Fact Sheet

October 17, 2011

The U.S. Environmental Protection Agency (EPA)
Proposes to Reissue a National Pollutant Discharge Elimination System (NPDES) Permit to Discharge Pollutants Pursuant to the Provisions of the Clean Water Act (CWA) to:

Lander Street Wastewater Treatment Facility, City of Boise
790 Lander Street
Boise, ID 83703

NPDES Permit Number: ID-0020443

Public Notice Date:
Public Notice Expiration Date:

EPA, Technical Contact: Kathleen Collins, 206-553-2108, collins.kathleen@epa.gov
1-800-424-4372 ext. 3-2108 (within Region 10)

EPA Proposes NPDES Permit Reissuance

The EPA proposes to reissue a National Pollutant Discharge Elimination System (NPDES) permit to the Lander Street Wastewater Treatment Facility owned by the City of Boise. The draft permit sets conditions on the discharge of pollutants from the facility to the Boise River. 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.

This fact sheet includes:

- Information on public comment, public hearing, and appeal procedures
- A description of the proposed discharge
- A listing of the proposed effluent limitations and other conditions
- A description of the discharge location
- Information supporting the conditions in the draft permit

The State of Idaho Certification.

The EPA is requesting that the State of Idaho Department of Environment Quality certify the NPDES permit under section 401 of the Clean Water Act (CWA). Comments regarding the certification should be directed to:

Regional Administrator
Idaho Department of Environmental Quality
1445 North Orchard
Boise, Idaho 83706

Public Comment

Persons wishing to comment on the draft permit or request a public hearing may do so in writing by the expiration date of the Public Notice. All comments should include name, address, phone number, a concise statement of basis of comment and relevant facts upon which it is based. A request for public hearing must state the nature of the issues to be raised as well as the requester's name, address and telephone number. All comments and requests for a public hearing must be in writing and should be addressed to the EPA as described in the Public Comments Section of the attached Public Notice. The EPA will consider all substantive comments before reissuing the final permit.

After the Public Notice expires and all significant comments have been considered, the EPA's Regional Director for the Office of Water and Watersheds will make a final decision regarding permit reissuance. If no substantive comments are received, the tentative conditions in the draft permit will become final, and the permit will become effective upon issuance. If significant comments are received, the EPA will address the comments and reissue the permit along with a response to comments document. The permit will become effective no less than 30 days after the issuance date, unless the permit is appealed to the Environmental Appeals Board within 30 days pursuant to 40 CFR § 124.19.

Documents are Available for Review

The draft NPDES permit and related documents can be reviewed or obtained by visiting or contacting the EPA's Regional Office in Seattle between 8:30 a.m. and 4:00 p.m., Monday through Friday (See address below).

United States Environmental Protection Agency
Region 10
1200 Sixth Avenue, Suite 900
Seattle, Washington 98101
(206) 553-0523 or
1-800-424-4372 (within Alaska, Idaho, Oregon and Washington)

The fact sheet and draft permit are also available at:

EPA Idaho Operations Office
1435 North Orchard Street
Boise, Idaho 83706
(208) 378-5746

Draft permits, Fact Sheets and other information can also be found by visiting the EPA Region 10's website at: http://yosemite.epa.gov/r10/WATER.NSF/NPDES+Permits/DraftPermitsID

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Acronyms

1Q10	1 day, 10 year low flow
7Q10	7 day, 10 year low flow
30Q10	30 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
AWL	Average Weekly Limit
BOD_5	Biochemical oxygen demand, five-day
BMP	Best Management Practices
ºC	Degrees Celsius
CFR	Code of Federal Regulations
CFS	Cubic Feet per Second
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
I/I	Infiltration and Inflow
lbs/day	Pounds per day
LTA	Long Term Average
mg/L	Milligrams per liter
ML	Minimum Level
µg/L	Micrograms per liter
mgd	Million gallons per day
MDL	Maximum Daily Limit or Method Detection Limit
N	Nitrogen
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System

OWW	Office of Water and Watersheds
O&M	Operations and maintenance
POTW	Publicly owned treatment works
QAP	Quality assurance plan
RP	Reasonable Potential
RPM	Reasonable Potential Multiplier
RWC	Receiving Water Concentration
SS	Suspended Solids
s.u.	Standard Units
TKN	Total Kjeldahl Nitrogen
TMDL	Total Maximum Daily Load
TRC	Total Residual Chlorine
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
WQBEL	Water quality-based effluent limit
WQS	Water Quality Standards
WWTP	Wastewater treatment plant

I. Applicant

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

Lander Street Wastewater Treatment Facility, City of Boise
NPDES Permit No. ID 002044-3

Facility Address:	790 Lander Street Boise, ID 83703
Facility Mailing Address:	11818 Joplin Road Boise, ID 83714
Applicant Name:	Boise City Public Works Department
Applicant Address:	150 N. Capitol Blvd Boise, ID 83702
Contact Person:	Paul Woods, Environmental Division Manager

II. Facility Information

The City of Boise (City) owns and operates two wastewater treatment facilities (WWTFs): Lander Street Wastewater Treatment Facility (hereafter referred to as the Lander Street facility) and the West Boise Wastewater Treatment Facility (West Boise facility). Both facilities treat wastewater from both domestic and industrial sources. The discharge from the Lander Street facility is located at approximately river mile 49.9 on the Boise River and the West Boise facility discharge is located downstream of the Lander Street facility at approximately river mile 43.5 of the Boise River. This fact sheet addresses the Lander Street facility only. The City submitted an NPDES permit application in April 2004, and submitted an updated NPDES permit application in January 2010.

A. Facility Description

The Lander Street facility serves Boise City/Ada County, Bench Sewer District, and the Northwest Boise Sewer District. The 2004 permit application identified the total population served as 127,000. The total population served according to the 2010 application is approximately 122,600. The population served by this facility has decreased by 4,600 from 2004 to 2010.

Design Flow of Facility
The 2004 and 2010 NPDES applications for the Lander Street facility identify the design flow rate of the facility as 15 million gallons per day (mgd) as a monthly average flow. The applications identified the highest maximum daily flow rate as 17.57 mgd (2004). The highest average monthly flow was 16.3 mgd.

In its NPDES permit application the City requested that the EPA use the design flow of the facility (i.e., 15 mgd) to calculate whether the effluent from the facility has the reasonable potential to cause or contribute to an exceedance of the water quality standards for the Boise River. However, the City also requested that the City be allowed to increase the effluent flow to greater than 15 mgd if needed. The City states that it is able to comply with its effluent limits in its permit even if the effluent flow is higher than 15 mgd.

40 C.F.R. § 122.45(b) requires the use of a POTW's design flow to calculate "permit effluent limits, standards or prohibitions." Therefore, the EPA uses the POTW's design flow of 15 mgd to calculate the effluent limits in the permit. In addition, as discussed in detail below, the final permit includes a flow limit of 15 mgd for the facility. The NPDES regulation at 40 CFR 122.44(d)(1) 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 water quality standard.

When determining whether a pollutant has the reasonable potential to cause or contribute to an excursion of a water quality standard, the EPA uses a mass balance equation which takes into consideration the effluent flow of the facility, receiving water flow, concentration of the effluent, and concentration of the receiving water. The mass balance equation is used to calculate the concentration of the receiving water downstream of the facility due to the effluent discharge. If the downstream receiving water concentration exceeds the applicable pollutant criterion necessary to protect the water body then an effluent limitation is required to be incorporated into the permit. When an effluent has a pollutant concentration that exceeds the water quality criterion, as the Lander Street facility effluent does (*e.g.*, ammonia), then increasing the effluent discharge flow will result in an increase in the downstream concentration of the pollutant. The downstream concentration of the pollutant will increase as the effluent flow increases, and the downstream concentration will eventually exceed the criterion depending on how high the effluent flow is. Therefore, analyzing the effects of the effluent design flow (*i.e.*, 15 mgd) on the receiving water but allowing the facility to discharge at flow rates higher than the facility's design flow will underestimate the adverse effects the effluent will have on the receiving water, and will underestimate the need for effluent limitations.

Additionally, when developing effluent limits for a pollutant, the EPA uses a mass balance equation which takes into consideration the design flow of the facility, receiving water flow, water quality criterion, and concentration of the receiving water. The effluent limit derived from the mass balance equation will become more stringent as the effluent flow increases. Therefore, to ensure that water quality criteria are not exceeded in the water body, it is important to ensure that the facility does not discharge at a flow rate that exceeds the one used to calculate the effluent limit. Therefore to ensure that the Lander Street facility does not discharge above this flow, the EPA is including a flow limit of 15 mgd as an average monthly limit in the permit.

Treatment Process

Raw sewage entering the facility is screened and pumped to the aerated grit chambers. Flow proportional sampling of the influent wastewater is done at the inlet to the grit chambers. From the grit chambers the sewage flows to the primary clarifiers where 50% of the total suspended solids and 35% of the biochemical oxygen demand is removed. The effluent is then pumped to the aeration basins where it is mixed with the return activated sludge to form mixed liquor for biochemical removal of wastes from the wastewater. The aeration basins are currently configured in a step-feed plug flow with anoxic selector zones process configuration for optimum performance and removal of ammonia and nitrogen. The mixed liquor from the aeration basin flows to the secondary clarifiers where solids settle and are removed for return to the aeration basins and for removal from the liquid process. The secondary process effluent flows through a parshall flume for measurement and on to the ultraviolet light disinfection system prior to discharge to the Boise River. A portion of the disinfected effluent is further disinfected using sodium hypochlorite and is pumped into a distribution system to provide water for miscellaneous sprays and other uses at various process units. This flow is measured with a magnetic flow meter. This flow is subtracted from the parshall flume flow rate to determine the plant net effluent flow.

Solids removed from the primary clarifiers and the gravity belt thickened waste activated sludge are pumped to anaerobic digesters. The Class B digested sludge is pumped through a six inch pipeline to the West Boise facility where it is blended with the Class B sludge produced at the West Boise facility, dewatered and hauled to the City owned sludge application site.

Bypasses

One emergency bypass is incorporated into the facilities. It has not been used in more than 30 years. This emergency plant bypass pipeline terminates in a discharge structure with a locked shut sluice gate.

Standby Power and Redundancy

Redundancy is provided for all process units such that the largest unit can be taken off line and the remaining units will provide adequate treatment of the design loadings.

Outfall structure

The outfall for this facility has a diffuser, and is located on the bottom of the river.

B. Permit History

This facility's current permit became effective on November 2, 1999. The permit was modified twice. The first modification to the permit became effective on February 12, 2001, and the second modification became effective on February 12, 2003.

The permit expired on November 2, 2004. The EPA received a permit renewal application from the City on April 28, 2004. Thus, pursuant to 40 CFR 122.6 and 122.21(d), the 1994 permit was administratively extended and continues to be in effect until a new permit is issued. The City submitted an updated application on January 29, 2010.

C. Compliance History

A review of the discharge monitoring reports (DMRs) for the Lander Street facility found that the City is generally in compliance with the conditions of its existing permit.

III. RECEIVING WATER

A. General Information

The Lander Street facility discharges continually to the Boise River at approximately river mile 49.9. Flows in this segment of the Boise River are controlled by the dams located several miles upstream of the Lander Street facility.

The presence of upper Boise River (Anderson Ranch Dam and Arrowrock Dam) and lower Boise River (Lucky Peak Dam, Diversion Dam, and Barber Dam) reservoirs and dams, numerous diversions, and local flood control policies have significantly altered the flow regime and the physical and biological characteristics of the lower Boise River. Lucky Peak Dam, the structure controlling flow at the upstream end of the lower Boise River watershed, was constructed and began operations in 1957. Water is released from the reservoir to the Boise River just a few miles upstream from the City of Boise. Water releases from the reservoir are managed primarily for flood control and irrigation. Flow regulation for flood control has replaced natural, short duration (two to three months) flushing peak flows with longer (four to six months), greatly reduced peak flows. Water management has increased river flows during the summer irrigation season and significantly decreased winter low flows. Low flow conditions generally begin in mid-October when irrigation diversions end. The low flow period extends until flood control releases begin, sometime between the end of January and March. Flood flows generally extend through June, and releases for irrigation control flows are from July through mid-October. The current flow management regime began in 1984 (*Lower Boise River TMDL, Subbasin Assessment, Total Maximum Daily Loads*, December 18, 1998, Idaho Department of Environmental Quality, pg. 6).

B. Low Flow Conditions

The low flow conditions of a water body are used to determine if an effluent discharge has the reasonable potential to cause or contribute to an exceedance of a water quality standard. If the EPA determines that reasonable potential to exceed the water quality standards exists then water quality-based effluent limits are developed based on low flow conditions (see Appendix C of this fact sheet for additional information on flows).

There is no stream gauge upstream of the Lander Street facility, so the EPA used ambient flow data collected at the Station 13206000 - Boise River at Glenwood Bridge NR Boise, ID (at River Mile 47.5), approximately 2.4 miles downstream from the Lander Street facility. The EPA used the data from the Glenwood Bridge Station and the EPA's DFLOW 3.1b model to calculate the low flow conditions[1] for the Boise River at the Glenwood Bridge Station. Table 1 presents the low flow values at USGS Station at Glenwood Bridge.

TABLE 1: Flows at USGS Station 13206000 - Boise River at Glenwood Bridge NR Boise, ID		
Flows	May 1 – September 30	October 1 – April 30
1Q10	171.3 mgd (265 cfs)	71.8 mgd (111 cfs)
7Q10	184.2 mgd (285 cfs)	82.1 mgd (127 cfs)
30Q10	248.2 mgd (384 cfs)	90.5 mgd (140 cfs)
30Q5	295.4 mgd (457 cfs)	105.4 mgd (163 cfs)
Harmonic Mean	257.3 mgd (398 cfs)	252.7 mgd (391 cfs)

As stated above, the Glenwood Bridge Station is downstream of the Lander Street facility; therefore the flow values in Table 1 include the flow from the Lander Street facility. The EPA estimated the flow values upstream of the Lander Street facility by subtracting the average flow from the Lander Street facility from the values in Table 1. The City of Boise has provided the EPA with daily effluent flow data from January 1, 2001 through July 31, 2009. Based on this data set the average flow at the facility is 13.2 mgd (20.4 cfs). The estimated low flows upstream of the Lander Street facility are presented in Table 2.

TABLE 2: Flows Upstream of the Lander Street Facility		
Flows	May 1 – September 30	October 1 – April 30
1Q10	158.1 mgd	58.6 mgd
7Q10	171 mgd	68.9 mgd
30Q10	235 mgd	77.3 mgd
30Q5	282.2 mgd	92.2 mgd
Harmonic Mean	244.1 mgd	239.5 mgd

[1] The 1Q10 is the 1-day low flow with a return period of 10 years, the 7Q10 is the 7-day average low flow with a return period of 10 days, the 30Q10 if the 30-day average low flow with a return period of 10 years, the 30Q5 if the 30-day average low flow with a return period of 5 years, the harmonic mean flow is a long term mean flow.

For this permit, only the gaging station flow data from March 12, 1982 through December 31, 2009 were used to develop the low flow values. The EPA chose this time period because the Boise River is a managed river and the time period March 12, 1982 through December 31, 2009 more accurately reflects the flows that have occurred since the completion of several dams, diversions and reservoirs[2].

Additionally, for this permit, the City of Boise requested that the flow seasons be changed to May through September and October through April (rather than April through September and October through March). The City stated in its application that the startup of the irrigation season (the transition from low flow to high flow) can be anytime in April while the shutdown of the irrigations system (transition back to low flows) can be anytime in October. The flow seasons requested by the City (i.e., May through September and October through April) would result in the transition flows being captured entirely in the October through April flow season. Dividing the seasons as described by Boise is an acceptable method to describe different flow regimes, and can be used when performing the water quality based analysis for metals, ammonia, and other parameters. However, for the effluent limitations that are based on an approved TMDL or the Idaho Department of Environmental Quality's (IDEQ) March 29, 1979 *Final Design Criteria and Ultimate Effluent Limitations for the City of Boise*, the proposed permit will follow the time periods/flow seasons specified in the documents.

C. Beneficial Uses and Water Quality Criteria

Section 301(b)(1)(C) of the Clean Water Act (CWA) requires the development of limitations in permits necessary to meet water quality standards by July 1, 1977. Federal regulations at 40 CFR 122.4(d) require that the conditions in NPDES permits ensure compliance with the water quality standards of all affected States. A State's water quality standards are composed of use classifications, numeric and/or narrative water quality criteria, and an anti-degradation policy. These are explained in more detail below.

Use Classifications

The use classification system designates the beneficial uses (*e.g.*, drinking water supply, contact recreation, aquatic life, etc.) that each water body is expected to achieve. The State of Idaho Water Quality Standards and Wastewater Treatment Requirements (IDAPA

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[2] Numerous dams, diversions, and reservoirs have been built on the Boise River. The structures that most affect the Boise River flows are (1) the Boise River Diversion Dam, completed in 1908, is 7 miles southeast of the City of Boise; (2) the Arrowrock dam, completed in 1915, is approximately 22 miles upstream of the City of Boise; (3) the Anderson Ranch Dam, completed in 1951, is approximately 42 miles upstream of Arrowrock Dam; and (4) the Lucky Peak Reservoir, completed in 1955, is 1 mile upstream of the Boise Diversion Dam and extends upstream to Arrowrock Dam. Since the last major structures to influence flows in the Boise River were built in the 1950's it is appropriate to use the Boise River flow record after 1955 to most accurately reflect the flows on the Boise River. Records exist from 1982 to the present.

58.01.02) protects this segment of the Boise River (HUC 17050114, SW-5: Boise River – river mile 50 to Indian Creek) for cold water aquatic life, primary contact recreation, salmonid spawning and agricultural water supply, industrial water supply, wildlife habitats, and aesthetics.

Numeric or Narrative Water Quality Criteria

The numeric and/or narrative water quality criteria associated with the beneficial use are the criteria deemed necessary by the State to support the beneficial use classification of each water body. These criteria may be numeric or narrative. The criteria are found in the following sections of the Idaho Water Quality Standards:

- The narrative criteria applicable to all surface waters of the State are found at IDAPA 58.01.02.200 (General Surface Water Quality Criteria).

- The numeric criteria for toxic substances for the protection of aquatic life and primary contact recreation are found at IDAPA 58.01.02.210 (Numeric Criteria for Toxic Substances for Waters Designated for Aquatic Life, Recreation, or Domestic Water Supply Use).

- Additional numeric criteria necessary for the protection of aquatic life can be found at IDAPA 58.01.02.250 (Surface Water Quality Criteria for Aquatic Life Use Designations).

- Numeric criteria necessary for the protection of recreation uses can be found at IDAPA 58.01.02.251 (Surface Water Quality Criteria for Recreation Use Designations).

- Water quality criteria for agricultural water supply can be found in the EPA's *Water Quality Criteria 1972*, also referred to as the "Blue Book" (EPA R3-73-033) (See IDAPA 58.01.02.252.02)

- Site specific water quality criteria applicable to the Boise River can be found at IDAPA 58.01.02.278.01 (Lower Boise River Subbasin, HUC 17050114 Subsection 150.12, Boise River, SW-1 and SW-5 – Salmonid Spawning and Dissolved Oxygen) and IDAPA 58.01.02.278.04 (Boise River, SW-5 and SW-11a – Copper and Lead Aquatic Life Criteria.

Additionally, on December 12, 2008 the EPA sent a letter to Barry Burnell, the Water Quality Program Administrator for the Idaho Department of Environmental Quality disapproving Idaho's removal of the mercury acute and chronic freshwater aquatic life criteria from its water quality standards. Therefore, the numeric aquatic life criteria for mercury applicable to the designated aquatic life uses in Idaho are the previously adopted acute criterion (2.1 µg/L) and chronic criterion (0.012 µg/) that were approved by the EPA in 1997.

The numeric and narrative water quality criteria applicable to Boise River are listed in Appendix A of this fact sheet.

Anti-degradation Policy

The State's anti-degradation policy is a water quality standard and, as such, the NPDES permit must ensure that the State's anti-degradation policy is met. A State's anti-degradation policy specifies the framework to be used in making decisions regarding changes in water quality. The intent of an anti-degradation policy is to ensure that in all cases, at a minimum, water quality necessary to support existing uses is maintained (Tier I), that where water quality is better than the minimum level necessary to support protection and propagation of fish, shellfish, and wildlife, and recreation in and on the water, that water quality is also maintained and protected unless, through a public process, some lowering of water quality is deemed to be necessary to allow important economic or social development to occur (Tier II), and to identify water bodies of exceptional recreational or ecological significance and maintain and protect water quality in such water bodies (Tier III). Anti-degradation allows States and Tribes to maintain and protect the finite public resource of clean water and ensure that decisions to allow reductions in water quality are made in a public manner and serve the public good.

IDEQ has completed an antidegradation review which is included in the draft 401 certification for this permit. See Appendix G for the State's draft 401 water quality certification. 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 IDEQ as set forth above.

D. Water Quality Limited Waters

Any waterbody for which the water quality does not, and/or is not expected to meet, applicable water quality standards is defined as a "water quality limited segment."

Section 303(d) of the Clean Water Act (CWA) requires states to develop a Total Maximum Daily Load (TMDL) management plan for water bodies determined to be water quality limited segments. A TMDL is a detailed analysis of the water body to determine its assimilative capacity. The assimilative capacity is the loading of a pollutant that a water body can assimilate without causing or contributing to a violation of water quality standards. Once the assimilative capacity of the water body has been determined, the TMDL will allocate that capacity among point and non-point pollutant sources, taking into account natural background levels and a margin of safety. Allocations for non-point sources are known as "load allocations" (LAs). The allocations for point sources, known as "waste load allocations" (WLAs), are implemented through effluent limitations in NPDES permits. Effluent limitations for point sources must be consistent with applicable TMDL allocations.

In January 2000, the EPA approved the IDEQ's *Lower Boise River TMDL, Subbasin Assessment, Total Maximum Daily Load*. The TMDL included wasteload allocations for bacteria and total suspended solids (TSS) for the Lander Street facility.

The *Lower Boise River TMDL* included WLAs for bacteria based on fecal coliform concentrations. However, the TMDL stated that if the bacteria criterion were revised to require *E. coli* criteria rather than fecal coliform then "…compliance with the load allocations in this TMDL could be demonstrated using E. Coli samples, rather than fecal coliform," and that "…[i]f E. Coli are used as the new Idaho criteria for contact recreation when the permits are re-issued, the new E. Coli criteria should be incorporated into the permits in place of fecal coliform requirements." (see *Lower Boise River TMDL, Subbasin Assessment, Total Maximum Daily Load*, Idaho Department of Environmental Quality, December 18, 1999, Page 72, paragraph 4, line2).

The State of Idaho's 2008 Integrated Report Section 5 (section 303(d)) lists the Boise River, from Diversion Dam to the mouth, as impaired for temperature and flow alteration. Additionally, the Boise River from Indian Creek to the mouth is listed as impaired for nutrients (see Idaho Department of Environmental Quality 2008 Integrated Report and the EPA's October 13, 2009 letter to Barry Burrnell, IDEQ which added nutrients to Idaho's 303(d) listing for the Boise River from Indian Creek to the mouth of the Boise River).

IV. EFFLUENT LIMITATIONS

A. Basis for Effluent Limitations

The CWA requires Publicly Owned Treatment Works (POTWs) to meet performance-based requirements based on available wastewater treatment technology. Section 301 of the CWA established a required performance level, referred to as "secondary treatment," that all POTWs were required to meet by July 1, 1977. The EPA's secondary treatment regulations are contained in 40 CFR Part 133. These technology-based limits are the minimum level of effluent quality attainable by secondary treatment in terms of 5-day biochemical oxygen demand (BOD_5), TSS and pH. Additionally, the CWA requires the EPA to include water quality-based effluent limits for any pollutant that may cause or contribute to an exceedance of a water quality standard (see also 40 CFR § 122.44(d)). A water quality-based effluent limit is designed to ensure that the water quality standards of a waterbody are being met and they may be more stringent than technology-based effluent limits. The bases for the proposed effluent limits are provided in Appendices B, C and D of this document.

B. Proposed Effluent Limitations

The following summarizes the proposed effluent limitations that are in the draft permit:

1. The daily effluent discharge must not exceed monthly average flow of 15 mgd.

2. There must be no floating, suspended, or submerged matter of any kind in concentrations causing nuisance or objectionable conditions that may impair designated uses in the receiving water.

3. The pH of the effluent must be between 6.4 – 9.0 standard units.

4. From October through April each year the dissolved oxygen concentration must be equal to or greater than 6.3 mg/L. From May- July 15 the dissolved oxygen concentration must be equal to or greater than 3.9 mg/L. (**Note**: If the IDEQ revises its temperature criteria and the EPA approves the revisions, the final dissolved oxygen limit must be equal to or greater than 3.6 mg/L from November through April and equal to or greater than 3.0 mg/L in October).

5. Table 3 presents the proposed effluent limitations for temperature.

TABLE 3 – Proposed Effluent Limitations for Temperature

Date	**Average Daily Limit**	**Instantaneous Maximum Limit**
December 1 – February 29	7.8 °C	20.5 °C
March 1 – July 15	9 °C	13 °C
July 16 – September 30	20.4 °C	26.3 °C
October 1 – November 30	9 °C	13 °C

Note: If the EPA approves the revisions to the temperature criteria, then the temperature limits will be as follows:

Date	**MWMT**	**Average Daily Limit**	**Instantaneous Maximum Limit**
November 1 – April 30	15.8 °C	NA	NA
April	14.4 °C	NA	NA
May	16.4	NA	NA
July 16- September 30	NA	19°C	22°C
October	NA	22.2°C	27.3°C
Note: The MWMT is the average of the maximum daily temperature collected over 7 days. For example, the MWMT for March 1 would be the average of the maximum daily temperatures collected on March 1 and the preceding six days (i.e., February 23, 24, 25, 26, 27, 28 and March 1).			

6. Table 4 presents the proposed effluent limits for BOD_5, TSS, the minimum percent removal rates for BOD_5 and TSS, total ammonia, mercury, total phosphorus and *Escherichia coli* (*E. coli*).

TABLE 4 - Proposed Effluent Limits for BOD_5, TSS, Total Ammonia, Mercury, Total Phosphorus and *E. coli*

	Average Monthly Limit	**Average Weekly Limit**	**Maximum Daily Limit**	**Monthly Geometric Mean**	**Instantaneous Maximum**
BOD_5 **Apr 1 – Sept 30**	20 mg/L 2200 lbs/day	30 mg/L 3400 lbs/day	---	---	---
BOD_5 **Oct 1 – Mar 31**	20 mg/L 1700 lbs/day	30 mg/L 2500 lbs/day	---	---	---
TSS **Apr 1 – Sept 30**	27 mg/L 3400 lbs/day	40 mg/L 5000 lbs/day	---	---	---
TSS **Oct 1 – Mar 31**	20 mg/L 2500 lbs/day	30 mg/L 3750 lbs/day	---	---	---
Removal Rates for BOD_5 and TSS	85% minimum	---	---	---	---
Total Ammonia as N **May 1 – Sept 30**	1098 µg/L 137 lbs/day	---	3718 µg/L 465 lbs/day	---	---
Total Ammonia as N **Oct 1 - Apr 30**	1027 µg/L 129 lbs/day	---	3479 µg/L 435 lbs/day	---	---
Mercury Total Recoverable	0.009 µg/L 0.001 lbs/day	---	0.019 µg/L 0.002 lbs/day	---	---
Total Phosphorus **May1 – Sept 30**	70 µg/L 8.7 lbs/day	93.1 µg/L 11.6 lbs/day	---	---	---
E. coli Bacteria	---	---	---	126 colonies per100 ml	406 colonies per 100 ml

The BOD_5 effluent limitations apply from April 1 – September 30 and October 1- March 31 because these time frames were established by the IDEQ in a their March 1979 staff evaluation (IDEQ Memorandum from Mike Smith to Tom Korpalski, *Final Design Criteria and Ultimate Effluent Limitations for the City of Boise*, March 29, 1979). The TSS effluent limitations apply from April 1 – September 30 and October 1- March 31 because these time frames were established by the IDEQ in the 1998 Lower Boise TMDL. The effluent limits for ammonia apply from May 1- September 30 and October 1 – April 30 because the City of Boise requested these time frames in their NPDES application. The effluent limits for total phosphorus apply from May 1 – September 30 because this is the time period when phosphorus is most likely to adversely impact the receiving water, additionally this time frame corresponds to the time frame used by the IDEQ to limit total phosphorus in the Snake River at the confluence of the Snake River and Boise Rivers.

C. Proposed Whole Effluent Toxicity Conditions

Whole effluent toxicity (WET) is defined as "the aggregate toxic effect of an effluent measured directly by an aquatic toxicity test." Aquatic toxicity tests are laboratory experiments that measure the biological effect (e.g., survival, growth and reproduction) of effluents or receiving waters on aquatic organisms. In aquatic toxicity tests, groups of organisms of a particular species are held in test chambers and exposed to different concentrations of an aqueous test sample (e.g., reference toxicant, effluent, or receiving water). Observations are made at predetermined exposure periods. At the end of the test, the responses of test organisms are used to estimate the effects of the aqueous sample.

WET tests are used to measure the acute and/or chronic toxicity of an effluent on the receiving water. Acute toxicity tests are used to determine the concentration of the effluent that results in mortality within a group of test organisms, during a 24-, 48- or 96-hour exposure. A chronic toxicity test is defined as a short-term test in which sub-lethal effects, such as fertilization, growth or reproduction, are measured in addition to lethality (in some tests).

The EPA has determined that an effluent limitation is not needed for WET and that a WET trigger is appropriate to measure the aggregate toxic effects of the effluent (see Appendix C *Reasonable Potential Analysis* for additional information the EPA's determination that an effluent limit is not needed and for information on how the triggers were developed). The WET trigger is 3.9 TU_c from May to September and 2.1 TU_c from October to April. The proposed permit requires WET monitoring 4 times per year. Any test results above these values will result in increased testing and a Toxicity Reduction Evaulation/Toxicity Identification Evaluation (TRE/TIE), if necessary.

V. COMPLIANCE SCHEDULES AND INTERIM EFFLUENT LIMITS

The Idaho Water Quality Standards at IDAPA 58.01.02.400.03 allow compliance schedules that allow a discharger to phase in, over time, compliance with water quality-based effluent limitations when limitations are in the permit for the first time. In this case, the water quality-based effluent limits for total phosphorus, temperature, ammonia, pH, mercury and dissolved oxygen are required for the first time.

Additionally, the federal regulation at 40 CFR 122.47 requires that the compliance schedules require compliance with effluent limitations as soon as possible and that, when the compliance schedule is longer than 1 year, the schedule shall set forth interim requirements and the dates for their achievement. The time between the interim dates shall generally not exceed 1 year, and when the time necessary to complete any interim requirement is more than one year, the schedule shall require reports on progress toward completion of these interim requirements.

In order to grant a compliance schedule the permitting authority must make a reasonable finding that the discharger cannot immediately comply with the water quality-based effluent limit upon the effective date of the permit and that a compliance schedule is appropriate (see 40 CFR 122.47 (a). The EPA has found that a compliance schedule may be appropriate for total phosphorus, temperature, pH, and dissolved oxygen and biosolids. However, a compliance schedule is not appropriate for ammonia or mercury. Each of these parameters is discussed below.

Total Phosphorus

A review of weekly total phosphorus effluent data gathered from August 1, 2001 to July 9, 2009 shows that phosphorus ranges from 930 µg/L to 17,500 µg/L, with an average of 4880 µg/L. The draft permit proposes an effluent limit of 70 µg/L. In order to achieve the phosphorus effluent limitation the City must make physical modifications to the Lander Street facility. Therefore, the facility's discharge will not be in compliance with the effluent limit upon the effective date of the permit and a compliance schedule is appropriate. Compliance with the final effluent limitations could be achieved by doing facility modifications, or possibly by doing a combination of facility modifications and participating in an offset trading project on the Boise River. The City, the IDEQ and the EPA are currently exploring the feasibility of City installing an offset project at Dixie Drain which is located at approximately river mile 9.4. If an offset at Dixie Drain is a viable project the permit may be re-opened and modified to include specific offset trading language. A re-opener clause has been included in the permit to allow the permit to be modified if appropriate.

The NPDES regulations at 40 CFR 122.47(a)(1) require compliance with the final effluent limitations "as soon as possible." The draft permit requires the facility to meet the final effluent limitation (70 µg/L) no later than 10 years from the effective date of the permit. The EPA believes this is appropriate time frame as discussed below.

As discussed previously, the City owns and operates two wastewater treatment facilities (Lander Street and West Boise). The Lander Street facility was originally constructed in 1950 and modification have been made to this facility over time. This facility does not currently have biological nutrient removal or chemical treatment for phosphorus removal at this time. This is significant because the ability to expand treatment capacity is very limited because the facility is bounded on three sides by residential areas and by the Boise River on the fourth side. The West Boise facility was built in 1975 and may be the City's primary location for wastewater treatment operations in the future.

In 2008 the City began a facilities planning effort to determine how the City will meet wastewater treatment needs over the next 20 years. The analysis included detailed inventory of growth scenarios, current capacity and needed improvements to accommodate changes in NPDES permit limitations as well as potential growth. In most scenarios, consolidating operations at the West Boise facility makes the most sense however there may be scenarios where keeping the Lander Street facility operational is a viable option.

The Facility Plan developed by the City and approved by the IDEQ in July 2010 provides a framework for evaluating the feasibility of keeping the Lander Street facility operational as more is known about the final effluent limitations in the Lander Street permit.

The NPDES permit for both the Lander Street facility and the West Boise facility contain stringent limits for total phosphorus and temperature. During the first 5 years of the compliance schedule the focus is on reducing the phosphorus at both facilities.

In order to complete the work necessary to achieve the interim limits the City plans to first divert flow from the Lander Street facility to the West Boise facility and install chemical addition at the Lander Street facility. Once this step has been completed the City will divert some of its flow from the West Boise facility to the Lander Street facility to facilitate the required upgrades at the West Boise facility. The compliance schedule requires the Lander Street facility to meet a 1 mg/L interim limit by May 1, 2013, and requires the West Boise facility to complete modifications to its biological nutrient removal system, install and operate a Struvite Plant and meet an interim total phosphorus limit of 600 µg/L by May 1, 2016. The facility must meet an interim total phosphorus limit of 500 µg/L by May 1, 2017. Additionally, during this time period the city will be evaluating whether to decommission the Lander Street facility or keep it up and running.

Once the interim limits for phosphorus are achieved, the compliance schedule allows the City time to determine the alternate methods of meeting the final effluent limits for both total phosphorus and temperature. For example, the City is exploring the feasibility of an offset project at Dixie Drain for total phosphorus. A possible option for achieving the final temperature limit would be re-using its effluent to achieve the temperature reductions, this option would require several years of study to determine possible groundwater impacts. Or it may be determined that it is not viable to keep the Lander Street facility operational and it may be decommissioned.

