Fact Sheet

Public Comment Start Date: June 11, 2015
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Proposed Reissuance of a National Pollutant Discharge Elimination System (NPDES) Permit to Discharge Pollutants Pursuant to the Provisions of the Clean Water Act (CWA)

Hecla Mining Company
Grouse Creek Unit

EPA Proposes To Reissue NPDES Permit
EPA proposes to reissue an NPDES permit to the facility referenced above. The draft permit places conditions on the discharge of pollutants from the wastewater treatment plant to waters of the United States. In order to ensure protection of water quality and human health, the permit places limits on the types and amounts of pollutants that can be discharged from the facility.

This Fact Sheet includes:
- information on public comment, public hearing, and appeal procedures
- a listing of proposed effluent limitations and other conditions for the facility
- a map and description of the discharge location
- technical material supporting the conditions in the permit

401 Certification
EPA is requesting that the Idaho Department of Environmental Quality certify the NPDES permit for this facility, under section 401 of the Clean Water Act. Comments regarding the certification should be directed to:

Regional Administrator
Idaho Department of Environmental Quality
Idaho Falls Regional Office
900 N. Skyline, Suite B
Idaho Falls, ID 83402
(208) 528-2650

(800) 232-4635

Public Comment

Persons wishing to comment on the tentative determinations contained in the draft permit may do so in writing to the above address or by e-mail to "Nickel.Brian@epa.gov" within 30 days of the date of this public notice. Comments must be received within the 30 day period to be considered in the formulation of final determinations regarding the applications. All comments should include the name, address and telephone number of the commenter and a concise statement of the exact basis of any comment and the relevant facts upon which it is based. All written comments and requests should be submitted to EPA at the above address to the attention of the Director, Office of Water and Watersheds.

Documents are Available for Review

The draft NPDES permit and related documents can be reviewed or obtained by visiting or contacting EPA's Regional Office in Seattle between 8:30 a.m. and 4:00 p.m., Monday through Friday at the address below. The draft permits, fact sheet, and other information can also be found by visiting the Region 10 NPDES website at "http://epa.gov/r10earth/waterpermits.htm."

United States Environmental Protection Agency
Region 10
1200 Sixth Avenue
Seattle, Washington 98101
(206) 553-6251 or
Toll Free 1-800-424-4372 (within Alaska, Idaho, Oregon and Washington)

The fact sheet and draft permits are also available at:

Idaho Department of Environmental Quality
Idaho Falls Regional Office
900 N. Skyline, Suite B
Idaho Falls, ID 83402
(208) 528-2650
(800) 232-4635

U.S. Environmental Protection Agency
Idaho Operations Office
950 West Bannock Street Suite 900
Boise, ID 83702
208-378-5746

Stanley Community Library
240 Niece Avenue
Stanley, ID 83278
208-774-2470

Challis Public Library
6^{th} and Main St.
Challis, ID 83226
208-879-4267

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Acronyms

1Q10	1 day, 10 year low flow
7Q10	7 day, 10 year low flow
30B3	Biologically-based design flow intended to ensure an excursion frequency of less than once every three years, for a 30-day average flow.
AML	Average Monthly Limit
BOD_5	Biochemical oxygen demand, five-day
°C	Degrees Celsius
CFR	Code of Federal Regulations
CV	Coefficient of Variation
CWA	Clean Water Act
DMR	Discharge Monitoring Report
DO	Dissolved oxygen
EFH	Essential Fish Habitat
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
IDEQ	Idaho Department of Environmental Quality
lbs/day	Pounds per day
LTA	Long Term Average
mg/L	Milligrams per liter
ml	milliliters
ML	Minimum Level
µg/L	Micrograms per liter
mgd	Million gallons per day
MDL	Maximum Daily Limit
N	Nitrogen
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
OW	Office of Water
O&M	Operations and maintenance
QAP	Quality assurance plan
RP	Reasonable Potential

RPM	Reasonable Potential Multiplier
RWC	Receiving Water Concentration
s.u.	Standard Units
TMDL	Total Maximum Daily Load
TSD	Technical Support Document for Water Quality-based Toxics Control (EPA/505/2-90-001)
TSS	Total suspended solids
USFWS	U.S. Fish and Wildlife Service
USGS	United States Geological Survey
WLA	Wasteload allocation
WQBEL	Water quality-based effluent limit

I. Applicant

This fact sheet provides information on the draft NPDES permit for the following entity:

Hecla Mining Company, Grouse Creek Unit
NPDES Permit No.: ID0026468

Mailing Address:
P.O. Box 647
Challis, Idaho 83226

Physical Location:
See Appendix A

Contact:
Brant Tritthart, Site Manager

II. Facility Information

The Grouse Creek Unit (GCU) is an inactive gold mine and mill located in Custer County, Idaho, approximately 19 miles northeast of Stanley (see Appendix A). The mine and mill are owned and operated by the Hecla Mining Company (Hecla). The facility operated from December 1994 until April 1997 and is currently undergoing closure.

The GCU covers approximately 590 acres on both private and federal lands. The federal land area is managed by the U.S. Forest Service (Salmon-Challis National Forest). The mine facilities are located in the Grouse Creek, Pinyon Creek, Washout Creek, and Jordan Creek drainages. Grouse Creek, Pinyon Creek, and Washout Creek are tributaries to Jordan Creek which flows into Yankee Fork Creek approximately 4 miles from the mine site. Yankee Fork Creek flows into the Salmon River approximately 8 miles from the confluence with Jordan Creek (see Appendix A).

Components of the facility that result in the generation of wastewater include mined areas and other disturbed areas, the Sunbeam mine adit, the waste rock storage area, and the former tailings impoundment. The tailings impoundment cap was completed in the summer of 2012. A general description of these components is provided below.

Mine Water

The GCU includes two deposits of gold-bearing ore: the Sunbeam deposit and the Grouse Creek deposit. Mining of the Sunbeam deposit is completed, no mining of the Grouse Creek deposit has occurred. When the mine was operating, gold ore was mined primarily via open pit methods. Runoff from the mined areas and mine drainage from the inactive Sunbeam mine adit are routed to sediment ponds located below the former tailings impoundment, prior to treatment and discharge via Outfall 002 and 003. See Section III for a description of the treatment process.

Waste Rock Runoff and Seepage

Waste rock (rock that is removed from the mine in order to gain access to the ore) was deposited in an area adjacent to the Sunbeam pit in the upper Pinyon Creek drainage. The waste rock dump is currently undergoing reclamation. Underdrains constructed underneath the waste rock dump collect seepage. Seepage and runoff from the waste rock dump is routed to the “west ditch”. The west ditch water flows to the wastewater treatment plant prior to discharge through Outfall 002 or 003.

Tailings Impoundment Wastewaters

During operations, mined ore was processed at the mill by cyanide leaching to recover gold. Tailings (the residuals from leaching) were disposed in a lined tailings impoundment. The tailings impoundment was constructed in the Pinyon Creek basin and covered approximately 197 acres. The impoundment served to separate the water and solids portions of the tailings via settling. During mining operations, water was collected from the surface of the impoundment for reuse in the mill. The impoundment was lined with an underdrain system to collect seepage and groundwater. The underdrain water and runoff from the impoundment embankment flowed to a collection pond at the base of the impoundment. Diversion ditches were used to reduce water inflow to the tailings impoundment. Portions of Washout Creek were diverted around the impoundment via the west ditch.

In the spring of 1999, cyanide was detected in Jordan Creek at levels exceeding Idaho aquatic life water quality criteria. The major source of the cyanide was leakage from the tailings impoundment. EPA, the State of Idaho, the U.S. Forest Service, and Hecla negotiated a Consent Order under the Comprehensive Environmental Response, Compensation, and Liability Act (also known as CERCLA or “Superfund”) to address these exceedances. The CERCLA Consent Order required Hecla to dewater the tailings impoundment to eliminate leakage and facilitate reclamation. Reclamation of the tailings impoundment began in 2007. Construction of the final engineered cover over the tailings impoundment was completed in 2012.

A gravity flow drain system was constructed beneath the engineered cover to drain residual pore water as the tailings consolidate. There are also 13 underdrains beneath the former tailings impoundment. The tailings are continuing to express pore water as they continue to consolidate. The pore water and underdrain water is comingled with all site waters, treated at the treatment plant, and discharged through outfalls 002 and 003.

Storm Water

Storm water run-off from most areas of the mine site (e.g., run-off from on-site roads, mined areas, and other disturbed areas) flow to the tailings impoundment or is routed through Outfalls 002 and 003. Storm water is controlled through the use of best management practices (BMPs) as discussed in Section VIII.B, below. Storm water that is not routed through Outfalls 002 or 003 is regulated under the Multi-Sector Storm Water General Permit.

III. Outfall Description

A. Overview

Until 2008, discharges from outfall 002 had been authorized under the previous NPDES permit, and discharges from outfall 003 had been authorized under CERCLA, in order to dewater the tailings impoundment.

Since 2008, treatment has been required to meet effluent limits established for outfall 003 under the CERCLA discharge authorization. Due to the inability to separate the tailings impoundment water from other site waters in the site's single treatment plant, the EPA authorized discharges from both outfall 002 and 003 under CERCLA, and the sources of wastewater for outfalls 002 and 003 have been the same.

The draft permit proposes to authorize this discharge under the Clean Water Act, subject to effluent limits that ensure compliance with technology-based requirements and water quality standards, including the State of Idaho's antidegradation policy.

The sources of wastewater in outfalls 002 and 003 discharge include runoff and seepage from the waste rock dump, mine drainage from the Sunbeam adit, storm water, and, wastewater from the tailings impoundment underdrains.

Wastewater is treated prior to discharge. Treatment consists of hydroxide and sulfide precipitation and settling. Lime and sodium sulfide are added to mixed reactor tanks in the precipitation stage. Following precipitation, coagulant and flocculant are added to aid settling and the wastewater flows to a lined settling pond. The flow of wastewater from the settling pond for discharge through outfall 002 is variable since the quantity of storm water, waste rock run-off, and mine drainage is highly dependent upon precipitation and snow melt. The average yearly discharge rate is 450 gpm (1 CFS) based on Hecla's NPDES permit application and supplemental information. The maximum flow rate of the treatment plant is 900 gpm (2.01 CFS).

Pollutants of concern include metals (arsenic, cadmium, chromium, copper, iron, lead, mercury, nickel, selenium, silver, and zinc), cyanide, total suspended solids (TSS), and pH.

B. Outfall 002

The facility is permitted under the previous NPDES permit to discharge wastewater through outfall 002, which is the dewatered Pinyon Creek channel, to Jordan Creek. Outfall 002 discharges at a point in Jordan Creek approximately 3.2 miles upstream of its confluence with Yankee Fork Creek. A map of the outfall location is provided in Appendix A.

C. Outfall 003

The most recent permit application requests an authorization to discharge from Outfall 003, to Yankee Fork Creek. A map of the outfall location is provided in Appendix A.

IV. Facility Background

A. Permit Background

EPA first issued a National Pollutant Discharge Elimination System (NPDES) permit for the GCU effective on November 5, 1992. That permit expired on November 5, 1997. Because Hecla submitted a timely application for renewal, the 1992 permit was administratively extended and remained fully effective and enforceable until the permit was reissued in 2002. The 2002 permit expired on February 12, 2007 but was administratively extended because Hecla submitted a timely and complete application for renewal, which EPA received on August 14, 2006.

As discussed in Section II above, storm water may be routed to discharge through outfalls 002 or 003. Storm water that is not routed to these locations is discharged from the site pursuant to the Multi-Sector Storm Water General Permit (tracking number IDR05C429).

V. Receiving Water

A. Low Flow Conditions

Appendix D of the *Technical Support Document for Water Quality-Based Toxics Control* (hereinafter referred to as the TSD) (EPA, 1991) and Section 210 of the Idaho WQS state that WQBELs intended to protect aquatic life uses should be based on the lowest seven-day average flow rate expected to occur once every ten years (7Q10) for chronic criteria and the lowest one-day average flow rate expected to occur once every ten years (1Q10) for acute criteria. The 1B3 and 4B3 biologically-based design flows may be substituted for the 1Q10 and 7Q10, respectively. However, because the chronic criterion for ammonia is a 30-day average concentration not to be exceeded more than once every three years, EPA has used either the 30B3 or 30Q10 for the chronic ammonia criterion instead of the 7Q10. The 30B3 is a biologically-based design flow intended to ensure an excursion frequency of less than once every three years for a 30-day average flow rate; the 30Q10 is the lowest 30-day average flow rate expected to occur once every 10 years.

Jordan Creek

Outfall 002 discharges to Jordan Creek. EPA used flow data provided by Hecla and the DFLOW computer program (version 3.1b) to calculate critical low flow conditions for Jordan Creek. In this case, there were not enough data available to calculate 1Q10 and 7Q10 flow rates for Jordan Creek. However, there were enough data to calculate the equivalent biologically-based design flows, the 1B3, 4B3, and 30B3. The 1B3 flow rate is 1.11 CFS, the 4B3 flow rate is 1.23 CFS, and the 30B3 is 1.82 CFS.

Yankee Fork Creek

Outfall 003 discharges to Yankee Fork Creek. The United States Geological Survey (USGS) collected flow data for Yankee Fork Creek (referred to as the “Yankee Fork Salmon River” by USGS) near Clayton, Idaho at station number 13296000, between 1921 and 1949. The flow rate of Yankee Fork Creek has also been monitored daily, upstream of the discharge from outfall 003, by Hecla, beginning in late 2003.

EPA has determined that the historic USGS flow data are statistically distinct from the recent Hecla flow data. The flow data generated by Hecla generally indicates a lower flow rate relative to the 1921-1949 USGS data. Therefore, it would not be protective of water quality to directly use the USGS data to calculate water quality-based effluent limits for outfall 003 or to determine if the discharge from outfall 003 has the reasonable potential to cause or contribute to excursions above water quality standards. The critical low flow rates for Yankee fork Creek were calculated as explained below.

