Surface Water Quality Baseline Study

Stibnite Gold Project
Midas Gold Idaho, Inc.

Lower Meadow Creek at surface water quality station YP-T-22, looking west and upstream (June 2012)

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SECTION 1: INTRODUCTION

1.1 Purpose of Study

The purpose of the surface water quality baseline study is to characterize existing conditions prior to the start of proposed mining operations at the Stibnite Gold Project in central Idaho. The study describes the surface water quality resources in the project study area. This study will be used to support the U.S. Forest Service (USFS) environmental impact statement (EIS) on future exploration and mining projects.

1.2 Background

Figure 1-1 shows the location of the Stibnite Gold Project. The project is located in the Stibnite-Yellow Pine Mining District in central Idaho, near the village of Yellow Pine. Located in Valley County, the district is characterized by historic mining activities and unpatented (federal land) and patented (private land) mineral claims containing deposits of gold, silver, tungsten, and antimony. The Stibnite-Yellow Pine Mining District is in the Boise National Forest (BOI), but administered by the Krassel Ranger District of the Payette National Forest (PAF).

Mining began in the district in the late 1800s and continued on and off through 1997. Beginning in 2009, Midas Gold, Inc. (MGII), a subsidiary of Midas Gold Corporation, began to acquire mining claims throughout the district from prior owners or by staking claims on its own behalf. With federal and state approval, MGII initiated mineral exploration activities in 2009 as part of the Stibnite Gold Project to better define the mineral deposit potential for the area. This work included using the existing road network and construction of several temporary roads to access drill sites, build drill pads, drill on both National Forest System (NFS) and private lands, and access disturbed areas for reclamation when exploration work ends.

The PAF Krassel Ranger District has jurisdictional authority over surface disturbance associated with mining and exploration activities on NFS land in the Stibnite-Yellow Pine District. The Payette Lakes Supervisory Area of the Idaho Department of Lands (IDL) has jurisdictional authority over exploration and mining-related activities on private lands within its administrative area (Idaho Administrative Procedure Act [IDAPA] 20.03.02).

In addition to the mining activities occurring in the Stibnite-Yellow Pine Mining District, future mine plans may include proposed access roads that provide transportation routes to and from the project. Proposed access roads would be on land located in the BOI and administered by the Cascade Ranger District as well as PAF land administered by the Krassel Ranger District.

1.2.1 Project Area Description

The project area is the general Stibnite-Yellow Pine Mining District and includes exploration areas and proposed mining areas. The study area is illustrated in **Figure 1-2** and **Figure 1-2**, is specific to the area where the surface water resources baseline study was conducted and is within the areas of exploration and proposed mining activities. The study area is further defined in Section 2. The terrain within the project area consists of narrow valleys surrounded by steep mountains. Elevations along valley floors range from 6,000 to 6,600 feet above mean sea level (msl). The surrounding mountains reach elevations over 8,500 feet above msl. The main drainage basin in the project area is the East Fork of the South Fork of the Salmon River (EFSFSR).

The EFSFSR joins Johnson Creek 16 miles downstream near Yellow Pine. The project area is encompassed by the watersheds of tributaries of the EFSFSR, including Sugar Creek, Meadow Creek, Johnson Creek, Riordan Creek, Burntlog Creek, and Trout Creek. The project area includes Cabin Creek and Warm Lake Creek which are tributary streams to the South Fork of the Salmon River. The primary uses or activities in the area have been mineral exploration, mining, logging, and dispersed recreation.

During non-winter conditions (roads clear of snow), the project site can be accessed from the City of Cascade by traveling northeast on Warm Lake Road (Forest Service road 579 [FS 579]/ Forest Highway 22 [FH 22]) for about 37 miles to Landmark, then north on Johnson Creek Road (FS 413) for 28 miles to Yellow Pine, and 14 miles east on Stibnite Road (FS 412) (**Figure 1-1**). The site can also be accessed from McCall during non-winter conditions by traveling east on Lick Creek Road (FS 412) for 33 miles to East Fork Road (FS 412), then 16 miles to Yellow Pine, and 14 miles on Stibnite Road (FS 412).

During winter, the site can be accessed only from Cascade by traveling 24 miles northeast on Warm Lake Road to the intersection with South Fork Road (FS 474/674), then north on South Fork Road for 32 miles to East Fork Road, 16 miles east on East Fork Road to Yellow Pine, and 14 miles on Stibnite Road.

1.3 Organization of Report

This report is organized as follows:

- Section 1 explains the purpose of the baseline study and provides background information on the project area and surrounding areas.
- Section 2 provides an overview of the surface water quality resources study area.
- Section 3 briefly reviews relevant previous studies; defines the applicable regulatory environment; summarizes the methodology used to characterize the existing surface water quality resources; and describes the data reduction and analysis procedures.
- Section 4 discusses the surface water quality resources of the potentially affected environment.
- Section 5 contains references and abbreviations and acronyms.
- Section 6 includes the list of preparers.

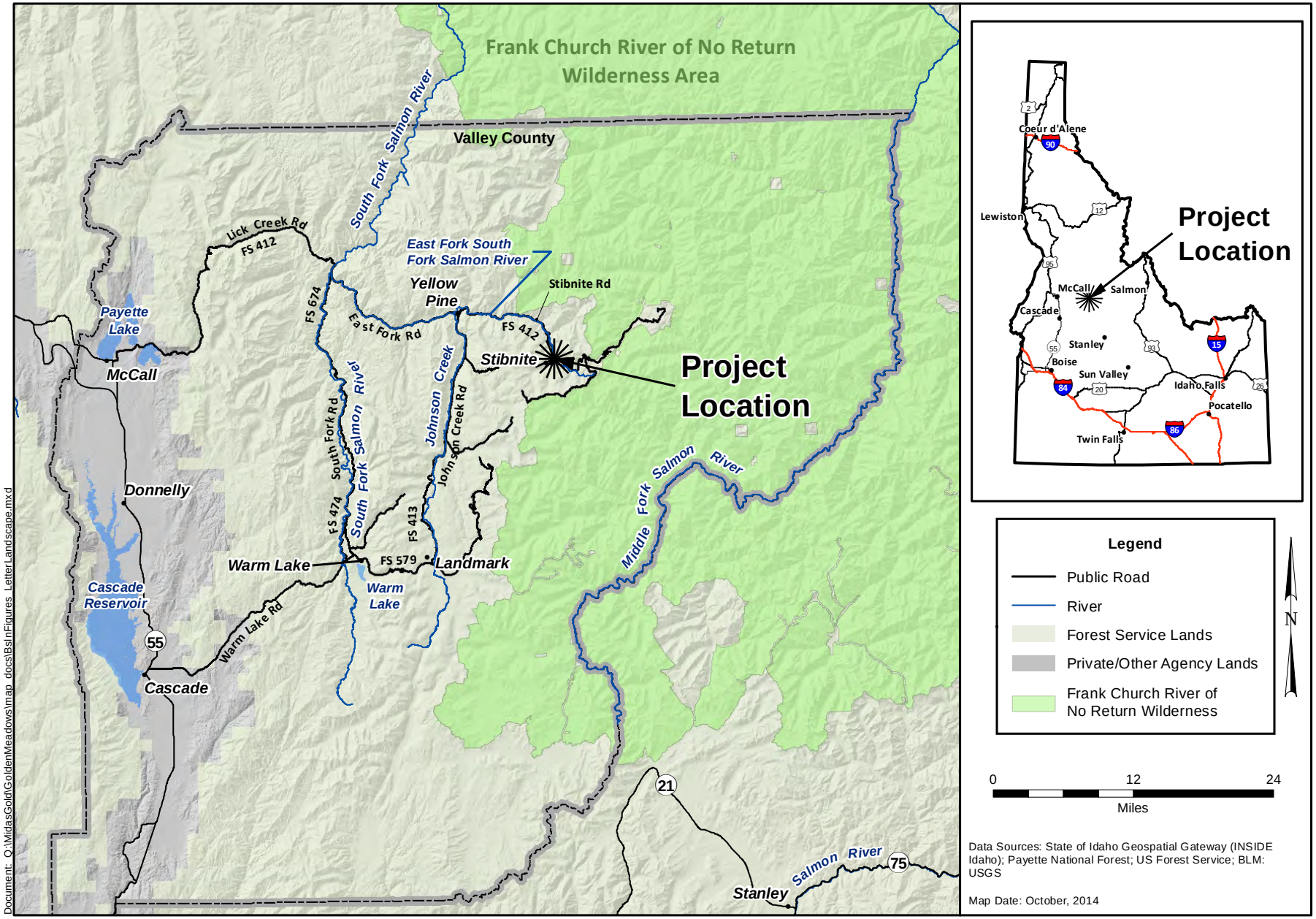

Figure 1-1
Vicinity Map
Stibnite Gold Project

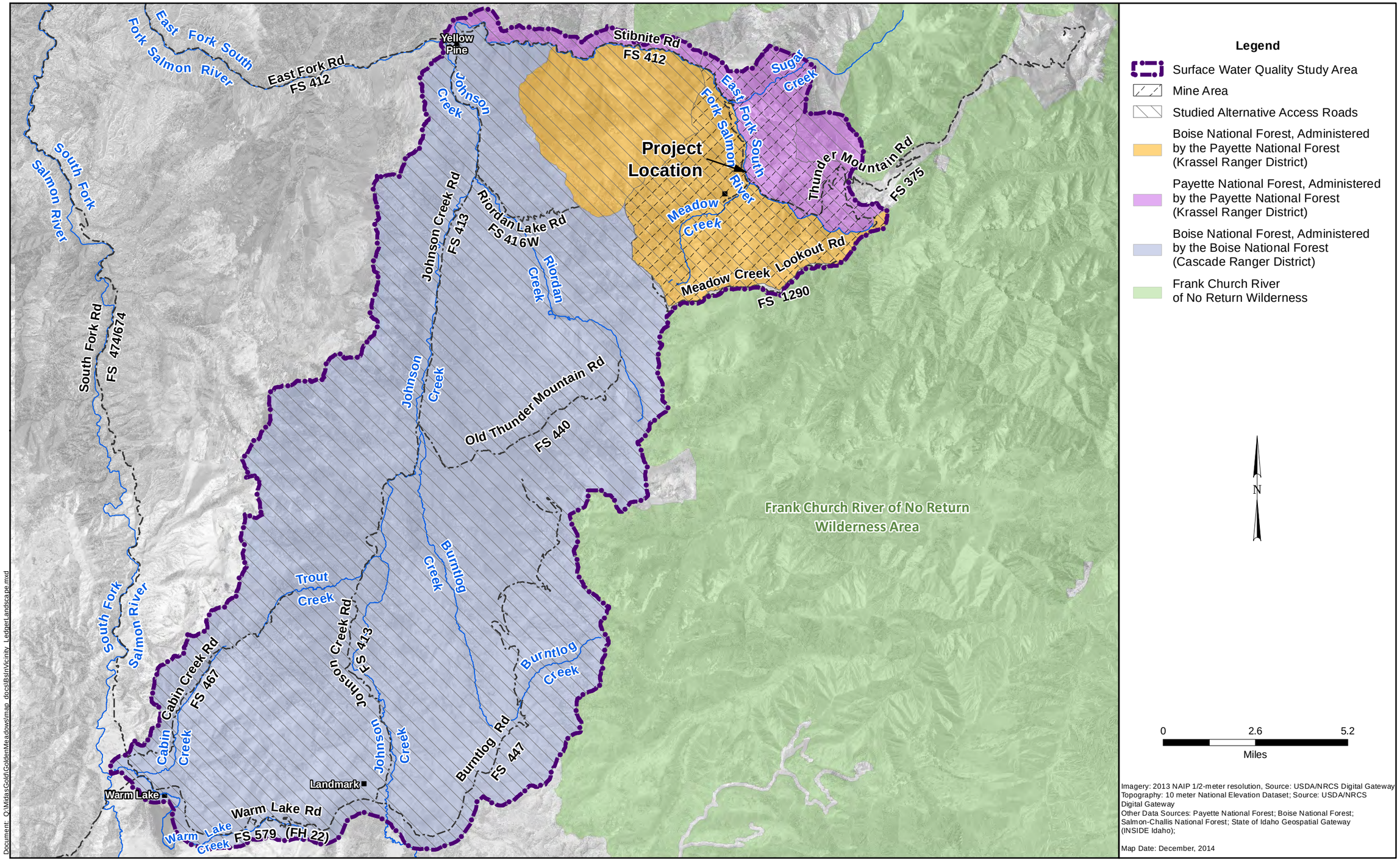

Figure 1-2
Surface Water Quality Study Area Map
Stibnite Gold Project

SECTION 2: RESOURCE STUDY AREA

2.1 Description of Study Area

The surface water quality resources study area encompasses two parts: the area of MGII's current exploration and potential future mine operation (the mine area), and the area of the studied alternative access routes, where proposed access roads to the facility could be modified or constructed (**Figure 1-2**).

The study area is bounded generally on the north from Yellow Pine to the end of Thunder Mountain Road (including the EFSFSR, Stibnite Road and Sugar Creek), on the east by the Frank Church River of No Return Wilderness Area, on the south by Warm Lake Road, and on the west by the ridgeline above Cabin Creek Road (FS 467) and north along the ridgeline directly above the west side of Johnson Creek Road to Yellow Pine (**Figure 1-2)**.

2.1.1 Mine Area

The mine area comprises the main zones of mineralization; current exploration operations and associated infrastructure such as equipment laydown and maintenance areas and camp facilities; and potential future mine operation and associated infrastructure such as potential camp, tailings impoundment, and processing facilities. This area was also the primary area of past Stibnite-Yellow Pine District mining activities and therefore contains legacy mining features such as pits, buildings, and tailings and wasterock repositories. **Figure 2-1** shows the streams, watersheds, and legacy and potential future mining activities in the mine area.

In the mine area, surface water quality resources were characterized by conducting a water quality monitoring and sampling program (described in Section 3.3). As the area affected by legacy mining impacts and proposed for future mine operation, this area was targeted for water quality sampling because there is greater potential for future impacts to surface water quality resources in this area (U.S. Environmental Protection Agency [USEPA], *EPA and Hardrock Mining: A Source Book for Industry in the Northwest and Alaska*, 2003a).

The designated beneficial uses and impairment status of water bodies within this portion of the study area are shown in **Table 2-1**. The streams identified in this portion of the study area are within the South Fork of the Salmon River Subbasin. Identifying the specific regulatory status associated with each watershed is informative to designing a baseline study that produces data appropriate for the study objectives; the regulatory environment is further discussed in Section 3.4.

Table 2-1. Designated Beneficial Uses and Impairment Status of Area Streams

NHD Water body[1]	NHD Hydrographic Category	Hydrologic Unit Code - 12 Digit	Designated Beneficial Uses[2]	IDEQ Status[2]	Cause of Impairment[2]	IDEQ Category[2]
Fern Creek	Perennial	170602080201	COLD, DWS, PCR, SS	Not Supporting	Arsenic	303D Listed
East Fork South Fork Salmon River	Perennial	170602080201	COLD, DWS, PCR, SS	Not Supporting	Antimony, Arsenic, Combined Biota/Habitat Bioassessments	303D Listed
Unnamed Tributary to EFSFSR (Rabbit Creek)	Perennial	170602080201	COLD, DWS, PCR, SS	Not Supporting	Arsenic	303D Listed
Meadow Creek	Perennial	170602080201	COLD, DWS, PCR, SS	Not Supporting	Arsenic	303D Listed
Garnet Creek	Perennial	170602080201	COLD, DWS, PCR, SS	Not Supporting	Arsenic	303D Listed
Fiddle Creek	Perennial	170602080201	COLD, DWS, PCR, SS	Not Supporting	Arsenic	303D Listed
Midnight Creek	Perennial	170602080201	COLD, DWS, PCR, SS	Not Supporting	Arsenic	303D Listed
Unnamed Tributary to EFSFSR (Hennessy Creek)	Perennial	170602080201	COLD, DWS, PCR, SS	Not Supporting	Arsenic	303D Listed
West End Creek	Perennial	170602080202	COLD, PCR, SS	Fully Supporting	--	--
Sugar Creek	Perennial	170602080202	COLD, PCR, SS, SCR	Not Supporting	Antimony, Arsenic, Mercury	303D Listed
Salt Creek	Perennial	170602080206	COLD, DWS, PCR, SS	Fully Supporting	--	--

[1]National Hydrography Dataset [NHD] Water body Proper Name. Parenthized names are unofficial but locally common names included for clarity.

[2]Status and causes from 2012 Integrated Report (Idaho Department of Environmental Quality 2014)

COLD = cold water communities; SS = salmonid spawning; PCR = primary contact recreation; DWS = drinking water supply; SCR = secondary contact recreation

2.1.2 Alternative Access Routes

Alternative access routes were identified in the *Transportation Baseline Study* (HDR 2017b). These are roads that could potentially be modified and/or constructed to provide access to the mine area for potential future mine operation. PAF completed environmental assessments (EAs) for actions that include forest road improvement and construction (USFS 2009a, 2009b). They primarily used Idaho Department of Environmental Quality (IDEQ) water body assessment data (IDEQ 2002) to characterize water quality resources affected by these actions.

HDR took a similar approach as PAF in characterizing potential water quality impacts from alternative access routes. A combination of publicly available GIS data, IDEQ data, and data generated from the *Wetlands Resources Baseline Study* and addenda (HDR 2013a, 2014b, 2014c, 2015b, 2016) were used to evaluate impacts. Surface water samples were not collected at any of

the alternative access route stream crossing locations. The characterization includes stream type, designated beneficial uses, impairment status, approximate size of the channel, channel slope, and other relevant information as available. This characterization is presented in Section 4.2.

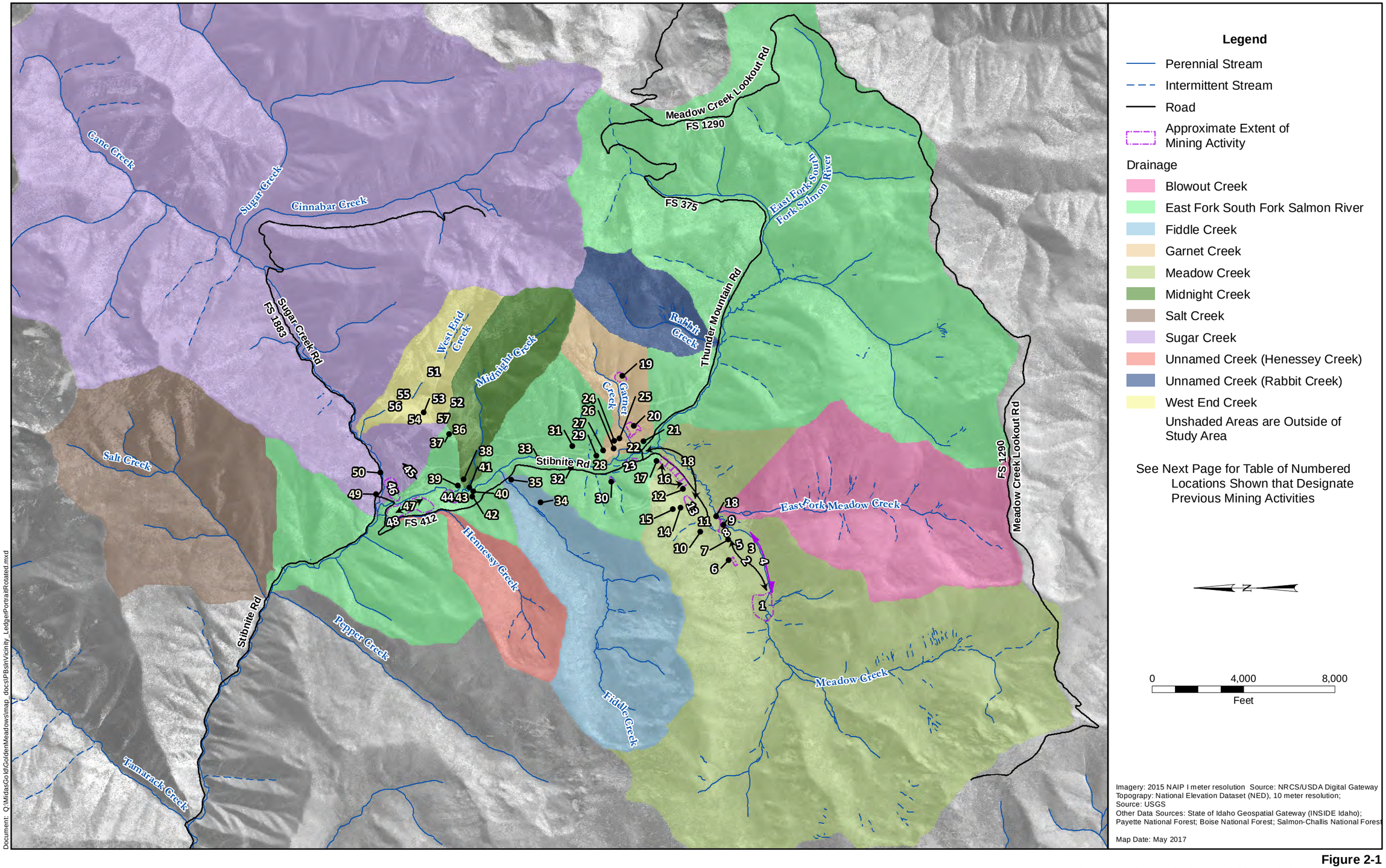

Figure 2-1
Drainage Basins and Mine Activities Within the Mine Area
Stibnite Gold Project

Number	Past Mine Activities	Number	Past Mine Activities
1	Former Extent of Meadow Creek Mine	39	BMC Bailey Tunnel Portal
2	Spent Ore Disposal Area (SODA)	40	BMC Monday Camp
3	Seep Area	41	Cinnabar Tunnel Drainage
4	Former Meadow Creek Diversion	42	Monday Tunnel Drainage
5	Smelter Flats Removal Action Tailings Repository	43	BMC Monday Camp Waste Rock Dump
6	Petroleum Contaminated Soil Land farm	44	BMC Yellow Pine Pit
7	Former USFS Reclamation Contractor Fuel Storage Site	45	Hecla Homestake Pit
8	Keyway	46	BMC Northeast Bradley Waste Rock Dump
9	Keyway Marsh	47	BMC Northwest Bradley Waste Rock Dump
10	Former Smelter Stack Location	48	USFS Tailings Repository
11	Former Mill and Smelter	49	Former Sugar Creek Power Plant
12	Hecla Former Processing Facilities	50	BMC Bailey Tunnel Outlet
13	Hecla Heap Leach	**West End Pits and Dumps**	
14	Meadow Creek Mill Waste Rock	51	SMI Upper West End Dump
15	Meadow Creek Mine	52	SMI West End Extension Pit
16	Superior Former Leach Pads	53	SMI West End Pit
17	Superior Former Processing Facility	54	SMI "D" Dump
18	Bradley Tailings	55	SMI Northeast Pit
19	SMI Garnet Creek Pit	56	SMI Lower West End Dump
20	SMI Stibnite Landfill and ANFO Storage Area	57	SMI Splay Pit
21	BMC Approximate Location of Former Stibnite Recreation Hall		
22	BMC Approximate Location of Former Stibnite Service Station		
23	Mineralized Waste Rock Spoil Pile		
24	SMI Former Petroleum AST Location		
25	SMI Former Shop Area		
26	Hecla Former Equipment Staging Area		
27	SMI Former Crushing Site		
28	Hecla Former Secondary Camp		
29	SMI Hooterville (former camp)		
30	DMEA Adit and Mine Dump		
31	Superior Former Pilot Plant		
32	BMC Former Sawmill Site		
33	SMI Former Primary Camp		
34	Adit and Dump Location		
35	SMI Former North Man Camp		
36	SMI Midnight Pit		
37	SMI Southwest Extension Pit		
38	BMC Southeast Bradley Waste Rock Dump		

ANFO = ammonium nitrate/fuel oil; AST = aboveground storage tank; BMC= Bradley Mining Company; SMI = Stibnite Mine, Inc. [includes previous pit and waste dumps generated by Superior and Pioneer], DMEA = Defense Minerals Exploration Administration; USFS = U.S. Forest Service

SECTION 3: SURFACE WATER QUALITY STUDY METHODOLOGY

This section briefly describes the major findings of previous surface water quality studies in the study area. It also summarizes the surface water quality field investigation conducted as part of the baseline study. Finally, it defines the procedures for data reduction and the statistical methods used to analyze data.

3.1 Literature Review

Surface water quality monitoring has occurred in the district since the late 1970s; these monitoring efforts have resulted in numerous surface water quality reports and summaries. Compilation and review of existing background information served as the starting point for this baseline study, and key existing documents are briefly summarized in this section. For a more extensive annotated bibliography, see the *Surface Water Quality Baseline Study Work Plan* (HDR 2012b) in **Appendix A**.

- The *Draft Environmental Impact Statement Stibnite Mine Expansion Project* (USFS 1994) documents existing conditions and analyzes the affected environment relating to a proposed mine expansion by Stibnite Mine, Inc.
- The *Final Water Quality Status Report* (Idaho Department of Environmental Quality [IDEQ] 1996) summarizes water quality impacts from historical mining activities.
- The *Stibnite Area Site Characterization Report* (URS Corporation [URS] 2000), comprehensively reviews the historical impacts of mining activities as well as documenting changes in water quality from remedial actions onsite from 1996 through 1998 and general site characteristics.
- *Phase II Environmental Site Assessment* (Millennium Science and Engineering, Inc. [MSE] 2011b) evaluates recognized environmental conditions onsite, including the results of onsite water quality monitoring from 2009 through 2011.

Surface water quality data exist that predate MGII's involvement in the property and provide useful information regarding changes in water quality over time in the study area. However, these data have a variety of shortcomings that reduce its usefulness as baseline data. For example, shifting method detection and reporting limits over time, insufficient documentation of sampling procedures, lack of quality control data, and dynamic site conditions limit the usefulness of these data for establishing a baseline consistent with protocol (USEPA 2003a). Therefore, HDR developed a new sampling program as described in Section 3.3 to collect high quality baseline data to support National Environmental Policy Act (NEPA) activities and permitting associated with the Stibnite Gold Project.

3.2 Regulatory Environment

The baseline surface water quality data will be used to support NEPA activities and environmental permitting, and to provide a baseline against which to evaluate potential future impacts of mine construction, operation, and closure. Multiple resource and regulatory agencies will be part of these activities and enforce regulations relevant to surface water quality. Pertinent

rules and regulations and the roles of involved agencies are described below and summarized in **Table 3-1**.

NEPA, signed in 1969 and enacted in 1970, requires federal agencies to describe and analyze the potential environmental effects of proposed federal actions, including permit issuance. NEPA activities include preparing EAs and EISs and soliciting public input on these documents (USEPA 2003a). USFS manages federal lands in the study area and enforces requirements of NEPA therein. Therefore, USFS will lead the preparation of the EIS, which will use data produced by the baseline studies.

The Clean Water Act (CWA) was enacted in 1972 to regulate surface water quality and the discharge of pollutants into waters of the U.S.; it is enforced by USEPA. Under Section 303(c) of the CWA, states are required to establish water quality standards. Water quality standards comprise three parts:

- **Designated uses** describe the assigned uses of a given water body that must be protected.
- **Water quality criteria** establish constituent levels that are sufficient to protect the designated uses of the water body; criteria may be narrative or numeric. When multiple criteria apply, water must meet the most stringent criteria.
- **Anti-degradation** requires that existing uses are maintained and protected; water quality is maintained and protected unless social or economic reasons are compelling and alternatives are not available; and Outstanding Resource Waters cannot be degraded. (USEPA 2003a).

Pursuant to the CWA, IDEQ sets water quality standards for Idaho and monitors compliance with these standards. Section 303(d) of the CWA further requires states to identify and rank by priority waters that do not meet applicable water quality standards. States then must develop a total maximum daily load (TMDL) to determine the maximum amount of a pollutant allowed in a water, and allocate that total amount between its sources such that the water meets applicable water quality standards.

USEPA enforces the CWA nationwide, and issues National Pollutant Discharge Elimination System (NPDES, CWA Section 202) permits in some states. In Idaho, IDEQ is the primary regulatory agency issuing NPDES permits. The U.S. Army Corps of Engineers (USACE) oversees and issues permits associated with CWA Section 404, which regulates dredging or filling activities associated with waters of the U.S. Under CWA Section 401, IDEQ must grant, waive or deny state certification of federal permits that may result in a discharge to state waters prior to their issuance; this process is known as Section 401 certification.

In addition, the U.S. Fish and Wildlife Service (USFWS) and the National Marine Fisheries Service (NMFS) are indirectly involved because they enforce the Endangered Species Act and surface water quality affects the habitat quality of some endangered species. However, these endangered species and pertinent regulations are primarily discussed in the baseline study prepared for this project for aquatic resources (MWH 2017).

Table 3-1. Regulatory Agencies and Roles

Agency	Role pertaining to Stibnite Gold Project
USFS	Lead agency for site EIS preparation and mine permitting (part of NEPA)
IDEQ	Sets water quality standards for Idaho (CWA Section 303) and monitors compliance; develops TMDLs (CWA Section 303(d)); CWA Section 401 certification
USEPA	Enforces the CWA and issues CWA Section 202 (NPDES) permits in Idaho
USACE	Issues and oversees CWA Section 404 (dredge and fill) permits
USFWS	Enforces the Endangered Species Act
NMFS	Enforces the Endangered Species Act

3.3 Field Investigation

HDR developed the *Surface Water Quality Baseline Study Work Plan* (Work Plan, HDR 2012b) to define the objectives and approach of the study. HDR also developed the QAPP-SWQSP (HDR 2012a) to specifically define the data type, quantity, and quality needed to meet the study objectives, and to establish field investigation procedures and protocols to collect this data. These documents have undergone several iterations of development, review, and revision, as described below:

- Work Plan (HDR 2012b) and QAPP-SWQSP (HDR 2012a) submitted to USFS, USEPA and IDEQ for review and comment in early 2012
- Monthly sampling commenced according to these plans in April 2012 and continued through July 2014. Sampling on a quarterly basis only commenced in August 2014 and continued through February 2016. This report represents the period of results from April 2012 through February 2016 although quarterly sampling is ongoing.
- Comments on Work Plan and QAPP-SWQSP from USFS, USEPA and IDEQ received in summer 2012
- Comment responses submitted to the agencies in fall 2012
- A joint meeting between USFS, USEPA, IDEQ, HDR and MGII held in early 2013 to discuss Work Plan and QAPP-SWQSP
- Additional comments on Work Plan and QAPP-SWQSP from IDEQ received in spring 2013
- Comment responses submitted to the agencies in spring 2013
- QAPP-SWQSP (HDR 2013b) revised and updated to incorporate comment responses in summer 2013
- QAPP-SWQSP (HDR 2014a) updated to reflect changes in sampling activities and submitted to USFS in early 2014
- QAPP-SWQSP (HDR 2015a) updated to reflect changes in sampling activities and submitted to USFS in early 2015
- QAPP-SWQSP (HDR 2017a) updated to reflect changes in sampling activities and submitted to USFS in 2016, revised in May 2017 to include Appendix L

The following sections briefly summarize the objectives, site locations, and sampling procedures for the baseline field investigation. These summaries are presented to facilitate understanding of

the baseline surface water quality data, but the reader should refer to the QAPP-SWQSP (HDR 2017a) in **Appendix B** for additional detail.

3.3.1 Baseline Study Objectives

The objective of the field investigation is to characterize existing surface water quality in the study area to support NEPA activities and environmental permitting. Specifically, the study objectives are as follows:

- Collect baseline data to provide defensible documentation of existing surface water quality conditions, including characterization of spatial and temporal variability
- Develop a baseline for evaluating possible surface water quality changes associated with future exploration and mining activities (construction, startup, operation, closure, and reclamation activities)

The QAPP-SWQSP (HDR 2012a, 2013b, 2014a, 2015a, 2017a) was developed according to USEPA guidance (2002, 2003a, 2009a) to establish the data type, quantity, and quality needed to meet baseline study objectives. The QAPP-SWQSP (HDR 2012a, 2013b, 2014a, 2015a, 2017a) guides all sampling activity but undergoes periodic updating based on evolving baseline study needs; these changes have been documented as they have occurred (see QAPP-SWQSP, HDR 2017a). Although baseline sample collection is ongoing, this baseline report encompasses only data collected from April 2012 through February 2016.

3.3.2 Sampling Plan

The sampling plan is described in detail in the QAPP-SWQSP (HDR 2017a). Briefly, the sampling network comprises 32 surface water locations on perennial streams and 23 sites where surface water is originating from a seep, adit seep, or other legacy mining-related feature. The sampling network is located in the mine area. **Figure 3-1** shows the sampling sites. The surface water sites are described in **Table 3-2**, and the adit seep and seep sites are described in **Table 3-3**.

From April 2012 through July 2014, site conditions permitting, surface water, adit seep and seep locations were visited monthly (12 times a year) to measure 6 field parameters and flow and to take pictures and document field observations. The surface water locations were sampled monthly (12 times a year); the adit seep or seep locations were sampled quarterly (4 times a year). Non-quarterly samples were analyzed for a reduced suite of 41 constituents; quarterly samples were analyzed for a full suite of 68 constituents (the 41 monthly constituents plus an additional 27 constituents). Starting in February 2014, some quarterly constituents that were consistently detected in samples were changed to be measured monthly; at the same time, some monthly constituents that were consistently not detected in samples were changed to be measured quarterly. These changes were documented in the 2013-2014 QAPP-SWQSP. From August 2014 through February 2016, surface water and adit seep or seep locations were sampled on a quarterly basis only. The sampling frequency, strictest potentially applicable regulatory criteria, and analytical method for the constituents are summarized in **Table 3-4**. The constituents were selected for analysis through the process described in the QAPP-SWQSP (HDR 2017a).

3.3.3 Field Sampling Methods

Samples and monitoring parameters were collected in accordance with the requirements of the QAPP-SWQSP (HDR 2012a, 2013b, 2014a, 2015a, 2017a) and the standard operating procedures (SOPs) documented therein. These SOPs are summarized in brief below.

Sampling equipment and bottles are inventoried and organized for use in the field before starting each sampling event. When field staff arrives at a sampling location, field water quality measurements and samples are taken prior to measuring flow. The sampling process is typically completed within approximately 10 to 20 minutes for each sampling location.

The field water quality measurements include water temperature, conductivity, pH, dissolved oxygen, turbidity, and color. When conditions allow, measurements are taken by submerging the probes directly into the main portion of the stream flow. When stream flow is too high and/or fast to allow safe access, the probes are submerged into a water sample taken from the main portion of the stream flow. This water is collected using a designated one-quart container. The probes and container are decontaminated between sites by rinsing three times with deionized water.

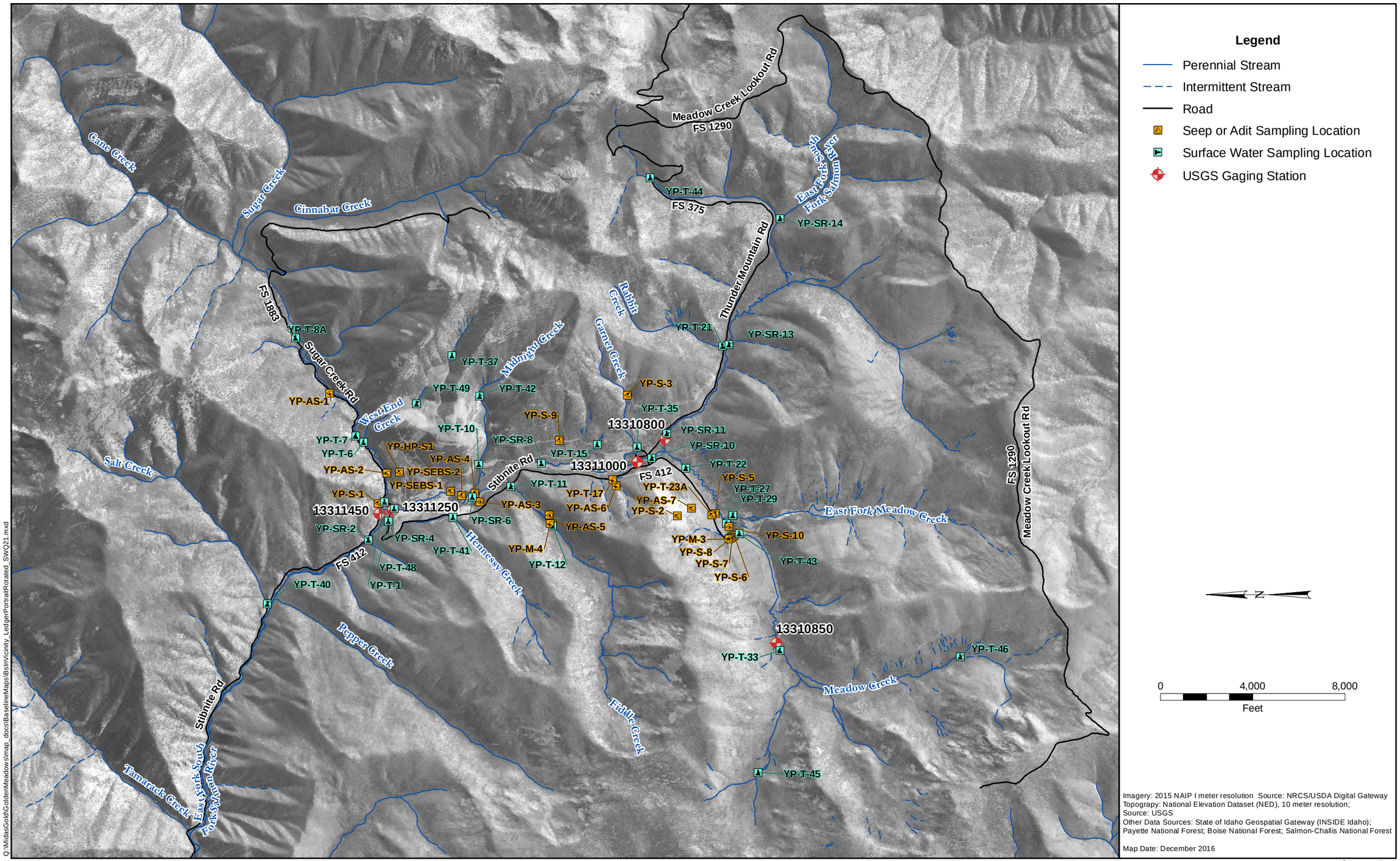

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Figure 3-1
Surface Water Quality Site Map
Stibnite Gold Project

Table 3-2. Surface Water Sampling Locations and Selection Rationale

Station Name[1]	STORET No.[2]	Location	Site Description and UTM Coordinates (northing, easting)	Legacy Upstream Activities[3]	Potential Future Upstream Stibnite Gold Project Activities	Additional Rationale	Watershed
YP-SR-14	None	EFSFSR, above Fern Creek	EFSFSSR upstream of Fern Creek confluence (4971931, 635093)	None	None	Upstream of confluence of Fern Creek, which originates in the abandoned Fern mercury mine	EFSFSR
YP-T-44	None	Fern Creek	Fern Creek downstream of Fern Mine (4973647, 635632)	Fern Mine	None	Downstream of abandoned Fern mercury mine, upstream of confluence with EFSFSR	EFSFSR
YP-SR-13	None	EFSFSR, above Rabbit Creek	EFSFSR upstream of Rabbit Creek confluence (4972601, 633435)	Fern Mine	None	Downstream of abandoned Fern mercury mine, upstream of mineralized and undisturbed tributary, upstream of future mining activities	EFSFSR
YP-T-21	None	Rabbit Creek	Unnamed tributary to EFSFSF (locally known as Rabbit Creek), north of FS 375 (4972682, 633402)	None	Rabbit exploration area	Mineralized but less disturbed tributary, has limited past water quality data	EFSFSR
YP-SR-11	2040315	EFSFSR above Meadow Creek	EFSFSR near USGS gaging station above Meadow Creek (4973430, 632257)	None	Rabbit exploration area	Located near new USGS gaging station, has past water quality data	EFSFSR
YP-T-45	None	North fork Meadow Creek	North fork of Meadow Creek near old jeep trail (4972220, 627777)	None	None	Upstream of potential future tailings impoundment	Meadow Creek
YP-T-46	None	South fork Meadow Creek	South fork of Meadow Creek (4969552, 629309)	None	None	Upstream of potential future tailings impoundment	Meadow Creek
YP-T-33	2040320	Meadow Creek above SODA	Meadow Creek, upstream of Spent Ore Disposal Area (SODA) and former pond (4971931, 629393)	None	Hangar Flats development rock storage facility	Locate near new USGS gaging station, has past water quality data	Meadow Creek
YP-T-43	None	Meadow Creek above Keyway Marsh	Meadow Creek, immediately upstream of Keyway Marsh (4972471, 630933)	SODA; Meadow Creek smelter tailings; petroleum contaminated land farm	Hangar Flats development rock storage facility	Discern between SODA and Keyway Marsh impacts	Meadow Creek
YP-T-27	2040368	Meadow Creek below Keyway Marsh	Meadow Creek downstream of Keyway Marsh and upstream of Blowout Creek (4972634, 631065)	SODA; Meadow Creek smelter tailings; Keyway; petroleum contaminated land farm	Hangar Flats development rock storage facility	Has past water quality data	Meadow Creek
YP-T-29	None	Blowout Creek	Blowout Creek (officially known as East Fork Meadow Creek) on debris fan (4972556, 631180)	Reservoir for hydroelectric power	Blowout Creek development rock storage area	Has past water quality data	Meadow Creek
YP-T-22	2040319	Meadow Creek above EFSFSR	Meadow Creek downstream of Blowout Creek and at east end of airstrip (4973181, 631797)	Meadow Creek Mine, mill, smelter, waste rock; Bradley tailings; SMI leach pads; Hecla heap leach and processing facilities; Keyway Marsh; fuel tank	Hangar Flats and/or Blowout Creek development rock storage area	Has past water quality data	Meadow Creek
YP-SR-10	2040365	EFSFSR below Meadow Creek	EFSFSR by box culvert and USGS gaging station 13311000 (4973626, 631931)	Bradley tailings; SMI leach pads and processing facilities; AST	Hangar Flats potential pit	Located near USGS gaging station, has past water quality data	EFSFSR
YP-T-35	2040318	Garnet Creek	Garnet Creek south of MGII shop (4973820, 632085)	SMI Garnet pit, landfill and ANFO storage	None	Has past water quality data	EFSFSR
YP-T-15	None	Scout Creek	Unnamed drainage immediately north of MGII shop, draining the Scout prospect (4974345, 632105)	Possibly Garnet pit – needs field verification of drainage	Scout exploration area	Has limited past water quality data	EFSFSR
YP-SR-8	2040310	EFSFSR above Fiddle Creek	EFSFSR downstream of Garnet Creek and DMEA, upstream of Fiddle Creek (4975086, 631866)	BMI DMEA mine adit and dump, sawmill, recreation hall, service station; SMI shop, AST, crusher area, pilot plant and camp; Hecla equipment area and camp	All those listed above	Has past water quality data	EFSFSR
YP-T-12	None	Upper Fiddle Creek	Fiddle Creek upstream of North Tunnel (4974932, 631043)	None	Fiddle Creek development rock storage area	Has limited past water quality data	EFSFSR
YP-T-11	None	Lower Fiddle Creek	Fiddle Creek upstream of FS 412 (4975489, 631564)	SMI North Tunnel Mine and North Camp	Fiddle Creek exploration area	Has limited past water quality data	EFSFSR
YP-SR-6	None	EFSFSR above Yellow Pine pit	EFSFSR downstream of Fiddle Creek and upstream of Midnight Creek (4976000, 631416)	SMI Monday Camp	All those listed above	Has limited past water quality data	EFSFSR

Table 3-2. Surface Water Sampling Locations and Selection Rationale

Station Name[1]	STORET No.[2]	Location	Site Description and UTM Coordinates (northing, easting)	Legacy Upstream Activities[3]	Potential Future Upstream Stibnite Gold Project Activities	Additional Rationale	Watershed
YP-T-10	2040321	Lower Midnight Creek	Midnight Creek along old lower haul road (4975905, 631854)	SMI Midnight and Southwest Extension pits	West End potential pit	Has past water quality data	EFSFSR
YP-T-42	None	Upper Midnight Creek	Midnight Creek immediately upstream of old upper haul road (4975900, 632744)	None	None (Control)	Upstream of past activities and potential future mining activities	EFSFSR
YP-T-41	None	Hennessy Creek	Unnamed tributary to EFSFSR (locally Hennessy Creek), upstream of water withdrawal point (4976255, 631149)	None	None	MGII water right	EFSFSR
YP-SR-4	2040308	EFSFSR below Yellow Pine pit	EFSFSR downstream of Yellow Pine pit and upstream of Sugar Creek (4977030, 631264)	BMI Yellow Pine pit, SE and NW Bradley waste rock dumps, Monday Camp waste rock dump, Bailey Tunnel Collar	Yellow Pine potential pit	Located near new USGS gaging station, has past water quality data	EFSFSR
YP-T-8A	None	Sugar Creek, uppermost site	Sugar Creek at downstream end of broad meadow (4978318, 633519)	Cinnabar Mine	None	Has limited past water quality data	Sugar Creek
YP-T-7	2040309	Sugar Creek above West End Creek	Sugar Creek upstream of West End Creek confluence (4977537, 632221)	Bonanza Adit	Sugar exploration area	Has past water quality data	Sugar Creek
YP-T-6	2040317	Lower West End Creek	West End just upstream of Sugar Creek confluence (4977435, 632146)	SMI West End pits and waste rock dumps	West End pit	Has past water quality data	Sugar Creek
YP-T-49	None	Middle West End Creek	West End Creek downstream of uppermost West End wasterock dump (4976733, 632647)	SMI West End pits and waste rock dumps	West End pit	Has limited past water quality data	Sugar Creek
YP-T-37	None	Upper West End Creek	West End Creek upstream of uppermost West End wasterock dump (4976267, 633283)	None	None (Control)	Has limited past water quality data	Sugar Creek
YP-T-1	2040316	Sugar Creek above EFSFSR	Sugar Creek upstream of EFSFSR confluence and FS 412 (4977158, 631355)	Bailey Tunnel Outlet; BMI NE Bradley Tailings; Hecla Homestake pit	Yellow Pine and West End pits	Located near new USGS gaging station, has past water quality data	Sugar Creek
YP-T-48	None	Lower Hennessy Creek	Unnamed tributary to EFSFSR (locally Hennessy Creek), upstream of EFSFSR confluence (4977107, 631117)	NW Bradley waste rock dumps	Yellow Pine potential pit	Downstream of past activities	EFSFSR
YP-SR-2	2040314	EFSFSR below Sugar Creek	EFSFSR, downstream of Sugar Creek confluence and by mile marker 10 (4977368, 630854)	All those listed above; USFS tailings repository	All those listed above	Location near USGS gaging station, has past water quality data	EFSFSR
YP-T-40	None	Salt Creek	Salt Creek, north of FS 412 (4978703, 630017)	None	None (Control)	Mineralized but undisturbed tributary that represents mineralized baseline, has limited past water quality data	EFSFSR

[1]Naming convention after MSE, 2011b. YP= Yellow Pine (i.e., old project name); S=seep; AS=adit seep; T= Tributary to East Fork South Fork Salmon River; SR= East Fork South Fork Salmon River site; SEBS= Southeast Bradley dump seep site; HP= Homestake pit seep site; M= Miscellaneous, mostly legacy mine-related; 7= assigned number, no other meaning

[2]IDEQ, 1996. STORET is the USEPA's data repository for water quality, biological and physical data used by state and federal agencies and other entities. The STORET Number is equivalent to a site name specific to the STORET system.

USGS = U.S. Geological Survey

[3]MSE 2011a, 2011b

Table 3-3. Adit Seep and Seep Sampling Locations

Station Name[1]	Site Description UTM Coordinates (northing, easting)	Site Description	Watershed
Adit Seep Sites			
YP-AS-1	Bonanza adit seep (4977882, 632780)	North side of Sugar Creek, between meadow and West End Creek confluence	Sugar Creek
YP-AS-2	Bailey Tunnel adit seep (4977119, 631730)	South side of Sugar Creek between EFSFSR and West End Creek confluences	Sugar Creek
YP-AS-3	Monday Tunnel adit seep (4975898, 631355)	On Monday Camp flat, south of Yellow Pine pit on west side of EFSFSR	EFSFSR
YP-AS-4	Cinnabar Tunnel adit seep (4975960, 631472)	South of Midnight Creek and Yellow Pine pit on east side of EFSFSR	EFSFSR
YP-AS-5	North Tunnel adit seep (4974987, 631185)	Downstream of pond and on south side of Fiddle Creek	EFSFSR
YP-AS-6	DMEA adit seep (4974090, 631567)	At top of DMEA dumps	EFFSFSR
YP-AS-7	Meadow Creek Mine adit seep (4973093, 631274)	On hillside above heap leach pad	Meadow Creek
Seep Sites			
YP-HP-S1	Homestake pit seep (4976952, 631745)	Outlet from lowest pond in the Homestake pit	Sugar Creek
YP-M-3	Settling pond on northeast corner of SODA (4972605, 630863)	Small settling pond at northeast corner of SODA, adjacent to Keyway Marsh; pond is sampled rather than flow into pond	Meadow Creek
YP-M-4	Fiddle Creek pond (4974969, 631062)	Pond on upstream side of breached dam on Fiddle Creek; Fiddle Creek flows through pond	EFSFSR
YP-S-1	Hillside seep by Sugar Creek (4977232, 631337)	North side of Sugar Creek and FS 412, near EFSFSR confluence	Sugar Creek
YP-S-2	Meadow Creek Fault seep (4973297, 631161)	Halfway up Hangar Flats hillslope	Meadow Creek
YP-S-3	Garnet pit seep (4973940, 632771)	Seep on open slope downhill from the Garnet pit	EFSFSR
YP-S-5	Smelter Flats seep (4972786, 631198)	West of the west end of the airstrip	Meadow Creek
YP-S-6	South Keyway Dam seep (4972547, 630907)	East side of SODA berm, adjacent to large marsh	Meadow Creek

Table 3-3. Adit Seep and Seep Sampling Locations

Station Name[1]	Site Description UTM Coordinates (northing, easting)	Site Description	Watershed
		east of SODA on Hangar Flats	
YP-S-7	Middle Keyway Dam seep (4972569, 630893)	East side of SODA berm, adjacent to large marsh east of SODA on Hangar Flats	Meadow Creek
YP-S-8	North Keyway Dam seep (4972585, 630876)	East side of SODA berm, adjacent to large marsh east of SODA on Hangar Flats	Meadow Creek
YP-S-9	Old haul road seep (4974840, 632172)	Hillside seep between Garnet and Midnight Creeks on old upper haul road	EFSFSR
YP-S-10	Keyway Marsh outlet (4972604, 631024)	Outlet from large marsh east of SODA on Hangar Flats	Meadow Creek
YP-SEBS-1	North southeast Bradley wasterock seep (4976284, 631492)	Seep from bench at northeast corner of Yellow Pine pit	EFSFSR
YP-SEBS-2	South southeast Bradley wasterock seep (4976135, 631443)	Seep from bench on eastern side of Yellow Pine pit	EFSFSR
YP-T-17	DMEA wasterock seep (4974141, 631644)	Seep on west side of FS 412 from toe of DMEA wasterock dump	EFSFSR
YP-T-23A	Heap leach seep (4972831, 631180)	Seep from southwest corner of heap leach on Hangar Flats	Meadow Creek

[1]Naming convention after MSE 2011b

YP= Yellow Pine (i.e., old project name); S=seep; AS=adit seep; T= Tributary to East Fork South Fork Salmon River; SR= East Fork South Fork Salmon River site; SEBS= Southeast Bradley dump seep site; HP= Homestake pit seep site; M= Miscellaneous, mostly legacy mine-related; 7= assigned number, no other meaning

Table 3-4. Constituents Analyzed

Surface Water Parameter	Sampling Frequency	Potentially Most Restrictive Limit			Best-Fit Method		Data Quality Indicators[1]		
		Potentially Strictest Regulatory Criteria	Units	Limiting Program(s)	Method Reporting Limit[1]	Method Number	Duplicate Samples RPD	LCS Percent Recovered	Matrix Spike Percent Recovered
Analytical Constituents									
Alkalinity	Monthly/Quarterly	> 20	mg/L as $CaCO_3$	USEPA Freshwater Aquatic Life Criteria[2]	9	SM[3] 2320 B	20	90 - 110	NA
Aluminum	Monthly/Quarterly	0.05	mg/L	USEPA Secondary Drinking Water Standards[4]	0.002	USEPA[5] 6020A	20	85 - 120	75 - 125
Ammonia	Monthly/Quarterly	NA	mg/L as NH_3	NA	0.01	USEPA 350.1	20	90 - 110	90 - 110
Antimony	Monthly/Quarterly	0.0056	mg/L	Idaho Domestic Water Supply Use[6]	0.00005	USEPA 6020A	20	91 - 112	75 - 125
Arsenic	Monthly/Quarterly	0.01	mg/L	Idaho Domestic Water Supply Use/USEPA Drinking Water MCL[7]	0.0005	USEPA 6020A	20	89 - 112	75 - 125
Arsenic III	Quarterly	NA	mg/L	NA	0.00002	USEPA 1632	35	70 - 130	30 - 170
Barium	Quarterly	2	mg/L	USEPA Drinking Water MCL	0.00005	USEPA 6020A	20	92 - 111	75 - 125
Beryllium	Quarterly	0.004	mg/L	USEPA Drinking Water MCL	0.00002	USEPA 6020A	20	80 - 120	75 - 125
Bicarbonate	Monthly/Quarterly	NA	mg/L as $CaCO_3$	NA	9	SM 2320 B	20	90 - 110	NA
Boron	Quarterly	120	mg/L	Wildlife Benchmark for Consumption of Surface Water[8]	0.010	USEPA 6010C	20	91 - 112	75 - 125
Cadmium	Quarterly	0.00025	mg/L	USEPA Freshwater Aquatic Life Criteria	0.00002	USEPA 6020A	20	92 - 111	75 - 125
Calcium	Monthly/Quarterly	NA	mg/L	NA	0.004	USEPA 6010C	20	85 - 116	75 - 125
Carbonate	Monthly/Quarterly	NA	mg/L as $CaCO_3$	NA	9	SM 2320 B	20	90 - 110	NA
Chloride	Monthly/Quarterly	230	mg/L	USEPA Freshwater Aquatic Life Criteria	0.2	USEPA 300.0	20	90 - 110	90 - 110
Chromium, Total	Quarterly	0.1	mg/L	USEPA Drinking Water MCL	0.0002	USEPA 6020A	20	88 - 113	75 - 125
Chromium III	Conditional[9]	0.074	mg/L	Idaho Criteria for Aquatic Life[10]/USEPA Aquatic Life Criteria	0.001	USEPA 218.6	ND	ND	ND
Chromium VI	Conditional	0.011	mg/L	Idaho Criteria for Aquatic Life/USEPA Aquatic Life Criteria	0.001	USEPA 218.6	ND	ND	ND
Cobalt	Quarterly	NA	mg/L	NA	0.00002	USEPA 6020A	20	87 - 114	75 - 125
Copper	Quarterly	0.009	mg/L	USEPA Freshwater Aquatic Life Criteria	0.0001	USEPA 6020A	20	89 - 113	75 - 125
Cyanide, Free	Conditional	0.2	mg/L	USEPA Drinking Water MCL	0.02	USEPA 9014	20	86 - 118	70 - 125
Cyanide, Total	Quarterly	0.0052	mg/L	Idaho Criteria for Aquatic Life/USEPA Aquatic Life Criteria	0.005	SM 4500 CN-E	20	84 - 115	23 - 148
Cyanide, Weak Acid Dissociable	Conditional	0.0052	mg/L	Idaho Criteria for Aquatic Life/USEPA Aquatic Life Criteria	0.005	SM 4500 CN I	20	70 - 141	64 - 136
Hardness	Monthly/Quarterly	NA	mg/L	NA	9	SM 2320 B	20	NA	NA
Iron	Monthly/Quarterly	0.3	mg/L	USEPA Secondary Drinking Water Standards	0.001	USEPA 6010C	20	92 - 111	75 - 125
Fluoride	Monthly/Quarterly	2.0	mg/L	USEPA Secondary Drinking Water Standards	0.2	USEPA 300.0	20	90 - 110	90 - 110
Lead	Monthly/Quarterly	0.0025	mg/L	Idaho Criteria for Aquatic Life/USEPA Aquatic Life Criteria	0.00002	USEPA 6020A	20	90 - 112	75 - 125

Table 3-4. Constituents Analyzed

Surface Water Parameter	Sampling Frequency	Potentially Most Restrictive Limit			Best-Fit Method		Data Quality Indicators[1]		
		Potentially Strictest Regulatory Criteria	Units	Limiting Program(s)	Method Reporting Limit[1]	Method Number	Duplicate Samples RPD	LCS Percent Recovered	Matrix Spike Percent Recovered
Magnesium	Monthly/Quarterly	NA	mg/L	NA	0.002	USEPA 6010C	20	86 - 115	75 - 125
Manganese	Monthly/Quarterly	0.05	mg/L	USEPA Secondary Drinking Water Standards	0.0006	USEPA 6010C	20	92 - 112	75 - 125
Mercury	Monthly/Quarterly	0.000012	mg/L	Idaho Criteria for Aquatic Life	0.000001	USEPA 1631E	24	77 - 123	71 - 125
Methyl Mercury	Quarterly	NA	mg/L	NA	0.0000001	USEPA 1630	35	67 - 133	65 - 135
Molybdenum	Quarterly	0.6	mg/L	Wildlife Benchmark for Consumption of Surface Water	0.00005	USEPA 6020A	20	80 - 120	75 - 125
Nickel	Quarterly	0.052	mg/L	Idaho Criteria for Aquatic Life/USEPA Aquatic Life Criteria	0.0002	USEPA 6020A	20	89 - 113	75 - 125
Nitrates	Conditional	10	mg/L as N	USEPA Drinking Water MCL	0.2	USEPA 300.0	ND	ND	ND
Nitrates and Nitrites	Monthly/Quarterly	NA	mg/L as N	NA	0.05	USEPA 353.2	20	90 - 110	89 - 114
Nitrites	Conditional	1	mg/L as N	USEPA Drinking Water MCL	0.2	USEPA 300.0	ND	ND	ND
Nitrogen, Total	Quarterly	NA	mg/L as N	NA	0.2	USEPA 351.4 and USEPA 353.2	20	72 - 129	53 - 160
Phosphorous	Monthly/Quarterly	NA	mg/L as P	NA	0.02	USEPA 6010C	20	80 - 120	75 - 125
Potassium	Monthly/Quarterly	NA	mg/L	NA	0.1	USEPA 6010C	20	89 - 114	75 - 125
Selenium	Quarterly	0.005	mg/L	Idaho Criteria for Aquatic Life/USEPA Aquatic Life Criteria	0.001	USEPA 6020A	2	87 - 115	75 - 125
Silver	Quarterly	0.0032	mg/L	USEPA Freshwater Aquatic Life Criteria	0.00002	USEPA 6020A	20	80 - 120	75 - 125
Sodium	Monthly/Quarterly	NA	mg/L	NA	0.2	USEPA 6010C	20	80 - 120	75 - 125
Solids, Total Dissolved (TDS)	Monthly/Quarterly	500	mg/L	USEPA Secondary Drinking Water Standards	5	SM 2540 C	10	90 - 108	NA
Solids, Total Suspended (TSS)	Monthly/Quarterly	NA	mg/L	NA	5	USEPA 160.2	10	85 - 111	NA
Sulfate	Monthly/Quarterly	250	mg/L	USEPA Secondary Drinking Water Standards	0.2	USEPA 300.0	20	90 - 110	90 - 110
Thallium	Quarterly	0.00024	mg/L	Idaho Domestic Water Supply Use	0.00002	USEPA 6020A	2	91 - 108	75 - 125
Vanadium	Quarterly	0.835	mg/L	Wildlife Benchmark for Consumption of Surface Water	0.0002	USEPA 6020A	2	87 - 113	75 - 125
Zinc	Monthly/Quarterly	0.120	mg/L	Idaho Criteria for Aquatic Life/USEPA Aquatic Life Criteria	0.0005	USEPA 6020A	20	86 - 119	75 - 125
Onsite Measurements									
Color	Quarterly	15	(PT-CO)	USEPA Secondary Drinking Water Standards	5	USEPA 110.2	NA	NA	NA
Dissolved Oxygen	Monthly/Quarterly	> 6	mg/L	Idaho Criteria for Aquatic Life Use Designations[11]	NA	USEPA 360.1	NA	NA	NA

Table 3-4. Constituents Analyzed

Surface Water Parameter	Sampling Frequency	Potentially Most Restrictive Limit			Best-Fit Method		Data Quality Indicators[1]		
		Potentially Strictest Regulatory Criteria	Units	Limiting Program(s)	Method Reporting Limit[1]	Method Number	Duplicate Samples RPD	LCS Percent Recovered	Matrix Spike Percent Recovered
pH	Monthly/Quarterly	≥ 6.5 and ≤ 9.0	units	Idaho Criteria for Aquatic Life Use Designations	NA	USEPA 150.1	NA	NA	NA
Conductivity	Monthly/Quarterly	NA	mS/cm	NA	NA	USEPA 120.1	NA	NA	NA
Temperature	Monthly/Quarterly	< 13	degree C	Idaho Criteria for Aquatic Life Use Designations	NA	USEPA 170.1	NA	NA	NA
Turbidity	Monthly/Quarterly	Background + 50	NTU	Idaho Criteria for Aquatic Life Use Designations	NA	USEPA 180.1	NA	NA	NA

[1]The method reporting limits and data quality indicators as developed in-house and reported by the contract laboratory, ALS, in Kelso, Washington
[2]USEPA National Recommended Water Quality Criteria for Aquatic Life, http://water.epa.gov/scitech/swguidance/standards/criteria/current/index.cfm
[3]Method numbers preceded by "SM" indicate Standard Methods. *2005. Standard Methods for the Evaluation of Water and Wastewater. 21st Edition.*
[4]USEPA National Primary Drinking Water Regulations, Secondary Standards, http://water.epa.gov/drink/contaminants/index.cfm
[5]Method numbers preceded by "USEPA" indicate a USEPA method. An index to these methods (USEPA 2003b), and appropriate links to each, can be found at: http://www.epa.gov/region1/info/testmethods/pdfs/testmeth.pdf
[6]IDAPA 58.01.02 Section 210, Numeric Criteria for Toxic Substances for Waters Designated for Domestic Water Supply Use, http://adminrules.idaho.gov/rules/2012/58/0102.pdf
[7]USEPA National Primary Drinking Water Regulations, http://water.epa.gov/drink/contaminants/index.cfm
[8]Opresko, D.M., B.E. Sample and G.W. Suter II. 1996. *Toxicological Benchmarks for Wildlife: 1996 Revision*. Oak Ridge National Laboratory, Oak Ridge, TN, ES/ER/TM-86/R3.
[9]"Conditional" indicates that a speciation analysis will only be conducted if total species analysis indicates that analyte concentration meets or exceeds strictest regulatory criteria
[10]IDAPA 58.01.02 Section 210, Numeric Criteria for Toxic Substances for Waters Designated for Aquatic Life - General (pH), Cold Water (dissolved oxygen and turbidity), Salmonid Spawning (temperature), http://adminrules.idaho.gov/rules/2012/58/0102.pdf
[11]IDAPA 58.01.02 Section 250, Surface Water Quality Criteria for Aquatic Life Use Designations, http://adminrules.idaho.gov/rules/2012/58/0102.pdf
[12]RPD = relative percent different. LCS = laboratory control sample. ND = no data. NA = not applicable. MCL = maximum contaminant level.

Water samples are collected from the fastest, deepest part of the stream using a 500-milliliter (mL) dip sampler or disposable 1000 mL bottles. Seven sample bottles, ranging in size from 250 to 1000 mL, are filled for monthly events. Ten bottles, ranging from 250 to 1000 mL, are filled for quarterly events. Sample bottles that require filtration (dissolved mercury and dissolved metals, 500 mL each) are filled by first collecting water in two (1000 mL), clean, unpreserved, sacrificial sample bottles. Filtration into two 500 mL bottles with appropriate preservatives is completed at the end of each field day using 0.45 micrometer (µm) membrane filters and a peristaltic pump. Sample bottles are labeled with the baseline study name, date and time, sample identification code, and sampler initials immediately before samples are taken. After collection, samples are kept secure on ice in coolers in the locked field staff vehicle, in dedicated and locked refrigerators, or on ice in coolers in transit via a national shipper to the laboratory. Standard chain-of-custody procedures are followed from sample collection through receipt of the samples by the laboratory.

Streamflow is measured, when accessible and safe (as determined by the field staff per the QAPP-SWQSP, HDR 2017a), immediately after the samples are collected. The flow measurement method establishes a transect perpendicular to streamflow and measures depth and velocity at varying intervals using a tape measure, a top-setting wading rod, and velocity meter. Flow is calculated using the mid-section method. For streams with very low flows and for adit seeps and seeps, field staff use graduated buckets in various sizes (1 quart, 1 gallon, 2 gallons, and 5 gallons) to measure flow. At these sites, the sample and flow are taken from an area of concentrated flow and a drop off sufficient to place a bucket below. Flow is measured by timing the fill rate of a bucket; this procedure is generally repeated between three to five times. These measurements are then converted into cubic feet per second (cfs); many of the very small cfs measurements (generally those less than 0.5 cfs) presented in the results are measured by this method.

3.4 Other Data Sources

Meteorological and hydrological data from existing stations are also used in some graphs in Section 4 to provide site condition context for water quality results. The *Surface Water Hydrology Baseline Study for Stibnite Gold Project* (HydroGeo 2017) discusses these data more extensively.

Meteorological data were recorded by a Campbell Scientific weather station (station ID 17556) installed onsite in 2011 for MGII by Campbell Scientific technicians. The station was located in an open area approximately 500 feet northwest of the MGII shop (approximately 4974090 N, 631950 W, 1,980 meters above msl). This station recorded time, date, temperature, barometric pressure, total rainfall, snow depth, wind speed, and wind direction at 30 minute intervals each day. The data were archived on the unit as well as being emailed daily to MGII and HDR staff. Meteorological data from this unit are used from April 2012 through November 2013.

A second weather station (station ID MGC01) was installed onsite in October 2013 for MGII by JBR Environmental Consulting (JBR) staff in conjunction with the air quality baseline study conducted by JBR. The station is located on top of the former heap leach (4973011 N, 631281 W, 2010 meters above mean sea level). This station records time, date, temperature, barometric pressure, solar radiation, vertical velocity, wind speed, and wind direction at 15-minute intervals. This data is automatically transmitted to MesoWest periodically and is available to the public for downloading from the MesoWest website. The station began recording data November 1, 2013. Meteorological data from this unit are used from November 2013 through February 2016.

Hydrological data are provided by U.S. Geological Survey (USGS) gaging stations. The gaging station names, locations, data record, and data types are summarized in **Table 3-5** and their locations are shown on **Figure 3-1**. Station 13311000, located on the EFSFSR below Meadow Creek, has been recording daily flow intermittently since 1928. Three continuous periods of record occur during this time: July 1928 through November 1941, October 1982 through September 1997, and October 2010 through present. Mean annual flow curves were generated from these intermittent records to place the 2012 flow record into hydrological context.

Four other gaging stations were installed by the USGS for MGII, with funding from MGII, in September 2011: 13310800 on the EFSFSR above Meadow Creek, 13310850 on upper Meadow Creek, 13311250 on the EFSFSR above Sugar Creek, and 13311450 on Sugar Creek. Two stations – 13311000 (EFSFSR near Stibnite) and 13311450 (Sugar Creek) transmit realtime flows and water quality (pH, temperature and conductivity, collected May through November) data. The other three stations collect flows daily and water quality seasonally (approximately May through November); these data are periodically downloaded from the field units, processed, and uploaded to the USGS website (USGS 2012).

3.5 Data Analysis

This section describes the data processing steps taken and statistical procedures completed to compile and summarize the baseline data.

3.5.1 Data Review, Verification, Validation, and Usability

Baseline study data are maintained in a secure, customized Microsoft Access database. Prior to inclusion in the database, 100 percent of the surface water field and analytical datasets undergo data review, verification, and validation as described in detail in the QAPP-SWQSP (HDR 2017a). Data review refers to the process of examining data for correct and complete recording, transmission, and processing. Data verification refers to the process of evaluating a dataset for completeness – that data requested from the laboratory have been received and complied with requirements. Data validation describes an analyte and sample specific process of evaluating that a dataset meets method, procedure, and contract requirements. Specific method and analyte acceptance criteria are established by the contract laboratory (ALS Environmental) and by the QAPP-SWQSP (HDR 2017a).

Through this process, data that are outside of acceptance criteria are evaluated and qualified according to USEPA's *National Functional Guidelines for Inorganic Superfund Data Review* (National Functional Guidelines, 2013a), and appropriate data qualification flags are attached to the corresponding data. These "validated" data are then uploaded to the baseline study database, and the validation flags follow the corresponding data throughout the life of the baseline study. Although data may be rejected for use, no data are deleted during this process. Data validation reports were prepared for each sampling event and are compiled in **Appendix C**.

The data review, verification and validation procedures represent established steps to check data completeness, accuracy and quality against specific data and measurement quality objectives. The data usability assessment evaluates whether these data and measurement quality objectives, as defined in the QAPP-SWQSP (HDR 2017a), have been met. If the objectives have not been met, then a determination is made whether to reject or how to qualify non-credible data. Thus, the data usability assessment summarizes the results of data quality control and quality assurance procedures and determines whether the data are fully usable for the baseline study objectives. Data usability assessments were made on quarterly basis and are compiled in **Appendix D**.

Table 3-5. USGS Gaging Stations Near Stibnite, Idaho

USGS Site #	USGS Site Name	Location	Status	Northing	Easting	Start Record	End Record	Stage	Flow	pH	Temperature	Conductivity	Other	Notes
13310800	EFSF Salmon R Abv Meadow Crk NR Stibnite, ID	EFSFSR above Meadow Creek	Active	4973458	632190	9/20/2011	Ongoing	None	None	Mean daily, seasonally	Mean daily, seasonally	Mean daily, seasonally	Limited	
13310850	Meadow Creek NR Stibnite, ID	Meadow Creek above SODA	Active	4971977	629498	9/8/2011	Ongoing	None	Mean daily	Limited	Limited	Limited	Limited	
13311000	EF of SF Salmon River at Stibnite, ID	EFSFSR below Meadow Creek	Active	4973819	631877	7/1/1928	Ongoing	Realtime	Realtime	Mean daily, seasonally	Mean daily, seasonally	Mean daily, seasonally	Limited	Discontinuous data collection between 1928-2012
13311250	EFSF Salmon R Abv Sugar Crk NR Stibnite, ID	EFSFSR above Sugar Creek	Active	4977052	631243	9/8/2011	Ongoing	None	Mean daily	Mean daily, seasonally	Mean daily, seasonally	Mean daily, seasonally	Limited	
13311450	Sugar Creek NR Stibnite, ID	Sugar Creek above EFSFSR	Active	4977225	631196	9/9/2011	Ongoing	Realtime	Realtime	Limited	Mean daily, seasonally	Mean daily, seasonally	Limited	
13311500	EF of SF Salmon River NR Stibnite ID	EFSFSR below Sugar Creek	Inactive	4977318	630924	6/1/1928	9/1/1941	None	Mean daily	Limited	Limited	Limited	Limited	

Through the data review, verification, and validation assessments, data have been qualified. Qualification flags are presented with their associated analytical results in the complete constituent analytical results in **Appendix E**. Although some data are qualified, 100 percent of the analytical data were deemed usable for the defined baseline study objectives (i.e., establishing baseline data). Data users should assess the usability of the data for their own specific purposes.

3.5.2 Field Duplicates

Duplicate sample results, agreement, and implications for data usability are evaluated as part of the data validation process and discussed in data validation reports. Both parent and duplicate sample data are maintained in the database, but only parent sample concentrations are used for analysis.

3.5.3 Dissolved Versus Total Concentrations

Many constituents are analyzed for both total and dissolved concentrations within the same sample. The total concentration reflects the entire amount of the constituent present in an unfiltered sample. Thus, it measures a constituent in both dissolved and solid phases in the sample. For this study, the dissolved concentration reflects the amount of the constituent occurring as particles smaller than 0.45 μm. Therefore, the total constituent concentration should always be greater than or equal to the dissolved constituent concentration, since the total concentration by definition includes the dissolved component.

However, in some instances, the dissolved concentration result may exceed the total concentration result for an analyte. This circumstance can indicate a procedural issue (e.g., filter contamination, or an inadvertent mis-labeling of total and dissolved samples), but is frequently a result of the inherent limit of analytical precision. For example, if the total and dissolved constituent concentrations are very similar and/or close to the method reporting limit, then the difference in concentration between the total and dissolved fractions may be well within the error limits of the analytical method. This circumstance can be evaluated using the criteria for duplicate sample review described in USEPA's National Functional Guidelines (2013a). Assuming that the actual total and dissolved concentrations are similar, using the duplicate sample analysis procedure provides a way to understand if the magnitude of the difference between the two sample concentrations is consistent with that expected from inherent analytical imprecision, or is not and is, therefore, indicative of a procedural issue.

In situations where the dissolved concentration is greater than the total concentration, the data pair is considered acceptable if it meets one of the following criteria (adapted from USEPA criteria for evaluating duplicate samples, 2013a):

a. If both results are greater than or equal to five times the method reporting limit, then the relative percent difference between the concentrations should be less than or equal to 20 percent.

b. If either result is less than five times the method reporting limit, then the difference between the concentrations should be less than or equal to the method reporting limit.

c. If neither of these conditions is met, then the data should be identified and evaluated but not rejected.

Identified and evaluated data (those data meeting condition c) are included in the report in order to allow for potential future use as determined by the third-party EIS practitioner. Data users with different end goals (e.g., compliance) may choose to exclude these flagged data from their analysis. Thus the screening criteria are used to describe the frequency at which this situation occurs but not as a basis to reject data for this baseline study.

For the 2016 surface water quality baseline data set, 23,482 pairs of total and dissolved metal analyses were evaluated. Of these, 3,624 pairs (15 percent) had dissolved concentrations greater than the corresponding total concentrations. However, only 316 pairs in total (1.35 percent) had dissolved concentrations greater than the total concentrations and did not meet the criteria for acceptable laboratory precision (as defined above). **Table 3-6** summarizes, by sampling year, the quantity of total and dissolved metal pairs where the dissolved concentration was greater than the total concentration and the number and percentage of pairs that do not meet the USEPA acceptance criteria.

Table 3-6. Pairs of Total and Dissolved Metals with Dissolved Concentrations Greater than Total

Sampling Year	Pairs of Total and Dissolved Metals	Dissolved Greater than Total	Did Not Meet Acceptance Criteria	Percent Did Not Meet Acceptance Criteria
2012	5,316	848	73	1.37
2013	6,812	1,117	77	1.13
2014	6,016	873	61	1.01
2015	4,455	599	79	1.77
2016	883	187	26	2.94
Totals	23,482	3,624	316	1.34

No consistent trends in dissolved greater than total results were observed, and no procedural issues have been identified. Therefore, it is assumed that instances where dissolved concentrations are greater than total concentrations reflect limitations of analytical precision. Paired metals account for most of the occurrences where dissolved concentrations were greater than total, with results at or near method detection limits. In most cases, the total concentration result did not meet method detection limits, but the dissolved concentration was detected at or near the detection limit.

3.5.4 Outlier Analysis

Outliers are extreme or unusual data measurements. They may result from a typographic error, a procedural issue, or reflect a real value of unusually low or high concentration. Because outliers inherently come from a different distribution than the other measurements in a statistical sample (see Section 3.5.5), the presence of outliers makes distribution fitting difficult and affects parametric summary statistics (i.e., mean and standard deviation). Rosner's or Dixon's test for outliers, at 5 percent significance, was run on all data; Rosner's test was used for statistical samples with 25 or more measurements ($n \geq 25$) and Dixon's test was used for statistical samples with fewer than 25 measurements ($n < 25$) (USEPA 2009a, USEPA 2013b, IDEQ 2014).

For the 2016 surface water quality baseline dataset, 76,682 data points were evaluated and 827 outliers were identified (1.1 percent of measurements). Identified outliers were back-checked against the field notes, lab results, and validation reports. However, outliers were only rejected for further analysis if a clear procedural or typographical error was identified. Of the 827 identified outliers, none were rejected for further analysis. Additional outliers that were identified and removed from the data set in previous baseline analyses are presented in

Appendix F. The other outliers were included in the analyses and assumed to represent real values; they were not flagged or otherwise identified outside of the outlier analysis. This approach is consistent with USEPA's *Statistical Analysis of Groundwater Monitoring Data at RCRA Facilities, Unified Guidance* (Unified Guidance, 2009a) and IDEQ's *Statistical Guidance for Determining Background Ground Water Quality and Degradation* (Statistical Guidance, 2014).

3.5.5 Generating Summary Statistics

For each constituent at each site, this baseline report describes summary statistics based on the sampling events. Measurements from the sampling events constitute a statistical sample (i.e., a finite subset of measurements from the population). A statistical population represents, in this case, all the possible measurements of the constituent concentration in a location. For example, if iron was measured 15 times at a single site, these 15 iron concentration measurements constitute a statistical sample, and all the possible iron concentrations at this site constitute the statistical population.

Given a statistical sample with a known distribution, calculations can be made to describe the underlying population. Thus, for each constituent at each site, the report describes: the number of detect and non-detect measurements, the sample minimum and maximum values, the population mean and median (i.e., 50th percentile), population standard deviation, and 90-, 95-, and 99-percentiles.

However, for some constituents with mostly non-detect measurements (see below for criteria), or for constituents that do not fit a known distribution, it may not be possible to calculate the population mean, population standard deviation, or percentiles. Additionally, there are not an adequate number of samples to produce statistically robust estimates of the population mean, standard deviation, and percentiles for seasonal conditions. Therefore, summary statistics were calculated from the aggregate of all sampling events across all seasons.

The method used to calculate summary statistics depended on the characteristics of the sample (i.e., distribution, proportion of non-detects). The baseline study used functions within Microsoft Access, Microsoft Excel, and the ProUCL (statistical analysis) software programs to perform these calculations. The general statistical procedures followed are described below.

3.5.5.1 Non-Detect Values

Datasets containing non-detect measurements are common in environmental projects. These datasets are often referred to as "censored" or "left-censored" datasets because concentration results are truncated at a lower (left) limit, which represents the analytical method reporting limit. This truncation can be problematic for calculating accurate statistics, but robust statistical procedures and software have been developed to deal appropriately with these datasets. In the surface water baseline datasets, non-detect values are treated according to USEPA's Unified Guidance (2009a), *ProUCL Version 5.0.00 Technical Guide: Statistical Software for Environmental Applications for Data Sets with and without Nondetect Observations* (2013b), IDEQ's Statistical Guidance (2014), and the characteristics of the dataset.

In general, for constituents with a mixture of detected and non-detected measurements, the nonparametric Kaplan-Meier method can be used to estimate population mean, standard deviation, and percentiles. For constituents with few or no detected measurements (i.e., mostly or entirely non-detects), no mean, median, standard deviation, or percentiles can be accurately

calculated. The baseline study used the following procedures if non-detect measurements were present in the dataset for a given analyte (USEPA 2009a, IDEQ 2014):

1. If detects were less than or equal to five measurements, or non-detects were greater than 50 percent of the total measurements, then censored data techniques are not accurate, and statistics were not calculated.

    a) In this case, reported the number of detects and non-detects, ***observed*** sample minimum and maximum values (even if one or both of these values were simply the method reporting limit, <0.05 micrograms per liter [µg/L]), and "n/a" (not applicable) for the mean, median, standard deviation, and percentiles.

2. If non-detects were present, but represent less than or equal to 50 percent of the total measurements, then censored data techniques were used to calculate statistics.

    a) In this case, reported the number of detects and non-detects, ***observed*** sample minimum and maximum values (the observed minimum value should, therefore, be the method reporting limit, <0.05 µg/L).

    b) The nonparametric Kaplan-Meier estimation method in ProUCL was used to determine the population mean, standard deviation, and percentiles.

3.5.5.2 Detected Values

For constituents that were detected during all sampling events (and there were more than five sampling events), measurements were tested for goodness-of-fit to normal, gamma and lognormal distributions. If data fit multiple distributions, the order of fit preference was 1) normal, 2) gamma, 3) lognormal. If the data did not fit any of these distributions, then the data were treated as nonparametric (USEPA 2009a, IDEQ 2014). If the data were normally distributed, then the basic statistics calculated by ProUCL represent the sample mean and standard deviations, which in the case of normally distributed data, also represent estimates of the population mean and standard deviation. If the data were gamma or lognormally distributed, then the gamma or lognormal population mean, standard deviation, and percentiles were estimated and reported. If the data did not fit any of these known distributions, then the nonparametric mean, median, standard deviation and percentiles were calculated. Additionally, if constituents were detected during all sampling events but there were five or fewer sampling events, the sample mean, median and standard deviation were calculated. **Table 3-7** summarizes the statistical estimator used to describe the population parameters for each distribution.

Table 3-7. Summary of the Statistical Procedures and Calculations

Type	Mean	Standard Deviation	50th, 90th, 95th and 99th Percentiles
Data contains non-detects:			
Data contains > 50 percent non-detects	Not enough data to calculate	Not enough data to calculate	Not enough data to calculate
Data contains ≤ 50 percent non-detects	Kaplan-Meier	Kaplan-Meier	Kaplan-Meier
Data are detected and distributed as follows:			
Normal	Population	Population	Population
Gamma	MLE[1]	MLE	MLE
Lognormal	MVUE[2]	MVUE	MLE
Nonparametric	Sample	Sample	Sample

[1]MLE: Maximum likelihood estimate; this is the estimator ProUCL uses to calculate gamma mean and standard deviation and gamma and lognormal percentiles.
[2]MVUE: Minimum variance unbiased estimate; this is the estimator ProUCL uses to calculate lognormal mean and standard deviation.

3.5.6 Comparisons to Regulatory Criteria

Water quality results for the sites are compared to potentially applicable regulatory criteria to provide a context in which to understand and interpret the data. **Table 3-4** presents the strictest *potentially* applicable criteria for each constituent; these criteria were initially identified through the process described in the QAPP-SWQSP (HDR 2017a). For example, the criterion presented for water temperature is < 13 degrees Celsius which derives from the IDAPA standard for waters with designated cold water aquatic life beneficial uses. More specifically, this criterion is for waters also designated for salmonid spawning during the periods of spawning and incubation. For simplicity, this water temperature criterion is used for comparison to site data throughout this report but not all sites are designated for salmonid spawning; for example, many seep sites are completely disconnected from streams and therefore from salmonid habitat. Similarly, other regulatory criteria represent primary drinking water standards and although some waters in the study area are designated for drinking water supply, many are not. Thus, although the regulatory criteria serve as a useful frame of reference to understand water quality data, these comparisons are provided strictly for context and may not be applicable to all sites.

SECTION 4: AFFECTED ENVIRONMENT

This section is divided into two sections: characterization of surface water quality resources in the mine area and characterization of surface water quality resources in the area of the studied alternative access routes. The mine area section discusses the results of the baseline sampling program, whereas the studied alternative access routes section discusses results compiled from existing data resources.

4.1 Mine Area

This section characterizes surface water quality resources in the mine area based on the results of the baseline sampling program. The section begins with a summary description of the frequency of detection of the constituents, mean concentration of select constituents, and spatial and temporal trends of select constituents. These summary results are presented first to give an overview of surface water quality in the study area. More detailed site results are presented later in the document (Section 4.1.2) for readers seeking this level of information; raw data are presented in Appendix E.

4.1.1 Overview of Surface Water Quality Resources

Analyte Detection

The baseline program collected samples from 32 stream sites and 23 seep and adit seep sites from April 2012 through February 2016. Monthly samples (from the 32 stream sites) were analyzed for 41 constituents. Quarterly samples (from the 32 stream sites and 23 seep and adit seep sites) were analyzed for 68 constituents (the 41 monthly constituents plus an additional 27 constituents). In addition, 7 parameters (including flow) were measured onsite at stream, seep and adit seep sites. For the entirety of the baseline program (all sampled sites, all conducted sampling events), **Figure 4-1** through **Figure 4-9** show how many times each analyte:

1) was not detected (shown in blue),
2) was detected and met the strictest regulatory criterion (or did not have an applicable regulatory criterion for comparison, shown in green), and
3) was detected and did not meet the strictest regulatory criterion (shown in red).

Sampling sites have been separated into three groups: adit seep sites (**Figure 4-1** through **Figure 4-3**), natural seep sites (**Figure 4-4** through **Figure 4-6**), and streams (**Figure 4-7** through **Figure 4-9**). These bar graphs (**Figure 4-1** through **Figure 4-9**) are additive; the total height of the bar associated with a given analyte represents the total number of times it was sampled and the colors illustrate conditions one through three (from above). Analytes with taller bars were measured more frequently (i.e., were on the monthly constituent list). For example, adit seep site samples were analyzed for total iron 85 times during the baseline study (**Figure 4-2**). Of these analyses, total iron was not detected 18 times, which is shown by the height of the blue bar associated with total iron. Total iron was detected but occurred in a concentration lower than the applicable regulatory criterion 27 times; this is shown by the height of the green bar. Finally, measured total iron concentrations did not meet (exceeded) the regulatory criterion 40 times, which is shown by the red bar. In sum, these bars add up to the 85 times that total iron was analyzed for in samples.

Overall, the adit seep site graphs (**Figure 4-1** through **Figure 4-3**) show that most constituents occur in concentrations that meet regulatory criteria most of the time. In addition, many constituents are not detected most of the time. The graphs also highlight the constituents that do not always meet regulatory criteria. Total and dissolved antimony exceeded regulatory criteria in most samples (**Figure 4-1**). Total and dissolved arsenic exceeded regulatory criteria in all but one of the samples analyzed (**Figure 4-1**). Measurements of total aluminum, total iron, total mercury, and total and dissolved manganese did not meet regulatory criteria in about half of the samples (**Figure 4-1** and **Figure 4-2**). Onsite measurements of dissolved oxygen, pH and water temperature occasionally did not meet regulatory criteria (**Figure 4-1**). Dissolved aluminum, dissolved cobalt, total cyanide, dissolved iron, total lead, dissolved mercury, total dissolved solids, sulfate, total thallium, and total zinc rarely did not meet regulatory criteria (**Figure 4-1** through **Figure 4-3**). Appendix H contains a summary table with all exceedances for the period of this baseline report.

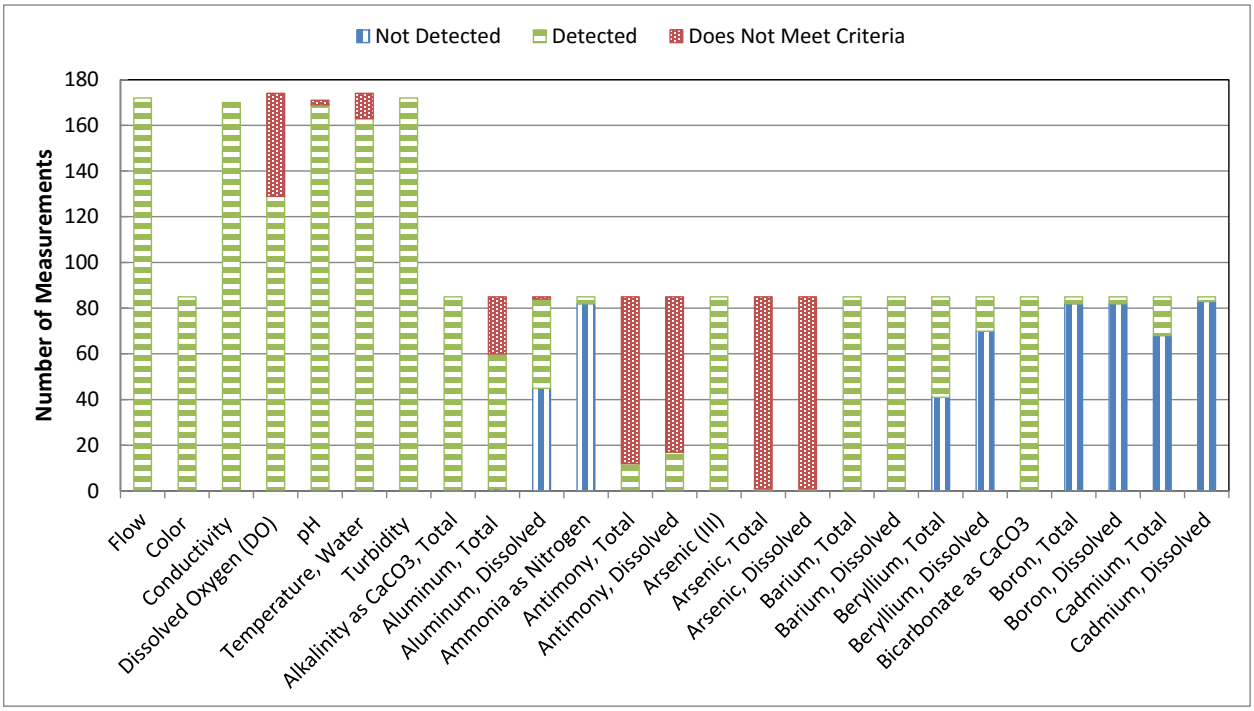

Figure 4-1. Analyte Detections in Adit Seep Sites—April 2012 through February 2016 (Part 1)

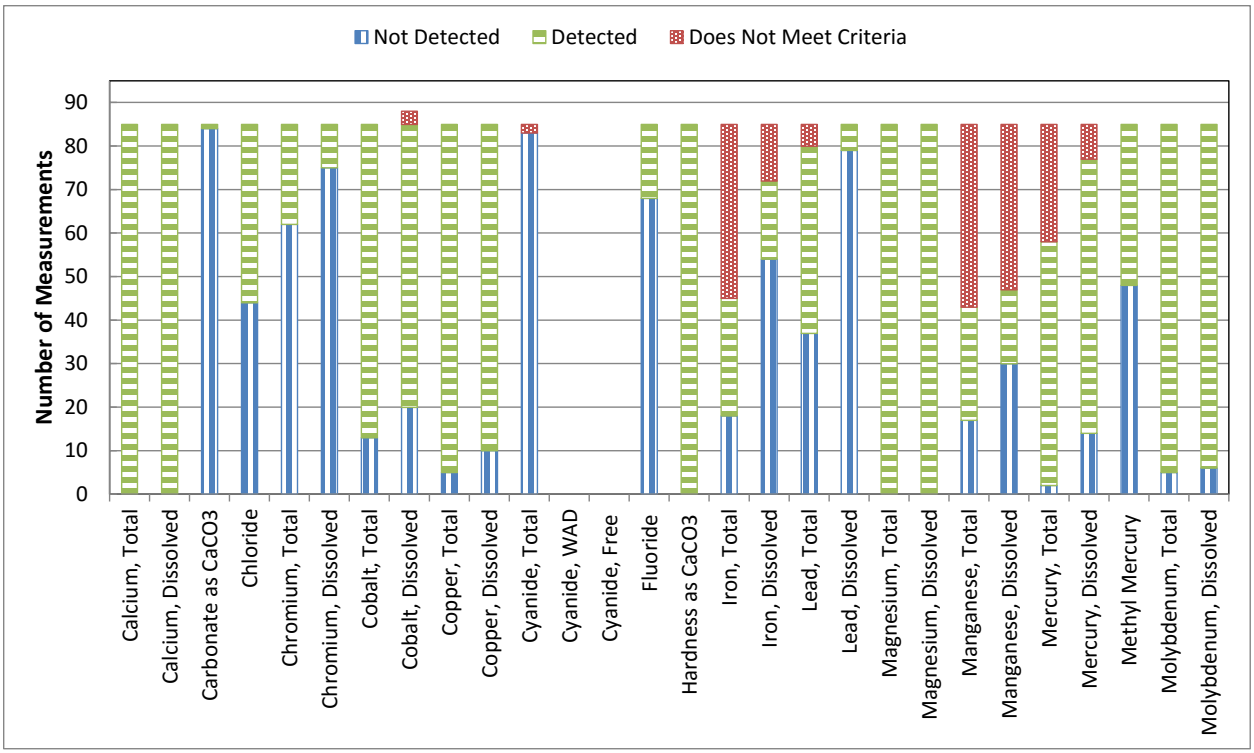

Figure 4-2. Analyte Detections in Adit Seep Sites—April 2012 through February 2016 (Part 2)

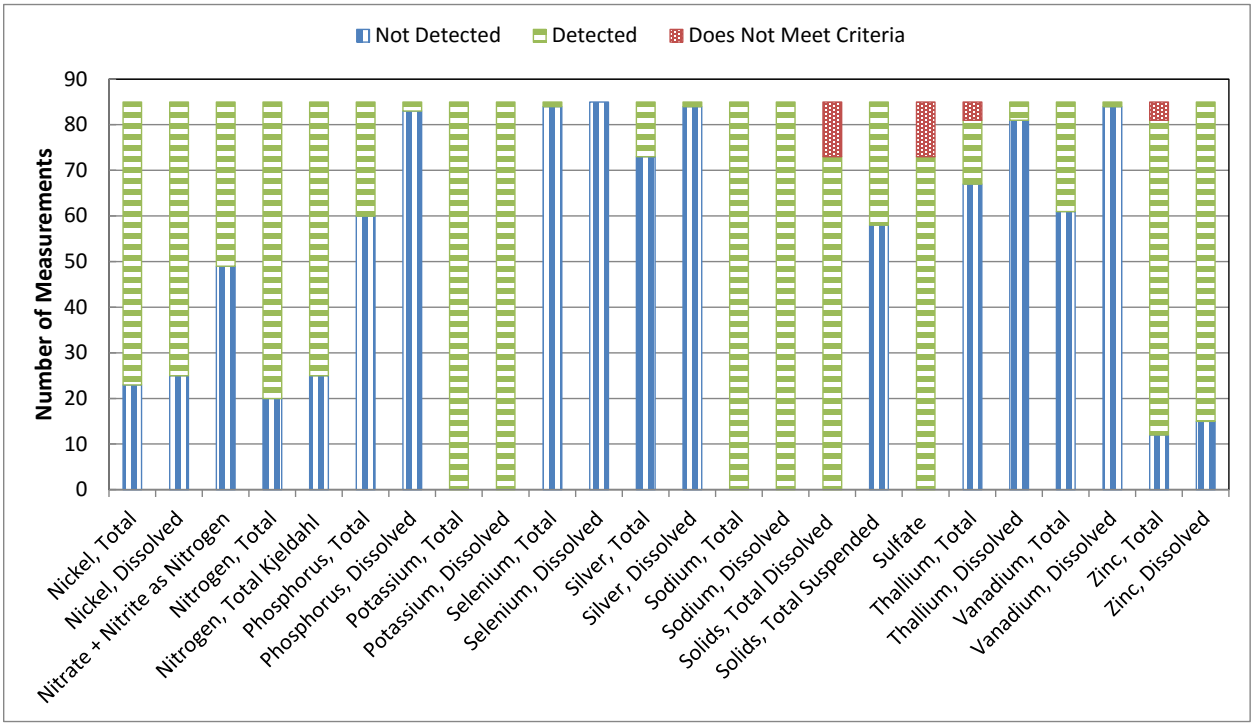

Figure 4-3. Analyte Detections in Adit Seep Sites—April 2012 through February 2016 (Part 3)

Overall, the natural seep site graphs (**Figure 4-4** through **Figure 4-6**) show that most constituents occur in concentrations that meet regulatory criteria most of the time. In addition, many constituents are not detected most of the time. The graphs also highlight the constituents that do not always meet regulatory criteria. Total and dissolved antimony and total and dissolved arsenic exceeded regulatory criteria in most samples (**Figure 4-4**). Measurements of total

aluminum, total cyanide, total and dissolved iron, total mercury, and total and dissolved manganese did not meet regulatory criteria in about half of the samples (**Figure 4-4** and **Figure 4-5**). Onsite measurements of dissolved oxygen, pH, and water temperature occasionally did not meet regulatory criteria (**Figure 4-4**). Alkalinity, dissolved aluminum, total and dissolved cadmium, dissolved cobalt, total and dissolved copper, total and dissolved lead, dissolved mercury, total and dissolved nickel, total and dissolved selenium, total dissolved solids, sulfate, total and dissolved thallium, and total and dissolved zinc rarely did not meet regulatory criteria (**Figure 4-4** through **Figure 4-6**). Appendix H contains a summary table with all exceedances for the period of this baseline report.

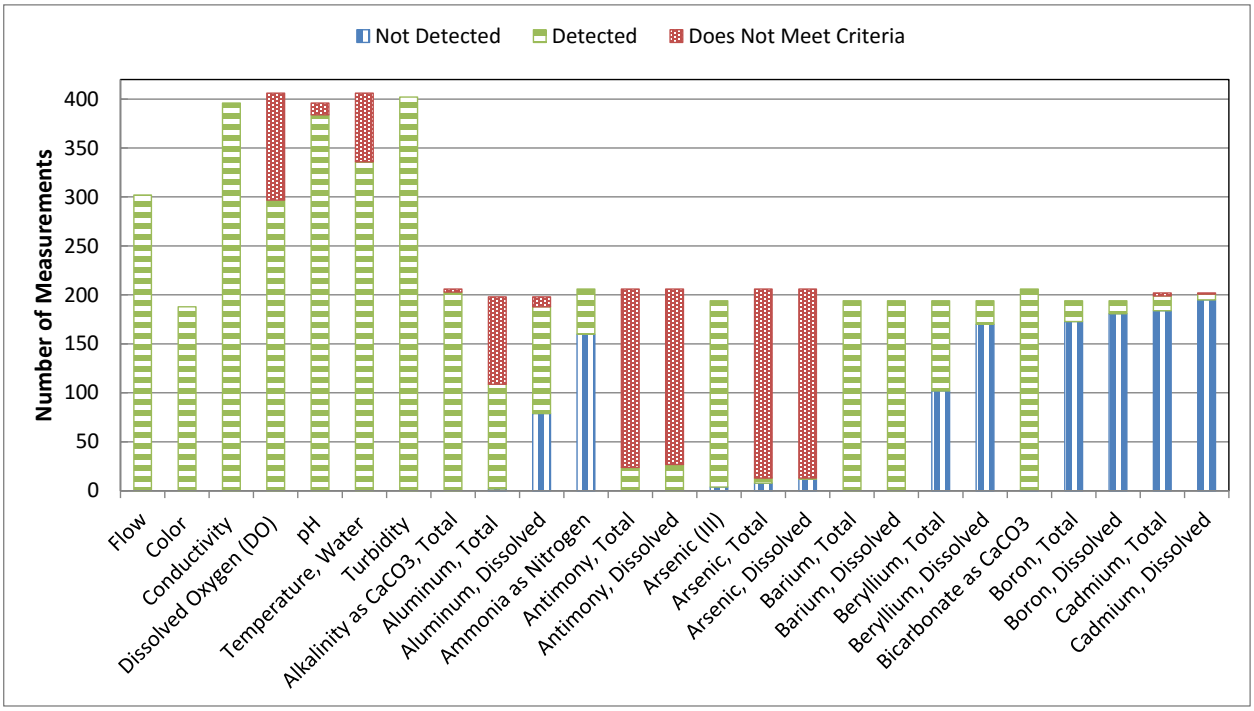

Figure 4-4. Analyte Detections in Natural Seep Sites—April 2012 through February 2016 (Part 1)

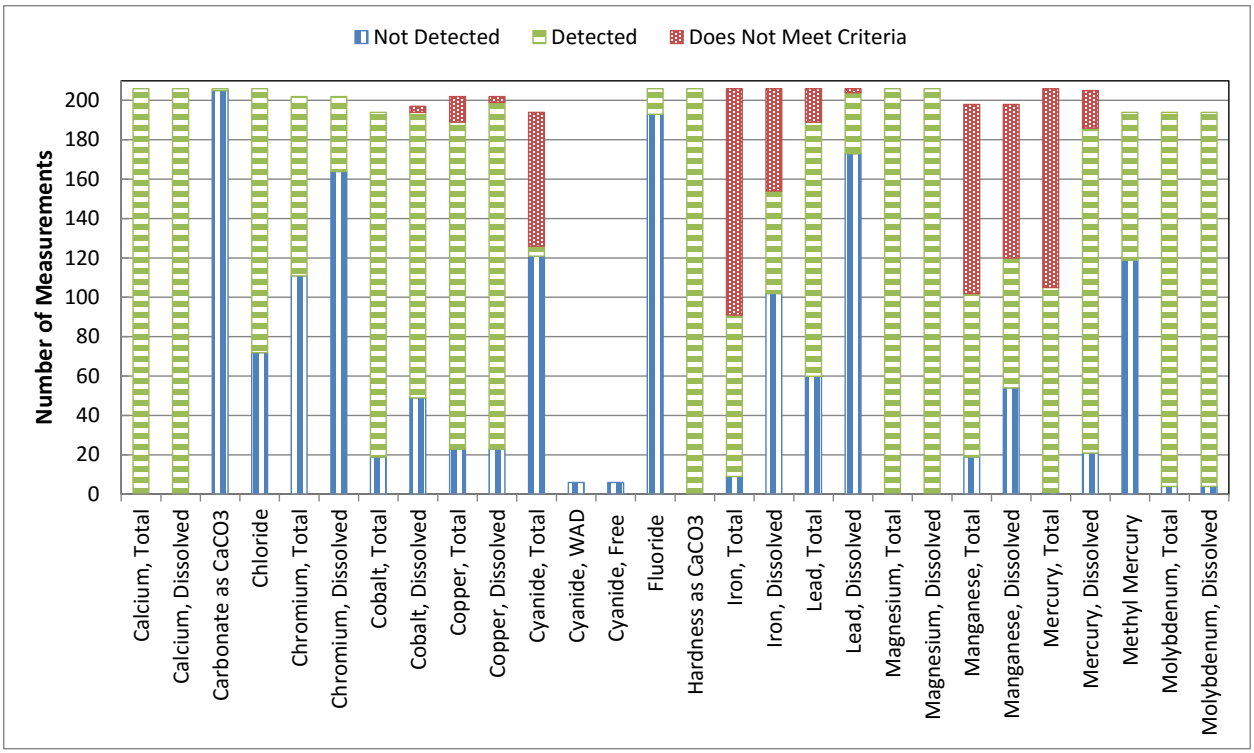

Figure 4-5. Analyte Detections in Natural Seep Sites—April 2012 through February 2016 (Part 2)

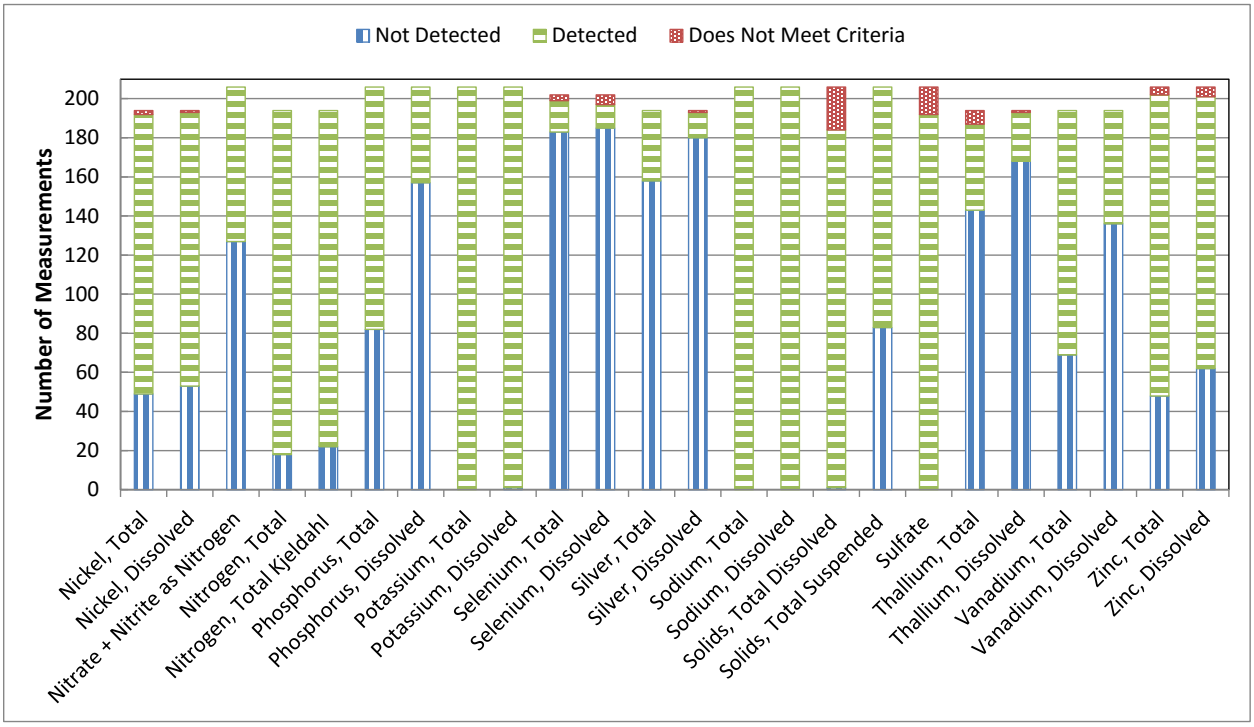

Figure 4-6. Analyte Detections in Natural Seep Sites—April 2012 through February 2016 (Part 3)

Overall, the stream site graphs (**Figure 4-7** through **Figure 4-9**) show that most constituents occur in concentrations that meet regulatory criteria most of the time. In addition, many constituents are not detected most of the time. The graphs also highlight the constituents that do not always meet regulatory criteria. Total and dissolved antimony, total and dissolved arsenic, total aluminum, and total mercury exceeded regulatory criteria in about half of samples

(**Figure 4-7** and **Figure 4-8**). Onsite measurements of pH and water temperature occasionally did not meet regulatory criteria (**Figure 4-7**). Alkalinity, dissolved aluminum, dissolved cadmium, dissolved cobalt, total cyanide, total iron, total lead, total and dissolved manganese, dissolved mercury, and total dissolved solids rarely did not meet regulatory criteria (**Figure 4-7** through **Figure 4-9**). Appendix H contains a summary table with all exceedances for the period of this baseline report.

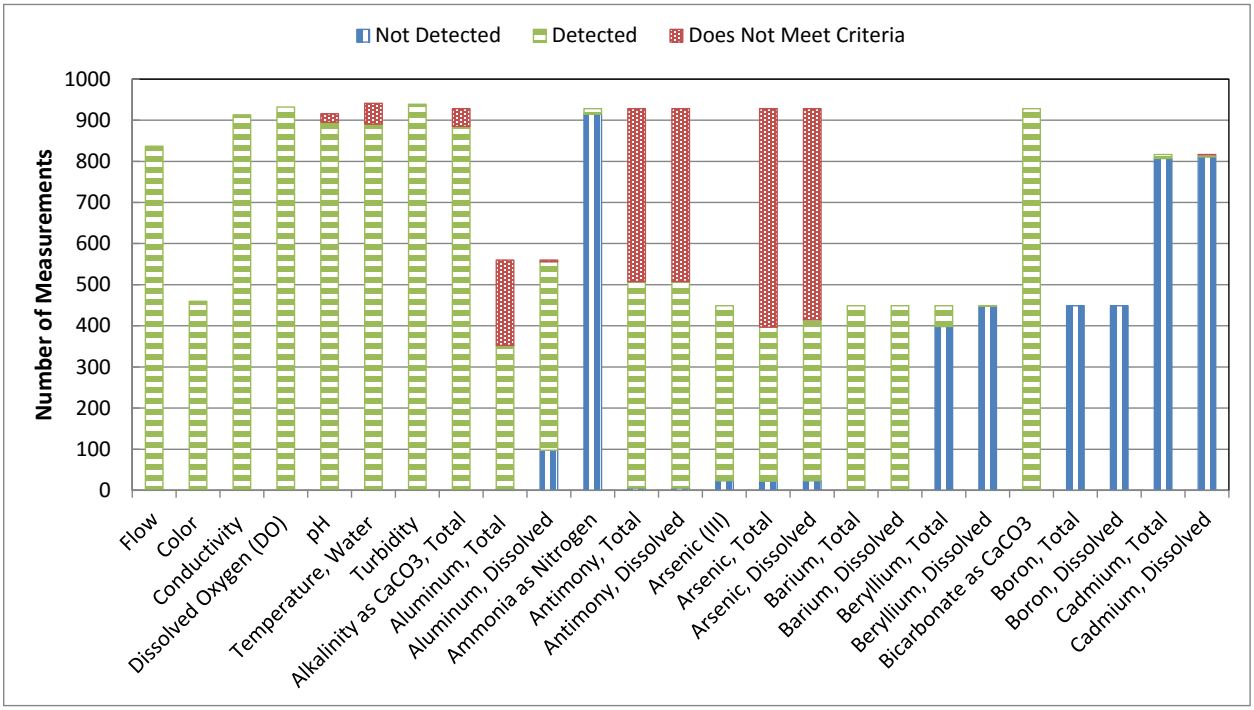

Figure 4-7. Analyte Detections in Stream Sites—April 2012 through February 2016 (Part 1)

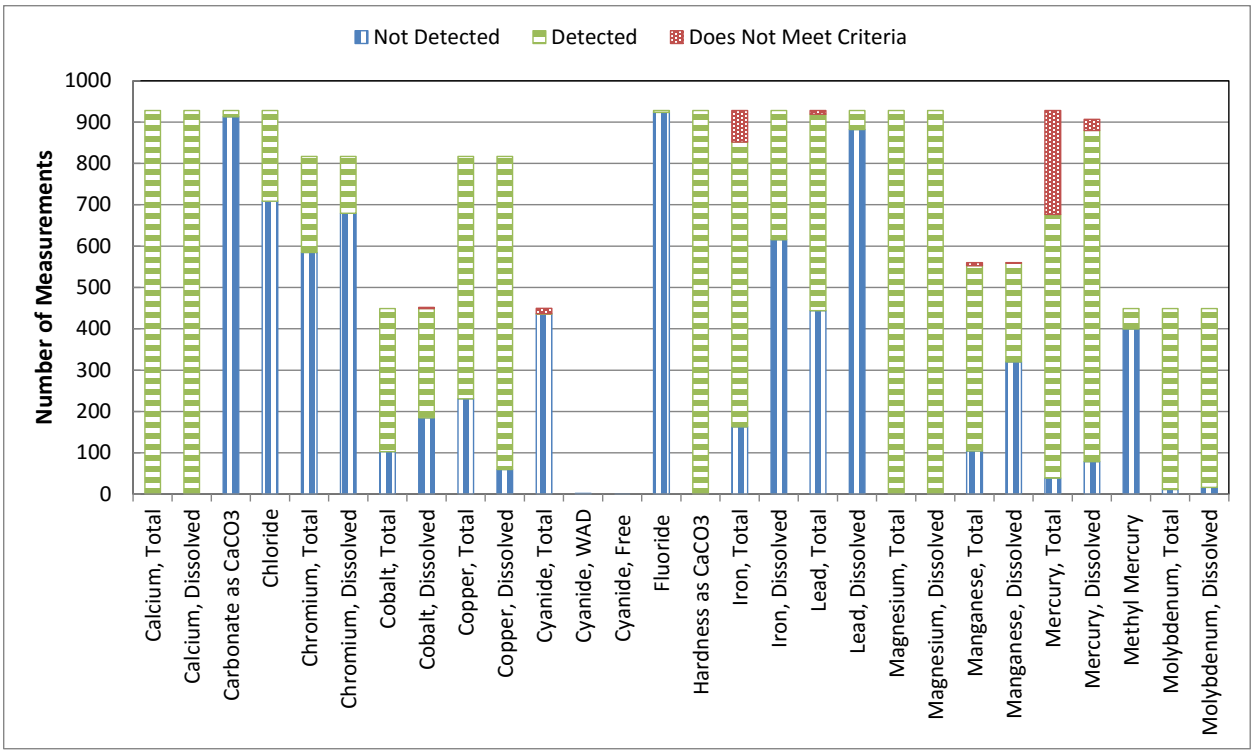

Figure 4-8. Analyte Detections in Stream Sites—April 2012 through February 2016 (Part 2)

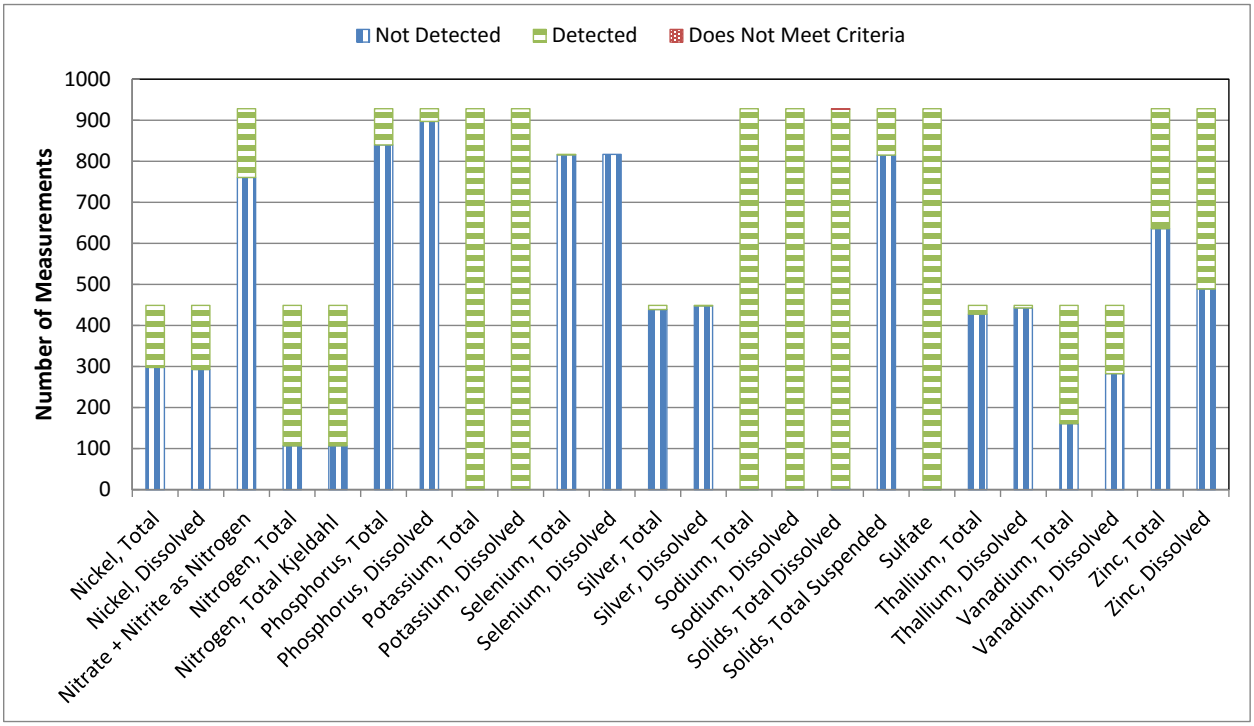

Figure 4-9. Analyte Detections in Stream Sites—April 2012 through February 2016 (Part 3)

Of the top five constituents that do not meet regulatory criteria most frequently (antimony, arsenic, aluminum, iron and mercury), the remainder of the overview focuses on antimony, arsenic and mercury. The strictest regulatory criteria associated with aluminum (50 µg/L), iron (300 µg/L), and manganese (50 µg/L) are secondary drinking water regulations, which are set by the USEPA as non-mandatory water quality standards and these constituents are not considered

threatening to health at these levels (USEPA 2009b). In contrast, the criteria associated with antimony (5.6 µg/L) and arsenic (10 µg/L) are set by IDAPA (58.01.02) as limits for human consumption of water and organisms, and the criterion associated with mercury (12 nanograms per liter [ng/L]) is the chronic criterion for aquatic life (IDEQ 2008).