Given the stringent permit limits for both phosphorus and temperature, the City's ability to meet interim limits which greatly reduce its phosphorus loading to the river, and the need for the City to explore cost effective alternatives to achieve the final limits for both total phosphorus and temperature EPA believes it is within reason to allow the city up to 10 years to achieve the final limits in the permit for both temperature and phosphorus.

Biosolids

When the City is making modifications to its West Boise facility to meet the interim total phosphorus limits the City anticipates diverting some flow from West Boise to the Lander Street facility. The City will divert flow such that the Lander Street facility is operating at 15 mgd. Flow diversion will occur until the West Boise modifications are complete.

The City will start operating the chemical addition facility at the Lander Street facility in May 2013. Once chemical addition starts there will be additional solids to handle at the Lander Street facility and the facility will not be able to accommodate the additional sludge. Therefore, the draft permit allows the facility to transfer sludge to the West Boise facility from May 1, 2013 through September 30 each year until September 30, 2016. The permittee may transfer up to 40,000 gpd of biosolids to the West Boise headworks.

Temperature
A review of the effluent temperature data at the facility from August 1, 2004 to July 31, 2009 shows that the temperature ranges from 15.6 °C to 25.5 °C, with an average temperature of 18.2 °C. The draft permit contains the following average daily effluent limits:

December 1 – February 29:	7.8 °C
March 1 – July 15:	9.0 °C
July 16 – September 30	20.4 °C
October 1 – November 30	9.0 °C

If Idaho's revised salmonid spawning criteria are approved by EPA the effluent limits are:

November 1 – April 30:	15.8 °C
May:	16.4 °C
July 16-September 30:	19 °C
October:	22.2 °C

The data above shows that the facility cannot meet the effluent limits except possibly for the July 16-September 30 time frame. A detailed review of the data from July 16 – September 30 shows that the effluent temperature ranges from 21.9 °C -25.5 °C, with an average temperature value of 23.7 °C. The current effluent temperatures are well above the proposed effluent limitations. In order to meet the proposed effluent temperature limits the facility will need to determine the appropriate method to control the effluent temperature. Because the facility cannot meet the effluent limit upon the effective date of the permit, the EPA believes it is appropriate to allow a compliance schedule for this parameter. The draft permit provides a 10 year compliance schedule to meet the final temperature limitations. EPA believes this is appropriate because the City has stringent effluent limits for both temperature and total phosphorus. The City will be focusing its efforts on reducing the phosphorus concentrations in its effluent during the first five years of the permit. Once this is accomplished the City will spend the next five years determining the most cost efficient method to achieve the temperature limits (see also discussion on total phosphorus above).

Mercury
A review of the effluent mercury data from January 5, 2005 to July 19, 2009[3] shows that the effluent data ranged from 0.001µg/L to 0.0169 µg/L. The maximum monthly average concentration is 0.0075 µg/L. The draft permit proposes the effluent achieve a monthly average limit of 0.009 µg/L and a maximum daily limit of 0.019 µg/L. The facility is currently able to achieve these limitations. Additionally, mercury in the effluent is primarily controlled through source control rather than end-of-pipe treatment. Therefore, in this case, a compliance schedule is not appropriate.

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[3] EPA only reviewed the results from January 5, 2005 through July 19, 2009 because prior to this date the analytical test method was not sensitive enough to detect mercury in the effluent.

Ammonia

The proposed effluent limits for ammonia vary depending on the flow season. From October – April the average monthly limit is 1027 µg/L and the maximum daily limit is 3479 µg/L. From May – September the average monthly limit is 1098 µg/L and the maximum daily limit is 3718 µg/L.

A review of the effluent ammonia data from January 2, 2001 to July 29, 2009 shows from April – October the average monthly ammonia concentrations range from 8 µg/L to 3184 µg/L, with an average value of 524 µg/L. The maximum daily ammonia concentration ranges from 20 µg/L to 5400 µg/L, with an average value of 548 µg/L. The facility can generally meet the maximum daily limit. Additionally, since April 2004, the facility has only exceeded the average monthly limit once. Based on the effluent data, it appears that a compliance schedule is not appropriate for ammonia.

A review of the effluent data from January 2, 2001 to July 29, 2010 shows that from May – September the average monthly ammonia concentration ranges from 129 µg/L to 810 µg/L with an average of 314 µg/L. The maximum daily concentration ranges from 20 µg/L to 2990 µg/L with an average of 309 µg/L. The facility can currently achieve these effluent limitations therefore a compliance schedule is not necessary and the permittee can reasonably comply with the effluent limitations upon issuance of the permit.

pH

A review of the effluent data from January 1, 2001 to July 31, 2009 shows that the effluent varies from 6.2 standard units to 7.9 standard units, with an average value of 6.8 standard units. A review of the data shows that in recent years the facility has some time frames where is has difficulty meeting the criteria. The draft permit proposes that the effluent be within the range of 6.4 standard units to 9.0 standard units. Given the facility has some difficulty meeting the 6.4 s.u. a compliance schedule may be appropriate . The proposed permit allows the facility until May 2012 to achieve the pH limits.

Dissolved Oxygen (DO)

A review of the effluent data from January 2001 to July 2009 shows that over 90% of the samples have a DO concentration of 4.2 mg/L or less. The proposed permit requires equal to or greater than 6.3 mg/L from October through April and equal to or greater than 3.9 mg/L from May through July 16. (Note: If the IDEQ revises its temperature criteria, and the EPA approves the revisions the final dissolved oxygen limits must be equal to or greater than 3.0 mg/L in October and equal to greater than 3.6 mg/L from November through April). Therefore, the facility may not be able to comply with the effluent limit, so a compliance schedule may be necessary. The draft permit requires compliance by eight months after the effective date of the permit.

VI. MONITORING REQUIREMENTS

Section 308 of the CWA 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 in the future and/or to monitor effluent impacts on the receiving water. Therefore, receiving water, effluent and biological monitoring have been incorporated into the draft permit. The permittee is responsible for conducting the monitoring and for reporting results with Discharge Monitoring Reports (DMRs) to the EPA.

A. Proposed 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 (40 CFR Part 136) and if the Method Detection Limits for the test methods are less than the effluent limits.

The previous permit required extensive effluent monitoring for a variety of parameters. The purpose of the monitoring was to assure that appropriate data was available for the next permit cycle. In general, 40 CFR 122.44(l)(1) prohibits the backsliding of any conditions (e.g., monitoring frequencies) unless the circumstances on which the previous permit was based have materially and substantially changed since the last permit was issued and which would constitute a cause for permit modification pursuant to 40 CFR 122.62. In addition, 40 CFR 122.44(l)(1) and CWA Section 402(o) allows for the imposition of less stringent effluent limitations if one of the anti-backsliding exceptions set forth in 40 CFR 122.44(l)(2) is applicable.

The regulations at 40 CFR 122.62(a)(2) allow modification of permit conditions if new information was received that was not available at the time of permit issuance. The purpose of the monitoring requirements in the 1999 permit was to ensure appropriate data was available for the next permit reissuance. The EPA considers the monitoring data gathered during the term of the 1999 permit new information that was not available at the time of issuance of the 1999 permit, therefore, the monitoring requirements may be modified. The EPA reviewed the monitoring results and has determined that some effluent parameters are no longer necessary (e.g., ortho-phosphorus and percent saturation for dissolved oxygen). In addition, some parameters are either at consistently low levels in the effluent or the effluent concentration is fairly consistent and therefore they can be monitored at a reduced frequency (e.g., nickel, chromium, oil and grease, total kjeldahl nitrogen and turbidity). Therefore, the EPA has eliminated or reduced monitoring for some parameters and is authorized to do so pursuant to 40 CFR 122.44(l).

In addition, some parameters were not included in the previous permit and need to be monitored in the effluent, therefore they have been incorporated into the monitoring program (e.g., cyanide, selenium, aluminum). It should be noted that the 1999 final permit did not require effluent monitoring for aluminum because the Idaho water quality standards did not have a water quality criterion for aluminum. The EPA is adding quarterly monitoring for aluminum because: (1) Aluminum can be toxic to aquatic life, (2) The permit contains an effluent limit for total phosphorus and alum may be used to reduce phosphorus levels, thus increasing the aluminum concentration in the effluent, (3) the EPA has developed an aquatic life criterion for aluminum (4) Federal regulations allow the permitting authority to use the EPA developed criteria in the absence of state water quality criteria and (5) during the next permit cycle the EPA will evaluate whether the concentration of alum in the effluent is being discharged at a concentration which could cause or contribute to an exceedance of water quality standards.

Additionally, the EPA is requiring monthly monitoring for metals that are being discharged at levels that are near the aquatic life or human health criterion at the end of the pipe (e.g., arsenic, cadmium, copper, lead, silver and zinc).

Finally, the EPA is including the list of pollutants found in NPDES Permit Application Form 2A, Part D for testing. Testing for these pollutants must occur once in the 2nd, 3rd and 4th year of the permit requirements. The table below presents the proposed monitoring requirements for the Lander Street facility.

TABLE 5: Proposed Influent/Effluent Monitoring

Parameter	Sample Location	Sample Frequency	Sample Type
Flow	Influent and Effluent	Continuous	Recording
E. coli bacteria	Effluent	5 days/week	Grab
pH, standard units	Effluent	5 days/week	Grab
Temperature, °C	Effluent	Continuous	Recording
Total ammonia as N, mg/L	Effluent	2 days/week	24-hour composite
BOD_5	Influent and Effluent	1/week	24-hour composite
TSS	Influent and Effluent	1/week	24-hour composite
Total Phosphorus, mg/L	Effluent	1/week	24-hour composite
Mercury, µg/L, see note 1	Effluent	1/week	24-hour composite
Dissolved Oxygen, mg/L	Effluent	1/week	Grab
Cyanide, µg/L	Effluent	1/week	Grab
Nitrate-Nitrite, mg/L	Effluent	1/month	24-hour composite
Arsenic, µg/L, see note 1	Effluent	1/month	24-hour composite
Cadmium, µg/L, see note 1	Effluent	1/month	24-hour composite
Copper, µg/L, see note 1	Effluent	1/month	24-hour composite
Lead, µg/L , see note 1	Effluent	1/month	24-hour composite
Silver, µg/L, see note 1	Effluent	1/month	24-hour composite
Zinc, µg/L, see note 1	Effluent	1/month	24-hour composite
Hardness as $CaCO_3$, mg/L	Effluent	1/month	24-hour composite
Total Organic Carbon, mg/L	Effluent	1/month	24 hour composite
Alkalinity as $CaCO_3$, mg/L	Effluent	1/month	24-hour composite
Aluminum, µg/L, see note 1	Effluent	1/quarter	24-hour composite
Chromium, µg/L, see note 1	Effluent	1/quarter	24-hour composite
Nickel, µg/L, see note 1	Effluent	1/quarter	24-hour composite
Selenium, µg/L, see note 1	Effluent	1/quarter	24-hour composite
Total Kjeldahl Nitrogen, mg/L	Effluent	1/quarter	24-hour composite
Oil and Grease, mg/L	Effluent	1/quarter	24-hour composite
Turbidity, NTU	Effluent	1/quarter	24-hour composite
Whole Effluent Toxicity, TU_c	Effluent	1/quarter	24-hour composite
Expanded Effluent Testing, see note 2	Effluent	see note 2	24-hour composite

NOTES:

1. These parameters shall be analyzed as total recoverable.
2. See NPDES Permit Application Form 2A, Part D for the list of pollutants to include in this testing. Testing must occur once in the 2nd, 3rd and 4th year of the permit. Additionally, the expanded effluent testing must occur on the same day as a whole effluent toxicity test and must be submitted with the WET test results with the next DMR as well as with the next permit application.

B. Proposed Surface Water Monitoring

The previous permit required extensive receiving water monitoring for a variety of parameters. As stated previously, the purpose of the monitoring was to assure that appropriate data was available for the next permit cycle. As discussed in Part VI.A., the EPA's anti-backsliding regulations at 40 CFR 122.44(l)(1) generally prohibit the backsliding of any conditions (e.g., monitoring frequencies) unless there is cause for change consistent with the federal regulations at 40 CFR 122.62. The regulations at 40 CFR 122.62 allow modification of permit conditions if new information was received that was not available at the time of permit issuance. The purpose of the monitoring requirements in the 1999 permit was to ensure appropriate data was available for the next permit reissuance. The EPA considers the monitoring data gathered during the term of the 1999 permit new information that was not available at the time of issuance of the 1999 permit, therefore, the monitoring requirements may be modified. The EPA reviewed the monitoring results and has determined that some receiving water parameters are no longer necessary (e.g., flow, ortho-phosphorus, percent saturation for dissolved oxygen, total organic carbon). In addition, some parameters are at consistently low levels in the receiving water and therefore they can be monitored at a reduced frequency (e.g., ammonia, oil and grease, total kjeldahl nitrogen, turbidity, nitrate/nitrite, chromium and nickel). Therefore, as a result, the EPA has eliminated or reduced monitoring of these constituents pursuant to 40 CFR 122.44(l). Furthermore, some parameters were not included in the previous permit and need to be monitored in the receiving water, therefore they have been incorporated into the monitoring program (e.g., cyanide, aluminum). The EPA is also requiring monthly receiving water monitoring for those metals that are being discharged at levels that are near the aquatic life or human health criterion in the effluent (e.g., arsenic, cadmium, copper, lead, silver and zinc). The table below presents the proposed receiving monitoring requirements for the Lander Street facility.

TABLE 6: Proposed Upstream and Downstream Monitoring

Parameter	Upstream	Downstream
E. coli bacteria, colonies/100 ml	1/month	1/month
pH, standard units	1/week	1/week
Temperature, °C	continuous	continuous
Total ammonia as N, mg/L	1/month	1/month
BOD_5, mg/L	1/month	1/month
TSS, mg/L	1/month	1/month
Total Phosphorus, mg/L	1/week	1/week
Mercury, µg/L see note 1	1/month	1/month
Dissolved Oxygen, mg/L	continuous	continuous
Cyanide, mg/L	1/month	1/month
Arsenic, µg/L, see note 2	1/month	1/month
Cadmium, µg/L, see note 3	1/month	1/month
Copper, µg/L, see note 3	1/month	1/month
Lead, µg/L, see note 3	1/month	1/month
Silver, µg/L, see note 3	1/month	1/month
Zinc, µg/L, see note 3	1/month	1/month
Hardness as $CaCO_3$, mg/L	1/month	1/month
Total Organic Carbon, mg/L	1/month	1/month
Alkalinity as $CaCO_3$, mg/L	1/month	1/month
Aluminum, see note 3	1/quarter	1/quarter
Chromium, see note 4	1/quarter	1/quarter
Nickel, see note 4	1/quarter	1/quarter
Selenium, see note 5	1/quarter	1/quarter
Total Kjeldahl Nitrogen, mg/L	1/quarter	1/quarter
Nitrate-Nitrite, mg/L	1/quarter	1/quarter
Oil and Grease, mg/L	1/quarter	1/quarter
Turbidity, NTU	1/quarter	1/quarter

1. Mercury shall be measured as total recoverable.
2. Arsenic is measured as total.
3. Upstream monitoring for Cadmium, Copper, Lead, Silver, Zinc and Aluminum shall be dissolved and downstream monitoring shall be dissolved and total recoverable. These values are needed to determine a translator.
4. Chromium and nickel shall be measured as dissolved.
5. Selenium shall be measured as total recoverable.

C. Proposed Methylmercury Fish Tissue Monitoring

The State of Idaho has a methylmercury fish tissue criterion for the protection of human health. In order to evaluate whether this criterion is being met in the Boise River, fish tissue concentrations in the Boise River need to be evaluated. The draft permit contains conditions requiring the monitoring and evaluation of methylmercury concentrations in fish tissue upstream and downstream of the facility's outfall.

VII. Additional Permit Conditions

A. Pretreatment Requirements

The City of Boise operates a pretreatment program that meets the requirements of 40 CFR Part 403. The program was approved by the EPA on January 31, 1985 and the city's NPDES permit was modified with pretreatment implementation conditions at that time.

The City's NPDES application identified the following major industrial users to the Lander Street facility:

- Ace Co Precision manufacturing – finished and/or coated metal parts (there is no discharge of process wastewater);
- Boise State University (College of Engineering) – Provides clean-room instruction and practicum relating to semiconductor microfabrication and manufacturing (200 gpd in process wastewater)
- Micron Task Technology Center – photo mask (reticules) for lithographic processes in semiconductor manufacturing (86,005 gpd in process wastewater);
- Meadow Gold – dairy product operation utilizing homogenization, pasteurization and blending of raw milk to produce milk, sour cream and ice cream mix. Flavored drinks and pure juices are also mixed at this facility (41,000 gpd in process wastewater);
- Micron Technology, Inc.- Research and development for dynamic random access memory, photovoltaics and related electronic components (1,200,000 gpd);
- Performance Design – machined metal parts for specialized paper processing machines (275 gpd of process wastewater)
- Photronics, Inc – manufacturing of semiconductor memory device peripheral products (109,516 gpd of process wastewater);

Flows from industrial users can potentially make up 8.5 – 17.5% of the City's discharge[4]. Typical pollutants that might be expected in discharges from these industrial processes include acids, alkalis, organic compounds, solvents, silicon, lubricants, disinfectants, degreasers, raw milk and aluminum.

The proposed permit includes requirements to continue implementation of the approved pretreatment program. In particular, it continues the pretreatment sampling requirements from the previous permit and adds requirements to monitor for ammonia, molybdenum and selenium, as required in the EPA's updated Local Limits Development Guidance (EPA 833-R-04-002A, July 2004). Additionally, the proposed permit will require the permittee to conduct a local limits evaluation to demonstrate whether local limits are necessary (40 CFR 403.8(f)(4)).

[4] Percentages were determined based on the minimum and maximum flows that occurred from 7/31/2004 – 7/31/2009.

B. Design Criteria Requirements

The 1999 NPDES permit for the Lander Street facility required all BOD_5 and TSS loadings in excess of 29,100 lbs/day be sent to the West Boise Facility. Section 402(o) of the Clean Water Act and federal regulations at 40 CFR 122.44 (l) prohibit the renewal, reissuance or modification of an existing NPDES permit that contains effluent limits, permit conditions or standards that are less stringent than those established in the previous permit (*i.e.*, anti-backsliding). Clean Water Act Section 402(o)(2) does set forth some exceptions to anti-backsliding, however, none of the exceptions apply to this permit condition. Therefore, the requirement to send all BOD_5 and TSS influent loadings in excess of 29,100 lbs/day to the West Boise Facility will be retained in the permit.

C. Operation & Maintenance Plan Review

The permit requires the City to properly operate and maintain all facilities and systems of treatment and control. Proper operation and maintenance is essential to meeting discharge limits, monitoring requirements and all other permit requirements at all times. The City is required to update and implement its operation and maintenance plan for its facility within 180 days of the effective date of the final permit. The plan shall be retained on site and made available to the EPA and the IDEQ upon request.

D. Sanitary Sewer Overflows and Proper Operation and Maintenance of the Collection System

Untreated or partially treated discharges from separate sanitary sewer systems are referred to as sanitary sewer overflows (SSOs). SSOs may present serious risks of human exposure when released to certain areas, such as streets, private property, basements and receiving waters used for drinking water, fishing and shellfishing, or contact recreation. Untreated sewage contains pathogens and other pollutants, which are toxic. SSOs are not authorized under this permit. Pursuant to the NPDES regulations, discharges from separate sanitary sewer systems authorized by NPDES permits must meet effluent limitations that are based upon secondary treatment. Further, discharges must meet any more stringent effluent limitations that are established to meet EPA-approved state water quality standards.

The permit contains language to address SSO reporting and public notice and operation and maintenance of the collection system. The permit requires that the City identify SSO occurrences and their causes. In addition, the permit establishes reporting, record keeping and third party notification of SSOs. Finally, the permit requires proper operation and maintenance of the collection system. The following specific permit conditions apply:

Immediate Reporting - The Permittee is required to notify the EPA of an SSO within 24 hours of the time the Permittee becomes aware of the overflow (See 40 CFR 122.41(l)(6)).

Written Reports - The Permittee is required to provide the EPA a written report within five days of the time it became aware of any overflow that is subject to the immediate reporting provision. (See 40 CFR 122.41(l)(6)(i)).

Third Party Notice – The permit requires that the Permittee establish a process to notify specified third parties of SSOs that may endanger health due to a likelihood of human exposure; or unanticipated bypass and upset that exceeds any effluent limitation in the permit or that may endanger health due to a likelihood of human exposure. The Permittee is required to develop, in consultation with appropriate authorities at the local, county and/or state level, a plan that describes how, under various overflow (and unanticipated bypass and upset) scenarios, the public, as well as other entities, would be notified of overflows that may endanger health. The plan should identify all overflows that would be reported and to whom, and the specific information that would be reported. The plan should include a description of lines of communication and the identities of responsible officials. (See 40 CFR 122.41(l)(6)).

Record Keeping -The Permittee is required to keep records of SSOs. The Permittee must retain the reports submitted to the EPA and other appropriate reports that could include work orders associated with investigation of system problems related to a SSO, that describe the steps taken or planned to reduce, eliminate and prevent reoccurrence of the SSO. (See 40 CFR 122.41(j)).

Proper Operation and Maintenance -The permit requires proper operation and maintenance of the collection system. (See 40 CFR 122.41(d) and (e)). SSOs may be indicative of improper operation and maintenance of the collection system. The Permittee may consider the development and implementation of a capacity, management, operation and maintenance (CMOM) program.

The Permittee may refer to *Guide for Evaluating Capacity, Management, Operation, and Maintenance (CMOM) Programs at Sanitary Sewer Collection Systems* (EPA 305-B-05-002). This guide identifies some of the criteria used by EPA inspectors to evaluate a collection system's management, operation and maintenance program activities. Owners/operators can review their own systems against the checklist (Chapter 3) to reduce the occurrence of sewer overflows and improve or maintain compliance. The CMOM Guide is currently available on the EPA website at: "www.epa.gov/npdes/sso/featuredinfo.cfm."

E. Biosolids

Sludge/solids (hereafter referred to as biosolids) from this facility is transferred to the West Boise Treatment facility for processing and disposal. The EPA Region 10 is using separate NPDES permits to permit wastewater effluent and biosolids. Under the CWA, the EPA has the authority to issue separate biosolids-only permits for the purpose of regulating biosolids. The EPA may issue a biosolids-only permit to the facility at a later date, if appropriate. In the absence of a biosolids-only permit, biosolids management and disposal activities at the facility are subject to the national standards at 40 CFR Part 503 and any requirements of the State's biosolids program. The regulations at 40 CFR Part 503 are self-implementing, therefore the City must comply with them whether or not a permit with biosolids conditions has been issued.

The EPA is removing many of the requirements for biosolids that were in the 1999 permit, because the conditions are covered by the self-implementing regulations at 40 CFR 503. In this case, since the conditions of 40 CFR 503 still apply to the facility and must be met by the facility, the EPA does not consider this anti-backsliding. However, there is a specific best management practice permit condition for sludge that was incorporated into the 1999 permit which states:

> "….Pollutants contained in the sewage sludge shall not be discharged to surface waters either directly or indirectly. Biosolids from other facilities may not be received at this facility mixed with sewage. Biosolids from this facility may not be mixed with sewage or other wastewater prior to treatment and discharge, or mixed with effluent prior to discharge, or discharged directly to surface waters."

The City's NPDES application requested that the above condition not be included in the reissued permit and that the permit allow the Lander Street biosolids to be transferred to the West Boise facility through its "wastewater interceptor pipeline."

The City states that the 1999 permit condition precludes the receipt of biosolids mixed with sewage or other wastewater prior to treatment at the wastewater treatment facility. The City currently uses a "biosolids pipeline" for conveyance of biosolids from the Lander Street facility to the West Boise facility where dewatering of biosolids and transport to the Twenty Mile South Farm occurs. The "biosolids pipeline" transports the Lander Street biosolids into the "biosolids only" side of the West Boise facility. The "biosolids pipeline" has been in place for 14 years and occasionally has experienced failures, recently with increasing frequency.

The City also has a "wastewater interceptor pipeline" (adjacent to the "biosolids pipeline") which conveys sewage from the Lander Street facility to the West Boise facility. The City states that the "wastewater interceptor pipeline" could be used to send Lander Street biosolids through the headworks of the West Boise facility. The City states that the prohibition of mixing biosolids with wastewater unnecessarily precludes the use of the "wastewater interceptor pipeline" to transport biosolids from the Lander Street facility to the West Boise facility. The City states that the language also precludes discharging biosolids, during the repair of a break in the "biosolids pipeline," into the "wastewater interceptor pipeline" for subsequent treatment at the West Boise facility.

The EPA does not object to the transfer of biosolids from the Lander Street facility to the West Boise facility for processing and disposal, however, using the "wastewater interceptor pipeline" is not an acceptable way to transport the biosolids, at this time, because, the "wastewater interceptor pipeline" will send the Lander Street biosolids through the headworks of the West Boise facility. This is significant because the Lander Street biosolids contains all of the metals, BOD, TSS, nutrients, pharmaceuticals and other wastes that settled out in the Lander Street treatment process.

If the Lander Street sludge goes through the headworks of the West Boise facility the pollutants that were captured in the Lander Street sludge will be re-suspended and need to be re-captured in the West Boise treatment process. No treatment process can capture 100% if the pollutants in its wastewater. Therefore, allowing the Lander Street sludge to go through the West Boise headworks will result in a percentage of the pollutants that were captured in the Lander Street sludge to be released through the West Boise outfall to the Boise River. The percentage that will be released will be dependent on the efficacy of the West Boise Treatment facility. If the Lander Street sludge is delivered to the "sludge only" side of the West Boise plant, as is currently occurring, these additional pollutants will not be released into the Boise River. Therefore allowing the Lander Street sludge to go to the headworks of the West Boise facility is increasing the pollutants released to the Boise River.

Transporting the sludge to the headworks of the West Boise facility (as Boise proposes) rather than the sludge side of the facility raises issues such as accurate characterization of the West Boise effluent to determine whether or not effluent limitations are required, anti-degradation policy/implementation issues and anti-backsliding issues. Each of these issues is explained in more detail below.

In this case, monitoring data provided on the Lander Street sludge shows that the sludge has been tested for a subset of pollutants including: arsenic, cadmium, chromium, copper, cyanide, lead, mercury, nickel, silver and zinc. With the exception of cyanide all the pollutants are present in the sludge. Additionally, there are numerous other parameters commonly found in sludge (e.g., nutrients, pharmaceuticals, steroids hormones, BOD, TSS, PAHs, etc) that have never been sampled for or quantified in the Lander Street sludge. All of the pollutants in the sludge will be put through the West Boise treatment process if the sludge goes through the headworks of the facility and as explained previously will result in an increase in pollutant concentrations.

The EPA is required under Section 301(b)(1)(C) of the CWA and the NPDES implementing regulations (40 CFR 122.4(d) and 122.44(d)) to establish conditions in NPDES permits that ensure compliance with State water quality standards, including anti-degradation requirements. Currently, the City has not provided information quantifying the expected effluent quality of the West Boise facility once the Lander Street sludge goes through the headworks of the West Boise facility. Without this information, the EPA cannot determine if the West Boise facility will require additional water quality-based effluent limitations due to the additional loading of pollutants that are being introduced into the facility. This information is necessary to satisfy the NPDES permitting requirements at 40 CFR 122.4(d) and 122.44(d). Additionally, this information is needed to ensure that the State's anti-degradation policy is met.

Finally, the EPA's anti-backsliding regulations at 40 CFR 122.44(l)(1) prohibit the backsliding of any conditions unless there is cause for change consistent with the federal regulations at 40 CFR 122.62. The regulations at 40 CFR 122.62 allow modification of permit conditions if new information was received that was not available at the time of permit issuance. The City has not provided any new information that would satisfy the NPDES regulations such that the conditions in the 1999 permit could be removed. Therefore, the condition will be retained in the proposed permit. It should be noted that as part of the Compliance Schedule requirements for total phosphorus the State's draft 401 certification allows a small quantity of sludge (not to exceed 40,000 gpd) to be transferred to the West Boise facility from when the interim limit of 1 mg/L is being met and discontinuing on September 30, 2016.

F. Removed Substances Provision

The removed substances provision was in the 1999 permit and will be retained in the proposed permit. The provisions states: "Collected screenings, grit, solids, biosolids, filter backwash, or other pollutants removed in the course of treatment or control of wastewaters shall be disposed of in a manner such as to prevent any pollutant from such materials from entering navigable waters". See Appendix B, Part III for additional information.

G. Water Effects Ratio Study

The previous permit required the City to develop and implement a study plan to evaluate the site specific water effect ratios (WER) that were developed for the acute and chronic aquatic life criteria for copper and lead (see IDAPA 58.01.02.278.04). This provision is being retained in the permit to ensure that the conditions upon which the WERs were based are still valid.

H. 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 to the EPA are accurate and to explain data anomalies if they occur. The Permittee is required to develop (or update) and implement a Quality Assurance Plan within 180 days of the effective date of the final permit. The Quality Assurance Plan shall consist of standard operating procedures that the Permittee must follow for collecting, handling, storing and shipping samples, laboratory analysis and data reporting. The plan shall be retained on site and be made available to the EPA and the IDEQ upon request.

I. Storm Water

The City's application disclosed that storm water runoff from the wastewater treatment plant site is collected and routed to the headworks of the facility. Since the storm water is routed through the headworks of the facility it is exempt from the requirements of 40 CFR 122.26(c) (Application requirements for storm water discharges associated with industrial activity and storm water associated with small construction activity).

J. 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 based on federal regulations, they cannot be challenged in the context of an individual NPDES permit action. The standard regulatory language covers requirements such as monitoring, recording and reporting requirements, compliance responsibilities other general requirements.

VIII. Other legal requirements

A. Endangered Species Act

The Endangered Species Act 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. A review of the threatened and endangered species located in Idaho finds that there are no threatened or endangered species located in vicinity of the Lander Street facility discharge, therefore ESA consultation is not required.

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 the EPA to consult with NOAA Fisheries when a proposed discharge has the potential to adversely affect EFH (i.e., reduce quality and/or quantity of EFH). A review of the Essential Fish Habitat documents shows that there is no EFH in the vicinity of the Lander Street facility discharge.

C. State Certification

Section 401 of the CWA requires the EPA to seek State 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. A copy of the State's draft 401 certification is included in Appendix H.
There are two less stringent conditions in the draft 401 certification that the EPA did not include in the draft permit. One condition relates to mercury effluent limitations and the other to the transfer of biosolids to the headworks of the West Boise facility which is allowed for a limited duration of time. These are discussed in more detail below.

Mercury

The 401 certification stated that the mercury effluent limits and sampling requirements should be removed. The State believes that both aquatic life and human health will be protected by the fish tissue sampling for methylmercury and mercury minimization plan contained in the draft permit (see Appendix H for the full text of the 401 certification).
The draft permit retains the mercury limits and sampling requirements for mercury. The State's water quality standards contain methyl mercury fish tissue criterion for the protection of human health and water column mercury criteria for the protection of aquatic life. The EPA believes that the mercury effluent limitation is necessary to ensure the State's aquatic life water quality criterion for mercury is achieved. The EPA has an independent duty under section 301(b)(1)(C) of the CWA to include more stringent permit limitations to protect water quality standards. Additional information on why the EPA is not relying solely on the State's human health criteria for the protection of aquatic life can be found in the EPA's December 12, 2008 letter to Barry Brunel (IDEQ) (EPA Disapproval of Idaho's Removal of Mercury Acute and Chronic Freshwater Aquatic Life Criteria, Docket No. 58-0102-0302).

Biosolids

In general, the draft permit does not allow Lander Street biosolids to go through the headworks of the West Boise facility for the reasons discussed on pages 30 through 32 of this fact sheet. The draft compliance schedule submitted to the State allowed up to 40,000 gpd of biosolids to be transferred from the Lander Street facility to the West Boise headworks from May 1, 2012 through September 30, 2016 only. This condition was included in the compliance schedule because when modifications are made to the City's West Boise facility (to meet the interim total phosphorus limits) the City anticipates diverting some flow from the West Boise facility to the Lander Street facility. The City will divert flow such that the Lander Street facility is operating at 15 mgd. Flow diversion will occur until the West Boise modifications are complete in September 2016. The City will start operating the chemical addition facility at the Lander Street facility in May 2013. Once chemical addition starts there will be additional biosolids to handle at the Lander Street facility and the facility will not be able to accommodate the additional biosolids at the Lander Street facility. Therefore, the draft permit allows the facility to transfer of the additional biosolids to the West Boise headworks, until September 30, 2016 (the date when modifications to the West Boise facility are complete.).

The 401 certification allows 90,000 gpd to be transferred from the West Boise facility to the Lander Street facility from March 1, 2012 through the term of the permit. The EPA regulations at 40 CFR 122.47 require compliance as soon as possible. Since, the compliance schedule requires the completion of the West Boise modifications by September 30, 2016 there is no reason to extend the compliance date for biosolids beyond that date. Additionally, since the Lander Street facility does not use chemical addition until May 1, 2013, there is no reason to allow the Lander Street biosolids to be transferred to the headworks of the West Boise facility prior to May 1, 2013. Therefore, the final draft permit allows transfer of biosolids starting May 1, 2013 and ending September 30, 2016.. Finally, the State did not provide any reason for increasing the amount to biosolids allowed to be sent from the Lander Street facility to the West Boise facility. The EPA has information from the City of Boise stating that they would only need to transfer up to 40,000 gpd through September 30, 2016. Therefore, the 40,0000 gpd requirement has been retained in the draft permit. If the City wishes to increase the amount of biosolids being transferred to the West Boise facility, they will need to provide the following information to justify the increase:

- Last 3 years of data detailing the amount of biosolids, in gpd, transferred from the Lander facility to the West Boise facility.
- Last 3 years of flow data for the facility.
- Estimate of the gpd of biosolids that would be generated at the Lander Street facility if the facility is operating at 15 mgd (without chemical addition). Include all calculation.
- Estimate of the biosolids production due to chemical addition. Include chemical that will be used for chemical precipitation process and the stoichiometric equations for estimating sludge production. The EPA's *Nutrient Control Design Manual*, EPA/600/R-10/100, August 2010, provides information and the equations necessary to estimate biosolids production due to chemical addition.

APPENDIX A
Water Quality Criteria Summary

Part I of this appendix provides a summary of the aquatic life and human health criteria applicable to the Boise River. Part II discusses additional aquatic life criteria applicable to the State of Idaho. Part III discusses the EPA's rationale for the hardness value used to develop hardness based metals criteria, translators for metals and water effects ratios for metals. Part IV discusses the EPA's rationale for the pH and temperature values used to develop the ammonia criteria.

