

Flow dynamics in the Blackfoot River basin indicate that base flow conditions occur during the winter. Spring snowmelt increases flow beginning in April, and peak flow is generally reached by the end of April. Peak flow conditions can be delayed in drier years. Peak flow generally occurs through the end of May.

Peak flow at the USGS gauging station on the Blackfoot River above Blackfoot Reservoir (13063000) have ranged between approximately 500 cfs and 2,100 cfs for the period of record 1915 through 1926, and 1968 through 1982 (Maxim 2002e). No data on peak flow are available for 1982 to 2000. The USGS defines peak flow as the annual maximum instantaneous peak stream flow. Peak flow along Angus Creek recorded at the USGS gauging station (13062700) for the period of record 1962 through 1981 ranged between 100 cfs and 1,100 cfs (Maxim 2002e). Data on continuous flow for most of the tributaries to the Blackfoot River is limited; however, flow dynamics described above are believed to be representative of flow conditions in those tributaries.

Information on baseline flow for streams near the project area was collected in 2000 and 2002. This information is summarized in **Table 3.3-4**. The monitoring entailed high- and low-flow sampling events conducted in June and September. Stream flows near the project area are minimal relative to base flow in the Blackfoot River basin downstream (Maxim 2001a).

**TABLE 3.3-4
MEASURED STREAM FLOW**

Site Location	Site Identification	Stream Flow Measurement (cfs)		
		June 2000	September 2000	April/June 2002
No Name Creek below mine	SW-2	0.12	Dry	1.64
No Name Creek just upstream of Angus Creek	SW-3	Dry	Dry	1.25
Sheep Creek East of office/shop	SW-4	3.16	1.98	3.96
Sheep Creek below confluence with West Fork of Sheep Creek	SW-5	4.95	2.40	6.58
West Fork of Sheep Creek just above Sheep Creek	SW-6	0.33	0.18	1.19
No Name Creek above existing mine disturbance	SW-7	0.10	Trickle	0.69
Reese Creek at first beaver dam	SW-26	0.15	Trickle	Trickle

Note: cfs = cubic feet per second
Source: Maxim 2002b

Flood flow estimates were derived for each drainage in the vicinity of the project area using the basin characteristics methodology outlined by Lowham (1988) for mountainous regions subject to snowmelt runoff. This information is summarized in **Table 3.3-5**.

**TABLE 3.3-5
FLOOD FLOW ESTIMATES**

Drainage	Contributing Drainage Area (mi²)	25-Year Event (cfs)	50-Year Event (cfs)	100-Year Event (cfs)
No Name Creek	2.3	68	84	103
Sheep Creek	9.8	210	260	313
Reese Canyon	0.7	28	34	43

Notes: mi² = square mile
cfs = cubic feet per second

Source: Calculated using method of Lowham (1988) and basin elevation, drainage area, and precipitation from project records

3.3.2 Surface Water Quality

Water quality standards for surface water are contained in IDAPA 58.01.02. According to IDAPA 58.01.02, streams and lakes are classified by designated beneficial use. Designated beneficial use may include: cold or warm water biota; salmonid spawning; primary or secondary contact recreation; domestic, agricultural, or industrial water supply; wildlife habitat; or aesthetics. If more than one beneficial use is designated for a waterbody, the most stringent standard is applied. Criteria for cold water biota and primary or secondary contact recreational are applicable for undesignated waterbodies. All water bodies within the project area are either undesignated (No Name Creek and Reese Canyon Creek) or designated for cold water biota; salmonid spawning; agricultural water supply; industrial water supply; wildlife habitat; and aesthetics (Sheep Creek). Streams within the project area are not designated as domestic water supplies and domestic water quality standards are not applicable (**Table 3.3-1**). Water quality criteria specified in IDAPA 58.01.02 are not applicable to mine facilities such as sedimentation ponds and pit impoundments.