In summary, **Figure 4-1** through **Figure 4-9** show that most constituents meet regulatory criteria. There are a limited number of constituents that occasionally do not meet criteria, and total and dissolved antimony and arsenic and total mercury frequently do not meet regulatory criteria. Appendix H contains a summary table with all exceedances for the period of this baseline report.

Mean Concentrations of Antimony, Arsenic, and Mercury

The following graphs (**Figure 4-10** through **Figure 4-15**) show the population mean and standard deviations for total and dissolved antimony, arsenic, and mercury concentrations. Only sites for which these values could be calculated (as described in Section 3.5.5) are shown; several sites that have too few data to calculate population statistics are not shown. The vertical axes are logarithmic and represent constituent concentration (in µg/L for antimony and arsenic, and in ng/L for mercury). A horizontal rank assigned to each sampling site is based on upstream and downstream location within major valleys and to effectively display the data uniformly and provide more clarity. General upstream to downstream flow throughout the system is presented as left to right on the horizontal axis. The horizontal distance between sampling sites does not represent relative ground distances between sites.

Sites are grouped into five categories within segments of primary streams and their associated valleys (see **Figure 3-1** for site locations). The term "group" refers to all sites, including streams and seep or adit seeps. Any sites referred to as "Meadow Creek" or "EFSFSR" refer to sites within the stream itself. For example, the upper EFSFSR group has all sites in the EFSFSR from YP-T-44 to YP-SR-11, with YP-T-44 being the left most on the horizontal axes and YP-SR-11 being the right most site. The Meadow Creek group encompasses both sites in the main stem of Meadow Creek, any tributaries (e.g., Blowout Creek) that directly flow into Meadow Creek, and all seep or adit seep sites within the Meadow Creek valley. The Meadow Creek group starts with YP-T-46 being the left most site on the horizontal axes and YP-T-22 being the right most. The middle EFSFSR group contains sites, including the EFSFSR, tributaries, and seeps or adit seeps between YP-SR-10 and YP-T-48. Similarly, Sugar Creek group includes all sites between YP-T-8A and YP-T-1. The lower EFSFSR group includes sites YP-SR-2 and YP-T-40.

Figure 4-10 and **Figure 4-11** show broad trends in mean concentrations of total and dissolved antimony. First, the similarity between the mean concentrations of total and dissolved antimony indicates that most of the antimony occurs in the dissolved fraction. For example, the first EFSFSR station shown (nearest to the vertical axis) has a mean total antimony concentration of about 0.1 µg/L (**Figure 4-10**) and also a mean dissolved antimony concentration of about 0.1 µg/L (**Figure 4-11**). The graphs show a correlation between increasing total and dissolved antimony and downstream location within the EFSFSR, with the exception of several tributary sites in the middle EFSFSR group. The Fiddle Creek sites (YP-T-11 and YP-T-12) and the Hennessy Creek site (YP-T-41) are part of the middle EFSFSR group (**Figure 3-1**) and have noticeably lower total and dissolved antimony concentrations when compared to EFSFSR sites. The lower concentrations at the Fiddle Creek and Hennessy Creek sites are likely due to little or no upstream legacy mining activity when compared to sites in the EFSFSR. The graphs also show that mean antimony concentrations exceed the regulatory criterion in most seep and adit seep sites for the Meadow Creek, middle EFSFSR, and Sugar Creek groups. In contrast, mean

antimony only exceeds the regulatory criterion in a few sites in Sugar Creek and Meadow Creek. Finally, the graphs show that mean antimony concentrations in some of the adit seeps and seeps can be one to two orders of magnitude greater than the concentrations measured in EFSFSR, Meadow Creek, and Sugar Creek sites.

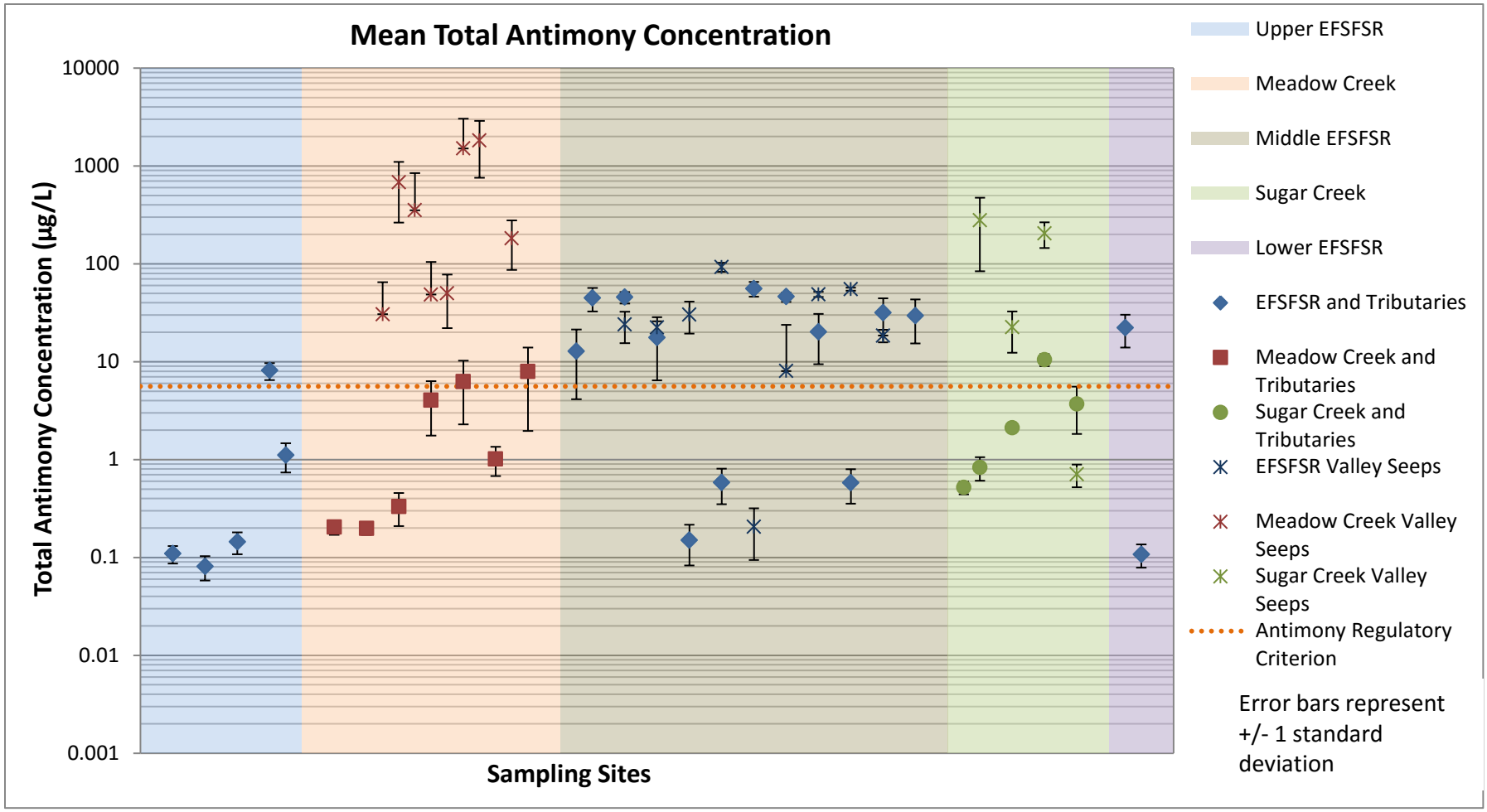

Figure 4-10. Mean Total Antimony Concentration at Sampling Sites—April 2012 through February 2016

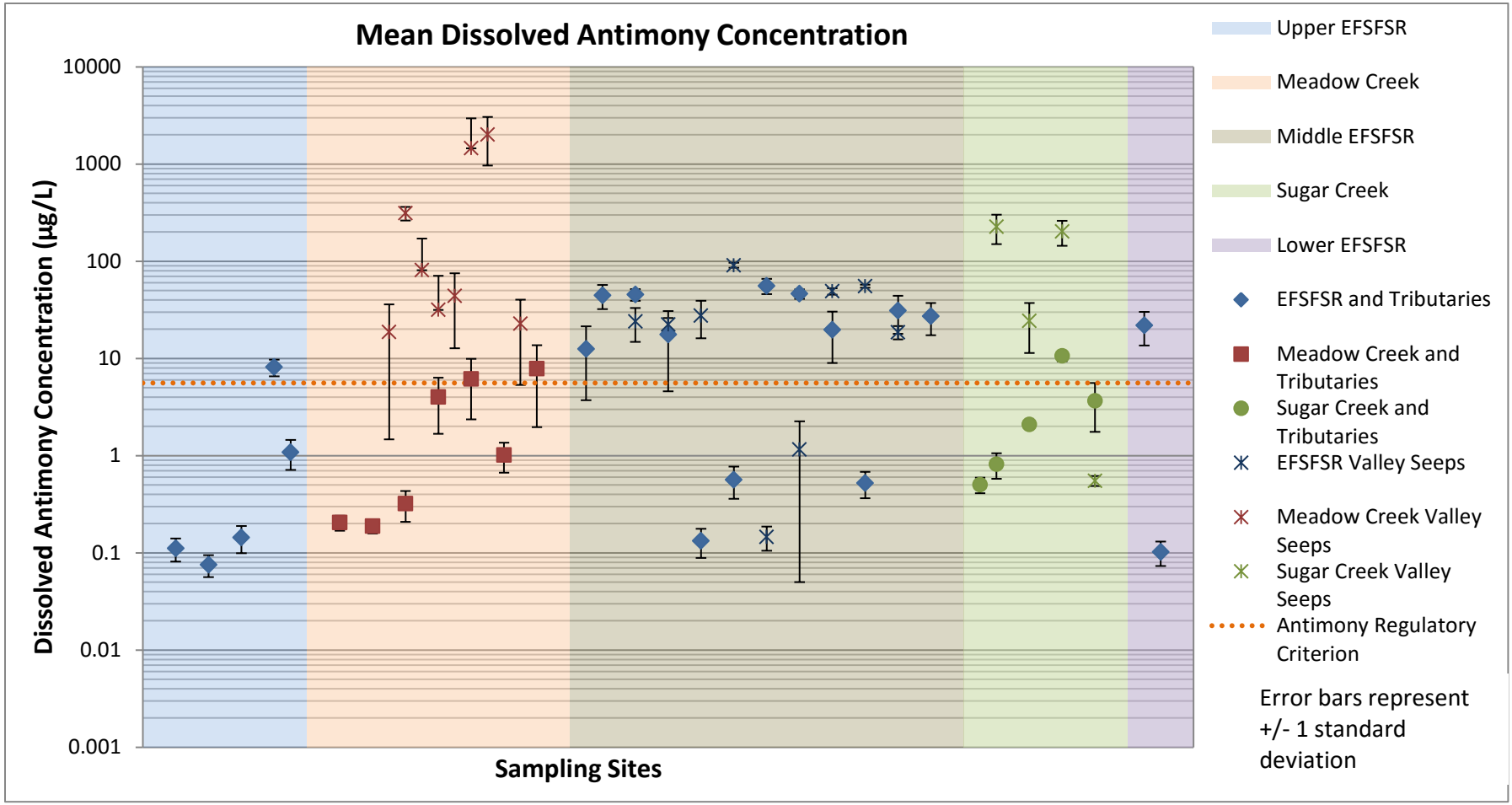

Figure 4-11. Mean Dissolved Antimony Concentration at Sampling Sites—April 2012 through February 2016

Figure 4-12 and **Figure 4-13** show broad trends in the mean concentrations of total and dissolved arsenic. First, the similarity between the mean concentrations of total and dissolved arsenic indicates that most of the arsenic occurs in the dissolved fraction, particularly for the EFSFSR, Meadow Creek, and Sugar Creek sites. For example, the first EFSFSR site, in the upper EFSFSR group, has a mean total arsenic concentration of about 4 µg/L (**Figure 4-12**) and also a mean dissolved arsenic concentration of about 4 µg/L (**Figure 4-13**). In the Meadow Creek and Sugar Creek groups, adit seep and seep sites tend to have more variation in the total arsenic concentration (indicated by the larger standard deviation bars) and more of the arsenic tends to occur in the total fraction. For example, the third seep, in the Meadow Creek group, has a mean total arsenic concentration of about 10,000 µg/L (**Figure 4-12**) and a mean dissolved arsenic concentration of about 1,100 µg/L (**Figure 4-13**). The graphs show a correlation between increasing total and dissolved arsenic and downstream location within the EFSFSR, with the exception of several tributary sites in the middle EFSFSR group. A Fiddle Creek site (YP-T-11) and the Hennessy Creek site (YP-T-41) are part of the middle EFSFSR group (**Figure 3-1**) and have noticeably lower total and dissolved arsenic concentrations when compared to EFSFSR sites. The lower concentrations in the Fiddle Creek and Hennessy Creek sites are likely due to little or no upstream legacy mining activity when compared to sites in the EFSFSR. The graphs also show that mean arsenic concentrations exceed the regulatory criterion in most of adit seep and seep sites for the Meadow Creek, middle EFSFSR, and Sugar Creek groups. Mean arsenic also exceeds the regulatory criterion in most of the middle EFSFSR sites. Finally, the graphs show that mean arsenic concentrations in many of the adit seeps and seeps can be one to two orders of magnitude greater than the concentrations measured in EFSFSR, Meadow Creek, and Sugar Creek sites.

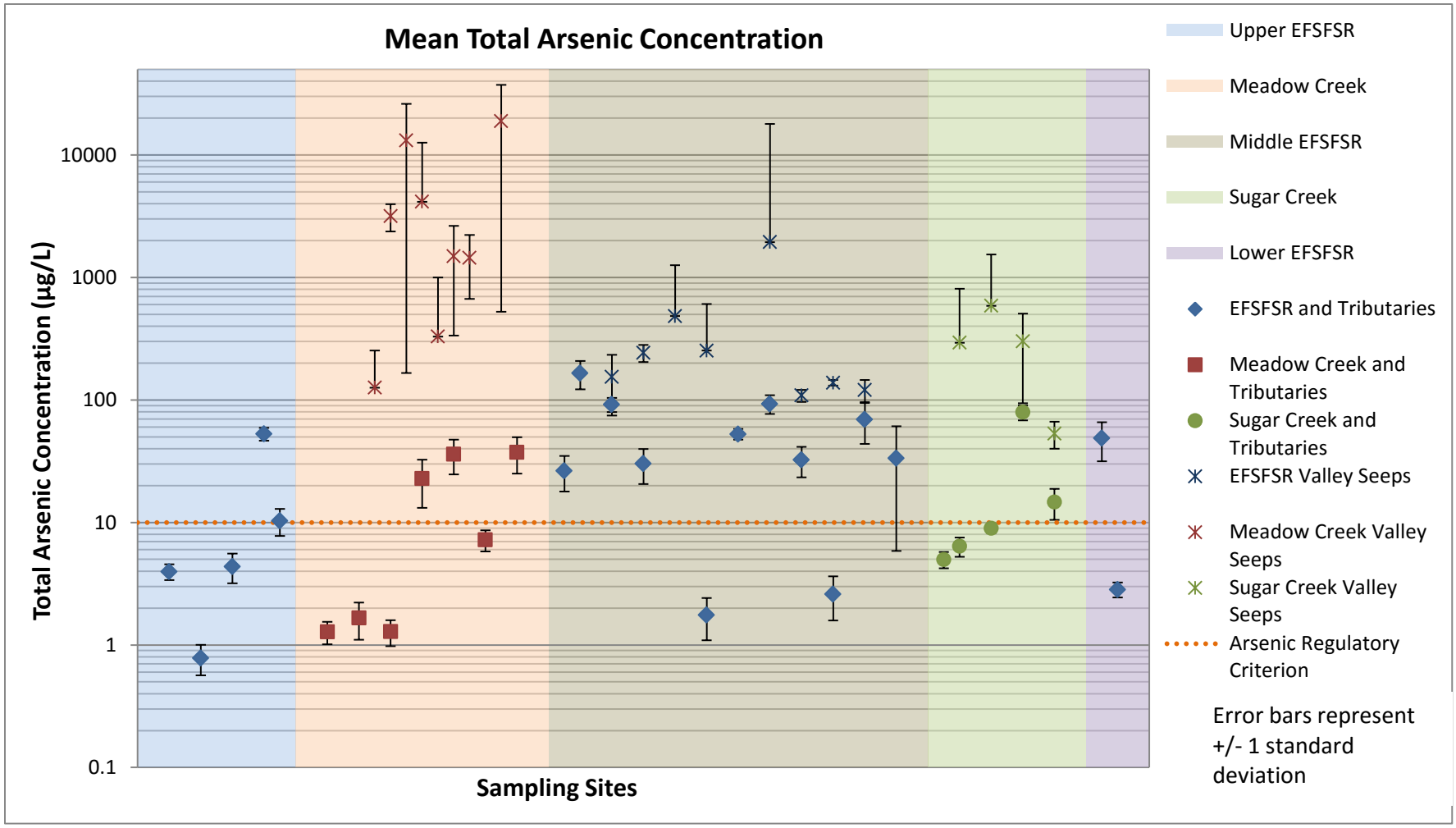

Figure 4-12. Mean Total Arsenic Concentration at Sampling Sites—April 2012 through February 2016

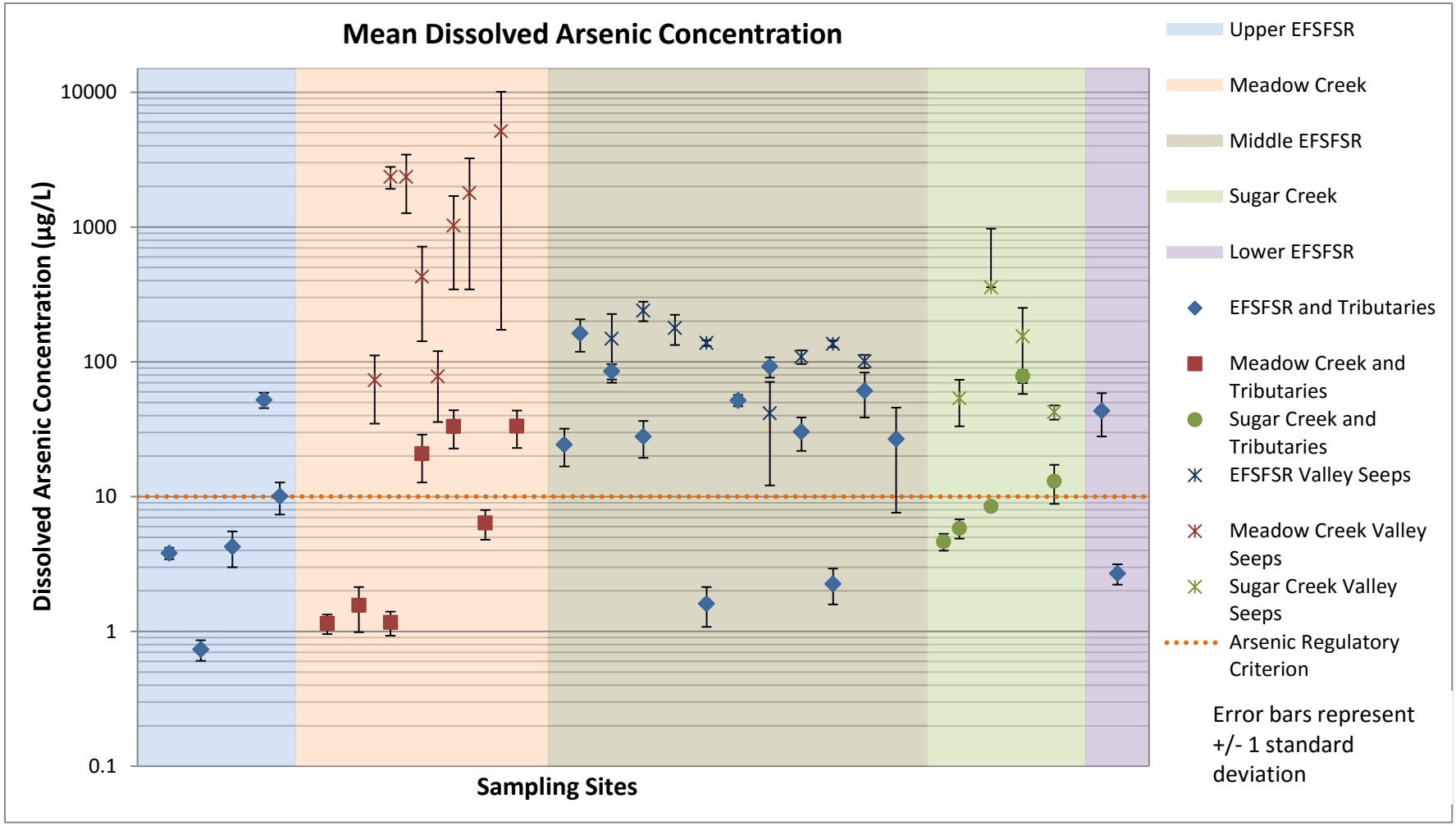

Figure 4-13. Mean Dissolved Arsenic Concentration at Sampling Sites—April 2012 through February 2016

Figure 4-14 and **Figure 4-15** show general trends in the mean concentrations of total and dissolved mercury. First, in contrast to antimony and arsenic, the mean concentrations of total and dissolved mercury vary substantially, which indicates that a greater proportion of the mercury occurs in the total fraction. For example, the first Sugar Creek site, in the Sugar Creek group, has a mean total mercury concentration of about 125 ng/L (**Figure 4-14**) and a mean dissolved mercury concentration of about 8 ng/L (**Figure 4-15**). For most sites, the standard deviation associated with the mean total mercury concentration is also relatively large, indicating that the total mercury concentration varies substantially at the sites during the period of record. In general, mean dissolved mercury is below the regulatory criterion at most of the sites, excluding two seep sites in Meadow Creek group and two seep sites in the Sugar Creek group. Similarly, mean total mercury is below the regulatory criterion at most upper, middle, and lower EFSFSR sites, most Meadow Creek sites, and about half of the adit seep and seep sites within the middle EFSFSR and Meadow Creek groups. However, mean total mercury exceeds the regulatory criterion in all but two of the sites in the Sugar Creek group.

In summary, **Figure 4-10** and **Figure 4-11** show that most of the antimony occurs in the dissolved fraction and that mean concentrations exceed the regulatory criterion in most of the adit seep and seep sites for the Meadow Creek, middle EFSFSR, and Sugar Creek groups. **Figure 4-12** and **Figure 4-13** show that most of the arsenic also occurs in the dissolved fraction and that mean concentrations exceed the regulatory criterion in most of the seep and adit seeps sites in the Meadow Creek, middle EFSFSR, and Sugar Creek groups, the majority of middle EFSFSR sites, and about half of the Meadow Creek and Sugar Creek sites. In addition, these figures show that mean concentrations of antimony and arsenic in the seep and adit sites can be one to two orders of magnitude higher than in surface water sites. Finally, **Figure 4-14** and **Figure 4-15** show that most of the mercury occurs in the total fraction and total mercury concentrations vary substantially. Mean total mercury exceeds the regulatory criterion in most of the adit seep and seep sites for the Meadow Creek and Sugar Creek groups, some upper, middle, and lower EFSFSR sites, and most Sugar Creek sites.

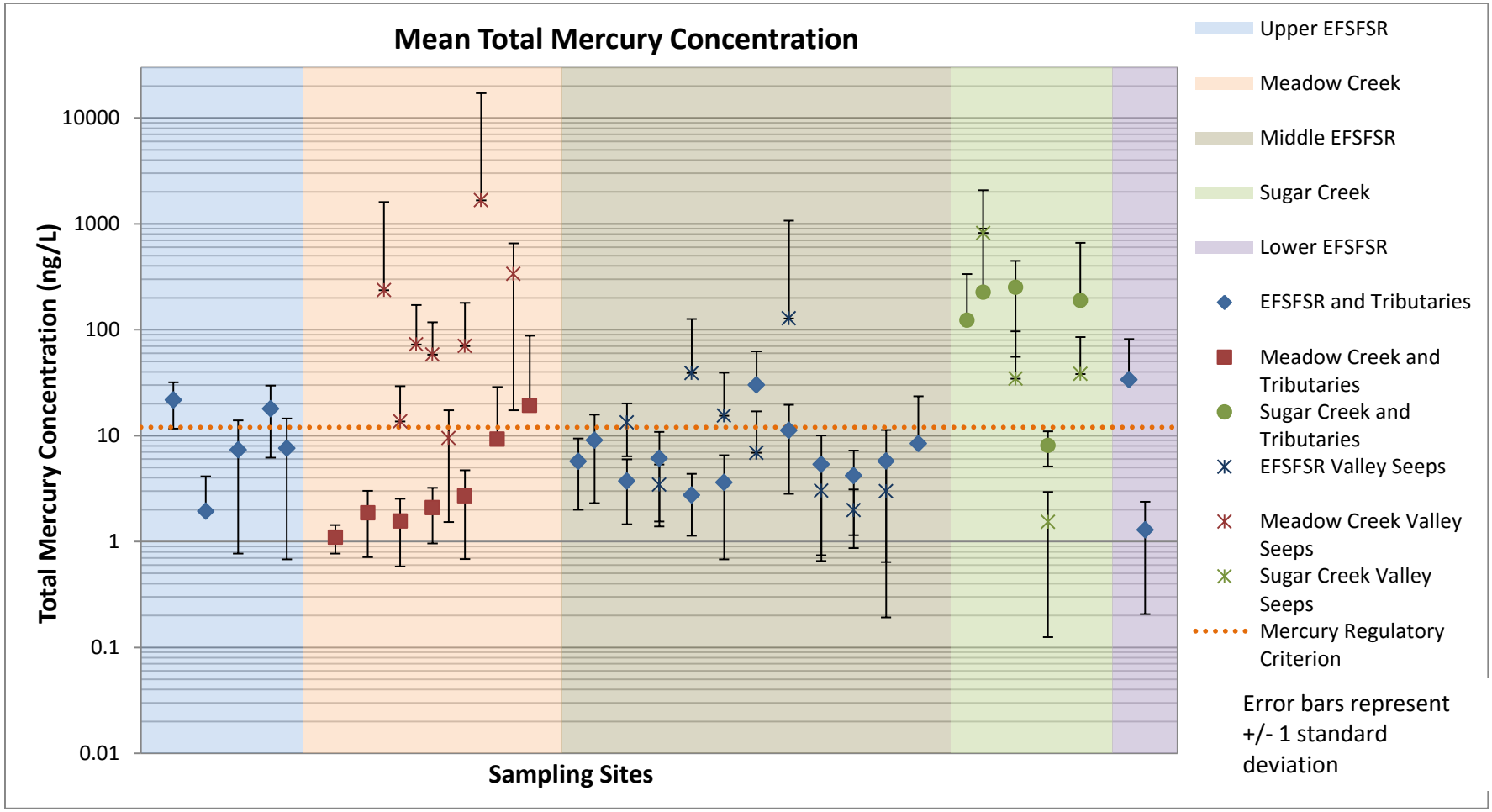

Figure 4-14. Mean Total Mercury Concentration at Sampling Sites—April 2012 through February 2016

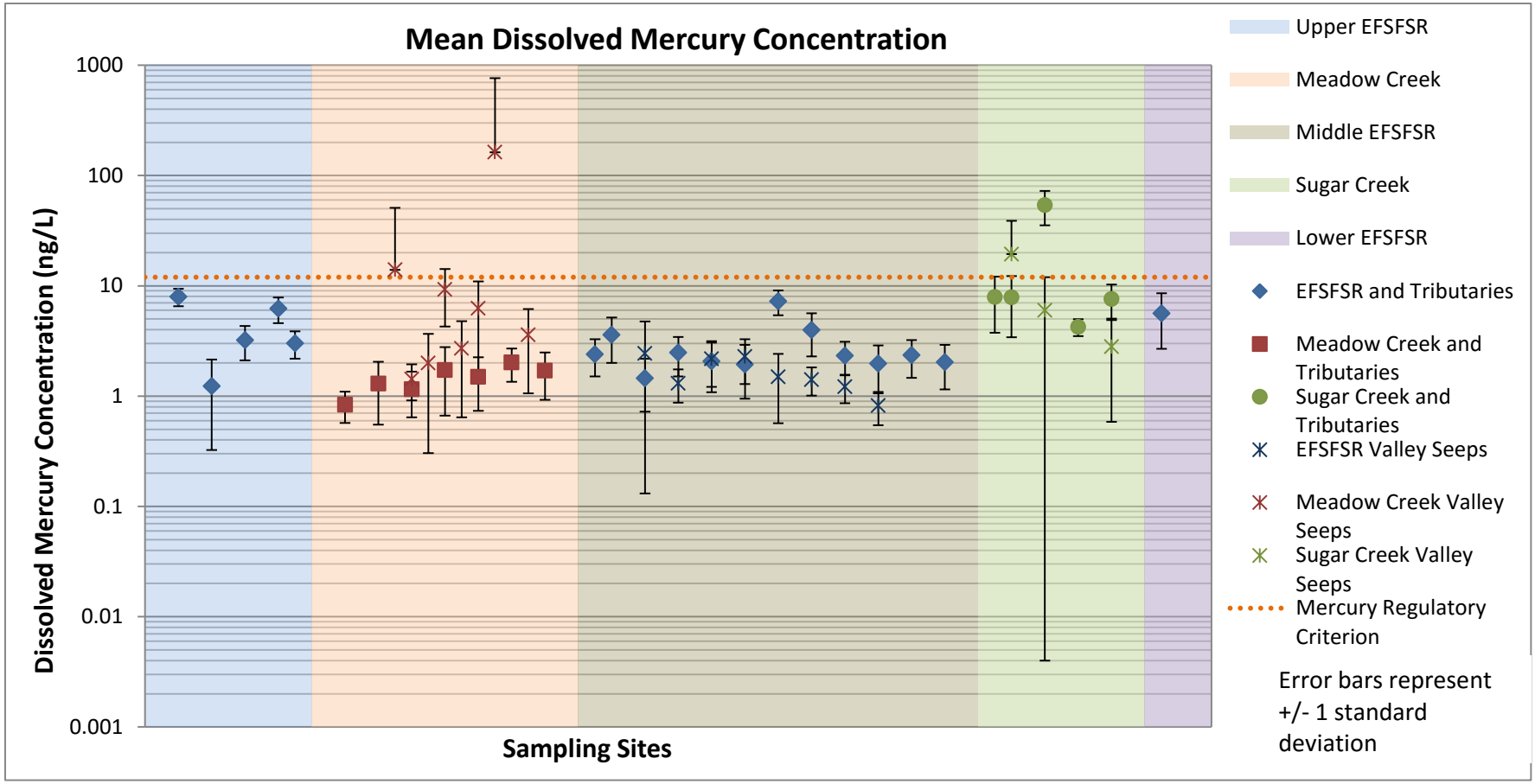

Figure 4-15. Mean Dissolved Mercury Concentration at Sampling Sites—April 2012 through February 2016

Spatial and Temporal Trends in Flow, Antimony, Arsenic and Mercury at Select Sites

The following graphs (**Figure 4-16** through **Figure 4-23**) show flow and total and dissolved antimony, arsenic and mercury concentrations for select sites on the main stems of Meadow Creek, Sugar Creek and the EFSFSR. These sites were selected to give a general sense of how concentrations vary with flow and through time, and how these constituents vary from upstream to downstream locations on streams in the study area. The reader should refer to the individual site results in Section 4.1.2 if more detailed analytical results are desired.

Figure 4-16 and **Figure 4-17** show flow and selected metals in Meadow Creek above SODA (YP-T-33) and in Meadow Creek above EFSFSR (YP-T-22). Refer to **Figure 3-1** for site locations. At the upper Meadow Creek site (YP-T-33), total and dissolved antimony, arsenic and mercury occur at concentrations below regulatory criteria, and concentrations vary only slightly with variations in flow (**Figure 4-16**). In general, the highest mercury and lowest antimony and arsenic concentrations tend to coincide with the highest flows during the spring snowmelt period. In contrast, at the lower Meadow Creek site (YP-T-22), total and dissolved arsenic consistently exceed the regulatory criterion (**Figure 4-17**). Total and dissolved antimony tend to exceed the regulatory criterion during low flow conditions, and total mercury occasionally exceeds the regulatory criterion, generally during high flow conditions. The lower Meadow Creek site (YP-T-22) shows an increase in arsenic and antimony concentrations prior to peak runoff. This may indicate a first flush of groundwater being displaced by snowmelt, but further analysis is needed to determine causation.

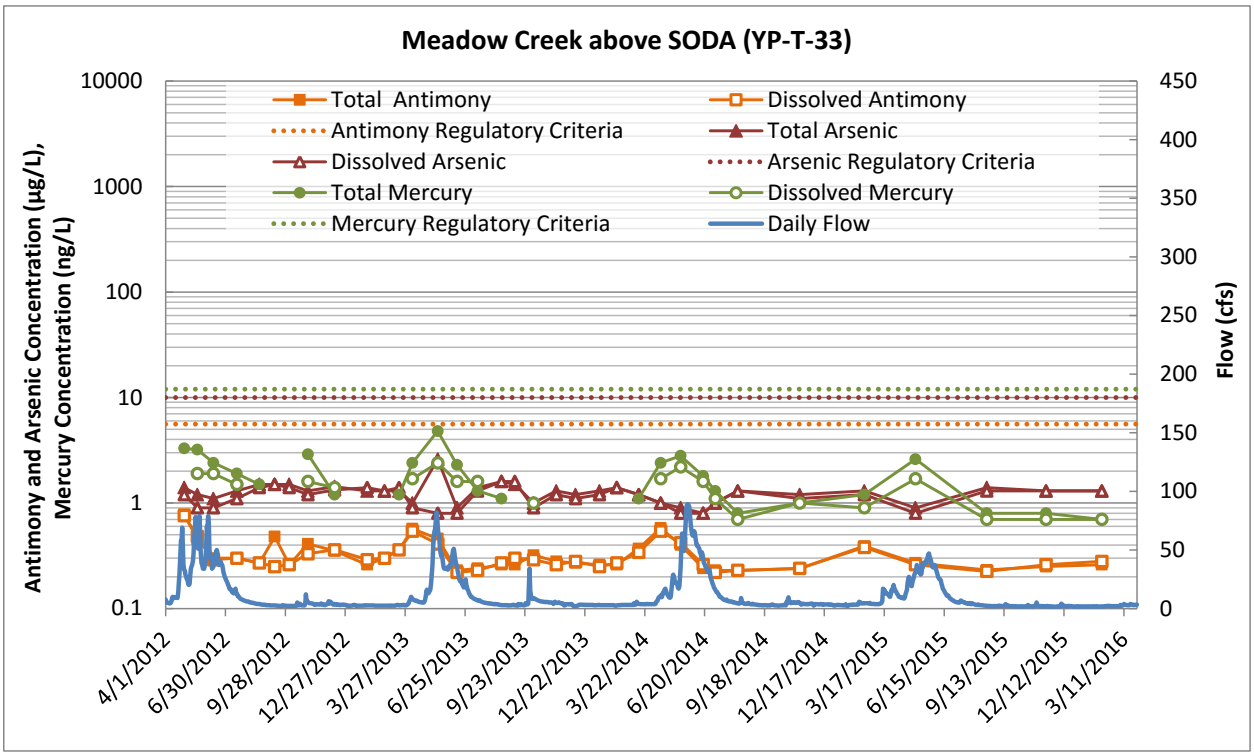

Figure 4-16. Flow and Selected Metals in Meadow Creek above SODA (YP-T-33)—April 2012 through February 2016

Note: Flow data are from USGS Station 13310850 (Meadow Creek near YP-T-33). Total and dissolved mercury were not detected (< 1.0 ng/L) during some events and therefore these non-detect data are not shown on the graph. Total and dissolved arsenic concentrations often have similar values and are difficult to differentiate on the graph. It can be assumed that both concentrations are plotted at locations with a single point or line.

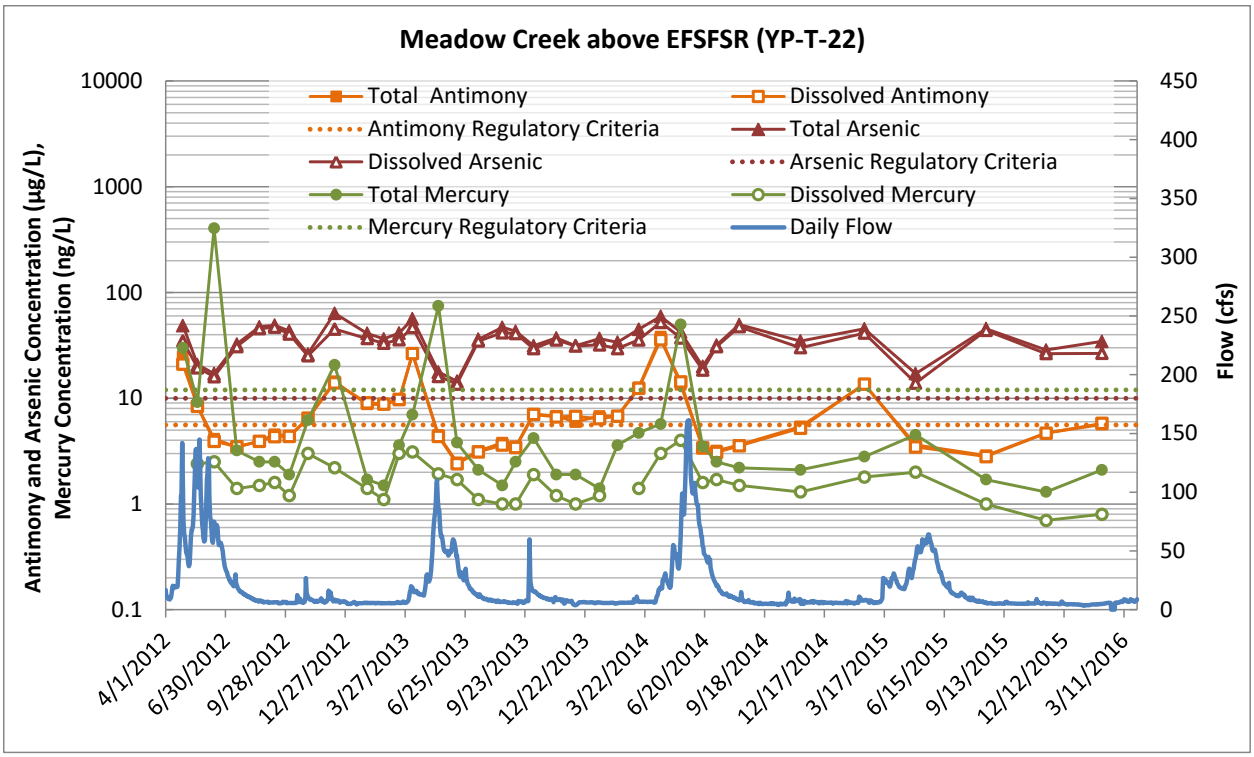

Figure 4-17. Flow and Selected Metals in Meadow Creek above EFSFSR (YP-T-22)—April 2012 through February 2016

Note: Flow data are calculated as the difference between flow at USGS Station 13311000 (EFSFSR near YP-SR-10) and USGS Station 13310850 (Meadow Creek near YP-T-33). Dissolved mercury was not detected (< 1.0 ng/L) during some events and therefore these non-detect data are not shown on the graph. Total and dissolved arsenic concentrations often have similar values and are difficult to differentiate on the graph. It can be assumed that both concentrations are plotted at locations with a single point or line.

Figure 4-18 and **Figure 4-19** show flow and selected metals in the uppermost Sugar Creek site (YP-T-8A) and in the Sugar Creek site above EFSFSR (YP-T-1). Refer to **Figure 3-1** for site locations. At the uppermost Sugar Creek site (YP-T-8A), total and dissolved antimony and arsenic consistently occur in concentrations below regulatory criteria and show no distinct temporal trends in concentrations (**Figure 4-18**). Total mercury is consistently above the regulatory criterion with the highest concentrations occurring during the highest flows in the spring snowmelt period; dissolved mercury occasionally exceeds the criterion during these flows as well. At the Sugar Creek site above the EFSFSR (YP-T-1), total and dissolved antimony and arsenic concentrations are highest during low flow conditions (**Figure 4-19**). Total and dissolved arsenic consistently exceed the regulatory criterion during low flow conditions, whereas total and dissolved antimony only occasionally exceed the criterion during low flow conditions. In contrast, total mercury concentrations are highest during high flow conditions during spring snowmelt and exceed the regulatory criterion most of the time. Dissolved mercury only occasionally exceeds the regulatory criterion, generally during high flow conditions.

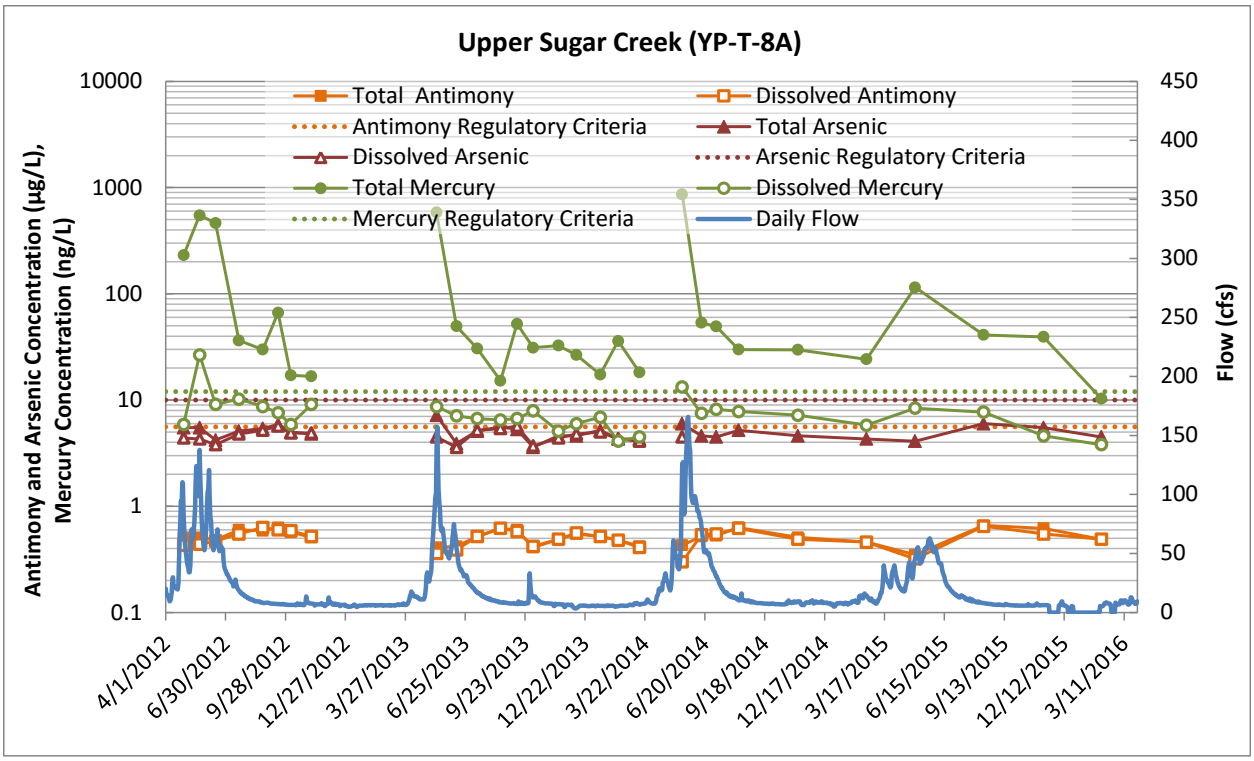

Figure 4-18. Flow and Selected Metals in Upper Sugar Creek (YP-T-8A)—April 2012 through February 2016

Note: Flow data are calculated from USGS Station 13311450 (Sugar Creek near YP-T-1) as a contributing watershed-scaled proportion of the flow measured at that downstream USGS station. The gaps in water quality data in the winter of 2012-2013 and spring 2014 occur because this site was not safely accessible for sampling during those periods. Total and dissolved arsenic concentrations often have similar values and are difficult to differentiate on the graph. It can be assumed that both concentrations are plotted at locations with a single point or line.

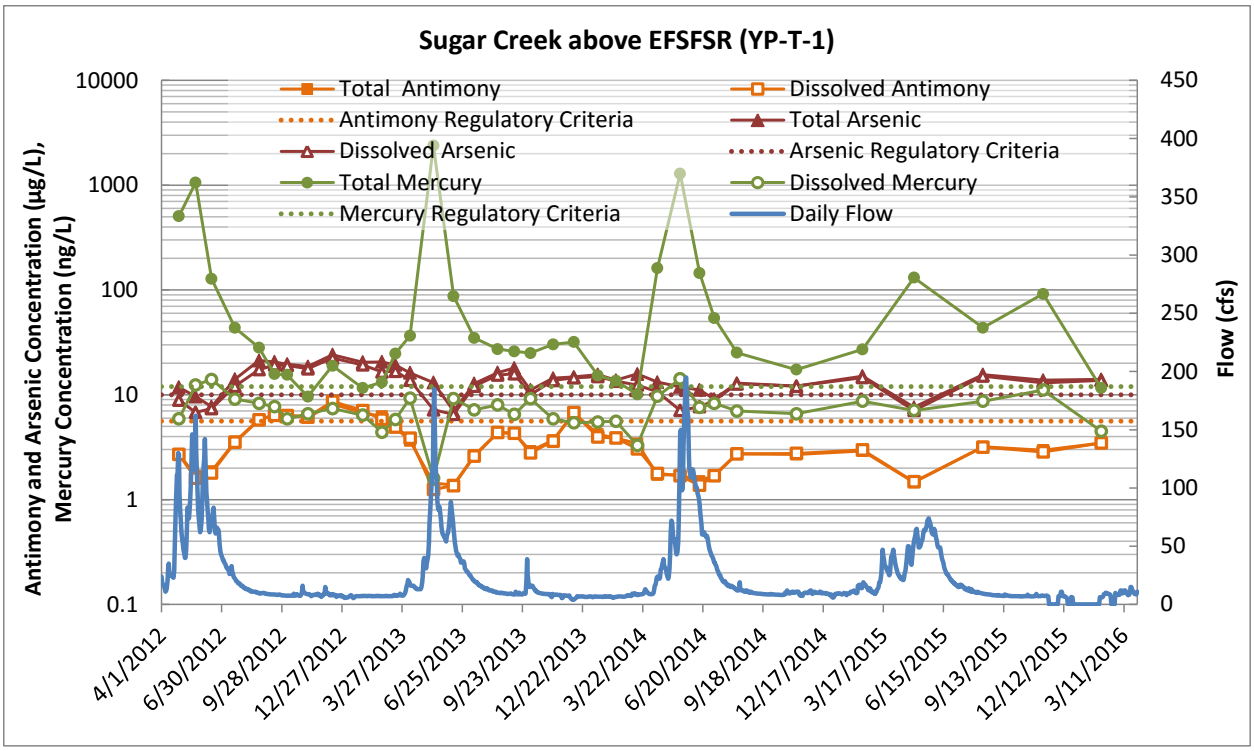

Figure 4-19. Flow and Selected Metals in Sugar Creek above EFSFSR (YP-T-1)—April 2012 through February 2016

Note: Flow data are from USGS Station 13311450 (Sugar Creek near YP-T-1). Total and dissolved arsenic concentrations often have similar values and are difficult to differentiate on the graph. It can be assumed that both concentrations are plotted at locations with a single point or line.

Figure 4-20 through **Figure 4-23** show flow and selected metals in four EFSFSR sites: EFSFSR above Rabbit Creek (YP-SR-13), EFSFSR below Meadow Creek (YP-SR-10), EFSFSR below Yellow Pine pit (YP-SR-4) and EFSFSR below Sugar Creek (YP-SR-2). Refer to **Figure 3-1** for site locations.

At the EFSFSR site above Rabbit Creek (YP-SR-13), total and dissolved antimony and arsenic consistently occur at concentrations below regulatory criteria; arsenic concentrations tend to be lowest during period of high flow, whereas antimony concentrations show no distinct temporal trends (**Figure 4-20**). Total and dissolved mercury concentrations tend to be highest in periods of high flow during the spring snowmelt conditions and total mercury occasionally exceeds the regulatory criterion during these times.

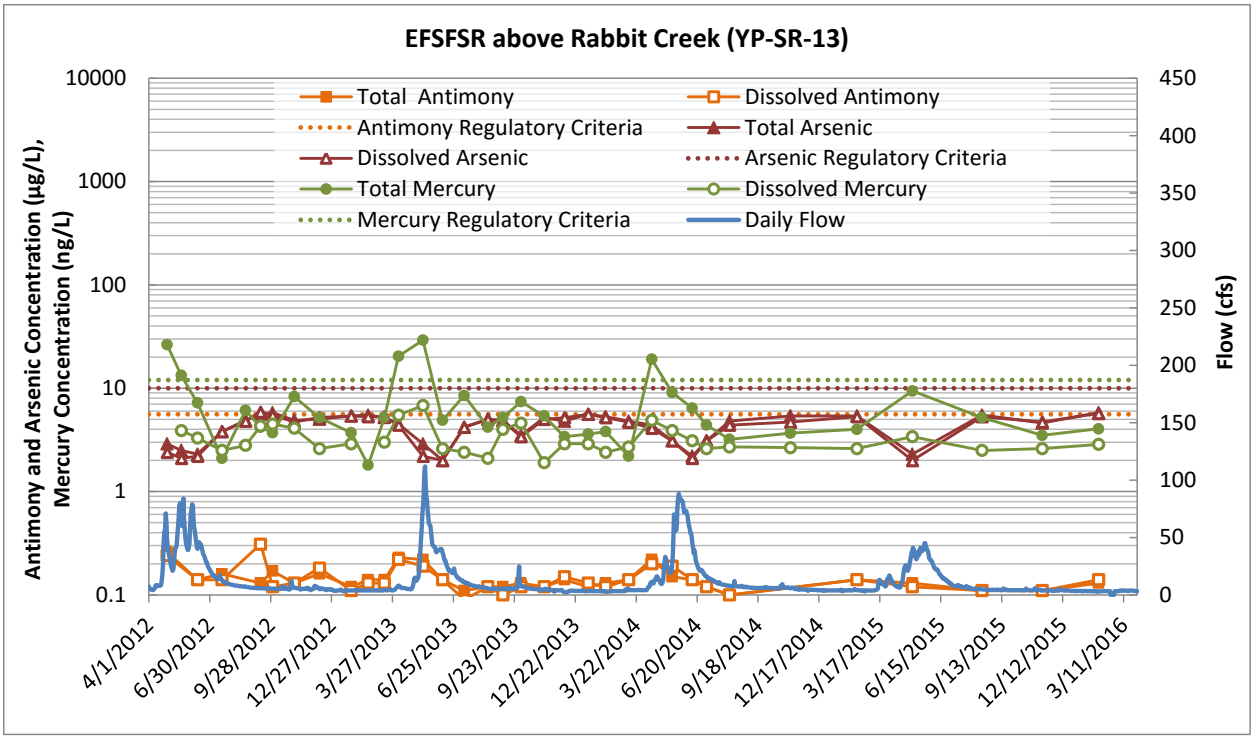

Figure 4-20. Flow and Selected Metals in EFSFSR above Rabbit Creek (YP-SR-13)—April 2012 through February 2016

Note: Flow data are from USGS Station 13310800 (EFSFSR near YP-SR-11). Dissolved mercury was not detected (< 1.0 ng/L) at this site during all events and therefore these non-detect data are not shown on the graph. Total and dissolved arsenic concentrations often have similar values and are difficult to differentiate on the graph. It can be assumed that both concentrations are plotted at locations with a single point or line.

At the EFSFSR site below Meadow Creek (YP-SR-10), total and dissolved antimony and arsenic concentrations tend to be lowest during the latter part of high flow conditions during the spring snowmelt period (**Figure 4-21**). Total and dissolved arsenic consistently exceed the regulatory criterion, whereas total and dissolved antimony are occasionally lower than the regulatory criterion. Total and dissolved mercury concentrations tend to be highest during higher flow conditions, and total mercury occasionally exceeds the regulatory criterion during rising high flow conditions in the spring snowmelt period.

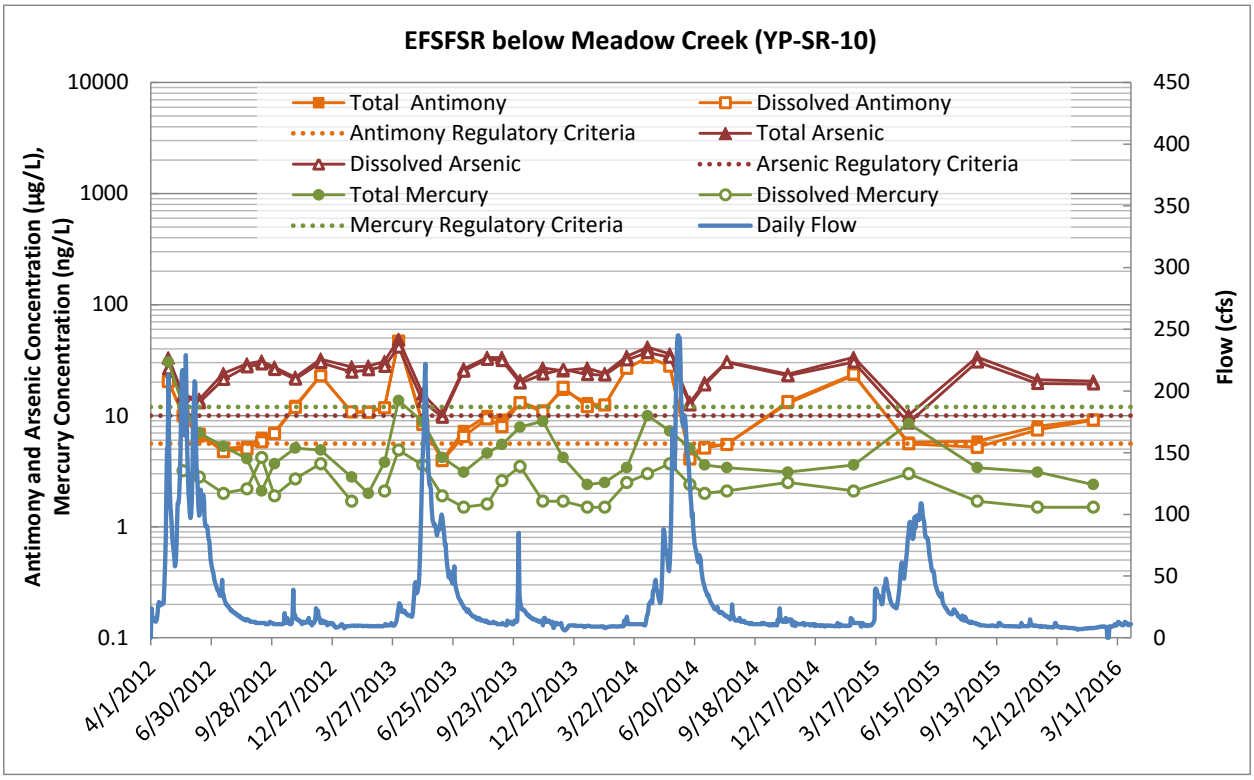

Figure 4-21. Flow and Selected Metals in EFSFSR below Meadow Creek (YP-SR-10)—April 2012 through February 2016

Note: Flow data are from USGS Station 13311000 (EFSFSR near YP-SR-10). Dissolved mercury was not detected (< 1.0 ng/L) at this site during all events and therefore these non-detect data are not shown on the graph. Total and dissolved arsenic concentrations often have similar values and are difficult to differentiate on the graph. It can be assumed that both concentrations are plotted at locations with a single point or line.

At the EFSFSR site below the Yellow Pine pit (YP-SR-4), total and dissolved antimony and arsenic concentrations tend to be lowest during high flow conditions in the spring snowmelt period (**Figure 4-22**). Both total and dissolved antimony and arsenic consistently exceeded regulatory criteria at this site. Total and dissolved mercury concentrations tend to be highest during higher flow conditions, and total mercury occasionally exceeds the regulatory criterion during spring snowmelt conditions.

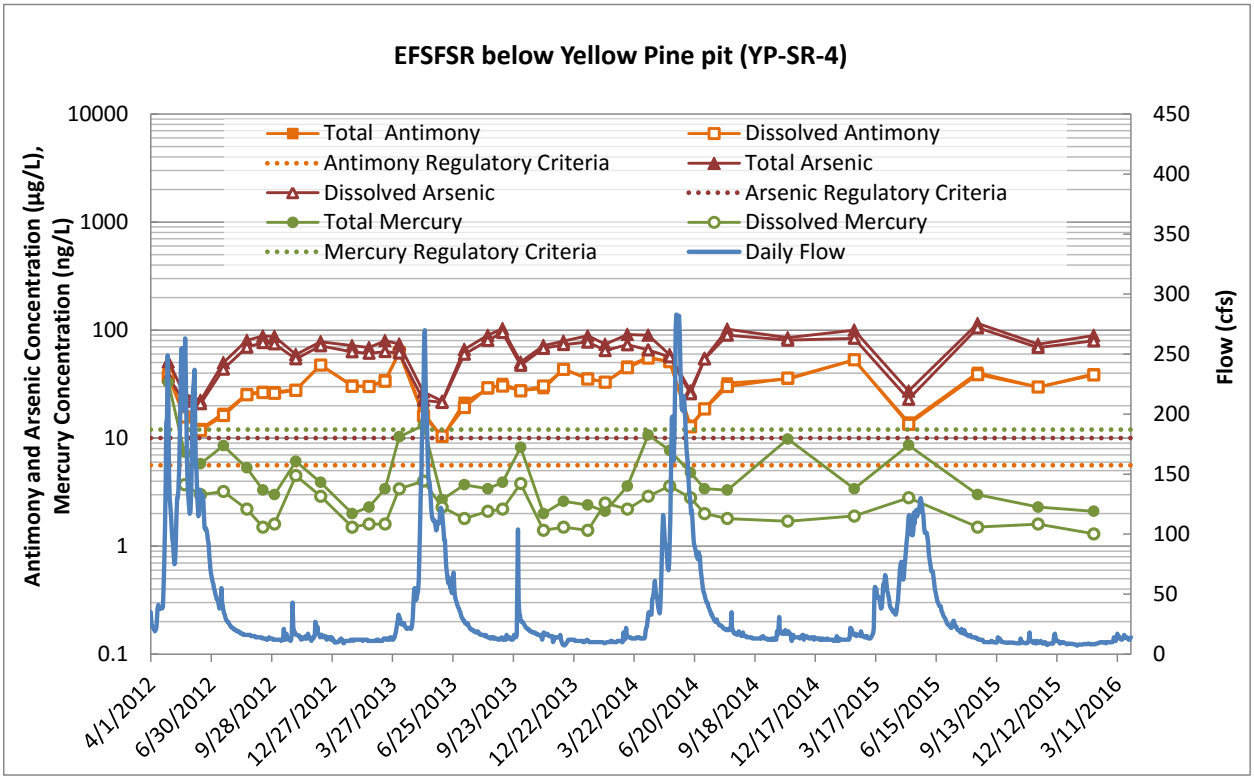

Figure 4-22. Flow and Selected Metals in EFSFSR below Yellow Pine pit (YP-SR-4)—April 2012 through February 2016

Note: Flow data are from USGS Station 13311250 (EFSFSR near YP-SR-4). Total and dissolved arsenic concentrations often have similar values and are difficult to differentiate on the graph. It can be assumed that both concentrations are plotted at locations with a single point or line.

At the EFSFSR site below Sugar Creek (YP-SR-2), similar to YP-SR-4, total and dissolved antimony and arsenic concentrations tend to be lowest during high flow conditions in the spring snowmelt period (**Figure 4-23**). Both total and dissolved antimony and arsenic consistently exceeded regulatory criteria at this site. Total and dissolved mercury concentrations tend to be highest during high flow conditions in the spring snowmelt period, but also show occasion high concentrations that are associated with higher flow conditions outside of the spring runoff period. Total mercury exceeds the regulatory criterion most of the time at this site.

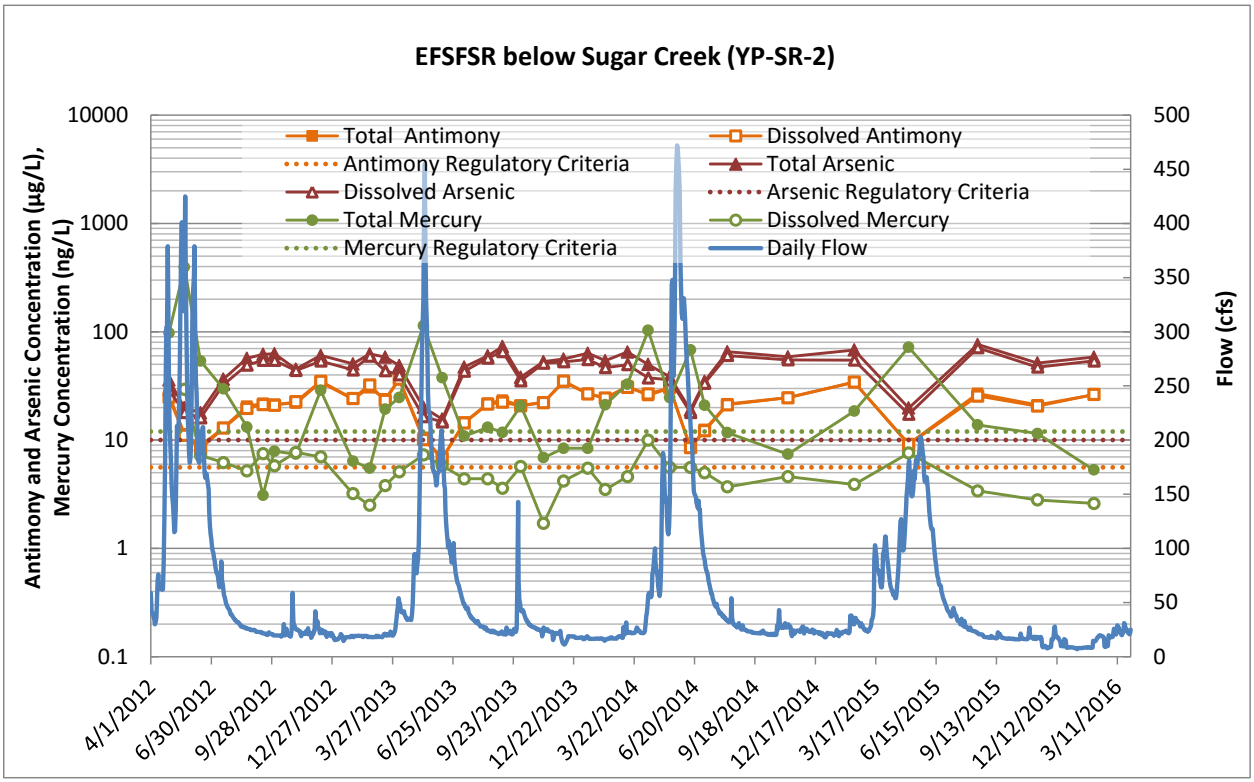

Figure 4-23. Flow and Selected Metals in EFSFSR below Sugar Creek (YP-SR-2)—April 2012 through February 2016

Note: Flow data are calculated as the sum of flow at USGS Station 13311450 (Sugar Creek near YP-T-1) and USGS Station 13311250 (EFSFSR near YP-SR-4). Total and dissolved arsenic concentrations often have similar values and are difficult to differentiate on the graph. It can be assumed that both concentrations are plotted at locations with a single point or line.

In summary, this series of figures illustrates that antimony and arsenic concentrations generally increase from upstream to downstream in Meadow Creek, Sugar Creek and EFSFSR, and mercury concentrations increase in the EFSFSR downstream of Sugar Creek. Antimony and arsenic concentrations tend to be lowest during high flow conditions, whereas mercury concentrations tend to be highest during high flow conditions. Antimony and arsenic consistently exceed regulatory criteria in the EFSFSR downstream of Meadow Creek and arsenic consistently exceeds the criterion in Meadow Creek downstream of SODA. Mercury consistently exceeds the regulatory criterion in Sugar Creek and in the EFSFSR downstream of Sugar Creek.

4.1.2 Surface Water Quality Site Results

The results in this section are presented by sample site, with the sampling locations grouped into three categories: Meadow Creek sites, Sugar Creek sites, and EFSFSR sites. Sites located in the Meadow Creek watershed – whether the water flows into Meadow Creek or not – are grouped into the Meadow Creek category. Similarly, sites within the Sugar Creek watershed, including West End Creek, are grouped as such. Other sites, including those on tributaries such as Fiddle and Midnight creeks, are grouped in the EFSFSR category.

Within each watershed, results are arranged in the text from approximate upstream to downstream location; these locations are approximate because many of the adit seep and seep sites are disconnected from streams. Each watershed is split between surface water sites and adit seep and seep sites. Given the number of sites discussed, the reader should refer to **Figure 3-1**, the sample site location map, to aid in spatial orientation.

For each sample site, the results are presented as follows:

- Description of sample site conditions and hydrology; photos of the sites can be found in **Appendix G**.
- Description of how many times the site was visited and sampled.
- Overview of constituents that were detected in fewer than 50 percent of samples.
- Overview of constituents that were detected in greater than 50 percent of samples but do not have applicable regulatory criteria to compare concentrations to.
- Overview of constituents that were detected in greater than 50 percent of samples and met applicable regulatory criteria in 100 percent of measurements.
- Overview of constituents that did not meet applicable regulatory criteria in at least one sample.
- Table showing the statistical summaries for each constituent measured at the site, including the number of times detected and not detected; the minimum and maximum concentrations measured; number of times the constituent did not meet relevant regulatory criterion; mean, median, standard deviation, 90-, 95- and 99- percentiles; and the statistical distribution.
- Tables showing the complete analytical results for a given site (every measurement taken for every analyzed constituent) are presented in **Appendix E**.

In the following discussion of results, if both fractions of a constituent (e.g., total and dissolved lead) fall into the same category (e.g., both were detected in fewer than 50 percent of samples), the constituent is simply described in the text as “iron” (e.g., “iron was not detected”). If the total and dissolved fractions fall into different categories, those are distinguished in the text (e.g., “dissolved iron was not detected”). For constituents that do not meet regulatory criteria, both fractions are explicitly specified to facilitate understanding even if both do not meet the criterion (e.g., “total and dissolved iron exceeded the regulatory criterion”).

4.1.2.1 Meadow Creek Surface Water Sites

YP-T-46, south fork Meadow Creek

The south fork Meadow Creek site (YP-T-46) is in a forested, lower gradient reach with minimal historical site disturbance (see photos in **Appendix G**). It is located upstream of the potential future tailings storage facility. Flow is generally from south to north, and onsite flow measurements have ranged from 0.28 cfs in August 2015 to 9.7 cfs in June 2013 with a median flow of 0.94 cfs.

This site was added to the sampling program in November 2012; it is inaccessible during winter conditions. For the time interval included in this baseline study, this site was visited nine times. **Appendix E** presents dates the site was visited and parameters or constituents sampled during each visit. Analytical results are summarized in **Table 4-1**. Multiple constituents were analyzed for but were not detected in at least half of the samples from YP-T-46. These constituents were ammonia, beryllium, boron, cadmium, carbonate, chloride, chromium, dissolved cobalt, cyanide, fluoride, dissolved iron, lead, dissolved manganese, methyl mercury, nickel, nitrate plus nitrite, total nitrogen, total Kjeldahl nitrogen, phosphorus, selenium, silver, total suspended solids, thallium, dissolved vanadium and zinc.

Of constituents that were regularly detected, many do not have defined or applicable regulatory criteria for comparison. These include conductivity, turbidity, arsenic III, bicarbonate, calcium, total cobalt, hardness, magnesium, potassium, and sodium. In general, of these constituents, the major cations (calcium, magnesium, potassium and sodium), major anion (bicarbonate), and related measurements (conductivity and hardness) tend to be lowest during periods of high flow. Turbidity, arsenic III, and total cobalt consistently occurred in low concentrations and show no distinct trends.

In addition, many constituents that were regularly detected and have applicable regulatory criteria occurred in concentrations that met criteria. These constituents include color, dissolved oxygen, temperature, dissolved aluminum, dissolved antimony, arsenic, barium, dissolved copper, total iron, total manganese, mercury, molybdenum, total dissolved solids, sulfate and total vanadium. In general, these constituents occurred in low concentrations and do not show distinct trends.

There were some constituents that did not meet regulatory criteria (see **Appendix E**). The pH was lower than the regulatory minimum ($\geq$ 6.5) once (11 percent of measurements). Alkalinity was lower than the regulatory minimum (> 20 mg/L) three times (33 percent of measurements). Total aluminum was higher than the criterion (50 µg/L) twice (33 percent of measurements).

Table 4-1. YP-T-46, South Fork Meadow Creek, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Alkalinity as CaCO3, Total	mg/L	9	0	0	12.9	28	3	20.9	21.9	5.27	25.3	26.6	27.7	Normal
Aluminum, Total	µg/L	6	0	0	19.5	58.2	2	35.2	27.4	17.0	56.8	57.5	58.1	Normal
Aluminum, Dissolved	µg/L	6	0	0	9	20.6	0	13.5	13.6	4.3	17.8	19.2	20.3	Normal
Ammonia as Nitrogen	mg/L	0	9	100	< 0.05	< 0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Antimony, Total	µg/L	9	0	0	0.15	0.25	0	0.20	0.21	0.03	0.23	0.24	0.25	Normal
Antimony, Dissolved	µg/L	9	0	0	0.15	0.25	0	0.21	0.21	0.04	0.24	0.25	0.25	Normal
Arsenic, Total	µg/L	9	0	0	0.9	1.7	0	1.3	1.3	0.3	1.6	1.7	1.7	Normal
Arsenic, Dissolved	µg/L	9	0	0	0.9	1.4	0	1.1	1.2	0.2	1.4	1.4	1.4	Normal
Arsenic (III)	µg/L	4	0	0	0.08	0.12	n/a	0.10	0.11	0.02	n/a	n/a	n/a	Sample
Barium, Total	µg/L	4	0	0	4.23	4.72	0	4.54	4.61	0.22	n/a	n/a	n/a	Sample
Barium, Dissolved	µg/L	4	0	0	3.89	4.73	0	4.41	4.51	0.38	n/a	n/a	n/a	Sample
Beryllium, Total	µg/L	0	4	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Beryllium, Dissolved	µg/L	0	4	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Bicarbonate as CaCO3	mg/L	9	0	0	12.9	28	n/a	20.9	21.9	5.3	25.3	26.6	27.7	Normal
Boron, Total	µg/L	0	4	100	< 20	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Boron, Dissolved	µg/L	0	4	100	< 20	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Total	µg/L	0	7	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Dissolved	µg/L	0	7	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Calcium, Total	µg/L	9	0	0	3770	7340	n/a	5588	5720	1364	7084	7212	7314	Normal
Calcium, Dissolved	µg/L	9	0	0	3800	7270	n/a	5574	5600	1320	6894	7082	7232	Normal
Carbonate as CaCO3	mg/L	0	9	100	< 2	< 15	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chloride	mg/L	0	9	100	< 0.4	< 0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chromium, Total	µg/L	0	7	100	< 0.2	< 0.2	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chromium, Dissolved	µg/L	2	5	71	< 0.2	0.47	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cobalt, Total	µg/L	3	1	25	< 0.02	0.024	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cobalt, Dissolved	µg/L	1	3	75	< 0.02	0.023	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Conductivity	mS/cm	9	0	0	0.03	0.071	n/a	0.053	0.056	0.013	0.065	0.068	0.070	Normal

Table 4-1. YP-T-46, South Fork Meadow Creek, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Copper, Total	µg/L	3	4	57	< 0.1	0.2	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Copper, Dissolved	µg/L	5	2	29	< 0.1	0.22	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cyanide, Total	mg/L	0	4	100	< 0.0047	< 0.0047	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Dissolved Oxygen (DO)	mg/L	9	0	0	8.47	9.55	0	9.1	9.3	0.4	9.5	9.5	9.5	Normal
Fluoride	mg/L	0	9	100	< 0.2	< 0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Hardness as CaCO3	mg/L	9	0	0	11.4	131	n/a	30.2	19.5	38.0	44.2	87.6	122	Nonparametric
Iron, Total	µg/L	9	0	0	27.1	93.9	0	55.0	54.8	20.3	72.5	83.2	91.8	Normal
Iron, Dissolved	µg/L	0	9	100	< 20	< 42.6	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Lead, Total	µg/L	1	8	89	< 0.02	0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Lead, Dissolved	µg/L	0	9	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Magnesium, Total	µg/L	9	0	0	494	1010	n/a	769	809	208	1002	1006	1009	Normal
Magnesium, Dissolved	µg/L	9	0	0	486	999	n/a	765	792	209	988	993	998	Normal
Manganese, Total	µg/L	6	0	0	1.7	7.5	0	4.7	5.1	2.4	7.2	7.3	7.5	Normal
Manganese, Dissolved	µg/L	3	3	50	< 1	5.3	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Mercury, Total	ng/L	7	2	22	< 0.8	1.7	0	1.1	1.0	0.3	1.5	1.6	1.7	KM - Nonparametric
Mercury, Dissolved	ng/L	6	3	33	< 0.6	1.2	0	0.8	1.0	0.3	1.1	1.2	1.2	KM - Nonparametric
Methyl Mercury	ng/L	0	4	100	< 0.1	< 0.1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Molybdenum, Total	µg/L	4	0	0	1.18	1.75	0	1.50	1.54	0.24	n/a	n/a	n/a	Sample
Molybdenum, Dissolved	µg/L	4	0	0	1.21	1.81	0	1.52	1.53	0.26	n/a	n/a	n/a	Sample
Nickel, Total	µg/L	0	4	100	< 0.2	< 0.2	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nickel, Dissolved	µg/L	1	3	75	< 0.2	0.26	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nitrate + Nitrite as Nitrogen	mg/L	0	9	100	< 0.05	< 0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nitrogen, Total	mg/L	2	2	50	< 0.4	0.53	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nitrogen, Total Kjeldahl (TKN)	mg/L	2	2	50	< 0.4	0.53	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
pH	pH units	9	0	0	6.09	7.32	1	6.9	6.9	0.4	7.3	7.3	7.3	Normal
Phosphorus, Total	µg/L	0	9	100	< 20	< 40	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample

Table 4-1. YP-T-46, South Fork Meadow Creek, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Phosphorus, Dissolved	µg/L	0	9	100	< 20	< 42.6	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Potassium, Total	µg/L	9	0	0	393	608	n/a	499	501	72.8	589	598	606	Normal
Potassium, Dissolved	µg/L	9	0	0	386	641	n/a	519	528	84.8	618	629	639	Normal
Selenium, Total	µg/L	0	7	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Selenium, Dissolved	µg/L	0	7	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Total	µg/L	0	4	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Dissolved	µg/L	0	4	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sodium, Total	µg/L	9	0	0	1090	1860	n/a	1478	1470	277.8	1748	1804	1849	Normal
Sodium, Dissolved	µg/L	9	0	0	1080	1830	n/a	1486	1500	283.4	1766	1798	1824	Normal
Solids, Total Dissolved (TDS)	mg/L	9	0	0	21	51	0	33	31	9.1	42	46	50	Normal
Solids, Total Suspended (TSS)	mg/L	0	9	100	< 5	< 5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sulfate	mg/L	9	0	0	1.24	2.28	0	1.83	1.87	0.43	2.27	2.28	2.28	Normal
Temperature, Water	deg C	9	0	0	4.91	9.89	0	7.5	7.8	1.8	9.6	9.7	9.9	Normal
Thallium, Total	µg/L	0	4	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Thallium, Dissolved	µg/L	0	4	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Turbidity	NTU	9	0	0	0.3	6.7	n/a	2.3	2.2	1.9	3.7	5.2	6.4	Normal
Vanadium, Total	µg/L	4	0	0	0.2	0.2	0	0.2	0.2	0	n/a	n/a	n/a	Sample
Vanadium, Dissolved	µg/L	0	4	100	< 0.2	< 0.2	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Zinc, Total	µg/L	0	9	100	< 0.5	< 0.5	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Zinc, Dissolved	µg/L	2	7	78	< 0.5	1.3	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample

Units: **µg/L** = micrograms per liter; **mg/L** = milligrams per liter; **mS/cm** = milliSiemens per centimeter; **ng/L** = nanograms per liter; **deg C** = degrees Celsius; **NTU** = nephelometric turbidity units
Measurements: **< 20 µg/L** = analyte not detected at the method reporting limit of 20 µg/L; **n/a** = not applicable; **Min** = minimum concentration measured; **Max** = maximum concentration measured
*Number that do not meet criterion: total number of analytical results that did not meet the strictest potentially applicable regulatory criterion (presented in **Table 3-4**). If a constituent does not have applicable regulatory criteria, then n/a is given.*
Distribution: **Normal** = data appear normally distributed at 0.05 significance level; statistics presented are normal population estimators; **Gamma** = data appear gamma distributed 0.05 significance level; statistics presented are gamma population estimators; **Lognormal** = data appear lognormally distributed at 0.05 significance level; statistics presented are lognormal populations estimators; **Nonparametric** = data do not appear normally, gamma or lognormally distributed at 0.05 significance level; statistics presented are sample statistics; **KM nonparametric** = data comprises ≤ 50% non-detects; statistics presented are nonparametric population estimators generated using the Kaplan-Meier method; **Sample** = data comprises > 50% non-detects and statistics are not presented; or, data comprises five or fewer measurements but each result was detected and statistics presented are sample statistics.

YP-T-45, north fork Meadow Creek

The north fork Meadow Creek site (YP-T-45) is in a steep, forested reach adjacent to an old jeep trail which is approximately 100 feet north of the channel (see photos in **Appendix G**). The site is located upstream of the potential future tailings storage facility. Flow is generally from west to east, and onsite flow measurements have ranged from 0.24 cfs in November 2015 to 19 cfs in May 2013 with a median flow of 0.95 cfs.

This site was added to the sampling program in November 2012; it is inaccessible during winter conditions. For the time interval included in this baseline study, this site was visited 15 times. **Appendix E** presents dates the site was visited and parameters or constituents sampled during each visit. Analytical results are summarized in **Table 4-2**. Multiple constituents were analyzed for but were not detected in at least half of the samples from YP-T-45. These constituents were ammonia, beryllium, boron, cadmium, carbonate, chloride, chromium, cyanide, fluoride, dissolved iron, lead, dissolved manganese, methyl mercury, total nickel, nitrate plus nitrite, phosphorus, selenium, silver, total suspended solids, thallium, and zinc.

Of constituents that were regularly detected, many do not have defined or applicable regulatory criteria for comparison (see **Appendix E**). These include conductivity, turbidity, arsenic III, bicarbonate, calcium, cobalt, hardness, magnesium, total nitrogen, total Kjeldahl nitrogen, potassium, and sodium. In general, of these constituents, the major cations (calcium, magnesium, potassium and sodium), major anion (bicarbonate), and related measurements (conductivity and hardness) tended to be lowest during periods of high flow. Turbidity, arsenic III, total nitrogen, and total Kjeldahl nitrogen consistently occurred in low concentrations and do not show distinct trends.

In addition, many constituents that were regularly detected and have applicable regulatory criteria occurred in concentrations that met criteria (see **Appendix E**). These constituents include color, dissolved oxygen, pH, temperature, alkalinity, dissolved aluminum, antimony, arsenic, barium, copper, total manganese, mercury, molybdenum, dissolved nickel, total dissolved solids, sulfate and vanadium. In general, the metal constituents tended to occur in low concentrations and do not show distinct trends.

There were some constituents that did not meet regulatory criteria (see **Appendix E**). Total aluminum was higher than the regulatory criterion (50 µg/L) four times (36 percent of measurements). Total iron was higher than the regulatory criterion (300 µg/L) once (7 percent of measurements).

Table 4-2. YP-T-45, North Fork Meadow Creek, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Alkalinity as CaCO3, Total	mg/L	15	0	0	22.6	65.2	0	45.7	49.5	15.8	64.2	65.1	65.2	Normal
Aluminum, Total	µg/L	11	0	0	14	240	4	55.1	35.6	65.2	126	163	249	Gamma
Aluminum, Dissolved	µg/L	11	0	0	5.6	36	0	15.1	15.5	9.1	23.1	29.6	34.7	Normal
Ammonia as Nitrogen	mg/L	0	15	100	< 0.05	< 0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Antimony, Total	µg/L	15	0	0	0.17	0.28	0	0.20	0.19	0.03	0.22	0.24	0.27	Normal
Antimony, Dissolved	µg/L	15	0	0	0.15	0.28	0	0.19	0.18	0.03	0.21	0.23	0.27	Normal
Arsenic, Total	µg/L	15	0	0	1	2.6	0	1.7	1.7	0.6	2.4	2.5	2.6	Normal
Arsenic, Dissolved	µg/L	15	0	0	0.8	2.5	0	1.6	1.6	0.6	2.3	2.4	2.5	Normal
Arsenic (III)	µg/L	6	3	33	< 0.02	0.11	n/a	0.05	0.05	0.03	0.09	0.10	0.11	KM - Nonparametric
Barium, Total	µg/L	9	0	0	3.28	4.9	0	3.8	3.8	0.5	4.4	4.6	4.8	Normal
Barium, Dissolved	µg/L	9	0	0	2.74	3.82	0	3.37	3.54	0.38	3.71	3.76	3.81	Normal
Beryllium, Total	µg/L	1	8	89	< 0.02	0.03	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Beryllium, Dissolved	µg/L	0	9	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Bicarbonate as CaCO3	mg/L	15	0	0	22.6	65.2	n/a	45.5	45.1	15.8	64.2	65.1	65.2	Normal
Boron, Total	µg/L	0	9	100	< 20	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Boron, Dissolved	µg/L	0	9	100	< 20	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Total	µg/L	0	13	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Dissolved	µg/L	0	13	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Calcium, Total	µg/L	15	0	0	6400	23400	n/a	14900	15100	5983	22700	23050	23330	Normal
Calcium, Dissolved	µg/L	15	0	0	6290	22600	n/a	14737	15100	5851	22180	22530	22586	Normal
Carbonate as CaCO3	mg/L	0	15	100	< 9	< 15	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chloride	mg/L	0	15	100	< 0.2	< 0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chromium, Total	µg/L	4	9	69	< 0.2	0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chromium, Dissolved	µg/L	3	10	77	< 0.2	0.3	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cobalt, Total	µg/L	7	2	22	< 0.02	0.09	n/a	0.04	0.03	0.02	0.07	0.08	0.09	KM - Nonparametric
Cobalt, Dissolved	µg/L	6	3	33	< 0.02	0.07	n/a	0.03	0.02	0.02	0.04	0.05	0.07	KM - Nonparametric
Conductivity	mS/cm	15	0	0	0.053	0.143	n/a	0.098	0.108	0.033	0.138	0.142	0.143	Normal

Table 4-2. YP-T-45, North Fork Meadow Creek, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Copper, Total	µg/L	10	3	23	< 0.1	0.3	0	0.2	0.1	0.1	0.2	0.2	0.3	KM - Nonparametric
Copper, Dissolved	µg/L	13	0	0	0.1	1.3	0	0.3	0.2	0.2	0.6	0.7	1.2	Lognormal
Cyanide, Total	mg/L	0	9	100	< 0.0047	< 0.0047	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Dissolved Oxygen (DO)	mg/L	15	0	0	8.24	11.26	0	9.7	9.7	0.9	10.8	11.0	11.2	Normal
Fluoride	mg/L	0	15	100	< 0.2	< 0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Hardness as CaCO3	mg/L	15	0	0	19.3	65.5	n/a	42.1	42.7	16.7	64.1	65.1	65.4	Normal
Iron, Total	µg/L	11	4	27	< 20	371	1	59.0	26.4	86.0	75.2	166	330	KM - Nonparametric
Iron, Dissolved	µg/L	0	15	100	< 20	< 42.6	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Lead, Total	µg/L	6	9	60	< 0.02	0.12	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Lead, Dissolved	µg/L	1	14	93	< 0.02	0.03	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Magnesium, Total	µg/L	15	0	0	650	1860	n/a	1185	1220	417	1722	1783	1845	Normal
Magnesium, Dissolved	µg/L	15	0	0	646	1740	n/a	1168	1180	412	1676	1712	1734	Normal
Manganese, Total	µg/L	10	1	9	< 1.1	17.2	0	3.6	2.0	4.4	5.0	11.1	16.0	KM - Nonparametric
Manganese, Dissolved	µg/L	0	11	100	< 1	< 5	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Mercury, Total	ng/L	13	2	13	< 0.8	5	0	1.9	1.6	1.2	3.3	3.8	4.8	KM - Nonparametric
Mercury, Dissolved	ng/L	11	4	27	< 0.5	2.7	0	1.3	1.3	0.7	2.3	2.6	2.7	KM - Nonparametric
Methyl Mercury	ng/L	0	9	100	< 0.1	< 0.1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Molybdenum, Total	µg/L	9	0	0	0.28	0.91	0	0.63	0.73	0.24	0.86	0.89	0.91	Normal
Molybdenum, Dissolved	µg/L	9	0	0	0.26	0.91	0	0.62	0.69	0.26	0.89	0.90	0.91	Normal
Nickel, Total	µg/L	4	5	56	< 0.2	0.3	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nickel, Dissolved	µg/L	5	4	44	< 0.2	0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nitrate + Nitrite as Nitrogen	mg/L	1	14	93	< 0.05	0.122	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nitrogen, Total	mg/L	7	2	22	< 0.4	0.72	n/a	0.5	0.5	0.1	0.7	0.7	0.7	KM - Nonparametric
Nitrogen, Total Kjeldahl (TKN)	mg/L	7	2	22	< 0.4	0.72	n/a	0.5	0.5	0.1	0.6	0.7	0.7	KM - Nonparametric
pH	pH units	15	0	0	6.81	8.19	0	7.5	7.6	0.4	8.1	8.2	8.2	Normal
Phosphorus, Total	µg/L	0	15	100	< 20	< 40	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample

Table 4-2. YP-T-45, North Fork Meadow Creek, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Phosphorus, Dissolved	µg/L	0	15	100	< 20	< 42.6	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Potassium, Total	µg/L	15	0	0	498	999	n/a	736	722	169	968	982	996	Normal
Potassium, Dissolved	µg/L	15	0	0	496	960	n/a	722	742	164	923	957	959	Normal
Selenium, Total	µg/L	0	13	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Selenium, Dissolved	µg/L	0	13	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Total	µg/L	0	9	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Dissolved	µg/L	0	9	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sodium, Total	µg/L	15	0	0	1380	2150	n/a	1699	1710	207.5	1904	1989	2118	Normal
Sodium, Dissolved	µg/L	15	0	0	1400	1930	n/a	1698	1710	171.6	1870	1888	1922	Normal
Solids, Total Dissolved (TDS)	mg/L	15	0	0	34	98	0	62	56	20	89	97	98	Normal
Solids, Total Suspended (TSS)	mg/L	1	14	93	< 5	8.5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sulfate	mg/L	15	0	0	1.47	4.45	0	2.94	2.88	1.07	4.33	4.40	4.44	Normal
Temperature, Water	deg C	15	0	0	0.52	11.18	0	5.7	5.6	3.6	10.4	10.9	11.1	Normal
Thallium, Total	µg/L	0	9	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Thallium, Dissolved	µg/L	0	9	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Turbidity	NTU	15	0	0	0.3	11.2	n/a	2.4	2.0	2.7	5.5	7.0	10.7	Gamma
Vanadium, Total	µg/L	9	0	0	0.3	0.64	0	0.5	0.4	0.1	0.6	0.6	0.6	Normal
Vanadium, Dissolved	µg/L	9	0	0	0.2	0.6	0	0.4	0.4	0.1	0.5	0.6	0.6	Normal
Zinc, Total	µg/L	3	12	80	< 0.5	1.2	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Zinc, Dissolved	µg/L	4	11	73	< 0.5	1.3	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample

Units: **µg/L** = micrograms per liter; **mg/L** = milligrams per liter; **mS/cm** = milliSiemens per centimeter; **ng/L** = nanograms per liter; **deg C** = degrees Celsius; **NTU** = nephelometric turbidity units
Measurements: **< 20 µg/L** = analyte not detected at the method reporting limit of 20 µg/L; **n/a** = not applicable; **Min** = minimum concentration measured; **Max** = maximum concentration measured
*Number that do not meet criterion: total number of analytical results that did not meet the strictest potentially applicable regulatory criterion (presented in **Table 3-4**). If a constituent does not have applicable regulatory criteria, then n/a is given.*
Distribution: **Normal** = data appear normally distributed at 0.05 significance level; statistics presented are normal population estimators; **Gamma** = data appear gamma distributed 0.05 significance level; statistics presented are gamma population estimators; **Lognormal** = data appear lognormally distributed at 0.05 significance level; statistics presented are lognormal populations estimators; **Nonparametric** = data do not appear normally, gamma or lognormally distributed at 0.05 significance level; statistics presented are sample statistics; **KM nonparametric** = data comprises ≤ 50% non-detects; statistics presented are nonparametric population estimators generated using the Kaplan-Meier method; **Sample** = data comprises > 50% non-detects and statistics are not presented; or, data comprises five or fewer measurements but each result was detected and statistics presented are sample statistics.

YP-T-33, Meadow Creek above SODA

The Meadow Creek site (YP-T-33) is located in the forest upstream of the large wetland west of SODA and upstream of the former Meadow Creek diversion (URS 2000). Meadow Creek is sinuous through this reach, but flow at the site is generally from southwest to northeast (see photos in **Appendix G**). The site is about 250 feet upstream from USGS Station 13310850 and is also upstream of major legacy mining activities (URS 2000). Flow measurements at the site have ranged from 1.9 cfs in December 2013 to 71 cfs in May 2013 with a median flow of 4.0 cfs.

For the time interval included in this baseline study, this site was visited 35 times. **Appendix E** presents dates the site was visited and parameters or constituents sampled during each visit. Analytical results are summarized in **Table 4-3**. Multiple constituents were measured but were detected less than half the time at YP-T-33. These constituents were ammonia, beryllium, boron, cadmium, carbonate, chloride, chromium, dissolved cobalt, cyanide, fluoride, dissolved iron, lead, methyl mercury, nickel, nitrate plus nitrite, phosphorus, selenium, silver, total suspended solids, thallium, and zinc.

Of constituents that were regularly detected, many do not have defined or applicable regulatory criteria for comparison (see **Appendix E**). These include conductivity, turbidity, arsenic III, bicarbonate, calcium, total cobalt, hardness, magnesium, total nitrogen, total Kjeldahl nitrogen, potassium and sodium. In general, of these constituents, the major cations (calcium, magnesium, potassium and sodium), major anion (bicarbonate), and related measurements (conductivity and hardness) tend to be lowest during periods of high flow. Turbidity, arsenic III, total nitrogen and total Kjeldahl nitrogen consistently occurred in low concentrations and do not show distinct trends.

In addition, many constituents that were regularly detected and have applicable regulatory criteria occurred in concentrations that met criteria (see **Appendix E**). These constituents include color, dissolved oxygen, dissolved aluminum, antimony, arsenic, barium, copper, manganese, mercury, molybdenum, total dissolved solids, sulfate, and vanadium. Of these, dissolved oxygen is generally lower during months with higher ambient temperatures. Total dissolved solids and sulfate are generally low during periods with high flow; in contrast, mercury is generally high during periods with high flow. The remaining constituents tended to occur in low concentrations and show no distinct trends.

There were some constituents that did not meet regulatory criteria (see **Appendix E**). The pH did not meet the regulatory minimum ($\geq$ 6.5) once (3 percent of measurements). Temperature exceeded the regulatory criterion (<13 degrees Celsius) three times (9 percent of measurements). Alkalinity was below the regulatory minimum (> 20 mg/L) once (3 percent of measurements). Total aluminum exceeded the regulatory criterion (50 µg/L) seven times (35 percent of measurements) generally during high flow conditions. Total iron exceeded the regulatory criterion (300 µg/L) once (3 percent of measurements).

Table 4-3. YP-T-33, Meadow Creek above SODA, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Alkalinity as CaCO3, Total	mg/L	35	0	0	17.4	48	1	32.0	33	8.09	40.6	43.2	47.3	Normal
Aluminum, Total	µg/L	20	0	0	10.9	356	7	65.2	32.6	80.4	148	192	292	Gamma
Aluminum, Dissolved	µg/L	20	0	0	5.7	28.7	0	13.9	11.4	6.3	21.0	22.6	27.5	Normal
Ammonia as Nitrogen	mg/L	2	33	94	< 0.05	0.122	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Antimony, Total	µg/L	35	0	0	0.23	0.78	0	0.33	0.27	0.12	0.47	0.57	0.71	Nonparametric
Antimony, Dissolved	µg/L	35	0	0	0.22	0.76	0	0.32	0.28	0.11	0.46	0.54	0.69	Nonparametric
Arsenic, Total	µg/L	35	0	0	0.8	2.6	0	1.3	1.3	0.3	1.5	1.5	2.3	Nonparametric
Arsenic, Dissolved	µg/L	35	0	0	0.8	1.6	0	1.2	1.2	0.2	1.4	1.5	1.6	Nonparametric
Arsenic (III)	µg/L	14	2	13	< 0.02	0.1	n/a	0.05	0.04	0.02	0.08	0.09	0.10	KM - Nonparametric
Barium, Total	µg/L	16	0	0	3.95	7.21	0	4.56	4.22	0.812	5.60	5.93	6.60	Gamma
Barium, Dissolved	µg/L	16	0	0	2.97	4.99	0	3.99	4.04	0.565	4.59	4.78	4.95	Normal
Beryllium, Total	µg/L	1	15	94	< 0.02	0.03	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Beryllium, Dissolved	µg/L	0	16	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Bicarbonate as CaCO3	mg/L	35	0	0	17.4	48	n/a	31.9	33	8.01	39.6	43.2	47.3	Normal
Boron, Total	µg/L	0	16	100	< 10	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Boron, Dissolved	µg/L	0	16	100	< 10	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Total	µg/L	0	31	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Dissolved	µg/L	0	31	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Calcium, Total	µg/L	35	0	0	4630	11700	n/a	8325	8940	2107	10360	10890	11496	Nonparametric
Calcium, Dissolved	µg/L	35	0	0	4430	11500	n/a	8270	8900	2144	10360	10990	11398	Nonparametric
Carbonate as CaCO3	mg/L	0	35	100	< 2	< 15	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chloride	mg/L	1	34	97	< 0.2	0.52	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chromium, Total	µg/L	7	24	77	< 0.2	0.5	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chromium, Dissolved	µg/L	3	28	90	< 0.2	0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cobalt, Total	µg/L	12	4	25	< 0.02	0.15	n/a	0.04	0.03	0.03	0.07	0.10	0.14	KM - Nonparametric
Cobalt, Dissolved	µg/L	7	9	56	< 0.02	0.04	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Conductivity	mS/cm	34	0	0	0.039	0.11	n/a	0.071	0.074	0.018	0.092	0.100	0.108	Normal

Table 4-3. YP-T-33, Meadow Creek above SODA, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Copper, Total	µg/L	19	12	39	< 0.1	0.4	0	0.1	0.1	0.1	0.2	0.3	0.4	KM - Nonparametric
Copper, Dissolved	µg/L	30	1	3	< 0.1	0.4	0	0.2	0.2	0.1	0.3	0.4	0.4	KM - Nonparametric
Cyanide, Total	mg/L	0	16	100	< 0.0047	< 0.01	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Dissolved Oxygen (DO)	mg/L	35	0	0	8.03	13.83	0	10.3	10.4	1.3	11.5	11.9	13.5	Normal
Fluoride	mg/L	0	35	100	< 0.2	< 0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Hardness as CaCO3	mg/L	35	0	0	15	37.1	n/a	26.5	28.7	6.73	33.3	34.5	36.6	Nonparametric
Iron, Total	µg/L	32	3	9	< 20	497	1	71.5	41.7	84.3	120	160	399	KM - Nonparametric
Iron, Dissolved	µg/L	3	32	91	< 20	42.6	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Lead, Total	µg/L	15	20	57	< 0.02	0.18	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Lead, Dissolved	µg/L	0	35	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Magnesium, Total	µg/L	35	0	0	779	1900	n/a	1407	1540	362	1772	1876	1897	Nonparametric
Magnesium, Dissolved	µg/L	35	0	0	713	1910	n/a	1392	1510	377	1792	1824	1900	Normal
Manganese, Total	µg/L	19	1	5	< 1.3	23.7	0	4.5	3.1	5.0	7.6	11.7	21.3	KM - Nonparametric
Manganese, Dissolved	µg/L	11	9	45	< 1	5	0	1.1	1.1	0.35	5	5	5	KM - Nonparametric
Mercury, Total	ng/L	25	10	29	< 0.7	4.8	0	1.6	1.2	1.0	2.9	3.2	4.3	KM - Nonparametric
Mercury, Dissolved	ng/L	21	13	38	< 0.7	2.4	0	1.2	1	0.5	1.8	2.0	2.3	KM - Nonparametric
Methyl Mercury	ng/L	1	15	94	< 0.1	0.2	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Molybdenum, Total	µg/L	16	0	0	0.48	1.13	0	0.88	0.96	0.22	1.11	1.12	1.13	Normal
Molybdenum, Dissolved	µg/L	16	0	0	0.47	1.19	0	0.87	0.93	0.24	1.12	1.15	1.18	Normal
Nickel, Total	µg/L	3	13	81	< 0.2	0.28	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nickel, Dissolved	µg/L	3	13	81	< 0.2	0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nitrate + Nitrite as Nitrogen	mg/L	9	26	74	< 0.05	0.08	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nitrogen, Total	mg/L	10	6	38	< 0.4	1.39	n/a	0.5	0.5	0.2	0.7	0.9	1.3	KM - Nonparametric
Nitrogen, Total Kjeldahl (TKN)	mg/L	12	4	25	< 0.4	1.37	n/a	0.5	0.4	0.2	0.7	0.9	1.3	KM - Nonparametric
pH	pH units	34	0	0	6.34	8.03	1	7.2	7.2	0.4	7.7	7.9	8.0	Normal

Table 4-3. YP-T-33, Meadow Creek above SODA, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Phosphorus, Total	µg/L	1	34	97	< 20	< 80	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Phosphorus, Dissolved	µg/L	0	35	100	< 20	< 80	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Potassium, Total	µg/L	35	0	0	511	838	n/a	679	688	82.7	775	803	833.20	Normal
Potassium, Dissolved	µg/L	35	0	0	453	860	n/a	673	682	102	794	818	852	Normal
Selenium, Total	µg/L	0	31	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Selenium, Dissolved	µg/L	0	31	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Total	µg/L	0	16	100	< 0.02	< 0.04	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Dissolved	µg/L	0	16	100	< 0.02	< 0.04	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sodium, Total	µg/L	35	0	0	1320	2170	n/a	1839	1910	251.0	2100	2110	2150	Nonparametric
Sodium, Dissolved	µg/L	35	0	0	1310	2260	n/a	1835	1930	267.6	2090	2122	2223	Nonparametric
Solids, Total Dissolved (TDS)	mg/L	34	1	3	< 10	97	0	44	44	15	61	68	87	KM - Nonparametric
Solids, Total Suspended (TSS)	mg/L	4	31	89	< 5	12.5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sulfate	mg/L	35	0	0	1.35	13.1	0	2.75	2.56	1.91	3.20	3.47	9.83	Nonparametric
Temperature, Water	deg C	35	0	0	0.11	13.9	3	4.6	3.2	4.6	11.3	15.2	24.4	Gamma
Thallium, Total	µg/L	0	16	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Thallium, Dissolved	µg/L	0	16	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Turbidity	NTU	35	0	0	0	8.2	n/a	2.7	2.3	2.1	5.8	6.7	8.0	Nonparametric
Vanadium, Total	µg/L	14	2	13	< 0.2	0.8	0	0.3	0.3	0.1	0.4	0.5	0.7	KM - Nonparametric
Vanadium, Dissolved	µg/L	12	4	25	< 0.2	0.3	0	0.2	0.2	0.04	0.3	0.3	0.3	KM - Nonparametric
Zinc, Total	µg/L	7	28	80	< 0.5	3.7	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Zinc, Dissolved	µg/L	10	25	71	< 0.5	18.5	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample

Units: **µg/L** = micrograms per liter; **mg/L** = milligrams per liter; **mS/cm** = milliSiemens per centimeter; **ng/L** = nanograms per liter; **deg C** = degrees Celsius; **NTU** = nephelometric turbidity units
Measurements: **< 20 µg/L** = analyte not detected at the method reporting limit of 20 µg/L; **n/a** = not applicable; **Min** = minimum concentration measured; **Max** = maximum concentration measured
*Number that do not meet criterion: total number of analytical results that did not meet the strictest potentially applicable regulatory criterion (presented in **Table 3-4**). If a constituent does not have applicable regulatory criteria, then n/a is given.*
Distribution: **Normal** = data appear normally distributed at 0.05 significance level; statistics presented are normal population estimators; **Gamma** = data appear gamma distributed 0.05 significance level; statistics presented are gamma population estimators; **Lognormal** = data appear lognormally distributed at 0.05 significance level; statistics presented are lognormal populations estimators; **Nonparametric** = data do not appear normally, gamma or lognormally distributed at 0.05 significance level; statistics presented are sample statistics; **KM nonparametric** = data comprises ≤ 50% non-detects; statistics presented are nonparametric population estimators generated using the Kaplan-Meier method; **Sample** = data comprises > 50% non-detects and statistics are not presented; or, data comprises five or fewer measurements but each result was detected and statistics presented are sample statistics.

YP-T-43, Meadow Creek above Keyway

The Meadow Creek site above Keyway (YP-T-43) is downstream of most of the SODA and upstream of the Keyway Dam and Marsh (see photos in **Appendix G**). The site is located in an engineered and armored portion of Meadow Creek that was designed to bypass SODA (URS 2006). Flow is generally from the southwest to the northeast at the site, and flow at the site during sampling events has ranged from 2.0 cfs in November 2015 to 74 cfs in May 2013 with a median flow of 5.9 cfs.

For the time interval included in this baseline study, this site was visited 32 times. **Appendix E** presents dates the site was visited and parameters or constituents sampled during each visit. Analytical results are summarized in **Table 4-4**. Multiple constituents were analyzed for but were not detected in at least half of the samples from YP-T-43. These constituents were ammonia, beryllium, boron, cadmium, carbonate, chromium, cyanide, fluoride, dissolved lead, methyl mercury, nickel, nitrate plus nitrite, total nitrogen, phosphorus, selenium, silver, total suspended solids, thallium, and zinc.

Of constituents that were regularly detected, many do not have defined or applicable regulatory criteria for comparison (see **Appendix E**). These include conductivity, turbidity, arsenic III, bicarbonate, calcium, cobalt, hardness, magnesium, total nitrogen, total kjehdahl nitrogen, potassium, and sodium. In general, of these constituents, the major cations (calcium, magnesium, potassium and sodium), major anion (bicarbonate), and related measurements (conductivity and hardness) tend to be lowest during periods of high flow. Turbidity and arsenic III consistently occurred in low concentrations, but turbidity tended to be higher during periods of high flow, and arsenic III tended to be higher during periods of low flow.

In addition, many constituents that were regularly detected and have applicable regulatory criteria occurred in concentrations that met criteria (see **Appendix E**). These constituents include color, dissolved oxygen, alkalinity, dissolved aluminum, barium, chloride, copper, iron, total lead, manganese, mercury, molybdenum, total dissolved solids, sulfate, and vanadium. In general, dissolved oxygen is lower during months with higher ambient temperatures. Alkalinity, chloride and manganese tend to be highest during low flow conditions. Dissolved aluminum and mercury tend to be highest during high flow conditions. The remaining constituents generally occurred in low concentrations and do not show distinct trends.

There were some constituents that did not meet regulatory criteria (see **Appendix E**). The pH was lower than the regulatory minimum ($\geq$ 6.5) once (3 percent of measurements). Temperature was above the regulatory criterion (< 13 degrees Celsius) six times (19 percent of measurements) during months with higher ambient temperatures. Total aluminum exceeded criterion (50 µg/L) nine times (47 percent of measurements). Total and dissolved antimony exceeded the regulatory criterion (5.6 µg/L) four times each (21 percent of measurements). Total and dissolved arsenic exceeded the regulatory criterion (10 µg/L) 18 and 16 times, respectively (95 and 84 percent of measurements).

Table 4-4. YP-T-43, Meadow Creek above Keyway, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Alkalinity as CaCO3, Total	mg/L	19	0	0	20.1	55	0	35.4	39	9.82	45.4	47.8	53.6	Normal
Aluminum, Total	µg/L	19	0	0	11.5	181	9	57.1	41.8	48.3	123	156	230	Gamma
Aluminum, Dissolved	µg/L	18	1	5	< 4.6	27	0	12.5	10.9	5.9	18.7	20.3	25.7	KM - Nonparametric
Ammonia as Nitrogen	mg/L	1	18	95	< 0.05	0.07	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Antimony, Total	µg/L	19	0	0	2.05	9.09	4	4.04	3.03	2.28	7.98	8.87	9.05	Nonparametric
Antimony, Dissolved	µg/L	19	0	0	2.04	9.21	4	4.00	2.99	2.32	8.08	9.05	9.18	Nonparametric
Arsenic, Total	µg/L	19	0	0	8	41	18	23	22	10	34	37	40	Normal
Arsenic, Dissolved	µg/L	19	0	0	7.3	34.1	16	20.8	19.5	8.1	29.8	31.8	33.6	Normal
Arsenic (III)	µg/L	15	0	0	0.21	5.1	n/a	2.1	1.9	1.5	3.9	4.5	5.0	Normal
Barium, Total	µg/L	15	0	0	4.24	5.75	0	4.98	4.90	0.41	5.44	5.58	5.72	Normal
Barium, Dissolved	µg/L	15	0	0	3.2	5.65	0	4.5	4.8	0.7	5.2	5.3	5.6	Normal
Beryllium, Total	µg/L	1	14	93	< 0.02	0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Beryllium, Dissolved	µg/L	0	15	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Bicarbonate as CaCO3	mg/L	19	0	0	20.1	53	n/a	35.3	39.0	9.6	45.4	47.6	51.9	Normal
Boron, Total	µg/L	0	15	100	< 10	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Boron, Dissolved	µg/L	0	15	100	< 10	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Total	µg/L	0	15	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Dissolved	µg/L	0	15	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Calcium, Total	µg/L	19	0	0	5600	12700	n/a	9879	11400	2454	12000	12430	12646	Nonparametric
Calcium, Dissolved	µg/L	19	0	0	5420	13100	n/a	9914	11100	2558	12320	12470	12974	Nonparametric
Carbonate as CaCO3	mg/L	0	19	100	< 2	< 15	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chloride	mg/L	10	9	47	< 0.36	0.67	0	0.44	0.40	0.10	0.58	0.61	0.66	KM - Nonparametric
Chromium, Total	µg/L	5	10	67	< 0.2	0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chromium, Dissolved	µg/L	1	14	93	< 0.2	0.2	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cobalt, Total	µg/L	15	0	0	0.05	0.14	n/a	0.09	0.08	0.03	0.13	0.13	0.14	Normal
Cobalt, Dissolved	µg/L	15	0	0	0.03	0.13	n/a	0.07	0.06	0.03	0.11	0.12	0.13	Normal
Conductivity	mS/cm	31	0	0	0.049	0.115	n/a	0.085	0.089	0.017	0.102	0.107	0.113	Normal

Table 4-4. YP-T-43, Meadow Creek above Keyway, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Copper, Total	µg/L	14	1	7	< 0.1	0.3	0	0.1	0.1	0.1	0.2	0.2	0.3	KM - Nonparametric
Copper, Dissolved	µg/L	15	0	0	0.1	0.5	0	0.2	0.2	0.1	0.4	0.5	0.6	Gamma
Cyanide, Total	mg/L	0	15	100	< 0.0047	< 0.0047	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Dissolved Oxygen (DO)	mg/L	32	0	0	8.48	12.13	0	10.2	10.1	1.1	11.6	11.8	12.0	Normal
Fluoride	mg/L	0	19	100	< 0.2	< 0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Hardness as CaCO3	mg/L	19	0	0	18.1	40.6	n/a	31.9	37.0	8.1	39.1	40.1	40.5	Nonparametric
Iron, Total	µg/L	19	0	0	63.8	286	0	128	120	48.5	163	184	266	Normal
Iron, Dissolved	µg/L	16	3	16	< 20	93.1	0	47.0	46.6	22.8	86.0	88.3	92.2	KM - Nonparametric
Lead, Total	µg/L	15	4	21	< 0.02	0.13	0	0.05	0.04	0.03	0.07	0.09	0.12	KM - Nonparametric
Lead, Dissolved	µg/L	0	19	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Magnesium, Total	µg/L	19	0	0	985	2330	n/a	1743	2000	473	2164	2195	2303	Nonparametric
Magnesium, Dissolved	µg/L	19	0	0	919	2390	n/a	1733	1960	496	2188	2273	2367	Normal
Manganese, Total	µg/L	19	0	0	8.4	32.8	0	21.8	25	8.1	30.7	32.2	32.7	Normal
Manganese, Dissolved	µg/L	19	0	0	3.4	29.9	0	17.9	19.7	8.99	27.9	28.2	29.6	Normal
Mercury, Total	ng/L	17	2	11	< 0.8	5	0	2.1	1.7	1.1	3.7	4.2	4.8	KM - Nonparametric
Mercury, Dissolved	ng/L	16	3	16	< 0.8	4.6	0	1.7	1.4	1.1	2.9	4.0	4.5	KM - Nonparametric
Methyl Mercury	ng/L	0	15	100	< 0.1	< 0.1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Molybdenum, Total	µg/L	15	0	0	0.5	1.16	0	0.9	1.0	0.2	1.1	1.1	1.2	Nonparametric
Molybdenum, Dissolved	µg/L	15	0	0	0.51	1.2	0	0.9	1.0	0.2	1.1	1.2	1.2	Normal
Nickel, Total	µg/L	3	12	80	< 0.2	0.2	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nickel, Dissolved	µg/L	7	8	53	< 0.2	0.3	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nitrate + Nitrite as Nitrogen	mg/L	3	16	84	< 0.05	0.059	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nitrogen, Total	mg/L	9	6	40	< 0.4	1.41	n/a	0.55	0.49	0.25	0.66	0.89	1.3	KM - Nonparametric
Nitrogen, Total Kjeldahl (TKN)	mg/L	10	5	33	< 0.4	1.4	n/a	0.54	0.43	0.25	0.66	0.89	1.3	KM - Nonparametric
pH	pH units	31	0	0	6.46	8.3	1	7.4	7.3	0.4	8.0	8.1	8.2	Normal
Phosphorus, Total	µg/L	0	19	100	< 20	< 40	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample

Table 4-4. YP-T-43, Meadow Creek above Keyway, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Phosphorus, Dissolved	µg/L	0	19	100	< 20	< 42.6	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Potassium, Total	µg/L	19	0	0	601	908	n/a	766	780	89.5	850	887	904	Normal
Potassium, Dissolved	µg/L	19	0	0	594	934	n/a	753	778	106	884	916	930	Normal
Selenium, Total	µg/L	0	15	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Selenium, Dissolved	µg/L	0	15	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Total	µg/L	0	15	100	< 0.02	< 0.04	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Dissolved	µg/L	0	15	100	< 0.02	< 0.04	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sodium, Total	µg/L	19	0	0	1480	2510	n/a	2095	2260	349.4	2434	2492	2506	Nonparametric
Sodium, Dissolved	µg/L	19	0	0	1460	2590	n/a	2088	2210	351.0	2398	2482	2568	Normal
Solids, Total Dissolved (TDS)	mg/L	19	0	0	26	64	0	46	48	12	63	64	64	Normal
Solids, Total Suspended (TSS)	mg/L	1	18	95	< 5	8	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sulfate	mg/L	19	0	0	2.43	6.96	0	4.53	4.61	1.32	6.11	6.28	6.82	Normal
Temperature, Water	deg C	32	0	0	0.01	15.6	6	5.9	4.3	5.3	14.7	14.9	15.4	Normal
Thallium, Total	µg/L	0	15	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Thallium, Dissolved	µg/L	0	15	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Turbidity	NTU	32	0	0	0	12.2	n/a	2.8	2.3	2.6	4.1	8.3	11.1	Nonparametric
Vanadium, Total	µg/L	13	2	13	< 0.2	0.4	0	0.3	0.3	0.1	0.4	0.4	0.4	KM - Nonparametric
Vanadium, Dissolved	µg/L	9	6	40	< 0.2	0.3	0	0.2	0.2	0.0	0.3	0.3	0.3	KM - Nonparametric
Zinc, Total	µg/L	5	14	74	< 0.5	0.8	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Zinc, Dissolved	µg/L	6	13	68	< 0.5	1.8	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample

Units: **µg/L** = micrograms per liter; **mg/L** = milligrams per liter; **mS/cm** = milliSiemens per centimeter; **ng/L** = nanograms per liter; **deg C** = degrees Celsius; **NTU** = nephelometric turbidity units
Measurements: **< 20 µg/L** = analyte not detected at the method reporting limit of 20 µg/L; **n/a** = not applicable; **Min** = minimum concentration measured; **Max** = maximum concentration measured
*Number that do not meet criterion: total number of analytical results that did not meet the strictest potentially applicable regulatory criterion (presented in **Table 3-4**). If a constituent does not have applicable regulatory criteria, then n/a is given.*
Distribution: **Normal** = data appear normally distributed at 0.05 significance level; statistics presented are normal population estimators; **Gamma** = data appear gamma distributed 0.05 significance level; statistics presented are gamma population estimators; **Lognormal** = data appear lognormally distributed at 0.05 significance level; statistics presented are lognormal populations estimators; **Nonparametric** = data do not appear normally, gamma or lognormally distributed at 0.05 significance level; statistics presented are sample statistics; **KM nonparametric** = data comprises ≤ 50% non-detects; statistics presented are nonparametric population estimators generated using the Kaplan-Meier method; **Sample** = data comprises > 50% non-detects and statistics are not presented; or, data comprises five or fewer measurements but each result was detected and statistics presented are sample statistics.