I. *Idaho Water Quality Criteria*

Idaho water quality standards include criteria necessary to protect designated beneficial uses. The standards are divided into three sections: General Water Quality Criteria, Surface Water Quality Criteria for Use Classifications and Site-Specific Surface Water Quality Criteria. The EPA has determined that the criteria listed below are applicable to the Boise River. This determination was based on (1) the applicable beneficial uses of the river (*i.e.*, cold water aquatic life, primary contact recreation, salmonid spawning, agricultural water supply, industrial water supply, wildlife habitats and aesthetics), (2) the type of facility, (3) a review of the application materials submitted by the City and (4) the quality of the water in the Boise River.

1. **IDAPA 58.01.02.200.02**: Surface waters of the state shall be free from toxic substances in concentrations that impair designated beneficial uses.

2. **IDAPA 58.01.02.200.05**: Surface waters of the State shall be free from floating, suspended, or submerged matter of any kind in concentrations causing nuisance or objectionable conditions or that may impair designated beneficial uses.

3. **IDAPA 58.01.02.200.06**: Surface waters of the State shall be free from excess nutrients that can cause visible slime growths or other nuisance aquatic growths impairing designated beneficial uses.

4. **IDAPA 58.01.02.200.07**: Surface waters of the State shall be free from oxygen demanding materials in concentrations that would result in an anaerobic water condition.

5. **IDAPA 58.01.02.200.08**: Sediment shall not exceed qualities specified in Section 250, or, in the absence of specific sediment criteria, quantities which impair designated beneficial uses. Determinations of impairment shall be based on water quality monitoring and surveillance and the information utilized as described in Subsection 350.02.b.

6. **IDAPA 58.01.02.210.01**: This section of the Idaho Water Quality Standards provides the numeric criteria for toxic substances for waters designated for aquatic life, recreation, or domestic water supply use. Table A-1, below, provides the applicable human health criteria and Table A-2 provides the applicable aquatic life criteria.

Table A-1 Human Health Criteria		
Parameter	Water and Organisms	Organisms Only
Arsenic, µg/L	10	10
Methylmercury, mg/kg	NA	0.3
Nickel, µg/L	610	4600
Selenium, µg/L	170	4200
Zinc, µg/L	7400	26000
Cyanide, µg/L	140	140

1. The IDEQ changed the arsenic criteria to 10 µg/L for both the consumption of water and organisms and the consumption of organisms only. The EPA approved this change to the Idaho water quality standards on July 7, 2010.

Table A-2 Aquatic Life Criteria					
Parameter[1]	Water Effects Ratio[2]	Acute Conversion Factor	Chronic Conversion Factor	Acute Criteria	Chronic Criteria
Arsenic[3]	1	1.0	1.0	340	150
Cadmium[3]	1	0.986	0.951	0.6	0.3
Chromium III[3]	1	0.316	0.860	252.4	32.8
Chromium VI[3]	1	0.982	0.962	15.7	10.6
Copper[3]	2.578	0.960	0.960	17.2	12.5
Lead[3]	2.049	0.956	0.956	44.2	1.7
Mercury[3,4]	1	NA	NA	2.1	0.012
Nickel[3]	1	0.998	0.997	201.9	22.4
Selenium[3]	NA	NA	NA	20	5
Silver[3]	1	0.850	NA	0.6	NA
Zinc[3]	1	0.978	0.986	50.5	50.9
Cyanide[5]	NA	NA	NA	22	5.2

1. All criteria are expressed as micrograms per liter (µg/L). All hardness based criteria (cadmium, chromium III, copper, lead, nickel, silver and zinc) were developed using a hardness value of 37 mg/L as $CaCO_3$. See Part III of this appendix for a discussion on how the hardness value was determined.
2. Site specific Water Effect Ratios (WER) were developed for the acute and chronic aquatic life criteria for copper and lead (see IDAPA 58.01.02.278.04). The WER for the acute and chronic aquatic life criteria for arsenic, cadmium, chromium III, chromium VI, nickel and zinc are based on the default value of 1 (see IDAPA 58.01.02.210.03c.iii). The WER for the acute aquatic life criterion for mercury and the acute aquatic life criterion for silver are based on the default value of 1 (see IDAPA 58.01.02.210.03c.iii). There is no WER associated with the chronic aquatic life criterion for mercury, or for the acute and chronic aquatic life criteria for selenium and cyanide. See Part III.C of this appendix for additional information.
3. The criteria for arsenic, cadmium, chromium III and VI, copper, lead, mercury (acute only), nickel, silver and zinc are expressed as dissolved. The chronic criterion for mercury is expressed as total recoverable. The acute and chronic criteria for selenium are expressed as total recoverable.
4. See Part II of this appendix.
5. Cyanide is expressed as weak acid dissociable (WAD).

7. **IDAPA 58.01.02.250.01.a**: Hydrogen Ion Concentration (pH) values within the range of 6.5 to 9.0.

8. **IDAPA 58.01.02.250.02.a**: Dissolved oxygen concentrations exceeding 6 mg/L at all times.

9. **IDAPA 58.01.02.250.02.b**: Water temperatures of 22°C or less with a maximum daily average of no greater than 19°C.

10. **IDAPA 58.01.02.250.02.d**: Ammonia:

Idaho's ammonia criteria are based on formulas which consider the pH and temperature of the receiving water. Part IV of this appendix provides a detailed discussion on the pH and temperature values used to develop the acute and chronic criteria.

- The acute criterion is based on the following formula:

$$\frac{0.275}{1+10^{7.204-pH}} + \frac{39.0}{1+10^{pH-7.204}}$$

Using the above equation and a pH value of 8.9 standard units for the May - September period and 8.6 standard units for the October – April period results in the following acute criteria:

May - September: 1039 µg/L
October – April: 1771 µg/L

- The chronic criterion is based on the following formula:

$$\left(\frac{0.0577}{1 + 10^{7.688-pH}} + \frac{2.487}{1+10^{pH-7.688}} \right) \text{X MIN} (2.85, 1.45 \text{ x } 10^{0.028(25-T)}$$

May - September: pH= 8.9 and temperature = 18.7 ºC
October – April: pH = 8.6 and temperature = 14.1 ºC

Using the above equation the chronic criteria are:
May - September: 430 µg/L
October – April: 945 µg/L

11. **IDAPA 58.01.02.250.02.e**: Turbidity below any applicable mixing zone set by the Department shall not exceed background turbidity by more than 50 NTU instantaneously or more than 25 NTU for more than ten (10) consecutive days.

12. **IDAPA 58.01.02.250.02.f**; The Department shall determine spawning periods on a water body specific basis…Waters designated for salmon spawning…are not to vary from the following characteristics due to human activities:

    ii. Water temperatures of 13°C or less with a maximum daily average no greater than 9°C.

Note: In the Response to Comments document for the 1999 permit, the IDEQ identified the following salmonid fish species and their associated spawning and incubation periods:

Brown trout – October 1 - April 1
Rainbow trout – January 15 - July 15
Mountain Whitefish – October 15 – March 15

Therefore, the salmonid spawning temperature criteria are applicable from October 1 through July 15 and the cold water biota temperature criteria at IDAPA 58.01.02.250.02.b are applicable from July 16 through September 30.

Additionally, on June 29, 2011 the State revised its salmonid spawning criterion to 13° C as a maximum weekly maximum temperature, and it would be applicable from November 1 through May 31. The metric "maximum weekly maximum temperature" averages the maximum temperature recorded on each of the 7 days in the week. The IDEQ has submitted the revised criteria to the EPA but EPA has not yet acted on the submittal.

13. **IDAPA 58.01.02.251.01**.a. and b:

    a. Geometric Mean Criterion. Waters designated for primary or secondary contact recreation are not to contain *E. coli* bacteria in concentrations exceeding a geometric mean of 126 *E. coli* organisms per 100 ml based on a minimum of 5 samples taken every 3 to 7 days over a 30 day period.

    b. Use of Single Sample Values: A water sample exceeding the *E. coli* single sample maximums below indicates likely exceedance of the geometric mean criterion but is not alone a violation of water quality standards. If a single sample exceeds the maximums set forth…

    ii. For waters designated as primary contact recreation, a single sample maximum of 406 *E. coli* organisms per 100 ml. at any time; and…

14. **IDAPA 58.01.02.278.01**.: Boise River, SW-1 and SW-5 -- Salmonid Spawning and Dissolved Oxygen. The waters of the Boise River from Veterans State Park to its mouth will have dissolved oxygen concentrations of six (6) mg/L or seventy-five percent (75%) of saturation, whichever is greater, during the spawning period of salmonid fishes inhabiting those waters.

15. **IDAPA 58.01.02.278.04**. Boise River, SW-5 and SW-11a – Copper and Lead Aquatic Life Criteria. The water effect ration (WER)values used in the equations in Subsection 210.02 for calculating copper and lead CMC and CCC values shall be two and five hundred seventy eight thousandths (2.578) for dissolved copper and two and forty-nine

thousandths (2.049) for lead. These site-specific criteria shall apply to the Boise River from the Lander St. wastewater outfall to where the channel of the Boise River become fully mixed downstream of Eagle Island.

16. **IDAPA 58.01.02.401.01.d. Temperature.** The wastewater must not affect the receiving water outside the mixing zone so that :…If the water is designated for cold water aquatic life, seasonal cold water aquatic life, or salmonid spawning, the induced variation is more than one (+1) degree C.

    Note: On June 29, 2011 the State revised this criterion such that it no longer applies to the Boise River. The IDEQ has submitted this revision to the EPA for review and approval/disapproval, however EPA has not yet acted on the submission.

Additionally, the Idaho Water Quality Standards at IDAPA 58.01.02.401.01 (e) states

> "If temperature for the designated aquatic life use are exceeded in the receiving waters upstream of the discharge due to natural conditions, then Subsections 401.01(c) and 401.01(d) do not apply and instead wastewater must not raise the receiving water temperatures by more than three tenths (0.3) degrees."

Idaho's water quality standards define natural conditions as:

> "The physical, chemical, biological, or radiological conditions existing in water body without human sources of pollution within the watershed. Natural disturbances including, but not limited to, wildfire, geologic disturbance, diseased vegetation, or flow extremes that affect the physical, chemical and biological integrity of the water are part of natural background conditions. Natural background conditions should be described and evaluated taking into account this inherent variability with time and place."

The Boise River is a highly regulated by dams and irrigation ditches therefore, it is not a natural condition situation and IDAPA 58.01.02.401.01 (e) does not apply.

II. ***Additional Criteria Applicable to Aquatic Life Designated Uses in Idaho***

On December 12, 2008 the EPA sent a letter to Barry Burnell, the Water Quality Program Administrator for Idaho Department of Environmental Quality disapproving Idaho's removal of the mercury acute and chronic freshwater aquatic life criteria from its water quality standards. Therefore, the numeric aquatic life criteria for mercury applicable to the designated aquatic life uses in Idaho are the acute criterion (2.1 µg/L) and chronic criterion (0.012 µg/) for mercury which the EPA approved in 1997.

III. *Metals Criteria*

A. Hardness Value Used to Develop Hardness Based Criteria

Some of the aquatic life criteria for metals are derived using an equation that is based on the hardness of the receiving water. Specifically, the criteria for cadmium, chromium III, copper, lead, nickel, silver and zinc are dependent on ambient hardness. The Idaho WQS state that "The hardness value used for calculating aquatic life criteria for metals at design discharge conditions shall be representative of the ambient hardness for a receiving water that occur at the design discharge conditions (IDAPA 58.01.02.210.03.c.ii)."

Determining the appropriate hardness value to use to calculate the hardness dependent metals criteria is important because the toxicity of these metals increases with lower hardness. As with any natural water body the ambient hardness value continually fluctuates, therefore, it is important to choose a hardness value that ensures protection of aquatic life under varying hardness conditions.

The EPA has effluent hardness data, and ambient hardness data (upstream and downstream of the Lander Street facility). The effluent data shows that the effluent hardness is approximately three times higher than the ambient hardness of the Boise River and the effluent discharge results in a slight increase in the hardness of the river, downstream of the Lander Street facility. The following table provides the hardness data at Veterans Monitoring Station, located upstream of the Lander Street facility, and the Glenwood Monitoring Station, located downstream of the Lander Street facility. As can be seen from the table below, the Glenwood hardness values are slightly higher than the Veterans hardness values.

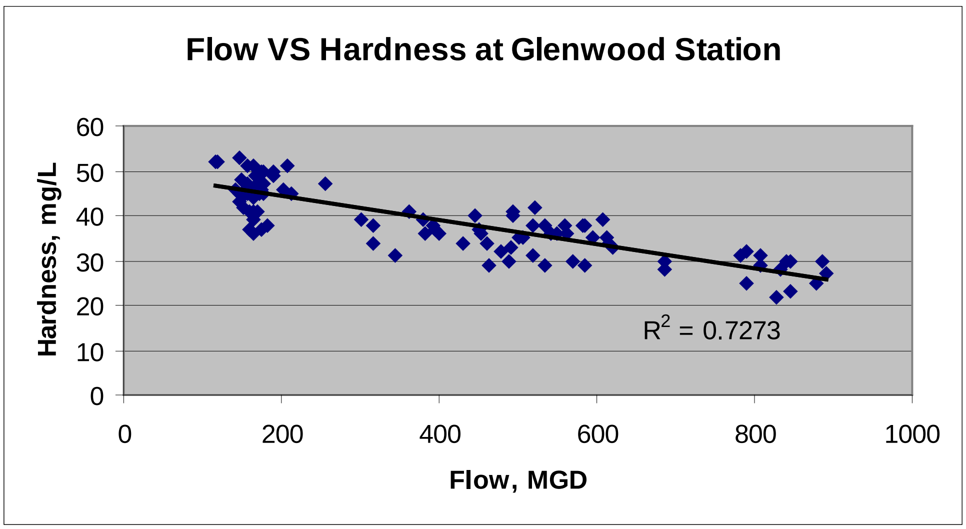
Table A-4: Comparison of hardness data at Veterans Station and Glenwood Station

	Veterans Station[1] **May – Sep, 2001 – 2009**	Glenwood Station[1] **May – Sep, 2001 – 2009**	Veterans Station[1] **Oct – Apr, 2001 – 2009**	Glenwood Station[1] **Oct – Apr, 2001 - 2009**
Minimum	20	22	27	31
Maximum	39	41	44	53
Samples collected	49	49	65	65
5th percentile of data set	22	24	33	35
25th percentile of data set	22	29	36	40
50th percentile of data set	30	32	38	44
75th percentile of data set	32	36	40	47

1. Veterans Station is located upstream of the Lander Street facility. Glenwood Station is located downstream of the Lander Street facility.

Since the downstream hardness is not overly influenced by the effluent the EPA believes it is acceptable to use the downstream hardness data set to determine the appropriate hardness value to use to calculate the hardness dependent metals criteria.

Idaho water quality standards state that the hardness values used for calculating aquatic life criteria for metals should be representative of the ambient hardness for a receiving water that occur at the 1Q10 and 7Q10 flows (see IDAPA 58.01.02.210.03.c.ii). Generally, the EPA does not have sufficient ambient hardness data to adequately approximate the receiving water hardness at the 1Q10 and 7Q10 flows. Due to the lack of ambient data the EPA Region 10 generally uses the 5th percentile of the entire hardness data set when developing hardness-based metals criteria. In this specific case, the EPA has 9 years of paired hardness and river flow data, therefore, the EPA has reviewed the relationship between river flow and hardness. This data indicates that when the flow is high, the in-stream hardness tends to be low and when the river flow is low the hardness value tends to be high. This relationship exists because when flows are high it's because high volumes of water, which have low hardness, are being released from the dam upstream of the City of Boise. The relationship between flow and hardness is important because metals are less toxic to aquatic life at high hardness values. The graph below shows the relationship between flow and hardness at Glenwood Station.



Because the hardness of the river closely correlates with flow, in this specific case, the EPA believes that rather than using the entire hardness data set, it is acceptable to use the 5th percentile of the hardness data associated with the low flow values to determine the appropriate hardness value to use when developing hardness based criteria. The relationship between flow and hardness should hold regardless of the season. The EPA believes this is acceptable because when hardness is low, there will be significantly more water in the Boise River to dilute any toxicity that may occur. Therefore, the EPA used the 5th percentile of the hardness values associated with all low flows close to the 1Q10 and 7Q10 flows to approximate the worst case condition. The hardness value used in calculating hardness based metals is 37 mg/L. The data set used in the calculation is provided below.

Hardness Values Associated with Low Flows at Glenwood Station			
Date	Flow at Glenwood	Flow at Glenwood	Hardness at Glenwood
	CFS	MGD	µg/L
3/5/2002	186	120	52
4/1/2008	221	143	46
2/5/2008	227	147	45
4/7/2009	227	147	43
4/1/2003	229	148	53
3/4/2003	233	151	48
11/2/2007	236	153	42
12/4/2007	237	153	45
1/8/2008	237	153	46
4/7/2005	240	155	47
3/4/2008	241	156	45
11/5/2002	242	156	51
12/10/2002	244	158	47
12/9/2008	246	159	37
2/3/2009	248	160	41
2/4/2003	253	163	51
12/5/2006	253	163	40
12/9/2006	253	163	36
2/6/2007	255	165	39
11/18/2003	256	165	44
3/3/2009	256	165	41
1/6/2004	257	166	46
12/6/2005	258	167	45
3/6/2007	259	167	46
12/9/2003	260	168	49
1/6/2009	262	169	41
11/3/2003	263	170	46
12/2/2003	263	170	47
3/18/2003	265	171	46
3/5/2005	265	171	45
1/9/2001	267	173	46
3/6/2001	268	173	49
1/23/2001	270	174	47
2/20/2001	270	174	50
1/10/2006	270	174	46
12/7/2004	272	176	47
11/4/2008	272	176	37
2/6/2001	273	176	45
1/4/2005	274	177	47
2/1/2005	274	177	47
3/20/2001	276	178	50
11/7/2006	281	182	38
2/18/2003	292	189	50

…Continued on Next Page…

Date	Flow at Glenwood	Flow at Glenwood	Hardness at Glenwood
	CFS	MGD	µg/L
3/9/2004	294	190	49
10/21/2003	312	202	46
2/3/2004	321	207	51
4/3/2001	328	212	45
11/1/2004	394	255	47
9/11/2001	468	302	39

B. Water Effects Ratios (WER) for Metals

A WER is a methodology that can be used to develop site-specific water quality criteria which reflect local environmental conditions. The WER procedure is intended to take into account relevant differences between the toxicities of the chemical in laboratory dilution water and in site water. WERs are applicable to the aquatic life criteria for arsenic, cadmium, chromium III and VI, copper, lead, nickel, silver, zinc and acute mercury.

Idaho's water quality standards (IDAPA 58.01.02.210.03.c.iii) state that:

> "…the WER is computed as a specific pollutant's acute or chronic toxicity values measured in water from the site, divided by the respective acute or chronic toxicity value in laboratory dilution water. The WER is assigned a value of one (1.0), except where the Department assigns a different value that protects the designated uses of the water body from the toxic effects of the pollutant and is derived from suitable tests on sampled water representative of conditions in the affected water body, consistent with the design discharge conditions.…"

Idaho has established site specific WERs for copper and lead that apply to the Boise River from the Lander St. wastewater outfall to where the channel of the Boise River becomes fully mixed downstream of Eagle Island. The WER for copper is 2.578 and the WER for lead is 2.049 (see IDAPA 58.01.02.278.04).

The WERs for acute and chronic aquatic life criteria for arsenic, cadmium, chromium III and VI, nickel, silver and zinc are assigned a default value of 1.0. The WER for the acute aquatic life criterion for mercury is also assigned a default value of 1.0. There are no WERs associated with the chronic aquatic life criterion for mercury or for the acute or chronic aquatic life criterion for selenium.

IV. *Temperature and pH Values Used to Determine Ammonia Criteria*

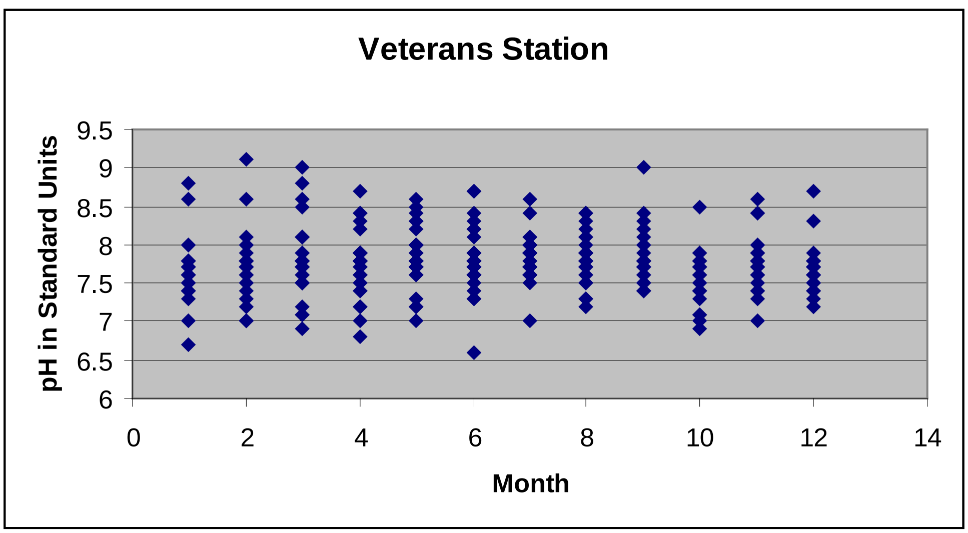
Ambient pH and temperature are factors used in the calculation of the ammonia criteria. The City has collected pH and temperature data in the Boise River (upstream and downstream of the Lander Street facility) from January 2003 through July 2009. These data were used to determine the appropriate pH and temperature values to calculate the ammonia criteria.

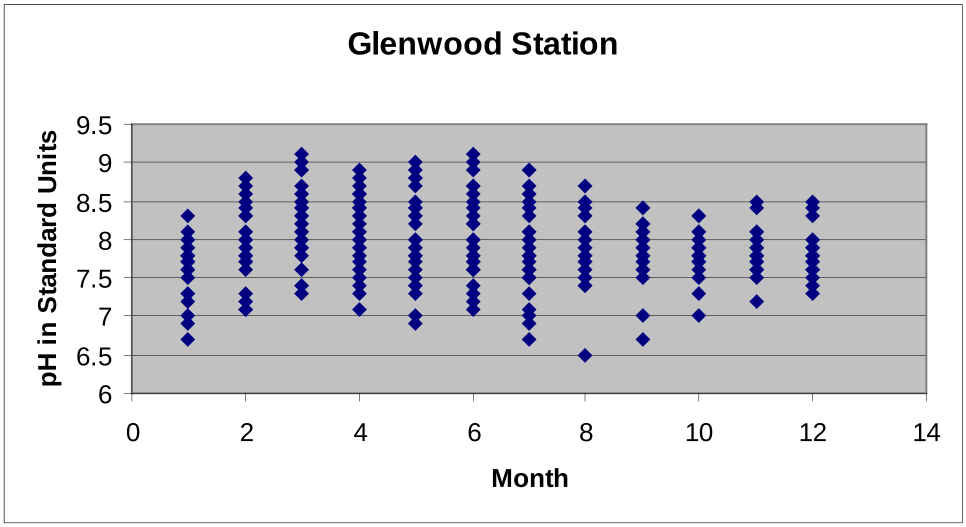
Ambient pH is the factor that determines the acute ammonia criterion. Ambient waters with higher pH values will have a more stringent acute criterion because ammonia is more acutely toxic to aquatic life at high pH. Ambient pH and temperature are the factors necessary to calculate the chronic ammonia criterion. An ambient water body with higher pH and higher temperature will have a more stringent chronic criterion because ammonia is more chronically toxic to aquatic life at high pH and temperatures.

The pH and temperature of a water body will vary over time. Therefore, to protect water quality criteria it is important to develop the criteria based on pH and temperature values that will be protective of aquatic life at all times.

A. pH

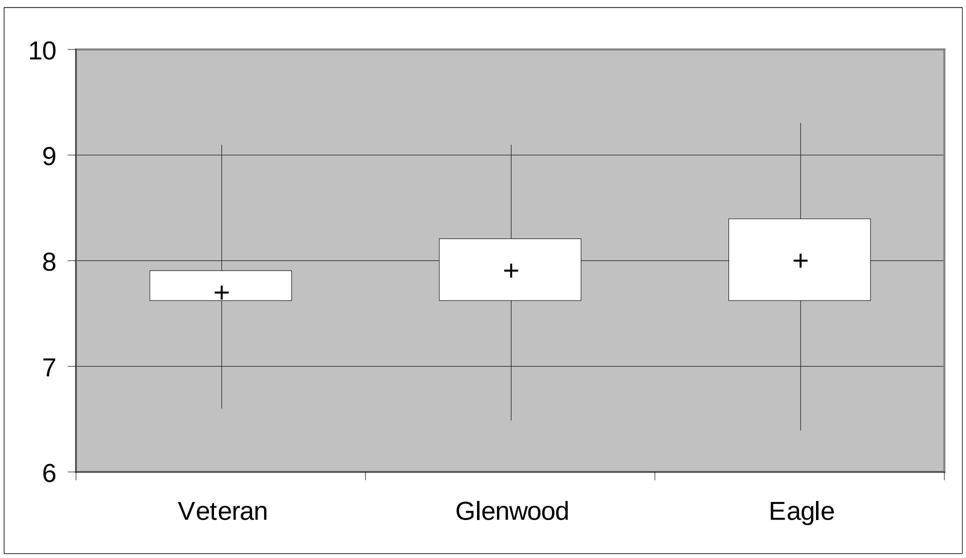
A review of the pH data at the Veteran's Monitoring Station, located upstream of the Lander Street facility, and the Glenwood monitoring Station, located downstream of the Lander Street facility, shows that the Lander Street facility effluent slightly influences the pH of the downstream water. The graphs, below, shows pH data by month at the Veteran and Glenwood Stations.





The following box and whisper plot provides the minimum, maximum, 25th percentile, median, and 75th percentile of the pH data at Veteran, Glenwood and Eagle Monitoring Stations.[1]

pH Data at Veterans, Glenwood and Eagle Monitoring Station



As can be seen from the box and whisper plot, the Lander Street facility influences the pH levels in the river downstream of the facility and the West Boise facility influences the pH levels in the River downstream of the West Boise facility. The EPA believes it is acceptable to use the downstream pH data set to determine the appropriate pH value to use to calculate ammonia criteria because using downstream data will capture the higher pH values. As discussed

[1] Veteran Station is above the Landers Street facility, Glenwood Station is below the Lander Street facility and above the West Boise facility, and Eagle Station is below the West Boise facility.

previously, the EPA is dividing the flow periods into the May – September period and the October – April period.

1. pH value for Acute Criterion

The acute criterion is based on the pH of the receiving water. The pH data set was collected from January 2003 – July 2009. The 95th percentile of the Glenwood Station pH data set results in the following ph values:

May – September: 8.9 standard units
October – April: 8.6 standard units

(Note: See page 3 of this Appendix for the ammonia equations)

2. pH value for the Chronic Criterion

The chronic criterion is based on the pH and the temperature data. The 95th percentile of the Glenwood pH data set and temperature data set was used to determine criterion. The pH data set was collected from January 2003 – July 2009. As stated above the 95th percentile of the data set is:

May – September: 8.9 standard units
October – April: 8.6 standard units

(Note: See page 3 of this Appendix for the ammonia equations)

B. <u>Temperature</u>

The data for temperature was divided into the May – September and October – April periods to account for the different temperature ranges that occur during these time periods.

As stated previously, temperature is a factor when deriving the chronic ammonia criterion. The EPA has average daily temperature data at Glenwood Station from January 2001 through September 2009. Using this data the 95th percentile for each time period is:

May – September: 18.7 °C
October – April: 14.1 °C

(Note: See page 3 of this Appendix for the ammonia equations)

APPENDIX B
BASIS FOR EFFLUENT LIMITATIONS

The following discussion explains the derivation of secondary treatment requirements and water quality-based effluent limits. Part I discusses the applicable secondary treatment requirements, Part II discusses water quality-based effluent limits, Part III discusses anti-backsliding provisions, Part IV discusses the effluent limits imposed due to the State's anti-degradation policy and Part V presents a summary of the facility specific limits.

I. Secondary Treatment Requirements

A. BOD_5, TSS and pH

1. Secondary Treatment:

The Clean Water Act (CWA) requires publicly owned treatment works (POTWs) to meet performance-based requirements based on available wastewater treatment technology. Section 301 of the CWA established a required performance level, referred to as "secondary treatment," that all POTWs were required to meet by July 1, 1977. The EPA developed "secondary treatment" regulations, which are specified in 40 CFR Part 133. These technology-based effluent limits apply to all municipal wastewater treatment plants and identify the minimum level of effluent quality attainable by secondary treatment in terms of BOD_5, TSS and pH. Table B-1 below lists the technology-based effluent limits:

Table B-1
Secondary Treatment Effluent Limits

Parameter	Average Monthly Limit	Average Weekly Limit	Range
BOD_5	30 mg/L	45 mg/L	---
TSS	30 mg/L	45 mg/L	---
Removal Rates for BOD_5 and TSS	85% (minimum)	---	---
pH	---	---	6.0 - 9.0 s.u.

2. Mass-based Limits

The federal regulations at 40 CFR 122.45(b) and (f) require that POTW limitations be expressed as mass-based limits using the design flow of the facility. The mass-based limits, expressed in lbs/day, are calculated as follows:

Mass-based limit (lbs/day) = concentration limit (mg/L) × design flow (mgd) × 8.34

Since the design flow for this facility is 15 mgd, the technology-based mass limits for

BOD_5 and TSS are calculated as follows:

Average Monthly Limit = 30 mg/L × 15 mgd × 8.34 = 3753 lbs/day

Average Weekly Limit = 45 mg/L × 15 mgd × 8.34 = 5629.5 lbs/day

II. <u>Water quality-based effluent Limits</u>

A. Statutory and Regulatory Basis

Section 301(b)(1)(C) of the CWA requires that effluent limitations in permits meet water quality standards. Discharges to State waters must also comply with limitations imposed by the State as part of its certification of NPDES permits under section 401 of the CWA.

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 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.

B. Reasonable Potential Analysis

When evaluating the effluent to determine if the pollutant parameters in the effluent 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 water quality criterion, the EPA projects the receiving water concentration (downstream of where the effluent enters the receiving water) for each pollutant of concern. The EPA uses the concentration of the pollutant in the effluent and receiving water and, if appropriate, the dilution available from the receiving water, to project the receiving water concentration. If the projected concentration of the pollutant in the receiving water exceeds the numeric criterion for that specific pollutant, then the discharge has the reasonable potential to cause or contribute to an excursion above the applicable water quality standard and a water quality-based effluent limit is required.

Sometimes it may be 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 concentration of the pollutant in the receiving water is less than the criterion necessary to protect the designated uses of the water body. Mixing zones may be authorized by the Idaho Department of Environmental Quality (IDEQ). The IDEQ’s draft certification proposes to authorize the following mixing zones:

- Silver - 10% of low flows
- Zinc - 15% of low flows
- pH - 25% of low flows
- Ammonia – 25% of low flows
- Whole Effluent Toxicity – 25% of low flows
- Temperature criteria for salmonid spawning – 25% of low flow from December to February only

- Temperature, allowable induced variation due to a point source discharge – 25% of low flow from December to February only
- Dissolved oxygen – 25% of low flow

It should also be noted that IDEQ has revised their temperature criteria for salmonid spawning. They submitted the revisions to the EPA on July 22, 2011 for review. The revised criteria cannot be used in NPDES permits until they are approved by the EPA. However, in anticipation of EPA approval, the IDEQ's draft certification has proposed alternate mixing zones for the revised temperature criteria. The IDEQ has proposed the following mixing zones for temperature based on the revised temperature criteria:

November through April – 50%

May through July 15 - 25%

October - 25%

If the IDEQ does not grant the mixing zones in its final certification of this permit, the water quality-based effluent limits will be re-calculated such that the criteria are met before the effluent is discharged to the receiving water.

A Reasonable Potential Analysis has been done for metals, cyanide, ammonia, temperature, pH, dissolved oxygen/ biochemical oxygen demand, whole effluent toxicity, turbidity and total phosphorus. Appendix C provides the details of the reasonable potential analysis. A reasonable potential analysis was not done for TSS and bacteria because the *Lower Boise River TMDL* provided waste load allocations (WLAs) for these pollutants and effluent limitations for point sources must be consistent with TMDL WLAs (see 40 CFR 122.44(d)(1)vii(B)).

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 may be discharged to the receiving water without causing or contributing to an excursion above the water quality standards. Wasteload allocations are determined in one of the following ways:

1. <u>TMDL-Based Wasteload Allocation</u>

   Where the receiving water quality does not meet water quality standards, the wasteload allocation is generally based on a TMDL developed by the State. A TMDL is a determination of the amount of a pollutant from point, non-point and natural background sources that may be discharged to a water body without causing the water body to exceed the criterion for that pollutant. Any loading above this capacity risks violating water quality standards.

   To ensure that these waters will come into compliance with water quality standards Section 303(d) of the CWA requires States to develop TMDLs for those water bodies that will not meet water quality standards even after the imposition of technology-based effluent limitations. The first step in establishing a TMDL is to determine the assimilative capacity (the loading of pollutant that a water body can assimilate without exceeding water quality standards). The next step is to divide the assimilative capacity into allocations for non-point sources (load allocations), point sources (wasteload allocations), natural background loadings and a margin of safety to account for any uncertainties. Permit limitations are then developed for point sources that are consistent with the wasteload allocation for the point source.

In January 2000, the EPA approved the Idaho Department of Environmental Quality's 1998 *Lower Boise River TMDL, Subbasin Assessment, Total Maximum Daily Load*. The TMDL included wasteload allocations for bacteria and total suspended solids for the Lander Street facility. Additionally, the *Snake River – Hells Canyon TMDL* (IDEQ, June 2004) provided a WLA for phosphorus for the confluence of the Boise River with the Snake River.

2. Mixing zone based WLA

When the State authorizes a mixing zone for the discharge, the WLA is calculated by using a simple mass balance equation. The equation takes into account the available dilution provided by the mixing zone and the background concentrations of the pollutant. The WLAs for ammonia, pH, temperature (during some months) and dissolved oxygen were derived using a mixing zone. A mixing zone was also used when determining the allowable induced temperature variation due to a point source.