The water quality standards for cold water biota are typically the most stringent and are applicable to all streams and rivers in the project and cumulative effects areas (**Table 3.3-6**). Aquatic criteria are divided into two categories based on the duration of exposure. The Criteria Maximum Concentration (CMC) is the highest concentration that aquatic life can be exposed to for a 1-hour period without deleterious effects. The Criteria Continuous Concentration (CCC) is the highest concentration that aquatic life can be exposed to for an extended period of time (4 days).

Surface water quality standards for metals are based on dissolved concentrations, with the exception of the criterion for selenium, which is based on the total recoverable concentration. Cold water biota standards for cadmium, copper, lead, nickel, and zinc depend on hardness and are calculated according to the following equations:

$$CMC = WER \cdot e^{m_A \cdot \ln(H) + b_A} \cdot K_A$$

$$CCC = WER \cdot e^{m_C \cdot \ln(H) + b_C} \cdot K_C$$

where: WER= Water effect ratio
 m_A = Metal-specific constant for acute toxicity
 m_C = Metal-specific constant for chronic toxicity
 H = Hardness (mg/L as CaCO_3)
 b_A = Metal-specific constant for acute toxicity
 b_C = Metal-specific constant for chronic toxicity
 K = Freshwater conversion factor

Examples of aquatic standards calculated using hardness of 100, 225, and 400 mg/L CaCO_3 and a Water Effect Ratio of 1.0 are provided in **Table 3.3-6**, along with other applicable standards.

Water quality was monitored at seven surface water stations within the monitoring area (**Figure 3.3-3**) during three sampling events (June 2000, September 2000, and April 2002) to establish baseline water quality (Maxim 2002b). In addition, samples of surface water were collected from 26 sampling stations in 1999 and analyzed for a limited suite of metals (cadmium, manganese, nickel, selenium, vanadium, and zinc). The seven baseline stations and 26 previous sampling locations are shown in **Table 3.3-7**. Data on surface water quality are provided in **Table 3.3-8**.

Background surface water is of near-neutral pH (6.22 to 7.84) with moderate concentrations of total dissolved solids (20 to 382 mg/L). The headwaters of No Name Creek are a calcium-bicarbonate type water, changing to a sodium-sulfate type water near the confluence with Angus Creek. Water in the West Fork of Sheep Creek is a sodium-sulfate type water, converting to a calcium-bicarbonate type water in the main stem of Sheep Creek. Water in Reese Canyon Creek is highly buffered, calcium-bicarbonate type water.

Surface waters contain few detectable dissolved metals. However, samples from stations SW-2, SW-3, and SW-6 contained total recoverable selenium in excess of applicable standards for cold water biota (**Table 3.3-8**).