YP-T-27, Meadow Creek below Keyway

Meadow Creek below Keyway (YP-T-27) is in a sinuous, open stretch of the creek upstream of Blowout Creek. This site is downstream of the Keyway Dam and Marsh (including the outlet to Keyway Marsh, site YP-S-10), as well as SODA. Flow through this stretch is generally from southwest to northeast (see photos in **Appendix G**). Flow measurements at the site have ranged from 2.8 cfs in February 2016 to 76 cfs in May 2013 with a median flow of 5.8 cfs.

For the time interval included in this baseline study, this site was visited 35 times. **Appendix E** presents dates the site was visited and parameters or constituents sampled during each visit. Analytical results are summarized in **Table 4-5**. Multiple constituents were analyzed for but were not detected in at least half of the samples from YP-T-27. These constituents were ammonia, beryllium, boron, cadmium, carbonate, chromium, cyanide, fluoride, dissolved lead, methyl mercury, nickel, nitrate plus nitrite, phosphorus, selenium, silver, total suspended solids, thallium, and zinc.

Of constituents that were regularly detected, many do not have defined or applicable regulatory criteria for comparison (see **Appendix E**). These include conductivity, turbidity, arsenic III, bicarbonate, calcium, cobalt, hardness, magnesium, total nitrogen, total Kjeldahl nitrogen, potassium, and sodium. In general, of these constituents, the major cations (calcium, magnesium, potassium and sodium), major anion (bicarbonate), and related measurements (conductivity and hardness) tend to be lowest during periods of high flow. The remainder of the constituents consistently occurred in low concentrations and show no distinct trends.

In addition, many constituents that were regularly detected and have applicable regulatory criteria occurred in concentrations that met criteria (see **Appendix E**). These constituents include color, dissolved oxygen, alkalinity, dissolved aluminum, barium, chloride, copper, iron, total lead, dissolved manganese, mercury, molybdenum, total dissolved solids, sulfate, and vanadium. In general, dissolved oxygen is lower during months with higher ambient temperatures. Alkalinity and chloride tend to be highest during low flow conditions. Dissolved aluminum, total lead and mercury tend to be highest during high flow conditions. The remaining constituents generally occurred in low concentrations and do not show distinct trends.

There were some constituents that did not meet regulatory criteria (see **Appendix E**). The pH was lower than the regulatory minimum ($\geq$ 6.5) once (3 percent of measurements). The temperature was higher than the regulatory criterion (< 13 degrees Celsius) three times (9 percent of measurements). Total aluminum exceeded the regulatory criterion (50 µg/L) eight times (40 percent of measurements). Total and dissolved antimony exceeded the regulatory criterion (5.6 µg/L) 15 and 16 times, respectively (43 and 46 percent of measurements). Total and dissolved arsenic exceeded the regulatory criterion (10 µg/L) 35 times each (100 percent of measurements).

Table 4-5. YP-T-27, Meadow Creek below Keyway, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Alkalinity as CaCO3, Total	mg/L	35	0	0	20.7	58	0	38.4	41.2	10.2	48.3	49.3	55.3	Nonparametric
Aluminum, Total	µg/L	20	0	0	10.2	197	8	57.8	32.9	55.1	126	160	239	Gamma
Aluminum, Dissolved	µg/L	20	0	0	4.2	25.3	0	12.6	11.1	6.1	19.7	22.6	24.8	Normal
Ammonia as Nitrogen	mg/L	0	35	100	< 0.05	< 0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Antimony, Total	µg/L	35	0	0	2.09	16.9	15	6.28	4.40	3.99	11.4	15.6	16.8	Nonparametric
Antimony, Dissolved	µg/L	35	0	0	2.04	16.9	16	6.16	5.24	3.79	10.8	13.3	19.6	Lognormal
Arsenic, Total	µg/L	35	0	0	12.6	53.2	35	36.0	37.7	11.3	49.4	51.0	52.5	Normal
Arsenic, Dissolved	µg/L	35	0	0	11.8	52.1	35	33.2	33.9	10.4	44.5	45.8	50.2	Normal
Arsenic (III)	µg/L	16	0	0	0.33	9.7	n/a	5.0	5.3	3.0	9.0	9.4	9.6	Normal
Barium, Total	µg/L	16	0	0	4.55	6.68	0	5.79	6.02	0.532	6.21	6.33	6.61	Normal
Barium, Dissolved	µg/L	16	0	0	3.44	6.68	0	5.32	5.72	0.991	6.16	6.34	6.61	Nonparametric
Beryllium, Total	µg/L	0	16	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Beryllium, Dissolved	µg/L	0	16	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Bicarbonate as CaCO3	mg/L	35	0	0	20.7	50	n/a	38.2	41.2	9.8	48.3	49	49.7	Nonparametric
Boron, Total	µg/L	0	16	100	< 10	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Boron, Dissolved	µg/L	0	16	100	< 10	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Total	µg/L	0	31	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Dissolved	µg/L	1	30	97	< 0.02	0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Calcium, Total	µg/L	35	0	0	5620	14500	n/a	11376	13000	2965	14360	14500	14500	Nonparametric
Calcium, Dissolved	µg/L	35	0	0	5700	14700	n/a	11362	12700	3008	14500	14530	14666	Nonparametric
Carbonate as CaCO3	mg/L	0	35	100	< 9	< 15	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chloride	mg/L	28	7	20	< 0.4	2.35	0	1.24	1.35	0.61	1.94	2.06	2.27	KM - Nonparametric
Chromium, Total	µg/L	10	21	68	< 0.2	0.3	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chromium, Dissolved	µg/L	3	28	90	< 0.2	0.6	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cobalt, Total	µg/L	16	0	0	0.09	0.21	n/a	0.13	0.13	0.03	0.17	0.18	0.20	Normal
Cobalt, Dissolved	µg/L	16	0	0	0.05	0.21	n/a	0.12	0.12	0.04	0.17	0.18	0.20	Normal
Conductivity	mS/cm	34	0	0	0.047	0.136	n/a	0.097	0.103	0.025	0.123	0.125	0.133	Nonparametric

Table 4-5. YP-T-27, Meadow Creek below Keyway, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Copper, Total	µg/L	28	3	10	< 0.1	0.4	0	0.2	0.2	0.1	0.3	0.3	0.4	KM - Nonparametric
Copper, Dissolved	µg/L	31	0	0	0.1	0.7	0	0.2	0.2	0.1	0.4	0.6	0.7	Nonparametric
Cyanide, Total	mg/L	2	14	88	< 0.0047	0.0105	1	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Dissolved Oxygen (DO)	mg/L	35	0	0	7.85	13.58	0	10.2	10.1	1.3	11.7	11.9	13.0	Normal
Fluoride	mg/L	0	35	100	< 0.2	< 0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Hardness as CaCO3	mg/L	35	0	0	18.2	47.7	n/a	37.1	42.2	9.88	47.0	47.4	47.6	Nonparametric
Iron, Total	µg/L	35	0	0	73.8	272	0	159	147	53.5	247	268	271	Normal
Iron, Dissolved	µg/L	31	4	11	< 20	124	0	61.8	65.6	30.7	99.3	109	123	KM - Nonparametric
Lead, Total	µg/L	27	8	23	< 0.02	0.15	0	0.05	0.04	0.03	0.07	0.13	0.15	KM - Nonparametric
Lead, Dissolved	µg/L	0	35	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Magnesium, Total	µg/L	35	0	0	1010	2850	n/a	2111	2320	614	2788	2813	2840	Nonparametric
Magnesium, Dissolved	µg/L	35	0	0	979	2920	n/a	2107	2430	624	2724	2835	2903	Nonparametric
Manganese, Total	µg/L	20	0	0	10.5	56.9	1	31.0	33.9	12.9	44.3	45.6	54.6	Normal
Manganese, Dissolved	µg/L	19	1	5	< 4.5	40.3	0	25.3	29.1	13.0	39.4	40.2	40.3	KM - Nonparametric
Mercury, Total	ng/L	34	1	3	< 1	11.8	0	2.7	2.2	2.0	4.0	6.0	10.1	KM - Nonparametric
Mercury, Dissolved	ng/L	28	6	18	< 0.6	3.8	0	1.5	1.4	0.8	2.4	2.8	3.6	KM - Nonparametric
Methyl Mercury	ng/L	1	15	94	< 0.1	0.13	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Molybdenum, Total	µg/L	16	0	0	0.51	1.23	0	0.96	1.03	0.23	1.16	1.18	1.22	Normal
Molybdenum, Dissolved	µg/L	16	0	0	0.52	1.19	0	0.94	1.03	0.22	1.16	1.18	1.19	Normal
Nickel, Total	µg/L	6	10	63	< 0.2	0.3	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nickel, Dissolved	µg/L	6	10	63	< 0.2	0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nitrate + Nitrite as Nitrogen	mg/L	7	28	80	< 0.05	0.091	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nitrogen, Total	mg/L	12	4	25	< 0.4	2.14	n/a	0.7	0.5	0.4	1.05	1.48	2.01	KM - Nonparametric
Nitrogen, Total Kjeldahl (TKN)	mg/L	12	4	25	< 0.4	2.12	n/a	0.6	0.4	0.4	1.05	1.48	1.99	KM - Nonparametric
pH	pH units	34	0	0	6.43	8.39	1	7.4	7.4	0.4	7.8	8.1	8.3	Normal
Phosphorus, Total	µg/L	3	32	91	< 20	< 80	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample

Table 4-5. YP-T-27, Meadow Creek below Keyway, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Phosphorus, Dissolved	µg/L	2	33	94	< 20	< 80	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Potassium, Total	µg/L	35	0	0	565	1060	n/a	876	916	150	1036	1043	1057	Nonparametric
Potassium, Dissolved	µg/L	35	0	0	554	1080	n/a	879	903	159	1060	1073	1080	Normal
Selenium, Total	µg/L	0	31	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Selenium, Dissolved	µg/L	0	31	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Total	µg/L	0	16	100	< 0.02	< 0.04	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Dissolved	µg/L	0	16	100	< 0.02	< 0.04	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sodium, Total	µg/L	35	0	0	1520	3070	n/a	2427	2600	491.3	2948	2992	3053	Nonparametric
Sodium, Dissolved	µg/L	35	0	0	1520	3120	n/a	2442	2570	494.9	2972	3100	3113	Nonparametric
Solids, Total Dissolved (TDS)	mg/L	35	0	0	30	85	0	57	55	16	78	79	83	Normal
Solids, Total Suspended (TSS)	mg/L	3	32	91	< 5	8	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sulfate	mg/L	35	0	0	2.41	11.6	0	5.78	5.83	1.98	7.87	8.39	10.8	Normal
Temperature, Water	deg C	35	0	0	0.01	16.44	3	5.3	4.7	5.1	12.6	14.8	16.1	Nonparametric
Thallium, Total	µg/L	0	16	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Thallium, Dissolved	µg/L	0	16	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Turbidity	NTU	35	0	0	0	11.6	n/a	2.7	2.2	2.4	4.6	6.6	10.7	Nonparametric
Vanadium, Total	µg/L	14	2	13	< 0.2	0.5	0	0.3	0.3	0.1	0.4	0.4	0.5	KM - Nonparametric
Vanadium, Dissolved	µg/L	10	6	38	< 0.2	0.3	0	0.2	0.2	0.04	0.3	0.3	0.3	KM - Nonparametric
Zinc, Total	µg/L	8	27	77	< 0.5	1.3	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Zinc, Dissolved	µg/L	14	21	60	< 0.5	2.8	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample

Units: **µg/L** = micrograms per liter; **mg/L** = milligrams per liter; **mS/cm** = milliSiemens per centimeter; **ng/L** = nanograms per liter; **deg C** = degrees Celsius; **NTU** = nephelometric turbidity units

Measurements: **< 20 µg/L** = analyte not detected at the method reporting limit of 20 µg/L; **n/a** = not applicable; **Min** = minimum concentration measured; **Max** = maximum concentration measured

*Number that do not meet criterion: total number of analytical results that did not meet the strictest potentially applicable regulatory criterion (presented in **Table 3-4**). If a constituent does not have applicable regulatory criteria, then n/a is given.*

Distribution: **Normal** = data appear normally distributed at 0.05 significance level; statistics presented are normal population estimators; **Gamma** = data appear gamma distributed 0.05 significance level; statistics presented are gamma population estimators; **Lognormal** = data appear lognormally distributed at 0.05 significance level; statistics presented are lognormal populations estimators; **Nonparametric** = data do not appear normally, gamma or lognormally distributed at 0.05 significance level; statistics presented are sample statistics; **KM nonparametric** = data comprises ≤ 50% non-detects; statistics presented are nonparametric population estimators generated using the Kaplan-Meier method; **Sample** = data comprises > 50% non-detects and statistics are not presented; or, data comprises five or fewer measurements but each result was detected and statistics presented are sample statistics.

YP-T-29, Blowout Creek

The Blowout Creek site (YP-T-29) is located within the debris fan from the 1965 upstream dam failure (URS 2000). The banks and substrate comprise loose gravel, sand and silt, and vegetation is still becoming established (see photos in **Appendix G).** Flow is generally from south to north at the site, and onsite flow measurements have ranged from 0.78 cfs in February 2016 to 24 cfs in May 2014 with a median flow of 2.0 cfs.

For the time interval included in this baseline study, this site was visited 35 times. **Appendix E** presents dates the site was visited and parameters or constituents sampled during each visit. Analytical results are summarized in **Table 4-6.** Multiple constituents were analyzed for but were not detected in at least half of the samples from YP-T-29. These constituents were ammonia, beryllium, boron, cadmium, carbonate, chloride, chromium, cyanide, fluoride, dissolved lead, methyl mercury, nickel, nitrate plus nitrite, phosphorus, selenium, silver, total suspended solids, thallium, and zinc.

Of constituents that were regularly detected, many do not have defined or applicable regulatory criteria for comparison (see **Appendix E**). These include conductivity, turbidity, arsenic III, bicarbonate, calcium, cobalt, hardness, magnesium, total nitrogen, total Kjeldahl nitrogen, potassium, and sodium. In general, of these constituents, most of the major cations (calcium, magnesium and sodium), major anion (bicarbonate), and related measurements (conductivity and hardness) tend to be lowest during periods of high flow. The exception is potassium, which does not show a consistent trend. Turbidity is highest during periods of high flow, although not all high flows show high turbidity. The remainder of the constituents consistently occurred in low concentrations and show no distinct trends.

In addition, many constituents that were regularly detected and have applicable regulatory criteria occurred in concentrations that met criteria (see **Appendix E**). These constituents include color, dissolved oxygen, pH, alkalinity, dissolved aluminum, antimony, dissolved arsenic, barium, copper, dissolved iron, dissolved manganese, dissolved mercury, molybdenum, total dissolved solids, sulfate, and vanadium. In general, dissolved oxygen is lower during months with higher ambient temperatures. Alkalinity, antimony, and dissolved arsenic tend to be highest during low flow conditions. The remaining constituents generally occurred in low concentrations and do not show distinct trends.

There were some constituents that did not meet regulatory criteria (see **Appendix E**). Temperature exceeded the regulatory criterion (< 13 degrees Celsius) three times (9 percent of measurements). Total aluminum exceeded the regulatory criterion (50 µg/L) 11 times (55 percent of measurements). Total arsenic exceeded the regulatory criterion (10 µg/L) once (3 percent of measurements). Total cyanide exceeded regulatory criterion (0.0052 mg/L) once (6 percent of measurements). Total iron exceeded the regulatory criterion (300 µg/L) nine times (26 percent of measurements). In May 2013 and May 2014 (6 percent of measurements), total lead exceeded site-specific, hardness-based regulatory criteria (0.69 and 0.96 µg/L, respectively). Total manganese exceeded the regulatory criterion (50 µg/L) twice (10 percent of measurements). Total mercury exceeded the criterion (12 ng/L) four times (11 percent of measurements).

Table 4-6. YP-T-29, Blowout Creek, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Alkalinity as CaCO3, Total	mg/L	35	0	0	23.1	85.6	0	41.8	43.8	12.0	49.0	54.5	78.6	Nonparametric
Aluminum, Total	µg/L	20	0	0	18.3	2730	11	378	54.4	816	898	2692	2722	Nonparametric
Aluminum, Dissolved	µg/L	18	2	10	< 3	40.1	0	12.1	10	10.2	22.9	38.5	39.8	KM - Nonparametric
Ammonia as Nitrogen	mg/L	0	35	100	< 0.05	< 0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Antimony, Total	µg/L	35	0	0	0.47	1.54	0	1.02	1.08	0.34	1.44	1.51	1.54	Normal
Antimony, Dissolved	µg/L	35	0	0	0.45	1.63	0	1.01	1.08	0.35	1.44	1.51	1.61	Normal
Arsenic, Total	µg/L	35	0	0	4.3	10.5	1	7.2	7.4	1.4	8.7	9.0	10.2	Normal
Arsenic, Dissolved	µg/L	35	0	0	3.5	8.7	0	6.4	6.9	1.6	8.4	8.6	8.7	Nonparametric
Arsenic (III)	µg/L	16	0	0	0.05	0.22	n/a	0.12	0.12	0.06	0.21	0.22	0.22	Normal
Barium, Total	µg/L	16	0	0	12.8	59.4	0	19.7	14.1	15.4	38.6	58.7	59.3	Nonparametric
Barium, Dissolved	µg/L	16	0	0	7.25	14.5	0	11.8	12.8	2.54	13.9	14.2	14.4	Nonparametric
Beryllium, Total	µg/L	4	12	75	< 0.02	0.23	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Beryllium, Dissolved	µg/L	0	16	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Bicarbonate as CaCO3	mg/L	35	0	0	23.1	85.6	n/a	41.3	43.8	11.4	48.6	51.2	74.9	Nonparametric
Boron, Total	µg/L	0	16	100	< 10	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Boron, Dissolved	µg/L	0	16	100	< 10	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Total	µg/L	1	30	97	< 0.02	0.03	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Dissolved	µg/L	0	31	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Calcium, Total	µg/L	35	0	0	6080	12400	n/a	10078	10700	1824	11880	12130	12332	Nonparametric
Calcium, Dissolved	µg/L	35	0	0	5670	12700	n/a	9984	10800	2101	11900	12250	12666	Nonparametric
Carbonate as CaCO3	mg/L	0	35	100	< 9	< 15	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chloride	mg/L	1	34	97	< 0.2	0.41	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chromium, Total	µg/L	15	16	52	< 0.2	2.9	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chromium, Dissolved	µg/L	4	27	87	< 0.2	0.7	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cobalt, Total	µg/L	16	0	0	0.03	1.37	n/a	0.23	0.04	0.43	0.79	1.30	1.36	Nonparametric
Cobalt, Dissolved	µg/L	13	3	19	< 0.02	0.06	n/a	0.03	0.03	0.01	0.04	0.05	0.06	KM - Nonparametric
Conductivity	mS/cm	33	0	0	0.047	0.107	n/a	0.083	0.087	0.018	0.104	0.104	0.106	Nonparametric

Table 4-6. YP-T-29, Blowout Creek, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Copper, Total	µg/L	30	1	3	< 0.1	1.7	0	0.3	0.2	0.4	0.5	1.4	1.7	KM - Nonparametric
Copper, Dissolved	µg/L	31	0	0	0.1	0.7	0	0.3	0.2	0.2	0.5	0.6	0.7	Nonparametric
Cyanide, Total	mg/L	1	15	94	< 0.0047	0.0248	1	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Dissolved Oxygen (DO)	mg/L	35	0	0	8.02	13.54	0	10.3	10.2	1.2	11.6	11.7	12.9	Normal
Fluoride	mg/L	0	35	100	< 0.2	< 0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Hardness as CaCO3	mg/L	35	0	0	21.2	40.6	n/a	34.4	36.3	5.58	39.7	40.5	40.6	Nonparametric
Iron, Total	µg/L	35	0	0	36.2	5470	9	575	120	1292	928	3353	5443	Nonparametric
Iron, Dissolved	µg/L	18	17	49	< 20	86.3	0	26.5	22.5	13.5	41.3	49.6	79.4	KM - Nonparametric
Lead, Total	µg/L	21	14	40	< 0.02	1.18	2	0.13	0.02	0.25	0.31	0.61	1.11	KM - Nonparametric
Lead, Dissolved	µg/L	3	32	91	< 0.02	0.14	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Magnesium, Total	µg/L	35	0	0	1430	2760	n/a	2236	2360	347.5	2522	2668	2743	Nonparametric
Magnesium, Dissolved	µg/L	35	0	0	1200	2650	n/a	2110	2320	456.8	2506	2551	2633	Nonparametric
Manganese, Total	µg/L	18	2	10	< 2.9	237	2	29.6	8.3	58.6	43.8	168	223	KM - Nonparametric
Manganese, Dissolved	µg/L	17	3	15	< 1.6	9.3	0	4.6	4.3	2.0	7.2	8.5	9.1	KM - Nonparametric
Mercury, Total	ng/L	35	0	0	1.2	113	4	9.3	3.4	19.5	15.1	28.3	88.0	Nonparametric
Mercury, Dissolved	ng/L	33	1	3	< 1	3.8	0	2.0	1.8	0.67	3.0	3.1	3.6	KM - Nonparametric
Methyl Mercury	ng/L	3	13	81	< 0.1	0.2	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Molybdenum, Total	µg/L	16	0	0	0.32	0.8	0	0.65	0.71	0.13	0.75	0.76	0.79	Nonparametric
Molybdenum, Dissolved	µg/L	16	0	0	0.45	0.78	0	0.67	0.70	0.11	0.77	0.77	0.78	Nonparametric
Nickel, Total	µg/L	6	10	63	< 0.2	1.5	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nickel, Dissolved	µg/L	5	11	69	< 0.2	0.52	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nitrate + Nitrite as Nitrogen	mg/L	2	33	94	< 0.05	0.071	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nitrogen, Total	mg/L	11	5	31	< 0.4	0.89	n/a	0.54	0.54	0.14	0.75	0.81	0.87	KM - Nonparametric
Nitrogen, Total Kjeldahl (TKN)	mg/L	12	4	25	< 0.4	0.82	n/a	0.54	0.54	0.13	0.74	0.78	0.81	KM - Nonparametric
pH	pH units	34	0	0	7.03	8.55	0	7.6	7.5	0.4	8.0	8.3	8.5	Normal
Phosphorus, Total	µg/L	10	25	71	< 20	316	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample

Table 4-6. YP-T-29, Blowout Creek, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Phosphorus, Dissolved	µg/L	2	33	94	< 20	< 80	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Potassium, Total	µg/L	35	0	0	531	2200	n/a	845	748	363	1018	1673	2166	Nonparametric
Potassium, Dissolved	µg/L	35	0	0	502	822	n/a	697	720	80.3	766	804	817	Nonparametric
Selenium, Total	µg/L	0	31	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Selenium, Dissolved	µg/L	0	31	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Total	µg/L	1	15	94	< 0.02	0.04	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Dissolved	µg/L	0	16	100	< 0.02	< 0.04	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sodium, Total	µg/L	35	0	0	1630	2480	n/a	2111	2180	235.8	2346	2378	2460	Nonparametric
Sodium, Dissolved	µg/L	35	0	0	1610	2500	n/a	2105	2180	268.2	2346	2446	2486	Nonparametric
Solids, Total Dissolved (TDS)	mg/L	35	0	0	29	383	0	62	51	58	70	89	285	Nonparametric
Solids, Total Suspended (TSS)	mg/L	9	26	74	< 5	134	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sulfate	mg/L	35	0	0	1.11	12.8	0	2.12	1.88	1.90	2.34	2.48	9.31	Nonparametric
Temperature, Water	deg C	35	0	0	-0.03	15.17	3	5.5	4.8	4.7	11.4	13.5	14.8	Nonparametric
Thallium, Total	µg/L	3	13	81	< 0.02	0.07	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Thallium, Dissolved	µg/L	0	16	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Turbidity	NTU	35	0	0	0	124	n/a	12.4	3.5	24.8	24.8	53.9	109.7	Nonparametric
Vanadium, Total	µg/L	16	0	0	0.3	7.2	0	1.3	0.4	2.2	3.9	6.5	7.1	Nonparametric
Vanadium, Dissolved	µg/L	16	0	0	0.2	0.4	0	0.3	0.3	0.04	0.3	0.3	0.4	Nonparametric
Zinc, Total	µg/L	14	21	60	< 0.5	9.9	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Zinc, Dissolved	µg/L	13	22	63	< 0.5	2.7	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample

Units: **µg/L** = micrograms per liter; **mg/L** = milligrams per liter; **mS/cm** = milliSiemens per centimeter; **ng/L** = nanograms per liter; **deg C** = degrees Celsius; **NTU** = nephelometric turbidity units

Measurements: **< 20 µg/L** = analyte not detected at the method reporting limit of 20 µg/L; **n/a** = not applicable; **Min** = minimum concentration measured; **Max** = maximum concentration measured

*Number that do not meet criterion: total number of analytical results that did not meet the strictest potentially applicable regulatory criterion (presented in **Table 3-4**). If a constituent does not have applicable regulatory criteria, then n/a is given.*

Distribution: **Normal** = data appear normally distributed at 0.05 significance level; statistics presented are normal population estimators; **Gamma** = data appear gamma distributed 0.05 significance level; statistics presented are gamma population estimators; **Lognormal** = data appear lognormally distributed at 0.05 significance level; statistics presented are lognormal populations estimators; **Nonparametric** = data do not appear normally, gamma or lognormally distributed at 0.05 significance level; statistics presented are sample statistics; **KM nonparametric** = data comprises ≤ 50% non-detects; statistics presented are nonparametric population estimators generated using the Kaplan-Meier method; **Sample** = data comprises > 50% non-detects and statistics are not presented; or, data comprises five or fewer measurements but each result was detected and statistics presented are sample statistics.

YP-T-22, Meadow Creek above EFSFSR

The lowest Meadow Creek site (YP-T-22) is located in a restored section of Meadow Creek near the northeast end of the airstrip (see photos in **Appendix G**). The stream banks at the site are lined with geotextiles, and the stream channel contains rock ribs and other engineered features constructed in 2004 and 2005 (URS 2006). Flow is generally from southwest to northeast, and onsite flow measurements have ranged from 3.9 cfs in November 2015 to 87 cfs in May 2012 with a median flow of 7.7 cfs.

For the time interval included in this baseline study, this site was visited 35 times. **Appendix E** presents dates the site was visited and parameters or constituents sampled during each visit. Analytical results are summarized in **Table 4-7**. Multiple constituents were analyzed for but were not detected in at least half of the samples from YP-T-22. These constituents were ammonia, beryllium, boron, cadmium, carbonate, chromium, total cyanide, fluoride, dissolved lead, methyl mercury, nickel, nitrate plus nitrite, phosphorus, selenium, silver, total suspended solids, thallium, and dissolved zinc.

Of constituents that were regularly detected, many do not have defined or applicable regulatory criteria for comparison (see **Appendix E**). These include conductivity, turbidity, arsenic III, bicarbonate, calcium, cobalt, hardness, magnesium, total nitrogen, total Kjeldahl nitrogen, potassium, and sodium. In general, of these constituents, the major cations (calcium, magnesium, potassium and sodium), major anion (bicarbonate), and related measurements (conductivity and hardness) tend to be highest during periods of low flow. In contrast, turbidity was highest during periods of high flow. Arsenic III, cobalt and nitrogen occurred in low concentrations and show no distinct trends.

In addition, many constituents that were regularly detected and have applicable regulatory criteria occurred in concentrations that met criteria (see **Appendix E**). These constituents include color, dissolved oxygen, pH, alkalinity, barium, chloride, copper, dissolved iron, total lead, dissolved manganese, dissolved mercury, molybdenum, total dissolved solids, sulfate, vanadium, and total zinc. Dissolved oxygen tends to be lowest during low flow conditions with warm ambient temperatures. Alkalinity and total dissolved solids tend to be lowest during high flow conditions. The remaining constituents generally occurred at low concentrations and show no distinct trends.

There were some constituents that did not meet regulatory criteria (see **Appendix E**). Temperature was higher than the regulatory maximum (< 13 degrees Celsius) eight times (23 percent of measurements). Total aluminum exceeded the regulatory criterion (50 µg/L) eight times (40 percent of measurements); dissolved aluminum also exceeded that criterion once (1 percent of measurements). Total and dissolved antimony exceeded the regulatory criterion (5.6 µg/L) 18 times each (51 percent of measurements). Total and dissolved arsenic exceeded the criterion (10 µg/L) 35 times each (100 percent of measurements). Total cyanide exceeded regulatory criterion (0.0052 mg/L) once (6 percent of measurements). Total iron exceeded the regulatory criterion (300 µg/L) 10 times (29 percent of measurements). Total manganese exceeded the regulatory criterion (50 µg/L) once (5 percent of measurements). Total mercury exceeded the regulatory criterion (12 ng/L) five times (14 percent of measurements).

Table 4-7. YP-T-22, Meadow Creek above EFSFSR, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Alkalinity as CaCO3, Total	mg/L	35	0	0	21.9	65	0	39.9	43.1	10.5	49.6	50.3	60.2	Nonparametric
Aluminum, Total	µg/L	20	0	0	20.5	1420	8	158	44.95	315	288	485	1233	Nonparametric
Aluminum, Dissolved	µg/L	19	1	5	< 3.6	57.7	1	13.7	10.5	11.4	21.7	24.3	51.0	KM - Nonparametric
Ammonia as Nitrogen	mg/L	0	35	100	< 0.05	< 0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Antimony, Total	µg/L	35	0	0	2.47	38.2	18	8.0	6.4	6.0	15.0	19.1	30.2	Lognormal
Antimony, Dissolved	µg/L	35	0	0	2.4	35.8	18	7.8	6.3	5.9	14.7	18.8	29.6	Lognormal
Arsenic, Total	µg/L	35	0	0	14.5	63.5	35	37.3	36.7	12.3	49.4	57.3	62.1	Normal
Arsenic, Dissolved	µg/L	35	0	0	13.6	52.1	35	33.3	34.8	10.3	46.2	47.2	50.5	Normal
Arsenic (III)	µg/L	16	0	0	0.48	6.8	n/a	2.0	1.8	1.6	3.1	4.2	6.3	Normal
Barium, Total	µg/L	16	0	0	7.01	30	0	9.77	8.51	5.45	9.78	15.3	27.1	Nonparametric
Barium, Dissolved	µg/L	16	0	0	4.49	8.97	0	7.37	7.84	1.42	8.73	8.80	8.94	Normal
Beryllium, Total	µg/L	3	13	81	< 0.02	0.12	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Beryllium, Dissolved	µg/L	0	16	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Bicarbonate as CaCO3	mg/L	35	0	0	21.9	54	n/a	39.4	43.1	9.73	48.6	50.3	53.0	Nonparametric
Boron, Total	µg/L	0	16	100	< 10	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Boron, Dissolved	µg/L	0	16	100	< 10	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Total	µg/L	1	30	97	< 0.02	0.06	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Dissolved	µg/L	0	31	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Calcium, Total	µg/L	35	0	0	5960	14300	n/a	11257	12600	2705	13800	14030	14232	Nonparametric
Calcium, Dissolved	µg/L	35	0	0	5820	14400	n/a	11186	12300	2787	14000	14160	14366	Nonparametric
Carbonate as CaCO3	mg/L	0	35	100	< 9	< 15	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chloride	mg/L	26	9	26	< 0.4	1.78	0	1.01	1.03	0.45	1.58	1.75	1.78	KM - Nonparametric
Chromium, Total	µg/L	14	17	55	< 0.2	1.6	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chromium, Dissolved	µg/L	4	27	87	< 0.2	1.3	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cobalt, Total	µg/L	16	0	0	0.087	0.76	n/a	0.17	0.13	0.16	0.21	0.36	0.68	Nonparametric
Cobalt, Dissolved	µg/L	16	0	0	0.05	0.2	n/a	0.11	0.11	0.04	0.13	0.15	0.19	Normal
Conductivity	mS/cm	34	0	0	0.048	0.135	n/a	0.096	0.102	0.023	0.115	0.126	0.134	Nonparametric

Table 4-7. YP-T-22, Meadow Creek above EFSFSR, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Copper, Total	µg/L	29	2	6	< 0.1	0.9	0	0.2	0.2	0.2	0.5	0.7	0.9	KM - Nonparametric
Copper, Dissolved	µg/L	31	0	0	0.1	1	0	0.3	0.2	0.2	0.5	0.5	0.9	Nonparametric
Cyanide, Total	mg/L	1	15	94	< 0.0047	0.0135	1	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Dissolved Oxygen (DO)	mg/L	35	0	0	7.59	13.81	0	10.0	10.1	1.5	11.7	12.0	13.2	Normal
Fluoride	mg/L	0	35	100	< 0.2	< 0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Hardness as CaCO3	mg/L	35	0	0	19.5	47.3	n/a	37.3	41.4	9.02	46.3	46.8	47.2	Nonparametric
Iron, Total	µg/L	35	0	0	113	2680	10	329	183	447	544	747	2112	Nonparametric
Iron, Dissolved	µg/L	35	0	0	21.4	149	0	69.9	67.3	34.1	114	129	144	Normal
Lead, Total	µg/L	31	4	11	< 0.02	0.48	0	0.08	0.04	0.10	0.21	0.29	0.43	KM - Nonparametric
Lead, Dissolved	µg/L	4	31	89	< 0.02	0.04	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Magnesium, Total	µg/L	35	0	0	1130	2980	n/a	2222	2430	566.1	2780	2891	2966	Nonparametric
Magnesium, Dissolved	µg/L	35	0	0	1050	3050	n/a	2162	2420	606.8	2738	2794	2982	Nonparametric
Manganese, Total	µg/L	20	0	0	14.4	80.5	1	33.3	31	13.5	41.6	45.6	73.5	Normal
Manganese, Dissolved	µg/L	20	0	0	5.7	39	0	23.0	26.7	10.1	32.6	35.6	38.3	Normal
Mercury, Total	ng/L	35	0	0	1.3	404	5	19	2.8	69	26	57.31	292	Nonparametric
Mercury, Dissolved	ng/L	33	1	3	< 0.7	4	0	1.7	1.5	0.78	3	3.0	3.7	KM - Nonparametric
Methyl Mercury	ng/L	3	13	81	< 0.1	0.18	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Molybdenum, Total	µg/L	16	0	0	0.49	1.08	0	0.87	0.94	0.20	1.05	1.07	1.08	Normal
Molybdenum, Dissolved	µg/L	16	0	0	0.52	1.1	0	0.88	0.95	0.20	1.07	1.08	1.10	Normal
Nickel, Total	µg/L	7	9	56	< 0.2	0.9	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nickel, Dissolved	µg/L	8	8	50	< 0.2	0.7	0	0.3	0.2	0.1	0.5	0.6	0.7	KM - Nonparametric
Nitrate + Nitrite as Nitrogen	mg/L	4	31	89	< 0.05	0.095	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nitrogen, Total	mg/L	14	2	13	< 0.4	1.05	n/a	0.6	0.5	0.2	0.9	1.05	1.05	KM - Nonparametric
Nitrogen, Total Kjeldahl (TKN)	mg/L	14	2	13	< 0.4	1.04	n/a	0.6	0.5	0.2	0.9	1.00	1.03	KM - Nonparametric
pH	pH units	34	0	0	6.57	8.33	0	7.5	7.4	0.4	8.2	8.2	8.3	Normal
Phosphorus, Total	µg/L	5	30	86	< 20	102	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample

Table 4-7. YP-T-22, Meadow Creek above EFSFSR, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Phosphorus, Dissolved	µg/L	1	34	97	< 20	< 80	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Potassium, Total	µg/L	35	0	0	581	1470	n/a	901	909	174	1056	1104	1365	Normal
Potassium, Dissolved	µg/L	35	0	0	527	1100	n/a	851	872	145	1016	1033	1080	Normal
Selenium, Total	µg/L	0	31	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Selenium, Dissolved	µg/L	0	31	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Total	µg/L	0	16	100	< 0.02	< 0.04	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Dissolved	µg/L	0	16	100	< 0.02	< 0.04	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sodium, Total	µg/L	35	0	0	1570	3040	n/a	2454	2590	454.5	2930	2990	3023	Nonparametric
Sodium, Dissolved	µg/L	35	0	0	1550	3120	n/a	2433	2560	474.6	2926	2996	3083	Nonparametric
Solids, Total Dissolved (TDS)	mg/L	35	0	0	29	74	0	55	56	12	66	69	74	Normal
Solids, Total Suspended (TSS)	mg/L	8	27	77	< 5	73.5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sulfate	mg/L	35	0	0	2.26	9.36	0	5.03	5.07	1.71	7.41	7.66	8.84	Normal
Temperature, Water	deg C	35	0	0	-0.01	17.35	8	6.5	4.7	6.0	16.7	17.1	17.4	Nonparametric
Thallium, Total	µg/L	1	15	94	< 0.02	0.04	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Thallium, Dissolved	µg/L	0	16	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Turbidity	NTU	35	0	0	0	70.2	n/a	6.3	2.8	12.1	11.0	17.0	54.9	Nonparametric
Vanadium, Total	µg/L	16	0	0	0.2	3.7	0	0.5	0.4	0.5	1.1	1.4	2.3	Lognormal
Vanadium, Dissolved	µg/L	12	4	25	< 0.2	0.31	0	0.2	0.2	0.1	0.3	0.3	0.3	KM - Nonparametric
Zinc, Total	µg/L	18	17	49	< 0.5	9.2	0	1.1	0.5	1.7	1.8	4.4	7.8	KM - Nonparametric
Zinc, Dissolved	µg/L	14	21	60	< 0.5	3.3	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample

Units: **µg/L** = micrograms per liter; **mg/L** = milligrams per liter; **mS/cm** = milliSiemens per centimeter; **ng/L** = nanograms per liter; **deg C** = degrees Celsius; **NTU** = nephelometric turbidity units

Measurements: **< 20 µg/L** = analyte not detected at the method reporting limit of 20 µg/L; **n/a** = not applicable; **Min** = minimum concentration measured; **Max** = maximum concentration measured

*Number that do not meet criterion: total number of analytical results that did not meet the strictest potentially applicable regulatory criterion (presented in **Table 3-4**). If a constituent does not have applicable regulatory criteria, then n/a is given.*

Distribution: **Normal** = data appear normally distributed at 0.05 significance level; statistics presented are normal population estimators; **Gamma** = data appear gamma distributed 0.05 significance level; statistics presented are gamma population estimators; **Lognormal** = data appear lognormally distributed at 0.05 significance level; statistics presented are lognormal populations estimators; **Nonparametric** = data do not appear normally, gamma or lognormally distributed at 0.05 significance level; statistics presented are sample statistics; **KM nonparametric** = data comprises ≤ 50% non-detects; statistics presented are nonparametric population estimators generated using the Kaplan-Meier method; **Sample** = data comprises > 50% non-detects and statistics are not presented; or, data comprises five or fewer measurements but each result was detected and statistics presented are sample statistics.

4.1.2.2 Meadow Creek Adit Seep and Seep Sites

YP-M-3, pond at northeast corner of SODA

The settling pond at the northeast corner of SODA is located on the eastern side of and directly adjacent to the Keyway Dam (see photos in **Appendix E**). The pond is visibly sourced by a small tributary that originates on the north side of the SODA and flows through a culvert under the road to the SODA and into the pond. The pond has water year-round although the pond forms a thick layer of ice during winter months. No surface water has been observed flowing out of the pond during any sampling events. Measurements of flow from the tributary into the pond have ranged $5.9x10^{-3}$ cfs in February 2016 to 0.75 cfs in April 2014 with a median flow of $7.6x10^{2}$ cfs.

For the time interval included in this baseline study, this site was visited 32 times. **Appendix E** presents dates the site was visited and parameters or constituents sampled during each visit. Analytical results are summarized in **Table 4-8**. Multiple constituents were analyzed for but were not detected in at least half of the samples from YP-M-3. These constituents were ammonia, dissolved beryllium, boron, cadmium, carbonate, dissolved chromium, fluoride, dissolved lead, phosphorus, selenium, silver, and thallium.

Of constituents that were regularly detected, many do not have defined or applicable regulatory criteria for comparison (see **Appendix E**). These include conductivity, turbidity, arsenic III, bicarbonate, calcium, cobalt, hardness, magnesium, methyl mercury, nitrate plus nitrite, total nitrogen, total Kjeldahl nitrogen, potassium, sodium, and total suspended solids. In general, calcium, magnesium and hardness were lower during periods with low flow. Potassium tended to be highest during winter quarters (November and February). The remainder of the constituents generally occurred in low concentrations and show no distinct trends.

In addition, many constituents that were regularly detected and have applicable regulatory criteria occurred in concentrations that met criteria (see **Appendix E**). These constituents include color, dissolved oxygen, alkalinity, barium, chloride, total chromium, dissolved copper, molybdenum, dissolved nickel, total dissolved solids, sulfate, vanadium, and dissolved zinc. In general, the constituents generally occurred in low concentrations and show no distinct trends.

There were some constituents that did not meet regulatory criteria (see **Appendix E**). The pH was below the regulatory minimum (≥ 6.5) six times (19 percent of measurements). The temperature exceeded the regulatory maximum (< 13 degrees Celsius) 13 times (41 percent of measurements), generally in months with higher ambient temperatures (June through September). Total and dissolved aluminum exceeded the regulatory criterion (50 µg/L) 12 and 2 times, respectively (75 and 13 percent of measurements). Total antimony exceeded the regulatory criterion (5.6 µg/L) 16 times (100 percent of measurements) and dissolved antimony exceeded this criterion 13 times (81 percent of measurements). Total and dissolved arsenic exceeded the regulatory criterion (10 µg/L) 16 times each (100 percent of measurements). Total cadmium exceeded the site-specific, hardness-based criteria (0.41 µg/L) once (6 percent of measurements) in November 2015. In February 2014 and November 2015 (13 percent of measurements), total copper exceeded the site-specific, hardness-based regulatory criterion (3.5 and 6.9 µg/L, respectively). Total cyanide exceeded the criterion (0.0052 mg/L) six times (38 percent of measurements). Total iron exceeded the regulatory criterion (300 µg/L) 10 times (63 percent of measurements). In February 2014, August 2015, November 2015, and February 2016 (25 percent of measurements), measured total lead exceeded site-specific, hardness-based

criteria (0.54, 0.54, 1.34, and 0.66 µg/L, respectively). Total manganese exceeded the regulatory criterion (50 µg/L) three times (19 percent of measurements); dissolved manganese exceeded once (6 percent of measurements). Total mercury exceeded the regulatory criterion (12 ng/L) 11 times (69 percent of measurements); dissolved mercury exceeded once (6 percent of measurements). Total nickel exceeded site-specific hardness-based regulatory criterion (32 µg/L) once (6 percent of measurements) in November 2015. Total thallium exceeded regulatory criterion (0.24 µ/L) once (6 percent of measurements). Total zinc exceeded site-specific, hardness-based regulatory criterion (73 µg/L) once (6 percent of measurements) in November 2015.

Table 4-8. YP-M-3, Pond at Northeast Corner of SODA, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Alkalinity as CaCO3, Total	mg/L	16	0	0	23	46	0	29	26	6.8	39	41	45	Nonparametric
Aluminum, Total	µg/L	16	0	0	20	12100	12	989	124	2990	1170	4233	10527	Nonparametric
Aluminum, Dissolved	µg/L	16	0	0	3.6	571	2	53.4	7.4	145	98.7	277	512	Nonparametric
Ammonia as Nitrogen	mg/L	2	14	88	< 0.05	0.23	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Antimony, Total	µg/L	16	0	0	5.8	192	16	30.6	20.3	34.4	64.7	89.9	166	Lognormal
Antimony, Dissolved	µg/L	16	0	0	3.9	68.7	13	18.8	12.9	17.3	39.2	49.1	71.4	Gamma
Arsenic, Total	µg/L	16	0	0	32.5	583	16	126	92.7	128	251	308	436	Gamma
Arsenic, Dissolved	µg/L	16	0	0	24.7	142	16	73.1	68.4	38.3	129	135	141	Normal
Arsenic (III)	µg/L	16	0	0	0.98	252	n/a	23.4	9.3	53.6	53.0	86.7	218	Lognormal
Barium, Total	µg/L	16	0	0	1.69	194	0	22.4	8.15	57.4	50.4	84.6	223	Lognormal
Barium, Dissolved	µg/L	16	0	0	0.42	17.1	0	3.51	2.10	3.96	7.61	9.65	14.3	Gamma
Beryllium, Total	µg/L	9	7	44	< 0.02	2.6	0	0.22	0.03	0.62	0.28	0.95	2.3	KM - Nonparametric
Beryllium, Dissolved	µg/L	2	14	88	< 0.02	0.13	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Bicarbonate as CaCO3	mg/L	15	1	6	< 15	46	n/a	27	25	7.0	34	38	44	KM - Nonparametric
Boron, Total	µg/L	0	16	100	< 10	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Boron, Dissolved	µg/L	0	16	100	< 10	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Total	µg/L	4	12	75	< 0.02	0.47	1	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Dissolved	µg/L	1	15	94	< 0.02	0.03	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Calcium, Total	µg/L	16	0	0	6590	23800	n/a	10192	8470	4677	15925	18109	22700	Gamma
Calcium, Dissolved	µg/L	16	0	0	5380	23300	n/a	9592	8255	4721	14900	18800	22400	Nonparametric
Carbonate as CaCO3	mg/L	1	15	94	< 9	24	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chloride	mg/L	10	6	38	< 0.32	1.05	0	0.48	0.47	0.19	0.62	0.73	0.99	KM - Nonparametric
Chromium, Total	µg/L	10	6	38	< 0.2	24.9	0	2.1	0.3	5.9	2.4	8.8	21.7	KM - Nonparametric
Chromium, Dissolved	µg/L	7	9	56	< 0.2	1.2	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cobalt, Total	µg/L	16	0	0	0.23	23	n/a	2.2	0.52	5.6	2.4	8.2	20.1	Nonparametric
Cobalt, Dissolved	µg/L	16	0	0	0.21	1.74	n/a	0.42	0.29	0.38	0.63	0.92	1.6	Nonparametric
Conductivity	mS/cm	31	0	0	0.06	0.221	n/a	0.098	0.092	0.036	0.145	0.164	0.209	Lognormal

Table 4-8. YP-M-3, Pond at Northeast Corner of SODA, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Copper, Total	µg/L	16	0	0	0.2	35	2	3.0	0.5	8.6	3.4	12.4	30.5	Nonparametric
Copper, Dissolved	µg/L	16	0	0	0.2	2	0	0.5	0.3	0.5	0.8	1.4	1.9	Nonparametric
Cyanide, Total	mg/L	9	7	44	< 0.0047	0.015	6	0.007	0.005	0.003	0.011	0.012	0.014	KM - Nonparametric
Dissolved Oxygen (DO)	mg/L	32	0	0	6.56	12.83	0	10.1	10.5	1.6	12.0	12.3	12.7	Normal
Fluoride	mg/L	0	16	100	< 0.2	< 0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Hardness as CaCO3	mg/L	16	0	0	20.3	76.2	n/a	33.4	30.7	14.2	51.8	60.1	79.4	Lognormal
Iron, Total	µg/L	16	0	0	80.4	40600	10	2743	652	11214	5723	10595	33644	Lognormal
Iron, Dissolved	µg/L	16	0	0	22.5	2720	2	295	74.3	687	577	1423	2461	Nonparametric
Lead, Total	µg/L	15	1	6	< 0.02	24.9	4	2.03	0.21	5.98	2.49	9.06	21.7	KM - Nonparametric
Lead, Dissolved	µg/L	6	10	63	< 0.02	1.24	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Magnesium, Total	µg/L	16	0	0	853	6060	n/a	1954	1440	1411	3609	4326	5895	Gamma
Magnesium, Dissolved	µg/L	16	0	0	731	4030	n/a	1491	1319	787	2490	2981	4179	Lognormal
Manganese, Total	µg/L	16	0	0	5	341	3	44.3	19.2	82.2	112	153	252	Gamma
Manganese, Dissolved	µg/L	15	1	6	< 2.4	73.2	1	13.4	8.3	16.5	21.6	35.9	65.7	KM - Nonparametric
Mercury, Total	ng/L	16	0	0	4.3	6600	11	237	40.3	1370	449	890	3209	Lognormal
Mercury, Dissolved	ng/L	16	0	0	1.9	152	1	14.0	4.6	36.9	9.2	46.7	131	Nonparametric
Methyl Mercury	ng/L	12	4	25	< 0.1	12.5	n/a	1.4	0.2	3.2	3.7	7.6	11.5	KM - Nonparametric
Molybdenum, Total	µg/L	16	0	0	0.1	0.94	0	0.34	0.30	0.23	0.65	0.81	0.92	Normal
Molybdenum, Dissolved	µg/L	16	0	0	0.11	1.06	0	0.40	0.34	0.24	0.71	0.84	1.1	Gamma
Nickel, Total	µg/L	15	1	6	< 0.2	48	1	4.2	0.75	11.4	4.8	17.0	41.8	KM - Nonparametric
Nickel, Dissolved	µg/L	14	2	13	< 0.2	3.8	0	0.72	0.40	0.89	1.3	2.4	3.5	KM - Nonparametric
Nitrate + Nitrite as Nitrogen	mg/L	10	6	38	< 0.05	0.258	n/a	0.11	0.09	0.07	0.21	0.24	0.25	KM - Nonparametric
Nitrogen, Total	mg/L	14	2	13	< 0.4	5.1	n/a	1.2	0.64	1.2	2.1	3.2	4.7	KM - Nonparametric
Nitrogen, Total Kjeldahl (TKN)	mg/L	14	2	13	< 0.4	4.84	n/a	1.1	0.61	1.1	2.0	3.1	4.5	KM - Nonparametric
pH	pH units	31	0	0	5.95	9.15	6	7.1	6.8	0.8	8.6	8.9	9.1	Nonparametric
Phosphorus, Total	µg/L	7	9	56	< 20	826	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample

Table 4-8. YP-M-3, Pond at Northeast Corner of SODA, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Phosphorus, Dissolved	µg/L	1	15	94	< 20	< 80	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Potassium, Total	µg/L	16	0	0	507	6500	n/a	1473	1055	1442	2255	3395	5879	Nonparametric
Potassium, Dissolved	µg/L	16	0	0	427	1860	n/a	920	840	373	1370	1673	1823	Normal
Selenium, Total	µg/L	0	16	100	< 1	< 2.5	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Selenium, Dissolved	µg/L	0	16	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Total	µg/L	8	8	50	< 0.02	1.04	0	0.10	0.02	0.24	0.1	0.34	0.90	KM - Nonparametric
Silver, Dissolved	µg/L	2	14	88	< 0.02	0.057	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sodium, Total	µg/L	16	0	0	3320	4980	n/a	3970	3942	469.8	4586	4786	5187	Lognormal
Sodium, Dissolved	µg/L	16	0	0	3260	4440	n/a	3819	3775	353.1	4325	4380	4428	Normal
Solids, Total Dissolved (TDS)	mg/L	16	0	0	25	124	0	61.7	57.5	22.3	82.5	99.3	119	Normal
Solids, Total Suspended (TSS)	mg/L	10	6	38	< 5	1120	n/a	99.4	5.5	270	185	435	983	KM - Nonparametric
Sulfate	mg/L	16	0	0	4.44	36.4	0	11.7	8.96	8.53	22.0	26.5	36.5	Gamma
Temperature, Water	deg C	32	0	0	-0.05	25.9	13	9.6	10.3	7.2	18.0	21.5	24.7	Normal
Thallium, Total	µg/L	6	10	63	< 0.02	1.44	1	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Thallium, Dissolved	µg/L	2	14	88	< 0.02	0.07	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Turbidity	NTU	30	0	0	0.6	1300	n/a	26.5	8.2	81.5	58.5	102.0	289.7	Lognormal
Vanadium, Total	µg/L	16	0	0	0.3	36.6	0	2.20	1.01	4.29	5.00	7.88	18.5	Lognormal
Vanadium, Dissolved	µg/L	16	0	0	0.2	2.61	0	0.62	0.47	0.54	1.22	1.61	2.69	Lognormal
Zinc, Total	µg/L	16	0	0	0.8	80.1	1	9.8	1.9	21.3	27.5	50.6	74.2	Nonparametric
Zinc, Dissolved	µg/L	13	3	19	< 0.5	4.8	0	1.1	1	1.0	1.3	2.2	4.3	KM - Nonparametric

Units: **µg/L** = micrograms per liter; **mg/L** = milligrams per liter; **mS/cm** = milliSiemens per centimeter; **ng/L** = nanograms per liter; **deg C** = degrees Celsius; **NTU** = nephelometric turbidity units

Measurements: **< 20 µg/L** = analyte not detected at the method reporting limit of 20 µg/L; **n/a** = not applicable; **Min** = minimum concentration measured; **Max** = maximum concentration measured

*Number that do not meet criterion: total number of analytical results that did not meet the strictest potentially applicable regulatory criterion (presented in **Table 3-4**). If a constituent does not have applicable regulatory criteria, then n/a is given.*

Distribution: **Normal** = data appear normally distributed at 0.05 significance level; statistics presented are normal population estimators; **Gamma** = data appear gamma distributed 0.05 significance level; statistics presented are gamma population estimators; **Lognormal** = data appear lognormally distributed at 0.05 significance level; statistics presented are lognormal populations estimators; **Nonparametric** = data do not appear normally, gamma or lognormally distributed at 0.05 significance level; statistics presented are sample statistics; **KM nonparametric** = data comprises ≤ 50% non-detects; statistics presented are nonparametric population estimators generated using the Kaplan-Meier method; **Sample** = data comprises > 50% non-detects and statistics are not presented; or, data comprises five or fewer measurements but each result was detected and statistics presented are sample statistics.

YP-S-8, north Keyway Dam seep

The north Keyway Dam seep (YP-S-8) originates from the base of the eastern side of the Keyway Dam (see photos in **Appendix G**). It is the northern-most monitored seep from the Dam. The seep flows visibly into the Keyway Marsh year-round. Flow measurements at the site ranged from $3.1x10^{-4}$ cfs in November 2015 to $9.5x10^{-2}$ cfs in June 2012, with median flow of $5.3x10^{-3}$ cfs.

For the time interval included in this baseline study, this site was visited 32 times. **Appendix E** presents dates the site was visited and parameters or constituents sampled during each visit. Analytical results are summarized in **Table 4-9**. Multiple constituents were analyzed for but were not detected in at least half of the samples from YP-S-8. These constituents were dissolved aluminum, beryllium, boron, cadmium, carbonate, chromium, fluoride, dissolved lead, methyl mercury, nitrate plus nitrite, dissolved phosphorus, selenium, silver, thallium, and dissolved vanadium.

Of constituents that were regularly detected, many do not have defined or applicable regulatory criteria for comparison (see **Appendix E**). These include conductivity, turbidity, ammonia, arsenic III, bicarbonate, calcium, cobalt, hardness, magnesium, total nitrogen, total Kjeldahl nitrogen, total phosphorus, potassium, sodium, and total suspended solids. In general, arsenic III, bicarbonate, potassium and sodium had the lowest concentrations during spring snowmelt conditions. The remainder of the constituents show no distinct trends.

In addition, many constituents that were regularly detected and have applicable regulatory criteria occurred in concentrations that met criteria (see **Appendix E**). These constituents include color, pH, temperature, alkalinity, total aluminum, barium, chloride, copper, total lead, dissolved mercury, molybdenum, nickel, total dissolved solids, sulfate, total vanadium, and zinc. In general, temperature was steady throughout the year, alkalinity was lowest during spring snowmelt conditions. The remainder of the constituents generally occurred in low concentrations and show no distinct trends.

There were some constituents that did not meet regulatory criteria (see **Appendix E**). Dissolved oxygen was below the regulatory minimum (> 6 mg/L) 31 times (100 percent of measurements). Total and dissolved antimony and arsenic exceeded regulatory criteria (5.6 and 10 µg/L, respectively) 15 times each (100 percent of measurements). Total cyanide exceeded the regulatory criterion (0.0052 mg/L) 14 times (93 percent of measurements). Total and dissolved iron and manganese exceeded regulatory criteria (300 and 50 µg/L, respectively) 15 times each (100 percent of measurements). Total mercury exceeded the regulatory criterion (12 ng/L) five times (33 percent of measurements).

Table 4-9. YP-S-8, North Keyway Dam Seep, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Alkalinity as CaCO3, Total	mg/L	15	0	0	117	150	0	134	136	9.60	144	147	149	Normal
Aluminum, Total	µg/L	14	1	7	< 2	19.9	0	7.6	4.6	5.4	14.9	17.4	19.4	KM - Nonparametric
Aluminum, Dissolved	µg/L	7	8	53	< 2	11.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Ammonia as Nitrogen	mg/L	15	0	0	0.099	0.235	n/a	0.192	0.202	0.039	0.226	0.232	0.234	Normal
Antimony, Total	µg/L	15	0	0	307	1700	15	682	505	418	1207	1427	1902	Gamma
Antimony, Dissolved	µg/L	15	0	0	246	391	15	313	326	50.7	377	388	390	Normal
Arsenic, Total	µg/L	15	0	0	1710	4650	15	3172	2980	795	4188	4377	4595	Normal
Arsenic, Dissolved	µg/L	15	0	0	1590	2870	15	2354	2400	432	2804	2863	2869	Normal
Arsenic (III)	µg/L	15	0	0	1420	4160	n/a	2673	2660	684.4	3250	3551	4038	Normal
Barium, Total	µg/L	15	0	0	55	114	0	68.5	60.8	15.8	83.7	93.9	110	Nonparametric
Barium, Dissolved	µg/L	15	0	0	47.9	55.9	0	53.0	53.7	2.52	55.5	55.8	55.9	Normal
Beryllium, Total	µg/L	5	10	67	< 0.02	0.08	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Beryllium, Dissolved	µg/L	0	15	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Bicarbonate as CaCO3	mg/L	15	0	0	117	160	n/a	135.1	136	11	144.2	149.5	157.9	Normal
Boron, Total	µg/L	2	13	87	< 10	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Boron, Dissolved	µg/L	2	13	87	< 10.5	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Total	µg/L	0	15	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Dissolved	µg/L	0	15	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Calcium, Total	µg/L	15	0	0	57000	76400	n/a	67060	66200	5985	74840	75420	76204	Normal
Calcium, Dissolved	µg/L	15	0	0	54500	76600	n/a	66173	64800	6196	75060	76110	76502	Normal
Carbonate as CaCO3	mg/L	0	15	100	< 9	< 15	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chloride	mg/L	15	0	0	29.2	64.4	0	42.7	37.7	13.0	62.3	63.6	64.3	Normal
Chromium, Total	µg/L	5	10	67	< 0.2	0.3	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chromium, Dissolved	µg/L	0	15	100	< 0.2	< 0.2	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cobalt, Total	µg/L	15	0	0	2.33	3.51	n/a	2.83	2.69	0.42	3.37	3.43	3.49	Normal
Cobalt, Dissolved	µg/L	15	0	0	2.25	3.49	n/a	2.80	2.69	0.43	3.39	3.43	3.48	Normal
Conductivity	mS/cm	30	0	0	0.445	0.682	n/a	0.578	0.566	0.051	0.656	0.671	0.681	Nonparametric

Table 4-9. YP-S-8, North Keyway Dam Seep, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Copper, Total	µg/L	9	6	40	< 0.1	0.4	0	0.2	0.2	0.1	0.4	0.4	0.4	KM - Nonparametric
Copper, Dissolved	µg/L	10	5	33	< 0.1	0.3	0	0.2	0.2	0.1	0.3	0.3	0.3	KM - Nonparametric
Cyanide, Total	mg/L	14	1	7	< 0.0047	0.0386	14	0.0203	0.0188	0.0080	0.031	0.0341	0.0377	KM - Nonparametric
Dissolved Oxygen (DO)	mg/L	31	0	0	0.53	2.74	31	1.2	1.0	0.5	1.7	2.2	2.6	Normal
Fluoride	mg/L	0	15	100	< 0.2	< 0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Hardness as CaCO3	mg/L	15	0	0	198	260	n/a	230	226	21.2	257	258	260	Normal
Iron, Total	µg/L	15	0	0	7990	19000	15	11768	11289	3464	16334	18138	22075	Lognormal
Iron, Dissolved	µg/L	15	0	0	4970	8040	15	6780	6860	909	7758	7879	8008	Normal
Lead, Total	µg/L	12	3	20	< 0.02	0.16	0	0.06	0.04	0.05	0.14	0.15	0.16	KM - Nonparametric
Lead, Dissolved	µg/L	1	14	93	< 0.02	0.03	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Magnesium, Total	µg/L	15	0	0	12800	17900	n/a	15140	14700	1614	17040	17410	17802	Normal
Magnesium, Dissolved	µg/L	15	0	0	12800	17800	n/a	15027	14700	1689	17160	17380	17716	Normal
Manganese, Total	µg/L	15	0	0	913	1190	15	1033	1020	96.1	1152	1169	1186	Normal
Manganese, Dissolved	µg/L	15	0	0	883	1190	15	1009	973	100	1166	1190	1190	Normal
Mercury, Total	ng/L	15	0	0	2.8	36.5	5	13.6	8.9	15.7	29.0	40.5	75.9	Lognormal
Mercury, Dissolved	ng/L	12	3	20	< 0.9	2.5	0	1.4	1.3	0.5	2.3	2.5	2.5	KM - Nonparametric
Methyl Mercury	ng/L	1	14	93	< 0.1	0.12	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Molybdenum, Total	µg/L	15	0	0	3.91	5.42	0	4.60	4.47	0.49	5.29	5.35	5.41	Normal
Molybdenum, Dissolved	µg/L	15	0	0	3.84	5.32	0	4.57	4.49	0.46	5.24	5.30	5.32	Normal
Nickel, Total	µg/L	15	0	0	0.68	1.7	0	1.1	1.2	0.32	1.6	1.6	1.7	Normal
Nickel, Dissolved	µg/L	15	0	0	0.74	1.6	0	1.1	1.1	0.30	1.6	1.6	1.6	Normal
Nitrate + Nitrite as Nitrogen	mg/L	0	15	100	< 0.05	< 0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nitrogen, Total	mg/L	14	1	7	< 0.4	1.23	n/a	0.7	0.6	0.3	1.2	1.2	1.2	KM - Nonparametric
Nitrogen, Total Kjeldahl (TKN)	mg/L	14	1	7	< 0.4	1.23	n/a	0.7	0.6	0.3	1.2	1.2	1.2	KM - Nonparametric
pH	pH units	30	0	0	6.53	7.39	0	7.0	7.1	0.2	7.3	7.3	7.4	Normal
Phosphorus, Total	µg/L	15	0	0	128	1420	n/a	466	268	376	952	1181	1696	Gamma

Table 4-9. YP-S-8, North Keyway Dam Seep, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Phosphorus, Dissolved	µg/L	6	9	60	< 20	88.9	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Potassium, Total	µg/L	15	0	0	4640	7240	n/a	6110	5900	792.7	7136	7212	7234	Normal
Potassium, Dissolved	µg/L	15	0	0	4640	7250	n/a	6070	5750	820.6	7014	7124	7225	Normal
Selenium, Total	µg/L	0	15	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Selenium, Dissolved	µg/L	0	15	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Total	µg/L	1	14	93	< 0.02	0.04	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Dissolved	µg/L	2	13	87	< 0.02	0.04	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sodium, Total	µg/L	15	0	0	10800	17800	n/a	14507	14100	2404	17580	17730	17786	Normal
Sodium, Dissolved	µg/L	15	0	0	10800	18200	n/a	14367	13700	2482	17540	17990	18158	Normal
Solids, Total Dissolved (TDS)	mg/L	14	1	7	< 10	375	0	292	301	81.3	353	360	372	KM - Nonparametric
Solids, Total Suspended (TSS)	mg/L	15	0	0	11.5	158	n/a	35.4	26.4	31.7	70.5	93.1	157	Lognormal
Sulfate	mg/L	15	0	0	51.5	82.8	0	65.5	66.9	8.79	75.1	78.5	81.9	Normal
Temperature, Water	deg C	31	0	0	0.14	10.86	0	6.9	7.0	1.7	8.1	9.6	10.6	Nonparametric
Thallium, Total	µg/L	2	13	87	< 0.02	0.03	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Thallium, Dissolved	µg/L	1	14	93	< 0.02	0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Turbidity	NTU	31	0	0	0.3	201	n/a	14.7	5.5	35.7	38.4	53.3	89.3	Gamma
Vanadium, Total	µg/L	8	7	47	< 0.2	0.5	0	0.3	0.2	0.1	0.4	0.5	0.5	KM - Nonparametric
Vanadium, Dissolved	µg/L	0	15	100	< 0.2	< 0.2	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Zinc, Total	µg/L	15	0	0	0.6	2.1	0	1.1	0.9	0.5	1.8	2.1	2.6	Gamma
Zinc, Dissolved	µg/L	15	0	0	0.6	1.9	0	1.1	1.0	0.4	1.7	1.8	1.9	Normal

Units: **µg/L** = micrograms per liter; **mg/L** = milligrams per liter; **mS/cm** = milliSiemens per centimeter; **ng/L** = nanograms per liter; **deg C** = degrees Celsius; **NTU** = nephelometric turbidity units
Measurements: **< 20 µg/L** = analyte not detected at the method reporting limit of 20 µg/L; **n/a** = not applicable; **Min** = minimum concentration measured; **Max** = maximum concentration measured
*Number that do not meet criterion: total number of analytical results that did not meet the strictest potentially applicable regulatory criterion (presented in **Table 3-4**). If a constituent does not have applicable regulatory criteria, then n/a is given.*
Distribution: **Normal** = data appear normally distributed at 0.05 significance level; statistics presented are normal population estimators; **Gamma** = data appear gamma distributed 0.05 significance level; statistics presented are gamma population estimators; **Lognormal** = data appear lognormally distributed at 0.05 significance level; statistics presented are lognormal populations estimators; **Nonparametric** = data do not appear normally, gamma or lognormally distributed at 0.05 significance level; statistics presented are sample statistics; **KM nonparametric** = data comprises ≤ 50% non-detects; statistics presented are nonparametric population estimators generated using the Kaplan-Meier method; **Sample** = data comprises > 50% non-detects and statistics are not presented; or, data comprises five or fewer measurements but each result was detected and statistics presented are sample statistics.

YP-S-7, middle Keyway Dam seep

The middle Keyway Dam seep (YP-S-7) also originates from the base of the eastern side of Keyway Dam (see photos in **Appendix G**). It emerges in between the northern and southern monitored seeps (YP-S-8 and YP-S-6). It contains stagnant liquid water year-round and is connected to the Keyway Marsh, but generally only visibly flows at the surface during the period of spring snowmelt. Flow measurements at the site ranged from $6.9x10^{-3}$ in April 2014 to $1.3x10^{-2}$cfs in April 2013.

For the time interval included in this baseline study, this site was visited 32 times. **Appendix E** presents dates the site was visited and parameters or constituents sampled during each visit. Analytical results are summarized in **Table 4-10**. Multiple constituents were analyzed for but were not detected in at least half of the samples from YP-S-7. These constituents were dissolved aluminum, dissolved beryllium, dissolved boron, cadmium, carbonate, dissolved chromium, fluoride, dissolved lead, methyl mercury, nitrate plus nitrite, dissolved phosphorus, selenium, silver, thallium, and dissolved vanadium.

Of constituents that were regularly detected, many do not have defined or applicable regulatory criteria for comparison (see **Appendix E**). These include conductivity, turbidity, ammonia, arsenic III, bicarbonate, calcium, cobalt, hardness, magnesium, total nitrogen, total Kjeldahl nitrogen, total phosphorus, potassium, sodium, and total suspended solids. In general, of these constituents, the major cations (calcium, magnesium, potassium and sodium) and related measurements (conductivity and hardness) tend to be lowest during the spring snowmelt period. The remainder of the constituents show no distinct trends.

In addition, many constituents that were regularly detected and have applicable regulatory criteria occurred in concentrations that met criteria (see **Appendix E**). These constituents include color, pH, alkalinity, barium, total beryllium, total boron, chloride, total chromium, copper, total lead, dissolved mercury, molybdenum, nickel, sulfate, total vanadium, and total zinc. Generally, chloride was lowest in during spring snowmelt conditions.

There were some constituents that did not meet regulatory criteria (see **Appendix E**). Dissolved oxygen was below the regulatory minimum (> 6 mg/L) 28 times (93 percent of measurements). Temperature exceeded the regulatory maximum (< 13 degrees Celsius) four times (13 percent of measurements). Total aluminum exceeded the regulatory criterion (50 µg/L) four times (29 percent of measurements). Total and dissolved antimony and arsenic exceeded the regulatory criteria (5.6 and 10 µg/L, respectively) 14 times each (100 percent of measurements). Total cyanide exceeded the regulatory criterion (0.0052 mg/L) 14 times (100 percent of measurements). Total and dissolved iron exceeded the regulatory criterion (300 µg/L) 14 and 12 times, respectively (100 and 86 percent of measurements). Total and dissolved manganese exceeded the regulatory criterion (50 µg/L) 14 and 13 times, respectively (100 percent and 93 percent of measurements). Total mercury exceeded the regulatory criterion (12 ng/L) 10 times (71 percent of measurements). Total dissolved solids exceeded the regulatory criterion (500 mg/L) five times (62 percent of measurements). Dissolved zinc exceeded the site-specific, hardness-based regulatory criterion (353 µg/L) once (7 percent of measurements) in November 2014.

Table 4-10. YP-S-7, Middle Keyway Dam Seep, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Alkalinity as CaCO3, Total	mg/L	14	0	0	150	198	0	163	162	10.9	164	176	194	Nonparametric
Aluminum, Total	µg/L	13	1	7	< 2	148	4	36.7	13.3	47.9	118	140	146	KM - Nonparametric
Aluminum, Dissolved	µg/L	5	9	64	< 2	13.1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Ammonia as Nitrogen	mg/L	13	1	7	< 0.05	0.23	n/a	0.17	0.18	0.05	0.22	0.23	0.23	KM - Nonparametric
Antimony, Total	µg/L	14	0	0	9.19	1760	14	354	144	491	907	1245	2058	Gamma
Antimony, Dissolved	µg/L	14	0	0	15.7	380	14	81.0	47.7	90.6	171	215	315	Gamma
Arsenic, Total	µg/L	14	0	0	2540	48600	14	13127	7030	12961	24470	32935	45467	Normal
Arsenic, Dissolved	µg/L	14	0	0	485	4300	14	2352	2495	1086	3546	3845	4209	Normal
Arsenic (III)	µg/L	14	0	0	104	6890	n/a	3935	4395	1921	5743	6240	6760	Normal
Barium, Total	µg/L	14	0	0	29.4	692	0	169	81.4	180	321	473	648	Normal
Barium, Dissolved	µg/L	14	0	0	12.8	68	0	42.0	42.7	12.5	50.0	56.4	65.7	Normal
Beryllium, Total	µg/L	9	5	36	< 0.02	0.39	0	0.11	0.03	0.13	0.32	0.38	0.39	KM - Nonparametric
Beryllium, Dissolved	µg/L	0	14	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Bicarbonate as CaCO3	mg/L	14	0	0	150	198	n/a	163	162	10.9	164	176	194	Nonparametric
Boron, Total	µg/L	8	6	43	< 10	< 50	0	20	23	8.0	45	50	50	KM - Nonparametric
Boron, Dissolved	µg/L	1	13	93	< 13.3	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Total	µg/L	0	14	100	< 0.02	< 0.05	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Dissolved	µg/L	1	13	93	< 0.02	0.03	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Calcium, Total	µg/L	14	0	0	64500	119000	n/a	100393	102500	14001	111700	114450	118090	Nonparametric
Calcium, Dissolved	µg/L	14	0	0	62700	107000	n/a	92586	94900	11834	103700	105050	106610	Normal
Carbonate as CaCO3	mg/L	0	14	100	< 9	< 15	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chloride	mg/L	14	0	0	4.41	148	0	108	125	38.7	136	140	146	Nonparametric
Chromium, Total	µg/L	10	4	29	< 0.2	4.7	0	1.0	0.6	1.2	2.1	3.2	4.4	KM - Nonparametric
Chromium, Dissolved	µg/L	2	12	86	< 0.2	0.5	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cobalt, Total	µg/L	14	0	0	0.99	6.57	n/a	5.3	5.8	1.4	6.1	6.3	6.5	Nonparametric
Cobalt, Dissolved	µg/L	14	0	0	0.91	6.49	n/a	5.1	5.4	1.5	6.4	6.5	6.5	Normal

Table 4-10. YP-S-7, Middle Keyway Dam Seep, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Conductivity	mS/cm	30	0	0	0.51	0.977	n/a	0.839	0.882	0.124	0.965	0.969	0.975	Nonparametric
Copper, Total	µg/L	12	2	14	< 0.1	20.4	0	1.9	0.45	5.1	1.5	8.3	18.0	KM - Nonparametric
Copper, Dissolved	µg/L	10	4	29	< 0.1	0.7	0	0.31	0.30	0.19	0.57	0.64	0.69	KM - Nonparametric
Cyanide, Total	mg/L	14	0	0	0.0064	0.0341	14	0.0208	0.0216	0.0075	0.0291	0.0314	0.0336	Normal
Dissolved Oxygen (DO)	mg/L	30	0	0	1.01	8.7	28	2.9	2.6	1.7	5.1	6.1	8.8	Lognormal
Fluoride	mg/L	2	12	86	< 0.2	0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Hardness as CaCO3	mg/L	14	0	0	225	406	n/a	359	370	49.8	401	404	406	Nonparametric
Iron, Total	µg/L	14	0	0	5840	137000	14	49982	25501	84256	112784	171907	379015	Lognormal
Iron, Dissolved	µg/L	14	0	0	23	8070	12	3737	3405	2709	7301	7810	8018	Normal
Lead, Total	µg/L	10	4	29	< 0.02	1.26	0	0.25	0.06	0.38	0.81	1.1	1.2	KM - Nonparametric
Lead, Dissolved	µg/L	1	13	93	< 0.02	0.62	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Magnesium, Total	µg/L	14	0	0	15600	31400	n/a	26371	27150	3996	29820	30490	31218	Normal
Magnesium, Dissolved	µg/L	14	0	0	15500	30800	n/a	25764	26650	4037	29610	30085	30657	Normal
Manganese, Total	µg/L	14	0	0	81.9	3710	14	1701	1535	814	2351	2872	3542	Normal
Manganese, Dissolved	µg/L	14	0	0	10.5	1510	13	1173	1265	373	1447	1471	1502	Nonparametric
Mercury, Total	ng/L	13	1	7	< 1	345	10	72.6	37.6	98.4	207	265	329	KM - Nonparametric
Mercury, Dissolved	ng/L	12	2	14	< 0.88	7	0	2.0	1.2	1.7	3.6	4.8	6.6	KM - Nonparametric
Methyl Mercury	ng/L	6	8	57	< 0.1	0.5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Molybdenum, Total	µg/L	14	0	0	4.49	7.92	0	6.29	6.27	0.94	7.29	7.54	7.85	Normal
Molybdenum, Dissolved	µg/L	14	0	0	5.51	7.48	0	6.46	6.48	0.59	7.11	7.27	7.44	Normal
Nickel, Total	µg/L	14	0	0	0.2	3.24	0	1.3	1.2	1.0	2.8	3.0	3.2	Normal
Nickel, Dissolved	µg/L	14	0	0	0.2	1.6	0	0.8	0.9	0.5	1.5	1.5	1.6	Normal
Nitrate + Nitrite as Nitrogen	mg/L	1	13	93	< 0.05	0.5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nitrogen, Total	mg/L	13	1	7	< 0.45	5.48	n/a	1.64	1.41	1.29	2.74	3.84	5.15	KM - Nonparametric
Nitrogen, Total Kjeldahl (TKN)	mg/L	13	1	7	< 0.4	5.48	n/a	1.61	1.21	1.30	2.74	3.84	5.15	KM - Nonparametric
pH	pH units	30	0	0	6.5	7.58	0	7.1	7.1	0.2	7.4	7.5	7.6	Normal

Table 4-10. YP-S-7, Middle Keyway Dam Seep, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Phosphorus, Total	µg/L	14	0	0	154	5410	n/a	1870	626	1973	4770	6526	10740	Gamma
Phosphorus, Dissolved	µg/L	4	10	71	< 22.4	< 80	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Potassium, Total	µg/L	14	0	0	5890	13700	n/a	11372	11800	1874	12800	13115	13583	Normal
Potassium, Dissolved	µg/L	14	0	0	5600	13400	n/a	11068	11400	1924	12670	12945	13309	Normal
Selenium, Total	µg/L	0	14	100	< 1	< 2.5	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Selenium, Dissolved	µg/L	0	14	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Total	µg/L	0	14	100	< 0.02	< 0.1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Dissolved	µg/L	1	13	93	< 0.02	0.04	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sodium, Total	µg/L	14	0	0	3160	32800	n/a	25254	26400	7248	31090	32020	32644	Normal
Sodium, Dissolved	µg/L	14	0	0	3070	31200	n/a	24969	26700	7269	30700	30875	31135	Normal
Solids, Total Dissolved (TDS)	mg/L	14	0	0	260	549	8	483	517	79.3	545	547	549	Normal
Solids, Total Suspended (TSS)	mg/L	14	0	0	13.5	480	n/a	116	59.8	129	247	343	453	Normal
Sulfate	mg/L	14	0	0	69.6	99.4	0	91.0	93.1	6.99	94.9	96.5	98.8	Normal
Temperature, Water	deg C	30	0	0	1.73	16.8	4	8.5	7.9	3.6	13.4	13.9	16.0	Normal
Thallium, Total	µg/L	2	12	86	< 0.02	0.05	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Thallium, Dissolved	µg/L	0	14	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Turbidity	NTU	30	0	0	0.7	306	n/a	47.7	20.1	69.4	123.8	171.1	285.4	Gamma
Vanadium, Total	µg/L	11	3	21	< 0.2	4.7	0	1.3	0.5	1.4	3.5	4.3	4.6	KM - Nonparametric
Vanadium, Dissolved	µg/L	0	14	100	< 0.2	< 0.2	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Zinc, Total	µg/L	14	0	0	0.9	24.9	0	8.3	3.9	15.5	18.8	29.4	67.6	Lognormal
Zinc, Dissolved	µg/L	12	2	14	< 0.5	1660	1	120	1	427	1.6	582	1444	KM - Nonparametric

Units: **µg/L** = micrograms per liter; **mg/L** = milligrams per liter; **mS/cm** = milliSiemens per centimeter; **ng/L** = nanograms per liter; **deg C** = degrees Celsius; **NTU** = nephelometric turbidity units
Measurements: **< 20 µg/L** = analyte not detected at the method reporting limit of 20 µg/L; **n/a** = not applicable; **Min** = minimum concentration measured; **Max** = maximum concentration measured
*Number that do not meet criterion: total number of analytical results that did not meet the strictest potentially applicable regulatory criterion (presented in **Table 3-4**). If a constituent does not have applicable regulatory criteria, then n/a is given.*
Distribution: **Normal** = data appear normally distributed at 0.05 significance level; statistics presented are normal population estimators; **Gamma** = data appear gamma distributed 0.05 significance level; statistics presented are gamma population estimators; **Lognormal** = data appear lognormally distributed at 0.05 significance level; statistics presented are lognormal populations estimators; **Nonparametric** = data do not appear normally, gamma or lognormally distributed at 0.05 significance level; statistics presented are sample statistics; **KM nonparametric** = data comprises ≤ 50% non-detects; statistics presented are nonparametric population estimators generated using the Kaplan-Meier method; **Sample** = data comprises > 50% non-detects and statistics are not presented; or, data comprises five or fewer measurements but each result was detected and statistics presented are sample statistics.

YP-S-6, south Keyway Dam seep

The south Keyway Dam seep (YP-S-6) also originates from the base of the eastern side of Keyway Dam (see photos in **Appendix G**). It is the southern-most monitored seep from the Dam. It contains stagnant liquid water year-round and is connected to the Keyway Marsh, but generally only visibly flows at the surface during the period of spring snowmelt. Flow measurements at the site ranged from $2.8x10^{-4}$ in February 2013 to $1.1x10^{-2}$ cfs in May 2012.

For the time interval included in this baseline study, this site was visited 33 times. **Appendix E** presents dates the site was visited and parameters or constituents sampled during each visit. Analytical results are summarized in **Table 4-11**. Multiple constituents were analyzed for but were not detected in at least half of the samples from YP-S-6. These constituents were dissolved aluminum, ammonia, beryllium, boron, cadmium, carbonate, dissolved chromium, fluoride, dissolved lead, nitrate plus nitrite, dissolved phosphorus, selenium, silver, thallium, and dissolved vanadium.

Of constituents that were regularly detected, many do not have defined or applicable regulatory criteria for comparison (see **Appendix E**). These include conductivity, turbidity, arsenic III, bicarbonate, calcium, cobalt, hardness, magnesium, methyl mercury, total nitrogen, total Kjeldahl nitrogen, total phosphorus, potassium, sodium, and total suspended solids. Generally, the major cations (calcium, magnesium, potassium, sodium), hardness, arsenic III, phosphorus and total suspended solids all tended to be lowest during spring snowmelt. The remainder of the constituents generally occurred at low concentrations and show no distinct trends.

In addition, many constituents that were regularly detected and have applicable regulatory criteria occurred in concentrations that met criteria (see **Appendix E**). These constituents include color, pH, alkalinity, barium, chloride, total chromium, copper, total lead, molybdenum, nickel, total dissolved solids, sulfate, total vanadium, and zinc. Generally, barium, chloride, total dissolved solids and sulfate tended to be lowest during spring snowmelt. The remainder of the constituents generally occurred at low concentrations and show no distinct trends.

There were some constituents that did not meet regulatory criteria (see **Appendix E**). Dissolved oxygen was below the regulatory minimum (> 6 mg/L) 21 times (68 percent of measurements). Temperature was above the regulatory maximum (< 13 degrees Celsius) three times (10 percent of measurements). Total and dissolved aluminum exceeded the regulatory criterion (50 µg/L) six and one times, respectively (38 and 6 percent of measurements). Total and dissolved antimony exceeded the criterion (5.6 µg/L) 15 times each (94 percent of measurements). Total and dissolved arsenic exceeded the regulatory criterion (10 µg/L) 16 times each (100 percent of measurements). Total cyanide exceeded the criterion (0.0052 mg/L) 16 times (100 percent of measurements). Total and dissolved iron exceeded the regulatory criterion (300 µg/L) 16 and 10 times, respectively (100 and 63 percent of measurements). Total and dissolved manganese exceeded the regulatory criterion (50 µg/L) 16 and 15 times, respectively (100 and 94 percent of measurements). Total and dissolved mercury exceeded regulatory criterion (12 ng/L) 13 and 4 times, respectively (81 and 25 percent of measurements).

Table 4-11. YP-S-6, South Keyway Dam Seep, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Alkalinity as CaCO3, Total	mg/L	16	0	0	26.8	212	0	169	179	41.0	189	196	209	Nonparametric
Aluminum, Total	µg/L	16	0	0	4.2	265	6	57.8	30.9	70.8	140	186	295	Gamma
Aluminum, Dissolved	µg/L	6	10	63	< 2	76.9	1	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Ammonia as Nitrogen	mg/L	5	11	69	< 0.05	0.171	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Antimony, Total	µg/L	16	0	0	4.64	229	15	48.5	22.4	56.3	112	146	224	Gamma
Antimony, Dissolved	µg/L	16	0	0	2.86	85.2	15	31.6	19.8	39.3	68.4	97.2	188	Lognormal
Arsenic, Total	µg/L	16	0	0	235	34400	16	4147	1580	8421	11100	15643	26760	Gamma
Arsenic, Dissolved	µg/L	16	0	0	119	943	16	429	366	287	903	932	941	Normal
Arsenic (III)	µg/L	16	0	0	1	7440	n/a	974	594	1802	2801	4196	7744	Gamma
Barium, Total	µg/L	16	0	0	21.4	492	0	72.6	54.5	63.8	144	189	317	Lognormal
Barium, Dissolved	µg/L	16	0	0	17.4	61.5	0	37.3	37.3	13.8	55.2	58.7	61.0	Normal
Beryllium, Total	µg/L	3	13	81	< 0.02	0.13	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Beryllium, Dissolved	µg/L	0	16	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Bicarbonate as CaCO3	mg/L	16	0	0	26.8	212	n/a	169	179	41.0	189	196	209	Nonparametric
Boron, Total	µg/L	3	13	81	< 10	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Boron, Dissolved	µg/L	4	12	75	< 14.8	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Total	µg/L	0	16	100	< 0.02	< 0.05	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Dissolved	µg/L	0	16	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Calcium, Total	µg/L	16	0	0	60100	101000	n/a	81294	80700	10496	94300	97400	100280	Normal
Calcium, Dissolved	µg/L	16	0	0	53700	94200	n/a	78094	80000	9737	87650	92625	93885	Normal
Carbonate as CaCO3	mg/L	0	16	100	< 9	< 15	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chloride	mg/L	16	0	0	16	72.5	0	35.8	35.9	15.1	50.0	58.7	69.7	Normal
Chromium, Total	µg/L	10	6	38	< 0.2	1.3	0	0.36	0.2	0.29	0.60	0.93	1.2	KM - Nonparametric
Chromium, Dissolved	µg/L	2	14	88	< 0.2	0.5	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cobalt, Total	µg/L	16	0	0	1.75	7.18	n/a	4.46	4.77	1.72	6.37	6.65	7.07	Normal
Cobalt, Dissolved	µg/L	16	0	0	1.49	6.48	n/a	4.06	4.25	1.56	5.70	5.95	6.37	Normal
Conductivity	mS/cm	30	0	0	0.034	0.833	n/a	0.605	0.632	0.162	0.714	0.781	0.822	Nonparametric

Table 4-11. YP-S-6, South Keyway Dam Seep, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Copper, Total	µg/L	16	0	0	0.2	1.8	0	0.5	0.4	0.4	1.0	1.2	1.6	Gamma
Copper, Dissolved	µg/L	14	2	13	< 0.1	0.7	0	0.3	0.3	0.2	0.6	0.7	0.7	KM - Nonparametric
Cyanide, Total	mg/L	16	0	0	0.0053	0.0273	16	0.015	0.015	0.007	0.025	0.026	0.027	Normal
Dissolved Oxygen (DO)	mg/L	31	0	0	1.32	10.99	21	5.0	4.9	2.4	8.4	8.5	10.3	Normal
Fluoride	mg/L	2	14	88	< 0.2	0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Hardness as CaCO3	mg/L	16	0	0	213	352	n/a	292	291	37.3	345	350	352	Normal
Iron, Total	µg/L	16	0	0	420	168000	16	18943	7720	40903	52291	75386	132735	Gamma
Iron, Dissolved	µg/L	15	1	6	< 20	4820	10	1484	1095	1475	3630	4273	4711	KM - Nonparametric
Lead, Total	µg/L	13	3	19	< 0.02	0.41	0	0.12	0.07	0.13	0.33	0.41	0.41	KM - Nonparametric
Lead, Dissolved	µg/L	5	11	69	< 0.02	0.14	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Magnesium, Total	µg/L	16	0	0	15400	26600	n/a	21744	21450	2859	25450	26525	26585	Normal
Magnesium, Dissolved	µg/L	16	0	0	14500	27600	n/a	21400	21300	2872	24050	24975	27075	Normal
Manganese, Total	µg/L	16	0	0	176	3310	16	1397	1450	899	2185	2470	3142	Normal
Manganese, Dissolved	µg/L	16	0	0	47.9	2250	15	1024	1040	739	1915	2063	2213	Normal
Mercury, Total	ng/L	16	0	0	1.1	201	13	58.3	33.2	59.4	145	175	196	Normal
Mercury, Dissolved	ng/L	15	1	6	< 1	19.6	4	9.3	8.1	5.0	16.9	19.0	19.5	KM - Nonparametric
Methyl Mercury	ng/L	12	4	25	< 0.1	1	n/a	0.3	0.3	0.2	0.6	0.7	0.9	KM - Nonparametric
Molybdenum, Total	µg/L	16	0	0	2.23	5.32	0	3.66	3.57	0.97	5.17	5.24	5.30	Normal
Molybdenum, Dissolved	µg/L	16	0	0	2.41	4.92	0	3.44	3.52	0.84	4.54	4.83	4.90	Normal
Nickel, Total	µg/L	16	0	0	0.5	4.3	0	1.39	1.31	0.92	2.00	2.73	3.99	Normal
Nickel, Dissolved	µg/L	16	0	0	0.39	2.1	0	1.06	0.99	0.53	1.70	1.95	2.07	Normal
Nitrate + Nitrite as Nitrogen	mg/L	5	11	69	< 0.05	0.383	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nitrogen, Total	mg/L	16	0	0	0.55	3.36	n/a	1.20	1.03	0.69	2.06	2.51	3.62	Lognormal
Nitrogen, Total Kjeldahl (TKN)	mg/L	16	0	0	0.45	3.36	n/a	1.15	0.87	0.86	2.15	2.58	3.55	Gamma
pH	pH units	30	0	0	6.75	7.96	0	7.2	7.2	0.3	7.6	7.7	7.9	Lognormal
Phosphorus, Total	µg/L	14	2	13	< 20.1	2600	n/a	278	96.9	607	308	919	2264	KM - Nonparametric

Table 4-11. YP-S-6, South Keyway Dam Seep, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Phosphorus, Dissolved	µg/L	1	15	94	< 20	< 80	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Potassium, Total	µg/L	16	0	0	5000	10600	n/a	7749	7910	1605	9510	9948	10470	Normal
Potassium, Dissolved	µg/L	16	0	0	4910	10700	n/a	7549	7900	1556	9205	9973	10555	Normal
Selenium, Total	µg/L	0	16	100	< 1	< 2.5	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Selenium, Dissolved	µg/L	0	16	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Total	µg/L	2	14	88	< 0.02	0.12	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Dissolved	µg/L	1	15	94	< 0.02	0.04	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sodium, Total	µg/L	16	0	0	8250	22100	n/a	15619	16650	3784	19350	20450	21770	Normal
Sodium, Dissolved	µg/L	16	0	0	7560	23000	n/a	15373	16750	3905	18200	19550	22310	Normal
Solids, Total Dissolved (TDS)	mg/L	16	0	0	244	495	0	386	390	61.8	446	478	492	Normal
Solids, Total Suspended (TSS)	mg/L	15	1	6	< 5	556	n/a	61.1	26.0	129	70.8	202	485	KM - Nonparametric
Sulfate	mg/L	16	0	0	66.8	148	0	92.6	89.0	19.9	111	123	143	Normal
Temperature, Water	deg C	31	0	0	0.03	19.83	3	6.9	6.0	4.9	12.3	13.9	18.3	Normal
Thallium, Total	µg/L	4	12	75	< 0.02	0.13	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Thallium, Dissolved	µg/L	3	13	81	< 0.02	0.05	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Turbidity	NTU	31	0	0	1.6	582	n/a	81.9	31.7	129.5	211.0	290.3	481.4	Gamma
Vanadium, Total	µg/L	13	3	19	< 0.2	3.1	0	0.56	0.35	0.69	0.90	1.5	2.8	KM - Nonparametric
Vanadium, Dissolved	µg/L	2	14	88	< 0.2	0.3	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Zinc, Total	µg/L	13	3	19	< 0.5	7.6	0	1.7	1.3	1.7	2.8	4.5	7.0	KM - Nonparametric
Zinc, Dissolved	µg/L	12	4	25	< 0.5	2	0	0.8	0.7	0.4	1.2	1.4	1.9	KM - Nonparametric

Units: **µg/L** = micrograms per liter; **mg/L** = milligrams per liter; **mS/cm** = milliSiemens per centimeter; **ng/L** = nanograms per liter; **deg C** = degrees Celsius; **NTU** = nephelometric turbidity units
Measurements: **< 20 µg/L** = analyte not detected at the method reporting limit of 20 µg/L; **n/a** = not applicable; **Min** = minimum concentration measured; **Max** = maximum concentration measured
*Number that do not meet criterion: total number of analytical results that did not meet the strictest potentially applicable regulatory criterion (presented in **Table 3-4**). If a constituent does not have applicable regulatory criteria, then n/a is given.*
Distribution: **Normal** = data appear normally distributed at 0.05 significance level; statistics presented are normal population estimators; **Gamma** = data appear gamma distributed 0.05 significance level; statistics presented are gamma population estimators; **Lognormal** = data appear lognormally distributed at 0.05 significance level; statistics presented are lognormal populations estimators; **Nonparametric** = data do not appear normally, gamma or lognormally distributed at 0.05 significance level; statistics presented are sample statistics; **KM nonparametric** = data comprises ≤ 50% non-detects; statistics presented are nonparametric population estimators generated using the Kaplan-Meier method; **Sample** = data comprises > 50% non-detects and statistics are not presented; or, data comprises five or fewer measurements but each result was detected and statistics presented are sample statistics.

YP-S-10, Keyway Marsh Outlet

The Keyway Marsh drains to the Keyway Marsh Outlet site (YP-S-10), located at the eastern end of the marsh complex downgradient from the Keyway Dam (see photos in **Appendix G**). From the YP-S-10 sample site, water flows into two channels, one to the north and one to the south. Both channels flow directly into Meadow Creek upstream of YP-T-27. The marsh and channels generally flow year-round, but there can be substantial ice-buildup at the outlets that prevents flow into Meadow Creek in the colder months. Measured flow ranged from $3.2x10^{-2}$ cfs in August 2015 to 0.86 cfs in May 2014 with a median flow of 0.12 cfs.

For the time interval included in this baseline study, this site was visited 34 times. **Appendix E** presents dates the site was visited and parameters or constituents sampled during each visit. Analytical results are summarized in **Table 4-12**. Multiple constituents were analyzed for but were not detected in at least half of the samples from YP-S-10. These constituents were dissolved aluminum, ammonia, beryllium, boron, cadmium, carbonate, chromium, fluoride, dissolved iron, dissolved lead, methyl mercury, nitrate plus nitrite, phosphorus, selenium, silver, total suspended solids, thallium, and vanadium.

Of constituents that were regularly detected, many do not have defined or applicable regulatory criteria for comparison (see **Appendix E**). These include conductivity, turbidity, arsenic III, bicarbonate, calcium, cobalt, hardness, magnesium, nitrogen, total Kjeldahl nitrogen, potassium, and sodium. In general, the major cations (calcium, magnesium, potassium, sodium), associated measurements (conductivity, hardness) and turbidity tended to be lowest during high flow associated with spring snowmelt. The remainder of the constituents generally occurred in low concentrations and show no distinct patterns.

In addition, many constituents that were regularly detected and have applicable regulatory criteria occurred in concentrations that met criteria (see **Appendix E**). These constituents include color, pH, alkalinity, barium, chloride, copper, total lead, dissolved mercury, molybdenum, nickel, total dissolved solids, sulfate, and zinc. In general, chloride, total dissolved solids and sulfate tended to be lowest during high flow associated with spring snowmelt. The remainder of the constituents generally occurred in low concentrations and show no distinct patterns.

There were some constituents that did not meet regulatory criteria (see **Appendix E**). Dissolved oxygen was below the regulatory minimum (> 6 mg/L) eight times (24 percent of measurements). Temperature was above the regulatory maximum (< 13 mg/L) 10 times (29 percent of measurements). Total aluminum exceeded the regulatory criterion (50 µg/L) three times (19 percent of measurements). Total and dissolved antimony exceeded the regulatory criterion (5.6 µg/L) 16 times each (100 percent of measurements). Total and dissolved arsenic exceeded the regulatory criterion (10 µg/L) 16 times each (100 percent of measurements). Total cyanide exceeded the regulatory criterion (0.0052 mg/L) eight times (50 percent of measurements). Total and dissolved iron exceeded the regulatory criterion (300 µg/L) eight and one times, respectively (50 and 6 percent of measurements). Total and dissolved manganese exceeded the regulatory criterion (50 µg/L) 14 and 10 times, respectively (88 and 63 percent of measurements). Total mercury exceeded the regulatory criterion (12 ng/L) five times (31 percent of measurements).

Table 4-12. YP-S-10, Keyway Marsh Outlet, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Alkalinity as CaCO3, Total	mg/L	16	0	0	49.6	150	0	98.8	99.2	25.2	127	134	147	Normal
Aluminum, Total	µg/L	16	0	0	2.5	168	3	33.5	14.5	46.4	86.6	119	199	Gamma
Aluminum, Dissolved	µg/L	5	11	69	< 2	29.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Ammonia as Nitrogen	mg/L	0	16	100	< 0.05	< 0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Antimony, Total	µg/L	16	0	0	19.5	135	16	50.1	44.0	28.0	74.2	93.2	127	Normal
Antimony, Dissolved	µg/L	16	0	0	11.5	139	16	43.9	41.3	31.1	83.4	101	139	Gamma
Arsenic, Total	µg/L	16	0	0	36.3	6540	16	329	146	668	749	1190	2843	Lognormal
Arsenic, Dissolved	µg/L	16	0	0	27.2	151	16	77.8	71.5	41.9	135	150	151	Normal
Arsenic (III)	µg/L	16	0	0	0.24	227	n/a	8.2	2.6	24.9	18.1	31.5	89.0	Lognormal
Barium, Total	µg/L	16	0	0	8.6	119	0	24.3	20.1	16.5	44.2	55.3	84.1	Lognormal
Barium, Dissolved	µg/L	16	0	0	7.3	24.1	0	16.4	17.1	4.79	22.0	24.0	24.1	Normal
Beryllium, Total	µg/L	1	15	94	< 0.02	0.05	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Beryllium, Dissolved	µg/L	0	16	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Bicarbonate as CaCO3	mg/L	16	0	0	49.6	150	n/a	98.7	99.2	25.2	127	134	147	Normal
Boron, Total	µg/L	0	16	100	< 10	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Boron, Dissolved	µg/L	0	16	100	< 10	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Total	µg/L	0	16	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Dissolved	µg/L	0	16	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Calcium, Total	µg/L	16	0	0	20300	66100	n/a	46306	47800	12158	56000	58600	64600	Normal
Calcium, Dissolved	µg/L	16	0	0	20100	62600	n/a	45788	48400	11770	56250	58175	61715	Nonparametric
Carbonate as CaCO3	mg/L	0	16	100	< 9	< 15	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chloride	mg/L	16	0	0	0.24	46.2	0	29.4	34.6	15.2	45.1	45.7	46.1	Normal
Chromium, Total	µg/L	4	12	75	< 0.2	0.6	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chromium, Dissolved	µg/L	1	15	94	< 0.2	0.2	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cobalt, Total	µg/L	16	0	0	0.55	5.2	n/a	1.9	1.9	1.1	3.3	3.9	5.2	Gamma
Cobalt, Dissolved	µg/L	16	0	0	0.51	2.19	n/a	1.6	1.8	0.54	2.1	2.1	2.2	Nonparametric
Conductivity	mS/cm	33	0	0	0.154	0.531	n/a	0.389	0.417	0.091	0.488	0.507	0.525	Normal

Table 4-12. YP-S-10, Keyway Marsh Outlet, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Copper, Total	µg/L	16	0	0	0.2	1.85	0	0.5	0.3	0.4	0.9	1.2	1.7	Nonparametric
Copper, Dissolved	µg/L	16	0	0	0.2	0.7	0	0.3	0.3	0.1	0.4	0.5	0.7	Nonparametric
Cyanide, Total	mg/L	9	7	44	< 0.0047	0.0148	8	0.0077	0.0052	0.0038	0.0142	0.0144	0.0147	KM - Nonparametric
Dissolved Oxygen (DO)	mg/L	34	0	0	3.66	10.29	8	7.4	7.7	1.6	9.2	9.6	10.2	Normal
Fluoride	mg/L	0	16	100	< 0.2	< 0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Hardness as CaCO3	mg/L	16	0	0	68.5	228	n/a	161	167	43.2	196	207	224	Normal
Iron, Total	µg/L	16	0	0	59.9	43500	8	2040	466	8691	4214	7868	25377	Lognormal
Iron, Dissolved	µg/L	8	8	50	< 20	574	1	74.7	20.1	141	152	334	526	KM - Nonparametric
Lead, Total	µg/L	9	7	44	< 0.02	0.852	0	0.12	0.04	0.21	0.31	0.45	0.77	KM - Nonparametric
Lead, Dissolved	µg/L	1	15	94	< 0.02	0.05	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Magnesium, Total	µg/L	16	0	0	4310	15400	n/a	11018	11750	3189	14300	14725	15265	Normal
Magnesium, Dissolved	µg/L	16	0	0	4350	14900	n/a	11148	11900	3212	14550	14750	14870	Normal
Manganese, Total	µg/L	16	0	0	24.5	3470	14	399	155	945	904	1488	3795	Lognormal
Manganese, Dissolved	µg/L	16	0	0	13.3	287	10	91.8	66.7	79.8	190	226	275	Normal
Mercury, Total	ng/L	16	0	0	1.7	27.8	5	9.5	6.7	7.9	20.4	25.8	38.2	Gamma
Mercury, Dissolved	ng/L	16	0	0	0.7	11.1	0	2.7	2.1	2.1	5.1	6.6	10.4	Lognormal
Methyl Mercury	ng/L	5	11	69	< 0.1	0.2	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Molybdenum, Total	µg/L	16	0	0	0.82	3.4	0	1.6	1.5	0.65	2.5	2.8	3.4	Gamma
Molybdenum, Dissolved	µg/L	16	0	0	0.77	2.71	0	1.5	1.4	0.49	2.2	2.4	2.9	Gamma
Nickel, Total	µg/L	16	0	0	0.3	2.53	0	0.78	0.60	0.58	1.5	1.8	2.5	Gamma
Nickel, Dissolved	µg/L	16	0	0	0.29	1.2	0	0.58	0.55	0.28	0.91	1.1	1.2	Normal
Nitrate + Nitrite as Nitrogen	mg/L	2	14	88	< 0.05	0.294	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nitrogen, Total	mg/L	14	2	13	< 0.4	1.21	n/a	0.6	0.6	0.2	0.9	1.1	1.2	KM - Nonparametric
Nitrogen, Total Kjeldahl (TKN)	mg/L	14	2	13	< 0.4	1.04	n/a	0.6	0.6	0.2	0.8	0.9	1.0	KM - Nonparametric
pH	pH units	33	0	0	6.75	7.99	0	7.3	7.3	0.3	7.7	7.8	8.0	Normal
Phosphorus, Total	µg/L	4	12	75	< 20	899	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Phosphorus, Dissolved	µg/L	1	15	94	< 20	< 80	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample

Table 4-12. YP-S-10, Keyway Marsh Outlet, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Potassium, Total	µg/L	16	0	0	1940	6380	n/a	4641	4935	1262	5935	6088	6322	Normal
Potassium, Dissolved	µg/L	16	0	0	1990	6240	n/a	4693	4940	1275	6030	6098	6212	Normal
Selenium, Total	µg/L	0	16	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Selenium, Dissolved	µg/L	0	16	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Total	µg/L	1	15	94	< 0.02	0.1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Dissolved	µg/L	0	16	100	< 0.02	< 0.04	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sodium, Total	µg/L	16	0	0	5340	15700	n/a	11512	12450	3347	15150	15400	15640	Normal
Sodium, Dissolved	µg/L	16	0	0	5380	15800	n/a	11677	12650	3398	15000	15425	15725	Normal
Solids, Total Dissolved (TDS)	mg/L	16	0	0	113	298	0	216	229	58.5	276	283	295	Normal
Solids, Total Suspended (TSS)	mg/L	6	10	63	< 5	344	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sulfate	mg/L	16	0	0	13	52.6	0	36.6	38.2	10.9	49.1	51.2	52.3	Normal
Temperature, Water	deg C	34	0	0	-0.04	19.18	10	7.8	6.9	6.9	17.4	17.9	18.9	Nonparametric
Thallium, Total	µg/L	1	15	94	< 0.02	0.024	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Thallium, Dissolved	µg/L	0	16	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Turbidity	NTU	34	0	0	1	108	n/a	16.8	8.1	30.7	38.2	59.2	135.1	Lognormal
Vanadium, Total	µg/L	5	11	69	< 0.2	1.94	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Vanadium, Dissolved	µg/L	0	16	100	< 0.2	< 0.2	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Zinc, Total	µg/L	12	4	25	< 0.5	9.3	0	1.6	0.8	2.1	3.0	4.7	8.4	KM - Nonparametric
Zinc, Dissolved	µg/L	9	7	44	< 0.5	0.9	0	0.6	0.6	0.1	0.9	0.9	0.9	KM - Nonparametric

Units: **µg/L** = micrograms per liter; **mg/L** = milligrams per liter; **mS/cm** = milliSiemens per centimeter; **ng/L** = nanograms per liter; **deg C** = degrees Celsius; **NTU** = nephelometric turbidity units
Measurements: **< 20 µg/L** = analyte not detected at the method reporting limit of 20 µg/L; **n/a** = not applicable; **Min** = minimum concentration measured; **Max** = maximum concentration measured
*Number that do not meet criterion: total number of analytical results that did not meet the strictest potentially applicable regulatory criterion (presented in **Table 3-4**). If a constituent does not have applicable regulatory criteria, then n/a is given.*
Distribution: **Normal** = data appear normally distributed at 0.05 significance level; statistics presented are normal population estimators; **Gamma** = data appear gamma distributed 0.05 significance level; statistics presented are gamma population estimators; **Lognormal** = data appear lognormally distributed at 0.05 significance level; statistics presented are lognormal populations estimators; **Nonparametric** = data do not appear normally, gamma or lognormally distributed at 0.05 significance level; statistics presented are sample statistics; **KM nonparametric** = data comprises ≤ 50% non-detects; statistics presented are nonparametric population estimators generated using the Kaplan-Meier method; **Sample** = data comprises > 50% non-detects and statistics are not presented; or, data comprises five or fewer measurements but each result was detected and statistics presented are sample statistics.

YP-S-5, Smelter Flats seep

The Smelter Flats seep (YP-S-5) originates on Hangar Flats southwest of the heap leach and on the north side of Hangar Flats road (see photos in **Appendix G**). During periods of high flow (i.e., snowmelt or storm events), it flows east from the source through a ditch on the north side of Hangar Flats road, crosses under the road via a culvert, through a ditch to the east, and to the sampling site at the west end of the airstrip. From there, flow continues into a series of ponds on the Meadow Creek floodplain. During periods of high flow (i.e., spring snowmelt conditions), Meadow Creek has rise to the level of the floodplain and intermixed with water from the ponds. During dry periods (i.e., summer months), the flow in the seep originates near the sampling site or the seep is entirely dry. During periods with temperatures below freezing and snow cover (i.e., winter months), water from the seep freezes and there is no flow. Measured flow at the site has ranged from $7.8x10^{-4}$ cfs in December 2012 to 0.19 cfs in May 2012 with a median flow of $1.2x10^{-2}$ cfs.

For the time interval included in this baseline study, this site was visited 34 times. **Appendix E** presents dates the site was visited and parameters or constituents sampled during each visit. Monthly onsite water quality and flow measurements were only taken when water was present. Analytical results are summarized in **Table 4-13**. Multiple constituents were analyzed for but were not detected in at least half of the samples from YP-S-5. These constituents were ammonia, dissolved beryllium, cadmium, carbonate, dissolved chromium, fluoride, dissolved lead, methyl mercury, and nitrate plus nitrite.

Of constituents that were regularly detected, many do not have defined or applicable regulatory criteria for comparison (see **Appendix E**). These include conductivity, turbidity, arsenic III, bicarbonate, calcium, cobalt, hardness, magnesium, total nitrogen, total Kjeldahl nitrogen, phosphorus, potassium, sodium, and total suspended solids. Generally, the major cations (calcium, magnesium, potassium, sodium), hardness and phosphorus were lowest in during spring snowmelt conditions. The remainder of the constituents generally occurred in low concentrations and show no distinct patterns.

In addition, many constituents that were regularly detected and have applicable regulatory criteria occurred in concentrations that met criteria (see **Appendix E**). These constituents include color, alkalinity, barium, total beryllium, boron, chloride, total chromium, molybdenum, nickel, selenium, silver, total dissolved solids, sulfate, and vanadium. Generally, barium, total dissolved solids and sulfate concentrations were lowest during spring snowmelt. The remainder of the constituents generally occurred in low concentrations and show no distinct patterns.

There were some constituents that did not meet regulatory criteria (see **Appendix E**). Dissolved oxygen was below the regulatory minimum (> 6 mg/L) three times (20 percent of measurements). The pH was above the regulatory maximum (≤ 9) twice (13 percent of measurements). Temperature was above the regulatory maximum (< 13 degrees Celsius) six times (40 percent of measurements). Total and dissolved aluminum exceeded the regulatory criterion (50 µg/L) six times and one time, respectively (100 percent and 17 percent of measurements). Total and dissolved antimony and arsenic exceeded the regulatory criteria (5.6 and 10 µg/L, respectively) six times each (100 percent of measurements). Total and dissolved copper exceeded the site-specific, hardness-based regulatory criterion (14 µg/L) once each (17 percent of measurements) in May 2015. Total cyanide exceeded the regulatory criterion (0.0052 mg/L) three times (50 percent of measurements). Total and dissolved iron exceeded the regulatory criterion (300 µg/L) four times and one time, respectively (67 percent and 17 percent

of measurements). Total and dissolved lead exceeded the site-specific, hardness-based regulatory criterion (3.29 µg/L) once each (17 percent of measurements) in May 2015. Total and dissolved manganese exceeded the regulatory criterion (50 µg/L) three times each (50 percent of measurements). Total and dissolved mercury exceeded the regulatory criterion (12 ng/L) six times each (100 percent of measurements). Dissolved selenium exceeded the regulatory criterion (5 µg/L) once (17 percent of measurements). Dissolved silver exceeded the regulatory criterion (3.4 µg/L) once (17 percent of measurements). Total and dissolved thallium exceeded the regulatory criterion (0.24 µg/L) once each (17 percent of measurements). Total and dissolved zinc exceeded the site-specific, hardness-based regulatory criterion (146 µg/L) once each (17 percent of measurements) in May 2015.