3. Criterion as the Wasteload Allocation

In some cases a mixing zone cannot be authorized, either because the receiving water is already at, or exceeds, the criterion, the receiving water flow is too low to provide dilution, or the facility can achieve the effluent limit without a mixing zone. In such cases, the criterion becomes the wasteload allocation. Establishing the criterion as the wasteload allocation ensures that the effluent discharge will not contribute to an exceedance of the criteria. The WLA for mercury, total phosphorus, and temperature (during some months) were derived using this method.

Once the wasteload allocation has been developed, the EPA applies the statistical permit limit derivation approach described in Chapter 5 of the *Technical Support Document for Water Quality-Based Toxics Control* (EPA/505/2-90-001, March 1991, hereafter referred to as the TSD) to obtain monthly average and weekly average or daily maximum permit limits. This approach takes into account effluent variability, sampling frequency and water quality standards. Appendix D provides the derivation of water quality-based effluent limits.

D. Water quality-based effluent Limits

The following provides a summary of the water quality-based effluent limits derived in Appendix D.

TABLE B-2 – Water quality-based effluent Limits

	Average Monthly Limit	Average Weekly Limit	Maximum Daily Limit	Monthly Geometric Mean	Average Daily Limit	Instantaneous Maximum	Minimum Daily Limit	Range
TSS **Apr 1 – Sep 30**	27 mg/L 3400 lbs/day	40 mg/L 5000 lbs/day	---	---	---	---	---	---
TSS **Oct 1 – Mar 31**	20 mg/L 2500 lbs/day	30 mg/L 3750 lbs/day	---	---	---	---	---	---
Total Ammonia as N **May 1 – Sep 30**	1098 µg/L 137 lbs/day	---	3718 µg/L 465 lbs/day	---	---	---	---	---
Total Ammonia as N **Oct 1 - Apr 30**	1027 µg/L 129 lbs/day	---	3479 µg/L 435 lbs/day	---	---	---	---	---
Mercury Total Recoverable	0.009 µg/L 0.001 lbs/day	---	0.019 µg/L 0.002 lbs/day	---	---	---	---	---
Total Phosphorus **May 1 – September 30**	70 µg/L 8.7 lbs/day	93.1 µg/L 11.6 lbs/day	---	---	---	---	---	---
E. coli Bacteria	---	---	---	126 col/100 ml	---	406 col/100 ml	---	
pH	---	---	---	---		---	---	6.4 – 9.0 s.u.
Temperature, see note 1 **Dec 1 – Feb 29**		---	---	---	7.8 º C	20.5 º C	---	---
Temperature, see note 1 **Mar 1 – Jul 15**		---	---	---	9.0º C	13.0 º C	---	---
Temperature, see note 1 **Jul 16 – Sep 30**		---	---	---	20.4º C	26.3º C	---	---
Temperature, see note 1 **Oct 1 – Nov 30**		---	---	---	9.0 º C	13.0 º C	---	---
Dissolved Oxygen, see note 2 **Oct 1 - April 30**		---	---	---	---	---	6.3 mg/L	---
Dissolved Oxygen, see note 2 **May 1 – July 15**							3.9 mg/L	

NOTE 1: If the EPA approves the IDEQ's revisions to the temperature criteria, then the temperature limits will be as follows:

Table B-3: Water quality-based Effluent Limits for Temperature Based on the IDEQ's Revised Temperature Criteria

Date	MWMT	Average Daily Limit	Instantaneous Maximum Limit
November 1 – April 30	15.8 °C	NA	NA
May	16.4 °C	NA	NA
June 1 – July 15	NA	NA	NA
July 16 – September 30	NA	19.0°C	22.0 °C
October 1 – October 31	NA	22.2°C	27.3°C

The MWMT is the average of the maximum temperature collected over 7 days. The MWMT for March 1 would be the average of the maximum daily temperatures based on the maximum temperature measured on March 1 and the preceding six days (i.e., February 23, 24, 25, 26, 27, 28 and March 1).

NOTE 2: If the EPA approves the IDEQ's revisions to the temperature criteria, then the dissolved oxygen limits and the dissolved oxygen minimum daily limits will be as follows:

October: 3.0 mg/L

November – April – 3.6 mg/L

III. Anti-backsliding Provisions

Section 402(o) of the Clean Water Act and federal regulations at 40 CFR §122.44 (l) prohibit the renewal, reissuance or modification of an existing NPDES permit that contains effluent limits, permit conditions or standards that are less stringent than those established in the previous permit (*i.e.*, anti-backsliding). The Clean Water Act at Section 402(o)(2) sets forth some exceptions to the prohibition against backsliding from effluent limitations provided the revised effluent limitation does not result in a violation of applicable water quality standards, including anti-degradation requirements.

The 1999 permit for the Lander Street facility has more stringent limitations or conditions for BOD, aesthetic conditions, collected screening, solids and grit, and sludge conditions. These limitations or conditions are being retained in the proposed permit based on anti-backsliding statues and regulations. Each permit requirement being retained is discussed below.

1. Biochemical Oxygen Demand

The federally required secondary treatment effluent limits for BOD are:

Average Monthly Limit:	30 mg/L (3753.5 lbs/day)
Average Weekly Limit:	45 mg/L (5726.9 lbs/day)

The 1999 permit requires the effluent to meet BOD limitations that are more restrictive than the secondary treatment effluent limits. These limits were developed in a March 29, 1979 evaluation conducted by the Idaho Department of Environmental Quality (IDEQ) to ensure that water quality standards in the river would be met (see March 29, 1979 Memo from Mike Smith to Tom Korpalski, *Final Design Criteria and Ultimate Effluent Limitations for the City of Boise*). The BOD limits in the 1999 permit are:

	April 1 – September 30	October 1 – March 31
Average Monthly Limit	20 mg/L (2200 lbs/day)	20 mg/L (1700 lbs/day)
Average Weekly Limit	30 mg/L (3400 lbs/day)	30 mg/L (2500 lbs/day)

Clean Water Act section 402(o) applies to backsliding of water quality-based effluent limits. In this case, none of the exceptions in Section 402(o)(2) of the CWA apply. Therefore, these limits must be retained in the proposed permit. (It should be noted that a reasonable potential analysis was done to see if more stringent limits than those incorporated into the 1999 permit were necessary to ensure water quality standards were protected. The reasonable potential analysis in Appendix C did not find that more stringent effluent limits for BOD were necessary at this time.)

2. Narrative Conditions

(a) Aesthetics Conditions

The 1999 permit contains the following narrative aesthetics provision:

> "There shall be no floating, suspended, or submerged matter of any kind in concentrations causing nuisance or objectionable conditions that may impair designated uses in the receiving water."

The anti-backsliding provision at 40 CFR 122.44(l) applies to this provision. 40 CFR 122.44(l) prohibits the relaxation of a permit condition unless the circumstances on which the previous permit (i.e., the 1999 permit) was based have materially and substantially changed since the time the permit was issued. Since the circumstances on which the 1999 permit was based have not changed the condition must be retained in the proposed permit.

(b) Collected Screenings, Solids, Grit, etc.

The 1999 permit contains the following narrative provision (see Part III.F. of the 1999 permit) to ensure that pollutants that have been removed from a waste stream are not re-introduced to the receiving waters.

> "Collected screening, grit, solids, biosolids, filter backwash, or other pollutants removed in the course of treatment or control of wastewaters shall be disposed of in a manner such as to prevent such materials from entering navigable waters."

The anti-backsliding provision at 40 CFR 122.44(l) applies to this provision. The circumstances on which the 1999 permit was based have not materially and substantially changed since the time the 1999 permit was issued. Therefore, the 1999 permit condition will be retained in the permit.

(c) Sludge Condition

The current permit contains the following narrative condition for sludge:

> "Pollutants contained in the sewage sludge shall not be discharged to surface waters either directly or indirectly. Biosolids from other facilities may not be received at this facility mixed with sewage. Biosolids from this facility may not be mixed with sewage or other wastewater prior to treatment and discharge, or mixed with effluent prior to discharge, or discharged directly to surface waters."

The anti-backsliding provision at 40 CFR 122.44(l) applies to this provision. The circumstances on which the 1999 permit was based have not materially and substantially changed since the time the 1999 permit issued. Therefore, the 1999 permit condition will be retained in the permit.

IV. Anti-degradation

The proposed issuance of an NPDES permit triggers the need to ensure that the conditions in the permit ensure that Tier I, II, and III of the State's anti-degradation policy are met. An anti-degradation analysis was conducted by the IDEQ. See Appendix G for the anti-degradation analysis.

V. Summary of Facility Specific Limits

The final limits are the more stringent of the secondary treatment requirements, the water quality-based effluent limits or the anti-backsliding requirements. The proposed permit will contain the following requirements:

(1) "There shall be no floating, suspended, or submerged matter of any kind in concentrations causing nuisance or objectionable conditions that may impair designated uses in the receiving water."

(2) "Collected screening, grit, solids, biosolids, filter backwash, or other pollutants removed in the course of treatment or control of wastewaters shall be disposed of in a manner such as to prevent such materials from entering navigable waters."

(3) Pollutants contained in the sewage sludge shall not be discharged to surface waters either directly or indirectly. Biosolids from other facilities may not be received at this facility mixed with sewage. Biolsolids from this facility may not be mixed with sewage or other wastewater prior to treatment and discharge, or mixed with effluent prior to discharge, or discharged directly to surface waters.

(4) Dissolved oxygen must be equal to or greater than 6.3 mg/L from October through April and equal to or greater than 3.9 mg/L from May through July 16. (Note: If the EPA approves the IDEQ temperature revisions, the final dissolved oxygen limits must be equal to or greater than 3.6 mg/L from November through April and equal to greater than 3.0 mg/L in October).

(5) pH must be within the range of 6.4 – 9.0 standard units.

TABLE B-4 - Proposed Effluent Limits

	Average Monthly Limit	Average Weekly Limit	Maximum Daily Limit	Monthly Geometric Mean	Average Daily Limit	Instantaneous Maximum Limit
BOD_5 **Apr 1 – Sep 30**	20 mg/L 2200 lbs/day	30 mg/L 3400 lbs/day	---	---	---	---
BOD_5 **Oct 1 – Mar 31**	20 mg/L 1700 lbs/day	30 mg/L 2500 lbs/day	---	---	---	---
TSS **Apr 1 – Sep 30**	27 mg/L 3400 lbs/day	40 mg/L 5000 lbs/day	---	---	---	---
TSS **Oct 1 – Mar 31**	20 mg/L 2500 lbs/day	30 mg/L 3750 lbs/day	---	---	---	---
Removal Rates for BOD_5 and TSS	85% minimum	---	---	---	---	---
Total Ammonia as N **May 1 – Sep 30**	1098 µg/L 137 lbs/day	---	3718 µg/L 465 lbs/day	---	---	---
Total Ammonia as N **Oct 1 - Apr 30**	1027 µg/L 129 lbs/day	---	3479 µg/L 435 lbs/day	---	---	---
Mercury Total Recoverable	0.009 µg/L 0.001 lbs/day	---	0.019 µg/L 0.002 lbs/day	---	---	---
Total Phosphorus	70 µg/L 8.7 lbs/day	93.1 µg/L 11.6 lbs/day	---	---	---	---
E. coli Bacteria	---	---	---	126 col/100 ml	---	406 col/100 ml
Temperature, **Dec 1 – Feb 29** **See note 1**	---	---	---	---	7.8 ° C	20.5 ° C
Temperature, **Mar 1 – Jul 15** **See note 1**	---	---	---	---	9.0º C	13.0 ° C
Temperature, **Jul 16 – Sep 30** **See note 2**	---	---	---	---	20.4º C	26.3º C
Temperature, **Oct 1 – Nov 30** **See note 2**		---	---	---	9.0 ° C	13.0 ° C

Note 1: If the EPA approves, the revisions to the salmonid spawning temperature criteria that the IDEQ has submitted to EPA for review, then the temperature limits will be as follows:

Table B-5: Water quality-based effluent Limits for Temperature Based on the IDEQ's Revised Temperature Criteria

Date	MWMT	Average Daily Limit	Instantaneous Maximum Limit
November 1 - April 30	15.8 °C	NA	NA
May	16.4	NA	NA
July 16 – September 30	NA	19 °C	22 °C
October	NA	22.2°C	27.3°C
Note: The MWMT is the average of the maximum temperature collected over 7 days. For example, the MWMT for March 1 would be the average of the maximum daily temperatures collected on March 1 and the preceding six days (i.e., February 23, 24, 25, 26, 27, 28 and March 1).			

NOTE 2: If the EPA approves the IDEQ's revisions to the temperature criteria, then the dissolved oxygen limits and the dissolved oxygen minimum daily limits will be as follows:

October: 3.0 mg/L

November – April: 3.6 mg/L

APPENDIX C
REASONABLE POTENTIAL ANALYSIS

Part I of this appendix provides the reasonable potential analysis for metals, cyanide and ammonia; Part II provides the reasonable potential analysis for total phosphorus; Part III provides the reasonable potential analysis for pH; Part IV provides the reasonable potential analysis for temperature; Part V provides the reasonable potential analysis for whole effluent toxicity, Part VI provides the RP for dissolved oxygen and Part VII provides the reasonable potential analysis for turbidity.

A summary of the results of the Reasonable Potential Analysis is presented in the table below. Following this table is a summary of the mixing zones used in the Reasonable Potential Analysis for each parameter.

Parameter	**Is there Reasonable Potential to exceed the criteria?**
Arsenic, Cadmium, Chromium III and VI, Copper, Lead, Nickel, Selenium, Cyanide	No
Mercury	Yes
Silver	No
Zinc	No
Total Phosphorus	Yes
pH	Yes
Ammonia	Yes
Temperature	Yes
Whole Effluent Toxicity	No
Dissolved Oxygen – near field **Dissolved Oxygen – far field**	Yes (from Oct – April only) No
Turbidity	No

A Summary of the Mixing Zone sizes used in the Reasonable Potential Analysis is provided below:

Parameter	Mixing Zone Size
Arsenic, Cadmium, Chromium III and VI, Copper, Lead, Nickel, Selenium, Cyanide, Mercury	0%
Silver	10%
Zinc	15%
Total Phosphorus	0%
pH	25%
Ammonia	25%
Temperature, allowable induced temperature variation due to a point source discharge	25% Dec – Feb 0% Mar – July 15 0% Oct - Nov
Temperature, salmonid spawning aquatic life criteria **See Note 1**	25% Dec – Feb 0% Mar – July 15 0% Oct - Nov
Temperature, cold water biota aquatic life criteria	0% July 16 – Sep 30
Whole Effluent Toxicity	25%
Dissolved Oxygen – near field **Dissolved Oxygen – far field**	25% NA
Turbidity	0%

Note 1. The IDEQ submitted revised salmonid spawning temperature criteria to the EPA on July 22, 2011. The criterion has been revised to 13 ºC as a maximum weekly maximum temperature, and is effective from November 1 through May 31. If the EPA approves the revisions to the temperature criteria prior to final issuance of the permit then EPA will use the revised criteria in the final permit. The IDEQ's draft 401 certification has included mixing zones for the revised criteria (as well as the currently EPA approved criteria) in anticipation of EPA approving the revisions. The proposed mixing zones are as follows:

November through April – 50%
May through July 15 – 25%
October – 25%

I. REASONABLE POTENTIAL ANALYSIS FOR METALS, CYANIDE AND AMMONIA

The Reasonable Potential Analysis determined that for the protection of aquatic life effluent limitations are required for ammonia and mercury. The analysis used to make this determination is discussed in detail below. See Appendix D for derivation of the water quality-based effluent limits.

Applicable Water Quality Criteria

The Idaho water quality standards provide the numeric criteria for toxic substances for waters designated for aquatic life, recreation, or domestic water supply use.

The applicable ammonia criteria are as follows:

	May – September	**October - April**
Acute aquatic life criterion	1039 µg/L	1771 µg/L
Chronic aquatic life criterion	430 µg/L	945 µg/L

See Appendix A for additional information on developing the criteria for ammonia

Table C-1, below, provides the human health criteria and the aquatic life criteria for cyanide and metals. All values are micrograms per liter. See Appendix A for additional information on developing the hardness based metals criteria for aquatic life.

Table C-1 Criteria for Aquatic Life and Human Health

Parameter	Aquatic Life Criteria		Human Health Criteria	
	Acute Criteria	Chronic Criteria	Water and Organisms	Organisms Only
Arsenic	340	150	10	10
Cadmium	0.6	0.3	NA	NA
Chromium III	252.4	32.8	NA	NA
Chromium VI	15.7	10.6	NA	NA
Copper	17.2	12.5	NA	NA
Lead	44.2	1.7	NA	NA
Methylmercury in mg/kg See note 4	NA	NA	NA	0.3
Mercury	2.1	0.012	NA	NA
Nickel	201.9	22.4	610	4600
Selenium	20	5	170	4200
Silver	0.6	NA	NA	NA
Zinc	50.5	50.9	7400	26000
Cyanide	22	5.2	140	140

1. The aquatic life criteria for arsenic, cadmium, chromium III and VI, copper, lead, mercury (acute only), nickel, silver and zinc are expressed as dissolved.
2. The chronic aquatic life criterion for mercury and the acute and chronic aquatic life criteria for selenium are expressed as total recoverable.
3. Human health criteria are expressed as total recoverable, except for methylmercury which is a fish tissue concentration and is expressed as mg/kg.
4. The EPA does not have Boise River fish tissue data for methylmercury, therefore sampling will be required during the term of the proposed permit.

General Equation Used to Determine Reasonable Potential

When evaluating the effluent to determine if a water quality-based effluent limit (WQBEL) is needed based on chemical specific numeric criteria, a projection of the receiving water concentration (downstream of where the effluent enters the receiving water) for the pollutant of concern is made. If the projected concentration of the receiving water exceeds the applicable numeric criterion, then there is reasonable potential that the discharge may cause or contribute to an excursion above the applicable water quality standards and a WQBEL is required. The EPA uses a steady state model to determine reasonable potential. Steady state models calculate wasteload allocations at critical conditions that are usually a combination of reasonable worst-case assumptions of receiving water flow, effluent pollutant concentrations and receiving water concentrations. The following mass balance equation is used to determine the downstream receiving water concentration (C_d):

$$C_d \times Q_d = (C_e \times Q_e) + (C_u \times Q_u) \qquad \textbf{(Equation 1)}$$

$$C_d = \frac{(C_e \times Q_e) + (C_u \times Q_u)}{Q_d} \qquad \textbf{(Equation 2)}$$

where,

C_d = projected receiving water concentration downstream of the effluent discharge
Q_d = receiving water flow downstream of the effluent discharge = $Q_u + Q_e$
C_e = maximum projected effluent concentration
Q_e = maximum effluent flow
C_u = upstream concentration of pollutant
Q_u = upstream flow

Mixing Zones (MZ) and the Mass Balance Equation

A mixing zone is an area where an effluent discharge undergoes initial dilution and is extended to cover the secondary mixing in the ambient water body. A mixing zone is an allocated impact zone where the water quality standards may be exceeded as long as acutely toxic conditions are prevented (U.S. EPA NPDES Permit Writers' Manual, 1996). The federal regulations at 40 CFR 131.13 states that "States may, at their discretion, include in their State standards, policies generally affecting their application and implementation, such as mixing zones, low flows and variances." The Idaho Water Quality Standards at IDAPA 58.01.02.060 provides Idaho's mixing zone policy for point source discharges. The policy allows the Idaho Department of Environmental Quality (IDEQ) to authorize a mixing zone for a point source discharge after a biological, chemical and physical appraisal of the receiving water and the proposed discharge. To account for allowable mixing zones the mass balance equation (*i.e.*, equation 2) becomes:

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

If no mixing zone is authorized by the state the mass balance equation is:

$$C_d = C_e \qquad \textbf{(Equation 4)}$$

The IDEQ draft 401 certification proposes to authorize mixing zones for some pollutants at the Lander Street facility. The EPA has used the proposed mixing zone in its reasonable potential analysis. The mixing zone sizes are for critical low flow conditions and apply year round. They are as follows:

Silver:	10% (for acute aquatic life criterion only)
Zinc:	15% (for acute and chronic aquatic life criterion)
Ammonia:	25% (for acute and chronic aquatic life criterion)

Boise River Critical Low Flows (Q_u)

The low flow conditions of a water body are used to determine water quality-based effluent limits. In general, Idaho's water quality standards define low flow conditions for acute aquatic life criteria as the 1Q10 or 1B3 flow, low flow conditions for chronic aquatic life criteria as the 7Q10 or 4B3 flow, low flow conditions for non-carcinogenic human health criteria as the 30Q5 and low flow conditions for carcinogenic human health criteria as the harmonic mean flow (see IDAPA 58.01.02210.03). Idaho's water quality standards do not specify a low flow to use for acute and chronic aquatic life ammonia criteria, however, the EPA's *Water Quality Criteria; Notice of Availability; 1999 Update of Ambient Water Quality Criteria for Ammonia; Notice* (64 FR 71976, December 22, 1999) identifies the 1Q10 as the appropriate flow for the acute ammonia criterion and the 30Q10 as the appropriate flow for the chronic ammonia criteria. Idaho's water quality standards define low flow conditions for non-carcinogenic human health criteria as the 30Q5 flow and the low flow condition for carcinogenic human health criteria as the harmonic mean flow. These low flow values are defined below:

1. The 1Q10 flow is used for the protection of aquatic life from acute effects. It represents the lowest one day flow with an average recurrence frequency of once in 10 years.

2. The 7Q10 flow is used for the protection of aquatic life from chronic effects. It represents lowest average 7 consecutive day flow with an average recurrence frequency of once in 10 years.

3. The 30Q5 flow is used for the protection of human health from non-carcinogens. It represents the lowest average 30 consecutive day flow with an average recurrence frequency of once in 5 years.

4. The 30Q10 flow is used for the protection of aquatic life for the chronic ammonia criterion. It represents the lowest average 30 consecutive day flow with an average recurrence frequency of once in 10 years.

5. The harmonic mean flow is a long-term mean flow and is used for the protection of human health from carcinogens. It is the number of daily flow measurements divided by the sum of the reciprocals of the flows.

The estimated low flows in the Boise River upstream of the Lander Street facility are presented in Table C-2 (see Part III.B of the fact sheet for a discussion on how the low flows were estimated).

TABLE C-2: Estimated Low Flows Upstream of the Lander Street Facility

Flows	May 1 – September 30	October 1 – April 30
1Q10	158.1 mgd	58.6 mgd
7Q10	171 mgd	68.9 mgd
30Q10	235 mgd	77.3 mgd
30Q5	282.2 mgd	92.2 mgd
Harmonic Mean	244.1 mgd	239.5 mgd

Maximum Projected Effluent Concentration (C_e)

When determining the projected receiving water concentration downstream of the effluent discharge, the EPA's *Technical Support Document for Water Quality-based Toxics Controls* (TSD, 1991) recommends using the maximum projected effluent concentration (C_e) in the mass balance calculation (see equation 3, page C-5). 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:

$\delta n \geq (1 - \text{confidence level})^{1/n}$ **(Equation 5)**

where, the confidence level = 99% (0.99)
n = number of samples

and

$$RPM = \frac{C99}{C\delta n} = \frac{\exp(2.36\sigma - 0.5\,\sigma^2)}{\exp(z\sigma - 0.5\,\sigma^2)}$$ **(Equation 6)**

where,

$\sigma^2 = \ln(CV^2 + 1)$
2.36 is the normal distribution value for the 99th percentile
z is the normal distribution value for the δn percentile.
CV = coefficient of variation of the data set (standard deviation ÷ mean).

The maximum projected concentration (C_e) for the effluent is then calculated by multiplying the maximum observed effluent concentration of the data set by the RPM. The following example shows how the maximum projected effluent concentration for arsenic was derived:

RPM Calculation for Arsenic
Effluent data for arsenic was collected from March 7, 2001 to July 15, 2009 and 144 samples were collected. The maximum observed concentration is 6.1µg/L, the standard deviation of the data set is 0.66, the average of the data set is 4.17 and the CV of the data set is 0.16.

$\delta n \geq (1 - .99)^{1/144} = 0.97$

$\sigma^2 = \ln(CV^2 + 1) = 0.025$
$\sigma = 0.158$

$$\frac{C99}{C97} = \frac{\exp(2.36\sigma - 0.5\,\sigma^2)}{\exp 1.88\sigma - 0.5\,\sigma^2)} = 1.07$$

Maximum projected effluent concentration = RPM X Maximum Observed Concentration
= 1.07 X 6.1 µg/L = 6.55 µg/L

The following table summarizes the CV's, number of samples, reasonable potential multipliers, maximum observed effluent concentration and maximum projected concentration (C_e) for each pollutant parameter. A summary of the effluent data set for each pollutant parameter is provided in Appendix E.

TABLE C-3: Maximum Projected Effluent Concentration

Parameter	CV	Number of Samples (n)	Reasonable Potential Multiplier	Maximum Observed Effluent Concentration	Maximum Projected Effluent Concentration
Arsenic	0.16	144	1.07	6.1	6.55
Cadmium	1.6	149	1.65	0.04	0.07
Chromium III see note 2	0.7	142	1.32	1.6	2.11
Chromium VI see note 2	0.7	142	1.32	1.6	2.11
Copper	0.2	159	1.09	15.8	17.22
Lead	0.4	158	1.19	1.7	2.02
Mercury	0.6	76	1.53	0.0169	0.026
Nickel	0.2	132	1.14	4.7	5.36
Selenium	0.2	129	1.12	1.7	1.90
Silver	0.8	94	1.61	0.5	0.81
Zinc	0.1	143	1.05	76.4	80.22
Cyanide see note 3					2.5
Ammonia	1.4	457	1.00	5400	5400

Notes: 1. All effluent metals concentrations are expressed at total recoverable.

2. Total Chromium was sampled rather than Chromium III and Chromium VI. As a worst case assumption, the total chromium sample result was used to represent Chromium III and Chromium VI.
3. All concentrations of cyanide were less than the detection limit of the analytical sample so the highest value was assumed to be ½ of the detection limit.
4. All concentrations are expressed as µg/L.

Background Concentration of Pollutant (C_u) in the Boise River

The following table provides the background concentrations of each pollutant. The background samples were collected in the Boise River at the Veterans Monitoring Station located upstream of the Lander Street facility at river mile (RM) 50. A reasonable worst case background concentration is represented by the 95th percentile of the data set. See Appendix F for a summary of the background data used.

TABLEC-4: Background Concentration at Veterans Monitoring Station

Parameter	Background Concentration[2]
Arsenic (total recoverable)	3.6
Cadmium (dissolved)	0.1
Chromium III[1] (dissolved)	0.25
Chromium VI[1] (dissolved)	0.25
Copper (dissolved)	0.5
Lead (dissolved)	0.3
Mercury (total recoverable)	0.0046
Nickel (dissolved)	0.5
Selenium (total recoverable)	0.19
Silver (dissolved)	0.06
Zinc (dissolved)	2.5
Cyanide	0 (no data collected for this parameter)
Ammonia	22.5
1. Total Chromium was sampled rather than Chromium III and Chromium VI. As a worst case assumption, the total chromium sample result was used to represent Chromium III and Chromium VI. 2. All concentrations are in µg/L.	

Dissolved vs. Total Recoverable Metals

When determining the reasonable potential for pollutant parameters to violate water quality standards the projected receiving water concentration is compared to the criteria. The aquatic life criteria for arsenic, cadmium, chromium, copper, lead, nickel, silver, zinc and acute mercury are expressed as dissolved. The aquatic life chronic criterion for mercury and the aquatic life acute and chronic criteria for selenium are expressed as total recoverable. The dissolved metal is the concentration of an analyte that will pass through a 0.45 micron membrane filter assembly. Total recoverable metal is the concentration of analyte in an unfiltered sample. The ambient data collected in the Boise River is expressed as dissolved however, the effluent data collected is expressed as total recoverable data.

The EPA's NPDES regulations require that effluent limits for metals be stated as total recoverable in an NPDES permit (see 40 CFR 122.45(c)). Expressing ambient water quality criteria for aquatic life as the dissolved form of the metal poses a need to be able to translate from dissolved metal to total recoverable metal for NPDES permits. This is necessary because the chemical conditions in ambient waters frequently differ substantially from those in the effluent and there is no assurance that effluent particulate metal would not dissolve after discharge (*i.e.*, after the effluent and ambient water mix). Therefore, permit writers must be able to translate between different metal forms. The translator determines what fraction of metal in the effluent will be dissolved in the receiving water body.

As an effluent mixes with the receiving water, chemical properties of the mixture will determine the fraction of the metal that is dissolved and the fraction of the metal that is in particulate form. Many different properties influence this dissolved to total recoverable metal ratio (e.g., temperature, pH, hardness, TSS, etc). It is difficult to predict the result of such complex chemistry. However, the most straight forward approach is to analyze the mixture (i.e., mixed effluent and receiving water) to determine the dissolved and total recoverable fractions. This ratio of dissolved to total recoverable metal concentrations can then be used to translate from a dissolved concentration to the total recoverable metal concentration (see *The Metals Translator: Guidance for Calculating A Total Recoverable Permit Limit From A Dissolved Criterion*, EPA 823-B-96-007, hereafter referred to as the Metals Translator document).

When performing the Reasonable Potential calculation the EPA first did a gross analysis of all the parameters assuming that no mixing zone would be authorized. Additionally, each pollutant parameter was assigned a default translator of 1 (i.e., it was assumed that 100% of the total recoverable metal in the effluent would become dissolved when the effluent mixed with the receiving water) as recommended in the EPA's Metals Translator document (see page 1). The analysis for copper, lead, mercury, silver and zinc showed that there was the reasonable potential to cause or contribute to an exceedance of the water quality criteria, therefore, the EPA refined its analysis for copper, lead and zinc by developing site specific translators rather than assuming that 100% of the total recoverable metal will become dissolved when it is mixed with the receiving water. A translator is not used for the chronic mercury criterion because the criterion is expressed as the total recoverable form of the metal. For silver, all the receiving water data was non-detectable so a site specific translator could not be developed. In such cases the Metals Translator document recommends using the conversion factor as the translator (see page 7 of the document), therefore, the EPA used the default translator of 0.85 for silver.

The EPA used the procedures outlined in Appendix A of the Metals Translator document to develop site specific translators for copper, lead and zinc. Mixed effluent and receiving water data was available at the Glenwood Monitoring Station. The geometric mean of the dissolved to total recoverable ratio was used as the translator. A translator of 0.7 was developed for copper, a translator of 0.6 was developed for lead and a translator of 0.9 was developed for zinc.

When using a translator, Equation 3 becomes

$$C_d = \frac{(\text{Translator} \times C_e \times Q_e) + (C_u \times (Q_u \times \%MZ))}{Q_e + (Q_u \times \%MZ)}$$ **(Equation 7)**

The following example calculates the receiving water concentration downstream of the facility (C_d) for copper, the assumption in this example is that no mixing zone is authorized for the facility.

Reasonable Potential Analysis for Aquatic Life Criteria

- **Determine if C_d exceeds the acute aquatic life criterion during the May – Sept time frame**

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

$$C_d = \frac{(0.7 \times 17.26 \times 15) + (0.5 \times (158.1 \times 0))}{15 + (158.1 \times 0)} = 12.08\ \mu g/L$$

Since 12.08 µg/L is less than the acute criterion of 17.2 µg/L a water quality-based effluent limit (WQBEL) is not needed for the acute criterion.

As can be seen from the above example, when no mixing zone is authorized Equation 7 becomes:

C_d = (Translator X C_e X Q_e) **(Equation 8)**

A similar analysis, assuming no mixing zone, was done for each of the aquatic life criteria for the May - September time frame and the October to April time frame. A summary of the analysis is presented in the tables below.

