENDIX D

## WATER QUALITY RESULTS BY SITE

Table D-1. Water Quality Results at the Annie Creek at USGS Site From January 14, 2015, Through August 6, 2021

| Sample Name | Date Sampled | Cond, Field (µmhos/cm) | ORP, Field (mV) | DO, Field (mg/L) | pH, Field (SU) | Temp, Field (°C) | Flow, Field (gpm) | Sodium – D (mg/L) | Mercury – T (mg/L) | Arsenic – T (mg/L) | Gold - T (mg/L) | Selenium – T (mg/L) | Bicarbonate (mg/L) | CN, Total (mg/L) | CN, WAD (mg/L) | Fluoride (mg/L) | N, Ammonia (mg/L) | N, Nitrate (mg/L) | N, Nitrite (mg/L) | Sulfate (mg/L) | Conductivity (µmhos/cm) | pH (SU) | TDS (mg/L) | TSS (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| A.C. @USGS | 1/14/15 | 410 | 36 | 11.1 | 8.62 | 0.1 | 220 | 10 | <0.0002 | 0.012 | 0.006 | <0.005 | 234 | 0.012 | <0.010 | 0.238 | <0.050 | 6.86 | <0.050 | 33.6 | 484 | 8.33 | 284 | <10.0 |
| A.C. @USGS | 4/30/15 | 280 | 56 | 10.6 | 8.67 | 6 | 630 | 4.9 | <0.0002 | 0.008 | 0.002 | <0.005 | 136 | <0.010 | <0.010 | 0.14 | <0.050 | 1.09 | <0.050 | <10.0 | 258 | 8.35 | 155 | <10.0 |
| A.C. @USGS | 5/20/15 | 230 | 127 | 11 | 8.38 | 4.3 | 5170 | 4.6 | <0.0002 | 0.013 | <0.001 | <0.005 | 99.3 | <0.010 | <0.010 | 0.125 | <0.050 | 1.82 | <0.050 | 16.6 | 224 | 8.16 | 122 | <10.0 |
| A.C. @USGS | 8/12/15 | 480 | 189 | 8.8 | 8.66 | 12.3 | | 9.41 | <0.0002 | 0.017 | 0.003 | <0.005 | 234 | <0.010 | <0.010 | 0.209 | <0.050 | 4.65 | <0.050 | 25.1 | 454 | 8.39 | 268 | 26 |
| A.C. @USGS | 1/15/16 | 570 | -13 | 10.3 | 8.68 | 3.3 | 4.06 | 11.5 | <0.0002 | 0.015 | 0.005 | <0.005 | 245 | 0.01 | <0.010 | 0.244 | <0.050 | 7.36 | <0.050 | 38.1 | 514 | 8.32 | 285 | <10.0 |
| A.C. @USGS | 4/8/16 | 260 | 182 | 10.1 | 8.72 | 6.4 | 4.3 | 5.29 | <0.0002 | 0.007 | 0.002 | <0.005 | 106 | <0.010 | <0.010 | 0.125 | <0.050 | 1.67 | <0.050 | <10.0 | 244 | 8 | 132 | <10.0 |
| A.C. @USGS | 5/11/16 | 280 | 71 | 13.9 | 8.52 | 8.2 | 4.3 | 5.34 | <0.0002 | 0.007 | 0.001 | <0.005 | 118 | <0.010 | <0.010 | 0.136 | <0.050 | 1.57 | <0.050 | <10.0 | 238 | 8.08 | 143 | <10.0 |
| A.C. @USGS | 8/14/16 | 460 | 140 | 12.1 | 8.77 | 17 | 4 | 8.57 | <0.0002 | 0.017 | 0.01 | <0.005 | 210 | <0.010 | <0.010 | 0.273 | <0.050 | 5.97 | <0.050 | 25.1 | 452 | 8.63 | 259 | <10.0 |
| A.C. @USGS | 1/31/17 | 450 | 164 | 14.5 | 8.56 | 0.8 | NR | 6.58 | <0.0002 | 0.017 | 0.011 | <0.005 | 234 | <0.010 | <0.010 | 0.282 | <0.050 | 5.65 | <0.050 | 20.3 | 441 | 8.2 | 257 | <10.0 |
| A.C. @USGS | 4/7/17 | 350 | 127 | 13.98 | 8.89 | 8.1 | 4.04 | 5.44 | <0.0002 | 0.013 | 0.007 | <0.005 | 167 | <0.010 | <0.010 | 0.216 | <0.050 | 2.62 | <0.050 | 12 | 340 | 8.44 | 196 | <10.0 |
| A.C. @USGS | 5/21/17 | 280 | 83 | 10.04 | 8.62 | 8.6 | 564.14 | 5.07 | <0.0002 | 0.01 | 0.002 | <0.005 | 135 | <0.010 | <0.010 | 0.146 | <0.050 | 1.69 | <0.050 | <10.0 | 278 | 8.22 | 155 | 11 |
| A.C. @USGS | 8/11/17 | 450 | 127 | 9.69 | 8.74 | 13 | 83.48 | 6.01 | <0.0002 | 0.014 | 0.008 | <0.005 | 207 | <0.010 | <0.010 | 0.273 | <0.050 | 5.6 | <0.050 | 20.3 | 426 | 8.59 | 208 | <10.0 |
| A.C. @USGS | 1/20/18 | 500 | 144 | 11.58 | 8.38 | 1.1 | 3.9 | 8 | <0.0002 | 0.018 | 0.009 | <0.005 | 250 | <0.010 | <0.010 | 0.27 | <0.050 | 7.28 | <0.050 | 29.7 | 500 | 8.19 | 239 | <10.0 |
| A.C. @USGS | 4/8/18 | 400 | 31 | 11.15 | 8.5 | 3 | 4.04 | 6.19 | <0.0002 | 0.016 | 0.007 | <0.005 | 211 | <0.010 | <0.010 | 0.232 | <0.050 | 4.49 | <0.050 | 16.8 | 410 | 8.28 | 229 | <10.0 |
| A.C. @USGS | 5/5/18 | 180 | 148 | 10.45 | 7.66 | 9.7 | 1157.9 | 4.13 | <0.0002 | 0.01 | 0.002 | <0.005 | 71.5 | <0.010 | <0.010 | 0.135 | <0.050 | 0.863 | <0.050 | <10.0 | 186 | 7.89 | 121 | <10.0 |
| A.C. @USGS | 8/23/18 | 390 | 102 | 8.65 | 8.24 | 12.5 | 446.56 | 9.29 | <0.0002 | 0.012 | 0.004 | <0.005 | 171 | <0.010 | <0.010 | 0.21 | <0.050 | 3.35 | <0.050 | 18.9 | 368 | 8.4 | 217 | 12 |
| A.C. @USGS | 1/8/19 | 450 | 163 | 11.87 | 8.17 | 0.3 | 200 | 6.54 | <0.0002 | 0.016 | 0.01 | <0.005 | 227 | <0.010 | <0.010 | 0.278 | <0.050 | 6.28 | <0.050 | 22 | 454 | 8.3 | 252 | <10.0 |
| A.C. @USGS | 4/25/19 | 190 | 162 | 10.13 | 8.22 | 5 | 5170 | 4.24 | <0.0002 | 0.014 | <0.001 | <0.005 | 78.5 | <0.010 | <0.010 | 0.135 | <0.050 | 1.14 | <0.050 | 10.7 | 193 | 7.92 | 103 | 17 |
| A.C. @USGS | 5/23/19 | 240 | 145 | 8.82 | 8.43 | 3.9 | 4000 | 4.2 | <0.0002 | 0.012 | <0.001 | <0.005 | 113 | <0.010 | <0.010 | 0.155 | <0.050 | 1.21 | <0.050 | 13 | 240 | 8.13 | 132 | <10.0 |
| A.C. @USGS | 8/9/19 | 410 | 142 | 8.38 | 8.71 | 14.6 | 420.08 | 7 | <0.0002 | 0.015 | 0.004 | <0.005 | 196 | <0.010 | <0.010 | 0.223 | <0.050 | 3.75 | <0.050 | 21.4 | 414 | 8.49 | 224 | 10 |
| A.C. @USGS | 1/10/20 | 440 | 171 | 12.24 | 8.12 | 0.4 | NR | 7.71 | <0.0002 | 0.013 | 0.007 | <0.005 | 226 | 0.011 | <0.010 | 0.268 | <0.050 | 5.82 | <0.050 | 26.5 | 460 | 8.15 | 236 | |
| A.C. @USGS | 4/28/20 | 190 | 219 | 9.75 | 7.49 | 6 | 7934 | 3.52 | <0.0002 | 0.018 | <0.001 | <0.005 | 84.6 | <0.010 | <0.010 | 0.122 | <0.050 | 0.682 | <0.050 | <10.0 | 175 | 7.77 | 113 | 37 |
| A.C. @USGS | 5/15/20 | 210 | 173 | 10.26 | 7.93 | 6.4 | 2261 | 3.64 | <0.0002 | 0.009 | <0.001 | <0.005 | 114 | <0.010 | <0.010 | 0.13 | <0.050 | 0.889 | <0.050 | <10.0 | 224 | 8.12 | 119 | <10.0 |
| A.C. @USGS | 8/7/20 | 410 | 140 | 7.54 | 8.32 | 19.8 | 301.14 | 5.59 | <0.0002 | 0.015 | 0.005 | <0.005 | 210 | <0.010 | <0.010 | 0.242 | <0.050 | 3.6 | <0.050 | 18.3 | 420 | 8.36 | 182 | 10 |
| A.C. @USGS | 1/10/20 | 440 | 171 | 12.24 | 8.12 | 0.4 | NR | 7.71 | <0.0002 | 0.013 | 0.007 | <0.005 | 226 | 0.011 | <0.010 | 0.268 | <0.050 | 5.82 | <0.050 | 26.5 | 460 | 8.15 | 236 | |
| A.C. @USGS | 4/28/20 | 190 | 219 | 9.75 | 7.49 | 6 | 7934 | 3.52 | <0.0002 | 0.018 | <0.001 | <0.005 | 84.6 | <0.010 | <0.010 | 0.122 | <0.050 | 0.682 | <0.050 | <10.0 | 175 | 7.77 | 113 | 37 |
| A.C. @USGS | 5/15/20 | 210 | 173 | 10.26 | 7.93 | 6.4 | 2261 | 3.64 | <0.0002 | 0.009 | <0.001 | <0.005 | 114 | <0.010 | <0.010 | 0.13 | <0.050 | 0.889 | <0.050 | <10.0 | 224 | 8.12 | 119 | <10.0 |
| A.C. @USGS | 8/7/20 | 410 | 140 | 7.54 | 8.32 | 19.8 | 301.14 | 5.59 | <0.0002 | 0.015 | 0.005 | <0.005 | 210 | <0.010 | <0.010 | 0.242 | <0.050 | 3.6 | <0.050 | 18.3 | 420 | 8.36 | 182 | 10 |
| A.C. @USGS | 1/6/21 | 490 | 224 | 10.78 | 8.47 | 2.4 | frozen | 6.74 | <0.0002 | 0.014 | 0.008 | <0.005 | 250 | <0.010 | <0.010 | 0.259 | <0.050 | 6.45 | <0.050 | 25.1 | 470 | 8.28 | 180 | <10.0 |
| A.C. @USGS | 4/9/21 | 350 | 224 | 10.82 | 8.34 | 2.7 | 564.14 | 5.35 | <0.0002 | 0.013 | 0.003 | <0.005 | 149 | <0.010 | <0.010 | 0.159 | <0.050 | 3.32 | <0.050 | 12.7 | 333 | 8.19 | 177 | <10.0 |
| A.C. @USGS | 5/22/21 | 280 | 91 | 10.49 | 8.49 | 6.7 | 703 | 4.8 | <0.0002 | 0.011 | 0.004 | <0.005 | 137 | <0.010 | <0.010 | 0.158 | <0.050 | 2.03 | <0.050 | <10.0 | 281 | 8.29 | 138 | <10.0 |
| A.C. @USGS | 8/6/21 | 430 | 174 | 8.96 | 8.54 | 16.2 | 420 | 6.73 | <0.0002 | 0.017 | 0.007 | <0.005 | 210 | <0.010 | <0.010 | 0.207 | <0.050 | 4.38 | <0.050 | 19.1 | 431 | 8.47 | 212 | <10.0 |

Notes:
D = dissolved
T = total
TR = total recoverable
CN = cyanide
WAD = Weak Acid Dissociable
N = nitrogen
TDS = total dissolved solids
TSS = total suspended solids

Table D-2. Water Quality Results at the Annie Creek II Site From January 5, 2015, Through August 2, 2021

| Sample Name | Date Sampled | Cond, Field (µmhos/cm) | ORP, Field (mV) | DO, Field (mg/L) | pH, Field (SU) | Temp, Field (°C) | Flow, Field (gpm) | Sodium – D (mg/L) | Mercury – T (mg/L) | Arsenic – T (mg/L) | Gold - T (mg/L) | Selenium – T (mg/L) | Bicarbonate (mg/L) | CN, Total (mg/L) | CN, WAD (mg/L) | Fluoride (mg/L) | N, Ammonia (mg/L) | N, Nitrate (mg/L) | N, Nitrite (mg/L) | Sulfate (mg/L) | Conductivity (µmhos/cm) | pH (SU) | TDS (mg/L) | TSS (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| ANNIE CREEK II | 1/5/15 | 920 | 170 | 9.86 | 7.77 | 4.4 | 100 | 21.2 | <0.0002 | 0.058 | <0.001 | 0.014 | 141 | 0.011 | <0.010 | 0.325 | <0.050 | 23.2 | <0.050 | 244 | 855 | 7.83 | 572 | <10.0 |
| ANNIE CREEK II | 5/20/15 | | | | | | | 15.7 | <0.0002 | 0.049 | <0.001 | 0.008 | 133 | <0.010 | <0.010 | 0.377 | <0.050 | 13.5 | <0.050 | 135 | 590 | 8.03 | 366 | <10.0 |
| ANNIE CREEK II | 8/12/15 | 940 | 70 | 9.63 | 7.5 | 7.5 | | 20 | <0.0002 | 0.059 | <0.001 | 0.016 | 155 | 0.011 | <0.010 | 0.36 | <0.050 | 22.4 | <0.050 | 253 | 887 | 7.78 | 571 | <10.0 |
| ANNIE CREEK II | 12/3/15 | | | | | | | 19.4 | <0.0002 | 0.056 | <0.001 | | 149 | <0.010 | <0.010 | 0.342 | <0.050 | 23 | <0.050 | 264 | 914 | 7.66 | 613 | <10.0 |
| ANNIE CREEK II | 1/2/16 | 990 | 87 | 10 | 7.81 | 4.3 | 0.18 | 17.5 | <0.0002 | 0.07 | <0.001 | 0.014 | 146 | 0.013 | <0.010 | 0.305 | <0.050 | 26.5 | <0.050 | 254 | 891 | 7.75 | 614 | <10.0 |
| ANNIE CREEK II | 4/3/16 | 710 | 83 | 9.8 | 7.9 | 8.4 | 0.25 | 15.9 | <0.0002 | 0.05 | <0.001 | 0.011 | 126 | <0.010 | <0.010 | 0.312 | <0.050 | 18 | <0.050 | 180 | 684 | 7.81 | 457 | <10.0 |
| ANNIE CREEK II | 5/2/16 | 670 | 12 | 9.9 | 8.46 | 10.1 | 13 | 15.4 | <0.0002 | 0.055 | <0.001 | 0.012 | 129 | <0.010 | <0.010 | 0.333 | <0.050 | 19 | <0.050 | 197 | 691 | 7.76 | 461 | <10.0 |
| ANNIE CREEK II | 8/8/16 | 890 | 218 | 12.4 | 7.73 | 9.5 | 0.175 | 18.4 | <0.0002 | 0.056 | <0.001 | 0.012 | 147 | <0.010 | <0.010 | 0.339 | <0.050 | 20.4 | <0.050 | 256 | 852 | 7.61 | 590 | <10.0 |
| ANNIE CREEK II | 1/16/17 | 870 | 8 | 9.88 | 7.78 | 4.7 | 75.62 | 17.6 | <0.0002 | 0.065 | <0.001 | 0.013 | 140 | 0.01 | <0.010 | 0.332 | <0.050 | 23.4 | <0.050 | 263 | 867 | 7.8 | 581 | <10.0 |
| ANNIE CREEK II | 4/2/17 | 790 | 116 | 12.35 | 7.92 | 5.8 | 75.62 | 17 | <0.0002 | 0.062 | <0.001 | 0.012 | 144 | <0.010 | <0.010 | 0.339 | <0.050 | 19.7 | <0.050 | 235 | 807 | 7.92 | 529 | <10.0 |
| ANNIE CREEK II | 5/10/17 | 790 | 150 | 12.44 | 7.72 | 7.5 | 75.62 | 14.8 | <0.0002 | 0.054 | <0.001 | 0.013 | 130 | <0.010 | <0.010 | 0.315 | <0.050 | 17.1 | <0.050 | 205 | 729 | 7.85 | 501 | |
| ANNIE CREEK II | 8/7/17 | 860 | 151 | 9.93 | 7.58 | 7.4 | 75.62 | 18 | <0.0002 | 0.056 | <0.001 | 0.009 | 148 | 0.01 | <0.010 | 0.314 | <0.050 | 19.3 | <0.050 | 252 | 842 | 7.93 | 575 | <10.0 |
| ANNIE CREEK II | 1/15/18 | 940 | 25 | 10.18 | 7.71 | 2.7 | 41 | 19.6 | <0.0002 | 0.079 | <0.001 | 0.015 | 144 | <0.010 | <0.010 | 0.347 | <0.050 | 22.6 | <0.050 | 269 | 927 | 7.94 | 636 | <10.0 |
| ANNIE CREEK II | 4/7/18 | 880 | 71 | 9.47 | 7.9 | 6 | 75.62 | 16.3 | <0.0002 | 0.081 | 0.002 | 0.013 | 155 | <0.010 | <0.010 | 0.405 | <0.050 | 21 | <0.050 | 257 | 884 | 7.94 | 580 | <10.0 |
| ANNIE CREEK II | 5/3/18 | 680 | 107 | 9.5 | 7.59 | 5.4 | 264.5 | 14.7 | <0.0002 | 0.053 | <0.001 | 0.011 | 123 | <0.010 | <0.010 | 0.401 | <0.050 | 16.5 | <0.050 | 189 | 685 | 7.73 | 453 | <10.0 |
| ANNIE CREEK II | 8/5/18 | 960 | 167 | 9.35 | 7.37 | 5.8 | 191.2 | 19 | <0.0002 | 0.053 | <0.001 | 0.016 | 158 | 0.013 | <0.010 | 0.446 | <0.050 | 21.6 | <0.050 | 265 | 901 | 7.85 | 632 | <10.0 |
| ANNIE CREEK II | 11/1/18 | 1030 | 229 | 8.69 | 7.95 | 5.3 | 95.76 | 20.1 | <0.0002 | 0.067 | <0.001 | 0.017 | 164 | 0.011 | <0.010 | 0.397 | <0.050 | 24 | <0.050 | 299 | 1010 | 7.9 | 682 | |
| ANNIE CREEK II | 1/3/19 | 1010 | 81 | 10.28 | 7.82 | 4.2 | 68.04 | 19 | <0.0002 | 0.078 | <0.001 | 0.016 | 148 | 0.01 | <0.010 | 0.358 | <0.050 | 24.1 | <0.050 | 279 | 951 | 7.94 | 652 | <10.0 |
| ANNIE CREEK II | 4/4/19 | 820 | 192 | 10.18 | 7.64 | 4.6 | 202 | 16.4 | <0.0002 | 0.065 | <0.001 | 0.013 | 160 | <0.010 | <0.010 | 0.442 | <0.050 | 18 | <0.050 | 226 | 831 | 7.92 | 546 | <10.0 |
| ANNIE CREEK II | 5/3/19 | 620 | 197 | 10.04 | 7.72 | 4.4 | 326.2 | 13 | <0.0002 | 0.048 | <0.001 | 0.009 | 112 | <0.010 | <0.010 | 0.377 | <0.050 | 14 | <0.050 | 165 | 639 | 7.87 | 410 | <10.0 |
| ANNIE CREEK II | 8/7/19 | 910 | 204 | 10.24 | 7.51 | 8.7 | 218.4 | 17.3 | <0.0002 | 0.063 | <0.001 | 0.016 | 155 | 0.01 | <0.010 | 0.421 | <0.050 | 20 | <0.050 | 234 | 909 | 7.83 | 629 | <10.0 |
| ANNIE CREEK II | 1/8/20 | 870 | 246 | 10.04 | 7.82 | 4.4 | 104.27 | 17.2 | <0.0002 | 0.057 | <0.001 | 0.012 | 150 | 0.01 | <0.010 | 0.354 | <0.050 | 21.3 | <0.050 | 268 | 888 | 7.79 | 602 | <10.0 |
| ANNIE CREEK II | 4/4/20 | 750 | -0.6 | 9.8 | 7.91 | 5.1 | 247 | 14.8 | <0.0002 | 0.058 | <0.001 | 0.011 | 155 | <0.010 | <0.010 | 0.428 | <0.050 | 15.6 | <0.050 | 195 | 753 | 7.85 | 494 | <10.0 |
| ANNIE CREEK II | 5/10/20 | 710 | 159 | 10.06 | 7.69 | 4.9 | 441 | 14.3 | <0.0002 | 0.048 | <0.001 | 0.01 | 140 | <0.010 | <0.010 | 0.403 | <0.050 | 11.9 | <0.050 | 190 | 672 | 7.79 | 428 | <10.0 |
| ANNIE CREEK II | 8/4/20 | 820 | 159 | 8.51 | 7.46 | 10.4 | 140.65 | 17.6 | <0.0002 | 0.065 | <0.001 | 0.016 | 161 | <0.010 | <0.010 | 0.396 | <0.050 | 16.6 | <0.050 | 236 | 848 | 7.81 | 550 | <10.0 |
| ANNIE CREEK II | 1/12/21 | 880 | 197 | 10.6 | 7.66 | 4.7 | 75.62 | 17.8 | <0.0002 | 0.072 | <0.001 | 0.015 | 145 | <0.010 | <0.010 | 0.323 | <0.050 | 19.8 | <0.050 | 249 | 851 | 7.83 | 579 | <10.0 |
| ANNIE CREEK II | 4/3/21 | 870 | 203 | 9.83 | 8.08 | 4.9 | 95.76 | 16.9 | <0.0002 | 0.07 | <0.001 | 0.014 | 153 | <0.010 | <0.010 | 0.368 | <0.050 | 14.3 | <0.050 | 248 | 857 | 8.03 | 569 | <10.0 |
| ANNIE CREEK II | 5/1/21 | 670 | 117 | 9.21 | 7.9 | 9.2 | 264.5 | 14.1 | <0.0002 | 0.055 | <0.001 | 0.01 | 137 | <0.0100 | <0.010 | 0.374 | <0.050 | 11.8 | <0.050 | 188 | 650 | 7.97 | 440 | <10.0 |
| ANNIE CREEK II | 8/2/21 | 830 | 42 | 8.39 | 7.52 | 11 | 108.6 | 16.9 | <0.0002 | 0.059 | <0.001 | 0.012 | 152 | <0.010 | <0.010 | 0.346 | <0.050 | 17 | <0.050 | 236 | 835 | 7.9 | 563 | <10.0 |

Notes:
D = dissolved
T = total
TR = total recoverable
CN = cyanide
WAD = Weak Acid Dissociable
N = nitrogen
TDS = total dissolved solids and TSS = total suspended solids

Table D-3. Water Quality Results at the CP001/NPDES001 Site From January 5, 2015, Through December 28, 2021 (Page 1 of 6)

| Sample Name | Date Sampled | Cond, Field µmhos/cm | ORP, Field (mV) | DO, Field (mg/L) | pH, Field (SU) | Temp, Field (°C) | Flow, Field (gpm) | Calcium – D (mg/L) | Magnesium – D (mg/L) | Mercury – T (mg/L) | Arsenic – TR (mg/L) | Cadmium – TR (mg/L) | Chromium – TR (mg/L) | Copper – TR (mg/L) | Iron - TR (mg/L) | Lead – TR (mg/L) | Nickel – TR (mg/L) | Selenium – TR (mg/L) | Silver – TR (mg/L) | Zinc - TR (mg/L) | BOD, 5-Day (mg/L) | CN, WAD (mg/L) | N, Ammonia (mg/L) | N, Nitrate (mg/L) | Phosphorus – D (mg/L) | Sulfate (mg/L) | Conductivity (µmhos/cm) | Hardness (mg/L) | pH (SU) | TDS (mg/L) | TSS (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NPDES001 | 1/5/15 | 630 | 136 | 8.49 | 8.62 | 1.7 | 120 | 63 | 26.7 | <0.0002 | 0.011 | <0.001 | <0.001 | <0.005 | | <0.001 | | 0.006 | <0.001 | <0.050 | <3.0 | <0.010 | <0.050 | 9.16 | | | | 267 | 8.45 | 325 | <10.0 |
| NPDES001 | 1/19/15 | 580 | 195 | 10.9 | 8.79 | 2.1 | 96 | | | | 0.011 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.55 | | <10.0 |
| NPDES001 | 2/3/15 | | | | | | | 60.6 | 26.5 | <0.0002 | 0.01 | <0.001 | | <0.005 | | <0.001 | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 6.19 | | | | 260 | 8.51 | 302 | <10.0 |
| NPDES001 | 2/18/15 | 450 | -19 | 11.3 | 8.76 | 0.5 | 120 | | | | 0.012 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.6 | | <10.0 |
| NPDES001 | 3/4/15 | 500 | 96 | 11.4 | 8.69 | 0.4 | 100 | 57.4 | 25.9 | <0.0002 | 0.01 | <0.001 | | <0.005 | | <0.001 | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 5.54 | | | | 250 | 8.42 | 260 | <10.0 |
| NPDES001 | 3/18/15 | 240 | -15 | 10.8 | 8.47 | 3.6 | 383 | | | | 0.027 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.46 | | <10.0 |
| NPDES001 | 4/1/15 | 280 | 95 | 10.2 | 8.5 | 5 | 324 | 30.5 | 13.4 | <0.0002 | 0.017 | <0.001 | | <0.005 | | 0.003 | | <0.005 | | 0.069 | <3.0 | <0.010 | <0.050 | 2.18 | | | | 131 | 8.31 | 177 | <10.0 |
| NPDES001 | 4/15/15 | | | | | | | | | | 0.013 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.59 | | <10.0 |
| NPDES001 | 4/30/15 | | | | | | | | | | 0.012 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.48 | | <10.0 |
| NPDES001 | 5/6/15 | 700 | 92 | 9.5 | 8.67 | 8.6 | 163 | 34.5 | 15.4 | <0.0002 | 0.013 | <0.001 | <0.001 | <0.005 | | 0.001 | | <0.005 | <0.001 | 0.06 | <3.0 | <0.010 | <0.050 | 1.46 | | | | 149 | 8.51 | 167 | <10.0 |
| NPDES001 | 5/20/15 | 380 | 127 | 10.5 | 8.37 | 4.7 | 1440 | | | | 0.03 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.36 | | <10.0 |
| NPDES001 | 6/2/15 | 460 | 181 | 9.57 | 8.45 | 8.6 | 1060 | 51.9 | 17.7 | <0.0002 | 0.028 | <0.001 | | <0.005 | | 0.001 | | <0.005 | | 0.087 | <3.0 | <0.010 | <0.050 | 7.15 | | | | 203 | 8.34 | 274 | <10.0 |
| NPDES001 | 6/16/15 | 590 | 74 | 9.72 | 8.47 | 7.6 | 570 | | | | 0.028 | | | | | | | 0.007 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.39 | | <10.0 |
| NPDES001 | 7/1/15 | 600 | 104 | 9.59 | 8.22 | 7.2 | 383 | 64 | 22.5 | <0.0002 | 0.028 | <0.001 | | <0.005 | | <0.001 | | 0.007 | | 0.272 | <3.0 | <0.010 | <0.050 | 10.7 | | | | 252 | 8.19 | 367 | <10.0 |
| NPDES001 | 7/13/15 | 270 | 71 | 8.95 | 8.33 | 11.1 | 203 | | | | 0.02 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.27 | | <10.0 |
| NPDES001 | 7/29/15 | 520 | 61 | 9.54 | 8.47 | 7.8 | 127 | | | | 0.018 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.42 | | <10.0 |
| NPDES001 | 8/12/15 | | | | | | | 67.3 | 26.7 | <0.0002 | 0.013 | <0.001 | <0.001 | <0.005 | | <0.001 | | <0.005 | <0.001 | 0.058 | <3.0 | <0.010 | <0.050 | 9.29 | | | | 278 | 8.52 | 332 | <10.0 |
| NPDES001 | 8/26/15 | | | | | | | | | | 0.013 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.63 | | <10.0 |
| NPDES001 | 9/10/15 | 610 | -5 | 9.55 | 8.4 | 9.7 | 127 | 70.6 | 29.5 | <0.0002 | <0.005 | <0.001 | | <0.005 | | <0.001 | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 9.5 | | | | 297 | 8.52 | 332 | <10.0 |
| NPDES001 | 9/22/15 | | | | | | | | | | 0.012 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.6 | | <10.0 |
| NPDES001 | 10/8/15 | 620 | 23 | 10.2 | 8.58 | 8.3 | 127 | | | | 0.011 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.51 | | <10.0 |
| NPDES001 | 10/19/15 | 600 | | 9.77 | 8.62 | 7.7 | 127 | 70.5 | 29.1 | <0.0002 | 0.016 | <0.001 | | <0.005 | | <0.001 | | <0.005 | | 0.06 | <3.0 | <0.010 | <0.050 | 8.93 | | | 591 | 296 | 8.52 | 338 | <10.0 |
| NPDES001 | 11/4/15 | 610 | | 9.2 | 8.56 | 7.7 | 114.4 | 68.3 | 29.1 | <0.0002 | 0.012 | <0.001 | | <0.005 | | <0.001 | | <0.005 | | 0.055 | <3.0 | <0.010 | <0.050 | 9.47 | | | 582 | 308 | 8.55 | 320 | <10.0 |
| NPDES001 | 11/17/15 | 660 | | 10.6 | 8.7 | 2.9 | 111 | | | | 0.015 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.49 | | <10.0 |
| NPDES001 | 12/2/15 | 640 | | 10.2 | 8.72 | 4.2 | 111 | 69.1 | 30.3 | <0.0002 | 0.012 | <0.001 | <0.001 | <0.005 | | <0.001 | | <0.005 | <0.001 | 0.056 | <3.0 | <0.010 | <0.050 | 9.67 | | | 612 | 297 | 8.39 | 344 | <10.0 |
| NPDES001 | 12/14/15 | | | | | | | | | | 0.013 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.53 | | <10.0 |
| NPDES001 | 12/29/15 | 630 | | 0.87 | 8.76 | 13.8 | 111 | | | | 0.014 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.38 | | <10.0 |
| NPDES001 | 1/11/16 | 640 | | 10.3 | 8.82 | 4.4 | 285 | 68.1 | 29.1 | <0.0002 | 0.013 | <0.001 | <0.001 | <0.005 | | <0.001 | | <0.005 | <0.001 | <0.050 | <3.0 | <0.010 | <0.050 | 11.1 | | | 606 | 290 | 8.42 | 358 | <10.0 |
| NPDES001 | 1/25/16 | 630 | | 11.5 | 8.67 | 1.5 | 111 | | | | 0.013 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.43 | | <10.0 |
| NPDES001 | 2/8/16 | 620 | | 9.3 | 8.81 | 9.3 | 114.4 | 71.9 | 30.1 | <0.0002 | 0.013 | <0.001 | | <0.005 | | <0.001 | | <0.005 | | 0.061 | <3.0 | <0.010 | <0.050 | 9.31 | | | 607 | 303 | 8.33 | 353 | <10.0 |
| NPDES001 | 2/22/16 | 630 | 116 | 10.9 | 8.87 | 3.3 | 127 | | | | 0.013 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.47 | | <10.0 |
| NPDES001 | 3/7/16 | 580 | | 10.6 | 8.02 | 4.9 | 127 | 68.1 | 27.6 | <0.0002 | 0.015 | <0.001 | | <0.005 | | <0.001 | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 8.54 | | | 573 | 284 | 8.36 | 330 | <10.0 |
| NPDES001 | 3/21/16 | 530 | | 10.1 | 8.71 | 5.9 | 141 | | | | 0.005 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.37 | | <10.0 |
| NPDES001 | 4/4/16 | 420 | | 10.7 | 8.65 | 5.3 | 203.8 | 51.4 | 20.9 | <0.0002 | 0.012 | <0.001 | <0.001 | <0.005 | | <0.001 | | <0.005 | <0.001 | <0.050 | <3.0 | <0.010 | <0.050 | 5.35 | | | 435 | 214 | 8.32 | 241 | <10.0 |
| NPDES001 | 4/18/16 | 290 | | 10.9 | 8.25 | 4.3 | 301.6 | | | | 0.013 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.29 | | <10.0 |
| NPDES001 | 5/2/16 | 320 | | 10.4 | 8.71 | 10.6 | 203.8 | 36 | 16.1 | <0.0002 | 0.012 | <0.001 | | <0.005 | | 0.002 | | <0.005 | | 0.054 | <3.0 | <0.010 | <0.050 | 3.51 | | | 331 | 156 | 8.43 | 196 | <10.0 |
| NPDES001 | 5/16/16 | 390 | | 11.4 | 8.79 | 10.4 | 162.9 | | | | 0.013 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.52 | | <10.0 |
| NPDES001 | 6/1/16 | 390 | | 12.5 | 8.69 | 6.9 | 144 | 45.6 | 19.2 | <0.0002 | 0.01 | <0.001 | | <0.005 | | <0.001 | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 4.12 | | | 393 | 193 | 8.39 | 214 | <10.0 |
| NPDES001 | 6/13/16 | 450 | | 10.7 | 8.64 | 14.4 | 96.49 | | | | 0.011 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.53 | | <10.0 |

Table D-3. Water Quality Results at the CP001/NPDES001 Site From January 5, 2015, Through December 28, 2021 (Page 2 of 6)

| Sample Name | Date Sampled | Cond, Field µmhos/cm | ORP, Field (mV) | DO, Field (mg/L) | pH, Field (SU) | Temp, Field (°C) | Flow, Field (gpm) | Calcium – D (mg/L) | Magnesium – D (mg/L) | Mercury – T (mg/L) | Arsenic – TR (mg/L) | Cadmium – TR (mg/L) | Chromium – TR (mg/L) | Copper – TR (mg/L) | Iron - TR (mg/L) | Lead – TR (mg/L) | Nickel – TR (mg/L) | Selenium – TR (mg/L) | Silver – TR (mg/L) | Zinc - TR (mg/L) | BOD, 5-Day (mg/L) | CN, WAD (mg/L) | N, Ammonia (mg/L) | N, Nitrate (mg/L) | Phosphorus – D (mg/L) | Sulfate (mg/L) | Conductivity (µmhos/cm) | Hardness (mg/L) | pH (SU) | TDS (mg/L) | TSS (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NPDES001 | 6/27/16 | 490 | | 10.8 | 8.68 | 17.2 | 96.49 | | | | 0.01 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.55 | | <10.0 |
| NPDES001 | 7/13/16 | 510 | | 11 | 8.71 | 13.9 | 70.46 | 56.3 | 27.3 | <0.0002 | 0.01 | <0.001 | <0.001 | <0.005 | | <0.001 | | <0.005 | <0.001 | <0.050 | <3.0 | <0.010 | <0.050 | 6.7 | | | 506 | 253 | 8.48 | 308 | <10.0 |
| NPDES001 | 7/25/16 | 530 | | 10.1 | 8.61 | 17.1 | 59 | | | | 0.011 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.51 | | <10.0 |
| NPDES001 | 8/8/16 | 540 | | 11 | 8.56 | 14.4 | 70.46 | 61.5 | 27 | <0.0002 | 0.012 | <0.001 | | <0.005 | | <0.001 | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 6.69 | 0.022 | | 531 | 265 | 8.49 | 301 | <10.0 |
| NPDES001 | 8/19/16 | 440 | | 11.8 | 8.56 | 9 | 102.3 | 48.5 | 20.7 | <0.0002 | 0.014 | <0.001 | | <0.005 | | <0.001 | | <0.005 | | <0.050 | 3.6 | <0.010 | <0.050 | 5.44 | | | 436 | 206 | 8.32 | 250 | <10.0 |
| NPDES001 | 8/24/16 | 490 | | 8.79 | 8.69 | 12.1 | 75.4 | | | | | | | | | | | | | | | | | | | | | | | | <10.0 |
| NPDES001 | 8/29/16 | 510 | | 11.4 | 8.75 | 15.4 | 75.4 | | | | 0.011 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.56 | | <10.0 |
| NPDES001 | 9/12/16 | 520 | | 12.1 | 8.64 | 7.9 | | 61.5 | 27.5 | <0.0002 | 0.01 | <0.001 | <0.001 | <0.005 | <0.050 | <0.001 | <0.005 | <0.005 | <0.001 | <0.050 | 3.5 | <0.010 | <0.050 | 6.29 | 0.025 | | 536 | 267 | 8.44 | 293 | <10.0 |
| NPDES001 | 9/26/16 | 470 | | 12.3 | 8.76 | 10.5 | 75.4 | | | | 0.011 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.49 | | <10.0 |
| NPDES001 | 10/10/16 | 480 | | 12 | 8.66 | 11 | 59 | 55.7 | 25.4 | 0.0002 | 0.011 | <0.001 | | <0.005 | | <0.001 | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 2.53 | | | 484 | 243 | 8.45 | 273 | <10.0 |
| NPDES001 | 10/24/16 | 480 | | 12.9 | 8.78 | 10.5 | 61.53 | 58.2 | 25.2 | | 0.011 | | <0.001 | | | | | <0.005 | <0.001 | | <3.0 | <0.010 | <0.050 | | | | | 249 | 8.49 | | <10.0 |
| NPDES001 | 11/7/16 | 480 | | 13.6 | 8.74 | 5.6 | 59 | 57.5 | 27.2 | <0.0002 | 0.011 | <0.001 | | <0.005 | | <0.001 | | <0.005 | | 0.192 | <3.0 | <0.010 | <0.050 | 2.95 | | | 492 | 256 | 8.54 | 256 | <10.0 |
| NPDES001 | 11/21/16 | 450 | | 14.4 | 8.82 | 3.9 | 61.53 | | | | 0.01 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.57 | | <10.0 |
| NPDES001 | 12/5/16 | 490 | | 14.2 | 8.71 | 1.2 | 59 | 57.6 | 26.2 | <0.0002 | 0.014 | <0.001 | | <0.005 | | <0.001 | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 2.75 | | | 489 | 252 | 8.44 | 262 | <10.0 |
| NPDES001 | 12/21/16 | 500 | | 13.3 | 8.65 | 2.6 | | | | | 0.012 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.4 | | <10.0 |
| NPDES001 | 1/3/17 | 350 | | 13.1 | 8.51 | 1.2 | 60 | 62.5 | 27.7 | <0.0002 | 0.012 | <0.001 | | <0.005 | | <0.001 | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 3.11 | | | 517 | 270 | 8.32 | 270 | <10.0 |
| NPDES001 | 1/16/17 | 510 | | 11.9 | 8.49 | 2.8 | | 58.7 | 27.6 | | 0.013 | | <0.001 | | | | | <0.005 | <0.001 | | <3.0 | <0.010 | <0.050 | | | | | 260 | 8.4 | | <10.0 |
| NPDES001 | 1/30/17 | 490 | | 14.3 | 7.59 | 1.8 | 100 | | | | 0.015 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.38 | | <10.0 |
| NPDES001 | 2/7/17 | 490 | | 14.4 | 8.4 | 2.2 | 100 | 60.2 | 27.2 | <0.0002 | 0.013 | <0.001 | | <0.005 | | <0.001 | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 2.87 | | | 493 | 262 | 8.44 | 260 | <10.0 |
| NPDES001 | 2/13/17 | 500 | | 14.4 | 8.42 | 0.6 | | | | | 0.014 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.4 | | <10.0 |
| NPDES001 | 2/27/17 | 500 | | 15.8 | 8.79 | 0.9 | | | | | 0.013 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.44 | | <10.0 |
| NPDES001 | 3/14/17 | 530 | | 14 | 8.76 | 1.7 | 70.46 | 59.8 | 26.5 | <0.0002 | 0.013 | <0.001 | | <0.005 | | <0.001 | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 3.26 | | | 494 | 258 | 8.5 | 259 | <10.0 |
| NPDES001 | 3/27/17 | 460 | | 13.5 | 8.79 | 4.8 | 70.46 | | | | 0.012 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.58 | | <10.0 |
| NPDES001 | 4/11/17 | 440 | | 13.1 | 8.85 | 3.4 | 70.46 | 50.9 | 23 | <0.0002 | 0.013 | <0.001 | <0.001 | <0.005 | | <0.001 | | <0.005 | <0.001 | <0.050 | <3.0 | <0.010 | <0.050 | 2.27 | | | 424 | 222 | 8.47 | 231 | <10.0 |
| NPDES001 | 4/19/17 | 360 | | 12.3 | 8.9 | 6.8 | 114.4 | 40.8 | 18.1 | <0.0002 | 0.014 | <0.001 | <0.001 | <0.005 | | <0.001 | | <0.005 | <0.001 | <0.050 | <3.0 | <0.010 | <0.050 | 1.7 | | | 350 | 176 | 8.59 | 173 | <10.0 |
| NPDES001 | 4/27/17 | | | | 8.71 | 6.6 | 83 | | | | | | | | | | | | | | | | <0.050 | | | | | | | | |
| NPDES001 | 5/1/17 | 400 | | 13.4 | 8.72 | 5.9 | | 47.4 | 21.9 | <0.0002 | 0.012 | <0.001 | | <0.005 | | <0.001 | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 2.3 | | | 397 | 208 | 8.58 | 210 | <10.0 |
| NPDES001 | 5/17/17 | 370 | | 12.2 | 8.68 | 7.6 | | | | | 0.015 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.47 | | <10.0 |
| NPDES001 | 5/29/17 | 360 | | 11.1 | 8.61 | 12.2 | | | | | 0.014 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.54 | | <10.0 |
| NPDES001 | 6/12/17 | 380 | | 8.65 | 8.69 | 17 | 70.46 | 44.4 | 20.2 | <0.0002 | 0.014 | <0.001 | | <0.005 | | <0.001 | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 2.02 | | | 379 | 194 | 8.63 | 181 | <10.0 |
| NPDES001 | 6/26/17 | 520 | | 9.86 | 8.59 | 7.5 | 70.46 | | | | 0.012 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.45 | | 10 |
| NPDES001 | 7/10/17 | 550 | | 9.04 | 8.54 | 12.7 | 70.46 | 63.7 | 27.8 | <0.0002 | 0.012 | <0.001 | <0.001 | <0.005 | | <0.001 | | <0.005 | <0.001 | <0.050 | <3.0 | <0.010 | <0.050 | 6.82 | | | 549 | 273 | 8.47 | 269 | <10.0 |
| NPDES001 | 7/24/17 | 480 | | 13.4 | 8.35 | 15.4 | 57.22 | | | | 0.011 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.48 | | <10.0 |
| NPDES001 | 8/7/17 | 440 | | 9.52 | 8.71 | 12.6 | 49.14 | 62.7 | 27.5 | <0.0002 | 0.013 | <0.001 | | <0.005 | | <0.001 | | <0.005 | | 0.073 | <3.0 | <0.010 | <0.050 | 2.25 | | | 460 | 270 | 8.55 | 237 | <10.0 |
| NPDES001 | 8/21/17 | 460 | | 8.97 | 8.65 | 12.7 | 49.14 | | | | 0.016 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.55 | | <10.0 |
| NPDES001 | 9/6/17 | 470 | | 9.18 | 8.69 | 10.2 | 35.01 | 55.4 | 27.1 | <0.0002 | 0.015 | <0.001 | | <0.005 | | <0.001 | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 2.74 | | | 449 | 250 | 8.55 | 256 | <10.0 |
| NPDES001 | 9/7/17 | | | | | | | | | | | | | | | | | | | | <3.0 | | | | | | | | | | |
| NPDES001 | 9/18/17 | 470 | | 9.16 | 8.73 | 9.3 | 23.47 | | | | 0.017 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.54 | | <10.0 |
| NPDES001 | 10/2/17 | 470 | | 9.8 | 8.66 | 5.4 | 40 | 53.3 | 25.5 | <0.0002 | 0.018 | <0.001 | <0.001 | <0.005 | | <0.001 | | <0.005 | <0.001 | <0.050 | <3.0 | <0.010 | <0.050 | 2.38 | | | 462 | 238 | 8.45 | 248 | <10.0 |

Table D-3. Water Quality Results at the CP001/NPDES001 Site From January 5, 2015, Through December 28, 2021 (Page 3 of 6)

| Sample Name | Date Sampled | Cond, Field µmhos/cm | ORP, Field (mV) | DO, Field (mg/L) | pH, Field (SU) | Temp, Field (°C) | Flow, Field (gpm) | Calcium – D (mg/L) | Magnesium – D (mg/L) | Mercury – T (mg/L) | Arsenic – TR (mg/L) | Cadmium – TR (mg/L) | Chromium – TR (mg/L) | Copper – TR (mg/L) | Iron - TR (mg/L) | Lead – TR (mg/L) | Nickel – TR (mg/L) | Selenium – TR (mg/L) | Silver – TR (mg/L) | Zinc - TR (mg/L) | BOD, 5-Day (mg/L) | CN, WAD (mg/L) | N, Ammonia (mg/L) | N, Nitrate (mg/L) | Phosphorus – D (mg/L) | Sulfate (mg/L) | Conductivity (µmhos/cm) | Hardness (mg/L) | pH (SU) | TDS (mg/L) | TSS (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NPDES001 | 10/16/17 | 500 | | 10.5 | 8.72 | 7.3 | 49.14 | | | | 0.012 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.47 | | <10.0 |
| NPDES001 | 10/30/17 | 550 | | 12.4 | 8.65 | 3.1 | 59 | | | | 0.013 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.44 | | <10.0 |
| NPDES001 | 11/13/17 | 560 | | 11.1 | 8.69 | 2.4 | 61.53 | 62.4 | 29.9 | <0.0002 | 0.013 | <0.001 | | <0.005 | | <0.001 | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 5.71 | | 29.9 | 573 | 279 | 8.46 | 324 | <10.0 |
| NPDES001 | 11/27/17 | 560 | | 10.7 | 8.68 | 6 | 70.46 | | | | 0.013 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.5 | | <10.0 |
| NPDES001 | 12/4/17 | 580 | | 11.4 | 8.6 | 2.2 | 96.49 | 65.2 | 31.2 | <0.0002 | 0.019 | <0.001 | | <0.005 | | <0.001 | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 5.95 | | | 575 | 291 | 8.46 | 280 | <10.0 |
| NPDES001 | 12/18/17 | 590 | | 11.2 | 8.61 | 3.4 | 96.49 | | | | 0.014 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.46 | | <10.0 |
| NPDES001 | 1/4/18 | 590 | | 11.5 | 8.58 | 1.7 | 100 | 64.6 | 30.6 | <0.0002 | <0.005 | <0.001 | <0.001 | <0.005 | | <0.001 | | <0.005 | <0.001 | <0.050 | <3.0 | <0.010 | <0.050 | 6.42 | | | 582 | 287 | 8.37 | 302 | <10.0 |
| NPDES001 | 1/15/18 | 620 | | 11.8 | 8.53 | -0.6 | 100 | | | | 0.014 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.46 | | <10.0 |
| NPDES001 | 1/29/18 | 580 | | 10.5 | 8.62 | 1.1 | 53 | | | | 0.014 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.44 | | <10.0 |
| NPDES001 | 2/12/18 | 550 | | 10.6 | 8.53 | 1.5 | 100 | 60.5 | 28.8 | <0.0002 | 0.011 | <0.001 | | <0.005 | | <0.001 | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 3.32 | | | 531 | 270 | 8.45 | 285 | <10.0 |
| NPDES001 | 2/26/18 | 510 | | 10.9 | 8.63 | 1.5 | 58 | | | | 0.014 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.4 | | <10.0 |
| NPDES001 | 3/12/18 | 500 | | 11.7 | 8.64 | 4 | 58 | 60.5 | 28 | <0.0002 | 0.013 | <0.001 | | <0.005 | | <0.001 | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 3.4 | | | 514 | 266 | 8.45 | 279 | <10.0 |
| NPDES001 | 3/26/18 | 520 | | 11.4 | 8.26 | 1.2 | 59 | | | | 0.013 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.59 | | <10.0 |
| NPDES001 | 4/11/18 | 550 | | 10.5 | 8.51 | 4.2 | 70.46 | 60.4 | 27.6 | <0.0002 | 0.014 | <0.001 | <0.001 | <0.005 | | <0.001 | | <0.005 | <0.001 | <0.050 | <3.0 | <0.010 | <0.050 | 3.08 | | | 494 | 265 | 8.51 | 251 | <10.0 |
| NPDES001 | 4/25/18 | 120 | | 10.5 | 8.03 | 5.5 | 127 | | | | 0.035 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.12 | | <10.0 |
| NPDES001 | 5/10/18 | 80 | | 10.3 | 7.87 | 5.9 | 162.9 | 11.3 | 3.26 | <0.0002 | 0.023 | <0.001 | | <0.005 | | 0.004 | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 0.105 | | | 84.4 | 41.6 | 7.83 | 109 | <10.0 |
| NPDES001 | 5/21/18 | 340 | | 10.1 | 7.87 | 7.5 | 183 | | | | 0.019 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.33 | | <10.0 |
| NPDES001 | 6/4/18 | 290 | | 8.51 | 8.23 | 13.6 | 162.9 | 27.4 | 12.1 | <0.0002 | 0.02 | <0.001 | | <0.005 | | 0.003 | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 3.7 | | | 291 | 118 | 8.33 | 191 | <10.0 |
| NPDES001 | 6/18/18 | 510 | | 9.37 | 8.34 | 9.7 | 111 | 43.5 | 20.5 | <0.0002 | 0.025 | <0.001 | 0.002 | <0.005 | | 0.002 | | <0.005 | <0.001 | <0.050 | <3.0 | <0.010 | <0.050 | 6.69 | | | 481 | 193 | 8.43 | 284 | <10.0 |
| NPDES001 | 7/3/18 | 350 | | 9.4 | 8.12 | 9.6 | 182 | 33 | 14.6 | <0.0002 | 0.018 | <0.001 | 0.002 | <0.005 | | 0.002 | | <0.005 | <0.001 | <0.050 | <3.0 | <0.010 | <0.050 | 4.28 | | | 357 | 142 | 8.29 | 222 | <10.0 |
| NPDES001 | 7/16/18 | 580 | | 8.99 | 8.15 | 10.3 | 111 | | | | <0.005 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.37 | | <10.0 |
| NPDES001 | 7/31/18 | 510 | | 9.41 | 8.27 | 8.7 | 108.2 | | | | 0.014 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.41 | | <10.0 |
| NPDES001 | 8/13/18 | 640 | | 8.49 | 8.43 | 13.4 | 75.4 | 55.7 | 25 | <0.0002 | 0.013 | <0.001 | | <0.005 | | <0.001 | | <0.005 | | <0.050 | <3.0 | 0.015 | <0.050 | 9.26 | | | 613 | 242 | 8.5 | 354 | <10.0 |
| NPDES001 | 8/27/18 | | | | | | | | | | | | | | | | | | | | | <0.010 | | | | | | | | | |
| NPDES001 | 8/28/18 | 510 | 166 | 9.33 | 8.34 | 8.2 | | 46.8 | 20.9 | <0.0002 | 0.015 | <0.001 | 0.001 | <0.005 | 0.268 | <0.001 | <0.005 | <0.005 | <0.001 | <0.050 | <3.0 | <0.010 | <0.050 | 6.68 | 0.035 | | | 203 | 8.47 | 289 | <10.0 |
| NPDES001 | 9/10/18 | 700 | | 8.95 | 8.66 | 11.1 | 40.46 | 61.4 | 28.6 | <0.0002 | 0.011 | <0.001 | | <0.005 | | <0.001 | | <0.005 | | <0.050 | <3.0 | 0.016 | <0.050 | 10.5 | | | 675 | 271 | 8.63 | 386 | <10.0 |
| NPDES001 | 9/18/18 | | | | | | | | | | | | | | | | | | | | | 0.016 | | | | | | | | | |
| NPDES001 | 9/19/18 | | | | | | | | | | | | | | | | | | | | | 0.013 | | | | | | | | | |
| NPDES001 | 9/20/18 | | | | | | | | | | | | | | | | | | | | | <0.010 | | | | | | | | | |
| NPDES001 | 9/24/18 | | | | | | | | | | 0.007 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.5 | | <10.0 |
| NPDES001 | 9/25/18 | | | | | | | | | | | | | | | | | | | | | <0.010 | | | | | | | | | |
| NPDES001 | 9/26/18 | | | | | | | | | | | | | | | | | | | | | <0.010 | | | | | | | | | |
| NPDES001 | 9/26/18 | | | | | | | | | | | | | | | | | | | | | <0.010 | | | | | | | | | |
| NPDES001 | 9/27/18 | | | | | | | | | | | | | | | | | | | | | <0.010 | | | | | | | | | |
| NPDES001 | 9/28/18 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| NPDES001 | 9/29/18 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| NPDES001 | 9/30/18 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| NPDES001 | 10/10/18 | 690 | | 11.4 | 8.39 | 0.8 | 28.95 | 67.9 | 30.3 | <0.0002 | 0.01 | <0.001 | 0.001 | <0.005 | | <0.001 | | <0.005 | <0.001 | <0.050 | <3.0 | <0.010 | <0.050 | 11 | 0.022 | | 701 | 294 | 8.46 | 418 | <10.0 |
| NPDES001 | 10/24/18 | 500 | 150 | 10.2 | 8.55 | 4.7 | 203.8 | | | | 0.014 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.41 | | <10.00 |
| NPDES001 | 11/5/18 | 460 | | 11 | 8.44 | 1.8 | 31.91 | 50 | 23.3 | <0.0002 | 0.015 | <0.001 | | <0.005 | | <0.001 | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 2.65 | | | 457 | 220 | 8.52 | 214 | <10.0 |