The period of record for the recent flow monitoring performed by Hecla was insufficient to allow the calculation critical low flow rates. However, there were enough data in the USGS dataset to calculate 10-year recurring low flow rates. To determine the appropriate critical flow rates for Yankee Fork Creek, EPA first calculated the 1Q10, 7Q10, and 30Q10 flow rates for Yankee Fork Creek, using the historical USGS data and DFLOW 3.1b. EPA then calculated the flow percentiles that correspond to the 1Q10, 7Q10, and 30Q10 flow rates, meaning, the percentage of the time that the flow rate in Yankee Fork Creek in the USGS dataset is less than the 1Q10, 7Q10, and 30Q10 flow rates, as calculated from that same dataset. EPA determined that, for Yankee Fork Creek, the 1Q10 flow rate is approximately equal to the 0.05th percentile flow rate, the 7Q10 is approximately equal to the 1st percentile, and the 30Q10 is approximately equal to the 3rd percentile.

Having determined the flow percentiles that correspond to the 1Q10, 7Q10, and 30Q10 flow rates, EPA calculated those flow percentiles from the recent Hecla data. Since the flow rate in Yankee Fork Creek is very seldom less than the 1Q10 flow rate (approximately 0.05% of the time), and because there are less than 10 years of data available, EPA did not calculate a 0.05th percentile flow rate from the Hecla data, rather, EPA used the minimum flow rate. The critical low flows for Yankee Fork Creek are summarized in Table 1, below.

Table 1: Critical Low Flow Rates for Yankee Fork Creek

Flow Statistic	Equivalent Design Flow	Value (CFS)
Minimum	1Q10/1B3	10
1st Percentile	7Q10/4B3	10
3rd Percentile	30Q10/30B3	10

B. Water Quality Standards

Section 301(b)(1)(C) of the Clean Water Act (Act) requires that NPDES permits contain effluent limits more stringent than technology-based limits when necessary to meet water quality standards. A State's water quality standards are composed of use classifications, numeric and/or narrative water quality criteria, and an anti-degradation policy. The use classification system designates the beneficial uses (such as cold water aquatic life, contact recreation, etc.) that each water body is expected to achieve. The numeric and/or narrative water quality criteria are the criteria deemed necessary by the State to support the beneficial use classification of each water body. The anti-degradation policy represents a three-tiered approach to maintain and protect various levels of water quality and uses.

As discussed in Section III, Outfall 002 discharges to Jordan Creek. The Idaho Water Quality Standards and Wastewater Treatment Requirements designate beneficial uses and water quality criteria for waters of the State. The Idaho water quality standards do not specify beneficial uses for Jordan Creek. However, according to the Idaho water quality standards, undesignated waters are protected for cold water aquatic life and primary and secondary contact recreation (IDAPA 58.01.02.101.a).

Outfall 003 discharges to Yankee Fork Creek between Jordan Creek and the Salmon River. This segment of Yankee Fork Creek is designated for the uses of cold water aquatic life, salmonid spawning, primary contact recreation, and domestic water supply (IDAPA 58.01.02.130.03).

In addition, the Idaho Water Quality Standards state that all waters of the State of Idaho are protected for industrial and agricultural water supply (Section 100.03.b and c.), wildlife habitats (100.04) and aesthetics (100.05).

The State water quality standards specify water quality criteria that are deemed necessary to support the use classifications. These criteria may by numeric or narrative. The water quality criteria applicable to Jordan Creek are summarized in Appendix C. These criteria provide the basis for most of the effluent limits in the draft permit.

Primary contact recreation is defined by the Idaho Water Quality Standards as "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 swimming, water skiing, or skin diving."

Antidegradation

The IDEQ has completed an antidegradation review which is included in the draft 401 certification for this permit. The antidegradation review addresses discharges from outfalls 002 and 003. See Appendix G for the State's draft 401 water quality certification.

The EPA has reviewed this antidegradation review and finds that it is consistent with the State's 401 certification requirements and the State's antidegradation implementation procedures. Comments on the 401 certification including the antidegradation review can be submitted to the IDEQ as set forth above (see State Certification).

C. Water Quality Limited Segment

A water quality limited segment is any waterbody, or definable portion of a waterbody, where it is known that water quality does not meet applicable water quality standards, and/or is not expected to meet applicable water quality standards. In accordance with section 303(d) of the Clean Water Act, States must identify waters not achieving water quality standards in spite of the application of technology-based controls in National Pollutant Discharge Elimination System (NPDES) permits for point sources. Such waterbodies are known as water quality limited segments (WQLSs), and the list of such waterbodies is called the "303(d) list." Once a water body is identified as a WQLS, the States are required under the Clean Water Act to develop a total maximum daily load (TMDL). A TMDL is a determination of the amount of a pollutant, or property of a pollutant, from point, nonpoint, and natural background sources (including a margin of safety) that may be discharged to a water body without causing the water body to exceed the water quality criterion for that pollutant.

In Idaho's 2012 303(d)/305(b) integrated report, the segments of Grouse Creek and Yankee Fork Creek that receive discharges from the Grouse Creek mine were fully supporting their designated uses.

VI. Effluent Limitations

A. Basis for Effluent Limitations

In general, the Clean Water Act (Act) requires that the effluent limits for a particular pollutant be the more stringent of either technology-based limits or water quality-based limits. Technology-based limits are set according to the level of treatment that is achievable using available technology. Technology-based effluent limits represent the minimum level of control that must be imposed in an NPDES permit (40 CFR 125.3(a)). A water quality-based effluent limit is designed to ensure that the water quality standards of a waterbody are being met and may be more stringent than technology-based effluent limits. The bases for the proposed effluent limits in the draft permit are provided in Appendices B, C and D.

EPA sets technology-based limits for different types of sources based on the effluent quality that is achievable using available technology. In the context of an individual permit action, the Agency evaluates the technology-based limits to determine whether they are adequate to ensure that water quality standards are met in the receiving water. If the technology-based effluent limits are not adequate to meet water quality standards, EPA must develop more stringent water quality-based limits (Clean Water Act Section 301(b)(1)(C), 40 CFR 122.44(d)). Water quality-based limits are derived from and ensure compliance with the Idaho water quality standards in the receiving waters.

The proposed permit includes technology-based limits for total suspended solids (TSS), water quality-based and water quality-based limits for pH, metals, and, in some cases, cyanide and whole effluent toxicity (WET).

For both outfalls, tiered limits were developed because of the variability of the effluent and receiving water flows. For outfall 002, two sets of limits were developed, and for outfall 003, three sets of limits were developed. Appendices B and C describe in detail how the effluent limits were derived.

Limits were established for whole effluent toxicity (WET), for outfall 002, based on state water quality standards that require surface waters to be free from toxic substances in concentrations that impair designated or existing beneficial uses of the receiving water (IDAPA 58.01.02.200.02). This narrative criterion was interpreted using recommendations in the EPA's *Technical Support Document for Water Quality-based Toxics Control* (TSD), section 2.3.3.

The conditions in the draft permit are based on non-operating conditions. If Hecla decides to reopen the mine, they will need to apply for a new permit. The effluent limits in the draft permit are summarized in Tables 2 and 3, below.

Table 2: Effluent Limits for Outfall 002

Parameter and Units	Draft Permit				2002 Permit			
	Jordan Creek Flow < 30 CFS		Jordan Creek Flow ≥ 30 CFS		Jordan Creek Flow < 30 CFS		Jordan Creek Flow ≥ 30 CFS	
	Average Monthly Limit	Max. Daily Limit	Average Monthly Limit	Max. Daily Limit	Average Monthly Limit	Max. Daily Limit	Average Monthly Limit	Max. Daily Limit
Effluent Flow, CFS	—	2.01	—	2.01	No limits. Monitor and report only.			
Cadmium, total recoverable (TR), µg/L	1.44	2.72	1.70	3.22	3.7	7.5	2.2	4.4
Copper, TR, µg/L	18.6	41.9	15.7	35.3	14	35	5.6	14
Cyanide, weak acid dissociable (WAD), µg/L	7.47	21.3	No limits. Monitor and report only.		21	47	21	47
Dilution Ratio	8:1 (minimum)				8:1 (minimum)			
Lead, TR, µg/L	1.80	4.84	1.25	3.38	9.5	19	4.0	8.1
Mercury, Total, µg/L	0.022	0.057	0.034	0.087	0.088	0.18	0.088	0.18
pH, standard units	6.5 – 9.0				6.5 – 9.0			
Selenium, µg/L	No limits. Monitor and report only.				No limits. Monitor and report only.			
Silver, TR	No limits. Monitor and report only.				1.8	3.6	0.60	1.1
Total Suspended Solids (TSS), mg/L	20	30	20	30	20	30	20	30
Zinc, TR, µg/L	141	304	119	256	110	250	50	110
WET, chronic, TUc	5.93	16.6	10.5	29.5	9.8	16	9.8	16

Table 3: Effluent Limits for Outfall 003

Parameter and Units	Yankee Fork Creek Flow < 15 CFS		Yankee Fork Creek Flow ≥ 15 and < 45 CFS		Yankee Fork Creek Flow ≥ 45 CFS	
	Average Monthly Limit	Max. Daily Limit	Average Monthly Limit	Max. Daily Limit	Average Monthly Limit	Max. Daily Limit
Flow (CFS)	—	0.668	—	1.11	—	2.01
Cadmium, TR, µg/L	2.22	4.08	2.50	4.59	2.96	5.42
Copper, TR, µg/L	21.6	39.8	21.8	40.3	20.8	38.5
Lead, TR, µg/L	1.40	4.84	0.75	2.60	0.96	3.32
Mercury, total, µg/L	0.026	0.053	0.025	0.050	0.035	0.069
pH, standard units	6.5 – 9.0 at all times					
TSS	20	30	20	30	20	30
Zinc, TR, µg/L	158	344	147	319	167	364

B. Anti-backsliding

Statutory Prohibitions on Backsliding

Section 402(o) of the Clean Water Act (CWA) generally prohibits "backsliding" in NPDES permits but provides exceptions. Section 402(o)(1) of the CWA states that a permit may not be reissued with less-stringent limits established based on Sections 301(b)(1)(C), 303(d) or 303(e) (i.e. water quality-based limits or limits established in accordance with State treatment standards) except in compliance with Section 303(d)(4). Section 402(o)(1) also prohibits backsliding on technology-based effluent limits established using best professional judgment (i.e. based on Section 402(a)(1)(B)). In this case, the effluent limits being revised are water quality-based effluent limits.

Section 303(d)(4) of the CWA states that, for water bodies where the water quality meets or exceeds the level necessary to support the water body's designated uses, WQBELs may be revised as long as the revision is consistent with the State's antidegradation policy. Additionally, Section 402(o)(2) contains exceptions to the general prohibition on backsliding in 402(o)(1). In accordance with the *U.S. EPA NPDES Permit Writers' Manual* (EPA-833-B-96-003), EPA generally views the 402(o)(2) exceptions as independent of the requirements of 303(d)(4). Therefore, it may be appropriate to relax effluent limits as long as either the 402(o)(2) exceptions or the requirements of 303(d)(4) are satisfied. EPA believes that the replacement of the fecal coliform effluent limits with E. coli limits is compliant with Section 303(d)(4) of the CWA.

Even if the requirements of Sections 303(d)(4) or 402(o)(2) are satisfied, Section 402(o)(3) prohibits backsliding which would result in violations of water quality standards or effluent limit guidelines.

In general, the effluent limits for outfall 002 in the draft permit are as stringent as or more stringent than those in the 2002 permit. Exceptions are explained below.

The prior permit did not authorize a discharge from outfall 003, therefore, anti-backsliding requirements do not apply to any of the proposed effluent limits for outfall 003. However, IDEQ has determined that the discharge from outfall 003 is consistent with the State of Idaho's antidegradation policy.

Less-Stringent Effluent Limits for Copper and Zinc for Outfall 002

When the EPA re-calculated effluent limits for copper and zinc based on current water quality criteria, mixing zones authorized by the State of Idaho, and effluent variability observed from January 2008 through July 2014, the resulting limits were less stringent than those in the prior permit.

One of the exceptions to the general prohibition on less-stringent effluent limits is that water quality-based effluent limits may be revised if the revised effluent limits are subject to and consistent with the State's antidegradation policy (CWA Section 303(d)(4)(B)). The State of Idaho has determined that the revised effluent limits for copper and zinc are consistent with its antidegradation policy. Because the revised limits ensure compliance with water quality criteria and with the State's antidegradation policy, the revised limits ensure compliance with Idaho's water quality standards and therefore with Section 402(o)(3) of the CWA.

Deletion of Effluent Limits for Silver and Cyanide for Outfall 002

Based on effluent data collected between January 2008 and July 2014 (a total of 214 samples for each parameter), the EPA has determined that the Grouse Creek discharge does not have the reasonable potential to cause or contribute to excursions above water quality criteria for silver under either high or low flow conditions in Jordan Creek, and does not have the reasonable potential to cause or contribute to excursions above water quality criteria for cyanide under high flow conditions (greater than or equal to 30 CFS) in Jordan Creek.

One of the exceptions to the general prohibition on less-stringent effluent limits is that water quality-based effluent limits may be revised if the revised effluent limits are subject to and consistent with the State's antidegradation policy (CWA Section 303(d)(4)(B)).

The State of Idaho has determined that deletion of the effluent limits for silver and for cyanide (under high receiving water flow conditions) is consistent with its antidegradation policy. Because effluent limits are not necessary ensure compliance with water quality criteria or with the State's antidegradation policy, the deletion of the limits will not cause violations of Idaho's water quality standards and is therefore consistent with Section 402(o)(3) of the CWA.