Water Quality Standard	Cold Water Biota based on 100 mg/L total hardness		Cold Water Biota based on 225 mg/L total hardness		Cold Water Biota based on 400 mg/L total hardness		Recreation Use
	CMC	CCC	CMC	CCC	CMC	CCC	
Parameter	CMC	CCC	CMC	CCC	CMC	CCC	
Calcium (mg/L)	---	---	---	---	---	---	---
Chloride (mg/L)	---	---	---	---	---	---	---
Fluoride (mg/L)	---	---	---	---	---	---	---
Nitrogen, nitrate (mg/L)	---	---	---	---	---	---	---
Phosphorus, total (mg/L)	---	---	---	---	---	---	---
Potassium (mg/L)	---	---	---	---	---	---	---
Sodium (mg/L)	---	---	---	---	---	---	---
Sulfate (mg/L)	---	---	---	---	---	---	---
TDS (mg/L)	---	---	---	---	---	---	---
TSS (mg/L)	---	---	---	---	---	---	---
Elec. Cond. (µmhos/cm)	---	---	---	---	---	---	---
Aluminum (mg/L)	---	---	---	---	---	---	---
Antimony (mg/L)	---	---	---	---	---	---	4.3
Arsenic (mg/L)	0.05	0.05	0.05	0.05	0.05	0.05	0.05
Barium (mg/L)	---	---	---	---	---	---	---
Cadmium (mg/L)	0.004	0.001	0.009	0.002	0.017	0.003	---
Chromium III (mg/L)	0.549	0.178	1.054	0.342	1.708	0.554	---
Copper (mg/L)	0.017	0.011	0.036	0.022	0.063	0.037	---
Iron (mg/L)	---	---	---	---	---	---	---
Lead (mg/L)	0.065	0.003	0.152	0.006	0.281	0.011	---
Magnesium (mg/L)	---	---	---	---	---	---	---
Manganese (mg/L)	---	---	---	---	---	---	---
Mercury (mg/L)	0.0021	0.000012	0.0021	0.000012	0.0021	0.000012	0.00015
Molybdenum (mg/L)	---	---	---	---	---	---	---
Nickel (mg/L)	1.415	0.157	2.779	0.309	4.573	0.508	4.6
Selenium (mg/L)	0.02	0.005	0.02	0.005	0.02	0.005	---
Thallium (mg/L)	---	---	---	---	---	---	0.0063
Vanadium (mg/L)	---	---	---	---	---	---	---
Zinc (mg/L)	0.114	0.105	0.225	0.205	0.37	0.338	---
Alkalinity (mg CaCO ₃ /l)	---	---	---	---	---	---	---
Bicarbonate (mg CaCO ₃ /l)	---	---	---	---	---	---	---
Hardness (mg CaCO ₃ /l)	---	---	---	---	---	---	---
pH	6.6 - 9.5						---
Dissolved Oxygen (mg/L)	>6 at all times						---
Temperature (°C)	≤22 (daily average ≤19)						---
Turbidity (NTU)	≤ 50 (10 day consecutive ≤25)						---
Nitrogen, ammonia (mg/L)	0.43/A/B/2						---

Notes: Standards from IDAPA 58.01.02
 --- indicates no established standard
 Cold water biota values in this table are calculated using a water effect ratio (WER) of 1.0
 Numeric criteria for ammonia is 0.43/A/B/2, where A=1 if T≤20 °C, A=10^{0.03(20-T)} if T<20 °C, B = 1 if pH≥8, B=(1+10^{7.4-pH})/1.25 if pH<8
 mg/L = milligrams per liter
 µmhos/cm = microohms per centimeter
 NTU = Nephelometric turbidity units
 Drinking water standards are not included in the table as there are no domestic wells within 2 miles.

Figure 3.3-3 Surface Water Monitoring, Spring, and Seep Locations

**TABLE 3.3-7
SURFACE WATER MONITORING STATIONS**

Station ID	Location Description
Baseline Surface Water Monitoring Stations	
SW-7	No Name Above Mining
SW-2	No Name Below Mining
SW-3	No Name Creek Before Angus
SW-4	Sheep Creek East Office/Shop
SW-5	Sheep Creek Below West Fork
SW-6	West Fork Dump Drainage
SW-26	1st Beaver Dam-Reese Canyon
Additional Surface Water Sampling Stations (1999)	
1	No Name Above Mining (same as SW-7)
2	No Name Below Mining (same as SW-2)
3	No Name Creek Before Angus (same as SW-3)
4	Sheep Creek East Office/Shop (same as SW-4)
5	Sheep Creek Below West Fork (same as SW-5)
6	West Fork Dump Drainage (same as SW-6)
7	South Pond Toe South Rasmussen Dump
8	Middle Pond Toe South Rasmussen Dump
9	North Pond Toe South Rasmussen Dump
10	Wetlands - SE Shop/Office
11	Spring & Pond S. Shop/Office
12	Rasmussen Creek Above Haulroad
13	Rasmussen Creek Below Haulroad
14	Rasmussen Creek Before Angus
15	Angus Creek Below No Name
16	Road Pond #1
17	Road Pond #2
18	Road Pond #3
19	Road Pond #4
20	Road Pond #5
21	Road Pond #6
22	Pond West of Central Haulroad
23	Angus Creek Above Rasmussen Creek
24	Spring into No Name Creek
26	1st Beaver Dam-Reese Canyon (same as SW-26)
27	2nd Beaver Dam-Reese Canyon