Table D-3. Water Quality Results at the CP001/NPDES001 Site From January 5, 2015, Through December 28, 2021 (Page 4 of 6)

| Sample Name | Date Sampled | Cond, Field µmhos/cm | ORP, Field (mV) | DO, Field (mg/L) | pH, Field (SU) | Temp, Field (°C) | Flow, Field (gpm) | Calcium – D (mg/L) | Magnesium – D (mg/L) | Mercury – T (mg/L) | Arsenic – TR (mg/L) | Cadmium – TR (mg/L) | Chromium – TR (mg/L) | Copper – TR (mg/L) | Iron - TR (mg/L) | Lead – TR (mg/L) | Nickel – TR (mg/L) | Selenium – TR (mg/L) | Silver – TR (mg/L) | Zinc - TR (mg/L) | BOD, 5-Day (mg/L) | CN, WAD (mg/L) | N, Ammonia (mg/L) | N, Nitrate (mg/L) | Phosphorus – D (mg/L) | Sulfate (mg/L) | Conductivity (µmhos/cm) | Hardness (mg/L) | pH (SU) | TDS (mg/L) | TSS (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NPDES001 | 11/20/18 | 500 | | 11.2 | 8.19 | 0 | 49.14 | | | | 0.011 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.58 | | <10.0 |
| NPDES001 | 12/10/18 | 440 | 0.83 | 0.91 | 8.37 | -0.4 | 60 | 58.3 | 27.6 | <0.0002 | 0.014 | <0.001 | | <0.005 | | <0.001 | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 3.3 | | | 518 | 259 | 8.35 | 259 | <10.0 |
| NPDES001 | 12/26/18 | 510 | 133 | 11.6 | 8.47 | -0.3 | 60 | | | | 0.011 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.54 | | <10.0 |
| NPDES001 | 1/7/19 | 490 | 187 | 11.3 | 8.52 | 0 | 60 | 59.6 | 28 | <0.0002 | 0.012 | <0.001 | <0.001 | <0.005 | | <0.001 | | <0.005 | <0.001 | <0.050 | <3.0 | <0.010 | <0.050 | 3.18 | | | 509 | 264 | 8.43 | 274 | <10.0 |
| NPDES001 | 1/21/19 | 520 | | 10.9 | 8.45 | 1.5 | 60 | | | | 0.012 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.47 | | <10.0 |
| NPDES001 | 2/4/19 | 520 | | 10.9 | 8.45 | 1.5 | 60 | 61 | 28.3 | <0.0002 | 0.012 | <0.001 | | <0.005 | | <0.001 | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 3.38 | | | 518 | 269 | 8.43 | 257 | <10.0 |
| NPDES001 | 2/19/19 | 530 | 199 | 11.1 | 8.3 | -4 | 65 | | | | 0.014 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.49 | | <10.0 |
| NPDES001 | 3/6/19 | 510 | 115 | 11.8 | 8.27 | -0.3 | 65 | 55.1 | 26.7 | <0.0002 | 0.015 | <0.001 | | <0.005 | | <0.001 | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 2.97 | | | 508 | 247 | 8.4 | 243 | <10.0 |
| NPDES001 | 3/19/19 | 500 | 148 | 11.3 | 7.87 | 0.6 | 60 | | | | 0.019 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.35 | | <10.0 |
| NPDES001 | 4/1/19 | 370 | 183 | 11.2 | 8.1 | 1.6 | 90 | 41.8 | 18.5 | <0.0002 | 0.02 | <0.001 | | <0.005 | | 0.001 | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 1.99 | | | 377 | 180 | 8.33 | 186 | <10.0 |
| NPDES001 | 4/17/19 | 200 | | 10.3 | 7.88 | 4.7 | 359 | | | | 0.025 | | 0.004 | | | | | <0.005 | <0.001 | | <3.0 | <0.010 | <0.050 | | | | | | 8.18 | | <10.0 |
| NPDES001 | 4/30/19 | 180 | 183 | 11.4 | 8.3 | 2.1 | 383.7 | | | | 0.02 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.15 | | <10.0 |
| NPDES001 | 5/14/19 | 160 | | 9.93 | 8.17 | 6.7 | 492.3 | 18.6 | 7.11 | <0.0002 | 0.017 | <0.001 | | <0.005 | | 0.002 | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 0.87 | | | 166 | 75.6 | 8.08 | 120 | <10.0 |
| NPDES001 | 5/27/19 | 160 | 224 | 9.85 | 8.13 | 6.3 | 2070 | 19.1 | 7.12 | <0.0002 | 0.03 | <0.001 | 0.003 | <0.005 | | 0.004 | | <0.005 | <0.001 | <0.050 | <3.0 | <0.010 | <0.050 | 1.75 | | | 174 | 76.9 | 7.89 | 131 | <10.0 |
| NPDES001 | 6/14/19 | 370 | | 9.33 | 8.3 | 7.1 | 120.7 | 37.3 | 15.7 | <0.0002 | 0.015 | <0.001 | | <0.005 | | 0.001 | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 2.32 | | | 350 | 158 | 8.3 | 209 | <10.0 |
| NPDES001 | 6/26/19 | 370 | | 8.75 | 8.49 | 10.2 | 127 | | | | 0.015 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.39 | | <10.0 |
| NPDES001 | 7/8/19 | 200 | 176 | 8.44 | 8.29 | 11.7 | 359 | 21.8 | 9.15 | <0.0002 | 0.02 | <0.001 | 0.004 | <0.005 | | 0.004 | | <0.005 | <0.001 | <0.050 | <3.0 | <0.010 | <0.050 | 0.844 | | | 195 | 92 | 8.14 | 161 | <10.0 |
| NPDES001 | 7/23/19 | 390 | 159 | 8.29 | 8.54 | 14.2 | 111 | | | | 0.016 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.44 | | <10.0 |
| NPDES001 | 8/5/19 | 510 | | 8.82 | 8.66 | 16.3 | 96.49 | 61.8 | 23.7 | <0.0002 | 0.016 | <0.001 | | <0.005 | | <0.001 | | <0.005 | | <0.050 | <3.0 | <0.010 | 0.056 | 6.69 | | | 532 | 252 | 8.52 | 301 | <10.0 |
| NPDES001 | 8/19/19 | 570 | | 9.05 | 8.66 | 10.2 | 102.3 | | | | 0.014 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.46 | | <10.0 |
| NPDES001 - BIO | 9/5/19 | 510 | 187 | 8.36 | 8.7 | 14.2 | 80.34 | 50.7 | 27.5 | <0.0002 | 0.014 | <0.001 | <0.001 | <0.005 | 0.107 | <0.001 | <0.005 | <0.005 | <0.001 | <0.050 | <3.0 | <0.010 | <0.050 | 4.39 | 0.028 | | 504 | 240 | 8.53 | 285 | <10.0 |
| NPDES001 | 9/16/19 | 540 | 191 | 9.19 | 8.67 | 9.6 | 109 | | | | 0.013 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.44 | | <10.0 |
| NPDES001 | 10/2/19 | 670 | 206 | 10.5 | 8.73 | 5.1 | 61.53 | 61.1 | 28.6 | <0.0002 | 0.012 | <0.001 | 0.001 | <0.005 | | <0.001 | | <0.005 | <0.001 | <0.050 | <3.0 | 0.013 | <0.050 | 9.62 | | | 662 | 270 | 8.57 | 398 | <10.0 |
| NPDES001 | 10/15/19 | | | | | | | | | | | | | | | | | | | | | <0.010 | | | | | | | | | |
| NPDES001 | 10/16/19 | | | | | | | | | | | | | | | | | | | | | <0.010 | | | | | | | | | |
| NPDES001 | 10/23/19 | 540 | 156 | 11.4 | 8.65 | 1.6 | 102.3 | | | | 0.01 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.47 | | <10.0 |
| NPDES001 | 10/31/19 | 560 | | 13.9 | 8.58 | 1 | 127 | | | | 0.013 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.3 | | <10.0 |
| NPDES001 | 11/13/19 | 560 | | 10.9 | 8.45 | 1.5 | 83 | 60.9 | 24.9 | <0.0002 | 0.011 | <0.001 | | <0.005 | | <0.001 | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 4.91 | | | 551 | 254 | 8.51 | 287 | <10.0 |
| NPDES001 | 11/25/19 | 520 | 200 | 11.1 | 8.26 | 1.1 | 96.49 | | | | 0.012 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.56 | | <10.0 |
| NPDES001 | 12/9/19 | 530 | 174 | 11.2 | 8.67 | -0.5 | 96.49 | 63.1 | 25.9 | <0.0002 | 0.01 | <0.001 | | <0.005 | | <0.001 | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 4.99 | | | 534 | 264 | 8.48 | 289 | <10.0 |
| NPDES001 | 12/22/19 | 560 | 230 | 10.7 | 8.36 | 1.7 | 49.14 | | | | 0.012 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.62 | | <10.0 |
| NPDES001 | 1/6/20 | 560 | 204 | 11.8 | 8.63 | -0.5 | 85 | 65.8 | 27.3 | <0.0002 | 0.011 | <0.001 | <0.001 | <0.005 | | <0.001 | | <0.005 | <0.001 | <0.050 | <3.0 | <0.010 | <0.050 | 5.24 | | | 548 | 277 | 8.46 | 313 | <10.0 |
| NPDES001 | 1/21/20 | 540 | 220 | 10.8 | 8.56 | 1.9 | 83 | | | | 0.01 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.55 | | <10.0 |
| NPDES001 | 2/3/20 | 400 | 190 | 11.5 | 8.6 | -0.5 | 70.46 | 66.7 | 28.5 | <0.0002 | 0.01 | <0.001 | | <0.005 | | <0.001 | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 6.17 | | | 567 | 284 | 8.46 | 312 | <10.0 |
| NPDES001 | 2/19/20 | 170 | 212 | 11.5 | 8.93 | -0.6 | | | | | 0.011 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.35 | | <10.0 |
| NPDES001 | 3/4/20 | 500 | 160 | 10.9 | 8.13 | 5.5 | 65.97 | 59.3 | 28.2 | <0.0002 | 0.011 | <0.001 | | <0.005 | | <0.001 | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 5.43 | | | 555 | 264 | 8.59 | 297 | <10.0 |
| NPDES001 | 3/17/20 | 510 | | 11 | 8.52 | 1.2 | 96.49 | | | | 0.013 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.38 | | <10.0 |
| NPDES001 | 3/31/20 | 350 | 157 | 11.3 | 8.33 | 1.7 | 111 | | | | 0.02 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.35 | 179 | <10.0 |
| NPDES001 | 4/13/20 | 460 | 219 | 10.6 | 8.21 | 1.7 | 686.7 | 50.7 | 18.5 | <0.0002 | 0.038 | <0.001 | | <0.005 | | 0.002 | | 0.006 | | <0.050 | <3.0 | <0.010 | <0.050 | 6.84 | | | 455 | 203 | 8.18 | 293 | <10.0 |

Table D-3. Water Quality Results at the CP001/NPDES001 Site From January 5, 2015, Through December 28, 2021 (Page 5 of 6)

| Sample Name | Date Sampled | Cond, Field µmhos/cm | ORP, Field (mV) | DO, Field (mg/L) | pH, Field (SU) | Temp, Field (°C) | Flow, Field (gpm) | Calcium – D (mg/L) | Magnesium – D (mg/L) | Mercury – T (mg/L) | Arsenic – TR (mg/L) | Cadmium – TR (mg/L) | Chromium – TR (mg/L) | Copper – TR (mg/L) | Iron - TR (mg/L) | Lead – TR (mg/L) | Nickel – TR (mg/L) | Selenium – TR (mg/L) | Silver – TR (mg/L) | Zinc - TR (mg/L) | BOD, 5-Day (mg/L) | CN, WAD (mg/L) | N, Ammonia (mg/L) | N, Nitrate (mg/L) | Phosphorus – D (mg/L) | Sulfate (mg/L) | Conductivity (µmhos/cm) | Hardness (mg/L) | pH (SU) | TDS (mg/L) | TSS (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NPDES001 | 4/16/20 | | | | | | | | | | | | | | | | | <0.005 | | | | | | | | | | | | | |
| NPDES001 | 4/29/20 | 150 | 209 | 11.1 | 8.01 | 2.9 | 2432 | | | | 0.026 | | 0.004 | | | | | <0.005 | <0.001 | | <3.0 | <0.010 | <0.050 | | | | | | 7.97 | | <10.0 |
| NPDES001 | 5/11/20 | 180 | 218 | 10.9 | 7.9 | 2.9 | 312.8 | 20 | 8.07 | <0.0002 | 0.019 | <0.001 | | <0.005 | | 0.003 | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 0.667 | | | 180 | 83.1 | 8.05 | 79 | <10.0 |
| NPDES001 | 5/25/20 | 210 | 160 | 10.1 | 8.38 | 6.2 | 212.3 | | | | 0.017 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.36 | | <10.0 |
| NPDES001 | 6/8/20 | 340 | | 9.45 | 8.51 | 13.9 | 16.38 | 39.4 | 17.3 | <0.0002 | 0.016 | <0.001 | | <0.005 | | <0.001 | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 1.69 | | | 336 | 170 | 8.62 | 137 | <10.0 |
| NPDES001 | 6/22/20 | 410 | 116 | 8.76 | 8.52 | 11.7 | 53.09 | | | | 0.015 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.46 | | <10.0 |
| NPDES001 | 7/6/20 | 450 | | 7.57 | 8.43 | 13.3 | 75.4 | 47 | 22.7 | <0.0002 | 0.018 | <0.001 | <0.001 | <0.005 | | <0.001 | | <0.005 | <0.001 | <0.050 | <3.0 | <0.010 | <0.050 | 2.3 | | | 434 | 211 | 8.39 | 198 | <10.0 |
| NPDES001 | 7/21/20 | 460 | 168 | 9.05 | 8.43 | 10.2 | 75.4 | | | | 0.014 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.43 | | <10.0 |
| NPDES001 | 8/3/20 | 430 | | 7.72 | 8.52 | 17.4 | 70.46 | 51.5 | 26 | <0.0002 | 0.014 | <0.001 | | <0.005 | | <0.001 | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 2.77 | | | 452 | 236 | 8.55 | 219 | <10.0 |
| NPDES001 | 8/18/20 | 470 | | 8.79 | 8.62 | 13.4 | 70.46 | | | | 0.013 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.46 | | <10.0 |
| NPDES001 - BIO | 8/26/20 | | | | 8.46 | 12.2 | 49.14 | 54.1 | 26.2 | <0.0002 | 0.012 | <0.001 | <0.001 | <0.005 | <0.050 | <0.001 | <0.005 | <0.005 | <0.001 | <0.050 | | <0.010 | | 3.09 | <0.010 | | | 243 | | 242 | <10.0 |
| NPDES001 | 8/31/20 | 420 | 182 | 9.29 | 8.71 | 11.2 | 70.46 | | | | 0.012 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.68 | | <10.0 |
| NPDES001 | 9/8/20 | 470 | 155 | 9.52 | 8.32 | 7.6 | 85.72 | 52.4 | 25.4 | <0.0002 | 0.011 | <0.001 | | <0.005 | | <0.001 | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 2.75 | | | 467 | 235 | 8.49 | 222 | <10.0 |
| NPDES001 | 9/21/20 | 460 | 157 | 9.36 | 8.62 | 9.9 | 70.46 | | | | 0.012 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.48 | | <10.0 |
| NPDES001 | 10/5/20 | 460 | 160 | 9.47 | 8.89 | 9.6 | 70.46 | 50.9 | 26.8 | <0.0002 | 0.011 | <0.001 | | <0.005 | | <0.001 | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 2.79 | | | 481 | 238 | 8.45 | 235 | <10.0 |
| NPDES001 | 10/19/20 | 480 | 124 | 10.8 | 8.76 | 3.3 | 70.46 | | | | 0.011 | | <0.001 | | | | | <0.005 | <0.001 | | <3.0 | <0.010 | <0.050 | | | | | | 8.43 | | <10.0 |
| NPDES001 | 11/2/20 | 510 | 229 | 10.7 | 8.74 | 3.7 | 70.46 | 57.5 | 25.8 | <0.0002 | 0.011 | <0.001 | | <0.005 | | <0.001 | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 3.27 | | | 501 | 250 | 8.5 | 254 | <10.0 |
| NPDES001 | 11/16/20 | 530 | 167 | 11.6 | 8.7 | 0.9 | 75.4 | | | | 0.01 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | 506 | | 8.45 | | <10.0 |
| NPDES001 | 11/30/20 | 520 | | 11.9 | 8.69 | 0.1 | 75.4 | | | | 0.01 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.42 | | <10.0 |
| NPDES001 | 12/14/20 | 510 | | 11.2 | 8.72 | 1 | 49.14 | 59.3 | 27.9 | <0.0002 | 0.01 | <0.001 | | <0.005 | | <0.001 | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 3.04 | | | 495 | 263 | 8.48 | 143 | <10.0 |
| NPDES001 | 12/29/20 | 520 | | 11.1 | 8.63 | 1.6 | 49.14 | | | | 0.009 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.42 | | <10.0 |
| NPDES001 | 1/12/21 | | | | | | | 61.1 | 28.4 | <0.0002 | 0.01 | <0.001 | <0.001 | <0.005 | | <0.001 | | <0.005 | <0.001 | <0.050 | <3.0 | <0.010 | <0.050 | 3.11 | | | 508 | 269 | 8.44 | 257 | <10.0 |
| NPDES001 | 1/26/21 | 530 | 190 | 11.3 | 8.54 | 0.7 | | | | | 0.008 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.43 | | <10.0 |
| NPDES001 | 2/8/21 | 500 | | 11.1 | 8.45 | -0.3 | | 61 | 27.6 | <0.0002 | 0.012 | <0.001 | | <0.005 | | <0.001 | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 3.07 | | | 516 | 266 | 8.27 | 253 | 11 |
| NPDES001 | 2/23/21 | 500 | 228 | 10.1 | 8.4 | 3.3 | 80 | | | | 0.013 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.43 | | <10.0 |
| NPDES001 | 3/9/21 | 480 | | 9.9 | 8.68 | 4.1 | | 58.3 | 25.1 | <0.0002 | 0.015 | <0.001 | | <0.005 | | <0.001 | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 2.9 | | | 495 | 249 | 8.44 | 250 | <10.0 |
| NPDES001 | 3/23/21 | 480 | | 11.2 | 8.56 | 3.9 | | | | | 0.011 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.54 | | <10.0 |
| NPDES001 | 4/5/21 | 460 | | 9.81 | 8.66 | 5.2 | 53.09 | 55.4 | 25.1 | <0.0002 | 0.014 | <0.001 | <0.001 | <0.005 | | <0.001 | | <0.005 | <0.001 | <0.050 | <3.0 | <0.010 | <0.050 | 2.55 | | | 474 | 242 | 8.5 | 225 | <10.0 |
| NPDES001 | 4/20/21 | 480 | | 11.9 | 8.78 | 1.2 | 57.22 | | | | 0.012 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.47 | | <10.0 |
| NPDES001 | 5/3/21 | 200 | | 11.5 | 8.47 | 6.3 | 330 | 22.5 | 9.4 | <0.0002 | 0.021 | <0.001 | | 0.009 | | 0.004 | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 0.736 | | | 197 | 94.9 | 8.22 | 142 | <10.0 |
| NPDES001 | 5/18/21 | 300 | | 8.39 | 8.62 | 16 | 148.1 | | | | 0.015 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.61 | | <10.0 |
| NPDES001 | 5/31/21 | 290 | | 9.4 | 8.73 | 12.8 | 162.9 | | | | 0.017 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.66 | | <10.0 |
| NPDES001 | 6/14/21 | 390 | | 8.69 | 8.7 | 19.7 | 85.71 | 47.1 | 22.5 | <0.0002 | 0.015 | <0.001 | | <0.005 | | <0.001 | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 2.18 | | | 399 | 210 | 8.59 | 190 | <10.0 |
| NPDES001 | 6/28/21 | 440 | | 9.82 | 8.7 | 12.1 | 75.4 | | | | 0.012 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.6 | | <10.0 |
| NPDES001 | 7/15/21 | 450 | | 9.54 | 8.5 | 16.4 | 70.46 | 53.2 | 22.2 | <0.0002 | 0.026 | <0.001 | <0.001 | <0.005 | | <0.001 | | <0.005 | <0.001 | <0.050 | <3.0 | <0.010 | <0.050 | 6.44 | | | 471 | 224 | 8.56 | 250 | <10.0 |
| NPDES001 | 7/26/21 | 450 | | 8.68 | 8.63 | 17.2 | 70.46 | | | | 0.013 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.56 | 223 | <10.0 |
| NPDES001 | 8/11/21 | 470 | | 9.09 | 8.46 | 10.1 | 70.46 | 58.7 | 28.4 | <0.0002 | 0.011 | <0.001 | | <0.005 | | <0.001 | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 2.92 | | | 487 | 263 | 8.33 | 228 | <10.0 |
| NPDES001 - BIO | 8/23/21 | 480 | | 8.79 | 8.6 | 10.9 | 70.46 | 51.9 | 26.3 | <0.0002 | 0.011 | <0.001 | <0.001 | <0.005 | <0.050 | <0.001 | <0.005 | <0.005 | <0.001 | <0.050 | <3.0 | <0.010 | <0.050 | 2.91 | 0.015 | | 484 | 238 | 8.5 | 242 | <10.0 |
| NPDES001 | 9/6/21 | 500 | | 9.1 | 8.61 | 13.1 | 70.46 | 54.8 | 27.1 | <0.0002 | 0.01 | <0.001 | | <0.005 | | <0.001 | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 2.65 | | | 494 | 248 | 8.54 | 227 | <10.0 |

Table D-3. Water Quality Results at the CP001/NPDES001 Site From January 5, 2015, Through December 28, 2021 (Page 6 of 6)

| Sample Name | Date Sampled | Cond, Field µmhos/cm | ORP, Field (mV) | DO, Field (mg/L) | pH, Field (SU) | Temp, Field (°C) | Flow, Field (gpm) | Calcium – D (mg/L) | Magnesium – D (mg/L) | Mercury – T (mg/L) | Arsenic – TR (mg/L) | Cadmium – TR (mg/L) | Chromium – TR (mg/L) | Copper – TR (mg/L) | Iron - TR (mg/L) | Lead – TR (mg/L) | Nickel – TR (mg/L) | Selenium – TR (mg/L) | Silver – TR (mg/L) | Zinc - TR (mg/L) | BOD, 5-Day (mg/L) | CN, WAD (mg/L) | N, Ammonia (mg/L) | N, Nitrate (mg/L) | Phosphorus – D (mg/L) | Sulfate (mg/L) | Conductivity (µmhos/cm) | Hardness (mg/L) | pH (SU) | TDS (mg/L) | TSS (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NPDES001 | 9/21/21 | 480 | 119 | 9.28 | 8.62 | 9.1 | 70.46 | | | | 0.01 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.44 | | <10.0 |
| NPDES001 | 10/4/21 | 490 | | 9.73 | 8.6 | 9.2 | 70.46 | 62.3 | 26.8 | <0.0002 | 0.01 | <0.001 | <0.001 | <0.005 | | <0.001 | | <0.005 | <0.001 | <0.050 | <3.0 | <0.010 | <0.050 | 3.22 | | | 515 | 266 | 8.42 | 242 | <10.0 |
| NPDES001 | 10/18/21 | 460 | | 10 | 8.65 | 7.7 | 102.3 | | | | 0.013 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.36 | | <10.0 |
| NPDES001 | 11/2/21 | 520 | | 11.7 | 8.48 | 1.1 | 85 | 62.7 | 26.8 | <0.0002 | 0.008 | <0.001 | | <0.005 | | <0.001 | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 2.84 | | | 514 | 267 | 8.37 | 244 | <10.0 |
| NPDES001 | 11/15/21 | 460 | | 10.8 | 8.58 | 5.4 | 49.14 | | | | 0.012 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.49 | | <10.0 |
| NPDES001 | 12/2/21 | 480 | | 10.5 | 8.62 | 4.9 | 49 | 55.7 | 27.5 | <0.0002 | 0.012 | <0.001 | | <0.005 | | <0.001 | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 3.05 | | | 507 | 252 | 8.45 | 246 | <10.0 |
| NPDES001 | 12/13/21 | 470 | | 11.4 | 8.46 | 1.6 | 3 | | | | 0.01 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.45 | | <10.0 |
| NPDES001 | 12/28/21 | 470 | | | 8.55 | -0.5 | | | | | 0.009 | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.17 | | <10.0 |

Notes:
D = dissolved
T = total
TR = total recoverable
CN = cyanide
WAD = Weak Acid Dissociable
N = nitrogen
TDS = total dissolved solids
TSS = total suspended solids

Table D-4. Water Quality Results at the CP005/NPDES005 Site From January 5, 2015, Through December 28, 2021 (Page 1 of 5)

| Sample Name | Date Sampled | Cond, Field µmhos/cm | ORP, Field (mV) | DO, Field (mg/L) | pH, Field (SU) | Temp, Field (°C) | Flow, Field (gpm) | Calcium – D (mg/L) | Magnesium – D (mg/L) | Mercury – T (mg/L) | Arsenic – T (mg/L) | Arsenic – TR (mg/L) | Cadmium – TR (mg/L) | Chromium – TR (mg/L) | Copper – TR (mg/L) | Iron - TR (mg/L) | Lead – TR (mg/L) | Nickel – TR (mg/L) | Selenium – T (mg/L) | Selenium – TR (mg/L) | Silver – TR (mg/L) | Zinc - TR (mg/L) | BOD, 5-Day (mg/L) | CN, WAD (mg/L) | N, Ammonia (mg/L) | N, Nitrate (mg/L) | Phosphorus – D (mg/L) | Sulfate (mg/L) | Conductivity (µmhos/cm) | Hardness (mg/L) | pH (SU) | TDS (mg/L) | TSS (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NPDES005 | 1/5/15 | 550 | 151 | 10.9 | 8.34 | 0.6 | 200 | 59.3 | 22.5 | <0.0002 | | 0.009 | <0.001 | <0.001 | <0.005 | | <0.001 | | | <0.005 | <0.001 | <0.050 | <3.0 | <0.010 | <0.050 | 6.43 | 0.035 | | | 241 | 8.44 | 278 | <10.0 |
| NPDES005 | 1/19/15 | 430 | 194 | 11 | 8.71 | 1.6 | 360 | | | | | 0.011 | | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.53 | | <10.0 |
| NPDES005 | 2/3/15 | | | | | | | 51.5 | 21.2 | <0.0002 | | 0.007 | <0.001 | | <0.005 | | <0.001 | | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 3.81 | 0.032 | | | 216 | 8.4 | 245 | <10.0 |
| NPDES005 | 2/18/15 | 240 | -50 | 11.6 | 8.64 | 0.5 | 850 | | | | | 0.008 | | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.39 | | <10.0 |
| NPDES005 | 3/4/15 | 380 | 97 | 11.3 | 8.48 | 0.5 | 300 | 40.9 | 16.9 | <0.0002 | | 0.007 | <0.001 | | <0.005 | | <0.001 | | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 2.65 | 0.035 | | | 172 | 8.38 | 194 | <10.0 |
| NPDES005 | 3/18/15 | 150 | -32 | 10.9 | 8.43 | 3 | 3300 | | | | | 0.013 | | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.2 | | 10 |
| NPDES005 | 4/1/15 | 180 | 93 | 10.4 | 8.2 | 4.2 | 3670 | 20.5 | 6.51 | <0.0002 | | 0.008 | <0.001 | | <0.005 | | 0.002 | | | <0.005 | | 0.05 | <3.0 | <0.010 | <0.050 | 0.606 | 0.038 | | | 77.9 | 8 | 115 | <10.0 |
| NPDES005 | 4/15/15 | | | | | | | | | | | 0.007 | | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.46 | | <10.0 |
| NPDES005 | 4/30/15 | | | | | | | | | | | 0.006 | | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.47 | | <10.0 |
| NPDES005 | 5/6/15 | 230 | 92 | 9.4 | 8.51 | 8.2 | 590 | 25.8 | 9.38 | <0.0002 | | 0.006 | <0.001 | <0.001 | <0.005 | | <0.001 | | | <0.005 | <0.001 | <0.050 | <3.0 | <0.010 | <0.050 | 0.526 | 0.038 | | | 103 | 8.37 | 134 | 10 |
| NPDES005 | 5/20/15 | 210 | 118 | 10.6 | 8.37 | 4.7 | 5100 | | | | | 0.012 | | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.35 | | <10.0 |
| NPDES005 | 6/2/15 | 240 | 164 | 8.2 | 8.56 | 10.5 | 5810 | 28.6 | 9.15 | <0.0002 | | 0.012 | <0.001 | | <0.005 | | 0.003 | | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 2.11 | 0.039 | | | 109 | 8.25 | 147 | 14 |
| NPDES005 | 6/16/15 | 300 | 36 | 7.82 | 8.48 | 8.5 | 4750 | | | | | 0.014 | | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.31 | | <10.0 |
| NPDES005 | 7/1/15 | 330 | 57 | 9.28 | 8.28 | 8.6 | 2770 | 37.2 | 12.8 | <0.0002 | | 0.012 | <0.001 | | <0.005 | | 0.002 | | | <0.005 | | 0.213 | <3.0 | <0.010 | <0.050 | 3.29 | 0.037 | | | 146 | 8.14 | 206 | <10.0 |
| NPDES005 | 7/13/15 | 250 | 65 | 8.41 | 8.42 | 14 | 1720 | 29.2 | 10.8 | | | 0.012 | | | | | | | | <0.005 | | 0.349 | <3.0 | <0.010 | <0.050 | | | | | 117 | 8.4 | | 10 |
| NPDES005 | 7/29/15 | 390 | 38 | 9.16 | 8.38 | 9.1 | 430 | 40.8 | 16.4 | | | 0.009 | | | | | | | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | | | | | 169 | 8.41 | | <10.0 |
| NPDES005 | 8/12/15 | | | | | | | 59.1 | 22.4 | <0.0002 | | 0.01 | <0.001 | <0.001 | <0.005 | | 0.002 | | | <0.005 | <0.001 | <0.050 | <3.0 | <0.010 | <0.050 | 5.17 | 0.039 | | | 240 | 8.49 | 275 | <10.0 |
| NPDES005 | 8/26/15 | | | | | | | | | | | 0.012 | | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.59 | | 14 |
| NPDES005 | 9/10/15 | 440 | -55 | 9.25 | 8.52 | 9.1 | 390 | 60.9 | 26 | <0.0002 | | 0.01 | <0.001 | | <0.005 | | <0.001 | | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 6.58 | 0.03 | | | 259 | 8.48 | 283 | <10.0 |
| NPDES005 | 9/22/15 | | | | | | | | | | | 0.011 | | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.53 | | <10.0 |
| NPDES005 | 10/8/15 | 590 | 16 | 9.62 | 8.47 | 9 | 365 | | | | | 0.011 | | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.44 | | <10.0 |
| NPDES005 | 10/19/15 | 570 | | 9.3 | 8.32 | 8.5 | 355 | 65.2 | 27.6 | <0.0002 | | 0.015 | <0.001 | | <0.005 | | <0.001 | | | <0.005 | | 0.052 | <3.0 | <0.010 | <0.050 | 6.93 | 0.024 | | 558 | 277 | 8.48 | 328 | <10.0 |
| NPDES005 | 11/4/15 | 570 | | 8.78 | 8.31 | 9.6 | 360 | 59.1 | 27.3 | <0.0002 | | 0.011 | <0.001 | | <0.005 | | <0.001 | | | <0.005 | | 0.058 | <3.0 | <0.010 | <0.050 | 6.9 | 0.025 | | 545 | 260 | 8.48 | 290 | <10.0 |
| NPDES005 | 11/17/15 | 630 | | 10 | 8.61 | 3.7 | 360 | | | | | 0.011 | | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.45 | | <10.0 |
| NPDES005 | 12/2/15 | 620 | | 10 | 8.69 | 4.5 | 350 | 65.1 | 28.6 | <0.0002 | | 0.012 | <0.001 | <0.001 | <0.005 | | <0.001 | | | <0.005 | <0.001 | 0.067 | <3.0 | <0.010 | <0.050 | 7.5 | 0.02 | | 587 | 281 | 8.33 | 323 | <10.0 |
| NPDES005 | 12/14/15 | | | | | | | | | | | 0.012 | | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.49 | | <10.0 |
| NPDES005 | 12/29/15 | 620 | 220 | 9.71 | 8.47 | 5.2 | 350 | | | | | 0.012 | | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.35 | | <10.0 |
| NPDES005 | 1/11/16 | 640 | | 10.4 | 8.6 | 4.5 | 310 | 66.7 | 28.3 | <0.0002 | | 0.012 | <0.001 | <0.001 | <0.005 | | <0.001 | | | <0.005 | <0.001 | <0.050 | <3.0 | <0.010 | <0.050 | 8.49 | 0.016 | | 584 | 283 | 8.38 | 333 | <10.0 |
| NPDES005 | 1/25/16 | 620 | | 10.2 | 8.31 | 4.1 | 300 | | | | | 0.012 | | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.36 | | <10.0 |
| NPDES005 | 2/8/16 | 610 | | 11.3 | 8.79 | 1.9 | 290 | 67.8 | 29.4 | <0.0002 | | 0.012 | <0.001 | | <0.005 | | <0.001 | | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 7.51 | 0.021 | | 586 | 290 | 8.45 | 337 | <10.0 |
| NPDES005 | 2/22/16 | 560 | 5 | 10.4 | 8.78 | 3.5 | 310 | | | | | 0.012 | | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.42 | | <10.0 |
| NPDES005 | 3/7/16 | 530 | | 10.2 | 8.74 | 5.5 | 350 | 55.5 | 21.9 | <0.0002 | | 0.012 | <0.001 | | <0.005 | | <0.001 | | | <0.005 | | 0.061 | <3.0 | <0.010 | <0.050 | 5.38 | 0.026 | | 472 | 229 | 8.34 | 254 | <10.0 |
| NPDES005 | 3/21/16 | 340 | | 8.9 | 7.87 | 9.4 | 375 | | | | | 0.008 | | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.2 | | <10.0 |
| NPDES005 | 4/4/16 | 250 | | 11.1 | 8.77 | 5.5 | 1100 | 28.4 | 10.3 | <0.0002 | | 0.006 | <0.001 | <0.001 | <0.005 | | 0.001 | | | <0.005 | <0.001 | <0.050 | <3.0 | <0.010 | <0.050 | 1.51 | 0.032 | | 252 | 113 | 8.1 | 149 | <10.0 |
| NPDES005 | 4/18/16 | 200 | | 10 | 8.27 | 5.2 | 1000 | | | | | 0.007 | | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.17 | | <10.0 |
| NPDES005 | 5/2/16 | 190 | | 9.8 | 8.56 | 9.5 | 1550 | 21.7 | 7.53 | <0.0002 | | 0.007 | <0.001 | | <0.005 | | 0.001 | | | <0.005 | | 0.057 | <3.0 | <0.010 | <0.050 | 0.971 | 0.038 | | 195 | 85.2 | 8.24 | 102 | <10.0 |
| NPDES005 | 5/16/16 | 230 | | 11.8 | 8.68 | 10.8 | 400 | | | | | 0.007 | | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.39 | | <10.0 |
| NPDES005 | 6/1/16 | 260 | | 12.7 | 8.56 | 7.4 | 404 | 30.6 | 11.1 | <0.0002 | | 0.007 | <0.001 | | <0.005 | | <0.001 | | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 1.35 | 0.032 | | 267 | 122 | 8.26 | 112 | <10.0 |
| NPDES005 | 6/13/16 | 330 | | 10.1 | 8.55 | 16.3 | 359 | | | | | 0.008 | | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.49 | | <10.0 |
| NPDES005 | 6/27/16 | 400 | | 10.5 | 8.59 | 18.4 | 350 | | | | | 0.009 | | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.55 | | <10.0 |
| NPDES005 | 7/13/16 | 450 | | 10.8 | 8.65 | 14.7 | 305 | 49.6 | 22.8 | <0.0002 | | 0.01 | <0.001 | <0.001 | <0.005 | | <0.001 | | | <0.005 | <0.001 | <0.050 | <3.0 | <0.010 | <0.050 | 3.56 | 0.028 | | 447 | 218 | 8.54 | 246 | <10.0 |

Table D-4. Water Quality Results at the CP005/NPDES005 Site From January 5, 2015, Through December 28, 2021 (Page 2 of 5)

| Sample Name | Date Sampled | Cond, Field µmhos/cm | ORP, Field (mV) | DO, Field (mg/L) | pH, Field (SU) | Temp, Field (°C) | Flow, Field (gpm) | Calcium – D (mg/L) | Magnesium – D (mg/L) | Mercury – T (mg/L) | Arsenic – T (mg/L) | Arsenic – TR (mg/L) | Cadmium – TR (mg/L) | Chromium – TR (mg/L) | Copper – TR (mg/L) | Iron - TR (mg/L) | Lead – TR (mg/L) | Nickel – TR (mg/L) | Selenium – T (mg/L) | Selenium – TR (mg/L) | Silver – TR (mg/L) | Zinc - TR (mg/L) | BOD, 5-Day (mg/L) | CN, WAD (mg/L) | N, Ammonia (mg/L) | N, Nitrate (mg/L) | Phosphorus – D (mg/L) | Sulfate (mg/L) | Conductivity (µmhos/cm) | Hardness (mg/L) | pH (SU) | TDS (mg/L) | TSS (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NPDES005 | 7/25/16 | 490 | | 10.3 | 8.52 | 17.7 | 290 | | | | | 0.01 | | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.5 | | <10.0 |
| NPDES005 | 8/8/16 | 510 | | 10.8 | 8.43 | 15.4 | 175 | 59.7 | 26.3 | <0.0002 | | 0.011 | <0.001 | | <0.005 | | <0.001 | | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 4.71 | 0.028 | | 501 | 258 | 8.46 | 288 | <10.0 |
| NPDES005 | 8/19/16 | 370 | | 11.3 | 8.42 | 11 | 450 | 42.1 | 42.5 | <0.0002 | | 0.018 | <0.001 | | <0.005 | | 0.005 | | | <0.005 | | <0.050 | 3.6 | <0.010 | <0.050 | 2.76 | 0.05 | | 363 | 280 | 8.14 | 227 | 300 |
| NPDES005 | 8/24/16 | 460 | | 8.95 | 8.72 | 12.1 | 400 | | | | | | | | | | | | | | | | | | | | | | | | | <10.0 |
| NPDES005 | 8/29/16 | 470 | | 10.1 | 8.69 | 17.2 | 400 | | | | | 0.012 | | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.51 | | <10.0 |
| NPDES005 | 9/12/16 | 510 | | 11.8 | 8.53 | 8.4 | 135 | 56.6 | 25 | <0.0002 | | 0.011 | <0.001 | <0.001 | <0.005 | 0.061 | <0.001 | <0.005 | | <0.005 | <0.001 | 0.058 | 3.6 | <0.010 | <0.050 | 5.2 | 0.029 | | 505 | 244 | 8.4 | 266 | 24 |
| NPDES005 | 9/26/16 | 460 | | 12.4 | 8.67 | 11.3 | 180 | | | | | 0.01 | | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.44 | | <10.0 |
| NPDES005 | 10/10/16 | 480 | | 12.3 | 8.62 | 10.3 | 100 | 53.9 | 24.2 | <0.0002 | | 0.011 | <0.001 | | <0.005 | | <0.001 | | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 1.96 | 0.024 | | 478 | 234 | 8.39 | 255 | <10.0 |
| NPDES005 | 10/24/16 | 480 | | 13.4 | 8.74 | 10.3 | 120 | 54.8 | 24.4 | | | 0.011 | | <0.001 | | | | | | <0.005 | <0.001 | | <3.0 | <0.010 | <0.050 | | | | | 237 | 8.43 | | <10.0 |
| NPDES005 | 11/7/16 | 490 | | 13 | 8.72 | 7.3 | 90 | 55.5 | 27 | <0.0002 | | 0.011 | <0.001 | | <0.005 | | <0.001 | | | <0.005 | | 0.141 | <3.0 | <0.010 | <0.050 | 3.98 | 0.026 | | 493 | 250 | 8.53 | 262 | <10.0 |
| NPDES005 | 11/21/16 | 470 | | 13.4 | 8.8 | 4.9 | 100 | | | | | 0.011 | | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.46 | | <10.0 |
| NPDES005 | 12/5/16 | 460 | | 13.5 | 8.57 | 3.7 | 80 | 54.1 | 25.3 | <0.0002 | | 0.011 | <0.001 | | <0.005 | | <0.001 | | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 2.41 | 0.031 | | 478 | 239 | 8.34 | 263 | <10.0 |
| NPDES005 | 12/19/16 | 470 | 164 | 10.3 | 10.3 | 2.8 | 80 | | | | | 0.012 | | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.27 | | <10.0 |
| NPDES005 | 1/3/17 | 510 | | 14.3 | 8.56 | 1.6 | 80 | 60.3 | 26.6 | <0.0002 | | 0.013 | <0.001 | | <0.005 | | <0.001 | | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 2.67 | 0.042 | | 506 | 260 | 8.31 | 262 | <10.0 |
| NPDES005 | 1/16/17 | 500 | | 10.9 | 8.49 | 6.8 | 80 | 58.7 | 27.1 | | | 0.014 | | <0.001 | | | | | | <0.005 | <0.001 | | <3.0 | <0.010 | <0.050 | | | | | 258 | 8.33 | | <10.0 |
| NPDES005 | 1/30/17 | 480 | | 13.2 | 7.74 | 3.7 | 100 | | | | | 0.017 | | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.35 | | <10.0 |
| NPDES005 | 2/7/17 | 470 | | 11.7 | 8.2 | 4.3 | 90 | 59.3 | 26.4 | <0.0002 | | 0.014 | <0.001 | | <0.005 | | <0.001 | | | <0.005 | | 0.058 | <3.0 | <0.010 | <0.050 | 2.43 | 0.049 | | 482 | 257 | 8.42 | 259 | <10.0 |
| NPDES005 | 2/13/17 | 480 | | 12.3 | 8.54 | 1.6 | 110 | | | | | 0.015 | | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.36 | | <10.0 |
| NPDES005 | 2/27/17 | 480 | | 14.4 | 8.59 | 1.5 | 100 | | | | | 0.014 | | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.29 | | <10.0 |
| NPDES005 | 3/14/17 | 490 | | 14.1 | 8.63 | 1 | 120 | 58 | 24.3 | <0.0002 | | 0.013 | <0.001 | | <0.005 | | <0.001 | | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 2.32 | 0.037 | | 462 | 245 | 8.43 | 244 | <10.0 |
| NPDES005 | 3/27/17 | 270 | | 13.7 | 8.63 | 3.1 | 375 | | | | | 0.007 | | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.27 | | <10.0 |
| NPDES005 | 4/11/17 | 310 | | 14.1 | 8.77 | 2.3 | 450 | 34.9 | 13.7 | <0.0002 | | 0.007 | <0.001 | <0.001 | <0.005 | | <0.001 | | | <0.005 | <0.001 | <0.050 | <3.0 | <0.010 | <0.050 | 1.08 | 0.08 | | 297 | 144 | 8.32 | 159 | <10.0 |
| NPDES005 | 4/19/17 | 240 | | 12.6 | 8.86 | 6.6 | 600 | 27.6 | 9.54 | <0.0002 | | 0.007 | <0.001 | <0.001 | <0.005 | | <0.001 | | | <0.005 | 0.001 | <0.050 | <3.0 | <0.010 | <0.050 | 0.739 | 0.03 | | 240 | 108 | 8.3 | 108 | 12 |
| NPDES005 | 4/27/17 | 260 | | 13.4 | 8.44 | 7.8 | 315 | 30 | 11.3 | <0.0002 | | 0.008 | <0.001 | <0.001 | <0.005 | | <0.001 | | | <0.005 | <0.001 | <0.050 | <3.0 | <0.010 | <0.050 | 0.893 | 0.018 | | 263 | 121 | 8.41 | 127 | <10.0 |
| NPDES005 | 5/1/17 | 280 | | 13.4 | 8.51 | 5.2 | 325 | 34.2 | 12.1 | <0.0002 | | 0.008 | <0.001 | | <0.005 | | <0.001 | | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 1.07 | <0.010 | | 277 | 135 | 8.42 | 144 | <10.0 |
| NPDES005 | 5/17/17 | 260 | | 11.8 | 8.29 | 8.6 | 350 | | | | | 0.008 | | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.25 | | 10 |
| NPDES005 | 5/29/17 | 240 | | 10.9 | 8.38 | 11.6 | 540 | | | | | 0.008 | | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.33 | | 20 |
| NPDES005 | 6/12/17 | 260 | | 9.02 | 8.56 | 17.5 | 225 | 30.9 | 10.9 | <0.0002 | | 0.008 | <0.001 | | <0.005 | | <0.001 | | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 0.675 | 0.04 | | 260 | 122 | 8.37 | 139 | 16 |
| NPDES005 | 6/26/17 | 390 | | 9.55 | 8.54 | 8.6 | 225 | | | | | 0.008 | | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.34 | | 10 |
| NPDES005 | 7/10/17 | 470 | | 9.1 | 8.46 | 13.1 | 95 | 53.8 | 22.2 | <0.0002 | | 0.011 | <0.001 | <0.001 | <0.005 | | <0.001 | | | <0.005 | <0.001 | 0.068 | <3.0 | <0.010 | <0.050 | 4.2 | 0.038 | | 457 | 226 | 8.42 | 247 | <10.0 |
| NPDES005 | 7/24/17 | 420 | | 8.2 | 8.3 | 16.6 | 100 | | | | | 0.012 | | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.43 | | <10.0 |
| NPDES005 | 8/7/17 | 420 | | 8.65 | 8.63 | 14.6 | 90 | 56 | 24.2 | <0.0002 | | 0.015 | <0.001 | | <0.005 | | <0.001 | | | <0.005 | | 0.077 | <3.0 | <0.010 | <0.050 | 1.57 | 0.104 | | 422 | 240 | 8.48 | 243 | 16 |
| NPDES005 | 8/21/17 | 450 | | 8.5 | 8.57 | 13.8 | 110 | | | | | 0.018 | | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.51 | | <10.0 |
| NPDES005 | 9/6/17 | 470 | | 8.6 | 8.59 | 10.3 | 89 | 56.4 | 26 | <0.0002 | | 0.017 | <0.001 | | <0.005 | | <0.001 | | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 2.24 | 0.03 | | 448 | 248 | 8.54 | 238 | <10.0 |
| NPDES005 | 9/7/17 | | | | | | | | | | | | | | | | | | | | | | <3.0 | | | | | | | | | | |
| NPDES005 | 9/18/17 | 460 | | 8.29 | 8.61 | 9.5 | 100 | | | | | 0.02 | | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.47 | | <10.0 |
| NPDES005 | 10/2/17 | 380 | | 9.64 | 8.53 | 5.8 | 180 | 44.6 | 20.5 | <0.0002 | | 0.016 | <0.001 | <0.001 | <0.005 | | 0.003 | | | <0.005 | <0.001 | <0.050 | 3.3 | <0.010 | <0.050 | 1.27 | 0.046 | | 386 | 196 | 8.26 | 223 | 75 |
| NPDES005 | 10/16/17 | 480 | | 9.3 | 8.68 | 7.1 | 190 | | | | | 0.013 | | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.45 | | <10.0 |
| NPDES005 | 10/30/17 | 560 | | 11.1 | 8.53 | 1.4 | 150 | | | | | 0.014 | | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.39 | | 10 |
| NPDES005 | 11/13/17 | 560 | | 10.2 | 8.64 | 1.6 | 120 | 64.6 | 29.3 | <0.0002 | | 0.015 | <0.001 | | <0.005 | | <0.001 | | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 4.8 | 0.031 | 29.2 | 559 | 282 | 8.42 | 307 | <10.0 |
| NPDES005 | 11/27/17 | 540 | | 9.79 | 8.6 | 5.6 | 80 | | | | | 0.013 | | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.47 | | <10.0 |

Table D-4. Water Quality Results at the CP005/NPDES005 Site From January 5, 2015, Through December 28, 2021 (Page 3 of 5)

| Sample Name | Date Sampled | Cond, Field µmhos/cm | ORP, Field (mV) | DO, Field (mg/L) | pH, Field (SU) | Temp, Field (°C) | Flow, Field (gpm) | Calcium – D (mg/L) | Magnesium – D (mg/L) | Mercury – T (mg/L) | Arsenic – T (mg/L) | Arsenic – TR (mg/L) | Cadmium – TR (mg/L) | Chromium – TR (mg/L) | Copper – TR (mg/L) | Iron - TR (mg/L) | Lead – TR (mg/L) | Nickel – TR (mg/L) | Selenium – T (mg/L) | Selenium – TR (mg/L) | Silver – TR (mg/L) | Zinc - TR (mg/L) | BOD, 5-Day (mg/L) | CN, WAD (mg/L) | N, Ammonia (mg/L) | N, Nitrate (mg/L) | Phosphorus – D (mg/L) | Sulfate (mg/L) | Conductivity (µmhos/cm) | Hardness (mg/L) | pH (SU) | TDS (mg/L) | TSS (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NPDES005 | 12/4/17 | 570 | | 11.9 | 8.64 | 3.2 | 150 | 62.4 | 30 | <0.0002 | | 0.021 | <0.001 | | <0.005 | | 0.002 | | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 5.29 | 0.047 | | 558 | 279 | 8.35 | 271 | 60 |
| NPDES005 | 12/18/17 | 600 | | 11.6 | 8.61 | 4.5 | 150 | | | | | 0.016 | | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | 8.4 | | 15 |
| NPDES005 | 1/4/18 | 590 | | 11 | 8.38 | 1.4 | 130 | 64.7 | 29.6 | <0.0002 | | 0.006 | <0.001 | <0.001 | <0.005 | | <0.001 | | | <0.005 | <0.001 | <0.050 | <3.0 | <0.010 | <0.050 | 5.66 | 0.037 | | 572 | 283 | 8.31 | 277 | <10.0 |
| NPDES005 | 1/15/18 | 600 | | 10.5 | 8.57 | -0.2 | 95 | | | | | 0.015 | | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | 8.42 | | <10.0 |
| NPDES005 | 1/29/18 | 600 | | 10.7 | 8.59 | 1.8 | 110 | | | | | 0.015 | | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | 8.41 | | <10.0 |
| NPDES005 | 2/12/18 | 580 | | 10.8 | 8.52 | 1.4 | 110 | 37 | 28.5 | <0.0002 | | 0.014 | <0.001 | | <0.005 | | <0.001 | | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 3.04 | 0.036 | | 527 | 210 | 8.4 | 274 | 12 |
| NPDES005 | 2/26/18 | 510 | | 11.2 | 8.48 | 2.4 | 95 | | | | | 0.016 | | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | 8.37 | | <10.0 |
| NPDES005 | 3/12/18 | 500 | | 11.8 | 8.54 | 4 | 120 | 58.7 | 26.1 | <0.0002 | | 0.014 | <0.001 | | <0.005 | | <0.001 | | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 2.98 | 0.035 | | 507 | 254 | 8.4 | 272 | <10.0 |
| NPDES005 | 3/26/18 | 430 | | 11 | 7.18 | -0.7 | 179 | | | | | 0.011 | | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | 8.39 | | <10.0 |
| NPDES005 | 4/11/18 | 400 | | 10.5 | 7.45 | 4.6 | 448 | 43.2 | 16.9 | <0.0002 | | 0.01 | <0.001 | <0.001 | <0.005 | | <0.001 | | | <0.005 | <0.001 | <0.050 | <3.0 | <0.010 | <0.050 | 1.72 | 0.026 | | 366 | 178 | 8.25 | 192 | <10.0 |
| NPDES005 | 4/25/18 | 190 | | 10.8 | 7.7 | 4.4 | 710 | | | | | 0.012 | | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | 8.04 | | <10.0 |
| NPDES005 | 5/10/18 | 160 | | 10.5 | 7.8 | 5.4 | 1570 | 18.9 | 4.74 | <0.0002 | | 0.008 | <0.001 | | <0.005 | | 0.001 | | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 0.392 | 0.031 | | 155 | 66.7 | 7.86 | 110 | <10.0 |
| NPDES005 | 5/21/18 | 190 | | 9.76 | 7.23 | 5.8 | 1000 | | | | | 0.008 | | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | 8.07 | | <10.0 |
| NPDES005 | 6/4/18 | 200 | | 8.74 | 8.04 | 14.1 | 1600 | 20.7 | 6.52 | <0.0002 | | 0.012 | <0.001 | | <0.005 | | 0.004 | | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 0.783 | 0.048 | | 186 | 78.6 | 8.04 | 121 | 16 |
| NPDES005 | 6/12/18 | | | 8.94 | 8.38 | | | 28.1 | 9.8 | | | | | | | | 0.001 | | | | | | | | | | | | 110 | | | |
| NPDES005 | 6/14/18 | | | | | | | 31.4 | 10.7 | | | | | | | | <0.001 | | | | | | | | | | | | 122 | | | |
| NPDES005 | 6/18/18 | 250 | | 9.14 | 7.49 | 9.6 | 400 | 28.6 | 10.7 | <0.0002 | | 0.032 | <0.001 | 0.022 | 0.009 | | 0.009 | | | <0.005 | <0.001 | 0.071 | <3.0 | <0.010 | <0.050 | 1.31 | 0.058 | | 238 | 115 | 8.1 | 188 | 266 |
| NPDES005 | 6/27/18 | | | | | | | 19.4 | 5.79 | | | | | | | | 0.002 | | | | | | | | | | | | 72.4 | | | |
| NPDES005 | 6/28/18 | | | | | | | 20.1 | 5.93 | | | | | | | | 0.002 | | | | | | | | | | | | 74.5 | | | |
| NPDES005 | 7/3/18 | 210 | | 9.41 | 7.84 | 9.4 | 1400 | 23.9 | 7.68 | <0.0002 | | 0.008 | <0.001 | 0.001 | <0.005 | | 0.001 | | | <0.005 | <0.001 | <0.050 | <3.0 | <0.010 | <0.050 | 0.781 | 0.038 | | 221 | 91.2 | 8.17 | 124 | <10.0 |
| NPDES005 | 7/16/18 | 330 | | 8.79 | 7.8 | 10.6 | 590 | | | | | 0.009 | | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | 8.26 | | <10.0 |
| NPDES005 | 7/31/18 | 280 | | 9.55 | 7.88 | 8.1 | 600 | | | | | 0.008 | | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | 8.22 | | 10 |
| NPDES005 | 8/13/18 | 390 | | 8.18 | 8.22 | 13.6 | 400 | 38.3 | 14.6 | | | 0.009 | <0.001 | | <0.005 | | <0.001 | | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 2.75 | 0.038 | | 373 | 156 | 8.38 | 212 | <10.0 |
| NPDES005 | 8/28/18 | 320 | 193 | 9.28 | 7.96 | 8.4 | 400 | 34.9 | 11.7 | <0.0002 | | 0.007 | <0.001 | <0.001 | <0.005 | 0.388 | <0.001 | <0.005 | | <0.005 | <0.001 | <0.050 | <3.0 | <0.010 | <0.050 | 1.49 | 0.038 | | | 136 | 8.37 | 152 | 10 |
| NPDES005 | 9/10/18 | 500 | | 8.34 | 8.4 | 11.3 | 71.8 | 45.6 | 18.8 | <0.0002 | | 0.009 | <0.001 | | <0.005 | | <0.001 | | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 4.99 | 0.041 | | 471 | 191 | 8.56 | 252 | 12 |
| NPDES005 | 9/24/18 | | | | | | | | | | | 0.006 | | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | 8.5 | | <10.0 |
| NPDES005 | 10/10/18 | 530 | | 10.9 | 8.44 | 0.8 | 125 | 56.5 | 23.7 | <0.0002 | | 0.008 | <0.001 | <0.001 | <0.005 | | <0.001 | | | <0.005 | <0.001 | <0.050 | <3.0 | <0.010 | <0.050 | 5.98 | 0.028 | | 540 | 239 | 8.44 | 285 | <10.0 |
| NPDES005 | 10/24/18 | 420 | 205 | 9.84 | 8.06 | 4.1 | 70 | | | | | 0.01 | | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | 8.27 | | <10.00 |
| NPDES005 | 11/5/18 | 360 | | 11 | 8.15 | 1.2 | 75 | 40.6 | 16.2 | <0.0002 | | 0.01 | <0.001 | | <0.005 | | <0.001 | | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 1.14 | 0.039 | | 356 | 168 | 8.37 | 172 | <10.0 |
| NPDES005 | 11/20/18 | 430 | | 11 | 7.72 | 1 | 100 | | | | | 0.009 | | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | 8.39 | | <10.0 |
| NPDES005 | 12/10/18 | 480 | 220 | 0.92 | 7.93 | -0.5 | 100 | 54.1 | 24.1 | <0.0002 | | 0.014 | <0.001 | | <0.005 | | <0.001 | | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 2.42 | 0.036 | | 475 | 234 | 8.32 | 245 | <10.0 |
| NPDES005 | 12/26/18 | 470 | 144 | 11.1 | 8.25 | 0.4 | 100 | | | | | 0.012 | | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | 8.49 | | <10.0 |
| NPDES005 | 1/7/19 | 470 | 211 | 10.8 | 8.19 | 0.5 | 95 | 53.8 | 25.2 | <0.0002 | | 0.012 | <0.001 | <0.001 | <0.005 | | <0.001 | | | <0.005 | <0.001 | <0.050 | <3.0 | <0.010 | <0.050 | 2.47 | 0.042 | | 475 | 238 | 8.32 | 236 | <10.0 |
| NPDES005 | 1/21/19 | 510 | | 10.9 | 8.3 | 1.7 | 95 | | | | | 0.012 | | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | 8.36 | | <10.0 |
| NPDES005 | 2/4/19 | 510 | 212 | 11.4 | 8.24 | -0.6 | 100 | 58.9 | 26.5 | <0.0002 | | 0.013 | <0.001 | | <0.005 | | <0.001 | | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 2.71 | 0.031 | | 506 | 256 | 8.34 | 249 | <10.0 |
| NPDES005 | 2/19/19 | 510 | 231 | 10.7 | 7.85 | -3 | 100 | | | | | 0.014 | | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | 8.48 | | <10.0 |
| NPDES005 | 3/6/19 | 500 | 218 | 11.4 | 7.72 | -0.3 | 100 | 53 | 24.7 | <0.0002 | | 0.014 | <0.001 | | <0.005 | | <0.001 | | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 2.56 | 0.032 | | 492 | 234 | 8.31 | 215 | <10.0 |
| NPDES005 | 3/19/19 | 470 | 204 | 9.72 | 7.8 | 2.4 | 100 | | | | | 0.015 | | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | 8.22 | | <10.0 |
| NPDES005 | 4/1/19 | 230 | 214 | 11.1 | 7.66 | 1.3 | 235 | 27.3 | 8.76 | <0.0002 | | 0.008 | <0.001 | 0.002 | <0.005 | | 0.002 | | | <0.005 | <0.001 | <0.050 | <3.0 | <0.010 | <0.050 | 0.833 | 0.034 | | 235 | 104 | 8.01 | 100 | <10.0 |
| NPDES005 | 4/17/19 | 180 | | 10.4 | 7.5 | 4 | 4730 | | | | | 0.009 | | 0.002 | | | | | | <0.005 | <0.001 | | <3.0 | <0.010 | <0.050 | | | | | 8 | | 31 |
| NPDES005 | 4/30/19 | 160 | 202 | 11.4 | 8.08 | 1.5 | 3580 | | | | | 0.007 | | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | 7.98 | | <10.0 |