Table 4-13. YP-S-5, Smelter Flats Seep, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Alkalinity as CaCO3, Total	mg/L	6	0	0	77.2	140	0	100	98	22.6	123	132	138	Normal
Aluminum, Total	µg/L	6	0	0	56.5	3360	6	714	208	1302	2013	2956	5325	Gamma
Aluminum, Dissolved	µg/L	6	0	0	2.9	13300	1	3816	21.7	669770	1339	4304	38492	Lognormal
Ammonia as Nitrogen	mg/L	0	6	100	< 0.05	< 0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Antimony, Total	µg/L	6	0	0	37.9	2870	6	1820	2000	1062	2815	2843	2865	Normal
Antimony, Dissolved	µg/L	6	0	0	38.5	2840	6	2013	2315	1048	2830	2835	2839	Normal
Arsenic, Total	µg/L	6	0	0	906	2950	6	1445	1115	776	2270	2610	2882	Normal
Arsenic, Dissolved	µg/L	6	0	0	817	5540	6	1790	1393	1445	3453	4466	7238	Lognormal
Arsenic (III)	µg/L	6	0	0	3.3	213	n/a	51.6	23.5	80.6	144	209	372	Gamma
Barium, Total	µg/L	6	0	0	10.4	118	0	38.0	25.6	40.3	89.7	118	184	Gamma
Barium, Dissolved	µg/L	6	0	0	9.35	354	0	66.3	29.2	135	151	240	575	Lognormal
Beryllium, Total	µg/L	5	1	17	< 0.02	0.79	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Beryllium, Dissolved	µg/L	1	5	83	< 0.02	2.67	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Bicarbonate as CaCO3	mg/L	6	0	0	77.2	140	n/a	100	98.0	22.6	123	132	138	Normal
Boron, Total	µg/L	4	2	33	< 20	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Boron, Dissolved	µg/L	4	2	33	< 20	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Total	µg/L	2	4	67	< 0.02	0.1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Dissolved	µg/L	1	5	83	< 0.02	0.31	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Calcium, Total	µg/L	6	0	0	34300	75200	n/a	50750	48400	17015	69350	72275	74615	Normal
Calcium, Dissolved	µg/L	6	0	0	33400	74900	n/a	51250	50400	17050	69650	72275	74375	Normal
Carbonate as CaCO3	mg/L	0	6	100	< 9	< 15	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chloride	mg/L	6	0	0	0.53	6.84	0	2.0	0.72	2.5	4.7	5.8	6.6	Normal
Chromium, Total	µg/L	6	0	0	0.3	5.5	0	1.2	0.6	1.9	2.6	3.9	8.4	Lognormal
Chromium, Dissolved	µg/L	2	4	67	< 0.2	18	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cobalt, Total	µg/L	6	0	0	0.3	5.51	n/a	1.4	0.66	2.0	3.8	5.2	8.8	Gamma
Cobalt, Dissolved	µg/L	6	0	0	0.25	13	n/a	2.2	0.73	6.1	4.8	8.3	22.6	Lognormal
Conductivity	mS/cm	15	0	0	0.097	0.506	n/a	0.337	0.326	0.106	0.462	0.486	0.502	Normal
Copper, Total	µg/L	6	0	0	1.6	26.6	1	9.6	6.5	9.6	20.6	23.6	26.0	Normal

Table 4-13. YP-S-5, Smelter Flats Seep, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Copper, Dissolved	µg/L	6	0	0	1.3	57.5	1	14.1	5.5	21.7	35.2	46.3	55.3	Normal
Cyanide, Total	mg/L	3	3	50	< 0.0047	0.0369	3	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Dissolved Oxygen (DO)	mg/L	15	0	0	3.44	13.54	3	8.3	8.4	2.7	10.5	11.5	13.1	Normal
Fluoride	mg/L	0	6	100	< 0.2	< 0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Hardness as CaCO3	mg/L	6	0	0	107	234	n/a	159	155	53.1	217	225	232	Normal
Iron, Total	µg/L	6	0	0	212	20400	4	3916	989	15006	8290	15147	46919	Lognormal
Iron, Dissolved	µg/L	5	1	17	< 20	64900	1	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Lead, Total	µg/L	6	0	0	0.18	10.6	1	2.1	0.66	6.7	4.7	8.3	23.5	Lognormal
Lead, Dissolved	µg/L	2	4	67	< 0.02	38.7	1	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Magnesium, Total	µg/L	6	0	0	4970	11300	n/a	7902	8120	2622	10550	10925	11225	Normal
Magnesium, Dissolved	µg/L	6	0	0	4920	11300	n/a	8535	9475	2857	11150	11225	11285	Normal
Manganese, Total	µg/L	6	0	0	28.6	1090	3	235	50.7	422	659	962	1722	Gamma
Manganese, Dissolved	µg/L	6	0	0	8.7	2470	3	548	63.5	4702	909	1933	7955	Lognormal
Mercury, Total	ng/L	6	0	0	39.9	11700	6	1667	179	15403	2684	5781	24378	Lognormal
Mercury, Dissolved	ng/L	6	0	0	12.7	1050	6	163	42.4	602	346	629	1922	Lognormal
Methyl Mercury	ng/L	2	4	67	< 0.1	6.6	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Molybdenum, Total	µg/L	6	0	0	0.63	3.92	0	1.91	1.76	1.22	3.15	3.53	3.84	Normal
Molybdenum, Dissolved	µg/L	6	0	0	1.01	4.23	0	2.09	1.81	1.28	3.44	3.83	4.15	Normal
Nickel, Total	µg/L	6	0	0	0.9	8.4	0	2.8	1.9	2.9	5.7	7.1	8.1	Normal
Nickel, Dissolved	µg/L	6	0	0	0.6	21.1	0	4.4	1.9	9.1	10.0	15.9	38.4	Lognormal
Nitrate + Nitrite as Nitrogen	mg/L	3	3	50	< 0.05	0.279	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nitrogen, Total	mg/L	5	1	17	< 0.45	1.31	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nitrogen, Total Kjeldahl (TKN)	mg/L	5	1	17	< 0.4	1.03	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
pH	pH units	15	0	0	6.61	9.47	2	7.7	7.5	0.8	8.8	9.3	9.4	Normal
Phosphorus, Total	µg/L	6	0	0	85.3	1260	n/a	410	290	434	839	1049	1218	Normal
Phosphorus, Dissolved	µg/L	6	0	0	76.6	2370	n/a	559	214	893	1509	2139	3687	Gamma
Potassium, Total	µg/L	6	0	0	2430	13200	n/a	6663	6015	4211	11505	12353	13031	Normal

Table 4-13. YP-S-5, Smelter Flats Seep, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Potassium, Dissolved	µg/L	6	0	0	2400	13000	n/a	7385	7780	4457	11950	12475	12895	Normal
Selenium, Total	µg/L	6	0	0	1.2	3.4	0	2.2	2.3	0.81	3.1	3.2	3.4	Normal
Selenium, Dissolved	µg/L	6	0	0	1.6	8.2	1	3.1	2.6	2.0	5.6	6.9	10.2	Lognormal
Silver, Total	µg/L	6	0	0	0.05	2.1	0	0.45	0.12	0.81	1.3	1.8	3.3	Gamma
Silver, Dissolved	µg/L	5	1	17	< 0.02	8.65	1	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sodium, Total	µg/L	6	0	0	5040	10700	n/a	7625	7710	2230	9825	10263	10613	Normal
Sodium, Dissolved	µg/L	6	0	0	5800	10700	n/a	7770	7585	2027	9880	10290	10618	Normal
Solids, Total Dissolved (TDS)	mg/L	6	0	0	146	334	0	221	197	85.4	319	326	333	Normal
Solids, Total Suspended (TSS)	mg/L	4	2	33	< 5	131	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sulfate	mg/L	6	0	0	30.1	144	0	72.9	42.8	54.7	143	144	144	Normal
Temperature, Water	deg C	15	0	0	0.82	27.32	6	11.5	11.8	8.5	21.2	23.2	26.5	Normal
Thallium, Total	µg/L	6	0	0	0.03	0.35	1	0.09	0.06	0.11	0.20	0.28	0.51	Lognormal
Thallium, Dissolved	µg/L	6	0	0	0.02	1.34	1	0.25	0.03	0.54	0.69	1.0	1.3	Nonparametric
Turbidity	NTU	15	0	0	1.9	97.2	n/a	29.8	18.8	28.2	67.7	79.1	93.6	Normal
Vanadium, Total	µg/L	6	0	0	0.7	10.7	0	2.6	1.6	3.3	5.7	8.1	15.6	Lognormal
Vanadium, Dissolved	µg/L	6	0	0	0.5	30.8	0	5.7	0.75	12.3	15.9	23.4	29.3	Nonparametric
Zinc, Total	µg/L	6	0	0	4.3	1380	1	198	18.0	2174	298	660	2937	Lognormal
Zinc, Dissolved	µg/L	6	0	0	1.4	2460	1	530	11.3	24882	395	1083	7175	Lognormal

Units: **µg/L** = micrograms per liter; **mg/L** = milligrams per liter; **mS/cm** = milliSiemens per centimeter; **ng/L** = nanograms per liter; **deg C** = degrees Celsius; **NTU** = nephelometric turbidity units
Measurements: **< 20 µg/L** = analyte not detected at the method reporting limit of 20 µg/L; **n/a** = not applicable; **Min** = minimum concentration measured; **Max** = maximum concentration measured
*Number that do not meet criterion: total number of analytical results that did not meet the strictest potentially applicable regulatory criterion (presented in **Table 3-4**). If a constituent does not have applicable regulatory criteria, then n/a is given.*
Distribution: **Normal** = data appear normally distributed at 0.05 significance level; statistics presented are normal population estimators; **Gamma** = data appear gamma distributed 0.05 significance level; statistics presented are gamma population estimators; **Lognormal** = data appear lognormally distributed at 0.05 significance level; statistics presented are lognormal populations estimators; **Nonparametric** = data do not appear normally, gamma or lognormally distributed at 0.05 significance level; statistics presented are sample statistics; **KM nonparametric** = data comprises ≤ 50% non-detects; statistics presented are nonparametric population estimators generated using the Kaplan-Meier method; **Sample** = data comprises > 50% non-detects and statistics are not presented; or, data comprises five or fewer measurements but each result was detected and statistics presented are sample statistics.

YP-T-23A, heap leach seep

The heap leach seep (YP-T-23A) originates from two sources on the southwest corner of the heap leach pile on Hangar Flats (see photos in **Appendix G**). The northern source begins in a drainage ditch that captures surface flow and intercepts seep flow along the west side of the heap leach pile. The northern source generally flows at low volumes year-round. The western source originates as a seep from the ground west of the north source and north of the heap leach road. The western seep generally only flowed during wet periods (i.e., spring snowmelt and storm events). The sources combine within 35 feet of their origins and flow downstream to the east in a trench along the Hangar Flats road. During periods of high flow (i.e., spring snowmelt or storm events), the flow crosses the Hangar Flats road at the southeast corner of the heap leach pile. From there, flow has continued southeast onto the Meadow Creek floodplain during April 2012 and May 2014 and flowed into Meadow Creek in May 2014. More commonly, it flows through a trench on the north side of the airstrip and eventually, if there enough flow, into the retention basin at the eastern end of the airstrip. Measured flow has ranged from $2.8x10^{-4}$ cfs in February 2013 to 0.13 cfs in April 2012 with a median flow of $1.2x10^{-2}$ cfs.

For the time interval included in this baseline study, this site was visited 35 times. **Appendix E** presents dates the site was visited and parameters or constituents sampled during each visit. Analytical results are summarized in **Table 4-14**. Multiple constituents were analyzed for but were not detected in at least half of the samples from YP-T-23A. These constituents were ammonia, dissolved beryllium, boron, cadmium, carbonate, chromium, fluoride, dissolved lead, methyl mercury, silver, and dissolved thallium.

Of constituents that were regularly detected, many do not have defined or applicable regulatory criteria for comparison **(see Appendix E)**. These include conductivity, turbidity, arsenic III, bicarbonate, calcium, cobalt, hardness, magnesium, nitrate plus nitrite, total nitrogen, total Kjeldahl nitrogen, phosphorus, potassium, sodium, and total suspended solids. These constituents have generally varied in concentration during the sampled period but show no distinct patterns.

In addition, many constituents that were regularly detected and have applicable regulatory criteria occurred in concentrations that met criteria **(see Appendix E)**. These constituents include color, pH, alkalinity, barium, total beryllium, chloride, dissolved copper, molybdenum, nickel, vanadium, and zinc. These constituents have varied in concentration during the sampled period but show no distinct patterns.

There were some constituents that did not meet regulatory criteria **(see Appendix E)**. Dissolved oxygen was lower than the regulatory minimum (> 6 mg/L) five times (24 percent of measurements). Temperature was the above the regulatory maximum (< 13 degrees Celsius) twice (10 percent of measurements). Total and dissolved aluminum exceeded the regulatory criterion (50 µg/L) eight times and one time, respectively (82 and 8 percent of measurements) Total and dissolved antimony exceeded the regulatory criterion (5.6 µg/L) 21 times each (100 percent of measurements). Total and dissolved arsenic exceeded the regulatory criterion (10 µg/L) 21 times each (100 percent of measurements). In July 2012 (6 percent of measurements), measured total copper at the site exceeded the site-specific, hardness-based criterion of 4.4 µg/L, which was calculated based on the sample hardness (32.8 mg/L). Total cyanide exceeded the regulatory criterion (0.0052 mg/L) four times (44 percent of measurements). Total and dissolved iron exceeded the regulatory criterion (300 µg/L) 16 and 8 times, respectively (76 and 38 percent of measurements). In July 2012 and July 2014

(10 percent of measurements), measured total lead at the site exceeded the site-specific, hardness-based criterion (0.73 and 0.87 µg/L, respectively). Total and dissolved manganese exceeded the regulatory criterion (50 µg/L) nine and six times, respectively (69 and 46 percent of measurements). Total and dissolved mercury exceeded the regulatory criterion (12 ng/L) 14 and 2 times, respectively (67 and 10 percent of measurements). Total and dissolved selenium exceeded the regulatory criterion (5 µg/L) three and four times, respectively (18 and 24 percent of measurements). Total dissolved solids exceeded the regulatory criterion (500 mg/L) twice (10 percent of measurements). Sulfate exceeded the regulatory criterion (250 mg/L) twice (10 percent of measurements). Total thallium exceeded the regulatory criterion (0.24 µg/L) once (11 percent of measurements).

Table 4-14. YP-T-23A, Heap Leach Seep, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Alkalinity as CaCO3, Total	mg/L	21	0	0	31.8	94	0	61.2	62	14.9	78.3	88	92.8	Normal
Aluminum, Total	µg/L	13	0	0	11.9	1170	8	240	73.6	349	641	902	1540	Gamma
Aluminum, Dissolved	µg/L	8	5	38	< 2	51.4	1	6.8	4.1	12.9	10	26.6	46.4	KM - Nonparametric
Ammonia as Nitrogen	mg/L	7	14	67	< 0.05	0.172	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Antimony, Total	µg/L	21	0	0	49.1	4920	21	1510	989	1535	3533	4629	7186	Gamma
Antimony, Dissolved	µg/L	21	0	0	33	4840	21	1456	999	1499	3552	4746	7570	Gamma
Arsenic, Total	µg/L	21	0	0	328	5130	21	1486	980	1151	2938	3603	5085	Gamma
Arsenic, Dissolved	µg/L	21	0	0	324	2450	21	1022	766	676.8	1909	2296	3147	Gamma
Arsenic (III)	µg/L	9	0	0	2.12	2930	n/a	941	34.3	25820	928	2365	13663	Lognormal
Barium, Total	µg/L	9	0	0	23.7	103	0	51.9	46.1	27.0	86.2	103	144	Lognormal
Barium, Dissolved	µg/L	9	0	0	22.8	45.5	0	32.8	32.9	8.05	43.5	44.5	45.3	Normal
Beryllium, Total	µg/L	7	2	22	< 0.02	0.3	0	0.09	0.03	0.10	0.20	0.25	0.29	KM - Nonparametric
Beryllium, Dissolved	µg/L	0	9	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Bicarbonate as CaCO3	mg/L	21	0	0	31.8	94	n/a	60.7	62	14.1	77	78.3	90.9	Normal
Boron, Total	µg/L	0	9	100	< 20	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Boron, Dissolved	µg/L	0	9	100	< 20	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Total	µg/L	5	12	71	< 0.02	0.11	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Dissolved	µg/L	2	15	88	< 0.02	0.04	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Calcium, Total	µg/L	21	0	0	10100	227000	n/a	52780	39210	47557	105315	139358	235673	Lognormal
Calcium, Dissolved	µg/L	21	0	0	9520	222000	n/a	52811	39101	47947	105614	139977	237432	Lognormal
Carbonate as CaCO3	mg/L	0	21	100	< 9	< 15	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chloride	mg/L	18	3	14	< 0.4	2.21	0	0.82	0.77	0.43	1.17	1.54	2.08	KM - Nonparametric
Chromium, Total	µg/L	7	10	59	< 0.2	1.6	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chromium, Dissolved	µg/L	2	15	88	< 0.2	0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cobalt, Total	µg/L	9	0	0	0.21	2.88	n/a	1.3	0.97	0.96	2.6	2.7	2.8	Normal
Cobalt, Dissolved	µg/L	9	0	0	0.15	2.4	n/a	0.95	0.56	0.81	2.0	2.2	2.4	Normal
Conductivity	mS/cm	20	0	0	0.118	1.253	n/a	0.362	0.307	0.226	0.640	0.789	1.167	Lognormal

Table 4-14. YP-T-23A, Heap Leach Seep, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Copper, Total	µg/L	17	0	0	0.5	15.2	1	3.3	2.1	3.6	7.4	9.4	14.2	Gamma
Copper, Dissolved	µg/L	17	0	0	0.2	5	0	1.5	0.8	1.6	3.5	4.6	7.2	Gamma
Cyanide, Total	mg/L	5	4	44	< 0.0047	0.015	4	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Dissolved Oxygen (DO)	mg/L	21	0	0	3.93	11.84	5	7.7	7.7	2.0	9.8	9.9	11.5	Normal
Fluoride	mg/L	2	19	90	< 0.2	0.72	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Hardness as CaCO3	mg/L	21	0	0	32.8	661	n/a	170	124	161	345	461	794	Lognormal
Iron, Total	µg/L	21	0	0	31.1	13400	16	2998	1130	3504	7925	11076	18749	Gamma
Iron, Dissolved	µg/L	12	9	43	< 20	6200	8	1091	34.9	1658	3350	3990	5758	KM - Nonparametric
Lead, Total	µg/L	21	0	0	0.03	7.64	2	1.43	0.46	4.21	3.16	5.46	15.3	Lognormal
Lead, Dissolved	µg/L	7	14	67	< 0.02	0.12	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Magnesium, Total	µg/L	21	0	0	1810	22700	n/a	5719	4726	3897	10428	13051	19881	Lognormal
Magnesium, Dissolved	µg/L	21	0	0	1500	21500	n/a	5772	4648	4251	10805	13724	21492	Lognormal
Manganese, Total	µg/L	13	0	0	10.3	3720	9	670	81.9	1096	1894	2788	5038	Gamma
Manganese, Dissolved	µg/L	13	0	0	4.7	1880	6	783	65.7	9307	1139	2559	11667	Lognormal
Mercury, Total	ng/L	21	0	0	7.5	390	14	70.1	21.4	110	264	284	368.8	Nonparametric
Mercury, Dissolved	ng/L	20	0	0	1.6	19.2	2	6.2	5.0	4.7	11.8	14.3	19.7	Gamma
Methyl Mercury	ng/L	1	8	89	< 0.1	0.2	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Molybdenum, Total	µg/L	9	0	0	0.57	4.24	0	1.7	1.5	1.2	2.9	3.6	4.1	Normal
Molybdenum, Dissolved	µg/L	9	0	0	0.63	3.95	0	1.7	1.6	1.0	2.5	3.2	3.8	Normal
Nickel, Total	µg/L	9	0	0	0.38	5.1	0	2.0	1.2	2.9	4.5	6.6	13.5	Lognormal
Nickel, Dissolved	µg/L	9	0	0	0.2	4.7	0	1.3	0.62	1.5	3.3	4.0	4.6	Normal
Nitrate + Nitrite as Nitrogen	mg/L	11	10	48	< 0.05	0.582	n/a	0.21	0.10	0.19	0.49	0.56	0.58	KM - Nonparametric
Nitrogen, Total	mg/L	9	0	0	0.55	1.67	n/a	1.1	1.1	0.35	1.5	1.6	1.7	Normal
Nitrogen, Total Kjeldahl (TKN)	mg/L	9	0	0	0.53	1.47	n/a	0.96	0.96	0.34	1.4	1.4	1.5	Normal
pH	pH units	20	0	0	6.52	7.88	0	7.1	7.0	0.4	7.6	7.7	7.8	Normal
Phosphorus, Total	µg/L	21	0	0	49	582	n/a	164	133	119	305	386	601	Lognormal
Phosphorus, Dissolved	µg/L	15	6	29	< 40	96.7	n/a	57	53	15.9	78.8	80.0	93.4	KM - Nonparametric

Table 4-14. YP-T-23A, Heap Leach Seep, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Potassium, Total	µg/L	21	0	0	1100	17800	n/a	3665	2330	3686	7050	7420	15724	Nonparametric
Potassium, Dissolved	µg/L	21	0	0	1010	16500	n/a	3447	2260	3494	7090	7330	14666	Nonparametric
Selenium, Total	µg/L	12	5	29	< 1	14.5	3	3.15	1.5	3.63	8.0	9.5	13.5	KM - Nonparametric
Selenium, Dissolved	µg/L	11	6	35	< 1	14.2	4	3.1	1.5	3.52	7.3	9.6	13.3	KM - Nonparametric
Silver, Total	µg/L	4	5	56	< 0.02	0.29	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Dissolved	µg/L	2	7	78	< 0.02	0.05	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sodium, Total	µg/L	21	0	0	3180	17400	n/a	6646	5470	3532	11700	12500	16420	Nonparametric
Sodium, Dissolved	µg/L	21	0	0	3020	16800	n/a	6573	5978	3004	10446	12237	16465	Lognormal
Solids, Total Dissolved (TDS)	mg/L	21	0	0	53.5	1020	2	237	191	174	442	562	879	Lognormal
Solids, Total Suspended (TSS)	mg/L	14	7	33	< 5	103	n/a	23.7	9.5	28.7	76	81.5	98.7	KM - Nonparametric
Sulfate	mg/L	21	0	0	5.14	614	2	106	60.4	142	256	340	537	Gamma
Temperature, Water	deg C	21	0	0	0.43	13.83	2	6.9	6.2	4.3	12.5	13.2	13.7	Normal
Thallium, Total	µg/L	8	1	11	< 0.02	0.33	1	0.10	0.06	0.10	0.23	0.28	0.32	KM - Nonparametric
Thallium, Dissolved	µg/L	4	5	56	< 0.02	0.1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Turbidity	NTU	21	0	0	1.41	49.4	n/a	13.2	6.7	22.1	29.7	45.2	99.6	Lognormal
Vanadium, Total	µg/L	9	0	0	0.2	3.1	0	1.1	0.7	1.0	2.4	3.1	4.6	Gamma
Vanadium, Dissolved	µg/L	7	2	22	< 0.2	0.4	0	0.3	0.3	0.1	0.4	0.4	0.4	KM - Nonparametric
Zinc, Total	µg/L	21	0	0	2.1	55.3	0	12.8	8.6	14.2	27.1	37.5	68.9	Lognormal
Zinc, Dissolved	µg/L	21	0	0	1.4	38.2	0	7.2	4.9	7.8	15.2	20.9	38.2	Lognormal

Units: **µg/L** = micrograms per liter; **mg/L** = milligrams per liter; **mS/cm** = milliSiemens per centimeter; **ng/L** = nanograms per liter; **deg C** = degrees Celsius; **NTU** = nephelometric turbidity units

Measurements: **< 20 µg/L** = analyte not detected at the method reporting limit of 20 µg/L; **n/a** = not applicable; **Min** = minimum concentration measured; **Max** = maximum concentration measured

*Number that do not meet criterion: total number of analytical results that did not meet the strictest potentially applicable regulatory criterion (presented in **Table 3-4**). If a constituent does not have applicable regulatory criteria, then n/a is given.*

Distribution: **Normal** = data appear normally distributed at 0.05 significance level; statistics presented are normal population estimators; **Gamma** = data appear gamma distributed 0.05 significance level; statistics presented are gamma population estimators; **Lognormal** = data appear lognormally distributed at 0.05 significance level; statistics presented are lognormal populations estimators; **Nonparametric** = data do not appear normally, gamma or lognormally distributed at 0.05 significance level; statistics presented are sample statistics; **KM nonparametric** = data comprises ≤ 50% non-detects; statistics presented are nonparametric population estimators generated using the Kaplan-Meier method; **Sample** = data comprises > 50% non-detects and statistics are not presented; or, data comprises five or fewer measurements but each result was detected and statistics presented are sample statistics.

YP-S-2, Meadow Creek fault seep

The Meadow Creek fault seep (YP-S-2) is located two-thirds of the way up the Hangar Flats hillside. Several seeps emerge in a hollow on the hillside, and then converge and flow down an oversized colluvial gully that runs the length of the hillside (see photos in **Appendix G**). During period of high flow (i.e., spring snowmelt or storm events), the flow can reach the base of the hillside where it infiltrates into the subsurface in a trench along the base of the hillside. The seep has low flow volume during most non-winter months. Measured flow ranged from $5.8x10^{-7}$ cfs in October 2012 to $2.5x10^{-2}$ cfs in March 2013, with a median flow of $2.7x10^{-4}$ cfs.

For the time interval included in this baseline study, this site was visited 23 times. **Appendix E** presents dates the site was visited and parameters or constituents sampled during each visit. During these periods, quarterly samples were taken when there was enough water to collect a full sample set, therefore samples were only collected five times total. Data from this site were therefore not processed using ProUCL because they did not meet the minimum processing requirements (> 5 measurements). Analytical results are summarized in **Table 4-15**. Multiple constituents were analyzed for but were not detected in at least half of the samples from YP-S-2. These constituents were ammonia, dissolved beryllium, boron, cadmium, carbonate, chromium, total cyanide, fluoride, dissolved iron, dissolved lead, dissolved nickel, nitrate plus nitrite, selenium, dissolved silver, dissolved vanadium, and dissolved zinc.

Of constituents that were regularly detected, many do not have defined or applicable regulatory criteria for comparison **(see Appendix E)**. These include conductivity, turbidity, arsenic III, bicarbonate, calcium, cobalt, hardness, magnesium, methyl mercury, total nitrogen, total Kjeldahl nitrogen, phosphorus, potassium, sodium, and total suspended solids. Turbidity tended to be highest when flow is high. The remainder of the constituents do not show distinct patterns in concentrations.

In addition, many constituents that were regularly detected and have applicable regulatory criteria occurred in concentrations that met criteria **(see Appendix E)**. These constituents include color, pH, alkalinity, barium, total beryllium, chloride, copper, total lead, molybdenum, total nickel, total silver, total dissolved solids, sulfate, dissolved thallium, total vanadium, and total zinc. These constituents generally occurred in low concentrations and show no distinct patterns.

There were some constituents that did not meet regulatory criteria **(see Appendix E)**. Dissolved oxygen was below the regulatory minimum (> 6 mg/L) once (6 percent of measurements). Temperature exceeded the regulatory maximum (< 13 degrees Celsius) four times (25 percent of measurements). Total and dissolved aluminum exceeded the regulatory criterion (50 µg/L) four times and one time, respectively (100 percent and 25 percent of measurements). Total and dissolved antimony and arsenic exceeded regulatory criteria (5.6 and 10 µg/L, respectively) five times each (100 percent of measurements). Total and dissolved arsenic exceeded the regulatory criterion (10 µg/L) five times each (100 percent of measurements). Total iron exceeded the regulatory criterion (300 µg/L) three times (60 percent of measurements). Total and dissolved manganese exceeded the regulatory criterion (50 µg/L) once each (20 percent of measurements). Total and dissolved mercury exceeded the regulatory criterion (12 ng/L) five times each (100 percent of measurements). Total thallium exceeded the regulatory criterion (0.24 µg/L) once (20 percent of measurements).

Table 4-15. YP-S-2, Meadow Creek Fault Seep, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Alkalinity as CaCO3, Total	mg/L	5	0	0	25	53.9	0	37.9	40	11.7	n/a	n/a	n/a	Sample
Aluminum, Total	µg/L	5	0	0	49.2	725	4	483	710	329	n/a	n/a	n/a	Sample
Aluminum, Dissolved	µg/L	5	0	0	3.7	276	1	63.6	8.5	119	n/a	n/a	n/a	Sample
Ammonia as Nitrogen	mg/L	0	5	100	< 0.05	< 0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Antimony, Total	µg/L	5	0	0	9.43	20.2	5	14.1	13.6	4.54	n/a	n/a	n/a	Sample
Antimony, Dissolved	µg/L	5	0	0	10.1	21.1	5	14.6	14.4	4.66	n/a	n/a	n/a	Sample
Arsenic, Total	µg/L	5	0	0	699	1350	5	1062	1070	236	n/a	n/a	n/a	Sample
Arsenic, Dissolved	µg/L	5	0	0	671	1230	5	970	989	211	n/a	n/a	n/a	Sample
Arsenic (III)	µg/L	5	0	0	1.7	7.3	n/a	4.3	4.2	2.1	n/a	n/a	n/a	Sample
Barium, Total	µg/L	5	0	0	16.2	99.5	0	60.9	66.9	31.0	n/a	n/a	n/a	Sample
Barium, Dissolved	µg/L	5	0	0	6.4	93	0	42.7	38.9	31.5	n/a	n/a	n/a	Sample
Beryllium, Total	µg/L	5	0	0	0.03	0.24	0	0.13	0.09	0.10	n/a	n/a	n/a	Sample
Beryllium, Dissolved	µg/L	1	4	80	< 0.02	0.04	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Bicarbonate as CaCO3	mg/L	5	0	0	25	53.9	n/a	37.9	40.0	11.7	n/a	n/a	n/a	Sample
Boron, Total	µg/L	1	4	80	< 20	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Boron, Dissolved	µg/L	0	5	100	< 20	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Total	µg/L	0	5	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Dissolved	µg/L	0	5	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Calcium, Total	µg/L	5	0	0	11900	23000	n/a	17100	17400	4985.4789	n/a	n/a	n/a	Sample
Calcium, Dissolved	µg/L	5	0	0	11500	23900	n/a	17060	16800	5512.0776	n/a	n/a	n/a	Sample
Carbonate as CaCO3	mg/L	0	5	100	< 9	< 15	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chloride	mg/L	5	0	0	0.84	2.5	0	1.6	1.4	0.64	n/a	n/a	n/a	Sample
Chromium, Total	µg/L	0	5	100	< 0.2	< 0.2	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chromium, Dissolved	µg/L	0	5	100	< 0.2	< 0.2	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cobalt, Total	µg/L	5	0	0	0.03	0.24	n/a	0.14	0.14	0.08	n/a	n/a	n/a	Sample
Cobalt, Dissolved	µg/L	4	1	20	< 0.02	0.11	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Conductivity	mS/cm	16	0	0	0.096	0.279	n/a	0.175	0.180	0.057	0.243	0.257	0.275	Normal

Table 4-15. YP-S-2, Meadow Creek Fault Seep, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Copper, Total	µg/L	5	0	0	0.2	0.5	0	0.4	0.5	0.2	n/a	n/a	n/a	Sample
Copper, Dissolved	µg/L	5	0	0	0.2	0.3	0	0.3	0.3	0.1	n/a	n/a	n/a	Sample
Cyanide, Total	mg/L	0	5	100	< 0.0047	< 0.01	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Dissolved Oxygen (DO)	mg/L	16	0	0	5.67	10.87	1	8.4	8.5	1.6	10.6	10.8	10.9	Normal
Fluoride	mg/L	0	5	100	< 0.2	< 0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Hardness as CaCO3	mg/L	5	0	0	37.1	76.5	n/a	55.4	56.0	17.2	n/a	n/a	n/a	Sample
Iron, Total	µg/L	5	0	0	84.5	1940	3	936	766	810	n/a	n/a	n/a	Sample
Iron, Dissolved	µg/L	1	4	80	< 20	224	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Lead, Total	µg/L	5	0	0	0.05	0.81	0	0.35	0.30	0.31	n/a	n/a	n/a	Sample
Lead, Dissolved	µg/L	1	4	80	< 0.02	0.07	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Magnesium, Total	µg/L	5	0	0	1810	4650	n/a	3106	3070	1155	n/a	n/a	n/a	Sample
Magnesium, Dissolved	µg/L	5	0	0	1670	4720	n/a	3060	3000	1249	n/a	n/a	n/a	Sample
Manganese, Total	µg/L	5	0	0	9.3	133	1	40.0	13.4	52.7	n/a	n/a	n/a	Sample
Manganese, Dissolved	µg/L	4	1	20	< 2.4	90	1	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Mercury, Total	ng/L	5	0	0	60.4	781	5	374	238	346	n/a	n/a	n/a	Sample
Mercury, Dissolved	ng/L	5	0	0	15.7	60.4	5	38.3	39.8	16.6	n/a	n/a	n/a	Sample
Methyl Mercury	ng/L	4	1	20	< 0.1	0.35	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Molybdenum, Total	µg/L	5	0	0	0.08	0.35	0	0.20	0.15	0.11	n/a	n/a	n/a	Sample
Molybdenum, Dissolved	µg/L	5	0	0	0.14	0.31	0	0.22	0.17	0.08	n/a	n/a	n/a	Sample
Nickel, Total	µg/L	3	2	40	< 0.2	0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nickel, Dissolved	µg/L	2	3	60	< 0.2	0.3	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nitrate + Nitrite as Nitrogen	mg/L	1	4	80	< 0.05	0.135	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nitrogen, Total	mg/L	4	1	20	< 0.4	0.94	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nitrogen, Total Kjeldahl (TKN)	mg/L	4	1	20	< 0.4	0.8	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
pH	pH units	16	0	0	6.78	8.09	0	7.4	7.5	0.4	8.0	8.0	8.1	Normal
Phosphorus, Total	µg/L	5	0	0	92.5	202	n/a	139	147	46.2	n/a	n/a	n/a	Sample
Phosphorus, Dissolved	µg/L	5	0	0	88.4	128	n/a	111	122	20.1	n/a	n/a	n/a	Sample

Table 4-15. YP-S-2, Meadow Creek Fault Seep, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Potassium, Total	µg/L	5	0	0	1370	2630	n/a	1914	1930	463.8	n/a	n/a	n/a	Sample
Potassium, Dissolved	µg/L	5	0	0	1290	2320	n/a	1568	1370	427.2	n/a	n/a	n/a	Sample
Selenium, Total	µg/L	0	5	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Selenium, Dissolved	µg/L	0	5	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Total	µg/L	3	2	40	< 0.02	0.06	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Dissolved	µg/L	0	5	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sodium, Total	µg/L	5	0	0	1440	2630	n/a	2258	2450	471.1	n/a	n/a	n/a	Sample
Sodium, Dissolved	µg/L	5	0	0	1400	2750	n/a	2256	2360	515.5	n/a	n/a	n/a	Sample
Solids, Total Dissolved (TDS)	mg/L	5	0	0	78	133	0	103	91	23	n/a	n/a	n/a	Sample
Solids, Total Suspended (TSS)	mg/L	3	2	40	< 5	40.5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sulfate	mg/L	5	0	0	13.3	35.9	0	20.0	17.0	9.06	n/a	n/a	n/a	Sample
Temperature, Water	deg C	16	0	0	0.64	17.45	4	9.0	9.2	5.4	15.3	16.4	17.2	Normal
Thallium, Total	µg/L	5	0	0	0.057	0.31	1	0.17	0.20	0.11	n/a	n/a	n/a	Sample
Thallium, Dissolved	µg/L	5	0	0	0.04	0.21	0	0.09	0.06	0.07	n/a	n/a	n/a	Sample
Turbidity	NTU	14	0	0	0.3	130	n/a	43.2	11.8	53.5	120.1	174.0	308.5	Gamma
Vanadium, Total	µg/L	3	2	40	< 0.2	0.9	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Vanadium, Dissolved	µg/L	1	4	80	< 0.2	0.2	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Zinc, Total	µg/L	4	1	20	< 0.5	3.1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Zinc, Dissolved	µg/L	1	4	80	< 0.5	2.7	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample

Units: **µg/L** = micrograms per liter; **mg/L** = milligrams per liter; **mS/cm** = milliSiemens per centimeter; **ng/L** = nanograms per liter; **deg C** = degrees Celsius; **NTU** = nephelometric turbidity units
Measurements: **< 20 µg/L** = analyte not detected at the method reporting limit of 20 µg/L; **n/a** = not applicable; **Min** = minimum concentration measured; **Max** = maximum concentration measured
*Number that do not meet criterion: total number of analytical results that did not meet the strictest potentially applicable regulatory criterion (presented in **Table 3-4**). If a constituent does not have applicable regulatory criteria, then n/a is given.*
Distribution: **Normal** = data appear normally distributed at 0.05 significance level; statistics presented are normal population estimators; **Gamma** = data appear gamma distributed 0.05 significance level; statistics presented are gamma population estimators; **Lognormal** = data appear lognormally distributed at 0.05 significance level; statistics presented are lognormal populations estimators; **Nonparametric** = data do not appear normally, gamma or lognormally distributed at 0.05 significance level; statistics presented are sample statistics; **KM nonparametric** = data comprises ≤ 50% non-detects; statistics presented are nonparametric population estimators generated using the Kaplan-Meier method; **Sample** = data comprises > 50% non-detects and statistics are not presented; or, data comprises five or fewer measurements but each result was detected and statistics presented are sample statistics.

YP-AS-7, Meadow Creek Mine adit seep

The Meadow Creek Mine adit seep (YP-AS-7) is located above the heap leach pile at the base of the Hangar Flats hillside (see photos in **Appendix G**). It originates from the scarred hillside; due to substantial disturbance from legacy mining and more recent hillslope erosion, it is not clear exactly where the adit was or how close the seep is to the former adit. Historical records, including photos and maps, indicate at least two adits existed on this hillside (Mitchell 2000). During spring snowmelt, the seep flows into a drainage ditch at the base of the hillside where it infiltrates into the subsurface. The seep generally only flows during the spring snowmelt season. Measured flow ranged from $1.2x10^{-5}$ cfs in June 2013 to $4.6x10^{-3}$ cfs in May 2014, with a median flow of $1.7x10^{-3}$ cfs.

For the time interval included in this baseline study, this site was visited 23 times. **Appendix E** presents dates the site was visited and parameters or constituents sampled during each visit. Monthly onsite water quality and flow measurements were only taken when water was present. Analytical results are summarized in **Table 4-16**. Multiple constituents were analyzed for but were not detected in at least half of the samples from YP-AS-7. These constituents were ammonia, dissolved beryllium, boron, dissolved cadmium, carbonate, chloride, dissolved chromium, dissolved copper, total cyanide, dissolved lead, nitrate plus nitrite, dissolved phosphorus, selenium, silver, dissolved thallium, and dissolved vanadium.

Of constituents that were regularly detected, many do not have defined or applicable regulatory criteria for comparison **(see Appendix E)**. These include conductivity, turbidity, arsenic III, bicarbonate, calcium cobalt, hardness, magnesium, methyl mercury, total nitrogen, total Kjeldahl nitrogen, total phosphorus, potassium, sodium, and total suspended solids. Most of the major cations and anion (calcium, magnesium, potassium, bicarbonate), associated constituents (conductivity, hardness, total dissolved solids) and several other constituents (arsenic III, methyl mercury, total nitrogen and total Kjeldahl nitrogen) had maximum concentrations concurrent with high flow.

In addition, many constituents that were regularly detected and have applicable regulatory criteria occurred in concentrations that met criteria **(see Appendix E)**. These constituents include color, pH, alkalinity, dissolved aluminum, barium, total beryllium, total cadmium, total chromium, total copper, fluoride, total lead, dissolved mercury, molybdenum, nickel, total vanadium, and zinc. Of these, alkalinity, dissolved aluminum, total barium, total beryllium, total copper, fluoride, total lead, total nickel and total zinc had maximum concentrations concurrent with high flow. The remainder of the constituents generally occurred in low concentrations and do not show distinct patterns.

There were some constituents that did not meet regulatory criteria **(see Appendix E)**. Dissolved oxygen was below the regulatory minimum (> 6 mg/L) 11 times (69 percent of measurements). Temperature was above the regulatory maximum (< 13 degrees Celsius) four times (25 percent of measurements). Total aluminum exceeded the regulatory criterion (50 µg/L) five times (71 percent of measurements). Total and dissolved antimony exceeded the regulatory criterion (5.6 µg/L) seven times each (100 percent of measurements). Total and dissolved arsenic exceeded the regulatory criterion (10 µg/L) seven times each (100 percent of measurements). Total and dissolved iron exceeded the regulatory criterion (300 µg/L) seven and six times, respectively (100 and 86 percent of measurements). Total and dissolved manganese exceeded the regulatory criterion (50 µg/L) seven times each (100 percent of measurements). Total mercury exceeded the regulatory criterion (12 ng/L) six times (86 percent of measurements). Total

dissolved solids and sulfate exceeded the regulatory criteria (500 and 250 mg/L, respectively) seven times each (100 percent of measurements). Total thallium exceeded the regulatory criterion (0.24 µg/L) four times (57 percent of measurements).

Table 4-16. YP-AS-7, Meadow Creek Mine Adit Seep, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Alkalinity as CaCO3, Total	mg/L	7	0	0	273	412	0	360	376	50.6	410	411	412	Normal
Aluminum, Total	µg/L	7	0	0	5	8530	5	2732	162	45916	3410	8086	40839	Lognormal
Aluminum, Dissolved	µg/L	6	1	14	< 2	14.1	0	6.0	3.7	4.8	13.5	13.8	14.0	KM - Nonparametric
Ammonia as Nitrogen	mg/L	1	6	86	< 0.05	0.135	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Antimony, Total	µg/L	7	0	0	40.9	270	7	182	211	95.6	268	269	270	Normal
Antimony, Dissolved	µg/L	7	0	0	7.45	56	7	22.8	19.5	17.4	41.8	48.9	54.6	Normal
Arsenic, Total	µg/L	7	0	0	1100	44800	7	18916	17500	18391	39280	42040	44248	Normal
Arsenic, Dissolved	µg/L	7	0	0	217	11900	7	5132	4190	4959	10646	11273	11775	Normal
Arsenic (III)	µg/L	7	0	0	556	20200	n/a	8524	6430	7813	18760	19480	20056	Normal
Barium, Total	µg/L	7	0	0	24.6	444	0	133	95.8	146	275	359	427	Normal
Barium, Dissolved	µg/L	7	0	0	14.8	45.4	0	24.6	21.1	9.91	34.6	40	44.3	Normal
Beryllium, Total	µg/L	7	0	0	0.03	3.72	0	0.97	0.55	1.3	2.4	3.1	3.6	Normal
Beryllium, Dissolved	µg/L	3	4	57	< 0.02	0.06	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Bicarbonate as CaCO3	mg/L	7	0	0	273	412	n/a	360	376	50.6	410	411	412	Normal
Boron, Total	µg/L	0	7	100	< 10	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Boron, Dissolved	µg/L	0	7	100	< 10	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Total	µg/L	5	2	29	< 0.02	0.22	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Dissolved	µg/L	0	7	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Calcium, Total	µg/L	7	0	0	173000	256000	n/a	222857	219000	26580	247000	251500	255100	Normal
Calcium, Dissolved	µg/L	7	0	0	175000	241000	n/a	214000	214000	21213	236800	238900	240580	Normal
Carbonate as CaCO3	mg/L	0	7	100	< 9	< 15	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chloride	mg/L	3	4	57	< 0.4	0.59	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chromium, Total	µg/L	4	3	43	< 0.2	3.2	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chromium, Dissolved	µg/L	2	5	71	< 0.2	0.3	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cobalt, Total	µg/L	7	0	0	0.58	6.65	n/a	3.9	3.9	1.9	5.7	6.2	6.6	Normal
Cobalt, Dissolved	µg/L	7	0	0	0.49	4.8	n/a	2.4	2.6	1.3	3.6	4.2	4.7	Normal
Conductivity	mS/cm	16	0	0	0.172	1.52	n/a	1.253	1.351	0.327	1.495	1.513	1.519	Nonparametric
Copper, Total	µg/L	7	0	0	0.1	7.8	0	1.5	0.6	3.5	3.4	5.6	14.1	Lognormal

Table 4-16. YP-AS-7, Meadow Creek Mine Adit Seep, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Copper, Dissolved	µg/L	1	6	86	< 0.1	0.3	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cyanide, Total	mg/L	0	7	100	< 0.0047	< 0.01	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Dissolved Oxygen (DO)	mg/L	16	0	0	1.88	11.56	11	5.1	4.3	2.7	8.5	9.4	11.1	Normal
Fluoride	mg/L	7	0	0	0.63	1.02	0	0.80	0.76	0.14	0.95	0.98	1.01	Normal
Hardness as CaCO3	mg/L	7	0	0	613	878	n/a	772	760	83.6	845	862	875	Normal
Iron, Total	µg/L	7	0	0	8200	135000	7	68129	81100	51666	120000	127500	133500	Normal
Iron, Dissolved	µg/L	7	0	0	22.6	43800	6	19649	12500	19080	40200	42000	43440	Normal
Lead, Total	µg/L	7	0	0	0.09	16.8	0	3.5	0.77	15.5	7.1	13.4	44.0	Lognormal
Lead, Dissolved	µg/L	1	6	86	< 0.02	0.03	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Magnesium, Total	µg/L	7	0	0	43800	58100	n/a	52486	52600	4424	56600	57350	57950	Normal
Magnesium, Dissolved	µg/L	7	0	0	44100	55800	n/a	51343	51900	3761	54840	55320	55704	Normal
Manganese, Total	µg/L	7	0	0	1610	2660	7	2047	2120	348.5	2354	2507	2629	Normal
Manganese, Dissolved	µg/L	7	0	0	1390	2100	7	1761	1740	237.2	2034	2067	2093	Normal
Mercury, Total	ng/L	7	0	0	11.5	746	6	336	253	318	682	714	740	Normal
Mercury, Dissolved	ng/L	7	0	0	1.4	8.9	0	3.6	2.8	2.5	6.2	7.6	8.6	Normal
Methyl Mercury	ng/L	6	1	14	< 0.1	1.6	n/a	0.45	0.2	0.52	1.1	1.4	1.6	KM - Nonparametric
Molybdenum, Total	µg/L	6	1	14	< 0.26	1.25	0	0.41	0.43	0.08	0.79	1.02	1.20	KM - Nonparametric
Molybdenum, Dissolved	µg/L	6	1	14	< 0.24	0.43	0	0.35	0.36	0.07	0.42	0.43	0.43	KM - Nonparametric
Nickel, Total	µg/L	7	0	0	1	6	0	3.7	4.2	1.7	5.2	5.6	5.9	Normal
Nickel, Dissolved	µg/L	7	0	0	0.9	4.18	0	2.4	2.5	1.1	3.7	3.9	4.1	Normal
Nitrate + Nitrite as Nitrogen	mg/L	0	7	100	< 0.05	< 0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nitrogen, Total	mg/L	5	2	29	< 0.4	1.12	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nitrogen, Total Kjeldahl (TKN)	mg/L	5	2	29	< 0.4	1.12	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
pH	pH units	16	0	0	6.75	7.85	0	7.2	7.0	0.4	7.6	7.7	7.8	Normal
Phosphorus, Total	µg/L	5	2	29	< 40	5610	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Phosphorus, Dissolved	µg/L	1	6	86	< 40	553	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample

Table 4-16. YP-AS-7, Meadow Creek Mine Adit Seep, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Potassium, Total	µg/L	7	0	0	3110	7270	n/a	4079	3670	1423	5140	6205	7057	Nonparametric
Potassium, Dissolved	µg/L	7	0	0	3050	3740	n/a	3394	3390	257	3668	3704	3733	Normal
Selenium, Total	µg/L	1	6	86	< 1	2.2	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Selenium, Dissolved	µg/L	0	7	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Total	µg/L	3	4	57	< 0.02	0.24	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Dissolved	µg/L	0	7	100	< 0.02	< 0.04	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sodium, Total	µg/L	7	0	0	6770	9470	n/a	7814	7630	939.2	8840	9155	9407	Normal
Sodium, Dissolved	µg/L	7	0	0	6850	9500	n/a	7723	7200	960.3	8762	9131	9426	Normal
Solids, Total Dissolved (TDS)	mg/L	7	0	0	776	1060	7	943	956	91.6	1036	1048	1058	Normal
Solids, Total Suspended (TSS)	mg/L	7	0	0	21.5	1250	n/a	261	108	441	709	1010	1754	Gamma
Sulfate	mg/L	7	0	0	319	473	7	399	405	57.0	465	469	472	Normal
Temperature, Water	deg C	16	0	0	1.37	18.3	4	11.0	10.7	4.9	17.9	18.1	18.3	Normal
Thallium, Total	µg/L	7	0	0	0.146	1.88	4	0.647	0.610	0.605	1.21	1.55	1.81	Normal
Thallium, Dissolved	µg/L	2	5	71	< 0.02	0.056	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Turbidity	NTU	15	0	0	1.44	1086	n/a	104.3	30.7	338.0	227.9	402.0	1166.0	Lognormal
Vanadium, Total	µg/L	4	3	43	< 0.2	15.5	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Vanadium, Dissolved	µg/L	0	7	100	< 0.2	< 0.2	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Zinc, Total	µg/L	7	0	0	1	49.7	0	13.0	8.5	17.2	30.7	40.2	47.8	Normal
Zinc, Dissolved	µg/L	6	1	14	< 0.5	2.7	0	1.6	1.8	0.75	2.5	2.6	2.7	KM - Nonparametric

Units: **µg/L** = micrograms per liter; **mg/L** = milligrams per liter; **mS/cm** = milliSiemens per centimeter; **ng/L** = nanograms per liter; **deg C** = degrees Celsius; **NTU** = nephelometric turbidity units

Measurements: **< 20 µg/L** = analyte not detected at the method reporting limit of 20 µg/L; **n/a** = not applicable; **Min** = minimum concentration measured; **Max** = maximum concentration measured

*Number that do not meet criterion: total number of analytical results that did not meet the strictest potentially applicable regulatory criterion (presented in **Table 3-4**). If a constituent does not have applicable regulatory criteria, then n/a is given.*

Distribution: **Normal** = data appear normally distributed at 0.05 significance level; statistics presented are normal population estimators; **Gamma** = data appear gamma distributed 0.05 significance level; statistics presented are gamma population estimators; **Lognormal** = data appear lognormally distributed at 0.05 significance level; statistics presented are lognormal populations estimators; **Nonparametric** = data do not appear normally, gamma or lognormally distributed at 0.05 significance level; statistics presented are sample statistics; **KM nonparametric** = data comprises ≤ 50% non-detects; statistics presented are nonparametric population estimators generated using the Kaplan-Meier method; **Sample** = data comprises > 50% non-detects and statistics are not presented; or, data comprises five or fewer measurements but each result was detected and statistics presented are sample statistics.

4.1.2.3 Sugar Creek Surface Water Sites

YP-T-8A, uppermost Sugar Creek

The uppermost Sugar Creek site (YP-T-8A) is located at the southwestern end of an open meadow adjacent to FS 1883 and about a half mile downstream from where the road crosses the creek. Sugar Creek is sinuous through this reach and flow is generally from northeast to southwest (see photos in **Appendix G**). This site is above potential future MGII activities but is downstream of the historic Hermes mercury mine (also locally known as Cinnabar; Mitchell 2000). Flow measurements at the site have ranged from 3.6 cfs in December 2013 to 181 cfs in May 2012 with a median flow of 10 cfs.

For the time interval included in this baseline study, this site was visited 29 times. **Appendix E** presents dates the site was visited and parameters or constituents sampled during each visit. Analytical results are summarized in **Table 4-17**. Multiple constituents were analyzed for but were not detected in at least half of the samples from YP-T-8A. These constituents were ammonia, beryllium, boron, cadmium, carbonate, chloride, chromium, dissolved cobalt, cyanide, fluoride, iron, lead, manganese, methyl mercury, nickel, nitrate plus nitrite, phosphorus, selenium, silver, total suspended solids, thallium, dissolved vanadium, and zinc.

Of constituents that were regularly detected, many do not have defined or applicable regulatory criteria for comparison **(see Appendix E)**. These include conductivity, turbidity, arsenic III, bicarbonate, calcium, total cobalt, hardness, magnesium, total nitrogen, total Kjeldahl nitrogen, potassium, and sodium. In general, most of the major cations (calcium, magnesium, sodium), major anion (bicarbonate), and related measurements (conductivity and hardness) tended to be lowest during periods of high flow. The other constituents generally occurred in low concentrations and show no distinct trends.

In addition, many constituents that were regularly detected and have applicable regulatory criteria occurred in concentrations that met criteria **(see Appendix E)**. These constituents include color, dissolved oxygen, pH, temperature, alkalinity, dissolved aluminum, antimony, arsenic, barium, copper, molybdenum, total dissolved solids, sulfate, and total vanadium. In general, alkalinity and sulfate tended to be lowest during periods of high flow. The remainder of the constituents generally occurred in low concentrations and show no distinct trends.

There were some constituents that did not meet regulatory criteria **(see Appendix E)**. Total aluminum exceeded the regulatory criterion (50 µg/L) six times (33 percent of measurements). Total iron exceeded the regulatory criterion (300 µg/L) twice (7 percent of measurements). In May 2013 and May 2014 (7 percent of measurements), total lead exceeded the site-specific hardness-based regulatory criteria (0.54 and 0.54 µg/L, respectively). Total and dissolved mercury exceeded the regulatory criterion (12 ng/L) 28 and 2 times, respectively (97 and 7 percent of measurements).

Table 4-17. YP-T-8A, Uppermost Sugar Creek, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Alkalinity as CaCO3, Total	mg/L	29	0	0	23.4	73	0	46.7	49.5	13.0	56.2	68.2	73	Normal
Aluminum, Total	µg/L	18	0	0	5	632	6	88.6	27.7	269	196	340	961	Lognormal
Aluminum, Dissolved	µg/L	15	3	17	< 2.5	21.2	0	6.5	5.1	5.1	13.0	17.4	20.4	KM - Nonparametric
Ammonia as Nitrogen	mg/L	0	29	100	< 0.05	< 0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Antimony, Total	µg/L	29	0	0	0.35	0.66	0	0.52	0.51	0.08	0.62	0.63	0.65	Normal
Antimony, Dissolved	µg/L	29	0	0	0.3	0.65	0	0.50	0.52	0.09	0.62	0.63	0.64	Normal
Arsenic, Total	µg/L	29	0	0	3.6	7.2	0	5.0	5	0.8	5.9	6	6.9	Normal
Arsenic, Dissolved	µg/L	29	0	0	3.5	6	0	4.6	4.5	0.7	5.5	5.7	5.9	Normal
Arsenic (III)	µg/L	15	0	0	0.08	0.16	n/a	0.12	0.12	0.02	0.16	0.16	0.16	Normal
Barium, Total	µg/L	15	0	0	5.99	11.8	0	9.65	9.72	1.57	11.4	11.7	11.8	Normal
Barium, Dissolved	µg/L	15	0	0	3.44	11.7	0	8.74	9.88	2.86	11.4	11.7	11.7	Nonparametric
Beryllium, Total	µg/L	4	11	73	< 0.02	0.11	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Beryllium, Dissolved	µg/L	0	15	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Bicarbonate as CaCO3	mg/L	29	0	0	23.4	73	n/a	46	49.5	12.3	55.4	59.4	69.6	Nonparametric
Boron, Total	µg/L	0	15	100	< 20	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Boron, Dissolved	µg/L	0	15	100	< 20	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Total	µg/L	1	25	96	< 0.02	0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Dissolved	µg/L	1	25	96	< 0.02	0.03	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Calcium, Total	µg/L	29	0	0	6460	17200	n/a	13443	15300	3434	16740	16960	17144	Nonparametric
Calcium, Dissolved	µg/L	29	0	0	6440	17900	n/a	13438	15300	3549	16880	17380	17788	Nonparametric
Carbonate as CaCO3	mg/L	1	28	97	< 9	16	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chloride	mg/L	2	27	93	< 0.22	0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chromium, Total	µg/L	7	19	73	< 0.2	0.7	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chromium, Dissolved	µg/L	3	23	88	< 0.2	0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cobalt, Total	µg/L	11	4	27	< 0.02	0.25	n/a	0.07	0.03	0.07	0.19	0.21	0.24	KM - Nonparametric
Cobalt, Dissolved	µg/L	6	9	60	< 0.02	0.06	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Conductivity	mS/cm	28	0	0	0.054	0.142	n/a	0.099	0.104	0.022	0.120	0.122	0.137	Nonparametric

Table 4-17. YP-T-8A, Uppermost Sugar Creek, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Copper, Total	µg/L	16	10	38	< 0.1	0.8	0	0.2	0.1	0.2	0.4	0.5	0.7	KM - Nonparametric
Copper, Dissolved	µg/L	25	1	4	< 0.1	0.6	0	0.2	0.2	0.1	0.3	0.4	0.6	KM - Nonparametric
Cyanide, Total	mg/L	0	15	100	< 0.0047	< 0.0047	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Dissolved Oxygen (DO)	mg/L	29	0	0	8.92	11.76	0	10.2	10.4	0.8	11.2	11.5	11.7	Normal
Fluoride	mg/L	1	28	97	< 0.2	0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Hardness as CaCO3	mg/L	29	0	0	19.5	51.8	n/a	40.5	45.6	10.1	49.8	50.8	51.6	Nonparametric
Iron, Total	µg/L	13	16	55	< 17.3	628	2	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Iron, Dissolved	µg/L	0	29	100	< 10	< 40	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Lead, Total	µg/L	12	17	59	< 0.02	0.78	2	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Lead, Dissolved	µg/L	0	29	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Magnesium, Total	µg/L	29	0	0	813	2180	n/a	1677	1810	399	2090	2096	2158	Nonparametric
Magnesium, Dissolved	µg/L	29	0	0	690	2140	n/a	1657	1800	427	2076	2118	2137	Nonparametric
Manganese, Total	µg/L	7	11	61	< 1	19.9	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Manganese, Dissolved	µg/L	1	17	94	< 1	5	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Mercury, Total	ng/L	29	0	0	10.3	863	28	123	36	212	481	568	784	Nonparametric
Mercury, Dissolved	ng/L	28	0	0	3.8	26.6	2	7.9	7.4	4.2	9.4	12.2	23.0	Nonparametric
Methyl Mercury	ng/L	3	12	80	< 0.1	0.26	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Molybdenum, Total	µg/L	15	0	0	0.31	1.49	0	0.95	1.0	0.38	1.3	1.4	1.5	Normal
Molybdenum, Dissolved	µg/L	15	0	0	0.31	1.44	0	0.96	1.1	0.38	1.4	1.4	1.4	Normal
Nickel, Total	µg/L	7	8	53	< 0.2	0.5	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nickel, Dissolved	µg/L	5	10	67	< 0.2	0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nitrate + Nitrite as Nitrogen	mg/L	0	29	100	< 0.05	< 0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nitrogen, Total	mg/L	9	6	40	< 0.4	3.39	n/a	0.66	0.45	0.74	0.69	1.5	3.0	KM - Nonparametric
Nitrogen, Total Kjeldahl (TKN)	mg/L	9	6	40	< 0.4	3.39	n/a	0.66	0.44	0.74	0.68	1.5	3.0	KM - Nonparametric
pH	pH units	29	0	0	6.71	8.5	0	7.3	7.2	0.5	7.9	8.1	8.4	Normal
Phosphorus, Total	µg/L	0	29	100	< 20	< 40	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample

Table 4-17. YP-T-8A, Uppermost Sugar Creek, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Phosphorus, Dissolved	µg/L	0	29	100	< 20	< 42.6	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Potassium, Total	µg/L	29	0	0	491	844	n/a	629	622	68.9	695	734	817	Normal
Potassium, Dissolved	µg/L	29	0	0	439	710	n/a	594	603	78.1	681	702	708	Normal
Selenium, Total	µg/L	0	26	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Selenium, Dissolved	µg/L	0	26	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Total	µg/L	2	13	87	< 0.02	0.04	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Dissolved	µg/L	0	15	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sodium, Total	µg/L	29	0	0	1510	2990	n/a	2313	2410	454.7	2784	2900	2976	Normal
Sodium, Dissolved	µg/L	29	0	0	1460	2970	n/a	2320	2520	464.2	2780	2952	2967	Nonparametric
Solids, Total Dissolved (TDS)	mg/L	28	1	3	< 5	83	0	53	53	17	77	80	82	KM - Nonparametric
Solids, Total Suspended (TSS)	mg/L	5	24	83	< 5	22	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sulfate	mg/L	29	0	0	1.28	5.25	0	3.27	3.62	1.30	4.69	4.73	5.11	Normal
Temperature, Water	deg C	29	0	0	-0.01	12.96	0	4.3	3.9	3.6	8.6	10.1	12.4	Normal
Thallium, Total	µg/L	7	8	53	< 0.02	0.042	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Thallium, Dissolved	µg/L	3	12	80	< 0.02	0.022	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Turbidity	NTU	29	0	0	0	19.2	n/a	3.5	1.4	4.9	9.6	14.5	18.8	Nonparametric
Vanadium, Total	µg/L	8	7	47	< 0.2	0.6	0	0.3	0.2	0.1	0.5	0.5	0.6	KM - Nonparametric
Vanadium, Dissolved	µg/L	3	12	80	< 0.2	0.3	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Zinc, Total	µg/L	7	22	76	< 0.5	3.5	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Zinc, Dissolved	µg/L	7	22	76	< 0.5	0.9	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample

Units: **µg/L** = micrograms per liter; **mg/L** = milligrams per liter; **mS/cm** = milliSiemens per centimeter; **ng/L** = nanograms per liter; **deg C** = degrees Celsius; **NTU** = nephelometric turbidity units

Measurements: **< 20 µg/L** = analyte not detected at the method reporting limit of 20 µg/L; **n/a** = not applicable; **Min** = minimum concentration measured; **Max** = maximum concentration measured

*Number that do not meet criterion: total number of analytical results that did not meet the strictest potentially applicable regulatory criterion (presented in **Table 3-4**). If a constituent does not have applicable regulatory criteria, then n/a is given.*

Distribution: **Normal** = data appear normally distributed at 0.05 significance level; statistics presented are normal population estimators; **Gamma** = data appear gamma distributed 0.05 significance level; statistics presented are gamma population estimators; **Lognormal** = data appear lognormally distributed at 0.05 significance level; statistics presented are lognormal populations estimators; **Nonparametric** = data do not appear normally, gamma or lognormally distributed at 0.05 significance level; statistics presented are sample statistics; **KM nonparametric** = data comprises ≤ 50% non-detects; statistics presented are nonparametric population estimators generated using the Kaplan-Meier method; **Sample** = data comprises > 50% non-detects and statistics are not presented; or, data comprises five or fewer measurements but each result was detected and statistics presented are sample statistics.

YP-T-7, Sugar Creek above West End Creek

The Sugar Creek site above West End Creek (YP-T-7) is approximately 500 feet upstream of the West End Creek confluence and is adjacent to FS 1883. It is located just downstream of a prominent S-bend in the stream in a reach with abundant large, woody debris (see photos in **Appendix G**). Flow is generally northeast to southwest and flow measurements at the site have ranged from 4.8 cfs in December 2012 to 201 cfs in May 2012, with a median flow of 11 cfs.

For the time interval included in this baseline study, this site was visited 35 times. **Appendix E** presents dates the site was visited and parameters or constituents sampled during each visit. Analytical results are summarized in **Table 4-18**. Multiple constituents were analyzed for but were not detected in at least half of the samples from YP-T-7. These constituents were ammonia, beryllium, boron, cadmium, carbonate, chloride, chromium, dissolved cobalt, total cyanide, fluoride, iron, lead, dissolved manganese, methyl mercury, nickel, nitrate plus nitrite, total nitrogen, total Kjeldahl nitrogen, phosphorus, selenium, silver, total suspended solids, thallium, vanadium, and zinc.

Of constituents that were regularly detected, many do not have defined or applicable regulatory criteria for comparison **(see Appendix E)**. These include conductivity, turbidity, arsenic III, bicarbonate, calcium, total cobalt, hardness, magnesium, potassium, and sodium. In general, most of the major cations (calcium, magnesium, sodium), major anion (bicarbonate), and related measurements (conductivity and hardness) tended to be lowest during periods of high flow. The remainder of the constituents generally occurred in low concentrations and show no distinct trends.

In addition, many constituents that were regularly detected and have applicable regulatory criteria occurred in concentrations that met criteria **(see Appendix E)**. These constituents include color, dissolved oxygen, pH, alkalinity, dissolved aluminum, antimony, dissolved arsenic, barium, copper, total manganese, molybdenum, total dissolved solids, and sulfate. In general, alkalinity tends to be lowest during high flow conditions. The remainder of the constituents generally occurred in low concentrations and show no distinct trends.

There were some constituents that did not meet regulatory criteria **(see Appendix E)**. Temperature was higher than the regulatory maximum (< 13 degrees Celsius) once (3 percent of measurements). Total aluminum exceeded the regulatory criterion (50 µg/L) eight times (40 percent of measurements). Total arsenic exceeded the regulatory criterion (10 µg/L) once (3 percent of measurements). Total iron exceeded the regulatory criterion (300 µg/L) four times (11 percent of measurements). In May 2013 and May 2014 (6 percent of measurements), total lead exceeded the site-specific, hardness-based regulatory criteria (0.54 and 0.54 µg/L, respectively). Total and dissolved mercury exceeded the regulatory criterion (12 ng/L) 33 and 2 times, respectively (94 and 6 percent of measurements).

Table 4-18. YP-T-7, Sugar Creek above West End Creek, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Alkalinity as CaCO3, Total	mg/L	35	0	0	23.8	75	0	49.6	55.3	12.6	58.6	66.0	74.3	Nonparametric
Aluminum, Total	µg/L	20	0	0	5	728	8	139	33.8	552	291	536	1686	Lognormal
Aluminum, Dissolved	µg/L	18	2	10	< 2.1	37.8	0	8.05	5.15	8.19	16.3	18.7	34.0	KM - Nonparametric
Ammonia as Nitrogen	mg/L	0	35	100	< 0.05	< 0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Antimony, Total	µg/L	35	0	0	0.49	1.33	0	0.83	0.86	0.22	1.08	1.27	1.32	Normal
Antimony, Dissolved	µg/L	35	0	0	0.39	1.34	0	0.82	0.85	0.24	1.07	1.30	1.33	Normal
Arsenic, Total	µg/L	35	0	0	4.4	10.1	1	6.4	6.2	1.1	7.4	7.9	9.4	Normal
Arsenic, Dissolved	µg/L	35	0	0	3.9	7.6	0	5.8	6.0	1.0	6.8	7.1	7.5	Normal
Arsenic (III)	µg/L	16	0	0	0.08	0.566	n/a	0.16	0.12	0.12	0.21	0.31	0.52	Nonparametric
Barium, Total	µg/L	16	0	0	7.49	14	0	11.8	12.1	1.74	13.5	13.9	14.0	Normal
Barium, Dissolved	µg/L	16	0	0	4.4	13.9	0	10.6	11.7	3.2	13.4	13.5	13.8	Nonparametric
Beryllium, Total	µg/L	4	12	75	< 0.02	0.12	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Beryllium, Dissolved	µg/L	0	16	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Bicarbonate as CaCO3	mg/L	35	0	0	23.8	72.9	n/a	48.9	54.4	11.8	58.0	59.5	69.5	Nonparametric
Boron, Total	µg/L	0	16	100	< 20	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Boron, Dissolved	µg/L	0	16	100	< 20	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Total	µg/L	0	31	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Dissolved	µg/L	0	31	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Calcium, Total	µg/L	35	0	0	6920	17800	n/a	14112	15900	3449	17520	17630	17766	Nonparametric
Calcium, Dissolved	µg/L	35	0	0	6630	18100	n/a	14208	15800	3562	17800	17830	18032	Nonparametric
Carbonate as CaCO3	mg/L	1	34	97	< 9	18	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chloride	mg/L	2	33	94	< 0.2	0.98	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chromium, Total	µg/L	8	23	74	< 0.2	2	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chromium, Dissolved	µg/L	1	30	97	< 0.2	0.2	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cobalt, Total	µg/L	11	5	31	< 0.02	0.28	n/a	0.07	0.03	0.08	0.20	0.23	0.27	KM - Nonparametric
Cobalt, Dissolved	µg/L	7	9	56	< 0.02	0.06	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Conductivity	mS/cm	35	0	0	0.056	0.144	n/a	0.103	0.109	0.025	0.128	0.129	0.139	Nonparametric

Table 4-18. YP-T-7, Sugar Creek above West End Creek, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Copper, Total	µg/L	21	10	32	< 0.1	0.6	0	0.2	0.1	0.1	0.4	0.4	0.5	KM - Nonparametric
Copper, Dissolved	µg/L	30	1	3	< 0.1	0.5	0	0.2	0.2	0.1	0.3	0.3	0.4	KM - Nonparametric
Cyanide, Total	mg/L	0	16	100	< 0.0047	< 0.0047	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Dissolved Oxygen (DO)	mg/L	35	0	0	8.64	12.25	0	10.4	10.8	1.0	11.4	11.8	12.2	Normal
Fluoride	mg/L	1	34	97	< 0.2	0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Hardness as CaCO3	mg/L	35	0	0	21.3	55.4	n/a	43.5	48.6	10.7	53.6	54.6	55.2	Nonparametric
Iron, Total	µg/L	17	18	51	< 10	846	4	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Iron, Dissolved	µg/L	3	32	91	< 10	46.7	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Lead, Total	µg/L	16	19	54	< 0.02	0.84	2	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Lead, Dissolved	µg/L	4	31	89	< 0.02	0.06	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Magnesium, Total	µg/L	35	0	0	977	2670	n/a	2019	2220	518	2524	2609	2656	Nonparametric
Magnesium, Dissolved	µg/L	35	0	0	774	2790	n/a	2021	2210	561	2516	2628	2773	Nonparametric
Manganese, Total	µg/L	11	9	45	< 1	26.9	0	3.9	1.5	6.3	10.3	15.6	24.6	KM - Nonparametric
Manganese, Dissolved	µg/L	2	18	90	< 1	5	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Mercury, Total	ng/L	35	0	0	8.1	3660	33	226	34.6	678	192	1137	3017	Nonparametric
Mercury, Dissolved	ng/L	34	0	0	3.4	30.2	2	7.8	7.2	4.4	9.7	11.7	24.6	Nonparametric
Methyl Mercury	ng/L	5	11	69	< 0.1	0.25	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Molybdenum, Total	µg/L	16	0	0	0.35	1.34	0	0.94	1.09	0.34	1.28	1.30	1.33	Normal
Molybdenum, Dissolved	µg/L	16	0	0	0.34	1.36	0	0.95	1.10	0.35	1.29	1.32	1.35	Nonparametric
Nickel, Total	µg/L	6	10	63	< 0.2	1.1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nickel, Dissolved	µg/L	5	11	69	< 0.2	0.3	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nitrate + Nitrite as Nitrogen	mg/L	1	34	97	< 0.05	0.058	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nitrogen, Total	mg/L	8	8	50	< 0.4	0.83	n/a	0.46	0.45	0.11	0.54	0.61	0.79	KM - Nonparametric
Nitrogen, Total Kjeldahl (TKN)	mg/L	8	8	50	< 0.4	0.83	n/a	0.46	0.41	0.11	0.54	0.61	0.79	KM - Nonparametric
pH	pH units	35	0	0	6.67	8.62	0	7.5	7.4	0.4	8.1	8.2	8.5	Normal
Phosphorus, Total	µg/L	0	35	100	< 20	< 80	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample

Table 4-18. YP-T-7, Sugar Creek above West End Creek, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Phosphorus, Dissolved	µg/L	0	35	100	< 20	< 80	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Potassium, Total	µg/L	35	0	0	506	996	n/a	719	728	92.2	792	816	944	Nonparametric
Potassium, Dissolved	µg/L	35	0	0	433	824	n/a	675	713	108	777	803	817	Nonparametric
Selenium, Total	µg/L	0	31	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Selenium, Dissolved	µg/L	0	31	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Total	µg/L	0	16	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Dissolved	µg/L	0	16	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sodium, Total	µg/L	35	0	0	1470	2880	n/a	2321	2460	411.0	2758	2807	2877	Normal
Sodium, Dissolved	µg/L	35	0	0	1470	3080	n/a	2339	2450	442.4	2790	2927	3049	Normal
Solids, Total Dissolved (TDS)	mg/L	35	0	0	18	113	0	60	61	18.4	82	88.6	105	Normal
Solids, Total Suspended (TSS)	mg/L	4	31	89	< 5	32.5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sulfate	mg/L	35	0	0	1.34	12.9	0	3.78	3.94	2.02	4.86	5.06	10.3	Nonparametric
Temperature, Water	deg C	35	0	0	0.02	14.84	1	4.4	3.1	4.2	11.0	14.8	23.9	Gamma
Thallium, Total	µg/L	4	12	75	< 0.02	0.045	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Thallium, Dissolved	µg/L	1	15	94	< 0.02	0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Turbidity	NTU	35	0	0	0	19.3	n/a	4.2	2.7	4.7	10.4	13.6	19.0	Nonparametric
Vanadium, Total	µg/L	7	9	56	< 0.2	0.7	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Vanadium, Dissolved	µg/L	3	13	81	< 0.2	0.3	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Zinc, Total	µg/L	10	25	71	< 0.5	2.6	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Zinc, Dissolved	µg/L	15	20	57	< 0.5	1.2	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample

Units: **µg/L** = micrograms per liter; **mg/L** = milligrams per liter; **mS/cm** = milliSiemens per centimeter; **ng/L** = nanograms per liter; **deg C** = degrees Celsius; **NTU** = nephelometric turbidity units
Measurements: **< 20 µg/L** = analyte not detected at the method reporting limit of 20 µg/L; **n/a** = not applicable; **Min** = minimum concentration measured; **Max** = maximum concentration measured
*Number that do not meet criterion: total number of analytical results that did not meet the strictest potentially applicable regulatory criterion (presented in **Table 3-4**). If a constituent does not have applicable regulatory criteria, then n/a is given.*
Distribution: **Normal** = data appear normally distributed at 0.05 significance level; statistics presented are normal population estimators; **Gamma** = data appear gamma distributed 0.05 significance level; statistics presented are gamma population estimators; **Lognormal** = data appear lognormally distributed at 0.05 significance level; statistics presented are lognormal populations estimators; **Nonparametric** = data do not appear normally, gamma or lognormally distributed at 0.05 significance level; statistics presented are sample statistics; **KM nonparametric** = data comprises ≤ 50% non-detects; statistics presented are nonparametric population estimators generated using the Kaplan-Meier method; **Sample** = data comprises > 50% non-detects and statistics are not presented; or, data comprises five or fewer measurements but each result was detected and statistics presented are sample statistics.

YP-T-37, upper West End Creek

The upper West End Creek site (YP-T-37) is located approximately 350 feet upstream of the upper West End dump (see photos in **Appendix G**). The creek is a steep, narrow, headwater stream through this reach before flowing under the upper West End dump via French drain (URS 2000). Flow is generally southeast to northwest and flow measurements at the site have ranged from $2.8x10^{-3}$ cfs in July 2014 to 0.63 cfs in May 2015, with a median flow of $2.0x10^{-2}$ cfs.

This site is located above 7000 feet elevation and is inaccessible during winter conditions. For the time interval included in this baseline study, this site was visited 23 times. **Appendix E** presents dates the site was visited and parameters or constituents sampled during each visit. Analytical results are summarized in **Table 4-19**. Multiple constituents were analyzed for but were not detected in at least half of the samples from YP-T-37. These constituents were dissolved aluminum, ammonia, beryllium, boron, cadmium, carbonate, chloride, dissolved cobalt, total cyanide, fluoride, dissolved iron, dissolved lead, dissolved manganese, methyl mercury, dissolved nickel, nitrate plus nitrite, phosphorus, selenium, silver, total suspended solids, thallium, and zinc.

Of constituents that were regularly detected, many do not have defined or applicable regulatory criteria for comparison **(see Appendix E)**. These include conductivity, turbidity, arsenic III, bicarbonate, calcium, total cobalt, hardness, magnesium, total nitrogen, total Kjeldahl nitrogen, potassium, and sodium. The constituents do not show distinct trends in concentrations.

In addition, many constituents that were regularly detected and have applicable regulatory criteria occurred in concentrations that met criteria **(see Appendix E)**. These constituents include color, dissolved oxygen, pH, alkalinity, antimony, dissolved arsenic, barium, chromium, copper, total lead, total manganese, molybdenum, total nickel, total dissolved solids, sulfate, and vanadium. These constituents generally occurred in low concentrations and do not show distinct trends.

There were some constituents that did not meet regulatory criteria **(see Appendix E)**. Temperature was greater than the regulatory maximum (< 13 degrees Celsius) once (5 percent of measurements). Total aluminum exceeded the regulatory criterion (50 µg/L) 10 times (91 percent of measurements). Total arsenic exceeded the regulatory criterion (10 µg/L) three times (16 percent of measurements). Total iron exceeded the regulatory criterion (300 µg/L) five times (26 percent of measurements). Total and dissolved mercury exceeded the regulatory criterion (12 ng/L) 19 times each (100 percent of measurements).

Table 4-19. YP-T-37, Upper West End Creek, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Alkalinity as CaCO3, Total	mg/L	19	0	0	105	148	0	123	124	10.0	132	135	146	Normal
Aluminum, Total	µg/L	11	0	0	29.6	1200	10	337	102	400	848	1024	1165	Normal
Aluminum, Dissolved	µg/L	5	6	55	< 2	10	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Ammonia as Nitrogen	mg/L	0	19	100	< 0.05	< 0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Antimony, Total	µg/L	19	0	0	1.72	2.33	0	2.11	2.15	0.17	2.30	2.30	2.33	Normal
Antimony, Dissolved	µg/L	19	0	0	1.69	2.36	0	2.09	2.16	0.18	2.27	2.30	2.35	Normal
Arsenic, Total	µg/L	19	0	0	8	10.5	3	8.9	8.8	0.75	10.1	10.2	10.5	Normal
Arsenic, Dissolved	µg/L	19	0	0	7.7	9.7	0	8.5	8.4	0.54	9.2	9.3	9.6	Normal
Arsenic (III)	µg/L	9	0	0	0.04	0.13	n/a	0.07	0.06	0.03	0.10	0.11	0.13	Normal
Barium, Total	µg/L	9	0	0	16	21.5	0	18.4	18	1.93	20.8	21.1	21.4	Normal
Barium, Dissolved	µg/L	9	0	0	15.6	19.7	0	16.9	16.6	1.3	18.2	18.9	19.6	Normal
Beryllium, Total	µg/L	2	7	78	< 0.02	0.04	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Beryllium, Dissolved	µg/L	0	9	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Bicarbonate as CaCO3	mg/L	19	0	0	104	148	n/a	122	123	10.2	131	135	146	Normal
Boron, Total	µg/L	0	9	100	< 20	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Boron, Dissolved	µg/L	0	9	100	< 20	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Total	µg/L	0	17	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Dissolved	µg/L	0	17	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Calcium, Total	µg/L	19	0	0	27400	47100	n/a	32963	31800	4431	36040	41970	46074	Nonparametric
Calcium, Dissolved	µg/L	19	0	0	27400	36300	n/a	30884	31200	2060	32600	34050	35850	Normal
Carbonate as CaCO3	mg/L	1	18	95	< 9	15.3	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chloride	mg/L	0	19	100	< 0.4	< 0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chromium, Total	µg/L	17	0	0	0.2	1.7	0	0.6	0.5	0.4	1.0	1.23	1.83	Lognormal
Chromium, Dissolved	µg/L	16	1	6	< 0.2	0.6	0	0.3	0.3	0.1	0.5	0.5	0.6	KM - Nonparametric
Cobalt, Total	µg/L	9	0	0	0.02	0.27	n/a	0.10	0.05	0.09	0.24	0.25	0.27	Normal
Cobalt, Dissolved	µg/L	3	6	67	< 0.02	0.03	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Conductivity	mS/cm	18	0	0	0.207	0.339	n/a	0.245	0.241	0.029	0.265	0.279	0.327	Normal

Table 4-19. YP-T-37, Upper West End Creek, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Copper, Total	µg/L	10	7	41	< 0.1	0.7	0	0.2	0.1	0.2	0.3	0.5	0.7	KM - Nonparametric
Copper, Dissolved	µg/L	12	5	29	< 0.1	0.3	0	0.1	0.1	0.1	0.2	0.3	0.3	KM - Nonparametric
Cyanide, Total	mg/L	0	9	100	< 0.0047	< 0.0047	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Dissolved Oxygen (DO)	mg/L	19	0	0	6.97	12.45	0	9.5	9.6	1.2	10.9	11.0	12.2	Normal
Fluoride	mg/L	0	19	100	< 0.2	< 0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Hardness as CaCO3	mg/L	19	0	0	106	173	n/a	126	126	14.2	145	151	163	Lognormal
Iron, Total	µg/L	19	0	0	23.3	1330	5	279	137	494	632	974	2194	Lognormal
Iron, Dissolved	µg/L	1	18	95	< 11.6	40	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Lead, Total	µg/L	17	2	11	< 0.02	0.51	0	0.11	0.04	0.14	0.30	0.38	0.48	KM - Nonparametric
Lead, Dissolved	µg/L	0	19	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Magnesium, Total	µg/L	19	0	0	9280	13500	n/a	10788	10600	1025	11780	12600	13320	Normal
Magnesium, Dissolved	µg/L	19	0	0	8790	11400	n/a	10249	10400	670.4	10800	11220	11364	Normal
Manganese, Total	µg/L	10	1	9	< 1.4	41.2	0	12.2	5.0	13.3	30.4	35.8	40.1	KM - Nonparametric
Manganese, Dissolved	µg/L	0	11	100	< 1	< 5	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Mercury, Total	ng/L	19	0	0	80.6	777	19	251	184	195	481	584	810	Gamma
Mercury, Dissolved	ng/L	19	0	0	27.5	98.3	19	53.8	50.8	18.5	76.6	85.1	95.7	Normal
Methyl Mercury	ng/L	2	7	78	< 0.1	0.3	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Molybdenum, Total	µg/L	9	0	0	0.09	0.13	0	0.11	0.10	0.01	0.12	0.13	0.13	Normal
Molybdenum, Dissolved	µg/L	9	0	0	0.06	0.12	0	0.10	0.11	0.02	0.11	0.12	0.12	Normal
Nickel, Total	µg/L	5	4	44	< 0.2	0.48	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nickel, Dissolved	µg/L	3	6	67	< 0.2	0.3	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nitrate + Nitrite as Nitrogen	mg/L	1	18	95	< 0.05	0.084	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nitrogen, Total	mg/L	7	2	22	< 0.4	0.84	n/a	0.5	0.5	0.1	0.7	0.8	0.8	KM - Nonparametric
Nitrogen, Total Kjeldahl (TKN)	mg/L	7	2	22	< 0.4	0.84	n/a	0.5	0.5	0.1	0.7	0.8	0.8	KM - Nonparametric
pH	pH units	18	0	0	7.14	8.12	0	7.7	7.6	0.3	8.1	8.1	8.1	Normal
Phosphorus, Total	µg/L	3	16	84	< 20	76.2	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample

Table 4-19. YP-T-37, Upper West End Creek, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Phosphorus, Dissolved	µg/L	0	19	100	< 20	< 42.6	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Potassium, Total	µg/L	19	0	0	877	1280	n/a	1092	1110	112	1218	1253	1275	Normal
Potassium, Dissolved	µg/L	19	0	0	840	1220	n/a	1057	1070	102	1164	1184	1213	Normal
Selenium, Total	µg/L	0	17	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Selenium, Dissolved	µg/L	0	17	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Total	µg/L	0	9	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Dissolved	µg/L	0	9	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sodium, Total	µg/L	18	1	5	< 293	400	n/a	343	348	23.9	378	396	399	KM - Nonparametric
Sodium, Dissolved	µg/L	18	1	5	< 294	400	n/a	340	345	20.0	360	373	395	KM - Nonparametric
Solids, Total Dissolved (TDS)	mg/L	19	0	0	103	173	0	126	119	20.1	152	169	172	Normal
Solids, Total Suspended (TSS)	mg/L	9	10	53	< 5	64	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sulfate	mg/L	19	0	0	0.61	0.96	0	0.79	0.82	0.11	0.92	0.94	0.96	Normal
Temperature, Water	deg C	19	0	0	0.14	13.3	1	6.1	6.3	3.8	10.5	11.4	12.9	Normal
Thallium, Total	µg/L	2	7	78	< 0.02	0.03	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Thallium, Dissolved	µg/L	0	9	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Turbidity	NTU	19	0	0	1.2	13.6	n/a	4.7	3.6	3.9	9.1	11.8	19.3	Lognormal
Vanadium, Total	µg/L	9	0	0	0.2	1.2	0	0.5	0.3	0.4	1.2	1.2	1.2	Normal
Vanadium, Dissolved	µg/L	7	2	22	< 0.2	0.2	0	0.2	0.2	0.0	0.2	0.2	0.2	KM - Nonparametric
Zinc, Total	µg/L	8	11	58	< 0.5	2.3	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Zinc, Dissolved	µg/L	6	13	68	< 0.5	1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample

Units: **µg/L** = micrograms per liter; **mg/L** = milligrams per liter; **mS/cm** = milliSiemens per centimeter; **ng/L** = nanograms per liter; **deg C** = degrees Celsius; **NTU** = nephelometric turbidity units
Measurements: **< 20 µg/L** = analyte not detected at the method reporting limit of 20 µg/L; **n/a** = not applicable; **Min** = minimum concentration measured; **Max** = maximum concentration measured
*Number that do not meet criterion: total number of analytical results that did not meet the strictest potentially applicable regulatory criterion (presented in **Table 3-4**). If a constituent does not have applicable regulatory criteria, then n/a is given.*
Distribution: **Normal** = data appear normally distributed at 0.05 significance level; statistics presented are normal population estimators; **Gamma** = data appear gamma distributed 0.05 significance level; statistics presented are gamma population estimators; **Lognormal** = data appear lognormally distributed at 0.05 significance level; statistics presented are lognormal populations estimators; **Nonparametric** = data do not appear normally, gamma or lognormally distributed at 0.05 significance level; statistics presented are sample statistics; **KM nonparametric** = data comprises ≤ 50% non-detects; statistics presented are nonparametric population estimators generated using the Kaplan-Meier method; **Sample** = data comprises > 50% non-detects and statistics are not presented; or, data comprises five or fewer measurements but each result was detected and statistics presented are sample statistics.

YP-T-49, middle West End Creek

The middle West End Creek site (YP-T-49) is located between the upper and lower West End dumps (see photos in **Appendix G**). The creek emerges from the toe of the upper West End dumb via a French drain (URS 2000) and flows down a 750-foot-long section of a steep, V-shaped, natural stream channel before reaching the sampling location. The sampling site is a former withdrawal location for drilling activities directly below a small waterfall. Flow is generally southeast to northwest and flow measurements at the site have ranged from 0.4 cfs in August 2015 to 1.4 cfs in November 2015, with a median flow of 0.4 cfs.

The site was added to the sampling program in May 2015 and has only been sampled 3 times during the period of this baseline study. Data from this site therefore were not processed using ProUCL because they did not meet the minimum processing requirements (> 5 measurements). **Appendix E** presents dates the site was visited and parameters or constituents sampled during each visit. Analytical results are summarized in **Table 4-20**. Multiple constituents were analyzed for but were not detected in at least half of the samples from YP-T-49. These constituents were dissolved aluminum, ammonia, beryllium, boron, cadmium, carbonate, chloride, cyanide, fluoride, dissolved iron, lead, dissolved manganese, methyl mercury, phosphorus, selenium, silver, total suspended solids, thallium, and dissolved zinc.

Of constituents that were regularly detected, many do not have defined or applicable regulatory criteria for comparison **(see Appendix E)**. These include conductivity, turbidity, arsenic III, bicarbonate, calcium, cobalt, hardness, magnesium, nitrate plus nitrite, total nitrogen, total Kjeldahl nitrogen, potassium, and sodium. The constituents do not show distinct trends in concentrations.

In addition, many constituents that were regularly detected and have applicable regulatory criteria occurred in concentrations that met criteria **(see Appendix E)**. These constituents include color, dissolved oxygen, pH, temperature, antimony, dissolved arsenic, barium, chromium, copper, total iron, total manganese, mercury, molybdenum, nickel, total dissolved solids, sulfate, vanadium and total zinc. These constituents generally occurred in low concentrations and do not show distinct trends.

There were some constituents that did not meet regulatory criteria **(see Appendix E)**. Total aluminum exceeded regulatory criterion (50 µg/L) once (33 percent of measurements). Total and dissolved arsenic exceeded regulatory criterion (10 µg/L) three times each (100 percent of measurements).

Table 4-20. YP-T-49, Middle West End Creek, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Alkalinity as CaCO3, Total	mg/L	3	0	0	116	131	0	126	130	8.39	n/a	n/a	n/a	Sample
Aluminum, Total	µg/L	3	0	0	11.8	79.7	1	35.5	15.1	38.3	n/a	n/a	n/a	Sample
Aluminum, Dissolved	µg/L	1	2	67	< 2	3.1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Ammonia as Nitrogen	mg/L	0	3	100	< 0.05	< 0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Antimony, Total	µg/L	3	0	0	3.55	4.07	0	3.84	3.91	0.27	n/a	n/a	n/a	Sample
Antimony, Dissolved	µg/L	3	0	0	3.58	4.11	0	3.88	3.94	0.27	n/a	n/a	n/a	Sample
Arsenic, Total	µg/L	3	0	0	17.6	18.9	3	18.4	18.7	0.7	n/a	n/a	n/a	Sample
Arsenic, Dissolved	µg/L	3	0	0	17.3	18.7	3	17.8	17.5	0.76	n/a	n/a	n/a	Sample
Arsenic (III)	µg/L	3	0	0	0.06	0.33	n/a	0.16	0.08	0.15	n/a	n/a	n/a	Sample
Barium, Total	µg/L	3	0	0	14.5	16.2	0	15.6	16.0	0.93	n/a	n/a	n/a	Sample
Barium, Dissolved	µg/L	3	0	0	14.6	16	0	15.4	15.6	0.72	n/a	n/a	n/a	Sample
Beryllium, Total	µg/L	0	3	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Beryllium, Dissolved	µg/L	0	3	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Bicarbonate as CaCO3	mg/L	3	0	0	115	129	n/a	124	128	7.81	n/a	n/a	n/a	Sample
Boron, Total	µg/L	0	3	100	< 20	< 20	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Boron, Dissolved	µg/L	0	3	100	< 20	< 21.3	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Total	µg/L	0	3	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Dissolved	µg/L	0	3	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Calcium, Total	µg/L	3	0	0	29600	34500	n/a	32333	32900	2499	n/a	n/a	n/a	Sample
Calcium, Dissolved	µg/L	3	0	0	30000	34700	n/a	32633	33200	2401	n/a	n/a	n/a	Sample
Carbonate as CaCO3	mg/L	0	3	100	< 15	< 15	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chloride	mg/L	0	3	100	< 0.2	< 0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chromium, Total	µg/L	3	0	0	0.2	0.34	0	0.3	0.3	0.1	n/a	n/a	n/a	Sample
Chromium, Dissolved	µg/L	3	0	0	0.22	0.3	0	0.3	0.3	0.05	n/a	n/a	n/a	Sample
Cobalt, Total	µg/L	3	0	0	0.04	0.08	n/a	0.06	0.07	0.02	n/a	n/a	n/a	Sample
Cobalt, Dissolved	µg/L	3	0	0	0.027	0.08	n/a	0.05	0.03	0.03	n/a	n/a	n/a	Sample
Conductivity	mS/cm	3	0	0	0.234	0.263	n/a	0.251	0.255	0.015	n/a	n/a	n/a	Sample

Table 4-20. YP-T-49, Middle West End Creek, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Copper, Total	µg/L	2	1	33	< 0.1	0.2	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Copper, Dissolved	µg/L	3	0	0	0.18	0.6	0	0.3	0.2	0.2	n/a	n/a	n/a	Sample
Cyanide, Total	mg/L	0	3	100	< 0.0047	< 0.0047	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Dissolved Oxygen (DO)	mg/L	3	0	0	8.59	9.9	0	9.0	8.6	0.8	n/a	n/a	n/a	Sample
Fluoride	mg/L	0	3	100	< 0.2	< 0.2	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Hardness as CaCO3	mg/L	3	0	0	124	137	n/a	132	136	7.23	n/a	n/a	n/a	Sample
Iron, Total	µg/L	2	1	33	< 20	150	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Iron, Dissolved	µg/L	0	3	100	< 20	< 42.6	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Lead, Total	µg/L	1	2	67	< 0.02	0.04	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Lead, Dissolved	µg/L	0	3	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Magnesium, Total	µg/L	3	0	0	12200	13000	n/a	12500	12300	435.9	n/a	n/a	n/a	Sample
Magnesium, Dissolved	µg/L	3	0	0	12200	12700	n/a	12500	12600	264.6	n/a	n/a	n/a	Sample
Manganese, Total	µg/L	3	0	0	1.1	10.9	0	4.4	1.2	5.6	n/a	n/a	n/a	Sample
Manganese, Dissolved	µg/L	0	3	100	< 1	< 1.1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Mercury, Total	ng/L	3	0	0	6.9	9.8	0	8.8	9.8	1.7	n/a	n/a	n/a	Sample
Mercury, Dissolved	ng/L	3	0	0	5.6	6.3	0	6.0	6.0	0.4	n/a	n/a	n/a	Sample
Methyl Mercury	ng/L	0	3	100	< 0.1	< 0.1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Molybdenum, Total	µg/L	3	0	0	0.88	1.07	0	0.96	0.93	0.10	n/a	n/a	n/a	Sample
Molybdenum, Dissolved	µg/L	3	0	0	0.93	1.11	0	1.0	0.96	0.10	n/a	n/a	n/a	Sample
Nickel, Total	µg/L	3	0	0	0.3	0.4	0	0.3	0.3	0.1	n/a	n/a	n/a	Sample
Nickel, Dissolved	µg/L	3	0	0	0.26	0.4	0	0.3	0.3	0.1	n/a	n/a	n/a	Sample
Nitrate + Nitrite as Nitrogen	mg/L	3	0	0	0.213	0.326	n/a	0.3	0.2	0.1	n/a	n/a	n/a	Sample
Nitrogen, Total	mg/L	3	0	0	0.73	0.96	n/a	0.9	0.9	0.1	n/a	n/a	n/a	Sample
Nitrogen, Total Kjeldahl (TKN)	mg/L	3	0	0	0.5	0.75	n/a	0.6	0.6	0.1	n/a	n/a	n/a	Sample
pH	pH units	3	0	0	8.4	8.63	0	8.5	8.5	0.1	n/a	n/a	n/a	Sample
Phosphorus, Total	µg/L	0	3	100	< 40	< 40	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample

Table 4-20. YP-T-49, Middle West End Creek, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Phosphorus, Dissolved	µg/L	0	3	100	< 40	< 42.6	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Potassium, Total	µg/L	3	0	0	1630	1820	n/a	1733	1750	96.09	n/a	n/a	n/a	Sample
Potassium, Dissolved	µg/L	3	0	0	1660	1850	n/a	1747	1730	96.09	n/a	n/a	n/a	Sample
Selenium, Total	µg/L	0	3	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Selenium, Dissolved	µg/L	0	3	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Total	µg/L	0	3	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Dissolved	µg/L	0	3	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sodium, Total	µg/L	3	0	0	673	695	n/a	685	686	11.1	n/a	n/a	n/a	Sample
Sodium, Dissolved	µg/L	3	0	0	649	742	n/a	693	688	46.7	n/a	n/a	n/a	Sample
Solids, Total Dissolved (TDS)	mg/L	3	0	0	109	135	0	121	119	13.1	n/a	n/a	n/a	Sample
Solids, Total Suspended (TSS)	mg/L	1	2	67	< 5	61	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sulfate	mg/L	3	0	0	5.31	9.27	0	6.94	6.25	2.07	n/a	n/a	n/a	Sample
Temperature, Water	deg C	3	0	0	3.72	6.31	0	5.3	5.8	1.4	n/a	n/a	n/a	Sample
Thallium, Total	µg/L	0	3	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Thallium, Dissolved	µg/L	0	3	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Turbidity	NTU	3	0	0	1.3	8.7	n/a	4.6	3.7	3.8	n/a	n/a	n/a	Sample
Vanadium, Total	µg/L	3	0	0	0.3	0.5	0	0.4	0.3	0.1	n/a	n/a	n/a	Sample
Vanadium, Dissolved	µg/L	3	0	0	0.29	0.3	0	0.3	0.3	0.01	n/a	n/a	n/a	Sample
Zinc, Total	µg/L	2	1	33	< 0.5	1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Zinc, Dissolved	µg/L	1	2	67	< 0.5	0.8	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample

Units: **µg/L** = micrograms per liter; **mg/L** = milligrams per liter; **mS/cm** = milliSiemens per centimeter; **ng/L** = nanograms per liter; **deg C** = degrees Celsius; **NTU** = nephelometric turbidity units
Measurements: **< 20 µg/L** = analyte not detected at the method reporting limit of 20 µg/L; **n/a** = not applicable; **Min** = minimum concentration measured; **Max** = maximum concentration measured
*Number that do not meet criterion: total number of analytical results that did not meet the strictest potentially applicable regulatory criterion (presented in **Table 3-4**). If a constituent does not have applicable regulatory criteria, then n/a is given.*
Distribution: **Normal** = data appear normally distributed at 0.05 significance level; statistics presented are normal population estimators; **Gamma** = data appear gamma distributed 0.05 significance level; statistics presented are gamma population estimators; **Lognormal** = data appear lognormally distributed at 0.05 significance level; statistics presented are lognormal populations estimators; **Nonparametric** = data do not appear normally, gamma or lognormally distributed at 0.05 significance level; statistics presented are sample statistics; **KM nonparametric** = data comprises ≤ 50% non-detects; statistics presented are nonparametric population estimators generated using the Kaplan-Meier method; **Sample** = data comprises > 50% non-detects and statistics are not presented; or, data comprises five or fewer measurements but each result was detected and statistics presented are sample statistics.

YP-T-6, lower West End Creek

The lower West End Creek site (YP-T-6) is located approximately 50 feet upstream of the confluence with Sugar Creek. The creek at this site is steep and narrow and flows through a thickly forested area (see photos in **Appendix G**). The site is downstream of both West End dumps. Flow is generally southeast to northwest and flow measurements at the site have ranged from 0.16 cfs in February 2016 to 1.7 cfs in May 2013 with a median flow of 0.40 cfs.

For the time interval included in this baseline study, this site was visited 34 times. **Appendix E** presents dates the site was visited and parameters or constituents sampled during each visit. Analytical results are summarized in **Table 4-21**. Multiple constituents were analyzed for but were not detected in at least half of the samples from YP-T-6. These constituents were dissolved aluminum, ammonia, beryllium, boron, cadmium, carbonate, chloride, cyanide, fluoride, dissolved iron, lead, dissolved manganese, methyl mercury, phosphorus, selenium, silver, total suspended solids, thallium, and zinc.

Of constituents that were regularly detected, many do not have defined or applicable regulatory criteria for comparison **(see Appendix E)**. These include conductivity, turbidity, arsenic III, bicarbonate, calcium, cobalt, hardness, magnesium, nitrate plus nitrite, total nitrogen, total Kjeldahl nitrogen, potassium, and sodium. In general, most of the major cations (calcium, magnesium, sodium), related measurements (conductivity and hardness) and nitrate plus nitrite tended to be higher during periods of high flow. The other constituents generally occurred in low concentrations and show no distinct trends.

In addition, many constituents that were regularly detected and have applicable regulatory criteria occurred in concentrations that met criteria **(see Appendix E)**. These constituents include color, dissolved oxygen, temperature, alkalinity, barium, chromium, copper, total manganese, dissolved mercury, molybdenum, nickel, total dissolved solids, sulfate, and vanadium. Of these constituents, total dissolved solids and sulfate tended to be higher during low flow conditions. The remaining constituents generally occurred in low concentrations and do not show distinct trends.

There were some constituents that did not meet regulatory criteria **(see Appendix E)**. The pH exceeded regulatory criteria ($\geq$ 6.5 and $\leq$ 9.0) twice (6 percent of measurements). Total aluminum exceeded the regulatory criterion (50 µg/L) twice (10 percent of measurements). Total and dissolved antimony exceeded the regulatory criterion (5.6 µg/L) 33 and 34 times, respectively (97 and 100 percent of measurements). Total and dissolved arsenic exceeded the regulatory criterion (10 µg/L) 34 times each (100 percent of measurements). Total iron exceeded the regulatory criterion (300 µg/L) once (3 percent of measurements). Total mercury exceeded the regulatory criterion (12 ng/L) three times (9 percent of measurements).

Table 4-21. YP-T-6, Lower West End Creek, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Alkalinity as CaCO3, Total	mg/L	34	0	0	39	154	0	121	124	18.6	135	141	151	Nonparametric
Aluminum, Total	µg/L	18	2	10	< 7.4	224	2	27.3	12.4	46.8	42.2	66.2	192	KM - Nonparametric
Aluminum, Dissolved	µg/L	1	19	95	< 2	10	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Ammonia as Nitrogen	mg/L	0	34	100	< 0.05	< 0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Antimony, Total	µg/L	34	0	0	3.63	12.6	33	10.5	10.8	1.47	11.6	11.9	12.5	Nonparametric
Antimony, Dissolved	µg/L	34	0	0	5.72	13	34	10.6	10.8	1.27	11.8	12.2	12.9	Normal
Arsenic, Total	µg/L	34	0	0	28.7	97.1	34	79.2	80.3	10.9	88.1	91.4	95.4	Nonparametric
Arsenic, Dissolved	µg/L	34	0	0	45	97.3	34	78.3	79.8	8.59	86.4	88.6	95.1	Nonparametric
Arsenic (III)	µg/L	16	0	0	0.1	0.35	n/a	0.24	0.24	0.06	0.32	0.34	0.35	Normal
Barium, Total	µg/L	16	0	0	15.1	20.2	0	17.7	17.5	1.6	19.9	20.2	20.2	Normal
Barium, Dissolved	µg/L	16	0	0	15.2	20	0	17.6	17.2	1.43	19.4	19.6	19.9	Normal
Beryllium, Total	µg/L	0	16	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Beryllium, Dissolved	µg/L	0	16	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Bicarbonate as CaCO3	mg/L	34	0	0	39	154	n/a	119	122	18.7	130	138	150	Nonparametric
Boron, Total	µg/L	0	16	100	< 20	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Boron, Dissolved	µg/L	0	16	100	< 20	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Total	µg/L	0	30	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Dissolved	µg/L	0	30	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Calcium, Total	µg/L	34	0	0	18300	53400	n/a	42706	41950	5904	49500	52745	53334	Nonparametric
Calcium, Dissolved	µg/L	34	0	0	26900	54300	n/a	42841	41800	5047	48610	53305	54036	Nonparametric
Carbonate as CaCO3	mg/L	3	31	91	< 9	42	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chloride	mg/L	1	33	97	< 0.2	0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chromium, Total	µg/L	19	11	37	< 0.2	0.8	0	0.3	0.2	0.1	0.4	0.5	0.7	KM - Nonparametric
Chromium, Dissolved	µg/L	17	13	43	< 0.2	0.9	0	0.3	0.2	0.1	0.3	0.5	0.8	KM - Nonparametric
Cobalt, Total	µg/L	13	3	19	< 0.02	0.13	n/a	0.06	0.06	0.03	0.10	0.11	0.13	KM - Nonparametric
Cobalt, Dissolved	µg/L	11	5	31	< 0.02	0.12	n/a	0.05	0.05	0.03	0.09	0.10	0.12	KM - Nonparametric

Table 4-21. YP-T-6, Lower West End Creek, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Conductivity	mS/cm	34	0	0	0.323	0.444	n/a	0.356	0.346	0.030	0.397	0.415	0.438	Nonparametric
Copper, Total	µg/L	20	10	33	< 0.1	0.3	0	0.1	0.1	0.1	0.2	0.3	0.3	KM - Nonparametric
Copper, Dissolved	µg/L	23	7	23	< 0.1	0.8	0	0.2	0.2	0.1	0.4	0.4	0.7	KM - Nonparametric
Cyanide, Total	mg/L	0	16	100	< 0.0047	< 0.0047	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Dissolved Oxygen (DO)	mg/L	34	0	0	9.11	12.28	0	10.4	10.4	0.7	11.1	11.4	12.1	Normal
Fluoride	mg/L	0	34	100	< 0.2	< 0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Hardness as CaCO3	mg/L	34	0	0	75.6	224	n/a	179	176	23.8	201	219	224	Nonparametric
Iron, Total	µg/L	32	2	6	< 20	346	1	48.4	31.9	57.2	78.3	118	272	KM - Nonparametric
Iron, Dissolved	µg/L	0	34	100	< 10	< 40	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Lead, Total	µg/L	4	30	88	< 0.02	0.09	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Lead, Dissolved	µg/L	3	31	91	< 0.02	0.04	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Magnesium, Total	µg/L	34	0	0	7260	22000	n/a	17464	17450	2285	19310	21150	21934	Nonparametric
Magnesium, Dissolved	µg/L	34	0	0	11100	22200	n/a	17591	17500	1835	19420	20985	22035	Nonparametric
Manganese, Total	µg/L	11	9	45	< 1	12.7	0	2.3	1.6	2.6	5.0	5.6	11.3	KM - Nonparametric
Manganese, Dissolved	µg/L	0	20	100	< 1	< 5	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Mercury, Total	ng/L	34	0	0	5.5	18.1	3	8.1	7.0	2.9	11.1	14.7	17.5	Nonparametric
Mercury, Dissolved	ng/L	34	0	0	3.2	6.3	0	4.2	4.0	0.7	5.2	5.5	6.1	Gamma
Methyl Mercury	ng/L	0	16	100	< 0.1	< 0.1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Molybdenum, Total	µg/L	16	0	0	1.4	2.02	0	1.7	1.7	0.17	1.9	2.0	2.0	Normal
Molybdenum, Dissolved	µg/L	16	0	0	1.45	2.03	0	1.7	1.7	0.17	2.0	2.0	2.0	Normal
Nickel, Total	µg/L	16	0	0	0.2	0.8	0	0.5	0.5	0.2	0.7	0.7	0.8	Normal
Nickel, Dissolved	µg/L	13	3	19	< 0.2	0.8	0	0.5	0.5	0.2	0.7	0.7	0.8	KM - Nonparametric
Nitrate + Nitrite as Nitrogen	mg/L	34	0	0	0.335	0.77	n/a	0.47	0.43	0.11	0.66	0.71	0.77	Nonparametric
Nitrogen, Total	mg/L	16	0	0	0.78	1.36	n/a	0.98	0.91	0.17	1.2	1.4	1.4	Normal
Nitrogen, Total Kjeldahl (TKN)	mg/L	16	0	0	0.4	0.68	n/a	0.5	0.5	0.1	0.7	0.7	0.7	Nonparametric
pH	pH units	34	0	0	7.58	9.25	2	8.4	8.3	0.4	8.8	9.0	9.2	Normal

Table 4-21. YP-T-6, Lower West End Creek, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Phosphorus, Total	µg/L	1	33	97	< 20	< 80	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Phosphorus, Dissolved	µg/L	0	34	100	< 20	< 80	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Potassium, Total	µg/L	34	0	0	768	2310	n/a	1908	1920	250	2173	2261	2300	Nonparametric
Potassium, Dissolved	µg/L	34	0	0	1150	2370	n/a	1922	1915	202	2157	2270	2337	Nonparametric
Selenium, Total	µg/L	1	29	97	< 1	1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Selenium, Dissolved	µg/L	0	30	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Total	µg/L	0	16	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Dissolved	µg/L	0	16	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sodium, Total	µg/L	34	0	0	410	1950	n/a	1105	1075	229	1278	1418	1835	Nonparametric
Sodium, Dissolved	µg/L	34	0	0	626	1940	n/a	1122	1095	207	1290	1420	1805	Nonparametric
Solids, Total Dissolved (TDS)	mg/L	34	0	0	165	297	0	210	203	32.8	252	266	293	Gamma
Solids, Total Suspended (TSS)	mg/L	4	30	88	< 5	36.5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sulfate	mg/L	34	0	0	14.5	115	0	54.7	49.7	16.3	73.3	85.2	106	Nonparametric
Temperature, Water	deg C	34	0	0	1.01	10.21	0	4.8	4.8	2.3	7.8	8.0	9.5	Normal
Thallium, Total	µg/L	0	16	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Thallium, Dissolved	µg/L	0	16	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Turbidity	NTU	34	0	0	0.3	13.3	n/a	3.4	2.5	2.6	6.4	7.7	10.7	Gamma
Vanadium, Total	µg/L	16	0	0	0.2	0.3	0	0.3	0.3	0.1	0.3	0.3	0.3	Nonparametric
Vanadium, Dissolved	µg/L	14	2	13	< 0.2	0.3	0	0.2	0.2	0.0	0.3	0.3	0.3	KM - Nonparametric
Zinc, Total	µg/L	7	27	79	< 0.5	1.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Zinc, Dissolved	µg/L	13	21	62	< 0.5	1.1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample

Units: **µg/L** = micrograms per liter; **mg/L** = milligrams per liter; **mS/cm** = milliSiemens per centimeter; **ng/L** = nanograms per liter; **deg C** = degrees Celsius; **NTU** = nephelometric turbidity units
Measurements: **< 20 µg/L** = analyte not detected at the method reporting limit of 20 µg/L; **n/a** = not applicable; **Min** = minimum concentration measured; **Max** = maximum concentration measured
*Number that do not meet criterion: total number of analytical results that did not meet the strictest potentially applicable regulatory criterion (presented in **Table 3-4**). If a constituent does not have applicable regulatory criteria, then n/a is given.*
Distribution: **Normal** = data appear normally distributed at 0.05 significance level; statistics presented are normal population estimators; **Gamma** = data appear gamma distributed 0.05 significance level; statistics presented are gamma population estimators; **Lognormal** = data appear lognormally distributed at 0.05 significance level; statistics presented are lognormal populations estimators; **Nonparametric** = data do not appear normally, gamma or lognormally distributed at 0.05 significance level; statistics presented are sample statistics; **KM nonparametric** = data comprises ≤ 50% non-detects; statistics presented are nonparametric population estimators generated using the Kaplan-Meier method; **Sample** = data comprises > 50% non-detects and statistics are not presented; or, data comprises five or fewer measurements but each result was detected and statistics presented are sample statistics.

YP-T-1, Sugar Creek above EFSFSR

The lowest Sugar Creek site (YP-T-1) is located immediately east and upstream of the FS 412 bridge over Sugar Creek and about 800 feet upstream of the EFSFSR confluence. The channel bottom and channel is relatively uniform and straight through this reach (see photos in **Appendix G**). Flow is generally from east to west and flow measurements at the site have ranged from 4.2 cfs in December 2013 to 213 cfs in May 2012 with a median flow of 11.6 cfs.

For the time interval included in this baseline study, this site was visited 35 times. **Appendix E** presents dates the site was visited and parameters or constituents sampled during each visit. Analytical results are summarized in **Table 4-22**. Multiple constituents were analyzed for but were not detected in at least half of the samples from YP-T-1. These constituents were ammonia, beryllium, boron, cadmium, carbonate, chloride, chromium, dissolved cobalt, total cyanide, fluoride, dissolved iron, lead, dissolved manganese, methyl mercury, dissolved nickel, nitrate plus nitrite, phosphorus, selenium, silver, total suspended solids, thallium, dissolved vanadium, and zinc.

Of constituents that were regularly detected, many do not have defined or applicable regulatory criteria for comparison **(see Appendix E)**. These include conductivity, turbidity, arsenic III, bicarbonate, calcium, total cobalt, hardness, magnesium, total nitrogen, total Kjeldahl nitrogen, potassium, and sodium. In general, most of the major cations (calcium, magnesium, sodium), major anion (bicarbonate), and related measurements (conductivity and hardness) tended to be lowest during periods of high flow. In contrast, turbidity tended to be highest during high flow. The remaining constituents generally occurred in low concentrations and show no distinct trends.

In addition, many constituents that were regularly detected and have applicable regulatory criteria occurred in concentrations that met criteria **(see Appendix E)**. These constituents include color, dissolved oxygen, pH, alkalinity, barium, copper, total manganese, molybdenum, total nickel, sulfate, and total vanadium. Alkalinity and sulfate tended to be higher during low flow conditions. In contrast, manganese tended to be higher during high flow conditions. The remaining constituents generally occurred in low concentrations and show no distinct trends.

There were some constituents that did not meet regulatory criteria **(see Appendix E)**. Temperature was higher than the regulatory maximum (< 13 degrees Celsius) three times (9 percent of measurements). Total and dissolved aluminum exceeded the regulatory criterion (50 µg/L) eight times and one time, respectively (40 and 5 percent of measurements). Total and dissolved antimony exceeded the regulatory criterion (5.6 µg/L) eight times each (23 percent of measurements). Total and dissolved arsenic exceeded the regulatory criterion (10 µg/L) 30 and 25 times, respectively (86 and 71 percent of measurements). Total iron exceeded the regulatory criterion (300 µg/L) five times (14 percent of measurements). In May 2013, measured total lead exceeded the site-specific, hardness-based criterion of 0.57 µg/L. Total and dissolved mercury exceeded the regulatory criterion (12 ng/L) 31 and 3 times, respectively (89 and 9 percent of measurements). Total dissolved solids exceeded the regulatory criterion (500 mg/L) once (3 percent of measurements).