**TABLE 3.3-8
SURFACE WATER QUALITY**

Stream Location Date		No Name Creek						West Fork Sheep Creek			Surface Water Standards		
		SW-7 6/14/00	SW-7 9/12/00	SW-7 4/23/02	SW-2 6/14/00	SW-2 4/23/02	SW-3 4/23/02	SW-6 6/13/00	SW-6 9/12/00	SW-6 4/24/02	Cold Water Biota	Domestic Supply	Recreational Use
General Parameters													
pH (field)	Std. Units	7.29	n.m.	6.7	7.3	6.78	6.7	7.4	7.27	6.22	---	---	---
pH (lab)	Std. Units	8.2	8.4	7.2	7.9	7.7	8.1	8.3	8.3	7.8	6.6-9.5	---	---
Temp. (field)	C	20.5	n.m.	3	17	7	13	10.5	5	1	<22	---	---
Dissolved Oxygen	mg/L	7.3	n.m.	9.09	7.1	9.5	7.5	7.99	9.4	10.1	>6	---	---
Total Alkalinity	mg/l CaCO ₃	136	193	34	141	45	45	152	189	63	---	---	---
Bicarbonate Alkalinity	mg/l HCO ₃	166	236	41	172	55	55	186	231	77	---	---	---
Carbonate Alkalinity	mg/l CO ₃	0	0		0			0	0		---	---	---
Hydroxide	mg/l	0			0			0			---	---	---
Acidity	mg/l CaCO ₃	<2.	<2.	<2.	<2.	<2.	<2.	<2.	<2.	<2.	---	---	---
E.C. (field)	umhos/cm	239	357	88	467	486	492	536	389	530	---	---	---
E.C. (lab)	umhos/cm	239	357	88	467	486	492	536	389	530	---	---	---
TDS	mg/l	137. JFB	213	96	317. JFB	326	341	382. JFB	240. B	20	---	---	---
TSS	mg/l	14	<1.	<3.	6	<2.	8	3	<1.	7	---	---	---
SAR	--	0.11 B	0.12	0.14	0.26 B	0.2	0.2	0.13 B	0.15	0.16	---	---	---
Hardness	mg/l CaCO ₃	130	199	38	228	229	232	276	215	276	---	---	---
Turbidity	NTU	8.9 JFB	0.2	17	1.9 JFB	3.3	11	1.9 JFB	0.3 JF	30	≤50	---	---
Major Ions													
Ca	mg/l	42	60	12	70	67	68	84	68	76	---	---	---
Cl	mg/l	2	3	<2.	25	18	20	2	3	5	---	---	---
F	mg/l	0.09	0.1	0.08	0.12	0.1	0.1	0.09	0.08	0.09	---	---	---
K	mg/l	<1.	<5.	<1.	1	1	1	<1.	<5.	1	---	---	---
Mg	mg/l	6	12	2	13	15	15	16	11	21	---	---	---
Na	mg/l	3	4	2	9	7	7	6	5	6	---	---	---
SO ₄	mg/l	5	6	8	78	169	169	144	26	201	---	---	---
Nutrients													
NO ₃ + NO ₂	mg/l N	0.07	<0.05	<0.05	0.05	0.23	0.14	0.09	0.09 B	0.39	---	---	---
NO ₃	mg/l N	0.07	<0.05	<0.05	0.05	0.23	0.14	0.09	0.09 B	0.39	---	---	---
NO ₂	mg/l N	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	---	---	---
NH ₄	mg/l N	<0.05	<0.05	<0.05	<0.05	<0.05	0.05	<0.05			0.43/A/B/2	---	---
PO ₃	mg/l	0.14 JF	0.04	0.34	0.19 JF	0.13	0.16	0.08 JF	0.05	0.16	---	---	---
PO ₃ Ortho	mg/l	0.1	0.03	0.11	0.14	0.04	0.09	0.05	0.04	0.06	---	---	---
Dissolved Metals													
Silver	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001		<0.001	---	---	---
Aluminum	mg/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	---	---	---
Arsenic	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001		<0.001	0.05/0.05	0.05	0.05
Boron	mg/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	---	---	---
Barium	mg/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1		<0.1	---	---	---
Beryllium	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001		<0.001	---	---	---