Table D-4. Water Quality Results at the CP005/NPDES005 Site From January 5, 2015, Through December 28, 2021 (Page 4 of 5)

| Sample Name | Date Sampled | Cond, Field µmhos/cm | ORP, Field (mV) | DO, Field (mg/L) | pH, Field (SU) | Temp, Field (°C) | Flow, Field (gpm) | Calcium – D (mg/L) | Magnesium – D (mg/L) | Mercury – T (mg/L) | Arsenic – T (mg/L) | Arsenic – TR (mg/L) | Cadmium – TR (mg/L) | Chromium – TR (mg/L) | Copper – TR (mg/L) | Iron - TR (mg/L) | Lead – TR (mg/L) | Nickel – TR (mg/L) | Selenium – T (mg/L) | Selenium – TR (mg/L) | Silver – TR (mg/L) | Zinc - TR (mg/L) | BOD, 5-Day (mg/L) | CN, WAD (mg/L) | N, Ammonia (mg/L) | N, Nitrate (mg/L) | Phosphorus – D (mg/L) | Sulfate (mg/L) | Conductivity (µmhos/cm) | Hardness (mg/L) | pH (SU) | TDS (mg/L) | TSS (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NPDES005 | 5/14/19 | 170 | | 9.78 | 7.8 | 6.9 | 3860 | 19.2 | 5.45 | <0.0002 | | 0.008 | <0.001 | | <0.005 | | 0.001 | | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 0.379 | 0.036 | | 164 | 70.4 | 8.01 | 122 | 14 |
| NPDES005 | 5/27/19 | 140 | 234 | 9.59 | 8.27 | 6.9 | 18600 | 17.9 | 5.29 | <0.0002 | | 0.016 | <0.001 | 0.004 | <0.005 | | 0.004 | | | <0.005 | <0.001 | <0.050 | <3.0 | <0.010 | <0.050 | 0.628 | 0.043 | | 149 | 66.6 | 7.95 | 108 | 44 |
| NPDES005 | 6/14/19 | 250 | | 9.69 | 8.13 | 6.3 | 800 | 26.3 | 8.78 | <0.0002 | | 0.007 | <0.001 | | <0.005 | | <0.001 | | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 0.514 | 0.027 | | 239 | 102 | 8.17 | 124 | <10.0 |
| NPDES005 | 6/26/19 | 240 | | 9.9 | 8.38 | 10.3 | 1200 | | | | | 0.009 | | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.4 | | 21 |
| NPDES005 | 7/8/19 | 200 | 158 | 8.6 | 8.33 | 11.7 | 2630 | 23.5 | 6.95 | <0.0002 | | 0.011 | <0.001 | 0.002 | <0.005 | | 0.003 | | | <0.005 | <0.001 | <0.050 | <3.0 | <0.010 | <0.050 | 0.315 | 0.039 | | 194 | 87.3 | 8.24 | 138 | 15 |
| NPDES005 | 7/23/19 | 270 | 0.94 | 8.27 | 8.46 | 14.5 | 800 | 33.8 | 10.3 | | | 0.009 | | | | | <0.001 | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | 127 | 8.35 | | <10.0 |
| NPDES005 | 8/5/19 | 360 | | 8.65 | 8.53 | 17 | 725 | 44.7 | 15.2 | <0.0002 | | 0.012 | <0.001 | | <0.005 | | <0.001 | | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 2.42 | 0.043 | | 369 | 174 | 8.4 | 192 | <10.0 |
| NPDES005 | 8/19/19 | 430 | 220 | 8.95 | 8.54 | 9.7 | 540 | | | | | 0.012 | | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.37 | | <10.0 |
| NPDES005 - BIO | 9/5/19 | 420 | 208 | 8.2 | 8.58 | 13.9 | 320 | 42.3 | 20.1 | <0.0002 | | 0.013 | <0.001 | 0.001 | <0.005 | 0.437 | <0.001 | <0.005 | | <0.005 | <0.001 | <0.050 | <3.0 | <0.010 | <0.050 | 2.31 | 0.039 | | 410 | 188 | 8.42 | 232 | 12 |
| NPDES005 | 9/16/19 | 450 | 205 | 8.94 | 8.56 | 9.2 | 205 | | | | | 0.011 | | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.34 | | <10.0 |
| NPDES005 | 10/2/19 | 490 | 245 | 10.1 | 8.57 | 4.6 | 290 | 45.8 | 20 | <0.0002 | | 0.009 | <0.001 | <0.001 | <0.005 | | <0.001 | | | <0.005 | <0.001 | <0.050 | <3.0 | <0.010 | <0.050 | 4.38 | 0.034 | | 474 | 196 | 8.46 | 259 | <10.0 |
| NPDES005 | 10/23/19 | 460 | 177 | 11.2 | 8.5 | 0.6 | 280 | | | | | 0.009 | | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.38 | | <10.0 |
| NPDES005 | 10/31/19 | 420 | | 15.6 | 8.35 | 1.9 | 270 | | | | | 0.009 | | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.23 | | <10.0 |
| NPDES005 | 11/13/19 | 450 | | 11.1 | 7.78 | 0.7 | | 47.6 | 18.9 | <0.0002 | | 0.009 | <0.001 | | <0.005 | | <0.001 | | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 2.64 | 0.031 | | 435 | 197 | 8.35 | 194 | <10.0 |
| NPDES005 | 11/25/19 | 370 | | 10.7 | 7.24 | 1.3 | 260 | | | | | 0.007 | | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.39 | | <10.0 |
| NPDES005 | 12/9/19 | 430 | 184 | 11.1 | 8.18 | -0.3 | 250 | 49.7 | 18.9 | <0.0002 | | 0.008 | <0.001 | | <0.005 | | <0.001 | | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 2.89 | 0.034 | | 421 | 202 | 8.38 | 189 | <10.0 |
| NPDES005 | 12/22/19 | 440 | 224 | 10.7 | 7.54 | 3.3 | 250 | | | | | 0.009 | | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.49 | | <10.0 |
| NPDES005 | 1/6/20 | 470 | 212 | 11.4 | 8.32 | -0.4 | 130 | 55.5 | 21.8 | <0.0002 | | 0.009 | <0.001 | <0.001 | <0.005 | | <0.001 | | | <0.005 | <0.001 | <0.050 | <3.0 | <0.010 | <0.050 | 3.29 | 0.037 | | 461 | 229 | 8.41 | 203 | <10.0 |
| NPDES005 | 1/21/20 | 470 | 251 | 9.94 | 8.52 | 1.7 | | | | | | 0.01 | | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.47 | | <10.0 |
| NPDES005 | 2/3/20 | 500 | 195 | 10.9 | 8.43 | -0.4 | | 57.3 | 23.3 | <0.0002 | | 0.009 | <0.001 | | <0.005 | | <0.001 | | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 4.15 | 0.033 | | 487 | 239 | 8.28 | 272 | <10.0 |
| NPDES005 | 2/19/20 | 520 | 209 | 11.4 | 8.38 | -0.6 | | | | | | 0.01 | | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.38 | | <10.0 |
| NPDES005 | 3/4/20 | 490 | 191 | 12 | 7.49 | 2.2 | | 52.8 | 22.7 | <0.0002 | | 0.009 | <0.001 | | <0.005 | | <0.001 | | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 3.78 | 0.03 | | 470 | 225 | 8.46 | 228 | <10.0 |
| NPDES005 | 3/17/20 | 320 | | 11 | 8.62 | 3.1 | 300 | | | | | 0.009 | | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.19 | | <10.0 |
| NPDES005 | 3/31/20 | 220 | 199 | 11 | 7.92 | 1.3 | 350 | | | | | 0.01 | | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.07 | 136 | 14 |
| NPDES005 | 4/13/20 | 260 | 262 | 10.6 | 7.77 | 0.4 | 555 | 32.8 | 9.18 | <0.0002 | | 0.019 | <0.001 | | <0.005 | | 0.003 | | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 2.22 | 0.035 | | 259 | 120 | 8.12 | 133 | 14 |
| NPDES005 | 4/29/20 | 170 | 248 | 10.5 | 7.29 | 2.8 | 5800 | 18.8 | 4.98 | | | 0.011 | | 0.003 | | | | | | <0.005 | <0.001 | | <3.0 | <0.010 | <0.050 | | | | | 67.4 | 7.91 | | 15 |
| NPDES005 | 5/11/20 | 228 | 226 | 10.5 | 7.98 | 2.5 | 2000 | 20.6 | 5.86 | <0.0002 | | 0.008 | <0.001 | | <0.005 | | 0.001 | | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 0.456 | 0.059 | | 172 | 75.5 | 8.12 | 102 | <10.0 |
| NPDES005 | 5/25/20 | 180 | 177 | 9.98 | 8.01 | 5.9 | 2130 | | | | | 0.009 | | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.35 | | 13 |
| NPDES005 | 6/8/20 | 230 | | 8.81 | 8.14 | 14.7 | 316 | 32.6 | 11.1 | <0.0002 | | 0.009 | <0.001 | | <0.005 | | <0.001 | | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 0.658 | 0.036 | | 256 | 127 | 8.54 | 97 | <10.0 |
| NPDES005 | 6/22/20 | 320 | 131 | 8.53 | 8.34 | 12 | 380 | | | | | 0.009 | | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.39 | | <10.0 |
| NPDES005 | 7/6/20 | 360 | | 8.16 | 8.15 | 14.3 | 897 | 42.6 | 14.7 | <0.0002 | | 0.015 | <0.001 | 0.002 | <0.005 | | 0.003 | | | <0.005 | <0.001 | <0.050 | <3.0 | <0.010 | <0.050 | 1.08 | 0.039 | | 328 | 167 | 8.29 | 173 | 42 |
| NPDES005 | 7/21/20 | 360 | 200 | 8.85 | 8.28 | 10.4 | 375 | | | | | 0.01 | | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.35 | | <10.0 |
| NPDES005 | 8/3/20 | 350 | | 8.08 | 8.38 | 18.2 | 350 | 42.5 | 16.2 | <0.0002 | | 0.011 | <0.001 | | <0.005 | | <0.001 | | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 1.42 | 0.038 | | 370 | 173 | 8.42 | 167 | <10.0 |
| NPDES005 | 8/18/20 | 430 | 197 | 7.95 | 8.46 | 16.2 | 250 | | | | | 0.012 | | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.35 | | <10.0 |
| NPDES005 - BIO | 8/26/20 | | | | 8.35 | 12.7 | 150 | 50.3 | 22.7 | <0.0002 | | 0.012 | <0.001 | <0.001 | <0.005 | 0.128 | <0.001 | <0.005 | | <0.005 | <0.001 | <0.050 | | <0.010 | | 1.96 | 0.013 | | | 219 | | 220 | <10.0 |
| NPDES005 | 8/31/20 | 410 | 208 | 8.7 | 8.54 | 12.3 | 250 | | | | | 0.01 | | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.57 | | <10.0 |
| NPDES005 | 9/8/20 | 420 | 141 | 10.2 | 8.61 | 4.7 | 285 | 45.7 | 20.8 | <0.0002 | | 0.009 | <0.001 | | <0.005 | | <0.001 | | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 1.91 | 0.027 | | 417 | 200 | 8.43 | 153 | <10.0 |
| NPDES005 | 9/21/20 | 420 | 189 | 8.91 | 8.44 | 9.6 | 150 | | | | | 0.008 | | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.4 | | <10.0 |
| NPDES005 | 10/5/20 | 440 | 225 | 9.13 | | 10.1 | 145 | 54.4 | 23.3 | <0.0002 | | 0.009 | <0.001 | | <0.005 | | <0.001 | | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 2.06 | 0.094 | | 456 | 232 | 8.41 | 231 | <10.0 |
| NPDES005 | 10/19/20 | 470 | 143 | 9.34 | 8.72 | 2.6 | 130 | 51.5 | 22.9 | | | 0.009 | | <0.001 | | | | | | <0.005 | <0.001 | | <3.0 | <0.010 | <0.050 | | | | | 223 | 8.4 | | <10.0 |
| NPDES005 | 11/2/20 | 480 | 264 | 10.9 | 8.12 | 2.8 | 125 | 51.1 | 21.8 | <0.0002 | | 0.009 | <0.001 | | <0.005 | | <0.001 | | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 2.1 | 0.025 | | 456 | 217 | 8.46 | 222 | <10.0 |

Table D-4. Water Quality Results at the CP005/NPDES005 Site From January 5, 2015, Through December 28, 2021 (Page 5 of 5)

| Sample Name | Date Sampled | Cond, Field µmhos/cm | ORP, Field (mV) | DO, Field (mg/L) | pH, Field (SU) | Temp, Field (°C) | Flow, Field (gpm) | Calcium – D (mg/L) | Magnesium – D (mg/L) | Mercury – T (mg/L) | Arsenic – T (mg/L) | Arsenic – TR (mg/L) | Cadmium – TR (mg/L) | Chromium – TR (mg/L) | Copper – TR (mg/L) | Iron - TR (mg/L) | Lead – TR (mg/L) | Nickel – TR (mg/L) | Selenium – T (mg/L) | Selenium – TR (mg/L) | Silver – TR (mg/L) | Zinc - TR (mg/L) | BOD, 5-Day (mg/L) | CN, WAD (mg/L) | N, Ammonia (mg/L) | N, Nitrate (mg/L) | Phosphorus – D (mg/L) | Sulfate (mg/L) | Conductivity (µmhos/cm) | Hardness (mg/L) | pH (SU) | TDS (mg/L) | TSS (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| NPDES005 | 11/16/20 | 500 | 189 | 10.4 | 8.62 | 0.8 | 125 | | | | | 0.009 | | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | 476 | | 8.39 | | <10.0 |
| NPDES005 | 11/30/20 | 550 | 233 | 11.4 | 8.43 | 1.2 | 125 | | | | | 0.011 | | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.33 | | <10.0 |
| NPDES005 | 12/14/20 | 520 | | 10.8 | 8.54 | 1 | 100 | 58.5 | 27.6 | <0.0002 | | 0.011 | <0.001 | | <0.005 | | <0.001 | | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 2.58 | 0.026 | | 506 | 260 | 8.39 | 270 | <10.0 |
| NPDES005 | 12/29/20 | 520 | | 10 | 8.51 | 3.8 | 100 | | | | | 0.01 | | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | 0.026 | | | | 8.35 | | <10.0 |
| NPDES005 | 1/12/21 | 530 | | 10.9 | 8.26 | 0.1 | 100 | 57.6 | 26 | <0.0002 | | 0.01 | <0.001 | <0.001 | <0.005 | | <0.001 | | | <0.005 | <0.001 | <0.050 | <3.0 | <0.010 | <0.050 | 2.63 | 0.015 | | 506 | 251 | 8.35 | 363 | <10.0 |
| NPDES005 | 1/26/21 | 540 | 201 | 11.5 | 8.43 | 0.5 | 100 | | | | | 0.01 | | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.33 | | <10.0 |
| NPDES005 | 2/8/21 | 520 | | 10.7 | 8.6 | 0.4 | 100 | 60.8 | 28.3 | <0.0002 | | 0.011 | <0.001 | | <0.005 | | <0.001 | | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 2.73 | 0.022 | | 527 | 268 | 8.22 | 246 | 11 |
| NPDES005 | 2/23/21 | 480 | 240 | 11 | 8.16 | 2 | 90 | | | | | 0.014 | | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.37 | | <10.0 |
| NPDES005 | 3/9/21 | 470 | | 9.82 | 8.57 | 4 | 130 | 57.1 | 24.5 | <0.0002 | | 0.015 | <0.001 | | <0.005 | | <0.001 | | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 2.33 | 0.028 | | 490 | 244 | 8.39 | 243 | <10.0 |
| NPDES005 | 3/23/21 | 400 | | 10.7 | 8.03 | 3.3 | 160 | | | | | 0.01 | | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.32 | | <10.0 |
| NPDES005 | 4/5/21 | 340 | | 10.9 | 8.4 | 3.8 | 450 | 39.5 | 14.9 | <0.0002 | | 0.008 | <0.001 | <0.001 | <0.005 | | <0.001 | | | <0.005 | <0.001 | <0.050 | <3.0 | <0.010 | <0.050 | 1.87 | 0.027 | | 342 | 160 | 8.28 | 173 | <10.0 |
| NPDES005 | 4/20/21 | 330 | | 11.5 | 8.32 | 1.7 | 380 | | | | | 0.007 | | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.19 | | <10.0 |
| NPDES005 | 5/3/21 | 210 | | 9.7 | 8.73 | 5 | 1800 | 23.6 | 6.3 | <0.0002 | | 0.009 | <0.001 | | <0.005 | | 0.002 | | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 1.22 | 0.023 | | 208 | 84.9 | 8 | 130 | 11 |
| NPDES005 | 5/18/21 | 230 | | 8.77 | 7.82 | 13.8 | 707 | | | | | 0.009 | | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.38 | | <10.0 |
| NPDES005 | 5/31/21 | 220 | | 10.2 | 8.57 | 12.6 | 525 | | | | | 0.008 | | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.37 | | <10.0 |
| NPDES005 | 6/14/21 | 300 | | 8.16 | 8.46 | 19.8 | 500 | 34 | 13.1 | <0.0002 | | 0.01 | <0.001 | | <0.005 | | <0.001 | | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 1.02 | 0.035 | | 294 | 139 | 8.42 | 131 | <10.0 |
| NPDES005 | 6/28/21 | 350 | | 8.36 | 8.59 | 14 | 300 | | | | | 0.009 | | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.52 | | <10.0 |
| NPDES005 | 7/15/21 | 320 | | 8.12 | 8.47 | 18.4 | 220 | 38.4 | 14.5 | <0.0002 | | 0.024 | <0.001 | <0.001 | <0.005 | | 0.001 | | | <0.005 | <0.001 | <0.050 | <3.0 | <0.010 | <0.050 | 0.87 | 0.034 | | 329 | 156 | 8.4 | 164 | 20 |
| NPDES005 | 7/26/21 | 360 | | 7.68 | 8.57 | 17.3 | 250 | | | | | 0.011 | | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.43 | 189 | <10.0 |
| NPDES005 | 8/11/21 | 420 | | 8.8 | 7.46 | 10.5 | 200 | 51.6 | 22.8 | <0.0002 | | 0.01 | <0.001 | | <0.005 | | <0.001 | | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 1.9 | 0.026 | | 437 | 222 | 8.36 | 195 | <10.0 |
| NPDES005 - BIO | 8/23/21 | 450 | | 9.26 | 8.55 | 11.8 | 175 | 54.1 | 23.1 | <0.0002 | | 0.01 | <0.001 | <0.001 | <0.005 | 0.061 | <0.001 | <0.005 | | <0.005 | <0.001 | <0.050 | <3.0 | <0.010 | <0.050 | 2.05 | 0.026 | | 455 | 230 | 8.52 | 231 | <10.0 |
| NPDES005 | 9/6/21 | 460 | | 8.77 | 8.46 | 13.3 | 165 | 52.1 | 24.2 | <0.0002 | | 0.011 | <0.001 | | <0.005 | | <0.001 | | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 2.12 | 0.01 | | 466 | 230 | 8.45 | 215 | <10.0 |
| NPDES005 | 9/23/21 | 480 | | 9.19 | 8.43 | 6.6 | 150 | | | | 0.01 | | | | | | | | <0.005 | | | | <3.0 | <0.010 | <0.050 | | | | | | 8.39 | | <10.0 |
| NPDES005 | 10/4/21 | 490 | | 9.86 | 8.37 | 8.7 | 145 | 58.1 | 25.3 | <0.0002 | | 0.011 | <0.001 | <0.001 | <0.005 | | <0.001 | | | <0.005 | <0.001 | <0.050 | <3.0 | <0.010 | <0.050 | 2.59 | 0.014 | | 504 | 249 | 8.37 | 240 | <10.0 |
| NPDES005 | 10/18/21 | 380 | | 9.7 | 8.33 | 6.3 | 200 | | | | | 0.029 | | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.27 | | 12 |
| NPDES005 | 11/2/21 | 440 | | 11.8 | 8.25 | 0.8 | 200 | 55.1 | 18.7 | <0.0002 | | 0.01 | <0.001 | | <0.005 | | 0.002 | | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 2.12 | 0.037 | | 420 | 215 | 8.23 | 192 | <10.0 |
| NPDES005 | 11/15/21 | 400 | | 11.2 | 8.52 | 4.1 | 150 | | | | | 0.015 | | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.35 | | <10.0 |
| NPDES005 | 12/2/21 | 430 | | 10.4 | 8.56 | 5 | 130 | 48.5 | 22.2 | <0.0002 | | 0.01 | <0.001 | | <0.005 | | <0.001 | | | <0.005 | | <0.050 | <3.0 | <0.010 | <0.050 | 2.08 | <0.050 | | 440 | 212 | 8.33 | 213 | <10.0 |
| NPDES005 | 12/13/21 | 460 | | 10.9 | 8.35 | 1.6 | 125 | | | | | 0.011 | | | | | | | | <0.005 | | | <3.0 | <0.010 | <0.050 | | | | | | 8.29 | | <10.0 |
| NPDES005 | 12/28/21 | 490 | | 11.4 | 8.58 | 0.8 | 115 | | | | | 0.011 | | | | | | | | <0.005 | | | 3.1 | <0.010 | <0.050 | | | | | | 8.25 | | <10.0 |

Notes:
D = dissolved
T = total
TR = total recoverable
CN = cyanide
WAD = Weak Acid Dissociable
N = nitrogen
TDS = total dissolved solids
TSS = total suspended solids

Table D-5. Water Quality Results at the 46MN31 Site From February 10, 2015, Through August 23, 2021

| Sample Name | Date Sampled | Cond, Field µmhos/cm | Field Depth (ft) | Field Width (ft) | DO, Field (mg/L) | pH, Field (SU) | Temp water, Field (°C) | Temp air, Field (°C) | Arsenic – D (mg/L) | Cadmium – D (mg/L) | Calcium – D (mg/L) | Chromium – D (mg/L) | Copper – D (mg/L) | Lead - D (mg/L) | Magnesium – D (mg/L) | Mercury – D (mg/L) | Nickel – D (mg/L) | Selenium – D (mg/L) | Silver – D (mg/L) | Zinc – D (mg/L) | Mercury – T (mg/L) | Aluminum – TR (mg/L) | Arsenic - T (mg/L) | Cadmium – TR (mg/L) | Chromium – TR (mg/L) | Copper – TR (mg/L) | Lead – TR (mg/L) | Nickel – TR (mg/L) | Selenium – TR (mg/L) | Silver – TR (mg/L) | Zinc – TR (mg/L) | CN, WAD (mg/L) | N, Ammonia (mg/L) | N, Nitrate+Nitrite (mg/L) | Kjeldahl nitrogen – T (mg/L) | Phosphorus – T (mg/L) | Alkalinity (mg/L) | Hardness (mg/L) | Organic Carbon – D (mg/L) | TDS (mg/L) | TSS (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| 46MN31 | 2/10/15 | 417 | 0.5 | 8 | 11.5 | 8.4 | 2 | 8 | 11.29 | 0.001 | 49.67 | 0.001 | 0.005 | 0.0001 | 20.23 | 0.0002 | 0.005 | 0.0005 | 0.001 | 0.05 | 0.0002 | | 0.01262 | 0.001 | 0.0001 | 0.0005 | 0.00102 | 0.0005 | 0.005 | 0.001 | 0.05 | 0.01 | 0.05 | 5.1 | 0.5 | 0.052 | 170 | 207 | | 230 | 0 |
| 46MN31 | 5/18/15 | 187 | 1.2 | 10 | 11 | 8.2 | 5 | 6 | 10.24 | 0.001 | 22.97 | 0.001 | 0.005 | 0.0001 | 7.32 | 0.0002 | 0.005 | 0.0005 | 0.001 | 0.05 | 0.0002 | | | | | | | | | | | 0.01 | 0.05 | 1.17 | 0.5 | 0.083 | | 87 | | 139 | 0 |
| 46MN31 | 8/17/15 | 427 | 0.8 | 8 | 9 | 8.4 | 11 | 14 | 11.24 | 0.001 | 53.05 | 0.001 | 0.005 | 0.0001 | 20.56 | 0.0002 | 0.005 | 0.0005 | 0.001 | 0.05 | 0.0002 | | | | | | | | | | | 0.01 | 0.05 | 4.38 | 0.67 | 0.136 | | 217 | 2.12 | 255 | 39 |
| 46MN31 | 11/9/15 | 494 | 0.5 | 7 | 11.2 | 8.7 | 2 | 8 | 10 | 0.001 | 59.6 | 0.001 | 0.005 | 0.0001 | 24.7 | 0.0002 | 0.005 | 0.0005 | 0.001 | 0.05 | 0.0002 | | | | | | | | | | | 0.01 | 0.05 | 6.6 | 0.5 | 0.039 | | 251 | 1.84 | 259 | 0 |
| 46MN31 | 2/1/16 | 530 | 0.6 | 7 | 11.7 | 8.5 | 0 | -4 | 10 | 0.001 | 61.9 | 0.001 | 0.005 | 0.0001 | 24.7 | 0.0002 | 0.005 | 0.0005 | 0.001 | 0.05 | 0.0002 | | | | | | | | | | | 0.01 | 0.05 | 7.21 | 0.5 | 0.042 | | 256 | 2.07 | 286 | 10 |
| 46MN31 | 5/4/16 | 226 | 1 | 7 | 11.3 | 8.4 | 5 | 19 | 6 | 0.001 | 25.1 | 0.001 | 0.005 | 0.0001 | 9.2 | 0.0002 | 0.005 | 0.0005 | 0.001 | 0.05 | 0.0002 | | | | | | | | | | | 0.01 | 0.05 | 1.39 | 0.5 | 0.048 | | 101 | 2.89 | 131 | 10 |
| 46MN31 | 8/16/16 | 451 | 0.1 | 4 | 10.1 | 8.8 | 13 | 26 | 10 | 0.001 | 56.2 | 0.001 | 0.005 | 0.0001 | 23.2 | 0.0002 | 0.005 | 0.0005 | 0.001 | 0.05 | 0.0002 | | | | | | | | | | | 0.01 | 0.05 | 5.76 | 0.5 | 0.049 | | 236 | 1.56 | 259 | 10 |
| 46MN31 | 11/8/16 | 348 | 0.2 | 4 | 12.5 | 8.4 | 2 | 20 | 10 | 0.001 | 55.4 | 0.001 | 0.005 | 0.0001 | 23.7 | 0.0002 | 0.005 | 0.0005 | 0.001 | 0.05 | 0.0002 | | | | | | | | | | | 0.01 | 0.05 | 5.66 | 0.5 | 0.040 | | 236 | 1.48 | 259 | 10 |
| 46MN31 | 2/6/17 | 452 | 0.2 | 4 | 10.7 | 8.7 | 0 | 8 | 20 | 0.001 | 54.9 | 0.001 | 0.005 | 0.0001 | 22 | 0.0002 | 0.005 | 0.0005 | 0.001 | 0.05 | 0.0002 | | | | | | | | | | | 0.01 | 0.05 | 5.65 | 0.5 | 0.059 | | 228 | 1.32 | 228 | 10 |
| 46MN31 | 5/15/17 | 318 | 0.2 | 5 | 11.1 | 8.7 | 9 | 16 | 10 | 0.001 | 39.1 | 0.001 | 0.005 | 0.0001 | 13.9 | 0.0002 | 0.005 | 0.0005 | 0.001 | 0.05 | 0.0002 | | | | | | | | | | | 0.01 | 0.05 | 2.47 | 0.5 | 0.051 | | 155 | 2.48 | 171 | 10 |
| 46MN31 | 8/29/17 | 434 | 0.2 | 4 | 10 | 8.2 | 12 | 24 | 20 | 0.001 | 54.8 | 0.001 | 0.005 | 0.0001 | 21.3 | 0.0002 | 0.005 | 0.0005 | 0.001 | 0.05 | 0.0002 | | | | | | | | | | | 0.01 | 0.05 | 5.9 | 0.5 | 0.054 | | 224 | 1.52 | 221 | 10 |
| 46MN31 | 11/16/17 | 482 | 0.3 | 5 | 12.2 | 8.1 | 1 | 11 | 20 | 0.001 | 60 | 0.001 | 0.005 | 0.0001 | 24.1 | 0.0002 | 0.005 | 0.0005 | 0.001 | 0.05 | 0.0002 | | | | | | | | | | | 0.01 | 0.05 | 6.77 | 0.5 | 0.046 | | 249 | 1.90 | 266 | 10 |
| 46MN31 | 2/14/18 | 482 | 0.3 | 3 | 12 | 8.4 | 0 | 4 | 20 | 0.001 | 55.5 | 0.001 | 0.005 | 0.0001 | 22.9 | 0.0002 | 0.005 | 0.0005 | 0.001 | 0.05 | 0.0002 | | | | | | | | | | | 0.01 | 0.05 | 6.05 | 0.5 | 0.061 | | 233 | 1.09 | 220 | 10 |
| 46MN31 | 5/24/18 | 248 | 0.3 | 7 | 10.6 | 8.4 | 9 | 18 | 8 | 0.001 | 28.9 | 0.001 | 0.005 | 0.0001 | 9.29 | 0.0002 | 0.005 | 0.0005 | 0.001 | 0.05 | 0.0002 | | | | | | | | | | | 0.01 | 0.05 | 1.82 | 0.5 | 0.055 | | 110 | 3.19 | 137 | 10 |
| 46MN31 | 8/22/18 | 344 | 0.3 | 7 | 10.1 | 8.5 | 11 | 17 | 10 | 0.001 | 39.6 | 0.001 | 0.005 | 0.0001 | 13.7 | 0.0002 | 0.005 | 0.0005 | 0.001 | 0.05 | 0.0002 | | | | | | | | | | | 0.01 | 0.05 | 2.81 | 0.5 | 0.060 | | 155 | 2.51 | 174 | 10 |
| 46MN31 | 11/20/18 | 444 | 0.4 | 7 | 12.1 | 8.5 | 0 | -1 | 10 | 0.001 | 49.7 | 0.001 | 0.005 | 0.0001 | 20.4 | 0.0002 | 0.005 | 0.0005 | 0.001 | 0.05 | 0.0002 | | | | | | | | | | | 0.01 | 0.05 | 5.58 | 0.5 | 0.043 | | 208 | 1.41 | 204 | 10 |
| 46MN31 | 2/20/19 | 395 | 0.3 | 5 | 12.9 | 8.4 | 0 | -6 | 20 | 0.001 | 54.6 | 0.001 | 0.005 | 0.0001 | 21.4 | 0.0002 | 0.005 | 0.0005 | 0.001 | 0.05 | 0.0002 | | | | | | | | | | | 0.01 | 0.05 | 6.83 | 0.5 | 0.048 | | 225 | 1.03 | 273 | 10 |
| 46MN31 | 5/24/19 | 245 | 1 | 7 | 11.4 | 8.1 | 4 | 3 | 10 | 0.001 | 29 | 0.001 | 0.005 | 0.0001 | 9.44 | 0.0002 | 0.005 | 0.0005 | 0.001 | 0.05 | 0.0002 | | | | | | | | | | | 0.01 | 0.05 | 1.43 | 0.5 | 0.057 | | 111 | 2.96 | 141 | 10 |
| 46MN31 | 8/15/19 | 396 | 0.5 | 7 | 9.4 | 8.6 | 11 | | 10 | 0.001 | 50.3 | 0.001 | 0.005 | 0.0001 | 17.7 | 0.0002 | 0.005 | 0.0005 | 0.001 | 0.05 | 0.0002 | | | | | | | | | | | 0.01 | 0.05 | 3.94 | 0.5 | 0.197 | | 198 | 2.82 | 242 | 70 |
| 46MN31 | 11/4/19 | 446 | 0.4 | 8 | 12.3 | 8.8 | 4 | | 10 | 0.001 | 52.7 | 0.001 | 0.005 | 0.0001 | 18.2 | 0.0002 | 0.005 | 0.0005 | 0.001 | 0.05 | 0.0002 | | | | | | | | | | | 0.01 | 0.05 | 5.01 | 0.5 | 0.044 | | 207 | 1.54 | 221 | 10 |
| 46MN31 | 2/21/20 | 491 | 0.4 | 5 | 13.3 | 8.2 | 0 | | 10 | 0.001 | 58.2 | 0.001 | 0.005 | 0.0001 | 20.3 | 0.0002 | 0.005 | 0.0005 | 0.001 | 0.05 | 0.0002 | | | | | | | | | | | 0.01 | 0.05 | 6.8 | 0.5 | 0.041 | | 229 | 1.31 | 258 | 10 |
| 46MN31 | 5/18/20 | 198 | 0.8 | 8 | 10.3 | 7.9 | 8 | | 7 | 0.001 | 24.5 | 0.001 | 0.005 | 0.0001 | 7.43 | 0.0002 | 0.005 | 0.0005 | 0.001 | 0.05 | 0.0002 | 1190 | | | | | | | | | | 0.01 | 0.05 | 0.754 | 0.5 | 0.033 | | 91.8 | 3.41 | 118 | 10 |
| 46MN31 | 8/25/20 | 442 | 0.3 | 6 | 8.3 | 8.5 | 16 | | 20 | 0.001 | 55.2 | 0.001 | 0.005 | 0.0001 | 20 | 0.0002 | 0.005 | 0.0005 | 0.001 | 0.05 | 0.0002 | 200 | | | | | | | | | | 0.01 | 0.05 | 4.96 | 0.5 | 0.050 | | 220 | 2.39 | 240 | 10 |
| 46MN31 | 11/18/20 | 462 | 0.4 | 7 | 12.4 | 8.6 | 2 | | 13 | 0.001 | 53.9 | 0.001 | 0.005 | 0.0001 | 20.5 | 0.0002 | 0.005 | 0.0005 | 0.001 | 0.05 | 0.0002 | 28.7 | | | | | | | | | | 0.01 | 0.05 | 5.66 | 0.5 | 0.048 | | 219 | 1.81 | 215 | 10 |
| 46MN31 | 2/3/21 | 491 | 0.3 | 6 | 12.1 | 8.6 | 0 | | 16 | 0.001 | 60.3 | 0.001 | 0.005 | 0.0001 | 24 | 0.0000 | 0.000 | 0.0000 | 0.000 | 0.00 | 0.0000 | 44.1 | | | | | | | | | | 0.00 | 0.00 | 6.01 | | 0.056 | | 249 | 1.54 | 252 | 0 |
| 46MN31 | 5/12/21 | 254 | 0.4 | 9 | 11 | 8.4 | 4 | | 8.67 | 0.001 | 29.2 | 0.001 | 0.005 | 0.0001 | 9.44 | 0.0000 | 0.000 | 0.0000 | 0.000 | 0.00 | 0.0000 | 639 | | | | | | | | | | 0.00 | 0.00 | 1.71 | | 0.047 | | 112 | 3.14 | 133 | 0 |
| 46MN31 | 8/23/21 | 447 | 0.3 | 8 | 9.6 | 8.8 | 12 | | 14.9 | 0.001 | 55.6 | 0.001 | 0.005 | 0.0001 | 22.6 | 0.0000 | 0.000 | 1.31 | 0.000 | 0.00 | 0.0000 | 79.7 | | | | | | | | | | 0.00 | 0.00 | 4.62 | 0 | 0.047 | | 232 | 1.79 | 237 | 0 |

Notes:
D = dissolved
T = total
TR = total recoverable
CN = cyanide
WAD = Weak Acid Dissociable
N = nitrogen
TDS = total dissolved solids
TSS = total suspended solids

Table D-6. Water Quality Results at the Lost Camp Site From August 12, 2015, Through August 11, 2021 (Page 1 of 2)

| Sample Name | Date Sampled | Cond, Field (µmhos/cm) | ORP, Field (mV) | DO, Field (mg/L) | pH, Field (SU) | Temp, Field (°C) | Flow, Field (gpm) | Sodium–D (mg/L) | Mercury–T (mg/L) | Arsenic–T (mg/L) | Gold-T (mg/L) | Selenium–T (mg/L) | Bicarbonate (mg/L) | CN, Total (mg/L) | CN, WAD (mg/L) | Fluoride (mg/L) | N, Ammonia (mg/L) | N, Nitrate (mg/L) | N, Nitrite (mg/L) | Sulfate (mg/L) | Conductivity (µmhos/cm) | pH (SU) | TDS (mg/L) | TSS (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LOST CAMP | 8/12/15 | 590 | 33 | 9.28 | 8.61 | 11.8 | 30 | 16.6 | <0.0002 | 0.02 | 0.004 | <0.005 | 261 | 0.018 | <0.010 | 0.139 | <0.050 | 7.31 | <0.050 | 43.6 | 564 | 8.5 | 305 | <10.0 |
| LOST CAMP | 8/8/16 | 280 | 193 | 9.94 | 8.18 | 15.6 | 75 | 3.96 | <0.0002 | <0.005 | <0.001 | <0.005 | 157 | <0.010 | <0.010 | 0.118 | <0.050 | 0.209 | <0.050 | <10.0 | 272 | 8.12 | 151 | <10.0 |
| LOST CAMP | 8/24/16 | 290 | | 8.47 | 8.37 | 11.8 | | | | | | | | | | | | | | | | | | <10.0 |
| LOST CAMP | 8/30/16 | 540 | 48 | 11.2 | 8.63 | 12.1 | 60 | | | | | | | | | | | | | | | 8.45 | 332 | <10.0 |
| LOST CAMP | 10/10/16 | 320 | 184 | 11.3 | 8.18 | 8.4 | | 4.68 | <0.0002 | | | | 185 | | <0.010 | 0.141 | <0.050 | 0.262 | 0.11 | <10.0 | 317 | 7.98 | 183 | |
| LOST CAMP | 10/24/16 | 280 | 55 | 14.2 | 8.41 | 7.8 | 25 | 3.6 | <0.0002 | <0.005 | <0.001 | <0.005 | 175 | <0.010 | <0.010 | 0.114 | <0.050 | 0.072 | <0.050 | <10.0 | 296 | 8.15 | 158 | <10.0 |
| LOST CAMP | 11/7/16 | 310 | 110 | 13.5 | 8.24 | 4.4 | 25 | 3.66 | <0.0002 | <0.005 | <0.001 | <0.005 | 183 | <0.010 | <0.010 | 0.117 | <0.050 | 0.165 | <0.050 | <10.0 | 308 | 7.98 | 144 | <10.0 |
| LOST CAMP | 11/21/16 | 330 | 125 | 15.1 | 8.33 | 5.3 | 20 | 4.55 | <0.0002 | <0.005 | 0.001 | <0.005 | 192 | <0.010 | <0.010 | 0.127 | <0.050 | 0.458 | <0.050 | <10.0 | 325 | 8.02 | 154 | <10.0 |
| LOST CAMP | 12/5/16 | 340 | 154 | 14.1 | 8.16 | 1.7 | 20 | 4.67 | <0.0002 | <0.005 | <0.001 | <0.005 | 192 | <0.010 | <0.010 | 0.136 | <0.050 | 0.485 | <0.050 | <10.0 | 326 | 7.87 | 182 | <10.0 |
| LOST CAMP | 12/19/16 | 350 | | 11.3 | 7.99 | 1.3 | 1 | 4.88 | <0.0002 | 0.006 | 0.001 | <0.005 | 203 | <0.010 | <0.010 | 0.147 | <0.050 | 0.726 | <0.050 | <10.0 | 344 | 7.9 | 172 | 117 |
| LOST CAMP | 1/3/17 | 180 | 145 | 13.5 | 8.59 | 1.3 | 20 | 3.87 | <0.0002 | <0.005 | 0.001 | <0.005 | 187 | <0.010 | <0.010 | 0.136 | <0.050 | 0.31 | <0.050 | <10.0 | 313 | 7.92 | 155 | 77 |
| LOST CAMP | 1/16/17 | 350 | 60 | 8.78 | 8.03 | 8.6 | 15 | 5.85 | <0.0002 | 0.006 | <0.001 | <0.005 | 206 | <0.010 | <0.010 | 0.119 | <0.050 | 0.779 | <0.050 | <10.0 | 344 | 7.87 | 177 | 93 |
| LOST CAMP | 1/30/17 | 340 | 116 | 12.5 | 7.59 | 2.4 | 20 | 5.4 | <0.0002 | 0.006 | <0.001 | <0.005 | 196 | <0.010 | <0.010 | 0.128 | <0.050 | 0.716 | <0.050 | <10.0 | 332 | 7.9 | 171 | <10.0 |
| LOST CAMP | 2/13/17 | 340 | 147 | 13.4 | 8.19 | 1.8 | 10 | 4.77 | <0.0002 | 0.006 | <0.001 | <0.005 | 197 | <0.010 | <0.010 | 0.135 | <0.050 | 0.672 | <0.050 | <10.0 | 338 | 7.92 | 178 | 15 |
| LOST CAMP | 2/27/17 | 300 | 148 | 13.61 | 8.24 | 1.2 | 20 | 3.26 | <0.0002 | <0.005 | <0.001 | <0.005 | 176 | <0.010 | <0.010 | 0.124 | <0.050 | 0.498 | <0.050 | <10.0 | 305 | 7.94 | 133 | <10.0 |
| LOST CAMP | 3/14/17 | 290 | 172 | 13.71 | 8.23 | 0.1 | 20 | 3.07 | <0.0002 | <0.005 | <0.001 | <0.005 | 152 | <0.010 | <0.010 | 0.122 | <0.050 | 0.56 | <0.050 | <10.0 | 271 | 8 | 140 | <10.0 |
| LOST CAMP | 3/27/17 | 170 | 135 | 12.52 | 8.28 | 6.8 | 100 | 3.69 | <0.0002 | <0.005 | <0.001 | <0.005 | 80.7 | <0.010 | <0.010 | 0.09 | <0.050 | 0.865 | <0.050 | <10.0 | 192 | 7.77 | 115 | <10.0 |
| LOST CAMP | 4/11/17 | 200 | 131 | 14.06 | 8.31 | 6.5 | 150 | 3.49 | <0.0002 | <0.005 | 0.002 | <0.005 | 78.1 | <0.010 | <0.010 | 0.088 | <0.050 | 0.506 | <0.050 | <10.0 | 195 | 7.98 | 112 | <10.0 |
| LOST CAMP | 5/24/17 | 180 | 172 | 10.06 | 7.82 | 5.2 | 450 | 4.24 | <0.0002 | <0.005 | <0.001 | <0.005 | 57.9 | <0.010 | <0.010 | 0.077 | <0.050 | 0.605 | <0.050 | <10.0 | 180 | 7.9 | 107 | <10.0 |
| LOST CAMP | 6/12/17 | 190 | 64 | 7.83 | 8.4 | 15.6 | 90 | 4.02 | <0.0002 | <0.005 | <0.001 | <0.005 | 73.9 | <0.010 | <0.010 | 0.092 | <0.050 | 0.164 | <0.050 | <10.0 | 189 | 8 | 107 | 22 |
| LOST CAMP | 8/7/17 | 250 | 101 | 7.79 | 8.25 | 13.8 | 20 | 4.06 | <0.0002 | 0.017 | <0.001 | <0.005 | 138 | <0.010 | <0.010 | 0.124 | <0.050 | 0.079 | <0.050 | <10.0 | 255 | 8.13 | 198 | 41 |
| LOST CAMP | 1/4/18 | 440 | 226 | 5.29 | 7.69 | 7 | 30 | 9.63 | <0.0002 | <0.005 | <0.001 | <0.005 | 236 | <0.010 | <0.010 | 0.174 | <0.050 | 1.73 | <0.050 | 18.4 | 437 | 7.81 | 208 | <10.0 |
| LOST CAMP | 4/11/18 | 260 | 118 | 10.9 | 7.65 | 2.5 | 50 | 7.77 | <0.0002 | <0.005 | 0.001 | <0.005 | 93 | <0.010 | <0.010 | 0.088 | <0.050 | 0.786 | <0.050 | <10.0 | 238 | 7.76 | 135 | <10.0 |
| LOST CAMP | 5/10/18 | 160 | 151 | 10.37 | 7.86 | 5.6 | 1300 | 4.34 | <0.0002 | <0.005 | <0.001 | <0.005 | 50.6 | <0.010 | <0.010 | 0.09 | <0.050 | 0.455 | <0.050 | <10.0 | 157 | 7.62 | 112 | <10.0 |
| LOST CAMP | 8/13/18 | 240 | 165 | 8.43 | 8.15 | 14.2 | 360 | 4.2 | <0.0002 | 0.007 | <0.001 | <0.005 | 104 | <0.010 | <0.010 | 0.103 | <0.050 | <0.050 | <0.050 | <10.0 | 227 | 8.22 | 122 | <10.0 |
| LOST CAMP | 10/24/18 | 260 | 168 | 10.06 | 7.82 | 2.4 | 25 | 4.08 | <0.0002 | <0.005 | <0.001 | <0.005 | 140 | <0.010 | <0.010 | 0.096 | <0.050 | 0.198 | <0.050 | <10.0 | 264 | 8.11 | 107 | <10.0 |
| LOST CAMP | 11/5/18 | 240 | 202 | 11.08 | 7.82 | 0.9 | 30 | 3.82 | <0.0002 | <0.005 | <0.001 | <0.005 | 119 | <0.010 | <0.010 | 0.098 | <0.050 | 0.244 | <0.050 | <10.0 | 243 | 8.18 | 108 | <10.0 |
| LOST CAMP | 12/10/18 | 250 | 195 | 11.17 | 7.57 | -0.6 | 30 | 4.73 | <0.0002 | <0.005 | <0.001 | <0.005 | 152 | <0.010 | <0.010 | 0.103 | <0.050 | 0.505 | <0.050 | <10.0 | 297 | 7.93 | 143 | <10.0 |
| LOST CAMP | 1/7/19 | 300 | 195 | 11.09 | 7.71 | -0.3 | 30 | 4.91 | <0.0002 | 0.005 | <0.001 | <0.005 | 161 | <0.010 | <0.010 | 0.112 | <0.050 | 0.583 | <0.050 | <10.0 | 304 | 7.99 | 157 | <10.0 |
| LOST CAMP | 4/1/19 | 170 | 200 | 11.04 | 7.37 | 0.3 | 70 | 4.1 | <0.0002 | 0.005 | <0.001 | <0.005 | 68.2 | <0.010 | <0.010 | 0.088 | <0.050 | 0.692 | <0.050 | <10.0 | 184 | 7.67 | 97 | <10.0 |
| LOST CAMP | 5/14/19 | 140 | 204 | 10.45 | 8.05 | 6.9 | 3000 | 3.51 | <0.0002 | <0.005 | <0.001 | <0.005 | 65.5 | <0.010 | <0.010 | 0.096 | <0.050 | 0.28 | <0.050 | <10.0 | 148 | 7.91 | 115 | 13 |
| LOST CAMP | 8/5/19 | 220 | 182 | 7.86 | 8.38 | 16.2 | 600 | 3.63 | <0.0002 | 0.007 | <0.001 | <0.005 | 108 | <0.010 | <0.010 | 0.105 | <0.050 | <0.050 | 0.161 | <10.0 | 224 | 8.19 | 124 | <10.0 |
| LOST CAMP | 1/6/20 | 250 | 213 | 11.72 | 8.12 | -0.5 | 30 | 4.29 | <0.0002 | <0.005 | <0.001 | <0.005 | 124 | <0.010 | <0.010 | 0.092 | <0.050 | 0.976 | <0.050 | <10.0 | 257 | 7.91 | 134 | <10.0 |
| LOST CAMP | 4/13/20 | 140 | 250 | 11.58 | 7.75 | -5 | 225 | 4.11 | <0.0002 | 0.007 | <0.001 | <0.005 | 58.6 | <0.010 | <0.010 | 0.107 | <0.050 | 0.665 | <0.050 | <10.0 | 147 | 7.67 | 102 | <10.0 |
| LOST CAMP | 5/11/20 | 150 | 231 | 10.86 | 7.59 | 2.9 | 1000 | 3.2 | <0.0002 | 0.006 | <0.001 | <0.005 | 69.3 | <0.010 | <0.010 | 0.104 | <0.050 | 1.23 | <0.050 | <10.0 | 152 | 7.85 | 90 | <10.0 |
| LOST CAMP | 8/3/20 | 260 | 178 | 8.01 | 8.1 | 17.9 | 170 | 4.24 | <0.0002 | 0.007 | <0.001 | <0.005 | 114 | <0.010 | <0.010 | 0.085 | <0.050 | 0.697 | <0.050 | <10.0 | 264 | 8.16 | 128 | 12 |
| LOST CAMP | 1/12/21 | 420 | 225 | 10.25 | 7.61 | 0.3 | <5 | 8.47 | <0.0002 | 0.012 | <0.001 | <0.005 | 241 | <0.010 | <0.010 | 0.172 | <0.050 | 1.13 | <0.050 | 12.9 | 407 | 8.03 | 188 | <10.0 |

Table D-6. Water Quality Results at the Lost Camp Site From August 12, 2015, Through August 11, 2021 (Page 2 of 2)

| Sample Name | Date Sampled | Cond, Field (µmhos/cm) | ORP, Field (mV) | DO, Field (mg/L) | pH, Field (SU) | Temp, Field (°C) | Flow, Field (gpm) | Sodium–D (mg/L) | Mercury–T (mg/L) | Arsenic–T (mg/L) | Gold-T (mg/L) | Selenium–T (mg/L) | Bicarbonate (mg/L) | CN, Total (mg/L) | CN, WAD (mg/L) | Fluoride (mg/L) | N, Ammonia (mg/L) | N, Nitrate (mg/L) | N, Nitrite (mg/L) | Sulfate (mg/L) | Conductivity (µmhos/cm) | pH (SU) | TDS (mg/L) | TSS (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| LOST CAMP | 1/12/21 | 420 | 225 | 10.25 | 7.61 | 0.3 | <5 | 8.47 | <0.0002 | 0.012 | <0.001 | <0.005 | 241 | <0.010 | <0.010 | 0.172 | <0.050 | 1.13 | <0.050 | 12.9 | 407 | 8.03 | 188 | <10.0 |
| LOST CAMP | 4/5/21 | 230 | 120 | 11.85 | 8.06 | 2.3 | 150 | 3.67 | <0.0002 | <0.005 | <0.001 | <0.005 | 84 | <0.010 | <0.010 | 0.078 | <0.050 | 1.69 | <0.050 | <10.0 | 240 | 7.86 | 122 | <10.0 |
| LOST CAMP | 5/3/21 | 200 | 235 | 10.12 | 8.24 | 4.4 | 1400 | 5.37 | <0.0002 | 0.006 | <0.001 | <0.005 | 65.8 | <0.010 | <0.010 | 0.077 | <0.050 | 1.36 | <0.050 | <10.0 | 201 | 7.92 | 128 | <10.0 |
| LOST CAMP | 8/11/21 | 290 | 222 | 8.89 | 7.97 | 10.6 | 50 | 6.31 | <0.0002 | <0.005 | <0.001 | <0.005 | 135 | <0.010 | <0.010 | 0.091 | <0.050 | 0.702 | <0.050 | <10.0 | 293 | 8.27 | 146 | <10.0 |

Notes:
ORP = oxygen reduction potential
D = dissolved
T = total
CN = cyanide
WAD = Weak Acid Dissociable
N = nitrogen
TDS = total dissolved solids
TSS = total suspended solids