VII. Monitoring Requirements

A. Basis for Effluent and Surface Water Monitoring

Section 308 of the Act and federal regulation 40 CFR 122.44(i) require monitoring in permits to determine compliance with effluent limitations. Monitoring may also be required to gather effluent and surface water data to determine if additional effluent limitations are required and/or to monitor effluent impacts on receiving water quality. The permittee is responsible for conducting the monitoring and for reporting results on Discharge Monitoring Reports (DMRs) or on the application for renewal, as appropriate, to the U.S. Environmental Protection Agency (EPA).

B. Effluent Monitoring

Monitoring frequencies are based on the nature and effect of the pollutant, as well as a determination of the minimum sampling necessary to adequately monitor the facility's performance. Permittees have the option of taking more frequent samples than are required under the permit. These samples can be used for averaging if they are conducted using EPA-approved test methods (generally found in 40 CFR 136) and if the Method Detection Limits are less than the effluent limits.

Tables 6 and 7, below, present the effluent monitoring requirements for the Grouse Creek Unit in the draft permit. The sampling location must be after the last treatment unit and prior to discharge to the receiving water. If no discharge occurs during the reporting period, "no discharge" shall be reported on the DMR.

Table 6: Effluent Monitoring Requirements – Outfall 002

Parameter	Unit	Sample Frequency	Sample Type
Effluent Flow	mgd	Continuous	Recording
Jordan Creek Flow	CFS	Daily	Recording
Acute Whole Effluent Toxicity	TU_a	Annual	24-hour composite
Aluminum	µg/L	Monthly	Grab
Ammonia	mg/L	Quarterly	Grab
Arsenic	µg/L	Quarterly	Grab
Cadmium, total recoverable (TR)	µg/L	Monthly	Grab
Chronic Whole Effluent Toxicity	TU_c	Monthly	24-hour composite
Copper, TR	µg/L	Twice Per Month	Grab
Cyanide, weak acid dissociable (WAD)	µg/L	Twice Per Month	Grab

Table 6: Effluent Monitoring Requirements – Outfall 002			
Parameter	**Unit**	**Sample Frequency**	**Sample Type**
Floating, suspended or submerged matter	N/A	Monthly	Visual
Hardness	Mg/L as $CaCO_3$	Monthly	Grab
Lead, TR	µg/L	Monthly	Grab
Mercury, total	µg/L	Monthly	Grab
Nitrate + Nitrite	mg/L	Quarterly	Grab
pH	s.u.	Daily	Grab
Selenium, TR	µg/L	Quarterly	Grab
Silver, TR	µg/L	Quarterly	Grab
Temperature	ºC	Weekly	Grab
Total Suspended Solids	µg/L	Twice Per Month	Grab
Zinc, TR	µg/L	Twice Per Month	Grab

Table 7: Effluent Monitoring Requirements – Outfall 003			
Parameter	**Unit**	**Sample Frequency**	**Sample Type**
Effluent Flow	mgd	Continuous	Recording
Yankee Fork Flow	CFS	Daily	Recording
Acute Whole Effluent Toxicity	TU_a	Annual	24-hour composite
Aluminum	µg/L	Monthly	Grab
Ammonia	mg/L	Quarterly	Grab
Arsenic	µg/L	Quarterly	Grab
Cadmium, total recoverable (TR)	µg/L	Monthly	Grab
Chronic Whole Effluent Toxicity	TU_c	Monthly	24-hour composite
Copper, TR	µg/L	Twice Per Month	Grab
Cyanide, weak acid dissociable (WAD)	µg/L	Monthly	Grab
Floating, suspended or submerged matter	N/A	Monthly	Visual
Hardness	Mg/L as $CaCO_3$	Monthly	Grab
Lead, TR	µg/L	Monthly	Grab
Mercury, total	µg/L	Twice Per Month	Grab
Nitrate + Nitrite	mg/L	Quarterly	Grab
pH	s.u.	Daily	Grab
Selenium, TR	µg/L	Quarterly	Grab
Silver, TR	µg/L	Quarterly	Grab
Total Suspended Solids	µg/L	Twice Per Month	Grab
Zinc, TR	µg/L	Twice Per Month	Grab
Yankee Fork Flow	CFS	Daily	Recording

Monitoring Changes from 2002 Permit

The 2002 permit did not authorize a discharge from Outfall 003 and thus did not require monitoring for Outfall 003. The draft permit would authorize a discharge from Outfall 003, thus it requires effluent monitoring for Outfall 003. The monitoring frequencies for outfall 003 are generally the same as the corresponding monitoring frequencies for Outfall 002.

Arsenic has been detected in the effluent from Outfall 002. Therefore, the permit also requires quarterly monitoring for arsenic in both outfalls, for the purpose of effluent characterization.

Aluminum has been detected in the effluent from Outfalls 002 and 003. Therefore, the permit requires quarterly monitoring for aluminum in both outfalls, for the purpose of effluent characterization.

In cases where historic levels of discharge were significantly lower than the proposed effluent limits, effluent monitoring frequencies were reduced relative to the frequencies in the 2002 permit. This is why some metals, which are subject to effluent limits, are monitored less frequently than others.

C. Surface Water Monitoring

The draft permit continues to require surface water monitoring upstream and downstream of outfall 002, as required by the 2002 permit; however, some changes are proposed. EPA proposes to discontinue surface water monitoring in Jordan Creek for cadmium and silver. Cadmium and silver were never measured at quantifiable levels upstream from Outfall 002 from 2008 – 2014. Therefore, EPA does not expect continued surface water monitoring of cadmium or silver to yield meaningful data.

EPA proposes to require surface water monitoring in Yankee Fork Creek upstream and downstream of outfall 003. These data will be used to verify that the effluent limits are protective of water quality and characterize background pollutant concentrations for use in future effluent limit calculations.

EPA has proposed to require fish tissue monitoring for methylmercury in Yankee Fork Creek instead of Jordan Creek. Fish tissue monitoring in Yankee Fork Creek will capture any impacts of the discharges of mercury from both active outfalls, whereas monitoring in Jordan Creek would only capture the impact of discharges from outfall 002. In addition, because Yankee Fork Creek is a larger stream than Jordan Creek, it is more likely to provide an adequate population of fish for sampling. For these reasons, and because it is appropriate to evaluate fish tissue concentrations on a waterbody or watershed scale, it is appropriate in this case to monitor for mercury in fish tissue in Yankee Fork Creek instead of Jordan Creek.

The *Implementation Guidance for the Idaho Mercury Water Quality Criteria* (Implementation Guidance) recommends that NPDES permits for "de minimis" sources require ambient fish tissue monitoring at least once every five years. As described in Appendix C, EPA has determined that this facility is a "de minimis" source of mercury. However, EPA believes that monitoring mercury in fish tissue only once in five years is inadequate to observe any trends that may exist in concentrations of mercury in fish tissue. Therefore, the draft permit proposes annual monitoring for mercury in fish tissue.

Consistent with the recommendations of Section 4.3.2 of the Implementation Guidance, the draft permit requires that this monitoring be performed between July 1st and September 30th, that at least 10 fish shall be collected from each sample location, that the fish collected shall be at least 10 inches in length, and that the smallest fish collected shall be no less than half the length of the largest fish. The methylmercury fish tissue criterion and the basis for permit conditions based upon it are discussed in more detail in Appendix C.

Tables 8 and 9, below, summarize the surface water monitoring requirements in the draft permit.

Table 8: Surface Water Monitoring Requirements for Jordan Creek

Parameter and Units	**Locations**	**Frequency**
Ammonia, Total as N, mg/L	S-3 and S-4	Four times per year
Copper, dissolved, µg/L	Upstream (S-3) and downstream (S-4)	Four times per year
Dissolved oxygen, mg/L	S-3 and S-4	Four times per year
Hardness as $CaCO_3$	S-3 and S-4	Four times per year
Lead, dissolved, µg/L	S-3 and S-4	Four times per year
Mercury, total, water column, µg/L	S-3 and S-4	Four times per year
Nitrate + Nitrite, mg/L	S-3 and S-4	Four times per year
pH, standard units	S-3 and S-4	Four times per year
Selenium, total recoverable, µg/L	S-3 and S-4	Four times per year
Temperature, ºC	S-3 and S-4	Once in January, once in April, and daily from June 1^{st} through October 1^{st}
Total Suspended Solids, mg/L	S-3 and S-4	Four times per year
Turbidity, NTU	S-3 and S-4	Four times per year
Zinc, dissolved, µg/L	S-3 and S-4	Four times per year

Table 9: Surface Water Monitoring Requirements for Yankee Fork Creek

Parameter and Units	**Locations**	**Frequency**
Ammonia, Total as N, mg/L	S-9 and S-10	Four times per year
Copper, dissolved, µg/L	Upstream (S-9) and downstream (S-10)	Four times per year
Dissolved oxygen, mg/L	S-9 and S-10	Four times per year
Hardness as $CaCO_3$	S-9 and S-10	Four times per year
Lead, dissolved, µg/L	S-9 and S-10	Four times per year
Mercury, total, water column, µg/L	S-9 and S-10	Four times per year
Nitrate + Nitrite, mg/L	S-9 and S-10	Four times per year
pH, standard units	S-9 and S-10	Four times per year
Selenium, total recoverable, µg/L	S-9 and S-10	Four times per year
Turbidity, NTU	S-9 and S-10	Four times per year
Zinc, dissolved, µg/L	S-9 and S-10	Four times per year

VIII. Other Permit Conditions

A. Quality Assurance Plan

The federal regulation at 40 CFR 122.41(e) requires the permittee to develop procedures to ensure that the monitoring data submitted is accurate and to explain data anomalies if they occur. Hecla is required to develop and implement a Quality Assurance Plan within 90 days of the effective date of the final permit. The Quality Assurance Plan shall consist of standard operating procedures the permittee must follow for collecting, handling, storing and shipping samples, laboratory analysis, and data reporting.

B. BMP Plan

Federal regulations at 40 CFR 122.44(k) require the permittee to use best management practices (BMP) in order to control or abate the discharge of pollutants whenever BMPs are reasonably necessary to carry out the purposes and intent of the CWA. According to the *U.S. Environmental Protection Agency NPDES Permit Writers' Manual* (section 9.1.2) permits can either require specific BMPs in the permit, or require the permittee to develop a BMP plan. The draft permit requires that the permittee develop a BMP plan that is consistent with certain objectives and with applicable EPA guidance.

C. Additional Permit Provisions

Sections III, IV, and V of the draft permit contain standard regulatory language that must be included in all NPDES permits. Because they are regulations, they cannot be challenged in the context of an NPDES permit action. The standard regulatory language covers requirements such as monitoring, recording, and reporting requirements, compliance responsibilities, and other general requirements.

IX. Other Legal Requirements

A. Endangered Species Act

The Endangered Species Act (ESA) requires federal agencies to consult with National Oceanic and Atmospheric Administration Fisheries (NOAA Fisheries) and the U.S. Fish and Wildlife Service (USFWS) if their actions could beneficially or adversely affect any threatened or endangered species.

The EPA has prepared a biological evaluation and determined that the discharge from the Grouse Creek mine may affect, but is not likely to adversely affect Chinook salmon, steelhead, bull trout or their critical habitat (EPA 2015). EPA will seek concurrence from USFWS and NOAA Fisheries on the not likely to adversely affect determination.

B. Essential Fish Habitat

Essential fish habitat (EFH) is the waters and substrate (sediments, etc.) necessary for fish to spawn, breed, feed, or grow to maturity. The Magnuson-Stevens Fishery Conservation and Management Act (January 21, 1999) requires EPA to consult with NOAA Fisheries when a proposed discharge has the potential to adversely affect (reduce quality and/or quantity of) EFH. In the biological evaluation, the EPA concluded that the issuance of an NPDES permit to the Grouse Creek mine is not likely to adversely affect EFH for Chinook salmon.

C. State/Tribal Certification

Section 401 of the CWA requires EPA to seek State or Tribal certification before issuing a final permit. As a result of the certification, the State may require more stringent permit conditions or additional monitoring requirements to ensure that the permit complies with water quality standards.

D. Permit Expiration

The permit will expire five years from the effective date.