Table 4-22. YP-T-1, Sugar Creek above EFSFSR, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Alkalinity as CaCO3, Total	mg/L	35	0	0	24.5	137	0	57.2	60.9	19.9	68.4	77.6	119	Nonparametric
Aluminum, Total	µg/L	20	0	0	4.5	858	8	155	33.5	697	315	595	1959	Lognormal
Aluminum, Dissolved	µg/L	15	5	25	< 2	80.2	1	10.5	4.6	17.9	18.7	39.9	72.1	KM - Nonparametric
Ammonia as Nitrogen	mg/L	0	35	100	< 0.05	< 0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Antimony, Total	µg/L	35	0	0	1.38	8.18	8	3.69	3.43	1.86	6.40	6.71	7.68	Normal
Antimony, Dissolved	µg/L	35	0	0	1.25	8.64	8	3.67	3.17	1.92	6.37	6.86	8.11	Normal
Arsenic, Total	µg/L	35	0	0	7	24.1	30	14.7	14.1	4.2	20.6	20.8	23.1	Normal
Arsenic, Dissolved	µg/L	35	0	0	6.5	22.4	25	13.0	13.5	4.2	18.5	19.3	21.4	Normal
Arsenic (III)	µg/L	16	0	0	0.14	1.39	n/a	0.50	0.38	0.33	0.82	1.02	1.32	Normal
Barium, Total	µg/L	16	0	0	7.77	14.7	0	12.5	12.8	1.69	13.9	14.3	14.6	Nonparametric
Barium, Dissolved	µg/L	16	0	0	5.11	14.5	0	11.2	12.4	3.15	13.4	13.8	14.4	Nonparametric
Beryllium, Total	µg/L	4	12	75	< 0.02	0.13	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Beryllium, Dissolved	µg/L	0	16	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Bicarbonate as CaCO3	mg/L	35	0	0	24.5	135	n/a	56.4	60.9	19.1	65.1	71.5	115	Nonparametric
Boron, Total	µg/L	0	16	100	< 20	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Boron, Dissolved	µg/L	0	16	100	< 20	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Total	µg/L	1	30	97	< 0.02	0.16	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Dissolved	µg/L	0	31	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Calcium, Total	µg/L	35	0	0	8130	22200	n/a	16412	18300	4115	20160	20530	21656	Nonparametric
Calcium, Dissolved	µg/L	35	0	0	7780	21800	n/a	16353	17900	4247	20580	21000	21528	Nonparametric
Carbonate as CaCO3	mg/L	1	34	97	< 9	19	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chloride	mg/L	2	33	94	< 0.21	0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chromium, Total	µg/L	6	25	81	< 0.2	0.6	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chromium, Dissolved	µg/L	2	29	94	< 0.2	0.3	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cobalt, Total	µg/L	11	5	31	< 0.02	0.34	n/a	0.08	0.04	0.10	0.26	0.31	0.33	KM - Nonparametric
Cobalt, Dissolved	µg/L	8	8	50	< 0.02	0.06	n/a	0.03	0.02	0.01	0.05	0.05	0.06	KM - Nonparametric
Conductivity	mS/cm	35	0	0	0.065	0.17	n/a	0.124	0.133	0.031	0.154	0.161	0.169	Nonparametric

Table 4-22. YP-T-1, Sugar Creek above EFSFSR, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Copper, Total	µg/L	25	6	19	< 0.1	0.6	0	0.2	0.1	0.1	0.4	0.6	0.6	KM - Nonparametric
Copper, Dissolved	µg/L	31	0	0	0.1	0.8	0	0.2	0.2	0.1	0.4	0.4	0.7	Nonparametric
Cyanide, Total	mg/L	0	16	100	< 0.0047	< 0.0047	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Dissolved Oxygen (DO)	mg/L	35	0	0	8.27	13.67	0	10.4	10.7	1.3	11.9	12.2	13.3	Normal
Fluoride	mg/L	2	33	94	< 0.2	0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Hardness as CaCO3	mg/L	35	0	0	26.2	74.8	n/a	53.7	59.9	13.9	66.1	67.2	72.3	Nonparametric
Iron, Total	µg/L	18	17	49	< 12.3	987	5	110	20	201	367	465	840	KM - Nonparametric
Iron, Dissolved	µg/L	3	32	91	< 10	40	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Lead, Total	µg/L	15	20	57	< 0.02	0.9	1	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Lead, Dissolved	µg/L	1	34	97	< 0.02	0.04	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Magnesium, Total	µg/L	35	0	0	1440	4710	n/a	3087	3440	898.3	3946	3990	4489	Nonparametric
Magnesium, Dissolved	µg/L	35	0	0	1200	4690	n/a	3052	3170	956.0	3982	4126	4551	Nonparametric
Manganese, Total	µg/L	15	5	25	< 1	28	0	4.5	1.6	7.1	12	21	27	KM - Nonparametric
Manganese, Dissolved	µg/L	3	17	85	< 1	5	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Mercury, Total	ng/L	35	0	0	9.6	2380	31	188	28.2	472	368	1129	2009	Nonparametric
Mercury, Dissolved	ng/L	34	0	0	1.6	14.2	3	7.6	7.3	2.7	10.7	13.0	14.1	Normal
Methyl Mercury	ng/L	5	11	69	< 0.1	0.64	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Molybdenum, Total	µg/L	16	0	0	0.36	1.33	0	0.97	1.10	0.34	1.28	1.29	1.32	Nonparametric
Molybdenum, Dissolved	µg/L	16	0	0	0.35	1.35	0	0.97	1.09	0.34	1.29	1.31	1.34	Nonparametric
Nickel, Total	µg/L	10	6	38	< 0.2	0.5	0	0.3	0.2	0.1	0.4	0.5	0.5	KM - Nonparametric
Nickel, Dissolved	µg/L	8	8	50	< 0.2	0.5	0	0.3	0.2	0.1	0.4	0.5	0.5	KM - Nonparametric
Nitrate + Nitrite as Nitrogen	mg/L	4	31	89	< 0.05	0.061	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nitrogen, Total	mg/L	12	4	25	< 0.4	0.76	n/a	0.5	0.4	0.1	0.6	0.6	0.7	KM - Nonparametric
Nitrogen, Total Kjeldahl (TKN)	mg/L	12	4	25	< 0.4	0.74	n/a	0.5	0.4	0.1	0.6	0.6	0.7	KM - Nonparametric
pH	pH units	35	0	0	6.66	8.72	0	7.7	7.6	0.5	8.2	8.4	8.7	Normal
Phosphorus, Total	µg/L	1	34	97	< 20	< 80	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample

Table 4-22. YP-T-1, Sugar Creek above EFSFSR, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Phosphorus, Dissolved	µg/L	0	35	100	< 20	< 80	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Potassium, Total	µg/L	35	0	0	551	1120	n/a	815	824	109	908	921	1059	Nonparametric
Potassium, Dissolved	µg/L	35	0	0	510	943	n/a	759	793	127	896	909	932	Normal
Selenium, Total	µg/L	0	31	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Selenium, Dissolved	µg/L	0	31	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Total	µg/L	0	16	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Dissolved	µg/L	0	16	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sodium, Total	µg/L	35	0	0	1460	2830	n/a	2269	2390	375.9	2668	2743	2803	Normal
Sodium, Dissolved	µg/L	35	0	0	1460	2780	n/a	2255	2380	373.6	2664	2698	2766	Normal
Solids, Total Dissolved (TDS)	mg/L	35	0	0	32	1920	1	129	75	313	111	131	1323	Nonparametric
Solids, Total Suspended (TSS)	mg/L	5	30	86	< 5	33.5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sulfate	mg/L	35	0	0	3.15	15.6	0	8.66	9.41	3.08	12.0	12.4	14.6	Normal
Temperature, Water	deg C	35	0	0	-0.02	14.56	3	5.4	3.9	4.8	12.5	13.6	14.3	Nonparametric
Thallium, Total	µg/L	3	13	81	< 0.02	0.051	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Thallium, Dissolved	µg/L	1	15	94	< 0.02	0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Turbidity	NTU	35	0	0	0	21.6	n/a	4.2	2.4	5.6	10.9	19.1	21.3	Nonparametric
Vanadium, Total	µg/L	9	7	44	< 0.2	0.9	0	0.3	0.2	0.2	0.6	0.8	0.9	KM - Nonparametric
Vanadium, Dissolved	µg/L	5	11	69	< 0.2	0.2	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Zinc, Total	µg/L	11	24	69	< 0.5	2.7	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Zinc, Dissolved	µg/L	15	20	57	< 0.5	7.6	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample

Units: **µg/L** = micrograms per liter; **mg/L** = milligrams per liter; **mS/cm** = milliSiemens per centimeter; **ng/L** = nanograms per liter; **deg C** = degrees Celsius; **NTU** = nephelometric turbidity units
Measurements: **< 20 µg/L** = analyte not detected at the method reporting limit of 20 µg/L; **n/a** = not applicable; **Min** = minimum concentration measured; **Max** = maximum concentration measured
*Number that do not meet criterion: total number of analytical results that did not meet the strictest potentially applicable regulatory criterion (presented in **Table 3-4**). If a constituent does not have applicable regulatory criteria, then n/a is given.*
Distribution: **Normal** = data appear normally distributed at 0.05 significance level; statistics presented are normal population estimators; **Gamma** = data appear gamma distributed 0.05 significance level; statistics presented are gamma population estimators; **Lognormal** = data appear lognormally distributed at 0.05 significance level; statistics presented are lognormal populations estimators; **Nonparametric** = data do not appear normally, gamma or lognormally distributed at 0.05 significance level; statistics presented are sample statistics; **KM nonparametric** = data comprises ≤ 50% non-detects; statistics presented are nonparametric population estimators generated using the Kaplan-Meier method; **Sample** = data comprises > 50% non-detects and statistics are not presented; or, data comprises five or fewer measurements but each result was detected and statistics presented are sample statistics.

4.1.2.4 Sugar Creek Adit Seep and Seep Sites

YP-AS-1, Bonanza adit seep

The Bonanza adit seep (YP-AS-1) originates on the north side of FS 1883 approximately halfway between the upper (YP-T-8A) and middle (YP-T-7) Sugar Creek sites. The hillside has been excavated across its face by legacy exploration activities (Mitchell 2000) and the adit opening is not visible. The seep originates as a small pond on a bench approximately 75 feet uphill of FS 1883 (see photos in **Appendix G**). The seep flows at a low volume year-round out of the pond, downhill, across the road, and onto the floodplain of Sugar Creek but has not been observed flowing into Sugar Creek via visible surface water flow. Flow measurements at the site have ranged from $2.9x10^{-4}$ cfs in August 2014 to $9.4x10^{-2}$ cfs in June 2013 with a median flow of $1.8x10^{-3}$ cfs.

For the time interval included in this baseline study, this site was visited 28 times. **Appendix E** presents dates the site was visited and parameters or constituents sampled during each visit. Analytical results are summarized in **Table 4-23**. Multiple constituents were analyzed for but were not detected in at least half of the samples from YP-AS-1. These constituents were dissolved aluminum, ammonia, dissolved beryllium, boron, cadmium, carbonate, chromium, total cyanide, fluoride, dissolved iron, dissolved lead, nitrate plus nitrite, dissolved phosphorus, selenium, silver, thallium, and vanadium.

Of constituents that were regularly detected, many do not have defined or applicable regulatory criteria for comparison **(see Appendix E)**. These include conductivity, turbidity, arsenic III, bicarbonate, calcium, cobalt, hardness, magnesium, methyl mercury, total nitrogen, total Kjeldahl nitrogen, total phosphorus, potassium, sodium, and total suspended solids. The major cations (calcium, magnesium, potassium, sodium), major anion (bicarbonate), and related measurements (conductivity, hardness) generally tended to be highest during periods of low flow. The other constituents consistently occurred in low concentrations and show no distinct trends.

In addition, many constituents that were regularly detected and have applicable regulatory criteria occurred in concentrations that met criteria **(see Appendix E)**. These constituents include color, pH, alkalinity, barium, total beryllium, chloride, copper, total lead, molybdenum, nickel, total dissolved solids, sulfate, and zinc. These constituents generally occurred in low concentrations and do not show distinct trends in concentration.

There were some constituents that did not meet regulatory criteria **(see Appendix E)**. Dissolved oxygen was below the regulatory minimum (> 6 mg/L) 11 times (41 percent of measurements). Temperature was higher than the regulatory maximum (< 13 degrees Celsius) seven times (26 percent of measurements). Total and dissolved aluminum exceeded the regulatory criterion (50 µg/L) nine times and one time, respectively (64 and 7 percent of measurements). Total and dissolved antimony and total and dissolve arsenic exceeded the regulatory criterion (5.6 µg/L and 10 µg/L, respectively) 14 times each (100 percent of measurements). Total cyanide exceeded the regulatory criterion (0.0052 mg/L) once (7 percent of measurements). Total and dissolved iron exceeded the regulatory criterion (300 µg/L) nine times and one time, respectively (64 and 7 percent of measurements). Total and dissolved manganese exceeded the regulatory criterion (50 µg/L) seven and four times, respectively (50 and 29 percent of measurements). Total and dissolved mercury exceeded the regulatory criterion (12 ng/L) 14 and 8 times, respectively (100 and 57 percent of measurements).

Table 4-23. YP-AS-1, Bonanza Adit Seep, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Alkalinity as CaCO3, Total	mg/L	14	0	0	82	225	0	147	141	41	206	218	224	Normal
Aluminum, Total	µg/L	14	0	0	9.8	1300	9	250	98.5	345	661	924	1565	Gamma
Aluminum, Dissolved	µg/L	7	7	50	< 2	79.8	1	9.1	2.1	19.8	10.0	34.7	70.8	KM - Nonparametric
Ammonia as Nitrogen	mg/L	0	14	100	< 0.05	< 0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Antimony, Total	µg/L	14	0	0	129	911	14	280	236	195	496	586	783	Gamma
Antimony, Dissolved	µg/L	14	0	0	129	354	14	226	208	75.6	336	350	353	Normal
Arsenic, Total	µg/L	14	0	0	41.6	2190	14	293	145	514	663	1020	2287	Lognormal
Arsenic, Dissolved	µg/L	14	0	0	29.5	89.4	14	53.5	48.1	20.2	83.6	86.8	88.9	Normal
Arsenic (III)	µg/L	14	0	0	0.26	143	n/a	21.3	1.8	38.9	61.8	93.5	175	Gamma
Barium, Total	µg/L	14	0	0	56.8	303	0	112	87.0	73.2	216	267	296	Nonparametric
Barium, Dissolved	µg/L	14	0	0	45.3	139	0	77.4	72.9	21.8	92.7	109	133	Normal
Beryllium, Total	µg/L	9	5	36	< 0.02	0.7	0	0.13	0.03	0.18	0.23	0.40	0.64	KM - Nonparametric
Beryllium, Dissolved	µg/L	0	14	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Bicarbonate as CaCO3	mg/L	14	0	0	82	225	n/a	147	141	41.3	206	218	224	Normal
Boron, Total	µg/L	3	11	79	< 20	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Boron, Dissolved	µg/L	3	11	79	< 20	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Total	µg/L	4	10	71	< 0.02	0.14	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Dissolved	µg/L	0	14	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Calcium, Total	µg/L	14	0	0	23300	54300	n/a	39743	40050	8663	48180	50595	53559	Normal
Calcium, Dissolved	µg/L	14	0	0	22200	52700	n/a	38964	40800	8134	46100	48605	51881	Normal
Carbonate as CaCO3	mg/L	0	14	100	< 9	< 90	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chloride	mg/L	13	1	7	< 0.4	1.17	0	0.7	0.6	0.2	1.0	1.1	1.2	KM - Nonparametric
Chromium, Total	µg/L	5	9	64	< 0.2	0.7	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chromium, Dissolved	µg/L	2	12	86	< 0.2	0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cobalt, Total	µg/L	14	0	0	0.02	9.47	n/a	1.20	0.28	4.9	2.5	4.6	14.7	Lognormal
Cobalt, Dissolved	µg/L	12	2	14	< 0.02	0.64	n/a	0.13	0.07	0.16	0.21	0.37	0.59	KM - Nonparametric
Conductivity	mS/cm	27	0	0	0.165	0.453	n/a	0.328	0.343	0.066	0.389	0.393	0.438	Normal

Table 4-23. YP-AS-1, Bonanza Adit Seep, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Copper, Total	µg/L	14	0	0	0.1	5.2	0	1.1	0.4	1.4	2.6	3.4	5.5	Gamma
Copper, Dissolved	µg/L	14	0	0	0.2	0.8	0	0.4	0.3	0.2	0.6	0.7	0.9	Gamma
Cyanide, Total	mg/L	1	13	93	< 0.0047	0.0079	1	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Dissolved Oxygen (DO)	mg/L	27	0	0	4.33	10.18	11	6.7	6.4	1.5	9.0	9.6	10.0	Normal
Fluoride	mg/L	1	13	93	< 0.2	0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Hardness as CaCO3	mg/L	14	0	0	87	220	n/a	154	156	36	185	198	216	Normal
Iron, Total	µg/L	14	0	0	53.1	30700	9	4507	929	8497	12874	19148	35036	Gamma
Iron, Dissolved	µg/L	6	8	57	< 20	496	1	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Lead, Total	µg/L	12	2	14	< 0.02	2.87	0	0.68	0.12	0.94	2.30	2.79	2.85	KM - Nonparametric
Lead, Dissolved	µg/L	2	12	86	< 0.02	0.06	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Magnesium, Total	µg/L	14	0	0	7000	20400	n/a	13342	13450	3495	16420	17930	19906	Normal
Magnesium, Dissolved	µg/L	14	0	0	6650	19900	n/a	13299	13500	3411	16270	17560	19432	Normal
Manganese, Total	µg/L	14	0	0	2.7	2910	7	405	57.3	2836	723	1483	5707	Lognormal
Manganese, Dissolved	µg/L	12	2	14	< 1	337	4	42.4	6.1	86	80.4	177	305	KM - Nonparametric
Mercury, Total	ng/L	14	0	0	23.4	3800	14	819	126	1254	2270	3285	5812	Gamma
Mercury, Dissolved	ng/L	14	0	0	3	111	8	19.4	13.7	19.6	39.9	54.1	95.8	Lognormal
Methyl Mercury	ng/L	11	3	21	< 0.1	14.6	n/a	2.3	0.41	3.9	6.1	9.8	13.6	KM - Nonparametric
Molybdenum, Total	µg/L	14	0	0	1.55	4.46	0	2.67	2.62	0.77	3.38	3.78	4.33	Normal
Molybdenum, Dissolved	µg/L	14	0	0	1.7	3.59	0	2.52	2.49	0.58	3.12	3.29	3.53	Normal
Nickel, Total	µg/L	13	1	7	< 0.2	5.6	0	1.4	0.6	1.7	4.1	5.1	5.5	KM - Nonparametric
Nickel, Dissolved	µg/L	13	1	7	< 0.2	1.9	0	0.57	0.45	0.43	0.91	1.3	1.8	KM - Nonparametric
Nitrate + Nitrite as Nitrogen	mg/L	0	14	100	< 0.05	< 0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nitrogen, Total	mg/L	11	3	21	< 0.4	2.47	n/a	0.87	0.53	0.68	2.0	2.4	2.5	KM - Nonparametric
Nitrogen, Total Kjeldahl (TKN)	mg/L	11	3	21	< 0.4	2.47	n/a	0.87	0.53	0.68	2.0	2.4	2.5	KM - Nonparametric
pH	pH units	27	0	0	6.79	7.73	0	7.3	7.3	0.2	7.5	7.7	7.7	Normal

Table 4-23. YP-AS-1, Bonanza Adit Seep, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Phosphorus, Total	µg/L	8	6	43	< 20	1030	n/a	191	60.5	276	446	663	957	KM - Nonparametric
Phosphorus, Dissolved	µg/L	1	13	93	< 20	42.6	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Potassium, Total	µg/L	14	0	0	1530	4010	n/a	2281	2213	571.6	3036	3321	3929	Lognormal
Potassium, Dissolved	µg/L	14	0	0	1400	3640	n/a	2081	2050	528.3	2776	3014	3494	Gamma
Selenium, Total	µg/L	0	14	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Selenium, Dissolved	µg/L	0	14	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Total	µg/L	1	13	93	< 0.02	0.06	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Dissolved	µg/L	0	14	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sodium, Total	µg/L	14	0	0	3120	9770	n/a	6474	6150	1929	8404	8886	9593	Normal
Sodium, Dissolved	µg/L	14	0	0	3140	9530	n/a	6499	6170	1876	8450	8906	9405	Normal
Solids, Total Dissolved (TDS)	mg/L	14	0	0	139	253	0	186	183	30.2	215	229	248	Normal
Solids, Total Suspended (TSS)	mg/L	11	3	21	< 5	384	n/a	56.6	14.5	96.9	103	207	349	KM - Nonparametric
Sulfate	mg/L	14	0	0	12.8	43.9	0	24.0	23.5	8.02	30.1	35.2	42.2	Normal
Temperature, Water	deg C	27	0	0	0.11	24.85	7	8.7	9.1	6.0	14.9	15.9	22.6	Normal
Thallium, Total	µg/L	5	9	64	< 0.02	0.07	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Thallium, Dissolved	µg/L	0	14	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Turbidity	NTU	27	0	0	1.8	189	n/a	43.0	31.2	43.5	98.6	128.1	196.4	Gamma
Vanadium, Total	µg/L	6	8	57	< 0.2	1.5	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Vanadium, Dissolved	µg/L	0	14	100	< 0.2	< 0.2	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Zinc, Total	µg/L	14	0	0	0.5	29.1	0	5.3	1.5	8.2	13.8	19.1	32.1	Gamma
Zinc, Dissolved	µg/L	8	6	43	< 0.5	2.2	0	0.8	0.6	0.4	1.1	1.6	2.1	KM - Nonparametric

Units: **µg/L** = micrograms per liter; **mg/L** = milligrams per liter; **mS/cm** = milliSiemens per centimeter; **ng/L** = nanograms per liter; **deg C** = degrees Celsius; **NTU** = nephelometric turbidity units
Measurements: **< 20 µg/L** = analyte not detected at the method reporting limit of 20 µg/L; **n/a** = not applicable; **Min** = minimum concentration measured; **Max** = maximum concentration measured
*Number that do not meet criterion: total number of analytical results that did not meet the strictest potentially applicable regulatory criterion (presented in **Table 3-4**). If a constituent does not have applicable regulatory criteria, then n/a is given.*
Distribution: **Normal** = data appear normally distributed at 0.05 significance level; statistics presented are normal population estimators; **Gamma** = data appear gamma distributed 0.05 significance level; statistics presented are gamma population estimators; **Lognormal** = data appear lognormally distributed at 0.05 significance level; statistics presented are lognormal populations estimators; **Nonparametric** = data do not appear normally, gamma or lognormally distributed at 0.05 significance level; statistics presented are sample statistics; **KM nonparametric** = data comprises ≤ 50% non-detects; statistics presented are nonparametric population estimators generated using the Kaplan-Meier method; **Sample** = data comprises > 50% non-detects and statistics are not presented; or, data comprises five or fewer measurements but each result was detected and statistics presented are sample statistics.

YP-AS-2, Bailey Tunnel outlet

The Bailey Tunnel outlet (YP-AS-2) flows from a collapsed wood frame on the hillside south of Sugar Creek about a quarter mile upstream from the FS 412 bridge over Sugar Creek (see photos in **Appendix G**). The Bailey Tunnel served as the EFSFSR diversion around the Yellow Pine pit in the 1940s during high flows; the upper (south) end of the tunnel was also used for development work during ten months of the year (Mitchell 2000). The seep flows through a thickly vegetated gully between two wasterock piles and flows into Sugar Creek year round, although the flow has been observed being blocked by heavy ice build-up occasionally in the winter. At the hillside outlet, onsite flow measurements have ranged from $2.5x10^{-2}$ cfs in November 2015 to 0.22 cfs in June 2013 with a median flow of $7.9x10^{-2}$ cfs.

For the time interval included in this baseline study, this site was visited 34 times. **Appendix E** presents dates the site was visited and parameters or constituents sampled during each visit. Analytical results are summarized in **Table 4-24**. Multiple constituents were analyzed for but detected less than half the time at the site. These constituents were ammonia, boron, cadmium, carbonate, chromium, total cyanide, fluoride, dissolved iron, lead, dissolved mercury, methyl mercury, phosphorus, selenium, silver, total suspended solids, thallium, and vanadium.

Of constituents that were regularly detected, many do not have appropriate or defined regulatory criteria for comparison **(see Appendix E)**. These constituents were conductivity, turbidity, arsenic III, bicarbonate, calcium, cobalt, hardness, magnesium, nitrate plus nitrite, total nitrogen, total Kjeldahl nitrogen, potassium, and sodium. Most of the major cations (calcium, magnesium, potassium, and sodium), and associated parameters (conductivity and hardness) generally tended to be highest during periods of low flow. The remainder of the constituents generally occurred in low concentrations and do not show consistent trends.

In addition, many constituents that were regularly detected and have applicable regulatory criteria occurred in concentrations that met criteria **(see Appendix E)**. These constituents include color, dissolved oxygen, pH, temperature, alkalinity, aluminum, barium, beryllium, chloride, copper, total mercury, molybdenum, nickel and zinc. Dissolved oxygen varies little but is highest during winter months (December and January); conversely, temperature is generally highest during summer months (June through August). The remainder of the constituents generally occurred in low concentrations and do not show consistent trends.

There were some constituents that did not meet regulatory criteria **(see Appendix E)**. Total and dissolved antimony and total and dissolved arsenic did not meet criteria (5.6 µg/L and 10 µg/L respectively) 16 times each (100 percent of measurements). Total cyanide exceeded regulatory criterion (0.0052 mg/L) once in May 2013 (6 percent of measurements). Total iron exceeded the criterion (300 µg/L) 10 times (63 percent of measurements). Total and dissolved manganese exceeded the criterion (50 µg/L) 16 times (100 percent of measurements). Total dissolved solids and sulfate exceeded regulatory criteria (500 mg/L and 250 mg/L, respectively) five times each (31 percent of measurements).

Table 4-24. YP-AS-2, Bailey Tunnel Outlet, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Alkalinity as CaCO3, Total	mg/L	16	0	0	87.6	136	0	103	102	10.6	117	121	129	Gamma
Aluminum, Total	µg/L	16	0	0	5.5	46.7	0	13.3	11.2	8.5	23.8	29.4	43.9	Lognormal
Aluminum, Dissolved	µg/L	10	6	38	< 2	7.8	0	3.4	2.8	1.9	6.5	7.7	7.8	KM - Nonparametric
Ammonia as Nitrogen	mg/L	1	15	94	< 0.05	0.065	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Antimony, Total	µg/L	16	0	0	111	308	16	205	186	60.4	293	298	306	Normal
Antimony, Dissolved	µg/L	16	0	0	111	298	16	203	184	58.2	292	296	298	Normal
Arsenic, Total	µg/L	16	0	0	153	794	16	300	181	207	609	714	778	Nonparametric
Arsenic, Dissolved	µg/L	16	0	0	66.9	351	16	154	102	96.7	328	341	349	Nonparametric
Arsenic (III)	µg/L	16	0	0	1.72	7.7	n/a	2.7	2.6	0.98	4.0	4.6	5.8	Lognormal
Barium, Total	µg/L	16	0	0	18.5	28.8	0	22.0	21.1	2.93	25.7	27.2	28.5	Normal
Barium, Dissolved	µg/L	16	0	0	18.5	27.5	0	21.4	20.6	2.71	25.6	26.5	27.3	Nonparametric
Beryllium, Total	µg/L	16	0	0	0.02	0.19	0	0.08	0.08	0.04	0.12	0.14	0.18	Normal
Beryllium, Dissolved	µg/L	11	5	31	< 0.02	0.14	0	0.06	0.06	0.03	0.09	0.11	0.13	KM - Nonparametric
Bicarbonate as CaCO3	mg/L	16	0	0	87.6	136	n/a	103	102	10.6	117	121	129	Gamma
Boron, Total	µg/L	0	16	100	< 20	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Boron, Dissolved	µg/L	0	16	100	< 20	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Total	µg/L	1	15	94	< 0.02	0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Dissolved	µg/L	1	15	94	< 0.02	0.04	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Calcium, Total	µg/L	16	0	0	61800	129000	n/a	88013	88600	20429	113500	126000	128400	Normal
Calcium, Dissolved	µg/L	16	0	0	61600	129000	n/a	87738	87300	20405	113000	126000	128400	Normal
Carbonate as CaCO3	mg/L	0	16	100	< 9	< 90	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chloride	mg/L	13	3	19	< 0.4	0.75	0	0.54	0.55	0.11	0.68	0.70	0.74	KM - Nonparametric
Chromium, Total	µg/L	2	14	88	< 0.2	0.8	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chromium, Dissolved	µg/L	1	15	94	< 0.2	0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cobalt, Total	µg/L	16	0	0	0.23	0.93	n/a	0.44	0.44	0.17	0.56	0.68	0.88	Normal
Cobalt, Dissolved	µg/L	16	0	0	0.05	0.88	n/a	0.39	0.40	0.18	0.51	0.61	0.83	Normal
Conductivity	mS/cm	34	0	0	0.439	0.945	n/a	0.616	0.610	0.129	0.754	0.824	0.932	Normal

Table 4-24. YP-AS-2, Bailey Tunnel Outlet, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Copper, Total	µg/L	16	0	0	0.2	0.8	0	0.5	0.5	0.2	0.8	0.8	0.8	Normal
Copper, Dissolved	µg/L	15	1	6	< 0.1	0.9	0	0.4	0.4	0.2	0.7	0.8	0.9	KM - Nonparametric
Cyanide, Total	mg/L	1	15	94	< 0.0047	0.0055	1	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Dissolved Oxygen (DO)	mg/L	34	0	0	6.8	10.93	0	9.3	9.3	0.7	9.9	10.1	10.8	Nonparametric
Fluoride	mg/L	1	15	94	< 0.2	0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Hardness as CaCO3	mg/L	16	0	0	224	496	n/a	329	330	80.7	427	479	493	Normal
Iron, Total	µg/L	16	0	0	228	932	10	395	330	216	697	926	931	Nonparametric
Iron, Dissolved	µg/L	5	11	69	< 20	136	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Lead, Total	µg/L	5	11	69	< 0.02	0.12	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Lead, Dissolved	µg/L	1	15	94	< 0.02	0.03	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Magnesium, Total	µg/L	16	0	0	16800	42300	n/a	26600	26300	7263	35000	39900	41820	Normal
Magnesium, Dissolved	µg/L	16	0	0	16700	42500	n/a	26500	26150	7208	34750	39800	41960	Normal
Manganese, Total	µg/L	16	0	0	111	207	16	148	143	29.7	185	197	205	Normal
Manganese, Dissolved	µg/L	16	0	0	93.8	205	16	142	137	33.0	180	193	203	Normal
Mercury, Total	ng/L	14	2	13	< 0.6	6.5	0	1.5	1.1	1.4	2.4	3.9	6.0	KM - Nonparametric
Mercury, Dissolved	ng/L	6	10	63	< 0.5	1.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Methyl Mercury	ng/L	3	13	81	< 0.1	0.11	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Molybdenum, Total	µg/L	16	0	0	0.44	1.13	0	0.79	0.75	0.22	1.1	1.1	1.1	Normal
Molybdenum, Dissolved	µg/L	16	0	0	0.38	1.13	0	0.78	0.74	0.22	1.1	1.1	1.1	Normal
Nickel, Total	µg/L	16	0	0	0.28	1.6	0	0.91	0.95	0.41	1.4	1.5	1.6	Normal
Nickel, Dissolved	µg/L	15	1	6	< 0.2	1.5	0	0.90	0.95	0.42	1.4	1.5	1.5	KM - Nonparametric
Nitrate + Nitrite as Nitrogen	mg/L	14	2	13	< 0.05	0.095	n/a	0.07	0.07	0.02	0.09	0.09	0.09	KM - Nonparametric
Nitrogen, Total	mg/L	11	5	31	< 0.4	0.68	n/a	0.49	0.51	0.08	0.57	0.61	0.67	KM - Nonparametric
Nitrogen, Total Kjeldahl (TKN)	mg/L	11	5	31	< 0.4	0.61	n/a	0.45	0.44	0.06	0.52	0.56	0.60	KM - Nonparametric
pH	pH units	34	0	0	6.71	7.65	0	7.3	7.3	0.2	7.5	7.6	7.6	Normal
Phosphorus, Total	µg/L	3	13	81	< 20	< 80	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample

Table 4-24. YP-AS-2, Bailey Tunnel Outlet, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Phosphorus, Dissolved	µg/L	0	16	100	< 20	< 80	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Potassium, Total	µg/L	16	0	0	1710	2470	n/a	2041	2050	241.6	2310	2373	2451	Normal
Potassium, Dissolved	µg/L	16	0	0	1700	2540	n/a	2038	2025	238.8	2285	2405	2513	Normal
Selenium, Total	µg/L	0	16	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Selenium, Dissolved	µg/L	0	16	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Total	µg/L	1	15	94	< 0.02	0.07	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Dissolved	µg/L	1	15	94	< 0.02	0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sodium, Total	µg/L	16	0	0	2840	4590	n/a	3544	3500	461.9	4165	4485	4569	Normal
Sodium, Dissolved	µg/L	16	0	0	2950	4550	n/a	3539	3465	436.3	4130	4423	4525	Normal
Solids, Total Dissolved (TDS)	mg/L	16	0	0	276	709	5	458	454	125	629	664	700	Normal
Solids, Total Suspended (TSS)	mg/L	1	15	94	< 5	6.5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sulfate	mg/L	16	0	0	128	445	5	230	225	84.7	318	387	434	Normal
Temperature, Water	deg C	34	0	0	4.59	10.52	0	6.2	6.2	1.2	7.2	7.6	9.6	Normal
Thallium, Total	µg/L	1	15	94	< 0.02	0.04	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Thallium, Dissolved	µg/L	1	15	94	< 0.02	0.04	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Turbidity	NTU	34	0	0	1.4	14.4	n/a	6.2	5.0	3.3	10.6	12.4	16.2	Gamma
Vanadium, Total	µg/L	0	16	100	< 0.2	< 0.2	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Vanadium, Dissolved	µg/L	0	16	100	< 0.2	< 0.2	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Zinc, Total	µg/L	16	0	0	3.4	22.1	0	8.3	8.3	4.7	12.6	15.0	20.7	Normal
Zinc, Dissolved	µg/L	16	0	0	0.9	21.2	0	8	8	5	11.9	14.6	19.9	Normal

Units: **µg/L** = micrograms per liter; **mg/L** = milligrams per liter; **mS/cm** = milliSiemens per centimeter; **ng/L** = nanograms per liter; **deg C** = degrees Celsius; **NTU** = nephelometric turbidity units
Measurements: **< 20 µg/L** = analyte not detected at the method reporting limit of 20 µg/L; **n/a** = not applicable; **Min** = minimum concentration measured; **Max** = maximum concentration measured
*Number that do not meet criterion: total number of analytical results that did not meet the strictest potentially applicable regulatory criterion (presented in **Table 3-4**). If a constituent does not have applicable regulatory criteria, then n/a is given.*
Distribution: **Normal** = data appear normally distributed at 0.05 significance level; statistics presented are normal population estimators; **Gamma** = data appear gamma distributed 0.05 significance level; statistics presented are gamma population estimators; **Lognormal** = data appear lognormally distributed at 0.05 significance level; statistics presented are lognormal populations estimators; **Nonparametric** = data do not appear normally, gamma or lognormally distributed at 0.05 significance level; statistics presented are sample statistics; **KM nonparametric** = data comprises ≤ 50% non-detects; statistics presented are nonparametric population estimators generated using the Kaplan-Meier method; **Sample** = data comprises > 50% non-detects and statistics are not presented; or, data comprises five or fewer measurements but each result was detected and statistics presented are sample statistics.

YP-HP-S1, Homestake pit seep

The Homestake pit seep (YP-HP-S1) is the outlet from the lowest pond in the former Homestake pit (see photos in **Appendix G**). During the spring snowmelt season (generally May through June) the pond is full enough to flow out of the outlet at the north side of the pond and flow down the forested hillside towards Sugar Creek; it has not been observed flowing into Sugar Creek. During the winter, the pond has been observed freezing through to the bottom although liquid water remained within the ice matrix. Flow measurements at the site have ranged from $5.2x10^{-3}$ cfs in February 2015 to 0.29 cfs in May 2014 with a median flow of $3.3x10^{-2}$ cfs.

For the time interval included in this baseline study, this site was visited 29 times. **Appendix E** presents dates the site was visited and parameters or constituents sampled during each visit. Analytical results are summarized in **Table 4-25**. Multiple constituents were analyzed for but were not detected in at least half of the samples from YP-HP-S1. These constituents were ammonia, boron, cadmium, carbonate, chromium, cyanide, fluoride, dissolved lead, nitrate plus nitrite as nitrogen, dissolved phosphorus, selenium, silver, dissolved thallium and vanadium.

Of constituents that were regularly detected, many do not have defined or applicable regulatory criteria for comparison **(see Appendix E)**. These include conductivity, turbidity, arsenic III, bicarbonate, calcium, cobalt, hardness, magnesium, methyl mercury, total nitrogen, total Kjeldahl nitrogen, total phosphorus, potassium, sodium and total suspended solids. In general, the major cations (calcium, magnesium, potassium, and sodium), major anion (bicarbonate), related measurements (conductivity, hardness) and arsenic III all tended to be lowest during the spring snowmelt period. The remaining constituents generally occurred in low concentrations and show no distinct trends.

In addition, many constituents that were regularly detected and have applicable regulatory criteria occurred in concentrations that met criteria **(see Appendix E)**. These constituents include color, pH, alkalinity, barium, beryllium, chloride, copper, total lead, molybdenum, nickel, and zinc. Alkalinity and chloride tended to be lowest during the spring snowmelt period. The remaining constituents generally occurred in low concentrations and show no distinct trends.

There were some constituents that did not meet regulatory criteria **(see Appendix E)**. Dissolved oxygen was below the regulatory minimum (> 6 mg/L) nine times (32 percent of measurements). Temperature was above the regulatory maximum (< 13 degrees Celsius) 12 times (43 percent of measurements). Total and dissolved aluminum exceeded the regulatory criterion (50 µg/L) seven and two times, respectively (50 and 14 percent of measurements). Total and dissolved antimony and arsenic exceeded the regulatory criteria (5.6 and 10 µg/L respectively) 13 times each (93 percent of measurements). Total and dissolved arsenic exceeded the regulatory criterion (10 µg/L) 14 times each (100 percent of measurements). Cyanide exceeded the regulatory criterion (0.0052 mg/L) once (7 percent of measurements). Total and dissolved iron exceeded the regulatory criteria (300 µg/L) 10 and three times, respectively (71 and 21 percent of measurements). Total and dissolved manganese exceeded the regulatory criterion (50 µg/L) 14 times each (100 percent of measurements). Total and dissolved mercury exceeded the regulatory criterion (12 ng/L) eight and one times, respectively (57 and 7 percent of measurements). Total dissolved solids and sulfate exceeded the regulatory criteria (500 and 250 mg/L, respectively) 12 times each (86 percent of measurements). Total thallium exceeded regulatory criterion (0.24 µg/L) once (7 percent of measurements).

Table 4-25. YP-HP-S1, Homestake Pit Seep, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Alkalinity as CaCO3, Total	mg/L	14	0	0	40	374	0	109	76	88	168	242	348	Normal
Aluminum, Total	µg/L	14	0	0	3.7	3770	7	323	85.4	1174	690	1247	3788	Lognormal
Aluminum, Dissolved	µg/L	11	3	21	< 2	536	2	52.8	11.4	135	55.0	228	474	KM - Nonparametric
Ammonia as Nitrogen	mg/L	3	11	79	< 0.05	4.92	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Antimony, Total	µg/L	14	0	0	4.43	38.6	13	22.5	24.4	10.1	35.0	37.2	38.3	Normal
Antimony, Dissolved	µg/L	14	0	0	4.57	52.8	13	24.3	25.1	12.9	38.2	43.8	51.0	Normal
Arsenic, Total	µg/L	14	0	0	21.3	3740	14	587	209	953	1499	2051	3377	Gamma
Arsenic, Dissolved	µg/L	14	0	0	50.2	2690	14	357	179	615	806	1235	2750	Lognormal
Arsenic (III)	µg/L	14	0	0	0.65	952	n/a	143	2.05	282	467	668	895	Nonparametric
Barium, Total	µg/L	14	0	0	11.7	79.6	0	34.9	26.3	21.2	62.9	74.8	100.7	Gamma
Barium, Dissolved	µg/L	14	0	0	9.31	69.5	0	24.4	22.1	15.4	35.1	47.3	65.1	Normal
Beryllium, Total	µg/L	13	1	7	< 0.02	2.3	0	0.39	0.15	0.61	1.0	1.7	2.2	KM - Nonparametric
Beryllium, Dissolved	µg/L	12	2	14	< 0.02	0.61	0	0.16	0.07	0.19	0.48	0.58	0.60	KM - Nonparametric
Bicarbonate as CaCO3	mg/L	14	0	0	40	374	n/a	109	76	87.8	168	242	348	Normal
Boron, Total	µg/L	2	12	86	< 20	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Boron, Dissolved	µg/L	2	12	86	< 20	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Total	µg/L	2	12	86	< 0.02	0.06	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Dissolved	µg/L	1	13	93	< 0.02	0.1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Calcium, Total	µg/L	14	0	0	78500	432000	n/a	241464	210500	132177	421600	428750	431350	Normal
Calcium, Dissolved	µg/L	14	0	0	80400	459000	n/a	242529	219000	132200	414500	434950	454190	Normal
Carbonate as CaCO3	mg/L	0	14	100	< 9	< 90	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chloride	mg/L	12	2	14	< 0.4	3.21	0	0.98	0.52	0.83	2.08	2.52	3.07	KM - Nonparametric
Chromium, Total	µg/L	6	8	57	< 0.2	4.6	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chromium, Dissolved	µg/L	4	10	71	< 0.2	1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cobalt, Total	µg/L	14	0	0	0.17	158	n/a	21.7	2.9	163	37.7	78.3	309	Lognormal
Cobalt, Dissolved	µg/L	13	1	7	< 0.02	161	n/a	20.6	1.5	47.3	76.2	125	154	KM - Nonparametric
Conductivity	mS/cm	27	0	0	0.069	4.16	n/a	1.636	1.450	0.912	2.830	3.223	3.947	Normal

Table 4-25. YP-HP-S1, Homestake Pit Seep, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Copper, Total	µg/L	13	1	7	< 0.1	11.4	0	1.7	0.5	2.9	3.9	6.9	10.5	KM - Nonparametric
Copper, Dissolved	µg/L	12	2	14	< 0.1	5.5	0	1.0	0.5	1.4	2.4	3.6	5.1	KM - Nonparametric
Cyanide, Total	mg/L	1	13	93	< 0.0047	0.0054	1	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Dissolved Oxygen (DO)	mg/L	28	0	0	2.16	13.48	9	7.9	8.1	3.3	12.2	13.1	13.4	Normal
Fluoride	mg/L	6	8	57	< 0.2	0.62	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Hardness as CaCO3	mg/L	14	0	0	298	1940	n/a	949	740	571	1722	1830	1918	Normal
Iron, Total	µg/L	14	0	0	43.4	89300	10	6882	768	61312	11242	24061	100279	Lognormal
Iron, Dissolved	µg/L	9	5	36	< 20	91000	3	7486	77.6	23333	8351	39000	80600	KM - Nonparametric
Lead, Total	µg/L	9	5	36	< 0.02	2.12	0	0.23	0.08	0.53	0.25	0.94	1.9	KM - Nonparametric
Lead, Dissolved	µg/L	4	10	71	< 0.02	0.34	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Magnesium, Total	µg/L	14	0	0	24700	213000	n/a	84207	56700	60201	161200	184400	207280	Normal
Magnesium, Dissolved	µg/L	14	0	0	23400	212000	n/a	83593	57600	59240	158100	181450	205890	Normal
Manganese, Total	µg/L	14	0	0	69.1	50200	14	9988	1189	83306	16730	35400	144419	Lognormal
Manganese, Dissolved	µg/L	14	0	0	67.7	49600	14	9456	1012	87846	15199	32763	138386	Lognormal
Mercury, Total	ng/L	14	0	0	3.9	370	8	34.5	16.7	62.1	78.1	121	274	Lognormal
Mercury, Dissolved	ng/L	14	0	0	1.9	24.9	1	6.0	4.6	6.0	12.5	15.7	22.7	Gamma
Methyl Mercury	ng/L	10	4	29	< 0.1	3.6	n/a	1.2	0.4	1.3	3.3	3.5	3.6	KM - Nonparametric
Molybdenum, Total	µg/L	12	2	14	< 0.05	1	0	0.25	0.14	0.3	0.5	0.7	0.9	KM - Nonparametric
Molybdenum, Dissolved	µg/L	12	2	14	< 0.05	1.1	0	0.32	0.22	0.3	0.9	1.0	1.1	KM - Nonparametric
Nickel, Total	µg/L	14	0	0	0.8	79.4	0	10.3	4.2	22.6	23.3	37.7	93.4	Lognormal
Nickel, Dissolved	µg/L	13	1	7	< 0.2	76.1	0	11.2	3.4	20.3	30.3	51.8	71.2	KM - Nonparametric
Nitrate + Nitrite as Nitrogen	mg/L	3	11	79	< 0.05	0.178	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nitrogen, Total	mg/L	14	0	0	0.41	72.2	n/a	7.2	0.91	18.9	7.8	30.7	63.9	Nonparametric
Nitrogen, Total Kjeldahl (TKN)	mg/L	14	0	0	0.41	72	n/a	4.9	1.7	13.1	10.9	18.4	49.6	Lognormal
pH	pH units	27	0	0	6.57	8.49	0	7.3	7.3	0.5	7.8	8.2	8.4	Normal

Table 4-25. YP-HP-S1, Homestake Pit Seep, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Phosphorus, Total	µg/L	10	4	29	< 23.4	472	n/a	130	91.1	130	293	365	451	KM - Nonparametric
Phosphorus, Dissolved	µg/L	5	9	64	< 20	145	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Potassium, Total	µg/L	14	0	0	453	20200	n/a	6340	4490	5567	13743	17440	25880	Gamma
Potassium, Dissolved	µg/L	13	1	7	< 200	20000	n/a	6178	4295	5351	13832	17270	19454	KM - Nonparametric
Selenium, Total	µg/L	0	14	100	< 1	< 2	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Selenium, Dissolved	µg/L	0	14	100	< 1	< 5	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Total	µg/L	4	10	71	< 0.02	0.04	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Dissolved	µg/L	0	14	100	< 0.02	< 0.1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sodium, Total	µg/L	14	0	0	1570	18700	n/a	4701	3509	4192	9352	12348	20796	Lognormal
Sodium, Dissolved	µg/L	14	0	0	1580	18300	n/a	4692	3490	4216	9355	12372	20900	Lognormal
Solids, Total Dissolved (TDS)	mg/L	14	0	0	61	2680	12	1253	952	885	2580	2615	2667	Normal
Solids, Total Suspended (TSS)	mg/L	8	6	43	< 5	987	n/a	86.1	9.25	251	63.6	396	869	KM - Nonparametric
Sulfate	mg/L	14	0	0	9.62	1700	12	761	635	547	1608	1648	1690	Normal
Temperature, Water	deg C	28	0	0	-0.01	28.73	12	11.9	10.5	10.1	25.1	26.6	28.3	Normal
Thallium, Total	µg/L	9	5	36	< 0.02	0.44	1	0.07	0.03	0.11	0.11	0.25	0.40	KM - Nonparametric
Thallium, Dissolved	µg/L	5	9	64	< 0.02	0.22	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Turbidity	NTU	28	0	0	0	303	n/a	43.0	25.0	63.2	116.6	139.0	261.8	Nonparametric
Vanadium, Total	µg/L	7	7	50	< 0.2	6.8	0	0.76	0.25	1.7	0.57	2.8	6.0	KM - Nonparametric
Vanadium, Dissolved	µg/L	2	12	86	< 0.2	1.3	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Zinc, Total	µg/L	14	0	0	1	139	0	20.2	8.29	44.9	45.9	74.5	185	Lognormal
Zinc, Dissolved	µg/L	13	1	7	< 0.5	127	0	15.7	5.5	31.6	23.1	62.1	114	KM - Nonparametric

Units: **µg/L** = micrograms per liter; **mg/L** = milligrams per liter; **mS/cm** = milliSiemens per centimeter; **ng/L** = nanograms per liter; **deg C** = degrees Celsius; **NTU** = nephelometric turbidity units
Measurements: **< 20 µg/L** = analyte not detected at the method reporting limit of 20 µg/L; **n/a** = not applicable; **Min** = minimum concentration measured; **Max** = maximum concentration measured
Number that do not meet criterion: total number of analytical results that did not meet the strictest potentially applicable regulatory criterion (presented in Table 3-4). If a constituent does not have applicable regulatory criteria, then n/a is given.
Distribution: **Normal** = data appear normally distributed at 0.05 significance level; statistics presented are normal population estimators; **Gamma** = data appear gamma distributed 0.05 significance level; statistics presented are gamma population estimators; **Lognormal** = data appear lognormally distributed at 0.05 significance level; statistics presented are lognormal populations estimators; **Nonparametric** = data do not appear normally, gamma or lognormally distributed at 0.05 significance level; statistics presented are sample statistics; **KM nonparametric** = data comprises ≤ 50% non-detects; statistics presented are nonparametric population estimators generated using the Kaplan-Meier method; **Sample** = data comprises > 50% non-detects and statistics are not presented; or, data comprises five or fewer measurements but each result was detected and statistics presented are sample statistics.

YP-S-1, Hillside seep by Sugar Creek

The hillside seep near Sugar Creek (YP-S-1) originates on the hillside north of FS 412, approximately 150 feet west of the intersection of FS 412 and FS 1883 (see photos in **Appendix G**). Generally, the seep originates and infiltrates into the same hillside before reaching the road. However, in April 2013 and 2014 (spring snowmelt season), the seep reached the ditch on the north side of FS 412, was joined by snowmelt runoff, and eventually flowed into Sugar Creek via a culvert under FS 412 about 300 feet west of the seep. In addition, the seep was dry in January and February 2014. Flow measurements at the site have ranged from $3.0x10^{-5}$ cfs in November 2013 to $2.8x10^{-2}$ cfs in April 2014 with a median flow of $9.8x10^{-4}$ cfs.

For the time interval included in this baseline study, this site was visited 32 times. **Appendix E** presents dates the site was visited and parameters or constituents sampled during each visit. Analytical results are summarized in **Table 4-26**. Multiple constituents were analyzed for but were not detected in at least half of the samples from YP-S-1. These constituents were ammonia, dissolved beryllium, boron, cadmium, carbonate, chloride, chromium, cyanide, fluoride, dissolved iron, dissolved lead, dissolved manganese, dissolved nickel, nitrate plus nitrite, dissolved phosphorus, selenium, silver, thallium, dissolved vanadium and dissolved zinc.

Of constituents that were regularly detected, many do not have defined or applicable regulatory criteria for comparison **(see Appendix E)**. These include conductivity, turbidity, arsenic III, bicarbonate, calcium, cobalt, hardness, magnesium, total nitrogen, total Kjeldahl nitrogen, total phosphorus, potassium, sodium and total suspended solids. In general, of these constituents, the major cations (calcium, magnesium, potassium, and sodium), major anion (bicarbonate), and related measurements (conductivity and hardness) tended to be lowest during periods of high flow. The other constituents generally occurred in low concentrations and show no distinct trends.

In addition, many constituents that were regularly detected and have applicable regulatory criteria occurred in concentrations that met criteria **(see Appendix E)**. These constituents include color, pH, alkalinity, antimony, barium, total beryllium, copper, total lead, dissolved mercury, molybdenum, total nickel, total dissolved solids, sulfate, total vanadium and total zinc. Alkalinity tended to be lowest during periods of high flow. The other constituents generally occurred in low concentrations and show no distinct trends.

There were some constituents that did not meet regulatory criteria **(see Appendix E)**. Dissolved oxygen did not meet the regulatory minimum (> 6 mg/L) once (4 percent of measurements). Temperature was above the regulatory maximum (< 13 degrees Celsius) six times (23 percent of measurements). Total and dissolved aluminum exceeded the regulatory criterion (50 µg/L) eight and one times, respectively (89 and 11 percent of measurements). Total and dissolved arsenic exceeded the regulatory criterion (10 µg/L) nine times (100 percent of measurements). Total iron exceeded the regulatory criterion (300 µg/L) six times (67 percent of measurements). Total manganese exceeded regulatory criterion (50 µg/L) once (11 percent of measurements). Total mercury exceeded the regulatory criterion (12 ng/L) seven times (78 percent of measurements).

Table 4-26. YP-S-1, Hillside Seep by Sugar Creek, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Alkalinity as CaCO3, Total	mg/L	9	0	0	50	155	0	94	80	35	137	146	153	Normal
Aluminum, Total	µg/L	9	0	0	49.5	1310	8	507	262	487	1270	1290	1306	Normal
Aluminum, Dissolved	µg/L	7	2	22	< 2	194	1	24.5	2.50	60.0	44.2	119	179	KM - Nonparametric
Ammonia as Nitrogen	mg/L	0	9	100	< 0.05	< 0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Antimony, Total	µg/L	9	0	0	0.53	1.04	0	0.71	0.65	0.18	0.97	1.00	1.03	Normal
Antimony, Dissolved	µg/L	9	0	0	0.51	0.72	0	0.55	0.53	0.07	0.59	0.66	0.71	Nonparametric
Arsenic, Total	µg/L	9	0	0	40.5	71.6	9	53.1	46.2	13.2	69.9	70.8	71.4	Normal
Arsenic, Dissolved	µg/L	9	0	0	36.7	55.9	9	42.4	42.1	5.06	49.0	51.2	55.5	Lognormal
Arsenic (III)	µg/L	9	0	0	0.08	0.31	n/a	0.16	0.15	0.08	0.24	0.27	0.30	Normal
Barium, Total	µg/L	9	0	0	60.6	156	0	94.2	81.5	34.7	150	153	155	Normal
Barium, Dissolved	µg/L	9	0	0	44.1	110	0	78.2	77.8	22.7	108	109	110	Normal
Beryllium, Total	µg/L	8	1	11	< 0.02	0.37	0	0.14	0.06	0.12	0.31	0.34	0.36	KM - Nonparametric
Beryllium, Dissolved	µg/L	1	8	89	< 0.02	0.05	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Bicarbonate as CaCO3	mg/L	9	0	0	50	155	n/a	94	80	35	137	146	153	Normal
Boron, Total	µg/L	0	9	100	< 20	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Boron, Dissolved	µg/L	0	9	100	< 20	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Total	µg/L	0	9	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Dissolved	µg/L	0	9	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Calcium, Total	µg/L	9	0	0	16000	45300	n/a	30533	27300	10279	44100	44700	45180	Normal
Calcium, Dissolved	µg/L	9	0	0	15400	43900	n/a	30200	26800	10226	43020	43460	43812	Normal
Carbonate as CaCO3	mg/L	0	9	100	< 9	< 90	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chloride	mg/L	2	7	78	< 0.4	1.22	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chromium, Total	µg/L	3	6	67	< 0.2	0.5	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chromium, Dissolved	µg/L	1	8	89	< 0.2	0.2	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cobalt, Total	µg/L	8	1	11	< 0.02	0.36	n/a	0.14	0.10	0.12	0.33	0.34	0.36	KM - Nonparametric
Cobalt, Dissolved	µg/L	6	3	33	< 0.02	0.07	n/a	0.04	0.04	0.02	0.05	0.06	0.07	KM - Nonparametric
Conductivity	mS/cm	26	0	0	0.108	0.298	n/a	0.220	0.234	0.060	0.283	0.285	0.295	Normal

Table 4-26. YP-S-1, Hillside Seep by Sugar Creek, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Copper, Total	µg/L	9	0	0	0.1	1.3	0	0.5	0.4	0.4	1.1	1.2	1.3	Normal
Copper, Dissolved	µg/L	9	0	0	0.1	0.4	0	0.2	0.2	0.1	0.3	0.4	0.4	Normal
Cyanide, Total	mg/L	0	9	100	< 0.0047	< 0.0047	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Dissolved Oxygen (DO)	mg/L	26	0	0	6	11.59	1	9.0	9.2	1.2	10.1	10.3	11.3	Normal
Fluoride	mg/L	0	9	100	< 0.2	< 0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Hardness as CaCO3	mg/L	9	0	0	49.3	141	n/a	94.9	83.8	32.4	138	139	141	Normal
Iron, Total	µg/L	9	0	0	98.8	2240	6	890	537	823	2080	2160	2224	Normal
Iron, Dissolved	µg/L	1	8	89	< 20	277	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Lead, Total	µg/L	9	0	0	0.04	0.81	0	0.28	0.13	0.28	0.69	0.75	0.80	Normal
Lead, Dissolved	µg/L	1	8	89	< 0.02	0.08	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Magnesium, Total	µg/L	9	0	0	2270	6740	n/a	4537	3820	1637	6700	6720	6736	Normal
Magnesium, Dissolved	µg/L	9	0	0	2140	6460	n/a	4464	3780	1609	6444	6452	6458	Normal
Manganese, Total	µg/L	8	1	11	< 1.7	70.4	1	19.8	7.5	22.7	53.3	61.8	68.7	KM - Nonparametric
Manganese, Dissolved	µg/L	1	8	89	< 1	5	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Mercury, Total	ng/L	9	0	0	5	159	7	38.2	22.7	47.1	91.1	121	190	Gamma
Mercury, Dissolved	ng/L	9	0	0	1	11.2	0	2.81	2.21	2.23	5.39	6.95	11.2	Lognormal
Methyl Mercury	ng/L	5	4	44	< 0.1	0.64	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Molybdenum, Total	µg/L	8	1	11	< 0.06	0.2	0	0.11	0.12	0.04	0.20	0.2	0.2	KM - Nonparametric
Molybdenum, Dissolved	µg/L	8	1	11	< 0.09	0.2	0	0.14	0.15	0.04	0.19	0.20	0.20	KM - Nonparametric
Nickel, Total	µg/L	5	4	44	< 0.2	0.8	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nickel, Dissolved	µg/L	4	5	56	< 0.2	0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nitrate + Nitrite as Nitrogen	mg/L	2	7	78	< 0.05	0.111	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nitrogen, Total	mg/L	9	0	0	0.46	1.74	n/a	0.75	0.60	0.39	1.2	1.4	1.9	Gamma
Nitrogen, Total Kjeldahl (TKN)	mg/L	9	0	0	0.46	1.74	n/a	0.73	0.58	0.40	1.2	1.4	1.9	Gamma
pH	pH units	26	0	0	6.81	8.14	0	7.5	7.6	0.4	7.9	8.0	8.1	Normal
Phosphorus, Total	µg/L	6	3	33	< 20	146	n/a	60.6	42.5	42.0	125	136	144	KM - Nonparametric

Table 4-26. YP-S-1, Hillside Seep by Sugar Creek, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Phosphorus, Dissolved	µg/L	1	8	89	< 20	< 40	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Potassium, Total	µg/L	9	0	0	1210	2040	n/a	1479	1370	308	1992	2016	2035	Nonparametric
Potassium, Dissolved	µg/L	9	0	0	984	1410	n/a	1173	1150	160	1370	1390	1406	Normal
Selenium, Total	µg/L	0	9	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Selenium, Dissolved	µg/L	0	9	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Total	µg/L	1	8	89	< 0.02	0.04	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Dissolved	µg/L	1	8	89	< 0.02	0.03	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sodium, Total	µg/L	9	0	0	2200	3920	n/a	3157	3030	590.0	3784	3852	3906	Normal
Sodium, Dissolved	µg/L	9	0	0	2170	3920	n/a	3140	2940	589.6	3800	3860	3908	Normal
Solids, Total Dissolved (TDS)	mg/L	9	0	0	83	229	0	135	120	45.5	181	205	224	Normal
Solids, Total Suspended (TSS)	mg/L	7	2	22	< 5	116	n/a	43.2	27.5	37.7	91.2	104	114	KM - Nonparametric
Sulfate	mg/L	9	0	0	5.21	21.3	0	13.2	10.7	5.52	19.9	20.6	21.2	Normal
Temperature, Water	deg C	26	0	0	0.39	17.76	6	9.6	9.5	4.5	15.4	17.0	17.6	Normal
Thallium, Total	µg/L	1	8	89	< 0.02	0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Thallium, Dissolved	µg/L	0	9	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Turbidity	NTU	26	0	0	3.8	846	n/a	99.4	22.8	226.5	223.8	705.0	840.5	Nonparametric
Vanadium, Total	µg/L	7	2	22	< 0.2	1.3	0	0.6	0.3	0.4	1.2	1.3	1.3	KM - Nonparametric
Vanadium, Dissolved	µg/L	1	8	89	< 0.2	0.2	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Zinc, Total	µg/L	6	3	33	< 0.5	3.9	0	1.6	0.8	1.3	3.8	3.9	3.89	KM - Nonparametric
Zinc, Dissolved	µg/L	4	5	56	< 0.5	0.7	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample

Units: **µg/L** = micrograms per liter; **mg/L** = milligrams per liter; **mS/cm** = milliSiemens per centimeter; **ng/L** = nanograms per liter; **deg C** = degrees Celsius; **NTU** = nephelometric turbidity units

Measurements: **< 20 µg/L** = analyte not detected at the method reporting limit of 20 µg/L; **n/a** = not applicable; **Min** = minimum concentration measured; **Max** = maximum concentration measured

*Number that do not meet criterion: total number of analytical results that did not meet the strictest potentially applicable regulatory criterion (presented in **Table 3-4**). If a constituent does not have applicable regulatory criteria, then n/a is given.*

Distribution: **Normal** = data appear normally distributed at 0.05 significance level; statistics presented are normal population estimators; **Gamma** = data appear gamma distributed 0.05 significance level; statistics presented are gamma population estimators; **Lognormal** = data appear lognormally distributed at 0.05 significance level; statistics presented are lognormal populations estimators; **Nonparametric** = data do not appear normally, gamma or lognormally distributed at 0.05 significance level; statistics presented are sample statistics; **KM nonparametric** = data comprises ≤ 50% non-detects; statistics presented are nonparametric population estimators generated using the Kaplan-Meier method; **Sample** = data comprises > 50% non-detects and statistics are not presented; or, data comprises five or fewer measurements but each result was detected and statistics presented are sample statistics.

4.1.2.5 East Fork of the South Fork of the Salmon River Surface Water Sites

YP-T-44, Fern Creek

The Fern Creek site (YP-T-44) is located downstream of the abandoned, mercury-producing Fern Mine, and is just upstream of where Fern Creek crosses under Thunder Mountain Road via a culvert. Through this reach, the creek is narrow, shrubby, and has a steep gradient (see photos in **Appendix G).** Flow is generally from northeast to southwest through this reach and onsite flow measurements have ranged from $5.9x10^{-2}$ cfs in February 2016 to 2.7 cfs in June 2014 with a median flow of 0.22 cfs.

For the time interval included in this baseline study, this site was visited 20 times when accessible during adverse winter conditions. **Appendix E** presents dates the site was visited and parameters or constituents sampled during each visit. Analytical results are summarized in **Table 4-27**. Multiple constituents were analyzed for but were not detected in at least half of the samples from YP-T-44. These constituents were dissolved aluminum, ammonia, beryllium, boron, cadmium, carbonate, chloride, chromium, cobalt, total copper, cyanide, fluoride, iron, lead, dissolved manganese, methyl mercury, molybdenum, nickel, nitrate plus nitrite, phosphorus, selenium, silver, total suspended solids, thallium, vanadium and zinc.

Of constituents that were regularly detected, many do not have defined or applicable regulatory criteria for comparison **(see Appendix E)**. These include conductivity, turbidity, arsenic III, bicarbonate, calcium, hardness, magnesium, total nitrogen, total Kjeldahl nitrogen, potassium and sodium. These constituents show no distinct trends in concentrations.

In addition, many constituents that were regularly detected and have applicable regulatory criteria occurred in concentrations that met criteria **(see Appendix E)**. These constituents include color, dissolved oxygen, pH, temperature, alkalinity, total aluminum, antimony, arsenic, barium, dissolved copper, total manganese, dissolved mercury, total dissolved solids and sulfate. These constituents show no distinct trends in concentrations

There was one constituent that did not meet regulatory criteria **(see Appendix E)**. Total mercury exceeded the regulatory criterion (12 ng/L) 20 times (100 percent of measurements).

Table 4-27. YP-T-44, Fern Creek, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Alkalinity as CaCO3, Total	mg/L	20	0	0	47.8	88	0	65.5	64.7	10.5	79.3	84.0	93.6	Lognormal
Aluminum, Total	µg/L	13	1	7	< 3.6	22.1	0	9.4	7.6	6.4	19.8	20.7	21.8	KM - Nonparametric
Aluminum, Dissolved	µg/L	6	8	57	< 2	16.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Ammonia as Nitrogen	mg/L	2	18	90	< 0.05	0.092	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Antimony, Total	µg/L	19	1	5	< 0.08	0.5	0	0.11	0.11	0.02	0.15	0.18	0.44	KM - Nonparametric
Antimony, Dissolved	µg/L	19	1	5	< 0.08	0.5	0	0.11	0.10	0.03	0.17	0.21	0.44	KM - Nonparametric
Arsenic, Total	µg/L	20	0	0	3	5.8	0	4.0	4.0	0.6	4.8	5.0	5.5	Gamma
Arsenic, Dissolved	µg/L	20	0	0	2.9	4.5	0	3.8	3.8	0.4	4.2	4.2	4.4	Normal
Arsenic (III)	µg/L	12	0	0	0.03	0.09	n/a	0.06	0.05	0.02	0.08	0.08	0.09	Normal
Barium, Total	µg/L	12	0	0	7.73	9.36	0	8.29	8.09	0.55	9.07	9.22	9.33	Normal
Barium, Dissolved	µg/L	12	0	0	7.63	9.21	0	8.18	8.01	0.46	8.65	8.90	9.15	Normal
Beryllium, Total	µg/L	0	12	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Beryllium, Dissolved	µg/L	0	12	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Bicarbonate as CaCO3	mg/L	20	0	0	47.8	88	n/a	64.2	63.6	9.4	76.6	80.8	89.2	Lognormal
Boron, Total	µg/L	0	12	100	< 20	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Boron, Dissolved	µg/L	0	12	100	< 20	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Total	µg/L	0	18	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Dissolved	µg/L	0	18	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Calcium, Total	µg/L	20	0	0	11300	20700	n/a	14535	14100	2143	15650	19750	20510	Nonparametric
Calcium, Dissolved	µg/L	20	0	0	11300	20600	n/a	14565	14150	2167	15610	20220	20524	Nonparametric
Carbonate as CaCO3	mg/L	0	20	100	< 9	< 15	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chloride	mg/L	0	20	100	< 0.2	< 0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chromium, Total	µg/L	4	14	78	< 0.2	0.2	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chromium, Dissolved	µg/L	2	16	89	< 0.2	0.2	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cobalt, Total	µg/L	5	7	58	< 0.02	0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cobalt, Dissolved	µg/L	2	10	83	< 0.02	0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Conductivity	mS/cm	20	0	0	0.1	0.162	n/a	0.129	0.126	0.016	0.155	0.159	0.161	Normal

Table 4-27. YP-T-44, Fern Creek, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Copper, Total	µg/L	5	13	72	< 0.1	0.2	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Copper, Dissolved	µg/L	14	4	22	< 0.1	1.8	0	0.2	0.1	0.4	0.3	0.7	1.6	KM - Nonparametric
Cyanide, Total	mg/L	0	12	100	< 0.0047	< 0.0047	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Dissolved Oxygen (DO)	mg/L	20	0	0	7.31	11.33	0	9.7	9.6	0.9	10.6	11.2	11.3	Normal
Fluoride	mg/L	0	20	100	< 0.2	< 0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Hardness as CaCO3	mg/L	20	0	0	46.8	85.3	n/a	60.5	59.1	9.0	64.7	83.3	84.9	Nonparametric
Iron, Total	µg/L	7	13	65	< 20	45	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Iron, Dissolved	µg/L	0	20	100	< 20	< 21.3	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Lead, Total	µg/L	0	20	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Lead, Dissolved	µg/L	1	19	95	< 0.02	0.03	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Magnesium, Total	µg/L	20	0	0	4540	8260	n/a	5877	5710	896.1	6220	8203	8249	Nonparametric
Magnesium, Dissolved	µg/L	20	0	0	4570	8140	n/a	5850	5740	865.8	6166	8112	8134	Nonparametric
Manganese, Total	µg/L	8	6	43	< 1	5	0	1.8	1.6	1.1	4.1	4.5	4.9	KM - Nonparametric
Manganese, Dissolved	µg/L	0	14	100	< 1	< 5	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Mercury, Total	ng/L	20	0	0	12.3	54.6	20	21.7	19.8	10.1	33.9	38.5	48.3	Gamma
Mercury, Dissolved	ng/L	20	0	0	5.7	11.4	0	8.0	7.9	1.4	9.5	10.4	11.2	Normal
Methyl Mercury	ng/L	0	12	100	< 0.1	< 0.1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Molybdenum, Total	µg/L	2	10	83	< 0.05	0.06	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Molybdenum, Dissolved	µg/L	1	11	92	< 0.05	0.14	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nickel, Total	µg/L	2	10	83	< 0.2	0.3	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nickel, Dissolved	µg/L	5	7	58	< 0.2	0.3	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nitrate + Nitrite as Nitrogen	mg/L	1	19	95	< 0.05	0.076	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nitrogen, Total	mg/L	10	2	17	< 0.4	0.76	n/a	0.5	0.5	0.1	0.6	0.7	0.7	KM - Nonparametric
Nitrogen, Total Kjeldahl (TKN)	mg/L	10	2	17	< 0.4	0.74	n/a	0.5	0.5	0.1	0.6	0.7	0.7	KM - Nonparametric
pH	pH units	20	0	0	6.81	8.27	0	7.4	7.3	0.4	8.0	8.0	8.2	Normal
Phosphorus, Total	µg/L	0	20	100	< 20	< 40	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample

Table 4-27. YP-T-44, Fern Creek, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Phosphorus, Dissolved	µg/L	0	20	100	< 20	< 42.6	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Potassium, Total	µg/L	20	0	0	485	786	n/a	632	628	71.1	700	762	781	Normal
Potassium, Dissolved	µg/L	20	0	0	456	772	n/a	610	615	78.6	682	741	766	Normal
Selenium, Total	µg/L	0	18	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Selenium, Dissolved	µg/L	0	18	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Total	µg/L	0	12	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Dissolved	µg/L	0	12	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sodium, Total	µg/L	20	0	0	480	645	n/a	573	573	41.6	622	640	644	Normal
Sodium, Dissolved	µg/L	20	0	0	466	645	n/a	574	576	43.9	640	640	644	Normal
Solids, Total Dissolved (TDS)	mg/L	20	0	0	35.5	89	0	61.7	60	13.2	76.3	88.1	88.8	Normal
Solids, Total Suspended (TSS)	mg/L	0	20	100	< 5	< 5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sulfate	mg/L	20	0	0	0.75	2.36	0	1.19	1.16	0.27	1.55	1.68	1.95	Lognormal
Temperature, Water	deg C	20	0	0	1.98	7.19	0	4.0	3.6	1.4	5.8	6.3	7.0	Normal
Thallium, Total	µg/L	0	12	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Thallium, Dissolved	µg/L	0	12	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Turbidity	NTU	20	0	0	0.1	4.3	n/a	2.1	2.1	1.1	3.5	3.8	4.2	Normal
Vanadium, Total	µg/L	0	12	100	< 0.2	< 0.2	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Vanadium, Dissolved	µg/L	0	12	100	< 0.2	< 0.2	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Zinc, Total	µg/L	1	19	95	< 0.5	0.8	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Zinc, Dissolved	µg/L	6	14	70	< 0.5	0.9	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample

Units: **µg/L** = micrograms per liter; **mg/L** = milligrams per liter; **mS/cm** = milliSiemens per centimeter; **ng/L** = nanograms per liter; **deg C** = degrees Celsius; **NTU** = nephelometric turbidity units
Measurements: **< 20 µg/L** = analyte not detected at the method reporting limit of 20 µg/L; **n/a** = not applicable; **Min** = minimum concentration measured; **Max** = maximum concentration measured
*Number that do not meet criterion: total number of analytical results that did not meet the strictest potentially applicable regulatory criterion (presented in **Table 3-4**). If a constituent does not have applicable regulatory criteria, then n/a is given.*
Distribution: **Normal** = data appear normally distributed at 0.05 significance level; statistics presented are normal population estimators; **Gamma** = data appear gamma distributed 0.05 significance level; statistics presented are gamma population estimators; **Lognormal** = data appear lognormally distributed at 0.05 significance level; statistics presented are lognormal populations estimators; **Nonparametric** = data do not appear normally, gamma or lognormally distributed at 0.05 significance level; statistics presented are sample statistics; **KM nonparametric** = data comprises ≤ 50% non-detects; statistics presented are nonparametric population estimators generated using the Kaplan-Meier method; **Sample** = data comprises > 50% non-detects and statistics are not presented; or, data comprises five or fewer measurements but each result was detected and statistics presented are sample statistics.

YP-SR-14, EFSFSR above Fern Creek

The EFSFSR site above Fern Creek (YP-SR-14) is located in a sinuous, forested reach of the river about 200 feet upstream of the EFSFSR confluence with Fern Creek (see photos in **Appendix G**). The creek is downhill of and adjacent to an old jeep road through this stretch, but this site is upstream of legacy disturbance associated with Stibnite. Flow is generally from the southeast to the northwest in this reach and onsite flow measurements have ranged from 0.48 cfs in March 2014 to 22 cfs in May 2013 with a median flow of 1 cfs.

For the time interval included in this baseline study, this site was visited 23 times. **Appendix E** presents dates the site was visited and parameters or constituents sampled during each visit. Analytical results are summarized in **Table 4-28**. Multiple constituents were analyzed for but were not detected in at least half of the samples from YP-SR-14. These constituents were ammonia, beryllium, boron, cadmium, carbonate, chloride, chromium, cobalt, total copper, cyanide, fluoride, iron, lead, dissolved manganese, methyl mercury, nickel, nitrate plus nitrite, phosphorus, selenium, silver, total suspended solids, thallium, vanadium and zinc.

Of constituents that were regularly detected, many do not have defined or applicable regulatory criteria for comparison **(see Appendix E)**. These include conductivity, turbidity, arsenic III, bicarbonate, calcium, hardness, magnesium, total nitrogen, total Kjeldahl nitrogen, potassium and sodium. In general, most of the major cations (calcium, magnesium, potassium, and sodium), the major anion (bicarbonate), and hardness were lowest during periods of high flow. The other constituents generally occurred in low concentrations and show no distinct trends.

In addition, many constituents that were regularly detected and have applicable regulatory criteria occurred in concentrations that met criteria **(see Appendix E)**. These constituents include color, dissolved oxygen, temperature, dissolved aluminum, antimony, arsenic, barium, dissolved copper, total manganese, mercury, molybdenum, total dissolved solids, and sulfate. These constituents generally occurred in low concentrations and show no distinct trends.

There were some constituents that did not meet regulatory criteria **(see Appendix E)**. The pH was below the regulatory minimum ($\geq$ 6.5) once (4 percent of measurements). Total alkalinity was below the regulatory minimum (> 20 mg/L) five times (22 percent of measurements). Total aluminum exceeded the regulatory criterion (50 µg/L) four times (24 percent of measurements).

Table 4-28. YP-SR-14, EFSFSR above Fern Creek, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Alkalinity as CaCO3, Total	mg/L	23	0	0	14.7	60	5	29.2	30.2	10.5	40	45.5	56.9	Normal
Aluminum, Total	µg/L	16	1	6	< 4.5	178	4	34.2	9.2	48.9	103	133	169	KM - Nonparametric
Aluminum, Dissolved	µg/L	13	4	24	< 2	14.5	0	5.7	4.8	3.8	11.6	12.7	14.2	KM - Nonparametric
Ammonia as Nitrogen	mg/L	1	22	96	< 0.05	0.058	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Antimony, Total	µg/L	22	1	4	< 0.05	0.5	0	0.08	0.08	0.02	0.12	0.15	0.42	KM - Nonparametric
Antimony, Dissolved	µg/L	22	1	4	< 0.05	0.5	0	0.08	0.07	0.02	0.11	0.11	0.41	KM - Nonparametric
Arsenic, Total	µg/L	23	0	0	0.6	1.5	0	0.8	0.7	0.2	1.1	1.2	1.4	Nonparametric
Arsenic, Dissolved	µg/L	22	1	4	< 0.6	1.2	0	0.7	0.7	0.1	0.9	1.0	1.2	KM - Nonparametric
Arsenic (III)	µg/L	7	6	46	< 0.02	0.05	n/a	0.03	0.02	0.01	0.04	0.04	0.05	KM - Nonparametric
Barium, Total	µg/L	13	0	0	4.55	8.54	0	7.31	7.92	1.36	8.45	8.50	8.53	Normal
Barium, Dissolved	µg/L	13	0	0	3.99	8.88	0	7.07	7.69	1.82	8.55	8.71	8.85	Nonparametric
Beryllium, Total	µg/L	1	12	92	< 0.02	0.03	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Beryllium, Dissolved	µg/L	0	13	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Bicarbonate as CaCO3	mg/L	23	0	0	14.7	55	n/a	28.6	30.2	9.7	40.0	41.9	52.1	Normal
Boron, Total	µg/L	0	13	100	< 20	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Boron, Dissolved	µg/L	0	13	100	< 20	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Total	µg/L	0	19	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Dissolved	µg/L	0	19	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Calcium, Total	µg/L	23	0	0	3350	9110	n/a	6868	7800	1927	8582	8754	9035	Nonparametric
Calcium, Dissolved	µg/L	23	0	0	3360	9560	n/a	6875	7760	1952	8726	8794	9393	Nonparametric
Carbonate as CaCO3	mg/L	0	23	100	< 2	< 15	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chloride	mg/L	1	22	96	< 0.2	0.43	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chromium, Total	µg/L	3	16	84	< 0.2	0.6	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chromium, Dissolved	µg/L	1	18	95	< 0.2	0.3	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cobalt, Total	µg/L	3	10	77	< 0.02	0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cobalt, Dissolved	µg/L	1	12	92	< 0.02	0.03	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample

Table 4-28. YP-SR-14, EFSFSR above Fern Creek, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Conductivity	mS/cm	23	0	0	0.031	0.095	n/a	0.062	0.063	0.018	0.081	0.083	0.092	Normal
Copper, Total	µg/L	3	16	84	< 0.1	0.2	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Copper, Dissolved	µg/L	15	4	21	< 0.1	0.4	0	0.2	0.1	0.1	0.3	0.4	0.4	KM - Nonparametric
Cyanide, Total	mg/L	0	13	100	< 0.0047	< 0.0047	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Dissolved Oxygen (DO)	mg/L	23	0	0	8.68	11.59	0	10.3	10.7	1.0	11.2	11.3	11.5	Nonparametric
Fluoride	mg/L	0	23	100	< 0.2	< 0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Hardness as CaCO3	mg/L	23	0	0	10.2	28.1	n/a	21.2	24.2	6.0	26.6	27.1	27.9	Nonparametric
Iron, Total	µg/L	8	15	65	< 20	242	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Iron, Dissolved	µg/L	0	23	100	< 20	< 21.3	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Lead, Total	µg/L	5	18	78	< 0.02	0.15	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Lead, Dissolved	µg/L	1	22	96	< 0.02	0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Magnesium, Total	µg/L	23	0	0	458	1290	n/a	973	1110	278	1252	1260	1283	Nonparametric
Magnesium, Dissolved	µg/L	23	0	0	456	1360	n/a	973	1110	286	1258	1260	1338	Nonparametric
Manganese, Total	µg/L	9	8	47	< 1	9.4	0	2.0	1.5	2.0	4.0	5.9	8.7	KM - Nonparametric
Manganese, Dissolved	µg/L	1	16	94	< 1	5	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Mercury, Total	ng/L	16	7	30	< 0.5	9	0	1.9	1.0	2.2	4.4	6.8	8.6	KM - Nonparametric
Mercury, Dissolved	ng/L	15	8	35	< 0.5	3.6	0	1.2	1.0	0.9	2.7	3.1	3.5	KM - Nonparametric
Methyl Mercury	ng/L	0	13	100	< 0.1	< 0.1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Molybdenum, Total	µg/L	13	0	0	0.42	1.1	0	0.77	0.78	0.23	1.1	1.1	1.1	Normal
Molybdenum, Dissolved	µg/L	13	0	0	0.41	1.11	0	0.78	0.79	0.23	1.1	1.1	1.1	Normal
Nickel, Total	µg/L	1	12	92	< 0.2	0.2	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nickel, Dissolved	µg/L	1	12	92	< 0.2	0.2	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nitrate + Nitrite as Nitrogen	mg/L	0	23	100	< 0.05	< 0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nitrogen, Total	mg/L	9	4	31	< 0.4	0.81	n/a	0.5	0.5	0.1	0.6	0.7	0.8	KM - Nonparametric
Nitrogen, Total Kjeldahl (TKN)	mg/L	10	3	23	< 0.4	0.81	n/a	0.5	0.5	0.1	0.6	0.7	0.8	KM - Nonparametric
pH	pH units	23	0	0	6.05	8.16	1	7.1	7.0	0.4	7.4	7.7	8.1	Normal

Table 4-28. YP-SR-14, EFSFSR above Fern Creek, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Phosphorus, Total	µg/L	0	23	100	< 20	< 40	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Phosphorus, Dissolved	µg/L	0	23	100	< 20	< 42.6	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Potassium, Total	µg/L	23	0	0	423	652	n/a	576	600	67.0	642	650	652	Nonparametric
Potassium, Dissolved	µg/L	23	0	0	444	703	n/a	592	605	69.2	691	697	702	Normal
Selenium, Total	µg/L	0	19	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Selenium, Dissolved	µg/L	0	19	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Total	µg/L	0	13	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Dissolved	µg/L	0	13	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sodium, Total	µg/L	23	0	0	1250	2150	n/a	1797	1920	279.1	2028	2048	2128	Nonparametric
Sodium, Dissolved	µg/L	23	0	0	1240	2280	n/a	1811	1900	286.1	2062	2088	2238	Normal
Solids, Total Dissolved (TDS)	mg/L	23	0	0	19.5	48	0	33.9	35.0	6.9	40.8	41.9	46.7	Normal
Solids, Total Suspended (TSS)	mg/L	0	23	100	< 5	< 5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sulfate	mg/L	23	0	0	0.69	2.16	0	1.41	1.42	0.44	1.87	1.99	2.13	Normal
Temperature, Water	deg C	23	0	0	-0.01	9.28	0	3.3	1.7	3.4	8.2	8.6	9.1	Nonparametric
Thallium, Total	µg/L	0	13	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Thallium, Dissolved	µg/L	0	13	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Turbidity	NTU	23	0	0	0	5.8	n/a	2.0	2.2	1.5	3.9	4.2	5.4	Normal
Vanadium, Total	µg/L	1	12	92	< 0.2	0.3	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Vanadium, Dissolved	µg/L	0	13	100	< 0.2	< 0.2	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Zinc, Total	µg/L	6	17	74	< 0.5	1.6	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Zinc, Dissolved	µg/L	10	13	57	< 0.5	1.3	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample

Units: **µg/L** = micrograms per liter; **mg/L** = milligrams per liter; **mS/cm** = milliSiemens per centimeter; **ng/L** = nanograms per liter; **deg C** = degrees Celsius; **NTU** = nephelometric turbidity units
Measurements: **< 20 µg/L** = analyte not detected at the method reporting limit of 20 µg/L; **n/a** = not applicable; **Min** = minimum concentration measured; **Max** = maximum concentration measured
*Number that do not meet criterion: total number of analytical results that did not meet the strictest potentially applicable regulatory criterion (presented in **Table 3-4**). If a constituent does not have applicable regulatory criteria, then n/a is given.*
Distribution: **Normal** = data appear normally distributed at 0.05 significance level; statistics presented are normal population estimators; **Gamma** = data appear gamma distributed 0.05 significance level; statistics presented are gamma population estimators; **Lognormal** = data appear lognormally distributed at 0.05 significance level; statistics presented are lognormal populations estimators; **Nonparametric** = data do not appear normally, gamma or lognormally distributed at 0.05 significance level; statistics presented are sample statistics; **KM nonparametric** = data comprises ≤ 50% non-detects; statistics presented are nonparametric population estimators generated using the Kaplan-Meier method; **Sample** = data comprises > 50% non-detects and statistics are not presented; or, data comprises five or fewer measurements but each result was detected and statistics presented are sample statistics.

YP-SR-13, EFSFSR above Rabbit Creek

The EFSFSR site above Rabbit Creek (YP-SR-13) is located in a sinuous, forested stretch of river (see photos in **Appendix G**). The site is upstream of the Rabbit Creek confluence and potential future MGII activities, but is downstream of the historic Fern mercury mine (Mitchell 2000). The site is approximately 150 feet south of FS 375. Flow in this stretch is generally south to north, and onsite flow measurements have ranged from 2.0 cfs in February 2016 to 67 cfs in May 2012 with a median flow of 5.3 cfs.

For the time interval included in this baseline study, this site was visited 35 times. **Appendix E** presents dates the site was visited and parameters or constituents sampled during each visit. Analytical results are summarized in **Table 4-29**. Multiple constituents were analyzed for but were not detected in at least half of the samples from YP-SR-13. These constituents were ammonia, beryllium, boron, cadmium, carbonate, chloride, chromium, cobalt, cyanide, fluoride, dissolved iron, lead, dissolved manganese, methyl mercury, nickel, nitrate plus nitrite, phosphorus, selenium, silver, total suspended solids, thallium, vanadium and total zinc.

Of constituents that were regularly detected, many do not have defined or applicable regulatory criteria for comparison **(see Appendix E)**. These include conductivity, turbidity, arsenic III, bicarbonate, calcium, hardness, magnesium, total nitrogen, total Kjeldahl nitrogen, potassium and sodium. In general, most of the major cations (calcium, magnesium, potassium, and sodium), major anion (bicarbonate), and related measurements (conductivity and hardness) tended to be lower during periods of high flow. The other constituents generally occurred in low concentrations and show no distinct trends.

In addition, many constituents that were regularly detected and have applicable regulatory criteria occurred in concentrations that met criteria **(see Appendix E)**. These constituents include color, dissolved oxygen, temperature, alkalinity, dissolved aluminum, antimony, arsenic, barium, copper, total iron, total manganese, dissolved mercury, molybdenum, total dissolved solids, sulfate, and dissolved zinc. Of these constituents, alkalinity and arsenic concentrations tended to be low during high flow conditions. In contrast, dissolved aluminum, antimony, total iron and total manganese concentrations tended to be highest during high flow conditions. The remaining constituents generally occurred in low concentrations and do not show distinct trends.

There were some constituents that did not meet regulatory criteria **(see Appendix E)**. The pH was lower than the regulatory minimum ($\geq$ 6.5) once (3 percent of measurements). Total aluminum exceeded the regulatory criterion (50 µg/L) six times (30 percent of measurements). Total mercury exceeded the regulatory criterion (12 ng/L) five times (14 percent of measurements).

Table 4-29. YP-SR-13, EFSFSR above Rabbit Creek, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Alkalinity as CaCO3, Total	mg/L	35	0	0	21.5	70	0	37.4	39.1	10.5	47.2	55	67.3	Nonparametric
Aluminum, Total	µg/L	20	0	0	6.1	185	6	38.1	23.1	49.9	83.2	120	237	Lognormal
Aluminum, Dissolved	µg/L	17	3	15	< 2.6	18.4	0	7.4	6.1	4.7	15.4	16.0	17.9	KM - Nonparametric
Ammonia as Nitrogen	mg/L	1	34	97	< 0.05	0.061	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Antimony, Total	µg/L	32	3	9	< 0.1	0.5	0	0.1	0.1	0.04	0.2	0.2	0.4	KM - Nonparametric
Antimony, Dissolved	µg/L	32	3	9	< 0.09	0.5	0	0.1	0.1	0.04	0.2	0.3	0.4	KM - Nonparametric
Arsenic, Total	µg/L	35	0	0	2	5.8	0	4.4	4.8	1.2	5.6	5.7	5.8	Nonparametric
Arsenic, Dissolved	µg/L	35	0	0	2	5.9	0	4.3	4.7	1.3	5.5	5.6	5.8	Nonparametric
Arsenic (III)	µg/L	16	0	0	0.02	0.18	n/a	0.08	0.08	0.04	0.12	0.14	0.17	Normal
Barium, Total	µg/L	16	0	0	6.67	10.6	0	9.3	9.7	1.1	10.1	10.3	10.5	Nonparametric
Barium, Dissolved	µg/L	16	0	0	5.8	10.5	0	8.9	9.6	1.6	9.9	10.1	10.4	Nonparametric
Beryllium, Total	µg/L	1	15	94	< 0.02	0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Beryllium, Dissolved	µg/L	0	16	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Bicarbonate as CaCO3	mg/L	35	0	0	21.5	58	n/a	36.7	39.1	8.86	46	50.1	57.0	Nonparametric
Boron, Total	µg/L	0	16	100	< 10	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Boron, Dissolved	µg/L	0	16	100	< 10	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Total	µg/L	0	31	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Dissolved	µg/L	1	30	97	< 0.02	0.04	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Calcium, Total	µg/L	35	0	0	5190	10800	n/a	8733	9460	1819	10420	10500	10698	Nonparametric
Calcium, Dissolved	µg/L	35	0	0	5030	11200	n/a	8747	9350	1887	10460	11000	11132	Nonparametric
Carbonate as CaCO3	mg/L	0	35	100	< 9	< 15	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chloride	mg/L	1	34	97	< 0.2	0.41	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chromium, Total	µg/L	5	26	84	< 0.2	0.3	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chromium, Dissolved	µg/L	3	28	90	< 0.2	0.3	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cobalt, Total	µg/L	5	11	69	< 0.02	0.07	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cobalt, Dissolved	µg/L	3	13	81	< 0.02	0.04	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Conductivity	mS/cm	33	0	0	0.042	0.112	n/a	0.078	0.080	0.018	0.097	0.105	0.111	Normal

Table 4-29. YP-SR-13, EFSFSR above Rabbit Creek, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Copper, Total	µg/L	16	15	48	< 0.1	0.3	0	0.1	0.1	0.1	0.2	0.3	0.3	KM - Nonparametric
Copper, Dissolved	µg/L	27	4	13	< 0.1	0.7	0	0.2	0.2	0.2	0.4	0.5	0.7	KM - Nonparametric
Cyanide, Total	mg/L	0	16	100	< 0.0047	< 0.01	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Dissolved Oxygen (DO)	mg/L	33	0	0	8.73	12.72	0	10.3	10.3	0.9	11.3	11.6	12.4	Normal
Fluoride	mg/L	0	35	100	< 0.2	< 0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Hardness as CaCO3	mg/L	35	0	0	17.5	38.5	n/a	30.3	34.1	7.0	36.9	37.4	38.3	Nonparametric
Iron, Total	µg/L	23	12	34	< 15.8	276	0	43.7	23.4	51.7	96.4	129	237	KM - Nonparametric
Iron, Dissolved	µg/L	0	35	100	< 10	< 21.3	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Lead, Total	µg/L	9	26	74	< 0.02	0.13	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Lead, Dissolved	µg/L	2	33	94	< 0.02	0.17	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Magnesium, Total	µg/L	35	0	0	1110	2880	n/a	2144	2430	542.4	2662	2706	2849	Nonparametric
Magnesium, Dissolved	µg/L	35	0	0	1080	2850	n/a	2140	2370	559.5	2710	2751	2833	Nonparametric
Manganese, Total	µg/L	14	6	30	< 1	13.9	0	2.95	2.35	2.86	5.12	6.59	12.4	KM - Nonparametric
Manganese, Dissolved	µg/L	1	19	95	< 0.9	5	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Mercury, Total	ng/L	35	0	0	1.8	29.2	5	7.4	5.2	6.6	16.8	22.2	28.3	Nonparametric
Mercury, Dissolved	ng/L	33	1	3	< 1	6.8	0	3.2	2.9	1.1	4.6	5.1	6.4	KM - Nonparametric
Methyl Mercury	ng/L	0	16	100	< 0.1	< 0.1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Molybdenum, Total	µg/L	16	0	0	0.65	1.19	0	0.96	1.0	0.16	1.1	1.2	1.2	Normal
Molybdenum, Dissolved	µg/L	16	0	0	0.62	1.2	0	0.95	0.97	0.15	1.1	1.1	1.2	Normal
Nickel, Total	µg/L	0	16	100	< 0.2	< 0.2	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nickel, Dissolved	µg/L	1	15	94	< 0.2	0.3	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nitrate + Nitrite as Nitrogen	mg/L	0	35	100	< 0.05	< 0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nitrogen, Total	mg/L	12	4	25	< 0.4	1	n/a	0.6	0.5	0.2	0.8	0.9	1.0	KM - Nonparametric
Nitrogen, Total Kjeldahl (TKN)	mg/L	14	2	13	< 0.4	1	n/a	0.6	0.5	0.2	0.8	0.9	1.0	KM - Nonparametric
pH	pH units	33	0	0	6.41	8.32	1	7.4	7.4	0.4	8.2	8.2	8.3	Normal

Table 4-29. YP-SR-13, EFSFSR above Rabbit Creek, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Phosphorus, Total	µg/L	2	33	94	< 20	< 40	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Phosphorus, Dissolved	µg/L	0	35	100	< 20	< 42.6	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Potassium, Total	µg/L	35	0	0	493	817	n/a	658	667	68.7	729	735	790	Normal
Potassium, Dissolved	µg/L	35	0	0	503	801	n/a	657	663	73.7	744	764	794	Normal
Selenium, Total	µg/L	0	31	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Selenium, Dissolved	µg/L	0	31	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Total	µg/L	1	15	94	< 0.02	0.04	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Dissolved	µg/L	0	16	100	< 0.02	< 0.04	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sodium, Total	µg/L	35	0	0	1210	1900	n/a	1607	1650	159.4	1774	1790	1863	Nonparametric
Sodium, Dissolved	µg/L	35	0	0	1210	1930	n/a	1619	1650	166.3	1750	1861	1923	Nonparametric
Solids, Total Dissolved (TDS)	mg/L	35	0	0	23.5	75	0	44.8	44	11.7	56.1	64.4	73.3	Normal
Solids, Total Suspended (TSS)	mg/L	0	35	100	< 5	< 5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sulfate	mg/L	35	0	0	0.79	1.97	0	1.39	1.42	0.33	1.79	1.86	1.94	Normal
Temperature, Water	deg C	35	0	0	-0.01	10.97	0	3.8	2.7	3.3	8.6	9.2	10.6	Nonparametric
Thallium, Total	µg/L	0	16	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Thallium, Dissolved	µg/L	0	16	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Turbidity	NTU	34	0	0	0	7.5	n/a	1.9	1.6	1.7	4.2	5.1	6.8	Normal
Vanadium, Total	µg/L	3	13	81	< 0.2	0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Vanadium, Dissolved	µg/L	0	16	100	< 0.2	< 0.2	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Zinc, Total	µg/L	6	29	83	< 0.5	1.3	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Zinc, Dissolved	µg/L	19	16	46	< 0.5	1.77	0	0.63	0.5	0.24	0.86	0.93	1.51	KM - Nonparametric

Units: **µg/L** = micrograms per liter; **mg/L** = milligrams per liter; **mS/cm** = milliSiemens per centimeter; **ng/L** = nanograms per liter; **deg C** = degrees Celsius; **NTU** = nephelometric turbidity units
Measurements: **< 20 µg/L** = analyte not detected at the method reporting limit of 20 µg/L; **n/a** = not applicable; **Min** = minimum concentration measured; **Max** = maximum concentration measured
*Number that do not meet criterion: total number of analytical results that did not meet the strictest potentially applicable regulatory criterion (presented in **Table 3-4**). If a constituent does not have applicable regulatory criteria, then n/a is given.*
Distribution: **Normal** = data appear normally distributed at 0.05 significance level; statistics presented are normal population estimators; **Gamma** = data appear gamma distributed 0.05 significance level; statistics presented are gamma population estimators; **Lognormal** = data appear lognormally distributed at 0.05 significance level; statistics presented are lognormal populations estimators; **Nonparametric** = data do not appear normally, gamma or lognormally distributed at 0.05 significance level; statistics presented are sample statistics; **KM nonparametric** = data comprises ≤ 50% non-detects; statistics presented are nonparametric population estimators generated using the Kaplan-Meier method; **Sample** = data comprises > 50% non-detects and statistics are not presented; or, data comprises five or fewer measurements but each result was detected and statistics presented are sample statistics.

YP-T-21, Rabbit Creek

The Rabbit Creek site (YP-T-21) is located on a forested reach approximately 100 feet north of FS 375. Some mining activity, including at least one small adit and some placer workings took place on Rabbit Creek during the early 1900s (Hardel 2011). The creek is narrow and steep throughout this reach (see photos in **Appendix G**). Flow is generally from east to west through this reach and onsite flow measurements have ranged from 0.22 cfs in February 2016 to 3.5 cfs in May 2013 with a median flow of 0.77 cfs.

For the time interval included in this baseline study, this site was visited 35 times. **Appendix E** presents dates the site was visited and parameters or constituents sampled during each visit. Analytical results are summarized in **Table 4-30**. Multiple constituents were analyzed for but were not detected in at least half of the samples from YP-T-21. These constituents were ammonia, beryllium, boron, cadmium, carbonate, chloride, chromium, cobalt, total copper, cyanide, fluoride, dissolved iron, lead, dissolved manganese, methyl mercury, nickel, nitrate plus nitrite, phosphorus, selenium, silver, total suspended solids, thallium, dissolved vanadium and zinc.

Of constituents that were regularly detected, many do not have defined or applicable regulatory criteria for comparison **(see Appendix E)**. These include conductivity, turbidity, arsenic III, bicarbonate, calcium, hardness, magnesium, total nitrogen, total Kjeldahl nitrogen, potassium and sodium. In general, some of the major cations (calcium, magnesium), major anion (bicarbonate), and related measurements (conductivity and hardness) tended to be lower during periods of high flow. The other constituents generally occurred in low concentrations and show no distinct trends.

In addition, many constituents that were regularly detected and have applicable regulatory criteria occurred in concentrations that met criteria **(see Appendix E)**. These constituents include color, dissolved oxygen, pH, temperature, alkalinity, dissolved aluminum, barium, dissolved copper, total manganese, dissolved mercury, molybdenum, total dissolved solids, sulfate, and total vanadium. Of these constituents, alkalinity and sulfate tended to be lowest during high flow conditions. The remaining constituents generally occurred in low concentrations and do not show distinct trends.

There were some constituents that did not meet regulatory criteria **(see Appendix E)**. Total aluminum exceeded the regulatory criterion (50 µg/L) four times (20 percent of measurements). Total and dissolved antimony exceeded the regulatory criterion (5.6 µg/L) 35 times each (100 percent of measurements). Total and dissolved arsenic exceeded the regulatory criterion (10 µg/L) 35 times each (100 percent of measurements). Total iron exceeded the regulatory criterion (300 µg/L) once (3 percent of measurements). Total mercury exceeded the regulatory criterion (12 ng/L) 25 times (71 percent of measurements).

Table 4-30. YP-T-21, Rabbit Creek, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Alkalinity as CaCO3, Total	mg/L	35	0	0	23.2	77	0	44.8	48	11.2	54.2	60.6	74.3	Nonparametric
Aluminum, Total	µg/L	20	0	0	8.7	220	4	42.9	26.0	56.1	93.7	135	266	Lognormal
Aluminum, Dissolved	µg/L	17	3	15	< 2.1	20.8	0	6.1	4.9	4.8	12.5	13.8	19.4	KM - Nonparametric
Ammonia as Nitrogen	mg/L	0	35	100	< 0.05	< 0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Antimony, Total	µg/L	35	0	0	5.69	10.4	35	8.1	8.01	1.60	10.2	10.3	10.4	Normal
Antimony, Dissolved	µg/L	35	0	0	5.7	10.9	35	8.15	7.95	1.59	10.2	10.4	10.8	Normal
Arsenic, Total	µg/L	35	0	0	35.9	62.4	35	52.9	54.5	6.31	60.0	60.6	61.9	Normal
Arsenic, Dissolved	µg/L	35	0	0	35.2	67.9	35	52.1	52.5	6.73	59.8	60.2	65.3	Normal
Arsenic (III)	µg/L	16	0	0	0.114	0.29	n/a	0.20	0.20	0.06	0.28	0.28	0.29	Normal
Barium, Total	µg/L	16	0	0	5.87	9.22	0	7.93	7.82	0.82	8.90	9.01	9.18	Normal
Barium, Dissolved	µg/L	16	0	0	5.45	8.9	0	7.47	7.66	1.07	8.49	8.59	8.84	Normal
Beryllium, Total	µg/L	1	15	94	< 0.02	0.03	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Beryllium, Dissolved	µg/L	0	16	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Bicarbonate as CaCO3	mg/L	35	0	0	23.2	64	n/a	43.8	48	9.5	52.2	55.6	61.6	Nonparametric
Boron, Total	µg/L	0	16	100	< 10	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Boron, Dissolved	µg/L	0	16	100	< 10	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Total	µg/L	0	31	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Dissolved	µg/L	1	30	97	< 0.02	0.03	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Calcium, Total	µg/L	35	0	0	4950	11100	n/a	9069	9880	1776	10820	10960	11100	Nonparametric
Calcium, Dissolved	µg/L	35	0	0	4860	11300	n/a	9111	10000	1805	10620	11020	11300	Nonparametric
Carbonate as CaCO3	mg/L	0	35	100	< 9	< 15	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chloride	mg/L	0	35	100	< 0.2	< 0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chromium, Total	µg/L	4	27	87	< 0.2	0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chromium, Dissolved	µg/L	5	26	84	< 0.2	0.5	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cobalt, Total	µg/L	8	8	50	< 0.02	0.07	n/a	0.03	0.02	0.01	0.05	0.06	0.07	KM - Nonparametric
Cobalt, Dissolved	µg/L	2	14	88	< 0.02	0.04	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Conductivity	mS/cm	34	0	0	0.053	0.134	n/a	0.096	0.099	0.021	0.115	0.123	0.131	Normal

Table 4-30. YP-T-21, Rabbit Creek, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Copper, Total	µg/L	13	18	58	< 0.1	0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Copper, Dissolved	µg/L	31	0	0	0.1	1.1	0	0.2	0.2	0.2	0.3	0.5	0.9	Nonparametric
Cyanide, Total	mg/L	0	16	100	< 0.0047	< 0.01	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Dissolved Oxygen (DO)	mg/L	35	0	0	8.22	12.28	0	10.0	10.2	1.0	10.9	11.4	12.1	Normal
Fluoride	mg/L	0	35	100	< 0.2	< 0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Hardness as CaCO3	mg/L	35	0	0	21.5	50.1	n/a	41.0	45.1	8.21	48.6	49.4	50.0	Nonparametric
Iron, Total	µg/L	28	7	20	< 19	314	1	65	29	82	194	280	303	KM - Nonparametric
Iron, Dissolved	µg/L	1	34	97	< 10	34.5	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Lead, Total	µg/L	11	24	69	< 0.02	0.13	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Lead, Dissolved	µg/L	4	31	89	< 0.02	0.04	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Magnesium, Total	µg/L	35	0	0	2230	5440	n/a	4474	4920	928.9	5320	5390	5423	Nonparametric
Magnesium, Dissolved	µg/L	35	0	0	2150	5950	n/a	4493	4870	967.9	5298	5505	5834	Nonparametric
Manganese, Total	µg/L	16	4	20	< 1	9.6	0	2.6	2	2.0	5	5.2	8.7	KM - Nonparametric
Manganese, Dissolved	µg/L	0	20	100	< 0.6	< 5	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Mercury, Total	ng/L	35	0	0	5.7	62.6	25	18.0	15.0	11.8	32.3	40.1	60.3	Lognormal
Mercury, Dissolved	ng/L	34	0	0	2.9	10.9	0	6.2	6.2	1.6	8.1	8.6	10.2	Normal
Methyl Mercury	ng/L	2	14	88	< 0.1	0.3	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Molybdenum, Total	µg/L	16	0	0	0.68	1.35	0	1.1	1.2	0.20	1.3	1.3	1.3	Normal
Molybdenum, Dissolved	µg/L	16	0	0	0.62	1.33	0	1.1	1.2	0.20	1.3	1.3	1.3	Normal
Nickel, Total	µg/L	1	15	94	< 0.2	0.3	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nickel, Dissolved	µg/L	4	12	75	< 0.2	0.3	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nitrate + Nitrite as Nitrogen	mg/L	1	34	97	< 0.05	0.058	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nitrogen, Total	mg/L	12	4	25	< 0.4	6.24	n/a	0.88	0.49	1.4	0.84	2.3	5.5	KM - Nonparametric
Nitrogen, Total Kjeldahl (TKN)	mg/L	13	3	19	< 0.4	6.24	n/a	0.88	0.49	1.4	0.84	2.3	5.5	KM - Nonparametric
pH	pH units	34	0	0	6.75	8.83	0	7.6	7.5	0.5	8.4	8.4	8.7	Normal
Phosphorus, Total	µg/L	3	32	91	< 20	< 40	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample

Table 4-30. YP-T-21, Rabbit Creek, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Phosphorus, Dissolved	µg/L	2	33	94	< 20	42.6	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Potassium, Total	µg/L	35	0	0	540	890	n/a	732	745	85.5	829	845	877	Normal
Potassium, Dissolved	µg/L	35	0	0	509	897	n/a	731	732	99.1	845	877	894	Normal
Selenium, Total	µg/L	0	31	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Selenium, Dissolved	µg/L	0	31	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Total	µg/L	0	16	100	< 0.02	< 0.04	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Dissolved	µg/L	0	16	100	< 0.02	< 0.04	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sodium, Total	µg/L	35	0	0	653	1100	n/a	846	829	103	1016	1033	1080	Normal
Sodium, Dissolved	µg/L	35	0	0	668	1110	n/a	858	833	102	1011	1046	1093	Normal
Solids, Total Dissolved (TDS)	mg/L	35	0	0	29	81	0	49	50	11	62	65	77	Normal
Solids, Total Suspended (TSS)	mg/L	1	34	97	< 5	8	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sulfate	mg/L	35	0	0	1.17	3.05	0	2.17	2.27	0.524	2.71	2.82	3.00	Normal
Temperature, Water	deg C	35	0	0	0.02	11.48	0	4.6	3.5	3.5	9.7	10.3	11.3	Normal
Thallium, Total	µg/L	0	16	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Thallium, Dissolved	µg/L	0	16	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Turbidity	NTU	34	0	0	0.3	7.5	n/a	2.9	2.6	1.7	4.9	5.6	7.3	Normal
Vanadium, Total	µg/L	9	7	44	< 0.2	0.4	0	0.2	0.2	0.1	0.3	0.3	0.4	KM - Nonparametric
Vanadium, Dissolved	µg/L	5	11	69	< 0.2	0.2	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Zinc, Total	µg/L	6	29	83	< 0.5	3.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Zinc, Dissolved	µg/L	17	18	51	< 0.5	1.5	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample

Units: **µg/L** = micrograms per liter; **mg/L** = milligrams per liter; **mS/cm** = milliSiemens per centimeter; **ng/L** = nanograms per liter; **deg C** = degrees Celsius; **NTU** = nephelometric turbidity units
Measurements: **< 20 µg/L** = analyte not detected at the method reporting limit of 20 µg/L; **n/a** = not applicable; **Min** = minimum concentration measured; **Max** = maximum concentration measured
*Number that do not meet criterion: total number of analytical results that did not meet the strictest potentially applicable regulatory criterion (presented in **Table 3-4**). If a constituent does not have applicable regulatory criteria, then n/a is given.*
Distribution: **Normal** = data appear normally distributed at 0.05 significance level; statistics presented are normal population estimators; **Gamma** = data appear gamma distributed 0.05 significance level; statistics presented are gamma population estimators; **Lognormal** = data appear lognormally distributed at 0.05 significance level; statistics presented are lognormal populations estimators; **Nonparametric** = data do not appear normally, gamma or lognormally distributed at 0.05 significance level; statistics presented are sample statistics; **KM nonparametric** = data comprises ≤ 50% non-detects; statistics presented are nonparametric population estimators generated using the Kaplan-Meier method; **Sample** = data comprises > 50% non-detects and statistics are not presented; or, data comprises five or fewer measurements but each result was detected and statistics presented are sample statistics.

YP-SR-11, EFSFSR above Meadow Creek

The EFSFSR site above Meadow Creek (YP-SR-11) is located in a sinuous, steep gradient, forested stretch of river in the vicinity of USGS Station 13310800 (see photos in **Appendix G**). However, from December 2012 through September 2013, this site was moved about 250 feet upstream after windfall blocked the original site. The site was moved back to its original location in October 2013 after USGS personnel cleared the windfall. The site is located at the southern end of the former Stibnite town site. Flow in this stretch is generally south to north and onsite flow measurements have ranged from 3.3 cfs in February 2014 to 80 cfs in May 2012 with a median flow of 5.6 cfs.

For the time interval included in this baseline study, this site was visited 35 times. **Appendix E** presents dates the site was visited and parameters or constituents sampled during each visit. Analytical results are summarized in **Table 4-31**. Multiple constituents were analyzed for but were not detected in at least half of the samples from YP-SR-11. These constituents were ammonia, beryllium, boron, cadmium, carbonate, chloride, chromium, cobalt, fluoride, cyanide, dissolved iron, lead, dissolved manganese, methyl mercury, nickel, nitrate plus nitrite, phosphorus, selenium, silver, total suspended solids, thallium, vanadium and total zinc.

Of constituents that were regularly detected, many do not have defined or applicable regulatory criteria for comparison **(see Appendix E)**. These include conductivity, turbidity, arsenic III, bicarbonate, calcium, hardness, magnesium, total nitrogen, total Kjeldahl nitrogen, potassium and sodium. In general, most of the major cations (calcium, magnesium, sodium), major anion (bicarbonate), and related measurements (conductivity and hardness) tended to be lowest during periods of high flow. The other constituents generally occurred in low concentrations and show no distinct trends.

In addition, many constituents that were regularly detected and have applicable regulatory criteria occurred in concentrations that met criteria **(see Appendix E)**. These constituents include color, dissolved oxygen, pH, temperature, alkalinity, dissolved aluminum, antimony, barium, copper, total iron, total manganese, dissolved mercury, molybdenum, total dissolved solids, sulfate, and dissolved zinc. Of these constituents, alkalinity and antimony tended to be low during periods of high flow. In contrast, total iron and total manganese were highest during periods of high flow. The remaining constituents generally occurred in low concentrations and do not show distinct trends.

There were some constituents that did not meet regulatory criteria **(see Appendix E)**. Total aluminum exceeded the regulatory criterion (50 µg/L) six times (30 percent of measurements). Total and dissolved arsenic exceeded the regulatory criterion (10 µg/L) 23 times each (66 percent of measurements). Cyanide exceeded the regulatory criterion (0.0052 mg/L) twice (13 percent of measurements). Total mercury exceeded the regulatory criterion (12 ng/L) six times (17 percent of measurements).

Table 4-31. YP-SR-11, EFSFSR above Meadow Creek, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Alkalinity as CaCO3, Total	mg/L	35	0	0	22	70	0	39	40	12	52	65	69	Nonparametric
Aluminum, Total	µg/L	20	0	0	7.7	190	6	42.9	25.6	57.8	94.2	136	273	Lognormal
Aluminum, Dissolved	µg/L	17	3	15	< 2.2	16.8	0	6.5	5.6	4.2	13.3	14.7	16.4	KM - Nonparametric
Ammonia as Nitrogen	mg/L	0	35	100	< 0.05	< 0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Antimony, Total	µg/L	35	0	0	0.47	1.9	0	1.1	1.1	0.37	1.5	1.6	1.9	Normal
Antimony, Dissolved	µg/L	35	0	0	0.47	1.86	0	1.1	1.0	0.37	1.5	1.6	1.8	Normal
Arsenic, Total	µg/L	35	0	0	4.9	13	23	10.3	11.4	2.6	12.8	12.9	13.0	Nonparametric
Arsenic, Dissolved	µg/L	35	0	0	4.6	13.2	23	10.1	11.0	2.7	12.5	12.7	13.1	Nonparametric
Arsenic (III)	µg/L	16	0	0	0.04	0.23	n/a	0.11	0.11	0.05	0.17	0.19	0.22	Normal
Barium, Total	µg/L	16	0	0	7.27	11.7	0	10.3	10.8	1.2	11.3	11.4	11.6	Normal
Barium, Dissolved	µg/L	16	0	0	6.2	11.9	0	9.8	10.3	1.7	11.4	11.7	11.9	Nonparametric
Beryllium, Total	µg/L	1	15	94	< 0.02	0.03	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Beryllium, Dissolved	µg/L	0	16	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Bicarbonate as CaCO3	mg/L	35	0	0	21.6	64	n/a	38.0	39.6	9.99	51.2	55.2	62.0	Nonparametric
Boron, Total	µg/L	0	16	100	< 10	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Boron, Dissolved	µg/L	0	16	100	< 10	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Total	µg/L	0	31	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Dissolved	µg/L	1	30	97	< 0.02	0.03	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Calcium, Total	µg/L	35	0	0	5290	11200	n/a	8795	9370	1797	10400	10690	11098	Nonparametric
Calcium, Dissolved	µg/L	35	0	0	5150	11200	n/a	8805	9380	1805	10360	10580	11132	Nonparametric
Carbonate as CaCO3	mg/L	0	35	100	< 9	< 15	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chloride	mg/L	0	35	100	< 0.2	< 0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chromium, Total	µg/L	4	27	87	< 0.2	0.8	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chromium, Dissolved	µg/L	3	28	90	< 0.2	0.3	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cobalt, Total	µg/L	7	9	56	< 0.02	0.08	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cobalt, Dissolved	µg/L	4	12	75	< 0.02	0.04	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Conductivity	mS/cm	34	0	0	0.043	0.112	n/a	0.080	0.082	0.017	0.097	0.108	0.111	Normal

Table 4-31. YP-SR-11, EFSFSR above Meadow Creek, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Copper, Total	µg/L	16	15	48	< 0.1	0.3	0	0.1	0.1	0.1	0.2	0.3	0.3	KM - Nonparametric
Copper, Dissolved	µg/L	28	3	10	< 0.1	1	0	0.2	0.1	0.2	0.3	0.5	0.9	KM - Nonparametric
Cyanide, Total	mg/L	2	14	88	< 0.0047	0.01	2	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Dissolved Oxygen (DO)	mg/L	34	0	0	8.46	12.31	0	10.3	10.5	1.06	11.5	11.7	12.2	Normal
Fluoride	mg/L	0	35	100	< 0.2	< 0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Hardness as CaCO3	mg/L	35	0	0	18	40.1	n/a	31.3	33.8	6.78	37.5	38.5	39.8	Nonparametric
Iron, Total	µg/L	23	12	34	< 19.1	297	0	50.7	23.7	60.9	132	173	264	KM - Nonparametric
Iron, Dissolved	µg/L	2	33	94	< 10	22.1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Lead, Total	µg/L	13	22	63	< 0.02	0.33	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Lead, Dissolved	µg/L	3	32	91	< 0.02	0.05	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Magnesium, Total	µg/L	35	0	0	1150	2980	n/a	2269	2480	565.4	2740	2932	2973	Nonparametric
Magnesium, Dissolved	µg/L	35	0	0	1100	3040	n/a	2260	2450	573.2	2742	2925	3013	Nonparametric
Manganese, Total	µg/L	17	3	15	< 1	14.6	0	3.28	2.45	3.22	5.45	9.76	13.6	KM - Nonparametric
Manganese, Dissolved	µg/L	2	18	90	< 1	5	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Mercury, Total	ng/L	35	0	0	2.9	37	6	7.6	4.8	6.9	15	19	32	Nonparametric
Mercury, Dissolved	ng/L	34	0	0	1.6	5.2	0	3.0	2.8	0.84	4.1	4.5	5.3	Gamma
Methyl Mercury	ng/L	1	15	94	< 0.1	0.1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Molybdenum, Total	µg/L	16	0	0	0.62	1.1	0	0.92	0.95	0.15	1.1	1.1	1.1	Normal
Molybdenum, Dissolved	µg/L	16	0	0	0.62	1.1	0	0.92	0.95	0.14	1.1	1.1	1.1	Normal
Nickel, Total	µg/L	1	15	94	< 0.2	0.2	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nickel, Dissolved	µg/L	2	14	88	< 0.2	0.8	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nitrate + Nitrite as Nitrogen	mg/L	1	34	97	< 0.05	0.052	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nitrogen, Total	mg/L	10	6	38	< 0.4	0.82	n/a	0.5	0.5	0.1	0.6	0.6	0.8	KM - Nonparametric
Nitrogen, Total Kjeldahl (TKN)	mg/L	11	5	31	< 0.4	0.82	n/a	0.5	0.5	0.1	0.6	0.6	0.8	KM - Nonparametric
pH	pH units	34	0	0	6.64	8.55	0	7.5	7.5	0.5	8.2	8.5	8.5	Normal
Phosphorus, Total	µg/L	1	34	97	< 20	< 40	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample

Table 4-31. YP-SR-11, EFSFSR above Meadow Creek, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Phosphorus, Dissolved	µg/L	0	35	100	< 20	< 42.6	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Potassium, Total	µg/L	35	0	0	523	841	n/a	694	698	83.1	789	803	832	Normal
Potassium, Dissolved	µg/L	35	0	0	503	817	n/a	696	721	89.0	792	809	817	Nonparametric
Selenium, Total	µg/L	0	31	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Selenium, Dissolved	µg/L	0	31	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Total	µg/L	0	16	100	< 0.02	< 0.04	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Dissolved	µg/L	0	16	100	< 0.02	< 0.04	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sodium, Total	µg/L	35	0	0	1220	1880	n/a	1661	1700	160.3	1820	1826	1866	Nonparametric
Sodium, Dissolved	µg/L	35	0	0	1320	2160	n/a	1685	1700	176.4	1868	1913	2078	Normal
Solids, Total Dissolved (TDS)	mg/L	35	0	0	25	79	0	45	46	12	61	63	75	Normal
Solids, Total Suspended (TSS)	mg/L	2	33	94	< 5	6.5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sulfate	mg/L	35	0	0	0.88	2.31	0	1.60	1.63	0.42	2.09	2.20	2.29	Normal
Temperature, Water	deg C	35	0	0	-0.03	11.79	0	4.3	2.9	3.8	10.3	10.8	11.5	Nonparametric
Thallium, Total	µg/L	0	16	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Thallium, Dissolved	µg/L	0	16	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Turbidity	NTU	35	0	0	0	41.5	n/a	4.0	2.1	7.1	7.8	10.8	31.7	Nonparametric
Vanadium, Total	µg/L	7	9	56	< 0.2	0.5	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Vanadium, Dissolved	µg/L	1	15	94	< 0.2	0.2	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Zinc, Total	µg/L	9	26	74	< 0.5	1.3	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Zinc, Dissolved	µg/L	21	14	40	< 0.5	1.8	0	0.7	0.5	0.3	1.2	1.4	1.7	KM - Nonparametric

Units: **µg/L** = micrograms per liter; **mg/L** = milligrams per liter; **mS/cm** = milliSiemens per centimeter; **ng/L** = nanograms per liter; **deg C** = degrees Celsius; **NTU** = nephelometric turbidity units

Measurements: **< 20 µg/L** = analyte not detected at the method reporting limit of 20 µg/L; **n/a** = not applicable; **Min** = minimum concentration measured; **Max** = maximum concentration measured

*Number that do not meet criterion: total number of analytical results that did not meet the strictest potentially applicable regulatory criterion (presented in **Table 3-4**). If a constituent does not have applicable regulatory criteria, then n/a is given.*

Distribution: **Normal** = data appear normally distributed at 0.05 significance level; statistics presented are normal population estimators; **Gamma** = data appear gamma distributed 0.05 significance level; statistics presented are gamma population estimators; **Lognormal** = data appear lognormally distributed at 0.05 significance level; statistics presented are lognormal populations estimators; **Nonparametric** = data do not appear normally, gamma or lognormally distributed at 0.05 significance level; statistics presented are sample statistics; **KM nonparametric** = data comprises ≤ 50% non-detects; statistics presented are nonparametric population estimators generated using the Kaplan-Meier method; **Sample** = data comprises > 50% non-detects and statistics are not presented; or, data comprises five or fewer measurements but each result was detected and statistics presented are sample statistics.