Table D-7. Water Quality Results at the SS-20 Site From January 10, 2015, Through August 14, 2021

| Sample Name | Date Sampled | Cond, Field (µmhos/cm) | pH, Field (SU) | Temp, Field (°C) | Flow, Field (gpm) | Sodium – D (mg/L) | Mercury – T (mg/L) | Arsenic – T (mg/L) | Selenium – T (mg/L) | Bicarbonate (mg/L) | N, Nitrate (mg/L) | N, Nitrite (mg/L) | Sulfate (mg/L) | Conductivity (µmhos/cm) | pH (SU) | TSS (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SS20 | 1/10/15 | | | | DRY | | | | | | | | | | | |
| SS20 | 4/30/15 | 390 | 7.25 | 6.1 | 45 | 22.4 | <0.0002 | 0.014 | <0.005 | 95 | 1.65 | <0.050 | 12 | 362 | 7.46 | <10.0 |
| SS20 | 5/21/15 | 440 | 7.52 | 6.6 | 95 | 30.2 | <0.0002 | 0.019 | <0.005 | 67.1 | 4.01 | <0.050 | 11.2 | 415 | 7.21 | <10.0 |
| SS20 | 8/21/15 | 490 | 7.97 | 13.8 | 7 | 43.1 | <0.0002 | 0.012 | <0.005 | 104 | 2.7 | <0.050 | 14.4 | 491 | 7.92 | <10.0 |
| SS20 | 1/21/16 | | | | FROZEN | | | | | | | | | | | |
| SS20 | 4/13/16 | 510 | 7.73 | 8.7 | 40 | 30.4 | <0.0002 | 0.016 | <0.005 | 108 | 2.9 | <0.050 | 16.5 | 507 | 7.15 | <10.0 |
| SS20 | 5/4/16 | 570 | 7.4 | 8.3 | 50 | 43.7 | <0.0002 | 0.016 | <0.005 | 74.6 | 2.71 | <0.050 | 13.3 | 546 | 7.2 | <10.0 |
| SS20 | 8/18/16 | | | | DRY | | | | | | | | | | | |
| SS20 | 1/19/17 | | | | FROZEN | | | | | | | | | | | |
| SS20 | 4/14/17 | 900 | 7.64 | 10 | 30 | 69 | <0.0002 | 0.013 | <0.005 | 97.7 | 4.2 | <0.050 | 23.2 | 864 | 7.82 | 28 |
| SS20 | 5/19/17 | 690 | 6.76 | 5.5 | 35 | 46.8 | <0.0002 | 0.017 | <0.005 | 99.3 | 4.52 | <0.050 | 25.4 | 640 | 7.07 | <10.0 |
| SS20 | 8/22/17 | | | | DRY | | | | | | | | | | | |
| SS20 | 1/12/18 | | | | DRY | | | | | | | | | | | |
| SS20 | 4/17/18 | 820 | 7.52 | 5 | 50 | 68.3 | <0.0002 | 0.014 | <0.005 | 72.7 | 3.26 | <0.050 | 19.1 | 786 | 7.6 | <10.0 |
| SS20 | 5/25/18 | 570 | 7.42 | 10.5 | 45 | 47.8 | <0.0002 | 0.036 | <0.005 | 88.5 | 1.72 | <0.050 | 16.6 | 565 | 7.85 | 30 |
| SS20 | 8/24/18 | 590 | 6.86 | 10 | 15 | 47.2 | <0.0002 | 0.013 | <0.005 | 113 | 2.28 | <0.050 | 19.1 | 567 | 7.62 | <10.0 |
| SS20 | 1/23/19 | | | | DRY | | | | | | | | | | | |
| SS20 | 4/20/19 | 500 | 7.36 | 10.9 | 35 | 44.3 | <0.0002 | 0.017 | <0.005 | 73.2 | 2.02 | <0.050 | 15.7 | 527 | 7.74 | <10.0 |
| SS20 | 5/21/19 | 600 | 7.34 | 3.3 | 40 | 47.1 | <0.0002 | 0.019 | <0.005 | 72.4 | 2.05 | <0.050 | 15 | 569 | 7.44 | <10.0 |
| SS20 | 8/10/19 | | | | DRY | | | | | | | | | | | |
| SS20 | 1/10/20 | | | | DRY | | | | | | | | | | | |
| SS20 | 4/15/20 | 400 | 7.33 | 2.5 | 40 | 38 | <0.0002 | 0.018 | <0.005 | 62.8 | 0.92 | <0.050 | <10.0 | 408 | 7.74 | <10.0 |
| SS20 | 5/18/20 | 550 | 7.65 | 12.9 | 30 | 40.6 | <0.0002 | 0.022 | <0.005 | 90 | 1.29 | <0.050 | 13.7 | 531 | 7.82 | <10.0 |
| SS20 | 8/13/20 | | | | DRY | | | | | | | | | | | |
| SS20 | 1/8/21 | | | | DRY | | | | | | | | | | | |
| SS20 | 4/2/21 | | | | DRY | | | | | | | | | | | |
| SS20 | 5/7/21 | 750 | 7.43 | 7.7 | 30 | 63.1 | <0.0002 | 0.024 | <0.005 | 93.1 | 2.14 | <0.050 | 21.5 | 733 | 7.65 | <10.0 |
| SS20 | 8/14/21 | | | | DRY | | | | | | | | | | | |

Notes:
No samples were taken on 1/21/2016 and 1/17/2017 because the creek was frozen and on 1/10/2015, 8/22/2017, 1/12/2018, 1/23/2019, 8/10/2019, and 1/10/2020 because the creek was dry.
D = dissolved
T = total
N = nitrogen
TSS = total suspended solids

Table D-8. Water Quality Results at the SS-04 Site From January 14, 2015, Through August 14, 2021

| Sample Name | Date Sampled | Cond, Field (µmhos/cm) | ORP, Field (mV) | DO, Field (mg/L) | pH, Field (SU) | Temp, Field (°C) | Flow, Field (gpm) | Sodium – D (mg/L) | Mercury – T (mg/L) | Arsenic – T (mg/L) | Selenium – T (mg/L) | Bicarbonate (mg/L) | N, Nitrate (mg/L) | N, Nitrite (mg/L) | Sulfate (mg/L) | Conductivity (µmhos/cm) | pH (SU) | TSS (mg/L) |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| SS04 | 1/14/15 | 680 | 150 | 9.72 | 6.96 | 2.7 | 44 | 17.9 | <0.0002 | 0.015 | <0.005 | 48.2 | 0.673 | <0.050 | 179 | 612 | 6.86 | <10.0 |
| SS04 | 4/30/15 | 220 | -24 | 9.28 | 7.49 | 7.4 | 290 | 9.93 | <0.0002 | 0.014 | <0.005 | 36.2 | 0.809 | <0.050 | 28.5 | 202 | 7.37 | <10.0 |
| SS04 | 5/21/15 | 230 | -28 | 9.16 | 7.41 | 8.6 | 1510 | 13.2 | <0.0002 | 0.026 | <0.005 | 38.3 | 1.02 | <0.050 | 24.4 | 217 | 7.43 | 25 |
| SS04 | 8/25/15 | 570 | -48 | 8.31 | 7.24 | 13.2 | 50 | 24.5 | <0.0002 | 0.017 | <0.005 | 66.1 | 1.03 | <0.050 | 122 | 536 | 7.42 | <10.0 |
| SS04 | 1/20/16 | 890 | -19 | 12.8 | 7.22 | 3.2 | 10 | 28.5 | <0.0002 | 0.03 | <0.005 | 55.3 | 0.18 | <0.050 | 283 | 848 | 6.61 | 19 |
| SS04 | 4/13/16 | 330 | -36 | 9.2 | 7.62 | 9.8 | 110 | 20.3 | <0.0002 | 0.02 | <0.005 | 50 | 1.28 | <0.050 | 37.1 | 319 | 7.06 | <10.0 |
| SS04 | 5/4/16 | 370 | -16 | 9.5 | 7.41 | 7.1 | 300 | 26 | <0.0002 | 0.017 | <0.005 | 44.8 | 1.06 | <0.050 | 28.9 | 359 | 7.24 | <10.0 |
| SS04 | 8/18/16 | 1140 | -20 | 10.1 | 6.92 | 14.1 | 44 | 20.8 | <0.0002 | 0.007 | <0.005 | 77.2 | 0.331 | <0.050 | 473 | 1190 | 7.04 | <10.0 |
| SS04 | 1/18/17 | 1000 | -31 | 14.04 | 7.18 | 5.7 | 18 | 32.2 | <0.0002 | 0.017 | <0.005 | 90.6 | 0.114 | <0.050 | 337 | 1030 | 6.98 | 16 |
| SS04 | 4/14/17 | 430 | -48 | 10.43 | 7.51 | 8.4 | 90 | 20.9 | <0.0002 | 0.012 | <0.005 | 52.5 | 1.29 | <0.050 | 52.5 | 404 | 7.41 | 12 |
| SS04 | 5/23/17 | 440 | 49 | 9.65 | 7.8 | 8.8 | 100 | 21.9 | <0.0002 | 0.019 | <0.005 | 61 | 1.15 | <0.050 | 53.8 | 414 | 7.51 | 28 |
| SS04 | 8/22/17 | 1040 | 3 | 7.99 | 7.03 | 16.3 | 20 | 20.6 | <0.0002 | 0.009 | <0.005 | 67.6 | 0.196 | <0.050 | 417 | 1050 | 6.96 | 14 |
| SS04 | 1/12/18 | 1170 | -33 | 9.79 | 6.9 | 2.6 | 10 | 23.7 | <0.0002 | 0.027 | <0.005 | 70.8 | 0.249 | <0.050 | 451 | 1090 | 6.98 | 25 |
| SS04 | 4/17/18 | 770 | 2 | 9.99 | 7.35 | 3.9 | 200 | 48.9 | <0.0002 | 0.02 | <0.005 | 71.2 | 2.21 | <0.050 | 53.3 | 723 | 7.5 | 13 |
| SS04 | 5/25/18 | 360 | -48 | 8.26 | 7.11 | 11.2 | 250 | 17.3 | <0.0002 | 0.035 | <0.005 | 53.8 | 0.776 | <0.050 | 50 | 355 | 7.44 | 32 |
| SS04 | 8/24/18 | 630 | -63 | 8.3 | 7.14 | 11 | 45 | 29.3 | <0.0002 | 0.071 | <0.005 | 94.7 | 0.867 | <0.050 | 118 | 627 | 7.56 | 234 |
| SS04 | 1/23/19 | 830 | 27 | 10.05 | 7.05 | 1.4 | 25 | 21.2 | <0.0002 | 0.018 | <0.005 | 63.3 | 0.626 | <0.050 | 241 | 811 | 6.98 | 11 |
| SS04 | 4/20/19 | 290 | 22 | 9.38 | 6.99 | 6.7 | 300 | 19.5 | <0.0002 | 0.028 | <0.005 | 48.7 | 0.929 | <0.050 | 27.7 | 296 | 7.48 | 19 |
| SS04 | 5/23/19 | 320 | 124 | 9.93 | 7.5 | 4.3 | 600 | 18.2 | <0.0002 | 0.02 | <0.005 | 44.1 | 0.856 | <0.050 | 35.7 | 308 | 7.31 | <10.0 |
| SS04 | 8/10/19 | 630 | 5 | 8.5 | 7.2 | 12.5 | 40 | 23.9 | <0.0002 | 0.015 | <0.005 | 68.9 | 0.545 | <0.050 | 169 | 640 | 7.38 | <10.0 |
| SS04 | 1/9/20 | 880 | 51 | 9.71 | 6.99 | 3.4 | 55 | 24.4 | <0.0002 | 0.014 | <0.005 | 57 | 1.04 | <0.050 | 287 | 860 | 6.97 | 32 |
| SS04 | 4/15/20 | 430 | 172 | 10.32 | 7.02 | 2.2 | 225 | 26.1 | <0.0002 | 0.016 | <0.005 | 54.5 | 0.976 | <0.050 | 57.1 | 424 | 7.41 | <10.0 |
| SS04 | 5/19/20 | 200 | 99 | 7.69 | 7.3 | 15.8 | 1400 | 10 | <0.0002 | 0.031 | <0.005 | 37.4 | 0.717 | <0.050 | 25.4 | 196 | 7.57 | 19 |
| SS04 | 8/13/20 | 790 | 4 | 7.73 | 7.08 | 14.5 | 35 | 25.4 | <0.0002 | 0.01 | <0.005 | 67.5 | 0.474 | <0.050 | 263 | 856 | 7.15 | <10.0 |
| SS04 | 1/8/21 | 900 | 68 | 10.11 | 7.44 | 3.2 | 15 | 32.5 | <0.0002 | 0.008 | <0.005 | 57.3 | 1.83 | <0.050 | 260 | 852 | 7.33 | <10.0 |
| SS04 | 4/8/21 | 670 | 163 | 10.45 | 7.53 | 3.1 | 100 | 34 | <0.0002 | 0.013 | <0.005 | 66 | 3.3 | <0.050 | 77.3 | 631 | 7.35 | <10.0 |
| SS04 | 5/7/21 | 340 | 31 | 9.42 | 7.3 | 10.6 | 525 | 20 | <0.0002 | 0.016 | <0.005 | 44.8 | 1.53 | <0.050 | 33.1 | 317 | 7.42 | <10.0 |
| SS04 | 8/14/21 | 990 | 17 | 7.46 | 6.75 | 15.7 | 15 | 36.3 | <0.0002 | 0.012 | <0.005 | 59.8 | 0.317 | <0.050 | 340 | 1110 | 7.16 | <10.0 |

Notes:
No samples were taken on 1/21/2016 and 1/17/2017 because the creek was frozen and on 1/10/2015, 8/22/2017, 1/12/2018, 1/23/2019, 8/10/2019, and 1/10/2020 because the creek was dry.
D = dissolved
T = total
N = nitrogen
TSS = total suspended solids

# APPENDIX E

## WATER QUALITY STATISTICS BY SITE

Table E-1. Statistics for the Water Quality Parameters at the Annie Creek at USGS Site (January 2015 Through August 2021)

| Parameter | Count | MDL | Percent Below MDL | Average | Standard Deviation | Minimum | 25th Percentile | 50th Percentile (Median) | 75th Percentile | Maximum |
|---|---|---|---|---|---|---|---|---|---|---|
| Cond, Field | 32 | NA | NA | 353.44 | 112.07 | 180 | 255 | 395 | 447.5 | 570 |
| ORP, Field | 32 | NA | NA | 138.91 | 57.70 | -13 | 120.75 | 144.5 | 173 | 224 |
| DO, Field | 32 | NA | NA | 10.56 | 1.69 | 7.54 | 9.735 | 10.375 | 11.4725 | 14.5 |
| pH, Field | 32 | NA | NA | 8.37 | 0.36 | 7.49 | 8.2075 | 8.45 | 8.65 | 8.89 |
| Temp water, Field | 32 | NA | NA | 7.23 | 5.74 | 0.1 | 2.925 | 6.2 | 11.65 | 19.8 |
| Flow, Field | 27 | NA | NA | 1510.01 | 2383.54 | 3.9 | 43.89 | 420.08 | 2261 | 7934 |
| Sodium - D | 32 | 0.02 | 0 | 6.15 | 2.03 | 3.52 | 4.75 | 5.59 | 7.5325 | 11.5 |
| Mercury - T | 32 | 0.000035 | 0 | 0.00 | 0.00 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 |
| Arsenic - T | 32 | 0.0005 | 0 | 0.01 | 0.00 | 0.007 | 0.01175 | 0.0135 | 0.016 | 0.018 |
| Gold - T | 32 | 0.001 | 0.25 | 0.00 | 0.00 | 0.0005 | 0.00175 | 0.004 | 0.007 | 0.011 |
| Selenium - T | 32 | 0.001 | 0 | 0.00 | 0.00 | 0.0025 | 0.0025 | 0.0025 | 0.0025 | 0.0025 |
| Bicarbonate | 32 | 0.513 | 0 | 170.58 | 59.09 | 71.5 | 114 | 183.5 | 226 | 250 |
| CN, Total | 32 | 0.00037 | 0 | 0.01 | 0.00 | 0.005 | 0.005 | 0.005 | 0.005 | 0.012 |
| CN, WAD | 32 | 0.00055 | 0 | 0.01 | 0.00 | 0.005 | 0.005 | 0.005 | 0.005 | 0.005 |
| Fluoride | 32 | 0.004 | 0 | 0.20 | 0.06 | 0.122 | 0.13575 | 0.2095 | 0.25525 | 0.282 |
| N, Ammonia | 32 | 0.007 | 0 | 0.03 | 0.00 | 0.025 | 0.025 | 0.025 | 0.025 | 0.025 |
| N, Nitrate | 32 | 0.056 | 0 | 3.53 | 2.24 | 0.682 | 1.48 | 3.475 | 5.7775 | 7.36 |
| N, Nitrite | 32 | 0.005 | 0 | 0.03 | 0.00 | 0.025 | 0.025 | 0.025 | 0.025 | 0.025 |
| Sulfate | 32 | 0.679 | 0.3125 | 14.85 | 11.37 | 0.5 | 0.5 | 17.55 | 24.325 | 38.1 |
| Conductivity | 32 | 0.153 | 0 | 349.72 | 112.38 | 175 | 239.5 | 389 | 453.5 | 514 |
| pH | 32 | NA | 0 | 8.23 | 0.21 | 7.77 | 8.1275 | 8.25 | 8.36 | 8.63 |
| TDS | 32 | 17.6 | 0 | 187.13 | 57.09 | 103 | 132 | 182 | 236 | 285 |
| TSS | 30 | 3.49 | 0 | 9.17 | 8.85 | 5 | 5 | 5 | 10 | 37 |

Table E-2. Statistics for the Water Quality Parameters at the Annie Creek II Site (January 2015 Through August 2021)

| Parameter | Count | MDL | Percent Below MDL | Average | Standard Deviation | Minimum | 25th Percentile | 50th Percentile (Median) | 75th Percentile | Maximum |
|---|---|---|---|---|---|---|---|---|---|---|
| Cond, Field | 27 | NA | NA | 840.00 | 111.22 | 620 | 770 | 870 | 920 | 1030 |
| ORP, Field | 27 | NA | NA | 128.16 | 73.14 | -0.6 | 76 | 150 | 197 | 246 |
| DO, Field | 27 | NA | NA | 10.02 | 1.00 | 8.39 | 9.565 | 9.9 | 10.18 | 12.44 |
| pH, Field | 27 | NA | NA | 7.76 | 0.22 | 7.37 | 7.615 | 7.73 | 7.9 | 8.46 |
| Temp water, Field | 27 | NA | NA | 6.34 | 2.27 | 2.7 | 4.65 | 5.4 | 8.4 | 11 |
| Flow, Field | 26 | NA | NA | 129.85 | 109.55 | 0.175 | 75.62 | 95.76 | 206.1 | 441 |
| Sodium - D | 29 | 0.02 | 0 | 17.10 | 2.02 | 13 | 15.7 | 17.2 | 18.7 | 21.2 |
| Mercury - T | 29 | 0.000035 | 0 | 0.00 | 0.00 | 0.00005 | 0.00005 | 0.00005 | 0.00005 | 0.00005 |
| Arsenic - T | 29 | 0.0005 | 0 | 0.06 | 0.01 | 0.048 | 0.055 | 0.058 | 0.066 | 0.081 |
| Gold - T | 29 | 0.001 | 1.0 | 0.00 | 0.00 | 0.00028 | 0.00028 | 0.00028 | 0.00028 | 0.00028 |
| Selenium - T | 28 | 0.001 | 0 | 0.01 | 0.00 | 0.008 | 0.011 | 0.013 | 0.015 | 0.017 |
| Bicarbonate | 29 | 0.513 | 0 | 144.83 | 12.36 | 112 | 140 | 147 | 155 | 164 |
| CN, Total | 29 | 0.00037 | 0 | 0.01 | 0.00 | 0.005 | 0.005 | 0.005 | 0.01 | 0.013 |
| CN, WAD | 29 | 0.00055 | 0 | 0.00 | 0.00 | 0.002 | 0.002 | 0.002 | 0.002 | 0.002 |
| Fluoride | 29 | 0.004 | 0 | 0.36 | 0.04 | 0.305 | 0.333 | 0.358 | 0.399 | 0.446 |
| N, Ammonia | 29 | 0.007 | 1.0 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 | 0.00 |
| N, Nitrate | 29 | 0.056 | 0 | 19.16 | 3.86 | 11.8 | 16.6 | 19.7 | 22.5 | 26.5 |
| N, Nitrite | 29 | 0.005 | 0 | 0.25 | 0.00 | 0.25 | 0.25 | 0.25 | 0.25 | 0.25 |
| Sulfate | 29 | 0.679 | 0 | 232.10 | 38.36 | 135 | 197 | 244 | 260 | 299 |
| Conductivity | 29 | 0.153 | 0 | 817.24 | 106.44 | 590 | 729 | 851 | 889.5 | 1010 |
| pH | 29 | NA | 0 | 7.85 | 0.10 | 7.61 | 7.79 | 7.85 | 7.925 | 8.03 |
| TDS | 29 | 17.6 | 0 | 547.41 | 79.63 | 366 | 494 | 571 | 607.5 | 682 |
| TSS | 27 | 3.49 | 1.0 | 0.00 | 0.00 | 0 | 0 | 0 | 0 | 0 |

Table E-3. Statistics for the Water Quality Parameters at the Lost Camp Site (August 2015 Through August 2021)

| Parameter | Count | MDL | Percent Below MDL | Average | Standard Deviation | Minimum | 25th Percentile | 50th Percentile (Median) | 75th Percentile | Maximum |
|---|---|---|---|---|---|---|---|---|---|---|
| Cond, Field | 41 | NA | NA | 279.51 | 100.50 | 140 | 200 | 260 | 335 | 590 |
| ORP, Field | 39 | NA | NA | 158.92 | 56.74 | 33 | 122.5 | 168 | 202 | 250 |
| DO, Field | 41 | NA | NA | 10.91 | 2.16 | 5.29 | 9.94 | 11.04 | 12.51 | 15.1 |
| pH, Field | 41 | NA | NA | 8.05 | 0.32 | 7.37 | 7.82 | 8.12 | 8.265 | 8.63 |
| Temp water, Field | 41 | NA | NA | 5.65 | 5.64 | -5 | 1.3 | 4.4 | 9.6 | 17.9 |
| Flow, Field | 39 | NA | NA | 249.38 | 564.03 | 1 | 20 | 30 | 150 | 3000 |
| Sodium - D | 39 | 0.02 | 0 | 5.00 | 2.44 | 3.07 | 3.755 | 4.24 | 4.91 | 16.6 |
| Mercury - T | 39 | 0.000035 | 0 | 0.00 | 0.00 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 |
| Arsenic - T | 38 | 0.0005 | 0 | 0.01 | 0.00 | 0.0025 | 0.0025 | 0.0025 | 0.006 | 0.02 |
| Gold - T | 38 | 0.001 | 0.95 | 0.00 | 0.00 | 0.0005 | 0.0005 | 0.0005 | 0.0005 | 0.004 |
| Selenium - T | 38 | 0.001 | 0 | 0.00 | 0.00 | 0.0025 | 0.0025 | 0.0025 | 0.0025 | 0.0025 |
| Bicarbonate | 39 | 0.513 | 0 | 141.55 | 60.10 | 50.6 | 82.35 | 140 | 192 | 261 |
| CN, Total | 38 | 0.00037 | 0 | 0.01 | 0.00 | 0.005 | 0.005 | 0.005 | 0.005 | 0.018 |
| CN, WAD | 39 | 0.00055 | 0 | 0.01 | 0.00 | 0.005 | 0.005 | 0.005 | 0.005 | 0.005 |
| Fluoride | 39 | 0.004 | 0 | 0.11 | 0.03 | 0.077 | 0.0915 | 0.107 | 0.128 | 0.174 |
| N, Ammonia | 39 | 0.007 | 0 | 0.03 | 0.00 | 0.025 | 0.025 | 0.025 | 0.025 | 0.025 |
| N, Nitrate | 39 | 0.056 | 0.05 | 0.78 | 1.15 | 0.025 | 0.271 | 0.583 | 0.786 | 7.31 |
| N, Nitrite | 39 | 0.005 | 0 | 0.03 | 0.03 | 0.025 | 0.025 | 0.025 | 0.025 | 0.161 |
| Sulfate | 39 | 0.679 | 0.90 | 2.70 | 7.77 | 0.5 | 0.5 | 0.5 | 0.5 | 43.6 |
| Conductivity | 39 | 0.153 | 0 | 275.82 | 87.10 | 147 | 212.5 | 271 | 325 | 564 |
| pH | 40 | NA | 0 | 7.98 | 0.19 | 7.62 | 7.8925 | 7.96 | 8.1175 | 8.5 |
| TDS | 40 | 17.6 | 0 | 150.70 | 49.60 | 90 | 115 | 141.5 | 175.75 | 332 |
| TSS | 40 | 3.49 | 0 | 13.75 | 24.91 | 5 | 5 | 5 | 5 | 117 |

Table E-4. Statistics for the Water Quality Parameters at the SS-20 Site (April 2015 Through August 2021)

| Parameter | Count | MDL | Percent Below MDL | Average | Standard Deviation | Minimum | 25th Percentile | 50th Percentile (Median) | 75th Percentile | Maximum |
|---|---|---|---|---|---|---|---|---|---|---|
| Cond, Field | 15 | NA | NA | 584.67 | 148.75 | 390 | 495 | 570 | 690 | 900 |
| pH, Field | 15 | NA | NA | 7.41 | 0.31 | 6.76 | 7.335 | 7.42 | 7.64 | 7.97 |
| Temp water, Field | 15 | NA | NA | 8.12 | 3.32 | 2.5 | 5.8 | 8.3 | 10.5 | 13.8 |
| Flow, Field | 15 | NA | NA | 39.13 | 19.51 | 7 | 30 | 40 | 45 | 95 |
| Sodium - D | 15 | 0.02 | 0 | 45.47 | 13.31 | 22.4 | 39.3 | 44.3 | 47.8 | 69 |
| Mercury - T | 15 | 0.000035 | 0 | 0.00 | 0.00 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 |
| Arsenic - T | 15 | 0.0005 | 0 | 0.02 | 0.01 | 0.012 | 0.014 | 0.017 | 0.019 | 0.036 |
| Selenium - T | 15 | 0.001 | 0 | 0.00 | 0.00 | 0.0025 | 0.0025 | 0.0025 | 0.0025 | 0.0025 |
| Bicarbonate | 15 | 0.513 | 0 | 87.43 | 15.87 | 62.8 | 72.95 | 90 | 99.3 | 113 |
| N, Nitrate | 15 | 0.056 | 0 | 2.56 | 1.07 | 0.92 | 1.87 | 2.28 | 3.26 | 4.52 |
| N, Nitrite | 15 | 0.005 | 0 | 0.03 | 0.00 | 0.025 | 0.025 | 0.025 | 0.025 | 0.025 |
| Sulfate | 15 | 0.679 | 0.67 | 15.81 | 5.89 | 0.5 | 13.5 | 15.7 | 19.1 | 25.4 |
| Conductivity | 15 | 0.153 | 0 | 567.40 | 139.43 | 362 | 499 | 546 | 640 | 864 |
| pH | 15 | NA | 0 | 7.55 | 0.28 | 7.07 | 7.325 | 7.62 | 7.82 | 7.92 |
| TSS | 15 | 3.49 | 0 | 8.20 | 8.45 | 5 | 5 | 5 | 5 | 30 |

Table E-5. Statistics for the Water Quality Parameters at the SS-04 Site (April 2015 Through August 2021)

| Parameter | Count | MDL | Percent Below MDL | Average | Standard Deviation | Minimum | 25th Percentile | 50th Percentile (Median) | 75th Percentile | Maximum |
|---|---|---|---|---|---|---|---|---|---|---|
| Cond, Field | 28 | NA | NA | 626.43 | 300.45 | 200 | 355 | 630 | 887.5 | 1170 |
| ORP, Field | 28 | NA | NA | 20.46 | 66.90 | -63 | -28.75 | 3.5 | 50.5 | 172 |
| DO, Field | 28 | NA | NA | 9.55 | 1.42 | 7.46 | 8.4525 | 9.575 | 10.0875 | 14.04 |
| pH, Field | 28 | NA | NA | 7.23 | 0.25 | 6.75 | 7.0275 | 7.21 | 7.4325 | 7.8 |
| Temp water, Field | 28 | NA | NA | 8.12 | 4.75 | 1.4 | 3.35 | 7.9 | 12.175 | 16.3 |
| Flow, Field | 28 | NA | NA | 229.50 | 378.82 | 10 | 32.5 | 72.5 | 280 | 1510 |
| Sodium - D | 28 | 0.02 | 0 | 23.84 | 8.14 | 9.93 | 19.875 | 22.8 | 27.9 | 48.9 |
| Mercury - T | 28 | 0.000035 | 0 | 0.00 | 0.00 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 |
| Arsenic - T | 28 | 0.0005 | 0 | 0.02 | 0.01 | 0.007 | 0.01375 | 0.017 | 0.0245 | 0.071 |
| Selenium - T | 28 | 0.001 | 0 | 0.00 | 0.00 | 0.0025 | 0.0025 | 0.0025 | 0.0025 | 0.0025 |
| Bicarbonate | 28 | 0.513 | 0 | 58.84 | 14.55 | 36.2 | 48.575 | 57.15 | 67.575 | 94.7 |
| N, Nitrate | 28 | 0.056 | 0 | 0.94 | 0.68 | 0.114 | 0.52725 | 0.8615 | 1.1275 | 3.3 |
| N, Nitrite | 28 | 0.005 | 0 | 0.03 | 0.00 | 0.025 | 0.025 | 0.025 | 0.025 | 0.025 |
| Sulfate | 28 | 0.679 | 0 | 161.60 | 145.72 | 24.4 | 36.75 | 97.65 | 278 | 473 |
| Conductivity | 28 | 0.153 | 0 | 617.04 | 309.12 | 196 | 346 | 619.5 | 855 | 1190 |
| pH | 28 | NA | 0 | 7.25 | 0.25 | 6.61 | 7.025 | 7.34 | 7.4275 | 7.57 |
| TSS | 28 | 3.49 | 0 | 20.32 | 42.86 | 5 | 5 | 8 | 19 | 234 |

Table E-6. Statistics for the Water Quality Parameters at the 46MN31 Site (February 2015 Through August 2021) (Page 1 of 2)

| Parameter | Count | MDL | Percent Below MDL | Average | Standard Deviation | Minimum | 25th Percentile | 50th Percentile (Median) | 75th Percentile | Maximum |
|---|---|---|---|---|---|---|---|---|---|---|
| Cond, Field | 27 | NA | NA | 390.78 | 101.96 | 187 | 331 | 434 | 462 | 530 |
| Field Depth | 27 | NA | NA | 0.45 | 0.28 | 0.1 | 0.3 | 0.4 | 0.5 | 1.2 |
| Field Width | 27 | NA | NA | 6.41 | 1.74 | 3 | 5 | 7 | 8 | 10 |
| DO, Field | 27 | NA | NA | 11.11 | 1.23 | 8.3 | 10.2 | 11.2 | 12.1 | 13.3 |
| pH, Field | 27 | NA | NA | 8.45 | 0.23 | 7.9 | 8.4 | 8.4 | 8.6 | 8.8 |
| Temp water, Field | 27 | NA | NA | 5.30 | 5.04 | 0 | 0.5 | 4 | 11 | 16 |
| Temp air, Field | 18 | NA | NA | 10.61 | 9.33 | -6 | 4.5 | 9.5 | 18.25 | 26 |
| Arsenic - D | 27 | 0.01 | 0 | 12.46 | 4.56 | 6 | 10 | 10 | 16 | 20 |
| Cadmium - D | 27 | 0.001 | 1.0 | 0.00 | 0.00 | 0.0005 | 0.0005 | 0.0005 | 0.0005 | 0.0005 |
| Calcium - D | 27 | 1 | 0 | 47.77 | 12.67 | 22.97 | 39.35 | 53.9 | 55.6 | 61.9 |
| Chromium - D | 27 | 0.001 | 1.0 | 0.00 | 0.00 | 0.0005 | 0.0005 | 0.0005 | 0.0005 | 0.0005 |
| Copper - D | 27 | 0.005 | 1.0 | 0.00 | 0.00 | 0.0025 | 0.0025 | 0.0025 | 0.0025 | 0.0025 |
| Lead - D | 27 | 0.001 | 1.0 | 0.00 | 0.00 | 0.0005 | 0.0005 | 0.0005 | 0.0005 | 0.0005 |
| Magnesium - D | 27 | 0.5 | 0 | 18.23 | 5.88 | 7.32 | 13.8 | 20.4 | 22.9 | 24.7 |
| Mercury - D | 27 | 0.005 | 1.0 | 0.00 | 0.00 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 |
| Nickel - D | 27 | 0.005 | 1.0 | 0.00 | 0.00 | 0.0025 | 0.0025 | 0.0025 | 0.0025 | 0.0025 |
| Selenium - D | 27 | 0.0005 | 0 | 0.00 | 0.00 | 0.00131 | 0.0025 | 0.0025 | 0.0025 | 0.0025 |
| Silver - D | 27 | 0.001 | 1.0 | 0.00 | 0.00 | 0.0005 | 0.0005 | 0.0005 | 0.0005 | 0.0005 |
| Zinc - D | 27 | 0.0005 | 0.11 | 0.04 | 0.02 | 0.00 | 0.05 | 0.05 | 0.05 | 0.05 |
| Mercury - T | 27 | 0.000035 | 0 | 0.00 | 0.00 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 |
| Aluminum - TR | 6 | 0.0001 | 0 | 363.58 | 464.84 | 28.7 | 53 | 139.85 | 776.75 | 1190 |
| Arsenic - T | 1 | 0.0005 | 0 | 0.01 | | 0.01262 | 0.01262 | 0.01262 | | 0.01262 |
| Cadmium - TR | 1 | 0.0001 | 0 | 0.00 | | 0.0005 | 0.0005 | 0.0005 | | 0.0005 |
| Chromium - TR | 1 | 0.0001 | 0 | 0.00 | | 0.0005 | 0.0005 | 0.0005 | | 0.0005 |
| Copper - TR | 1 | 0.0009 | 0 | 0.00 | | 0.0025 | 0.0025 | 0.0025 | | 0.0025 |
| Lead - TR | 1 | 0.000026 | 0 | 0.00 | | 0.00102 | 0.00102 | 0.00102 | | 0.00102 |
| Nickel - TR | 1 | 0.0005 | 0 | 0.00 | | 0.0025 | 0.0025 | 0.0025 | | 0.0025 |
| Selenium - TR | 1 | 0.001 | 0 | 0.00 | | 0.0025 | 0.0025 | 0.0025 | | 0.0025 |
| Silver - TR | 1 | 0.0002 | 0 | 0.00 | | 0.0005 | 0.0005 | 0.0005 | | 0.0005 |
| Zinc - TR | 1 | 0.006 | 0 | 0.03 | | 0.025 | 0.025 | 0.025 | | 0.025 |
| CN, Total | 3 | 0.00037 | 0 | 0.01 | 0.00 | 0.005 | 0.005 | 0.005 | 0.005 | 0.005 |
| CN, WAD | 27 | 0.00055 | 0 | 0.01 | 0.00 | 0.005 | 0.005 | 0.005 | 0.005 | 0.005 |
| N, Ammonia | 27 | 0.007 | 0 | 0.03 | 0.00 | 0.025 | 0.025 | 0.025 | 0.025 | 0.025 |
| N, Nitrate+Nitrite | 27 | | 0 | 4.52 | 2.04 | 0.754 | 2.64 | 5.1 | 6.01 | 7.21 |
| Kjeldahl nitrogen - T | 25 | 0.5 | 0.96 | 0.05 | 0.13 | 0.025 | 0.025 | 0.025 | 0.025 | 0.67 |
| Phosphorus - T | 27 | 0.01 | 0 | 0.06 | 0.03 | 0.033 | 0.045 | 0.049 | 0.057 | 0.197 |

Table E-6. Statistics for the Water Quality Parameters at the 46MN31 Site (February 2015 Through August 2021) (Page 2 of 2)

| Parameter | Count | MDL | Percent Below MDL | Average | Standard Deviation | Minimum | 25th Percentile | 50th Percentile (Median) | 75th Percentile | Maximum |
|---|---|---|---|---|---|---|---|---|---|---|
| Alkalinity | 1 | NA | 0 | 170.00 | | 170 | 170 | 170 | | 170 |
| Hardness | 27 | 5 | 0 | 194.36 | 55.61 | 87.49985 | 155 | 219 | 233 | 256 |
| D - Organic Carbon | 25 | 0.2 | 0 | 2.04 | 0.71 | 1.03 | 1.52 | 1.84 | 2.665 | 3.41 |
| TDS | 27 | 17.6 | 0 | 213.67 | 51.21 | 118 | 172.5 | 228 | 258 | 286 |
| TSS | 27 | 3.49 | 0 | 8.67 | 13.89 | 5 | 5 | 5 | 5 | 70 |

Notes:
N/A = Not Available
D = dissolved
TR = total recoverable
T = total
CN = cyanide
WAD = Weak Acid Dissociable
N = nitrogen
TDS = total dissolved solids
TSS = total suspended solids
All units are milligrams per liter (mg/L) with the following exceptions: conductivity (micromhos per cm); depth and width (feet); pH (standard units); temperature (degrees Celsius)

Table E-7. Summary Statistics for the Water Quality Parameters at the CP001/NPDES001 (January 2015 Through December 2021)

| Parameter | Count | MDL | Percent Below MDL | Average | Standard Deviation | Minimum | 25th Percentile | 50th Percentile (Median) | 75th Percentile | Maximum |
|---|---|---|---|---|---|---|---|---|---|---|
| Cond, Field | 178 | NA | NA | 469.49 | 117.84 | 80 | 440 | 490 | 530 | 700 |
| ORP, Field | 58 | NA | NA | 149.03 | 63.37 | -19 | 116.75 | 160 | 192 | 230 |
| DO, Field | 177 | NA | NA | 10.54 | 1.79 | 0.87 | 9.47 | 10.7 | 11.4 | 15.8 |
| pH, Field | 180 | NA | NA | 8.53 | 0.23 | 7.59 | 8.43 | 8.6 | 8.69 | 8.93 |
| Temp water, Field | 180 | NA | NA | 6.37 | 5.06 | -4 | 1.7 | 5.5 | 10.2 | 19.7 |
| Flow, Field | 165 | NA | NA | 152.96 | 283.05 | 3 | 61.53 | 83 | 123.85 | 2432 |
| Calcium - D | 93 | 1 | 0 | 53.61 | 13.01 | 11.3 | 50 | 57.5 | 61.65 | 71.9 |
| Magnesium - D | 93 | 0.5 | 0 | 23.95 | 6.07 | 3.26 | 21.9 | 26.5 | 27.65 | 31.2 |
| Mercury - T | 91 | 0.000035 | 0 | 0.00 | 0.00 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0002 |
| Arsenic - TR | 187 | 0.0006 | 0 | 0.01 | 0.01 | 0.0025 | 0.011 | 0.013 | 0.015 | 0.038 |
| Cadmium - TR | 91 | 0.0001 | 0 | 0.00 | 0.00 | 0.0005 | 0.0005 | 0.0005 | 0.0005 | 0.0005 |
| Chromium - TR | 36 | 0.0001 | 0 | 0.00 | 0.00 | 0.0005 | 0.0005 | 0.0005 | 0.000875 | 0.004 |
| Copper - TR | 91 | 0.0009 | 0 | 0.00 | 0.00 | 0.0025 | 0.0025 | 0.0025 | 0.0025 | 0.009 |
| Iron - TR | 5 | 0.00056 | 0.60 | 0.08 | 0.12 | 0.0005 | 0.0005 | 0.0005 | 0.1875 | 0.268 |
| Lead - TR | 91 | 0.000026 | 0 | 0.00 | 0.00 | 0.0005 | 0.0005 | 0.0005 | 0.0005 | 0.004 |
| Nickel - TR | 5 | 0.0005 | 0 | 0.00 | 0.00 | 0.0025 | 0.0025 | 0.0025 | 0.0025 | 0.0025 |
| Selenium - TR | 188 | 0.001 | 0 | 0.00 | 0.00 | 0.0025 | 0.0025 | 0.0025 | 0.0025 | 0.007 |
| Silver - TR | 36 | 0.0002 | 0 | 0.00 | 0.00 | 0.0005 | 0.0005 | 0.0005 | 0.0005 | 0.0005 |
| Zinc - TR | 91 | 0.006 | 0 | 0.03 | 0.03 | 0.025 | 0.025 | 0.025 | 0.025 | 0.272 |
| BOD, 5-Day | 187 | NA | 0 | 1.52 | 0.21 | 1.5 | 1.5 | 1.5 | 1.5 | 3.6 |
| CN, WAD | 197 | 0.00055 | 0 | 0.01 | 0.00 | 0.005 | 0.005 | 0.005 | 0.005 | 0.016 |
| N, Ammonia | 187 | 0.007 | 0 | 0.03 | 0.00 | 0.025 | 0.025 | 0.025 | 0.025 | 0.056 |
| N, Nitrate | 91 | 0.056 | 0 | 4.56 | 2.77 | 0.105 | 2.695 | 3.27 | 6.44 | 11.1 |
| Phosphorus - D | 7 | 0.004 | 0 | 0.02 | 0.01 | 0.005 | 0.0185 | 0.022 | 0.028 | 0.035 |
| Sulfate | 1 | 0.679 | 0 | 29.90 | | 29.9 | 29.9 | 29.9 | | 29.9 |
| Conductivity | 81 | 0.153 | 0 | 472.13 | 116.29 | 84.4 | 436 | 494 | 533 | 701 |
| Hardness | 93 | 5 | 0 | 232.58 | 56.99 | 41.6 | 210 | 252 | 267 | 308 |
| pH | 186 | NA | 0 | 8.44 | 0.13 | 7.83 | 8.39 | 8.46 | 8.52 | 8.68 |
| TDS | 93 | 17.6 | 0 | 254.81 | 64.85 | 79 | 222 | 256 | 295 | 418 |
| TSS | 188 | 3.49 | 0 | 5.06 | 0.57 | 5 | 5 | 5 | 5 | 11 |

Notes:
N/A = Not Available
D = dissolved
TR = total recoverable
T = total
CN = cyanide
WAD = Weak Acid Dissociable
N = nitrogen
TDS = total dissolved solids
TSS = total suspended solids
All units are milligrams per liter (mg/L) with the following exceptions: conductivity (micromhos per cm); depth and width (feet); pH (standard units); temperature (degrees Celsius)

Table E-8. Summary Statistics for the Water Quality Parameters at the CP005/NPDES005 (January 2015 Through December 2021) (Page 1 of 2)

| Parameter | Count | MDL | Percent Below MDL | Average | Standard Deviation | Minimum | 25th Percentile | 50th Percentile (Median) | 75th Percentile | Maximum |
|---|---|---|---|---|---|---|---|---|---|---|
| Cond, Field | 277 | NA | NA | 476.71 | 206.07 | 140 | 340 | 460 | 555 | 1170 |
| Field Depth | 27 | NA | NA | 0.45 | 0.28 | 0.1 | 0.3 | 0.4 | 0.5 | 1.2 |
| Field Width | 27 | NA | NA | 6.41 | 1.74 | 3 | 5 | 7 | 8 | 10 |
| ORP, Field | 117 | NA | NA | 121.77 | 95.50 | -63 | 31 | 151 | 204 | 264 |
| DO, Field | 263 | NA | NA | 10.30 | 1.56 | 0.92 | 9.3 | 10.2 | 11.1 | 15.6 |
| pH, Field | 278 | NA | NA | 8.14 | 0.53 | 6.75 | 7.7475 | 8.335 | 8.54 | 10.3 |
| Temp water, Field | 278 | NA | NA | 6.60 | 4.92 | -3 | 2.525 | 5.5 | 10.3 | 19.8 |
| Temp air, Field | 18 | NA | NA | 10.61 | 9.33 | -6 | 4.5 | 9.5 | 18.25 | 26 |
| Flow, Field | 245 | NA | NA | 541.06 | 1472.84 | 0.175 | 95.76 | 180 | 375 | 18600 |
| Arsenic - D | 27 | 0.01 | 0 | 12.46 | 4.56 | 6 | 10 | 10 | 16 | 20 |
| Cadmium - D | 27 | 0.001 | 1.0 | 0.00 | 0.00 | 0.0005 | 0.0005 | 0.0005 | 0.0005 | 0.0005 |
| Calcium - D | 130 | 1 | 0 | 45.14 | 13.94 | 17.9 | 32.65 | 50 | 56.25 | 67.8 |
| Chromium - D | 27 | 0.001 | 1.0 | 0.00 | 0.00 | 0.0005 | 0.0005 | 0.0005 | 0.0005 | 0.0005 |
| Copper - D | 27 | 0.005 | 1.0 | 0.00 | 0.00 | 0.0025 | 0.0025 | 0.0025 | 0.0025 | 0.0025 |
| Lead - D | 27 | 0.001 | 1.0 | 0.00 | 0.00 | 0.0005 | 0.0005 | 0.0005 | 0.0005 | 0.0005 |
| Magnesium - D | 130 | 0.5 | 0 | 18.54 | 7.57 | 4.74 | 11.1 | 20.5 | 24.225 | 42.5 |
| Mercury - D | 27 | 0.005 | 1.0 | 0.00 | 0.00 | 0.0001 | 0.0001 | 0.0001 | 0.0001 | 0.0001 |
| Nickel - D | 27 | 0.005 | 1.0 | 0.00 | 0.00 | 0.0025 | 0.0025 | 0.0025 | 0.0025 | 0.0025 |
| Selenium - D | 27 | 0.0005 | 0 | 0.00 | 0.00 | 0.00131 | 0.0025 | 0.0025 | 0.0025 | 0.0025 |
| Silver - D | 27 | 0.001 | 1.0 | 0.00 | 0.00 | 0.0005 | 0.0005 | 0.0005 | 0.0005 | 0.0005 |
| Sodium - D | 72 | 0.02 | 0 | 25.63 | 13.26 | 9.93 | 17.275 | 20.2 | 30.35 | 69 |
| Mercury - T | 190 | 0.000035 | 0 | 0.00 | 0.00 | 0.00005 | 0.0001 | 0.0001 | 0.0001 | 0.0001 |
| Aluminum - TR | 6 | 0.0001 | 0 | 363.58 | 464.84 | 28.7 | 53 | 139.85 | 776.75 | 1190 |
| Arsenic - T | 74 | 0.0005 | 0 | 0.04 | 0.02 | 0.007 | 0.016 | 0.025 | 0.05625 | 0.081 |
| Arsenic - TR | 187 | 0.0006 | 0 | 0.01 | 0.00 | 0.006 | 0.009 | 0.01 | 0.012 | 0.032 |
| Cadmium - TR | 93 | 0.0001 | 0 | 0.00 | 0.00 | 0.0005 | 0.0005 | 0.0005 | 0.0005 | 0.0005 |
| Chromium - TR | 39 | 0.0001 | 0 | 0.00 | 0.00 | 0.0005 | 0.0005 | 0.0005 | 0.0005 | 0.022 |
| Copper - TR | 93 | 0.0009 | 0 | 0.00 | 0.00 | 0.0025 | 0.0025 | 0.0025 | 0.0025 | 0.009 |
| Gold - T | 29 | 0.001 | 1.0 | 0.00 | 0.00 | 0.00028 | 0.00028 | 0.00028 | 0.00028 | 0.00028 |
| Iron - TR | 5 | 0.00056 | 0 | 0.22 | 0.18 | 0.061 | 0.061 | 0.128 | 0.4125 | 0.437 |
| Lead - TR | 98 | 0.000026 | 0 | 0.00 | 0.00 | 0.0005 | 0.0005 | 0.0005 | 0.001 | 0.009 |
| Nickel - TR | 6 | 0.0005 | 0 | 0.00 | 0.00 | 0.0025 | 0.0025 | 0.0025 | 0.0025 | 0.0025 |
| Selenium - T | 72 | 0.001 | 0 | 0.01 | 0.01 | 0.0025 | 0.0025 | 0.0025 | 0.012 | 0.017 |
| Selenium - TR | 188 | 0.001 | 0 | 0.00 | 0.00 | 0.0025 | 0.0025 | 0.0025 | 0.0025 | 0.0025 |
| Silver - TR | 39 | 0.0002 | 0 | 0.00 | 0.00 | 0.0005 | 0.0005 | 0.0005 | 0.0005 | 0.001 |
| Zinc - TR | 95 | 0.006 | 0 | 0.04 | 0.04 | 0.025 | 0.025 | 0.025 | 0.025 | 0.349 |
| Bicarbonate | 72 | 0.513 | 0 | 99.43 | 41.38 | 36.2 | 63.175 | 93.9 | 144 | 164 |

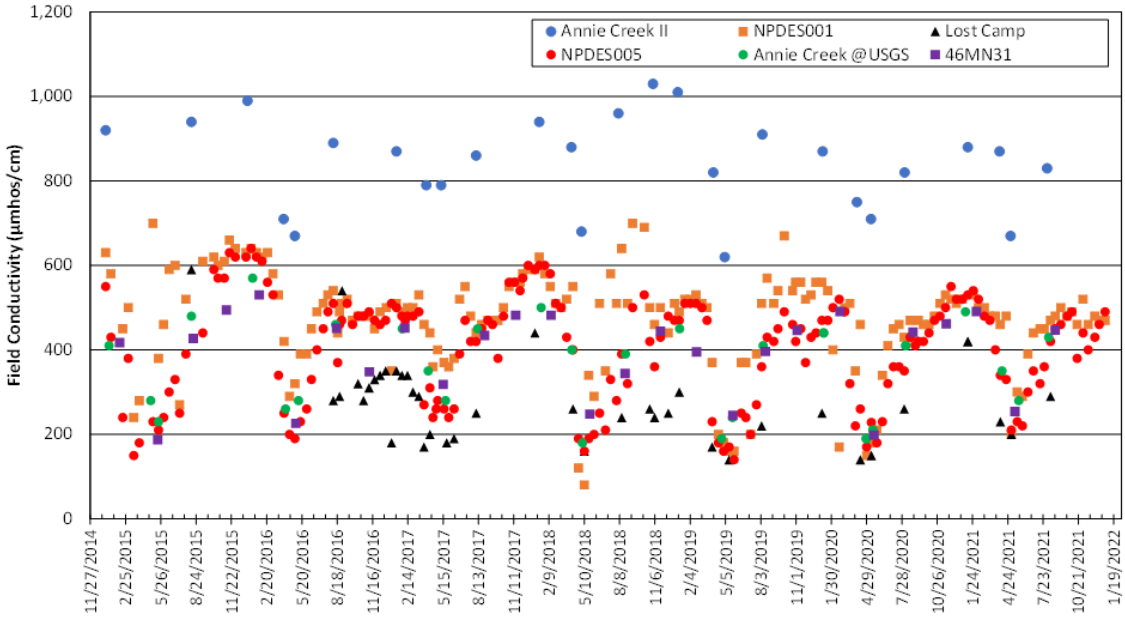
Table E-8. Summary Statistics for the Water Quality Parameters at the CP005/NPDES005 (January 2015 Through December 2021) (Page 2 of 2)

| Parameter | Count | MDL | Percent Below MDL | Average | Standard Deviation | Minimum | 25th Percentile | 50th Percentile (Median) | 75th Percentile | Maximum |
|---|---|---|---|---|---|---|---|---|---|---|
| CN, Total | 32 | 0.00037 | 0 | 0.01 | 0.00 | 0.005 | 0.005 | 0.005 | 0.01 | 0.013 |
| BOD, 5-Day | 188 | NA | 0 | 1.54 | 0.28 | 1.5 | 1.5 | 1.5 | 1.5 | 3.6 |
| CN, WAD | 244 | 0.00055 | 0 | 0.00 | 0.00 | 0.002 | 0.005 | 0.005 | 0.005 | 0.005 |
| Fluoride | 29 | 0.004 | 0 | 0.36 | 0.04 | 0.305 | 0.333 | 0.358 | 0.399 | 0.446 |
| N, Ammonia | 243 | 0.007 | 0.12 | 0.02 | 0.01 | 0 | 0.025 | 0.025 | 0.025 | 0.025 |
| N, Nitrate+Nitrite | 27 | | 0 | 4.52 | 2.04 | 0.754 | 2.64 | 5.1 | 6.01 | 7.21 |
| N, Nitrate | 164 | 0.056 | 0 | 5.29 | 6.83 | 0.114 | 1.0775 | 2.325 | 5.1925 | 26.5 |
| N, Nitrite | 72 | 0.005 | 0 | 0.12 | 0.11 | 0.025 | 0.025 | 0.025 | 0.25 | 0.25 |
| Kjeldahl nitrogen - T | 25 | 0.5 | 0.96 | 0.05 | 0.13 | 0.025 | 0.025 | 0.025 | 0.025 | 0.67 |
| Phosphorus - T | 27 | 0.01 | 0 | 0.06 | 0.03 | 0.033 | 0.045 | 0.049 | 0.057 | 0.197 |
| Phosphorus - D | 93 | 0.004 | 0 | 0.03 | 0.01 | 0.005 | 0.027 | 0.034 | 0.038 | 0.104 |
| Sulfate | 73 | 0.679 | 0.01 | 157.84 | 123.29 | 0.5 | 28.5 | 180 | 255 | 473 |
| Alkalinity | 1 | NA | 0 | 170.00 | | 170 | 170 | 170 | | 170 |
| Conductivity | 154 | 0.153 | 0 | 535.70 | 233.28 | 149 | 369.25 | 491.5 | 684.25 | 1190 |
| Hardness | 130 | 5 | 0 | 189.04 | 64.60 | 66.6 | 123.25 | 213.5 | 239.25 | 290 |
| D - Organic Carbon | 25 | 0.2 | 0 | 2.04 | 0.71 | 1.03 | 1.52 | 1.84 | 2.665 | 3.41 |
| pH | 259 | NA | 0 | 8.13 | 0.41 | 6.61 | 7.92 | 8.32 | 8.4 | 8.59 |
| TDS | 150 | 17.6 | 0 | 275.29 | 148.83 | 97 | 173 | 241 | 286.5 | 682 |
| TSS | 286 | 3.49 | 0.09 | 10.22 | 28.09 | 0 | 5 | 5 | 5 | 300 |

Notes:
N/A = Not Available
D = dissolved
TR = total recoverable
T = total
CN = cyanide
WAD = Weak Acid Dissociable
N = nitrogen
TDS = total dissolved solids
TSS = total suspended solids
All units are milligrams per liter (mg/L) with the following exceptions: conductivity (micromhos per cm); depth and width (feet); pH (standard units); temperature (degrees Celsius)