Cadmium	mg/l	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001	<0.0001		<0.0001	0.004/0.001	---	---
Chromium	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.549/0.178	---	---
Copper	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01		<0.01	0.017/0.011	---	---
Iron	mg/l	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05		<0.05	---	---	---
Mercury	mg/l	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002		<0.0002	0.0021/0.000012	0.00014	0.00015
Manganese	mg/l	0.07	<0.02	<0.02	0.1	<0.02	<0.02	<0.02	<0.02	<0.02	---	---	---
Nickel	mg/l	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02		<0.02	1.415/0.157	0.61	4.6
Lead	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001		<0.001	0.065/0.003	---	---
Antimony	mg/l	<0.001	<0.001	0.001	<0.001	0.001	<0.001	<0.001		<0.001	---	0.014	4.3
Selenium	mg/l	<0.001	<0.001	<0.001	0.002	0.027	0.027	0.003		0.014	---	---	---
Thallium	mg/l	<0.002	<0.0002	<0.002	<0.002	<0.002	<0.002	<0.002		<0.002	---	0.0017	0.0063
Vanadium	mg/l	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005		<0.005	---	---	---
Zinc	mg/l	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02		<0.02	0.114/0.105	---	---
Total Metals													
Silver	mg/l	<0.001	n/a	<0.001	<0.001	<0.001	<0.001J	<0.001	<0.001	<0.001	---	---	---
Aluminum	mg/l	0.8	n/a	2.6	<0.1	0.3	0.6	0.2	n/a	2.4	---	---	---
Arsenic	mg/l	0.001	n/a	<0.001	0.001	<0.001	0.001	0.001	<0.001	0.001	---	---	---
Boron	mg/l	<0.1	n/a	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	---	---	---
Barium	mg/l	<0.1	n/a	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	---	---	---
Beryllium	mg/l	<0.001	n/a	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	---	---	---
Cadmium	mg/l	0.0002	n/a	<0.0001	0.0002	<0.0001	0.0002	0.0001	0.0001B	<0.0001	---	---	---
Chromium	mg/l	<0.01	n/a	<0.01	<0.01	<0.01	<0.01	<0.01	n/a	<0.01	---	---	---
Copper	mg/l	<0.01	n/a	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	---	---	---
Iron	mg/l	<0.05	n/a	1.4	0.18	0.2	0.44	0.14	<0.05	1.6	---	---	---
Mercury	mg/l	<0.0002	n/a	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	---	---	---
Manganese	mg/l	0.06	n/a	<0.02	0.25	<0.02	<0.02	<0.02	n/a	<0.02	---	---	---
Nickel	mg/l	<0.02	n/a	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	---	---	---
Lead	mg/l	0.012 B	n/a	<0.001	0.005 B	<0.001	<0.001	0.003 B	<0.001	<0.001	---	---	---
Antimony	mg/l	<0.001	n/a	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	---	---	---
Selenium	mg/l	<0.001	n/a	<0.001	0.002 JF	0.032	0.033	0.004 JF	<0.001	0.017	0.02/0.005	---	---
Thallium	mg/l	<0.002	n/a	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	<0.002	---	---	---
Vanadium	mg/l	<0.005	n/a	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	---	---	---
Zinc	mg/l	0.02	n/a	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.03	---	---	---