YP-SR-10, EFSFSR below Meadow Creek

The EFSFSR site below Meadow Creek (YP-SR-10) is located about 100 feet upstream (south) of the FS 412 box culvert over the EFSFSR (see photos in **Appendix G**). It is approximately 700 feet upstream of USGS Station 1331100 and about 650 feet downstream of the confluence of Meadow Creek. The site is in an open area disturbed by legacy mining (Mitchell 2000, URS 2000). Flow is generally from south to north through this reach, and onsite flow measurements have ranged from 6.2 cfs in February 2014 to 169 cfs in May 2012 with a median flow of 15 cfs.

For the time interval included in this baseline study, this site was visited 35 times. **Appendix E** presents dates the site was visited and parameters or constituents sampled during each visit. Analytical results are summarized in **Table 4-32**. Multiple constituents were analyzed for but were not detected in at least half of the samples from YP-SR-10. These constituents were ammonia, beryllium, boron, cadmium, carbonate, chromium, cyanide, fluoride, dissolved lead, methyl mercury, nickel, nitrate plus nitrite, phosphorus, selenium, silver, total suspended solids, thallium, dissolved vanadium and total zinc.

Of constituents that were regularly detected, many do not have defined or applicable regulatory criteria for comparison **(see Appendix E)**. These include conductivity, turbidity, arsenic III, bicarbonate, calcium, cobalt, hardness, magnesium, total nitrogen, total Kjeldahl nitrogen, potassium and sodium. In general, most of the major cations (calcium, magnesium, sodium), major anion (bicarbonate), and related measurements (conductivity and hardness) were lowest during periods of high flow. The other constituents generally occurred in low concentrations and show no distinct trends.

In addition, many constituents that were regularly detected and have applicable regulatory criteria occurred in concentrations that met criteria **(see Appendix E)**. These constituents include color, dissolved oxygen, pH, alkalinity, dissolved aluminum, barium, chloride, copper, dissolved iron, manganese, dissolved mercury, molybdenum, total dissolved solids, sulfate, total vanadium and dissolved zinc. Of these constituents, alkalinity and chloride tended to be lower during high flow conditions. The remaining constituents generally occurred in low concentrations and do not show distinct trends.

There were some constituents that did not meet regulatory criteria **(see Appendix E)**. Temperature exceeded the regulatory maximum (< 13 degrees Celsius) four times (11 percent of measurements). Total aluminum exceeded the regulatory criterion (50 µg/L) eight times (40 percent of measurements). Total and dissolved antimony exceeded the regulatory criterion (5.6 µg/L) 29 and 27 times, respectively (83 and 77 percent of measurements). Total and dissolved arsenic exceeded the regulatory criterion (10 µg/L) 35 and 33 times, respectively (100 and 94 percent of measurements). Cyanide exceeded the regulatory criterion (0.0052 mg/L) once (6 percent of measurements). Total iron exceeded the regulatory criterion (300 µg/L) three times (9 percent of measurements). In May 2013, measured total lead at the site exceeded the site-specific, hardness-based criterion of 0.54 µg/L (3 percent of measurements). Total mercury exceeded the regulatory criterion (12 ng/L) three times (9 percent of measurements).

Table 4-32. YP-SR-10, EFSFSR below Meadow Creek, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Alkalinity as CaCO3, Total	mg/L	35	0	0	22.1	72	0	39.6	41	11.8	50.2	59.1	71.7	Normal
Aluminum, Total	µg/L	20	0	0	8.1	346	8	67.6	36.3	82.3	155	202	309	Gamma
Aluminum, Dissolved	µg/L	18	2	10	< 3	17.8	0	9.0	8.3	4.8	16.3	17.7	17.8	KM - Nonparametric
Ammonia as Nitrogen	mg/L	2	33	94	< 0.05	0.084	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Antimony, Total	µg/L	35	0	0	3.99	46.6	29	12.8	10.6	8.61	23.2	29.0	44.0	Lognormal
Antimony, Dissolved	µg/L	35	0	0	3.93	47.1	27	12.6	10.3	8.85	23.2	29.2	45.0	Lognormal
Arsenic, Total	µg/L	35	0	0	10.1	48.7	35	26.4	26.9	8.6	34.0	37.6	46.2	Normal
Arsenic, Dissolved	µg/L	35	0	0	8.6	41.4	33	24.4	25.2	7.6	32.0	34.6	39.9	Normal
Arsenic (III)	µg/L	16	0	0	0.3	2.43	n/a	1.40	1.48	0.7	2.15	2.33	2.41	Normal
Barium, Total	µg/L	16	0	0	6.94	11.1	0	9.51	9.72	0.948	10.3	10.6	11.0	Normal
Barium, Dissolved	µg/L	16	0	0	5.57	10.7	0	8.80	9.31	1.63	10.1	10.3	10.6	Nonparametric
Beryllium, Total	µg/L	1	15	94	< 0.02	0.04	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Beryllium, Dissolved	µg/L	0	16	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Bicarbonate as CaCO3	mg/L	35	0	0	22.1	62	n/a	39.0	41	10.3	49.8	56.1	61.7	Normal
Boron, Total	µg/L	0	16	100	< 10	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Boron, Dissolved	µg/L	0	16	100	< 10	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Total	µg/L	0	31	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Dissolved	µg/L	0	31	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Calcium, Total	µg/L	35	0	0	5750	12600	n/a	10318	11200	2348	12460	12600	12600	Nonparametric
Calcium, Dissolved	µg/L	35	0	0	5440	13600	n/a	10301	11200	2413	12560	12790	13396	Nonparametric
Carbonate as CaCO3	mg/L	0	35	100	< 9	< 15	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chloride	mg/L	25	10	29	< 0.4	1.13	0	0.7	0.7	0.2	1.0	1.04	1.11	KM - Nonparametric
Chromium, Total	µg/L	6	25	81	< 0.2	0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chromium, Dissolved	µg/L	5	26	84	< 0.2	0.8	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cobalt, Total	µg/L	16	0	0	0.05	0.17	n/a	0.09	0.09	0.03	0.12	0.14	0.16	Normal
Cobalt, Dissolved	µg/L	16	0	0	0.03	0.12	n/a	0.07	0.07	0.02	0.10	0.11	0.12	Normal
Conductivity	mS/cm	34	0	0	0.047	0.125	n/a	0.090	0.097	0.022	0.111	0.120	0.124	Nonparametric

Table 4-32. YP-SR-10, EFSFSR below Meadow Creek, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Copper, Total	µg/L	28	3	10	< 0.1	0.6	0	0.2	0.1	0.1	0.4	0.5	0.6	KM - Nonparametric
Copper, Dissolved	µg/L	30	1	3	< 0.1	0.5	0	0.2	0.2	0.1	0.4	0.5	0.5	KM - Nonparametric
Cyanide, Total	mg/L	1	15	94	< 0.0047	0.01	1	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Dissolved Oxygen (DO)	mg/L	34	0	0	7.56	11.85	0	10.1	10.4	1.2	11.4	11.5	11.8	Normal
Fluoride	mg/L	0	35	100	< 0.2	< 0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Hardness as CaCO3	mg/L	35	0	0	19.6	43.5	n/a	35.1	38.4	8.17	42.8	42.9	43.3	Nonparametric
Iron, Total	µg/L	35	0	0	60.1	586	3	151	130	89.3	263	320	465	Lognormal
Iron, Dissolved	µg/L	29	6	17	< 20	67	0	38.6	39.8	14.0	57.5	60.2	65.8	KM - Nonparametric
Lead, Total	µg/L	29	6	17	< 0.02	0.59	1	0.07	0.04	0.10	0.13	0.16	0.46	KM - Nonparametric
Lead, Dissolved	µg/L	1	34	97	< 0.02	0.04	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Magnesium, Total	µg/L	35	0	0	1160	2920	n/a	2277	2460	574.2	2806	2868	2917	Nonparametric
Magnesium, Dissolved	µg/L	35	0	0	1130	2990	n/a	2247	2430	606.3	2838	2955	2990	Nonparametric
Manganese, Total	µg/L	20	0	0	8.9	28.6	0	18.3	19.0	4.7	23	24.1	27.7	Normal
Manganese, Dissolved	µg/L	19	1	5	< 3.5	21	0	13.7	15.6	5.7	19.4	20.2	20.9	KM - Nonparametric
Mercury, Total	ng/L	35	0	0	2	30.4	3	5.7	4.8	3.7	10.2	12.7	19.0	Lognormal
Mercury, Dissolved	ng/L	33	1	3	< 1	4.9	0	2.4	2.1	0.89	3.7	3.9	4.7	KM - Nonparametric
Methyl Mercury	ng/L	2	14	88	< 0.1	0.17	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Molybdenum, Total	µg/L	16	0	0	0.62	1.1	0	0.90	0.95	0.15	1.08	1.09	1.10	Normal
Molybdenum, Dissolved	µg/L	16	0	0	0.62	1.08	0	0.90	0.95	0.15	1.06	1.07	1.08	Normal
Nickel, Total	µg/L	4	12	75	< 0.2	0.23	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nickel, Dissolved	µg/L	6	10	63	< 0.2	0.5	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nitrate + Nitrite as Nitrogen	mg/L	1	34	97	< 0.05	0.063	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nitrogen, Total	mg/L	11	5	31	< 0.4	0.73	n/a	0.51	0.5	0.10	0.66	0.72	0.73	KM - Nonparametric
Nitrogen, Total Kjeldahl (TKN)	mg/L	11	5	31	< 0.4	0.73	n/a	0.51	0.50	0.10	0.65	0.71	0.73	KM - Nonparametric
pH	pH units	34	0	0	6.57	8.11	0	7.4	7.4	0.4	7.9	8.0	8.1	Normal

Table 4-32. YP-SR-10, EFSFSR below Meadow Creek, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Phosphorus, Total	µg/L	3	32	91	< 20	49	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Phosphorus, Dissolved	µg/L	0	35	100	< 20	< 42.6	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Potassium, Total	µg/L	35	0	0	543	1130	n/a	810	821	125	923	979	1089	Normal
Potassium, Dissolved	µg/L	35	0	0	492	1090	n/a	785	813	126	929	969	1055	Normal
Selenium, Total	µg/L	0	31	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Selenium, Dissolved	µg/L	0	31	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Total	µg/L	0	16	100	< 0.02	< 0.04	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Dissolved	µg/L	0	16	100	< 0.02	< 0.04	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sodium, Total	µg/L	35	0	0	1370	2530	n/a	2133	2230	330.5	2460	2510	2523	Nonparametric
Sodium, Dissolved	µg/L	35	0	0	1320	2700	n/a	2132	2220	355.8	2472	2510	2635	Nonparametric
Solids, Total Dissolved (TDS)	mg/L	35	0	0	33.5	101	0	52.9	52.0	13.8	66.6	71.4	92.8	Normal
Solids, Total Suspended (TSS)	mg/L	6	29	83	< 5	16	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sulfate	mg/L	35	0	0	1.82	6.87	0	4.09	3.97	1.42	6.05	6.44	6.74	Normal
Temperature, Water	deg C	35	0	0	0.07	15.8	4	5.2	3.3	4.9	13.1	17.8	28.9	Gamma
Thallium, Total	µg/L	0	16	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Thallium, Dissolved	µg/L	0	16	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Turbidity	NTU	35	0	0	0	18.3	n/a	2.9	2.2	3.3	6.2	7.4	14.9	Nonparametric
Vanadium, Total	µg/L	13	3	19	< 0.2	0.8	0	0.3	0.3	0.1	0.5	0.6	0.8	KM - Nonparametric
Vanadium, Dissolved	µg/L	6	10	63	< 0.2	0.3	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Zinc, Total	µg/L	12	23	66	< 0.5	1.6	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Zinc, Dissolved	µg/L	20	15	43	< 0.5	1	0	0.6	0.5	0.2	0.9	1	1	KM - Nonparametric

Units: **µg/L** = micrograms per liter; **mg/L** = milligrams per liter; **mS/cm** = milliSiemens per centimeter; **ng/L** = nanograms per liter; **deg C** = degrees Celsius; **NTU** = nephelometric turbidity units
Measurements: **< 20 µg/L** = analyte not detected at the method reporting limit of 20 µg/L; **n/a** = not applicable; **Min** = minimum concentration measured; **Max** = maximum concentration measured
*Number that do not meet criterion: total number of analytical results that did not meet the strictest potentially applicable regulatory criterion (presented in **Table 3-4**). If a constituent does not have applicable regulatory criteria, then n/a is given.*
Distribution: **Normal** = data appear normally distributed at 0.05 significance level; statistics presented are normal population estimators; **Gamma** = data appear gamma distributed 0.05 significance level; statistics presented are gamma population estimators; **Lognormal** = data appear lognormally distributed at 0.05 significance level; statistics presented are lognormal populations estimators; **Nonparametric** = data do not appear normally, gamma or lognormally distributed at 0.05 significance level; statistics presented are sample statistics; **KM nonparametric** = data comprises ≤ 50% non-detects; statistics presented are nonparametric population estimators generated using the Kaplan-Meier method; **Sample** = data comprises > 50% non-detects and statistics are not presented; or, data comprises five or fewer measurements but each result was detected and statistics presented are sample statistics.

YP-T-35, Garnet Creek

The Garnet Creek site (YP-T-35) is about 500 feet south of the MGII shop and 100 feet upstream of the road to the shop. The site is downstream of the former Garnet pit and Stibnite Mines, Inc. landfill. This area is relatively open and the channel is narrow and steep (see photos **Appendix G**). Flow is generally from east to west through this reach and onsite flow measurements have ranged from $7.0x10^{-3}$ cfs in February 2013 to 1.9 cfs in May 2012 with a median flow of $6.0x10^{-2}$ cfs.

For the time interval included in this baseline study, this site was visited 35 times. **Appendix E** presents dates the site was visited and parameters or constituents sampled during each visit. Analytical results are summarized in **Table 4-33**. Multiple constituents were analyzed for but were not detected in at least half of the samples from YP-T-35. These constituents were ammonia, beryllium, boron, cadmium, carbonate, chloride, chromium, cyanide, fluoride, dissolved iron, dissolved lead, dissolved manganese, methyl mercury, nitrate plus nitrite, phosphorus, selenium, silver, total suspended solids, thallium, vanadium, and total zinc.

Of constituents that were regularly detected, many do not have defined or applicable regulatory criteria for comparison **(see Appendix E)**. These include conductivity, turbidity, arsenic III, bicarbonate, calcium, cobalt, hardness, magnesium, potassium, total nitrogen, total Kjeldahl nitrogen, potassium, and sodium. In general, most of the major cations (calcium, magnesium, sodium), major anion (bicarbonate) and related measurements (conductivity and hardness) were lowest during high flow conditions. The remaining constituents generally occurred in low concentrations and show no distinct trends.

In addition, many constituents that were regularly detected and have applicable regulatory criteria occurred in concentrations that met criteria **(see Appendix E)**. These constituents include color, dissolved oxygen, pH, alkalinity, dissolved aluminum, barium, copper, total lead, total manganese, dissolved mercury, molybdenum, nickel, total dissolved solids, sulfate and dissolved zinc. Of these constituents, alkalinity was lowest during high flow conditions. The remaining constituents generally occurred in low concentrations and do not show distinct trends.

There were some constituents that did not meet regulatory criteria **(see Appendix E)**. Temperature exceeded the regulatory maximum (< 13 degrees Celsius) three times (10 percent of measurements). Total aluminum exceeded the regulatory criterion (50 µg/L) eight times (42 percent of measurements). Total and dissolved antimony exceeded the regulatory criterion (5.6 µg/L) 31 times (100 percent of measurements). Total and dissolved arsenic exceeded the regulatory criterion (10 µg/L) 31 times (100 percent of measurements). Cyanide exceeded the regulatory criterion (0.0052 mg/L) once (7 percent of measurements). Total iron exceeded the regulatory criterion (300 µg/L) twice (6 percent of measurements). Total mercury exceeded the regulatory criterion (12 ng/L) five times (16 percent of measurements).

Table 4-33. YP-T-35, Garnet Creek, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Alkalinity as CaCO3, Total	mg/L	31	0	0	24.6	107	0	51.8	49.1	17.3	74.5	83.9	105	Lognormal
Aluminum, Total	µg/L	19	0	0	7	341	8	80.6	33	94.4	193	256	405	Gamma
Aluminum, Dissolved	µg/L	17	2	11	< 2.1	14.1	0	5.7	3.6	3.7	11.0	12.2	13.7	KM - Nonparametric
Ammonia as Nitrogen	mg/L	1	30	97	< 0.05	0.15	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Antimony, Total	µg/L	31	0	0	22.1	58.4	31	44.7	48.4	12.0	57.4	57.8	58.3	Nonparametric
Antimony, Dissolved	µg/L	31	0	0	21.2	58.8	31	44.7	48.7	12.5	57.5	57.7	58.5	Nonparametric
Arsenic, Total	µg/L	31	0	0	66.1	220	31	165	176	42.9	212	218	220	Nonparametric
Arsenic, Dissolved	µg/L	31	0	0	65.8	218	31	163	175	43.7	213	215	217	Nonparametric
Arsenic (III)	µg/L	15	0	0	0.28	0.91	n/a	0.5	0.48	0.18	0.73	0.81	0.89	Normal
Barium, Total	µg/L	15	0	0	7.05	11	0	8.6	8.4	1.2	10.1	10.7	10.9	Normal
Barium, Dissolved	µg/L	15	0	0	5.7	10.4	0	7.8	7.6	1.2	9.4	9.7	10.3	Normal
Beryllium, Total	µg/L	3	12	80	< 0.02	0.07	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Beryllium, Dissolved	µg/L	0	15	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Bicarbonate as CaCO3	mg/L	31	0	0	24.6	107	n/a	51.3	53.3	17	73.5	81.5	97.9	Gamma
Boron, Total	µg/L	0	15	100	< 10	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Boron, Dissolved	µg/L	0	15	100	< 10	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Total	µg/L	1	26	96	< 0.02	0.05	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Dissolved	µg/L	0	27	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Calcium, Total	µg/L	31	0	0	7940	18600	n/a	14311	15500	3094	18100	18350	18540	Nonparametric
Calcium, Dissolved	µg/L	31	0	0	7750	18900	n/a	14205	15600	3089	17400	17800	18630	Nonparametric
Carbonate as CaCO3	mg/L	1	30	97	< 9	15	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chloride	mg/L	6	25	81	< 0.23	0.45	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chromium, Total	µg/L	5	22	81	< 0.2	0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chromium, Dissolved	µg/L	5	22	81	< 0.2	0.8	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cobalt, Total	µg/L	14	1	7	< 0.02	0.22	n/a	0.07	0.05	0.05	0.13	0.17	0.21	KM - Nonparametric
Cobalt, Dissolved	µg/L	9	6	40	< 0.02	0.07	n/a	0.03	0.03	0.02	0.06	0.06	0.07	KM - Nonparametric
Conductivity	mS/cm	30	0	0	0.063	0.166	n/a	0.121	0.126	0.028	0.148	0.153	0.162	Normal

Table 4-33. YP-T-35, Garnet Creek, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Copper, Total	µg/L	27	0	0	0.1	0.7	0	0.3	0.2	0.2	0.5	0.6	0.7	Nonparametric
Copper, Dissolved	µg/L	26	1	4	< 0.1	0.7	0	0.3	0.3	0.1	0.4	0.5	0.6	KM - Nonparametric
Cyanide, Total	mg/L	1	14	93	< 0.0047	0.0412	1	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Dissolved Oxygen (DO)	mg/L	31	0	0	7.16	11.69	0	9.6	9.8	1.1	10.7	10.9	11.5	Normal
Fluoride	mg/L	0	31	100	< 0.2	< 0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Hardness as CaCO3	mg/L	31	0	0	28	64.1	n/a	49.9	54.2	10.6	61.6	63.3	64.0	Nonparametric
Iron, Total	µg/L	26	5	16	< 20	591	2	93.8	56.5	114	181	296	506	KM - Nonparametric
Iron, Dissolved	µg/L	2	29	94	< 11.7	40	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Lead, Total	µg/L	23	8	26	< 0.02	0.25	0	0.05	0.03	0.05	0.1	0.15	0.22	KM - Nonparametric
Lead, Dissolved	µg/L	1	30	97	< 0.02	0.04	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Magnesium, Total	µg/L	31	0	0	1990	4310	n/a	3465	3720	708.1	4210	4280	4304	Nonparametric
Magnesium, Dissolved	µg/L	31	0	0	1880	4290	n/a	3411	3680	746.4	4160	4215	4269	Normal
Manganese, Total	µg/L	18	1	5	< 1.7	27.7	0	5.84	3.6	6.22	11.1	16.9	25.5	KM - Nonparametric
Manganese, Dissolved	µg/L	4	15	79	< 0.8	6.7	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Mercury, Total	ng/L	31	0	0	2.8	37.6	5	9.1	7.3	6.7	17.0	21.7	34.1	Lognormal
Mercury, Dissolved	ng/L	30	0	0	1.7	7.9	0	3.6	3.3	1.6	5.6	6.6	8.8	Lognormal
Methyl Mercury	ng/L	2	13	87	< 0.1	0.11	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Molybdenum, Total	µg/L	15	0	0	0.53	1.6	0	1.2	1.4	0.37	1.6	1.6	1.6	Nonparametric
Molybdenum, Dissolved	µg/L	15	0	0	0.58	1.56	0	1.2	1.4	0.36	1.6	1.6	1.6	Nonparametric
Nickel, Total	µg/L	9	6	40	< 0.2	0.46	0	0.3	0.2	0.08	0.4	0.4	0.5	KM - Nonparametric
Nickel, Dissolved	µg/L	8	7	47	< 0.2	0.5	0	0.2	0.2	0.08	0.3	0.4	0.5	KM - Nonparametric
Nitrate + Nitrite as Nitrogen	mg/L	3	28	90	< 0.05	0.106	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nitrogen, Total	mg/L	9	6	40	< 0.4	9.68	n/a	1.1	0.5	2.3	0.9	3.6	8.5	KM - Nonparametric
Nitrogen, Total Kjeldahl (TKN)	mg/L	11	4	27	< 0.4	9.68	n/a	1.1	0.4	2.3	0.8	3.6	8.5	KM - Nonparametric
pH	pH units	30	0	0	6.92	8.19	0	7.5	7.5	0.3	8.0	8.0	8.2	Normal

Table 4-33. YP-T-35, Garnet Creek, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Phosphorus, Total	µg/L	10	21	68	< 21.1	47.3	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Phosphorus, Dissolved	µg/L	7	24	77	< 20	42.6	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Potassium, Total	µg/L	31	0	0	674	1360	n/a	955	968	147	1110	1120	1291	Normal
Potassium, Dissolved	µg/L	31	0	0	671	1420	n/a	919	932	157	1070	1070	1315	Normal
Selenium, Total	µg/L	0	27	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Selenium, Dissolved	µg/L	0	27	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Total	µg/L	1	14	93	< 0.02	0.04	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Dissolved	µg/L	0	15	100	< 0.02	< 0.04	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sodium, Total	µg/L	31	0	0	1290	2200	n/a	1835	1870	260.4	2120	2165	2194	Normal
Sodium, Dissolved	µg/L	31	0	0	1290	2220	n/a	1822	1890	267.8	2130	2165	2214	Normal
Solids, Total Dissolved (TDS)	mg/L	31	0	0	19	115	0	69	68	20	91	97	110	Normal
Solids, Total Suspended (TSS)	mg/L	5	26	84	< 5	21	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sulfate	mg/L	31	0	0	4.75	10.9	0	8.07	8.63	1.66	9.75	10.1	10.7	Normal
Temperature, Water	deg C	31	0	0	-0.01	14.87	3	6.5	5.7	4.6	12.9	13.7	14.6	Normal
Thallium, Total	µg/L	1	14	93	< 0.02	0.034	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Thallium, Dissolved	µg/L	0	15	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Turbidity	NTU	31	0	0	0.4	14.1	n/a	4.4	3.1	3.2	8.4	10.2	14.2	Gamma
Vanadium, Total	µg/L	5	10	67	< 0.2	0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Vanadium, Dissolved	µg/L	0	15	100	< 0.2	< 0.2	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Zinc, Total	µg/L	15	16	52	< 0.5	2.6	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Zinc, Dissolved	µg/L	19	12	39	< 0.5	2.2	0	0.7	0.6	0.4	1.1	1.6	2.0	KM - Nonparametric

Units: **µg/L** = micrograms per liter; **mg/L** = milligrams per liter; **mS/cm** = milliSiemens per centimeter; **ng/L** = nanograms per liter; **deg C** = degrees Celsius; **NTU** = nephelometric turbidity units
Measurements: **< 20 µg/L** = analyte not detected at the method reporting limit of 20 µg/L; **n/a** = not applicable; **Min** = minimum concentration measured; **Max** = maximum concentration measured
*Number that do not meet criterion: total number of analytical results that did not meet the strictest potentially applicable regulatory criterion (presented in **Table 3-4**). If a constituent does not have applicable regulatory criteria, then n/a is given.*
Distribution: **Normal** = data appear normally distributed at 0.05 significance level; statistics presented are normal population estimators; **Gamma** = data appear gamma distributed 0.05 significance level; statistics presented are gamma population estimators; **Lognormal** = data appear lognormally distributed at 0.05 significance level; statistics presented are lognormal populations estimators; **Nonparametric** = data do not appear normally, gamma or lognormally distributed at 0.05 significance level; statistics presented are sample statistics; **KM nonparametric** = data comprises ≤ 50% non-detects; statistics presented are nonparametric population estimators generated using the Kaplan-Meier method; **Sample** = data comprises > 50% non-detects and statistics are not presented; or, data comprises five or fewer measurements but each result was detected and statistics presented are sample statistics.

YP-T-15, Scout Creek

The Scout Creek site (YP-T-15) is a small, unnamed creek thus nicknamed because it originates in the Scout prospect (Zinsser 2011). The sample site is about 700 feet northeast of the MGII man camp at Stibnite and about 30 feet east and upstream of the old upper haul road running north towards Midnight Creek. The creek is narrow, steep, and forested at the sample site (see photos in **Appendix G**). Flow is generally east to west in this reach, and onsite flow measurements have ranged from 3.8x10-2 cfs in February 2013 to 1.0 cfs in April 2012 with a median flow of $9.1x10^{-2}$ cfs.

For the time interval included in this baseline study, this site was visited 35 times. **Appendix E** presents dates the site was visited and parameters or constituents sampled during each visit. Analytical results are summarized in **Table 4-34**. Multiple constituents were analyzed for but were not detected in at least half of the samples from YP-T-15. These constituents were ammonia, beryllium, boron, cadmium, carbonate, chloride, chromium, fluoride, cyanide, dissolved iron, dissolved lead, methyl mercury, nickel, nitrate plus nitrite, phosphorus, selenium, silver, total suspended solids, thallium, dissolved vanadium and total zinc.

Of constituents that were regularly detected, many do not have defined or applicable regulatory criteria for comparison **(see Appendix E)**. These include conductivity, turbidity, arsenic III, bicarbonate, calcium, cobalt, hardness, magnesium, total nitrogen, total Kjeldahl nitrogen, potassium and sodium. In general, most of the major cations (calcium, magnesium, sodium), major anion (bicarbonate) and related measurement (hardness) were lowest during high flow conditions. The remaining constituents generally occurred in low concentrations and show no distinct trends.

In addition, many constituents that were regularly detected and have applicable regulatory criteria occurred in concentrations that met criteria **(see Appendix E)**. These constituents include color, dissolved oxygen, pH, alkalinity, dissolved aluminum, barium, copper, total lead, dissolved manganese, mercury, molybdenum, total dissolved solids, sulfate, total vanadium and dissolved zinc. Of these constituents, alkalinity was lowest during high flow conditions. The remaining constituents generally occurred in low concentrations and do not show distinct trends.

There were some constituents that did not meet regulatory criteria **(see Appendix E)**. Temperature exceeded the regulatory maximum (< 13 degrees Celsius) once (3 percent of measurements). Total aluminum exceeded the regulatory criterion (50 µg/L) seven times (35 percent of measurements). Total and dissolved antimony exceeded the regulatory criterion (5.6 µg/L) 35 times each (100 percent of measurements). Total and dissolved arsenic exceeded the regulatory criterion (10 µg/L) 35 times each (100 percent of measurements). Cyanide exceeded the regulatory criterion (0.0052 mg/L) twice (13 percent of measurements). Total iron exceeded regulatory criterion (300 µg/L) once (3 percent of measurements). Total manganese exceeded regulatory criterion (50 µg/L) once (5 percent of measurements).

Table 4-34. YP-T-15, Scout Creek, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Alkalinity as CaCO3, Total	mg/L	35	0	0	32.1	70	0	46.6	47.5	7.4	54.6	56.5	65.8	Normal
Aluminum, Total	µg/L	20	0	0	18.2	195	7	58.2	39.0	45.2	113	137	191	Gamma
Aluminum, Dissolved	µg/L	16	4	20	< 2.7	21.1	0	5.7	5.4	3.9	10	10.6	19.0	KM - Nonparametric
Ammonia as Nitrogen	mg/L	0	35	100	< 0.05	< 0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Antimony, Total	µg/L	35	0	0	32.2	58.9	35	45.4	44.7	6.1	51.9	54.3	57.7	Normal
Antimony, Dissolved	µg/L	35	0	0	32	58.4	35	45.4	45.4	6.2	52.2	54.5	57.4	Normal
Arsenic, Total	µg/L	35	0	0	75.5	117	35	91.8	87.7	12.1	110	111	116	Normal
Arsenic, Dissolved	µg/L	35	0	0	71.4	110	35	84.9	81.3	10.9	101	103	108	Nonparametric
Arsenic (III)	µg/L	16	0	0	0.241	0.86	n/a	0.50	0.45	0.21	0.80	0.84	0.86	Normal
Barium, Total	µg/L	16	0	0	8.18	13	0	10.2	10.1	1.32	11.9	12.4	12.9	Normal
Barium, Dissolved	µg/L	16	0	0	7.37	10.3	0	8.99	9.00	0.82	10.2	10.2	10.3	Normal
Beryllium, Total	µg/L	0	16	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Beryllium, Dissolved	µg/L	0	16	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Bicarbonate as CaCO3	mg/L	35	0	0	32.1	57.6	n/a	46.1	47.4	6.22	53.6	55.3	57.1	Normal
Boron, Total	µg/L	0	16	100	< 20	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Boron, Dissolved	µg/L	0	16	100	< 20	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Total	µg/L	0	31	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Dissolved	µg/L	0	31	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Calcium, Total	µg/L	35	0	0	8500	14600	n/a	12275	12600	1498	13860	14130	14464	Normal
Calcium, Dissolved	µg/L	35	0	0	8450	14600	n/a	12218	12600	1558	13800	14500	14566	Normal
Carbonate as CaCO3	mg/L	1	34	97	< 2	17	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chloride	mg/L	3	32	91	< 0.2	0.49	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chromium, Total	µg/L	7	24	77	< 0.2	0.5	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chromium, Dissolved	µg/L	6	25	81	< 0.2	0.6	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cobalt, Total	µg/L	16	0	0	0.02	0.17	n/a	0.06	0.05	0.04	0.09	0.12	0.16	Normal
Cobalt, Dissolved	µg/L	10	6	38	< 0.02	0.05	n/a	0.02	0.02	0.01	0.03	0.04	0.05	KM - Nonparametric
Conductivity	mS/cm	33	0	0	0.073	0.134	n/a	0.107	0.113	0.015	0.121	0.124	0.131	Nonparametric

Table 4-34. YP-T-15, Scout Creek, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Copper, Total	µg/L	30	1	3	< 0.1	0.4	0	0.2	0.1	0.1	0.3	0.3	0.4	KM - Nonparametric
Copper, Dissolved	µg/L	29	2	6	< 0.1	0.7	0	0.2	0.2	0.1	0.3	0.4	0.6	KM - Nonparametric
Cyanide, Total	mg/L	2	14	88	< 0.0047	0.0171	2	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Dissolved Oxygen (DO)	mg/L	35	0	0	7.93	11.52	0	9.9	9.9	1.1	11.2	11.4	11.5	Normal
Fluoride	mg/L	0	35	100	< 0.2	< 0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Hardness as CaCO3	mg/L	35	0	0	32	52.7	n/a	45.2	47.3	5.6	51.0	51.9	52.6	Nonparametric
Iron, Total	µg/L	35	0	0	46.5	303	1	132	137	61.9	204	237	285	Normal
Iron, Dissolved	µg/L	6	29	83	< 20	49.1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Lead, Total	µg/L	21	14	40	< 0.02	0.09	0	0.03	0.02	0.02	0.06	0.07	0.09	KM - Nonparametric
Lead, Dissolved	µg/L	0	35	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Magnesium, Total	µg/L	35	0	0	2610	4230	n/a	3526	3730	462.3	3990	4138	4213	Nonparametric
Magnesium, Dissolved	µg/L	35	0	0	2670	4310	n/a	3506	3690	479.7	3936	4263	4296	Nonparametric
Manganese, Total	µg/L	20	0	0	3.9	72.8	1	17.6	12.7	16.8	36.3	45.1	65.1	Gamma
Manganese, Dissolved	µg/L	12	8	40	< 1	10.7	0	2.5	1.9	2.3	5.0	5.4	9.6	KM - Nonparametric
Mercury, Total	ng/L	34	1	3	< 1	11.9	0	3.7	3	2.3	5.8	6.9	10.9	KM - Nonparametric
Mercury, Dissolved	ng/L	24	10	29	< 0.71	3.5	0	1.5	1.3	0.73	2.4	3.0	3.4	KM - Nonparametric
Methyl Mercury	ng/L	4	12	75	< 0.1	0.17	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Molybdenum, Total	µg/L	16	0	0	0.93	1.41	0	1.15	1.15	0.13	1.31	1.35	1.40	Normal
Molybdenum, Dissolved	µg/L	16	0	0	0.98	1.36	0	1.14	1.11	0.13	1.33	1.35	1.36	Normal
Nickel, Total	µg/L	5	11	69	< 0.2	0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nickel, Dissolved	µg/L	5	11	69	< 0.2	0.3	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nitrate + Nitrite as Nitrogen	mg/L	0	35	100	< 0.05	< 0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nitrogen, Total	mg/L	13	3	19	< 0.4	1.51	n/a	0.6	0.5	0.3	0.7	0.9	1.40	KM - Nonparametric
Nitrogen, Total Kjeldahl (TKN)	mg/L	13	3	19	< 0.4	1.51	n/a	0.6	0.5	0.3	0.7	0.9	1.40	KM - Nonparametric
pH	pH units	33	0	0	6.88	8.39	0	7.4	7.4	0.4	7.8	7.9	8.3	Normal

Table 4-34. YP-T-15, Scout Creek, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Phosphorus, Total	µg/L	9	26	74	< 20	< 80	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Phosphorus, Dissolved	µg/L	5	30	86	< 20	< 80	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Potassium, Total	µg/L	35	0	0	817	1290	n/a	1087	1090	115	1230	1248	1290	Normal
Potassium, Dissolved	µg/L	35	0	0	830	1360	n/a	1071	1100	110	1192	1232	1326	Normal
Selenium, Total	µg/L	0	31	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Selenium, Dissolved	µg/L	0	31	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Total	µg/L	0	16	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Dissolved	µg/L	0	16	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sodium, Total	µg/L	35	0	0	1600	2630	n/a	1881	1890	174.7	2008	2053	2436	Nonparametric
Sodium, Dissolved	µg/L	35	0	0	1550	2110	n/a	1860	1850	131.4	2028	2072	2107	Normal
Solids, Total Dissolved (TDS)	mg/L	34	1	3	< 10	97	0	64	66	15	75	86	94	KM - Nonparametric
Solids, Total Suspended (TSS)	mg/L	5	30	86	< 5	15	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sulfate	mg/L	35	0	0	4.13	8.69	0	6.29	6.04	1.31	7.95	8.07	8.53	Normal
Temperature, Water	deg C	35	0	0	0.01	13.65	1	5.8	4.8	4.4	11.5	12.3	13.3	Nonparametric
Thallium, Total	µg/L	0	16	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Thallium, Dissolved	µg/L	0	16	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Turbidity	NTU	35	0	0	0.8	12	n/a	3.4	2.9	2.2	6.0	7.1	9.6	Gamma
Vanadium, Total	µg/L	11	5	31	< 0.2	0.5	0	0.3	0.2	0.1	0.4	0.4	0.5	KM - Nonparametric
Vanadium, Dissolved	µg/L	4	12	75	< 0.2	0.3	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Zinc, Total	µg/L	8	27	77	< 0.5	2.8	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Zinc, Dissolved	µg/L	20	15	43	< 0.5	1.1	0	0.6	0.5	0.1	0.8	0.9	1.1	KM - Nonparametric

Units: **µg/L** = micrograms per liter; **mg/L** = milligrams per liter; **mS/cm** = milliSiemens per centimeter; **ng/L** = nanograms per liter; **deg C** = degrees Celsius; **NTU** = nephelometric turbidity units

Measurements: **< 20 µg/L** = analyte not detected at the method reporting limit of 20 µg/L; **n/a** = not applicable; **Min** = minimum concentration measured; **Max** = maximum concentration measured

*Number that do not meet criterion: total number of analytical results that did not meet the strictest potentially applicable regulatory criterion (presented in **Table 3-4**). If a constituent does not have applicable regulatory criteria, then n/a is given.*

Distribution: **Normal** = data appear normally distributed at 0.05 significance level; statistics presented are normal population estimators; **Gamma** = data appear gamma distributed 0.05 significance level; statistics presented are gamma population estimators; **Lognormal** = data appear lognormally distributed at 0.05 significance level; statistics presented are lognormal populations estimators; **Nonparametric** = data do not appear normally, gamma or lognormally distributed at 0.05 significance level; statistics presented are sample statistics; **KM nonparametric** = data comprises ≤ 50% non-detects; statistics presented are nonparametric population estimators generated using the Kaplan-Meier method; **Sample** = data comprises > 50% non-detects and statistics are not presented; or, data comprises five or fewer measurements but each result was detected and statistics presented are sample statistics.

YP-SR-8, EFSFSR above Fiddle Creek

The EFSFSR site above Fiddle Creek (YP-SR-8) is about 450 feet east and downhill of FS 412. The site is in an open area adjacent to the former haul road along the EFSFSR, and the channel is relatively broad, straight and shallow through this reach (see photos in **Appendix G**). The site is about ¼-mile upstream of the Fiddle Creek confluence. Flow is generally south to north and onsite flow measurements have ranged from 5.9 cfs in March 2014 to 195 cfs in May 2012 with a median flow of 16 cfs.

For the time interval included in this baseline study, this site was visited 35 times. **Appendix E** presents dates the site was visited and parameters or constituents sampled during each visit. Analytical results are summarized in **Table 4-35**. Multiple constituents were analyzed for but were not detected in at least half of the samples from YP-SR-8. These constituents were ammonia, beryllium, boron, cadmium, carbonate, chromium, cyanide, fluoride, dissolved lead, methyl mercury, nickel, nitrate plus nitrite, phosphorus, selenium, silver, total suspended solids, thallium and total zinc.

Of constituents that were regularly detected, many do not have defined or applicable regulatory criteria for comparison **(see Appendix E)**. These include conductivity, turbidity, arsenic III, bicarbonate, calcium, cobalt, hardness, magnesium, total nitrogen, total Kjeldahl nitrogen, potassium and sodium. In general, most of the major cations (calcium, magnesium, sodium), major anion (bicarbonate), and related measurements (conductivity and hardness) tended to be lower during periods of high flow. The other constituents generally occurred in low concentrations and show no distinct trends.

In addition, many constituents that were regularly detected and have applicable regulatory criteria occurred in concentrations that met criteria **(see Appendix E)**. These constituents include color, dissolved oxygen, pH, alkalinity, dissolved aluminum, barium, chloride, copper, dissolved iron, total lead, manganese, dissolved mercury, molybdenum, total dissolved solids, sulfate, vanadium and dissolved zinc. Of these constituents, alkalinity was lowest during high flow conditions. The remaining constituents generally occurred in low concentrations and do not show distinct trends.

There were some constituents that did not meet regulatory criteria **(see Appendix E)**. Temperature exceeded the regulatory maximum (< 13 degrees Celsius) three times (9 percent of measurements). Total aluminum exceeded the regulatory criterion (50 µg/L) nine times (45 percent of measurements). Total and dissolved antimony exceeded the regulatory criterion (5.6 µg/L) 35 times each (100 percent of measurements). Total and dissolved arsenic exceeded the regulatory criterion (10 µg/L) 35 times each (100 percent of measurements). Cyanide exceeded the regulatory criterion (0.0052 mg/L) once (6 percent of measurements). Total iron exceeded the regulatory criterion (300 µg/L) five times (14 percent of measurements). Total mercury exceeded the regulatory criterion (12 ng/L) five times (14 percent of measurements).

Table 4-35. YP-SR-8, EFSFSR above Fiddle Creek, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Alkalinity as CaCO3, Total	mg/L	35	0	0	20.4	86.8	0	43.5	45.7	15.9	64.8	72.6	88.9	Gamma
Aluminum, Total	µg/L	20	0	0	11.2	424	9	81.5	41.6	97.7	190	249	386	Gamma
Aluminum, Dissolved	µg/L	19	1	5	< 3.1	25.6	0	9.8	7.1	6.7	19.4	21.0	24.7	KM - Nonparametric
Ammonia as Nitrogen	mg/L	1	34	97	< 0.05	0.053	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Antimony, Total	µg/L	35	0	0	5.8	61.3	35	17.5	14.8	11.1	31.1	38.4	57.0	Lognormal
Antimony, Dissolved	µg/L	35	0	0	5.7	61.8	35	17.6	12.5	13.0	36.4	44.8	56.3	Nonparametric
Arsenic, Total	µg/L	35	0	0	13	57.7	35	30.2	29.6	9.6	41.3	47.1	54.2	Normal
Arsenic, Dissolved	µg/L	35	0	0	12.3	48.7	35	27.9	26.7	8.5	38.7	42.2	46.6	Normal
Arsenic (III)	µg/L	16	0	0	0.36	1.81	n/a	1.06	1.0	0.52	1.8	1.80	1.81	Normal
Barium, Total	µg/L	16	0	0	7.17	12.7	0	11.1	11.8	1.65	12.7	12.7	12.7	Nonparametric
Barium, Dissolved	µg/L	16	0	0	5.81	12.4	0	10.1	10.7	2.22	12.2	12.3	12.4	Nonparametric
Beryllium, Total	µg/L	1	15	94	< 0.02	0.05	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Beryllium, Dissolved	µg/L	0	16	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Bicarbonate as CaCO3	mg/L	35	0	0	20.4	86.8	n/a	42.8	45.7	14.9	62.9	70.2	85.3	Gamma
Boron, Total	µg/L	0	16	100	< 10	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Boron, Dissolved	µg/L	0	16	100	< 10	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Total	µg/L	0	31	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Dissolved	µg/L	1	30	97	< 0.02	0.27	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Calcium, Total	µg/L	35	0	0	5950	15100	n/a	11471	12600	2830	14180	14520	14998	Nonparametric
Calcium, Dissolved	µg/L	35	0	0	5740	14700	n/a	11426	12300	2873	14280	14600	14666	Nonparametric
Carbonate as CaCO3	mg/L	0	35	100	< 9	< 15	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chloride	mg/L	26	9	26	< 0.4	1.17	0	0.7	0.8	0.3	1.08	1.11	1.16	KM - Nonparametric
Chromium, Total	µg/L	11	20	65	< 0.2	0.5	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chromium, Dissolved	µg/L	4	27	87	< 0.2	0.5	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cobalt, Total	µg/L	16	0	0	0.08	0.21	n/a	0.14	0.13	0.04	0.21	0.21	0.21	Normal
Cobalt, Dissolved	µg/L	16	0	0	0.04	0.22	n/a	0.11	0.11	0.05	0.15	0.18	0.21	Normal
Conductivity	mS/cm	34	0	0	0.049	0.137	n/a	0.101	0.108	0.024	0.125	0.132	0.136	Nonparametric

Table 4-35. YP-SR-8, EFSFSR above Fiddle Creek, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Copper, Total	µg/L	29	2	6	< 0.1	0.7	0	0.2	0.2	0.1	0.3	0.5	0.6	KM - Nonparametric
Copper, Dissolved	µg/L	31	0	0	0.1	2.6	0	0.3	0.2	0.4	0.4	0.5	2.0	Nonparametric
Cyanide, Total	mg/L	1	15	94	< 0.0047	0.0104	1	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Dissolved Oxygen (DO)	mg/L	34	0	0	7.8	11.88	0	10.4	10.6	1.1	11.6	11.7	11.9	Normal
Fluoride	mg/L	0	35	100	< 0.2	< 0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Hardness as CaCO3	mg/L	35	0	0	19.9	51.8	n/a	39.1	43.1	9.92	48.8	50.8	51.6	Nonparametric
Iron, Total	µg/L	35	0	0	36.3	771	5	173	110	161	329	549	714	Nonparametric
Iron, Dissolved	µg/L	29	6	17	< 20	54.5	0	33.9	30.7	11.0	49.0	49.8	53.5	KM - Nonparametric
Lead, Total	µg/L	29	6	17	< 0.02	0.46	0	0.07	0.04	0.08	0.14	0.15	0.36	KM - Nonparametric
Lead, Dissolved	µg/L	4	31	89	< 0.02	0.06	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Magnesium, Total	µg/L	35	0	0	1210	3570	n/a	2571	2790	715.7	3290	3435	3536	Nonparametric
Magnesium, Dissolved	µg/L	35	0	0	1180	3610	n/a	2542	2740	738.2	3270	3316	3515	Nonparametric
Manganese, Total	µg/L	20	0	0	10	36.3	0	18.7	17.8	6.4	27.0	30.0	36.3	Gamma
Manganese, Dissolved	µg/L	19	1	5	< 4.1	18.9	0	12.0	13.3	4.3	16.1	16.2	18.4	KM - Nonparametric
Mercury, Total	ng/L	35	0	0	1.6	20	5	6.1	4.2	4.7	15	17	19	Nonparametric
Mercury, Dissolved	ng/L	33	1	3	< 1	5	0	2.5	2.1	1.0	4.0	4.3	4.8	KM - Nonparametric
Methyl Mercury	ng/L	0	16	100	< 0.1	< 0.1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Molybdenum, Total	µg/L	16	0	0	0.62	1.06	0	0.88	0.94	0.14	1.01	1.02	1.05	Nonparametric
Molybdenum, Dissolved	µg/L	16	0	0	0.55	1.04	0	0.87	0.91	0.14	1.01	1.02	1.04	Normal
Nickel, Total	µg/L	7	9	56	< 0.2	0.32	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nickel, Dissolved	µg/L	6	10	63	< 0.2	0.3	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nitrate + Nitrite as Nitrogen	mg/L	6	29	83	< 0.05	0.065	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nitrogen, Total	mg/L	14	2	13	< 0.4	1.06	n/a	0.6	0.6	0.2	0.7	0.8	1.02	KM - Nonparametric
Nitrogen, Total Kjeldahl (TKN)	mg/L	14	2	13	< 0.4	1.06	n/a	0.6	0.5	0.2	0.7	0.8	1.02	KM - Nonparametric
pH	pH units	34	0	0	6.6	8.49	0	7.5	7.5	0.4	7.9	8.1	8.4	Normal
Phosphorus, Total	µg/L	4	31	89	< 20	57.3	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample

Table 4-35. YP-SR-8, EFSFSR above Fiddle Creek, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Phosphorus, Dissolved	µg/L	0	35	100	< 20	< 42.6	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Potassium, Total	µg/L	35	0	0	545	1270	n/a	849	879	140	971	1021	1202	Normal
Potassium, Dissolved	µg/L	35	0	0	527	1090	n/a	827	853	147	996	1046	1080	Normal
Selenium, Total	µg/L	0	31	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Selenium, Dissolved	µg/L	0	31	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Total	µg/L	1	15	94	< 0.02	0.04	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Dissolved	µg/L	0	16	100	< 0.02	< 0.04	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sodium, Total	µg/L	35	0	0	1430	3000	n/a	2364	2540	452.7	2882	2923	2976	Nonparametric
Sodium, Dissolved	µg/L	35	0	0	1410	2990	n/a	2367	2500	467.1	2870	2959	2987	Nonparametric
Solids, Total Dissolved (TDS)	mg/L	35	0	0	25.5	96	0	60.3	61	14.3	76.3	85.7	94.6	Normal
Solids, Total Suspended (TSS)	mg/L	7	28	80	< 5	24.5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sulfate	mg/L	34	1	3	< 0.2	17.5	0	6.8	7.0	3.3	9.8	10.1	15.0	KM - Nonparametric
Temperature, Water	deg C	35	0	0	-0.02	16.18	3	5.0	4.5	4.6	10.6	14.2	15.9	Normal
Thallium, Total	µg/L	0	16	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Thallium, Dissolved	µg/L	1	15	94	< 0.02	0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Turbidity	NTU	35	0	0	0	11.3	n/a	3.0	2.4	2.5	6.4	7.9	10.4	Nonparametric
Vanadium, Total	µg/L	14	2	13	< 0.2	1.1	0	0.3	0.3	0.2	0.5	0.7	1.0	KM - Nonparametric
Vanadium, Dissolved	µg/L	9	7	44	< 0.2	0.2	0	0.2	0.2	0	0.2	0.2	0.2	KM - Nonparametric
Zinc, Total	µg/L	16	19	54	< 0.5	7.3	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Zinc, Dissolved	µg/L	20	15	43	< 0.5	2.7	0	0.7	0.5	0.4	1.1	1.3	2.3	KM - Nonparametric

Units: **µg/L** = micrograms per liter; **mg/L** = milligrams per liter; **mS/cm** = milliSiemens per centimeter; **ng/L** = nanograms per liter; **deg C** = degrees Celsius; **NTU** = nephelometric turbidity units
Measurements: **< 20 µg/L** = analyte not detected at the method reporting limit of 20 µg/L; **n/a** = not applicable; **Min** = minimum concentration measured; **Max** = maximum concentration measured
*Number that do not meet criterion: total number of analytical results that did not meet the strictest potentially applicable regulatory criterion (presented in **Table 3-4**). If a constituent does not have applicable regulatory criteria, then n/a is given.*
Distribution: **Normal** = data appear normally distributed at 0.05 significance level; statistics presented are normal population estimators; **Gamma** = data appear gamma distributed 0.05 significance level; statistics presented are gamma population estimators; **Lognormal** = data appear lognormally distributed at 0.05 significance level; statistics presented are lognormal populations estimators; **Nonparametric** = data do not appear normally, gamma or lognormally distributed at 0.05 significance level; statistics presented are sample statistics; **KM nonparametric** = data comprises ≤ 50% non-detects; statistics presented are nonparametric population estimators generated using the Kaplan-Meier method; **Sample** = data comprises > 50% non-detects and statistics are not presented; or, data comprises five or fewer measurements but each result was detected and statistics presented are sample statistics.

YP-T-12, upper Fiddle Creek

The upper Fiddle Creek site (YP-T-12) is located about 150 feet upstream of the Fiddle Creek pond, and about 850 feet upstream of the end of the current Fiddle Creek road. This reach is forested and the channel is filled with boulders with a relatively steep gradient (see photos in **Appendix G**). The site is located upstream of the former North Mine. Flow is generally southwest to northeast and onsite flow measurements have ranged from 0.15 cfs in February 2016 to 19 cfs in May 2012 with a median flow of 1.0 cfs.

For the time interval included in this baseline study, this site was visited 24 times. **Appendix E** presents dates the site was visited and parameters or constituents sampled during each visit. Analytical results are summarized in **Table 4-36**. Multiple constituents were analyzed for but were not detected in at least half of the samples from YP-T-12. These constituents were ammonia, arsenic III, arsenic, beryllium, boron, cadmium, carbonate, chloride, chromium, cobalt, total copper, cyanide, fluoride, dissolved iron, lead, dissolved manganese, methyl mercury, nickel, nitrate plus nitrite, phosphorus, selenium, silver, total suspended solids, thallium, vanadium and total zinc.

Of constituents that were regularly detected, many do not have defined or applicable regulatory criteria for comparison **(see Appendix E)**. These include conductivity, turbidity, bicarbonate, calcium, hardness, magnesium, total nitrogen, total Kjeldahl nitrogen, potassium and sodium. In general, most of the major cations (calcium, magnesium, sodium), major anion (bicarbonate), and related measurements (conductivity and hardness) were lowest during periods of high flow. The remainder of the constituents generally occurred in low concentrations and show no distinct trends.

In addition, many constituents that were regularly detected and have applicable regulatory criteria occurred in concentrations that met criteria **(see Appendix E)**. These constituents include color, dissolved oxygen, temperature, dissolved aluminum, antimony, barium, dissolved copper, total manganese, mercury, molybdenum, total dissolved solids, sulfate and dissolved zinc. Of these constituents, mercury was highest during high flow conditions. The remaining constituents generally occurred in low concentrations and do not show distinct trends.

There were some constituents that did not meet regulatory criteria **(see Appendix E)**. The pH was below the regulatory minimum ($\geq$ 6.5) four times (17 percent of measurements). Alkalinity was below the regulatory minimum (> 20 mg/L) 10 times (42 percent of measurements). Total aluminum exceeded the regulatory criterion (50 µg/L) five times (31 percent of measurements). Total cyanide exceeded the regulatory criterion (0.0052 mg/L) once (7 percent of measurements). Total iron exceeded the regulatory criterion (300 µg/L) once (4 percent of measurements).

Table 4-36. YP-T-12, Upper Fiddle Creek, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Alkalinity as CaCO3, Total	mg/L	24	0	0	7.8	29	10	19	22	6.1	24	24	28	Nonparametric
Aluminum, Total	µg/L	16	0	0	13	259	5	53.7	33.0	61.4	117	149	222	Gamma
Aluminum, Dissolved	µg/L	16	0	0	5.8	38	0	17.7	14.1	11.4	35.7	37.6	37.9	Normal
Ammonia as Nitrogen	mg/L	0	24	100	< 0.05	< 0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Antimony, Total	µg/L	24	0	0	0.08	0.31	0	0.15	0.13	0.07	0.23	0.26	0.33	Gamma
Antimony, Dissolved	µg/L	24	0	0	0.08	0.27	0	0.13	0.13	0.04	0.19	0.21	0.25	Gamma
Arsenic, Total	µg/L	1	23	96	< 0.5	0.7	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Arsenic, Dissolved	µg/L	1	23	96	< 0.5	0.7	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Arsenic (III)	µg/L	1	13	93	< 0.02	0.02	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Barium, Total	µg/L	14	0	0	7.8	11.5	0	9.9	10.1	1.2	11.3	11.4	11.5	Normal
Barium, Dissolved	µg/L	14	0	0	6.3	11	0	9.2	9.5	1.6	10.7	10.8	11.0	Nonparametric
Beryllium, Total	µg/L	2	12	86	< 0.02	0.04	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Beryllium, Dissolved	µg/L	0	14	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Bicarbonate as CaCO3	mg/L	24	0	0	7.8	29	n/a	19	22	6.1	24	24	28	Nonparametric
Boron, Total	µg/L	0	14	100	< 20	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Boron, Dissolved	µg/L	0	14	100	< 20	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Total	µg/L	0	22	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Dissolved	µg/L	0	22	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Calcium, Total	µg/L	24	0	0	2310	6280	n/a	4316	4745	1213	5744	5984	6220	Normal
Calcium, Dissolved	µg/L	24	0	0	2290	6260	n/a	4329	4675	1231	5704	6136	6246	Normal
Carbonate as CaCO3	mg/L	0	24	100	< 2	< 15	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chloride	mg/L	0	24	100	< 0.2	< 0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chromium, Total	µg/L	2	20	91	< 0.2	0.5	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chromium, Dissolved	µg/L	2	20	91	< 0.2	1.6	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cobalt, Total	µg/L	5	9	64	< 0.02	0.08	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cobalt, Dissolved	µg/L	1	13	93	< 0.02	0.02	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Conductivity	mS/cm	23	0	0	0.023	0.068	n/a	0.046	0.046	0.012	0.062	0.065	0.067	Normal
Copper, Total	µg/L	8	14	64	< 0.1	0.3	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample

Table 4-36. YP-T-12, Upper Fiddle Creek, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Copper, Dissolved	µg/L	19	3	14	< 0.1	0.7	0	0.2	0.2	0.1	0.3	0.5	0.7	KM - Nonparametric
Cyanide, Total	mg/L	1	13	93	< 0.0047	0.0125	1	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Dissolved Oxygen (DO)	mg/L	24	0	0	8.54	11.53	0	10.1	10.2	0.9	11.2	11.4	11.5	Normal
Fluoride	mg/L	0	24	100	< 0.2	< 0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Hardness as CaCO3	mg/L	24	0	0	6.9	18.7	n/a	13.0	14.3	3.6	17.2	18.0	18.6	Normal
Iron, Total	µg/L	14	10	42	< 20	330	1	51	38	63	84	103	278	KM - Nonparametric
Iron, Dissolved	µg/L	5	19	79	< 12.8	42.6	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Lead, Total	µg/L	4	20	83	< 0.02	0.12	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Lead, Dissolved	µg/L	1	23	96	< 0.02	0.19	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Magnesium, Total	µg/L	24	0	0	286	745	n/a	535	581	143	715	741	744	Normal
Magnesium, Dissolved	µg/L	24	0	0	279	751	n/a	530	572	145	711	741	749	Normal
Manganese, Total	µg/L	9	7	44	< 1	19.5	0	3.08	1.95	4.50	5.60	9.38	17.5	KM - Nonparametric
Manganese, Dissolved	µg/L	1	15	94	< 1	5	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Mercury, Total	ng/L	24	0	0	1.3	7.6	0	2.8	2.1	1.6	4.7	5.5	7.2	Gamma
Mercury, Dissolved	ng/L	22	2	8	< 1	4.4	0	2.1	1.9	1.0	3.5	4.1	4.4	KM - Nonparametric
Methyl Mercury	ng/L	2	12	86	< 0.1	0.18	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Molybdenum, Total	µg/L	13	1	7	< 0.06	0.2	0	0.10	0.11	0.02	0.13	0.16	0.19	KM - Nonparametric
Molybdenum, Dissolved	µg/L	12	2	14	< 0.05	0.16	0	0.10	0.10	0.03	0.12	0.13	0.16	KM - Nonparametric
Nickel, Total	µg/L	1	13	93	< 0.2	0.26	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nickel, Dissolved	µg/L	1	13	93	< 0.2	0.3	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nitrate + Nitrite as Nitrogen	mg/L	0	24	100	< 0.05	< 0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nitrogen, Total	mg/L	10	4	29	< 0.4	0.88	n/a	0.5	0.5	0.2	0.8	0.8	0.9	KM - Nonparametric
Nitrogen, Total Kjeldahl (TKN)	mg/L	11	3	21	< 0.4	0.85	n/a	0.5	0.5	0.1	0.7	0.8	0.8	KM - Nonparametric
pH	pH units	23	0	0	6.26	7.87	4	7.0	6.9	0.4	7.4	7.7	7.8	Normal
Phosphorus, Total	µg/L	2	22	92	< 20	< 80	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample

Table 4-36. YP-T-12, Upper Fiddle Creek, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Phosphorus, Dissolved	µg/L	0	24	100	< 20	< 80	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Potassium, Total	µg/L	24	0	0	335	596	n/a	480	500	83.0	565	580	593	Normal
Potassium, Dissolved	µg/L	24	0	0	264	569	n/a	471	477	74.6	551	565	569	Normal
Selenium, Total	µg/L	0	22	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Selenium, Dissolved	µg/L	0	22	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Total	µg/L	1	13	93	< 0.02	0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Dissolved	µg/L	0	14	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sodium, Total	µg/L	24	0	0	1280	2690	n/a	1958	2055	442.0	2513	2579	2665	Normal
Sodium, Dissolved	µg/L	24	0	0	1270	2730	n/a	1963	2035	434.6	2408	2633	2716	Normal
Solids, Total Dissolved (TDS)	mg/L	24	0	0	11	51	0	31	32	10	44	47	50	Normal
Solids, Total Suspended (TSS)	mg/L	2	22	92	< 5	9	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sulfate	mg/L	24	0	0	0.59	2	0	1.2	1.2	0.37	1.6	1.7	1.9	Normal
Temperature, Water	deg C	24	0	0	0.01	11.34	0	5.1	3.9	3.6	9.7	9.9	11.0	Normal
Thallium, Total	µg/L	0	14	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Thallium, Dissolved	µg/L	0	14	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Turbidity	NTU	24	0	0	0.3	11.8	n/a	3.3	2.3	3.1	7.4	9.5	14.3	Gamma
Vanadium, Total	µg/L	7	7	50	< 0.2	0.5	0	0.2	0.2	0.1	0.3	0.4	0.5	KM - Nonparametric
Vanadium, Dissolved	µg/L	0	14	100	< 0.2	< 0.2	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Zinc, Total	µg/L	3	21	88	< 0.5	5.8	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Zinc, Dissolved	µg/L	14	10	42	< 0.5	1.2	0	0.7	0.6	0.2	0.9	0.9	1.1	KM - Nonparametric

Units: **µg/L** = micrograms per liter; **mg/L** = milligrams per liter; **mS/cm** = milliSiemens per centimeter; **ng/L** = nanograms per liter; **deg C** = degrees Celsius; **NTU** = nephelometric turbidity units

Measurements: **< 20 µg/L** = analyte not detected at the method reporting limit of 20 µg/L; **n/a** = not applicable; **Min** = minimum concentration measured; **Max** = maximum concentration measured

*Number that do not meet criterion: total number of analytical results that did not meet the strictest potentially applicable regulatory criterion (presented in **Table 3-4**). If a constituent does not have applicable regulatory criteria, then n/a is given.*

Distribution: **Normal** = data appear normally distributed at 0.05 significance level; statistics presented are normal population estimators; **Gamma** = data appear gamma distributed 0.05 significance level; statistics presented are gamma population estimators; **Lognormal** = data appear lognormally distributed at 0.05 significance level; statistics presented are lognormal populations estimators; **Nonparametric** = data do not appear normally, gamma or lognormally distributed at 0.05 significance level; statistics presented are sample statistics; **KM nonparametric** = data comprises ≤ 50% non-detects; statistics presented are nonparametric population estimators generated using the Kaplan-Meier method; **Sample** = data comprises > 50% non-detects and statistics are not presented; or, data comprises five or fewer measurements but each result was detected and statistics presented are sample statistics.

YP-T-11, lower Fiddle Creek

The lower Fiddle Creek site (YP-T-11) is located about 30 feet west of FS 412. The channel is relatively steep and filled with boulders through this forested stretch (see photos in **Appendix G**). The site is located within the area of the former North Camp and downstream of the former North Mine (Mitchell 2000). Flow is generally southwest to northeast at the site and onsite flow measurements have ranged from 0.22 cfs in February 2016 to 21 cfs in May 2013 with a median flow of 0.86 cfs.

For the time interval included in this baseline study, this site was visited 35 times. **Appendix E** presents dates the site was visited and parameters or constituents sampled during each visit. Analytical results are summarized in **Table 4-37**. Multiple constituents were analyzed for but were not detected in at least half of the samples from YP-T-11. These constituents were ammonia, beryllium, boron, cadmium, carbonate, chloride, chromium, cobalt, cyanide, fluoride, dissolved iron, lead, dissolved manganese, methyl mercury, nickel, nitrate plus nitrite, phosphorus, selenium, silver, total suspended solids, thallium, vanadium and zinc.

Of constituents that were regularly detected, many do not have defined or applicable regulatory criteria for comparison **(see Appendix E)**. These include conductivity, turbidity, arsenic III, bicarbonate, calcium, hardness, magnesium, total nitrogen, total Kjeldahl nitrogen, potassium and sodium. In general, most of the major cations (calcium, magnesium, sodium), major anion (bicarbonate), and related measurements (conductivity and hardness) were lowest during periods of high flow. The other constituents generally occurred in low concentrations and show no distinct trends.

In addition, many constituents that were regularly detected and have applicable regulatory criteria occurred in concentrations that met criteria **(see Appendix E)**. These constituents include color, dissolved oxygen, temperature, dissolved aluminum, antimony, arsenic, barium, copper, total manganese, dissolved mercury, molybdenum, total dissolved solids and sulfate. Of these constituents, dissolved aluminum and antimony were highest during rising spring snowmelt conditions (April and May), whereas sulfate was highest during low flow conditions. The remaining constituents generally occurred in low concentrations and do not show distinct trends.

There were some constituents that did not meet regulatory criteria **(see Appendix E)**. The pH was below the regulatory minimum ($\geq$ 6.5) three times (9 percent of measurements). Alkalinity was lower than the regulatory minimum (> 20 mg/L) nine times (26 percent of measurements). Total aluminum exceeded the regulatory criterion (50 µg/L) eight times (40 percent of measurements). Total cyanide exceeded the regulatory criterion (0.0052 mg/L) once (6 percent of measurements). Total iron exceeded the regulatory criterion (300 µg/L) twice (6 percent of measurements). Total mercury exceeded the regulatory criterion (12 ng/L) once (3 percent of measurements).

Table 4-37. YP-T-11, Lower Fiddle Creek, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Alkalinity as CaCO3, Total	mg/L	35	0	0	9.4	66.1	9	25.6	24.6	11.7	33.4	42.5	64.0	Nonparametric
Aluminum, Total	µg/L	20	0	0	11	528	8	93.6	22.7	155	243	521	527	Nonparametric
Aluminum, Dissolved	µg/L	20	0	0	4.4	45.6	0	17.7	10.9	13.7	36.2	44.9	64.5	Gamma
Ammonia as Nitrogen	mg/L	0	35	100	< 0.05	< 0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Antimony, Total	µg/L	35	0	0	0.23	1.21	0	0.58	0.52	0.23	0.88	0.99	1.22	Gamma
Antimony, Dissolved	µg/L	35	0	0	0.23	1.09	0	0.57	0.54	0.21	0.84	0.95	1.16	Gamma
Arsenic, Total	µg/L	35	0	0	0.6	3.9	0	1.8	1.7	0.7	2.5	2.8	3.5	Normal
Arsenic, Dissolved	µg/L	35	0	0	0.5	2.7	0	1.6	1.7	0.5	2.2	2.4	2.7	Normal
Arsenic (III)	µg/L	16	0	0	0.02	0.12	n/a	0.06	0.06	0.03	0.11	0.11	0.12	Normal
Barium, Total	µg/L	16	0	0	7.4	19.4	0	13.7	14.1	3.0	17.0	18.7	19.3	Normal
Barium, Dissolved	µg/L	16	0	0	7	15.7	0	12.6	13.5	2.8	15.4	15.5	15.7	Normal
Beryllium, Total	µg/L	1	15	94	< 0.02	0.07	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Beryllium, Dissolved	µg/L	0	16	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Bicarbonate as CaCO3	mg/L	35	0	0	9.4	66.1	n/a	25.6	23.3	11.5	40.4	47.1	63.1	Lognormal
Boron, Total	µg/L	0	16	100	< 20	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Boron, Dissolved	µg/L	0	16	100	< 20	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Total	µg/L	2	29	94	< 0.02	0.04	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Dissolved	µg/L	0	31	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Calcium, Total	µg/L	35	0	0	2530	7960	n/a	5673	6050	1628	7464	7766	7899	Nonparametric
Calcium, Dissolved	µg/L	35	0	0	2500	7970	n/a	5635	5930	1630	7242	7715	7943	Nonparametric
Carbonate as CaCO3	mg/L	0	35	100	< 2	< 15	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chloride	mg/L	1	34	97	< 0.2	0.89	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chromium, Total	µg/L	2	29	94	< 0.2	0.3	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chromium, Dissolved	µg/L	3	28	90	< 0.2	2	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cobalt, Total	µg/L	6	10	63	< 0.02	0.17	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cobalt, Dissolved	µg/L	5	11	69	< 0.02	0.04	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Conductivity	mS/cm	34	0	0	0.025	0.079	n/a	0.055	0.057	0.013	0.071	0.072	0.077	Normal
Copper, Total	µg/L	18	13	42	< 0.1	0.5	0	0.1	0.1	0.1	0.2	0.2	0.4	KM - Nonparametric

Table 4-37. YP-T-11, Lower Fiddle Creek, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Copper, Dissolved	µg/L	30	1	3	< 0.1	0.6	0	0.2	0.2	0.1	0.3	0.4	0.6	KM - Nonparametric
Cyanide, Total	mg/L	1	15	94	< 0.0047	0.0128	1	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Dissolved Oxygen (DO)	mg/L	35	0	0	6.15	12.58	0	10.3	10.7	1.3	11.6	11.7	12.3	Normal
Fluoride	mg/L	0	35	100	< 0.2	< 0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Hardness as CaCO3	mg/L	35	0	0	7.6	24.1	n/a	17.2	18.3	4.9	22.5	23.6	24.0	Nonparametric
Iron, Total	µg/L	32	3	9	< 20	773	2	80	36	134	169	241	619	KM - Nonparametric
Iron, Dissolved	µg/L	8	27	77	< 10	42.6	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Lead, Total	µg/L	9	26	74	< 0.02	0.28	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Lead, Dissolved	µg/L	1	34	97	< 0.02	0.03	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Magnesium, Total	µg/L	35	0	0	320	1040	n/a	748	819	212	967	1013	1033	Nonparametric
Magnesium, Dissolved	µg/L	35	0	0	308	1040	n/a	737	775	217	970	987	1025	Nonparametric
Manganese, Total	µg/L	15	5	25	< 1.2	45.9	0	4.7	2.8	9.5	5.1	7.6	38.2	KM - Nonparametric
Manganese, Dissolved	µg/L	1	19	95	< 1	5	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Mercury, Total	ng/L	34	1	3	< 1	13.9	1	3.6	2.5	2.9	7.5	9.6	12.5	KM - Nonparametric
Mercury, Dissolved	ng/L	30	4	12	< 0.9	4.2	0	1.9	1.6	1.0	3.6	3.8	4.2	KM - Nonparametric
Methyl Mercury	ng/L	3	13	81	< 0.1	0.35	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Molybdenum, Total	µg/L	15	1	6	< 0.05	0.15	0	0.11	0.13	0.03	0.15	0.15	0.15	KM - Nonparametric
Molybdenum, Dissolved	µg/L	15	1	6	< 0.05	0.16	0	0.12	0.12	0.03	0.15	0.15	0.16	KM - Nonparametric
Nickel, Total	µg/L	0	16	100	< 0.2	< 0.2	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nickel, Dissolved	µg/L	2	14	88	< 0.2	0.38	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nitrate + Nitrite as Nitrogen	mg/L	6	29	83	< 0.05	0.082	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nitrogen, Total	mg/L	13	3	19	< 0.4	4.88	n/a	0.8	0.5	1.1	0.8	1.9	4.3	KM - Nonparametric
Nitrogen, Total Kjeldahl (TKN)	mg/L	14	2	13	< 0.4	4.88	n/a	0.8	0.5	1.1	0.8	1.9	4.3	KM - Nonparametric
pH	pH units	34	0	0	6.3	7.87	3	7.2	7.2	0.4	7.7	7.8	7.9	Normal
Phosphorus, Total	µg/L	2	33	94	< 20	< 80	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample

Table 4-37. YP-T-11, Lower Fiddle Creek, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Phosphorus, Dissolved	µg/L	1	34	97	< 20	< 80	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Potassium, Total	µg/L	35	0	0	293	779	n/a	557	571	100	674	709	763	Normal
Potassium, Dissolved	µg/L	35	0	0	318	720	n/a	547	579	88.8	624	635	696	Nonparametric
Selenium, Total	µg/L	0	31	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Selenium, Dissolved	µg/L	0	31	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Total	µg/L	0	16	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Dissolved	µg/L	0	16	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sodium, Total	µg/L	35	0	0	1330	3000	n/a	2205	2360	471.3	2682	2771	2963	Nonparametric
Sodium, Dissolved	µg/L	35	0	0	1310	2970	n/a	2207	2350	469.3	2662	2783	2933	Normal
Solids, Total Dissolved (TDS)	mg/L	35	0	0	8	59	0	37	39	10	48	51	57	Normal
Solids, Total Suspended (TSS)	mg/L	1	34	97	< 5	34	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sulfate	mg/L	35	0	0	0.67	2.53	0	1.71	1.82	0.54	2.30	2.47	2.51	Normal
Temperature, Water	deg C	35	0	0	-0.01	11.92	0	4.2	2.8	3.9	10.3	10.7	11.6	Nonparametric
Thallium, Total	µg/L	0	16	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Thallium, Dissolved	µg/L	0	16	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Turbidity	NTU	35	0	0	0	13.1	n/a	2.8	2.1	2.8	4.7	7.5	12.7	Nonparametric
Vanadium, Total	µg/L	5	11	69	< 0.2	0.9	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Vanadium, Dissolved	µg/L	1	15	94	< 0.2	0.3	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Zinc, Total	µg/L	7	28	80	< 0.5	2.2	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Zinc, Dissolved	µg/L	12	23	66	< 0.5	1.2	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample

Units: **µg/L** = micrograms per liter; **mg/L** = milligrams per liter; **mS/cm** = milliSiemens per centimeter; **ng/L** = nanograms per liter; **deg C** = degrees Celsius; **NTU** = nephelometric turbidity units
Measurements: **< 20 µg/L** = analyte not detected at the method reporting limit of 20 µg/L; **n/a** = not applicable; **Min** = minimum concentration measured; **Max** = maximum concentration measured
*Number that do not meet criterion: total number of analytical results that did not meet the strictest potentially applicable regulatory criterion (presented in **Table 3-4**). If a constituent does not have applicable regulatory criteria, then n/a is given.*
Distribution: **Normal** = data appear normally distributed at 0.05 significance level; statistics presented are normal population estimators; **Gamma** = data appear gamma distributed 0.05 significance level; statistics presented are gamma population estimators; **Lognormal** = data appear lognormally distributed at 0.05 significance level; statistics presented are lognormal populations estimators; **Nonparametric** = data do not appear normally, gamma or lognormally distributed at 0.05 significance level; statistics presented are sample statistics; **KM nonparametric** = data comprises ≤ 50% non-detects; statistics presented are nonparametric population estimators generated using the Kaplan-Meier method; **Sample** = data comprises > 50% non-detects and statistics are not presented; or, data comprises five or fewer measurements but each result was detected and statistics presented are sample statistics.

YP-SR-6, EFSFSR above Yellow Pine pit

The EFSFSR site above the Yellow Pine pit (YP-SR-6) is located within the area of the former Monday Camp (YP-SR-6) and upstream of the Midnight Creek confluence. The channel is steep and filled with boulders and metal and concrete debris throughout this open stretch (see photos in **Appendix G**). Flow is generally south to north and onsite flow measurements have ranged from 8.0 cfs in February 2016 to 216 cfs in May 2012 with a median flow of 17.9 cfs.

For the time interval included in this baseline study, this site was visited 35 times. **Appendix E** presents dates the site was visited and parameters or constituents sampled during each visit. Analytical results are summarized in **Table 4-38**. Multiple constituents were analyzed for but were not detected in at least half of the samples from YP-SR-6. These constituents were ammonia, beryllium, boron, cadmium, carbonate, chromium, cyanide, fluoride, dissolved lead, methyl mercury, nickel, nitrate plus nitrite, phosphorus, selenium, silver, total suspended solids, thallium, dissolved vanadium and total zinc.

Of constituents that were regularly detected, many do not have defined or applicable regulatory criteria for comparison **(see Appendix E)**. These include conductivity, turbidity, arsenic III, bicarbonate, calcium, cobalt, hardness, magnesium, total nitrogen, total Kjeldahl nitrogen, potassium and sodium. In general, most of the major cations (calcium, magnesium, sodium), major anion (bicarbonate), and related measurements (conductivity and hardness) were lower during periods of high flow. The other constituents generally occurred in low concentrations and show no distinct trends.

In addition, many constituents that were regularly detected and have applicable regulatory criteria occurred in concentrations that met criteria **(see Appendix E)**. These constituents include color, dissolved oxygen, alkalinity, dissolved aluminum, barium, chloride, copper, dissolved iron, total lead, manganese, dissolved mercury, molybdenum, total dissolved solids, sulfate, total vanadium and dissolved zinc. Of these constituents, alkalinity and chloride tended to be lower during high flow conditions. The remaining constituents generally occurred in low concentrations and do not show distinct trends.

There were some constituents that did not meet regulatory criteria **(see Appendix E)**. The pH was lower than the regulatory minimum ($\geq$ 6.5) twice (6 percent of measurements). Temperature was above the regulatory maximum (< 13 degrees Celsius) once (3 percent of measurements). Total aluminum exceeded the regulatory criterion (50 µg/L) nine times (45 percent of measurements). Total and dissolved antimony exceeded the regulatory criterion (5.6 µg/L) 35 times each (100 percent of measurements). Total and dissolved arsenic exceeded the regulatory criterion (10 µg/L) 35 times each (100 percent of measurements). Total iron exceeded the regulatory criterion (300 µg/L) four times (11 percent of measurements). Total mercury exceeded the regulatory criterion (12 ng/L) three times (9 percent of measurements).

Table 4-38. YP-SR-6, EFSFSR above Yellow Pine pit, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Alkalinity as CaCO3, Total	mg/L	35	0	0	21.5	70	0	41.3	43	11.7	51.8	58.8	67.62	Normal
Aluminum, Total	µg/L	20	0	0	10.6	268	9	73.7	41.6	71.9	165	212	321	Gamma
Aluminum, Dissolved	µg/L	19	1	5	< 2.6	41	0	10.1	6.5	8.8	16.7	20.6	36.9	KM - Nonparametric
Ammonia as Nitrogen	mg/L	1	34	97	< 0.05	0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Antimony, Total	µg/L	35	0	0	6.38	47.3	35	20.1	17.8	10.6	33.9	39.5	51.4	Gamma
Antimony, Dissolved	µg/L	35	0	0	6.37	46.9	35	19.7	16.5	10.7	33.6	39.2	51.3	Gamma
Arsenic, Total	µg/L	35	0	0	13	45.6	35	32.4	34.1	9.04	42.9	44.8	45.6	Normal
Arsenic, Dissolved	µg/L	35	0	0	12.6	41.4	35	30.3	32.5	8.44	39.0	40.2	41.2	Normal
Arsenic (III)	µg/L	16	0	0	0.25	96	n/a	6.7	0.61	23.8	1.5	25.3	81.9	Nonparametric
Barium, Total	µg/L	16	0	0	7.55	13.1	0	11.3	11.6	1.58	12.8	13.0	13.1	Nonparametric
Barium, Dissolved	µg/L	16	0	0	6	12.6	0	10.3	11.0	2.32	12.5	12.5	12.6	Normal
Beryllium, Total	µg/L	2	14	88	< 0.02	0.03	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Beryllium, Dissolved	µg/L	0	16	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Bicarbonate as CaCO3	mg/L	35	0	0	21.5	57	n/a	40.4	43	10.2	50.2	53.3	56.0	Nonparametric
Boron, Total	µg/L	0	16	100	< 10	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Boron, Dissolved	µg/L	0	16	100	< 10	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Total	µg/L	0	31	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Dissolved	µg/L	0	31	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Calcium, Total	µg/L	35	0	0	5700	14600	n/a	11393	12400	2896	14260	14330	14532	Nonparametric
Calcium, Dissolved	µg/L	35	0	0	5660	14500	n/a	11394	12400	2989	14360	14500	14500	Nonparametric
Carbonate as CaCO3	mg/L	0	35	100	< 9	< 15	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chloride	mg/L	26	9	26	< 0.4	1.07	0	0.69	0.73	0.23	0.98	1.04	1.07	KM - Nonparametric
Chromium, Total	µg/L	12	19	61	< 0.2	0.7	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chromium, Dissolved	µg/L	4	27	87	< 0.2	0.2	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cobalt, Total	µg/L	16	0	0	0.08	0.19	n/a	0.12	0.12	0.03	0.16	0.18	0.19	Normal
Cobalt, Dissolved	µg/L	16	0	0	0.04	0.18	n/a	0.10	0.11	0.04	0.14	0.15	0.17	Normal
Conductivity	mS/cm	34	0	0	0.047	0.144	n/a	0.099	0.109	0.024	0.122	0.126	0.140	Nonparametric

Table 4-38. YP-SR-6, EFSFSR above Yellow Pine pit, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Copper, Total	µg/L	27	4	13	< 0.1	0.5	0	0.2	0.2	0.1	0.3	0.5	0.5	KM - Nonparametric
Copper, Dissolved	µg/L	31	0	0	0.1	0.5	0	0.2	0.2	0.1	0.4	0.5	0.5	Nonparametric
Cyanide, Total	mg/L	0	16	100	< 0.0047	< 0.0047	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Dissolved Oxygen (DO)	mg/L	34	0	0	8.06	12.31	0	10.5	10.7	1.1	11.6	11.8	12.2	Normal
Fluoride	mg/L	0	35	100	< 0.2	< 0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Hardness as CaCO3	mg/L	35	0	0	19.2	50.1	n/a	38.9	42.2	10.2	48.6	49.0	49.9	Nonparametric
Iron, Total	µg/L	35	0	0	48.6	382	4	140	114	87.7	247	292	388	Gamma
Iron, Dissolved	µg/L	25	10	29	< 20	54.3	0	29.1	27.6	8.48	41.0	42.1	50.4	KM - Nonparametric
Lead, Total	µg/L	31	4	11	< 0.02	0.25	0	0.06	0.05	0.05	0.10	0.15	0.24	KM - Nonparametric
Lead, Dissolved	µg/L	1	34	97	< 0.02	0.03	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Magnesium, Total	µg/L	35	0	0	1170	3420	n/a	2547	2810	731.7	3250	3329	3396	Nonparametric
Magnesium, Dissolved	µg/L	35	0	0	1120	3570	n/a	2537	2790	761.6	3266	3342	3502	Nonparametric
Manganese, Total	µg/L	20	0	0	8.8	21.1	0	15.0	14.2	3.5	19.7	21.0	21.1	Normal
Manganese, Dissolved	µg/L	19	1	5	< 3.5	15.4	0	9.0	9.4	3.2	12.5	13.2	15.0	KM - Nonparametric
Mercury, Total	ng/L	35	0	0	1.9	24.6	3	5.4	3.7	4.7	9.8	14.8	22.0	Nonparametric
Mercury, Dissolved	ng/L	34	0	0	1.4	4.6	0	2.3	2.2	0.78	3.4	3.8	4.7	Lognormal
Methyl Mercury	ng/L	1	15	94	< 0.1	0.2	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Molybdenum, Total	µg/L	16	0	0	0.56	0.97	0	0.82	0.87	0.14	0.95	0.96	0.97	Nonparametric
Molybdenum, Dissolved	µg/L	16	0	0	0.49	0.97	0	0.80	0.85	0.15	0.96	0.97	0.97	Normal
Nickel, Total	µg/L	7	9	56	< 0.2	0.3	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nickel, Dissolved	µg/L	6	10	63	< 0.2	1.11	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nitrate + Nitrite as Nitrogen	mg/L	7	28	80	< 0.05	0.066	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nitrogen, Total	mg/L	13	3	19	< 0.4	1.43	n/a	0.6	0.6	0.3	0.8	1.03	1.35	KM - Nonparametric
Nitrogen, Total Kjeldahl (TKN)	mg/L	14	2	13	< 0.4	1.39	n/a	0.6	0.5	0.2	0.8	1.02	1.32	KM - Nonparametric
pH	pH units	34	0	0	6.36	8.53	2	7.4	7.4	0.4	7.8	7.9	8.3	Normal
Phosphorus, Total	µg/L	4	31	89	< 20	42.8	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample

Table 4-38. YP-SR-6, EFSFSR above Yellow Pine pit, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Phosphorus, Dissolved	µg/L	1	34	97	< 20	42.6	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Potassium, Total	µg/L	35	0	0	530	1090	n/a	849	889	133	986	1018	1080	Normal
Potassium, Dissolved	µg/L	35	0	0	500	1060	n/a	827	869	142	967	1019	1053	Normal
Selenium, Total	µg/L	0	31	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Selenium, Dissolved	µg/L	0	31	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Total	µg/L	0	16	100	< 0.02	< 0.04	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Dissolved	µg/L	0	16	100	< 0.02	< 0.04	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sodium, Total	µg/L	35	0	0	1400	2950	n/a	2334	2470	440.5	2834	2888	2943	Normal
Sodium, Dissolved	µg/L	35	0	0	1410	2980	n/a	2347	2500	455.1	2824	2932	2973	Nonparametric
Solids, Total Dissolved (TDS)	mg/L	35	0	0	25.5	99	0	57.2	56	14.7	74.2	78.7	94.2	Normal
Solids, Total Suspended (TSS)	mg/L	6	29	83	< 5	13.5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sulfate	mg/L	35	0	0	2.33	10.1	0	6.43	6.69	2.41	9.20	9.61	9.98	Normal
Temperature, Water	deg C	35	0	0	-0.02	17.77	1	4.6	3.8	4.4	9.5	11.9	16.0	Nonparametric
Thallium, Total	µg/L	0	16	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Thallium, Dissolved	µg/L	0	16	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Turbidity	NTU	35	0	0	0	50.1	n/a	5.3	3.0	9.3	6.7	14.8	43.4	Nonparametric
Vanadium, Total	µg/L	15	1	6	< 0.2	0.6	0	0.3	0.3	0.1	0.5	0.5	0.6	KM - Nonparametric
Vanadium, Dissolved	µg/L	6	10	63	< 0.2	0.2	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Zinc, Total	µg/L	12	23	66	< 0.5	3.6	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Zinc, Dissolved	µg/L	18	17	49	< 0.5	3	0	0.8	0.5	0.6	1.0	2.6	2.9	KM - Nonparametric

Units: **µg/L** = micrograms per liter; **mg/L** = milligrams per liter; **mS/cm** = milliSiemens per centimeter; **ng/L** = nanograms per liter; **deg C** = degrees Celsius; **NTU** = nephelometric turbidity units

Measurements: **< 20 µg/L** = analyte not detected at the method reporting limit of 20 µg/L; **n/a** = not applicable; **Min** = minimum concentration measured; **Max** = maximum concentration measured

*Number that do not meet criterion: total number of analytical results that did not meet the strictest potentially applicable regulatory criterion (presented in **Table 3-4**). If a constituent does not have applicable regulatory criteria, then n/a is given.*

Distribution: **Normal** = data appear normally distributed at 0.05 significance level; statistics presented are normal population estimators; **Gamma** = data appear gamma distributed 0.05 significance level; statistics presented are gamma population estimators; **Lognormal** = data appear lognormally distributed at 0.05 significance level; statistics presented are lognormal populations estimators; **Nonparametric** = data do not appear normally, gamma or lognormally distributed at 0.05 significance level; statistics presented are sample statistics; **KM nonparametric** = data comprises ≤ 50% non-detects; statistics presented are nonparametric population estimators generated using the Kaplan-Meier method; **Sample** = data comprises > 50% non-detects and statistics are not presented; or, data comprises five or fewer measurements but each result was detected and statistics presented are sample statistics.

YP-T-42, upper Midnight Creek

The upper Midnight Creek site (YP-T-42) is located just upstream of the upper haul road below the Stibnite pit. This reach is steep, narrow and filled with boulders (see photos in **Appendix G**). Flow is generally east to west and onsite flow measurements have ranged from 0.12 cfs in April 2013 to 4.0 cfs in May 2012 with a median flow of 0.58 cfs.

For the time interval included in this baseline study, this site was visited 22 times. **Appendix E** presents dates the site was visited and parameters or constituents sampled during each visit. Analytical results are summarized in **Table 4-39**. Multiple constituents were analyzed for but were not detected in at least half of the samples from YP-T-42. These constituents were dissolved aluminum, ammonia, beryllium, boron, cadmium, carbonate, chloride, chromium, dissolved cobalt, total copper, cyanide, fluoride, iron, lead, manganese, methyl mercury, nickel, nitrate plus nitrite, total nitrogen, total Kjeldahl nitrogen, phosphorus, selenium, silver, total suspended solids, thallium, vanadium and total zinc.

Of constituents that were regularly detected, many do not have defined or applicable regulatory criteria for comparison **(see Appendix E)**. These include conductivity, turbidity, arsenic III, bicarbonate, calcium, total cobalt, hardness, magnesium, potassium and sodium. In general, most of the major cations (calcium, magnesium, sodium), major anion (bicarbonate) and hardness were lower during higher flows. The other constituents generally occurred in low concentrations and show no distinct trends.

In addition, many constituents that were regularly detected and have applicable regulatory criteria occurred in concentrations that met criteria **(see Appendix E)**. These constituents include color, dissolved oxygen, pH, temperature, alkalinity, barium, dissolved copper, dissolved mercury, molybdenum, total dissolved solids, sulfate and dissolved zinc. Of these constituents, alkalinity, total dissolved solids and sulfate tended to be lowest during the highest flows. The remaining constituents generally occurred in low concentrations and do not show distinct trends.

There were some constituents that did not meet regulatory criteria **(see Appendix E)**. Total aluminum exceeded the regulatory criterion (50 µg/L) twice (15 percent of measurements). Total and dissolved antimony exceeded the regulatory criterion (5.6 µg/L) 22 times each (100 percent of measurements). Total and dissolved arsenic exceeded the regulatory criterion (10 µg/L) 22 times each (100 percent of measurements). Total iron exceeded the regulatory criterion (300 µg/L) once (5 percent of measurements). Total mercury exceeded the regulatory criterion (12 ng/L) 14 times (88 percent of measurements) with the higher concentrations occurring during periods of higher flow.

Table 4-39. YP-T-42, Upper Midnight Creek, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Alkalinity as CaCO3, Total	mg/L	22	0	0	32.6	135	0	83.1	92.1	22.9	96.9	97	127	Nonparametric
Aluminum, Total	µg/L	13	0	0	5.3	344	2	34.9	17.8	59.1	78.8	120	266	Lognormal
Aluminum, Dissolved	µg/L	5	8	62	< 2	10	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Ammonia as Nitrogen	mg/L	0	22	100	< 0.05	< 0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Antimony, Total	µg/L	22	0	0	37.9	70.3	22	55.6	57.0	9.55	66.5	68.1	69.9	Normal
Antimony, Dissolved	µg/L	22	0	0	37.1	70.9	22	55.9	57.5	10.1	67.3	68.8	70.5	Normal
Arsenic, Total	µg/L	22	0	0	41.1	62.7	22	52.7	52.8	5.33	60.7	61.8	62.5	Normal
Arsenic, Dissolved	µg/L	22	0	0	41.4	61.4	22	51.7	52.3	4.94	56	60.2	61.2	Normal
Arsenic (III)	µg/L	11	0	0	0.1	0.201	n/a	0.16	0.17	0.03	0.20	0.20	0.20	Normal
Barium, Total	µg/L	11	0	0	3.8	6.87	0	5.7	6.2	0.96	6.5	6.7	6.8	Normal
Barium, Dissolved	µg/L	11	0	0	2.83	7	0	5.5	6.3	1.4	6.7	6.8	7.0	Nonparametric
Beryllium, Total	µg/L	1	10	91	< 0.02	0.03	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Beryllium, Dissolved	µg/L	0	11	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Bicarbonate as CaCO3	mg/L	22	0	0	32.6	135	n/a	82.6	90.8	22.8	96.9	97	127	Nonparametric
Boron, Total	µg/L	0	11	100	< 20	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Boron, Dissolved	µg/L	0	11	100	< 20	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Total	µg/L	0	20	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Dissolved	µg/L	0	20	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Calcium, Total	µg/L	22	0	0	9010	25500	n/a	21378	23750	4818	24870	25375	25479	Nonparametric
Calcium, Dissolved	µg/L	22	0	0	8760	25600	n/a	21312	23800	4960	24890	25375	25558	Nonparametric
Carbonate as CaCO3	mg/L	1	21	95	< 9	15	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chloride	mg/L	0	22	100	< 0.4	< 0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chromium, Total	µg/L	7	13	65	< 0.2	0.6	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chromium, Dissolved	µg/L	8	12	60	< 0.2	0.8	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cobalt, Total	µg/L	6	5	45	< 0.02	0.19	n/a	0.04	0.03	0.05	0.05	0.12	0.18	KM - Nonparametric
Cobalt, Dissolved	µg/L	5	6	55	< 0.02	0.03	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Conductivity	mS/cm	21	0	0	0.083	0.203	n/a	0.168	0.184	0.034	0.199	0.199	0.202	Nonparametric

Table 4-39. YP-T-42, Upper Midnight Creek, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Copper, Total	µg/L	7	13	65	< 0.1	0.6	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Copper, Dissolved	µg/L	15	5	25	< 0.1	0.4	0	0.2	0.2	0.1	0.3	0.4	0.4	KM - Nonparametric
Cyanide, Total	mg/L	0	11	100	< 0.0047	< 0.0047	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Dissolved Oxygen (DO)	mg/L	21	0	0	9.03	10.89	0	9.9	9.9	0.5	10.5	10.5	10.8	Normal
Fluoride	mg/L	0	22	100	< 0.2	< 0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Hardness as CaCO3	mg/L	22	0	0	33.2	94.4	n/a	79.6	89.3	18.4	93.0	94.2	94.4	Nonparametric
Iron, Total	µg/L	8	14	64	< 15.2	466	1	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Iron, Dissolved	µg/L	1	21	95	< 10	40	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Lead, Total	µg/L	2	20	91	< 0.02	0.1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Lead, Dissolved	µg/L	2	20	91	< 0.02	0.03	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Magnesium, Total	µg/L	22	0	0	2600	7660	n/a	6365	7145	1558	7553	7570	7641	Nonparametric
Magnesium, Dissolved	µg/L	22	0	0	2410	7720	n/a	6377	7125	1621	7600	7610	7697	Nonparametric
Manganese, Total	µg/L	5	8	62	< 1	19.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Manganese, Dissolved	µg/L	0	13	100	< 1	< 5	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Mercury, Total	ng/L	22	0	0	7.9	168	20	30.2	23.4	32.4	35.8	56.4	145	Nonparametric
Mercury, Dissolved	ng/L	22	0	0	4.5	10.7	0	7.2	7.1	1.8	9.5	10.4	10.6	Normal
Methyl Mercury	ng/L	2	9	82	< 0.1	0.14	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Molybdenum, Total	µg/L	11	0	0	0.39	0.99	0	0.76	0.81	0.19	0.9	0.95	0.98	Normal
Molybdenum, Dissolved	µg/L	11	0	0	0.41	0.92	0	0.76	0.81	0.18	0.9	0.91	0.92	Nonparametric
Nickel, Total	µg/L	5	6	55	< 0.2	0.68	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nickel, Dissolved	µg/L	4	7	64	< 0.2	0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nitrate + Nitrite as Nitrogen	mg/L	0	22	100	< 0.05	< 0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nitrogen, Total	mg/L	5	6	55	< 0.4	0.6	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nitrogen, Total Kjeldahl (TKN)	mg/L	5	6	55	< 0.4	0.59	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
pH	pH units	21	0	0	7.05	8.53	0	7.8	7.7	0.4	8.4	8.4	8.5	Normal
Phosphorus, Total	µg/L	0	22	100	< 20	< 40	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Phosphorus, Dissolved	µg/L	0	22	100	< 20	< 42.6	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample

Table 4-39. YP-T-42, Upper Midnight Creek, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Potassium, Total	µg/L	22	0	0	973	1370	n/a	1197	1210	102	1307	1358	1368	Normal
Potassium, Dissolved	µg/L	22	0	0	930	1520	n/a	1202	1215	127	1308	1310	1476	Nonparametric
Selenium, Total	µg/L	0	20	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Selenium, Dissolved	µg/L	0	20	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Total	µg/L	0	11	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Dissolved	µg/L	0	11	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sodium, Total	µg/L	22	0	0	474	607	n/a	557	575	44.7	596	606	607	Nonparametric
Sodium, Dissolved	µg/L	22	0	0	472	620	n/a	562	577	48.4	614	616	619	Nonparametric
Solids, Total Dissolved (TDS)	mg/L	22	0	0	35	139	0	89	87	23	109	111	133	Normal
Solids, Total Suspended (TSS)	mg/L	1	21	95	< 5	17	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sulfate	mg/L	22	0	0	1.35	4.1	0	3.3	3.7	0.78	4.0	4.0	4.1	Nonparametric
Temperature, Water	deg C	22	0	0	2.62	9.83	0	4.8	4.5	1.9	7.3	8.5	11.0	Lognormal
Thallium, Total	µg/L	0	11	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Thallium, Dissolved	µg/L	0	11	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Turbidity	NTU	22	0	0	0	7	n/a	2.2	2.0	1.7	4.0	4.5	6.5	Normal
Vanadium, Total	µg/L	1	10	91	< 0.2	0.5	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Vanadium, Dissolved	µg/L	0	11	100	< 0.2	< 0.2	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Zinc, Total	µg/L	2	20	91	< 0.5	0.8	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Zinc, Dissolved	µg/L	14	8	36	< 0.5	2.1	0	0.7	0.6	0.4	1.2	1.6	2.0	KM - Nonparametric

Units: **µg/L** = micrograms per liter; **mg/L** = milligrams per liter; **mS/cm** = milliSiemens per centimeter; **ng/L** = nanograms per liter; **deg C** = degrees Celsius; **NTU** = nephelometric turbidity units

Measurements: **< 20 µg/L** = analyte not detected at the method reporting limit of 20 µg/L; **n/a** = not applicable; **Min** = minimum concentration measured; **Max** = maximum concentration measured

*Number that do not meet criterion: total number of analytical results that did not meet the strictest potentially applicable regulatory criterion (presented in **Table 3-4**). If a constituent does not have applicable regulatory criteria, then n/a is given.*

Distribution: **Normal** = data appear normally distributed at 0.05 significance level; statistics presented are normal population estimators; **Gamma** = data appear gamma distributed 0.05 significance level; statistics presented are gamma population estimators; **Lognormal** = data appear lognormally distributed at 0.05 significance level; statistics presented are lognormal populations estimators; **Nonparametric** = data do not appear normally, gamma or lognormally distributed at 0.05 significance level; statistics presented are sample statistics; **KM nonparametric** = data comprises ≤ 50% non-detects; statistics presented are nonparametric population estimators generated using the Kaplan-Meier method; **Sample** = data comprises > 50% non-detects and statistics are not presented; or, data comprises five or fewer measurements but each result was detected and statistics presented are sample statistics.

YP-T-10, lower Midnight Creek

The lower Midnight Creek site (YP-T-10) is on the old lower haul road below the Stibnite pit. The channel is narrow and steep and cuts through the old road trace (see photos in **Appendix G**). This site is just upstream of the former Monday Camp. Flow is generally east to west through this reach and onsite flow measurements have ranged from 0.15 cfs in January 2013 to 3.3 cfs in May 2012 with a median flow of 0.4 cfs.

For the time interval included in this baseline study, this site was visited 34 times. **Appendix E** presents dates the site was visited and parameters or constituents sampled during each visit. Analytical results are summarized in **Table 4-40**. Multiple constituents were analyzed for but were not detected in at least half of the samples from YP-T-10. These constituents were ammonia, beryllium, boron, cadmium, carbonate, chloride, chromium, cyanide, fluoride, dissolved iron, lead, dissolved manganese, methyl mercury, dissolved nickel, phosphorus, selenium, silver, total suspended solids, thallium, vanadium and zinc.

Of constituents that were regularly detected, many do not have defined or applicable regulatory criteria for comparison **(see Appendix E)**. These include conductivity, turbidity, arsenic III, bicarbonate, calcium, cobalt, hardness, magnesium, nitrate plus nitrite, total nitrogen, total Kjeldahl nitrogen, potassium and sodium. In general, most of the major cations (calcium, magnesium, sodium), major anion (bicarbonate), related measurements (conductivity and hardness) were lowest during the highest flows. The other constituents generally occurred in low concentrations and show no distinct trends.

In addition, many constituents that were regularly detected and have applicable regulatory criteria occurred in concentrations that met criteria **(see Appendix E)**. These constituents include color, dissolved oxygen, temperature, alkalinity, dissolved aluminum, barium, copper, total manganese, dissolved mercury, molybdenum, total nickel, total dissolved solids, sulfate and dissolved zinc. Of these constituents, alkalinity, total dissolved solids and sulfate tended to be higher during low flow conditions. The remaining constituents generally occurred in low concentrations and do not show distinct trends.

There were some constituents that did not meet regulatory criteria **(see Appendix E)**. The pH was higher than the regulatory maximum ($\leq$ 9.0) once (3 percent of measurements). Total aluminum exceeded the regulatory criterion (50 µg/L) five times (26 percent of measurements). Total and dissolved antimony exceeded the regulatory criterion (5.6 µg/L) 34 times each (100 percent of measurements). Total and dissolved arsenic exceeded the regulatory criterion (10 µg/L) 34 times each (100 percent of measurements). Cyanide exceeded regulatory criterion (0.0052 mg/L) once (7 percent of measurements). Total iron exceeded the regulatory criterion (300 µg/L) once (3 percent of measurements). Total mercury exceeded the regulatory criterion (12 ng/L) eight times (24 percent of measurements).

Table 4-40. YP-T-10, Lower Midnight Creek, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Alkalinity as CaCO3, Total	mg/L	34	0	0	50	134	0	91	96	18	103	113	127	Nonparametric
Aluminum, Total	µg/L	19	0	0	7.5	189	5	44.6	26.4	60.6	98.0	142	285	Lognormal
Aluminum, Dissolved	µg/L	11	8	42	< 2	13.1	0	3.5	2.4	2.7	10	10.3	12.5	KM - Nonparametric
Ammonia as Nitrogen	mg/L	0	34	100	< 0.05	< 0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Antimony, Total	µg/L	34	0	0	31.6	55.5	34	45.9	46.9	4.95	51.2	52.4	54.6	Normal
Antimony, Dissolved	µg/L	34	0	0	31.8	55.5	34	46.3	47.1	5.06	52.0	53.2	54.9	Normal
Arsenic, Total	µg/L	34	0	0	59.6	124	34	93.0	92.8	16.3	114	118	122	Normal
Arsenic, Dissolved	µg/L	34	0	0	59.9	120	34	92.2	92.7	15.8	114	115	119	Normal
Arsenic (III)	µg/L	15	0	0	0.03	4.54	n/a	0.57	0.28	1.10	0.44	1.68	3.97	Nonparametric
Barium, Total	µg/L	15	0	0	5.5	10.3	0	8.7	9.3	1.2	9.5	9.8	10.2	Nonparametric
Barium, Dissolved	µg/L	15	0	0	5.1	9.98	0	8.4	9.0	1.5	9.6	9.7	9.9	Nonparametric
Beryllium, Total	µg/L	1	14	93	< 0.02	0.03	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Beryllium, Dissolved	µg/L	0	15	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Bicarbonate as CaCO3	mg/L	34	0	0	50	134	n/a	89	94	17	102	107	127	Nonparametric
Boron, Total	µg/L	0	15	100	< 20	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Boron, Dissolved	µg/L	0	15	100	< 20	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Total	µg/L	2	28	93	< 0.02	0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Dissolved	µg/L	0	30	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Calcium, Total	µg/L	34	0	0	15800	30500	n/a	25209	26600	3783	28300	28635	29906	Nonparametric
Calcium, Dissolved	µg/L	34	0	0	15500	30700	n/a	25291	26900	3917	28400	28805	30139	Nonparametric
Carbonate as CaCO3	mg/L	2	32	94	< 9	33	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chloride	mg/L	1	33	97	< 0.2	45.8	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chromium, Total	µg/L	10	20	67	< 0.2	0.8	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chromium, Dissolved	µg/L	6	24	80	< 0.2	0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cobalt, Total	µg/L	11	4	27	< 0.02	0.11	n/a	0.05	0.05	0.03	0.09	0.10	0.11	KM - Nonparametric
Cobalt, Dissolved	µg/L	8	7	47	< 0.02	0.1	n/a	0.03	0.02	0.02	0.06	0.07	0.09	KM - Nonparametric
Conductivity	mS/cm	33	0	0	0.14	0.246	n/a	0.200	0.211	0.027	0.222	0.227	0.240	Nonparametric

Table 4-40. YP-T-10, Lower Midnight Creek, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Copper, Total	µg/L	19	11	37	< 0.1	0.4	0	0.2	0.1	0.1	0.3	0.3	0.4	KM - Nonparametric
Copper, Dissolved	µg/L	26	4	13	< 0.1	0.4	0	0.2	0.2	0.1	0.3	0.4	0.4	KM - Nonparametric
Cyanide, Total	mg/L	1	14	93	< 0.0047	0.011	1	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Dissolved Oxygen (DO)	mg/L	34	0	0	8.69	11.7	0	10.4	10.8	0.8	11.2	11.5	11.7	Normal
Fluoride	mg/L	0	34	100	< 0.2	< 0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Hardness as CaCO3	mg/L	34	0	0	59.8	115	n/a	96.8	103	15.2	110	111	114	Nonparametric
Iron, Total	µg/L	25	9	26	< 20	304	1	48.7	28	55.5	101	147	253	KM - Nonparametric
Iron, Dissolved	µg/L	0	34	100	< 10	< 40	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Lead, Total	µg/L	9	25	74	< 0.02	0.13	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Lead, Dissolved	µg/L	0	34	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Magnesium, Total	µg/L	34	0	0	4930	10100	n/a	8239	8700	1440	9457	9568	9935	Nonparametric
Magnesium, Dissolved	µg/L	34	0	0	4790	9930	n/a	8275	8835	1479	9531	9854	9914	Nonparametric
Manganese, Total	µg/L	10	9	47	< 1	10.7	0	2.3	1.9	2.3	5	5.6	9.7	KM - Nonparametric
Manganese, Dissolved	µg/L	0	19	100	< 1	< 5	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Mercury, Total	ng/L	34	0	0	2.5	44.7	8	11.2	9.4	8.4	20.9	25.1	34.4	Gamma
Mercury, Dissolved	ng/L	33	0	0	1.7	8.9	0	4.0	3.6	1.7	5.9	6.7	8.4	Normal
Methyl Mercury	ng/L	0	15	100	< 0.1	< 0.1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Molybdenum, Total	µg/L	15	0	0	0.65	1.16	0	1.01	1.05	0.15	1.14	1.15	1.16	Nonparametric
Molybdenum, Dissolved	µg/L	15	0	0	0.6	1.19	0	1.01	1.05	0.16	1.15	1.17	1.19	Nonparametric
Nickel, Total	µg/L	10	5	33	< 0.2	0.5	0	0.3	0.3	0.1	0.5	0.5	0.5	KM - Nonparametric
Nickel, Dissolved	µg/L	7	8	53	< 0.2	0.5	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nitrate + Nitrite as Nitrogen	mg/L	33	1	3	< 0.05	0.652	n/a	0.28	0.25	0.13	0.47	0.49	0.60	KM - Nonparametric
Nitrogen, Total	mg/L	12	3	20	< 0.4	1.61	n/a	0.76	0.73	0.29	0.99	1.2	1.5	KM - Nonparametric
Nitrogen, Total Kjeldahl (TKN)	mg/L	12	3	20	< 0.4	1.11	n/a	0.6	0.5	0.2	0.8	0.9	1.1	KM - Nonparametric
pH	pH units	33	0	0	7.1	9.05	1	8.1	8.1	0.6	8.7	8.9	9.0	Normal
Phosphorus, Total	µg/L	1	33	97	< 20	< 40	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample

Table 4-40. YP-T-10, Lower Midnight Creek, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Phosphorus, Dissolved	µg/L	0	34	100	< 20	< 42.6	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Potassium, Total	µg/L	34	0	0	1160	1770	n/a	1530	1560	124	1644	1687	1747	Nonparametric
Potassium, Dissolved	µg/L	34	0	0	1150	1730	n/a	1531	1560	128	1644	1678	1723	Normal
Selenium, Total	µg/L	0	30	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Selenium, Dissolved	µg/L	0	30	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Total	µg/L	1	14	93	< 0.02	0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Dissolved	µg/L	0	15	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sodium, Total	µg/L	34	0	0	588	980	n/a	774	779	99.7	914	943	973	Normal
Sodium, Dissolved	µg/L	34	0	0	581	1190	n/a	792	783	128	958	975	1124	Normal
Solids, Total Dissolved (TDS)	mg/L	34	0	0	78	245	0	112	106	29.7	134	152	221	Nonparametric
Solids, Total Suspended (TSS)	mg/L	3	31	91	< 5	35.5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sulfate	mg/L	34	0	0	5.73	53.8	0	13.1	12.8	7.62	14.7	15.1	41.2	Nonparametric
Temperature, Water	deg C	34	0	0	0.21	11.42	0	4.4	3.6	3.1	9.1	11.4	16.5	Gamma
Thallium, Total	µg/L	0	15	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Thallium, Dissolved	µg/L	0	15	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Turbidity	NTU	34	0	0	0	10.7	n/a	3.5	2.3	3.0	7.9	9.3	10.6	Nonparametric
Vanadium, Total	µg/L	4	11	73	< 0.2	0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Vanadium, Dissolved	µg/L	0	15	100	< 0.2	< 0.2	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Zinc, Total	µg/L	13	21	62	< 0.5	1.7	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Zinc, Dissolved	µg/L	17	17	50	< 0.5	1.3	0	0.6	0.5	0.2	0.9	0.9	1.2	KM - Nonparametric

Units: **µg/L** = micrograms per liter; **mg/L** = milligrams per liter; **mS/cm** = milliSiemens per centimeter; **ng/L** = nanograms per liter; **deg C** = degrees Celsius; **NTU** = nephelometric turbidity units
Measurements: **< 20 µg/L** = analyte not detected at the method reporting limit of 20 µg/L; **n/a** = not applicable; **Min** = minimum concentration measured; **Max** = maximum concentration measured
*Number that do not meet criterion: total number of analytical results that did not meet the strictest potentially applicable regulatory criterion (presented in **Table 3-4**). If a constituent does not have applicable regulatory criteria, then n/a is given.*
Distribution: **Normal** = data appear normally distributed at 0.05 significance level; statistics presented are normal population estimators; **Gamma** = data appear gamma distributed 0.05 significance level; statistics presented are gamma population estimators; **Lognormal** = data appear lognormally distributed at 0.05 significance level; statistics presented are lognormal populations estimators; **Nonparametric** = data do not appear normally, gamma or lognormally distributed at 0.05 significance level; statistics presented are sample statistics; **KM nonparametric** = data comprises ≤ 50% non-detects; statistics presented are nonparametric population estimators generated using the Kaplan-Meier method; **Sample** = data comprises > 50% non-detects and statistics are not presented; or, data comprises five or fewer measurements but each result was detected and statistics presented are sample statistics.

YP-T-41, upper Hennessy Creek

The upper Hennessy Creek site (YP-T-41) is about 50 feet west of FS 412 and about 50 feet upstream of the MGII water right withdrawal point. The site is located downstream of a cascade and the channel through this reach is relatively broad, shallow and shaded by an alder thicket (see photos in **Appendix G**). Only minor exploration activities have occurred upstream of the site. Flow through this stretch is south to north and onsite flow measurements have ranged from 0.15 cfs in February 2016 to 7.4 cfs in May 2014 with a median flow of 0.42 cfs.

For the time interval included in this baseline study, this site was visited 35 times. **Appendix E** presents dates the site was visited and parameters or constituents sampled during each visit. Analytical results are summarized in **Table 4-41**. Multiple constituents were analyzed for but were not detected in at least half of the samples from YP-T-41. These constituents were ammonia, beryllium, boron, cadmium, carbonate, chloride, chromium, dissolved cobalt, total copper, cyanide, fluoride, dissolved lead, methyl mercury, nickel, phosphorus, selenium, silver, total suspended solids, thallium, dissolved vanadium and zinc.