TABLE C-5: Acute Reasonable Potential Analysis for May – September Time Period – No Mixing Zone

Parameter	Qu	Qe	Cu	Ce	% MZ	Translator	Cd	Acute criterion	Does Cd exceed the criterion
Arsenic	158.1	15	3.6	6.55	0	1	6.55	340 (dissolved)	No
Cadmium	158.1	15	0.1	0.07	0	1	0.07	0.6 (dissolved)	No
Chromium III	158.1	15	0.25	2.11	0	1	2.11	252.4 (dissolved)	No
Chromium VI	158.1	15	0.25	2.11	0	1	2.11	15.7 (dissolved)	No
Copper	158.1	15	0.5	17.22	0	0.7	12.05	17.2 (dissolved)	No
Lead	158.1	15	0.3	2.02	0	0.6	1.21	44.2 (dissolved)	No
Mercury	158.1	15	0.0046	0.026	0	1	0.026	2.1 (dissolved)	No
Nickel	158.1	15	0.5	5.36	0	1	5.36	201.9 (dissolved)	No
Selenium	158.1	15	0.19	1.90	0	NA	1.90	20 (total recoverable)	No
Silver	158.1	15	0.06	0.81	0	0.85	0.69	0.6 (dissolved)	**YES**
Zinc	158.1	15	2.5	80.22	0	0.9	72.20	50.5 (dissolved)	**YES**
Cyanide	158.1	15	0	2.5	0	NA	2.5	22 (WAD)	No
Ammonia	158.1	15	22.5	5400	0	NA	5400	1039	**YES**

NOTES:

1. For metals Ce is expressed as total recoverable.
2. For metals Cu is expressed as dissolved except for arsenic, selenium and mercury which are expressed as total recoverable.
3. Flows are expressed as mgd and concentrations are expressed as µg/L.
4. C_d = projected receiving water concentration downstream of the effluent discharge.
5. Q_d = receiving water flow downstream of the effluent discharge = $Q_u + Q_e$
6. C_e = maximum projected effluent concentration
7. Q_e = maximum effluent flow
8. C_u = upstream concentration of pollutant
9. Q_u = upstream flow

Table C-6: Chronic Reasonable Potential Analysis for May – September Time Period – No Mixing Zone

CHRONIC	Qu	Qe	Cu	Ce	% MZ	Translator	Cd (chronic)	Chronic Criterion	Does Cd exceed the criterion
Arsenic	171	15	3.6	6.55	0	1	6.55	150 (dissolved)	No
Cadmium	171	15	0.1	0.07	0	1	0.07	0.3 (dissolved)	No
Chromium III	171	15	0.25	2.11	0	1	2.11	32.8 (dissolved)	No
Chromium VI	171	15	0.25	2.11	0	1	2.11	10.6 (dissolved)	No
Copper	171	15	0.5	17.22	0	0.7	12.05	12.5 (dissolved)	No
Lead	171	15	0.3	2.02	0	0.6	1.21	1.7 (dissolved)	No
Mercury	171	15	0.0046	0.026	0	NA	0.026	0.012 (total recoverable)	**YES**
Nickel	171	15	0.50	5.36	0	1	5.36	22.4 (dissolved)	No
Selenium	171	15	0.19	1.90	0	NA	1.90	5 (total recoverable)	No
Silver	171	15	0.06	0.81	0	0.85	0.69	NA	NA
Zinc	171	15	2.5	80.22	0	0.9	72.20	50.9 (dissolved)	**YES**
Cyanide	171	15	0	2.5	0	NA	2.5	5.2 WAD	No
Ammonia	235	15	22.5	5400	0	NA	5400	430	**YES**

NOTES:

1. For metals Ce is expressed as total recoverable.
2. For metals Cu is expressed as dissolved except for arsenic, selenium and mercury which are expressed as total recoverable.
3. Flows are expressed as mgd and concentrations are expressed as µg/L.
4. C_d = projected receiving water concentration downstream of the effluent discharge
5. Q_d = receiving water flow downstream of the effluent discharge = $Q_u + Q_e$
6. C_e = maximum projected effluent concentration
7. Q_e = maximum effluent flow
8. C_u = upstream concentration of pollutant
9. Q_u = upstream flow

Table C-7: Acute Reasonable Potential Analysis for October - April Time Period – No Mixing Zone

Parameter	Qu	Qe	Cu	Ce	% MZ	Translator (T)	Cd(acute)	Acute criterion	Does Cd exceed the criterion
Arsenic	58.6	15	3.6	6.55	0	1	6.55	340 (dissolved)	No
Cadmium	58.6	15	0.1	0.07	0	1	0.07	0.6 (dissolved)	No
Chromium III	58.6	15	0.25	2.11	0	1	2.11	252.4 (dissolved)	No
Chromium VI	58.6	15	0.25	2.11	0	1	2.11	15.7 (dissolved)	No
Copper	58.6	15	0.5	17.22	0	0.7	12.05	17.2 (dissolved)	No
Lead	58.6	15	0.3	2.02	0	0.56	1.21	44.2 (dissolved)	No
Mercury	58.6	15	0.0046	0.026	0	1	0.026	2.1 (dissolved)	No
Nickel	58.6	15	0.50	5.36	0	1	5.36	201.9 (dissolved)	No
Selenium	58.6	15	0.19	1.90	0	NA	1.90	20 (total recoverable)	No
Silver	58.6	15	0.06	0.81	0	0.85	0.69	0.6 (dissolved)	**YES**
Zinc	58.6	15	2.5	80.22	0	0.9	72.20	50.5 (dissolved)	**YES**
Cyanide	58.6	15	0	2.5		NA	2.5	22.0 WAD	No
Ammonia	58.6	15	22.5	5400	0	NA	5400	1771	**YES**

NOTES:

1. For metals Ce is expressed as total recoverable.
2. For metals Cu is expressed as dissolved except for arsenic, selenium and mercury which are expressed as total recoverable.
3. Flows are expressed as mgd and concentrations are expressed as µg/L.
4. C_d = projected receiving water concentration downstream of the effluent discharge
5. Q_d = receiving water flow downstream of the effluent discharge = $Q_u + Q_e$
6. C_e = maximum projected effluent concentration
7. Q_e = maximum effluent flow
8. C_u = upstream concentration of pollutant
9. Q_u = upstream flow

Table C-8: Chronic Reasonable Potential Analysis for October - April Time Period – No Mixing Zone

Parameter	Qu	Qe	Cu	Ce	% MZ	Translator	Cd (chronic)	Chronic Criterion	Does Cd exceed the criterion
Arsenic	68.9	15	3.6	6.55	0	1	6.55	150 (dissolved)	No
Cadmium	68.9	15	0.1	0.07	0	1	0.07	0.3 (dissolved)	No
Chromium III	68.9	15	0.25	2.11	0	1	2.11	32.8 (dissolved)	No
Chromium VI	68.9	15	0.25	2.11	0	1	2.11	10.6 (dissolved)	No
Copper	68.9	15	0.5	17.22	0	0.7	12.05	12.5 (dissolved)	No
Lead	68.9	15	0.3	2.02	0	0.6	1.21	1.7 (dissolved)	No
Mercury	68.9	15	0.0046	0.026	0	NA	0.026	0.012 (total recoverable)	**YES**
Nickel	68.9	15	0.50	5.36	0	1	5.36	22.4 (dissolved)	No
Selenium	68.9	15	0.19	1.90	0	NA	1.90	5 (total recoverable)	No
Silver	68.9	15	0.06	0.81	0	0.85	0.69	NA	NA
Zinc	68.9	15	2.5	80.22	0	0.9	72.20	50.9 (dissolved)	**YES**
Cyanide	68.9	15	0	2.5	0	NA	2.5	5.2 WAD	No
Ammonia	77.3	15	22.5	5400	0	NA	5400	945	**YES**

NOTES:

1. For metals Ce is expressed as total recoverable.
2. For metals Cu is expressed as dissolved except for arsenic, selenium and mercury which are expressed as total recoverable.
3. Flows are expressed as mgd and concentrations are expressed as µg/L.
4. C_d = projected receiving water concentration downstream of the effluent discharge
5. Q_d = receiving water flow downstream of the effluent discharge = $Q_u + Q_e$
6. C_e = maximum projected effluent concentration
7. Q_e = maximum effluent flow
8. C_u = upstream concentration of pollutant
9. Q_u = upstream flow

Based on the analysis it was found that the following parameters do have the reasonable potential to cause or contribute to an exceedance of the acute and/or the chronic aquatic life criteria if no mixing zone is allowed:

Table C-9: Reasonable Potential to Exceed Acute and/or Chronic Aquatic Life Criteria when No Mixing Zone is allowed

Parameter	**May - September**		**October - April**	
	Acute	**Chronic**	**Acute**	**Chronic**
Mercury	No	**YES**	No	**YES**
Silver	**YES**	NA	**YES**	NA
Zinc	**YES**	**YES**	**YES**	**YES**
Ammonia	**YES**	**YES**	**YES**	**YES**

As discussed previously, the State is proposing to authorize the following mixing zones:

10% for Silver
15% for Zinc
25% for Ammonia

No mixing zone is authorized for mercury, because (1) the facility is able to meet its water quality-based effluent limits without a mixing zone and the EPA's Water Quality Standard's Handbook (EPA-823-B-94-005a, August 1994) states that mixing zones should be as small as practicable; (2) the City can control the input of mercury to its facility through its pretreatment program; (3) there is a fish advisory for mercury in effect on the Snake River where the Boise River empties into the Snake River because of high levels of mercury in fish tissue. This is significant because mercury is a bioaccumulative pollutant that does not degrade over time and accumulates in organisms living in the waterbody. Bioaccumulative pollutants become more concentrated as they move up the food chain (i.e., from biota to fish and wildlife to humans). Because the effects of bioaccumulative pollutants are not mitigated by dilution, using a mixing zone to "dilute" a bioaccumulative pollutant discharge is not appropriate. Because mercury is harmful to the environment, any discharge of mercury, even those discharges that are equivalent to the applicable water quality criteria, have the potential to impair the integrity of the receiving waterbody. Using mixing zones to increase the amount of allowable discharge exacerbates this situation because the effects of mercury are not limited to the short term, or localized zone of initial dilution, meaning that adverse effects could occur far outside the mixing zone and long after the mercury discharge occurred. Therefore no mixing zone is being authorized for mercury.

Using the mixing zones for silver, zinc and ammonia in the reasonable potential calculation found that reasonable potential to cause or contribute to an exceedance of the water quality standards only exists for mercury and ammonia (see Tables C-10 to C-13). See Appendix D for the derivation of the water quality-based effluent limits. A summary of the reasonable potential analysis is presented in the tables below.

Table C-10: Reasonable Potential Analysis for acute aquatic life criteria for the May – September time frame.

Parameter	Qu	Qe	Cu	Ce	% MZ	Translator	Cd	Acute criterion	Does Cd exceed the criterion
Silver	158.1	15	0.06	0.81	0.1	0.85	0.37	0.6 (dissolved)	No
Zinc	158.1	15	2.5	80.22	0.15	0.9	29.50	50.5 (dissolved)	No
Ammonia	158.1	15	22.5	5400	0.25	NA	1502.00	1039	**YES**

1. For metals Ce is expressed as total recoverable.
2. For metals Cu is expressed as dissolved.
3. Flows are expressed as mgd and concentrations are expressed as µg/L.

Table C-11: Reasonable Potential Analysis for chronic aquatic life criteria for the May – September time frame.

Parameter	Qu	Qe	Cu	Ce	% MZ	Translator	Cd	Chronic Criterion	Does Cd exceed the criterion
Mercury	171	15	0.0046	0.026	0	NA	0.026	0.012 (total recoverable)	Yes
Zinc	171	15	2.5	80.22	0.15	0.9	28.22	50.9 (dissolved)	No
Ammonia	235	15	22.5	5400	0.25	NA	1116.20	430	**YES**

1. For metals Ce is expressed as total recoverable and Cd is expressed as dissolved except for mercury which is total recoverable.
2. For metals Cu is expressed as dissolved except for mercury which is expressed as total recoverable.
3. Flows are expressed as mgd and concentrations are expressed as µg/L.

Table C-12: Reasonable Potential Analysis for acute aquatic life criteria for the October – April time frame.

Parameter	Qu	Qe	Cu	Ce	% MZ	Translator	Cd	Acute criterion	Does Cd exceed the criterion
Silver	58.6	15	0.06	0.81	0.1	0.85	0.51	0.6 (dissolved)	No
Zinc	58.6	15	2.5	80.22	0.15	0.9	46.45	50.5 (dissolved)	No
Ammonia	58.6	15	20	5400	0.25	NA	2743.0	1771	**YES**

1. For silver and zinc Ce is expressed as total recoverable, Cd is expressed as dissolved, and the criteria are expressed as dissolved.
2. For silver and zinc Cu is expressed as dissolved.
3. Flows are expressed as mgd and concentrations are expressed as µg/L.

Table C-13: Reasonable Potential Analysis for chronic aquatic life criteria for October - April time frame.

CHRONIC	Qu	Qe	Cu	Ce	% MZ	Translator	Cd	Chronic Criterion	Does Cd exceed the criterion
Mercury	68.9	15	0.0046	0.026	0	NA	0.026	0.012 (total recoverable)	**YES**
Zinc	68.9	15	2.5	80.22	0.15	0.9	43.77	50.9 (dissolved)	No
Ammonia	77.3	15	20	5400	0.25	NA	2372.50	945	**YES**

1. For metals Ce is expressed as total recoverable.
2. For metals Cu is expressed as dissolved except for mercury which is expressed as total recoverable.
3. Flows are expressed as mgd and concentrations are expressed as µg/L.

Reasonable Potential Analysis for Human Health Criteria

Except for arsenic, a carcinogen, the aquatic life criteria are much more stringent than the human health criteria and therefore it is the aquatic life criteria that will determine if water quality-based effluent limits are necessary. Because the human health criterion for arsenic is more stringent than the aquatic life criteria, a reasonable potential analysis was completed for arsenic. The analysis was performed using no mixing zone. The result of that analysis showed that there is no reasonable potential for the effluent to cause or contribute to an exceedance of the arsenic human health criterion.

Table C-14: Reasonable Potential Analysis for Arsenic – No Mixing Zone

	Qu	Qe	Cu	Ce	% MZ	Cd	HH criterion	Does Cd exceed the criterion
Arsenic	239.5	15	3.6	6.55	0	6.55	10	No

1. Ce and Cu are expressed as total recoverable.
2. Flows are expressed as mgd and concentrations are expressed as µg/L.

II. REASONABLE POTENTIAL ANALYSIS FOR TOTAL PHOSPHORUS

The Reasonable Potential Analysis determined that effluent limitations are required for total phosphorus. The analysis is explained below.

Background

The Boise River is listed as impaired for nutrients, from its confluence with Indian Creek (RM 19.7, approximately 30 miles downstream of the Lander Street facility) to the mouth of the Boise River. A total phosphorus TMDL has not been completed for the Boise River.

The Boise River flows into the Snake River whose water quality is also impaired due to high levels of total phosphorus. The Idaho Department of Environmental Quality completed a TMDL for total phosphorus for the Snake River (RM 409- RM188 also known as the Snake River-Hells Canyon reach) and it was approved by the EPA in September 2004. The *Snake River Hells Canyon TMDL* found that approximately 92% of the phosphorus load to the Snake River-Hells Canyon reach is from non-point sources to the river. Tributary systems to the Snake River, such as the Boise River, are described as non-point sources in the TMDL. The Boise River contributes over 18% of the total non-point source phosphorus load to the Snake River Hell's Canyon Reach (see *Snake River Hells Canyon TMDL*, page 274-283). The TMDL set a target for total phosphorus for each tributary to the Snake River as a concentration of less than or equal to 70 µg/L total phosphorus as measured at the mouth of the tributary and that target applies from May through September.

Applicable Water Quality Criteria

Idaho's water quality standards at IDAPA 58.01.02.200.06 states: "Surface waters of the State shall be free from excess nutrients that can cause visible slime growths or other nuisance aquatic growths impairing designated beneficial uses." This narrative criterion applies to all surface waters in the State.

The exact nutrient concentration at which aquatic growths impair designated beneficial uses has not defined by the State. When the State water quality standards do not contain numeric criteria for a given pollutant, the EPA may calculate a numeric water quality criterion for the pollutant which will attain and maintain the narrative water quality criteria and fully protect designated uses (*see* 40 CFR 122.44(d)(1)(vi)). Specifically, the regulation states:

> "Where a State has not established a water quality criterion for a specific chemical pollutant that is present in an effluent at a concentration that causes, has the reasonable potential to cause, or contributes to an excursion above a narrative criterion within an applicable State water quality standard, the permitting authority must establish effluent limits using one or more of the following options: (A) Establish effluent limits using a calculated numeric water quality criterion for the pollutant which the permitting authority demonstrates will attain and maintain applicable narrative water quality criteria and will fully protect the designated use….or (B) Establish effluent limits on a case-by-case basis, using the EPA's water quality criteria, published under section 304(a) of the CWA, supplemented where necessary by other relevant information; or…"

To determine the appropriate total phosphorus criterion for the Boise River the EPA reviewed the recommendations provided in the EPA's *Quality Criteria for Water 1986* (EPA 440/5-86-001, hereafter referred to as the Gold Book), the EPA's *Ambient Water Quality Criteria Recommendations: Rivers and Streams in Nutrient Ecoregion III* (EPA 822-B-00-016), EPA's *Nutrient Criteria Technical Guidance Manual, Rivers and Stream*s (EPA-822-B-00-002, July 2000) and the Idaho Department of Environmental Quality's *Snake River Hells Canyon TMDL*. Each of these four documents suggests a different ambient total phosphorus concentrations that would be sufficiently stringent to control cultural eutrophication (*i.e*., human-caused inputs of excess nutrients in waterbodies) and other adverse nutrient-related impacts in the Boise River downstream of the City of Boise's outfalls. The four documents are summarized below.

1. *EPA's Gold Book Recommendation*

The EPA's Gold Book provides an effects-based approach. An effects-based approach provides a threshold value above which adverse effects (*i.e.*, water quality impairments) are likely to occur. It applies empirical observations of a causal variable (*i.e.*, phosphorus) and a response variable (*i.e.*, chlorophyll *a*) associated with designated use impairments. The EPA's Gold Book recommends in-stream phosphorus concentrations of no greater than 0.1 mg/l for any stream not discharging directly to lakes or impoundments.

2. *Ambient Water Quality Criteria Recommendations: Rivers and Streams in Nutrient Ecoregion III*

This document provides a reference-based approach to developing the appropriate phosphorus concentration. Phosphorus concentrations are statistically derived from a comparison within a population of rivers in the same eco-region class. They are a quantitative set of river characteristics (physical, chemical and biological) that represent conditions in waters in an ecoregion that are minimally impacted by human activities (*i.e.*, reference conditions) and thus by definition representative of water without cultural eutrophication. The EPA's *Ambient Water Quality Criteria Recommendations: Rivers and Streams in Nutrient Ecoregion III* establishes nutrient recommendations drawn from reference sites and peer-reviewed scientific literature in geographic areas in the Xeric West where the Lower Boise River is located. The EPA's Ecoregion III 304(a) criteria recommend seasonal or annual average total phosphorus concentrations no greater than 43 µg/L. It should be noted that while reference conditions, which reflect minimally disturbed conditions, will meet the requirements necessary to support designated uses, they may also be more stringent than necessary to support designated uses.

3. *Nutrient Criteria Technical Guidance Manual, Rivers and Streams*

The EPA's *Nutrient Criteria Technical Guidance Manual*, cites a range of ambient concentrations drawn from the peer-reviewed scientific literature that are sufficiently stringent to control periphyton and plankton (two types of aquatic plant growth commonly associated with eutrophication). A 2004 U.S. Geological Survey study concluded that in the Lower Boise River, the growth of aquatic plants is largely associated with periphyton (see *Water-Quality and Biological Conditions in the Lower Boise River, Ada and Canyon Counties, Idaho, 1994-2002,* Dorene E. MacCoy, U.S. Geological Survey, 2004). The *Nutrient Criteria Technical Guidance Manual* indicates in-stream phosphorus concentrations between 0.01 mg/l and 0.09 mg/l will be sufficient to control periphyton growth.

4. *Snake River Hells Canyon TMDL*

The *Snake River Hells Canyon TMDL* provided an in-depth water quality analysis which found the Boise River to be a significant contributor of total phosphorus to the Snake River Hells Canyon reach. The TMDL found that beneficial uses in the Snake River could be attained if the concentration of phosphorus at the mouth of the Boise River was less than or equal to 70 µg/L. The TMDL requires that the mouth of the Boise River achieve less than or equal to 70 µg/L from May through September.

After considering the information presented in the four documents, the EPA has determined that the total phosphorus concentration of 70 µg/L from the *Snake River Hells Canyon TMDL* is the appropriate value to interpret Idaho's narrative criterion for nutrients for the purposes of determining reasonable potential and, if necessary, for calculating effluent limits for total phosphorus. First, the 70 µg/L limit is based on an Idaho document: the Snake River TMDL. Second, the EPA believes this concentration is reasonable because (1) the concentration is below EPA's effects based criterion of 0.1 mg/L, and therefore would be protective of the Boise River; (2) the concentration falls within the range of acceptable concentrations for the control of periphyton cited in EPA's *Nutrient Criteria Technical Guidance Manual, Rivers and Streams* and (3) the analysis the IDEQ performed for the TMDL demonstrated that beneficial uses in the Snake River could be restored if the concentration of phosphorus at the mouth of the Boise River was less than or equal to 70 µg/L. The EPA believes 70 µg/L of phosphorus will be protective of both the Boise River and the Snake River. Any effluent limit higher than70 µg/L would not sufficiently protect water quality in the Boise River where stretches downstream of the City's outfall are known to be impaired for nutrients. The City of Boise currently is a major contributor of phosphorous to the Boise River. Phosphorous concentrations in the Boise River spike at the Lander and West Boise outfalls and increase further as one travels downstream in the Boise River. Concentrations at the confluence with the Snake River frequently range between 200 and 300 µg/L. Therefore, any effluent limit in excess of 70 µg/L would not ensure compliance with the 70 µg/L target set in the TMDL, nor would it ensure compliance with instream standards between the City of Boise and the confluence with the Snake River.

Reasonable Potential Analysis

The following discussion details how the EPA has determined if the effluent discharge from the Lander Street facility has the reasonable potential to cause or contribute to excursions above water quality standards for total phosphorus.

As stated previously in Appendix B, Section 301(b)(1)(C) of the Clean Water Act requires the EPA to include water quality-based effluent limits in NPDES permits. The regulation at 40 CFR 122.44(d)(1)(i) states:

> "Limitations must control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines 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 water quality standard, including State narrative criteria for water quality."

The federal regulation 40 CFR 122.44(d)(1)(ii) states that:

> "When determining whether a discharge causes, has the reasonable potential to cause, or contribute to an in-stream excursion above a narrative or numeric criteria within a State water quality standard, the permitting authority shall use procedures which account for existing controls on point and nonpoint sources of pollution, the variability of the pollutant or pollutant parameter in the effluent….and, where appropriate, the dilution of the effluent in the receiving water."

Additionally, due to the tendency of phosphorus to be retained in the water column and/or transported downstream, the EPA's nutrient guidance emphasizes that when establishing a nutrient criterion, downstream impacts of the pollutant must be taken into account. The EPA's Gold Book states: "There are two basic needs in establishing a phosphorus criterion for flowing waters: one is to control the development of plant nuisances within the flowing water, and…the other is to protect the downstream receiving waterway, regardless of its proximity in linear distance." The EPA's *Nutrient Technical Guidance Manual, Rivers and Streams* (page 3), states: "In flowing systems, nutrients may be rapidly transported downstream and the effects of nutrient inputs may be uncoupled from the nutrient source." Therefore, the reasonable potential analysis must determine if the effluent discharge has the reasonable potential to cause or contribute to an in-stream excursion of 70 µg/L at the point of discharge and throughout the Boise River.

The Boise River has numerous tributaries, agricultural drains, and municipal wastewater treatment plants discharging to it all along the river. The wastewater treatment plants, agricultural drains and tributaries all have very high phosphorus concentrations (see USGS report entitled *Water Quality and Biological Conditions in the Lower Boise River, Ada and Canyon Counties, Idaho, 1994-2002*). The EPA reviewed the ambient data upstream of the Lander Street facility all the way to river mile 3.8 near the mouth of the Boise River. Table C-15 provides a summary of all of the total phosphorus data collected at different points within the Boise River. Table C-16 is a summary of all of the data collected from May through September, the time of year when nuisance growth is most likely to occur, at different points along the Boise River.

Table C-15 – Summary of Total Phosphorus Data (in µg/L)

Station	Approximate Location by river mile (RM)	Minimum	Maximum	Median	Number of Samples	Number of samples over 70 µg/L (percent of samples over 70 µg/L)
Veterans see Note 1	RM 50	6	75	17	438	3 (0.7 %)
Glenwood see Note 2	RM 47.5	28	1120	203	438	393 (90%)
Eagle see Note 3	RM 42.8	76	1954	537	435	435 (100%)
Middleton see Note 4	RM 26.8	30	850	210	112	103 (92%)
Parma See Note 5	RM 3.8	70	3900	340	550	547 (99.5%)

1. The data for the Veterans Station was collected by the City of Boise from 1/2/01 – 7/9/09.
2. The data for Glenwood Station was collected by the City of Boise from 1/2/01 – 7/9/09.
3. The data for the Eagle Station was collected by the City of Boise from 1/2/01 – 7/9/09.
4. The data for Middleton was collected by the USGS at station 13210050, Boise River near Middleton, Idaho. Data was collected from 2/24/76 – 11/18/08.
5. The data for Parma was collected by the USGS at station 13213000, Boise River near Parma, Idaho. Data was collected from 7/31/69- 4/6/10. When more than one sample was collected during the day the highest sample was used.

Table C-16 – Summary of Seasonal (May through September) Total Phosphorus Data (in µg/L)

Station	Approximate Location	Minimum	Maximum	Median	Number of Samples	Number of samples over 70 µg/L
Veterans see Note 1	RM 50	6	52	14	174	0 (0%)
Glenwood see Note 2	RM 47.5	28	338	104	174	140 (78.7%)
Eagle see Note 3	RM 42.8	76	732	269	173	177 (100%)
Middleton see Note 4	RM 26.8	60	330	160	47	43 (91.5%)
Parma See Note 5	RM 3.8	100	2000	300	238	238 (100%)

1. The data for the Veterans Station was collected by the City of Boise and the station is located approximately 0.1 mile above the Lander Street facility.
2. The data for Glenwood Station was collected by the City of Boise and the station is located approximately 2.4 miles below the Lander Street facility.
3. The data for the Eagle Station was collected by the City of Boise and is located approximately 0.7 miles downstream of the City of Boise's West Boise WWTP.
4. The data for Middleton was collected by the USGS at station 13210050, Boise River near Middleton, Idaho.
5. The data for Parma was collected by the USGS at station 13213000, Boise River near Parma, Idaho. When more than one sample was collected during the day the highest sample was used.

As can be seen from the tables above, the total phosphorus criterion is exceeded in all locations downstream of the Veterans monitoring station, therefore there is no capacity in the river to assimilate total phosphorus being discharged from the Lander Street facility and therefore a mixing zone is not appropriate in this case.

As stated previously, the mass balance equation the EPA uses in its Reasonable Potential Analysis is:

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

When no mixing zone is authorized the equation is reduced to the following:

$$C_d = C_e$$

A review of the Lander Street effluent data from January 3, 2001 through July 29, 2009 (325 samples) found that the facility's lowest total phosphorus discharge was 930 µg/L. Since this concentration exceeds 70 µg/L, a water quality-based effluent limit is required. See Appendix D for the derivation of the water quality-based effluent limit.

III. REASONABLE POTENTIAL ANALYSIS FOR pH

The Reasonable Potential Analysis determined that water quality-based effluent limitations are required for pH for the protection of aquatic life. The analysis is explained below.

Applicable Water Quality Criteria

The Idaho water quality standards at IDAPA 58.01.02.250.01.a, require pH values of the river to be within the range of 6.5 to 9.0 standard units.

Reasonable Potential Analysis

Effluent pH data was collected daily at the Lander Street facility from January 2001 through July 2009, a total of 3134 samples were collected. The data ranged from 6.16 – 7.85 standard units, with a median value of 6.8 standard units. The 14th percentile of the data set is less than 6.5 standard units, therefore, if no mixing zone is authorized, there is reasonable potential for the effluent to cause or contribute to an exceedance of the pH criterion (i.e., the effluent is below the allowable pH criterion).

Since the State has proposed to authorize a 25% mixing zone for pH, an additional reasonable potential analysis was conducted using the State's proposed mixing zone of 25% to determine the effect of Lander's Street discharge on the Boise River pH. This analysis was conducted using the procedures in the EPAs DESCON program (*Guidance on Supplementary Stream Design Conditions for Steady State Modeling*, U.S.E.P.A. Office of Water, 1988). The Table below provides the information input into the model:

TABLE C-17: Inputs into pH model

	May- September	October - April
Upstream flow (25% of 7Q10 in cfs)	66.1	26.6
Upstream temperature (95th percentile in °C)	18.5	13.7
Upstream alkalinity (5th percentile in mg/L)	26.3	39.8
Upstream pH (95th percentile in standard units)	8.5	8.5
Effluent flow (maximum in cfs)	23.2	23.2
Effluent temperature ((95th percentile in °C)	24	22
Effluent pH (range in standard units)	6.0	6.0
Effluent alkalinity (mg/L)	50-136	50-136

Notes:

1. Upstream temperature data was collected from January 2001 – September 2009. Data was broken up by season. The average daily temperature was used in the model.
2. Upstream alkalinity (Veterans Monitoring Station) shows seasonal variation so the data set was divided into the May – September and October – April time frames. Data was collected from January 2001 – October 2007.
3. Upstream pH does not vary by season therefore the entire data set was used to develop the 95th percentile of the data set. Data was collected from January 2003 – July 2009.
4. Effluent temperature does vary slightly between the May – September time frame and the October - April time frame. Daily temperature data was collected from 8/1/2004 through 7/31/2009 and was used to determine the 95th percentile of the data for each time period.

5. Effluent pH used in the model is the minimum effluent limitation in the existing permit (i.e., the permit allows the effluent to be discharged at a minimum level of 6.0 standard units).
6. Effluent alkalinity does not vary by season. Data was collected from January 2001 to July 2009.

The table below shows the inputs and provides the outputs of the model.

TABLE C-18: pH Analysis

INPUT *********	*	*	*	*	*	*
			May-Sept	May-Sept	Oct-Apr	Oct-Apr
1. UPSTREAM CHARACTERISTICS						
Upstream Discharge (cfs)			66.40	66.40	26.60	26.60
Upstream Temperature (deg C)			18.50	18.50	13.70	13.70
Upstream pH		.	8.50	8.50	8.50	8.50
Upstream Alkalinity (mg CaCO3/L)			26.30	26.30	39.80	39.80
2. EFFLUENT CHARACTERISTICS						
Effluent Discharge (cfs)			23.2	23.2	23.2	23.2
Effluent Temperature (deg C)			23.80	23.80	22.00	22.00
Effluent pH		.	6.00	6.00	6.00	6.00
Effluent Alkalinity (mg CaCO3/L)			136.00	50.00	136.00	50.00
OUTPUT *********	*	*	*	*	*	*
1. IONIZATION CONSTANTS						
Upstream pKa		.	6.39	6.39	6.43	6.43
Effluent pKa		.	6.36	6.36	6.37	6.37
2. IONIZATION FRACTIONS						
Upstream Ionization Fraction			0.99	0.99	0.99	0.99
Effluent Ionization Fraction			0.31	0.31	0.30	0.30
3. TOTAL INORGANIC CARBON						
Upstream Total Inorganic Carbon (mg CaCO3/L)			26.51	26.51	40.14	40.14
Effluent Total Inorganic Carbon (mg CaCO3/L)			445.51	163.79	453.70	166.80
4. DOWNSTREAM MIXED FLOW CONDITIONS						
Mixture Temperature (deg C)			19.87	19.87	17.57	17.57
Mixture Alkalinity (mg CaCO3/L)			54.70	32.44	84.62	44.55
Mixture Total Inorganic Carbon (mg CaCO3/L)			135.00	62.05	232.80	99.15
Mixture pKa		.	6.38	6.38	6.40	6.40
pH of Mixture		.	6.2	6.4	6.2	6.3

As can be seen from the tables above, after the effluent mixes with the river, the pH level of the mixture is below the pH criterion of 6.5 standard units when the facility discharges at a pH level of 6.0. Therefore, there is reasonable potential for the effluent discharge to cause or contribute to an exceedance of the water quality standard and a water quality-based effluent limit is required. See Appendix D for the derivation of the effluent limitation.

IV. REASONABLE POTENTIAL ANALYSIS FOR TEMPERATURE

The reasonable potential analysis determined that temperature limitations are needed. The analysis is presented in more detail below.

A. Background

The lower Boise River from Star to the mouth was listed as impaired for temperature and scheduled for a TMDL in 1998. The 1999 TMDL said that "atmospheric sources" preclude attainment of existing WQS and suggests alternative regulatory approaches such as a Use Attainability Analysis and site specific temperature criteria. In January 2001 the EPA added segments of the mainstem Boise River to the 303(d) list such that the entire length of the Boise River, from Diversion Dam to the mouth, is now listed as impaired for temperature. Additionally, the Snake River, which the Boise River discharges to, is also listed as impaired for temperature.

The current EPA- approved aquatic life criteria for temperature are as follows:

Salmonid Spawning:	Daily Average = 9°C; Max Daily = 13°C This criterion is applicable from October 1 – July 15[1] (see IDAPA 58.01.02.250.02.f)
Cold Water Aquatic Life:	Daily Average = 19°C; Max Daily = 22°C This criterion applies from July 16 – September 30. (see IDAPA 58.01.02.250.02.b)
Wastewater Provision:	The wastewater must not affect the receiving water outside the mixing zone so that :…If the water is designated for cold water aquatic life, seasonal cold water aquatic life, or salmonid spawning, the induced variation is more than one (+1) degree C (see IDAPA 58.01.02.401.01.d).

On June 29, 2011, changes to the salmonid spawning criteria for the Boise River were adopted by the IDEQ Board. On July 20, 2011 the IDEQ submitted the temporary changes to the EPA for review and approval/disapproval. The EPA has not yet acted on these changes. Without approval by the EPA the new temperature criteria cannot be used in NPDES permits. However, because the new salmonid criteria may be approved by the EPA prior to final issuance of the permit, the EPA is providing an analysis of the current EPA-approved salmonid spawning temperature criteria (i.e., daily average of 9°C and a max Daily of 13°C), and an analysis of the State's newly adopted salmonid spawning temperature criteria.

[1] IDEQ identified the following fish species and spawning and incubation periods in the Boise River (see *Response to Comments* document for the 1999 permit):

Brown trout – October 1 - April 1
Rainbow trout – January 15 - July 15
Mountain Whitefish – October 15 – March 15

The newly adopted salmonid aquatic life criteria for temperature are as follows:

Salmonid Spawning:	Maximum Weekly Maximum Temperature of 13°C This criterion is applicable from November 1 – May 31
Cold Water Aquatic Life:	Daily Average = 19°C; Max Daily = 22°C This criterion applies from June 1 – October 30.
Point Source Thermal Requirement:	Wastewater must not affect the receiving water outside the mixing zone so that (1) the temperature of the receiving water or of downstream waters will interfere with designated beneficial uses, and, (2) daily and seasonal temperature cycles characteristics of the water body are maintained.

If the EPA approves the newly adopted temperature criteria prior to final issuance of the permit, the effluent limits based on the newly adopted criteria will be incorporated into the final permit.

B. Reasonable Potential Analysis Using EPA-approved Water Quality Criteria

As stated previously, Section 301(b)(1)(C) of the Clean Water Act requires the EPA to include water quality-based effluent limits in NPDES permits. The regulation at 40 CFR 122.44(d)(1)(i) states:

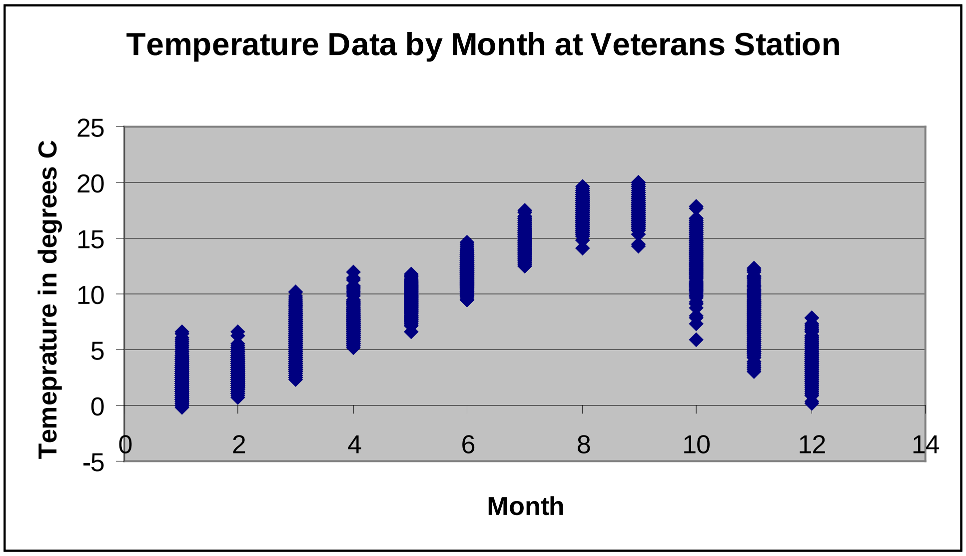
> "Limitations must control all pollutants or pollutant parameters (either conventional, nonconventional, or toxic pollutants) which the Director determines are or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality."