X. References

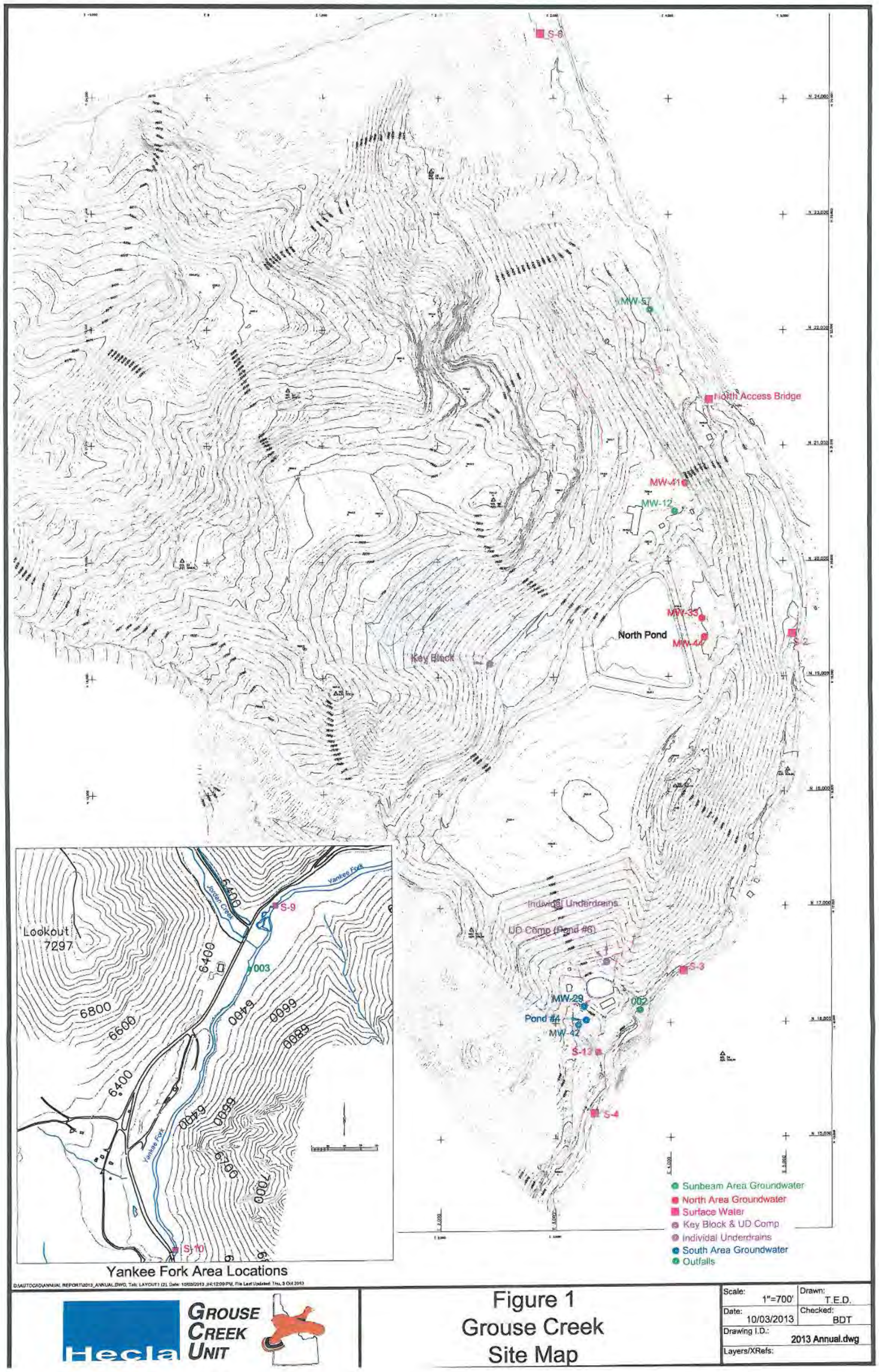
EPA. 1991. *Technical Support Document for Water Quality-based Toxics Control.* US Environmental Protection Agency, Office of Water, EPA/505/2-90-001. www.epa.gov/npdes/pubs/owm0264.pdf

EPA. 2010. *U.S. Environmental Protection Agency NPDES Permit Writers' Manual*. US Environmental Protection Agency, Office of Wastewater Management, Water Permits Division, EPA-833-K-10-001. water.epa.gov/polwaste/npdes/basics/upload/pwm_2010.pdf

EPA. 2015. *Biological Evaluation for the NPDES Permit for the Hecla Mining Company Grouse Creek Unit.* May 2015.

IDEQ. 2005. *Implementation Guidance for the Idaho Mercury Water Quality Criteria*. Idaho Department of Environmental Quality. Negotiated Rulemaking Committee. Boise, Idaho. April 2005. http://www.deq.idaho.gov/media/639808-idaho_mercury_wq_guidance.pdf

Appendix A: Facility Map



Appendix B: Technology-based Effluent Limits

A. Statutory and Regulatory Basis

Section 301(b) of the CWA requires technology-based controls on effluents, and 40 CFR 125.3(a) states that technology-based treatment requirements under Section 301(b) of the Act represent the minimum level of control that must be imposed in an NPDES permit. This section of the Clean Water Act requires that, by March 31, 1989, all permits contain effluent limitations which:

1. Control toxic pollutants and nonconventional pollutants through the use of "best available technology economically achievable" (BAT), and
2. Represent "best conventional pollutant control technology" (BCT) for conventional pollutants. In no case may BCT or BAT be less stringent than "best practical control technology currently achievable" (BPT), which is the minimum level of control required by section 301(b)(1)(A) of the Clean Water Act.

Sections 301(b)(2) and (3) require further technology-based controls on effluents. After March 31, 1989, all permits for new sources are required to contain effluent limitations for all categories of point sources which control toxic pollutants through the use of best available demonstrated technology (BADT). BADT is specifically applied through New Source Performance Standards (NSPS). In many cases, BPT, BAT, BCT, and NSPS limitations are based on effluent guidelines developed by EPA for specific industries. On December 3, 1982, EPA published effluent guidelines for the mining industry. These guidelines are found in 40 CFR 440. Effluent guidelines applicable to gold mines, such as the Grouse Creek Unit are found in the Copper, Lead, Zinc, Gold, Silver, and Molybdenum Ores Subcategory (Subpart J) of Part 440.

The Part 440 guidelines are applicable to active mining areas and to operating mills (40 CFR 100, 40 CFR 132). Although the GCU is not currently operating, the characteristics of the discharges from outfalls 002 and 003 are similar to those of an active mine (specifically the mine drainage from the Sunbeam adit which is a component of the discharge). Therefore, EPA has determined, based on best professional judgment (BPJ), that the technology-based limits applicable to the discharges from outfalls 002 and 003 are the NSPS effluent guidelines shown in Table B-1. The NPDES regulations at 40 CFR 122.44 and The NPDES regulations at 40 CFR 122.44 and 125.3 require determination of permit conditions using BPJ in the absence of applicable effluent guidelines. One of the ways in which BPJ may be applied is to apply effluent limit guidelines for a similar source to the source being permitted (see the 1996 *U.S. EPA NPDES Permit Writer's Manual*, EPA-833-B-96-003, at Page 71). Because the GCU was constructed after promulgation of the NSPS, the NSPS in Part 440.104 are appropriate for the facility.

EPA has determined that the technology-based TSS effluent limitations are stringent enough to protect water quality in the receiving waters at all times. See the discussion under "Total Suspended Solids," below.

For all of the other parameters for which technology-based effluent limits have been established, EPA determined that the technology-based effluent limits are not stringent enough to ensure compliance with water quality standards in the receiving waters. Therefore, EPA is required by

Section 301(b)(1)(C) of the Clean Water Act to establish "more stringent limitation(s)…necessary to meet water quality standards."

Table B-1: Technology-Based Effluent Limits for Outfalls 002 and 003
(40 CFR 440.104)

Parameter (units)	Average Monthly Limit	Maximum Daily Limit	Range
cadmium (µg/L)	50	100	—
copper (µg/L)	150	300	—
lead (µg/L)	300	600	—
mercury (µg/L)	1	2	—
zinc (µg/L)	750	1500	—
total suspended solids (mg/L)	20	30	—
pH (s.u.)	—	—	6.0 - 9.0

B. Total Suspended Solids

The total suspended solids effluent limits in the permit are technology-based effluent limits. EPA has determined that it is not necessary to impose more stringent, water quality-based effluent limits on the discharge of total suspended solids, in order to ensure compliance with Idaho's water quality standards.

The State of Idaho has a narrative water quality criterion for sediment (IDAPA 58.01.02.200.08). Other sources provide appropriate numeric limits and targets for suspended sediment. Suggested limits for suspended sediment have been developed by the European Inland Fisheries Advisory Commission and the National Academy of Sciences, and have been adopted by the State of Idaho in previous TMDLs. A limit of 25 mg/L of suspended sediment provides a high level of protection of aquatic organisms; 80 mg/L moderate protection; 400 mg/L low protection; and over 400 mg/L very low protection (USDA FS 1990, Thurston et al. 1979).

The technology-based average monthly limit for TSS is less than 25 mg/L, a concentration that provides a high level of protection of aquatic organisms. Therefore, the technology-based TSS limit is adequate to protect water quality.

C. References

EPA. 1996. U.S. EPA NPDES Permit Writers' Manual. United States Environmental Protection Agency. Office of Water. EPA-833-B-96-003. www.epa.gov/npdes/pubs/owm0243.pdf

Thurston R.V., R.C. Russo, C.M. Fetterolf, T.A. Edsall, Y.M. Barber Jr., editors. 1979. *Review of the EPA Red Book: Quality Criteria for Water.* Bethesda, MD. Water Quality Section, American Fisheries.

U.S. Department of Agriculture Forest Service (USDA FS). 1990. *Salmonid-habitat Relationships in the Western United States: A Review and Indexed Bibliography.* USDA Forest Service. General Technical Report RM-188. Fort Collins, CO. Rocky Mountain Forest and Range Experiment Station, USDA FS.

Appendix C: Water Quality-based Effluent Limits

A. Statutory and Regulatory Basis

Section 301(b)(1)(C) of the CWA requires the development of limitations in permits necessary to meet water quality standards. Discharges to State or Tribal waters must also comply with limitations imposed by the State or Tribe as part of its certification of NPDES permits under section 401 of the CWA. Federal regulations at 40 CFR 122.4(d) prohibit the issuance of an NPDES permit when the imposition of conditions in that permit cannot ensure compliance with the water quality standards of all affected States. The NPDES regulation (40 CFR 122.44(d)(1)) implementing Section 301(b)(1)(C) of the CWA requires that permits include limits for all pollutants or parameters which are or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any State or Tribal water quality standard, including narrative criteria for water quality.

The regulations require the permitting authority to make this evaluation using procedures which account for existing controls on point and nonpoint sources of pollution, the variability of the pollutant in the effluent, species sensitivity (for toxicity), and where appropriate, dilution in the receiving water. The limits must be stringent enough to ensure that water quality standards are met, and must be consistent with any available wasteload allocation.

B. Mixing Zones

Sometimes it is appropriate to allow a small area of the receiving water to provide dilution of the effluent. These areas are called mixing zones. Mixing zone allowances will increase the mass loadings of the pollutant to the water body, and decrease treatment requirements. Mixing zones can be used only when there is adequate receiving water flow volume and the receiving water meets the criteria necessary to protect the designated uses of the water body. Mixing zones must be authorized by the Idaho Department of Environmental Quality (IDEQ).

Based on IDEQ’s draft Clean Water Act Section 401 certification and a clarifying letter dated April 13, 2015, some of the reasonable potential analyses were conducted and some of the water quality-based effluent limits in this permit have been calculated using a mixing zone. The mixing zones sizes as percentages of the critical low flow volumes and the corresponding dilution factors, are listed in Tables C-1 and C-2, below.

The results of plume modeling of the discharges using the Cornell Mixing Zone Expert System (CORMIX) are provided in the biological evaluation (EPA 2015).

Table C-1: Authorized Mixing Zones for Outfall 002 (Jordan Creek)

Parameter	Jordan Creek Flow < 30 CFS		Jordan Creek Flow ≥ 30 CFS	
	Mixing Zone	Dilution Factor	Mixing Zone	Dilution Factor
Ammonia	25%	3.00	25%	4.74
Arsenic	25%	3.00	25%	4.74
Cadmium	25%	3.00	25%	4.74
Copper	25%	3.00	9%	2.35
Cyanide (weak acid dissociable)	25%	3.00	25%	4.74
Lead	25%	3.00	25%	4.74
Mercury	25%	3.00	25%	4.74
Nitrate + Nitrite	25%	3.00	25%	4.74
Selenium	25%	3.00	25%	4.74

Table C-1: Authorized Mixing Zones for Outfall 002 (Jordan Creek)

Parameter	Jordan Creek Flow < 30 CFS		Jordan Creek Flow ≥ 30 CFS	
	Mixing Zone	Dilution Factor	Mixing Zone	Dilution Factor
Silver	25%	3.00	25%	4.74
Whole Effluent Toxicity (WET)	100%	9.00	100%	15.96
Zinc	25%	3.00	10%	2.5

Table C-2: Authorized Mixing Zones for Outfall 003 (Yankee Fork Creek)

Parameter	Yankee Fork Creek Flow < 15 CFS		Yankee Fork Creek Flow ≥ 15 and < 45 CFS		Yankee Fork Creek Flow ≥ 45 CFS	
	Mixing Zone	Dilution Factor	Mixing Zone	Dilution Factor	Mixing Zone	Dilution Factor
Ammonia	25%	4.74	25%	4.37	25%	6.61
Arsenic	25%	4.74	25%	4.37	25%	6.61
Cadmium	9%	2.35	18%	3.42	19%	5.26
Copper	13%	2.94	25%	4.37	13%	3.92
Cyanide (weak acid dissociable)	25%	4.74	25%	4.37	25%	6.61
Lead	25%	4.74	25%	4.37	25%	6.61
Mercury	25%	4.74	25%	4.37	25%	6.61
Selenium	25%	4.74	25%	4.37	25%	6.61
Silver	25%	4.74	25%	4.37	25%	6.61
Whole Effluent Toxicity (WET)	100%	15.96	100%	14.46	100%	23.4
Zinc	23%	4.44	25%	4.37	25%	6.61

If IDEQ does not grant a mixing zone in the final Clean Water Act Section 401 certification, the water quality-based effluent limits will be recalculated such that the criteria are met at the "end-of-pipe," before the effluent is discharged to the receiving water. If IDEQ grants mixing zones providing different dilution factors than those calculated in this fact sheet, EPA will re-calculate the effluent limits to be consistent with the mixing zone authorization.

C. Procedure for Deriving Water Quality-based Effluent Limits

The first step in developing a water quality-based effluent limit is to develop a wasteload allocation (WLA) for the pollutant. A wasteload allocation is the concentration or loading of a pollutant that the permittee may discharge without causing or contributing to an excursion above water quality standards in the receiving water.

In cases where a mixing zone is not authorized, either because the receiving water already exceeds the criterion, the receiving water flow is too low to provide dilution, or the State does not authorize one, the criterion becomes the WLA. Establishing the criterion as the wasteload allocation ensures that the permittee will not cause or contribute to an excursion above the criterion. The following discussion details the specific water quality-based effluent limits in the draft permit.

Once a WLA is developed, EPA calculates effluent limits which are protective of the WLA using statistical procedures described below. The following calculations demonstrate how the water quality-based effluent limits (WQBELs) in the draft permit were calculated.