Notes: Cold water biota values in this table are calculated using a hardness of 100 and water effect ratio (WER) of 1.0
 < indicates parameter was not detected above the listed practical quantitation limit (PQL);
 J = estimated concentration;
 UJ = Reported PQL for sample is approximate
 F = field duplicate results exceeded acceptable limits;
 B = value between PQL and method detection limit (MDL);
 Bolded values exceed applicable standards

**TABLE 3.3-8 (CONT.)
SURFACE WATER QUALITY**

Stream Location Date		Sheep Creek						Reese Canyon		Surface Water Standards		
		SW-4 6/14/00	SW-4 9/12/00	SW-4 4/23/02	SW-5 6/13/00	SW-5 9/12/00	SW-5 4/24/02	SW-26 6/14/00	SW-26 6/13/02	Cold Water Biota	Domestic Supply	Recreational Use
General Parameters												
pH (field)	Std. Units	7.28	7.66	6.69	7.84	7.25	6.91	6.84	6.9	---	---	---
pH (lab)	Std. Units	8.5	8.7	8.3	8.6	8.4	8.1	8.1	8.1	6.6-9.5	---	---
Temp. (field)	C	9.5	13	4	12	6	2	14	12.7	≤22	---	---
Dissolved Oxygen	mg/L	8.46	6.9	9.3	7.94	9	10.3	7.2	4.36	>6	---	---
Total Alkalinity	mg/l CaCO ₃	184	173	144	173	193	122	168	142	---	---	---
Bicarbonate Alkalinity	mg/l HCO ₃	225	191	176	211	236	149	205	173	---	---	---
Carbonate Alkalinity	mg/l CO ₃	0	10		0	0		0	0	---	---	---
Hydroxide	mg/l	0			0			0	0	---	---	---
Acidity	mg/l CaCO ₃	<2.	<2.	<2.	<2.	<2.	<2.		<2.	---	---	---
E.C. (field)	umhos/cm	475	348	234	366	403	282.4	524	350	---	---	---
E.C. (lab)	umhos/cm	326	317	297	330	357	346	290	316	---	---	---
TDS	mg/l	195. JFB	127. B	177	213. JFB	213. B	223	167. JFB	185	---	---	---
TSS	mg/l	3	3	5	5	<1.	12	10		---	---	---
SAR	--	0.1 B	0.1	0.11	0.1 B	0.12	0.13	0.14 B		---	---	---
Hardness	mg/l CaCO ₃	184	183	153	183	199	180	154	190	---	---	---
Turbidity	NTU	2.4 JFB	0.5 JF	4.3	1.5 JFB	0.2 JF	13	4.5 JFB		≤50	---	---
Major Ions												
Ca	mg/l	57	55	48	55	60	54	50	58	---	---	---
Cl	mg/l	3	2	2	2	3	2	2	<4.	---	---	---
F	mg/l	0.09	0.08	0.07	0.09	0.1	0.09	0.1	0.13	---	---	---
K	mg/l	<1.	<5.	<1.	<1.	<5.	<1.	<1.	<1.	---	---	---
Mg	mg/l	10	11	8	11	12	11	7	11	---	---	---
Na	mg/l	3	3	3	3	4	4	4	5	---	---	---
SO ₄	mg/l	8	6	8	20	6	53	7	14	---	---	---
Nutrients												
NO ₃ + NO ₂	mg/l N	0.09	<0.05	0.09	0.05	<0.05	0.22	<0.05	<0.05	---	---	---
NO ₃	mg/l N	0.09	<0.05	0.09	0.05	<0.05	0.22	<0.05	<0.05	---	---	---
NO ₂	mg/l N	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	<0.05	---	---	---
NH ₄	mg/l N	<0.05		0.09	<0.05		0.1	<0.05	<0.05	0.43/A/B/2	---	---
PO ₃	mg/l	0.07 JF	0.05	0.12	0.08 JF	0.04	0.14	0.19 JF	0.06	---	---	---
PO ₃ Ortho	mg/l	0.03	0.03	0.02	0.03	0.03	0.05	0.08	0.03	---	---	---
Dissolved Metals												
Silver	mg/l	<0.001		<0.001	<0.001		<0.001	<0.001	<0.001	---	---	---
Aluminum	mg/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	---	---	---
Arsenic	mg/l	<0.001		<0.001	<0.001		<0.001	<0.001	0.002	0.05/0.05	0.05	0.05
Boron	mg/l	<0.1		<0.1	<0.1		<0.1	<0.1	<0.1	---	---	---
Barium	mg/l	<0.1		<0.1	<0.1		<0.1	<0.1	<0.03	---	---	---
Beryllium	mg/l	<0.001		<0.001	<0.001		<0.001	<0.001	<0.001	---	---	---