# APPENDIX F

## TIME SERIES FOR BASELINE SURFACE WATER SITES


Annie Creek II
NPDES001
Lost Camp
NPDES005
Annie Creek @USGS
46MN31
Field Conductivity (µmhos/cm)
1,200
1,000
800
600
400
200
0
11/27/2014
2/25/2015
5/26/2015
8/24/2015
11/22/2015
2/20/2016
5/20/2016
8/18/2016
11/16/2016
2/14/2017
5/15/2017
8/13/2017
11/11/2017
2/9/2018
5/10/2018
8/8/2018
11/6/2018
2/4/2019
5/5/2019
8/3/2019
11/1/2019
1/30/2020
4/29/2020
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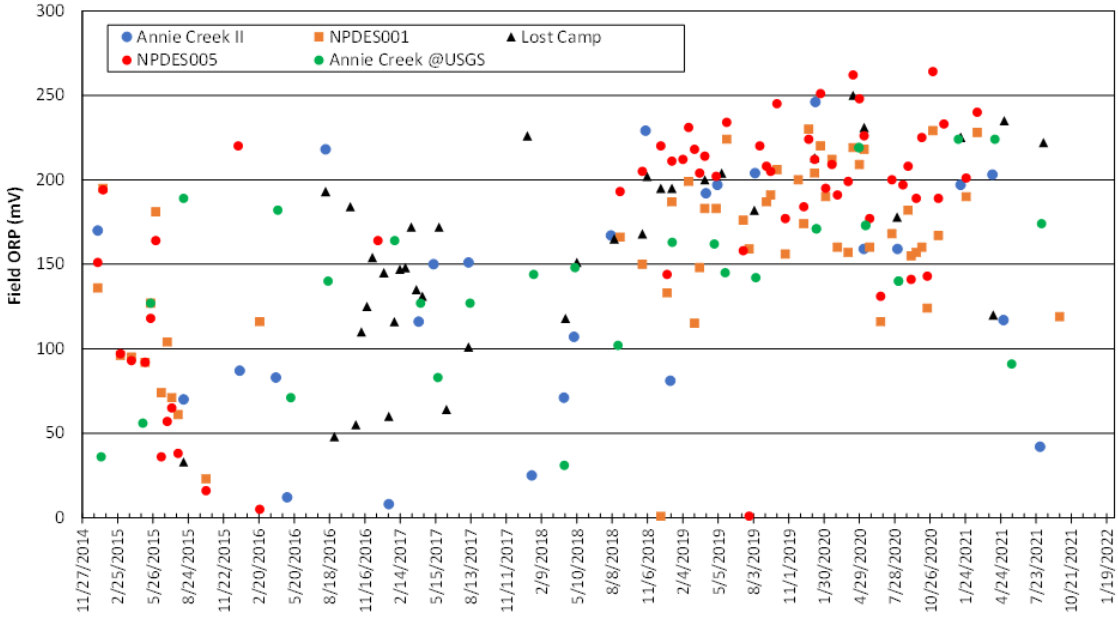
4/24/2021
7/23/2021
10/21/2021
1/19/2022


Annie Creek II
NPDES001
Lost Camp
NPDES005
Annie Creek @USGS
Field ORP (mV)
300
250
200
150
100
50
0
11/27/2014
2/25/2015
5/26/2015
8/24/2015
11/22/2015
2/20/2016
5/20/2016
8/18/2016
11/16/2016
2/14/2017
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8/13/2017
11/11/2017
2/9/2018
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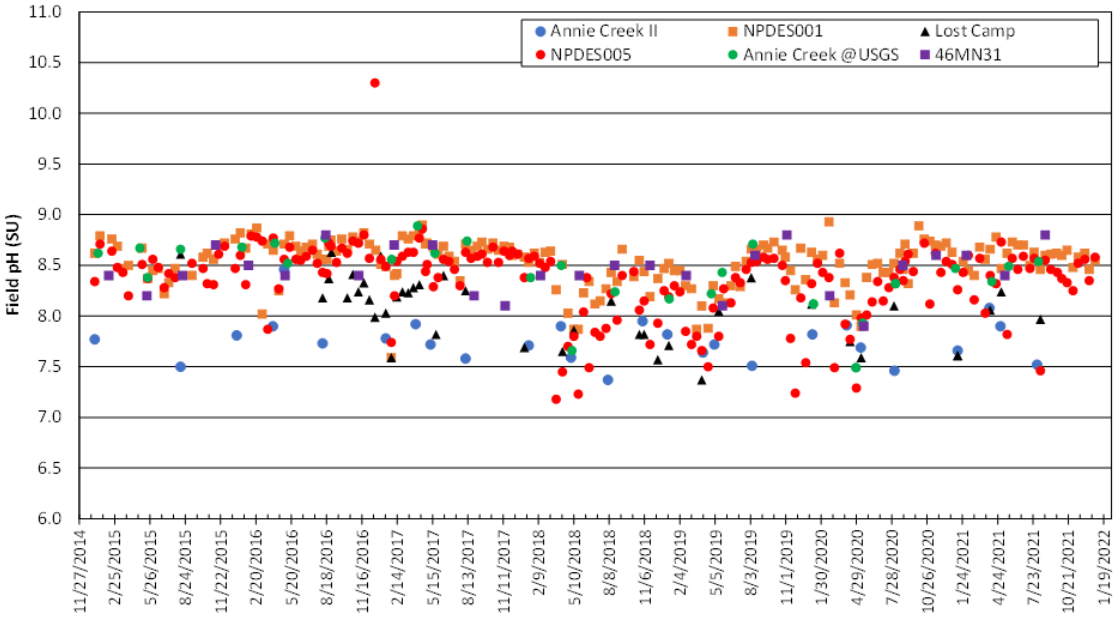
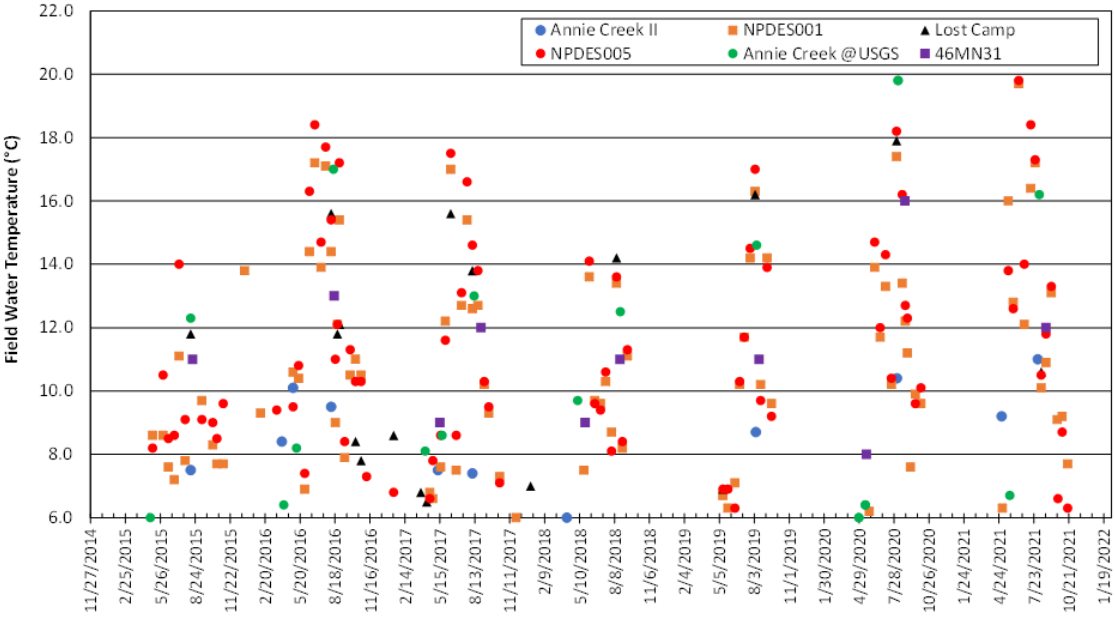
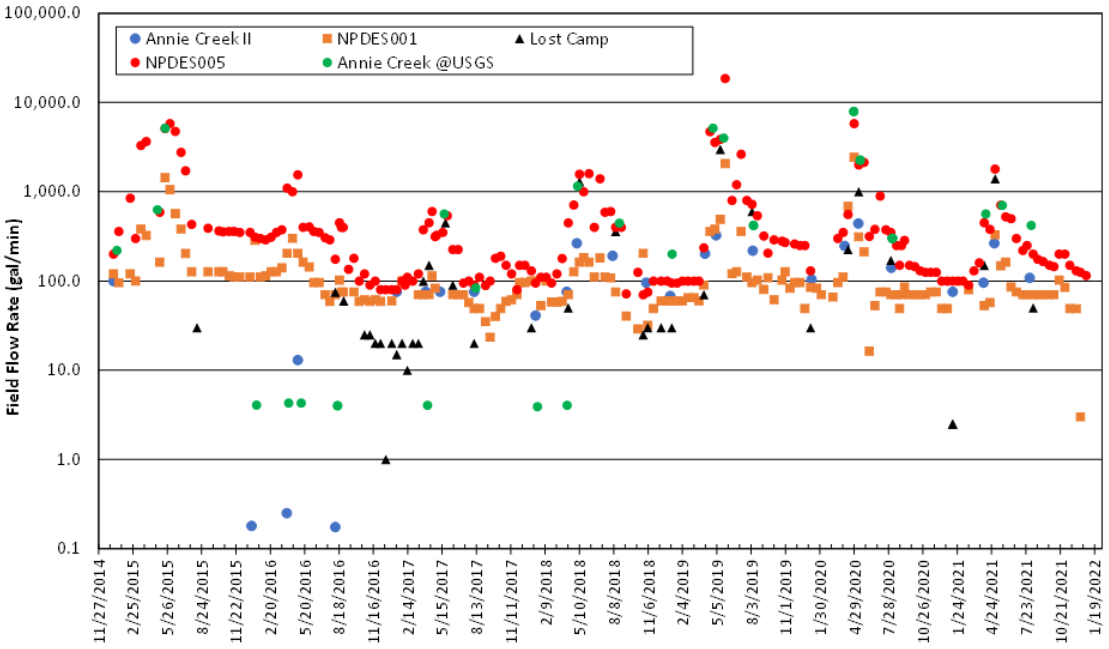
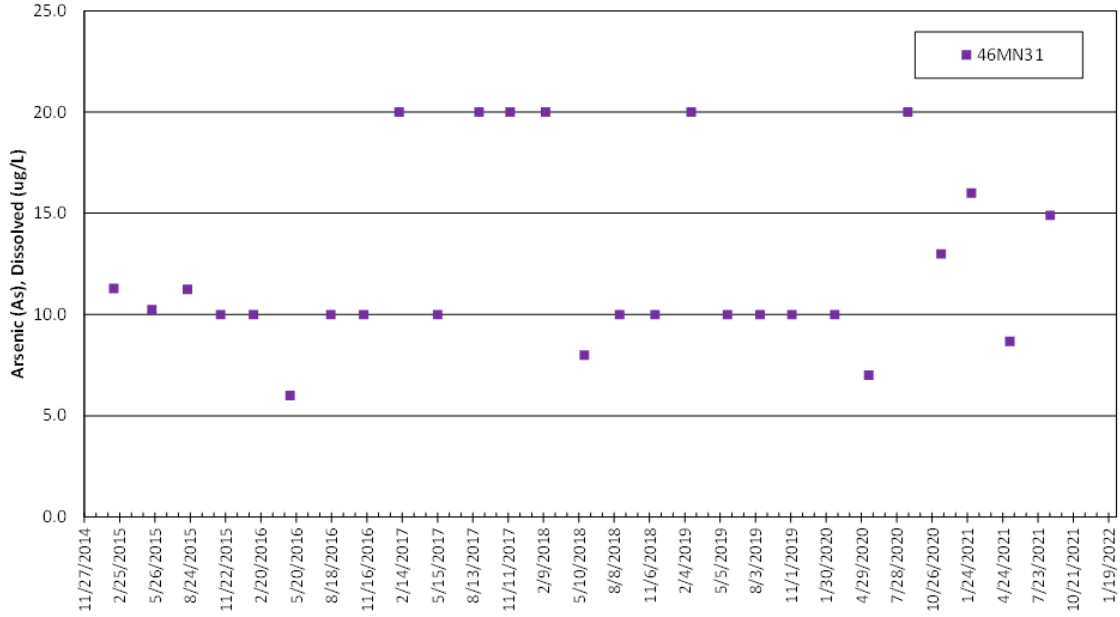
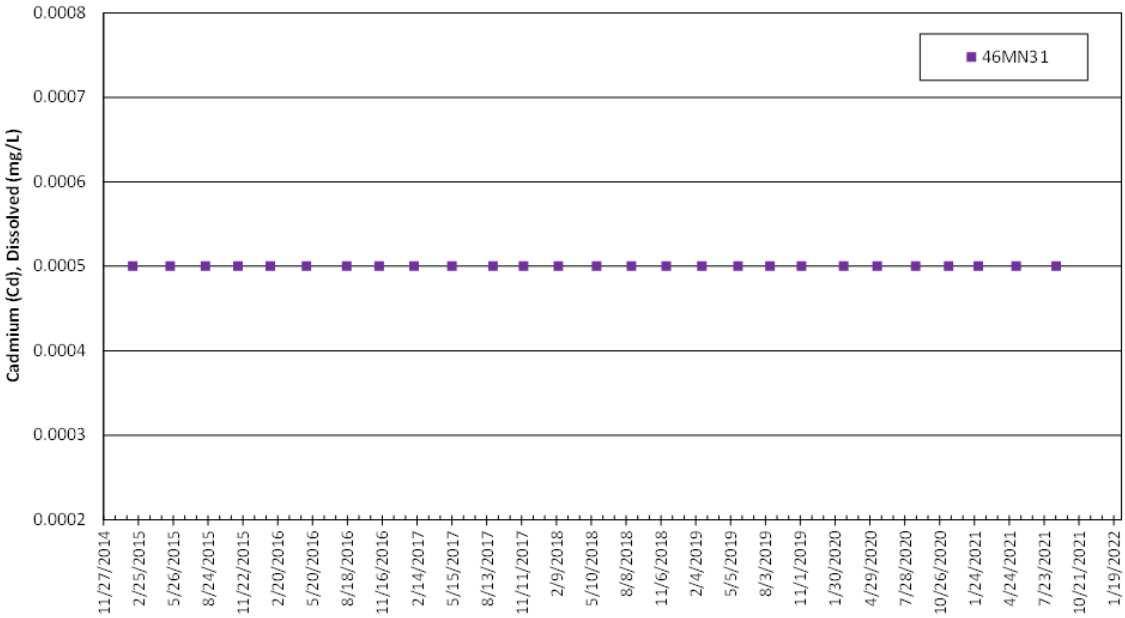
10/26/2020
1/24/2021
4/24/2021
7/23/2021
10/21/2021
1/19/2022

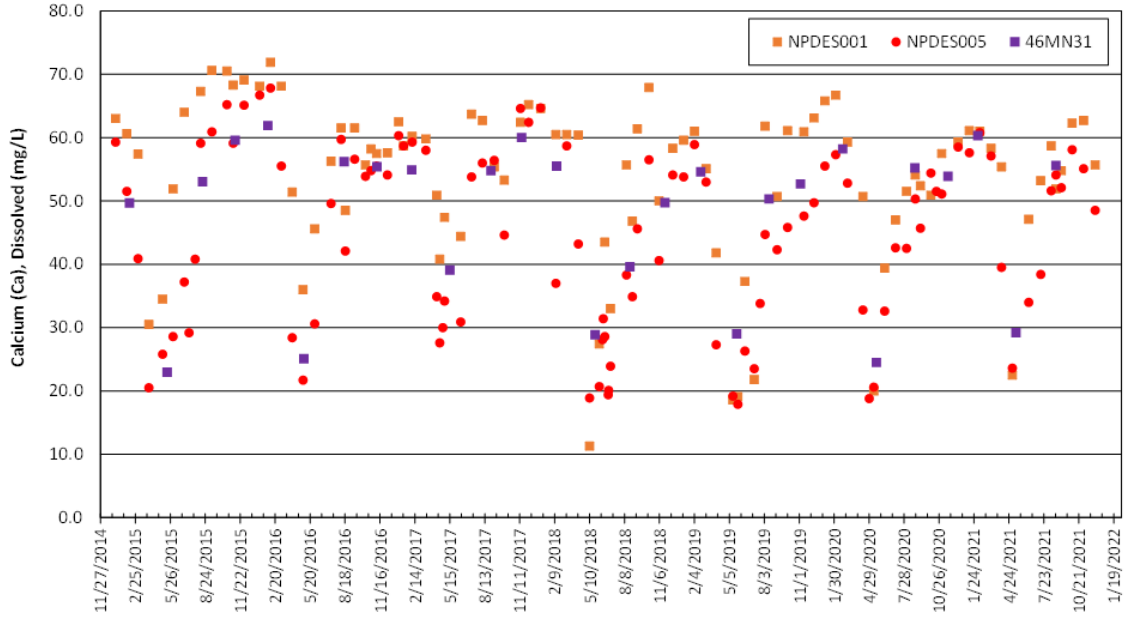

Annie Creek II
NPDES001
Lost Camp
NPDES005
Annie Creek @USGS
46MN31
Field pH (SU)
11.0
10.5
10.0
9.5
9.0
8.5
8.0
7.5
7.0
6.5
6.0
11/27/2014
2/25/2015
5/26/2015
8/24/2015
11/22/2015
2/20/2016
5/20/2016
8/18/2016
11/16/2016
2/14/2017
5/15/2017
8/13/2017
11/11/2017
2/9/2018
5/10/2018
8/8/2018
11/6/2018
2/4/2019
5/5/2019
8/3/2019
11/1/2019
1/30/2020
4/29/2020
7/28/2020
10/26/2020
1/24/2021
4/24/2021
7/23/2021
10/21/2021
1/19/2022

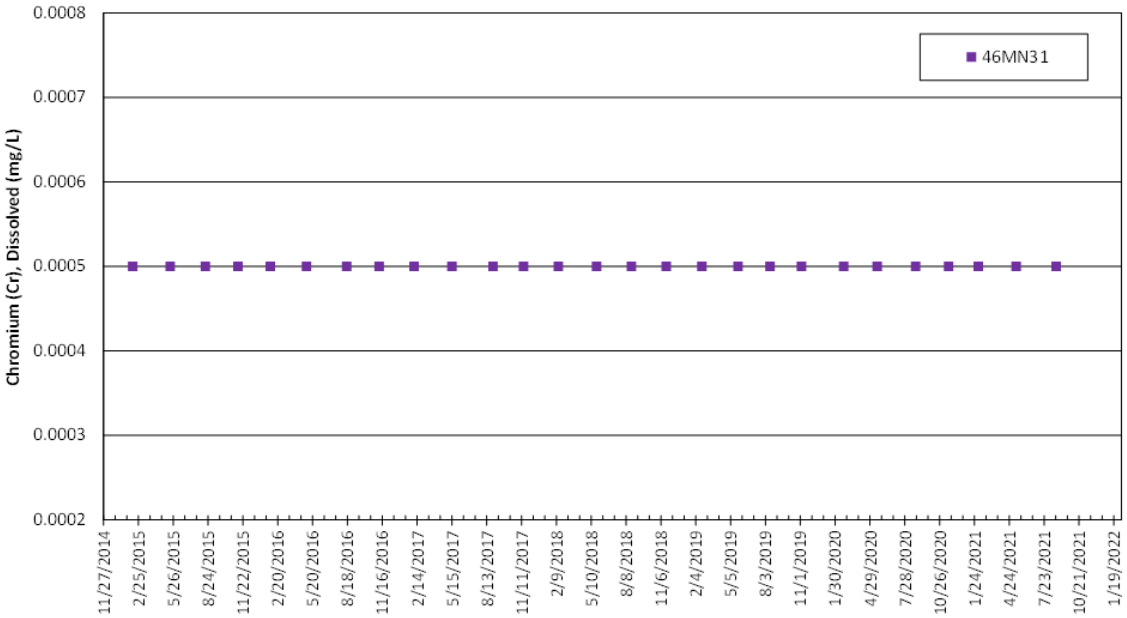

Annie Creek II
NPDES001
Lost Camp
NPDES005
Annie Creek @USGS
46MN31
Field Water Temperature (°C)
22.0
20.0
18.0
16.0
14.0
12.0
10.0
8.0
6.0
11/27/2014
2/25/2015
5/26/2015
8/24/2015
11/22/2015
2/20/2016
5/20/2016
8/18/2016
11/16/2016
2/14/2017
5/15/2017
8/13/2017
11/11/2017
2/9/2018
5/10/2018
8/8/2018
11/6/2018
2/4/2019
5/5/2019
8/3/2019
11/1/2019
1/30/2020
4/29/2020
7/28/2020
10/26/2020
1/24/2021
4/24/2021
7/23/2021
10/21/2021
1/19/2022

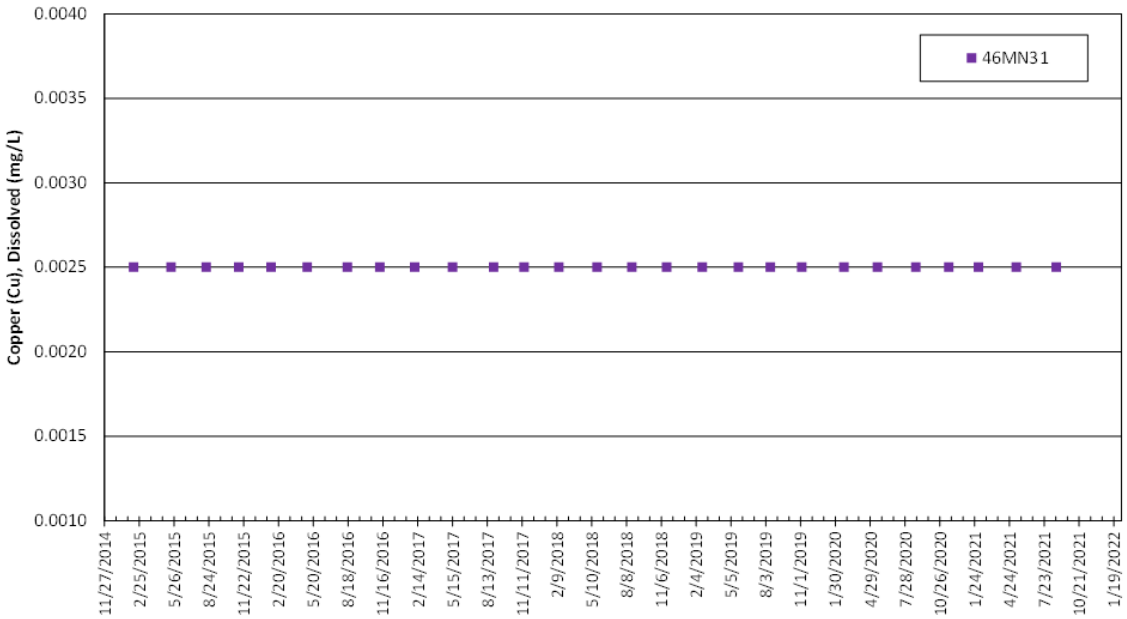

Annie Creek II
NPDES001
Lost Camp
NPDES005
Annie Creek @USGS
Field Flow Rate (gal/min)
100,000.0
10,000.0
1,000.0
100.0
10.0
1.0
0.1
11/27/2014
2/25/2015
5/26/2015
8/24/2015
11/22/2015
2/20/2016
5/20/2016
8/18/2016
11/16/2016
2/14/2017
5/15/2017
8/13/2017
11/11/2017
2/9/2018
5/10/2018
8/8/2018
11/6/2018
2/4/2019
5/5/2019
8/3/2019
11/1/2019
1/30/2020
4/29/2020
7/28/2020
10/26/2020
1/24/2021
4/24/2021
7/23/2021
10/21/2021
1/19/2022

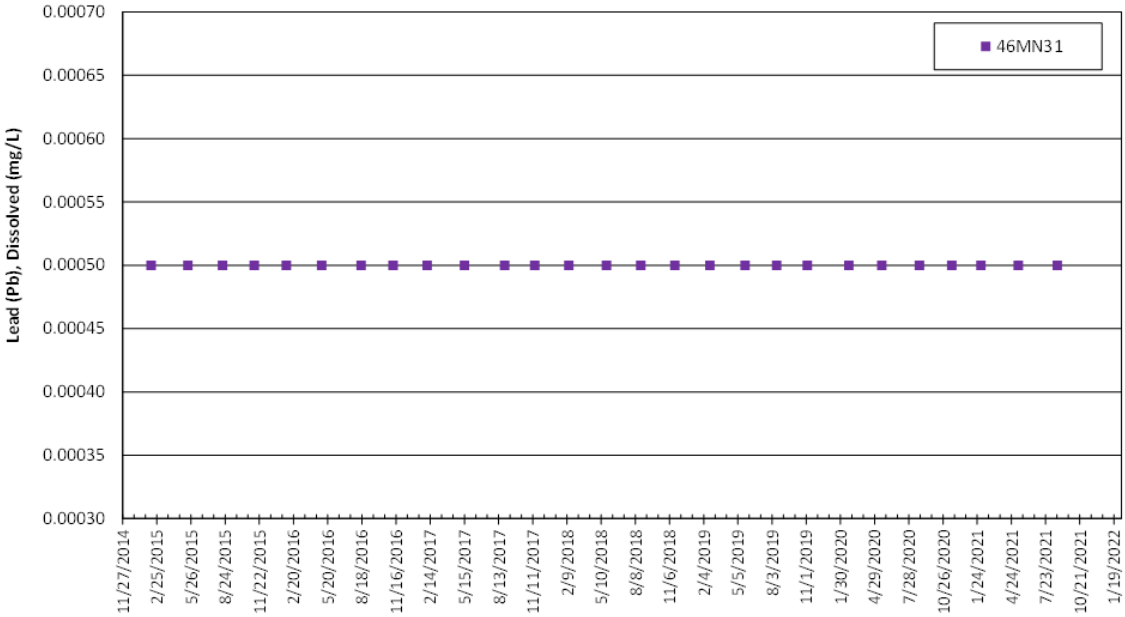

46MN31
Arsenic (As), Dissolved (ug/L)
25.0
20.0
15.0
10.0
5.0
0.0
11/27/2014
2/25/2015
5/26/2015
8/24/2015
11/22/2015
2/20/2016
5/20/2016
8/18/2016
11/16/2016
2/14/2017
5/15/2017
8/13/2017
11/11/2017
2/9/2018
5/10/2018
8/8/2018
11/6/2018
2/4/2019
5/5/2019
8/3/2019
11/1/2019
1/30/2020
4/29/2020
7/28/2020
10/26/2020
1/24/2021
4/24/2021
7/23/2021
10/21/2021
1/19/2022

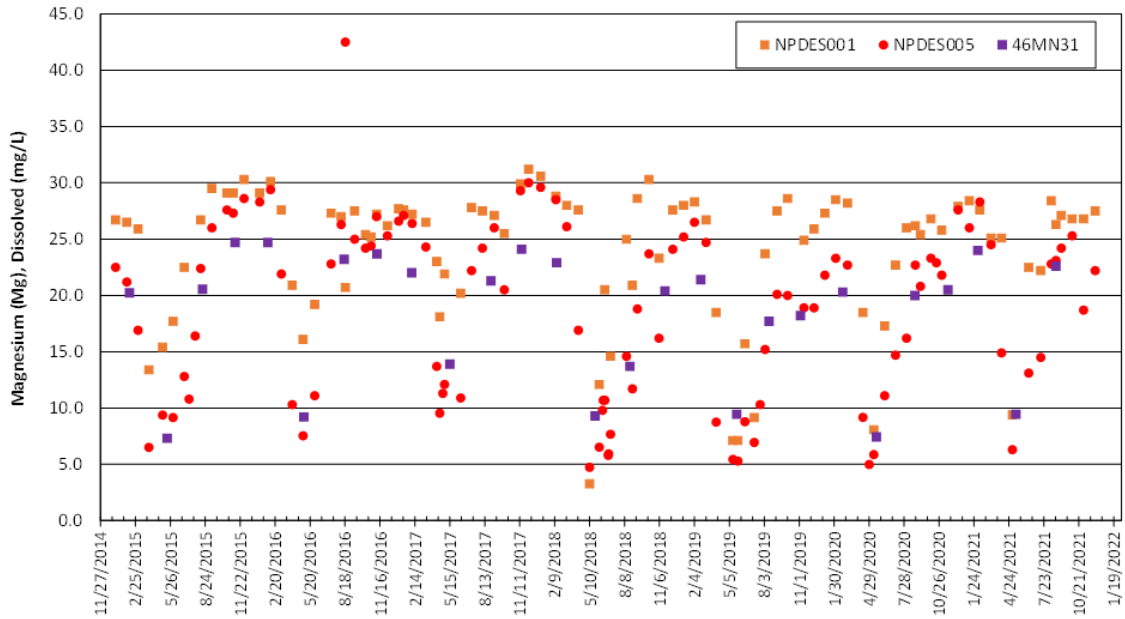

Cadmium (Cd), Dissolved (mg/L)
0.0008
0.0007
0.0006
0.0005
0.0004
0.0003
0.0002
46MN31
11/27/2014
2/25/2015
5/26/2015
8/24/2015
11/22/2015
2/20/2016
5/20/2016
8/18/2016
11/16/2016
2/14/2017
5/15/2017
8/13/2017
11/11/2017
2/9/2018
5/10/2018
8/8/2018
11/6/2018
2/4/2019
5/5/2019
8/3/2019
11/1/2019
1/30/2020
4/29/2020
7/28/2020
10/26/2020
1/24/2021
4/24/2021
7/23/2021
10/21/2021
1/19/2022

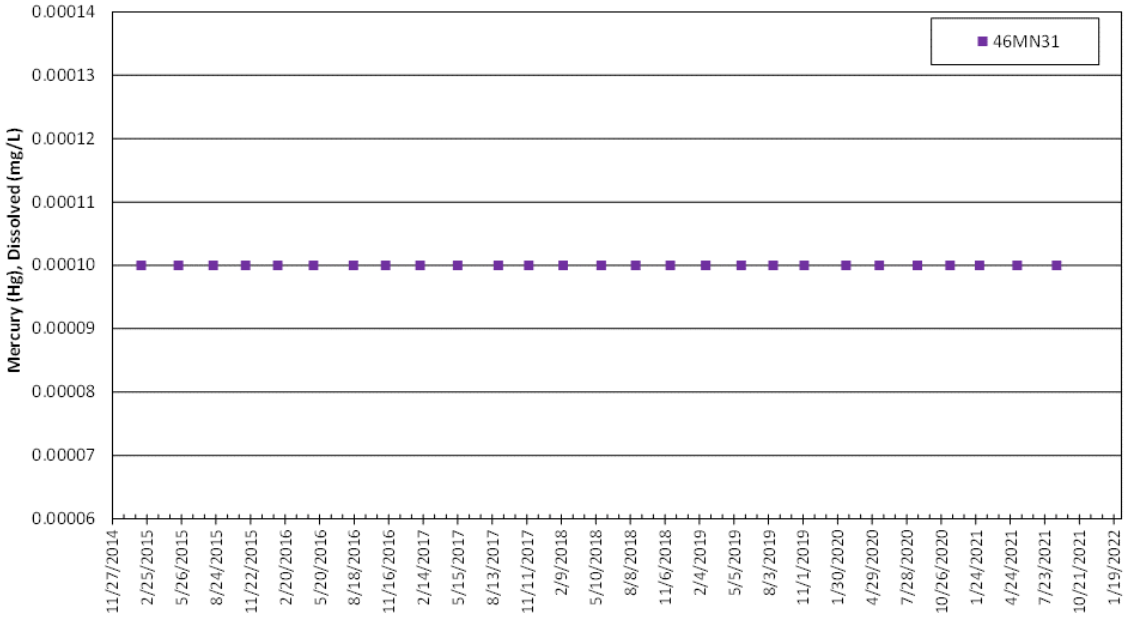

Calcium (Ca), Dissolved (mg/L)
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
NPDES001
NPDES005
46MN31
11/27/2014
2/25/2015
5/26/2015
8/24/2015
11/22/2015
2/20/2016
5/20/2016
8/18/2016
11/16/2016
2/14/2017
5/15/2017
8/13/2017
11/11/2017
2/9/2018
5/10/2018
8/8/2018
11/6/2018
2/4/2019
5/5/2019
8/3/2019
11/1/2019
1/30/2020
4/29/2020
7/28/2020
10/26/2020
1/24/2021
4/24/2021
7/23/2021
10/21/2021
1/19/2022

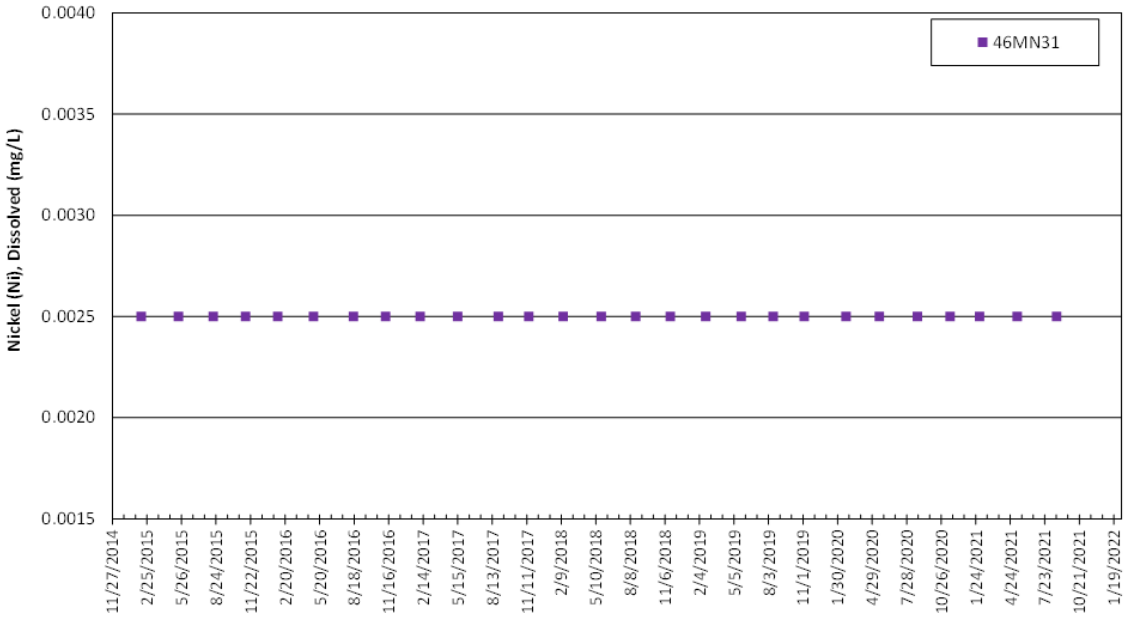

Chromium (Cr), Dissolved (mg/L)
0.0008
0.0007
0.0006
0.0005
0.0004
0.0003
0.0002
46MN31
11/27/2014
2/25/2015
5/26/2015
8/24/2015
11/22/2015
2/20/2016
5/20/2016
8/18/2016
11/16/2016
2/14/2017
5/15/2017
8/13/2017
11/11/2017
2/9/2018
5/10/2018
8/8/2018
11/6/2018
2/4/2019
5/5/2019
8/3/2019
11/1/2019
1/30/2020
4/29/2020
7/28/2020
10/26/2020
1/24/2021
4/24/2021
7/23/2021
10/21/2021
1/19/2022

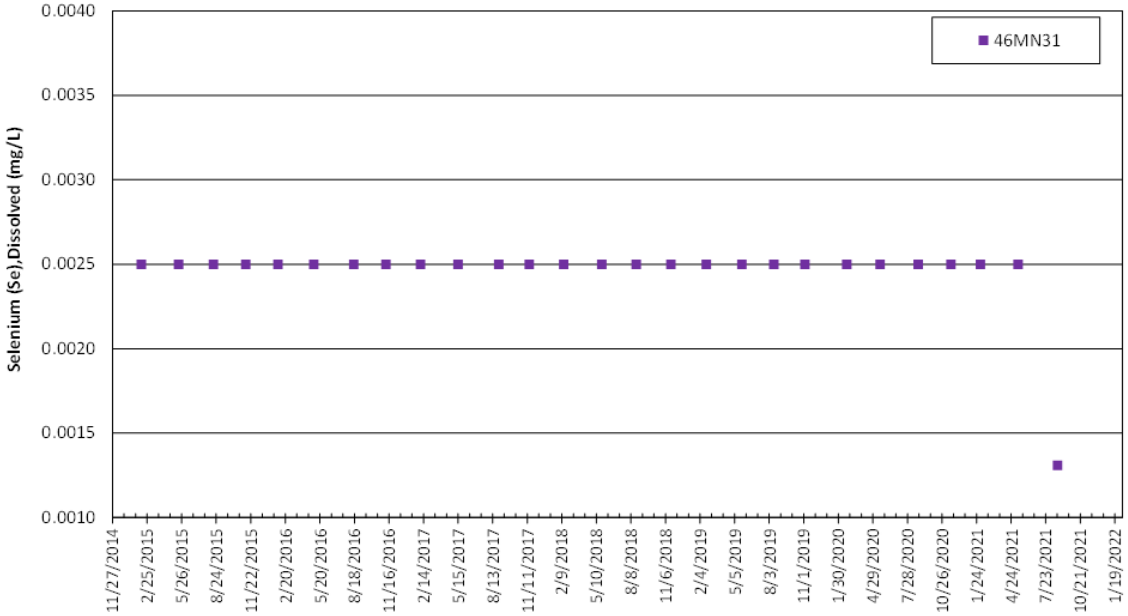

Copper (Cu), Dissolved (mg/L)
0.0040
0.0035
0.0030
0.0025
0.0020
0.0015
0.0010
46MN31
11/27/2014
2/25/2015
5/26/2015
8/24/2015
11/22/2015
2/20/2016
5/20/2016
8/18/2016
11/16/2016
2/14/2017
5/15/2017
8/13/2017
11/11/2017
2/9/2018
5/10/2018
8/8/2018
11/6/2018
2/4/2019
5/5/2019
8/3/2019
11/1/2019
1/30/2020
4/29/2020
7/28/2020
10/26/2020
1/24/2021
4/24/2021
7/23/2021
10/21/2021
1/19/2022

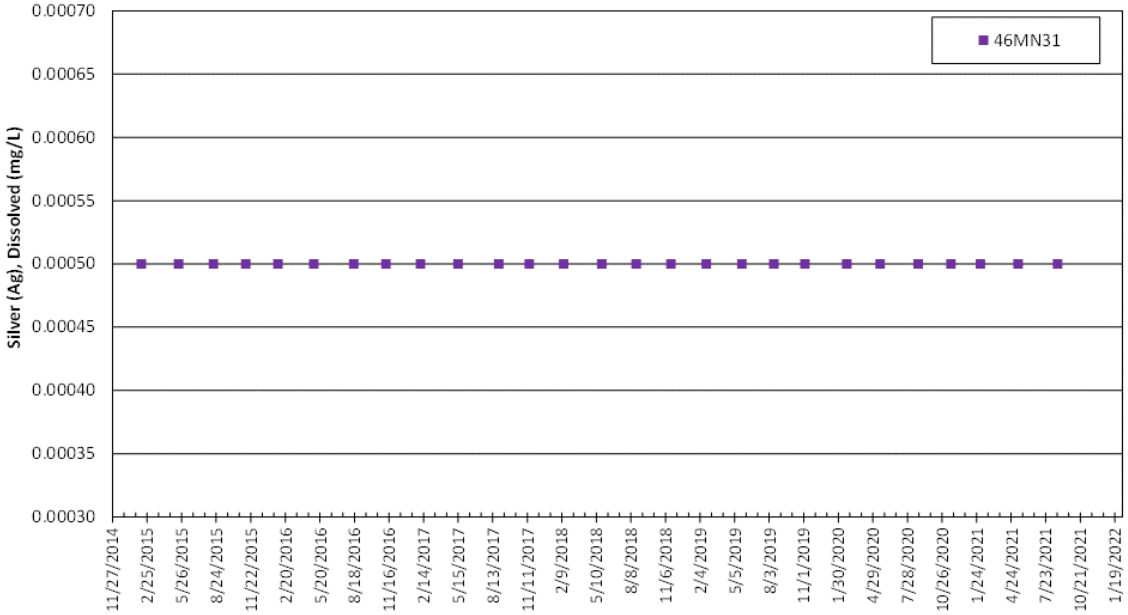

Lead (Pb), Dissolved (mg/L)
0.00070
0.00065
0.00060
0.00055
0.00050
0.00045
0.00040
0.00035
0.00030
46MN31
11/27/2014
2/25/2015
5/26/2015
8/24/2015
11/22/2015
2/20/2016
5/20/2016
8/18/2016
11/16/2016
2/14/2017
5/15/2017
8/13/2017
11/11/2017
2/9/2018
5/10/2018
8/8/2018
11/6/2018
2/4/2019
5/5/2019
8/3/2019
11/1/2019
1/30/2020
4/29/2020
7/28/2020
10/26/2020
1/24/2021
4/24/2021
7/23/2021
10/21/2021
1/19/2022

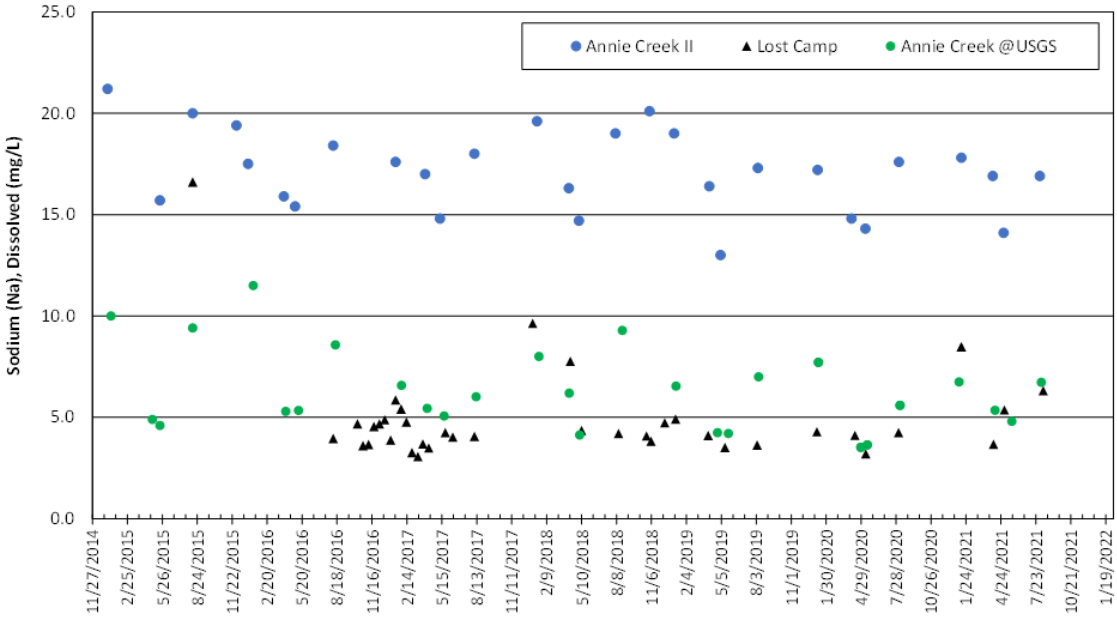

Magnesium (Mg), Dissolved (mg/L)
45.0
40.0
35.0
30.0
25.0
20.0
15.0
10.0
5.0
0.0
NPDES001
NPDES005
46MN31
11/27/2014
2/25/2015
5/26/2015
8/24/2015
11/22/2015
2/20/2016
5/20/2016
8/18/2016
11/16/2016
2/14/2017
5/15/2017
8/13/2017
11/11/2017
2/9/2018
5/10/2018
8/8/2018
11/6/2018
2/4/2019
5/5/2019
8/3/2019
11/1/2019
1/30/2020
4/29/2020
7/28/2020
10/26/2020
1/24/2021
4/24/2021
7/23/2021
10/21/2021
1/19/2022

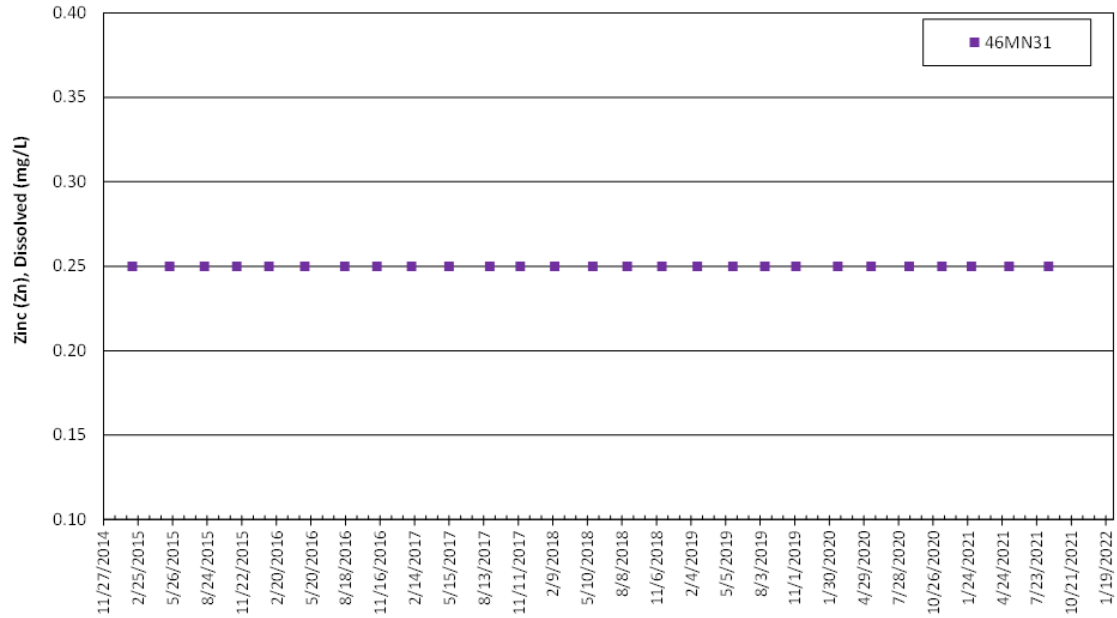

Mercury (Hg), Dissolved (mg/L)
0.00014
0.00013
0.00012
0.00011
0.00010
0.00009
0.00008
0.00007
0.00006
46MN31
11/27/2014
2/25/2015
5/26/2015
8/24/2015
11/22/2015
2/20/2016
5/20/2016
8/18/2016
11/16/2016
2/14/2017
5/15/2017
8/13/2017
11/11/2017
2/9/2018
5/10/2018
8/8/2018
11/6/2018
2/4/2019
5/5/2019
8/3/2019
11/1/2019
1/30/2020
4/29/2020
7/28/2020
10/26/2020
1/24/2021
4/24/2021
7/23/2021
10/21/2021
1/19/2022

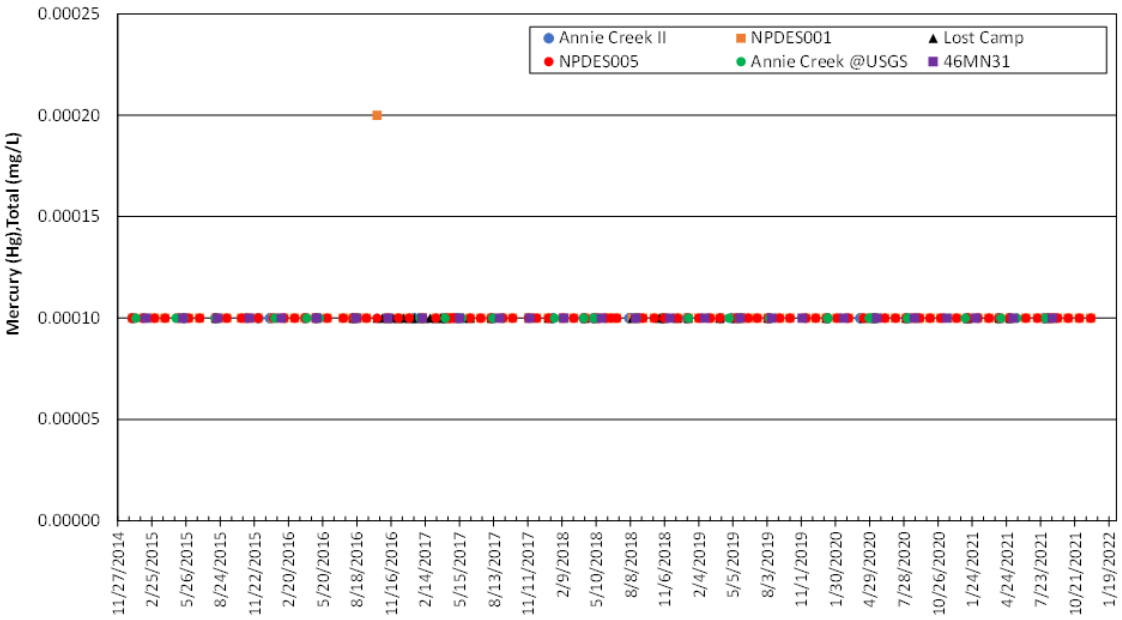

Nickel (Ni), Dissolved (mg/L)
0.0040
0.0035
0.0030
0.0025
0.0020
0.0015
46MN31
11/27/2014
2/25/2015
5/26/2015
8/24/2015
11/22/2015
2/20/2016
5/20/2016
8/18/2016
11/16/2016
2/14/2017
5/15/2017
8/13/2017
11/11/2017
2/9/2018
5/10/2018
8/8/2018
11/6/2018
2/4/2019
5/5/2019
8/3/2019
11/1/2019
1/30/2020
4/29/2020
7/28/2020
10/26/2020
1/24/2021
4/24/2021
7/23/2021
10/21/2021
1/19/2022

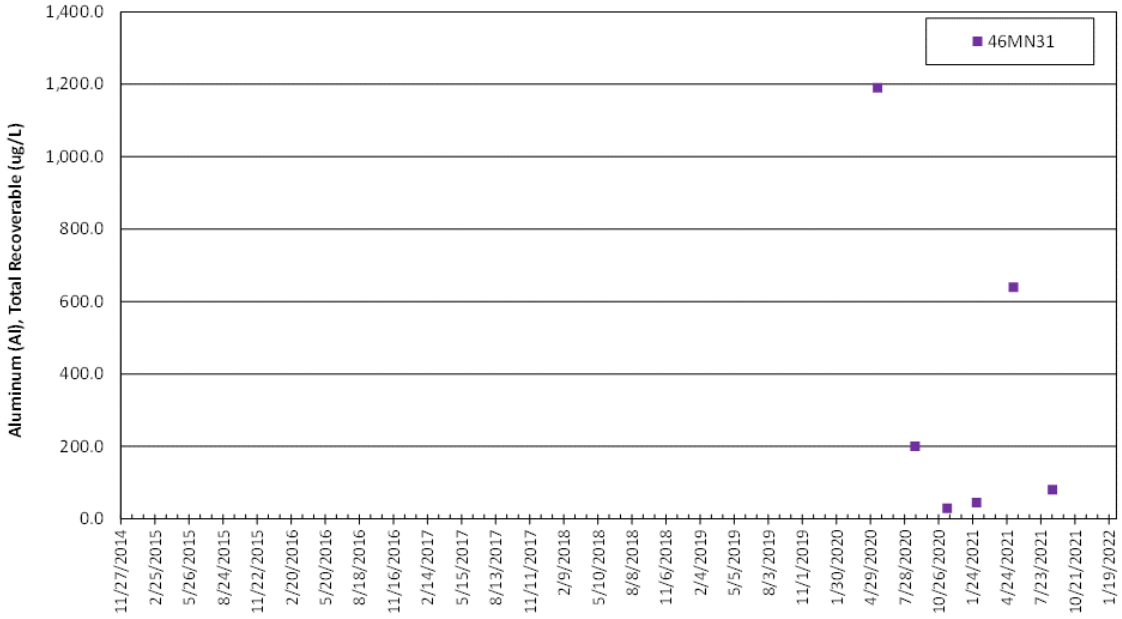

Selenium (Se),Dissolved (mg/L)
0.0040
0.0035
0.0030
0.0025
0.0020
0.0015
0.0010
46MN31
11/27/2014
2/25/2015
5/26/2015
8/24/2015
11/22/2015
2/20/2016
5/20/2016
8/18/2016
11/16/2016
2/14/2017
5/15/2017
8/13/2017
11/11/2017
2/9/2018
5/10/2018
8/8/2018
11/6/2018
2/4/2019
5/5/2019
8/3/2019
11/1/2019
1/30/2020
4/29/2020
7/28/2020
10/26/2020
1/24/2021
4/24/2021
7/23/2021
10/21/2021
1/19/2022

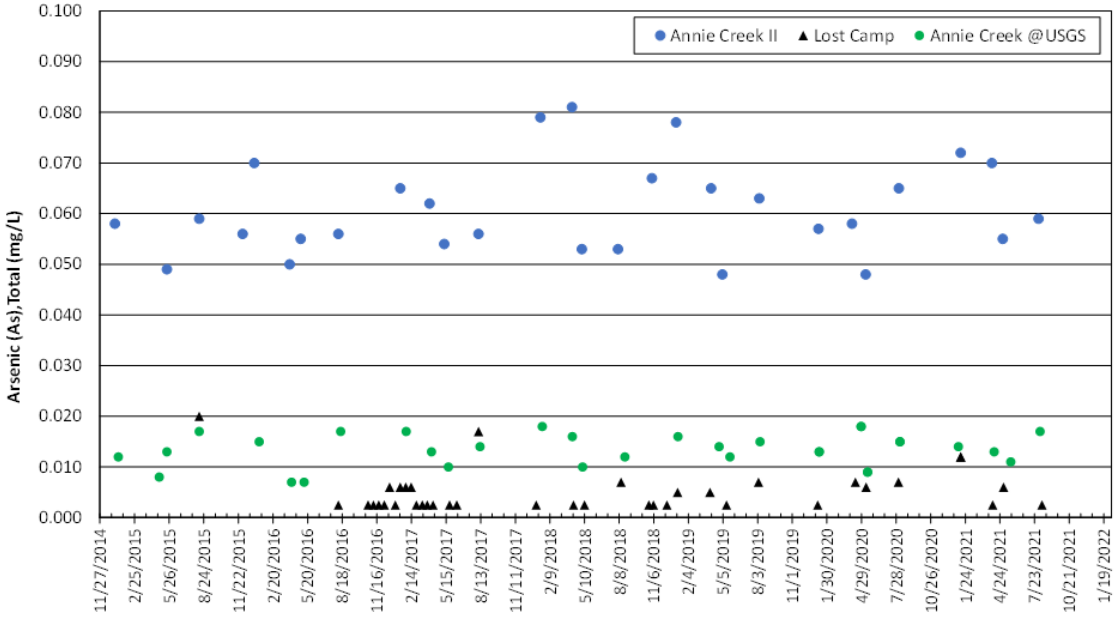

Silver (Ag), Dissolved (mg/L)
0.00070
0.00065
0.00060
0.00055
0.00050
0.00045
0.00040
0.00035
0.00030
46MN31
11/27/2014
2/25/2015
5/26/2015
8/24/2015
11/22/2015
2/20/2016
5/20/2016
8/18/2016
11/16/2016
2/14/2017
5/15/2017
8/13/2017
11/11/2017
2/9/2018
5/10/2018
8/8/2018
11/6/2018
2/4/2019
5/5/2019
8/3/2019
11/1/2019
1/30/2020
4/29/2020
7/28/2020
10/26/2020
1/24/2021
4/24/2021
7/23/2021
10/21/2021
1/19/2022