Determine the Applicable Water Quality Criteria

Water quality criteria specify the level of water quality that is necessary to support a waterbody's designated uses. At the point of discharge for Outfall 003, Yankee Fork Creek is designated for the uses of cold water aquatic life, salmonid spawning, primary contact recreation, and domestic water supply (IDAPA 58.01.02.130.03). Jordan Creek is not designated for specific uses in the water quality standards. However, IDAPA 58.01.02.101.01 designates all undesignated waters for cold water aquatic life and primary contact recreation. In addition, all waters of the State of Idaho are designated for industrial and agricultural water supply, wildlife habitats, and aesthetics (IDAPA 58.01.02.100).

Different water quality criteria are associated with the various uses. For each water quality parameter, water quality-based effluent limits must be based on the most stringent water quality criterion applicable to the receiving water, in order to ensure that all of the uses are protected. The applicable water quality criteria, based on the designated uses of the receiving waters, are listed in Table C-3.

Table C-3: Idaho Water Quality Criteria Applicable to the Grouse Creek Permit

Parameter	Criteria	Uses
Ammonia	**Jordan Creek:** Acute: 8.31 mg/L Chronic: 3.24 mg/L **Yankee Fork Creek:** Acute: 10.3 mg/L Chronic: 3.74 mg/L	Cold Water Aquatic Life
Cadmium	Dependent upon hardness. See below.	Cold Water Aquatic Life
Copper	Dependent upon hardness. See below.	Cold Water Aquatic Life
Cyanide	Acute: 22 µg/L Chronic: 5.2 µg/L	Cold Water Aquatic Life
Lead	Dependent upon hardness. See below.	Cold Water Aquatic Life
Mercury, Water Column	Acute: 2.1 µg/L Chronic: 0.012 µg/L See discussion below.	Cold Water Aquatic Life
Methyl Mercury, Fish Tissue	0.3 mg/kg See discussion below.	Human Health (consumption of fish)
Nitrate + Nitrite (Yankee Fork Creek only)	10 mg/L	Domestic Water Supply
Nitrate + Nitrite (Statewide)	100 mg/L	Agricultural Water Supply
pH	6.5 – 9.0 standard units	Aquatic Life
Sediment	Narrative criterion (see Appendix B)	Various uses
Selenium	Acute: 20 µg/L Chronic: 5 µg/L	Cold Water Aquatic Life
Silver	Dependent upon hardness. See discussion below.	Cold Water Aquatic Life
Whole Effluent Toxicity	"Surface waters of the state shall be free from toxic substances in concentrations that impair designated beneficial uses." See below for numeric interpretation.	Cold Water Aquatic Life, other designated uses.
Zinc	Dependent upon hardness. See below.	Cold Water Aquatic Life

Hardness Dependent Metals Criteria

The numeric values of the aquatic life water quality criteria for certain metals vary with the hardness of the receiving water. Hardness is a measure of the concentration of divalent metal cations (mostly calcium and magnesium) in the water. Some metals are less toxic to aquatic life in hard water than in soft water, therefore, the water quality criteria become less stringent (i.e.

numerically greater) in harder waters. Table C-4, below, lists the hardness of the effluent and the receiving water, for various conditions.

Table C-4: Hardness of Effluent and Receiving Water

Description	Hardness (mg/L as CaCO3)
Fifth percentile effluent hardness at outfall 002	191
Fifth percentile effluent hardness at outfall 003	198
Fifth percentile hardness in Jordan Creek, upstream from outfall 002, with flows less than 30 CFS	34.0
Minimum hardness in Jordan Creek, upstream from outfall 002, with flows greater than or equal to 30 CFS	17.7
Fifth percentile hardness in Jordan Creek, downstream from outfall 002, with flows less than 30 CFS	41.0
Minimum hardness in Jordan Creek, downstream from outfall 002, with flows greater than or equal to 30 CFS	24.0
Hardness in Yankee Fork Creek, upstream from outfall 003, with flows less than 15 CFS	24.0
Minimum hardness in Yankee Fork Creek, upstream from outfall 003, with flows greater than or equal to 15 CFS and less than 45 CFS	18.0
Fifth percentile hardness in Yankee Fork Creek, upstream from outfall 003, with flows greater than or equal to 45 CFS	15.9
Hardness in Yankee Fork Creek, downstream from outfall 003, with flows less than 15 CFS	38.0
Minimum hardness in Yankee Fork Creek, downstream from outfall 003, with flows greater than or equal to 15 CFS and less than 45 CFS	27.0
Fifth percentile hardness in Jordan Creek, downstream from outfall 003, with flows greater than or equal to 45 CFS	20.0

In the Grouse Creek permit, there are different sets of water quality-based effluent limits for each outfall, which apply under different circumstances for receiving water flow. The hardness values used to calculate the value of the water quality criteria, for the purpose of calculating these various effluent limits, are consistent with these varying conditions.

Influence of a Hard Effluent

As shown in Table C-2, the effluent is considerably harder than the receiving water. The fact that the effluent is relatively hard decreases the toxic impact of the effluent, relative to what it would have been if the effluent had been soft. EPA has considered this in the development of effluent limits for metals.

Cadmium, Copper and Zinc

For cadmium, copper, and zinc, the influence of the hard effluent is considered in the development of effluent limits for these metals by calculating the values of the water quality criteria using the hardness expected to occur at the point where the criteria are being applied, which is at the edge of the mixing zone, i.e, the hardness of the mixture of the effluent and the receiving water (at the edge of the mixing zone, under critical conditions) has been used to calculate the water quality criteria. Table C-2, above, lists the hardness values used to calculate the values of the cadmium, copper, and zinc water quality criteria for the various limits in the draft permits.

Using a hardness value that considers the fact that the effluent is harder than the receiving water to calculate the values of the water quality criteria makes the water quality criteria less stringent than they would be if the hardness of the receiving water were used. However, applying the water quality criteria in this manner nonetheless results in effluent limits that are derived from and comply with water quality criteria for cadmium, copper, and zinc, as required by 40 CFR 122.44(d)(1)(vii)(A)). This is because any mixture of two waters, which each meet water quality criteria for cadmium, copper, and zinc at their respective hardness, will also meet criteria for these metals.

For example, consider a mixture of equal parts of water, each of which individually had a copper concentration equal to the chronic copper criterion (at their respective hardness) and where one sample is much harder than the other. Specifically, assume one sample has a hardness of 34 mg/L as $CaCO_3$ (the 5th percentile hardness of Jordan Creek when flows are less than 30 CFS) and a dissolved copper concentration of 4.5 µg/L, and the other has a hardness of 191 mg/L (the 5th percentile hardness of outfall 002) and a dissolved copper concentration of 19.7 µg/L. The equal-parts mixture would have a hardness of 112.5 mg/L as $CaCO_3$, and a dissolved copper concentration of 12.1 µg/L. The value of the chronic copper criterion at a hardness of 112.5 mg/L as $CaCO_3$ is 12.6 µg/L dissolved copper. Therefore, the mixture would meet the criterion, even though the hard-water sample had a copper concentration considerably higher than the value of the copper criterion calculated at the hardness of the softer water sample.

The reason for this is that, when the criteria for cadmium, zinc, and copper are plotted against hardness, the shape of the curve is "concave down," meaning, the slope of the curve decreases with increasing hardness (i.e. the value of the second derivative is always negative). On this same plot, the hardness and copper concentration of a mixture of the two waters, in any given proportion, will fall on a straight line connecting the hardnesses and copper concentrations of the individual waters, prior to mixing. Because the shape of the criteria curve is concave down, all of the points on this line, representing all of the possible mixing proportions of the two waters, will always lie below the criterion, as long as each individual water has a copper concentration less than or equal to the criterion, at their respective hardnesses. See Figure 1, below, for an illustration of this.

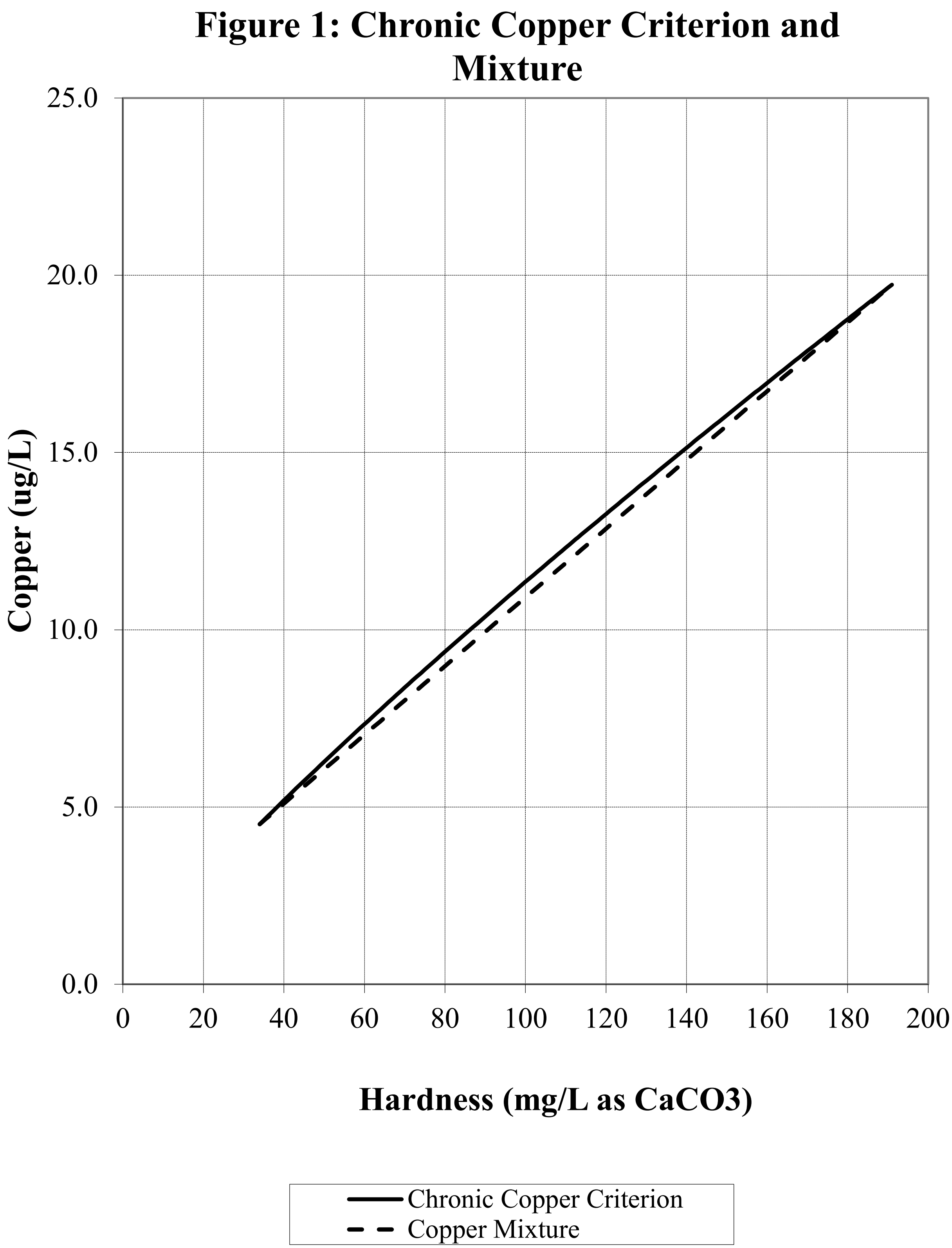


Figure 1: Chronic Copper Criterion and Mixture
25.0
20.0
15.0
10.0
5.0
0.0
Copper (ug/L)
0
20
40
60
80
100
120
140
160
180
200
Hardness (mg/L as CaCO3)
Chronic Copper Criterion
Copper Mixture

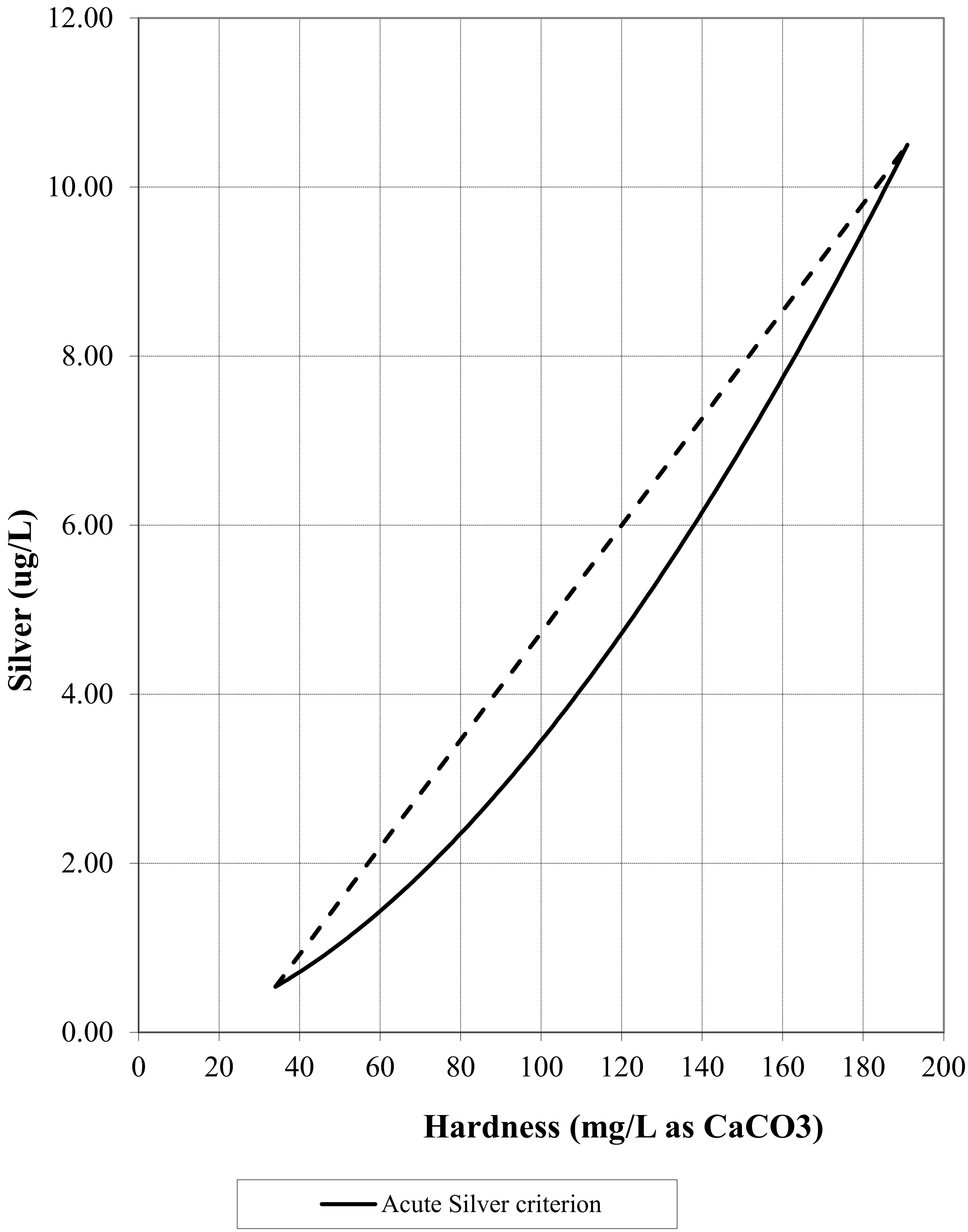
Silver and Lead
In contrast, for silver and lead, the shape of the curve is "concave up." As explained above, when two waters are mixed, the hardness and metal concentration of the mixture will fall somewhere on a straight line connecting the points representing the hardness and metal concentrations of the two waters prior to mixing, and when the criterion curve is concave down, this straight line always lies below the criterion curve. When the criterion curve is concave up, this straight line may not be below the criterion curve. See Figure 2, below, for an illustration of this.