The federal regulation 40 CFR 122.44(d)(1)(ii) states that:

> "When determining whether a discharge causes, has the reasonable potential to cause, or contribute to an in-stream excursion above a narrative or numeric criteria within a State water quality standard, the permitting authority shall use procedures which account for existing controls on point and nonpoint sources of pollution, the variability of the pollutant or pollutant parameter in the effluent….and, where appropriate, the dilution of the effluent in the receiving water."

The reasonable potential analysis must determine if the effluent discharge has the reasonable potential to cause or contribute to an in-stream excursion of the temperature criterion. A preliminary analysis will be done to determine if the effluent has the reasonable potential to cause or contribute to an exceedance of the aquatic life criteria for salmonid spawning and cold water biota. If there is reasonable potential then water quality-based effluents will be established. Once the effluent limits are established, the EPA will do an reasonable potential analysis using the proposed effluent limitations to determine if the effluent has the reasonable potential to cause or contribute to an exceedance of the wastewater provision (i.e., wastewater must not affect the receiving water outside of the mixing zone so that the induced variation is more than 1° C.). If there is reasonable potential to cause more than a 1° C increase in the receiving water than more stringent limits will be developed. For additional information see Appendix D.

The City of Boise collected daily temperature data in the Boise River upstream of the Lander Street facility at Veterans Monitoring Station, RM 50 and downstream of the Lander Street facility at the Glenwood Monitoring Station, RM 47.5. The Lander Street facility is located at RM 49.9. Daily temperature data was collected from January 1, 2001 through September 9, 2009. The City provided the EPA with the minimum, maximum and average temperature of the river for each day. The graph below shows how the daily average temperature varies by month in the Boise River at Veteran's Station.



Because the temperature at Veteran's station varies so much, the following time periods were evaluated to determine if the water quality standards were being met:

November
December-February
March-May
June-October

(1) <u>November</u>

Applicable criteria in November are Salmonid Spawning Criteria Daily Average = 9°C; Max Daily = 13°C

For temperature the mass balance equation (equation 3) is used.

$C_d = \underline{(C_e \text{ X } Q_e) + (C_u \text{ X } (Q_u \text{ X } \%MZ))}$

$Q_e + (Q_u \text{ X } \%MZ)$

The table below presents a summary of the daily temperature data gathered in November from 2001 to 2008 at Veteran's Station:

Table C-19 – Boise River Temperature Data at Veterans Station, November

	Range	50th percentile	75th percentile	95th percentile	Number of Samples
Daily Maximum Temperature	3.5 – 13.2 °C	8.5 °C	9.8 °C	11.6 °C	241
Daily Average Temperature	3.1 – 12.3 °C	7.7 °C	9.0 °C	10.9 °C	241

As can be seen from the above data, the receiving stream already exceeds the daily average temperature requirement of 9°C required for the protection of salmonid spawning more than 25% of the time, therefore no mixing zone can be authorized.

When a mixing zone is not authorized the equation to calculate C_d becomes:

$C_d = C_e$

The table below presents a summary of the daily effluent temperature data collected during November from 2001 to 2008 at the Lander Street facility:

Table C-20 – Effluent Temperature Data, November

	Range	50th percentile	75th percentile	95th percentile	Number of Samples
Daily Maximum Temperature	18.5 – 23.5 °C	20.1 °C	20.6 °C	21.3 °C	243

As can be seen from the data above the effluent temperature is always greater than the average numeric temperature criterion of 9 °C, therefore there is reasonable potential that the effluent may cause or contribute to a water quality exceedance and water quality-based effluent limits are needed to ensure that water quality standards are met.

(2) <u>December - February</u>

Applicable criteria from December through February are Salmonid Spawning Criteria
Daily Average = 9°C; Max Daily = 13°C

For temperature the mass balance equation is used.

$$C_d = \frac{(C_e \text{ X } Q_e) + (C_u \text{ X } (Q_u \text{ X } \%MZ))}{Q_e + (Q_u \text{ X } \%MZ)}$$

The table below presents a summary of the daily temperature data gathered in the months from December through February from 2001 to 2009 at Veteran's Station:

Table C 21 – Boise River Temperature Data at Veterans Station, December - February

	Range	50th percentile	75th percentile	95th percentile	Number of Samples
Daily Maximum Temperature	0.2 - 8.4 °C	3.8 °C	4.9 °C	6.5 °C	781
Daily Average Temperature	-0.1 – 7.9 °C	3.0 °C	4.1 °C	5.7 °C	781

As can be seen from the above data, the receiving stream does not exceed the salmonid spawning criteria, therefore a mixing zone may be authorized.

The table below presents a summary of the daily maximum temperature data collected during the months December through February from 2001 to 2009, at the Lander Street facility:

Table C 22 – Effluent Temperature Data, December - February

	Range	50th percentile	75th percentile	95th percentile	Number of Samples
Daily Maximum Temperature	15.6 – 19.8 °C	17.2 °C	17.9 °C	18.8 °C	850

Determine if there is a reasonable potential to exceed the average daily criterion of 9 °C

C_e = effluent temperature December-February, represented by 95th percentile = 19.8 °C
Q_e = maximum effluent flow = 15 mgd
C_u = upstream daily average temperature (95th percentile) = 5.7 °C
Q_u = upstream flow = Oct – April: 68.9 mgd (7Q10 flow)
MZ = assume the State will allow a 25%

$$C_d = \frac{(19.8 \times 15) + (5.7 \times (68.9 \times 0.25))}{15 + (68.9 \times 0.25)} = 12.3\ °C$$

Since 12.3 °C is greater than the average daily criterion of 9 °C, water quality-based effluent limits are needed.

Determine if there is a reasonable potential to exceed the daily max criterion of 13 °C

C_e = maximum effluent temperature December-February = 19.8 °C
Q_e = maximum effluent flow = 15 mgd
C_u = upstream daily maximum temperature (95th percentile) = 6.5 °C
Q_u = upstream flow = Oct – April: 68.9 mgd (7Q10 flow)
MZ = assume the State will allow a 25%

$$C_d = \frac{(19.8 \text{ X } 15) + (6.5 \text{ X } (68.9 \text{ X } 0.25))}{15 + (68.9 \text{ X } 0.25)} = 12.7 \text{ °C}$$

12.7°C is less than the daily max criterion of 13 °C, therefore the maximum daily criterion is not exceeded.

(3) <u>March - May</u>

Applicable criteria in March through May are Salmonid Spawning Criteria
Daily Average = 9°C; Max Daily = 13°C

$$C_d = \frac{(C_e \text{ X } Q_e) + (C_u \text{ X } (Q_u \text{ X } \%MZ))}{Q_e + (Q_u \text{ X } \%MZ)}$$

The table below presents a summary of the daily temperature data gathered March – May from 2001 to 2009 at Veteran's Station:

Table C 23 – Boise River Temperature Data, March - May

	Range	**50th percentile**	**75th percentile**	**95th percentile**	**Number of Samples**
Daily Maximum Temperature	3.5-14.6 °C	9.6 °C	11.0 °C	12.8 °C	725
Daily Average Temperature	2.3-11.9 °C	7.8 °C	9.0 °C	10.6 °C	725

As can be seen from the above data, the receiving stream exceeds the average daily salmonid spawning criterion of 9° C over 50% of the time, therefore a mixing zone is not appropriate.

When a mixing zone is not authorized the equation above becomes:
$C_d = C_e$

The table below presents a summary of the daily maximum temperature data collected during the months of March- May from 2001 to 2009, at the Lander Street facility:

Table C 24, Effluent Temperature Data, March – May

	Range	**50th percentile**	**75th percentile**	**95th percentile**	**Number of Samples**
Daily Maximum Temperature	15.8 - 21.9 °C	18.5 °C	19.4 °C	20.7 °C	855

As can be seen from the data above the effluent temperature is always greater than the daily average and daily max numeric temperature criteria, therefore there is reasonable potential that the effluent may cause or contribute to a water quality exceedance of the water quality criteria and water quality-based effluent limits are needed to ensure that water quality standards are met.

(4) June – October

The applicable criteria from June through October are as follows:

- June 1 – July 15: Salmonid Spawning Criteria: Daily Average = 9°C; Max Daily = 13°C
- July 16 - Sept 30: Cold Water Biota: Daily Average =19°C; Max Daily = 22°C
- Oct 1 - Oct 30: Salmonid Spawning Criteria: Daily Average = 9°C; Max Daily = 13°C

$$C_d = \frac{(C_e \text{ X } Q_e) + (C_u \text{ X } (Q_u \text{ X } \%MZ))}{Q_e + (Q_u \text{ X } \%MZ)}$$

(a) June – July 15

The table below presents a summary of the daily temperature data gathered June – July 15 from 2001 to 2009 at Veteran's Station:

Table C 25 – Boise River Temperature Data, June 1 – July 15

	Range	**50th percentile**	**75th percentile**	**95th percentile**	**Number of Samples**
Daily Maximum Temperature	10.3 – 18.4 °C	15.1 °C	16.1 °C	17.4 °C	418
Daily Average Temperature	9.5 – 15.9 °C	12.7 °C	13.7 °C	14.9 °C	418

From June 1 through July 15th the salmonid spawning criteria are in effect. As can be seen from the above data, the river always exceeds the average daily salmonid spawning criterion of 9 °C, therefore a mixing zone is not appropriate. When a mixing zone is not authorized the equation above becomes:

$C_d = C_e$

The table below presents a summary of the daily maximum temperature data collected from June 1 through July 15, from 2001 to 2009, at the Lander Street facility:

Table C 26 – Effluent Temperature Data

	Range	50th percentile	75th percentile	95th percentile	Number of Samples
Daily Maximum Temperature	19.6 – 24.2 °C	21.8 °C	22.7 °C	23.4 °C	404

As can be seen from the data above the effluent temperature is always greater than the average daily and maximum daily numeric salmonid spawning temperature criteria, therefore there is reasonable potential that the effluent may cause or contribute to a water quality exceedance and water quality-based effluent limits are needed from June 1 – July 15.

(b) <u>July 16 – September 30</u>

From July 16 through September 30 the cold water biota criteria are in effect (daily average temperature is 19 °C and the daily max temperature is 22 °C). The table below presents the daily temperature data collected from July 16 through September 30 each year. At Veterans Station

Table C 27 – Boise River Temperature Data, July 16 – September 30

	Range	50th percentile	75th percentile	95th percentile	Number of Samples
Daily Maximum Temperature	14.8 – 22.0 °C	18.8 °C	19.7 °C	21.0 °C	666
Daily Average Temperature	13.8 – 20.0 °C	16.9 °C	17.8 °C	18.8 °C	666

Because the 95th percentile of the data is almost at the criteria, no mixing zone is allowed.

Determine if there is a reasonable potential to exceed the average daily criterion of 19 °C
When a mixing zone is not authorized the equation above becomes:

$C_d = C_e$

The table below presents a summary of the daily maximum temperature data collected from June 1 through July 15, from 2001 to 2009, at the Lander Street facility:

Table C 28– Effluent Temperature Data, July 16- September 30

	Range	50th percentile	75th percentile	95th percentile	Number of Samples
Daily Maximum Temperature	21.9-25.5 °C	23.7 °C	24.0 °C	24.6 °C	632

As can be seen from the data above the effluent temperature is always greater than the average daily and maximum daily numeric cold water biota temperature criteria, therefore there is reasonable potential that the effluent may cause or contribute to a water quality exceedance and water quality-based effluent limits are needed from July 16 – September 30.

(c) *October*

Applicable criteria:

- Salmonid Spawning Criteria: Daily Average = 9°C; Max Daily = 13°C

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

The table below presents a summary of the daily temperature data gathered in October from 2001 to 2009 at Veteran's Station:

Table C 29 – Boise River Temperature Data, October

	Range	**50th percentile**	**75th percentile**	**95th percentile**	**Number of Samples**
Daily Maximum Temperature	6.8-18.2 °C	14.1 °C	15.7 °C	17.4 °C	217
Daily Average Temperature	6.0-16.8 °C	13.0 °C	14.4 °C	16.2 °C	217

In October the salmonid spawning criteria are in effect. As can be seen from the above data, the river exceeds the average daily salmonid spawning criterion of 9 °C over 50% of the time, therefore a mixing zone is not appropriate. When a mixing zone is not authorized the equation above becomes:

$C_d = C_e$

The table below presents a summary of the daily maximum temperature data collected from in October, from 2001 to 2009, at the Lander Street facility:

Table C 30 – Effluent Temperature Data, October

	Range	**50th percentile**	**75th percentile**	**95th percentile**	**Number of Samples**
Daily Maximum Temperature	20.2-23.9 °C	21.9 °C	22.4 °C	23.1 °C	248

As can be seen from the data above the effluent temperature is always greater than the numeric salmonid spawning temperature criteria, therefore there is reasonable potential that the effluent may cause or contribute to a water quality exceedance and water quality-based effluent limits are needed in October.

C. Summary

The following table provides a summary of whether there is reasonable potential for the criteria to be exceeded.

Table C 31 – Summary of Reasonable Potential Analysis

	Is there Reasonable Potential to exceed Salmonid Spawning Criteria?		**Is there Reasonable Potential to exceed Coldwater Biota Criteria**	
	Daily Max	**Average Daily**	**Daily Max**	**Average Daily**
November	Yes	Yes	NA	NA
December-February	No	Yes	NA	NA
March-May	Yes	Yes	NA	NA
June - October				
June 1 – July 16	Yes	Yes	NA	NA
July 16 – Sept 30	NA	NA	Yes	Yes
Oct 1 – Oct 30	Yes	Yes	NA	NA

D. Reasonable Potential Analysis Based on the Revised Idaho Water Quality Standards

As stated previously, the IDEQ has submitted to the EPA revised temperature criteria for the Boise River. The State has adopted the following revisions:

Salmonid Spawning: Maximum Weekly Maximum Temperature[2] of 13°C
This criterion is applicable from November 1 – May 31

Cold Water Aquatic Life: Daily Average = 19°C; Max Daily = 22°C
This criterion applies from June 1 – October 30.

Point Source Thermal Requirement: Wastewater must not affect the receiving water outside the mixing zone so that (1) the temperature of the receiving water or of downstream waters will interfere with designated beneficial uses, and, (2) daily and seasonal temperature cycles characteristics of the water body are maintained.

These proposed changes in the water quality standards require additional analysis of the effluent and receiving water to determine if the effluent has the reasonable potential to cause or

[2] The Maximum Weekly Maximum Temperature (MWMT) is the 7-day average of the maximum recorded temperature on each day. For example, the MWMT of May 15 is calculated by averaging the highest temperature recorded on each day from May 9 through May 15.

contribute to an exceedance of the new water quality criteria. The analysis below addresses the proposed water quality standard changes. If the water quality criteria changes are approved by the EPA prior to the final issuance of the permit, any effluent limits that may be required based on the new temperature criteria will be incorporated into the final permit.

The tables below provide a summary of the temperature data for the Lander Street effluent (Table C-32) and for Veterans Station (Table C-33). In the State's July 20, 2011 submittal package for the salmonid spawning criteria, it was stated:

> "…In order to maintain the thermal cycles fish are accustomed to, DEQ recommends that subdivision of regulatory spawning periods stated in the water quality standards be evaluated cautiously, e.g. for purpose of developing seasonal, monthly or flow-tiered thermal effluent limits. In most situations it will likely be best to take the whole spawning and incubation period as one time period, and develop a single thermal effluent limit based on meeting temperature criteria at the warmer end of this period. In this way normally cooler temperatures that occur within the spawning and incubation period will be maintained. This will be especially important to the protection of species, such as mountain whitefish, which require cooler mid-winter temperatures to be most successful in reproduction…."

In this case, the entire season over which salmonid spawning occurs (i.e., November 1 – May 31) was reviewed when summarizing the temperature data.

The State's draft 401 certification authorizes a 50% mixing zone from November through April, a 25% mixing zone from May through July 15, no mixing zone from July 16 through September 30, and a 25% mixing zone for the month of October.

TABLE C-32: Lander Street Summary of Effluent Temperature in °C

	Minimum	**Maximum**	**Median**	**95th percentile**
Nov 1 – May 31, MWMT	15.9	22.0	18.1	20.6
June – July 15	19.6	24.2	21.8	23.4
July 16- Sept 30	21.9	25.5	23.7	24.6
Oct	20.2	23.9	21.9	23.1

TABLE C-33: Veteran Station Summary of Temperature in °C

	Minimum	**Maximum**	**Median**	**95th percentile**	**Mixing Zone Size**
Nov 1 – May 31, MWMT	0.8	14.1	10.7	11.8	Nov -Apr 50% May 25%
June – July 15	9.5 (daily avg) 10.3 (daily max)	15.9 (daily avg) 18.4 (daily max)	12.7 (daily avg) 15.1 (daily max)	14.9(daily avg) 17.4 (daily max)	25%
July 16 – Sept 30	13.8 (daily avg) 14.8 (daily max)	20.0 (daily avg) 22.0 (daily max)	16.9 (daily avg) 18.8 (daily max)	18.8 (daily avg) 21.0 (daily max)	0%
Oct	6.0 (daily avg) 6.8 (daily max)	16.8 (daily avg) 18.2 (daily max)	13.0 (daily avg) 14.1 (daily max)	16.2 (daily avg) 17.4 (daily max)	25%

Reasonable Potential to exceed the water quality criterion is based on the following equation:

$$C_d = \frac{(C_e \, X \, Q_e) + (C_u \, X \, (Q_u \, X \, \%MZ))}{Q_e + (Q_u \, X \, \%MZ)}$$

C_e = maximum MWMT effluent data for salmonid spawning periods (November 1 – May 31); and the maximum of the data set for cold water biota periods (June 1 – Oct 31)
Q_e = maximum effluent flow = 15 mgd
C_u = represented by the 95th percentile of the MWMT data set at Veterans Station for salmonid spawning period (November 1 – May 31), and the 95th percentile of the data set at Veterans Station for cold water biota periods.
Q_u = upstream flow = Oct – April: 68.9 mgd (7Q10 flow): and May – Sept: 171 mgd (7Q10 flow)
MZ = allowable mixing zone

Based on the above information it was found that the there is a reasonable potential for the effluent to cause or contribute to an exceedance of the water quality standards from November through May and from July 16 through October. There is no reasonable potential to cause or contribute to an exceedance of the water quality standards from June 1 through July 15th, therefore effluent limitations are not required during this time period.

V. REASONABLE POTENTIAL ANALYSIS FOR WHOLE EFFLUENT TOXICITY

Whole Effluent Toxicity (WET) refers to the aggregate toxic effect to aquatic organisms from all pollutants contained in a facility's effluent. At this time, the EPA is including a trigger in the permit, the rationale is explained below.

Water Quality Criterion

The Idaho water quality standards have a narrative criterion at IDAPA 58.01.02.200.02 that requires surface waters of the state to be free from toxic substances in concentrations that impair designated beneficial uses. This narrative criterion is the basis for establishing WET controls in NPDES permits (see 40 CFR 122.44(d)(1)). For protection against chronic effects to aquatic life the EPA recommends using 1.0 chronic toxic units (TUc) to the most sensitive of at least three test species (*EPA Region 10 Toxicity Training Tool*, Debra Denton, Jeff Miller, Robyn Stuber, September2007).

Reasonable Potential Analysis

Chronic toxicity tests were conducted on the effluent from the Lander Street facility according to procedures in the EPA's *Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to Freshwater Organisms* (EPA-821-R-02-013). The procedures involved a 7-day static-renewal exposure to the effluent. The endpoints from these tests were *Ceriodaphnia dubia* survival and reproduction, and fathead minnow survival and growth. Toxicity tests from 2001 onward were reviewed by the EPA.

Eight WET tests were performed with fathead minnow and no toxicity was detected in any of the tests.

Thirty one WET tests were performed on *Ceriodaphnia dubia* and no toxicity was shown for survival, however, 15 of the tests showed chronic toxicity for reproduction. The 1999 permit for Lander Street included a "trigger" of 6.9 TUc from April – September and a trigger of 4.1 TUc from October - March. The triggers were based on a mixing zone of 75% of the 7Q10 flow. A summary of the *Ceriodaphnia dubia* results are provided in Table C 34, below. As can be seen from the table, there are 7 sampling events where the toxicity of the effluent exceeded the triggers.

Table C 34: *Ceriodaphnia dubia* Whole Effluent Toxicity Results

Date	Survival[1]	Reproduction[1]	Comments
September 2001	1	1.8	
December 2001	1	1	
March 2002	1	1	
December 2002	1	1	
March 2003	1	1	
June 2003	1	62.6	Accelerated testing and Toxicity Identification Evaluation (TIE) started [2]
July 2003	1	>25	
August 2003	<1	<1	
September 2003	<1	<1	
December 2003	<1	<1	
June 2004	<1	<1	
…CONTINUED ON NEXT PAGE…			

Date	Survival[1]	Reproduction[1]	Comments
September 2004	<1	26	Untreated sample[2]
	<1	<1	Chlorinated/dechlorinated sample[2]
December 2004	<1	2.4	
March 2005	<1	<1	
July 2005	<1	<1	
September 2005	<1	1.3	
December 2005	<1	<1	
March 2006	<1	1.4	
July 2006	<1	<1	
September 2006	<1	3	
January 2007	<1	1.8	
March 2007	<1	1.1	
July 2007	<1	<1	Untreated sample[2]
	<1	<1	Chlorinated/dechlorinated sample[2]
September 2007	<1	44.4	Untreated sample[2]
	<1	15.4	Chlorinated/dechlorinated sample[2], result triggered accelerated testing, see October 2007 results
October 2007	<1	<1	Untreated sample[2]
	<1	<1	Chlorinated/dechlorinated sample[2]
January 2008	<1	5.1	Untreated sample[2]
	<1	<1	Chlorinated/dechlorinated sample[2]
March 2008	<1	27.9	Untreated sample[2] QA problems, sample to be re-run, see April 2008 results
	<1	<1	Chlorinated/dechlorinated sample[2]
April 2008	<1	<1	Untreated sample[2]
	<1	<1	Chlorinated/dechlorinated sample[2]
	<1	<1	UV treated sample[3]
July 2008	<1	<1	Untreated sample[2]
	<1	<1	Chlorinated/dechlorinated sample[2]
	<1	<1	UV treated sample[3]
September 2008	<1	<1	Untreated sample[2]
	<1	<1	Chlorinated/dechlorinated sample[2]
	<1	<1	UV treated sample[3]
December 2008	<1	<1	Untreated sample[2]
	<1	<1	Chlorinated/dechlorinated sample[2]
March 2009	<1	<1	Untreated sample[2]
	<1	<1	Chlorinated/dechlorinated sample[2]
July 2009	<1	<1	Untreated sample[2]
	<1	<1	Chlorinated/dechlorinated sample[2]
September 2009	<1	1.76	Untreated sample[2]
	<1	<1	Chlorinated/dechlorinated sample[2]
March 2010	<1	<1	Untreated sample[2]
	<1	<1	Chlorinated/dechlorinated sample[2]

1. All results are in chronic toxic units.
2. The TIE attributed the cause of reproduction suppression to a high abundance of micro-organisms in the samples which opportunistically colonized the *Ceriodaphnia*, resulting in stress, reduced output of young and even death. As a result of the TIE, all subsequent samples are tested concurrently with a sub-sample that had been chlorinated and dechlorinated to disinfect it prior to testing. Treatment controls were prepared and tested for the chlorination/dechlorination treatment to confirm that the manipulations themselves did not contribute to toxicity.
3. UV treatment was performed to determine whether UV treatment would be a suitable alternative to chlorination/dechlorination and provide less potential for toxicity due to micro-organisms.

In June 2003, the *Ceriodaphnia dubia* WET test resulted in 62.6 chronic toxic units (TUc) for reproduction. Due to these results the City initiated accelerated WET testing and a Toxicity Identification Evaluation (TIE). The TIE found that reproduction suppression in the June and July 2003 WET tests were due to the microbial make up of the effluent (see letter dated October 3, 2003 from Richard Dees (City of Boise) to Robert Grandinetti (EPA)). The WET test results were attributed to a high abundance of micro-organisms which opportunistically colonized the *Ceriodaphnia dubia*, resulting in stress, reduced output of young and even death.

Subsequent samples were tested concurrently with a sub-sample that had been chlorinated and dechlorinated to disinfect it prior to testing. The effects of disinfection on toxicity suggest young production was improved in all concentrations of disinfected effluent, resulting in performance comparable to control organisms. The results provide support to the hypothesis that microorganisms were responsible for the toxic effects observed on reproduction. There was only one sample where toxicity was still high after disinfection (see reproduction results for September 2007). Accelerated testing was performed, however, no toxicity was found in subsequent samples.

The effluent has not had an elevated toxicity result since 2008. The City has developed a plan which will be used to identify and eliminate the source of microorganisms should a toxicity hit due to microorganisms occur again. The EPA is not including an effluent limit in the permit at this time since the City has identified the toxicant and has a plan in place to find the source and remove it should toxicity due to microorganisms recur. A trigger will continue to be included in the permit. The previous permit had a mixing zone of 75%, however, when the toxicity effects due to microorganisms are not considered, the effluent toxicity is quite low and a 75% mixing zone is not needed. Therefore, the trigger is based on the State allowing a 25% mixing zone for WET. The trigger was developed using the following mass balance equation:

$C_d \text{ X } Q_d = (C_e \text{ X } Q_e) + (C_u \text{ X } Q_u)$

C_d = criterion not to be exceeded in the water body = 1 TUc
Q_d = receiving water flow downstream of the effluent discharge = $Q_u + Q_e$
C_e = allowable effluent concentration
Q_e = maximum effluent flow = 15 mgd
C_u = upstream concentration of pollutant = 0 (no data available)
Q_u = upstream flow = 171.7 mgd (May – Sept); 68.9 mgd (Oct – April)
MZ = 25% =0.25

When the above equation is solved for C_e, it becomes:

May – Sept

$$C_e = \frac{(C_d \text{ X } Q_d) - (C_u \text{ X } Q_u)}{Q_e} = \frac{(1 \text{ X } ((171 \text{ X } 0.25)+15)) - (171 \text{ X } 0.25 \text{ X } 0)}{15} = 3.9 \text{ TUc}$$

October – March

$$C_e = \frac{(C_d \text{ X } Q_d) - (C_u \text{ X } Q_u)}{Q_e} = \frac{(1 \text{ X } ((68.9 \text{ X } 0.25)+15)) - (68.9 \text{ X } 0.25 \text{ X } 0)}{15} = 2.1 \text{ TUc}$$

These triggers are included in the proposed permit. Any test results above these values will result in increased testing and TIE/TRE if necessary.

The toxicity testing on each organism must include a series of five test dilutions and a control. The dilution series must include the receiving water concentration (RWC), which is the dilution associated with the chronic toxicity trigger (i.e. 26% from May through September and 47% from October through May); two dilutions above the RWC and two dilutions below the RWC. The receiving water concentration is calculated as follows:

RWC = Qe ÷ (Mixing Zone X Qu) + Qe

VI. REASONABLE POTENTIAL ANALYSIS FOR DISSOLVED OXYGEN/BIOCHEMICAL OXYGEN DEMAND

The results of the reasonable potential analysis found that an effluent limitation is needed for dissolved oxygen from October 1 – July 15. The reasonable potential analysis is presented below.

Applicable Water Quality Criterion

The Idaho water quality standards, at IDAPA 58.01.02.278.01., require the Boise River, from Veterans State Park to its mouth, to have dissolved oxygen concentrations of six (6) mg/L or seventy-five percent (75%) of saturation, whichever is greater, during the spawning period of salmonid fishes inhabiting those waters (i.e, October 1 – July 15). Additionally, IDAPA 58.01.02.25.02.a. requires that dissolved oxygen concentrations exceed 6 mg/L at all times. This criterion applies from July 16 – September 30.

D.O. saturation depends on the temperature of the river and the elevation of the facility. Temperature at the Veterans Monition Station shows that the average daily temperature of the river varies from -0.1°C to 17.8 °C, with a median temperature of 9.1 °C during the salmonid spawning period. Because D.O. saturation can fluctuate daily due to daily temperature fluctuations, EPA is using the average temperature criterion associated with the protection of salmonid spawning to determine the minimum acceptable D.O. criterion. In this case the elevation of the facility is approximately 2600 feet, and the average daily temperature criterion for salmonid spawning is 9° C. This results in a D.O. saturation of 10.5 mg/L; 75% of 10.5 mg/L is 7.9 mg/L. Therefore, from October 1- July 15, the minimum D.O. criterion is 7.9 mg/L. From July 16 through September 30 the minimum temperature criterion is 6.0 mg/L.

Reasonable Potential Analysis

An effluent may cause a violation of the dissolved oxygen criterion near the point of discharge (near field) if the effluent is low in dissolved oxygen, and/or downstream of the discharge location (far field) due to its BOD load. The following presents the analysis for near field conditions and far field conditions.

(1) Near Field Analysis

For the near field analysis the following mass balance equation is used:

$$C_d = \frac{(C_e \text{ X } Q_e) + (C_u \text{ X } (Q_u \text{ X } \%MZ))}{Q_e + (Q_u \text{ X } \%MZ)}$$

C_e = minimum effluent dissolved oxygen. EPA is using the 5th percentile value of the effluent data set to represent the minimum effluent concentration.
Oct 1 – July 15 = 2.7 mg/L
July 16-Sept 30 = 2.3 mg/L

Q_e = maximum effluent flow = 15 mgd
C_u = minimum upstream D.O. concentration (5th percentile at Veterans Monitoring Station)

Oct 1 – July 15 = 9.3 mg/L
July 16 – September 30 = 8.6 mg/L

Q_u = upstream flow
May - September: 171 mgd (7Q10 flow),
October – April = 68.9 mgd (7Q10 flow)

MZ = 25%

(a) *<u>October 1-July 15</u> – because the 7Q10 flow changes in May, two calculations will be done for this time frame to capture the different low flows.*

<u>October 1 – April 30</u>: Cu for DO = 9.3 mg/L, Qu = 68.9 mgd

$$C_d = \frac{(2.7 \text{ X } 15) + (9.3 \text{ X } (68.9 \text{ X } 0.25))}{15 + (68.9 \text{ X } 0.25)} = 6.2 \text{ mg/L}$$

<u>May 1- July 15</u>: Cu for DO = 9.3 mg/L, Qu = 171 mgd

$$C_d = \frac{(2.7 \text{ X } 15) + (9.3 \text{ X } (171 \text{ X } 0.25))}{15 + (171 \text{ X } 0.25)} = 7.6 \text{ mg/L}$$

The D.O. criterion for the protection of salmonid spawning is 7.9 mg/L from October through July 15. Therefore, there is a reasonable potential that the effluent could cause or contribute to an exceedance of the water quality standards from October 1 through July 15 and effluent limitations are required.

(b) *<u>July 16-September 30</u>*

$$C_d = \frac{(2.3 \text{ X } 15) + (8.6 \text{ X } (171 \text{ X } 0.25))}{15 + (171 \text{ X } 0.25)} = 7.0 \text{ mg/L}$$

The D.O. criterion from July 16 – September 30 is 6.0 mg. Therefore, there is a not reasonable potential that the effluent could cause or contribute to an exceedance of the water quality standards during this time.

(2) <u>Revisions to the State Water Quality Standards</u>
On July 22, 2011, the State submitted to the EPA its revised salmonid spawning temperature criterion (13° C as a maximum weekly maximum temperature (MWMT)). This criterion is applicable from November through May. If EPA approves the State’s revisions, the 75% D.O. saturation criterion would change to 7.2 mg/L and apply from November through May. If the proposed change becomes effective (i.e., if the revised water quality standards are approved by EPA) then the reasonable potential calculation is as follows:

Near Field Analysis

For the near field analysis the following mass balance equation is used:

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

C_e = minimum effluent dissolved oxygen. EPA is using the 5th percentile value of the effluent data set to represent the minimum effluent concentration.
November - May = 2.7 mg/L
June - October = 2.5 mg/L

Q_e = maximum effluent flow = 15 mgd

C_u = minimum upstream D.O. concentration (5th percentile at Veterans Monitoring Station)
November - May = 10.3 mg/L
June - October = 8.7 mg/L

Q_u = upstream flow
May - September: 171 mgd (7Q10 flow),
October – April = 68.9 mgd (7Q10 flow)

MZ = 25%

(a) *November - May – because the 7Q10 flow changes in May, two calculations will be done for this time frame to capture the different low flows.*

November 1 – April 30: Cu for DO = 10.3 mg/L, Qu = 68.9 mgd

$$C_d = \frac{(2.7 \times 15) + (10.3 \times (68.9 \times 0.25))}{15 + (68.9 \times 0.25)} = 6.8 \text{ mg/L}$$

May : Cu for DO = 10.3 mg/L, Qu = 171 mgd

$$C_d = \frac{(2.7 \times 15) + (10.3 \times (171 \times 0.25))}{15 + (171 \times 0.25)} = 8.3 \text{ mg/L}$$

The D.O. criterion for the protection of salmonid spawning is 7.2 mg/L from November through May. Therefore, there is a reasonable potential that the effluent could cause or contribute to an exceedance of the water quality standards from November through April and effluent limitations are required during this time period.

(b) *June – October - because the 7Q10 flow changes in October, two calculations will be done for this time frame to capture the different low flows*

June - September

$$C_d = \frac{(2.5 \text{ X } 15) + (8.7 \text{ X } (171 \text{ X } 0.25))}{15 + (171 \text{ X } 0.25)} = 7.0 \text{ mg/L}$$

October

$$C_d = \frac{(2.5 \text{ X } 15) + (8.7 \text{ X } (68.9 \text{ X } 0.25))}{15 + (68.9 \text{ X } 0.25)} = 5.8 \text{ mg/L}$$

The D.O. criterion from June through October is 6.0 mg. Therefore, there is a reasonable potential that the effluent could cause or contribute to an exceedance of the water quality standards during October and a water quality based effluent limit is needed at this time.

(3) Far Field Analysis

When organic matter decomposes, it is fed upon by aerobic bacteria. In this process, organic matter is broken down and oxidized (combined with oxygen). BOD is a commonly used metric for measuring the quantity of organic oxygen-demanding material in water. The technology-based effluent limits for this facility allow the facility to discharge BOD up to 45 mg/L in a day. However, the current permit requires the facility to meet a maximum of 30 mg/L. To be consistent with anti-backsliding regulations (as well as anti-degradation regulations) the limits in the 1999 permit have been retained in the proposed permit. A Streeter-Phelps model was used to determine if more stringent BOD limits were necessary to protect downstream uses. The seasons were divided into the May –September and October – April time periods and worst case assumptions were used in the initial analysis. The following values were input into the model:

(a) May - September

River Conditions Upstream of the Lander Street Facility:

- Flow – 171 mgd (7Q10)
- Temperature – 18.5° C, this value is the 95th percentile of the temperature data collected at the Veterans Monitoring Station (upstream of the facility).
- BOD – 2.0 mg/L (assumed value)
- Dissolved oxygen – 8.6 mg/L (5th percentile of the data collected at Veterans Monitoring Station)

Effluent Characteristics:

- Flow – 15 mgd
- BOD – 30 mg/L (highest allowable BOD concentration)
- Dissolved oxygen – 2.2 mg/L (lowest observed effluent concentration)

Values Used to Estimate Dissolved Oxygen Saturation

- Temperature – 18.5° C (95th percentile of data collected at Veterans monitoring station)
- Elevation – 2600 (from City of Boise 2010 NPDES application)

The model predicts that the lowest downstream dissolved oxygen concentration is 8.2 mg/L (one mile from the facility). Because the downstream concentration is greater than either the salmonid criterion (7.9 mg/L from May-July 15) or the cold water biota criterion (6.0 mg/L from July 16- September 30) the EPA has determined that more stringent BOD limits are not needed at this time.