Of constituents that were regularly detected, many do not have defined or applicable regulatory criteria for comparison **(see Appendix E)**. These include conductivity, turbidity, arsenic III, bicarbonate, calcium, total cobalt, hardness, magnesium, nitrate plus nitrite, total nitrogen, total Kjeldahl nitrogen, potassium and sodium. In general, most of the major cations (calcium, magnesium, sodium), major anion (bicarbonate), and related measurements (conductivity and hardness) were lowest during periods of high flow. The other constituents generally occurred in low concentrations and show no distinct trends.

In addition, many constituents that were regularly detected and have applicable regulatory criteria occurred in concentrations that met criteria **(see Appendix E)**. These constituents include color, dissolved oxygen, antimony, arsenic, barium, dissolved copper, dissolved iron, total lead, manganese, dissolved mercury, molybdenum, total dissolved solids, sulfate and total vanadium. These constituents generally occurred in low concentrations and do not show distinct trends.

There were some constituents that did not meet regulatory criteria **(see Appendix E)**. The pH was lower than the regulatory minimum ($\geq$ 6.5) once (3 percent of measurements). Temperature exceeded the regulatory maximum (< 13 degrees Celsius) once (4 percent of measurements). Alkalinity was lower than the regulatory minimum (> 20 mg/L) ten times (29 percent of measurements). Total and dissolved aluminum exceeded the regulatory criterion (50 µg/L) eight and one times, respectively (40 and 5 percent of measurements). Total iron exceeded the regulatory criterion (300 µg/L) three times (9 percent of measurements). Total mercury exceeded the regulatory criterion (12 ng/L) twice (6 percent of measurements).

Table 4-41. YP-T-41, Upper Hennessy Creek, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Alkalinity as CaCO3, Total	mg/L	35	0	0	9.4	53	10	22	22	8.2	28.6	33.9	47.2	Nonparametric
Aluminum, Total	µg/L	20	0	0	12.3	274	8	81.8	41.3	91.5	189	247	380	Gamma
Aluminum, Dissolved	µg/L	18	2	10	< 4.3	120	1	16.2	8.80	24.9	24.9	36.5	103	KM - Nonparametric
Ammonia as Nitrogen	mg/L	1	34	97	< 0.05	0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Antimony, Total	µg/L	35	0	0	0.28	1.45	0	0.58	0.52	0.22	0.77	0.88	1.31	Normal
Antimony, Dissolved	µg/L	35	0	0	0.26	1.07	0	0.52	0.50	0.16	0.68	0.73	0.97	Normal
Arsenic, Total	µg/L	35	0	0	0.9	6.6	0	2.6	2.7	1.0	3.4	3.6	5.6	Normal
Arsenic, Dissolved	µg/L	35	0	0	0.8	3.3	0	2.3	2.5	0.7	3.0	3.1	3.3	Nonparametric
Arsenic (III)	µg/L	16	0	0	0.03	0.82	n/a	0.38	0.41	0.24	0.67	0.72	0.80	Normal
Barium, Total	µg/L	16	0	0	11.4	22.5	0	17.5	17.5	2.63	20.0	20.9	22.2	Normal
Barium, Dissolved	µg/L	16	0	0	9.31	19.1	0	15.7	16.9	3.33	18.5	18.8	19.0	Nonparametric
Beryllium, Total	µg/L	3	13	81	< 0.02	0.03	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Beryllium, Dissolved	µg/L	0	16	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Bicarbonate as CaCO3	mg/L	35	0	0	9.4	52	n/a	22	22.4	8.0	28.6	33.9	46.6	Nonparametric
Boron, Total	µg/L	0	16	100	< 20	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Boron, Dissolved	µg/L	0	16	100	< 20	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Total	µg/L	0	31	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Dissolved	µg/L	0	31	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Calcium, Total	µg/L	35	0	0	2390	5940	n/a	4485	4820	1094	5652	5738	5886	Nonparametric
Calcium, Dissolved	µg/L	35	0	0	2430	5970	n/a	4495	4860	1141	5776	5820	5919	Nonparametric
Carbonate as CaCO3	mg/L	0	35	100	< 2	< 15	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chloride	mg/L	1	34	97	< 0.2	0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chromium, Total	µg/L	5	26	84	< 0.2	0.6	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chromium, Dissolved	µg/L	2	29	94	< 0.2	0.41	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cobalt, Total	µg/L	14	2	13	< 0.02	0.1	n/a	0.04	0.03	0.02	0.07	0.09	0.10	KM - Nonparametric
Cobalt, Dissolved	µg/L	8	8	50	< 0.02	0.04	n/a	0.02	0.02	0.01	0.03	0.03	0.04	KM - Nonparametric
Conductivity	mS/cm	33	0	0	0.025	0.075	n/a	0.049	0.048	0.012	0.063	0.069	0.074	Normal

Table 4-41. YP-T-41, Upper Hennessy Creek, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Copper, Total	µg/L	12	19	61	< 0.1	0.3	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Copper, Dissolved	µg/L	20	11	35	< 0.1	0.4	0	0.1	0.1	0.1	0.2	0.3	0.4	KM - Nonparametric
Cyanide, Total	mg/L	0	16	100	< 0.0047	< 0.0047	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Dissolved Oxygen (DO)	mg/L	35	0	0	8.07	12.58	0	10.2	10.5	1.1	11.4	11.7	12.4	Normal
Fluoride	mg/L	0	35	100	< 0.2	< 0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Hardness as CaCO3	mg/L	35	0	0	7.14	17.9	n/a	13.6	14.8	3.32	17.2	17.5	17.8	Nonparametric
Iron, Total	µg/L	35	0	0	58.9	460	3	153	132	87.7	263	319	459	Lognormal
Iron, Dissolved	µg/L	28	7	20	< 20	110	0	41.4	43.1	19.1	59.8	68.0	101	KM - Nonparametric
Lead, Total	µg/L	27	8	23	< 0.02	0.31	0	0.06	0.03	0.07	0.17	0.19	0.28	KM - Nonparametric
Lead, Dissolved	µg/L	1	34	97	< 0.02	0.03	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Magnesium, Total	µg/L	35	0	0	288	775	n/a	580	628	146	755	760	773	Nonparametric
Magnesium, Dissolved	µg/L	35	0	0	280	776	n/a	571	613	156	756	772	775	Nonparametric
Manganese, Total	µg/L	19	1	5	< 4.8	47.5	0	13.9	12.3	9.1	21.8	25.2	43.0	KM - Nonparametric
Manganese, Dissolved	µg/L	19	1	5	< 1	10	0	6.4	7.7	3.3	9.8	9.9	10.0	KM - Nonparametric
Mercury, Total	ng/L	35	0	0	1.6	12.6	2	4.2	2.9	3.1	8.4	10.7	12.5	Nonparametric
Mercury, Dissolved	ng/L	33	1	3	< 0.8	4.2	0	2.0	1.7	0.9	3.4	4.0	4.2	KM - Nonparametric
Methyl Mercury	ng/L	1	15	94	< 0.1	0.17	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Molybdenum, Total	µg/L	16	0	0	0.05	0.13	0	0.09	0.09	0.02	0.12	0.12	0.13	Normal
Molybdenum, Dissolved	µg/L	13	3	19	< 0.05	0.13	0	0.09	0.09	0.02	0.12	0.12	0.13	KM - Nonparametric
Nickel, Total	µg/L	0	16	100	< 0.2	< 0.2	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nickel, Dissolved	µg/L	1	15	94	< 0.2	0.23	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nitrate + Nitrite as Nitrogen	mg/L	19	16	46	< 0.05	0.221	n/a	0.08	0.05	0.04	0.13	0.17	0.21	KM - Nonparametric
Nitrogen, Total	mg/L	10	6	38	< 0.4	0.74	n/a	0.51	0.48	0.11	0.64	0.68	0.73	KM - Nonparametric
Nitrogen, Total Kjeldahl (TKN)	mg/L	10	6	38	< 0.4	0.62	n/a	0.46	0.44	0.07	0.58	0.61	0.62	KM - Nonparametric
pH	pH units	33	0	0	6.38	7.85	1	7.1	7.1	0.3	7.5	7.6	7.8	Normal

Table 4-41. YP-T-41, Upper Hennessy Creek, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Phosphorus, Total	µg/L	15	20	57	< 21.3	< 80	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Phosphorus, Dissolved	µg/L	8	27	77	< 20	< 80	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Potassium, Total	µg/L	35	0	0	401	813	n/a	601	619	81.0	683	715	781	Normal
Potassium, Dissolved	µg/L	35	0	0	377	731	n/a	586	603	75.6	657	664	711	Normal
Selenium, Total	µg/L	0	31	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Selenium, Dissolved	µg/L	0	31	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Total	µg/L	1	15	94	< 0.02	0.03	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Dissolved	µg/L	0	16	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sodium, Total	µg/L	35	0	0	1640	2860	n/a	2437	2550	328.9	2776	2810	2843	Nonparametric
Sodium, Dissolved	µg/L	35	0	0	1600	2870	n/a	2456	2580	350.7	2808	2853	2867	Nonparametric
Solids, Total Dissolved (TDS)	mg/L	35	0	0	5.5	56.5	0	33.8	33	8.5	43.4	47	53.3	Normal
Solids, Total Suspended (TSS)	mg/L	4	31	89	< 5	15.5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sulfate	mg/L	35	0	0	0.72	12.8	0	1.7	1.4	2.0	1.9	2.0	9.2	Nonparametric
Temperature, Water	deg C	35	0	0	0.11	13.21	1	4.7	3.2	4.1	10.9	14.2	21.8	Gamma
Thallium, Total	µg/L	0	16	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Thallium, Dissolved	µg/L	0	16	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Turbidity	NTU	35	0	0	0	10.6	n/a	3.5	3.2	2.4	5.9	8.5	10.5	Normal
Vanadium, Total	µg/L	10	6	38	< 0.2	0.5	0	0.3	0.2	0.1	0.5	0.5	0.5	KM - Nonparametric
Vanadium, Dissolved	µg/L	6	10	63	< 0.2	0.3	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Zinc, Total	µg/L	15	20	57	< 0.5	2	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Zinc, Dissolved	µg/L	16	19	54	< 0.5	1.7	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample

Units: **µg/L** = micrograms per liter; **mg/L** = milligrams per liter; **mS/cm** = milliSiemens per centimeter; **ng/L** = nanograms per liter; **deg C** = degrees Celsius; **NTU** = nephelometric turbidity units
Measurements: **< 20 µg/L** = analyte not detected at the method reporting limit of 20 µg/L; **n/a** = not applicable; **Min** = minimum concentration measured; **Max** = maximum concentration measured
*Number that do not meet criterion: total number of analytical results that did not meet the strictest potentially applicable regulatory criterion (presented in **Table 3-4**). If a constituent does not have applicable regulatory criteria, then n/a is given.*
Distribution: **Normal** = data appear normally distributed at 0.05 significance level; statistics presented are normal population estimators; **Gamma** = data appear gamma distributed 0.05 significance level; statistics presented are gamma population estimators; **Lognormal** = data appear lognormally distributed at 0.05 significance level; statistics presented are lognormal populations estimators; **Nonparametric** = data do not appear normally, gamma or lognormally distributed at 0.05 significance level; statistics presented are sample statistics; **KM nonparametric** = data comprises ≤ 50% non-detects; statistics presented are nonparametric population estimators generated using the Kaplan-Meier method; **Sample** = data comprises > 50% non-detects and statistics are not presented; or, data comprises five or fewer measurements but each result was detected and statistics presented are sample statistics.

YP-SR-4, EFSFSR above Sugar Creek

The EFSFSR site above Sugar Creek (YP-SR-4) is about 250 downstream of the FS 412 bridge over the EFSFSR and collocated with USGS Station 13311250. The channel in this reach flows between Bradley waste rock piles (URS 2000) and is steep and filled with boulders (see photos in **Appendix G**). Flow is generally southeast to northwest and onsite flow measurements have ranged from 7.7 cfs in February 2016 to 227 cfs in May 2012 with a median flow of 17 cfs.

For the time interval included in this baseline study, this site was visited 35 times. **Appendix E** presents dates the site was visited and parameters or constituents sampled during each visit. Analytical results are summarized in **Table 4-42**. Multiple constituents were analyzed for but were not detected in at least half of the samples from YP-SR-4. These constituents were ammonia, beryllium, boron, cadmium, carbonate, chromium, cyanide, fluoride, dissolved lead, methyl mercury, nickel, nitrate plus nitrite, phosphorus, selenium, silver, total suspended solids, thallium and total zinc.

Of constituents that were regularly detected, many do not have defined or applicable regulatory criteria for comparison **(see Appendix E)**. These include conductivity, turbidity, arsenic III, bicarbonate, calcium, cobalt, hardness, magnesium, total nitrogen, total Kjeldahl nitrogen, potassium and sodium. In general, the major cations (calcium, magnesium, potassium, sodium), major anion (bicarbonate), and related measurements (conductivity and hardness) were lowest during the highest flows. The remaining constituents generally occurred in low concentrations and show no distinct trends.

In addition, many constituents that were regularly detected and have applicable regulatory criteria occurred in concentrations that met criteria **(see Appendix E)**. These constituents include color, dissolved oxygen, pH, alkalinity, dissolved aluminum, barium, chloride, copper, dissolved iron, total lead, dissolved mercury, molybdenum, total dissolved solids, sulfate, vanadium and dissolved zinc. Of these constituents, alkalinity, chloride, total dissolved solids and sulfate were lowest during the highest flows. The remaining constituents generally occurred in low concentrations and do not show distinct trends.

There were some constituents that did not meet regulatory criteria **(see Appendix E)**. Temperature exceeded the regulatory maximum (< 13 degrees Celsius) five times (14 percent of measurements). Total aluminum exceeded the regulatory criterion (50 µg/L) eight times (40 percent of measurements). Total and dissolved antimony exceeded the regulatory criterion (5.6 µg/L) 35 times each (100 percent of measurements). Total and dissolved arsenic exceeded the regulatory criterion (10 µg/L) 35 times each (100 percent of measurements). Total iron exceeded the regulatory criterion (300 µg/L) five times (14 percent of measurements). Total and dissolved manganese exceeded the regulatory criterion (50 µg/L) once each (5 percent of measurements). Total mercury exceeded the regulatory criterion (12 ng/L) twice (6 percent of measurements).

Table 4-42. YP-SR-4, EFSFSR above Sugar Creek, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Alkalinity as CaCO3, Total	mg/L	35	0	0	22.1	83	0	43.2	47.0	12.9	54.2	55.9	74.5	Normal
Aluminum, Total	µg/L	20	0	0	6.2	206	8	62.7	29.8	61.9	144	188	288	Gamma
Aluminum, Dissolved	µg/L	20	0	0	2.5	28.1	0	12.1	8.8	8.1	23.8	29.2	41.1	Gamma
Ammonia as Nitrogen	mg/L	0	35	100	< 0.05	< 0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Antimony, Total	µg/L	35	0	0	10.2	62.2	35	31.5	29.9	13.0	49.7	53.8	60.1	Normal
Antimony, Dissolved	µg/L	35	0	0	10.4	62	35	31.0	30.0	13.0	49.6	53.7	59.6	Normal
Arsenic, Total	µg/L	35	0	0	22	115	35	69.2	73.9	25.4	96.4	102	111	Normal
Arsenic, Dissolved	µg/L	35	0	0	20.8	105	35	60.9	64.7	22.3	82.7	91.3	102	Normal
Arsenic (III)	µg/L	16	0	0	1.3	10.9	n/a	6.3	6.4	3.2	9.9	10.2	10.8	Normal
Barium, Total	µg/L	16	0	0	7.51	13.9	0	11.6	12.1	1.91	13.1	13.4	13.8	Nonparametric
Barium, Dissolved	µg/L	16	0	0	6.2	13.3	0	10.9	11.8	2.37	12.8	13.0	13.2	Nonparametric
Beryllium, Total	µg/L	2	14	88	< 0.02	0.05	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Beryllium, Dissolved	µg/L	1	15	94	< 0.02	0.03	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Bicarbonate as CaCO3	mg/L	35	0	0	22.1	68	n/a	42.6	47	11.5	53	55	63.6	Nonparametric
Boron, Total	µg/L	0	16	100	< 10	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Boron, Dissolved	µg/L	0	16	100	< 10	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Total	µg/L	0	31	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Dissolved	µg/L	0	31	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Calcium, Total	µg/L	35	0	0	6140	16200	n/a	12736	14300	3364	15800	15930	16132	Nonparametric
Calcium, Dissolved	µg/L	35	0	0	5900	16100	n/a	12675	14000	3444	15860	16000	16066	Nonparametric
Carbonate as CaCO3	mg/L	1	34	97	< 9	16	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chloride	mg/L	26	9	26	< 0.4	1.05	0	0.68	0.71	0.22	0.98	1.00	1.04	KM - Nonparametric
Chromium, Total	µg/L	9	22	71	< 0.2	0.5	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chromium, Dissolved	µg/L	4	27	87	< 0.2	0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cobalt, Total	µg/L	16	0	0	0.08	0.22	n/a	0.13	0.13	0.04	0.18	0.21	0.22	Normal
Cobalt, Dissolved	µg/L	16	0	0	0.05	0.21	n/a	0.12	0.11	0.05	0.18	0.20	0.21	Normal
Conductivity	mS/cm	33	0	0	0.051	0.143	n/a	0.110	0.120	0.027	0.133	0.137	0.142	Nonparametric

Table 4-42. YP-SR-4, EFSFSR above Sugar Creek, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Copper, Total	µg/L	30	1	3	< 0.1	0.6	0	0.2	0.2	0.1	0.4	0.5	0.6	KM - Nonparametric
Copper, Dissolved	µg/L	31	0	0	0.1	0.5	0	0.3	0.2	0.1	0.4	0.4	0.5	Nonparametric
Cyanide, Total	mg/L	0	16	100	< 0.0047	< 0.0047	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Dissolved Oxygen (DO)	mg/L	34	0	0	8.23	12.45	0	10.4	10.7	1.2	11.6	11.9	12.4	Normal
Fluoride	mg/L	0	35	100	< 0.2	< 0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Hardness as CaCO3	mg/L	35	0	0	20.8	55.6	n/a	43.8	49.3	11.9	54.3	54.9	55.6	Nonparametric
Iron, Total	µg/L	35	0	0	74	589	5	216	194	105	350	413	565	Lognormal
Iron, Dissolved	µg/L	33	2	6	< 20	98.7	0	57.9	55.9	23.1	88.2	93.2	98.5	KM - Nonparametric
Lead, Total	µg/L	31	4	11	< 0.02	0.26	0	0.06	0.04	0.05	0.10	0.19	0.24	KM - Nonparametric
Lead, Dissolved	µg/L	1	34	97	< 0.02	0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Magnesium, Total	µg/L	35	0	0	1300	3940	n/a	2908	3280	850.4	3696	3724	3886	Nonparametric
Magnesium, Dissolved	µg/L	35	0	0	1260	3960	n/a	2883	3240	862.9	3636	3695	3906	Nonparametric
Manganese, Total	µg/L	20	0	0	12.3	59.5	1	30.1	28.8	12.0	42.3	44.8	56.6	Normal
Manganese, Dissolved	µg/L	20	0	0	5.7	50.6	1	21.5	20.5	12.2	37.2	38.1	48.1	Normal
Mercury, Total	ng/L	35	0	0	2	32.7	2	5.7	3.6	5.5	10.1	11.4	26.0	Nonparametric
Mercury, Dissolved	ng/L	34	0	0	1.3	4.5	0	2.3	2.2	0.88	3.5	3.9	4.8	Gamma
Methyl Mercury	ng/L	1	15	94	< 0.1	0.11	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Molybdenum, Total	µg/L	16	0	0	0.52	1.04	0	0.82	0.88	0.15	0.95	0.97	1.03	Nonparametric
Molybdenum, Dissolved	µg/L	16	0	0	0.52	1.06	0	0.83	0.89	0.16	0.97	1.01	1.05	Normal
Nickel, Total	µg/L	6	10	63	< 0.2	0.3	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nickel, Dissolved	µg/L	7	9	56	< 0.2	0.41	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nitrate + Nitrite as Nitrogen	mg/L	3	32	91	< 0.05	0.061	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nitrogen, Total	mg/L	12	4	25	< 0.4	0.78	n/a	0.54	0.5	0.12	0.72	0.75	0.77	KM - Nonparametric
Nitrogen, Total Kjeldahl (TKN)	mg/L	12	4	25	< 0.4	0.78	n/a	0.54	0.5	0.12	0.72	0.75	0.77	KM - Nonparametric
pH	pH units	34	0	0	6.65	8.51	0	7.5	7.4	0.5	8.1	8.4	8.5	Normal
Phosphorus, Total	µg/L	3	32	91	< 20	< 80	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample

Table 4-42. YP-SR-4, EFSFSR above Sugar Creek, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Phosphorus, Dissolved	µg/L	1	34	97	< 20	< 80	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Potassium, Total	µg/L	35	0	0	554	1200	n/a	904	950	152	1036	1060	1152	Nonparametric
Potassium, Dissolved	µg/L	35	0	0	521	1110	n/a	880	930	150	1010	1032	1093	Nonparametric
Selenium, Total	µg/L	0	31	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Selenium, Dissolved	µg/L	0	31	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Total	µg/L	0	16	100	< 0.02	< 0.04	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Dissolved	µg/L	0	16	100	< 0.02	< 0.04	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sodium, Total	µg/L	35	0	0	1440	2850	n/a	2305	2460	432	2686	2816	2843	Nonparametric
Sodium, Dissolved	µg/L	35	0	0	1370	2900	n/a	2309	2460	443	2726	2794	2883	Nonparametric
Solids, Total Dissolved (TDS)	mg/L	35	0	0	35.5	142	0	66.7	68	21.0	87.2	98.6	128	Normal
Solids, Total Suspended (TSS)	mg/L	3	32	91	< 5	13.5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sulfate	mg/L	35	0	0	3.04	14.7	0	8.89	9.14	3.73	14.0	14.6	14.7	Normal
Temperature, Water	deg C	35	0	0	0.19	16.77	5	5.9	4.5	5.2	13.8	18.1	28.1	Gamma
Thallium, Total	µg/L	0	16	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Thallium, Dissolved	µg/L	0	16	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Turbidity	NTU	35	0	0	0	40.5	n/a	5.5	3.2	7.8	7.8	19.4	35.9	Nonparametric
Vanadium, Total	µg/L	12	4	25	< 0.2	0.4	0	0.3	0.3	0.1	0.4	0.4	0.4	KM - Nonparametric
Vanadium, Dissolved	µg/L	9	7	44	< 0.2	0.3	0	0.2	0.2	0.02	0.2	0.2	0.3	KM - Nonparametric
Zinc, Total	µg/L	17	18	51	< 0.5	2.1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Zinc, Dissolved	µg/L	23	12	34	< 0.5	1.5	0	0.7	0.6	0.3	1.2	1.3	1.5	KM - Nonparametric

Units: **µg/L** = micrograms per liter; **mg/L** = milligrams per liter; **mS/cm** = milliSiemens per centimeter; **ng/L** = nanograms per liter; **deg C** = degrees Celsius; **NTU** = nephelometric turbidity units
Measurements: **< 20 µg/L** = analyte not detected at the method reporting limit of 20 µg/L; **n/a** = not applicable; **Min** = minimum concentration measured; **Max** = maximum concentration measured
*Number that do not meet criterion: total number of analytical results that did not meet the strictest potentially applicable regulatory criterion (presented in **Table 3-4**). If a constituent does not have applicable regulatory criteria, then n/a is given.*
Distribution: **Normal** = data appear normally distributed at 0.05 significance level; statistics presented are normal population estimators; **Gamma** = data appear gamma distributed 0.05 significance level; statistics presented are gamma population estimators; **Lognormal** = data appear lognormally distributed at 0.05 significance level; statistics presented are lognormal populations estimators; **Nonparametric** = data do not appear normally, gamma or lognormally distributed at 0.05 significance level; statistics presented are sample statistics; **KM nonparametric** = data comprises ≤ 50% non-detects; statistics presented are nonparametric population estimators generated using the Kaplan-Meier method; **Sample** = data comprises > 50% non-detects and statistics are not presented; or, data comprises five or fewer measurements but each result was detected and statistics presented are sample statistics.

YP-T-48, lower Hennessy Creek

The lower Hennessy Creek site (YP-T-48) is just downstream of a culvert under FS 412 and just upstream of a steep gradient section that flows about 300 feet to its confluence with the EFSFSR (see photos in **Appendix G**). From the upper Hennessy Creek site, the creek flows north and adjacent to FS 412, under FS 412 via a culvert, and flows around the USFS tailings repository; during low flow conditions the creek sometimes goes subsurface under the western edge of the repository and then remerges along the southern edge. From there, the creek flows under FS 412 again via a second culvert, through site YP-T-48, and into the EFSFSR. Flow is generally from south to north in the vicinity of YP-T-48 and onsite flow measurements have ranged from $9.3x10^{-2}$ cfs in February 2014 to 5.1 cfs in May 2014 with a median flow of 0.38 cfs.

For the time interval included in this baseline study, this site was visited 16 times. **Appendix E** presents dates the site was visited and parameters or constituents sampled during each visit. Analytical results are summarized in **Table 4-43**. Multiple constituents were analyzed for but were not detected in at least half of the samples from YP-T-48. These constituents were ammonia, beryllium, boron, cadmium, carbonate, chloride, chromium, dissolved cobalt, cyanide, fluoride, dissolved iron, dissolved lead, methyl mercury, nickel, phosphorus, selenium, silver, total suspended solids, thallium and dissolved vanadium.

Of constituents that were regularly detected, many do not have defined or applicable regulatory criteria for comparison **(see Appendix E)**. These include conductivity, turbidity, arsenic III, bicarbonate, calcium, total cobalt, hardness, magnesium, total nitrogen, total Kjeldahl nitrogen, potassium and sodium. In general, most of the major cations (calcium, magnesium, sodium), major anion (bicarbonate) and hardness were lowest when flow was highest. The remaining constituents generally occurred in low concentrations and show no distinct trends.

In addition, many constituents that were regularly detected and have applicable regulatory criteria occurred in concentrations that met criteria **(see Appendix E)**. These constituents include color, dissolved oxygen, temperature, dissolved aluminum, barium, copper, dissolved manganese, dissolved mercury, molybdenum, total dissolved solids, sulfate, total vanadium and zinc. These constituents generally occurred in low concentrations and do not show distinct trends.

There were some constituents that did not meet regulatory criteria (see Appendix E). The pH was below the regulatory minimum (≥ 6.5) twice (13 percent of measurements). Alkalinity was below the regulatory minimum (> 20 mg/L) five times (31 percent of measurements). Total aluminum exceeded the regulatory criterion (50 µg/L) ten times (71 percent of measurements). Total and dissolved antimony exceeded the regulatory criterion (5.6 µg/L) 16 times each (100 percent of measurements). Total and dissolved arsenic exceeded the regulatory criterion (10 µg/L) 16 times each (100 percent of measurements). Total iron exceeded the regulatory criterion (300 µg/L) three times (19 percent of measurements). In April 2014 (6 percent of measurements), total lead exceeded the site-specific, hardness-based regulatory criteria (0.93 µg/L). Total manganese exceeded the regulatory criterion (50 µg/L) once (7 percent of measurements). Total mercury exceeded the regulatory criterion (12 ng/L) twice (13 percent of measurements).

Table 4-43. YP-T-48, Lower Hennessy Creek, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Alkalinity as CaCO3, Total	mg/L	16	0	0	11.7	54	5	22.4	20.8	9.22	34.4	39.8	52.0	Lognormal
Aluminum, Total	µg/L	14	0	0	25.9	1570	10	157	92.2	217	346	504	1019	Lognormal
Aluminum, Dissolved	µg/L	13	1	7	< 4.3	34.2	0	10.2	8.6	7.6	15.9	23.2	32.0	KM - Nonparametric
Ammonia as Nitrogen	mg/L	0	16	100	< 0.05	< 0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Antimony, Total	µg/L	16	0	0	15.2	71.9	16	29.4	26.5	14.0	41.3	50.7	67.7	Normal
Antimony, Dissolved	µg/L	16	0	0	14.1	46.6	16	27.3	26.6	9.9	40.8	44.1	46.1	Normal
Arsenic, Total	µg/L	16	0	0	10.1	107	16	33.4	24.6	27.5	68.7	82.9	102	Normal
Arsenic, Dissolved	µg/L	16	0	0	9.3	61.4	12	26.7	20.7	19.1	57.8	61.0	61.3	Normal
Arsenic (III)	µg/L	10	0	0	0.22	0.744	n/a	0.41	0.39	0.16	0.61	0.68	0.73	Normal
Barium, Total	µg/L	10	0	0	14.1	20.7	0	17.7	17.7	1.84	19.7	20.2	20.6	Normal
Barium, Dissolved	µg/L	10	0	0	11.1	17.9	0	15.8	16.3	2.23	17.9	17.9	17.9	Nonparametric
Beryllium, Total	µg/L	1	9	90	< 0.02	0.04	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Beryllium, Dissolved	µg/L	0	10	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Bicarbonate as CaCO3	mg/L	16	0	0	11.7	51	n/a	22.3	22.7	9.64	34.7	39.5	49.5	Gamma
Boron, Total	µg/L	0	10	100	< 20	< 40	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Boron, Dissolved	µg/L	0	10	100	< 20	< 40	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Total	µg/L	0	12	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Dissolved	µg/L	0	12	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Calcium, Total	µg/L	16	0	0	2880	10700	n/a	5561	5570	1860	7115	8195	10199	Normal
Calcium, Dissolved	µg/L	16	0	0	2910	10300	n/a	5468	5495	1786	7005	8035	9847	Normal
Carbonate as CaCO3	mg/L	0	16	100	< 2	< 15	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chloride	mg/L	3	13	81	< 0.2	1.01	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chromium, Total	µg/L	1	11	92	< 0.2	0.2	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chromium, Dissolved	µg/L	1	11	92	< 0.2	0.2	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cobalt, Total	µg/L	9	1	10	< 0.02	0.11	n/a	0.05	0.04	0.03	0.09	0.10	0.11	KM - Nonparametric
Cobalt, Dissolved	µg/L	3	7	70	< 0.02	0.03	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Conductivity	mS/cm	16	0	0	0.03	0.096	n/a	0.057	0.055	0.017	0.078	0.093	0.095	Normal

Table 4-43. YP-T-48, Lower Hennessy Creek, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Copper, Total	µg/L	12	0	0	0.1	0.4	0	0.2	0.2	0.1	0.2	0.3	0.4	Nonparametric
Copper, Dissolved	µg/L	12	0	0	0.1	0.5	0	0.2	0.2	0.2	0.4	0.5	0.8	Lognormal
Cyanide, Total	mg/L	0	11	100	< 0.0047	< 0.0047	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Dissolved Oxygen (DO)	mg/L	16	0	0	8.59	12.38	0	10.4	10.6	1.2	11.4	11.7	12.2	Normal
Fluoride	mg/L	0	16	100	< 0.2	< 0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Hardness as CaCO3	mg/L	16	0	0	9.55	40.5	n/a	19.1	18.4	7.13	28.4	31.9	39.0	Gamma
Iron, Total	µg/L	16	0	0	62	2440	3	299	120	581	390	930	2138	Nonparametric
Iron, Dissolved	µg/L	3	13	81	< 20	42.6	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Lead, Total	µg/L	14	2	13	< 0.02	0.93	1	0.11	0.06	0.22	0.15	0.38	0.82	KM - Nonparametric
Lead, Dissolved	µg/L	2	14	88	< 0.02	0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Magnesium, Total	µg/L	16	0	0	574	3350	n/a	1268	1175	513	1935	2229	2906	Lognormal
Magnesium, Dissolved	µg/L	16	0	0	552	2880	n/a	1207	1126	468	1818	2083	2688	Lognormal
Manganese, Total	µg/L	14	0	0	2.9	88.4	1	11.8	7.9	13.2	24.9	34.6	63.9	Lognormal
Manganese, Dissolved	µg/L	8	6	43	< 1	8.8	0	1.9	1.1	2.0	2.9	5.2	8.1	KM - Nonparametric
Mercury, Total	ng/L	16	0	0	1.3	64.3	2	8.4	4.4	15.1	9.8	26.1	56.7	Nonparametric
Mercury, Dissolved	ng/L	15	1	6	< 1	4.6	0	2.0	1.9	0.9	2.8	3.3	4.3	KM - Nonparametric
Methyl Mercury	ng/L	0	10	100	< 0.1	< 0.1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Molybdenum, Total	µg/L	10	0	0	0.06	0.11	0	0.09	0.09	0.02	0.11	0.11	0.11	Normal
Molybdenum, Dissolved	µg/L	10	0	0	0.05	0.12	0	0.09	0.10	0.02	0.12	0.12	0.12	Normal
Nickel, Total	µg/L	0	10	100	< 0.2	< 0.2	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nickel, Dissolved	µg/L	1	9	90	< 0.2	0.2	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nitrate + Nitrite as Nitrogen	mg/L	7	9	56	< 0.05	0.179	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nitrogen, Total	mg/L	8	2	20	< 0.4	0.92	n/a	0.6	0.7	0.2	0.8	0.9	0.9	KM - Nonparametric
Nitrogen, Total Kjeldahl (TKN)	mg/L	8	2	20	< 0.4	0.92	n/a	0.6	0.6	0.2	0.7	0.8	0.9	KM - Nonparametric
pH	pH units	16	0	0	6.24	8.5	2	7.2	7.2	0.6	7.8	8.1	8.4	Normal
Phosphorus, Total	µg/L	2	14	88	< 40	103	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample

Table 4-43. YP-T-48, Lower Hennessy Creek, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Phosphorus, Dissolved	µg/L	0	16	100	< 40	< 42.6	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Potassium, Total	µg/L	16	0	0	453	1380	n/a	647	606	210	703	884	1281	Nonparametric
Potassium, Dissolved	µg/L	16	0	0	397	764	n/a	587	597	104	705	751	761	Normal
Selenium, Total	µg/L	0	12	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Selenium, Dissolved	µg/L	0	12	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Total	µg/L	0	10	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Dissolved	µg/L	0	10	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sodium, Total	µg/L	16	0	0	1650	2930	n/a	2433	2515	382.2	2830	2900	2924	Normal
Sodium, Dissolved	µg/L	16	0	0	1640	2880	n/a	2420	2505	367.5	2830	2880	2880	Normal
Solids, Total Dissolved (TDS)	mg/L	16	0	0	23.5	80	0	39	34.8	14.0	53.3	65.4	77.1	Normal
Solids, Total Suspended (TSS)	mg/L	5	11	69	< 5	61.5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sulfate	mg/L	16	0	0	2.39	23.7	0	6.37	5.51	3.71	11.0	13.4	19.3	Lognormal
Temperature, Water	deg C	16	0	0	0.66	11.34	0	5.0	3.7	4.1	10.6	11.0	11.3	Normal
Thallium, Total	µg/L	0	10	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Thallium, Dissolved	µg/L	0	10	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Turbidity	NTU	16	0	0	1.6	63.2	n/a	12.1	3.5	19.3	43.0	51.9	60.9	Nonparametric
Vanadium, Total	µg/L	8	2	20	< 0.2	0.6	0	0.3	0.3	0.1	0.3	0.5	0.6	KM - Nonparametric
Vanadium, Dissolved	µg/L	2	8	80	< 0.2	0.2	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Zinc, Total	µg/L	16	0	0	0.8	18.1	0	6.7	3.7	5.7	15.0	19.3	29.2	Gamma
Zinc, Dissolved	µg/L	14	2	13	< 0.5	17.7	0	5.5	3.2	5.2	12.8	15.7	17.3	KM - Nonparametric

Units: **µg/L** = micrograms per liter; **mg/L** = milligrams per liter; **mS/cm** = milliSiemens per centimeter; **ng/L** = nanograms per liter; **deg C** = degrees Celsius; **NTU** = nephelometric turbidity units

Measurements: **< 20 µg/L** = analyte not detected at the method reporting limit of 20 µg/L; **n/a** = not applicable; **Min** = minimum concentration measured; **Max** = maximum concentration measured

*Number that do not meet criterion: total number of analytical results that did not meet the strictest potentially applicable regulatory criterion (presented in **Table 3-4**). If a constituent does not have applicable regulatory criteria, then n/a is given.*

Distribution: **Normal** = data appear normally distributed at 0.05 significance level; statistics presented are normal population estimators; **Gamma** = data appear gamma distributed 0.05 significance level; statistics presented are gamma population estimators; **Lognormal** = data appear lognormally distributed at 0.05 significance level; statistics presented are lognormal populations estimators; **Nonparametric** = data do not appear normally, gamma or lognormally distributed at 0.05 significance level; statistics presented are sample statistics; **KM nonparametric** = data comprises ≤ 50% non-detects; statistics presented are nonparametric population estimators generated using the Kaplan-Meier method; **Sample** = data comprises > 50% non-detects and statistics are not presented; or, data comprises five or fewer measurements but each result was detected and statistics presented are sample statistics.

YP-SR-2, EFSFSR below Sugar Creek

The EFSFSR site below Sugar Creek (YP-SR-2) is located adjacent to FS 412, about 700 feet south of mile marker 10. The site is about 60 feet upstream of a small tributary and debris fan that was active in spring 2012. The channel is relatively wide, deep and low gradient at the site and was geomorphologically active during the sampling period (see photos in **Appendix G**). This site is downstream of Stibnite legacy mining impacts. The flow is generally southeast to northwest and onsite flow measurements have ranged from 9.0 cfs in February 2013 to 407 cfs in May 2012 with a median flow of 35 cfs.

For the time interval included in this baseline study, this site was visited 35 times. **Appendix E** presents dates the site was visited and parameters or constituents sampled during each visit. Analytical results are summarized in **Table 4-44**. Multiple constituents were analyzed for but were not detected in at least half of the samples from YP-SR-2. These constituents were ammonia, beryllium, boron, cadmium, carbonate, chromium, cyanide, fluoride, dissolved lead, methyl mercury, nickel, nitrate plus nitrite, phosphorus, selenium, silver, total suspended solids, thallium and dissolved vanadium.

Of constituents that were regularly detected, many do not have defined or applicable regulatory criteria for comparison **(see Appendix E)**. These include conductivity, turbidity, arsenic III, bicarbonate, calcium, cobalt, hardness, magnesium, total nitrogen, total Kjeldahl nitrogen, potassium and sodium. In general, the major cations (calcium, magnesium, potassium, sodium), major anion (bicarbonate) and related measurements (conductivity and hardness) tended to be lower during periods of high flow. The other constituents generally occurred in low concentrations and show no distinct trends.

In addition, many constituents that were regularly detected and have applicable regulatory criteria occurred in concentrations that met criteria **(see Appendix E)**. These constituents include color, dissolved oxygen, pH, barium, chloride, copper, dissolved iron, total lead, manganese, molybdenum, total dissolved solids, sulfate, total vanadium and zinc. Of these constituents, chloride tended to be higher during lower flow conditions. The remaining constituents generally occurred in low concentrations and do not show distinct trends.

There were some constituents that did not meet regulatory criteria **(see Appendix E)**. Temperature exceeded the regulatory maximum (< 13 degrees Celsius) three times (9 percent of measurements). Alkalinity was below the regulatory minimum (> 20 mg/L) once (3 percent of measurements). Total and dissolved aluminum exceeded the regulatory criterion (50 µg/L) nine and one times, respectively (45 and 5 percent of measurements). Total and dissolved antimony exceeded the regulatory criterion (5.6 µg/L) 35 times each (100 percent of measurements). Total and dissolved arsenic exceeded the regulatory criterion (10 µg/L) 35 times each (100 percent of measurements). Total iron exceeded the regulatory criterion (300 µg/L) four times (11 percent of measurements). Total and dissolved mercury exceeded the regulatory criterion (12 ng/L) 21 and one times, respectively (60 and 3 percent of measurements).

Table 4-44. YP-SR-2, EFSFSR below Sugar Creek, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Alkalinity as CaCO3, Total	mg/L	35	0	0	16.3	90	1	48.1	52	16.2	60	69.9	89.5	Nonparametric
Aluminum, Total	µg/L	20	0	0	4.8	476	9	82.6	38.5	157	188	294	682	Lognormal
Aluminum, Dissolved	µg/L	19	1	5	< 2.2	111	1	15.3	8.1	23.4	23.9	37.2	96.2	KM - Nonparametric
Ammonia as Nitrogen	mg/L	0	35	100	< 0.05	< 0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Antimony, Total	µg/L	35	0	0	6.82	36.5	35	22.1	22.3	8.1	33.1	34.3	35.8	Normal
Antimony, Dissolved	µg/L	35	0	0	6.79	36.5	35	21.9	22.4	8.3	33.5	35.0	36.0	Normal
Arsenic, Total	µg/L	35	0	0	15.6	76.2	35	48.7	52.9	17.1	65.2	69.5	75.2	Normal
Arsenic, Dissolved	µg/L	35	0	0	14.7	71.1	35	43.2	46.7	15.3	58.5	61.9	69.2	Normal
Arsenic (III)	µg/L	16	0	0	0.35	5.65	n/a	2.74	2.95	1.42	4.42	5.04	5.53	Normal
Barium, Total	µg/L	16	0	0	7.53	14.7	0	12.0	12.4	2.03	13.8	14.3	14.6	Nonparametric
Barium, Dissolved	µg/L	16	0	0	6.36	15.4	0	11.3	12.1	2.69	13.5	14.2	15.2	Nonparametric
Beryllium, Total	µg/L	3	13	81	< 0.02	0.05	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Beryllium, Dissolved	µg/L	0	16	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Bicarbonate as CaCO3	mg/L	35	0	0	23.5	88.4	n/a	48.5	52.0	14.2	60.0	65.6	83.5	Nonparametric
Boron, Total	µg/L	0	16	100	< 10	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Boron, Dissolved	µg/L	0	16	100	< 10	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Total	µg/L	1	30	97	< 0.02	0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Dissolved	µg/L	0	31	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Calcium, Total	µg/L	35	0	0	7220	19300	n/a	14307	15800	3538	17460	18060	18926	Nonparametric
Calcium, Dissolved	µg/L	35	0	0	7120	20300	n/a	14289	15800	3591	17960	18030	19552	Nonparametric
Carbonate as CaCO3	mg/L	1	34	97	< 9	16	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chloride	mg/L	22	13	37	< 0.4	0.81	0	0.53	0.49	0.14	0.74	0.78	0.81	KM - Nonparametric
Chromium, Total	µg/L	9	22	71	< 0.2	1.2	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chromium, Dissolved	µg/L	5	26	84	< 0.2	0.6	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cobalt, Total	µg/L	16	0	0	0.06	0.15	n/a	0.09	0.09	0.03	0.13	0.14	0.15	Normal
Cobalt, Dissolved	µg/L	16	0	0	0.03	0.17	n/a	0.08	0.07	0.04	0.11	0.13	0.16	Normal
Conductivity	mS/cm	34	0	0	0.059	0.162	n/a	0.116	0.126	0.028	0.143	0.149	0.159	Nonparametric

Table 4-44. YP-SR-2, EFSFSR below Sugar Creek, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Copper, Total	µg/L	29	2	6	< 0.1	0.5	0	0.2	0.2	0.1	0.3	0.4	0.5	KM - Nonparametric
Copper, Dissolved	µg/L	31	0	0	0.1	0.4	0	0.2	0.2	0.1	0.3	0.4	0.4	Nonparametric
Cyanide, Total	mg/L	0	16	100	< 0.0047	< 0.0047	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Dissolved Oxygen (DO)	mg/L	34	0	0	7.84	12.22	0	10.3	10.5	1.2	11.8	11.9	12.2	Normal
Fluoride	mg/L	0	35	100	< 0.2	< 0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Hardness as CaCO3	mg/L	35	0	0	24	67.3	n/a	48.2	52.7	12.3	59.1	60.9	65.2	Nonparametric
Iron, Total	µg/L	35	0	0	64.7	413	4	157	137	88.3	268	325	464	Lognormal
Iron, Dissolved	µg/L	29	6	17	< 20	101	0	37.5	33.8	18.3	56.4	68.5	95.8	KM - Nonparametric
Lead, Total	µg/L	27	8	23	< 0.02	0.27	0	0.06	0.04	0.06	0.13	0.24	0.26	KM - Nonparametric
Lead, Dissolved	µg/L	2	33	94	< 0.02	0.04	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Magnesium, Total	µg/L	35	0	0	1400	4660	n/a	3016	3320	864.3	3784	3852	4419	Nonparametric
Magnesium, Dissolved	µg/L	35	0	0	1370	4940	n/a	2998	3350	883	3786	3841	4583	Nonparametric
Manganese, Total	µg/L	20	0	0	7.6	28.9	0	17.3	17.1	6.05	25.6	28.7	28.9	Normal
Manganese, Dissolved	µg/L	19	1	5	< 3.4	23.3	0	11.6	10.2	6.15	19.9	21.9	23.0	KM - Nonparametric
Mercury, Total	ng/L	35	0	0	3.1	395	21	33.8	19.4	48.1	74.9	110	225	Lognormal
Mercury, Dissolved	ng/L	34	0	0	1.7	29.5	1	5.6	5.0	2.9	9.4	11.2	15.7	Lognormal
Methyl Mercury	ng/L	4	12	75	< 0.1	0.15	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Molybdenum, Total	µg/L	16	0	0	0.47	1.07	0	0.87	0.93	0.21	1.06	1.06	1.07	Nonparametric
Molybdenum, Dissolved	µg/L	16	0	0	0.48	1.11	0	0.87	0.92	0.21	1.10	1.10	1.11	Nonparametric
Nickel, Total	µg/L	5	11	69	< 0.2	0.3	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nickel, Dissolved	µg/L	7	9	56	< 0.2	0.3	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nitrate + Nitrite as Nitrogen	mg/L	4	31	89	< 0.05	0.114	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nitrogen, Total	mg/L	13	3	19	< 0.4	34.8	n/a	2.7	0.5	8.3	1.0	9.5	29.7	KM - Nonparametric
Nitrogen, Total Kjeldahl (TKN)	mg/L	13	3	19	< 0.4	34.8	n/a	2.7	0.5	8.3	1.0	9.5	29.7	KM - Nonparametric
pH	pH units	34	0	0	6.64	8.62	0	7.6	7.6	0.5	8.1	8.4	8.6	Normal
Phosphorus, Total	µg/L	2	33	94	< 20	< 80	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample

Table 4-44. YP-SR-2, EFSFSR below Sugar Creek, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Phosphorus, Dissolved	µg/L	0	35	100	< 20	< 80	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Potassium, Total	µg/L	35	0	0	535	1060	n/a	878	905	131	1016	1040	1053	Nonparametric
Potassium, Dissolved	µg/L	35	0	0	551	1070	n/a	841	878	131	952	976	1046	Nonparametric
Selenium, Total	µg/L	0	31	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Selenium, Dissolved	µg/L	0	31	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Total	µg/L	0	16	100	< 0.02	< 0.04	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Dissolved	µg/L	0	16	100	< 0.02	< 0.04	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sodium, Total	µg/L	35	0	0	1420	2880	n/a	2311	2430	401.6	2688	2786	2853	Normal
Sodium, Dissolved	µg/L	35	0	0	1410	3050	n/a	2318	2470	407.8	2680	2762	2985	Nonparametric
Solids, Total Dissolved (TDS)	mg/L	35	0	0	34.5	137	0	67.2	65	20.2	87.6	93.7	127	Normal
Solids, Total Suspended (TSS)	mg/L	4	31	89	< 5	10	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sulfate	mg/L	35	0	0	3.33	17.3	0	9.21	9.8	3.42	12.3	13.5	16.3	Normal
Temperature, Water	deg C	35	0	0	0.07	17.41	3	6.0	4.3	5.2	12.9	14.8	16.6	Normal
Thallium, Total	µg/L	0	16	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Thallium, Dissolved	µg/L	0	16	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Turbidity	NTU	35	0	0	0	27.4	n/a	3.8	2.7	5.0	6.5	11.1	22.7	Nonparametric
Vanadium, Total	µg/L	11	5	31	< 0.2	0.4	0	0.3	0.3	0.1	0.4	0.4	0.4	KM - Nonparametric
Vanadium, Dissolved	µg/L	3	13	81	< 0.2	0.2	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Zinc, Total	µg/L	19	16	46	< 0.5	1.7	0	0.8	0.5	0.3	1.3	1.4	1.6	KM - Nonparametric
Zinc, Dissolved	µg/L	24	11	31	< 0.5	1.3	0	0.7	0.6	0.2	1.0	1.1	1.2	KM - Nonparametric

Units: **µg/L** = micrograms per liter; **mg/L** = milligrams per liter; **mS/cm** = milliSiemens per centimeter; **ng/L** = nanograms per liter; **deg C** = degrees Celsius; **NTU** = nephelometric turbidity units
Measurements: **< 20 µg/L** = analyte not detected at the method reporting limit of 20 µg/L; **n/a** = not applicable; **Min** = minimum concentration measured; **Max** = maximum concentration measured
*Number that do not meet criterion: total number of analytical results that did not meet the strictest potentially applicable regulatory criterion (presented in **Table 3-4**). If a constituent does not have applicable regulatory criteria, then n/a is given.*
Distribution: **Normal** = data appear normally distributed at 0.05 significance level; statistics presented are normal population estimators; **Gamma** = data appear gamma distributed 0.05 significance level; statistics presented are gamma population estimators; **Lognormal** = data appear lognormally distributed at 0.05 significance level; statistics presented are lognormal populations estimators; **Nonparametric** = data do not appear normally, gamma or lognormally distributed at 0.05 significance level; statistics presented are sample statistics; **KM nonparametric** = data comprises ≤ 50% non-detects; statistics presented are nonparametric population estimators generated using the Kaplan-Meier method; **Sample** = data comprises > 50% non-detects and statistics are not presented; or, data comprises five or fewer measurements but each result was detected and statistics presented are sample statistics.

YP-T-40, Salt Creek

The Salt Creek site (YP-T-40) is about 80 feet east and upstream of the FS 412 bridge over Salt Creek, and about 225 feet upstream of the confluence with the EFSFSR. The Salt Creek drainage is thought to be minimally disturbed by human activities and the sample site is located within a dogwood thicket (see photos in **Appendix G**). Flow is generally northeast to southwest and onsite flow measurements have ranged from 0.8 cfs in November 2015 to 14 cfs in April 2012 with a median flow of 1.5 cfs.

For the time interval included in this baseline study, this site was visited 35 times. **Appendix E** presents dates the site was visited and parameters or constituents sampled during each visit. Analytical results are summarized in **Table 4-45**. Multiple constituents were analyzed for but were not detected in at least half of the samples from YP-T-40. These constituents were ammonia, beryllium, boron, cadmium, carbonate, chloride, chromium, cyanide, fluoride, dissolved iron, lead, dissolved manganese, dissolved mercury, methyl mercury, nitrate plus nitrite, phosphorus, selenium, silver, total suspended solids, thallium and zinc.

Of constituents that were regularly detected, many do not have defined or applicable regulatory criteria for comparison **(see Appendix E)**. These include conductivity, turbidity, arsenic III, bicarbonate, calcium, cobalt, hardness, magnesium, total nitrogen, total Kjeldahl nitrogen, potassium and sodium. In general, the major cations (calcium, magnesium, potassium, sodium), major anion (bicarbonate), and related measurements (conductivity and hardness) were lower during periods of high flow. The other constituents generally occurred in low concentrations and show no distinct trends.

In addition, many constituents that were regularly detected and have applicable regulatory criteria occurred in concentrations that met criteria **(see Appendix E)**. These constituents include color, dissolved oxygen, pH, alkalinity, dissolved aluminum, antimony, arsenic, barium, copper, total manganese, molybdenum, nickel, total dissolved solids, sulfate and vanadium. Of these constituents, alkalinity was lower during higher flows whereas total manganese was higher during higher flows. The remaining constituents generally occurred in low concentrations and do not show distinct trends.

There were some constituents that did not meet regulatory criteria **(see Appendix E)**. Temperature exceeded the regulatory minimum (< 13 degrees Celsius) twice (6 percent of measurements). Total aluminum exceeded the regulatory criterion (50 µg/L) seven times (35 percent of measurements). Total iron exceeded the regulatory criterion (300 µg/L) twice (6 percent of measurements).

Table 4-45. YP-T-40, Salt Creek, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Alkalinity as CaCO3, Total	mg/L	35	0	0	24.5	92	0	59.7	64.1	14.0	72.6	73	85.5	Nonparametric
Aluminum, Total	µg/L	20	0	0	9.9	305	7	69.8	35.4	118	158	240	532	Lognormal
Aluminum, Dissolved	µg/L	14	6	30	< 2	19.6	0	5.3	3.8	5.1	10.9	19.0	19.5	KM - Nonparametric
Ammonia as Nitrogen	mg/L	0	35	100	< 0.05	< 0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Antimony, Total	µg/L	34	1	3	< 0.07	0.2	0	0.1	0.1	0.03	0.2	0.2	0.2	KM - Nonparametric
Antimony, Dissolved	µg/L	34	1	3	< 0.07	0.2	0	0.1	0.09	0.03	0.2	0.2	0.2	KM - Nonparametric
Arsenic, Total	µg/L	35	0	0	2.1	3.7	0	2.8	2.9	0.40	3.4	3.5	3.7	Normal
Arsenic, Dissolved	µg/L	35	0	0	1.8	3.6	0	2.7	2.7	0.46	3.3	3.5	3.6	Normal
Arsenic (III)	µg/L	16	0	0	0.03	0.09	n/a	0.06	0.06	0.02	0.08	0.08	0.09	Normal
Barium, Total	µg/L	16	0	0	11.5	16.1	0	14.6	15.1	1.35	15.8	16.0	16.1	Normal
Barium, Dissolved	µg/L	16	0	0	9.73	16.4	0	13.9	14.7	2.16	15.8	16.0	16.3	Nonparametric
Beryllium, Total	µg/L	1	15	94	< 0.02	0.03	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Beryllium, Dissolved	µg/L	0	16	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Bicarbonate as CaCO3	mg/L	35	0	0	24.5	76	n/a	59.0	64	13.1	72.6	73	75.0	Nonparametric
Boron, Total	µg/L	0	16	100	< 20	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Boron, Dissolved	µg/L	0	16	100	< 20	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Total	µg/L	0	31	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Dissolved	µg/L	0	31	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Calcium, Total	µg/L	35	0	0	9670	20400	n/a	16451	17700	3064	19380	19860	20264	Nonparametric
Calcium, Dissolved	µg/L	35	0	0	9340	20900	n/a	16340	17700	3179	19100	19770	20730	Nonparametric
Carbonate as CaCO3	mg/L	1	34	97	< 9	17	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chloride	mg/L	4	31	89	< 0.25	0.49	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chromium, Total	µg/L	11	20	65	< 0.2	0.6	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chromium, Dissolved	µg/L	6	25	81	< 0.2	0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cobalt, Total	µg/L	14	2	13	< 0.02	0.18	n/a	0.05	0.04	0.04	0.1	0.13	0.17	KM - Nonparametric
Cobalt, Dissolved	µg/L	11	5	31	< 0.02	0.07	n/a	0.03	0.02	0.01	0.05	0.06	0.07	KM - Nonparametric
Conductivity	mS/cm	34	0	0	0.078	0.163	n/a	0.128	0.135	0.023	0.149	0.154	0.161	Normal

Table 4-45. YP-T-40, Salt Creek, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Copper, Total	µg/L	30	1	3	< 0.1	0.6	0	0.2	0.2	0.1	0.3	0.6	0.6	KM - Nonparametric
Copper, Dissolved	µg/L	31	0	0	0.1	0.4	0	0.3	0.2	0.1	0.4	0.4	0.4	Nonparametric
Cyanide, Total	mg/L	0	16	100	< 0.0047	< 0.0047	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Dissolved Oxygen (DO)	mg/L	35	0	0	8.36	11.89	0	10.2	10.5	1.10	11.6	11.7	11.8	Normal
Fluoride	mg/L	0	35	100	< 0.2	< 0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Hardness as CaCO3	mg/L	35	0	0	33.4	68.3	n/a	56.0	60.4	10.3	65.7	67.0	68.1	Nonparametric
Iron, Total	µg/L	33	2	6	< 20	603	2	91	40	125	228	316	549	KM - Nonparametric
Iron, Dissolved	µg/L	1	34	97	< 10	42.6	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Lead, Total	µg/L	9	26	74	< 0.02	0.14	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Lead, Dissolved	µg/L	2	33	94	< 0.02	0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Magnesium, Total	µg/L	35	0	0	2250	4300	n/a	3635	3910	647.2	4202	4229	4283	Nonparametric
Magnesium, Dissolved	µg/L	35	0	0	2100	4380	n/a	3607	3920	677.4	4230	4294	4370	Nonparametric
Manganese, Total	µg/L	12	8	40	< 1	16.4	0	2.88	1.95	3.55	5.84	7.57	14.6	KM - Nonparametric
Manganese, Dissolved	µg/L	0	20	100	< 1	< 5	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Mercury, Total	ng/L	22	13	37	< 0.5	6	0	1.3	1	1.1	2.6	2.9	5.0	KM - Nonparametric
Mercury, Dissolved	ng/L	15	19	56	< 0.5	2.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Methyl Mercury	ng/L	1	15	94	< 0.1	0.13	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Molybdenum, Total	µg/L	16	0	0	0.44	0.88	0	0.72	0.77	0.14	0.85	0.86	0.88	Normal
Molybdenum, Dissolved	µg/L	16	0	0	0.43	0.87	0	0.71	0.77	0.14	0.84	0.86	0.87	Normal
Nickel, Total	µg/L	11	5	31	< 0.2	0.4	0	0.3	0.2	0.07	0.3	0.4	0.4	KM - Nonparametric
Nickel, Dissolved	µg/L	10	6	38	< 0.2	0.4	0	0.2	0.2	0.06	0.3	0.3	0.4	KM - Nonparametric
Nitrate + Nitrite as Nitrogen	mg/L	6	29	83	< 0.05	0.114	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nitrogen, Total	mg/L	12	4	25	< 0.4	1	n/a	0.5	0.5	0.2	0.7	0.8	1.0	KM - Nonparametric
Nitrogen, Total Kjeldahl (TKN)	mg/L	12	4	25	< 0.4	0.97	n/a	0.5	0.5	0.1	0.7	0.8	0.9	KM - Nonparametric
pH	pH units	34	0	0	6.87	8.64	0	7.8	7.7	0.4	8.3	8.4	8.6	Normal

Table 4-45. YP-T-40, Salt Creek, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Phosphorus, Total	µg/L	1	34	97	< 20	< 80	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Phosphorus, Dissolved	µg/L	1	34	97	< 20	< 80	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Potassium, Total	µg/L	35	0	0	1020	1590	n/a	1368	1390	144.2	1530	1552	1587	Nonparametric
Potassium, Dissolved	µg/L	35	0	0	1000	1610	n/a	1351	1400	162.2	1506	1528	1596	Nonparametric
Selenium, Total	µg/L	0	31	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Selenium, Dissolved	µg/L	0	31	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Total	µg/L	1	15	94	< 0.02	0.04	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Dissolved	µg/L	1	15	94	< 0.02	0.03	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sodium, Total	µg/L	35	0	0	1560	2490	n/a	2133	2140	233.6	2428	2473	2487	Normal
Sodium, Dissolved	µg/L	35	0	0	1610	2580	n/a	2139	2100	228.9	2412	2456	2543	Normal
Solids, Total Dissolved (TDS)	mg/L	34	1	3	< 10	113	0	71.4	72	18.9	91.6	98.9	111	KM - Nonparametric
Solids, Total Suspended (TSS)	mg/L	4	31	89	< 5	15.5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sulfate	mg/L	35	0	0	2.22	14.8	0	4.49	4.20	1.68	6.68	7.62	9.76	Lognormal
Temperature, Water	deg C	35	0	0	0.05	14.15	2	5.8	4.3	4.5	11.9	13.0	14.1	Normal
Thallium, Total	µg/L	0	16	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Thallium, Dissolved	µg/L	0	16	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Turbidity	NTU	35	0	0	0	17	n/a	3.3	2.5	3.2	6.4	8.1	14.4	Nonparametric
Vanadium, Total	µg/L	14	2	13	< 0.2	0.7	0	0.3	0.3	0.1	0.5	0.6	0.7	KM - Nonparametric
Vanadium, Dissolved	µg/L	11	5	31	< 0.2	0.4	0	0.3	0.2	0.06	0.3	0.3	0.4	KM - Nonparametric
Zinc, Total	µg/L	9	26	74	< 0.5	6.9	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Zinc, Dissolved	µg/L	15	20	57	< 0.5	1.1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample

Units: **µg/L** = micrograms per liter; **mg/L** = milligrams per liter; **mS/cm** = milliSiemens per centimeter; **ng/L** = nanograms per liter; **deg C** = degrees Celsius; **NTU** = nephelometric turbidity units
Measurements: **< 20 µg/L** = analyte not detected at the method reporting limit of 20 µg/L; **n/a** = not applicable; **Min** = minimum concentration measured; **Max** = maximum concentration measured
*Number that do not meet criterion: total number of analytical results that did not meet the strictest potentially applicable regulatory criterion (presented in **Table 3-4**). If a constituent does not have applicable regulatory criteria, then n/a is given.*
Distribution: **Normal** = data appear normally distributed at 0.05 significance level; statistics presented are normal population estimators; **Gamma** = data appear gamma distributed 0.05 significance level; statistics presented are gamma population estimators; **Lognormal** = data appear lognormally distributed at 0.05 significance level; statistics presented are lognormal populations estimators; **Nonparametric** = data do not appear normally, gamma or lognormally distributed at 0.05 significance level; statistics presented are sample statistics; **KM nonparametric** = data comprises ≤ 50% non-detects; statistics presented are nonparametric population estimators generated using the Kaplan-Meier method; **Sample** = data comprises > 50% non-detects and statistics are not presented; or, data comprises five or fewer measurements but each result was detected and statistics presented are sample statistics.

4.1.2.6 East Fork of the South Fork of the Salmon River Adit Seep and Seep Sites

YP-S-3, Garnet pit seep

The Garnet pit seep (YP-S-3) originates about 300 feet downhill and to the west of the base of the pit and immediately west of a colluvial gully (see photos in **Appendix G**). Several seeps emerge from the ground in the vicinity of the sampling site, converge, and flow downhill through a shrubby area and into Garnet Creek. During high flow conditions (e.g., spring snowmelt), the seep comingles with seasonal flow in the colluvial gully. The seep generally flows from east to west and onsite flow measurements have ranged from $5.1x10^{-3}$ cfs in November 2014 to 0.23 cfs in May 2014 with a median flow of $2.1x10^{-2}$ cfs.

For the time interval included in this baseline study, this site was visited 35 times. **Appendix E** presents dates the site was visited and parameters or constituents sampled during each visit. Analytical results are summarized in **Table 4-46**. Multiple constituents were analyzed for but were not detected in at least half of the samples from YP-S-3. These constituents were ammonia, boron, cadmium, carbonate, chloride, chromium, dissolved cobalt, cyanide, fluoride, dissolved iron, dissolved lead, dissolved manganese, methyl mercury, nickel, dissolved phosphorus, selenium, silver, thallium and dissolved vanadium.

Of constituents that were regularly detected, many do not have defined or applicable regulatory criteria for comparison **(see Appendix E)**. These include conductivity, turbidity, arsenic III, bicarbonate, calcium, total cobalt, hardness, magnesium, nitrate plus nitrite, total nitrogen, total Kjeldahl nitrogen, total phosphorus, potassium, sodium and total suspended solids. Many of these constituents occurred in low concentrations, and none show distinct trends in concentrations.

In addition, many constituents that were regularly detected and have applicable regulatory criteria occurred in concentrations that met criteria **(see Appendix E)**. These constituents include color, dissolved oxygen, pH, temperature, dissolved aluminum, barium, beryllium, copper, total iron, total lead, total manganese, dissolved mercury, molybdenum, total dissolved solids, sulfate, total vanadium and zinc. These constituents generally occurred in low concentrations and do not show distinct trends.

There were some constituents that did not meet regulatory criteria **(see Appendix E)**. Dissolved oxygen was below the regulatory criterion (> 6 mg/L) once (5 percent of measurements). Alkalinity was below the regulatory minimum (> 20 mg/L) once (8 percent of measurements). Total aluminum exceeded the regulatory criterion (50 µg/L) eight times (67 percent of measurements). Total and dissolved antimony exceeded the regulatory criterion (5.6 µg/L) 12 times each (100 percent of measurements). Total and dissolved arsenic exceeded the regulatory criterion (10 µg/L) 12 times each (100 percent of measurements). Total mercury exceeded the regulatory criterion (12 ng/L) seven times (58 percent of measurements).

Table 4-46. YP-S-3, Garnet Pit Seep, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Alkalinity as CaCO3, Total	mg/L	12	0	0	15	101	1	65.3	71.6	22.5	78.4	88.9	98.6	Nonparametric
Aluminum, Total	µg/L	12	0	0	12.2	218	8	82.5	72.6	60.1	155	186	212	Normal
Aluminum, Dissolved	µg/L	9	3	25	< 2	15.4	0	4.92	2.80	4.27	11.9	13.8	15.1	KM - Nonparametric
Ammonia as Nitrogen	mg/L	0	12	100	< 0.05	< 0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Antimony, Total	µg/L	12	0	0	9.7	31.7	12	24.0	28.8	8.5	31.0	31.4	31.6	Nonparametric
Antimony, Dissolved	µg/L	12	0	0	8.3	32.2	12	24.0	28.8	9.2	32.0	32.2	32.2	Nonparametric
Arsenic, Total	µg/L	12	0	0	18.7	229	12	154	195	79.6	216	222	228	Nonparametric
Arsenic, Dissolved	µg/L	12	0	0	17	225	12	148	185	78	211	218	224	Nonparametric
Arsenic (III)	µg/L	12	0	0	0.1	0.76	n/a	0.40	0.39	0.21	0.68	0.72	0.75	Normal
Barium, Total	µg/L	12	0	0	2.7	10.5	0	8.2	9.0	2.6	9.8	10.1	10.4	Nonparametric
Barium, Dissolved	µg/L	12	0	0	1.9	9.29	0	7.5	8.3	2.5	9.2	9.2	9.3	Nonparametric
Beryllium, Total	µg/L	12	0	0	0.03	0.25	0	0.08	0.06	0.06	0.15	0.20	0.24	Normal
Beryllium, Dissolved	µg/L	7	5	42	< 0.02	0.11	0	0.03	0.02	0.03	0.08	0.10	0.11	KM - Nonparametric
Bicarbonate as CaCO3	mg/L	12	0	0	15	101	n/a	65.3	71.6	22.5	78.4	88.9	98.6	Nonparametric
Boron, Total	µg/L	0	12	100	< 20	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Boron, Dissolved	µg/L	0	12	100	< 20	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Total	µg/L	0	12	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Dissolved	µg/L	0	12	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Calcium, Total	µg/L	12	0	0	3470	23300	n/a	18654	21300	6582	23040	23190	23278	Nonparametric
Calcium, Dissolved	µg/L	12	0	0	3460	22900	n/a	18475	21050	6468	22790	22845	22889	Nonparametric
Carbonate as CaCO3	mg/L	0	12	100	< 2	< 15	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chloride	mg/L	1	11	92	< 0.22	0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chromium, Total	µg/L	3	9	75	< 0.2	0.3	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chromium, Dissolved	µg/L	5	7	58	< 0.2	0.9	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cobalt, Total	µg/L	9	3	25	< 0.02	0.09	n/a	0.04	0.03	0.02	0.08	0.08	0.09	KM - Nonparametric
Cobalt, Dissolved	µg/L	4	8	67	< 0.02	0.06	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Conductivity	mS/cm	21	0	0	0.073	0.659	n/a	0.178	0.160	0.112	0.174	0.178	0.563	Nonparametric

Table 4-46. YP-S-3, Garnet Pit Seep, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Copper, Total	µg/L	12	0	0	0.2	0.9	0	0.4	0.4	0.2	0.7	0.9	1.2	Lognormal
Copper, Dissolved	µg/L	12	0	0	0.1	0.8	0	0.3	0.2	0.3	0.6	0.8	1.4	Lognormal
Cyanide, Total	mg/L	0	12	100	< 0.0047	< 0.0047	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Dissolved Oxygen (DO)	mg/L	22	0	0	5.98	9.96	1	8.0	7.8	0.9	9.3	9.8	9.9	Nonparametric
Fluoride	mg/L	0	12	100	< 0.2	< 0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Hardness as CaCO3	mg/L	12	0	0	11.7	71.9	n/a	58.5	66.4	19.9	71.2	71.6	71.9	Nonparametric
Iron, Total	µg/L	12	0	0	31	248	0	136	132	70.0	229	239	246	Normal
Iron, Dissolved	µg/L	1	11	92	< 20	21.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Lead, Total	µg/L	9	3	25	< 0.02	0.08	0	0.05	0.05	0.02	0.07	0.07	0.08	KM - Nonparametric
Lead, Dissolved	µg/L	0	12	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Magnesium, Total	µg/L	12	0	0	744	3940	n/a	2892	3140	882	3337	3610	3874	Nonparametric
Magnesium, Dissolved	µg/L	12	0	0	722	3890	n/a	2827	3085	864	3200	3511	3814	Nonparametric
Manganese, Total	µg/L	10	2	17	< 2.7	23.7	0	9.7	6.8	7.3	21	22.4	23.5	KM - Nonparametric
Manganese, Dissolved	µg/L	4	8	67	< 1	5	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Mercury, Total	ng/L	12	0	0	1.7	24.1	7	13.3	13.8	6.9	21.3	22.6	23.8	Normal
Mercury, Dissolved	ng/L	11	1	8	< 0.7	8.4	0	2.4	1.3	2.3	5.4	6.9	8.1	KM - Nonparametric
Methyl Mercury	ng/L	1	11	92	< 0.1	0.1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Molybdenum, Total	µg/L	11	1	8	< 0.05	2.6	0	1.6	2.2	0.99	2.5	2.5	2.6	KM - Nonparametric
Molybdenum, Dissolved	µg/L	11	1	8	< 0.05	2.58	0	1.6	2.2	1.0	2.4	2.5	2.6	KM - Nonparametric
Nickel, Total	µg/L	5	7	58	< 0.2	0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nickel, Dissolved	µg/L	5	7	58	< 0.2	0.8	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nitrate + Nitrite as Nitrogen	mg/L	9	3	25	< 0.05	0.244	n/a	0.12	0.12	0.06	0.19	0.22	0.24	KM - Nonparametric
Nitrogen, Total	mg/L	9	3	25	< 0.4	1.03	n/a	0.66	0.67	0.21	0.90	0.96	1.02	KM - Nonparametric
Nitrogen, Total Kjeldahl (TKN)	mg/L	10	2	17	< 0.4	0.89	n/a	0.58	0.50	0.17	0.81	0.85	0.88	KM - Nonparametric
pH	pH units	21	0	0	6.56	7.63	0	7.0	7.0	0.2	7.3	7.4	7.6	Normal

Table 4-46. YP-S-3, Garnet Pit Seep, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Phosphorus, Total	µg/L	9	3	25	< 24.8	67.7	n/a	43.4	43.3	15.1	60.2	63.6	66.9	KM - Nonparametric
Phosphorus, Dissolved	µg/L	4	8	67	< 22.1	42.6	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Potassium, Total	µg/L	12	0	0	625	1320	n/a	1092	1105	191	1311	1320	1320	Normal
Potassium, Dissolved	µg/L	12	0	0	604	1330	n/a	1060	1095	186	1221	1275	1319	Normal
Selenium, Total	µg/L	0	12	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Selenium, Dissolved	µg/L	0	12	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Total	µg/L	0	12	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Dissolved	µg/L	0	12	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sodium, Total	µg/L	12	0	0	1780	3510	n/a	2750	2935	528.6	3186	3334	3475	Normal
Sodium, Dissolved	µg/L	12	0	0	1770	3150	n/a	2736	3035	524.0	3149	3150	3150	Nonparametric
Solids, Total Dissolved (TDS)	mg/L	12	0	0	50	117	0	84	87	22	112	115	117	Normal
Solids, Total Suspended (TSS)	mg/L	8	4	33	< 5	88	n/a	17	6.0	25	48	68	84	KM - Nonparametric
Sulfate	mg/L	12	0	0	0.86	5.86	0	4.4	5.4	1.9	5.8	5.8	5.9	Nonparametric
Temperature, Water	deg C	22	0	0	3.22	8.81	0	6.5	6.6	1.3	8.2	8.4	8.7	Normal
Thallium, Total	µg/L	0	12	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Thallium, Dissolved	µg/L	0	12	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Turbidity	NTU	22	0	0	0.5	32.5	n/a	7.2	5.2	6.6	14.8	18.4	26.5	Gamma
Vanadium, Total	µg/L	10	2	17	< 0.2	0.4	0	0.3	0.3	0.1	0.4	0.4	0.4	KM - Nonparametric
Vanadium, Dissolved	µg/L	4	8	67	< 0.2	0.3	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Zinc, Total	µg/L	8	4	33	< 0.5	2.1	0	0.8	0.7	0.4	1.0	1.5	2.0	KM - Nonparametric
Zinc, Dissolved	µg/L	7	5	42	< 0.5	0.9	0	0.6	0.6	0.1	0.8	0.8	0.9	KM - Nonparametric

Units: **µg/L** = micrograms per liter; **mg/L** = milligrams per liter; **mS/cm** = milliSiemens per centimeter; **ng/L** = nanograms per liter; **deg C** = degrees Celsius; **NTU** = nephelometric turbidity units
Measurements: **< 20 µg/L** = analyte not detected at the method reporting limit of 20 µg/L; **n/a** = not applicable; **Min** = minimum concentration measured; **Max** = maximum concentration measured
*Number that do not meet criterion: total number of analytical results that did not meet the strictest potentially applicable regulatory criterion (presented in **Table 3-4**). If a constituent does not have applicable regulatory criteria, then n/a is given.*
Distribution: **Normal** = data appear normally distributed at 0.05 significance level; statistics presented are normal population estimators; **Gamma** = data appear gamma distributed 0.05 significance level; statistics presented are gamma population estimators; **Lognormal** = data appear lognormally distributed at 0.05 significance level; statistics presented are lognormal populations estimators; **Nonparametric** = data do not appear normally, gamma or lognormally distributed at 0.05 significance level; statistics presented are sample statistics; **KM nonparametric** = data comprises ≤ 50% non-detects; statistics presented are nonparametric population estimators generated using the Kaplan-Meier method; **Sample** = data comprises > 50% non-detects and statistics are not presented; or, data comprises five or fewer measurements but each result was detected and statistics presented are sample statistics.

YP-AS-6, DMEA adit seep

The DMEA adit seep (YP-AS-6) emerges at the base of the collapsed DMEA adit, located at the northwest corner of the DMEA wasterock dump (see photos in **Appendix G**). It flows east down the dump for about ten feet then infiltrates into the subsurface before reaching the former access road. The seep flows year-round and onsite flow measurements have ranged from $4.5x10^{-4}$ cfs in January 2014 to $2.0x10^{-2}$ cfs in May 2012 with a median flow of $3.4x10^{-3}$ cfs.

For the time interval included in this baseline study, this site was visited 31 times. **Appendix E** presents dates the site was visited and parameters or constituents sampled during each visit. Analytical results are summarized in **Table 4-47**. Multiple constituents were analyzed for but were not detected in at least half of the samples from YP-AS-6. These constituents were dissolved aluminum, ammonia, beryllium, boron, cadmium, carbonate, chloride, chromium, cyanide, dissolved iron, dissolved lead, dissolved manganese, methyl mercury, nitrate plus nitrite, phosphorus, selenium, silver, total suspended solids, thallium and vanadium.

Of constituents that were regularly detected, many do not have defined or applicable regulatory criteria for comparison **(see Appendix E)**. These include conductivity, turbidity, arsenic III, bicarbonate, calcium, cobalt, hardness, magnesium, total nitrogen, total Kjeldahl nitrogen, potassium and sodium. In general, the major cations (calcium, magnesium, potassium, sodium), major anion (bicarbonate), and hardness were lowest during spring snowmelt conditions. The remaining constituents generally occurred in low concentrations and show no distinct trends.

In addition, many constituents that were regularly detected and have applicable regulatory criteria occurred in concentrations that met criteria **(see Appendix E)**. These constituents include color, dissolved oxygen, pH, temperature, alkalinity, barium, copper, fluoride, total iron, total lead, mercury, molybdenum, nickel, total dissolved solids, sulfate and zinc. Of these constituents, alkalinity, total dissolved solids and sulfate were lowest during spring snowmelt conditions. The remaining constituents generally occurred in low concentrations and do not show distinct trends.

There were some constituents that did not meet regulatory criteria **(see Appendix E)**. Total aluminum exceeded regulatory criterion (50 µg/L) once (7 percent of measurements). Total and dissolved antimony exceeded the regulatory criterion (5.6 µg/L) 15 times each (100 percent of measurements). Total and dissolved arsenic exceeded the regulatory criterion (10 µg/L) 15 times each (100 percent of measurements). Total manganese exceeded the regulatory criterion (50 µg/L) once (7 percent of measurements).

Table 4-47. YP-AS-6, DMEA Adit Seep, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Alkalinity as CaCO3, Total	mg/L	15	0	0	102	153	0	140	146	14.9	150	152	153	Nonparametric
Aluminum, Total	µg/L	15	0	0	2.6	68.2	1	12.1	7.9	14.2	25.9	36.3	68.3	Lognormal
Aluminum, Dissolved	µg/L	5	10	67	< 2	5.3	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Ammonia as Nitrogen	mg/L	0	15	100	< 0.05	< 0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Antimony, Total	µg/L	15	0	0	14.8	26.1	15	22.4	23.4	3.43	25.9	26.0	26.1	Nonparametric
Antimony, Dissolved	µg/L	15	0	0	14	26.7	15	22.4	23.5	3.62	25.9	26.3	26.6	Normal
Arsenic, Total	µg/L	15	0	0	192	314	15	242	244	38.7	299	304	312	Normal
Arsenic, Dissolved	µg/L	15	0	0	195	326	15	240	232	39.2	295	305	322	Normal
Arsenic (III)	µg/L	15	0	0	0.29	1.5	n/a	0.66	0.51	0.37	1.2	1.4	1.5	Normal
Barium, Total	µg/L	15	0	0	30.8	47.3	0	39.4	40.3	4.47	43.4	44.6	46.8	Normal
Barium, Dissolved	µg/L	15	0	0	29.1	44.5	0	39.3	40	4.26	43.3	43.9	44.4	Nonparametric
Beryllium, Total	µg/L	6	9	60	< 0.02	0.06	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Beryllium, Dissolved	µg/L	1	14	93	< 0.02	0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Bicarbonate as CaCO3	mg/L	15	0	0	102	153	n/a	140	146	14.9	150	152	153	Nonparametric
Boron, Total	µg/L	0	15	100	< 10	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Boron, Dissolved	µg/L	0	15	100	< 10	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Total	µg/L	2	13	87	< 0.02	0.03	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Dissolved	µg/L	0	15	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Calcium, Total	µg/L	15	0	0	39500	53000	n/a	48793	49900	4119	52420	52790	52958	Normal
Calcium, Dissolved	µg/L	15	0	0	39200	53300	n/a	48480	49400	4103	52720	52950	53230	Normal
Carbonate as CaCO3	mg/L	0	15	100	< 9	< 15	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chloride	mg/L	4	11	73	< 0.25	0.47	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chromium, Total	µg/L	1	14	93	< 0.2	0.2	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chromium, Dissolved	µg/L	2	13	87	< 0.2	0.5	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cobalt, Total	µg/L	9	6	40	< 0.02	0.2	n/a	0.06	0.04	0.05	0.13	0.17	0.19	KM - Nonparametric
Cobalt, Dissolved	µg/L	8	7	47	< 0.02	0.16	n/a	0.05	0.04	0.04	0.10	0.13	0.15	KM - Nonparametric
Conductivity	mS/cm	31	0	0	0.134	0.437	n/a	0.350	0.367	0.053	0.384	0.398	0.426	Nonparametric

Table 4-47. YP-AS-6, DMEA Adit Seep, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Copper, Total	µg/L	15	0	0	0.2	2.2	0	0.6	0.5	0.5	1.2	1.4	2.0	Gamma
Copper, Dissolved	µg/L	15	0	0	0.2	0.5	0	0.3	0.3	0.1	0.5	0.5	0.5	Normal
Cyanide, Total	mg/L	0	15	100	< 0.0047	< 0.0047	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Dissolved Oxygen (DO)	mg/L	31	0	0	7.6	9.64	0	8.7	8.6	0.5	9.1	9.3	9.5	Normal
Fluoride	mg/L	8	7	47	< 0.2	0.4	0	0.2	0.3	0.02	0.4	0.4	0.4	KM - Nonparametric
Hardness as CaCO3	mg/L	15	0	0	135	188	n/a	171	174	16.1	187	187	188	Normal
Iron, Total	µg/L	10	5	33	< 20	214	0	52.8	40	49.7	93.5	139	199	KM - Nonparametric
Iron, Dissolved	µg/L	4	11	73	< 20	42.6	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Lead, Total	µg/L	9	6	40	< 0.02	1.3	0	0.14	0.03	0.32	0.17	0.52	1.1	KM - Nonparametric
Lead, Dissolved	µg/L	1	14	93	< 0.02	0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Magnesium, Total	µg/L	15	0	0	8890	14000	n/a	11985	12400	1489	13440	13720	13944	Normal
Magnesium, Dissolved	µg/L	15	0	0	8810	13800	n/a	11969	12400	1434	13420	13730	13786	Normal
Manganese, Total	µg/L	14	1	7	< 1.1	86.1	1	10.6	3.4	20.8	15.3	37.2	76.3	KM - Nonparametric
Manganese, Dissolved	µg/L	4	11	73	< 1	12.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Mercury, Total	ng/L	15	0	0	1.1	6.9	0	3.4	3.4	1.9	6.2	6.9	6.9	Normal
Mercury, Dissolved	ng/L	13	2	13	< 0.9	2.6	0	1.3	1.2	0.44	1.8	2.0	2.5	KM - Nonparametric
Methyl Mercury	ng/L	4	11	73	< 0.1	0.2	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Molybdenum, Total	µg/L	15	0	0	3.48	4.31	0	3.9	3.9	0.23	4.2	4.3	4.3	Normal
Molybdenum, Dissolved	µg/L	15	0	0	3.4	4.27	0	3.9	3.9	0.23	4.1	4.2	4.3	Normal
Nickel, Total	µg/L	8	7	47	< 0.2	0.9	0	0.4	0.4	0.2	0.7	0.8	0.9	KM - Nonparametric
Nickel, Dissolved	µg/L	9	6	40	< 0.2	0.8	0	0.4	0.5	0.2	0.7	0.7	0.8	KM - Nonparametric
Nitrate + Nitrite as Nitrogen	mg/L	0	15	100	< 0.05	< 0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nitrogen, Total	mg/L	10	5	33	< 0.4	1.42	n/a	0.6	0.5	0.3	0.9	1.1	1.4	KM - Nonparametric
Nitrogen, Total Kjeldahl (TKN)	mg/L	11	4	27	< 0.4	1.42	n/a	0.6	0.4	0.3	0.9	1.1	1.4	KM - Nonparametric
pH	pH units	31	0	0	6.88	8.28	0	7.3	7.3	0.3	7.7	7.8	8.1	Normal

Table 4-47. YP-AS-6, DMEA Adit Seep, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Phosphorus, Total	µg/L	0	15	100	< 20	< 40	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Phosphorus, Dissolved	µg/L	0	15	100	< 20	< 42.6	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Potassium, Total	µg/L	15	0	0	1100	1560	n/a	1344	1370	127.4	1474	1511	1550	Normal
Potassium, Dissolved	µg/L	15	0	0	1090	1560	n/a	1329	1360	135.8	1464	1504	1549	Normal
Selenium, Total	µg/L	0	15	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Selenium, Dissolved	µg/L	0	15	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Total	µg/L	2	13	87	< 0.02	0.04	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Dissolved	µg/L	0	15	100	< 0.02	< 0.04	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sodium, Total	µg/L	15	0	0	3630	6430	n/a	5077	4990	688.9	5830	6108	6366	Normal
Sodium, Dissolved	µg/L	15	0	0	3730	6530	n/a	5093	4960	743.7	5992	6173	6459	Normal
Solids, Total Dissolved (TDS)	mg/L	15	0	0	34	245	0	199	206	49	226	232	242	Nonparametric
Solids, Total Suspended (TSS)	mg/L	0	15	100	< 5	< 5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sulfate	mg/L	15	0	0	37.2	51.8	0	42.6	42	3.82	47.1	49.4	51.3	Normal
Temperature, Water	deg C	31	0	0	4.22	11.76	0	7.7	7.0	1.8	10.0	10.9	11.6	Normal
Thallium, Total	µg/L	2	13	87	< 0.02	0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Thallium, Dissolved	µg/L	1	14	93	< 0.02	0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Turbidity	NTU	31	0	0	0.2	45.9	n/a	5.1	2.3	10.4	11.7	18.6	44.3	Lognormal
Vanadium, Total	µg/L	0	15	100	< 0.2	< 0.2	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Vanadium, Dissolved	µg/L	0	15	100	< 0.2	< 0.2	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Zinc, Total	µg/L	15	0	0	1.7	11.5	0	5.0	4.2	3.0	9.6	10.2	11.3	Normal
Zinc, Dissolved	µg/L	15	0	0	1.8	9.9	0	4.3	3.7	2.3	7.7	9.1	9.7	Normal

Units: **µg/L** = micrograms per liter; **mg/L** = milligrams per liter; **mS/cm** = milliSiemens per centimeter; **ng/L** = nanograms per liter; **deg C** = degrees Celsius; **NTU** = nephelometric turbidity units

Measurements: **< 20 µg/L** = analyte not detected at the method reporting limit of 20 µg/L; **n/a** = not applicable; **Min** = minimum concentration measured; **Max** = maximum concentration measured

*Number that do not meet criterion: total number of analytical results that did not meet the strictest potentially applicable regulatory criterion (presented in **Table 3-4**). If a constituent does not have applicable regulatory criteria, then n/a is given.*

Distribution: **Normal** = data appear normally distributed at 0.05 significance level; statistics presented are normal population estimators; **Gamma** = data appear gamma distributed 0.05 significance level; statistics presented are gamma population estimators; **Lognormal** = data appear lognormally distributed at 0.05 significance level; statistics presented are lognormal populations estimators; **Nonparametric** = data do not appear normally, gamma or lognormally distributed at 0.05 significance level; statistics presented are sample statistics; **KM nonparametric** = data comprises ≤ 50% non-detects; statistics presented are nonparametric population estimators generated using the Kaplan-Meier method; **Sample** = data comprises > 50% non-detects and statistics are not presented; or, data comprises five or fewer measurements but each result was detected and statistics presented are sample statistics.

YP-T-17, DMEA wasterock seep

The DMEA wasterock seep (YP-T-17) originates at the toe of the DMEA wasterock dump, about 150 feet east and downhill from the DMEA adit. The wasterock seep flows to the east, towards FS 412, where it is joined by a second tributary that flows south of the DMEA dump (see photos in **Appendix G**). Together, these two sources flow north next to FS 412 and into a settling pond, and are joined by a second tributary that originates on the DMEA hillside. The three sources flow into a culvert under FS 412, and then down a steep hill to the east before flowing into the EFSFSR. Thus, the DMEA wasterock seep, as part of a larger flow, flows into the EFSFSR year-round. Near the source, the measured DMEA wasterock seep flow has ranged from $3.7x10^{-4}$ cfs in November 2014 to 0.12 cfs in May 2014 with a median flow of $6.9x10^{-3}$ cfs.

For the time interval included in this baseline study, this site was visited 34 times. **Appendix E** presents dates the site was visited and parameters or constituents sampled during each visit. Analytical results are summarized in **Table 4-48**. Multiple constituents were analyzed for but were not detected in at least half of the samples from YP-T-17. These constituents were dissolved aluminum, ammonia, beryllium, boron, cadmium, carbonate, chloride, chromium, dissolved cobalt, cyanide, fluoride, dissolved iron, lead, dissolved manganese, methyl mercury, nitrate plus nitrite, phosphorus, selenium, silver, total suspended solids, thallium and vanadium.

Of constituents that were regularly detected, many do not have defined or applicable regulatory criteria for comparison **(see Appendix E)**. These include conductivity, turbidity, arsenic III, bicarbonate, calcium, total cobalt, hardness, dissolved magnesium, total nitrogen, total Kjeldahl nitrogen, potassium and sodium. In general, the major cations (calcium, magnesium, potassium, sodium), major anion (bicarbonate), and related measurements (conductivity and hardness) were lowest during periods of high flow. The remaining constituents generally occurred in low concentrations and show no distinct trends.

In addition, many constituents that were regularly detected and have applicable regulatory criteria occurred in concentrations that met criteria **(see Appendix E)**. These constituents include color, dissolved oxygen, pH, alkalinity, barium, copper, dissolved mercury, molybdenum, nickel, total dissolved solids, sulfate and zinc. Of these constituents, alkalinity, barium, manganese, total dissolved solids and sulfate tended to be higher during low flow conditions. The remaining constituents generally occurred in low concentrations and do not show distinct trends.

There were some constituents that did not meet regulatory criteria **(see Appendix E)**. Temperature exceeded the regulatory maximum (< 13 degrees Celsius) once (3 percent of measurements). Total aluminum exceeded regulatory criterion (50 µg/L) four times (25 percent of measurements). Total and dissolved antimony exceeded the regulatory criterion (5.6 µg/L) 16 times each (100 percent of measurements). Total and dissolved arsenic exceeded the regulatory criterion (10 µg/L) 16 times each (100 percent of measurements). Total iron exceeded the regulatory criterion (300 µg/L) five times (31 percent of measurements). Total manganese exceeded the regulatory criterion (50 µg/L) five times (31 percent of measurements). Total mercury exceeded regulatory criterion (12 ng/L) four times (25 percent of measurements). Total thallium exceeded regulatory criterion (0.24 µg/L) once (6 percent of measurements).

Table 4-48. YP-T-17, DMEA Wasterock Seep, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Alkalinity as CaCO3, Total	mg/L	16	0	0	37	137	0	96	109	30	117	122	134	Nonparametric
Aluminum, Total	µg/L	16	0	0	3.6	3090	4	179	29.7	1059	337	670	2435	Lognormal
Aluminum, Dissolved	µg/L	8	8	50	< 2	23.3	0	3.7	2	5.1	4.0	8.8	20.4	KM - Nonparametric
Ammonia as Nitrogen	mg/L	0	16	100	< 0.05	< 0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Antimony, Total	µg/L	16	0	0	16.1	57.9	16	30.3	29.0	10.9	43.8	48.8	56.1	Normal
Antimony, Dissolved	µg/L	16	0	0	11	56.3	16	27.6	26.5	11.5	41.6	49.1	54.9	Normal
Arsenic, Total	µg/L	16	0	0	160	3230	16	484	224	775	806	1730	2930	Nonparametric
Arsenic, Dissolved	µg/L	16	0	0	44.4	220	16	178	192	44.8	213	215	219	Normal
Arsenic (III)	µg/L	16	0	0	0.3	5.79	n/a	1.6	1.1	1.4	3.2	3.9	5.6	Gamma
Barium, Total	µg/L	16	0	0	13.4	335	0	55.5	37.5	77.0	73.5	157	299	Nonparametric
Barium, Dissolved	µg/L	16	0	0	13	47	0	32	34	10	42	44	46	Normal
Beryllium, Total	µg/L	5	11	69	< 0.02	2.27	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Beryllium, Dissolved	µg/L	0	16	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Bicarbonate as CaCO3	mg/L	16	0	0	37	137	n/a	95	109	30	117	122	134	Normal
Boron, Total	µg/L	0	16	100	< 10	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Boron, Dissolved	µg/L	0	16	100	< 10	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Total	µg/L	2	14	88	< 0.02	0.236	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Dissolved	µg/L	0	16	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Calcium, Total	µg/L	16	0	0	18900	62400	n/a	38238	42150	11361	46800	51525	60225	Normal
Calcium, Dissolved	µg/L	16	0	0	19000	52200	n/a	37513	41450	10129	47000	49200	51600	Normal
Carbonate as CaCO3	mg/L	0	16	100	< 9	< 15	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chloride	mg/L	6	10	63	< 0.34	0.68	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chromium, Total	µg/L	4	12	75	< 0.2	1.45	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chromium, Dissolved	µg/L	1	15	94	< 0.2	0.6	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cobalt, Total	µg/L	13	3	19	< 0.02	5.73	n/a	0.53	0.07	1.4	0.87	2.4	5.1	KM - Nonparametric
Cobalt, Dissolved	µg/L	8	8	50	< 0.02	0.15	n/a	0.04	0.03	0.04	0.09	0.11	0.14	KM - Nonparametric
Conductivity	mS/cm	34	0	0	0.171	0.401	n/a	0.293	0.297	0.059	0.357	0.369	0.391	Normal

Table 4-48. YP-T-17, DMEA Wasterock Seep, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Copper, Total	µg/L	16	0	0	0.2	11.8	0	1.2	0.3	2.9	2.0	5.2	10.5	Nonparametric
Copper, Dissolved	µg/L	15	1	6	< 0.1	0.4	0	0.3	0.3	0.1	0.4	0.4	0.4	KM - Nonparametric
Cyanide, Total	mg/L	0	16	100	< 0.0047	< 0.01	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Dissolved Oxygen (DO)	mg/L	34	0	0	6.71	11.67	0	9.2	9.4	1.3	10.7	11.2	11.6	Normal
Fluoride	mg/L	0	16	100	< 0.2	< 0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Hardness as CaCO3	mg/L	16	0	0	66.6	216	n/a	135	149	39.9	166	181	209	Normal
Iron, Total	µg/L	14	2	13	< 20	24400	5	2198	203	5945	3925	11073	21735	KM - Nonparametric
Iron, Dissolved	µg/L	1	15	94	< 20	42.6	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Lead, Total	µg/L	8	8	50	< 0.02	2.98	0	0.29	0.03	0.74	0.60	1.5	2.7	KM - Nonparametric
Lead, Dissolved	µg/L	0	16	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Magnesium, Total	µg/L	16	0	0	4720	14700	n/a	9575	10295	2857	12050	12825	14325	Normal
Magnesium, Dissolved	µg/L	16	0	0	4750	12900	n/a	9471	10450	2648	12000	12300	12780	Normal
Manganese, Total	µg/L	15	1	6	< 1	3620	5	305	20	872	431	1414	3179	KM - Nonparametric
Manganese, Dissolved	µg/L	8	8	50	< 1	10.5	0	3.6	4.1	3.4	9.4	10.3	10.5	KM - Nonparametric
Mercury, Total	ng/L	16	0	0	1.9	353	4	39.0	6.05	87.6	74.2	149	312	Nonparametric
Mercury, Dissolved	ng/L	15	1	6	< 1	4.7	0	2.2	2.0	0.97	3.5	4.1	4.6	KM - Nonparametric
Methyl Mercury	ng/L	6	10	63	< 0.1	2.9	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Molybdenum, Total	µg/L	16	0	0	1.44	3.12	0	2.25	2.25	0.44	2.73	2.89	3.07	Normal
Molybdenum, Dissolved	µg/L	16	0	0	1.47	2.68	0	2.14	2.12	0.34	2.55	2.61	2.67	Normal
Nickel, Total	µg/L	11	5	31	< 0.2	5.51	0	0.7	0.3	1.3	1.1	2.3	4.9	KM - Nonparametric
Nickel, Dissolved	µg/L	9	7	44	< 0.2	0.7	0	0.3	0.3	0.2	0.6	0.6	0.7	KM - Nonparametric
Nitrate + Nitrite as Nitrogen	mg/L	0	16	100	< 0.05	< 0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nitrogen, Total	mg/L	11	5	31	< 0.4	2.44	n/a	0.7	0.6	0.5	1.1	1.5	2.2	KM - Nonparametric
Nitrogen, Total Kjeldahl (TKN)	mg/L	12	4	25	< 0.4	2.44	n/a	0.7	0.6	0.5	1.1	1.5	2.2	KM - Nonparametric
pH	pH units	34	0	0	6.68	8.43	0	7.4	7.3	0.4	7.8	7.9	8.3	Normal

Table 4-48. YP-T-17, DMEA Wasterock Seep, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Phosphorus, Total	µg/L	5	11	69	< 20	924	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Phosphorus, Dissolved	µg/L	0	16	100	< 20	< 42.6	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Potassium, Total	µg/L	16	0	0	935	3170	n/a	1630	1590	539	2095	2465	3029	Normal
Potassium, Dissolved	µg/L	16	0	0	929	2130	n/a	1549	1615	350	1930	2003	2105	Normal
Selenium, Total	µg/L	1	15	94	< 1	1.3	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Selenium, Dissolved	µg/L	0	16	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Total	µg/L	2	14	88	< 0.02	0.238	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Dissolved	µg/L	0	16	100	< 0.02	< 0.04	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sodium, Total	µg/L	16	0	0	2340	5280	n/a	4051	4215	838.6	4880	5010	5226	Normal
Sodium, Dissolved	µg/L	16	0	0	2380	5290	n/a	4089	4190	821.7	5020	5155	5263	Normal
Solids, Total Dissolved (TDS)	mg/L	16	0	0	97	232	0	169	180	40.3	213	219	230	Normal
Solids, Total Suspended (TSS)	mg/L	6	10	63	< 5	744	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sulfate	mg/L	16	0	0	29.8	61.2	0	46.5	48.1	9.37	56.1	58.7	60.7	Normal
Temperature, Water	deg C	34	0	0	1.36	13.68	1	6.1	5.2	3.8	10.9	12.0	13.3	Normal
Thallium, Total	µg/L	4	12	75	< 0.02	0.476	1	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Thallium, Dissolved	µg/L	0	16	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Turbidity	NTU	34	0	0	0	235	n/a	16.9	3.3	45.2	33.8	91.2	195.7	Nonparametric
Vanadium, Total	µg/L	6	10	63	< 0.2	7.13	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Vanadium, Dissolved	µg/L	2	14	88	< 0.2	0.21	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Zinc, Total	µg/L	12	4	25	< 0.5	81.6	0	7.3	0.9	19.6	11.2	33.2	71.9	KM - Nonparametric
Zinc, Dissolved	µg/L	13	3	19	< 0.5	2.7	0	0.8	0.8	0.5	0.9	1.4	2.4	KM - Nonparametric

Units: **µg/L** = micrograms per liter; **mg/L** = milligrams per liter; **mS/cm** = milliSiemens per centimeter; **ng/L** = nanograms per liter; **deg C** = degrees Celsius; **NTU** = nephelometric turbidity units
Measurements: **< 20 µg/L** = analyte not detected at the method reporting limit of 20 µg/L; **n/a** = not applicable; **Min** = minimum concentration measured; **Max** = maximum concentration measured
*Number that do not meet criterion: total number of analytical results that did not meet the strictest potentially applicable regulatory criterion (presented in **Table 3-4**). If a constituent does not have applicable regulatory criteria, then n/a is given.*
Distribution: **Normal** = data appear normally distributed at 0.05 significance level; statistics presented are normal population estimators; **Gamma** = data appear gamma distributed 0.05 significance level; statistics presented are gamma population estimators; **Lognormal** = data appear lognormally distributed at 0.05 significance level; statistics presented are lognormal populations estimators; **Nonparametric** = data do not appear normally, gamma or lognormally distributed at 0.05 significance level; statistics presented are sample statistics; **KM nonparametric** = data comprises ≤ 50% non-detects; statistics presented are nonparametric population estimators generated using the Kaplan-Meier method; **Sample** = data comprises > 50% non-detects and statistics are not presented; or, data comprises five or fewer measurements but each result was detected and statistics presented are sample statistics.

YP-S-9, old haul road seep

The old haul road seep (YP-S-9) is an intermittent seep originating on the hillside above the old upper haul road running between Garnet and Midnight Creeks. The seep is not known to be associated with any former disturbance except the road itself. At the sampling site, the seep emerges and infiltrates into the subsurface within the width of the road (see photos in **Appendix G**). Onsite flow measurements at the seep have ranged from $7.7x10^{-4}$ cfs in May 2015 to $5.9x10^{-3}$ cfs in June 2012 with a median flow of $1.7x10^{-3}$ cfs.

For the time interval included in this baseline study, this site was visited 21 times. **Appendix E** presents dates the site was visited and parameters or constituents sampled during each visit. Analytical results are summarized in **Table 4-49**. Multiple constituents were analyzed for but were not detected in at least half of the samples from YP-S-9. These constituents were ammonia, beryllium, boron, cadmium, carbonate, chloride, dissolved chromium, cyanide, fluoride, dissolved iron, dissolved lead, dissolved manganese, methyl mercury, nitrate plus nitrite, phosphorus, selenium, silver, total suspended solids, thallium and zinc.

Of constituents that were regularly detected, many do not have defined or applicable regulatory criteria for comparison **(see Appendix E)**. These include conductivity, turbidity, arsenic III, bicarbonate, calcium, cobalt, hardness, magnesium, total nitrogen, total Kjeldahl nitrogen, potassium and sodium. In general, the major cations (calcium, magnesium, potassium, sodium) and related measurements (conductivity and hardness) tended to be lower during periods of high flow. The remaining constituents generally occurred in low concentrations and show no distinct trends.

In addition, many constituents that were regularly detected and have applicable regulatory criteria occurred in concentrations that met criteria **(see Appendix E)**. These constituents include color, pH, alkalinity, barium, total chromium, dissolved copper, dissolved mercury, molybdenum, nickel, total dissolved solids, sulfate and vanadium. Of these constituents, alkalinity, total dissolved solids and sulfate tended to be lower during high flow conditions. The remaining constituents generally occurred in low concentrations and do not show distinct trends.

There were some constituents that did not meet regulatory criteria **(see Appendix E)**. Dissolved oxygen exceeded regulatory criterion (> 6 mg/L) once (5 percent of measurements). Temperature exceeded the regulatory maximum (< 13 degrees Celsius) eight times (38 percent of measurements). Total and dissolved aluminum exceeded the regulatory criterion (50 µg/L) ten and one times, respectively (91 and 9 percent of measurements). Total and dissolved antimony exceeded the regulatory criterion (5.6 µg/L) 11 times each (100 percent of measurements). Total and dissolved arsenic exceeded the regulatory criterion (10 µg/L) 11 times each (100 percent of measurements). In August 2015 (9 percent of measurements), total copper exceeded the site-specific, hardness-based regulatory criterion (26.9 µg/L). Total cyanide exceeded the regulatory criterion (0.0052 mg/L) twice (18 percent of measurements). Total iron exceeded the regulatory criterion (300 µg/L) three times (27 percent of measurements). In August 2015 (9 percent of measurements), total lead exceeded the site-specific, hardness-based regulatory criterion (7.39 µg/L). Total manganese exceeded regulatory criterion (50 µg/L) once (9 percent of measurements). Total mercury exceeded the regulatory criterion (12 ng/L) four times (36 percent of measurements). Total thallium exceeded regulatory criterion (0.24 µg/L) once (9 percent of measurements).

Table 4-49. YP-S-9, Old Haul Road Seep, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Alkalinity as CaCO3, Total	mg/L	11	0	0	69	150	0	108	114	23.7	131	141	148	Normal
Aluminum, Total	µg/L	11	0	0	32.8	37900	10	3689	103	11356	1620	19760	34272	Nonparametric
Aluminum, Dissolved	µg/L	8	3	27	< 2	80.9	1	10.6	2.3	22.4	8.8	44.9	73.7	KM - Nonparametric
Ammonia as Nitrogen	mg/L	0	11	100	< 0.05	< 0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Antimony, Total	µg/L	11	0	0	83.7	123	11	92.7	92.2	9.8	106	110	118	Lognormal
Antimony, Dissolved	µg/L	11	0	0	82.7	100	11	91.1	89.8	5.5	100	100	100	Normal
Arsenic, Total	µg/L	11	0	0	134	1320	11	253	144	354	174	747	1205	Nonparametric
Arsenic, Dissolved	µg/L	11	0	0	127	149	11	138	138	6.91	146	148	149	Normal
Arsenic (III)	µg/L	11	0	0	0.25	11.7	n/a	1.25	0.69	1.91	2.79	4.16	8.79	Lognormal
Barium, Total	µg/L	11	0	0	4.18	261	0	30.6	7.08	76.5	14.7	138	236	Nonparametric
Barium, Dissolved	µg/L	11	0	0	3.72	8.8	0	6.25	6.15	1.45	7.74	8.27	8.69	Normal
Beryllium, Total	µg/L	4	7	64	< 0.02	3.66	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Beryllium, Dissolved	µg/L	0	11	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Bicarbonate as CaCO3	mg/L	11	0	0	69	150	n/a	108	114	24	131	141	148	Normal
Boron, Total	µg/L	1	10	91	< 20	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Boron, Dissolved	µg/L	0	11	100	< 20	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Total	µg/L	1	10	91	< 0.02	0.34	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Dissolved	µg/L	0	11	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Calcium, Total	µg/L	11	0	0	16500	47600	n/a	26991	27400	8157	30300	38950	45870	Normal
Calcium, Dissolved	µg/L	11	0	0	16000	32300	n/a	25436	27400	5035	29600	30950	32030	Normal
Carbonate as CaCO3	mg/L	0	11	100	< 9	< 90	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chloride	mg/L	3	8	73	< 0.4	0.83	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chromium, Total	µg/L	7	4	36	< 0.2	62.5	0	6.1	0.2	17.8	2.6	32.6	56.5	KM - Nonparametric
Chromium, Dissolved	µg/L	4	7	64	< 0.2	0.8	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cobalt, Total	µg/L	11	0	0	0.04	15.4	n/a	1.51	0.06	4.61	0.61	8.01	13.9	Nonparametric
Cobalt, Dissolved	µg/L	8	3	27	< 0.02	0.08	n/a	0.03	0.03	0.02	0.04	0.06	0.08	KM - Nonparametric
Conductivity	mS/cm	20	0	0	0.154	0.27	n/a	0.22	0.23	0.03	0.26	0.26	0.27	Normal

Table 4-49. YP-S-9, Old Haul Road Seep, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Copper, Total	µg/L	11	0	0	0.3	55	1	5.7	0.6	16	2.6	29	50	Nonparametric
Copper, Dissolved	µg/L	11	0	0	0.3	0.6	0	0.4	0.4	0.1	0.6	0.6	0.6	Normal
Cyanide, Total	mg/L	2	9	82	< 0.0047	0.0322	2	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Dissolved Oxygen (DO)	mg/L	21	0	0	5.53	9.91	1	8.4	8.5	1.1	9.8	9.8	9.9	Normal
Fluoride	mg/L	0	11	100	< 0.2	< 0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Hardness as CaCO3	mg/L	11	0	0	66.6	274	n/a	116	111	55.4	119	197	259	Nonparametric
Iron, Total	µg/L	11	0	0	41.2	57300	3	2393	273.1	20829	3944	8407	34776	Lognormal
Iron, Dissolved	µg/L	1	10	91	< 20	105	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Lead, Total	µg/L	7	4	36	< 0.02	11.2	1	1.1	0.03	3.2	0.54	5.9	10.1	KM - Nonparametric
Lead, Dissolved	µg/L	2	9	82	< 0.02	0.04	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Magnesium, Total	µg/L	11	0	0	6180	37700	n/a	11773	10200	8755	10900	24300	35020	Nonparametric
Magnesium, Dissolved	µg/L	11	0	0	5990	11000	n/a	9121	9980	1702	10400	10700	10940	Nonparametric
Manganese, Total	µg/L	6	5	45	< 1	555	1	54.8	5	158	19.6	287	502	KM - Nonparametric
Manganese, Dissolved	µg/L	3	8	73	< 1	5	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Mercury, Total	ng/L	11	0	0	1.7	106	4	15.4	8.4	23.9	34.5	51.6	110	Lognormal
Mercury, Dissolved	ng/L	11	0	0	1	4.1	0	2.3	2.1	1.0	3.6	3.9	4.1	Normal
Methyl Mercury	ng/L	1	10	91	< 0.1	1.73	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Molybdenum, Total	µg/L	11	0	0	0.85	2.28	0	1.37	1.33	0.32	1.79	1.95	2.28	Lognormal
Molybdenum, Dissolved	µg/L	11	0	0	1.15	1.61	0	1.36	1.37	0.14	1.48	1.55	1.60	Normal
Nickel, Total	µg/L	8	3	27	< 0.2	40.2	0	4.07	0.33	11.4	2.0	21.1	36.4	KM - Nonparametric
Nickel, Dissolved	µg/L	7	4	36	< 0.2	0.5	0	0.3	0.2	0.1	0.4	0.5	0.5	KM - Nonparametric
Nitrate + Nitrite as Nitrogen	mg/L	0	11	100	< 0.05	< 0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nitrogen, Total	mg/L	11	0	0	0.4	1.45	n/a	0.7	0.7	0.3	1.1	1.3	1.4	Normal
Nitrogen, Total Kjeldahl (TKN)	mg/L	11	0	0	0.4	1.45	n/a	0.7	0.7	0.3	1.1	1.3	1.4	Normal
pH	pH units	20	0	0	6.96	7.61	0	7.3	7.2	0.2	7.6	7.6	7.6	Normal
Phosphorus, Total	µg/L	3	8	73	< 20	2010	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample

Table 4-49. YP-S-9, Old Haul Road Seep, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Phosphorus, Dissolved	µg/L	0	11	100	< 20	< 80	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Potassium, Total	µg/L	11	0	0	2690	19100	n/a	4818	3580	4755	3910	11505	17581	Nonparametric
Potassium, Dissolved	µg/L	11	0	0	2560	4040	n/a	3337	3350	488.5	3820	3930	4018	Normal
Selenium, Total	µg/L	0	11	100	< 1	< 2.5	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Selenium, Dissolved	µg/L	0	11	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Total	µg/L	3	8	73	< 0.02	2.33	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Dissolved	µg/L	0	11	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sodium, Total	µg/L	11	0	0	805	1440	n/a	918	872	180	971	1206	1393	Nonparametric
Sodium, Dissolved	µg/L	11	0	0	735	967	n/a	864	848	71.7	964	966	967	Normal
Solids, Total Dissolved (TDS)	mg/L	11	0	0	42	135	0	102	107	24.8	120	128	134	Normal
Solids, Total Suspended (TSS)	mg/L	5	6	55	< 5	228	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sulfate	mg/L	11	0	0	2.8	4.61	0	3.7	3.7	0.70	4.6	4.6	4.6	Normal
Temperature, Water	deg C	21	0	0	2.92	17.84	8	10.7	11.3	4.5	15.4	16.2	17.5	Normal
Thallium, Total	µg/L	2	9	82	< 0.02	0.5	1	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Thallium, Dissolved	µg/L	0	11	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Turbidity	NTU	21	0	0	0	88.2	n/a	11.3	4.2	20.3	19.2	44.0	79.4	Nonparametric
Vanadium, Total	µg/L	11	0	0	0.3	55.4	0	5.7	0.5	16.5	2.8	29.1	50.1	Nonparametric
Vanadium, Dissolved	µg/L	11	0	0	0.2	0.5	0	0.4	0.4	0.1	0.5	0.5	0.5	Normal
Zinc, Total	µg/L	4	7	64	< 0.5	60.2	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Zinc, Dissolved	µg/L	3	8	73	< 0.5	1.1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample

Units: **µg/L** = micrograms per liter; **mg/L** = milligrams per liter; **mS/cm** = milliSiemens per centimeter; **ng/L** = nanograms per liter; **deg C** = degrees Celsius; **NTU** = nephelometric turbidity units
Measurements: **< 20 µg/L** = analyte not detected at the method reporting limit of 20 µg/L; **n/a** = not applicable; **Min** = minimum concentration measured; **Max** = maximum concentration measured
*Number that do not meet criterion: total number of analytical results that did not meet the strictest potentially applicable regulatory criterion (presented in **Table 3-4**). If a constituent does not have applicable regulatory criteria, then n/a is given.*
Distribution: **Normal** = data appear normally distributed at 0.05 significance level; statistics presented are normal population estimators; **Gamma** = data appear gamma distributed 0.05 significance level; statistics presented are gamma population estimators; **Lognormal** = data appear lognormally distributed at 0.05 significance level; statistics presented are lognormal populations estimators; **Nonparametric** = data do not appear normally, gamma or lognormally distributed at 0.05 significance level; statistics presented are sample statistics; **KM nonparametric** = data comprises ≤ 50% non-detects; statistics presented are nonparametric population estimators generated using the Kaplan-Meier method; **Sample** = data comprises > 50% non-detects and statistics are not presented; or, data comprises five or fewer measurements but each result was detected and statistics presented are sample statistics.

YP-M-4, Fiddle Creek pond

The Fiddle Creek pond (YP-M-4) is what remains of a reservoir behind an old earthen dam on Fiddle Creek (see photos in **Appendix G**). The pond is downstream of the upper Fiddle Creek site (YP-T-12) and upstream of the North Tunnel adit. Fiddle Creek flows into the pond at three places on the southwestern side, and flows out via the old spillway on the southeastern corner. The dam rises about 15 feet above the valley floor on the downstream side, and the reservoir appears be substantially filled with silt and is overgrown with vegetation on the western side. No flow is measured at this site.

For the time interval included in this baseline study, this site was visited 21 times. **Appendix E** presents dates the site was visited and parameters or constituents sampled during each visit. Analytical results are summarized in **Table 4-50**. Multiple constituents were analyzed for but were not detected in at least half of the samples from YP-M-4. These constituents were ammonia, arsenic, beryllium, boron, cadmium, carbonate, chloride, chromium, dissolved cobalt, cyanide, fluoride, dissolved iron, dissolved lead, dissolved manganese, nickel, phosphorus, selenium, silver, total suspended solids, thallium, dissolved vanadium.

Of constituents that were regularly detected, many do not have defined or applicable regulatory criteria for comparison **(see Appendix E)**. These include conductivity, turbidity, arsenic III, bicarbonate, calcium, total cobalt, hardness, magnesium, methyl mercury, nitrate plus nitrite, total nitrogen, total Kjeldahl nitrogen, potassium and sodium. In general, most of the major cations (calcium, magnesium, sodium), major anion (bicarbonate), and related measurements (conductivity and hardness) were lowest in spring snowmelt conditions. The remaining constituents generally occurred in low concentrations and show no distinct trends.