For example, if equal parts of water were mixed, one with a hardness of 34 mg/L as $CaCO_3$ and one with a hardness of 191 mg/L, and if each of these waters had a dissolved silver concentration equal to the value of the silver criterion at their respective hardness (0.54 µg/L for the softer water and 10.50 µg/L for the harder water), the mixture would have a hardness of 112.5 mg/L as CaCO3, and a silver concentration of 5.52 µg/L. However, the value of the silver criterion at a hardness of 102 µg/L is only 4.22 µg/L, so the mixture would exceed the silver criterion, even though each part of the mixture individually met the silver criterion, prior to mixing. This would be true for any mixture of the above-described waters, in any proportion. See Figure 2.

Therefore, the influence of the hard effluent cannot be considered directly in the calculation of effluent limits for silver and lead, as it can be for copper, cadmium and zinc. To calculate the values of the water quality criteria for silver and lead for the purpose of calculating effluent limits, EPA has used the worst-case (minimum, or, if there were at least 20 hardness results, 5^{th} percentile) hardness measured in the receiving water downstream of the outfalls.

This is appropriate because the hardness of a mixture of the effluent and the receiving waters will generally not be less than the minimum or 5^{th} percentile hardness measured downstream of the outfalls. This approach considers the influence of the relatively hard water discharged, while ensuring compliance with water quality standards under critical conditions.

Figure 2: Silver Acute Criterion and Mixture



Metals Criteria Summary

Tables C-5 and C-6, below, summarize all of the hardness values used to calculate the values of the water quality criteria for metals, and list the resulting criteria values.

Table C-5: Hardness Values Used to Calculate Water Quality Criteria for Metals: Outfall 002

Limit Description	Hardness (mg/L as CaCO3)	Hardness Basis	Acute Criterion (µg/L)	Chronic Criterion (µg/L)
Cadmium, copper and zinc, Jordan Creek flow < 30 CFS	86.4	Mixed hardness at the edge of the mixing zone	Cd: 1.19	Cd: 0.52
			Cu: 14.8	Cu: 10.0
			Zn: 103	Zn: 104
Cadmium, Jordan Creek flow ≥ 30 CFS	54.3	Mixed hardness at the edge of the mixing zone	0.80	0.40
Copper, Jordan Creek flow ≥ 30 CFS	91.6	Mixed hardness at the edge of the mixing zone	15.7	10.5
Zinc, Jordan Creek flow ≥ 30 CFS	87.1	Mixed hardness at the edge of the mixing zone	104	105
Lead and silver, Jordan Creek flow < 30 CFS	40.9	5^{th} percentile hardness measured in Jordan Creek downstream of Outfall 002, with creek flows < 30 CFS	Pb: 24.1	Pb: 0.938
			Ag: 0.740	Ag: N/A
Lead and silver, Jordan Creek flow ≥ 30 CFS	23.6	5^{th} percentile hardness measured in Jordan Creek downstream of Outfall 002, with creek flows ≥ 30 CFS	Pb: 13.9	Pb: 0.541
			Ag: 0.318	Ag: N/A

Table C-6: Hardness Values Used to Calculate Water Quality Criteria for Metals: Outfall 003

Parameter	Upstream Hardness	Dilution Factor	Hardness (mg/L as CaCO3)	Hardness Basis	Acute Criterion (µg/l)	Chronic Criterion (µg/l)
Low Flow (< 15 CFS)						
Cadmium	24	2.35	98.2	Mixed hardness at the edge of the mixing zone	1.98	1.02
Copper	24	2.94	83.1	Mixed hardness at the edge of the mixing zone	14.3	9.689
Lead	N/A	4.74	38.0	Minimum hardness measured in Yankee Fork Creek downstream of outfall 003, with stream flows < 15 CFS.	22.2	0.865
Silver	N/A	4.74	38.0	Minimum hardness measured in Yankee Fork Creek downstream of outfall 003, with stream flows < 15 CFS.	0.653	
Zinc	24	4.44	63.2	Mixed hardness at the edge of the mixing zone	79.4	80.1

Table C-6: Hardness Values Used to Calculate Water Quality Criteria for Metals: Outfall 003						
Parameter	Upstream Hardness	Dilution Factor	Hardness (mg/L as CaCO3)	Hardness Basis	Acute Criterion (µg/l)	Chronic Criterion (µg/l)
Medium Flow (15 – 45 CFS)						
Cadmium	18	3.42	70.6	Mixed hardness at the edge of the mixing zone	1.43	0.797
Copper	18	4.37	59.2	Mixed hardness at the edge of the mixing zone	10.4	7.255
Lead	N/A	4.37	27.0	Minimum hardness measured in Yankee Fork Creek downstream of outfall 003, with stream flows between 15 and 45 CFS.	15.1	0.590
Silver	N/A	4.37	27.0	Minimum hardness measured in Yankee Fork Creek downstream of outfall 003, with stream flows between 15 and 45 CFS.	0.363	
Zinc	18	4.37	59.2	Mixed hardness at the edge of the mixing zone	75.2	75.8
High Flow (> 45 CFS)						
Cadmium	15.85	5.26	50.5	Mixed hardness at the edge of the mixing zone	1.03	0.622
Copper	15.85	3.92	62.3	Mixed hardness at the edge of the mixing zone	10.9	7.581
Lead	N/A	6.61	20.3	5th percentile hardness measured in Yankee Fork Creek downstream of outfall 003, with stream flows greater than 45 CFS.	13.9	0.541
Silver	N/A	6.61	20.3	5th percentile hardness measured in Yankee Fork Creek downstream of outfall 003, with stream flows greater than 45 CFS.	0.318	
Zinc	15.85	6.61	43.4	Mixed hardness at the edge of the mixing zone	57.8	58.2

Ammonia

Similar to metals, the water quality criteria for ammonia are not fixed numeric values; rather, they are calculated based on other water chemistry parameters. In the case of ammonia, the water quality criteria are calculated based on the temperature and pH of the receiving water. The ammonia criteria are shown in Table C-7, below.

Table C-7: Water Quality Criteria for Ammonia		
	pH (s.u.)	**Temperature (ºC)**
Outfall 002	7.8	10
Outfall 003	7.66	12.1
	Acute Criterion	**Chronic Criterion**
Equations:	$\frac{0.275}{1+10^{7.204-pH}}+\frac{39}{1+10^{pH-7.204}}$	$\left(\frac{0.0577}{1+10^{7.688-pH}}+\frac{2.487}{1+10^{pH-7.688}}\right)\times MIN\left(2.85, 1.45\times 10^{0.028\times(25-T)}\right)$
Results – Outfall 002	**8.31**	**3.24**
Results – Outfall 003	**10.31**	**3.74**

Whole Effluent Toxicity

The State of Idaho has a narrative water quality criterion for toxicity, which reads "surface waters of the state shall be free from toxic substances in concentrations that impair designated beneficial uses" (IDAPA 58.01.02.200.02). The federal regulation 40 CFR 122.44(d)(1)(v) states that, whenever a discharge has the reasonable potential to cause or contribute to excursions above a narrative criterion for toxicity, the permit must contain an effluent limit for whole effluent toxicity. For the purposes of developing water quality-based effluent limits from narrative criteria, 40 CFR 122.44(d)(1)(vi)(A) states that effluent limits may be derived from a calculated numeric criterion that the permitting authority demonstrates will attain and maintain applicable narrative criteria. EPA's recommended numeric interpretation of this narrative criterion is 1.0 chronic toxic unit (TU_c) and 0.3 acute toxic units (TU_a) for the chronic and acute criteria, respectively (*See* TSD at Section 2.3.3). The recommended criterion for acute toxicity is converted to TU_c using an acute-to-chronic ratio of 10, also based on the recommendations of the TSD (*See* TSD at Pages 17 and 99).

Mercury

There are two sets of criteria for mercury that are in effect for Clean Water Act purposes in Idaho. There are numeric criteria for total mercury in the water column, which protect aquatic life uses, and there numeric criteria for methylmercury in fish tissue, which protect human health and recreational uses.

Water Column Criteria for Aquatic Life Uses

When the State of Idaho adopted the EPA-recommended criterion for methylmercury in fish tissue, it deleted from the water quality standards the numeric aquatic life water quality criteria for total mercury in the water column that were in place at that time. EPA has disapproved the deletion of the water column criteria.

Consistent with 40 CFR 131.21, until Idaho develops and adopts and EPA approves revisions to numeric aquatic life criteria for mercury, the applicable water column criteria for aquatic life uses in Idaho that are effective for Clean Water Act purposes are the previously-adopted acute (2.1 μg/L) and chronic (0.012 μg/L) mercury criteria which EPA approved in 1997.[1] Using the procedures described in section D, below, EPA has determined that the discharges from outfalls 002 and 003 have the reasonable potential to cause or contribute to excursions above these criteria. Therefore, the draft permit contains water quality-based effluent limits that are derived from, and comply with, these criteria (40 CFR 122.44(d)(1)(vii)(A)).

Fish Tissue Criterion for Human Health

The State of Idaho has an EPA-approved water quality criterion for methylmercury in fish tissue, which is 0.3 mg/kg wet weight (IDAPA 58.01.02.210). The implementation of a fish tissue criterion in an NPDES permit is different than the implementation of a typical water column criterion. In 2005, IDEQ published the *Implementation Guidance for the Idaho Mercury Water Quality Criteria* (Implementation Guidance) to explain how to implement the fish tissue criterion. The Implementation Guidance discusses NPDES permits in Section 6.

The Implementation Guidance recommends different types of NPDES permit conditions for mercury, depending on whether the permitted point source is "significant" or "de minimis." The Implementation Guidance states that, in the context of the mercury fish tissue criterion,

[1] See letter from Michael F. Gearheard, EPA to Barry Burnell, IDEQ, December 12, 2008.

"significant permittees are defined as having either been assigned a wasteload allocation (WLA) as part of the TMDL process or having been determined to have reasonable potential to exceed (RPTE) the mercury criteria." The Implementation Guidance defines de minimis permittees as those facilities that have neither a wasteload allocation assigned through the TMDL process nor have reasonable potential to exceed the criterion. *See* Implementation Guidance at Sections 1.5 and 6.1.1.

As stated above, the facility has the reasonable potential to cause or contribute to excursions above the aquatic life criteria for mercury, and water quality-based effluent limits have therefore been derived from those criteria. EPA has followed the recommendations of the Implementation Guidance to determine if any additional or more stringent permit conditions may be necessary, in order to ensure compliance with the fish tissue criterion.

The recommended procedure for determining reasonable potential to cause or contribute to excursions above the fish tissue criterion for mercury is provided in Section 6.2 of the Implementation Guidance. The Implementation Guidance recommends making the reasonable potential determination based in part on data for mercury in fish tissue. If the average concentration of mercury in fish tissue is greater than 0.24 mg/kg, and if the elevated tissue concentration is due to a single point source, that point source has the reasonable potential to cause or contribute to excursions above the fish tissue criterion, and should receive NPDES permit conditions for a significant source. If multiple sources contribute to the elevated fish tissue concentration, then the preferred solution is a TMDL for mercury, however, as stated on Page 95 of the Implementation Guidance, permit conditions would be required if a permit were issued prior to the completion of a TMDL (*See also* 40 CFR 122.44(d)(1)).

In order to satisfy the requirements of the Administrative Order on Consent (AOC) under CERCLA, Hecla has performed monitoring of mercury in fish tissue in Yankee Fork Creek upstream and downstream of outfall 003. The monitoring station that is downstream of outfall 003 is also downstream of outfall 002, thus, sampling performed at this location would be representative of any effects upon mercury concentrations in fish tissue resulting from the discharges from both outfalls. Fish tissue data collected between October 2000 and August 2013 show that the average concentration of mercury in the fish tissue collected during each sampling event ranged from < 0.05 mg/kg to 0.14 mg/kg (GEI Consultants, 2014). The maximum average fish tissue concentration of 0.14 mg/kg, which was observed at station S-9 (upstream from outfall 003 on Yankee Fork Creek) in 2005, is much less than the 0.24 mg/kg threshold for reasonable potential recommended in the Implementation Guidance, and is less than half the water quality criterion.