(b) *October - April*

River Conditions Upstream of the Lander Street Facility:

- Flow – 68.9 mgd (7Q10)
- Temperature – 13.7° C, this value is the 95^{th} percentile of the temperature data collected at the Veterans Monitoring Station (upstream of the facility).
- BOD – 2.0 mg/L (assumed value)
- Dissolved oxygen – 9.3 mg/L (5th percentile of the data collected at Veterans Monitoring Station)

Effluent Characteristics:

- Flow – 15 mgd
- BOD – 30 mg/L (highest allowable BOD concentration)
- Dissolved oxygen – 2.2 mg/L (lowest observed effluent concentration)

Values Used to Estimate Dissolved Oxygen Saturation

- Temperature – 13.7 (95^{th} percentile of temperature data at Veterans Monitoring Station)
- Elevation – 2600 (from City of Boise 2010 NPDES application)

The model predicts that the lowest downstream concentration is 8.0 mg/L, which is above both the salmonid spawning criterion (7.9 mg/L) and the cold water biota criterion (6.0 mg/L). Therefore more stringent BOD limits are not needed at this time.

VII. REASONABLE POTENTIAL FOR TURBIDITY CRITERION

The analysis determined that there was not a reasonable potential for the effluent to cause or contribute to an exceedance of the turbidity water quality standard.

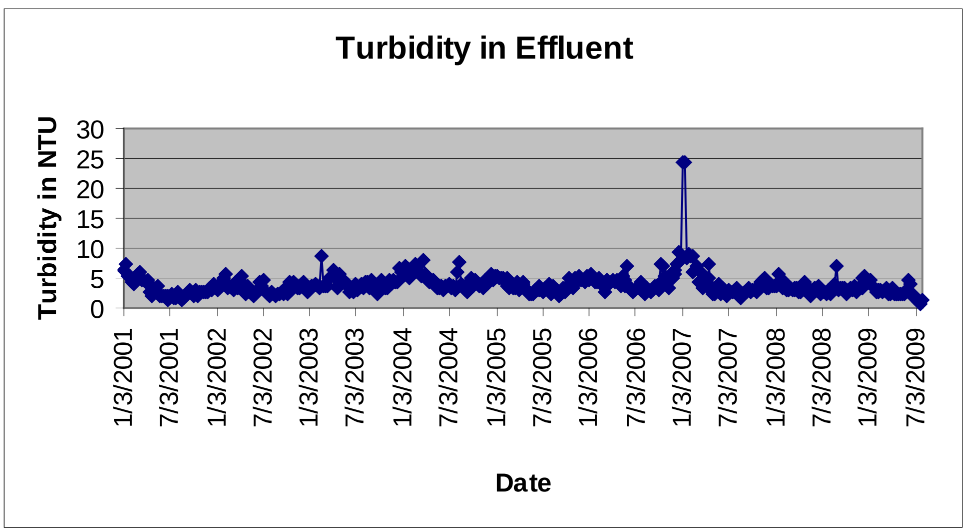
Applicable Water Quality Criterion

The Idaho water quality standards at IDAPA 58.01.02.250.02.e: state that: Turbidity below any applicable mixing zone set by the Department shall not exceed background turbidity by more than 50 NTU instantaneously or more than 25 NTU for more than ten (10) consecutive days.

Reasonable Potential Analysis

The City of Boise collected turbidity data upstream of the Lander Street facility from January 2001 to July 2009. During this time 88 turbidity samples were collected and they ranged from 1.2 NTU to 12.2 NTU with an average value of 3.1 NTU. To reflect a worst case scenario, the EPA used the 5^{th} percentile of the data set, 1.4 NTU, to represent the background turbidity level. Assuming no mixing zone will be authorized, the effluent should not exceed 50 NTU + 1.4 NTU = 51.4 NTU instantaneously or 25 NTU for 10 consecutive days.

The City collected weekly data from for the effluent from January 2001 to July 2009. The City collected 447 samples which ranged from 0.7 NTU to 24.5 NTU with an average value of 3.8 NTU. The 99^{th} percentile of the effluent data is 8.5 NTU. A graph of the effluent results is presented below:



As can be seen from the graph above, the facility is well below the instantaneous criterion of 50.4 NTU and is always below 10 NTU with one exception in 2007, therefore there is no reasonable potential for the effluent to cause or contribute to an exceedance of water quality standards and water quality-based effluent limits are not required.

<u>APPENDIX D</u>
Derivation of Water Quality-Based Effluent Limits

As a result of either a TMDL that has been completed or the reasonable potential analysis conducted in Appendix C it has been determined that water quality-based effluent limits (WQBEL) are necessary for bacteria, total suspended solids, ammonia, mercury, pH, total phosphorus, temperature and dissolved oxygen. The following discussion presents the derivation of WQBELs.

In general, the first step in developing a WQBEL 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 exceedance of water quality standards in the receiving water.

Once a WLA is developed, the EPA generally calculates effluent limits that are protective of the WLA using statistical procedures described in chapter 5 of the EPA's *Technical Support Document for Water Quality-based Toxics Control* (March 1991). For pH effluent limits, the EPA's DESCON program (Guidance on Supplementary Stream Design Conditions for Steady State Modeling, U.S.E.P.A., Office of Water 1988) was used.

Part I of this appendix discusses the development of water quality-based effluent limits for bacteria and TSS; Part II discusses the development of water quality- based effluent limits for ammonia and mercury; Part III discusses the development of water quality-based effluent limits for pH; Part IV discusses the development of water quality-based effluent limits for total phosphorus, Part V discusses the development of the water quality-based effluent limits for temperature and Part VI discusses the development of water quality-based effluent limits for dissolved oxygen.

I. Derivation of Water Quality-Based Effluent Limitations for Bacteria and Total Suspended Solids

When developing water quality-based effluent limits the permitting authority must ensure that the limits are protective of water quality standards and are consistent with the assumptions and requirements of an approved TMDL. Specifically the federal regulations at 40 CFR 122.44(d)(vii) state:

> "When developing water quality-based effluent limits under this paragraph the permitting authority shall ensure that: (A) The level of water quality to be achieved by limits on point sources established under this paragraph is derived from and complies with all applicable water quality standards and (B) Effluent limits developed to protect a…numeric water quality criterion…are consistent with the assumptions and requirements of any available wasteload allocation for the discharge prepared by the State and approved by the EPA pursuant to 40 CFR 130.7."

The State developed the wasteload allocations for bacteria and total suspended solids in the *Lower Boise River TMDL, Subbasin Assessment, Total Maximum Daily Load* and the EPA approved the TMDL on January 25, 2000.

A. <u>Bacteria</u>

The *Lower Boise River TMDL* included monthly, weekly and daily wasteload allocations for bacteria for the Lander Street facility. The WLAs were based on fecal coliform concentrations because when the TMDL was developed the Idaho water quality standards used fecal coliform as the indicator organism for bacteria for the protection of contact recreation. However, the TMDL also stated that if Idaho's bacteria criteria were revised to require *E. coli* as the indicator organism rather than fecal coliform then "…compliance with the load allocations in this TMDL could be demonstrated using *E. Coli* samples, rather than fecal coliform," and that "…[i]f E. Coli are used as the new Idaho criteria for contact recreation when the permits are re-issued, the new E. Coli criteria should be incorporated into the permits in place of fecal coliform requirements." (see *Lower Boise River TMDL*; Page 74).

The Idaho water quality standards state that waters of the State of Idaho that are designated for recreation are not to contain *E. coli* bacteria in concentrations exceeding 126 organisms per 100 ml based on a minimum of five samples taken every three to seven days over a thirty day period. Therefore, the draft permit contains a monthly geometric mean effluent limit for *E. coli* of 126 organisms per 100 ml (IDAPA 58.01.02.251.01.a.).

The Idaho water quality standards also state that a water sample that exceeds certain "single sample maximum" values indicates a likely exceedance of the geometric mean criterion, although it is not, in and of itself, a violation of water quality standards. For waters designated for primary contact recreation, the "single sample maximum" value is 406 organisms per 100 ml (IDAPA 58.01.02.251.01.b.ii.).

The goal of a water quality-based effluent limit is to ensure a low probability that water quality standards will be exceeded in the receiving water as a result of a discharge, while considering the variability of the pollutant in the effluent. Because a single sample value exceeding 406 organisms per 100 ml indicates a likely exceedance of the geometric mean criterion, the EPA has imposed an instantaneous (single grab sample) maximum effluent limit for *E. coli* of 406 organisms per 100 ml, in addition to a monthly geometric mean limit of 126 organisms per 100 ml, which directly implements the water quality criterion for *E. coli*. This will ensure that the discharge will have a low probability of exceeding water quality standards for *E. coli*.

Regulations at 40 CFR 122.45(d)(2) require that effluent limitations for continuous discharges from POTWs be expressed as average monthly and average weekly limits, unless impracticable. Additionally, the terms "average monthly limit" and "average weekly limit" are defined in 40 CFR 122.2 as being arithmetic (as opposed to geometric) averages. It is impracticable to properly implement a 30-day geometric mean criterion in a permit using monthly and weekly arithmetic average limits. The geometric mean of a given data set is equal to the arithmetic mean of that data set if and only if all of the values in that data set are equal. Otherwise, the geometric mean is always less than the arithmetic mean. In order to ensure that the effluent limits are "derived from and comply with" the geometric mean water quality criterion, as required by 40 CFR 122.44(d)(1)(vii)(A), it is necessary to express the effluent limits as a monthly geometric mean and an instantaneous maximum limit.

B. Total Suspended Solids

The 1999 *Lower Boise River TMDL* included the following WLAs for total suspended solids (TSS) for the Lander Street facility:

	April 1 – September 30	October 1 – March 31
Monthly WLA	3400 lbs/day	2500 lbs/day
Weekly WLA	5000 lbs/day	3750 lbs/day

In translating the wasteload allocations into permit limits, the EPA followed procedures in the TSD. The first step in developing limits is to determine the time frame over which the WLAs apply. In general, the period over which a criterion applies is based on the length of time the target organism can be exposed to the pollutant without adverse effect. For example, aquatic life criteria generally apply as one-hour averages (acute criteria) or four-day averages (chronic criteria). In the case of total suspended solids the target organisms are aquatic organisms and TSS affects them by (1) killing them directly, (2) reducing growth rates and resistance to disease, by preventing successful development of eggs and larvae, (3) modifying natural movement or migration patterns and/or (4) reducing the natural availabilities of food. The period over which this effect occurs is uncertain. However, since TSS is not a toxic the EPA believes that applying the WLA directly as monthly and weekly averages, as stated in the TMDL, is appropriate. Therefore the effluent limits are:

	April 1 – September 30	October 1 – March 31
Average Monthly Limit	3400 lbs/day	2500 lbs/day
Average Weekly Limit	5000 lbs/day	3750 lbs/day

The NPDES regulation at 40 CFR 122.45(f)(2) states: "Pollutants limited in terms of mass additionally may be limited in terms of other units of measurement and the permit shall require the permittee to comply with both limitations. Therefore, the loading limits above will also be expressed as concentration based limits. The concentration is derived as follows:

Concentration = Loading ÷ (effluent flow X 8.34)

Therefore, the effluent limitations are:

	April 1 – September 30	October 1 – March 31
Average Monthly Limit	27 mg/L (3400 lbs/day)	20 mg/L (2500 lbs/day)
Average Weekly Limit	40 mg/L (5000 lbs/day)	30 mg/L (3750 lbs/day)

II. Derivation of Mercury and Total Ammonia Water Quality-Based Effluent Limitations

The Reasonable Potential Analysis determined that water quality-based effluent limitations are required for mercury and ammonia (see Appendix C for the reasonable potential analysis). The following section derives the water quality-based effluent limits.

A. Ammonia

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.

$C_dQ_d = C_eQ_e + C_uQ_u$ where,

C_d = water quality criterion
C_e = WLA
C_u = Maximum measured receiving water upstream concentration (the 95th percentile of the data set is used)
Q_d = Receiving water flow rate downstream of the effluent discharge = $Q_e + Q_u$
Q_e = Effluent flow rate (set equal to the highest discharge from facility)
Q_u = Receiving water low flow rate upstream of the discharge

To calculate a wasteload allocation (*i.e.*, C_e), C_d is set equal to the criterion and the equation is solved for C_e. This procedure is done for both the acute criterion and the chronic criterion. If mixing zones are allowed, the equation becomes:

$$C_e = WLA = \frac{C_d\,(Q_u \times MZ) + C_dQ_e}{Q_e} - \frac{(C_u \times (Q_u \times MZ))}{Q_e}$$

An example calculation is provided below for ammonia.

(1) Ammonia, Outfall 001 (discharge to Boise River from May through September)

C_d (acute) = 1039 µg/L
C_d (chronic) = 430 µg/L
$Q_{u(acute)}$ = 158.1 mgd from May - Sept
$Q_{u(chronic)}$ = 235 mgd from May – Sept
C_u = 22.5 µg/L
Q_e = 15 mgd
$C_{e(acute)} = WLA_{(acute)}$
$C_{e(chronic)} = WLA_{(chronic)}$
MZ (acute) = 25% (0.25)
MZ(chronic) = 25% (0.25)

$$WLA_{acute} = \frac{1039\ (158.1 \text{ X } 0.25) + (1039 \text{ X } 15)}{15} - \frac{[(22.5 \text{ X } (158.1 \text{ X } 0.25)]}{15} = 3717.5\ \mu g/L$$

$$WLA_{chronic} = \frac{430\ (235 \times 0.25) + (430 \times 15)}{15} - \frac{[(22.5 \times (235 \times 0.25)]}{15} = 2026.0\ \mu g/L$$

The next step is to compute the "long term average" (LTA) concentrations which will be protective of the WLAs. This is done using the following equations from Section 5.4 of the TSD:

$LTA_a = WLA_a \times \exp(0.5\sigma^2 - z\ \sigma)$
$LTA_c = WLA_c \times \exp(0.5\ \sigma_{30}^2 - z\ \sigma_{30})$

where,

$\sigma^2 = \ln(CV^2 + 1)$
$\sigma = (\sigma^2)^{1/2}$

$\sigma_{30}^2 = \ln(CV^2/30 + 1)$
$\sigma_{30} = (\sigma_{30}^2)^{1/2}$

$z = 2.326$ for 99^{th} percentile probability basis

For Ammonia,

$CV = 1.4$
$\sigma^2 = \ln(1.4^2 + 1) = 1.085$
$\sigma = \sqrt{\sigma^2} = 1.042$
$\sigma_{30}^2 = \ln(1.4^2/30 + 1) = 0.063$
$\sigma_{30} = \sqrt{\sigma_4^2} = 0.252$
$z = 2.326$ for 99^{th} percentile probability basis

Therefore,

$LTA_a = 567.0\ \mu g/L$
$LTA_c = 1164.8\ \mu g/L$

The acute and chronic LTAs are compared and the more stringent is used to develop the daily maximum (MDL) and average monthly (AML) permit limits as shown below. The acute LTA of 567.6 µg/L is more stringent.

<u>Derive the maximum daily and average monthly effluent limits</u>

Using the equations in Section 5.4 of the TSD, the MDL and AML effluent limits are calculated as follows:

$MDL = LTA \times \exp(z_m\ \sigma - 0.5\ \sigma^2)$
$AML = LTA \times \exp(z_a\ \sigma_n - 0.5\ \sigma_n^2)$

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

$\sigma_n^2 = \ln(CV^2/n + 1) = 0.219$
$\sigma_n = \sqrt{\sigma_n^2} = 0.468$
$z_a = 1.645$ for 95th percentile probability basis
$z_m = 2.326$ for 99th percentile probability basis
n = number of sampling events required per month = 8
CV = 1.4

From May through September the water quality-based effluent limits are:

MDL = 567.6 X 6.56 = 3718 µg/L
AML = 567.6 X 1.93 = 1098 µg/L

The associated mass based limits are derived as follows:

MDL = 3.7217 X 8.34 X 15 = 465 lbs/day
AML = 1.097 X 8.34 X 15 = 137 lbs/day

The NPDES regulations at 40 CFR 122.45(d) require permit limits for publicly owned treatment works be expressed as average monthly limits (AMLs) and average weekly limits (AWLs) unless impracticable. Region 10 considers it impracticable to incorporate weekly limits for toxic pollutants into permits because federal regulations do not prohibit a permittee from increasing their sampling events above what is required in an NPDES permit. This is significant because a permittee may collect as many samples as necessary during a week to bring the average of the data set below the average weekly effluent limit. In such cases, spikes of a pollutant, which could be harmful to aquatic life, could be masked by the increased sampling.

(2) <u>Ammonia, Outfall 001 (discharge to Boise River from October through April)</u>

A similar procedure was done for the October - April time frame and resulted in the following:

Acute criterion =1771 µg/L
Chronic criterion = 945 µg/L

WLA acute = 3478.7 µg/L
WLA chronic = 2133.9 µg/L

LTA acute = 530.6 µg/L
LTA chronic =1226.6 µg/L

From October through April the water quality-based effluent limits are:
MDL = 3479 µg/L (435 lbs/day)
AML = 1027 µg/L (129 lbs/day)

B. Mercury

The same general procedures described above are used to derive the mercury water quality-based limits. Both the acute and chronic WLAs are derived using the same mass balance equation as provided above.

The following is an example of how the mercury effluent limitations were derived.

C_d (acute) = 2.1 µg/L (expressed as dissolved)
C_d (chronic) = 0.012 µg/L (expressed as total recoverable)
$Q_{u(acute)}$ = 158.1 mgd from May - Sept; 58.6 mgd from Oct - Apr
$Q_{u(chronic)}$ = 171 mgd from May –Sept; 68.9 mgd from Oct - Apr
C_u = 0.0047 µg/L
Qe = 15 mgd
$Ce_{(acute)} = WLA_{(acute)}$
$Ce_{(chronic)} = WLA_{(chronic)}$
MZ (acute) = 0
MZ(chronic) = 0

$$C_e = WLA = \frac{C_d\,(Q_u \times MZ) + C_d Q_e}{Q_e} - \frac{(C_u \times (Q_u \times MZ))}{Q_e}$$

When no mixing zone is authorized the equation applies year round and is:

$C_e = WLA = C_d$

WLA_{acute} = 2.1 µg/L X 1 (translator) = 2.1 µg/L (total recoverable)

$WLA_{chronic}$= 0.012 µg/L (total recoverable)

The next step is to compute the "long term average" (LTA) concentrations which will be protective of the WLAs. This is done using the following equations from Section 5.4 of the TSD:

$LTA_a = WLA_a \times \exp(0.5\sigma^2 - z\sigma)$
$LTA_c = WLA_c \times \exp(0.5\sigma_4^2 - z\sigma_4)$
where,

$\sigma^2 = \ln(CV^2 + 1)$
$\sigma = (\sigma^2)^{1/2}$

$\sigma_4^2 = \ln(CV^2/4 + 1)$
$\sigma_4 = (\sigma_4^2)^{1/2}$

z = 2.326 for 99th percentile probability basis

For Mercury,

$CV = 0.6$

$\sigma^2 = \ln(0.6^2 + 1) = 0.307$

$\sigma = \sqrt{\sigma^2} = 0.554$

$\sigma_4^2 = \ln(0.6^2/4 + 1) = 0.086$

$\sigma_4 = \sqrt{\sigma_4^2} = 0.293$

$z = 2.326$ for 99th percentile probability basis

Therefore,

$LTA_a = 0.674$ µg/L

$LTA_c = 0.006$ µg/L

The acute and chronic LTAs are compared and the more stringent is used to develop the daily maximum (MDL) and average monthly (AML) permit limits as shown below. The chronic LTA of 0.006 µg/L is more stringent.

Derive the maximum daily and average monthly effluent limits

Using the equations in Section 5.4 of the TSD, the MDL and AML effluent limits are calculated as follows:

$MDL = LTA \times \exp(z_m \sigma - 0.5 \sigma^2)$

$AML = LTA \times \exp(z_a \sigma_n - 0.5 \sigma_n^2)$

where,

$\sigma^2 = \ln(CV^2 + 1)$

$\sigma = (\sigma^2)^{1/2}$

$\sigma_n^2 = \ln(CV^2/n + 1)$

$\sigma_n = \sqrt{\sigma_n^2}$

$z_a = 1.645$ for 95th percentile probability basis

$z_m = 2.326$ for 99th percentile probability basis

n = number of sampling events required per month = 4

$CV = 0.6$

The water quality-based effluent limits are:

MDL = 0.006 X 3.11 = 0.019 µg/L

AML = 0.006 X 1.38 = 0.009 µg/L

The associated mass based limits are derived as follows:

MDL = (0.019 ÷ 1000) X 8.34 X 15 = 0.002 lbs/day

AML = (0.009 ÷1000) X 8.34 X 15 = 0.001 lbs/day

III. Derivation of Water Quality-Based Effluent Limitations for pH

The Idaho water quality standards at IDAPA 58.01.02.250.01.a, require pH values of the river to be within the range of 6.5 to 9.0 standard units. Water quality-based effluent limits for pH were derived using the procedures in the EPA's DESCON program (*Guidance on Supplementary Stream Design Conditions for Steady State Modeling*, U.S.E.P.A. Office of Water, 1988). The Table below provides the information input into the model:

TABLE D-1: Inputs Into pH Model

	May- September	**October - April**
Upstream flow (25% of 7Q10 in cfs)	66.1	26.6
Upstream temperature (95th percentile in °C)	18.5	13.7
Upstream alkalinity (5th percentile in mg/L)	26.3	39.8
Upstream pH (95th percentile in standard units)	8.5	8.5
Effluent flow (maximum in cfs)	23.2	23.2
Effluent temperature ((95th percentile in °C)	24	22
Effluent alkalinity (mg/L)	50-136	50-136

Notes:

1. Upstream temperature data was collected from January 2001 – September 2009
2. Upstream alkalinity (Veterans Monitoring Station) shows seasonal variation so the data set was divided into the May – September and October – April time frames. Data was collected from January 2001 – October 2007.
3. Upstream pH does not vary by season therefore the entire data set was used to develop the 95th percentile of the data set. Data was collected from January 2003 – July 2009.
4. Effluent temperature does vary slightly between the May – September time frame and the October - April time frame. Daily temperature data was collected from August 1, 2004 through July 31, 2009.
5. Effluent alkalinity does not vary by season. Data was collected from January 2001 to April 2008.

The analysis found that the minimum allowable pH value that the effluent must discharge at 6.4 standard units year round in order to ensure that downstream water quality standards will be met. The following table is a printout of the results of the model.

Table D-2 – Results of pH model

	May-Sept	May-Sept	Oct-Apr	Oct-Apr
1. UPSTREAM CHARACTERISTICS				
Upstream Discharge (cfs)	66.40	66.40	26.60	26.60
Upstream Temperature (deg C)	18.50	18.50	13.70	13.70
Upstream pH	8.50	8.50	8.50	8.50
Upstream Alkalinity (mg CaCO3/L)	26.30	26.30	39.80	39.80
2. EFFLUENT CHARACTERISTICS				
Effluent Discharge (cfs)	66.4	66.4	26.6	26.6
Effluent Temperature (deg C)	24.00	24.00	22.00	22.00
Allowable Effluent pH .	**6.40**	**6.30**	**6.40**	**6.20**
Effluent Alkalinity (mg CaCO3/L)	136.00	50.00	136.00	50.00
OUTPUT * * * *	*	*	*	*
1. IONIZATION CONSTANTS				
Upstream pKa	6.39	6.39	6.43	6.43
Effluent pKa	6.36	6.36	6.37	6.37
2. IONIZATION FRACTIONS				
Upstream Ionization Fraction	0.99	0.99	0.99	0.99
Effluent Ionization Fraction	0.53	0.47	0.52	0.40
3. TOTAL INORGANIC CARBON				
Upstream Total Inorganic Carbon (mg CaCO3/L)	26.51	26.51	40.14	40.14
Effluent Total Inorganic Carbon (mg CaCO3/L)	258.87	106.87	262.48	123.70
4. DOWNSTREAM MIXED FLOW CONDITIONS				
Mixture Temperature (deg C)	21.25	21.25	17.85	17.85
Mixture Alkalinity (mg CaCO3/L)	81.15	38.15	87.90	44.90
Mixture Total Inorganic Carbon (mg CaCO3/L)	142.69	66.69	151.31	81.92
Mixture pKa	6.37	6.37	6.40	6.40
pH of Mixture	6.5	6.5	6.5	6.5

IV. Derivation of Water Quality-Based Effluent Limitations for Total Phosphorus

As discussed in Appendix B, in some cases a mixing zone cannot be authorized, either because the receiving water is already at, or exceeds, the criterion or the receiving water flow is too low to provide dilution. In such cases, the criterion becomes the wasteload allocation. Establishing the criterion as the wasteload allocation ensures that the effluent discharge will not contribute to an exceedance of the criteria. The water quality-based effluent limits for total phosphorus were derived using this method because the Boise River, from just below the Lander Street facility to the mouth of the Boise River, significantly exceeds the total phosphorus criterion of 70 µg/L (see Part II of Appendix C for a summary of the total phosphorus data along the Boise River).

The NPDES regulations at 40 CFR 122.45(d)(2) require that effluent limitations for continuous discharges from POTWs be expressed as average monthly and average weekly limits unless impracticable. The EPA has set the average monthly limit (AML) equal to the 70 µg/L wasteload allocation. This means the effluent concentration of total phosphorus could be greater than 70 µg/L for short periods of time within a calendar month, but such excursions will be of such a short duration and small magnitude that they will be negligible in terms of their effect on phosphorus concentrations in the main stem Boise River.

The purpose of a water quality-based effluent limit is to require the permittee to achieve a long term average level of performance that will ensure a low probability of exceeding the wasteload allocation. Since effluents are not constant, the average weekly discharge limitation is numerically greater than the average monthly discharge limitation. The EPA has calculated an average weekly limit (AWL) of 93.1 µg/L by using the procedures described in Chapter 5.5.1 of the EPA's TSD.

The AWL is calculated using the following relationship:

$$\frac{AWL}{AML} = \frac{\exp[Z_m \sigma - .5\sigma^2]}{\exp[Z_a \sigma_n - .5\sigma_n^2]}$$

CV = 0.2 (CV of total phosphorus data collected at the Lander Street facility from May through September from 2001 -2009)

n = 4

σ_n^2 = $\ln(CV^2/n + 1) = \ln(0.2^2/4 + 1) = 0.01$

σ^2 = $\ln(CV^2 + 1) = \ln(0.2^2 + 1) = 0.039$

Z_m = percentile exceedance probability for AWL (99%) = 2.326

Z_a = percentile exceedance probability for AML (95%) = 1.645

AWL = 1.33 X 70 µg/L = 93.1 µg/L

The federal regulation 40 CFR 122.45(f) requires that effluent limits be expressed in terms of mass and allows limits to be expressed in terms of other units of measurements in addition to mass. Therefore the permit contains both mass and concentration limits and the permittee is required to comply with both the mass and concentration limits. Mass limits were calculated from the concentration limits based on the maximum month design flow of the facility, consistent with 40 CFR 122.45(b)(1). The AML mass load is 8.7 lbs/day and the AWL mass load is 11.6 lbs/day.

The effluent limits are applicable during from May through September.

V. Derivation of Water Quality-Based Effluent Limitations for Temperature

A. Wasteload allocations

Wasteload allocations (WLAs) for temperature are calculated using the same mass balance equations used to calculate the concentration of the pollutant at the edge of the mixing zone.

$C_d Q_d = C_e Q_e + C_u Q_u$ where,

C_d = water quality criterion
C_e = WLA
C_u = Maximum measured receiving water temperature upstream (the 95th percentile of the data set is used)
Q_d = Receiving water flow rate downstream of the effluent discharge = $Q_e + Q_u$
Q_e = Effluent flow rate (set equal to the highest discharge from facility)
Q_u = Receiving water low flow rate upstream of the discharge

To calculate a wasteload allocation (*i.e.*, C_e), C_d is set equal to the criterion and the equation is solved for C_e. If mixing zones are allowed, the equation becomes:

$$C_e = WLA = \frac{C_d\,(Q_u \times MZ) + C_d Q_e}{Q_e} - \frac{(C_u \times (Q_u \times MZ))}{Q_e}$$

When no mixing zone is authorized then the equation becomes:

$C_e = WLA = C_d$

Because temperature is not a toxicant, EPA believes that applying the WLA directly as the effluent limit is appropriate.

B. Induced Variation

In addition to Idaho's numeric criteria for the protection of aquatic life, the Idaho's water quality standards state that the induced temperature variation in the receiving water, caused by a wastewater treatment facility, must not be greater than 1 °C. The downstream average daily temperature is calculated as follows:

$$C_d = \frac{(C_e \text{ X } Q_e) + (C_u \text{ X } (Q_u \text{ X } \%MZ))}{Q_e + (Q_u \text{ X } \%MZ)}$$

C_d = downstream average daily temperature
C_e = maximum allowable effluent temperature (i.e., proposed effluent limitation)
Q_e = maximum effluent flow = 15 mgd
C_u = upstream daily average temperature (95th percentile)
Q_u = upstream flow = Oct – April: 68.9 mgd (7Q10 flow); May - Sept: 171 mgd (7Q10 flow)
MZ = mixing zone

To calculate the induced variation the upstream average daily temperature is subtracted from the average daily temperature downstream of the facility. This value must be less than or equal to 1°C (i.e., $C_d - C_u \leq 1°$ C)

If the induced variation is greater than 1°C, then the daily average temperature limit is calculated as follows:

C_d = criterion (i.e., allowable temperature increase)= 1° C + C_u

$$C_d \text{ X } Q_d = (C_e \text{ X } Q_e) + (C_u \text{ X } (Q_u)$$

$$C_e = \frac{(C_d \text{ X } (Q_d) - (C_u \text{ X } (Q_u)}{Q_e}$$

$$C_e = \frac{((1 + C_u) \text{ X } Q_d)) - (C_u \text{ X } (Q_u)}{Q_e}$$

NOTE: $Q_d = Q_u + Q_e$

C. Effluent Limit Calculation based on Aquatic Life Criteria

The following presents the effluent limit calculations based on the numeric salmonid spawning criteria and the numeric cold water biota criteria. The example is for the December-February time period. Following this example is a table which provides a summary of the calculations for each of the time periods.

(1) Aquatic Life Criteria, average monthly limit

$$C_e = \text{WLA} = \frac{C_d (Q_u \times MZ) + C_d Q_e}{Q_e} - \frac{(C_u \times (Q_u \times MZ))}{Q_e}$$

C_d = water quality criterion = 9 °C
C_e = WLA
C_u = Maximum ambient daily average temperature measured upstream of facility = 7.9 °C
Q_d = Receiving water flow rate downstream of the effluent discharge = Qe + Qu
Q_e = Effluent flow rate (set equal to the highest discharge from facility) = 15 mgd
Q_u = Receiving water low flow rate upstream of the discharge = 68.9 mgd
MZ = 25%

$$C_e = \text{WLA} = \frac{9 (68.9 \times 0.25) + (9 \text{ X } 15)}{15} - \frac{(7.9 \times (68.9 \times 0.25))}{15}$$

C_e = WLA = 12.8 °C

(2) Aquatic Life Criteria, Maximum Daily Limit

C_d = 13 °C
C_e = WLA
Cu = 6.5 °C
Q_d = Qe + Qu
Q_e = 15 mgd
Q_u = 68.9 mgd
MZ = 25%

$$C_e = WLA = \frac{13(68.9 \times 0.25) + (13 X 15)}{15} - \frac{(6.5 \times (68.9 \times 0.25))}{15}$$

C_e = WLA= 20.5 °C

Table D 3 - Summary of Effluent Limitation Calculation Based on Aquatic Life Criteria

Time Frame	Limitation	Cd	Qu	Mixing Zone	Qe	Cu	Ce
December –February Salmonid Spawning	Avg Daily	9 °C	68.9 mgd	25 %	15 mgd	5.7 °C	12.8 °C
	Instantaneous Max	13 °C	68.9 mgd	25 %	15 mgd	6.5 °C	20.5 °C
March – April 30 Salmonid Spawning	Avg Daily	9 °C	68.9 mgd	0 %	15 mgd	10.6 °C	9.0 °C
	Instantaneous Max	13 °C	68.9 mgd	0 %	15 mgd	12.8 °C	13.0 °C
May 1- May 31 Salmonid Spawning	Avg Daily	9 °C	171 mgd	0 %	15 mgd	10.6 °C	9.0 °C
	Instantaneous Max	13 °C	171 mgd	0 %	15 mgd	12.8 °C	13.0 °C
June 1 – July 15 Salmonid Spawning	Avg Daily	9 °C	171 mgd	0 %	15 mgd	18.5 °C	9.0 °C
	Instantaneous Max	13 °C	171 mgd	0 %	15 mgd	20.5 °C	13.0 °C
July l6 – September 30 Cold Water Biota	Avg Daily	19 °C	171 mgd	0 %	15 mgd	18.8 °C	19
	Instantaneous Max	22 °C	171 mgd	0 %	15 mgd	21.0 °C	22
October 1 – October 31 Salmonid Spawning	Avg Daily	9 °C	68.9 mgd	0 %	15 mgd	18.5 °C	9.0 °C
	Instantaneous Max	13 °C	68.9 mgd	0 %	15 mgd	20.5 °C	13.0 °C
November 1 – November 30	Avg Daily	9 °C	68.9 mgd	0 %	15 mgd	10.9 °C	9.0 °C
	Instantaneous Max	13 °C	68.9 mgd	0 %	15 mgd	11.6 °C	13.0 °C

NOTES: The equation used in the above table is:

$$C_e = WLA = \frac{C_d\,(Q_u \times MZ) + C_d Q_e}{Q_e} - \frac{(C_u \times (Q_u \times MZ))}{Q_e}$$

where,

C_d = water quality criterion

C_e = WLA = effluent limitation

Cu = Maximum measured receiving water upstream concentration (the 95th percentile of the data set is used)

Q_d = Receiving water flow rate downstream of the effluent discharge = Qe + Qu

Q_e = Effluent flow rate (set equal to the highest discharge from facility)

Q_u = Receiving water low flow rate upstream of the discharge

D. Effluent Limit Calculation based on Allowable Induced Variation Criterion

The following presents the effluent limit calculations based on the allowable induced temperature variation criterion (i.e., 1 °C). These calculations determine if the temperature limitations established in Table D 3 are sufficient to ensure that the temperature of the downstream water will not increase by more than 1 °C.