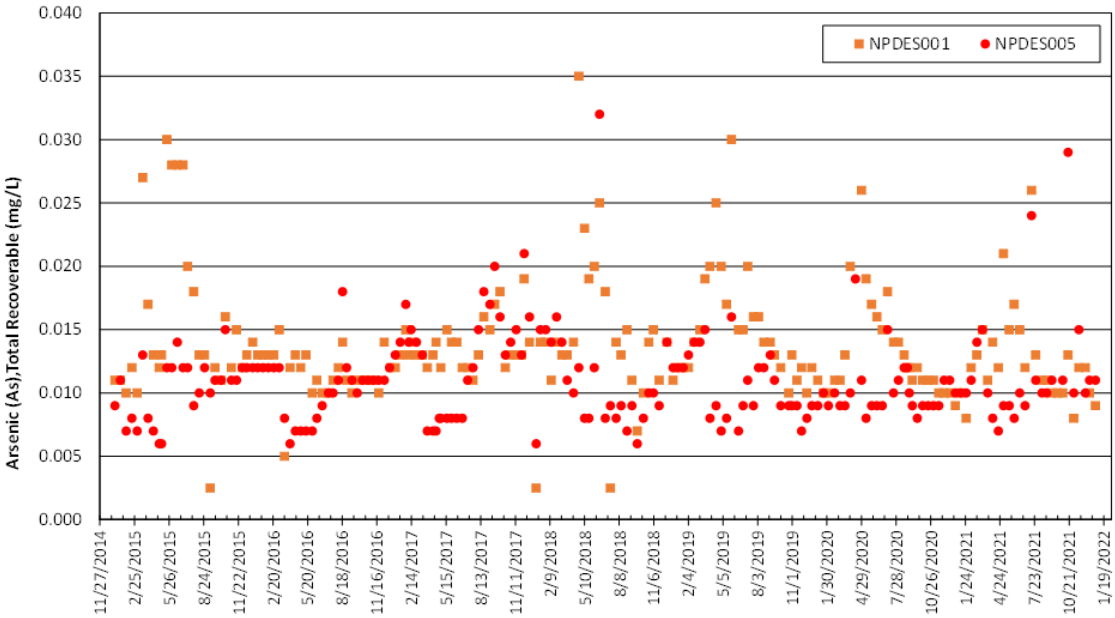

Annie Creek II
Lost Camp
Annie Creek @USGS
Sodium (Na), Dissolved (mg/L)
25.0
20.0
15.0
10.0
5.0
0.0
11/27/2014
2/25/2015
5/26/2015
8/24/2015
11/22/2015
2/20/2016
5/20/2016
8/18/2016
11/16/2016
2/14/2017
5/15/2017
8/13/2017
11/11/2017
2/9/2018
5/10/2018
8/8/2018
11/6/2018
2/4/2019
5/5/2019
8/3/2019
11/1/2019
1/30/2020
4/29/2020
7/28/2020
10/26/2020
1/24/2021
4/24/2021
7/23/2021
10/21/2021
1/19/2022

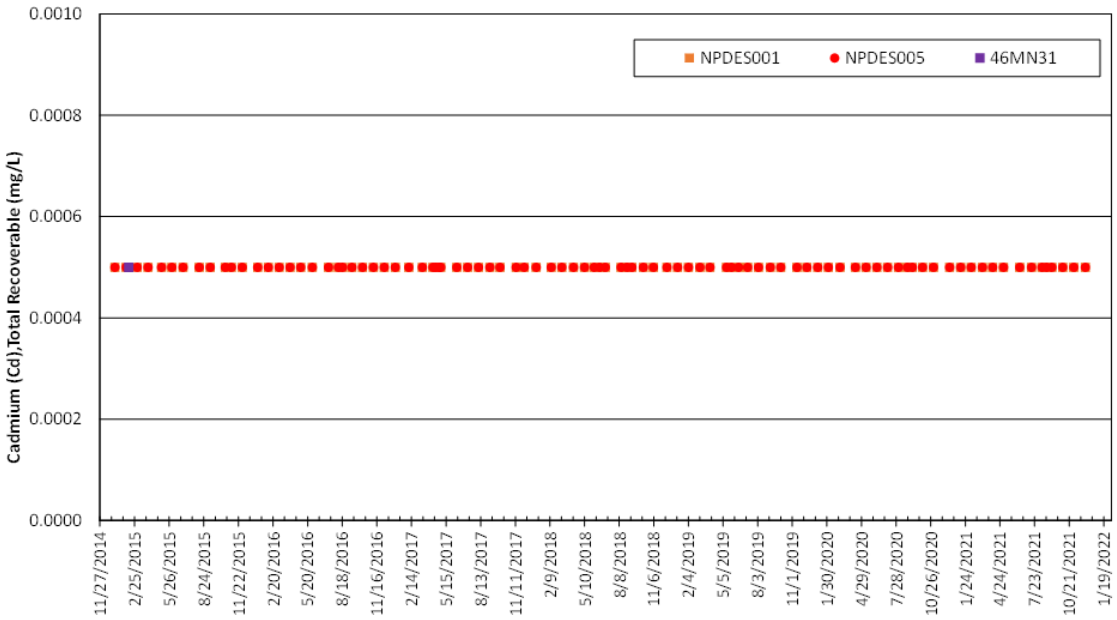

46MN31
Zinc (Zn), Dissolved (mg/L)
0.40
0.35
0.30
0.25
0.20
0.15
0.10
11/27/2014
2/25/2015
5/26/2015
8/24/2015
11/22/2015
2/20/2016
5/20/2016
8/18/2016
11/16/2016
2/14/2017
5/15/2017
8/13/2017
11/11/2017
2/9/2018
5/10/2018
8/8/2018
11/6/2018
2/4/2019
5/5/2019
8/3/2019
11/1/2019
1/30/2020
4/29/2020
7/28/2020
10/26/2020
1/24/2021
4/24/2021
7/23/2021
10/21/2021
1/19/2022

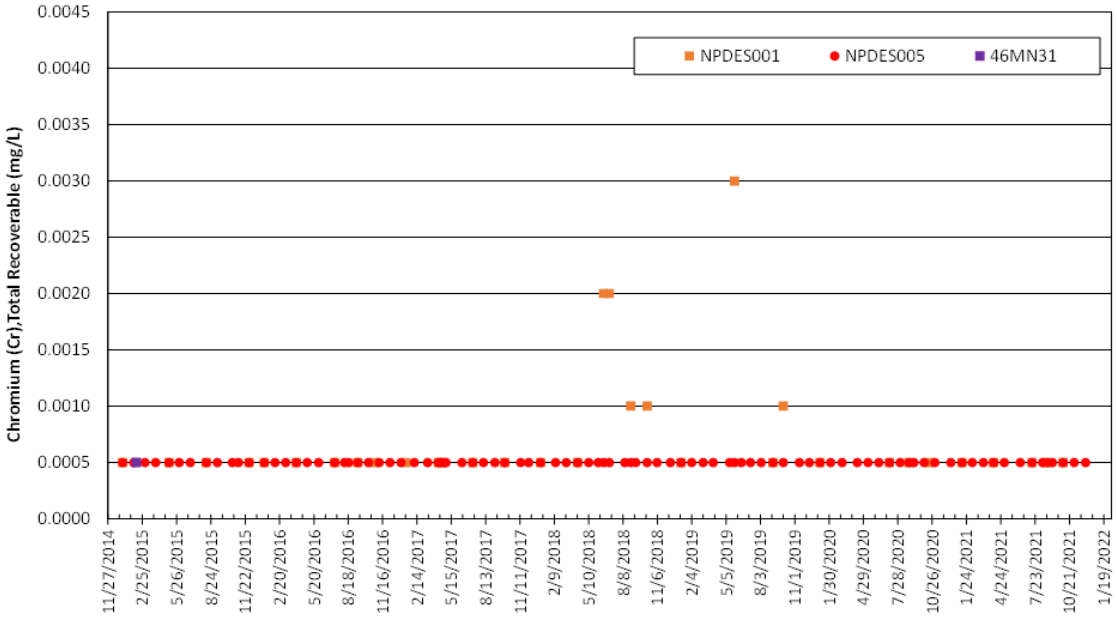

Annie Creek II
NPDES001
Lost Camp
NPDES005
Annie Creek @USGS
46MN31
Mercury (Hg),Total (mg/L)
0.00025
0.00020
0.00015
0.00010
0.00005
0.00000
11/27/2014
2/25/2015
5/26/2015
8/24/2015
11/22/2015
2/20/2016
5/20/2016
8/18/2016
11/16/2016
2/14/2017
5/15/2017
8/13/2017
11/11/2017
2/9/2018
5/10/2018
8/8/2018
11/6/2018
2/4/2019
5/5/2019
8/3/2019
11/1/2019
1/30/2020
4/29/2020
7/28/2020
10/26/2020
1/24/2021
4/24/2021
7/23/2021
10/21/2021
1/19/2022

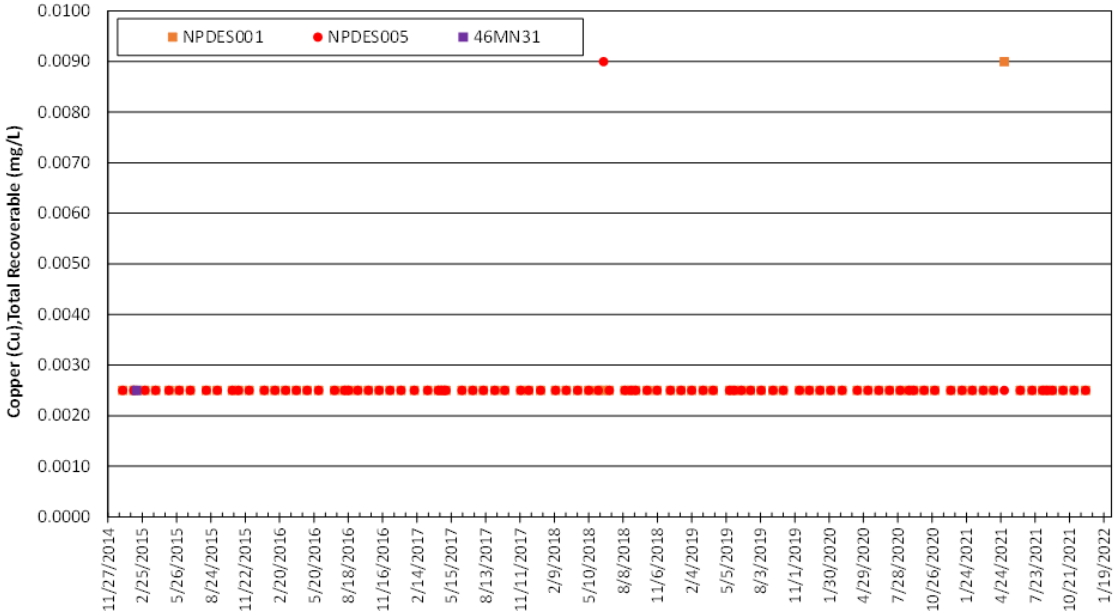

46MN31
Aluminum (Al), Total Recoverable (ug/L)
1,400.0
1,200.0
1,000.0
800.0
600.0
400.0
200.0
0.0
11/27/2014
2/25/2015
5/26/2015
8/24/2015
11/22/2015
2/20/2016
5/20/2016
8/18/2016
11/16/2016
2/14/2017
5/15/2017
8/13/2017
11/11/2017
2/9/2018
5/10/2018
8/8/2018
11/6/2018
2/4/2019
5/5/2019
8/3/2019
11/1/2019
1/30/2020
4/29/2020
7/28/2020
10/26/2020
1/24/2021
4/24/2021
7/23/2021
10/21/2021
1/19/2022

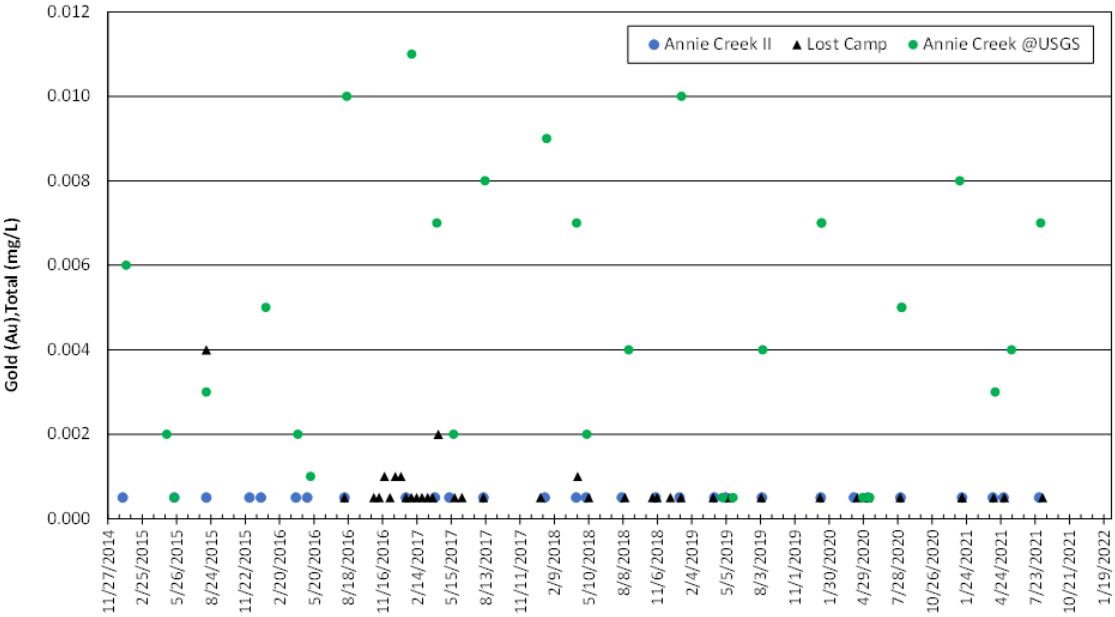

Annie Creek II
Lost Camp
Annie Creek @USGS
Arsenic (As),Total (mg/L)
0.100
0.090
0.080
0.070
0.060
0.050
0.040
0.030
0.020
0.010
0.000
11/27/2014
2/25/2015
5/26/2015
8/24/2015
11/22/2015
2/20/2016
5/20/2016
8/18/2016
11/16/2016
2/14/2017
5/15/2017
8/13/2017
11/11/2017
2/9/2018
5/10/2018
8/8/2018
11/6/2018
2/4/2019
5/5/2019
8/3/2019
11/1/2019
1/30/2020
4/29/2020
7/28/2020
10/26/2020
1/24/2021
4/24/2021
7/23/2021
10/21/2021
1/19/2022

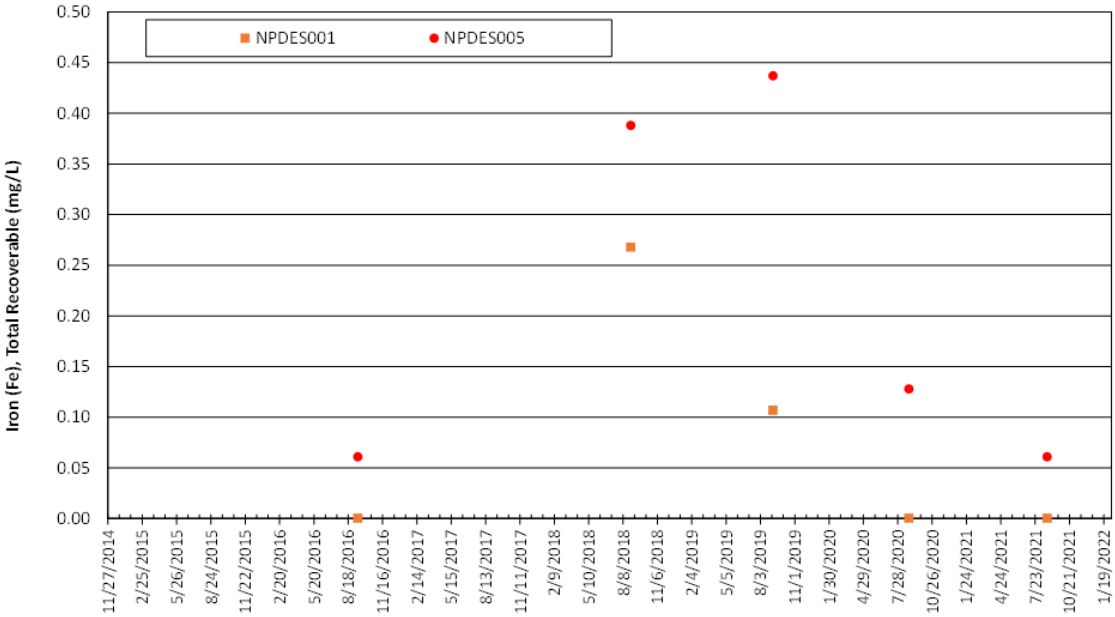

NPDES001
NPDES005
Arsenic (As),Total Recoverable (mg/L)
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
11/27/2014
2/25/2015
5/26/2015
8/24/2015
11/22/2015
2/20/2016
5/20/2016
8/18/2016
11/16/2016
2/14/2017
5/15/2017
8/13/2017
11/11/2017
2/9/2018
5/10/2018
8/8/2018
11/6/2018
2/4/2019
5/5/2019
8/3/2019
11/1/2019
1/30/2020
4/29/2020
7/28/2020
10/26/2020
1/24/2021
4/24/2021
7/23/2021
10/21/2021
1/19/2022

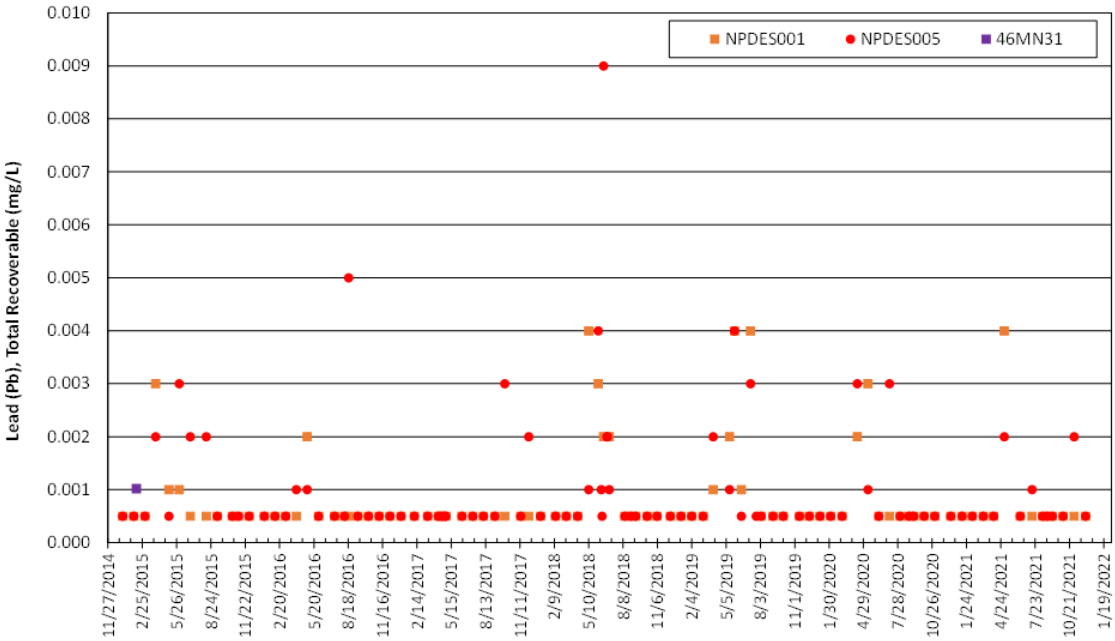

NPDES001
NPDES005
46MN31
Cadmium (Cd),Total Recoverable (mg/L)
0.0010
0.0008
0.0006
0.0004
0.0002
0.0000
11/27/2014
2/25/2015
5/26/2015
8/24/2015
11/22/2015
2/20/2016
5/20/2016
8/18/2016
11/16/2016
2/14/2017
5/15/2017
8/13/2017
11/11/2017
2/9/2018
5/10/2018
8/8/2018
11/6/2018
2/4/2019
5/5/2019
8/3/2019
11/1/2019
1/30/2020
4/29/2020
7/28/2020
10/26/2020
1/24/2021
4/24/2021
7/23/2021
10/21/2021
1/19/2022

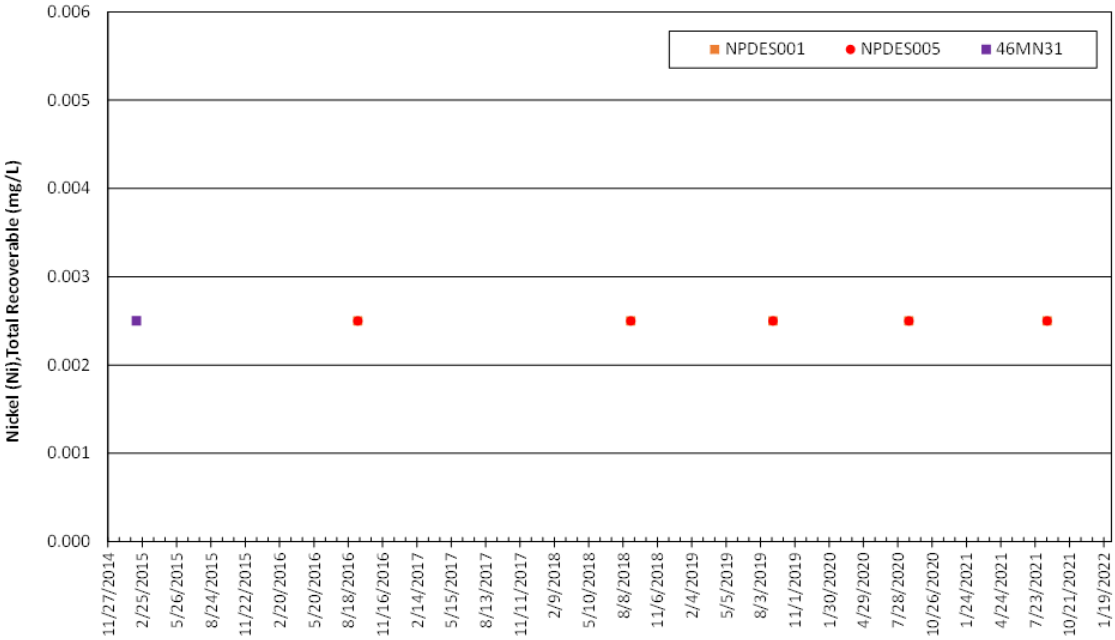

NPDES001
NPDES005
46MN31
Chromium (Cr),Total Recoverable (mg/L)
0.0045
0.0040
0.0035
0.0030
0.0025
0.0020
0.0015
0.0010
0.0005
0.0000
11/27/2014
2/25/2015
5/26/2015
8/24/2015
11/22/2015
2/20/2016
5/20/2016
8/18/2016
11/16/2016
2/14/2017
5/15/2017
8/13/2017
11/11/2017
2/9/2018
5/10/2018
8/8/2018
11/6/2018
2/4/2019
5/5/2019
8/3/2019
11/1/2019
1/30/2020
4/29/2020
7/28/2020
10/26/2020
1/24/2021
4/24/2021
7/23/2021
10/21/2021
1/19/2022

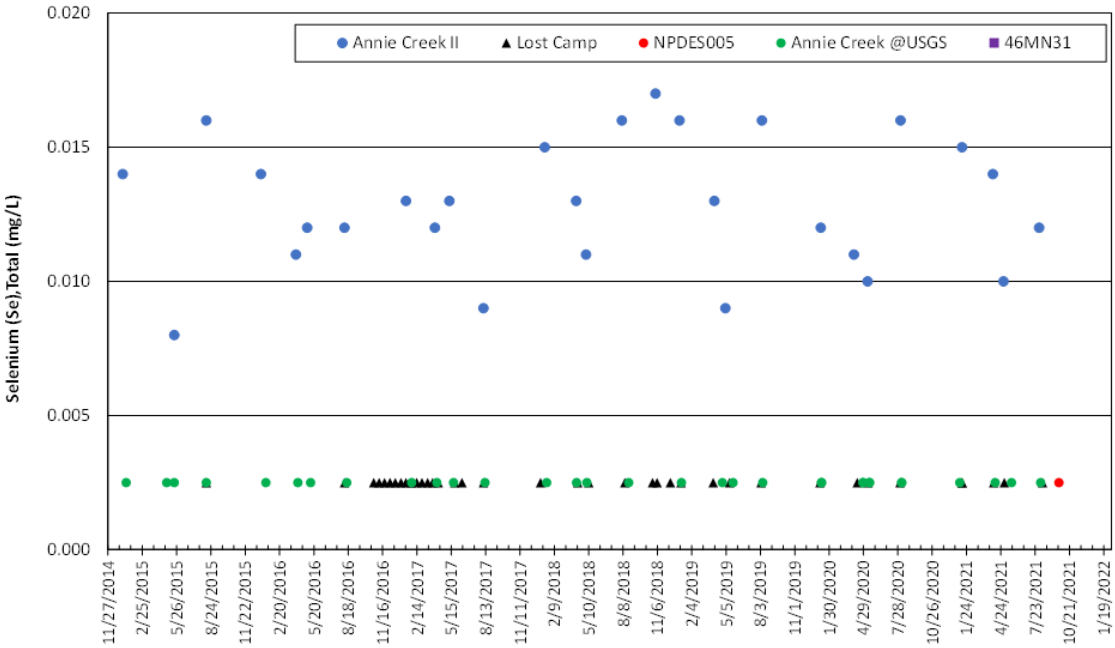

NPDES001
NPDES005
46MN31
Copper (Cu),Total Recoverable (mg/L)
0.0100
0.0090
0.0080
0.0070
0.0060
0.0050
0.0040
0.0030
0.0020
0.0010
0.0000
11/27/2014
2/25/2015
5/26/2015
8/24/2015
11/22/2015
2/20/2016
5/20/2016
8/18/2016
11/16/2016
2/14/2017
5/15/2017
8/13/2017
11/11/2017
2/9/2018
5/10/2018
8/8/2018
11/6/2018
2/4/2019
5/5/2019
8/3/2019
11/1/2019
1/30/2020
4/29/2020
7/28/2020
10/26/2020
1/24/2021
4/24/2021
7/23/2021
10/21/2021
1/19/2022

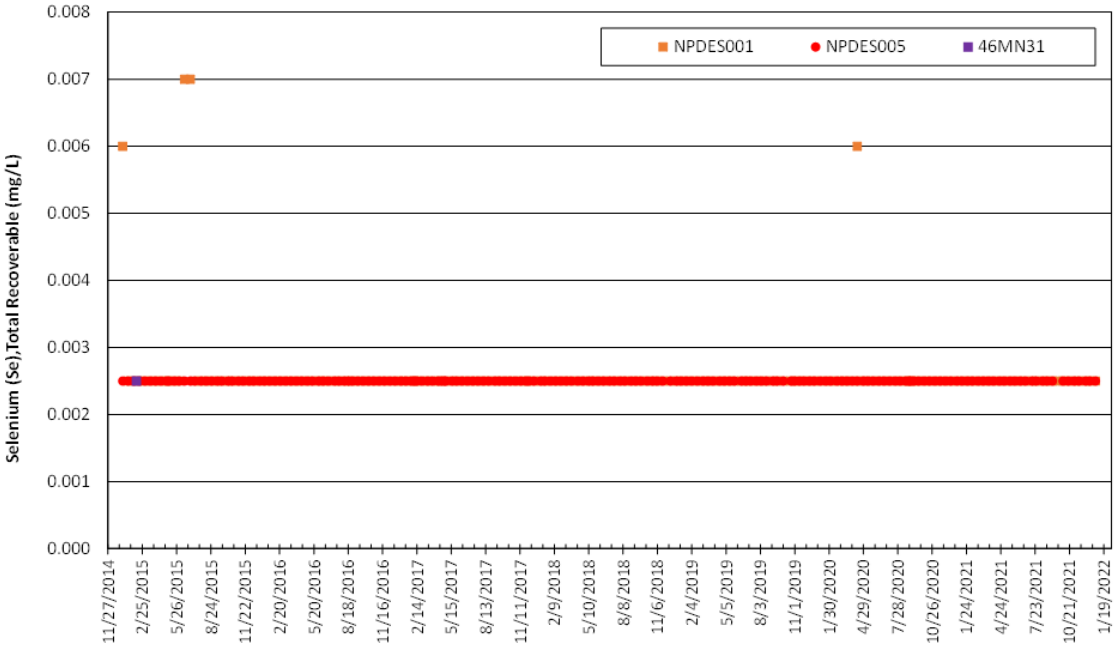

Annie Creek II
Lost Camp
Annie Creek @USGS
Gold (Au),Total (mg/L)
0.012
0.010
0.008
0.006
0.004
0.002
0.000
11/27/2014
2/25/2015
5/26/2015
8/24/2015
11/22/2015
2/20/2016
5/20/2016
8/18/2016
11/16/2016
2/14/2017
5/15/2017
8/13/2017
11/11/2017
2/9/2018
5/10/2018
8/8/2018
11/6/2018
2/4/2019
5/5/2019
8/3/2019
11/1/2019
1/30/2020
4/29/2020
7/28/2020
10/26/2020
1/24/2021
4/24/2021
7/23/2021
10/21/2021
1/19/2022

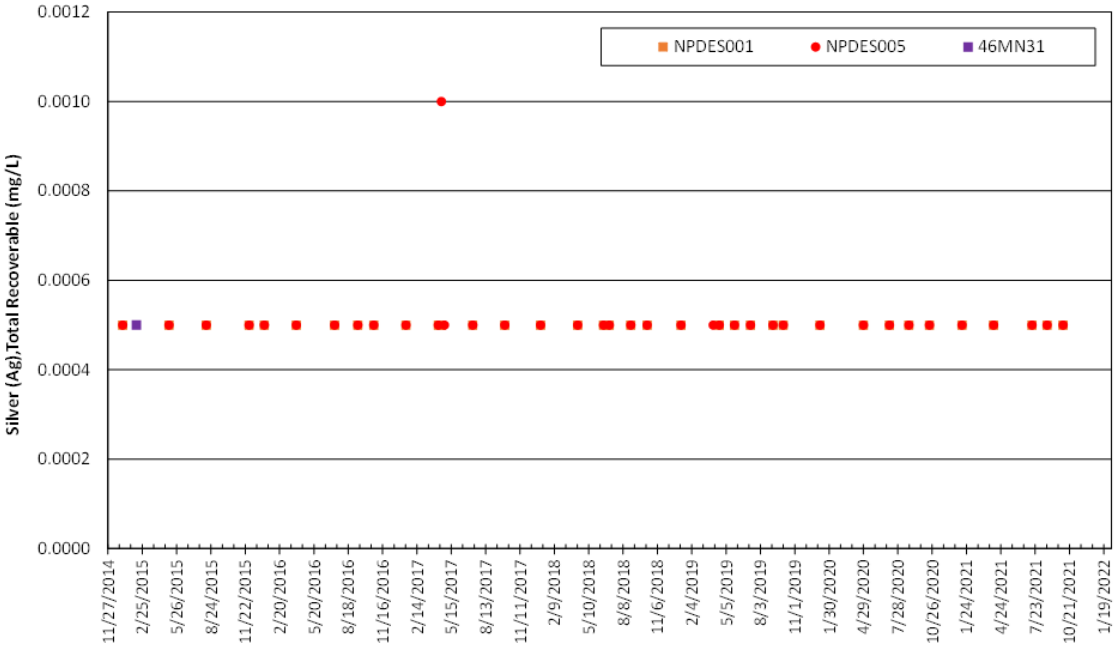

NPDES001
NPDES005
Iron (Fe), Total Recoverable (mg/L)
0.50
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
11/27/2014
2/25/2015
5/26/2015
8/24/2015
11/22/2015
2/20/2016
5/20/2016
8/18/2016
11/16/2016
2/14/2017
5/15/2017
8/13/2017
11/11/2017
2/9/2018
5/10/2018
8/8/2018
11/6/2018
2/4/2019
5/5/2019
8/3/2019
11/1/2019
1/30/2020
4/29/2020
7/28/2020
10/26/2020
1/24/2021
4/24/2021
7/23/2021
10/21/2021
1/19/2022

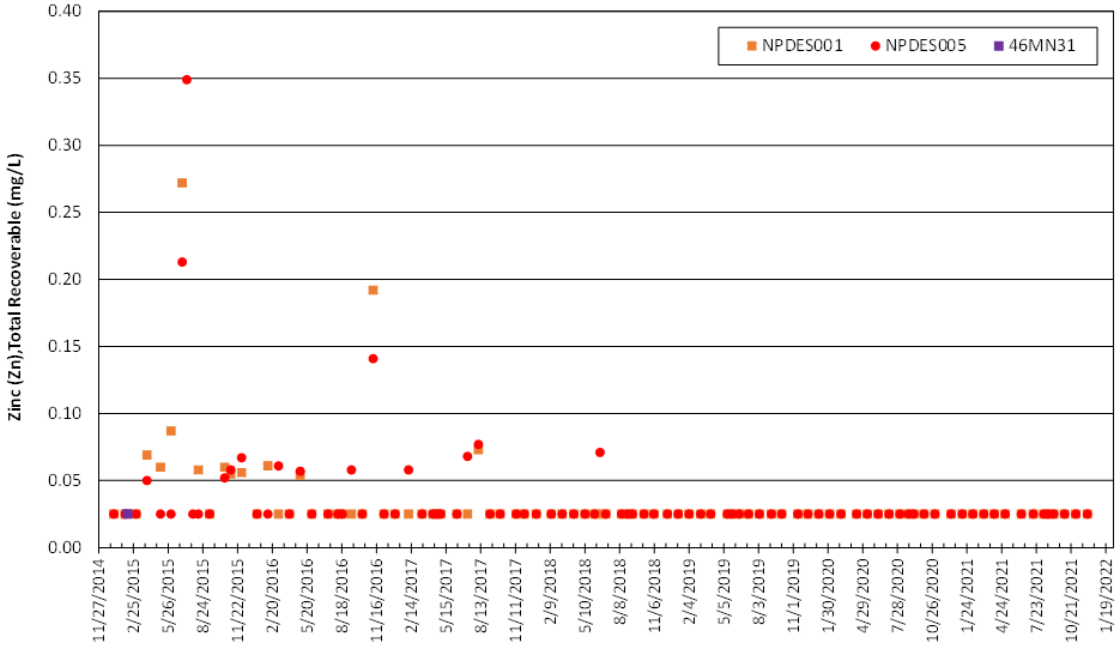

NPDES001
NPDES005
46MN31
Lead (Pb), Total Recoverable (mg/L)
0.010
0.009
0.008
0.007
0.006
0.005
0.004
0.003
0.002
0.001
0.000
11/27/2014
2/25/2015
5/26/2015
8/24/2015
11/22/2015
2/20/2016
5/20/2016
8/18/2016
11/16/2016
2/14/2017
5/15/2017
8/13/2017
11/11/2017
2/9/2018
5/10/2018
8/8/2018
11/6/2018
2/4/2019
5/5/2019
8/3/2019
11/1/2019
1/30/2020
4/29/2020
7/28/2020
10/26/2020
1/24/2021
4/24/2021
7/23/2021
10/21/2021
1/19/2022

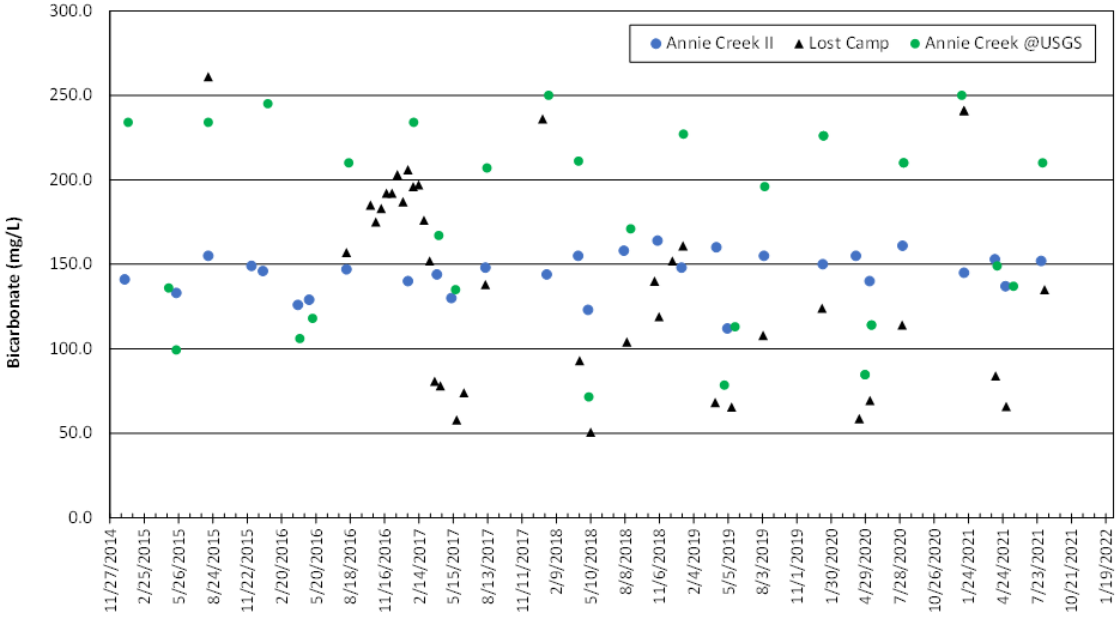

Nickel (Ni),Total Recoverable (mg/L)
0.006
0.005
0.004
0.003
0.002
0.001
0.000
NPDES001
NPDES005
46MN31
11/27/2014
2/25/2015
5/26/2015
8/24/2015
11/22/2015
2/20/2016
5/20/2016
8/18/2016
11/16/2016
2/14/2017
5/15/2017
8/13/2017
11/11/2017
2/9/2018
5/10/2018
8/8/2018
11/6/2018
2/4/2019
5/5/2019
8/3/2019
11/1/2019
1/30/2020
4/29/2020
7/28/2020
10/26/2020
1/24/2021
4/24/2021
7/23/2021
10/21/2021
1/19/2022

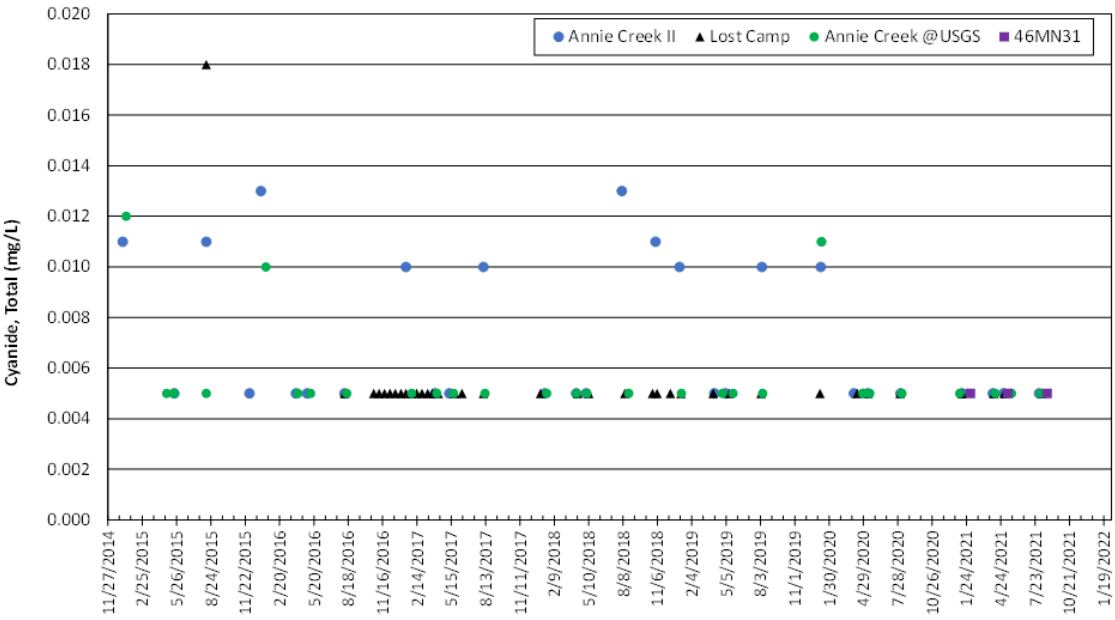

Selenium (Se),Total (mg/L)
0.020
0.015
0.010
0.005
0.000
Annie Creek II
Lost Camp
NPDES005
Annie Creek @USGS
46MN31
11/27/2014
2/25/2015
5/26/2015
8/24/2015
11/22/2015
2/20/2016
5/20/2016
8/18/2016
11/16/2016
2/14/2017
5/15/2017
8/13/2017
11/11/2017
2/9/2018
5/10/2018
8/8/2018
11/6/2018
2/4/2019
5/5/2019
8/3/2019
11/1/2019
1/30/2020
4/29/2020
7/28/2020
10/26/2020
1/24/2021
4/24/2021
7/23/2021
10/21/2021
1/19/2022

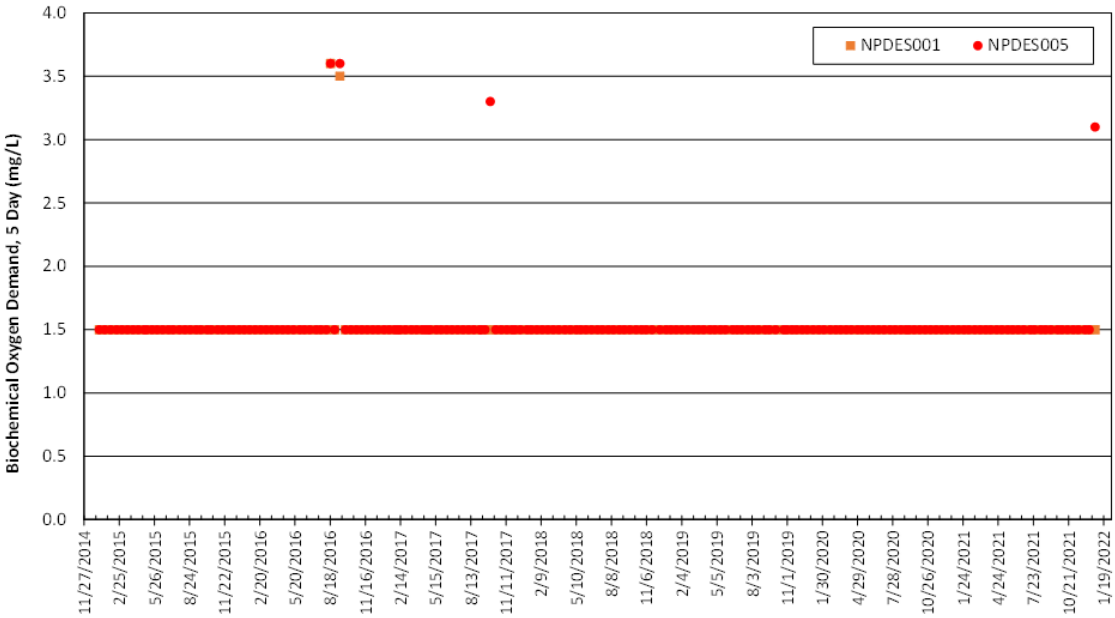

NPDES001
NPDES005
46MN31
Selenium (Se),Total Recoverable (mg/L)
0.008
0.007
0.006
0.005
0.004
0.003
0.002
0.001
0.000
11/27/2014
2/25/2015
5/26/2015
8/24/2015
11/22/2015
2/20/2016
5/20/2016
8/18/2016
11/16/2016
2/14/2017
5/15/2017
8/13/2017
11/11/2017
2/9/2018
5/10/2018
8/8/2018
11/6/2018
2/4/2019
5/5/2019
8/3/2019
11/1/2019
1/30/2020
4/29/2020
7/28/2020
10/26/2020
1/24/2021
4/24/2021
7/23/2021
10/21/2021
1/19/2022

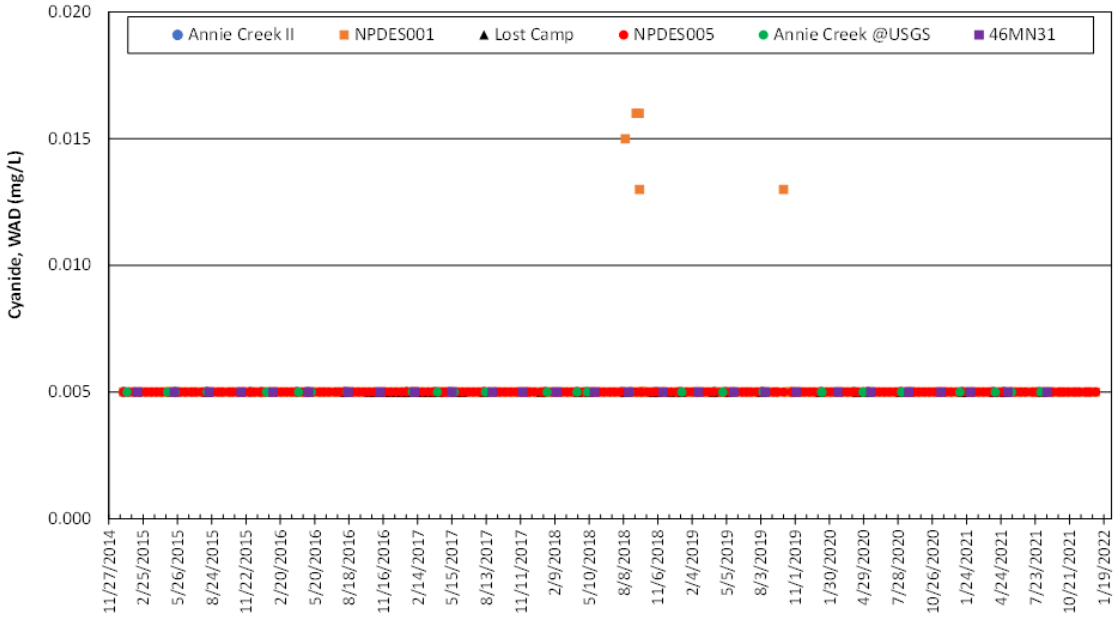

NPDES001
NPDES005
46MN31
Silver (Ag),Total Recoverable (mg/L)
0.0012
0.0010
0.0008
0.0006
0.0004
0.0002
0.0000
11/27/2014
2/25/2015
5/26/2015
8/24/2015
11/22/2015
2/20/2016
5/20/2016
8/18/2016
11/16/2016
2/14/2017
5/15/2017
8/13/2017
11/11/2017
2/9/2018
5/10/2018
8/8/2018
11/6/2018
2/4/2019
5/5/2019
8/3/2019
11/1/2019
1/30/2020
4/29/2020
7/28/2020
10/26/2020
1/24/2021
4/24/2021
7/23/2021
10/21/2021
1/19/2022

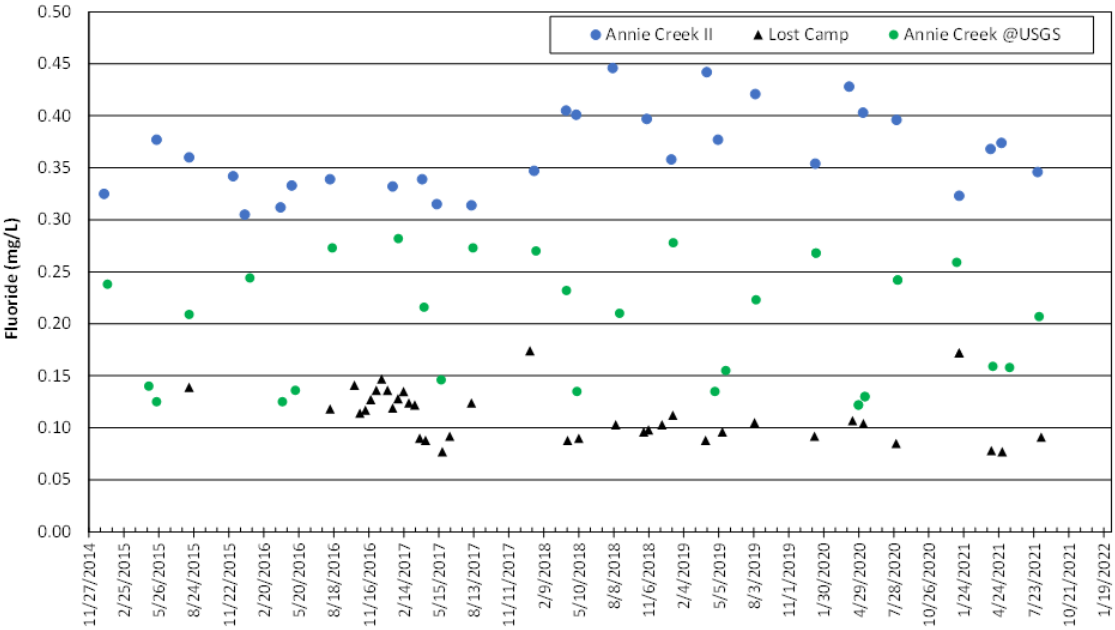

NPDES001
NPDES005
46MN31
Zinc (Zn),Total Recoverable (mg/L)
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
11/27/2014
2/25/2015
5/26/2015
8/24/2015
11/22/2015
2/20/2016
5/20/2016
8/18/2016
11/16/2016
2/14/2017
5/15/2017
8/13/2017
11/11/2017
2/9/2018
5/10/2018
8/8/2018
11/6/2018
2/4/2019
5/5/2019
8/3/2019
11/1/2019
1/30/2020
4/29/2020
7/28/2020
10/26/2020
1/24/2021
4/24/2021
7/23/2021
10/21/2021
1/19/2022

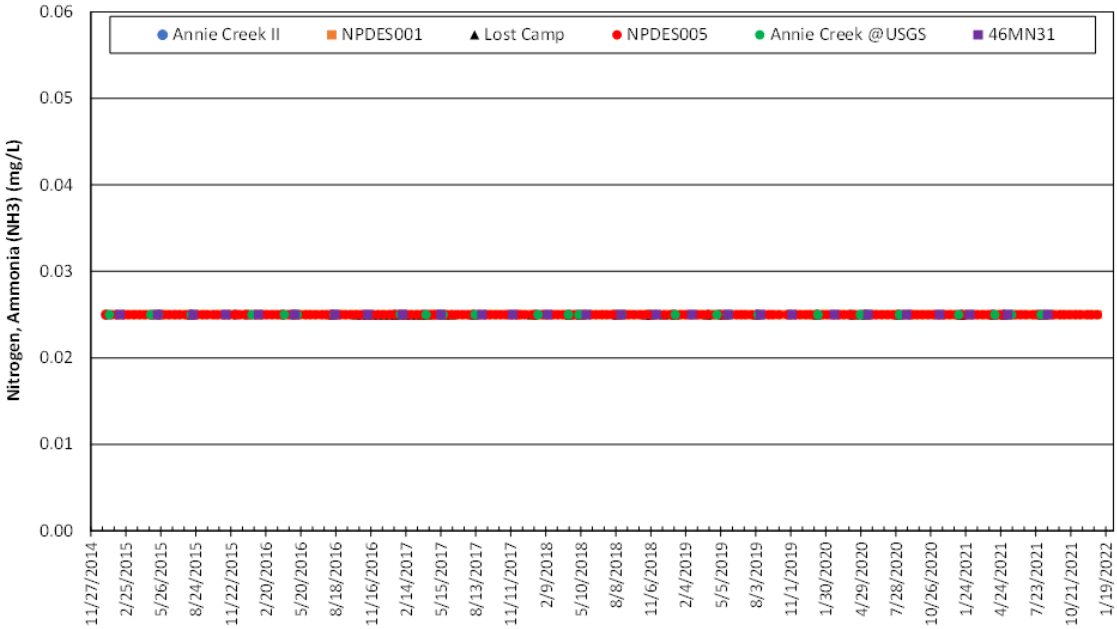

Annie Creek II
Lost Camp
Annie Creek @USGS
Bicarbonate (mg/L)
300.0
250.0
200.0
150.0
100.0
50.0
0.0
11/27/2014
2/25/2015
5/26/2015
8/24/2015
11/22/2015
2/20/2016
5/20/2016
8/18/2016
11/16/2016
2/14/2017
5/15/2017
8/13/2017
11/11/2017
2/9/2018
5/10/2018
8/8/2018
11/6/2018
2/4/2019
5/5/2019
8/3/2019
11/1/2019
1/30/2020
4/29/2020
7/28/2020
10/26/2020
1/24/2021
4/24/2021
7/23/2021
10/21/2021
1/19/2022

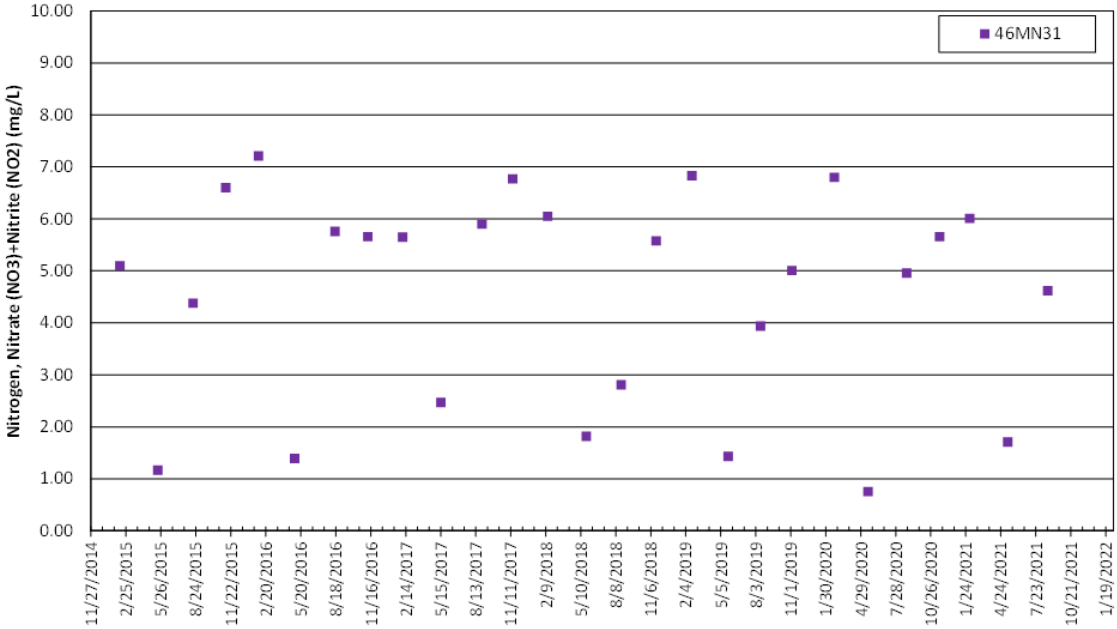

Annie Creek II
Lost Camp
Annie Creek @USGS
46MN31
Cyanide, Total (mg/L)
0.020
0.018
0.016
0.014
0.012
0.010
0.008
0.006
0.004
0.002
0.000
11/27/2014
2/25/2015
5/26/2015
8/24/2015
11/22/2015
2/20/2016
5/20/2016
8/18/2016
11/16/2016
2/14/2017
5/15/2017
8/13/2017
11/11/2017
2/9/2018
5/10/2018
8/8/2018
11/6/2018
2/4/2019
5/5/2019
8/3/2019
11/1/2019
1/30/2020
4/29/2020
7/28/2020
10/26/2020
1/24/2021
4/24/2021
7/23/2021
10/21/2021
1/19/2022