The CERCLA discharge authorization contained effluent limits for mercury. The draft NPDES permit would authorize less mercury to be discharged from outfall 003, relative to the CERCLA discharge authorization. Likewise, the revised effluent limits for mercury in outfall 002 are more stringent than the corresponding limits in the previous permit. Therefore, the draft permit will not result in an increased discharge of mercury, and the Implementation Guidance procedures for increased discharges of mercury are therefore not applicable to this discharge.

Because historic concentrations of methylmercury in fish tissue are less than 0.24 mg/kg, and because the reissued permit will not authorize increased discharges of mercury, per the procedures of the Implementation Guidance, the discharge does not have the reasonable potential to cause or contribute to excursions above Idaho's fish tissue criterion for mercury. Since there is no reasonable potential to cause or contribute to excursions above the fish tissue criterion, and the facility does not have a wasteload allocation for mercury assigned to it in a TMDL, it is considered a de minimis source of mercury.

For de minimis industrial sources of mercury, the Implementation Guidance recommends that NPDES permits contain voluntary BMP conditions for mercury, and a no net increase provision. However, as explained above, the draft permit contains numeric effluent limits for mercury, which are derived from and comply with the water column aquatic life criteria. As explained above, these numeric effluent limits will not result in an increased discharge of mercury relative to those in the previous NPDES permit for outfall 002 and the CERCLA discharge authorization for outfall 003. Therefore, EPA believes these numeric effluent limitations are adequate to meet the intent of the Implementation Guidance's recommendations for voluntary BMPs and a no net increase provision. The permit also contains fish tissue monitoring requirements, as described in this fact sheet.

D. Reasonable Potential Analysis

The EPA uses the process described in the *Technical Support Document for Water Quality-based Toxics Control* or TSD (EPA 1991) to determine reasonable potential. To determine if there is reasonable potential for the discharge to cause or contribute to an exceedance of water quality criteria for a given pollutant, the EPA compares the maximum projected receiving water concentration to the water quality criteria for that pollutant. If the projected receiving water concentration exceeds the criteria, there is reasonable potential, and a water quality-based effluent limit must be included in the permit. This following section discusses how the maximum projected receiving water concentration is determined.

Mass Balance

For discharges to flowing water bodies, the maximum projected receiving water concentration is determined using the following mass balance equation:

$$C_d Q_d = C_e Q_e + C_u Q_u \qquad \text{Equation 1}$$

where,

C_d = Receiving water concentration downstream of the effluent discharge (that is, the concentration at the edge of the mixing zone)
C_e = Maximum projected effluent concentration
C_u = 95th percentile measured receiving water upstream concentration
Q_d = Receiving water flow rate downstream of the effluent discharge = $Q_e + Q_u$
Q_e = Effluent flow rate (set equal to the design flow of the WWTP)
Q_u = Receiving water low flow rate upstream of the discharge (1Q10, 7Q10 or 30B3)

When the mass balance equation is solved for C_d, it becomes:

$$C_d = \frac{C_e \times Q_e + C_u \times Q_u}{Q_e + Q_u} \qquad \text{Equation 2}$$

The above form of the equation is based on the assumption that the discharge is rapidly and completely mixed with 100% of the receiving stream.

If the mixing zone is based on less than complete mixing with the receiving water, the equation becomes:

$$C_d = \frac{C_e \times Q_e + C_u \times (Q_u \times \%MZ)}{Q_e + (Q_u \times \%MZ)} \qquad \text{Equation 3}$$

Where:

% MZ = the percentage of the receiving water flow available for mixing.

If a mixing zone is not allowed, dilution is not considered when projecting the receiving water concentration and,

$$C_d = C_e \qquad \text{Equation 4}$$

A dilution factor (D) can be introduced to describe the allowable mixing. Where the dilution factor is expressed as:

$$D = \frac{Q_e + Q_u \times \%MZ}{Q_e} \qquad \text{Equation 5}$$

After the dilution factor simplification, the mass balance equation becomes:

$$C_d = \frac{C_e - C_u}{D} + C_u \qquad \text{Equation 6}$$

If the criterion is expressed as dissolved metal, the effluent concentrations are measured in total recoverable metal and must be converted to dissolved metal as follows:

$$C_d = \frac{CF \times C_e - C_u}{D} + C_u \qquad \text{Equation 7}$$

Where C_e is expressed as total recoverable metal, C_u and C_d are expressed as dissolved metal, and CF is a conversion factor used to convert between dissolved and total recoverable metal.

The above equations for C_d are the forms of the mass balance equation which were used to determine reasonable potential and calculate wasteload allocations.

Maximum Projected Effluent Concentration

When determining the projected receiving water concentration downstream of the effluent discharge, the EPA's TSD recommends using the maximum projected effluent concentration (C_e) in the mass balance calculation. To determine the maximum projected effluent concentration (C_e) the EPA has developed a statistical approach to better characterize the effects of effluent variability. The approach combines knowledge of effluent variability as estimated by a coefficient of variation (CV) with the uncertainty due to a limited number of data to project an estimated maximum concentration for the effluent. Once the CV for each pollutant parameter has been calculated, the reasonable potential multiplier (RPM) used to derive the maximum projected effluent concentration (C_e) can be calculated using the following equations:

First, the percentile represented by the highest reported concentration is calculated.

$$p_n = (1 - \text{confidence level})^{1/n} \qquad \text{Equation 8}$$

where,

p_n = the percentile represented by the highest reported concentration
n = the number of samples
confidence level = 99% = 0.99

and

$$RPM = \frac{C_{99}}{C_{P_n}} = \frac{e^{Z_{99} \times \sigma - 0.5 \times \sigma^2}}{e^{Z_{P_n} \times \sigma - 0.5 \times \sigma^2}}$$ Equation 9

Where,

σ^2 = $\ln(CV^2 + 1)$
Z_{99} = 2.326 (z-score for the 99th percentile)
Z_{Pn} = z-score for the P_n percentile (inverse of the normal cumulative distribution function at a given percentile)
CV = coefficient of variation (standard deviation ÷ mean)

The maximum projected effluent concentration is determined by simply multiplying the maximum reported effluent concentration by the RPM:

$$C_e = (RPM)(MRC)$$ Equation 10

where MRC = Maximum Reported Concentration

Reasonable Potential

The discharge has reasonable potential to cause or contribute to an exceedance of water quality criteria if the maximum projected concentration of the pollutant at the edge of the mixing zone exceeds the most stringent criterion for that pollutant.

Results of Reasonable Potential Calculations

The results of the calculations are presented in Tables C-5 and C-6 of this appendix.

E. WQBEL Calculations

The following calculations demonstrate how the water quality-based effluent limits (WQBELs) in the draft permit were calculated. The WQBELs for cadmium, copper, cyanide, lead, mercury, WET and zinc are intended to protect aquatic life criteria. The following discussion presents the general equations used to calculate the water quality-based effluent limits. The calculations for all WQBELs based on aquatic life criteria are summarized in Tables C-7 and C-8.

Calculate the Wasteload Allocations (WLAs)

Wasteload allocations (WLAs) are calculated using the same mass balance equations used to calculate the concentration of the pollutant at the edge of the mixing zone in the reasonable potential analysis (Equations 6 and 7). To calculate the wasteload allocations, C_d is set equal to the acute or chronic criterion and the equation is solved for C_e. The calculated C_e is the acute or chronic WLA. Equation 6 is rearranged to solve for the WLA, becoming:

$$C_e = WLA = D \times (C_d - C_u) + C_u \quad \text{Equation 11}$$

Idaho's water quality criteria for some metals are expressed as the dissolved fraction, but the Federal regulation at 40 CFR 122.45(c) requires that effluent limits be expressed as total recoverable metal. Therefore, the EPA must calculate a wasteload allocation in total recoverable metal that will be protective of the dissolved criterion. This is accomplished by dividing the WLA expressed as dissolved by the criteria translator, as shown in equation 12, below. As discussed in Appendix B, the criteria translator (CT) is equal to the conversion factor, because site-specific translators are not available for this discharge.

$$C_e = WLA = \frac{D \times (C_d - C_u) + C_u}{CT} \quad \text{Equation 12}$$

The next step is to compute the "long term average" concentrations which will be protective of the WLAs. This is done using the following equations from the EPA's *Technical Support Document for Water Quality-based Toxics Control* (TSD):

$$LTA_a = WLA_a \times e^{(0.5\sigma^2 - z\sigma)} \quad \text{Equation 13}$$

$$LTA_c = WLA_c \times e^{(0.5\sigma_4^2 - z\sigma_4)} \quad \text{Equation 14}$$

where,

σ^2 = $\ln(CV^2 + 1)$
Z_{99} = 2.326 (z-score for the 99th percentile probability basis)
CV = coefficient of variation (standard deviation ÷ mean)
σ_4^2 = $\ln(CV^2/4 + 1)$

For ammonia, because the chronic criterion is based on a 30-day averaging period, the Chronic Long Term Average (LTA_c) is calculated as follows:

$$LTA_c = WLA_c \times e^{(0.5\sigma_{30}^2 - z\sigma_{30})} \quad \text{Equation 15}$$

where,

σ_{30}^2 = $\ln(CV^2/30 + 1)$

The LTAs are compared and the more stringent is used to develop the daily maximum and monthly average permit limits as shown below.

Derive the maximum daily and average monthly effluent limits

Using the TSD equations, the MDL and AML effluent limits are calculated as follows:

$$MDL = LTA \times e^{(z_m\sigma - 0.5\sigma^2)} \quad \text{Equation 16}$$

$$AML = LTA \times e^{(z_a\sigma_n - 0.5\sigma_n^2)} \quad \text{Equation 17}$$

where σ, and σ^2 are defined as they are for the LTA equations above, and,

σ_n^2 = $\ln(CV^2/n + 1)$
z_a = 1.645 (z-score for the 95th percentile probability basis)
z_m = 2.326 (z-score for the 99th percentile probability basis)

n = number of sampling events required per month. With the exception of ammonia, if the AML is based on the LTA_c, i.e., $LTA_{minimum} = LTA_c$), the value of ''n'' should is set at a minimum of 4. For ammonia, In the case of ammonia, if the AML is based on the LTA_c, i.e., $LTA_{minimum} = LTA_c$), the value of ''n'' should is set at a minimum of 30.

Tables C-8 through C-11, below, detail the calculations for reasonable potential determinations and water quality-based effluent limits.

F. References

EPA. 1991. *Technical Support Document for Water Quality-based Toxics Control*. US Environmental Protection Agency, Office of Water, EPA/505/2-90-001. March 1991. http://www.epa.gov/npdes/pubs/owm0264.pdf

GEI Consultants. 2014. *Mercury and selenium Bioaccumulation Evaluation Report for the Yankee Fork of the Salmon River, Idaho, 2013*. GEI Consultants, Inc. Ecological Division. Denver, CO. March 2014.

IDEQ. 2005. *Implementation Guidance for the Idaho Mercury Water Quality Criteria*. Idaho Department of Environmental Quality. Negotiated Rulemaking Committee. Boise, Idaho. April 2005.
http://www.deq.idaho.gov/media/639808-idaho_mercury_wq_guidance.pdf

Table C-8: Reasonable Potential Calculations for Outfall 002

				State Water Quality Standard		Max concentration at edge of...													
Parameter	Metal Criteria Translator as decimal Acute	Metal Criteria Translator as decimal Chronic	Ambient Concentration (metals as dissolved) ug/L	Acute ug/L	Chronic ug/L	Acute Mixing Zone ug/L	Chronic Mixing Zone ug/L	LIMIT REQ'D?	Effluent percentile value	Pn	Max effluent conc. measured (metals as total recoverable) ug/L	Coeff Variation CV	s	s^2	# of samples n	Multiplier	Acute Dil'n Factor	Chronic Dil'n Factor	COMMENTS
Acute WET <30 CFS (Tua)	1.00	1.00		0.300	0.300	0.23	0.23	NO	0.99	0.681	1.50	0.18	0.178	0.032	12	1.39	9.00	9.00	100% MZ
Acute WET >30 CFS (Tua)	1.00	1.00		0.300	0.300	0.13	0.13	NO	0.99	0.681	1.50	0.18	0.178	0.032	12	1.39	15.96	15.96	100% MZ
Ammonia <30 CFS (mg/L)	1.00	1.00	0.204	8.31	3.24	0.27	0.27	NO	0.99	0.969	0.31	0.69	0.623	0.388	144	1.34	3.00	3.00	25% MZ
Ammonia >30 CFS (mg/L)	1.00	1.00	0.204	8.31	3.24	0.24	0.24	NO	0.99	0.969	0.31	0.31	0.303	0.092	144	1.15	4.74	4.74	25% MZ
Chronic WET <30 CFS (Tuc)	1.00	1.00		3.00	1.00	9.15	9.15	YES	0.99	0.763	16.00	1.35	1.017	1.035	17	5.15	9.00	9.00	100% MZ
Chronic WET >30 CFS (Tuc)	1.00	1.00		3.00	1.00	5.16	5.16	YES	0.99	0.763	16.00	1.35	1.017	1.035	17	5.15	15.96	15.96	100% MZ
Cyanide <30 CFS	1.00	1.00	2.00	22.00	5.20	5.90	5.90	YES	0.99	0.979	10.00	1.44	1.059	1.121	214	1.37	3.00	3.00	25% MZ
Cyanide >30 CFS	1.00	1.00	2.00	22.00	5.20	4.47	4.47	NO	0.99	0.979	10.00	1.44	1.059	1.121	214	1.37	4.74	4.74	25% MZ
Nitrate+Nitrite <30 CFS (mg/L)	1.00	1.00	0.200		100		0.57	NO	0.99	0.922	0.90	0.43	0.412	0.169	57	1.45		3.00	25% MZ
Nitrate+Nitrite <30 CFS (mg/L)	1.00	1.00	0.200		100		0.43	NO	0.99	0.922	0.90	0.43	0.412	0.169	57	1.45		4.74	25% MZ
Selenium <30 CFS	1.00	1.00	0.300	20.0	5.00	2.02	2.02	NO	0.99	0.969	4.70	0.336	0.327	0.107	145	1.16	3.00	3.00	25% MZ
Selenium >30 CFS	1.00	1.00	0.300	20.0	5.00	1.39	1.39	NO	0.99	0.969	4.70	0.336	0.327	0.107	145	1.16	4.74	4.74	25% MZ
Silver <30 CFS	0.85			0.740		0.052		NO	0.99	0.979	0.13	1.60	1.127	1.271	214	1.40	3.00		25% MZ
Silver >30 CFS	0.85			0.318		0.033		NO	0.99	0.979	0.13	1.60	1.127	1.271	214	1.40	4.74		25% MZ