Cadmium	mg/l	<0.0001		<0.0001	<0.0001		<0.0001	<0.0001	<0.0001	0.004/0.001	---	---
Chromium	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	0.549/0.178	---	---
Copper	mg/l	<0.01		<0.01	<0.01		<0.01	<0.01	<0.01	0.017/0.011	---	---
Iron	mg/l	<0.05		<0.05	<0.05		<0.05	<0.05	<0.05	---	---	---
Mercury	mg/l	<0.0002		<0.0002	<0.0002		<0.0002	<0.0002	<0.0002	0.0021/0.000012	0.00014	0.00015
Manganese	mg/l	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.08	<0.02	---	---	---
Nickel	mg/l	<0.02		<0.02	<0.02		<0.02	<0.02	<0.02	1.415/0.157	0.61	4.6
Lead	mg/l	<0.001		<0.001	<0.001		<0.001	<0.001	<0.001	0.065/0.003	---	---
Antimony	mg/l	<0.001		0.001	<0.001		<0.001	<0.001	<0.001	---	0.014	4.3
Selenium	mg/l	<0.001		<0.001	<0.001		0.003	<0.001	<0.001	---	---	---
Thallium	mg/l	<0.002		<0.002	<0.002		<0.002	<0.002	<0.002	---	0.0017	0.0063
Vanadium	mg/l	<0.005		<0.005	<0.005		<0.005	<0.005	<0.005	---	---	---
Zinc	mg/l	<0.02		<0.02	<0.02		<0.02	<0.02	<0.03	0.114/0.105	---	---
Total Metals												
Silver	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	---	---	---
Aluminum	mg/l	<0.1	n/a	0.3	<0.1	n/a	0.9	0.2	0.2	---	---	---
Arsenic	mg/l	<0.001	<0.001	<0.001	0.001	<0.001	<0.001	<0.001	0.012	---	---	---
Boron	mg/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	---	---	---
Barium	mg/l	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	<0.1	0.03	---	---	---
Beryllium	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	---	---	---
Cadmium	mg/l	<0.0001	0.0001 B	<0.0001	<0.0001	0.0001 B	<0.0001	0.0002	0.0003	---	---	---
Chromium	mg/l	<0.01	n/a	<0.01	<0.01	n/a	<0.01	<0.01	<0.01	---	---	---
Copper	mg/l	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	<0.01	---	---	---
Iron	mg/l	0.1	<0.05	0.25	0.17	<0.05	0.71	0.51	0.73	---	---	---
Mercury	mg/l	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0002	<0.0004	---	---	---
Manganese	mg/l	0.6	n/a	<0.02	<0.02	n/a	<0.02	0.13	0.02	---	---	---
Nickel	mg/l	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	---	---	---
Lead	mg/l	0.002 B	<0.001	<0.001	0.004 B	<0.001	<0.001	0.005 B	<0.001	---	---	---
Antimony	mg/l	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	<0.001	---	---	---
Selenium	mg/l	0.001	<0.001	<0.001	0.001	<0.001	0.004	<0.001	<0.001	0.02/0.005	---	---
Thallium	mg/l	<0.002	<0.0002	<0.002	<0.0002	<0.0002	<0.002	<0.002	<0.002	---	---	---
Vanadium	mg/l	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	<0.005	---	---	---
Zinc	mg/l	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	0.02	0.09	---	---	---

Notes: Cold water biota values in this table are calculated using a hardness of 100 and water effect ratio (WER) of 1.0
 < indicates parameter was not detected above the listed practical quantitation limit (PQL);
 J = estimated concentration;
 UJ = Reported PQL for sample is approximate
 F = field duplicate results exceeded acceptable limits;
 B = value between PQL and method detection limit (MDL);
 Bolded values exceed applicable standards