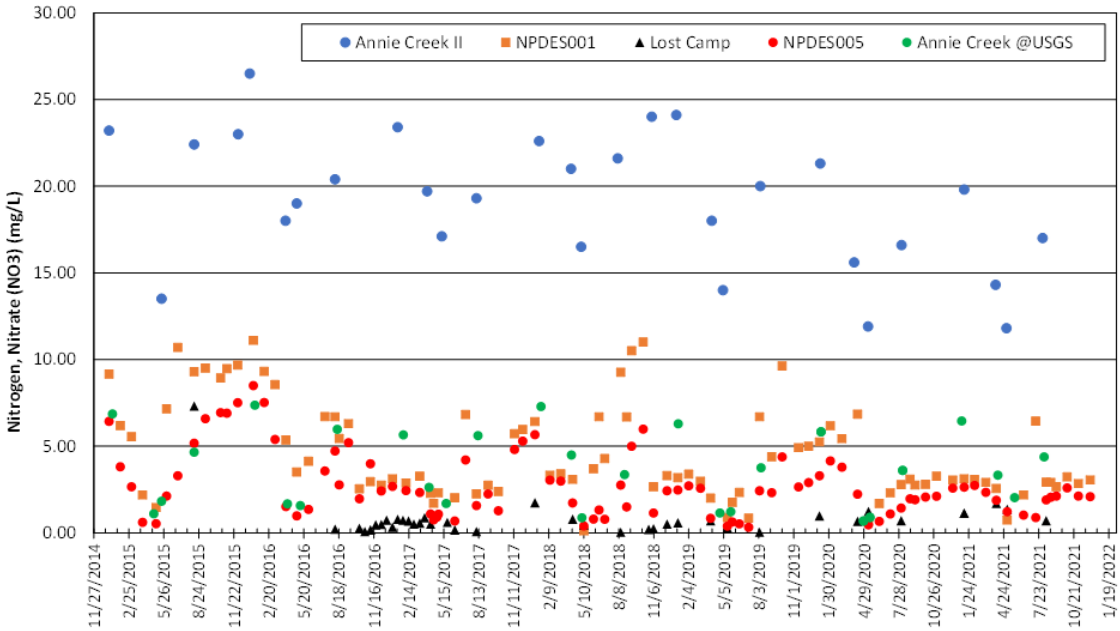

NPDES001
NPDES005
Biochemical Oxygen Demand, 5 Day (mg/L)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
11/27/2014
2/25/2015
5/26/2015
8/24/2015
11/22/2015
2/20/2016
5/20/2016
8/18/2016
11/16/2016
2/14/2017
5/15/2017
8/13/2017
11/11/2017
2/9/2018
5/10/2018
8/8/2018
11/6/2018
2/4/2019
5/5/2019
8/3/2019
11/1/2019
1/30/2020
4/29/2020
7/28/2020
10/26/2020
1/24/2021
4/24/2021
7/23/2021
10/21/2021
1/19/2022

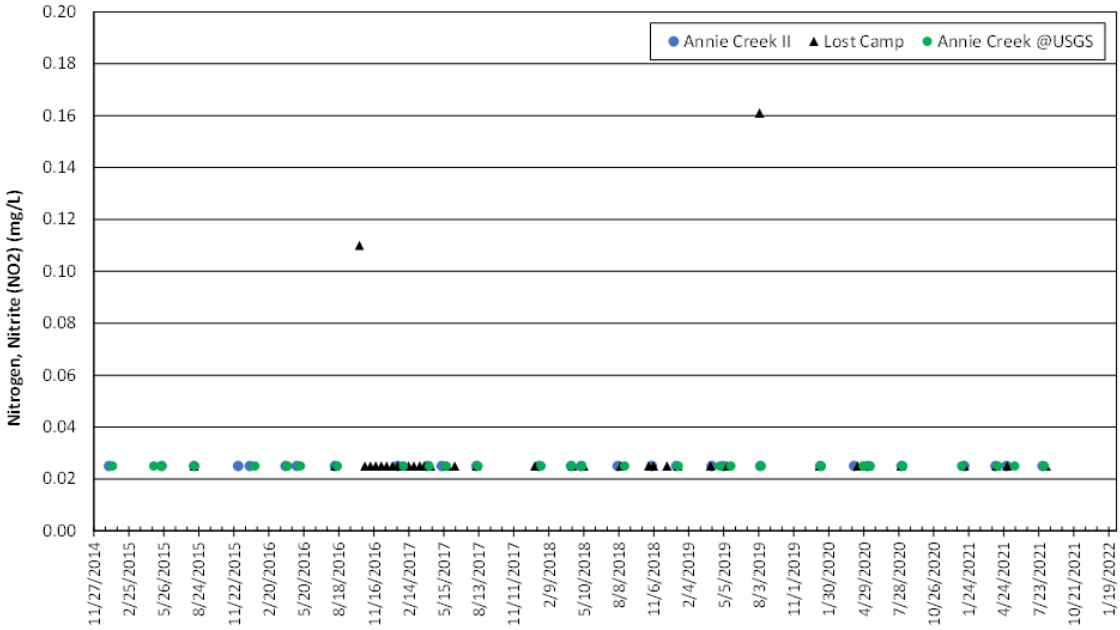

Annie Creek II
NPDES001
Lost Camp
NPDES005
Annie Creek @USGS
46MN31
Cyanide, WAD (mg/L)
0.020
0.015
0.010
0.005
0.000
11/27/2014
2/25/2015
5/26/2015
8/24/2015
11/22/2015
2/20/2016
5/20/2016
8/18/2016
11/16/2016
2/14/2017
5/15/2017
8/13/2017
11/11/2017
2/9/2018
5/10/2018
8/8/2018
11/6/2018
2/4/2019
5/5/2019
8/3/2019
11/1/2019
1/30/2020
4/29/2020
7/28/2020
10/26/2020
1/24/2021
4/24/2021
7/23/2021
10/21/2021
1/19/2022

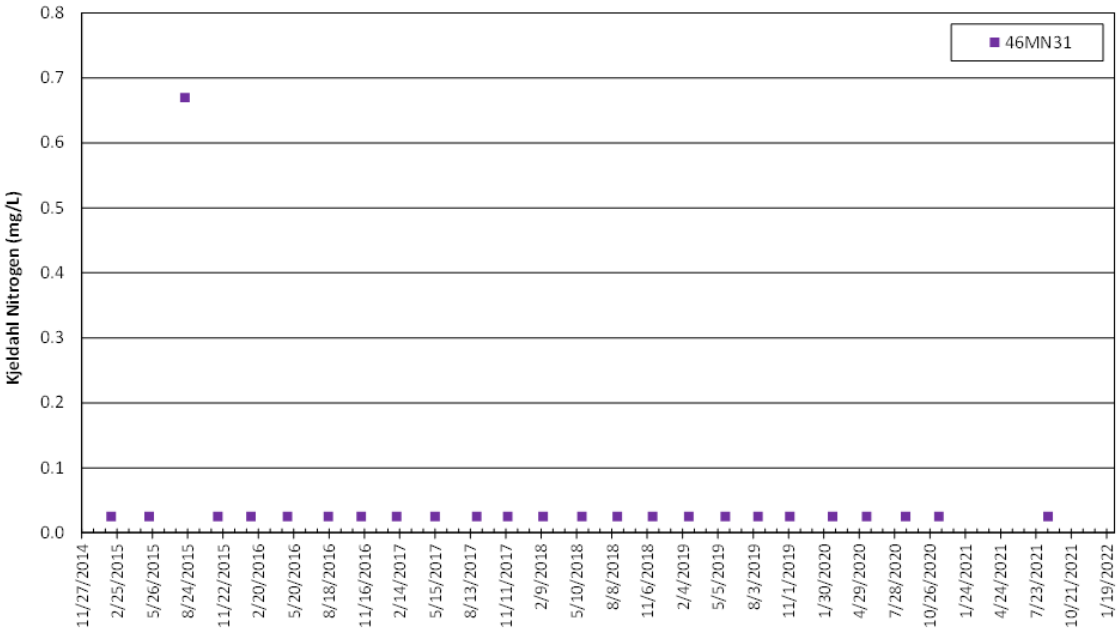

Annie Creek II
Lost Camp
Annie Creek @USGS
Fluoride (mg/L)
0.50
0.45
0.40
0.35
0.30
0.25
0.20
0.15
0.10
0.05
0.00
11/27/2014
2/25/2015
5/26/2015
8/24/2015
11/22/2015
2/20/2016
5/20/2016
8/18/2016
11/16/2016
2/14/2017
5/15/2017
8/13/2017
11/11/2017
2/9/2018
5/10/2018
8/8/2018
11/6/2018
2/4/2019
5/5/2019
8/3/2019
11/1/2019
1/30/2020
4/29/2020
7/28/2020
10/26/2020
1/24/2021
4/24/2021
7/23/2021
10/21/2021
1/19/2022

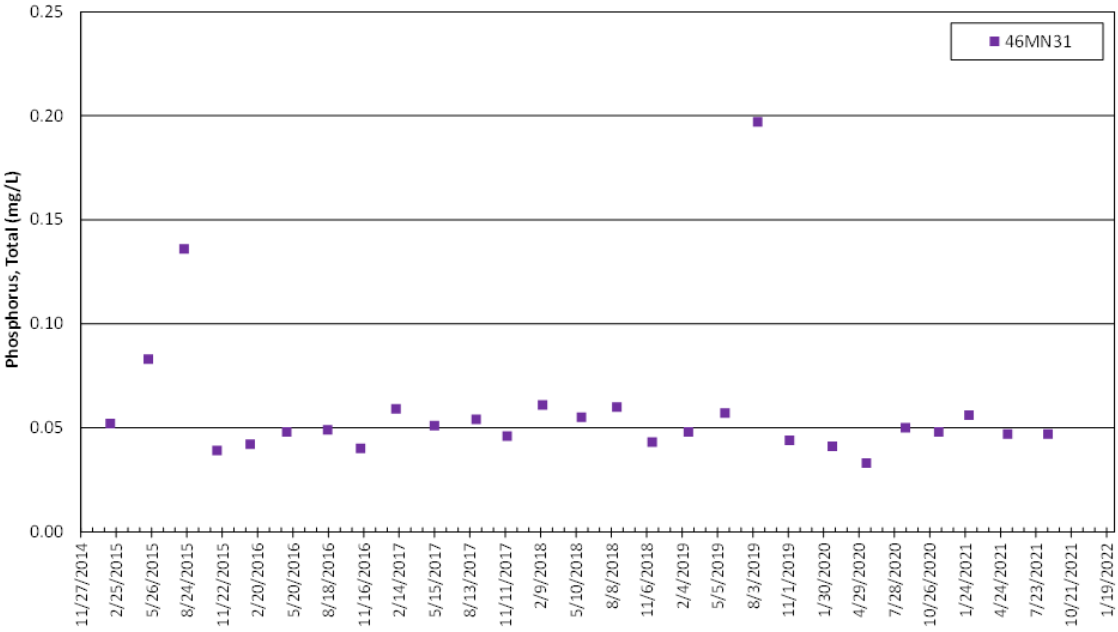

Annie Creek II
NPDES001
Lost Camp
NPDES005
Annie Creek @USGS
46MN31
Nitrogen, Ammonia (NH3) (mg/L)
0.06
0.05
0.04
0.03
0.02
0.01
0.00
11/27/2014
2/25/2015
5/26/2015
8/24/2015
11/22/2015
2/20/2016
5/20/2016
8/18/2016
11/16/2016
2/14/2017
5/15/2017
8/13/2017
11/11/2017
2/9/2018
5/10/2018
8/8/2018
11/6/2018
2/4/2019
5/5/2019
8/3/2019
11/1/2019
1/30/2020
4/29/2020
7/28/2020
10/26/2020
1/24/2021
4/24/2021
7/23/2021
10/21/2021
1/19/2022

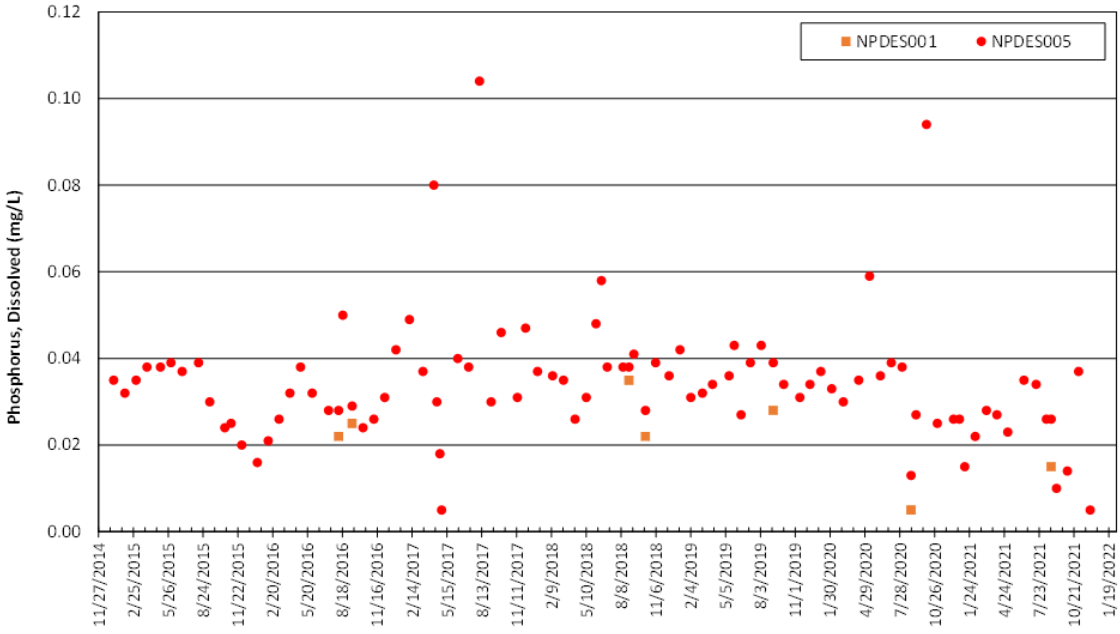

46MN31
Nitrogen, Nitrate (NO3)+Nitrite (NO2) (mg/L)
10.00
9.00
8.00
7.00
6.00
5.00
4.00
3.00
2.00
1.00
0.00
11/27/2014
2/25/2015
5/26/2015
8/24/2015
11/22/2015
2/20/2016
5/20/2016
8/18/2016
11/16/2016
2/14/2017
5/15/2017
8/13/2017
11/11/2017
2/9/2018
5/10/2018
8/8/2018
11/6/2018
2/4/2019
5/5/2019
8/3/2019
11/1/2019
1/30/2020
4/29/2020
7/28/2020
10/26/2020
1/24/2021
4/24/2021
7/23/2021
10/21/2021
1/19/2022

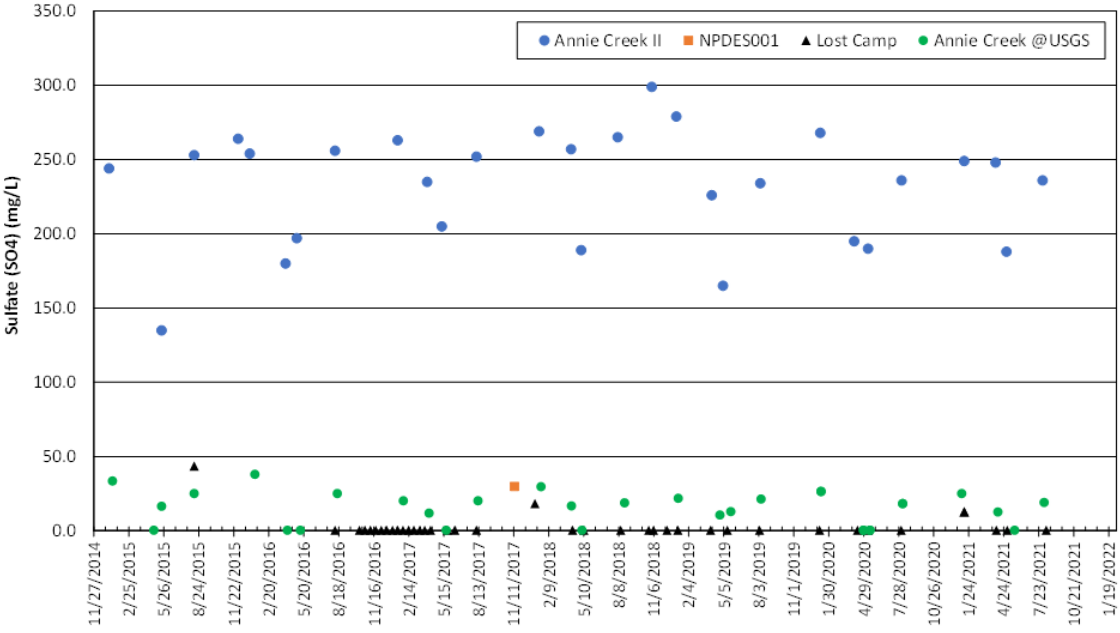

Annie Creek II
NPDES001
Lost Camp
NPDES005
Annie Creek @USGS
Nitrogen, Nitrate (NO3) (mg/L)
30.00
25.00
20.00
15.00
10.00
5.00
0.00
11/27/2014
2/25/2015
5/26/2015
8/24/2015
11/22/2015
2/20/2016
5/20/2016
8/18/2016
11/16/2016
2/14/2017
5/15/2017
8/13/2017
11/11/2017
2/9/2018
5/10/2018
8/8/2018
11/6/2018
2/4/2019
5/5/2019
8/3/2019
11/1/2019
1/30/2020
4/29/2020
7/28/2020
10/26/2020
1/24/2021
4/24/2021
7/23/2021
10/21/2021
1/19/2022

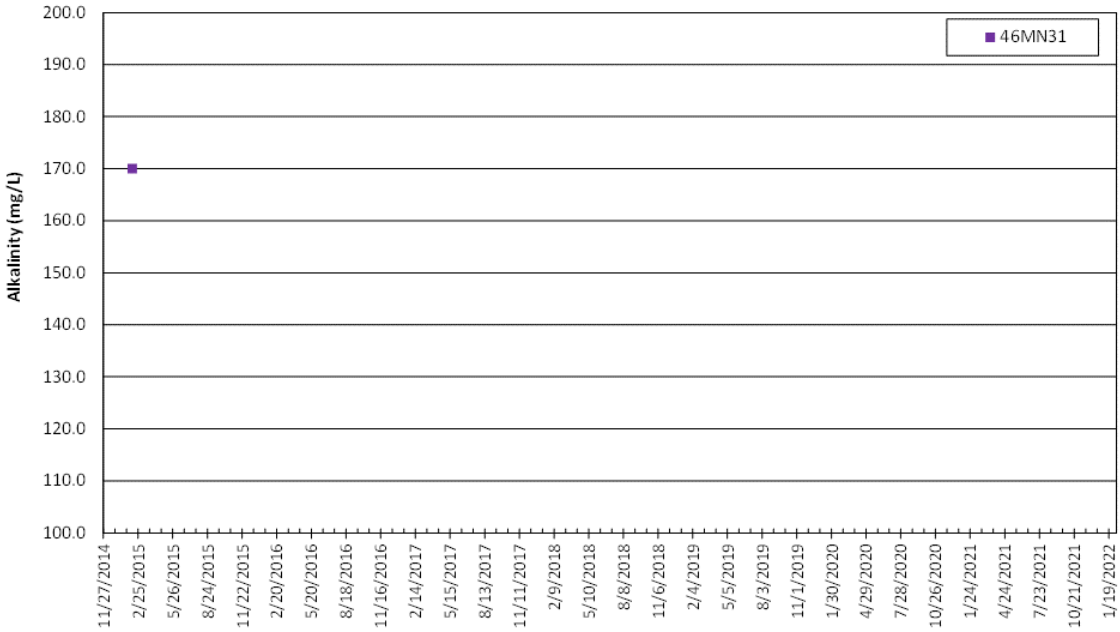

Annie Creek II
Lost Camp
Annie Creek @USGS
Nitrogen, Nitrite (NO2) (mg/L)
0.20
0.18
0.16
0.14
0.12
0.10
0.08
0.06
0.04
0.02
0.00
11/27/2014
2/25/2015
5/26/2015
8/24/2015
11/22/2015
2/20/2016
5/20/2016
8/18/2016
11/16/2016
2/14/2017
5/15/2017
8/13/2017
11/11/2017
2/9/2018
5/10/2018
8/8/2018
11/6/2018
2/4/2019
5/5/2019
8/3/2019
11/1/2019
1/30/2020
4/29/2020
7/28/2020
10/26/2020
1/24/2021
4/24/2021
7/23/2021
10/21/2021
1/19/2022

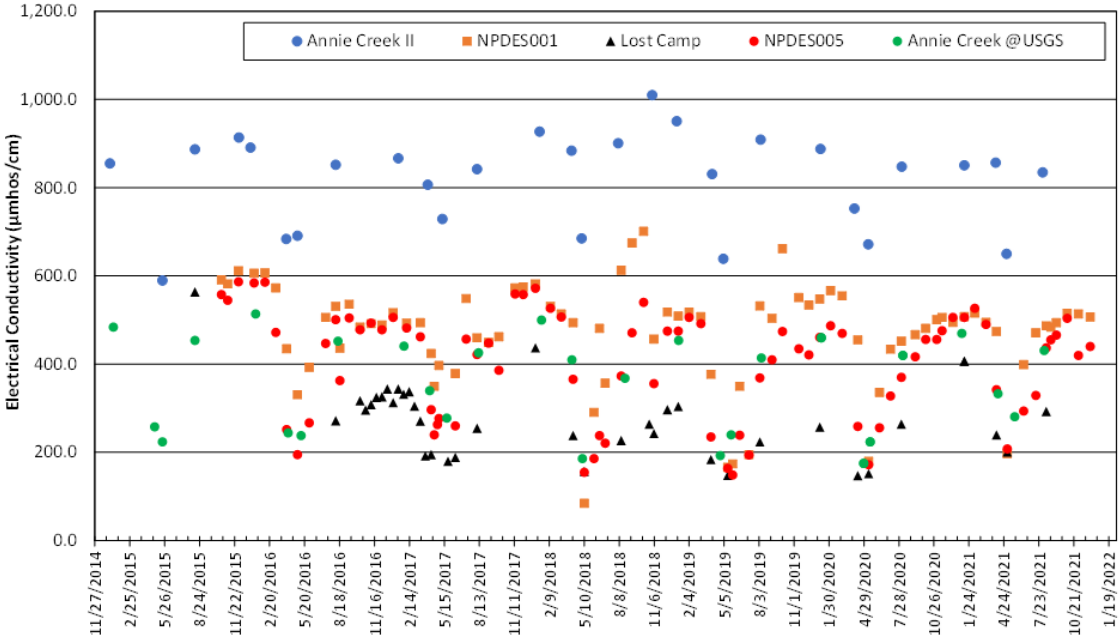

46MN31
Kjeldahl Nitrogen (mg/L)
0.8
0.7
0.6
0.5
0.4
0.3
0.2
0.1
0.0
11/27/2014
2/25/2015
5/26/2015
8/24/2015
11/22/2015
2/20/2016
5/20/2016
8/18/2016
11/16/2016
2/14/2017
5/15/2017
8/13/2017
11/11/2017
2/9/2018
5/10/2018
8/8/2018
11/6/2018
2/4/2019
5/5/2019
8/3/2019
11/1/2019
1/30/2020
4/29/2020
7/28/2020
10/26/2020
1/24/2021
4/24/2021
7/23/2021
10/21/2021
1/19/2022

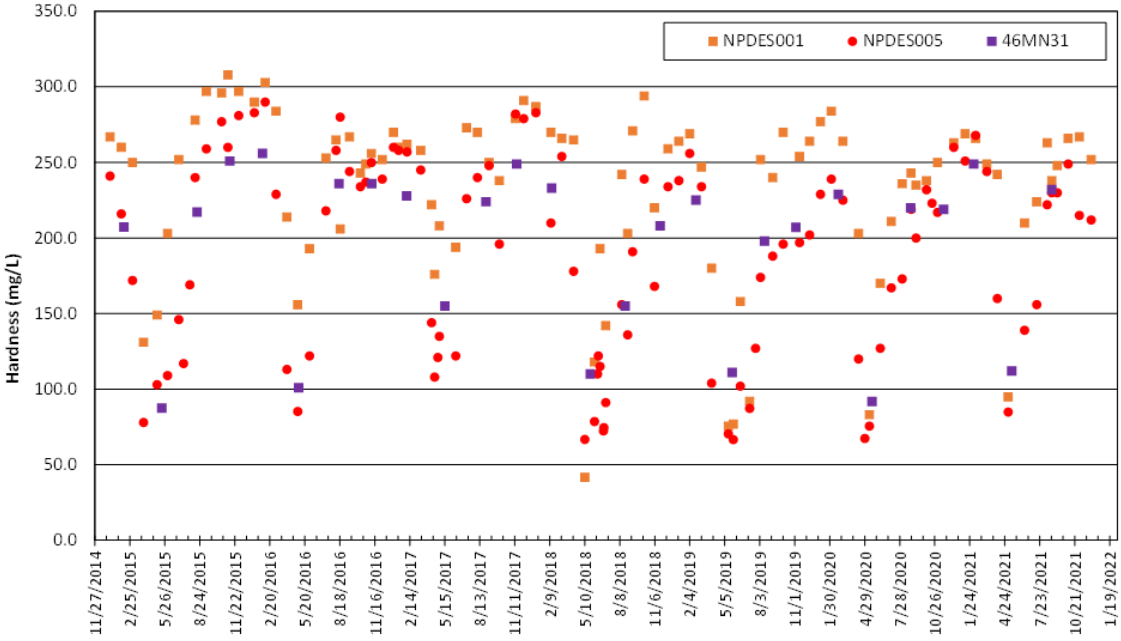

46MN31
Phosphorus, Total (mg/L)
0.25
0.20
0.15
0.10
0.05
0.00
11/27/2014
2/25/2015
5/26/2015
8/24/2015
11/22/2015
2/20/2016
5/20/2016
8/18/2016
11/16/2016
2/14/2017
5/15/2017
8/13/2017
11/11/2017
2/9/2018
5/10/2018
8/8/2018
11/6/2018
2/4/2019
5/5/2019
8/3/2019
11/1/2019
1/30/2020
4/29/2020
7/28/2020
10/26/2020
1/24/2021
4/24/2021
7/23/2021
10/21/2021
1/19/2022

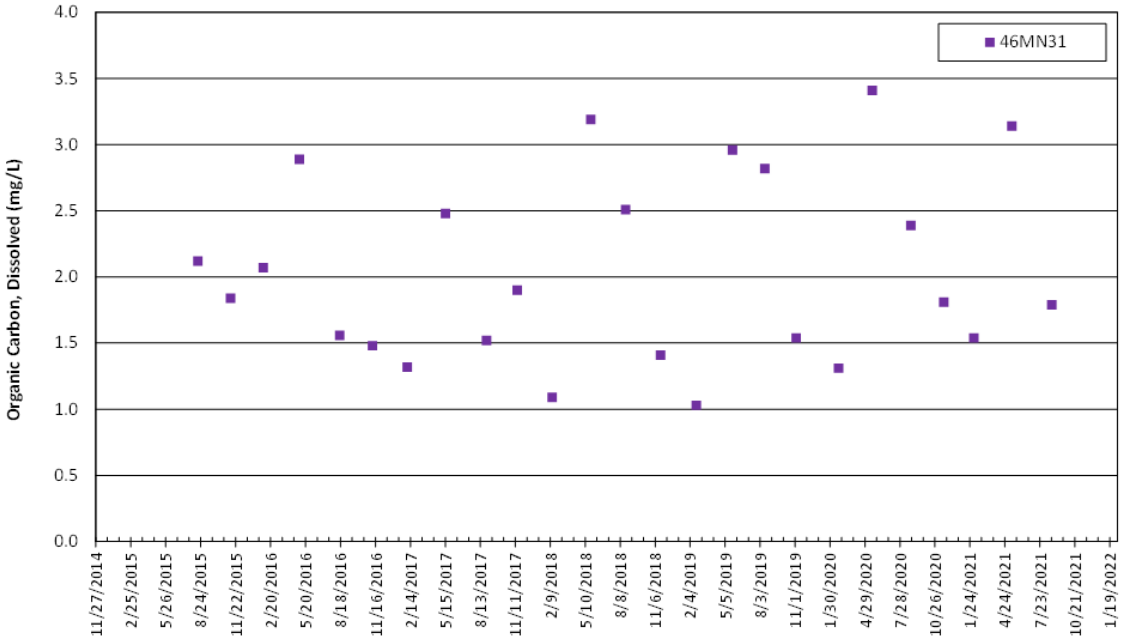

NPDES001
NPDES005
Phosphorus, Dissolved (mg/L)
0.12
0.10
0.08
0.06
0.04
0.02
0.00
11/27/2014
2/25/2015
5/26/2015
8/24/2015
11/22/2015
2/20/2016
5/20/2016
8/18/2016
11/16/2016
2/14/2017
5/15/2017
8/13/2017
11/11/2017
2/9/2018
5/10/2018
8/8/2018
11/6/2018
2/4/2019
5/5/2019
8/3/2019
11/1/2019
1/30/2020
4/29/2020
7/28/2020
10/26/2020
1/24/2021
4/24/2021
7/23/2021
10/21/2021
1/19/2022

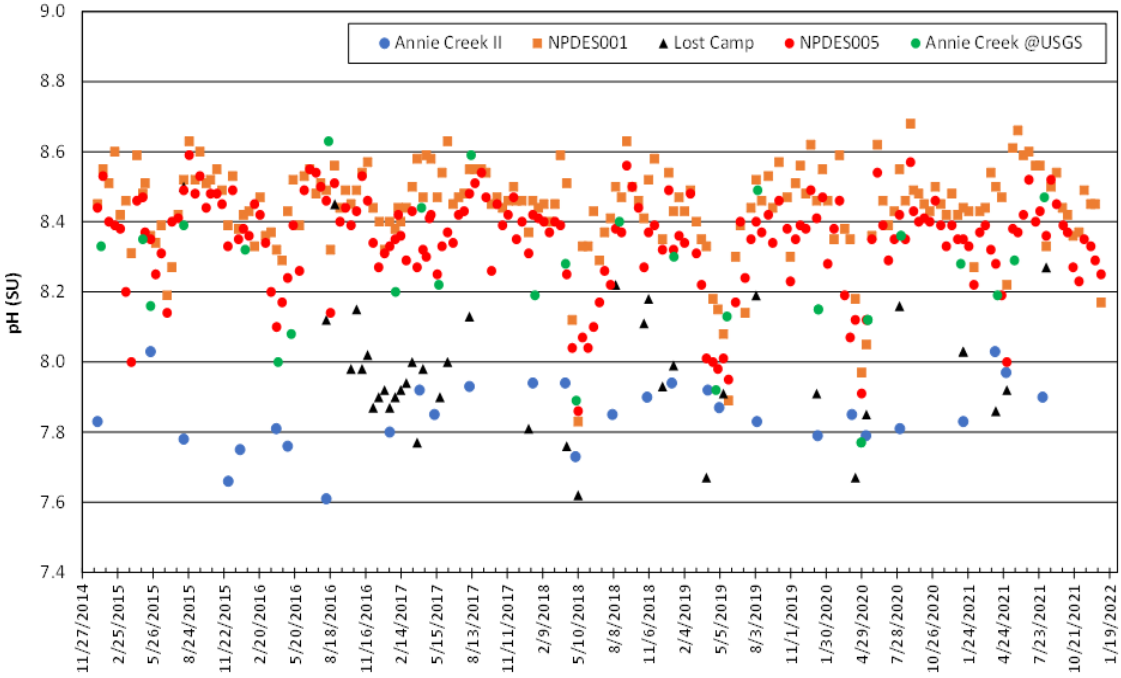

Annie Creek II
NPDES001
Lost Camp
Annie Creek @USGS
Sulfate (SO4) (mg/L)
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
11/27/2014
2/25/2015
5/26/2015
8/24/2015
11/22/2015
2/20/2016
5/20/2016
8/18/2016
11/16/2016
2/14/2017
5/15/2017
8/13/2017
11/11/2017
2/9/2018
5/10/2018
8/8/2018
11/6/2018
2/4/2019
5/5/2019
8/3/2019
11/1/2019
1/30/2020
4/29/2020
7/28/2020
10/26/2020
1/24/2021
4/24/2021
7/23/2021
10/21/2021
1/19/2022

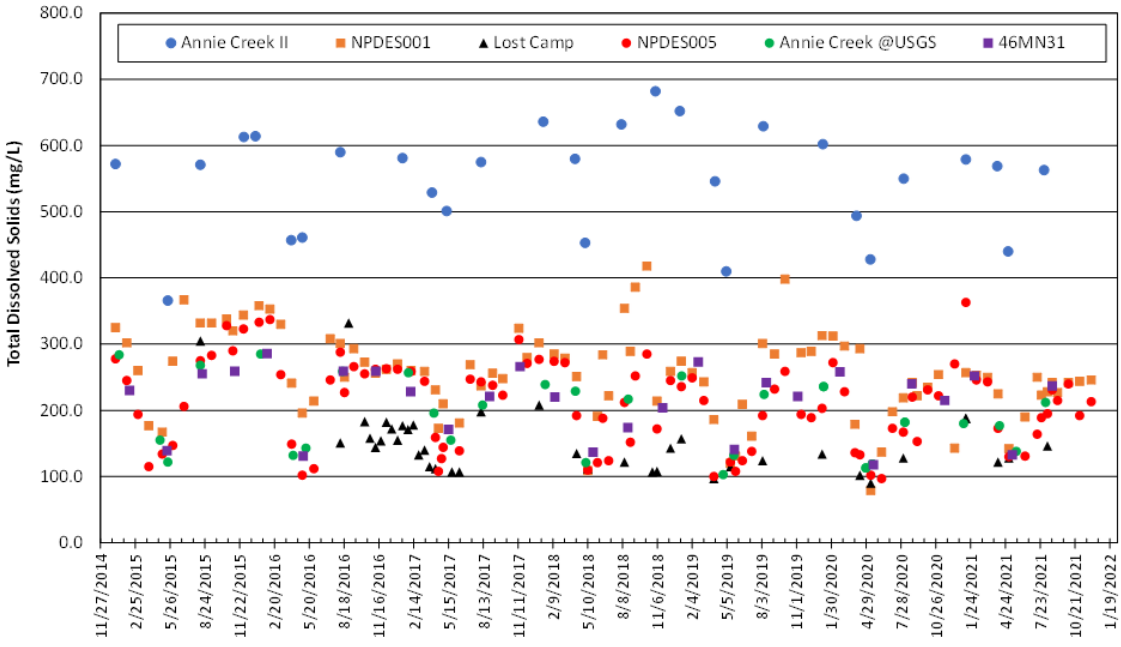

46MN31
Alkalinity (mg/L)
200.0
190.0
180.0
170.0
160.0
150.0
140.0
130.0
120.0
110.0
100.0
11/27/2014
2/25/2015
5/26/2015
8/24/2015
11/22/2015
2/20/2016
5/20/2016
8/18/2016
11/16/2016
2/14/2017
5/15/2017
8/13/2017
11/11/2017
2/9/2018
5/10/2018
8/8/2018
11/6/2018
2/4/2019
5/5/2019
8/3/2019
11/1/2019
1/30/2020
4/29/2020
7/28/2020
10/26/2020
1/24/2021
4/24/2021
7/23/2021
10/21/2021
1/19/2022

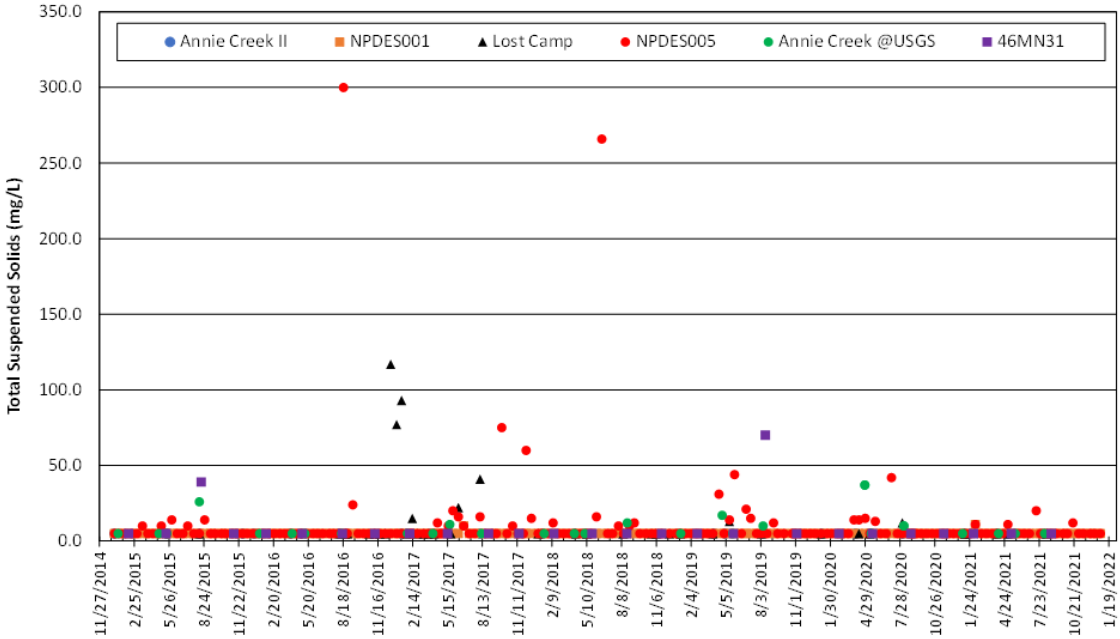

Annie Creek II
NPDES001
Lost Camp
NPDES005
Annie Creek @USGS
Electrical Conductivity (µmhos/cm)
1,200.0
1,000.0
800.0
600.0
400.0
200.0
0.0
11/27/2014
2/25/2015
5/26/2015
8/24/2015
11/22/2015
2/20/2016
5/20/2016
8/18/2016
11/16/2016
2/14/2017
5/15/2017
8/13/2017
11/11/2017
2/9/2018
5/10/2018
8/8/2018
11/6/2018
2/4/2019
5/5/2019
8/3/2019
11/1/2019
1/30/2020
4/29/2020
7/28/2020
10/26/2020
1/24/2021
4/24/2021
7/23/2021
10/21/2021
1/19/2022

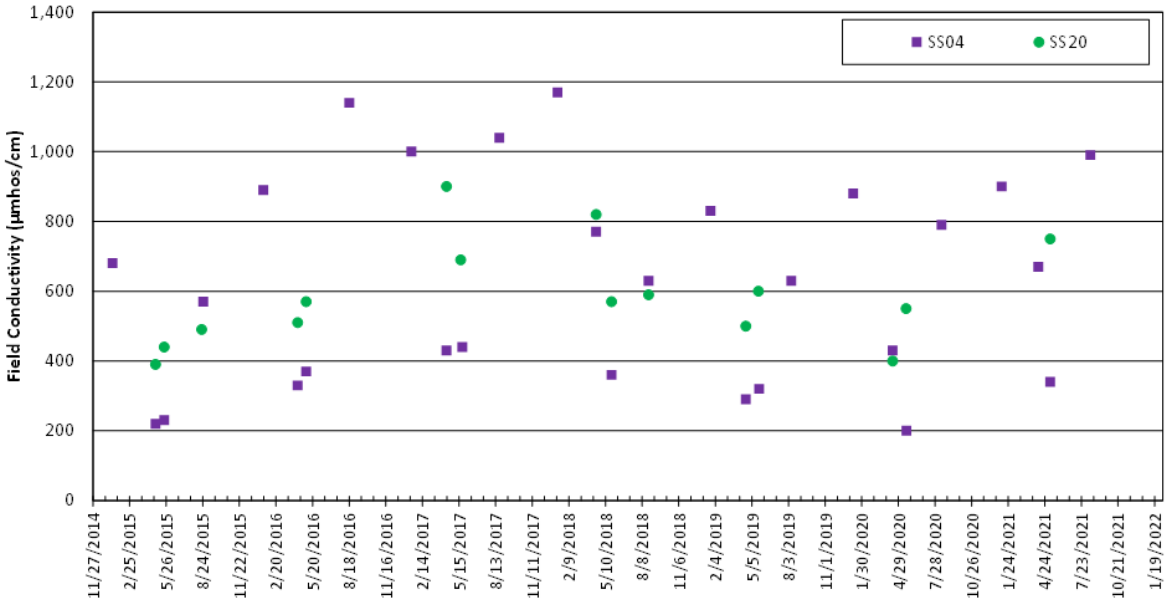

NPDES001
NPDES005
46MN31
Hardness (mg/L)
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
11/27/2014
2/25/2015
5/26/2015
8/24/2015
11/22/2015
2/20/2016
5/20/2016
8/18/2016
11/16/2016
2/14/2017
5/15/2017
8/13/2017
11/11/2017
2/9/2018
5/10/2018
8/8/2018
11/6/2018
2/4/2019
5/5/2019
8/3/2019
11/1/2019
1/30/2020
4/29/2020
7/28/2020
10/26/2020
1/24/2021
4/24/2021
7/23/2021
10/21/2021
1/19/2022

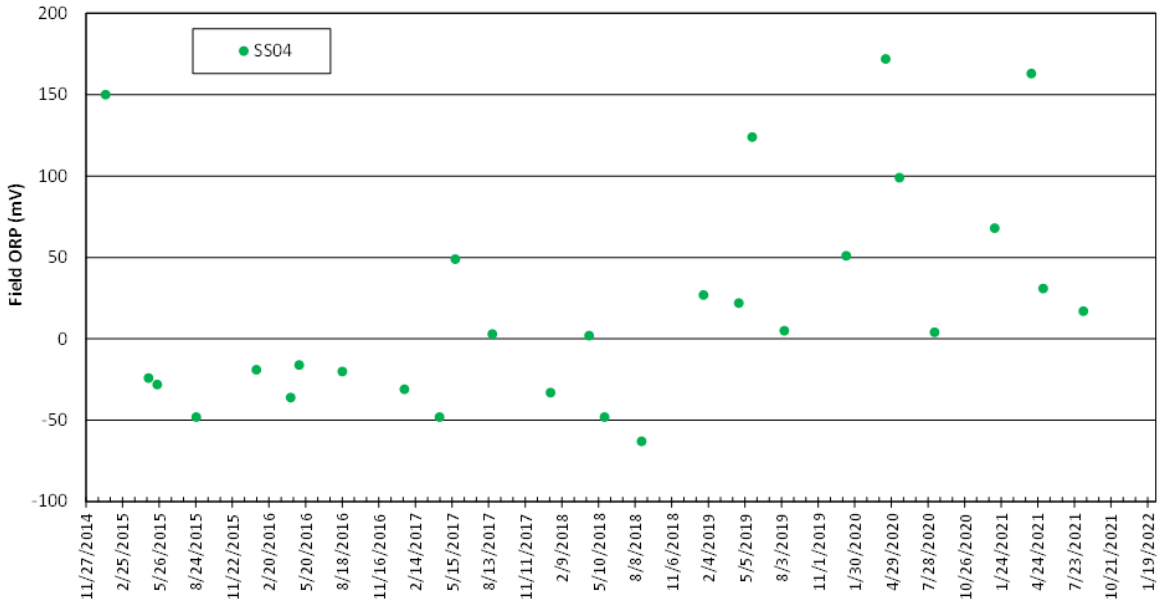

46MN31
Organic Carbon, Dissolved (mg/L)
4.0
3.5
3.0
2.5
2.0
1.5
1.0
0.5
0.0
11/27/2014
2/25/2015
5/26/2015
8/24/2015
11/22/2015
2/20/2016
5/20/2016
8/18/2016
11/16/2016
2/14/2017
5/15/2017
8/13/2017
11/11/2017
2/9/2018
5/10/2018
8/8/2018
11/6/2018
2/4/2019
5/5/2019
8/3/2019
11/1/2019
1/30/2020
4/29/2020
7/28/2020
10/26/2020
1/24/2021
4/24/2021
7/23/2021
10/21/2021
1/19/2022

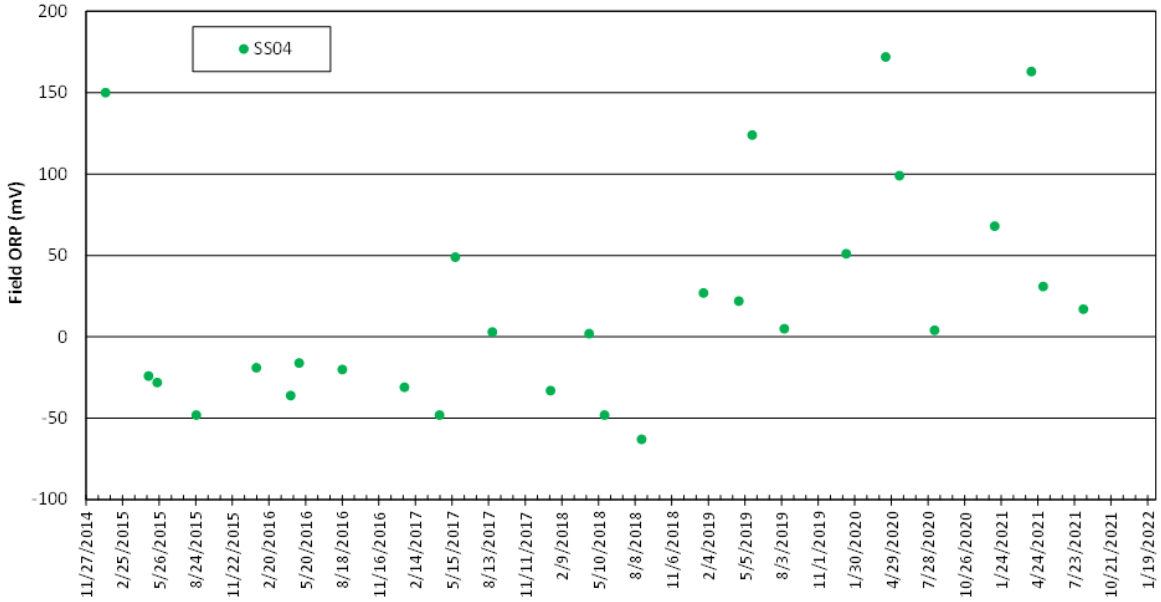

Annie Creek II
NPDES001
Lost Camp
NPDES005
Annie Creek @USGS
pH (SU)
9.0
8.8
8.6
8.4
8.2
8.0
7.8
7.6
7.4
11/27/2014
2/25/2015
5/26/2015
8/24/2015
11/22/2015
2/20/2016
5/20/2016
8/18/2016
11/16/2016
2/14/2017
5/15/2017
8/13/2017
11/11/2017
2/9/2018
5/10/2018
8/8/2018
11/6/2018
2/4/2019
5/5/2019
8/3/2019
11/1/2019
1/30/2020
4/29/2020
7/28/2020
10/26/2020
1/24/2021
4/24/2021
7/23/2021
10/21/2021
1/19/2022

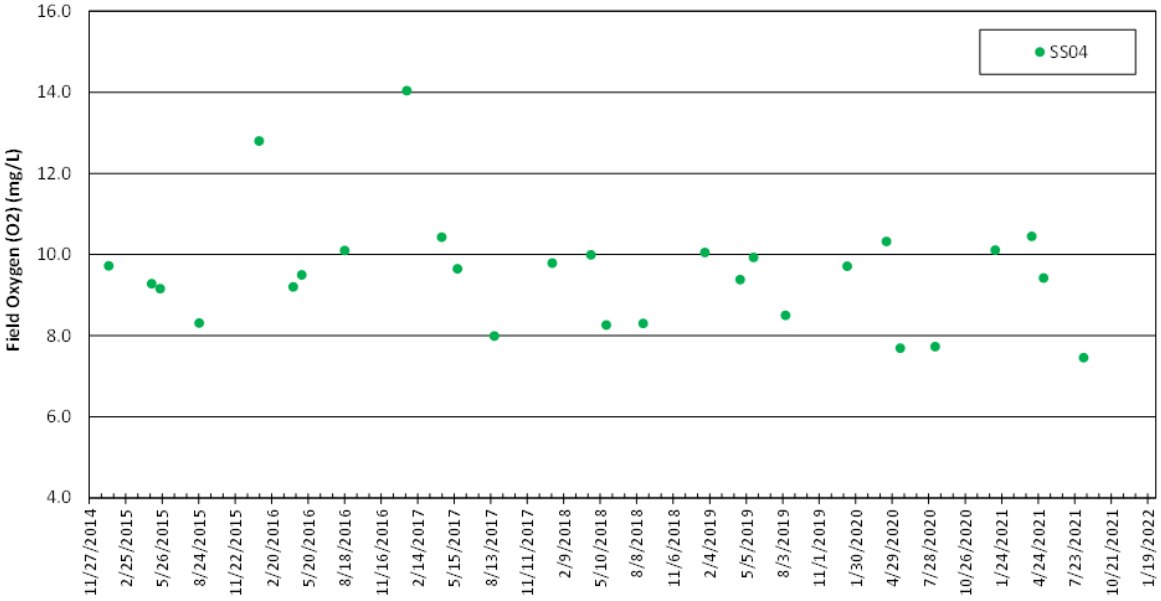

Annie Creek II
NPDES001
Lost Camp
NPDES005
Annie Creek @USGS
46MN31
Total Dissolved Solids (mg/L)
800.0
700.0
600.0
500.0
400.0
300.0
200.0
100.0
0.0
11/27/2014
2/25/2015
5/26/2015
8/24/2015
11/22/2015
2/20/2016
5/20/2016
8/18/2016
11/16/2016
2/14/2017
5/15/2017
8/13/2017
11/11/2017
2/9/2018
5/10/2018
8/8/2018
11/6/2018
2/4/2019
5/5/2019
8/3/2019
11/1/2019
1/30/2020
4/29/2020
7/28/2020
10/26/2020
1/24/2021
4/24/2021
7/23/2021
10/21/2021
1/19/2022

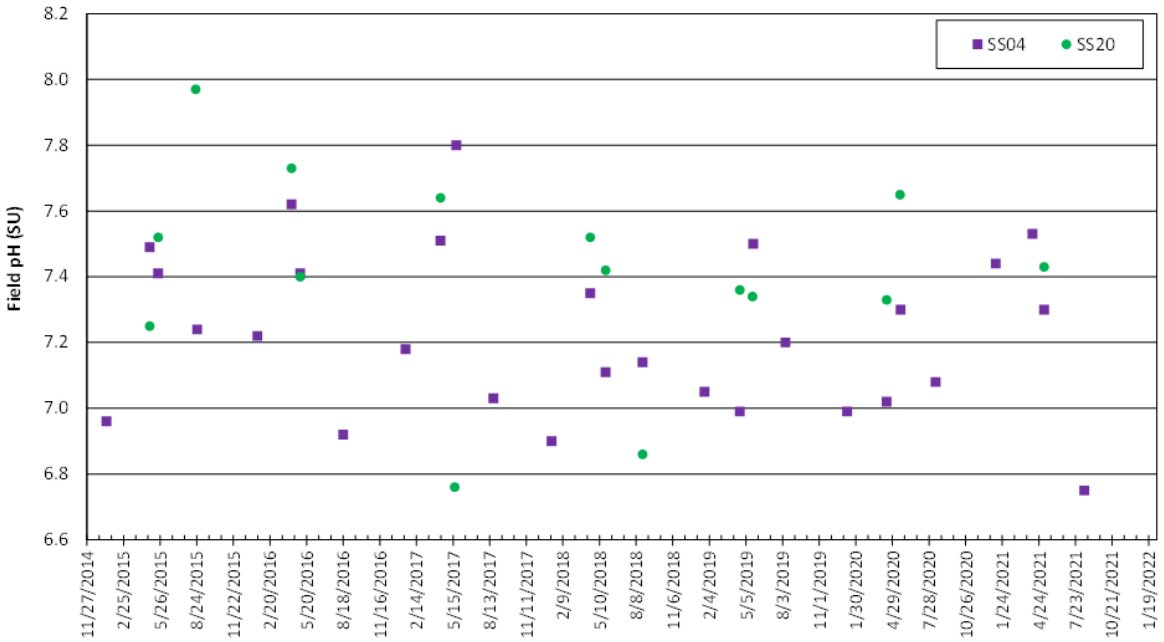

Annie Creek II
NPDES001
Lost Camp
NPDES005
Annie Creek @USGS
46MN31
Total Suspended Solids (mg/L)
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
11/27/2014
2/25/2015
5/26/2015
8/24/2015
11/22/2015
2/20/2016
5/20/2016
8/18/2016
11/16/2016
2/14/2017
5/15/2017
8/13/2017
11/11/2017
2/9/2018
5/10/2018
8/8/2018
11/6/2018
2/4/2019
5/5/2019
8/3/2019
11/1/2019
1/30/2020
4/29/2020
7/28/2020
10/26/2020
1/24/2021
4/24/2021
7/23/2021
10/21/2021
1/19/2022

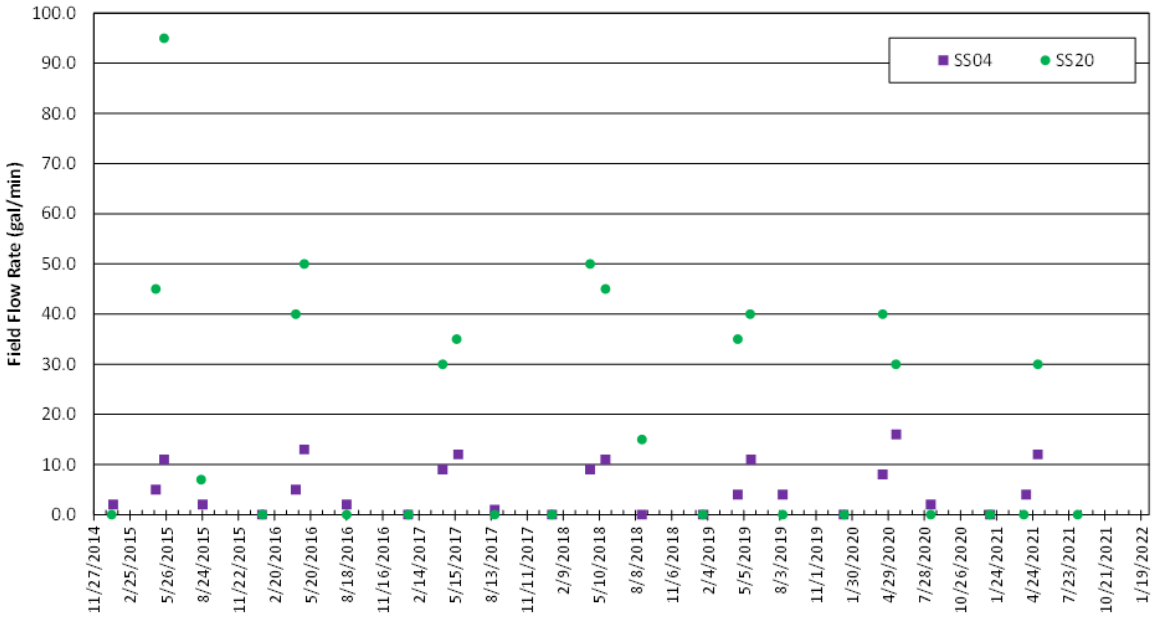

SS04
SS20
Field Conductivity (µmhos/cm)
1,400
1,200
1,000
800
600
400
200
0
11/27/2014
2/25/2015
5/26/2015
8/24/2015
11/22/2015
2/20/2016
5/20/2016
8/18/2016
11/16/2016
2/14/2017
5/15/2017
8/13/2017
11/11/2017
2/9/2018
5/10/2018
8/8/2018
11/6/2018
2/4/2019
5/5/2019
8/3/2019
11/1/2019
1/30/2020
4/29/2020
7/28/2020
10/26/2020
1/24/2021
4/24/2021
7/23/2021
10/21/2021
1/19/2022