Table C-9: Reasonable Potential Calculations for Outfall 003

				State Water Quality Standard		Max concentration at edge of...												
Parameter	Metal Criteria Translator as decimal Acute	Metal Criteria Translator as decimal Chronic	Ambient Concentration (metals as dissolved) ug/L	Acute ug/L	Chronic ug/L	Acute Mixing Zone ug/L	Chronic Mixing Zone ug/L	LIMIT REQ'D?	Effluent percentile value	Pn	Max effluent conc. measured (metals as total recoverable) ug/L	Coeff Variation CV	s	# of samples n	Multiplier	Acute Dil'n Factor	Chronic Dil'n Factor	COMMENTS
Ammonia, mg/L (<15)	1.00	1.00	0.0740	10.3	3.74	0.11	0.11	NO	0.99	0.973	0.21	0.65	0.60	167	1.27	4.74	4.74	
Ammonia, mg/L (15-45)	1.00	1.00	0.0740	10.3	3.74	0.12	0.12	NO	0.99	0.973	0.21	0.65	0.60	167	1.27	4.37	4.37	
Ammonia, mg/L (>45)	1.00	1.00	0.0740	10.3	3.74	0.10	0.10	NO	0.99	0.973	0.21	0.65	0.60	167	1.27	6.61	6.61	
Arsenic-CWAL (<15)	1.00	1.00		340	150	3.05	3.05	NO	0.99	0.720	6.70	0.46	0.44	14	2.16	4.74	4.74	
Arsenic-CWAL (15-45)	1.00	1.00		340	150	3.31	3.31	NO	0.99	0.720	6.70	0.46	0.44	14	2.16	4.37	4.37	
Arsenic-CWAL (>45)	1.00	1.00		340	150	2.19	2.19	NO	0.99	0.720	6.70	0.46	0.44	14	2.16	6.61	6.61	
Chronic WET, TUc (<15)	1.00	1.00		3.00	1.00	0.297	0.297	NO	0.99	0.599	1.50	0.60	0.55	9	3.16	15.96	15.96	
Chronic WET TUc(15-45)	1.00	1.00		3.00	1.00	0.33	0.33	NO	0.99	0.599	1.50	0.60	0.55	9	3.16	14.46	14.46	
Chronic WET TUc (>45)	1.00	1.00		3.00	1.00	0.20	0.20	NO	0.99	0.599	1.50	0.60	0.55	9	3.16	23.44	23.44	
Cyanide (<15)	1.00	1.00		22.0	5.20	4.50	4.50	NO	0.99	0.973	13.00	1.86	1.22	166	1.64	4.74	4.74	
Cyanide (15-45)	1.00	1.00		22.0	5.20	4.89	4.89	NO	0.99	0.973	13.00	1.86	1.22	166	1.64	4.37	4.37	
Cyanide (>45)	1.00	1.00		22.0	5.20	3.23	3.23	NO	0.99	0.973	13.00	1.86	1.22	166	1.64	6.61	6.61	
Selenium (<15)	1.00	1.00	0.1000	20.0	5.00	0.74	0.74	NO	0.99	0.973	2.80	0.29	0.29	168	1.12	4.74	4.74	
Selenium (15-45)	1.00	1.00	0.1000	20.0	5.00	0.80	0.80	NO	0.99	0.973	2.80	0.29	0.29	168	1.12	4.37	4.37	
Selenium (>45)	1.00	1.00	0.1000	20.0	5.00	0.56	0.56	NO	0.99	0.973	2.80	0.29	0.29	168	1.12	6.61	6.61	
Silver (<15)	0.85			0.653		0.035		NO	0.99	0.973	0.10	3.85	1.66	167	1.95	4.74		
Silver (15-45)	0.85			0.363		0.038		NO	0.99	0.973	0.10	3.85	1.66	167	1.95	4.37		
Silver (>45)	0.85			0.318		0.025		NO	0.99	0.973	0.10	3.85	1.66	167	1.95	6.61		
Mercury (<15)	1.00	1.00	0.0066	2.10	0.012	0.0066	0.0066	NO	0.99	0.316	0.00140	0.60	0.55	4	4.74	4.74	4.74	
Mercury (15-45)	1.00	1.00	0.0066	2.10	0.012	0.0066	0.0066	NO	0.99	0.316	0.00140	0.60	0.55	4	4.74	4.37	4.37	
Mercury (>45)	1.00	1.00	0.0066	2.10	0.012	0.0066	0.0066	NO	0.99	0.316	0.00140	0.60	0.55	4	4.74	6.61	6.61	

Table C-10: Water Quality-based Effluent Limit Calculations for Outfall 002

Dilution (Dil'n) factor is the inverse of the percent effluent concentration at the edge of the acute or chronic mixing zone.

PARAMETER	Acute Dil'n Factor	Chronic Dil'n Factor	Metal Criteria Translator Acute	Metal Criteria Translator Chronic	Ambient Concentration ug/L	Water Quality Standard Acute ug/L	Water Quality Standard Chronic ug/L	Average Monthly Limit (AML) ug/L	Maximum Daily Limit (MDL) ug/L	Comments	WLA Acute ug/L	WLA Chronic ug/L	LTA Acute ug/L	LTA Chronic ug/L	LTA Coeff. Var. (CV) decimal	LTA Prob'y Basis decimal	Limiting LTA ug/L	Coeff. Var. (CV) decimal	AML Prob'y Basis decimal	MDL Prob'y Basis decimal	# of Samples per Month n
			Permit Limit Calculation Summary								Waste Load Allocation (WLA) and Long Term Average (LTA) Calculations							Statistical variables for permit limit calculation			
Jordan Cr < 30 CFS, 8:1															0.60	0.99		0.60	0.95	0.99	4.00
Cadmium	3.00	3.00	0.95	0.92		1.19	0.52	**1.44**	**2.72**		3.74	1.72	1.33	0.969	0.53	0.99	0.969	0.53	0.95	0.99	4.00
Copper	3.00	3.00	0.96	0.96	2.11	14.8	10.01	**18.6**	**41.9**		41.9	26.9	10.8	12.1	0.77	0.99	10.77	0.77	0.95	0.99	4.00
Cyanide	3.00	3.00	1.00	1.00	2.00	22.0	5.20	**7.47**	**21.3**		62.0	11.6	9.25	3.18	1.44	0.99	3.18	1.44	0.95	0.99	4.00
Lead	3.00	3.00	0.92	0.92	0.20	24.1	0.94	**1.80**	**4.84**		77.9	2.62	13.53	0.841	1.20	0.99	0.84	1.20	0.95	0.99	4.00
Mercury	3.00	3.00	1.00	1.00	0.0025	2.10	0.012	**0.022**	**0.057**		6.29	0.0310	1.22	0.0110	1.06	0.99	0.0110	1.06	0.95	0.99	4.00
Zinc	3.00	3.00	0.98	0.99	6.70	103.5	104.3	**141**	**304**		304	304	85.5	146	0.70	0.99	85.5	0.70	0.95	0.99	4.00
WET (TUc)	9.00	9.00	1.00	1.00		3.00	1.00	**5.93**	**16.6**		27.00	9.00	4.25	2.616	1.35	0.99	2.616	1.35	0.95	0.99	4.00
Jordan Cr ≥ 30 CFS																					
Cadmium	4.74	4.74	0.97	0.93		0.80	0.40	**1.70**	**3.22**		3.93	2.03	1.40	1.145	0.53	0.99	1.145	0.53	0.95	0.99	4.00
Copper	2.35	2.35	0.96	0.96	2.11	15.7	10.53	**15.7**	**35.3**		35.3	22.8	9.1	10.2	0.77	0.99	9.08	0.77	0.95	0.99	4.00
Lead	4.74	4.74	0.99	0.99	0.20	13.9	0.54	**1.25**	**3.38**		65.5	1.83	11.38	0.587	1.20	0.99	0.59	1.20	0.95	0.99	4.00
Mercury	4.74	4.74	1.00	1.00	0.0025	2.10	0.012	**0.034**	**0.087**		9.95	0.0474	1.92	0.0168	1.06	0.99	0.0168	1.06	0.95	0.99	4.00
Zinc	2.50	2.50	0.98	0.99	6.70	104.3	105.1	**119**	**256**		256	256	72.1	123	0.70	0.99	72.1	0.70	0.95	0.99	4.00
WET (TUc)	16.0	16.0	1.00	1.00		3.00	1.00	**10.5**	**29.5**		47.88	15.96	7.54	4.640	1.35	0.99	4.640	1.35	0.95	0.99	4.00

Table C-11: Water Quality-based Effluent Limit Calculations for Outfall 003

Dilution (Dil'n) factor is the inverse of the percent effluent concentration at the edge of the acute or chronic mixing zone.

PARAMETER	Acute Dil'n Factor	Chronic Dil'n Factor	Metal Criteria Translator Acute	Metal Criteria Translator Chronic	Ambient Concentration ug/L	Water Quality Standard Acute ug/L	Water Quality Standard Chronic ug/L	Average Monthly Limit (AML) ug/L	Maximum Daily Limit (MDL) ug/L	Comments	WLA Acute ug/L	WLA Chronic ug/L	LTA Acute ug/L	LTA Chronic ug/L	LTA Coeff. Var. (CV) decimal	LTA Prob'y Basis decimal	Limiting LTA ug/L	Coeff. Var. (CV) decimal	AML Prob'y Basis decimal	MDL Prob'y Basis decimal	# of Samples per Month n
			Permit Limit Calculation Summary								Waste Load Allocation (WLA) and Long Term Average (LTA) Calculations							Statistical variables for permit limit calculation			
Low Flow (< 15 CFS)																					
Cadmium	2.35	2.35	0.94	0.91		1.98	1.02	**2.22**	**4.08**		5	2.62	1.9	1.5	0.49	0.99	1.54	0.49	0.95	0.99	4.00
Copper	2.94	2.94	0.96	0.96	1.97	14.29	9.69	**21.6**	**39.8**		40	25.73	14.8	14.9	0.50	0.99	14.80	0.50	0.95	0.99	4.00
Lead	4.74	4.74	0.93	0.93	0.20	22.2	0.865	**1.40**	**4.84**		112	3.60	8.7	0.4	4.84	0.99	0.37	4.84	0.95	0.99	4.00
Mercury	4.74	4.74	1.00	1.00	0.0066	2.10	0.012	**0.026**	**0.053**		10	0.03	3.2	0.0	0.60	0.99	0.0170	0.60	0.95	0.99	4.00
Zinc	4.44	4.44	0.98	0.99	4.70	79.4	80.1	**158**	**344**		344	344.20	95.2	163.6	0.71	0.99	95.22	0.71	0.95	0.99	4.00
Medium Flow (15-45 CFS)																					
Cadmium	3.42	3.42	0.96	0.92		1.43	0.80	**2.50**	**4.59**		5	2.95	1.9	1.7	0.49	0.99	1.73	0.49	0.95	0.99	4.00
Copper	4.37	4.37	0.96	0.96	1.97	10.4	7.26	**21.8**	**40.3**		40	26.09	15.0	15.1	0.50	0.99	14.98	0.50	0.95	0.99	4.00
Lead	4.37	4.37	0.98	0.98	0.20	15.1	0.59	**0.75**	**2.60**		67	1.94	5.2	0.2	4.84	0.99	0.20	4.84	0.95	0.99	4.00
Mercury	4.37	4.37	1.00	1.00	0.0066	2.10	0.012	**0.025**	**0.050**		9	0.03	2.9	0.0	0.60	0.99	0.016	0.60	0.95	0.99	4.00
Zinc	4.37	4.37	0.98	0.99	4.70	75.2	75.8	**147**	**319**		319	319.59	88.4	151.9	0.71	0.99	88.4	0.71	0.95	0.99	4.00
High Flow (>45 CFS)																					
Cadmium	5.26	5.26	0.97	0.94		1.03	0.62	**2.96**	**5.42**		6	3.49	2.1	2.0	0.49	0.99	2.04	0.49	0.95	0.99	4.00
Copper	3.92	3.92	0.96	0.96	1.97	10.90	7.58	**20.8**	**38.5**		39	24.95	14.3	14.5	0.50	0.99	14.30	0.50	0.95	0.99	4.00
Lead	6.61	6.61	0.99	0.99	0.20	13.9	0.54	**0.96**	**3.32**		91	2.47	7.1	0.3	4.84	0.99	0.26	4.84	0.95	0.99	4.00
Mercury	6.61	6.61	1.00	1.00	0.0066	2.10	0.012	**0.035**	**0.069**		14	0.04	4.4	0.02	0.60	0.99	0.022	0.60	0.95	0.99	4.00
Zinc	6.61	6.61	0.98	0.99	4.70	57.8	58.2	**167**	**364**		364	363.77	100.6	172.86	0.71	0.99	100.6	0.71	0.95	0.99	4.00