In addition, many constituents that were regularly detected and have applicable regulatory criteria occurred in concentrations that met criteria **(see Appendix E)**. These constituents include color, dissolved oxygen, dissolved aluminum, antimony, barium, copper, total manganese, dissolved mercury, molybdenum, total dissolved solids, sulfate, total vanadium and zinc. Of these constituents, dissolved aluminum, antimony and mercury were highest during spring runoff events, whereas total dissolved solids and sulfate were lowest during spring runoff events. The remaining constituents generally occurred in low concentrations and do not show distinct trends.

There were some constituents that did not meet regulatory criteria **(see Appendix E)**. The pH was below the regulatory minimum (≥ 6.5) four times (19 percent of measurements). Temperature exceeded the regulatory maximum (< 13 degrees Celsius) once (5 percent of measurements). Alkalinity was below the regulatory minimum (> 20 mg/L) twice (15 percent of measurements). Total aluminum exceeded the regulatory criterion (50 µg/L) eight times (62 percent of measurements). Total iron exceeded the regulatory criterion (300 µg/L) four times (31 percent of measurements). In February 2016 (8 percent of measurements), total lead exceeded the site-specific, hardness-based regulatory criterion (0.86 µg/L). Total mercury exceeded regulatory criterion (12 ng/L) twice (15 percent of measurements).

Table 4-50. YP-M-4, Fiddle Creek Pond, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Alkalinity as CaCO3, Total	mg/L	13	0	0	15.7	48	2	34.0	38.7	10.1	39.8	43.2	47.0	Nonparametric
Aluminum, Total	µg/L	13	0	0	9.4	2390	8	326	73.2	646	906	1315	2332	Gamma
Aluminum, Dissolved	µg/L	13	0	0	2.8	30.1	0	10.8	6.5	9.0	22.3	25.5	29.2	Normal
Ammonia as Nitrogen	mg/L	1	12	92	< 0.05	1.3	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Antimony, Total	µg/L	13	0	0	0.1	0.44	0	0.21	0.16	0.11	0.38	0.42	0.44	Normal
Antimony, Dissolved	µg/L	13	0	0	0.1	0.22	0	0.15	0.12	0.04	0.20	0.21	0.22	Normal
Arsenic, Total	µg/L	5	8	62	< 0.5	1.1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Arsenic, Dissolved	µg/L	1	12	92	< 0.5	0.7	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Arsenic (III)	µg/L	9	4	31	< 0.02	0.05	n/a	0.03	0.02	0.01	0.05	0.05	0.05	KM - Nonparametric
Barium, Total	µg/L	13	0	0	10	69.3	0	24.1	21.6	11.8	39.2	46.3	63.6	Lognormal
Barium, Dissolved	µg/L	13	0	0	8.69	22.3	0	17.9	20.1	5.0	21.3	21.7	22.2	Nonparametric
Beryllium, Total	µg/L	5	8	62	< 0.02	0.26	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Beryllium, Dissolved	µg/L	0	13	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Bicarbonate as CaCO3	mg/L	13	0	0	15.7	48	n/a	34.0	38.7	10.1	39.8	43.2	47.0	Nonparametric
Boron, Total	µg/L	0	13	100	< 20	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Boron, Dissolved	µg/L	0	13	100	< 20	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Total	µg/L	2	11	85	< 0.02	0.04	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Dissolved	µg/L	0	13	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Calcium, Total	µg/L	13	0	0	4100	12300	n/a	9218	10200	2844	11500	11880	12216	Nonparametric
Calcium, Dissolved	µg/L	13	0	0	3980	11300	n/a	9082	10400	2875	11160	11240	11288	Nonparametric
Carbonate as CaCO3	mg/L	0	13	100	< 2	< 15	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chloride	mg/L	2	11	85	< 0.22	0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chromium, Total	µg/L	4	9	69	< 0.2	0.9	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chromium, Dissolved	µg/L	0	13	100	< 0.2	< 0.2	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cobalt, Total	µg/L	8	5	38	< 0.02	0.47	n/a	0.08	0.03	0.12	0.12	0.26	0.43	KM - Nonparametric
Cobalt, Dissolved	µg/L	3	10	77	< 0.02	0.03	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Conductivity	mS/cm	21	0	0	0.046	0.109	n/a	0.083	0.088	0.019	0.104	0.108	0.109	Normal

Table 4-50. YP-M-4, Fiddle Creek Pond, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Copper, Total	µg/L	9	4	31	< 0.1	1.1	0	0.2	0.1	0.3	0.4	0.7	1.0	KM - Nonparametric
Copper, Dissolved	µg/L	11	2	15	< 0.1	0.5	0	0.2	0.2	0.1	0.4	0.5	0.5	KM - Nonparametric
Cyanide, Total	mg/L	0	13	100	< 0.0047	< 0.0047	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Dissolved Oxygen (DO)	mg/L	21	0	0	8.83	10.73	0	9.8	9.9	0.6	10.5	10.7	10.7	Normal
Fluoride	mg/L	0	13	100	< 0.2	< 0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Hardness as CaCO3	mg/L	13	0	0	12.4	37.9	n/a	27.5	30.3	8.5	34.3	35.9	37.5	Nonparametric
Iron, Total	µg/L	10	3	23	< 20	2490	4	342	73	648	565	1342	2260	KM - Nonparametric
Iron, Dissolved	µg/L	3	10	77	< 20	48.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Lead, Total	µg/L	9	4	31	< 0.02	1.56	1	0.21	0.04	0.41	0.37	0.85	1.42	KM - Nonparametric
Lead, Dissolved	µg/L	2	11	85	< 0.02	0.03	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Magnesium, Total	µg/L	13	0	0	495	1730	n/a	1092	1170	347	1350	1514	1687	Normal
Magnesium, Dissolved	µg/L	13	0	0	481	1290	n/a	1027	1160	307	1240	1260	1284	Nonparametric
Manganese, Total	µg/L	9	4	31	< 1	40.1	0	7.4	3.8	10.7	17.7	27.9	37.7	KM - Nonparametric
Manganese, Dissolved	µg/L	6	7	54	< 1	6.8	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Mercury, Total	ng/L	13	0	0	0.8	38.4	2	6.9	2.9	10.1	16.8	22.4	35.7	Gamma
Mercury, Dissolved	ng/L	12	1	8	< 0.5	3.4	0	1.5	1.1	0.9	3.0	3.2	3.4	KM - Nonparametric
Methyl Mercury	ng/L	7	6	46	< 0.1	1.5	n/a	0.3	0.1	0.4	0.9	1.2	1.4	KM - Nonparametric
Molybdenum, Total	µg/L	13	0	0	0.07	0.24	0	0.18	0.20	0.06	0.22	0.23	0.24	Nonparametric
Molybdenum, Dissolved	µg/L	13	0	0	0.07	0.25	0	0.18	0.19	0.06	0.24	0.24	0.25	Normal
Nickel, Total	µg/L	2	11	85	< 0.2	0.6	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nickel, Dissolved	µg/L	2	11	85	< 0.2	0.29	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nitrate + Nitrite as Nitrogen	mg/L	10	3	23	< 0.05	0.08	n/a	0.06	0.06	0.01	0.07	0.08	0.08	KM - Nonparametric
Nitrogen, Total	mg/L	10	3	23	< 0.4	1.11	n/a	0.6	0.6	0.2	0.9	1.0	1.1	KM - Nonparametric
Nitrogen, Total Kjeldahl (TKN)	mg/L	10	3	23	< 0.4	1.04	n/a	0.6	0.5	0.2	0.9	0.9	1.0	KM - Nonparametric
pH	pH units	21	0	0	6.12	7.85	4	6.9	6.8	0.5	7.4	7.5	7.8	Normal

Table 4-50. YP-M-4, Fiddle Creek Pond, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Phosphorus, Total	µg/L	3	10	77	< 20	240	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Phosphorus, Dissolved	µg/L	0	13	100	< 20	< 80	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Potassium, Total	µg/L	13	0	0	427	1340	n/a	726	679	215	860	1062	1284	Nonparametric
Potassium, Dissolved	µg/L	13	0	0	399	747	n/a	638	673	103	734	740	746	Normal
Selenium, Total	µg/L	0	13	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Selenium, Dissolved	µg/L	0	13	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Total	µg/L	0	13	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Dissolved	µg/L	0	13	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sodium, Total	µg/L	13	0	0	1680	3580	n/a	2868	3080	654	3484	3532	3570	Nonparametric
Sodium, Dissolved	µg/L	13	0	0	1690	3610	n/a	2862	3070	660	3530	3592	3606	Nonparametric
Solids, Total Dissolved (TDS)	mg/L	13	0	0	30.5	62	0	47.7	46.0	11.2	60.6	61.4	61.9	Normal
Solids, Total Suspended (TSS)	mg/L	6	7	54	< 5	118	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sulfate	mg/L	13	0	0	1.01	3.53	0	2.63	2.97	0.85	3.25	3.37	3.50	Nonparametric
Temperature, Water	deg C	21	0	0	1.44	13.02	1	6.6	7.1	3.6	11.4	12.3	12.9	Normal
Thallium, Total	µg/L	1	12	92	< 0.02	0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Thallium, Dissolved	µg/L	0	13	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Turbidity	NTU	21	0	0	0	37.5	n/a	4.7	2.2	8.6	7.6	19.9	34.0	Nonparametric
Vanadium, Total	µg/L	9	4	31	< 0.2	2.3	0	0.5	0.3	0.6	0.8	1.4	2.1	KM - Nonparametric
Vanadium, Dissolved	µg/L	5	8	62	< 0.2	0.24	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Zinc, Total	µg/L	7	6	46	< 0.5	8.5	0	1.4	0.5	2.1	2.0	4.6	7.7	KM - Nonparametric
Zinc, Dissolved	µg/L	7	6	46	< 0.5	1.8	0	0.8	0.6	0.4	1.0	1.3	1.7	KM - Nonparametric

Units: **µg/L** = micrograms per liter; **mg/L** = milligrams per liter; **mS/cm** = milliSiemens per centimeter; **ng/L** = nanograms per liter; **deg C** = degrees Celsius; **NTU** = nephelometric turbidity units
Measurements: **< 20 µg/L** = analyte not detected at the method reporting limit of 20 µg/L; **n/a** = not applicable; **Min** = minimum concentration measured; **Max** = maximum concentration measured
*Number that do not meet criterion: total number of analytical results that did not meet the strictest potentially applicable regulatory criterion (presented in **Table 3-4**). If a constituent does not have applicable regulatory criteria, then n/a is given.*
Distribution: **Normal** = data appear normally distributed at 0.05 significance level; statistics presented are normal population estimators; **Gamma** = data appear gamma distributed 0.05 significance level; statistics presented are gamma population estimators; **Lognormal** = data appear lognormally distributed at 0.05 significance level; statistics presented are lognormal populations estimators; **Nonparametric** = data do not appear normally, gamma or lognormally distributed at 0.05 significance level; statistics presented are sample statistics; **KM nonparametric** = data comprises ≤ 50% non-detects; statistics presented are nonparametric population estimators generated using the Kaplan-Meier method; **Sample** = data comprises > 50% non-detects and statistics are not presented; or, data comprises five or fewer measurements but each result was detected and statistics presented are sample statistics.

YP-AS-5, North Tunnel adit

The North Tunnel adit (YP-AS-5) was positively identified during the June 2012 sampling event. The collapsed adit is located on the south side of Fiddle Creek above an old road bed and a small wasterock pile. The collapsed adit is recognized by a scar on the hillside from the base of which two tracks emerge (see photos in **Appendix G**). Although a thick stand of alders occurs at the adit, neither visibly flowing water nor signs of recently flowing water have been observed at the site during the baseline program. Therefore, no flow measurements or water quality parameters have ever been taken at the dry adit.

YP-AS-3, Monday Tunnel adit seep

The Monday Tunnel adit seep (YP-AS-3) emerges at the base of the collapsed adit located on the hillside directly west of the Monday Camp ruins on the west side of the EFSFSR (see photos in **Appendix G**). The seep flows north through the ruins before infiltrating into the subsurface at the edge of the ruins. The seep flows year-round and onsite flow measurements have ranged from $4.4x10^{-4}$ cfs in October 2012 to $3.6x10^{-2}$ cfs in May 2012 with a median flow of $2.1x10^{-3}$ cfs.

For the time interval included in this baseline study, this site was visited 32 times. **Appendix E** presents dates the site was visited and parameters or constituents sampled during each visit. Analytical results are summarized in **Table 4-51**. Multiple constituents were analyzed for but were not detected in at least half of the samples from YP-AS-3. These constituents were dissolved aluminum, ammonia, beryllium, boron, cadmium, carbonate, chloride, chromium, cyanide, fluoride, dissolved lead, dissolved nickel, nitrate plus nitrite, dissolved phosphorus, selenium, silver, total suspended solids, thallium and dissolved vanadium.

Of constituents that were regularly detected, many do not have defined or applicable regulatory criteria for comparison **(see Appendix E)**. These include conductivity, turbidity, arsenic III, bicarbonate, calcium, cobalt, hardness, magnesium, methyl mercury, total nitrogen, total Kjeldahl nitrogen, total phosphorus, potassium and sodium. Of these constituents, the major cations (calcium, magnesium, potassium, sodium), the major anion (bicarbonate), related measurements (conductivity, hardness), turbidity, arsenic III, and total phosphorus were generally lower with higher flows. The remaining constituents generally occurred in low concentrations and show no distinct trends.

In addition, many constituents that were regularly detected and have applicable regulatory criteria occurred in concentrations that met criteria **(see Appendix E)**. These constituents include color, temperature, alkalinity, dissolved antimony, barium, copper, total lead, dissolved mercury, molybdenum, total nickel, total dissolved solids, sulfate, total vanadium and dissolved zinc. Of these constituents, alkalinity and total dissolved solids tended to be lower during high flow conditions. The remaining constituents generally occurred in low concentrations and do not show distinct trends.

There were some constituents that did not meet regulatory criteria **(see Appendix E)**. Dissolved oxygen was lower than the regulatory minimum (> 6 mg/L) 23 times (72 percent of measurements). The pH was lower than the regulatory minimum (≥ 6.5) twice (6 percent of measurements). Total aluminum exceeded the regulatory criterion (50 µg/L) eight times (50 percent of measurements). Total antimony exceeded the regulatory criterion (5.6 µg/L) five times (31 percent of measurements). Total and dissolved arsenic exceeded the regulatory criterion (10 µg/L) 16 times each (100 percent of measurements). Total and dissolved iron

exceeded the regulatory criterion (300 µg/L) 14 and six times, respectively (88 and 38 percent of measurements). Total and dissolved manganese exceeded the regulatory criterion (50 µg/L) 11 times each (69 percent of measurements). Total mercury exceeded the regulatory criterion (12 ng/L) seven times (44 percent of measurements). Total zinc exceeded the site-specific, hardness-based regulatory criteria twice (13 percent of measurements). In February 2013, measured total zinc at the site (194 µg/L) exceeded the site-specific criterion of 132 µg/L, which was calculated based on the sample hardness (114 mg/L). In February 2014, measured total zinc at the site (210 µg/L) exceeded the site-specific criterion of 160 µg/L, which was calculated based on the sample hardness (143 mg/L).

Table 4-51. YP-AS-3, Monday Tunnel Adit Seep, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Alkalinity as CaCO3, Total	mg/L	16	0	0	32.5	163	0	98.5	111	40.3	137	145	159	Normal
Aluminum, Total	µg/L	16	0	0	7.2	1440	8	234	59.8	376	642	921	1611	Gamma
Aluminum, Dissolved	µg/L	7	9	56	< 2	20	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Ammonia as Nitrogen	mg/L	1	15	94	< 0.05	0.304	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Antimony, Total	µg/L	16	0	0	0.45	40.2	5	8.0	3.7	15.8	18.3	28.8	67.9	Lognormal
Antimony, Dissolved	µg/L	16	0	0	0.2	3.9	0	1.2	0.60	1.1	2.6	3.4	5.2	Gamma
Arsenic, Total	µg/L	16	0	0	19.3	19600	16	1943	234	15995	3269	6903	28043	Lognormal
Arsenic, Dissolved	µg/L	16	0	0	13.2	101	16	41.5	25.3	29.4	82.2	101	142	Gamma
Arsenic (III)	µg/L	16	0	0	1.1	2430	n/a	358	19.0	6709	424	1023	5329	Lognormal
Barium, Total	µg/L	16	0	0	55.7	1780	0	260	170	300	553	773	1448	Lognormal
Barium, Dissolved	µg/L	16	0	0	54.1	147	0	115	130	34.0	146	146	147	Nonparametric
Beryllium, Total	µg/L	6	10	63	< 0.02	0.54	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Beryllium, Dissolved	µg/L	0	16	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Bicarbonate as CaCO3	mg/L	16	0	0	32.5	163	n/a	97.0	106	39.5	137	145	159	Normal
Boron, Total	µg/L	0	16	100	< 10	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Boron, Dissolved	µg/L	0	16	100	< 10	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Total	µg/L	5	11	69	< 0.02	0.24	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Dissolved	µg/L	1	15	94	< 0.02	0.03	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Calcium, Total	µg/L	16	0	0	7400	38400	n/a	21859	24750	8749	30050	33000	37320	Normal
Calcium, Dissolved	µg/L	16	0	0	7340	29800	n/a	20601	24200	7306	27400	28825	29605	Nonparametric
Carbonate as CaCO3	mg/L	1	15	94	< 9	24	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chloride	mg/L	5	11	69	< 0.31	2.27	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chromium, Total	µg/L	7	9	56	< 0.2	2.2	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chromium, Dissolved	µg/L	1	15	94	< 0.2	0.3	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cobalt, Total	µg/L	16	0	0	0.03	28.1	n/a	3.1	0.49	7.1	9.0	13.6	25.5	Gamma
Cobalt, Dissolved	µg/L	14	2	13	< 0.02	0.91	n/a	0.31	0.25	0.29	0.73	0.89	0.91	KM - Nonparametric
Conductivity	mS/cm	30	0	0	0.102	0.81	n/a	0.223	0.220	0.123	0.274	0.282	0.658	Nonparametric

Table 4-51. YP-AS-3, Monday Tunnel Adit Seep, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Copper, Total	µg/L	13	3	19	< 0.1	6.4	0	1.1	0.2	1.9	3.8	5.5	6.2	KM - Nonparametric
Copper, Dissolved	µg/L	13	3	19	< 0.1	0.4	0	0.2	0.1	0.1	0.3	0.3	0.4	KM - Nonparametric
Cyanide, Total	mg/L	0	16	100	< 0.0047	< 0.0047	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Dissolved Oxygen (DO)	mg/L	32	0	0	2.62	7.03	23	4.8	4.5	1.3	6.3	6.7	7.0	Normal
Fluoride	mg/L	0	16	100	< 0.2	< 0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Hardness as CaCO3	mg/L	16	0	0	28.1	143	n/a	85.4	95.9	34.4	120	129	140	Normal
Iron, Total	µg/L	16	0	0	84.5	248000	14	26984	2580	63329	79649	123706	238302	Gamma
Iron, Dissolved	µg/L	9	7	44	< 20	841	6	200	28.5	246	484	580	789	KM - Nonparametric
Lead, Total	µg/L	12	4	25	< 0.02	2.85	0	0.57	0.10	0.92	2.1	2.7	2.8	KM - Nonparametric
Lead, Dissolved	µg/L	1	15	94	< 0.02	0.04	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Magnesium, Total	µg/L	16	0	0	2330	11300	n/a	7456	8265	3070	10850	11150	11270	Normal
Magnesium, Dissolved	µg/L	16	0	0	2280	11200	n/a	7271	8155	2918	10250	10675	11095	Normal
Manganese, Total	µg/L	16	0	0	11.2	16200	11	1945	354	4103	5675	8657	16327	Gamma
Manganese, Dissolved	µg/L	16	0	0	6.7	975	11	291	195	321	769	893	959	Normal
Mercury, Total	ng/L	16	0	0	1.9	882	7	128	17.2	947	224	464	1820	Lognormal
Mercury, Dissolved	ng/L	16	0	0	0.9	2.7	0	1.4	1.3	0.41	1.9	2.1	2.5	Gamma
Methyl Mercury	ng/L	13	3	19	< 0.1	8.8	n/a	1.0	0.3	2.1	2.3	4.0	7.8	KM - Nonparametric
Molybdenum, Total	µg/L	13	3	19	< 0.05	1.14	0	0.2	0.1	0.3	0.2	0.5	1.0	KM - Nonparametric
Molybdenum, Dissolved	µg/L	11	5	31	< 0.05	0.2	0	0.09	0.09	0.03	0.1	0.2	0.2	KM - Nonparametric
Nickel, Total	µg/L	9	7	44	< 0.2	2.6	0	0.6	0.3	0.7	1.7	2.4	2.6	KM - Nonparametric
Nickel, Dissolved	µg/L	8	8	50	< 0.2	0.5	0	0.3	0.2	0.1	0.5	0.5	0.5	KM - Nonparametric
Nitrate + Nitrite as Nitrogen	mg/L	5	11	69	< 0.05	0.279	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nitrogen, Total	mg/L	11	5	31	< 0.4	1.58	n/a	0.7	0.5	0.4	1.2	1.5	1.6	KM - Nonparametric
Nitrogen, Total Kjeldahl (TKN)	mg/L	11	5	31	< 0.4	1.58	n/a	0.6	0.4	0.4	1.1	1.4	1.6	KM - Nonparametric
pH	pH units	31	0	0	6.44	7.87	2	7.1	7.0	0.4	7.5	7.7	7.8	Normal

Table 4-51. YP-AS-3, Monday Tunnel Adit Seep, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Phosphorus, Total	µg/L	9	7	44	< 35.6	3240	n/a	345	44.6	778	648	1451	2882	KM - Nonparametric
Phosphorus, Dissolved	µg/L	0	16	100	< 20	< 42.6	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Potassium, Total	µg/L	16	0	0	829	1950	n/a	1264	1190	329	1775	1928	1946	Normal
Potassium, Dissolved	µg/L	16	0	0	785	1310	n/a	1101	1105	154	1280	1310	1310	Normal
Selenium, Total	µg/L	0	16	100	< 1	< 2	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Selenium, Dissolved	µg/L	0	16	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Total	µg/L	4	12	75	< 0.02	0.13	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Dissolved	µg/L	0	16	100	< 0.02	< 0.04	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sodium, Total	µg/L	16	0	0	3570	8410	n/a	6302	6875	1660	7950	8223	8373	Normal
Sodium, Dissolved	µg/L	16	0	0	3650	8620	n/a	6345	6890	1684	8000	8163	8529	Normal
Solids, Total Dissolved (TDS)	mg/L	16	0	0	45	134	0	100.3	108	26	125	128	133	Normal
Solids, Total Suspended (TSS)	mg/L	8	8	50	< 5	697	n/a	79.3	7.5	170	179	311	620	KM - Nonparametric
Sulfate	mg/L	16	0	0	2.4	6.03	0	3.1	2.7	1.1	4.4	5.8	6.0	Nonparametric
Temperature, Water	deg C	32	0	0	0.67	10.27	0	5.9	6.1	2.2	8.1	9.4	10.1	Normal
Thallium, Total	µg/L	3	13	81	< 0.02	0.05	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Thallium, Dissolved	µg/L	0	16	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Turbidity	NTU	31	0	0	1.1	244	n/a	39.3	14.4	52.5	100.7	138.3	228.5	Gamma
Vanadium, Total	µg/L	12	4	25	< 0.2	17.4	0	2.0	0.4	4.2	4.5	8.3	15.6	KM - Nonparametric
Vanadium, Dissolved	µg/L	0	16	100	< 0.2	< 0.2	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Zinc, Total	µg/L	16	0	0	0.9	210	2	36.5	5.4	67.0	103.0	151.4	273.2	Gamma
Zinc, Dissolved	µg/L	16	0	0	0.8	8.1	0	2.6	1.8	2.0	5.0	6.2	8.7	Gamma

Units: **µg/L** = micrograms per liter; **mg/L** = milligrams per liter; **mS/cm** = milliSiemens per centimeter; **ng/L** = nanograms per liter; **deg C** = degrees Celsius; **NTU** = nephelometric turbidity units
Measurements: **< 20 µg/L** = analyte not detected at the method reporting limit of 20 µg/L; **n/a** = not applicable; **Min** = minimum concentration measured; **Max** = maximum concentration measured
*Number that do not meet criterion: total number of analytical results that did not meet the strictest potentially applicable regulatory criterion (presented in **Table 3-4**). If a constituent does not have applicable regulatory criteria, then n/a is given.*
Distribution: **Normal** = data appear normally distributed at 0.05 significance level; statistics presented are normal population estimators; **Gamma** = data appear gamma distributed 0.05 significance level; statistics presented are gamma population estimators; **Lognormal** = data appear lognormally distributed at 0.05 significance level; statistics presented are lognormal populations estimators; **Nonparametric** = data do not appear normally, gamma or lognormally distributed at 0.05 significance level; statistics presented are sample statistics; **KM nonparametric** = data comprises ≤ 50% non-detects; statistics presented are nonparametric population estimators generated using the Kaplan-Meier method; **Sample** = data comprises > 50% non-detects and statistics are not presented; or, data comprises five or fewer measurements but each result was detected and statistics presented are sample statistics.

YP-AS-4, Cinnabar Tunnel adit seep

The Cinnabar Tunnel adit seep (YP-AS-4) flows from the collapsed Cinnabar adit opening in the middle of the hillside east of the EFSFSR and about 250 feet upstream of the Midnight Creek confluence (see photos in **Appendix G**). The seep flows directly to the west, splits through thick riparian vegetation on the EFSFSR floodplain, and flows into the EFSFSR year-round in three locations – one upstream of YP-SR-6 and two downstream of that site. Onsite flow measurements have ranged from $1.0x10^{-2}$ cfs in November 2015 to 0.37 cfs in May 2012 with a median flow of $7.0x10^{-2}$ cfs.

For the time interval included in this baseline study, this site was visited 34 times. **Appendix E** presents dates the site was visited and parameters or constituents sampled during each visit. Analytical results are summarized in **Table 4-52**. Multiple constituents were analyzed for but were not detected in at least half of the samples from YP-AS-4. These constituents were dissolved aluminum, ammonia, beryllium, boron, cadmium, carbonate, chloride, chromium, dissolved cobalt, cyanide, fluoride, iron, lead, manganese, methyl mercury, dissolved nickel, phosphorus, selenium, silver, total suspended solids, thallium, vanadium and zinc.

Of constituents that were regularly detected, many do not have defined or applicable regulatory criteria for comparison **(see Appendix E)**. These include conductivity, turbidity, arsenic III, bicarbonate, calcium, total cobalt, hardness, magnesium, nitrate plus nitrite, total nitrogen, total Kjeldahl nitrogen, potassium and sodium. Of these constituents, the major cations (calcium, magnesium, potassium, sodium), major anion (bicarbonate) and hardness were lowest during high flow. The remaining constituents generally occurred in low concentrations and show no distinct trends.

In addition, many constituents that were regularly detected and have applicable regulatory criteria occurred in concentrations that met criteria **(see Appendix E)**. These constituents include color, dissolved oxygen, pH, temperature, alkalinity, barium, copper, mercury, molybdenum, total nickel, total dissolved solids and sulfate. These constituents generally occurred in low concentrations and do not show distinct trends.

There were some constituents that did not meet regulatory criteria **(see Appendix E)**. Total aluminum exceeded the regulatory criterion (50 µg/L) once (6 percent of measurements). Total and dissolved antimony exceeded the regulatory criterion (5.6 µg/L) 16 times each (100 percent of measurements). Total and dissolved arsenic exceeded the regulatory criterion (10 µg/L) 16 times each (100 percent of measurements).

Table 4-52. YP-AS-4, Cinnabar Tunnel Adit Seep, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Alkalinity as CaCO3, Total	mg/L	16	0	0	76.6	118	0	107	108	9.39	114	115	117	Nonparametric
Aluminum, Total	µg/L	15	1	6	< 2	69.8	1	11.5	4.4	16.7	24.5	40.7	64.0	KM - Nonparametric
Aluminum, Dissolved	µg/L	4	12	75	< 2	2.7	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Ammonia as Nitrogen	mg/L	0	16	100	< 0.05	< 0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Antimony, Total	µg/L	16	0	0	43.4	54.6	16	48.8	49.2	2.97	51.9	53.0	54.3	Normal
Antimony, Dissolved	µg/L	16	0	0	42.8	56.3	16	49.1	49.7	3.65	52.9	55.1	56.1	Normal
Arsenic, Total	µg/L	16	0	0	82.5	126	16	109	109	12.3	122	123	125	Normal
Arsenic, Dissolved	µg/L	16	0	0	82.3	127	16	109	110	12.6	123	126	127	Normal
Arsenic (III)	µg/L	16	0	0	0.08	0.26	n/a	0.16	0.16	0.04	0.19	0.21	0.25	Normal
Barium, Total	µg/L	16	0	0	6.4	11.4	0	9.6	9.5	1.2	11.1	11.3	11.4	Normal
Barium, Dissolved	µg/L	16	0	0	6.3	11.1	0	9.6	9.5	1.3	11.0	11.0	11.1	Normal
Beryllium, Total	µg/L	0	16	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Beryllium, Dissolved	µg/L	0	16	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Bicarbonate as CaCO3	mg/L	16	0	0	76.6	118	n/a	107	108	9.35	114	115	117	Nonparametric
Boron, Total	µg/L	0	16	100	< 20	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Boron, Dissolved	µg/L	0	16	100	< 20	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Total	µg/L	0	16	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Dissolved	µg/L	0	16	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Calcium, Total	µg/L	16	0	0	23500	34500	n/a	31244	31750	2416	33100	33525	34305	Normal
Calcium, Dissolved	µg/L	16	0	0	23200	34900	n/a	31200	31450	2556	33450	34150	34750	Nonparametric
Carbonate as CaCO3	mg/L	0	16	100	< 9	< 15	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chloride	mg/L	3	13	81	< 0.22	0.43	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chromium, Total	µg/L	4	12	75	< 0.2	1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chromium, Dissolved	µg/L	2	14	88	< 0.2	0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cobalt, Total	µg/L	9	7	44	< 0.02	0.12	n/a	0.04	0.03	0.03	0.08	0.09	0.11	KM - Nonparametric
Cobalt, Dissolved	µg/L	8	8	50	< 0.02	0.11	n/a	0.04	0.03	0.03	0.08	0.09	0.11	KM - Nonparametric
Conductivity	mS/cm	32	0	0	0.185	0.305	n/a	0.236	0.238	0.023	0.257	0.268	0.295	Normal

Table 4-52. YP-AS-4, Cinnabar Tunnel Adit Seep, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Copper, Total	µg/L	14	2	13	< 0.1	0.2	0	0.2	0.2	0.1	0.2	0.2	0.2	KM - Nonparametric
Copper, Dissolved	µg/L	16	0	0	0.1	0.4	0	0.2	0.2	0.1	0.3	0.3	0.4	Nonparametric
Cyanide, Total	mg/L	0	16	100	< 0.0047	< 0.0047	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Dissolved Oxygen (DO)	mg/L	33	0	0	6.67	10.82	0	9.6	9.7	0.9	10.6	10.8	10.8	Nonparametric
Fluoride	mg/L	0	16	100	< 0.2	< 0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Hardness as CaCO3	mg/L	16	0	0	84.9	125	n/a	114	117	8.92	120	121	124	Normal
Iron, Total	µg/L	3	13	81	< 20	88.8	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Iron, Dissolved	µg/L	0	16	100	< 20	< 21.3	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Lead, Total	µg/L	2	14	88	< 0.02	0.03	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Lead, Dissolved	µg/L	0	16	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Magnesium, Total	µg/L	16	0	0	6360	9680	n/a	8764	9000	781.2	9390	9478	9640	Nonparametric
Magnesium, Dissolved	µg/L	16	0	0	6260	9520	n/a	8706	8955	812.4	9435	9483	9513	Normal
Manganese, Total	µg/L	1	15	94	< 1	5	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Manganese, Dissolved	µg/L	0	16	100	< 1	< 5	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Mercury, Total	ng/L	16	0	0	1.2	10.4	0	3.0	2.5	2.3	5.6	6.7	9.2	Gamma
Mercury, Dissolved	ng/L	14	2	13	< 0.7	1.9	0	1.2	1.1	0.4	1.7	1.8	1.9	KM - Nonparametric
Methyl Mercury	ng/L	0	16	100	< 0.1	< 0.1	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Molybdenum, Total	µg/L	16	0	0	0.88	1.13	0	1.01	1.01	0.07	1.1	1.1	1.1	Normal
Molybdenum, Dissolved	µg/L	16	0	0	0.85	1.1	0	1.01	1.03	0.08	1.1	1.1	1.1	Normal
Nickel, Total	µg/L	9	7	44	< 0.2	0.5	0	0.3	0.3	0.1	0.5	0.5	0.5	KM - Nonparametric
Nickel, Dissolved	µg/L	8	8	50	< 0.2	0.6	0	0.3	0.2	0.1	0.4	0.5	0.6	KM - Nonparametric
Nitrate + Nitrite as Nitrogen	mg/L	16	0	0	0.134	0.382	n/a	0.23	0.22	0.08	0.35	0.36	0.38	Normal
Nitrogen, Total	mg/L	12	4	25	< 0.4	1.07	n/a	0.70	0.71	0.22	0.98	1.02	1.06	KM - Nonparametric
Nitrogen, Total Kjeldahl (TKN)	mg/L	10	6	38	< 0.4	0.93	n/a	0.53	0.47	0.15	0.73	0.79	0.90	KM - Nonparametric
pH	pH units	32	0	0	6.91	8.07	0	7.4	7.4	0.3	7.7	7.9	8.0	Normal
Phosphorus, Total	µg/L	0	16	100	< 20	< 40	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample

Table 4-52. YP-AS-4, Cinnabar Tunnel Adit Seep, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Phosphorus, Dissolved	µg/L	0	16	100	< 20	< 42.6	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Potassium, Total	µg/L	16	0	0	1400	1730	n/a	1594	1615	92.73	1695	1715	1727	Normal
Potassium, Dissolved	µg/L	16	0	0	1340	1750	n/a	1583	1610	99.71	1670	1698	1740	Normal
Selenium, Total	µg/L	0	16	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Selenium, Dissolved	µg/L	0	16	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Total	µg/L	1	15	94	< 0.02	0.03	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Dissolved	µg/L	0	16	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sodium, Total	µg/L	16	0	0	815	1030	n/a	937	926	74.8	1025	1030	1030	Normal
Sodium, Dissolved	µg/L	16	0	0	794	1040	n/a	941	933	74.1	1025	1040	1040	Normal
Solids, Total Dissolved (TDS)	mg/L	16	0	0	107	222	0	131	128	26.5	143	165	211	Nonparametric
Solids, Total Suspended (TSS)	mg/L	0	16	100	< 5	< 5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sulfate	mg/L	16	0	0	9.42	15.1	0	12.4	12.7	1.67	14.5	14.7	15.0	Normal
Temperature, Water	deg C	33	0	0	2.27	9.08	0	5.1	5.0	1.6	7.0	7.2	8.5	Normal
Thallium, Total	µg/L	0	16	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Thallium, Dissolved	µg/L	0	16	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Turbidity	NTU	33	0	0	0	4.9	n/a	1.8	1.6	1.0	3.1	3.3	4.5	Normal
Vanadium, Total	µg/L	1	15	94	< 0.2	0.2	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Vanadium, Dissolved	µg/L	1	15	94	< 0.2	0.2	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Zinc, Total	µg/L	5	11	69	< 0.5	1.2	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Zinc, Dissolved	µg/L	8	8	50	< 0.5	1.1	0	0.6	0.5	0.2	0.8	0.9	1.1	KM - Nonparametric

Units: **µg/L** = micrograms per liter; **mg/L** = milligrams per liter; **mS/cm** = milliSiemens per centimeter; **ng/L** = nanograms per liter; **deg C** = degrees Celsius; **NTU** = nephelometric turbidity units
Measurements: **< 20 µg/L** = analyte not detected at the method reporting limit of 20 µg/L; **n/a** = not applicable; **Min** = minimum concentration measured; **Max** = maximum concentration measured
*Number that do not meet criterion: total number of analytical results that did not meet the strictest potentially applicable regulatory criterion (presented in **Table 3-4**). If a constituent does not have applicable regulatory criteria, then n/a is given.*
Distribution: **Normal** = data appear normally distributed at 0.05 significance level; statistics presented are normal population estimators; **Gamma** = data appear gamma distributed 0.05 significance level; statistics presented are gamma population estimators; **Lognormal** = data appear lognormally distributed at 0.05 significance level; statistics presented are lognormal populations estimators; **Nonparametric** = data do not appear normally, gamma or lognormally distributed at 0.05 significance level; statistics presented are sample statistics; **KM nonparametric** = data comprises ≤ 50% non-detects; statistics presented are nonparametric population estimators generated using the Kaplan-Meier method; **Sample** = data comprises > 50% non-detects and statistics are not presented; or, data comprises five or fewer measurements but each result was detected and statistics presented are sample statistics.

YP-SEBS-2, south Bradley wasterock seep

There are two seep sites associated with the southeast Bradley wasterock dumps which are located on the eastern side of the Yellow Pine pit. The southern seep associated with the southeast Bradley wasterock piles (YP-SEBS-2) originates as a series of seeps at the base of the lowest dump at the southeast corner of the Yellow Pine pit (see photos in **Appendix G**). The seep cascades downhill to the northwest through a thickly vegetated, boulder and bedrock gully before flowing across a prominent gravel delta within an established riparian corridor and into the Yellow Pine pit (and therefore into the EFSFSR). The seep appears to flow year-round because flow across the delta is visible year-round; however, direct access to the site is not safe during winter conditions so this cannot be verified. Onsite flow measurements have ranged from $2.1x10^{-2}$ in November 2014 to 0.54 cfs in May 2014 with a median flow of 0.27 cfs.

For the time interval included in this baseline study, this site was visited 28 times. **Appendix E** presents dates the site was visited and parameters or constituents sampled during each visit. Analytical results are summarized in **Table 4-53**. Multiple constituents were analyzed for but were not detected in at least half of the samples from YP-SEBS-2. These constituents were dissolved aluminum, ammonia, beryllium, boron, cadmium, carbonate, chloride, chromium, cobalt, total copper, cyanide, fluoride, dissolved iron, lead, manganese, methyl mercury, nickel, phosphorus, selenium, silver, total suspended solids, thallium, vanadium and zinc.

Of constituents that were regularly detected, many do not have defined or applicable regulatory criteria for comparison **(see Appendix E)**. These include conductivity, turbidity, arsenic III, bicarbonate, calcium, hardness, magnesium, nitrate plus nitrite, total nitrogen, total Kjeldahl nitrogen, potassium and sodium. Many of these constituents occurred in low concentrations, and none show distinct trends in concentrations.

In addition, many constituents that were regularly detected and have applicable regulatory criteria occurred in concentrations that met criteria **(see Appendix E)**. These constituents include color, dissolved oxygen, pH, temperature, alkalinity, total aluminum, barium, dissolved copper, total iron, mercury, molybdenum, total dissolved solids and sulfate. Most of these constituents occurred in low concentrations, and none show distinct trends in concentrations.

There were some constituents that did not meet regulatory criteria **(see Appendix E)**. Total and dissolved antimony exceeded the regulatory criterion (5.6 µg/L) 11 times each (100 percent of measurements). Total and dissolved arsenic exceeded the regulatory criterion (10 µg/L) 11 times each (100 percent of measurements).

Table 4-53. YP-SEBS-2, South Bradley Wasterock Seep, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Alkalinity as CaCO3, Total	mg/L	11	0	0	90.2	122	0	110	111	9.03	122	122	122	Normal
Aluminum, Total	µg/L	11	0	0	3.8	8	0	5.7	5.5	1.4	7.9	8.0	8.0	Normal
Aluminum, Dissolved	µg/L	1	10	91	< 2	3.5	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Ammonia as Nitrogen	mg/L	0	11	100	< 0.05	< 0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Antimony, Total	µg/L	11	0	0	52.3	59	11	55.2	55.1	2.1	57.2	58.1	58.8	Normal
Antimony, Dissolved	µg/L	11	0	0	52.8	58.7	11	55.3	55.1	2.0	58.3	58.5	58.7	Normal
Arsenic, Total	µg/L	11	0	0	127	151	11	138	139	7.35	148	150	151	Normal
Arsenic, Dissolved	µg/L	11	0	0	125	149	11	136	137	7.75	148	149	149	Normal
Arsenic (III)	µg/L	11	0	0	0.17	0.9	n/a	0.6	0.6	0.2	0.8	0.9	0.9	Normal
Barium, Total	µg/L	11	0	0	10.8	14.6	0	12.7	12.9	1.0	13.2	13.9	14.5	Normal
Barium, Dissolved	µg/L	11	0	0	10.4	14.7	0	12.6	12.9	1.2	13.4	14.1	14.6	Normal
Beryllium, Total	µg/L	0	11	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Beryllium, Dissolved	µg/L	0	11	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Bicarbonate as CaCO3	mg/L	11	0	0	90.2	122	n/a	110	111	9.03	122	122	122	Normal
Boron, Total	µg/L	0	11	100	< 20	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Boron, Dissolved	µg/L	0	11	100	< 20	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Total	µg/L	0	11	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Dissolved	µg/L	1	10	91	< 0.02	0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Calcium, Total	µg/L	11	0	0	30800	39800	n/a	34700	34500	2572	37100	38450	39530	Normal
Calcium, Dissolved	µg/L	11	0	0	31100	40200	n/a	34491	34400	2633	36600	38400	39840	Normal
Carbonate as CaCO3	mg/L	0	11	100	< 9	< 15	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chloride	mg/L	0	11	100	< 0.4	< 0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chromium, Total	µg/L	3	8	73	< 0.2	1.2	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chromium, Dissolved	µg/L	2	9	82	< 0.2	0.5	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cobalt, Total	µg/L	4	7	64	< 0.02	0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cobalt, Dissolved	µg/L	3	8	73	< 0.02	0.04	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Conductivity	mS/cm	21	0	0	0.213	0.319	n/a	0.253	0.252	0.027	0.277	0.305	0.316	Normal

Table 4-53. YP-SEBS-2, South Bradley Wasterock Seep, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Copper, Total	µg/L	5	6	55	< 0.1	0.2	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Copper, Dissolved	µg/L	8	3	27	< 0.1	0.2	0	0.1	0.1	0.0	0.2	0.2	0.2	KM - Nonparametric
Cyanide, Total	mg/L	0	11	100	< 0.0047	< 0.0047	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Dissolved Oxygen (DO)	mg/L	22	0	0	6.55	10.46	0	9.5	9.7	0.9	10.1	10.3	10.4	Nonparametric
Fluoride	mg/L	1	10	91	< 0.2	0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Hardness as CaCO3	mg/L	11	0	0	113	146	n/a	126	128	9.52	133	140	145	Normal
Iron, Total	µg/L	7	4	36	< 20	33.3	0	24.2	21.5	4.69	30.1	31.7	33.0	KM - Nonparametric
Iron, Dissolved	µg/L	0	11	100	< 20	< 21.3	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Lead, Total	µg/L	0	11	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Lead, Dissolved	µg/L	0	11	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Magnesium, Total	µg/L	11	0	0	8830	11400	n/a	9634	9790	781.9	10200	10800	11280	Normal
Magnesium, Dissolved	µg/L	11	0	0	8520	11600	n/a	9659	9650	866.2	10400	11000	11480	Normal
Manganese, Total	µg/L	5	6	55	< 1	6.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Manganese, Dissolved	µg/L	1	10	91	< 1	5	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Mercury, Total	ng/L	11	0	0	1.1	4.9	0	2.0	1.6	1.1	2.7	3.8	4.7	Normal
Mercury, Dissolved	ng/L	7	4	36	< 0.5	1.4	0	0.82	1	0.27	1.1	1.3	1.4	KM - Nonparametric
Methyl Mercury	ng/L	1	10	91	< 0.1	0.11	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Molybdenum, Total	µg/L	11	0	0	0.88	1.12	0	0.98	0.99	0.07	1.1	1.1	1.1	Normal
Molybdenum, Dissolved	µg/L	11	0	0	0.78	1.07	0	0.96	0.99	0.09	1.1	1.1	1.1	Normal
Nickel, Total	µg/L	3	8	73	< 0.2	0.7	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nickel, Dissolved	µg/L	4	7	64	< 0.2	0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nitrate + Nitrite as Nitrogen	mg/L	11	0	0	0.059	0.272	n/a	0.154	0.156	0.067	0.235	0.254	0.268	Normal
Nitrogen, Total	mg/L	9	2	18	< 0.4	0.85	n/a	0.6	0.7	0.1	0.8	0.8	0.8	KM - Nonparametric
Nitrogen, Total Kjeldahl (TKN)	mg/L	8	3	27	< 0.4	0.69	n/a	0.5	0.5	0.1	0.6	0.6	0.7	KM - Nonparametric
pH	pH units	21	0	0	7.02	8	0	7.5	7.4	0.3	7.8	7.9	8.0	Normal
Phosphorus, Total	µg/L	0	11	100	< 20	< 40	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample

Table 4-53. YP-SEBS-2, South Bradley Wasterock Seep, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Phosphorus, Dissolved	µg/L	0	11	100	< 20	< 42.6	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Potassium, Total	µg/L	11	0	0	1540	1770	n/a	1648	1610	90.31	1760	1765	1769	Normal
Potassium, Dissolved	µg/L	11	0	0	1510	1820	n/a	1653	1660	108.0	1760	1790	1814	Normal
Selenium, Total	µg/L	0	11	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Selenium, Dissolved	µg/L	0	11	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Total	µg/L	0	11	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Dissolved	µg/L	0	11	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sodium, Total	µg/L	11	0	0	879	1160	n/a	1043	1050	83.3	1150	1155	1159	Normal
Sodium, Dissolved	µg/L	11	0	0	885	1150	n/a	1049	1070	82.0	1130	1140	1148	Normal
Solids, Total Dissolved (TDS)	mg/L	11	0	0	104	196	0	148	149	24.3	169	183	193	Normal
Solids, Total Suspended (TSS)	mg/L	0	11	100	< 5	< 5	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sulfate	mg/L	11	0	0	13.7	39.7	0	21.2	19.6	8.10	30.4	35.1	38.8	Normal
Temperature, Water	deg C	22	0	0	4.45	9.65	0	6.3	6.2	1.3	8.2	8.4	9.4	Normal
Thallium, Total	µg/L	0	11	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Thallium, Dissolved	µg/L	0	11	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Turbidity	NTU	22	0	0	0.4	8	n/a	2.7	2.1	2.2	5.2	6.7	10.8	Lognormal
Vanadium, Total	µg/L	1	10	91	< 0.2	0.2	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Vanadium, Dissolved	µg/L	1	10	91	< 0.2	0.2	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Zinc, Total	µg/L	2	9	82	< 0.5	0.7	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Zinc, Dissolved	µg/L	3	8	73	< 0.5	0.7	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample

Units: **µg/L** = micrograms per liter; **mg/L** = milligrams per liter; **mS/cm** = milliSiemens per centimeter; **ng/L** = nanograms per liter; **deg C** = degrees Celsius; **NTU** = nephelometric turbidity units
Measurements: **< 20 µg/L** = analyte not detected at the method reporting limit of 20 µg/L; **n/a** = not applicable; **Min** = minimum concentration measured; **Max** = maximum concentration measured
*Number that do not meet criterion: total number of analytical results that did not meet the strictest potentially applicable regulatory criterion (presented in **Table 3-4**). If a constituent does not have applicable regulatory criteria, then n/a is given.*
Distribution: **Normal** = data appear normally distributed at 0.05 significance level; statistics presented are normal population estimators; **Gamma** = data appear gamma distributed 0.05 significance level; statistics presented are gamma population estimators; **Lognormal** = data appear lognormally distributed at 0.05 significance level; statistics presented are lognormal populations estimators; **Nonparametric** = data do not appear normally, gamma or lognormally distributed at 0.05 significance level; statistics presented are sample statistics; **KM nonparametric** = data comprises ≤ 50% non-detects; statistics presented are nonparametric population estimators generated using the Kaplan-Meier method; **Sample** = data comprises > 50% non-detects and statistics are not presented; or, data comprises five or fewer measurements but each result was detected and statistics presented are sample statistics.

YP-SEBS-1, north Bradley wasterock seep

The northern seep associated with the southeast Bradley wasterock piles (YP-SEBS-1) is located at the northeast corner of the Yellow Pine pit and originates in a wetland one bench up from the Yellow Pine pit water surface (see photos in **Appendix G**). The seep flows north at this level before flowing down a bedrock gully and into the EFSFSR just downstream of the Yellow Pine pit. The seep appears to flow year-round because melted snow along the seep flow path is visible year-round; however, direct access to the site is not safe during winter conditions so this cannot be verified. Onsite flow measurements have ranged from $6.0x10^{-3}$ cfs in August 2015 to $8.4x10^{-2}$ cfs in May 2012 with a median flow of $2.8x10^{-2}$ cfs.

For the time interval included in this baseline study, this site was visited 27 times. **Appendix E** presents dates the site was visited and parameters or constituents sampled during each visit. Analytical results are summarized in **Table 4-54**. Multiple constituents were analyzed for but were not detected in at least half of the samples from YP-SEBS-1. These constituents were dissolved aluminum, ammonia, beryllium, boron, cadmium, carbonate, dissolved chromium, dissolved cobalt, cyanide, fluoride, dissolved iron, lead, dissolved mercury, methyl mercury, nickel, phosphorus, selenium, silver, total suspended solids, thallium, vanadium and zinc.

Of constituents that were regularly detected, many do not have defined or applicable regulatory criteria for comparison **(see Appendix E)**. These include conductivity, turbidity, arsenic III, bicarbonate, calcium, total cobalt, hardness, magnesium, nitrate plus nitrite, total nitrogen, total Kjeldahl nitrogen, potassium and sodium. Many of these constituents occurred in low concentrations, and none show distinct trends in concentrations.

In addition, many constituents that were regularly detected and have applicable regulatory criteria occurred in concentrations that met criteria **(see Appendix E)**. These constituents include color, pH, temperature, alkalinity, barium, chloride, total chromium, copper, manganese, total mercury, molybdenum, total dissolved solids and sulfate. Most of these constituents occurred in low concentrations, and none show distinct trends in concentrations.

There were some constituents that did not meet regulatory criteria **(see Appendix E)**. Dissolved oxygen was below regulatory criterion (> 6 mg/L) once (5 percent of measurements). Total aluminum exceeded the regulatory criterion (50 µg/L) once (9 percent of measurements). Total and dissolved antimony exceeded the regulatory criterion (5.6 µg/L) 11 times each (100 percent of measurements). Total and dissolved arsenic exceeded the regulatory criterion (10 µg/L) 11 times each (100 percent of measurements). Total iron exceeded the regulatory criterion (300 µg/L) once (9 percent of measurements).

Table 4-54. YP-SEBS-1, North Bradley Wasterock Seep, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Alkalinity as CaCO3, Total	mg/L	11	0	0	158	175	0	169	170	5.36	174	175	175	Normal
Aluminum, Total	µg/L	11	0	0	10.9	67.4	1	25.6	18.6	16.9	39.6	53.5	64.6	Normal
Aluminum, Dissolved	µg/L	4	7	64	< 2	5.5	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Ammonia as Nitrogen	mg/L	0	11	100	< 0.05	< 0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Antimony, Total	µg/L	11	0	0	12.1	22	11	18.5	19.3	2.72	20.8	21.4	21.9	Normal
Antimony, Dissolved	µg/L	11	0	0	12.4	22.4	11	18.6	19.5	2.89	21.2	21.8	22.3	Normal
Arsenic, Total	µg/L	11	0	0	96.9	171	11	121	115	24.7	149	160	169	Normal
Arsenic, Dissolved	µg/L	11	0	0	85.1	125	11	101	98.8	11.3	110	118	124	Normal
Arsenic (III)	µg/L	11	0	0	0.69	3.9	n/a	1.6	1.3	1.0	2.8	3.5	5.2	Lognormal
Barium, Total	µg/L	11	0	0	117	155	0	138	139	12.0	154	155	155	Normal
Barium, Dissolved	µg/L	11	0	0	117	150	0	135	137	11.0	146	148	150	Normal
Beryllium, Total	µg/L	1	10	91	< 0.02	0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Beryllium, Dissolved	µg/L	0	11	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Bicarbonate as CaCO3	mg/L	11	0	0	158	175	n/a	169	170	5.36	174	175	175	Normal
Boron, Total	µg/L	0	11	100	< 20	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Boron, Dissolved	µg/L	0	11	100	< 20	< 50	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Total	µg/L	0	11	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cadmium, Dissolved	µg/L	0	11	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Calcium, Total	µg/L	11	0	0	50800	59000	n/a	54718	53800	2802	58700	58850	58970	Normal
Calcium, Dissolved	µg/L	11	0	0	51600	59200	n/a	55364	54800	2429	58600	58900	59140	Normal
Carbonate as CaCO3	mg/L	0	11	100	< 9	< 15	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Chloride	mg/L	8	3	27	< 0.4	0.75	0	0.5	0.4	0.1	0.5	0.6	0.7	KM - Nonparametric
Chromium, Total	µg/L	9	2	18	< 0.2	0.4	0	0.2	0.2	0.1	0.3	0.4	0.4	KM - Nonparametric
Chromium, Dissolved	µg/L	5	6	55	< 0.2	0.6	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Cobalt, Total	µg/L	11	0	0	0.02	0.08	n/a	0.04	0.05	0.02	0.07	0.08	0.08	Normal
Cobalt, Dissolved	µg/L	4	7	64	< 0.02	0.05	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Conductivity	mS/cm	21	0	0	0.399	0.483	n/a	0.439	0.445	0.025	0.472	0.473	0.481	Normal

Table 4-54. YP-SEBS-1, North Bradley Wasterock Seep, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Copper, Total	µg/L	7	4	36	< 0.1	0.2	0	0.1	0.1	0.0	0.2	0.2	0.2	KM - Nonparametric
Copper, Dissolved	µg/L	7	4	36	< 0.1	0.4	0	0.2	0.1	0.1	0.2	0.3	0.4	KM - Nonparametric
Cyanide, Total	mg/L	0	11	100	< 0.0047	< 0.0047	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Dissolved Oxygen (DO)	mg/L	22	0	0	5.47	9.64	1	8.4	8.6	0.8	9.1	9.2	9.5	Nonparametric
Fluoride	mg/L	0	11	100	< 0.2	< 0.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Hardness as CaCO3	mg/L	11	0	0	210	241	n/a	222	218	12.0	239	240	241	Normal
Iron, Total	µg/L	11	0	0	68.7	461	1	179	128	125	298	380	445	Normal
Iron, Dissolved	µg/L	2	9	82	< 20	53.8	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Lead, Total	µg/L	4	7	64	< 0.02	0.05	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Lead, Dissolved	µg/L	0	11	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Magnesium, Total	µg/L	11	0	0	19000	22800	n/a	20600	20300	1236	22100	22450	22730	Normal
Magnesium, Dissolved	µg/L	11	0	0	19300	22700	n/a	20864	20800	1146	22300	22500	22660	Normal
Manganese, Total	µg/L	11	0	0	5.1	19.9	0	9.9	8.8	4.9	15	17.5	19.4	Normal
Manganese, Dissolved	µg/L	8	3	27	< 2	18.1	0	4.7	3.5	4.6	8.7	13.4	17.2	KM - Nonparametric
Mercury, Total	ng/L	11	0	0	0.8	8.2	0	3.0	2.0	2.3	5.2	6.7	7.9	Normal
Mercury, Dissolved	ng/L	3	8	73	< 0.5	1.5	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Methyl Mercury	ng/L	1	10	91	< 0.1	0.15	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Molybdenum, Total	µg/L	11	0	0	0.74	1.13	0	1.0	1.0	0.1	1.1	1.1	1.1	Normal
Molybdenum, Dissolved	µg/L	11	0	0	0.7	1.18	0	1.0	1.0	0.2	1.1	1.2	1.2	Normal
Nickel, Total	µg/L	3	8	73	< 0.2	0.6	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nickel, Dissolved	µg/L	5	6	55	< 0.2	0.6	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Nitrate + Nitrite as Nitrogen	mg/L	11	0	0	0.09	0.363	n/a	0.22	0.24	0.07	0.25	0.31	0.35	Normal
Nitrogen, Total	mg/L	9	2	18	< 0.4	0.9	n/a	0.7	0.7	0.1	0.8	0.9	0.9	KM - Nonparametric
Nitrogen, Total Kjeldahl (TKN)	mg/L	9	2	18	< 0.4	0.66	n/a	0.5	0.5	0.1	0.6	0.6	0.7	KM - Nonparametric
pH	pH units	21	0	0	7.08	7.82	0	7.4	7.3	0.2	7.6	7.7	7.8	Normal
Phosphorus, Total	µg/L	2	9	82	< 20	< 40	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample

Table 4-54. YP-SEBS-1, North Bradley Wasterock Seep, Compiled Summary of Analytes

Analyte	Units	Detects	Non-detects	Percent Non-detects	Min	Max	Number that do not meet criterion	Mean	Median	Standard Deviation	90-Percentile	95-Percentile	99-Percentile	Distribution
Phosphorus, Dissolved	µg/L	0	11	100	< 20	< 42.6	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Potassium, Total	µg/L	11	0	0	1760	2120	n/a	1897	1880	104.9	2010	2065	2109	Normal
Potassium, Dissolved	µg/L	11	0	0	1800	2110	n/a	1910	1890	89.78	2040	2075	2103	Normal
Selenium, Total	µg/L	0	11	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Selenium, Dissolved	µg/L	0	11	100	< 1	< 1	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Total	µg/L	1	10	91	< 0.02	0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Silver, Dissolved	µg/L	0	11	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sodium, Total	µg/L	11	0	0	2290	3100	n/a	2695	2600	270.7	3080	3090	3098	Normal
Sodium, Dissolved	µg/L	11	0	0	2350	3140	n/a	2735	2670	268.5	3080	3110	3134	Normal
Solids, Total Dissolved (TDS)	mg/L	11	0	0	218	300	0	262	258	23.5	296	298	300	Normal
Solids, Total Suspended (TSS)	mg/L	2	9	82	< 5	14	n/a	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Sulfate	mg/L	11	0	0	49.6	75.9	0	59.4	58.6	7.48	66.2	71.1	74.9	Normal
Temperature, Water	deg C	22	0	0	4.93	9.25	0	7.3	7.2	1.2	8.7	8.9	9.2	Normal
Thallium, Total	µg/L	0	11	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Thallium, Dissolved	µg/L	0	11	100	< 0.02	< 0.02	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Turbidity	NTU	22	0	0	0.4	25.2	n/a	5.9	4.2	6.2	13.4	17.4	26.6	Gamma
Vanadium, Total	µg/L	3	8	73	< 0.2	0.3	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Vanadium, Dissolved	µg/L	0	11	100	< 0.2	< 0.2	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Zinc, Total	µg/L	4	7	64	< 0.5	0.6	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample
Zinc, Dissolved	µg/L	5	6	55	< 0.5	1.4	0	n/a	n/a	n/a	n/a	n/a	n/a	Sample

Units: **µg/L** = micrograms per liter; **mg/L** = milligrams per liter; **mS/cm** = milliSiemens per centimeter; **ng/L** = nanograms per liter; **deg C** = degrees Celsius; **NTU** = nephelometric turbidity units
Measurements: **< 20 µg/L** = analyte not detected at the method reporting limit of 20 µg/L; **n/a** = not applicable; **Min** = minimum concentration measured; **Max** = maximum concentration measured
*Number that do not meet criterion: total number of analytical results that did not meet the strictest potentially applicable regulatory criterion (presented in **Table 3-4**). If a constituent does not have applicable regulatory criteria, then n/a is given.*
Distribution: **Normal** = data appear normally distributed at 0.05 significance level; statistics presented are normal population estimators; **Gamma** = data appear gamma distributed 0.05 significance level; statistics presented are gamma population estimators; **Lognormal** = data appear lognormally distributed at 0.05 significance level; statistics presented are lognormal populations estimators; **Nonparametric** = data do not appear normally, gamma or lognormally distributed at 0.05 significance level; statistics presented are sample statistics; **KM nonparametric** = data comprises ≤ 50% non-detects; statistics presented are nonparametric population estimators generated using the Kaplan-Meier method; **Sample** = data comprises > 50% non-detects and statistics are not presented; or, data comprises five or fewer measurements but each result was detected and statistics presented are sample statistics.

4.2 Studied Alternative Access Routes

Based on the *Transportation Baseline Study* (HDR 2017b), this water quality characterization considers seven alternative access routes to the project location:

- Burntlog
- Cabin-Trout
- Current access route
- Johnson Creek
- Riordan
- Thunder Mountain
- Combined Riordan – Thunder Mountain

Stream segments are characterized at locations where a studied alternative crosses an NHD waterbody. Streams are characterized using existing geospatial datasets (NHD, IDEQ 2014) and data generated by the *Wetlands Resources Baseline Study* and addenda (HDR 2013a, 2014b, 2014c, 2015b, 2016). The designated beneficial uses, impairment status, and characteristics of stream segments are shown in **Table 4-55** through **Table 4-61**. For nondesignated streams, IDEQ presumes most waters will support cold water aquatic life (COLD) and primary or secondary contact uses (PCR and SCR, respectively) and assigns these streams COLD and SCR as a default. In total, there are 85 stream crossings (see **Figure 4-24** and **Figure 4-25)**. Each stream crossing is assigned an HDR-generated unique crossing ID number, which can be cross-referenced to **Table 4-55** through **Table 4-61**. Where a stream crossing occurs in multiple alternative access routes, the crossing occurs in the table associated with each route. For example, crossing 30427 on Trapper Creek is in the tables for the Cabin-Trout (**Table 4-56**), Johnson Creek (**Table 4-58**), and Thunder Mountain (**Table 4-60**) alternatives.

4.2.1 Burntlog

Along the Burntlog alternative access route, there are 34 stream crossings (**Table 4-55**). Many of these are relatively small headwater streams, although there are crossings on the EFSFSR, Burntlog Creek, Riordan Creek, Johnson Creek and Trapper Creek. Each of the stream segments has COLD and PCR or SCR designated beneficial uses. Most segments also have salmonid spawning designations (SS) and some have drinking water supply (DWS).

Most of the segments are fully supporting beneficial uses (IDEQ 2014). However, the EFSFSR (crossing ID 60193) and an unnamed tributary to the EFSFSR (locally known as Rabbit Creek, crossing ID 30258) are not supporting COLD, DWS, PCR, or SS due to arsenic levels and are 303(d) listed. In addition, several stream segments are not supporting SS due to water temperature (IDEQ 2014). Each of the segments not supporting SS has an approved TMDL for temperature (IDEQ 2012).

4.2.2 Cabin-Trout

Along the Cabin-Trout alternative access route, there are 18 stream crossings (**Table 4-56**). Many of these are relatively small headwater streams, although there are crossings on the EFSFSR, Riordan Creek, Johnson Creek and Trapper Creek. Each of the stream segments has COLD and PCR or SCR designated beneficial uses. Most segments also have SS and some have DWS.

Most of the segments are fully supporting beneficial uses (IDEQ 2014). However, the EFSFSR (crossing ID 60193) and an unnamed tributary to the EFSFSR (locally known as Rabbit Creek, crossing ID 30258) are not supporting COLD, DWS, PCR, or SS due to arsenic levels and are 303(d) listed. In addition, several stream segments are not supporting SS due to water temperature (IDEQ 2014). Each of the segments not supporting SS has an approved TMDL for temperature (IDEQ 2012).

4.2.3 Current Access Route

Along the current access route, there are 41 stream crossings (**Table 4-57**). Many of these are relatively small headwater streams, although there are crossings on the EFSFSR, Profile Creek, Johnson Creek, Tamarack Creek, Trapper Creek and Sugar Creek. Each of the stream segments has COLD and PCR or SCR designated beneficial uses. Most segments also have SS and some have DWS.

Most of the segments are fully supporting beneficial uses (IDEQ 2014). However, Fiddle Creek and an unnamed tributary to the EFSFSR (locally known as Rabbit Creek, crossing IDs 30241 and 30234, respectively) are not supporting COLD, DWS, PCR, or SS due to arsenic levels. These segments are 303(d) listed. The EFSFSR (crossing ID 30246) is not supporting COLD and SS uses due to antimony and arsenic levels and combined biota/habitat bioassessments. This segment is 303(d) listed. Sugar Creek (crossing ID 30815) is not supporting COLD, PCR, or SS due to antimony, arsenic, and mercury levels. This segment is 303(d) listed. In addition, several stream segments are not supporting SS due to water temperature (IDEQ 2014). Each of the segments not supporting SS has an approved TMDL for temperature (IDEQ 2012).

4.2.4 Johnson Creek

Along the Johnson Creek alternative access route, there are 25 stream crossings (**Table 4-58**). Many of these are relatively small headwater streams, although there are crossings on the EFSFSR, Riordan Creek, Johnson Creek and Trapper Creek. Each of the stream segments has COLD and PCR or SCR designated beneficial uses. Most segments also have SS and some have DWS.

Most of the segments are fully supporting beneficial uses (IDEQ 2014). However, the EFSFSR (crossing ID 60193) and an unnamed tributary to the EFSFSR (locally known as Rabbit Creek, crossing ID 30258) are not supporting COLD, DWS, PCR, or SS due to arsenic levels and are 303(d) listed. In addition, several stream segments are not supporting SS due to water temperature (IDEQ 2014). Each of the segments not supporting SS has an approved TMDL for temperature (IDEQ 2012).

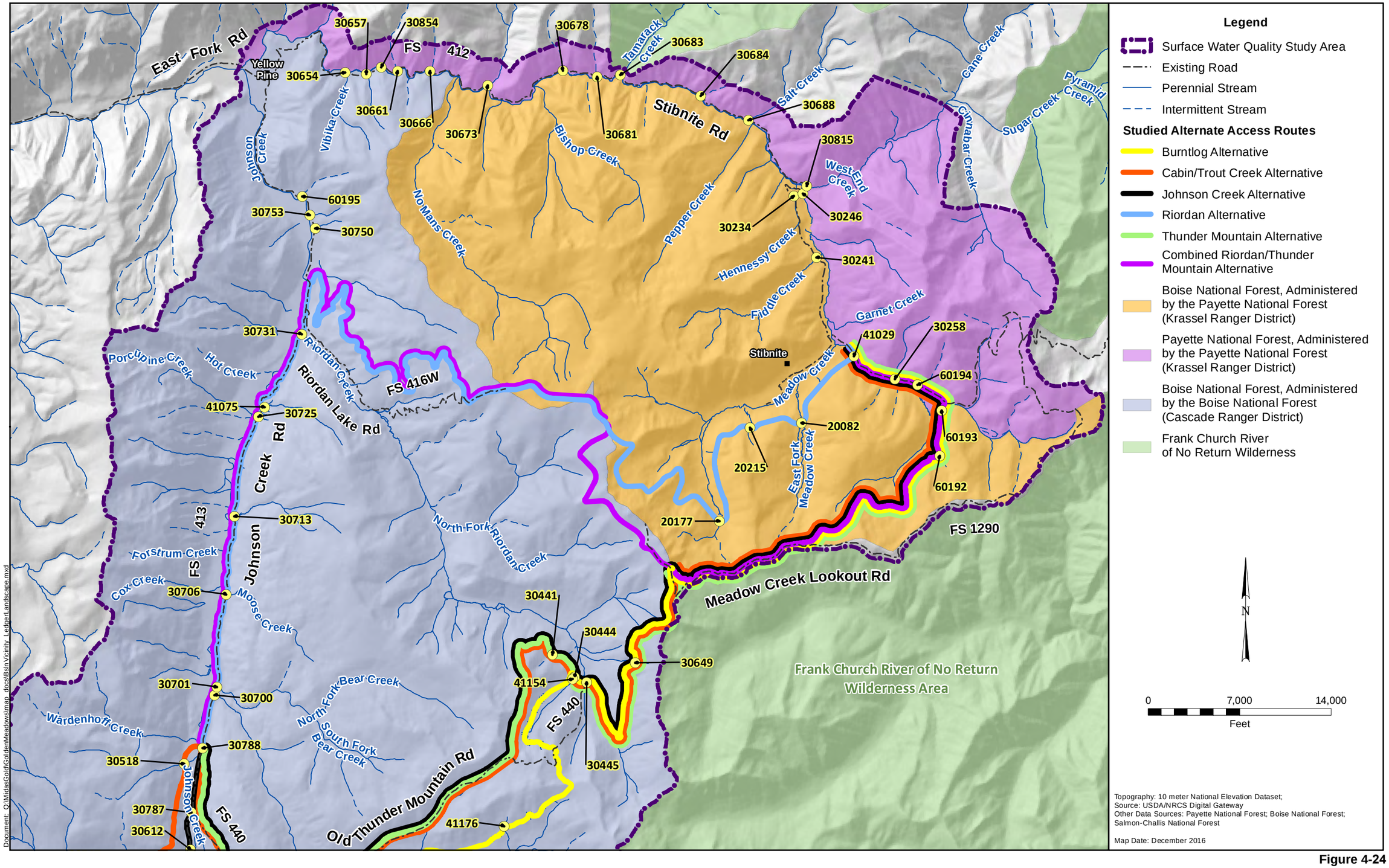

Figure 4-24
Studied Alternate Access Routes with Stream Crossings
(Northern Portion of Study Area)
Stibnite Gold Project

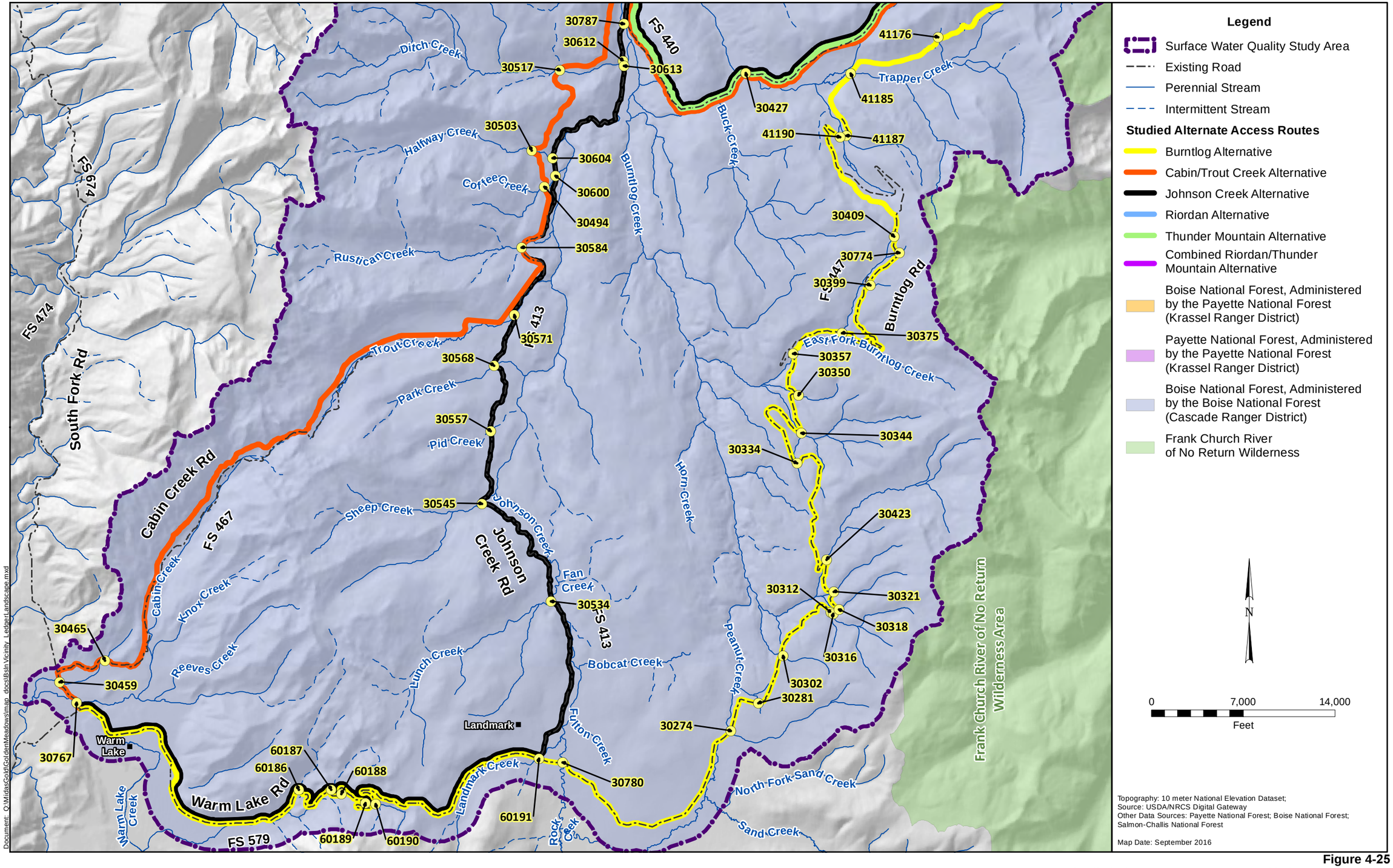

Figure 4-25
Studied Alternate Access Routes with Stream Crossings
(Southern Portion of Study Area)
Stibnite Gold Project

Table 4-55. Burntlog Alternative Access Route Stream Crossings and Characterization

Crossing ID[1]	Stream Name[2]	NHD[2] Hydrographic Category	Channel Depth[3] (feet)	Channel Width[3] (feet)	Mean Elevation[4] (feet amsl)	Average Slope[4] (%)	Hydrologic Unit Code[2] - 12 digit	Designated Beneficial Uses and IDEQ Status[5]			Cause of Impairment[5]	IDEQ Category[5]
								Fully Supporting	Not Supporting	Not Assessed		
30258	Unnamed Tributary to EFSFSR (Rabbit Creek)	Perennial	1	3	6815	17	170602080201	--	COLD, DWS, PCR, SS	--	Arsenic	303(d) Listed
60194	Unnamed Tributary to EFSFSR	Intermittent	NM	NM	6908	31	170602080201	--	--	--	--	--
60193	East Fork South Fork Salmon River	Perennial	3	25	6970	6	170602080201	--	COLD, DWS, PCR, SS	--	Arsenic	303(d) Listed
60192	Unnamed Tributary to EFSFSR	Perennial	1.5	3	7348	23	170602080201	--	--	default COLD, SCR	--	--
30649	Unnamed Tributary to Riordan Creek	Perennial	2	5	7895	46	170602080107	COLD, PCR, SS	--	--	--	--
30445	Riordan Creek	Perennial	2	18	6824	7.4	170602080107	COLD, PCR, SS	--	--	--	--
41154	Unnamed Tributary to Riordan Creek	Perennial	3	10	6901	18	170602080107	COLD, PCR, SS	--	--	--	--
41176	Unnamed Tributary to Trapper Creek	Perennial	1	3	7557	25	170602080106	--	--	default COLD, SCR	--	--
41185	Trapper Creek	Perennial	4	25	6765	4.1	170602080106	COLD, PCR, SS	--	--	--	--
41187	Unnamed Tributary to Trapper Creek	Perennial	2	6	7231	11	170602080106	COLD, PCR, SS	--	--	--	--
41190	Unnamed Tributary to Trapper Creek	Perennial	3	15	7226	12	170602080106	COLD, PCR, SS	--	--	--	--
30409	Burntlog Creek	Perennial	0.5	1.3	7985	4.9	170602080105	COLD, PCR, SS	--	SCR	--	--
30774	Unnamed Tributary to East Fork Burntlog Creek	Perennial	1	3	7920	4.9	170602080105	--	--	default COLD, SCR	--	--
30399	Unnamed Tributary to East Fork Burntlog Creek	Perennial	2	10	7708	16	170602080105	--	--	default COLD, SCR	--	--
30375	Unnamed Tributary to East Fork Burntlog Creek	Perennial	1	3	7128	10	170602080105	COLD, PCR, SS	--	SCR	--	--
30357	Unnamed Tributary to East Fork Burntlog Creek	Perennial	3	22.5	6879	11	170602080105	COLD, PCR, SS	--	SCR	--	--
30350	East Fork Burntlog Creek	Perennial	1.5	6	6988	10	170602080105	COLD, PCR, SS	--	SCR	--	--
30344	Unnamed Tributary to East Fork Burntlog Creek	Perennial	14	3	6953	7.6	170602080105	COLD, PCR, SS	--	SCR	--	--
30334	Unnamed Tributary to East Fork Burntlog Creek	Perennial	0.8	2.5	7163	8.5	170602080105	--	--	default COLD, SCR	--	--
30423	Unnamed Tributary to Peanut Creek	Perennial	2.5	15	7121	5.5	170602080105	COLD, PCR, SS	--	SCR	--	--
30321	Unnamed Tributary to East Fork Burntlog Creek	Perennial	2	5	7098	15	170602080105	COLD, PCR, SS	--	SCR	--	--
30318	Unnamed Tributary to Burntlog Creek	Perennial	2	6	7093	10	170602080105	COLD, PCR, SS	--	SCR	--	--
30316	Unnamed Tributary to Burntlog Creek	Perennial	2	8	7103	6.3	170602080105	COLD, PCR, SS	--	SCR	--	--
30312	Unnamed Tributary to Burntlog Creek	Perennial	1	3	7109	10	170602080105	--	--	default COLD, SCR	--	--
30302	Unnamed Tributary to Burntlog Creek	Perennial	0.5	2	7021	18	170602080105	COLD, PCR, SS	--	SCR	--	--
30281	Unnamed Tributary to Burntlog Creek	Perennial	1	2.5	6966	9.9	170602080105	--	--	default COLD, SCR	--	--
30274	Peanut Creek	Perennial	2	6	6853	5.7	170602080105	COLD, PCR, SS	--	SCR	--	--
30780	Johnson Creek	Perennial	3	25	6620	0.55	170602080102	COLD, DWS, PCR	SS	--	Temperature	Approved TMDL
60191	Landmark Creek	Perennial	NM	NM	6644	1	170602080102	COLD, DWS, PCR	SS	--	Temperature	Approved TMDL
60190	Warm Lake Creek	Perennial	NM	NM	6727	14	170602080404	COLD, PCR	SS	--	Temperature	Approved TMDL
60189	Warm Lake Creek	Perennial	NM	NM	6553	14	170602080404	COLD, PCR	SS	--	Temperature	Approved TMDL
60188	Warm Lake Creek	Perennial	NM	NM	6313	14	170602080404	COLD, PCR	SS	--	Temperature	Approved TMDL
60187	Warm Lake Creek	Perennial	NM	NM	6190	14	170602080404	COLD, PCR	SS	--	Temperature	Approved TMDL
60186	Unnamed Tributary to Warm Lake Creek	Intermittent	NM	NM	5788	15	170602080404	--	--	default COLD, SCR	--	--

[1]Crossing ID was generated by HDR based on delineated stream IDs during wetland studies and is unique to each crossing location
[2]Data from NHD, National Hydrography Dataset by the U.S. Geological Survey
[3]Data from the 2013, 2014, 2015, and 2016 *Wetlands Resources Baseline Study* and addenda, ordinary high water mark delineations
[4]Data from NED, National Elevation Dataset by the U.S. Geological Survey; mean elevation and slope were calculated using the NHD delineated stream segment for each crossing
[5]Data from 2012 Integrated Report by the Idaho Department of Environmental Quality [IDEQ]
Approved TMDL is *South Fork Salmon River Temperature TMDLs (& Revised Sediment Targets) 2012* by the Idaho Department of Environmental Quality
TMDL = total maximum daily load; amsl = above mean sea level; COLD = cold water communities; SS = salmonid spawning; PCR = primary contact recreation; DWS = drinking water supply
-- = no data

Table 4-56. Cabin-Trout Alternative Access Route Stream Crossings and Characterization

Crossing ID[1]	Stream Name[2]	NHD[2] Hydrographic Category	Channel Depth[3] (feet)	Channel Width[3] (feet)	Mean Elevation[4] (feet amsl)	Average Slope[4] (%)	Hydrologic Unit Code[2] - 12 digit	Designated Beneficial Uses and IDEQ Status[5]			Cause of Impairment[5]	IDEQ Category[5]
								Fully Supporting	Not Supporting	Not Assessed		
30258	Unnamed Tributary to EFSFSR (Rabbit Creek)	Perennial	1	3	6815	17	170602080201	--	COLD, DWS, PCR, SS	--	Arsenic	303(D) Listed
60194	Unnamed Tributary to EFSFSR	Intermittent	NM	NM	6908	31	170602080201	--	--	default COLD, SCR	--	--
60193	East Fork South Fork Salmon River	Perennial	3	25	6970	6	170602080201	--	COLD, DWS, PCR, SS	--	Arsenic	303(D) Listed
60192	Unnamed Tributary to EFSFSR	Perennial	1.5	3	7348	23	170602080201	--	--	default COLD, SCR	--	--
30649	Unnamed Tributary to Riordan Creek	Perennial	2	5	7895	46	170602080107	COLD, PCR, SS	--	--	--	--
30445	Riordan Creek	Perennial	2	18	6824	7.4	170602080107	COLD, PCR, SS	--	--	--	--
30444	Unnamed Tributary to Riordan Creek	Perennial	0.5	2	6878	10	170602080107	COLD, PCR, SS	--	--	--	--
30441	Unnamed Tributary to Riordan Creek	Intermittent	0.5	2	7139	19	170602080107	--	--	default COLD, SCR	--	--
30427	Trapper Creek	Perennial	3	20	6538	4.3	170602080106	COLD, PCR, SS	--	--	--	--
30788	Johnson Creek	Perennial	3	80	5162	0.69	170602080106	COLD	SS	DWS, PCR	Temperature	Approved TMDL
30518	Unnamed Tributary to Johnson Creek	Perennial	1.5	4	5350	94	170602080106	COLD, PCR, SS	--	DWS	--	--
30517	Ditch Creek	Perennial	1	4	6045	6	170602080104	COLD, PCR, SS	--	DWS	--	--
30503	Halfway Creek	Perennial	2.8	17.5	6113	18	170602080104	COLD, PCR, SS	--	DWS	--	--
30494	Coffee Creek	Perennial	3	10	5933	23	170602080104	COLD, PCR, SS	--	DWS	--	--
30584	Rustican Creek	Perennial	2	15	6088	16	170602080104	COLD, PCR, SS	--	DWS	--	--
30465	Unnamed Tributary to Warm Lake Creek	Perennial	1	2.5	5293	5.2	170602080404	COLD, PCR	SS	--	Temperature	Approved TMDL
30459	Unnamed Tributary to Warm Lake Creek	Perennial	NM	NM	5158	0.84	170602080404	COLD, PCR	SS	--	Temperature	Approved TMDL
30767	Cabin Creek	Perennial	1.5	15	5152	2.7	170602080404	COLD, SCR	SS	--	Temperature	Approved TMDL

[1]Crossing ID was generated by HDR based on delineated stream IDs during wetland studies and is unique to each crossing location
[2]Data from NHD, National Hydrography Dataset by the U.S. Geological Survey
[3]Data from the 2013, 2014, 2015, and 2016 ***Wetlands Resources Baseline Study*** and addenda, ordinary high water mark delineations
[4]Data from NED, National Elevation Dataset by the U.S. Geological Survey; mean elevation and slope were calculated using the NHD delineated stream segment for each crossing
[5]Data from 2012 Integrated Report by the Idaho Department of Environmental Quality [IDEQ]
Approved TMDL is ***South Fork Salmon River Temperature TMDLs (& Revised Sediment Targets) 2012*** by the Idaho Department of Environmental Quality
TMDL = total maximum daily load; amsl = above mean sea level; COLD = cold water communities; SS = salmonid spawning; PCR = primary contact recreation; DWS = drinking water supply
-- = no data

Table 4-57. Current Access Route Stream Crossings and Characterization

Crossing ID[1]	Stream Name[2]	NHD[2] Hydrographic Category	Channel Depth[3] (feet)	Channel Width[3] (feet)	Mean Elevation[4] (feet amsl)	Average Slope[4] (%)	Hydrologic Unit Code[2] - 12 digit	Designated Beneficial Uses and IDEQ Status[5]			Cause of Impairment[5]	IDEQ Category[5]
								Fully Supporting	Not Supporting	Not Assessed		
30241	Fiddle Creek	Perennial	1	8	6334	7.7	170602080201	--	COLD, DWS, PCR, SS	--	Arsenic	303(d) Listed
30234	Unnamed Tributary to EFSFSR (Hennessy Creek)	Perennial	1.5	4	6141	6.1	170602080201	--	COLD, DWS, PCR, SS	--	Arsenic	303(d) Listed
30246	East Fork South Fork Salmon River	Perennial	5	25	5960	5.8	170602080201	--	COLD, SS	DWS, PCR	Antimony, arsenic, combined biota/habitat bioassessments	303(d) Listed
30815	Sugar Creek	Perennial	3	25	5944	2.7	170602080202	--	COLD, PCR, SS	SCR	Antimony, arsenic, mercury	303(d) Listed
30688	Salt Creek	Perennial	2.5	8	5763	9.2	170602080206	COLD, DWS, PCR, SS	--	--	--	--
30684	Whiskey Creek	Intermittent	1	3	5650	18	170602080206	COLD, DWS, PCR, SS	--	--	--	--
30683	Tamarack Creek	Perennial	2	20	5479	5.4	170602080206	COLD, PCR, SS	--	--	--	--
30681	Unnamed Tributary to EFSFSR	Intermittent	1.5	3	5493	30	170602080206	COLD, DWS, PCR, SS	--	--	--	--
30678	Unnamed Tributary to EFSFSR	Intermittent	1	4.5	5427	34	170602080206	COLD, DWS, PCR, SS	--	--	--	--
30673	Profile Creek	Perennial	NM	NM	5247	20	170602080206	COLD, PCR	SS	--	Temperature	Approved TMDL
30666	East Fork South Fork Salmon River	Intermittent	1.5	3	5150	42	170602080206	--	--	default COLD, SCR	--	--
30661	Unnamed Tributary to EFSFSR	Intermittent	1	5	5101	19	170602080206	COLD, DWS, PCR, SS	--	--	--	--
30854	East Fork South Fork Salmon River	Perennial	4	80	5070	4.2	170602080206	COLD, SS	--	DWS, PCR	--	--
30657	Double A Creek	Perennial	1.5	3	5049	37	170602080206	COLD, DWS, PCR, SS	--	--	--	--
30654	Vibika Creek	Perennial	1.5	5	5053	23	170602080206	COLD, DWS, PCR, SS	--	--	--	--
60195	Unnamed Tributary to Johnson Creek	Intermittent	NM	NM	4820	32	170602080108	--	--	default COLD, SCR	--	--
30753	Unnamed Tributary to Johnson Creek	Perennial	NM	NM	4861	29	170602080108	--	--	default COLD, SCR	--	--
30750	Unnamed Tributary to Johnson Creek	Perennial	0.5	2	4877	8.8	170602080108	--	--	default COLD, SCR	--	--
30731	Riordan Creek	Perennial	2.5	15	4937	1.8	170602080107	COLD, PCR, SS	--	SCR	--	--
41075	Olson Creek	Perennial	1	2	5042	23	170602080108	COLD, PCR, SS	--	DWS	--	--
30725	Unnamed Tributary to Johnson Creek	Perennial	1	2	5015	39	170602080108	--	--	default COLD, SCR	--	--
30713	Hanson Creek	Perennial	1	3	5116	11	170602080108	COLD, PCR, SS	--	DWS	--	--
30706	Moose Creek	Perennial	1.5	5	5106	26	170602080108	COLD, PCR, SS	--	DWS	--	--
30701	Bear Creek	Perennial	2.5	10	5147	7.3	170602080108	COLD, PCR, SS	--	DWS	--	--
30700	Trapper Creek	Perennial	2.5	20	5151	7.8	170602080106	COLD, PCR, SS	--	--	--	--
30787	Johnson Creek	Perennial	3	80	5241	0.42	170602080106	COLD	SS	DWS, PCR	Temperature	Approved TMDL
30612	Ditch Creek	Perennial	1.5	16.5	5319	6.4	170602080104	COLD, PCR, SS	--	DWS	--	--
30613	Ditch Creek	Perennial	2	8	5322	6.6	170602080104	COLD, PCR, SS	--	DWS	--	--
30604	Halfway Creek	Perennial	1.5	10	5826	14	170602080104	COLD, PCR, SS	--	DWS	--	--
30600	Coffee Creek	Perennial	1.5	5	5798	3.5	170602080104	COLD, PCR, SS	--	DWS	--	--
30584	Rustican Creek	Perennial	2	15	6110	9	170602080104	COLD, PCR, SS	--	DWS	--	--
30571	Trout Creek	Perennial	3	20	6319	1.2	170602080104	COLD, DWS, PCR	SS	--	Temperature	Approved TMDL
30568	Park Creek	Perennial	2.5	25	6428	7	170602080103	COLD, DWS, PCR	SS	--	Temperature	Approved TMDL
30557	Pid Creek	Intermittent	3	30	6514	1.6	170602080103	COLD, DWS, PCR	SS	--	Temperature	Approved TMDL
30545	Sheep Creek	Perennial	2.5	10	6454	1.9	170602080103	COLD, DWS, PCR	SS	--	Temperature	Approved TMDL
30534	Lunch Creek	Perennial	2.5	15	6576	12	170602080102	COLD, DWS, PCR	SS	--	Temperature	Approved TMDL
60190	Warm Lake Creek	Perennial	NM	NM	6727	14	170602080404	COLD, PCR, SS	--	--	Temperature	Approved TMDL

Table 4-57. Current Access Route Stream Crossings and Characterization

Crossing ID[1]	Stream Name[2]	NHD[2] Hydrographic Category	Channel Depth[3] (feet)	Channel Width[3] (feet)	Mean Elevation[4] (feet amsl)	Average Slope[4] (%)	Hydrologic Unit Code[2] - 12 digit	Designated Beneficial Uses and IDEQ Status[5]			Cause of Impairment[5]	IDEQ Category[5]
								Fully Supporting	Not Supporting	Not Assessed		
60189	Warm Lake Creek	Perennial	NM	NM	6553	14	170602080404	COLD, PCR, SS	--	--	Temperature	Approved TMDL
60188	Warm Lake Creek	Perennial	NM	NM	6313	14	170602080404	COLD, PCR, SS	--	--	Temperature	Approved TMDL
60187	Warm Lake Creek	Perennial	NM	NM	6190	14	170602080404	COLD, PCR, SS	--	--	Temperature	Approved TMDL
60186	Unnamed Tributary to Warm Lake Creek	Intermittent	NM	NM	5788	15	170602080404	--	--	default COLD, SCR	--	--

[1]Crossing ID was generated by HDR based on delineated stream IDs during wetland studies and is unique to each crossing location
[2]Data from NHD, National Hydrography Dataset by the U.S. Geological Survey
[3]Data from the2013, 2014, 2015, and 2016 ***Wetlands Resources Baseline Study*** and addenda, ordinary high water mark delineations
[4]Data from NED, National Elevation Dataset by the U.S. Geological Survey; mean elevation and slope were calculated using the NHD delineated stream segment for each crossing
[5]Data from 2012 Integrated Report by the Idaho Department of Environmental Quality [IDEQ]
Approved TMDL is ***South Fork Salmon River Temperature TMDLs (& Revised Sediment Targets) 2012*** by the Idaho Department of Environmental Quality
TMDL = total maximum daily load; amsl = above mean sea level; COLD = cold water communities; SS = salmonid spawning; PCR = primary contact recreation; DWS = drinking water supply
-- = no data

Table 4-58. Johnson Creek Alternative Access Route Stream Crossings and Characterization

Crossing ID[1]	Stream Name[2]	NHD[2] Hydrographic Category	Channel Depth[3] (feet)	Channel Width[3] (feet)	Mean Elevation[4] (feet amsl)	Average Slope[4] (%)	Hydrologic Unit Code[2] - 12 digit	Designated Beneficial Uses and IDEQ Status[5]			Cause of Impairment[5]	IDEQ Category[5]
								Fully Supporting	Not Supporting	Not Assessed		
30258	Unnamed Tributary to EFSFSR (Rabbit Creek)	Perennial	1	3	6815	17	170602080201	--	COLD, DWS, PCR, SS	--	Arsenic	303(d) Listed
60194	Unnamed Tributary to EFSFSR	Intermittent	NM	NM	6908	31	170602080201	--	--	default COLD, SCR	--	--
60193	East Fork South Fork Salmon River	Perennial	3	25	6970	6	170602080201	--	COLD, DWS, PCR, SS	--	Arsenic	303(d) Listed
60192	Unnamed Tributary to EFSFSR	Perennial	1.5	3	7348	23	170602080201	--	--	default COLD, SCR	--	--
30649	Unnamed Tributary to Riordan Creek	Perennial	2	5	7895	46	170602080107	COLD, PCR, SS	--	--	--	--
30445	Riordan Creek	Perennial	2	18	6824	7.4	170602080107	COLD, PCR, SS	--	--	--	--
30444	Unnamed Tributary to Riordan Creek	Intermittent	0.5	2	6878	10	170602080107	COLD, PCR, SS	--	--	--	--
30441	Unnamed Tributary to Riordan Creek	Perennial	0.5	2	7139	19	170602080107	--	--	default COLD, SCR	--	--
30427	Trapper Creek	Perennial	3	20	6538	4.3	170602080106	COLD, PCR, SS	--	--	--	--
30787	Johnson Creek	Perennial	3	80	5241	0.42	170602080106	COLD	SS	DWS, PCR	Temperature	Approved TMDL
30612	Ditch Creek	Perennial	1.5	16.5	5319	6.4	170602080104	COLD, PCR, SS	--	DWS	--	--
30613	Ditch Creek	Perennial	2	8	5322	6.6	170602080104	COLD, PCR, SS	--	DWS	--	--
30604	Halfway Creek	Perennial	1.5	10	5826	14	170602080104	COLD, PCR, SS	--	DWS	--	--
30600	Coffee Creek	Perennial	1.5	5	5798	3.5	170602080104	COLD, PCR, SS	--	DWS	--	--
30584	Rustican Creek	Perennial	2	15	6110	9	170602080104	COLD, PCR, SS	--	DWS	--	--
30571	Trout Creek	Perennial	3	20	6319	1.2	170602080104	COLD, DWS, PCR	SS	--	Temperature	Approved TMDL
30568	Park Creek	Perennial	2.5	25	6428	7	170602080103	COLD, DWS, PCR	SS	--	Temperature	Approved TMDL
30557	Pid Creek	Perennial	3	30	6514	1.6	170602080103	COLD, DWS, PCR	SS	--	Temperature	Approved TMDL
30545	Sheep Creek	Perennial	2.5	10	6454	1.9	170602080103	COLD, DWS, PCR	SS	--	Temperature	Approved TMDL
30534	Lunch Creek	Intermittent	2.5	15	6576	12	170602080102	COLD, DWS, PCR	SS	--	Temperature	Approved TMDL
60190	Warm Lake Creek	Perennial	NM	NM	6727	14	170602080404	COLD, PCR, SS	--	--	Temperature	Approved TMDL
60189	Warm Lake Creek	Perennial	NM	NM	6553	14	170602080404	COLD, PCR, SS	--	--	Temperature	Approved TMDL
60188	Warm Lake Creek	Perennial	NM	NM	6313	14	170602080404	COLD, PCR, SS	--	--	Temperature	Approved TMDL
60187	Warm Lake Creek	Perennial	NM	NM	6190	14	170602080404	COLD, PCR, SS	--	--	Temperature	Approved TMDL
60186	Unnamed Tributary to Warm Lake Creek	Intermittent	NM	NM	5788	15	170602080404	--	--	default COLD, SCR	--	--

[1]Crossing ID was generated by HDR based on delineated stream IDs during wetland studies and is unique to each crossing location
[2]Data from NHD, National Hydrography Dataset by the U.S. Geological Survey
[3]Data from the 2013, 2014, 2015, and 2016 ***Wetlands Resources Baseline Study*** and addenda, ordinary high water mark delineations
[4]Data from NED, National Elevation Dataset by the U.S. Geological Survey; mean elevation and slope were calculated using the NHD delineated stream segment for each crossing
[5]Data from 2012 Integrated Report by the Idaho Department of Environmental Quality [IDEQ]
Approved TMDL is ***South Fork Salmon River Temperature TMDLs (& Revised Sediment Targets) 2012*** by the Idaho Department of Environmental Quality
TMDL = total maximum daily load; amsl = above mean sea level; COLD = cold water communities; SS = salmonid spawning; PCR = primary contact recreation; DWS = drinking water supply
-- = no data

4.2.5 Riordan

Along the Riordan alternative access route, there are 11 stream crossings (**Table 4-59**). Many of these are relatively small headwater streams, although there are crossings on the EFSFSR, Riordan Creek, and Trapper Creek. Each of the stream segments has COLD and PCR or SCR designated beneficial uses. Most segments also have SS and some have DWS.

Most of the segments are fully supporting beneficial uses (IDEQ 2014). However, the EFSFSR (crossing ID 41029) and Meadow Creek (crossing ID 20082) are not supporting COLD, DWS, PCR, or SS due to arsenic levels. These segments are 303(d) listed (IDEQ 2014).

4.2.6 Thunder Mountain

Along the Thunder Mountain alternative access route, there are nine stream crossings (**Table 4-60**). Many of these are relatively small headwater streams, although there are crossings on the EFSFSR, Riordan Creek, and Trapper Creek. Each of the stream segments has COLD and PCR or SCR designated beneficial uses. Most segments also have SS and some have DWS.

Most of the segments are fully supporting beneficial uses (IDEQ 2014). However, the EFSFSR (crossing ID 60193) and an unnamed tributary to the EFSFSR (locally known as Rabbit Creek, crossing ID 30258) are not supporting COLD, DWS, PCR, or SS due to arsenic levels and are 303(d) listed.

4.2.7 Combined Riordan –Thunder Mountain

Along the combined Riordan – Thunder Mountain alternative access route, there are 11 stream crossings (**Table 4-61**). Many of these are relatively small headwater streams, although there are crossings on the EFSFSR, Riordan Creek, and Trapper Creek. Each of the stream segments has COLD and PCR or SCR designated beneficial uses. Most segments also have SS and some have DWS.

Most of the segments are fully supporting beneficial uses (IDEQ 2014). However, the EFSFSR (crossing ID 60193) and an unnamed tributary to the EFSFSR (locally known as Rabbit Creek, crossing ID 30258) are not supporting COLD, DWS, PCR, or SS due to arsenic levels and are 303(d) listed.

Table 4-59. Riordan Alternative Access Route Stream Crossings and Characterization

Crossing ID[1]	Stream Name[2]	NHD[2] Hydrographic Category	Channel Depth[3] (feet)	Channel Width[3] (feet)	Mean Elevation[4] (feet amsl)	Average Slope[4] (%)	Hydrologic Unit Code[2] - 12 digit	Designated Beneficial Uses and IDEQ Status[5]			Cause of Impairment[5]	IDEQ Category[5]
								Fully Supporting	Not Supporting	Not Assessed		
41029	East Fork South Fork Salmon River	Perennial	4	20	6593	7	170602080201	--	COLD, DWS, PCR, SS	--	Arsenic	303(d) Listed
20082	East Fork Meadow Creek	Perennial	1.5	5	6972	3.4	170602080201	--	COLD, DWS, PCR, SS	--	Arsenic	303(d) Listed
20215	Unnamed Tributary to Meadow Creek	Perennial	1.5	3	7265	42	170602080201	--	--	default COLD, SCR	--	--
20177	Meadow Creek	Perennial	2	8	7329	16	170602080201	--	--	default COLD, SCR	--	--
30731	Riordan Creek	Perennial	2.5	15	4937	1.8	170602080107	COLD, PCR, SS	--	SCR	--	--
41075	Olson Creek	Perennial	1	2	5042	23	170602080108	COLD, PCR, SS	--	DWS	--	--
30725	Unnamed Tributary to Johnson Creek	Perennial	1	2	5015	39	170602080108	--	--	default COLD, SCR	--	--
30713	Hanson Creek	Perennial	1	3	5116	11	170602080108	COLD, PCR, SS	--	DWS	--	--
30706	Moose Creek	Perennial	1.5	5	5106	26	170602080108	COLD, PCR, SS	--	DWS	--	--
30701	Bear Creek	Perennial	2.5	10	5147	7.3	170602080108	COLD, PCR, SS	--	DWS	--	--
30700	Trapper Creek	Perennial	2.5	20	5151	7.8	170602080106	COLD, PCR, SS	--	--	--	--

[1]Crossing ID was generated by HDR based on delineated stream IDs during wetland studies and is unique to each crossing location
[2]Data from NHD, National Hydrography Dataset by the U.S. Geological Survey
[3]Data from the 2013, 2014, 2015, and 2016 *Wetlands Resources Baseline Study* and addenda, ordinary high water mark delineations
[4]Data from NED, National Elevation Dataset by the U.S. Geological Survey; mean elevation and slope were calculated using the NHD delineated stream segment for each crossing
[5]Data from 2012 Integrated Report by the Idaho Department of Environmental Quality [IDEQ]
Approved TMDL is *South Fork Salmon River Temperature TMDLs (& Revised Sediment Targets) 2012* by the Idaho Department of Environmental Quality
TMDL = total maximum daily load; amsl = above mean sea level; COLD = cold water communities; SS = salmonid spawning; PCR = primary contact recreation; DWS = drinking water supply
-- = no data

Table 4-60. Thunder Mountain Alternative Access Route Stream Crossings and Characterization

Crossing ID[1]	Stream Name[2]	NHD[2] Hydrographic Category	Channel Depth[3] (feet)	Channel Width[3] (feet)	Mean Elevation[4] (feet amsl)	Average Slope[4] (%)	Hydrologic Unit Code[2] - 12 digit	Designated Beneficial Uses and IDEQ Status[5]			Cause of Impairment[5]	IDEQ Category[5]
								Fully Supporting	Not Supporting	Not Assessed		
30258	Unnamed Tributary to EFSFSR (Rabbit Creek)	Perennial	1	3	6815	17	170602080201	--	COLD, DWS, PCR, SS	--	Arsenic	303(d) Listed
60194	Unnamed Tributary to EFSFSR	Intermittent	NM	NM	6908	31	170602080201	--	--	default COLD, SCR	--	--
60193	East Fork South Fork Salmon River	Perennial	3	25	6970	6	170602080201	--	COLD, DWS, PCR, SS	--	Arsenic	303(d) Listed
60192	Unnamed Tributary to EFSFSR	Perennial	1.5	3	7348	23	170602080201	--	--	default COLD, SCR	--	--
30649	Unnamed Tributary to Riordan Creek	Perennial	2	5	7895	46	170602080107	COLD, PCR, SS	--	--	--	--
30445	Riordan Creek	Perennial	2	18	6824	7.4	170602080107	COLD, PCR, SS	--	--	--	--
30444	Unnamed Tributary to Riordan Creek	Intermittent	0.5	2	6878	10	170602080107	COLD, PCR, SS	--	--	--	--
30441	Unnamed Tributary to Riordan Creek	Perennial	0.5	2	7139	19	170602080107	--	--	default COLD, SCR	--	--
30427	Trapper Creek	Perennial	3	20	6538	4.3	170602080106	COLD, PCR, SS	--	--	--	--

[1]Crossing ID was generated by HDR based on delineated stream IDs during wetland studies and is unique to each crossing location
[2]Data from NHD, National Hydrography Dataset by the U.S. Geological Survey
[3]Data from the 2013, 2014, 2015, and 2016 *Wetlands Resources Baseline Study* and addenda, ordinary high water mark delineations
[4]Data from NED, National Elevation Dataset by the U.S. Geological Survey; mean elevation and slope were calculated using the NHD delineated stream segment for each crossing
[5]Data from 2012 Integrated Report by the Idaho Department of Environmental Quality [IDEQ]
Approved TMDL is *South Fork Salmon River Temperature TMDLs (& Revised Sediment Targets) 2012* by the Idaho Department of Environmental Quality
TMDL = total maximum daily load; amsl = above mean sea level; COLD = cold water communities; SS = salmonid spawning; PCR = primary contact recreation; DWS = drinking water supply
-- = no data

Table 4-61. Combined Riordan-Thunder Mountain Alternative Access Route Stream Crossings and Characterization

Crossing ID[1]	Stream Name[2]	NHD[2] Hydrographic Category	Channel Depth[3] (feet)	Channel Width[3] (feet)	Mean Elevation[4] (feet amsl)	Average Slope[4] (%)	Hydrologic Unit Code[2] - 12 digit	Designated Beneficial Uses and IDEQ Status[5]			Cause of Impairment[5]	IDEQ Category[5]
								Fully Supporting	Not Supporting	Not Assessed		
30258	Unnamed Tributary to EFSFSR (Rabbit Creek)	Perennial	1	3	6815	17	170602080201	--	COLD, DWS, PCR, SS	--	Arsenic	303(d) Listed
60194	Unnamed Tributary to EFSFSR	Intermittent	NM	NM	6908	31	170602080201	--	--	default COLD, SCR	--	--
60193	East Fork South Fork Salmon River	Perennial	3	25	6970	6	170602080201	--	COLD, DWS, PCR, SS	--	Arsenic	303(d) Listed
60192	Unnamed Tributary to EFSFSR	Perennial	1.5	3	7348	23	170602080201	--	--	default COLD, SCR	--	--
30731	Riordan Creek	Perennial	2.5	15	4937	1.8	170602080107	COLD, PCR, SS	--	SCR	--	--
41075	Olson Creek	Perennial	1	2	5042	23	170602080108	COLD, PCR, SS	--	DWS	--	--
30725	Unnamed Tributary to Johnson Creek	Perennial	1	2	5015	39	170602080108	--	--	default COLD, SCR	--	--
30713	Hanson Creek	Perennial	1	3	5116	11	170602080108	COLD, PCR, SS	--	DWS	--	--
30706	Moose Creek	Perennial	1.5	5	5106	26	170602080108	COLD, PCR, SS	--	DWS	--	--
30701	Bear Creek	Perennial	2.5	10	5147	7.3	170602080108	COLD, PCR, SS	--	DWS	--	--
30700	Trapper Creek	Perennial	2.5	20	5151	7.8	170602080106	COLD, PCR, SS	--	--	--	--

[1]Crossing ID was generated by HDR based on delineated stream IDs during wetland studies and is unique to each crossing location
[2]Data from NHD, National Hydrography Dataset by the U.S. Geological Survey
[3]Data from the 2013, 2014, 2015, and 2016 *Wetlands Resources Baseline Study* and addenda, ordinary high water mark delineations
[4]Data from NED, National Elevation Dataset by the U.S. Geological Survey; mean elevation and slope were calculated using the NHD delineated stream segment for each crossing
[5]Data from 2012 Integrated Report by the Idaho Department of Environmental Quality [IDEQ]
Approved TMDL is *South Fork Salmon River Temperature TMDLs (& Revised Sediment Targets) 2012* by the Idaho Department of Environmental Quality
TMDL = total maximum daily load; amsl = above mean sea level; COLD = cold water communities; SS = salmonid spawning; PCR = primary contact recreation; DWS = drinking water supply
-- = no data

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5.2 Acronyms and Abbreviations

Acronym	Definition
µg/L	micrograms per liter
µm	micrometer
BOI	Boise National Forest
C	Celsius
cfs	cubic feet per second
COC	chain of custody
COLD	cold water
CWA	Clean Water Act
DWS	domestic water supply
EA	environmental assessment
EFSFSR	East Fork of the South Fork of the Salmon River
EIS	environmental impact statement
F	Fahrenheit
FD	field duplicate
FS	Forest Service road
GPS	global positioning system
HDR	HDR Engineering, Inc.
ICS	interference check sample
IDAPA	Idaho Administrative Procedures Act
IDEQ	Idaho Department of Environmental Quality
IDL	Idaho Department of Lands
JBR	JBR Environmental Consulting
KM	Kaplan-Meier
LCS	laboratory control sample
LCSD	laboratory control sample duplicate
m^2	square meters
MCL	maximum contaminant level
MDL	method detection limit
MGII	Midas Gold Idaho, Inc.
mg/L	milligram per liter
mL	milliliter
MLE	maximum likelihood estimator
MRL	method reporting limit
MSE	Millennium Science and Engineering, Inc.
mS/cm	milliSiemens per centimeter
MS/MSD	matrix spike/matrix spike duplicate
msl	mean sea level
MVUE	minimum variance unbiased estimator
NA	not applicable
ND	no data
NEPA	National Environmental Policy Act
NFS	National Forest System
NHD	National Hydrography Dataset
ng/L	nanograms per liter
NM	not measured

Acronym	Definition
NMFS	National Marine Fisheries Service
NPDES	National Pollutant Discharge Elimination System
NTU	nephelometric turbidity unit
PAF	Payette National Forest
PCR	primary contact recreation
PT-CO	platinum-cobalt scale
QAPP-SWQSP	quality assurance project plan-surface water quality sampling plan
QA/QC	quality assurance/quality control
RPD	relative percent difference
SCR	secondary contact recreation
SM	standard method
SOP	standard operating procedures
SRW	special resource water
SS	salmonid spawning
TMDL	total maximum daily load
URS	URS Corporation
USACE	U.S. Army Corps of Engineers
USEPA	U.S. Environmental Protection Agency
USFS	U.S. Forest Service
USFWS	U.S. Fish and Wildlife Service
USGS	U.S. Geological Survey
UTM	Universal Transverse Mercator coordinate system
WAD	weak acid dissociable

5.3 Glossary

Term	Definition
adit	A horizontal or nearly horizontal passage driven from the surface for the working or dewatering of a mine (Bureau of Mines 1996).
adit seep	Seep that emerges from an adit (HDR 2012a).
baseline conditions	Water quality measured at a given point prior to future disturbance (USEPA 2003a).
beneficial use	Any of the various uses which may be made of the water of Idaho, including but not limited to, domestic water supplies, industrial water supplies, agricultural water supplies, navigation, recreation in and on the water, wildlife habitat, and aesthetics. The beneficial use is dependent upon actual use, the ability of the water to support a non-existing use either now or in the future, and its likelihood of being used in a given manner (IDAPA 58.01.02).
cold water (COLD)	A surface water designated beneficial use indicating water quality appropriate for the protection and maintenance of a viable aquatic life community for cold water species (IDAPA 58.01.02).
conductivity	A measure of the ability of a liquid to conduct an electrical current (USGS 2009). Also known as specific conductance.
constituent	A chemical or biological substance in water, sediment, or biota that can be measured by an analytical method (USGS 2009).
designated beneficial uses	Those beneficial uses assigned to identified waters in Idaho Department of Environmental Quality Rules whether or not the uses are being attained (IDAPA 58.01.02).
dissolved oxygen	The measure of the amount of oxygen dissolved in the water (IDAPA 58.01.02).
domestic water supply (DWS)	A surface water designated beneficial use indicating water quality appropriate for drinking water supplies (IDAPA 58.01.02).
flow rate	The volume of fluid passing a point per unit of time (HDR 2012a).
intermittent	A stream or portion of a stream that flows only in direct response to precipitation or seasonal run-off, and that receives little or no water from springs or other permanent sources. Unlike ephemeral streams, an intermittent stream has well-defined channel and banks, and it may seasonally be below the water table (USFS 2003).
load	Material that is moved or carried by streams, reported as weight of material transported during a specified time period, such as tons per year (USGS 2009).
maximum contaminant level	The highest level of a contaminant that is allowed in drinking water (USEPA 2009b).
method detection limit	The concentration of a constituent or analyte below which a particular analytical method cannot determine, with a high degree of certainty, the concentration (USGS 2009).
method reporting limit	The smallest measured concentration of a constituent that may be reliably reported using a given analytical method (USGS 2009).

Term	Definition
ore	Naturally occurring material from which a mineral or minerals of economic value can be extracted profitably or to satisfy social or political objectives (Bureau of Mines 1996).
primary contact recreation (PCR)	A surface water designated beneficial use indicating water quality appropriate for prolonged and intimate contact by humans or for recreational activities when the ingestion of small quantities of water is likely to occur. Such activities include, but are not restricted to, those used for swimming, water skiing, or skin diving (IDAPA 58.01.01).
perennial	A stream that typically maintains year-round surface flow, except possibly during extreme periods of drought. A perennial stream receives its water from springs or other permanent sources, and the water table usually stands at a higher level than the floor of the stream (USFS 2003).
quality assurance	Procedures that support maintenance of quality standards; for example, establishing and following standard operating procedures for sample collection, shipping and analysis (USEPA 2002).
quality control	Specific steps to determine the validity of sampling and analytical procedures; for example, analysis of standard, duplicate and blank samples to quantify precision and accuracy (USEPA 2002).
relative percent difference	Measure of the difference in value between two samples; used here to establish the acceptable measurement difference (i.e. accuracy) between two identical samples measured separately (USEPA 2003a).
review (data)	Process of examining data for correct and complete recording, transmission and processing (USEPA 2002).
salmonid spawning (SS)	A surface water designated beneficial use indicating waters which provide or could provide a habitat for active self-propagating populations of salmonid fishes (IDAPA 58.01.02).
secondary maximum contaminant level	Non-enforceable federal guidelines regarding contaminants that may cause cosmetic effects (such as skin or tooth discoloration) or aesthetic effects (such as taste, odor or color) in drinking water (USEPA 2009b).
seep	A small area where water percolates slowly to the land surface (USGS 2009).
special resource water (SRW)	A surface water designated beneficial use recognizing at least one of the following characteristics: outstanding high quality; unique ecological significance; outstanding recreational or aesthetic qualities; intensive protection of water quality is in paramount interest of the people of Idaho; water is part of the National Wild and Scenic River System, is within a State or National Park or wildlife refuge and is of prime or major importance to that park or refuge; intensive protection of the quality of the water is necessary to maintain an existing, but jeopardized beneficial use (IDAPA 58.01.02).

Term	Definition
strictest regulatory criterion	Strictest state or federal minimum or maximum concentration of a constituent that is appropriate or applicable and relevant to surface water within the study area (HDR 2012a).
tailings	The gangue and other refuse material resulting from the washing, concentration, or treatment of ground ore (Bureau of Mines 1996).
usability (data)	End assessment, based on data review, validation and verification results, of whether data meets established standards and can be used for the intended purpose; for example, water data is of sufficient and known quality to be used confidently as baseline data (USEPA 2003a).
validation and verification (data)	Process of evaluating the completeness, correctness and compliance of the data against specified standards; for example, that actual method reporting limits meet the standard limit (USEPA 2003a).
waste rock	Barren or submarginal rock or ore that has been mined, but is not of sufficient value to warrant treatment and is therefore removed ahead of the milling processes (Bureau of Mines 1996).

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Table 6-1. List of Preparers

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