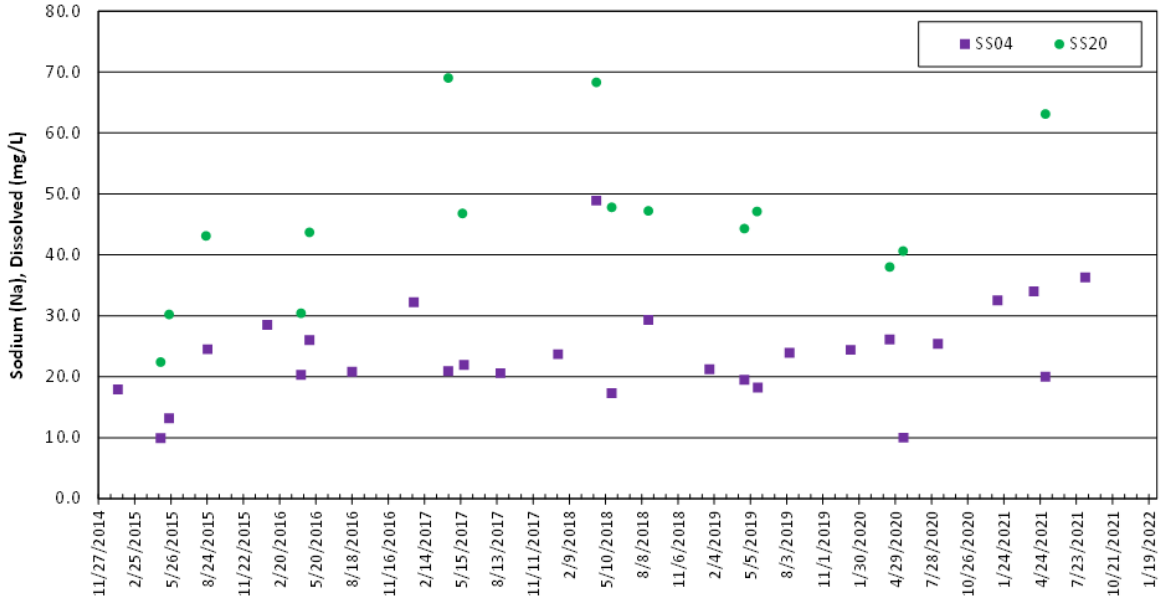

SS04
Field ORP (mV)
200
150
100
50
0
-50
-100
11/27/2014
2/25/2015
5/26/2015
8/24/2015
11/22/2015
2/20/2016
5/20/2016
8/18/2016
11/16/2016
2/14/2017
5/15/2017
8/13/2017
11/11/2017
2/9/2018
5/10/2018
8/8/2018
11/6/2018
2/4/2019
5/5/2019
8/3/2019
11/1/2019
1/30/2020
4/29/2020
7/28/2020
10/26/2020
1/24/2021
4/24/2021
7/23/2021
10/21/2021
1/19/2022

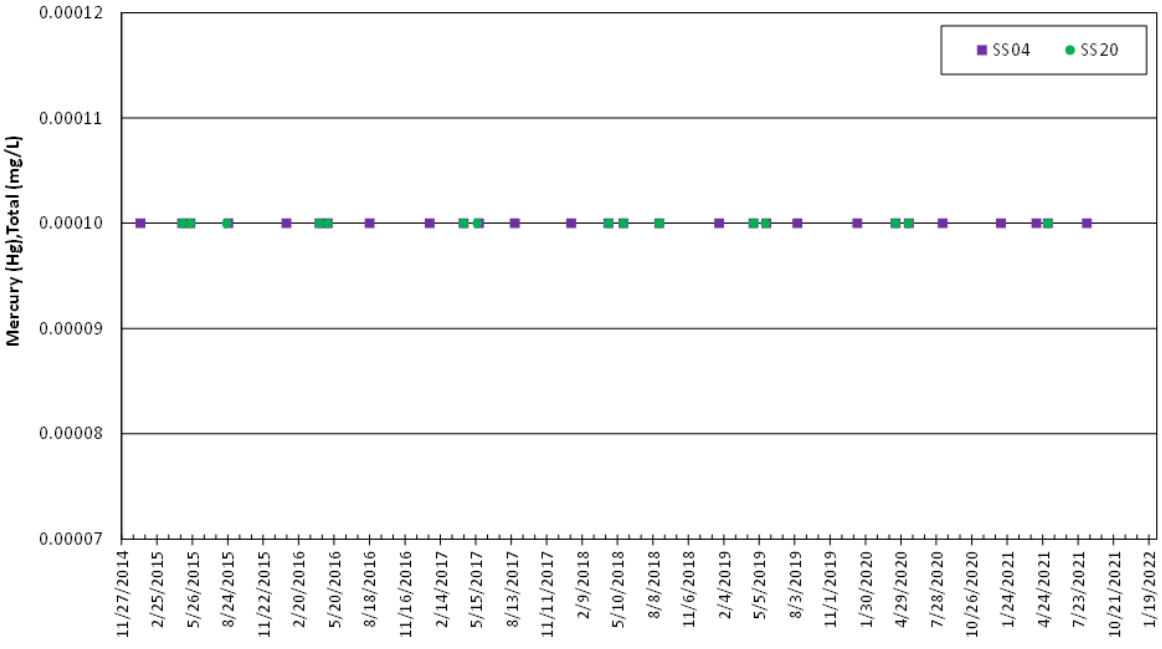

SS04
Field ORP (mV)
200
150
100
50
0
-50
-100
11/27/2014
2/25/2015
5/26/2015
8/24/2015
11/22/2015
2/20/2016
5/20/2016
8/18/2016
11/16/2016
2/14/2017
5/15/2017
8/13/2017
11/11/2017
2/9/2018
5/10/2018
8/8/2018
11/6/2018
2/4/2019
5/5/2019
8/3/2019
11/1/2019
1/30/2020
4/29/2020
7/28/2020
10/26/2020
1/24/2021
4/24/2021
7/23/2021
10/21/2021
1/19/2022

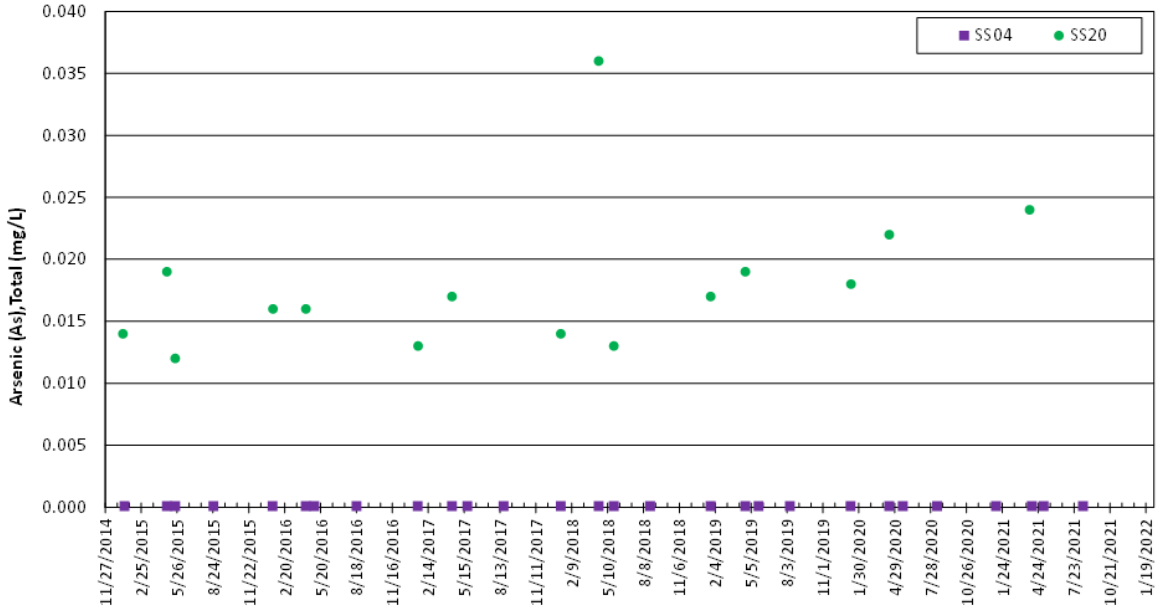

SS04
Field Oxygen (O2) (mg/L)
16.0
14.0
12.0
10.0
8.0
6.0
4.0
11/27/2014
2/25/2015
5/26/2015
8/24/2015
11/22/2015
2/20/2016
5/20/2016
8/18/2016
11/16/2016
2/14/2017
5/15/2017
8/13/2017
11/11/2017
2/9/2018
5/10/2018
8/8/2018
11/6/2018
2/4/2019
5/5/2019
8/3/2019
11/1/2019
1/30/2020
4/29/2020
7/28/2020
10/26/2020
1/24/2021
4/24/2021
7/23/2021
10/21/2021
1/19/2022

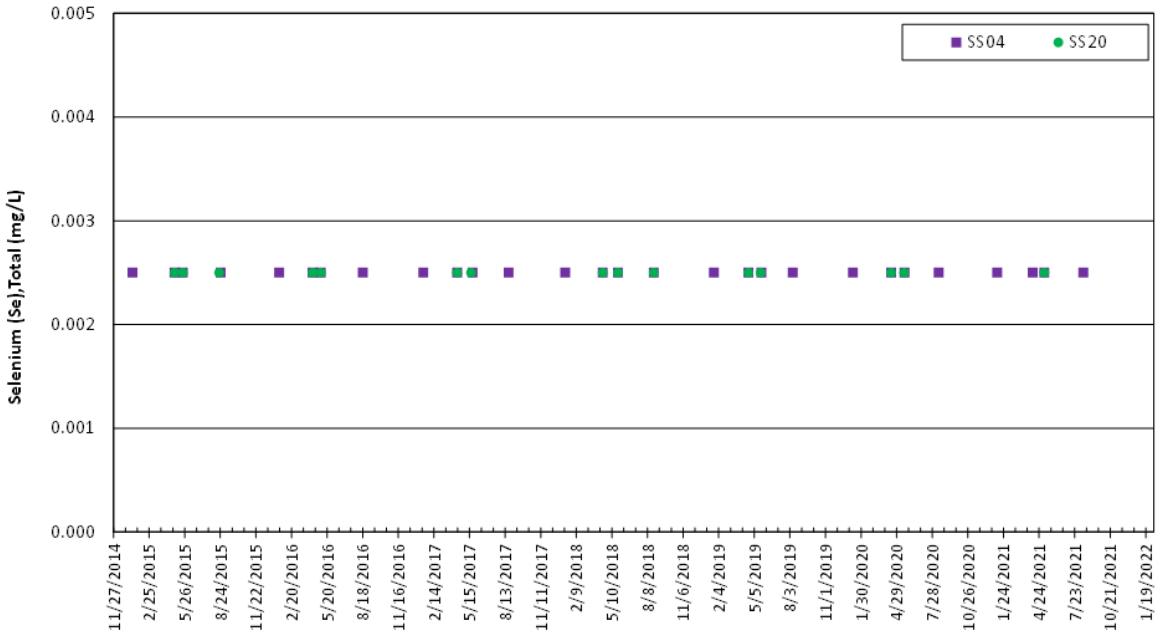

SS04
SS20
Field pH (SU)
8.2
8.0
7.8
7.6
7.4
7.2
7.0
6.8
6.6
11/27/2014
2/25/2015
5/26/2015
8/24/2015
11/22/2015
2/20/2016
5/20/2016
8/18/2016
11/16/2016
2/14/2017
5/15/2017
8/13/2017
11/11/2017
2/9/2018
5/10/2018
8/8/2018
11/6/2018
2/4/2019
5/5/2019
8/3/2019
11/1/2019
1/30/2020
4/29/2020
7/28/2020
10/26/2020
1/24/2021
4/24/2021
7/23/2021
10/21/2021
1/19/2022

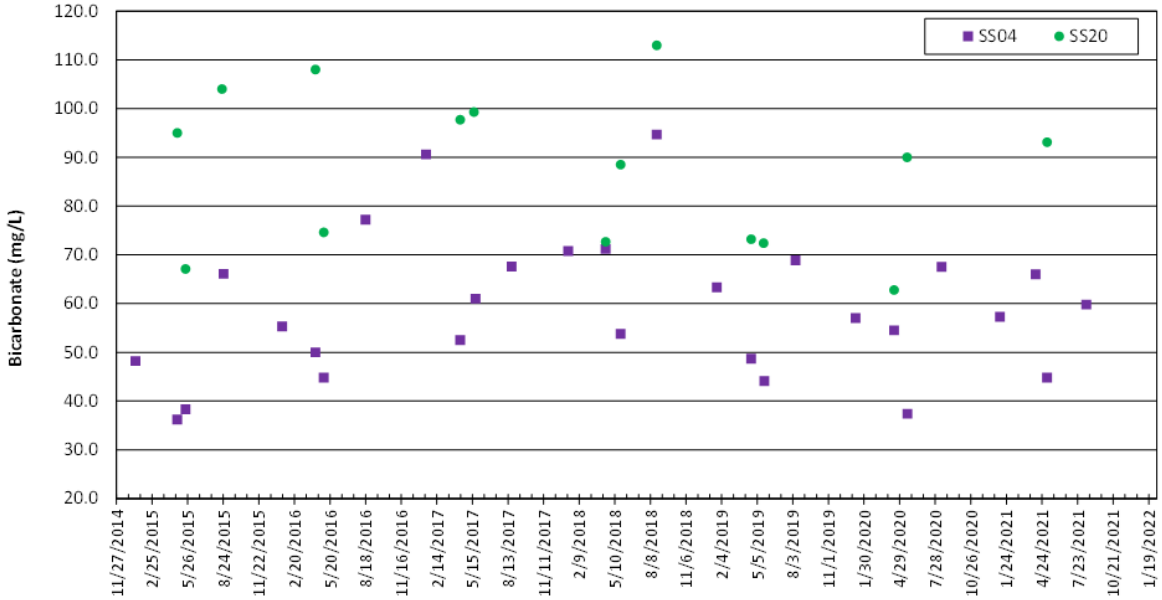

SS04
SS20
Field Flow Rate (gal/min)
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
11/27/2014
2/25/2015
5/26/2015
8/24/2015
11/22/2015
2/20/2016
5/20/2016
8/18/2016
11/16/2016
2/14/2017
5/15/2017
8/13/2017
11/11/2017
2/9/2018
5/10/2018
8/8/2018
11/6/2018
2/4/2019
5/5/2019
8/3/2019
11/1/2019
1/30/2020
4/29/2020
7/28/2020
10/26/2020
1/24/2021
4/24/2021
7/23/2021
10/21/2021
1/19/2022


Sodium (Na), Dissolved (mg/L)
80.0
70.0
60.0
50.0
40.0
30.0
20.0
10.0
0.0
SS04
SS20
11/27/2014
2/25/2015
5/26/2015
8/24/2015
11/22/2015
2/20/2016
5/20/2016
8/18/2016
11/16/2016
2/14/2017
5/15/2017
8/13/2017
11/11/2017
2/9/2018
5/10/2018
8/8/2018
11/6/2018
2/4/2019
5/5/2019
8/3/2019
11/1/2019
1/30/2020
4/29/2020
7/28/2020
10/26/2020
1/24/2021
4/24/2021
7/23/2021
10/21/2021
1/19/2022


Mercury (Hg),Total (mg/L)
0.00012
0.00011
0.00010
0.00009
0.00008
0.00007
SS04
SS20
11/27/2014
2/25/2015
5/26/2015
8/24/2015
11/22/2015
2/20/2016
5/20/2016
8/18/2016
11/16/2016
2/14/2017
5/15/2017
8/13/2017
11/11/2017
2/9/2018
5/10/2018
8/8/2018
11/6/2018
2/4/2019
5/5/2019
8/3/2019
11/1/2019
1/30/2020
4/29/2020
7/28/2020
10/26/2020
1/24/2021
4/24/2021
7/23/2021
10/21/2021
1/19/2022


SS04
SS20
Arsenic (As),Total (mg/L)
0.040
0.035
0.030
0.025
0.020
0.015
0.010
0.005
0.000
11/27/2014
2/25/2015
5/26/2015
8/24/2015
11/22/2015
2/20/2016
5/20/2016
8/18/2016
11/16/2016
2/14/2017
5/15/2017
8/13/2017
11/11/2017
2/9/2018
5/10/2018
8/8/2018
11/6/2018
2/4/2019
5/5/2019
8/3/2019
11/1/2019
1/30/2020
4/29/2020
7/28/2020
10/26/2020
1/24/2021
4/24/2021
7/23/2021
10/21/2021
1/19/2022


SS04
SS20
Selenium (Se),Total (mg/L)
0.005
0.004
0.003
0.002
0.001
0.000
11/27/2014
2/25/2015
5/26/2015
8/24/2015
11/22/2015
2/20/2016
5/20/2016
8/18/2016
11/16/2016
2/14/2017
5/15/2017
8/13/2017
11/11/2017
2/9/2018
5/10/2018
8/8/2018
11/6/2018
2/4/2019
5/5/2019
8/3/2019
11/1/2019
1/30/2020
4/29/2020
7/28/2020
10/26/2020
1/24/2021
4/24/2021
7/23/2021
10/21/2021
1/19/2022


Bicarbonate (mg/L)
SS04
SS20
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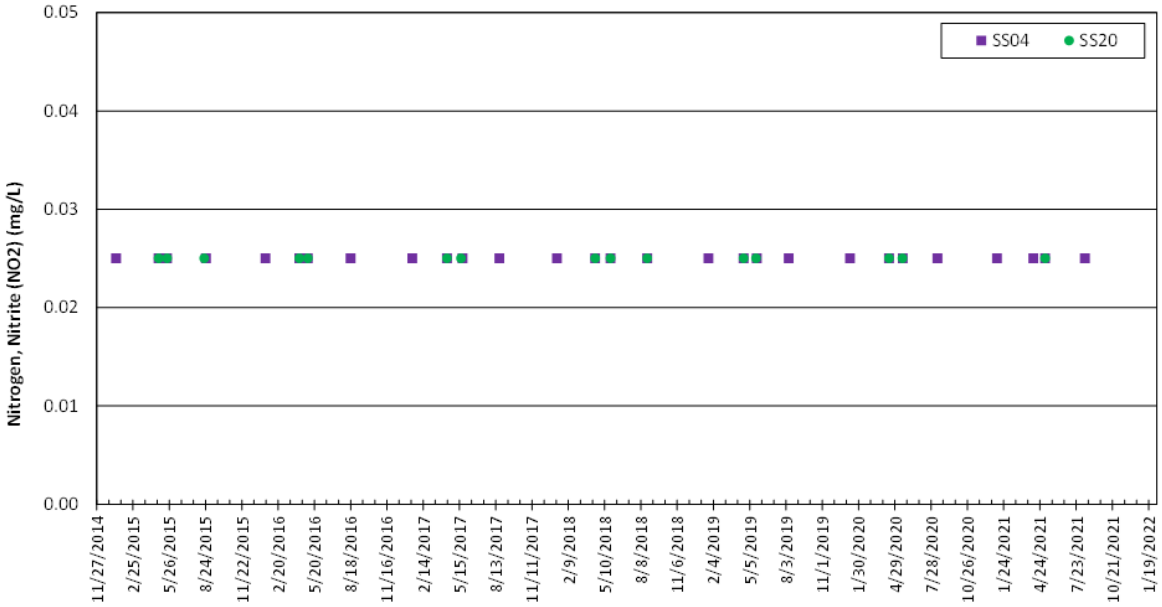
110.0
100.0
90.0
80.0
70.0
60.0
50.0
40.0
30.0
20.0
11/27/2014
2/25/2015
5/26/2015
8/24/2015
11/22/2015
2/20/2016
5/20/2016
8/18/2016
11/16/2016
2/14/2017
5/15/2017
8/13/2017
11/11/2017
2/9/2018
5/10/2018
8/8/2018
11/6/2018
2/4/2019
5/5/2019
8/3/2019
11/1/2019
1/30/2020
4/29/2020
7/28/2020
10/26/2020
1/24/2021
4/24/2021
7/23/2021
10/21/2021
1/19/2022


Nitrogen, Nitrite (NO2) (mg/L)
SS04
SS20
0.05
0.04
0.03
0.02
0.01
0.00
11/27/2014
2/25/2015
5/26/2015
8/24/2015
11/22/2015
2/20/2016
5/20/2016
8/18/2016
11/16/2016
2/14/2017
5/15/2017
8/13/2017
11/11/2017
2/9/2018
5/10/2018
8/8/2018
11/6/2018
2/4/2019
5/5/2019
8/3/2019
11/1/2019
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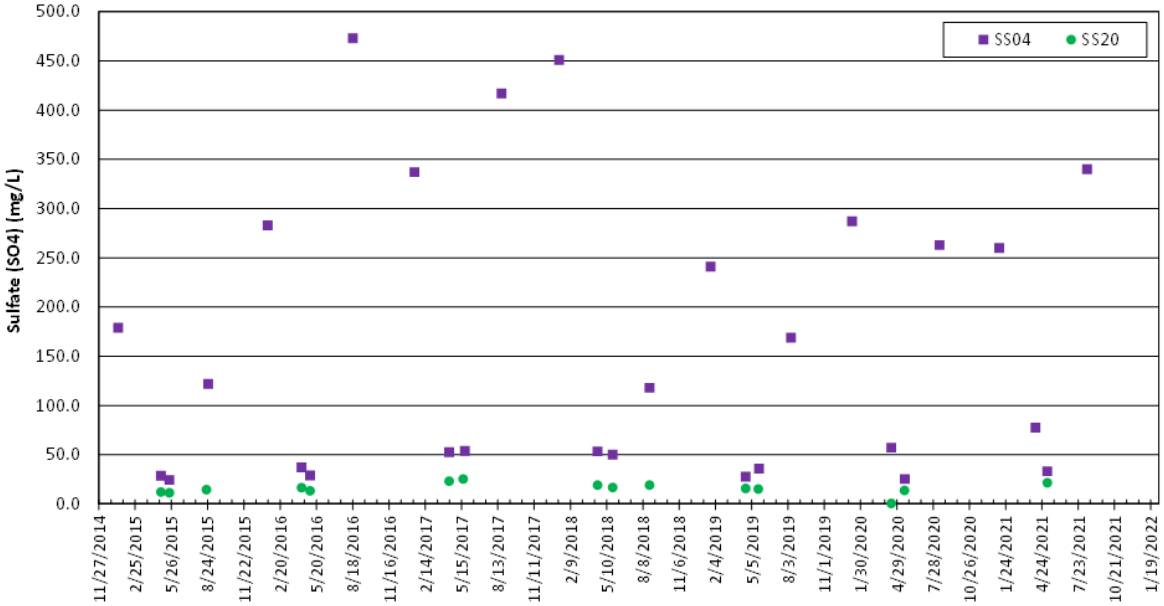
4/24/2021
7/23/2021
10/21/2021
1/19/2022


SS04
SS20
Sulfate (SO4) (mg/L)
500.0
450.0
400.0
350.0
300.0
250.0
200.0
150.0
100.0
50.0
0.0
11/27/2014
2/25/2015
5/26/2015
8/24/2015
11/22/2015
2/20/2016
5/20/2016
8/18/2016
11/16/2016
2/14/2017
5/15/2017
8/13/2017
11/11/2017
2/9/2018
5/10/2018
8/8/2018
11/6/2018
2/4/2019
5/5/2019
8/3/2019
11/1/2019
1/30/2020
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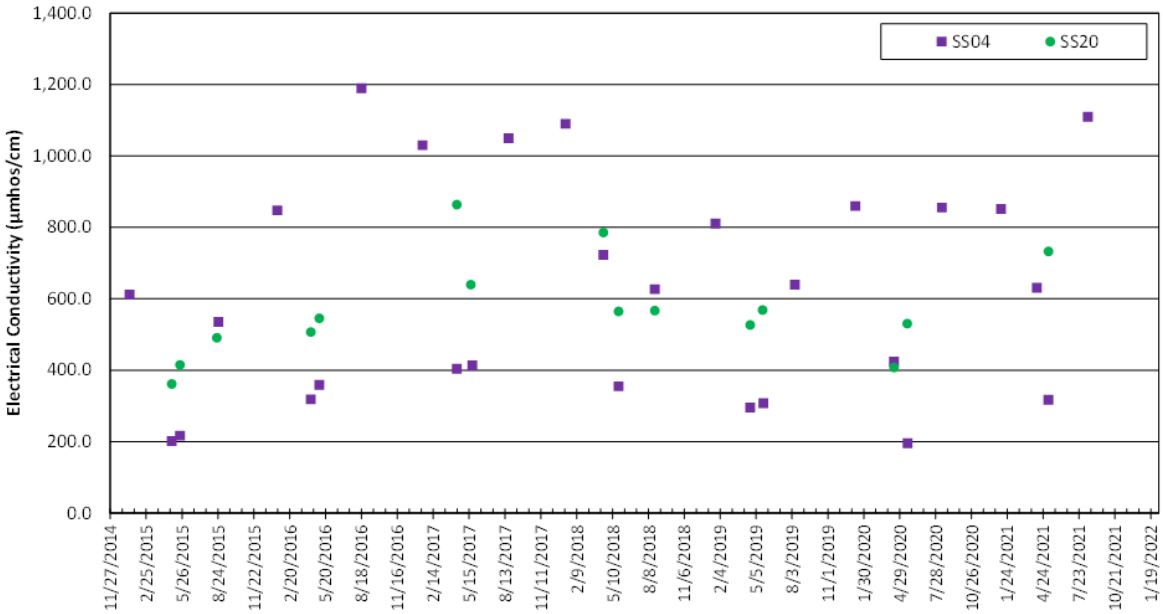
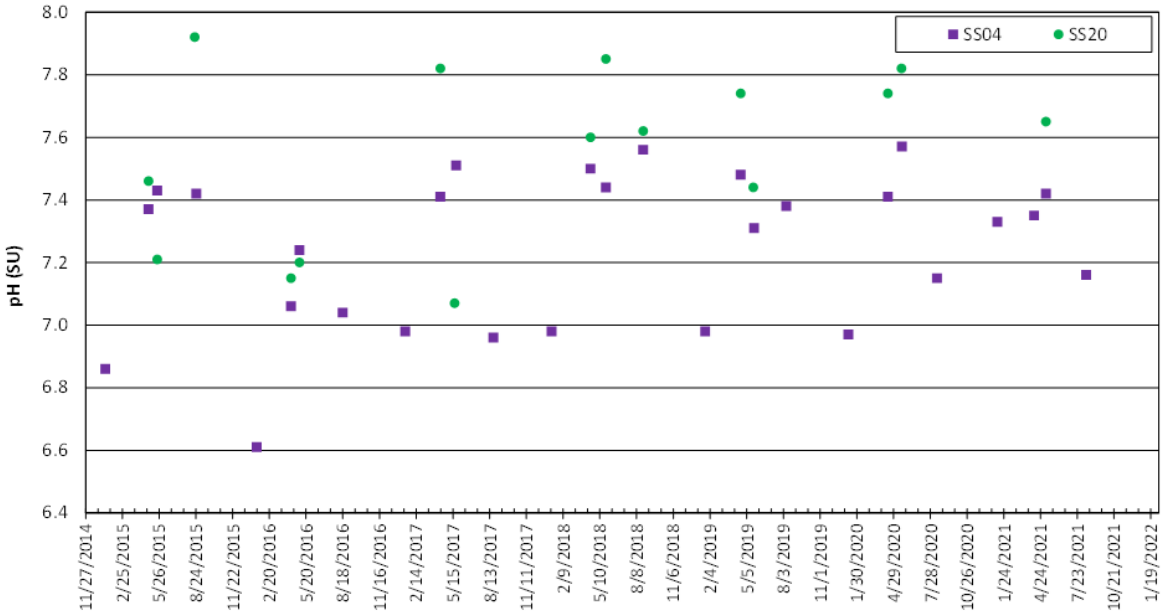
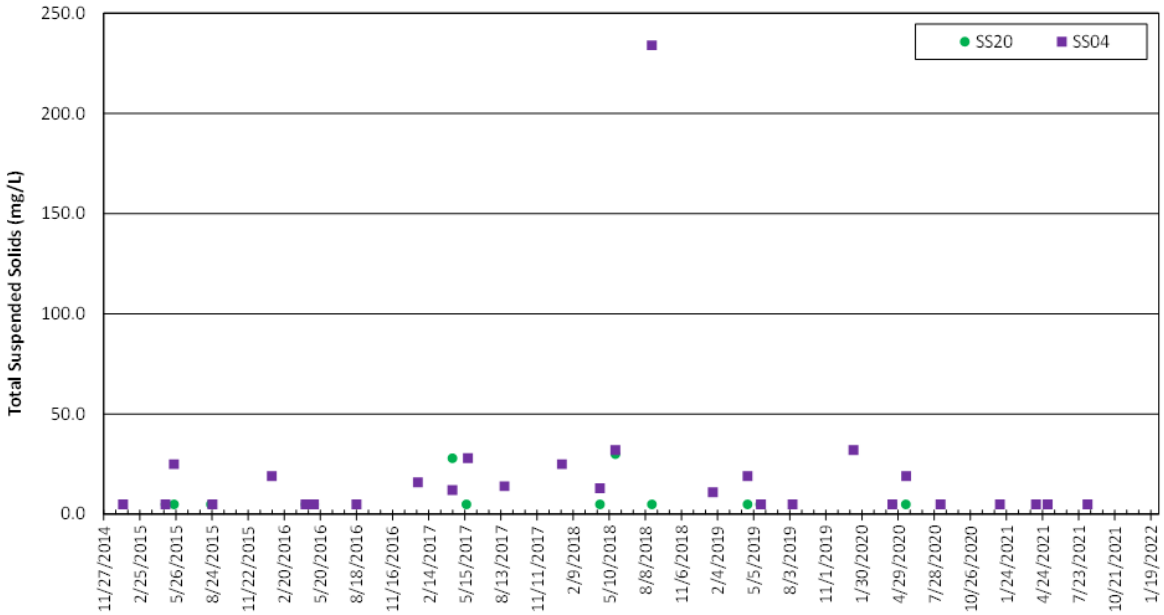
4/24/2021
7/23/2021
10/21/2021
1/19/2022

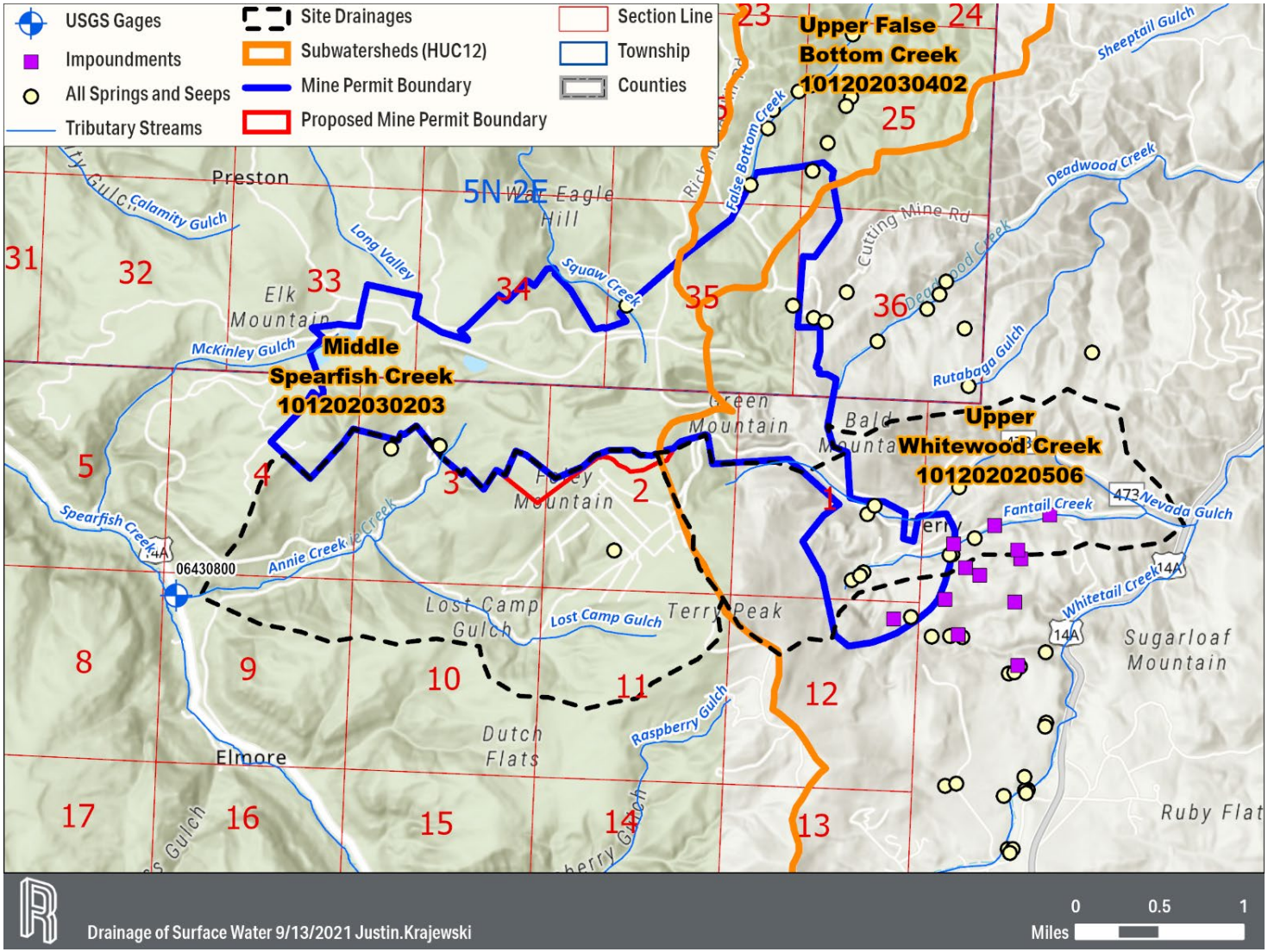

SS04
SS20
Electrical Conductivity (µmhos/cm)
1,400.0
1,200.0
1,000.0
800.0
600.0
400.0
200.0
0.0
11/27/2014
2/25/2015
5/26/2015
8/24/2015
11/22/2015
2/20/2016
5/20/2016
8/18/2016
11/16/2016
2/14/2017
5/15/2017
8/13/2017
11/11/2017
2/9/2018
5/10/2018
8/8/2018
11/6/2018
2/4/2019
5/5/2019
8/3/2019
11/1/2019
1/30/2020
4/29/2020
7/28/2020
10/26/2020
1/24/2021
4/24/2021
7/23/2021
10/21/2021
1/19/2022


SS04
SS20
pH (SU)
8.0
7.8
7.6
7.4
7.2
7.0
6.8
6.6
6.4
11/27/2014
2/25/2015
5/26/2015
8/24/2015
11/22/2015
2/20/2016
5/20/2016
8/18/2016
11/16/2016
2/14/2017
5/15/2017
8/13/2017
11/11/2017
2/9/2018
5/10/2018
8/8/2018
11/6/2018
2/4/2019
5/5/2019
8/3/2019
11/1/2019
1/30/2020
4/29/2020
7/28/2020
10/26/2020
1/24/2021
4/24/2021
7/23/2021
10/21/2021
1/19/2022


SS20
SS04
Total Suspended Solids (mg/L)
250.0
200.0
150.0
100.0
50.0
0.0
11/27/2014
2/25/2015
5/26/2015
8/24/2015
11/22/2015
2/20/2016
5/20/2016
8/18/2016
11/16/2016
2/14/2017
5/15/2017
8/13/2017
11/11/2017
2/9/2018
5/10/2018
8/8/2018
11/6/2018
2/4/2019
5/5/2019
8/3/2019
11/1/2019
1/30/2020
4/29/2020
7/28/2020
10/26/2020
1/24/2021
4/24/2021
7/23/2021
10/21/2021
1/19/2022

# APPENDIX G

## SURFACE WATER INVENTORY MAP


USGS Gages
Impoundments
All Springs and Seeps
Tributary Streams
Site Drainages
Subwatersheds (HUC12)
Mine Permit Boundary
Proposed Mine Permit Boundary
Section Line
Township
Counties
Upper False Bottom Creek 101202030402
Middle Spearfish Creek 101202030203
Upper Whitewood Creek 101202020506
5N 2E
Preston
War Eagle Hill
Elk Mountain
Green Mountain
Bald Mountain
Terry Peak
Sugarloaf Mountain
Dutch Flats
Elmore
Ruby Flat
Lost Camp Gulch
Calamity Gulch
Long Valley
Squaw Creek
McKinley Gulch
Spearfish Creek
Annie Creek
False Bottom Creek
Cutting Mine Rd
Deadwood Creek
Rutabaga Gulch
Fantail Creek
Nevada Gulch
Whitetail Creek
Raspberry Gulch
Sheeptail Gulch
06430800
14A
473
Drainage of Surface Water 9/13/2021 Justin.Krajewski
0
0.5
1
Miles

# APPENDIX H

## LOST CAMP SPRING SURVEY MEMORANDUM

# EXTERNAL MEMORANDUM

**To:** Amy Allen
Sr. Environmental Compliance Coordinator
Coeur Wharf
10928 Wharf Rd.
Lead, SD 57754

**cc:** Crystal Hocking, PE, PG, RESPEC
Project Central File M0025.21001

**From:** Nicholas Marnach, PE
Staff Engineer
RESPEC
P.O. Box 725
Rapid City, SD 57709

**Date:** June 8, 2022

**Subject:** Lost Camp Creek Spring Survey

A spring survey was completed on Lost Camp Creek on May 24 and 25, 2022, to identify and inventory springs and seeps upstream of the Lost Camp Creek surface-water sampling site. This project was completed by RESPEC Company, LLC (RESPEC) hydrologists for Coeur Wharf (Wharf) in support of permitting efforts for the proposed Boston Expansion and ongoing hydrologic site investigations. No springs or seeps are located within the proposed Boston Expansion Area.

As part of the Boston Expansion project, Wharf conducted a field inventory for springs along Lost Camp Creek in May 2021. The inventory involved searching for a source of water by walking up the Lost Camp Creek drainage from its confluence with Annie Creek to the Lost Camp Creek headwaters. In May 2021, the Lost Camp Creek headwaters spring was sampled while flowing, but the site has been dry since the initial sampling. The field inventory also identified a stormwater outfall from the Lost Camp Creek subdivision, which was contributing flow to the drainage but was not sampled because of uncertainty in its source. In May 2022, RESPEC conducted a spring survey to identify additional sources of flow within the drainage.

At the time of the survey, local streams and creeks had higher flow than observed in 2021, which was likely a result of spring melt and runoff from recent precipitation events. RESPEC observed localized saturated portions of the road surface leading to the Wharf Mine, which confirmed precipitation during the night of May 23. Weather during the spring survey was partly cloudy to sunny with a temperature ranging from 40 to 65 degrees Fahrenheit (°F). Light rain fell for approximately 30 minutes during the afternoon hours of May 24, and May 25 was partly cloudy to sunny.

3824 JET DRIVE
RAPID CITY, SD 57703
P.O. BOX 725 // RAPID CITY, SD 57709
605.394.6400

## METHODOLOGY

To identify springs and seeps in the Lost Camp Creek drainage, RESPEC traversed the entire creek length and conducted a visual investigation that involved recording streamflow measurements and collecting data with a multiparameter sonde. Recorded sonde data included temperature, dissolved oxygen, conductivity, and pH. RESPEC also recorded visual seeps or springs and incoming side flow channels into the channel being studied.

RESPEC attempted to maintain consistent stationing of cross-section locations through pacing, but physical streambed characteristics and channel morphology generally dictated the cross-section and measurement station location. RESPEC accessed the entire length of each contributing creek except for one area, approximately 500 feet (ft) along Lost Camp Creek, where the channel became inaccessible because of steep terrain and dense vegetation.

The headwater springs identified by Wharf in 2021 and observed during this study were the only springs where traditional streamflow measurements could be collected outside the main channel. All other springs and seeps observed were either too shallow, too narrow, or too disparate to collect flow measurements with a top-setting wading rod; therefore, flow measurements were collected directly within the Lost Camp Creek channel where the shallowest portion of the cross section possessed a depth greater than 0.2 ft.

Side seeps and springs along each reach were not sampled using the multiparameter sonde because they had shallow depths less than 0.5 inch. Greater depths from a spring or seep were caused by confinement and ponding, not a concentration of flow from the spring or seep; therefore, data collected with the sonde were restricted to within the main Lost Camp Creek channel.

RESPEC used a thermal imaging camera in the study. Results showed observable temperature differences when measuring the relative temperature of side seeps and springs compared to the main channel. RESPEC attempted to identify springs and seeps within the channel using the thermal camera, but the turbulent nature of the flow within the channel was not conducive to observing a gradual mixing of different temperatures. Spring and seep temperatures were cooler than the main channel, but RESPEC assumed that the temperature difference was not great enough to measure with the capabilities of the thermal camera. The colorimetric scale of the thermal camera is relative and temperature readings were found not to be precise in this application compared to sonde temperature measurements. On thermal images, red and yellow colors are relatively warmer temperatures and blue and purple colors represent relatively cooler temperatures.

## RESULTS

Twenty total potential spring or seep locations were identified along Lost Camp Creek during the May 2022 spring survey. Sites typically consisted of a single seep or spring, although a few locations consisted of two or more visibly separate springs or seeps. The springs and seeps identified along Lost Camp Creek are listed in Table 1 and shown in Figure 1. Flow measurements and physical data measurements within Lost Camp Creek are listed in Table 2. Representative photographs of springs and seeps along Lost Camp Creek are shown in Figures 2 through 11.

Table 1. Lost Camp Creek Springs and Seep Locations and Physical Data Measurements

| Spring I.D. | Description | Latitude | Longitude | Elevation (ft) | Temperature (°F) | Dissolved Oxygen (mg/L) | Specific Conductivity (µS/cm) | pH |
|---|---|---|---|---|---|---|---|---|
| S-1 | Spring | 44.33238719 | 103.873252 | 5,480.2 | 39.9 | 11.46 | 155.4 | 8.09 |
| S-2 | Seep/spring | 44.33021711 | 103.8705156 | 5,532.3 | – | – | – | – |
| S-3 | Two seeps | 44.32893814 | 103.8683654 | 5,593.2 | – | – | – | – |
| S-4 | Seep | 44.32862722 | 103.8674344 | 5,607.9 | – | – | – | – |
| S-5 | Seep | 44.328562 | 103.8671931 | 5,622.2 | – | – | – | – |
| S-6 | Seep | 44.32814869 | 103.865536 | 5,636.2 | – | – | – | – |
| S-7 | Spring/seep | 44.32828892 | 103.8647688 | 5,629.3 | – | – | – | – |
| S-8 | Seep | 44.32741644 | 103.862188 | 5,688.2 | – | – | – | – |
| S-9 | Two seeps | 44.32672786 | 103.862188 | 5,726.7 | – | – | – | – |
| S-10 | Spring | 44.32654903 | 103.8603031 | 5,726.7 | – | – | – | – |
| S-11 | Seep | 44.32422664 | 103.8547772 | 5,851.5 | 41.8 | 10.23 | 57.1 | 7.41 |
| S-12 | Series of seeps and springs | 44.32548275 | 103.8530282 | 5,892.3 | 41.4 | 10.66 | 74.9 | 7.50 |
| S-13 | Series of seeps and springs | 44.32549886 | 103.8538909 | 5,913.2 | – | – | – | – |
| C-14 | Confluence | 44.32533247 | 103.8561044 | 5,811.7 | – | – | – | – |
| S-15 | Out welling/ old spring | 44.32611442 | 103.8567752 | 5,829.8 | – | – | – | – |
| S-16 | Spring | coordinate not obtained | | | – | – | – | – |
| S-17 | Spring/ out welling | 44.32732883 | 103.8560688 | 5,879.2 | 40.2 | 8.23 | 213.0 | 7.34 |
| S-18 | Spring/ out welling | 44.32793783 | 103.8556806 | 5,882.3 | 40.2 | 8.27 | 214.7 | 7.00 |
| S-19 | Seep | 44.32834425 | 103.8549457 | 5,917.2 | 41.7 | 9.77 | 227.7 | 7.29 |
| S-20 | Spring | 44.33018117 | 103.8515424 | 6,024.5 | 40.8 | 9.06 | 226.8 | 6.84 |
| S-21 | Stream headwater/ spring | 44.33220436 | 103.8473905 | 6,231.5 | 39.7 | 10.70 | 231.8 | 8.15 |

µS/cm = microsiemens per centimeter

mg/L = milligrams per liter

RESPEC walked from the Lost Camp Creek downstream confluence with Annie Creek upstream to its confluence with the eastern tributary of Lost Camp Creek at C-14 shown in Figure 1 on May 24, 2022. On May 25, the upper branch of Lost Camp Creek was inspected from its headwater at S-21 (Figure 1) downstream to C-14. An approximate 500-ft length of stream between spring S-7 and cross-section

measurement station M-6 was inaccessible because of heavy vegetation and steep terrain during the time of the survey.

Figures 2 through 8 show seeps/springs S-2, S-3, S-5, S-6, and S-7. Thermal imaging of side seep/spring S-2 is shown in Figure 3 and was taken from the same frame of seep/spring S-2 shown in Figure 2. Inspection of the thermal gradient shown in Figure 2 yields a discrete temperature difference between the seep/spring and the adjacent Lost Camp Creek.

Table 2. Lost Camp Creek Cross-Section Streamflow and Physical Data Measurements

| Stream Cross-Section ID | Latitude | Longitude | Elevation (ft) | Streamflow (cfs) | Temperature (°F) | Dissolved Oxygen (mg/L) | Specific Conductivity (µS/cm) | pH |
|---|---|---|---|---|---|---|---|---|
| M-1 | 44.33245917 | 103.8733672 | 5,503.3 | 4.06 | 39.0 | 11.6 | 271.3 | 8.57 |
| M-2 | 44.33156325 | 103.8722928 | 5,515.3 | 1.51 | 41.4 | 11.3 | 154.5 | 8.06 |
| M-3 | 44.33036347 | 103.8708574 | 5,556.0 | 1.35 | 42.4 | 11.1 | 153.0 | 8.08 |
| M-4 | 44.32922417 | 103.8689321 | 5,566.0 | 1.83 | 42.1 | 10.6 | 149.4 | 8.08 |
| M-5 | 44.32822747 | 103.8664294 | 5,634.6 | 1.83 | 42.7 | 10.4 | 146.5 | 8.07 |
| M-6 | 44.32741644 | 103.862188 | 5,688.2 | 2.24 | 42.0 | 10.6 | 144.8 | 7.95 |
| M-7 | 44.3251015 | 103.8580149 | 5,812.0 | 1.91 | 40.9 | 10.7 | 140.7 | 7.66 |
| M-8 | 44.33220436 | 103.8473905 | 6,231.5 | 0.38 | 39.7 | 10.7 | 231.8 | 8.15 |

cfs = cubic feet per second

Between cross-section measurement stations M-6 and M-7, spring S-10 was located on a small terrace approximately 20 ft above the Lost Camp Creek water surface. This spring produced a large marshy area on the terrace with several springs presented in an approximate 150-ft radius. Flow from spring S-10 concentrated on the unimproved road surface adjacent to Lost Camp Creek where it picked up sediment from the road and flowed into the creek at the road crossing. No active traffic was observed at the time of the survey, but the road appears to be used and the clearing above spring S-10 has been disturbed by all-terrain vehicles (ATVs); runoff from such ATV disturbance is finding its way down the ruts created by vehicles.

Several tributaries and springs are present in the clearing at the end of False Bottom Road as identified by S-12 and S-13, which concentrate at the confluence at C-14. As shown in Figure 1, east of the confluence at C-14, an additional tributary at the south side of the clearing located at the end of False Bottom Road flows into Lost Camp Creek from S-11 approximately 300 ft downstream of the confluence at C-14. An effort was made to trace the tributary running upstream of S-11 but was abandoned because of lack of flow.

Streamflow became subterranean several hundred feet downstream of the headwater spring at S-21 and did not return to the surface until S-20 (see Figure 11). From S-20 downstream to C-14, flow measurements were unreliable because of channel conditions (e.g. cobles, braided flow channels with depths less than 0.2 ft, and ponded locations). Traditional runs were minimal; therefore, only sonde data were collected.

Table 2 presents the cross-section streamflow and physical data measurements collected along the length of Lost Camp Creek. The cross-section measurement stations M-1 through M-8 numerically increase from downstream to upstream. Cross-section measurement station M-1 was recorded downstream of the confluence to Annie Creek and includes streamflow from Annie Creek and Lost Camp Creek. Streamflow rates generally increase when traveling upstream from cross-section measurement stations M-2 to M-8, except for M-6. Flow from spring S-10 is likely being realized in the streamflow measurement at cross-section measurement station M-6; however, a greater degree of inaccuracy is likely to result when comparing small stream flow values.

## DISCUSSION

Twenty potential spring or seep locations were identified along Lost Camp Creek during the May 2022 spring survey. Sites consisted of single or multiple seeps that often formed shallow marshy areas, which made measuring individual spring flow challenging during this initial survey. Based on RESPEC's understanding of the local surface-water hydrology, most of these springs and seeps are likely to be intermittent; springs are more likely to be dry during late summer and fall and more significant following precipitation events.

CMH:akm


Figure 1. Lost Camp Creek – Springs, Seeps, and Measurement Cross Sections.


**Figure 2.** Side Seep/Spring S-2 Along Lost Camp Creek.

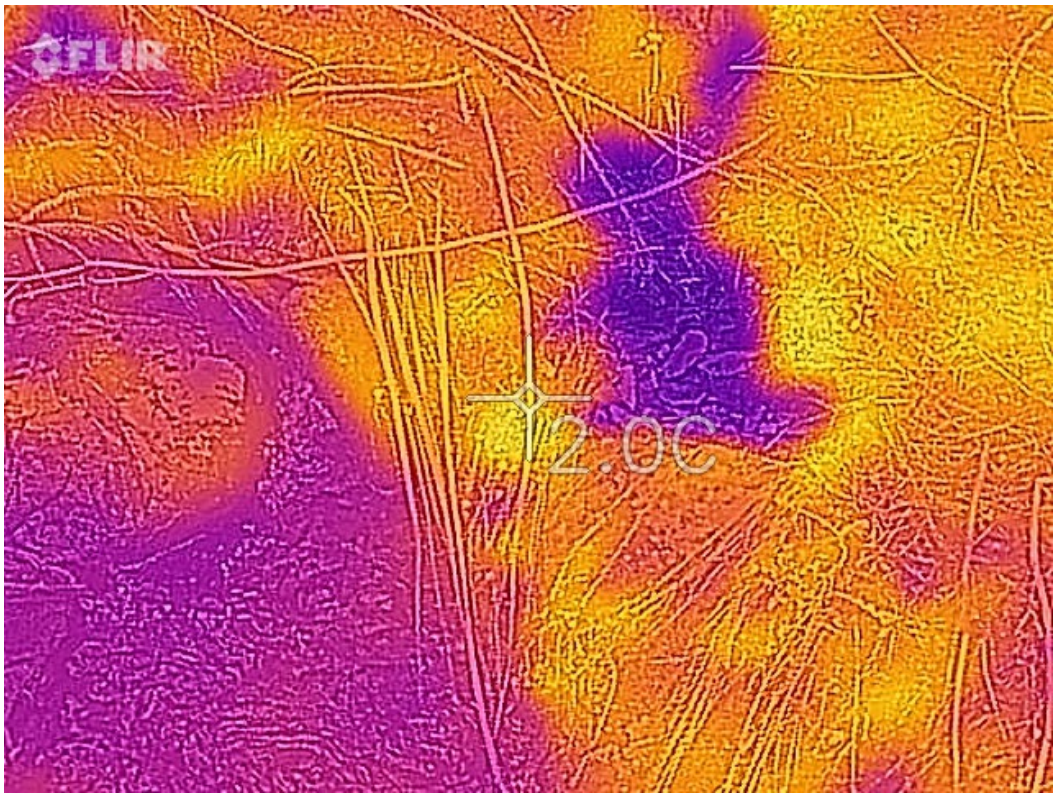



**Figure 3.** Thermal Imagery of Side Seep/Spring S-2 Along Lost Camp Creek.


**Figure 4.** Two Side Seeps at S-3 Along Lost Camp Creek.


**Figure 5.** Side Seep S-5 Along Lost Camp Creek.


Figure 6. Side Seep/Spring S-6 Looking Downstream Toward Lost Camp Creek.

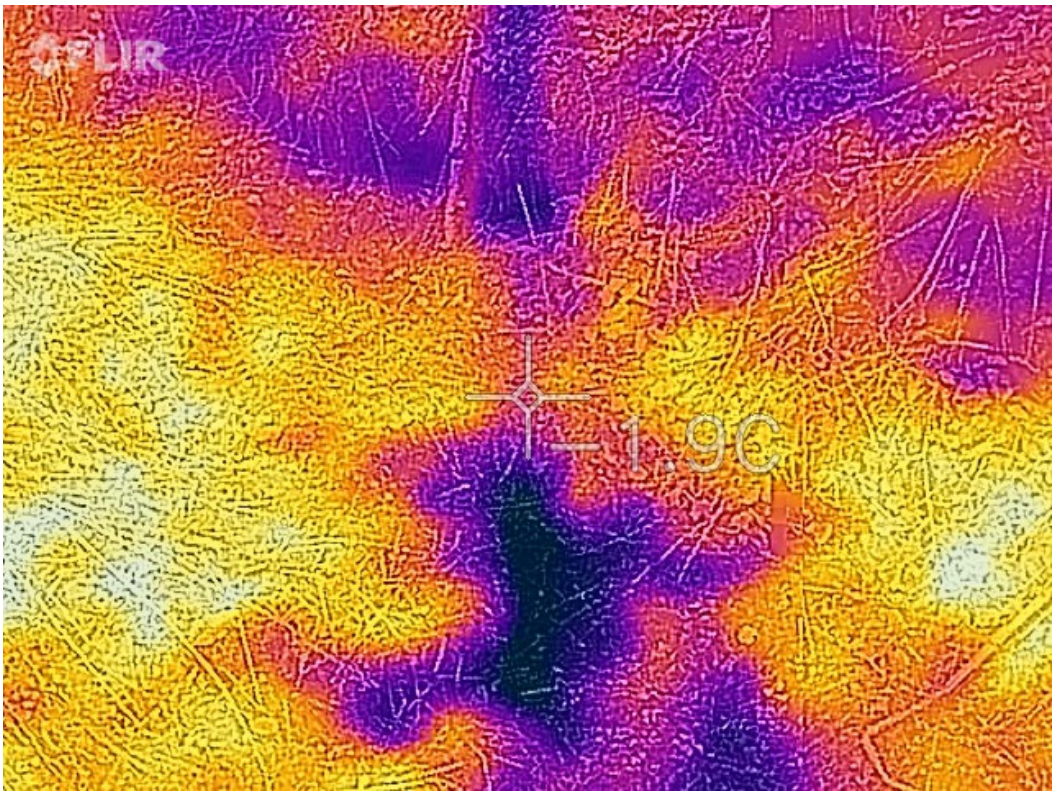



Figure 7. Thermal Imagery of Side Seep/Spring S-6 Along Lost Camp Creek.


**Figure 8.** Side Seep/Spring S-7 50 Feet to the North of Lost Camp Creek.


**Figure 9.** Spring S-15.


Figure 10. Spring S-18.


Figure 11. Spring S-20.