As seen in Table D 3, with the exception of the December to February time frame, the effluent limits are lower than or very close to the receiving water temperature, therefore, the effluent will not cause or contribute to a 1 °C increase in receiving water temperature downstream of the facility.

The December-February time period will be analyzed to determine if there is reasonable potential for the proposed effluent limits to cause an increase in the temperature of the receiving water (downstream of the facility).

(1) Determine if the proposed daily average temperature limit will cause greater than 1 °C temperature increase downstream

$$C_d = \frac{(C_e \text{ X } Q_e) + (C_u \text{ X } (Q_u \text{ X } \%MZ))}{Q_e + (Q_u \text{ X } \%MZ)}$$

C_d = downstream average daily temperature
C_e = daily average effluent temperature = 12.8 °C
Q_e = maximum effluent flow = 15 mgd
C_u = upstream daily average temperature (95^{th} percentile) = 5.7 °C
Q_u = upstream flow = Oct – April: 68.9 mgd (7Q10 flow)
MZ = 25%

$$C_d = \frac{(12.8 \text{ X } 15) + (5.7\text{X } (68.9 \text{ X } 0.25))}{15 + (68.9 \text{ X } 0.25)} = 9.0\ °C$$

9.0 – 5.7 = 3.3 °C

The temperature increase of 3.3 °C is greater than the States allowable increase of 1 °C, therefore, an effluent limit will need to be derived does not cause an increase of more than 1 °C downstream. C_e, the effluent limit, is calculated as follows:

$$C_e = \frac{((1 + C_u) \text{ X } ((Q_u \text{ X } 0.25) + Q_e)) - (C_u \text{ X } (Q_u \text{ X } 0.25)}{Q_e}$$

$$C_e = \frac{((1+ 5.7) \text{ X } ((68.9 \text{ X } 0.25) + 15)) – (5.7 \text{ X } (68.9\ 0.25))}{15} = 7.8\ °C$$

E. Summary of Proposed Effluent Limitations for Temperature

The table below presents the proposed effluent limitations for temperature. The average daily temperature limit is the more stringent of the limitations calculated based on the aquatic life criteria, or the limit based on the allowable induced temperature increase (in this case the average daily temperature from December – February is based on the allowable induced temperature increase).

Table D-4 – Proposed Effluent Limitations for Temperature

Date	Average Daily Limit	Instantaneous Maximum Limit
December 1 – February 29	7.8 °C	20.5 °C
March 1 – July 15	9.0 °C	13.0 °C
July 16 – September 30	20.4 °C	26.3 °C
October 1 – November 30	9.0 °C	13.0 °C

F. Proposed Changes to Water Quality Standards

As stated previously, the IDEQ has submitted to the EPA revised salmonid spawning temperature criteria for the Boise River. The State has adopted the following revisions:

Salmonid Spawning:	Maximum Weekly Maximum Temperature[1] of 13°C This criterion is applicable from November 1 – May 31
Cold Water Aquatic Life:	Daily Average = 19°C; Max Daily = 22°C This criterion applies from June 1 – October 30.
Point Source Thermal Requirement:	Wastewater must not affect the receiving water outside the mixing zone so that (1) the temperature of the receiving water or of downstream waters will interfere with designated beneficial uses, and, (2) daily and seasonal temperature cycles characteristics of the water body are maintained.

This change in the water quality standards would result in a different set of temperature limitations in the permit. Table D-5 presents a summary of the effluent limit calculations, and Table D-6 presents the proposed temperature limits that would be applicable and will be incorporated into the final permit if the new water quality standards are approved by EPA prior to issuance of the final permit.

[1] The Maximum Weekly Maximum Temperature (MWMT) is the 7-day average of the maximum recorded temperature on each day. For example, the MWMT of May 15 is calculated by averaging the highest temperature recorded on each day from May 9 through May 15.

Table D 5 - Summary of Effluent Limitation Calculation Based on Revised Aquatic Life Temperature Criteria

Time Frame	Metric	Cd	Qu	Mixing Zone	Qe	Cu	Ce
November 1 – April 30 Salmonid Spawning	MWMT	13 °C	68.9 mgd	50 %	15 mgd	11.8 °C	15.8 °C
May Salmonid Spawning	MWMT	13 °C	171 mgd	25 %	15 mgd	11.8°C	16.4 °C
July l6 – September 30 Cold Water Biota	Avg Daily	19 °C	171 mgd	0 %	15 mgd	18.8 °C	19.0
	Instantaneous Max	22 °C	171 mgd	0 %	15 mgd	20.9 °C	22.0
October Cold Water Biota	Avg Daily	19 °C	68.9 mgd	25 %	15 mgd	16.2 °C	22.2
	Instantaneous Max	22 °C	68.9 mgd	25 %	15 mgd	17.4 °C	27.3

NOTES: The equation used in the above table is:

$$C_e = WLA = \frac{C_d\,(Q_u \times MZ) + C_d Q_e}{Q_e} - \frac{(C_u \times (Q_u \times MZ))}{Q_e}$$

where,

C_d = water quality criterion

C_e = WLA = effluent limitation

C_u = Represented by 95th percentile of the temperature data set when calculating limits from July 16 – September 30 and October; and the 95 percentile of the MWMT data set for all other time periods.

Q_d = Receiving water flow rate downstream of the effluent discharge = Qe + Qu

Q_e = Effluent flow rate (set equal to the highest discharge from facility)

Q_u = Receiving water low flow rate upstream of the discharge; 7Q10 flows were used. From October-April the 7Q10 is 68.9 mgd, and from May through September the 7Q10 is 171 mgd.

Table D-6 – Proposed Effluent Limitations for Temperature

Date	MWMT	Average Daily Limit	Instantaneous Maximum Limit
November 1 – April 30	15.8 °C	NA	NA
May	16.4 °C	NA	NA
June 1 – July 15	NA	NA	NA
July 16 – September 30	NA	19.0°C	22.0 °C
October 1 – October 31	NA	22.2°C	27.3°C

Note: The MWMT is the average of the maximum temperature collected over 7 days. The MWMT for March 1 would be the average of the maximum daily temperatures based on the maximum temperature measured on March 1 and the preceding six days (i.e., February 23, 24, 25, 26, 27, 28 and March 1.

VI. Derivation of Water Quality-Based Effluent Limitations for Dissolved Oxygen

1. The result of the reasonable potential analysis found that the effluent had the reasonable potential to cause or contribute to an exceedance of the dissolved oxygen criterion from October 1 through July 15. The effluent limit is derived as follows:

The WLA for dissolved oxygen is calculated using the following mass balance equation:

$C_dQ_d = C_eQ_e + C_uQ_u$ where,

C_d = water quality criterion
C_e = WLA = effluent limit
C_u = Minimum measured receiving water concentration upstream (the 5th percentile of the data set is used) = 9.3 mg/L
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 facility) = 15 mgd
Q_u = Receiving water low flow rate upstream of the discharge
Oct-April = 68.9 mgd
May-July 15 = 171 mgd
MZ = mixing zone = 25% (0.25)

To calculate the WLA (*i.e.*, C_e), C_d is set equal to the criterion (7.9 mg/L) and the equation is solved for C_e. If mixing zones are allowed, the equation becomes:

$$C_e = WLA = \frac{C_d\,(C_u \times MZ) + C_dQ_e}{Q_e} - \frac{(C_u \times (Q_u \times MZ))}{Q_e}$$

October-April

$$C_e = WLA = \frac{7.9(68.9 \times 0.25) + (7.9\ X\ 15)}{15} - \frac{(9.3 \times (68.9 \times 0.25))}{15} = 6.3\ mg/L$$

May-July 15

$$C_e = WLA = \frac{7.9\ (171 \times 0.25) + (7.9\ X\ 15)}{15} - \frac{(9.3 \times (171 \times 0.25))}{15} = 3.9\ mg/L$$

2. On July 22, 2011, the submitted its revised salmonid spawning temperature criterion to EPA for review. The State proposed to change the temperature criterion to 13° C as a 7 day average of the daily maximum temperatures (MWMT). If this occurs, the 75% D.O. saturation criterion would be 7.2 mg/L. If the proposed revisions become effective (i.e., approved by EPA) prior to issuance of the final permit then D.O. limits are only required from October through April. The effluent limits would be as follows:

October

$$C_e = WLA = \frac{6.0(68.9 \times 0.25) + (6.0 \text{ X } 15)}{15} - \frac{(8.7 \times (68.9 \times 0.25))}{15} = 3.0 \text{ mg/L}$$

November-April

$$C_e = WLA = \frac{7.2(68.9 \times 0.25) + (7.2 \text{ X } 15)}{15} - \frac{(10.3 \times (68.9 \times 0.25))}{15} = 3.6 \text{ mg/L}$$

APPENDIX E

Summary of Effluent Data for Metals, Cyanide, and Ammonia

Note: All metal effluent samples are expressed as the total recoverable form of the metal.
All sample results are in micrograms per liter.

Parameter	Min	Max	Average	Stddev	CV	Count	Comments
Arsenic	2.9	6.1	4.17	0.66	0.16	144	Samples were collected from 3/7/01 - 7/15/09
Cadmium	<0.02	0.04	0.05	0.08	1.6	149	Samples were collected from Jan 10, 2001 - Jul 15, 2009. Four samples had
							detectable amounts of Cd: Jan 10, 2001 (1 µg/L) ; Oct 10, 2002 (0.04 µg/L),
							and February 5, 2003 (0.48 µg/L), Oct 9, 2003 (0.02 µg/L)
							21 samples were non detect where the sampling detection level was 0.5 µg/L;
							14 samples were non detect where the sampling detection level was 0.04 µg/L;
							11 samples were non-detect where the sampling detection level was 0.06 µg/L;
							102 samples were non-detects where the sample detection level was 0.02 µg/L.
							Each non-detect was set at a value equal to 1/2 of the detection level in
							order to calculate the average, std deviation, and CV.
							The concentrations from Jan 10, 2001 and Feb 15, 2003 were not used
							to calculate the average, std deviation, CV, or in the RP calculation since the
							cadmium concentrations since Feb 5, 2003 were all
							less than 0.04 µg/L.
Chromium	ND (<0.5)	1.6	0.6	0.4	0.7	142	Samples collected from 3/7/01 - 7/15/09. 45 of the samples were non detect
							where the sampling detection level was 0.5 µg/L. 22 of the samples were
							non detect where the sample detection level was 1.0 µg/L.
							Each of the non detects was set equal to 1/2 of the detection
							level in order to calculate the average, std dev, and CV
							for non detects of 1.0 µg/L a value of 0.5 µg/L was assigned,
							for non-detects of 0.5 µg/L a value of 0.25 µg/L was assigned
Copper	3.9	15.8	8.75	2.02	0.2	159	Samples were collected from 1/10/01 - 7/15/09.

Parameter	Min	Max	Average	Stddev	CV	Count	Comments
Lead	0.29	1.7	0.6	0.22	0.4	158	Samples were collected from 1/10/01 - 7/15/09
							The highest sample observed was 4.2 µg/L on Feb 3, 2003.
							Since that date, an additional 115 samples were taken and the highest
							observed value in the 115 samples was 1.1 µg/L. Since the effluent
							concentration has been very consistent after February 3, 2003, the 4.2 µg/L
							result is not being used to calculate the average, std deviation, CV or in the
							RP calculation, instead the next highest value of 1.7 µg/L will be used.
Mercury	<0.002	0.0169	0.004	0.0026	0.6	76	Samples that were collected from 3/7/01 - 12/8/04 had a detect level of 0.2
							µg/L . which is an extremely high detection level for Hg. All samples were non
							detect. The facility used a more sensitive test method when it became
							available, and from 1/5/05 - 7/15/09 used a method with a detection level
							of 0.002 µg/L. There were only 2 non-detects since 1/5/05.
							Only data from 1/5/05-7/15/09 was used for statistics and RP because it
							is representative of the mercury concentrations in the effluent.
Nickel	1.6	4.7	2	0.5	0.2	132	Samples collected from 3/7/01-7/15/09; 13 of the samples were non detect
							where the sample detection level was 2.0 µg/L. The non detects were
							assigned a value of 1.0 in order to determine the average, std deviation, and
							CV.
Selenium	0.27	1.7	0.86	0.2	0.2	129	Samples collected from 2/5/02-7/15/09. 5 samples collected from 2/5/02 to
							4/5/02 had a sample detection level of 5.0. One of the samples detected Se
							at 5. Since 4/5/02 129 samples were collected and the highest observed value
							was 1.7. Since 4/4/02 the Se in the effluent has been consistently low,
							therefore, only the data collected since May 8, 2002 will be used in calculating
							the average, std deviation, CV, and RP calculation.
Silver	<0.02	0.51	0.14	0.11	0.8	94	Samples collected from 3/7/01 - 7/15/09. 12 of the samples were non detect
							where the sample detection level was 0.5, and 18 of the samples were non
							detect where the sample detection level was 0.02.
							Each of the non detects was set equal to 1/2 of the detection
							level in order to calculate the average, std dev, and CV

Parameter	Min	Max	Average	Stddev	CV	Count	Comments
Zinc	42.1	76.4	55.6	5.86	0.1	143	Samples were collected from 3/7/01 - 7/15/09
Cyanide	<5.0	<5.0	<5.0	NA	NA	48	Samples were collected from Apr 18, 2001 to Oct 9, 2009; 57 samples were
							collected. All of the samples were non detect where the sample detection
							level is 5 except for the last 9 sample events. Each of the last 9 samples had
							detectable amounts of cyanide. However, the City provided
							sufficient information to the EPA to show that the results in the last
							nine samples were due to laboratory error, therefore these 9
							samples will not be used.
Ammonia	< 20	5400	450	648	1.4	457	Samples were collected from January 3, 2001 to July 29, 2009. Only one
							sample was below the sample detection level of 20.

APPENDIX F
Concentration of Metals, Cyanide and Ammonia in the Boise River at Veterans Monitoring Station

All sample results are in micrograms/Liter

Parameter	Background Concentration	Comments
Arsenic	3.6	100 samples were collected from Mar 6, 2001 - Jul 14, 2009.
(total recoverable)		The 95th percentile of the samples was used to represent background concentration.
Cadmium	0.1	100 samples were collected from March 6, 2001 - Jul 14, 2009.
(dissolved)		5 samples were non detect where the sample detection level was 0.5 µg/L. These results
		were not used in determining the background because the detection level was so high.
		1 sample was detected at 0.11 µg/L.
		5 samples were non detect where the sample detection level was 0.05 µg/L
		28 samples were non detect at 0.12 µg/L
		61 samples were non-detect at 0.2 µg/L
		Each of the non-detects was set at a value equal to 1/2 of the detection level. Then the 95th
		percentile of this data set was used to represent the background concentration
Chromium	0.25	98 samples were collected from March 6, 2001 - Jul 14, 2009.
(dissolved)		One sample was detected (0.9), and all other samples were non-detect where the
		sample detection level was 0.5 µg/L.
		Each of the non-detects was set at a value equal to 1/2 of the detection level. Then the 95th
		percentile of this data set was used to represent the background concentration.
Copper	0.5	114 samples were collected from Jan 9, 2001 - Jul 14, 2009. 6 samples were non-detect
(dissolved)		where the sample detection level was 1.0 µg/L; 12 samples were non-detect where the
		sample detection level was 1.1 µg/L; and 1 sample was non detect where the sample
		detection level was 0.2 µg/L, all other samples were detects.
		Each of the non-detects was set at a value equal to 1/2 of the detection level. Then the 95th
		percentile of this data set was used to represent the background concentration.

Parameter	Background Concentration	Comments
Lead	0.3	110 samples collected from Jan. 9, 2001 - Jul 14, 2009. One sample was detected at 0.23 µg/L.
(dissolved)		21 samples were non detect where the sample detection level was 0.6 µg/L.
		27 samples were non detect where the sample detection level was 0.19 µg/L
		61 samples were non detect where the sample detection level was at 0.2 µg/L
		Each of the non-detects was set at a value equal to 1/2 of the detection level. Then the 95th
		percentile of this data set was used to represent the background concentration.
Mercury	0.0046	Only data collected after Jan 4, 2005 was used because data collected prior to that date
(total recoverable)		had a very high detection level. 55 samples were collected, and 26 of the samples were
		non-detect where the sample detection level was 0.002 µg/L.
		Each of the non-detects was set at a value equal to 1/2 of the detection level. Then the 95th
		percentile of this data set was used to represent the background.
Nickel	0.5	94 samples were collected from March 6, 2001 –July 14, 2009.
(dissolved)		5 samples collected from March 6, 2001- March 5, 2002 were non-detect where the
		sample detection level was 2.0 µg/L. These results were not used because the detection level
		was so high.
		6 of the samples were non-detect where the sample detection level was 0.6 µg/L.
		Each of the non-detects was set at a value equal to 1/2 of the detection level. Then the 95th
		percentile of this data set was used to represent the background.
Selenium	0.19	46 samples were collected from Jun 4, 2002-Jun 2, 2009.
(total recoverable)		25 samples were non detect where the sample detection level was 0.11 µg/L
		1 sample was non detect where the sample detection level was 0.14 µg/L
		1 sample was non detect where the sample detection level was 0.17 µg/L
		10 samples were non detect where the sample detection level was 0.16 µg/L
		Each of the non-detects was set at a value equal to 1/2 of the detection level. Then the 95th
		percentile of this data set was used to represent the background.

Parameter	Background Concentration	Comments
Silver	0.06	88 samples were collected from June 4, 2002 to July 14, 2009.
(dissolved)		28 samples were non-detect at 0.03 µg/L
		51 samples were non-detect at 0.1 µg/L
		9 samples were non-detect at 0.13 µg/L
		Each of the non-detects was set at a value equal to 1/2 of the detection level. Then the 95th
		percentile of this data set was used to represent the background.
Zinc	2.5	98 samples were collected from March 6, 2001 to July 14, 2009
(dissolved)		34 samples were non detect at 5.0 µg/L
		33 samples were non detect at 1.0 µg/L
		16 samples were non detect at 3.0 µg/L
		12 samples were non detect at 2.0 µg/L
		Each of the non-detects was set at a value equal to 1/2 of the detection level. Then the 95th
		percentile of this data set was used to represent the background.
Cyanide	0	No data was collected, use zero as background.
Ammonia	22.5	447 samples were collected from Jan 2, 2001 to Jul 28, 2009; only 7 samples were detected.
(Total)		Each of the non-detects was set at a value equal to 1/2 of the detection level. Then the 95th
		percentile of this data set was used to represent the background.

APPENDIX G

DRAFT 401 WATER QUALITY CERTIFICATION

Idaho Department of Environmental Quality

DRAFT §401 Water Quality Certification

October 3, 2011

NPDES Permit Number(s): ID-0020443, Lander Street Wastewater Treatment Facility, City of Boise,

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Pursuant to the provisions of Section 401(a) (1) of the Federal Water Pollution Control Act (Clean Water Act), as amended, 33 USC Section 1341 (a) (1), and Idaho Code §§ 39-101 et. seq., and 39-3601 et. seq., the Idaho Department of Environmental Quality (DEQ) has authority to review National Pollutant Discharge Elimination System (NDPES) permits and issue water quality certification decisions.

Based upon its review of the above-referenced permit and associated fact sheet, DEQ certifies that if the permittee complies with the terms and conditions imposed by the permit along with the conditions set forth in this water quality certification, then there is reasonable assurance the discharge will comply with the applicable requirements of Sections 301, 302, 303, 306, and 307 of the Clean Water Act, including the Idaho Water Quality Standards (WQS) (IDAPA 58.01.02) and other appropriate water quality requirements of State law.

This certification does not constitute authorization of the permitted activities by any other state or federal agency or private person or entity. This certification does not excuse the permit holder from the obligation to obtain any other necessary approvals, authorizations or permits.

CONDITIONS THAT ARE NECESSARY TO ASSURE COMPLIANCE WITH WATER QUALITY STANDARDS OR OTHER APPROPRIATE WATER QUALITY REQUIREMENTS OF STATE LAW

Surface Water Monitoring Requirements

In order to determine the effect of the Lander Street WWTF effluent with regard to WQS 58.01.02.250.02.b, upstream and downstream water temperature must be collected continuously at no less than hourly intervals. Determining compliance with Idaho WQS requires more than a single instantaneous recorded measurement once each week. The city of Boise is presently collecting continuous water temperature data at several locations and this requirement is included in EPA's factsheet of April 21, 2011 on page 22, Table 6.

ALTERNATIVE LIMITATIONS

The following subsection(s) discuss how the permit can be made less stringent and still comply with Idaho WQS.

Mercury Limits

The draft permit contains effluent limits for mercury contained in Table 2 and mercury effluent monitoring requirements contained in Table 3. As explained below, DEQ's methylmercury fish tissue criteria is more stringent and more protective of aquatic life than the mercury water column criteria used by EPA to set the effluent limits and sampling requirements. Therefore, the mercury effluent limits and sampling requirements should be removed. Instead, both aquatic life and human health will be protected by the fish tissue sampling and mercury minimization plan set forth below.

Statement on relative stringency and thus protectiveness of Idaho's fish tissue criterion

Based on concurrent fish tissue and water column sampling of mercury from major rivers in Idaho (Essig 2009), fish tissue methylmercury levels at Idaho's criterion is associated with a water column Hg level much less than 12 ng/L. Specifically, regressing water total Hg on fish tissue with the 55 paired data from Essig's report, and using upper 99th percent confidence limits on both slope and intercept from that regression, shows a fish tissue methylmercury level of 0.3 mg/Kg corresponds to a water column total mercury level of 2.6 ng/L. In other words, there is only a 1% probability of water total mercury being > 2.6 ng/L when methylmercury levels in fish tissue from that water meets Idaho's tissue criterion.

This correlated level of water column total mercury of 2.6 ng/L is almost 100 times lower (more stringent) than the lowest estimated chronic toxicity value of 250 ng/L in EPA's 1995 aquatic life criteria updates. It is more than four times lower than the outdated chronic aquatic life criterion of 12 ng/L based on back calculation from the FDA action level for mercury in fish of 1.0 mg/Kg. This gives Idaho very high confidence in saying that its human health fish tissue criterion is the more stringent criterion, that human health is a more sensitive use than aquatic life for mercury, and that meeting Idaho's fish tissue criterion will be protective of aquatic life uses.

Fish Tissue Sampling

Objective: The objective of the Methylmercury Fish Tissue Monitoring program is to collect reliable methylmercury fish tissue data, within a specific geographic area, to determine if fish tissue concentrations of methylmercury are compliant with Idaho's methylmercury fish tissue criterion of 0.3 mg/kg. The monitoring program may also be used to advise the public on safe levels of fish consumption.

Applicability: The permittee may satisfy the requirements of the Methylmercury Fish Tissue Monitoring Program by arranging to participate in a cooperative effort with other entities which have NPDES permitted discharges to the Lower Boise River or tributaries to the Lower Boise River.

Requirements: The permittee must develop and submit a Methylmercury Fish Tissue Monitoring Plan to EPA and IDEQ for review and approval within one year of the effective date of the permit. At a minimum the plan must include the following elements:

- Identify all participants (e.g., City of Boise, other municipalities or industries) funding the monitoring program. The monitoring plan must be updated each time a municipality or industrial facility joins the cooperative monitoring program, and the City of Boise must provide notice to EPA and IDEQ each time a new entity becomes part of the cooperative monitoring program. Written notice must be provided to EPA and IDEQ within 30 days of a new participant joining the program.
- Monitoring stations where fish tissue samples will be collected. One monitoring station must be located in each of the following areas:
    - Upstream of River Mile 50 in the Lower Boise River,
    - An area downstream of both of the City of Boise outfalls and near the middle of the Lower Boise River,
    - Near the mouth of the Boise River,
    - Snake River upstream of the confluence of the Boise and Snake Rivers,
    - Snake River downstream of the confluence of the Boise and Snake Rivers, and
    - Within the Brownlee Reservoir.
- Identify the name and address of organization collecting and analyzing fish tissue samples. The organization must have experience or training in the collection and analysis of methylmercury fish tissue samples.
- Develop a sampling plan that specifies sample target species, sample number and size, timing of sample collection, and all essential fish collection, handling, and shipping information for field sampling teams collecting fish. The plan should include a project description, detailed standard operating procedures (SOPs) for fish collection, and instructions for completing field forms and labels and for shipping fish samples. Protocols should be consistent with Chapter 4 of *Implementation Guidance for the Idaho Mercury Water Quality Criteria* (Idaho Department of Environmental Quality, 2005).
- Identify all protocols related to sample preparation methods and analytical methods to be used on samples.
- Identify data quality goals for all sample collection and handling activities and describe the Quality Assurance/Quality Control (QA/QC) techniques employed by field teams to support those goals.

Sample Frequency: Initial sampling must occur within two years of the effective date of the permit. Following the initial sampling event, monitoring must occur at least once every two years from five of six sample locations, and yearly at the sixth location. After three sampling cycles, five of six sample locations may be sampled once every five years, depending on results of the first three cycles.

Additional Sampling: At each sample location where fish are collected a surface water sample must be collected and analyzed for total mercury using an analytical method which achieves a Minimum Level of 0.0005 µg/L.

Reporting Requirements: The permittee must submit a report which lists the participants financing the monitoring program; the name, address and phone number of the entity collecting and analyzing samples; sample locations; target species used; sample size; time samples were collected; analytical methods used; results, and any other information relevant to the monitoring program. The permittee must submit the report to EPA, IDEQ and Idaho Fish Consumption Advisory Program by March 31st of the year following sampling.

Revision to the Methylmercury Monitoring Plan: Any revisions to the Methylmercury Monitoring Plan must be approved by IDEQ and EPA.

Mercury Minimization Plan

1. The permittee must develop and implement a mercury minimization plan that identifies potential sources of mercury and the measures to reduce or eliminate mercury loading. The mercury minimization plan should include the following:

    a) A Program Plan which includes the City's commitments for:

        (i) Identification of potential sources of mercury that contribute to discharge levels;

        (ii) Reasonable, cost-effective activities to reduce or eliminate mercury loadings from identified sources;

        (iii) Tracking mercury source reduction implementation and mercury source monitoring;

        (iv) Quarterly monitoring of POTW influent and effluent; and

        (v) Resources and staffing

    b) Implementation of cost-effective control measures for direct and indirect contributors; and

    c) An annual status report submitted to the US EPA, which includes:

        (i) A list of potential mercury sources;

        (ii) A summary of actions taken to reduce or eliminate mercury discharges to progress toward meeting water quality standards;

        (iii) Mercury source reduction implementation, source monitoring results, influent and effluent, and results for the previous year; and

        (iv) Proposed adjustments to the Program Plan based on findings from the previous year.

2. The permittee must submit written notice to EPA and IDEQ that the plan has been developed and implemented within 90 days of the effective date of this permit. Any existing emergency response and public notification plan may be modified for compliance with this section.

Biosolids

The permit prohibits the use of the wastewater interceptor pipeline to transport biosolids. However, in order to accomplish the interim and final effluent reductions necessary to achieve permit compliance with TP and temperature limits, the Lander Street WWTF is anticipated to generate solids that exceed capacity. In order to properly manage this excess, it is necessary to use the South Boise Interceptor (SBI) pipeline to transport up to 90,000 gpd of biosolids to the West Boise WWTF for proper treatment. This temporary modification of waste treatment is necessary to allow for timely completion of plant modifications planned for Lander Street and West Boise WWTF's. At no time will permit limits at the West Boise WWTF be exceeded as a result of this process. This process modification is authorized from March 1, 2012 through the term of this permit.

Temperature Permit Limit

Summer thermal effluent limits may be made less stringent by application of Idaho's WQS allowing a cumulative 0.3°C increase in temperature from all sources when natural conditions are warmer than numeric criteria (IDAPA 58.01.02.200.09). Based on the City of Boise's Chapter 7 analysis of temperature, it appears to DEQ this may be the case during a portion of the warmer months of the year in the Boise River. The City, however, must complete additional work in order for DEQ to make a decision on the application of the natural background provision. The interim effluent limits for temperature are intended to be consistent with Idaho WQS.

COMPLIANCE SCHEDULE

Pursuant to IDAPA 58.01.02.400.03, DEQ may authorize compliance schedules for water quality based effluent limits that are in a permit for the first time. Lander Street WWTP cannot immediately achieve compliance with the effluent limits for total phosphorus, temperature, pH and dissolved oxygen; therefore, DEQ authorizes a compliance schedule and interim requirements as set forth below. This compliance schedule provides the permittee a reasonable amount of time to achieve the final effluent limitations as specified in the permit, while at the same time, it ensures compliance with the final effluent limitations is accomplished as soon as possible.

1. **Total Phosphorus:** The permittee must comply with the following Compliance Schedule requirements for Total Phosphorus.
    a) The interim and final limitations in Table 1 must be achieved by the dates cited.

TABLE 1: Effluent Limitation

Date	Effluent Limit Seasonal Average
May 1, 2012 through September 30, 2012	Not to exceed 7,400 μg/L Total Phosphorus
May 1, 2013 through September 30, 2013 and each year until the final effluent limit is achieved	Not to exceed 1,000 μg/L Total Phosphorus
10 years from effective date of permit	See Table 2, Part I.B of this permit

b) The permittee must complete the tasks and reports described below.

(i) By December 31, 2012 the following interim steps must be completed.

(a) Obtain IDEQ approval of preliminary and final design for total phosphorus improvements.

(b) Procure chemical dosing equipment.

(c) Procure contracting services for installation.

(d) Install and test equipment.

The IDEQ and the EPA must be notified in writing by December 31, 2012 that the above items have been completed.

(ii) Evaluate options available to achieve the final effluent limitation for total phosphorus, including, but not limited to, treatment plant upgrades, seasonal re-use of effluent, effluent trading projects, and decommissioning the Lander Street wastewater treatment facility and consolidating all operations at the West Boise wastewater treatment facility.

Starting in 2013 and continuing through 2017 the permittee must submit a Report of Progress to the IDEQ and the EPA detailing the evaluation of each available option. Reports must be submitted by December 31 of each year.

(iii) No later than December 31, 2018 the permittee must decide on the final option that will be used to achieve the final effluent limits.

(a) If the Lander Street facility is to be decommissioned the following provisions apply.

- The permittee must make a public commitment to cease operations within 6 months of achieving adequate capacity to handle all of the flows at the West Boise facility.

- Provide a proposed schedule of the steps that will be taken to decommission the facility and consolidate all operations at the West Boise facility within 6 months of making this decision.
- By December 31, 2019, the permittee will provide a Report of Progress detailing the steps taken during the year to decommission the facility, and the proposed steps to be taken in the upcoming year. Thereafter, a Report of Progress will be submitted each year until the facility is decommissioned. The reports must be submitted to the IDEQ and the EPA.
- Cease all effluent discharge at the Lander Street facility no later than 10 years from the effective date of this permit. The permittee must provide the IDEQ and the EPA notice, in writing, when the facility ceases discharge and is scheduled to be decommissioned.

(b) If the Lander Street facility is not decommissioned the following provisions apply.

- The permittee must provide a preliminary schedule of design upgrades and a preliminary construction schedule that will be used to achieve compliance with the final limits. This report should be submitted to the IDEQ and the EPA by December 31, 2018.
- Thereafter, by December 31st of each year, the permittee must provide a Report of Progress to the IDEQ and the EPA which details the progress made toward achieving the final effluent limitation, and the series of actions that will be taken in the coming year.
- No later than 10 years from the effective date of the permit, the permittee must be in compliance with the final effluent limit. The permittee must notify the IDEQ and the EPA in writing when the final effluent limit is achieved.

2. **Temperature:** The permittee must comply with the following Compliance Schedule requirements for Temperature.

   a) The following interim and final limitations must be achieved by the dates cited.

- The following Maximum Daily Average interim limits will be effective on the effective date of the permit:

January – March:	18.6 ° C
April – June:	22.9 ° C
July – September:	24.9 ° C
October – September:	23.4 ° C

- The final effluent limits listed in Part I. B. or limits based on Idaho WQS natural background provision (IDAPA 58.01.02.200.09) must be achieved no later than 10 years after the effective date of the permit.

b) The permittee must complete the tasks and reports described below.

(i) No later than December 31, 2017 complete an alternatives evaluation and identify the methods the City may use to achieve the final effluent limits. The evaluation should consider facility improvements, re-use of effluent, and possible trading mechanisms such as offsite mitigation including wetland and habitat restoration. Starting in 2013 and continuing through 2017 the permittee must submit a Report of Progress to the IDEQ and the EPA detailing the evaluation of each available option. Reports must be submitted by December 31 of each year.

If the City determines to pursue limits based on the natural background provision in the WQS, the City must, no later than December 31, 2017 complete and submit an updated natural conditions model for temperature that is reviewed and approved by EPA and DEQ.

(ii) No later than December 31, 2018 provide a preliminary schedule of design upgrades and a preliminary construction schedule that will be used to achieve compliance with the final limits. Thereafter a Report of Progress must be submitted by December 31st of each year to the IDEQ and the EPA. The report should detail the progress made toward achieving the final effluent limitation, and the series of actions that will be taken in the coming year.

(iii) No later than 10 years from the effective date of the permit, the permittee must be in compliance with the final effluent limits for temperature. The permittee must notify the IDEQ and the EPA in writing when the final effluent limit is achieved.

3. **pH:** The permittee must comply with the final effluent limits for pH in Part I.B no later than May 1, 2012. In the interim the effluent must be between 6.2 – 9.0 standard units.

The permittee must notify the IDEQ and the EPA in writing when the final effluent limit is achieved.

4. **Dissolved Oxygen:** The permittee must comply with the final effluent limits for dissolved oxygen in Part I. B no later than 8 months from the effective date of the permit. In the interim the effluent DO must not be less than 2.2 mg/L.

   The permittee must notify the IDEQ and the EPA in writing when the final effluent limit is achieved.

MIXING ZONES

Pursuant to IDAPA 58.01.02.060, DEQ authorizes the following mixing zones:

- 15% of the critical flow volumes of the Boise River for zinc year round;
- 10% mixing zone for silver year round;
- 25% mixing zone for pH year round
- 25% mixing zone for ammonia year round; and a
- 25% mixing zone for whole effluent toxicity year round.

Temperature and Dissolved Oxygen

DEQ is in the process of modifying state water quality standards to address site-specific conditions for the lower Boise River. Because it is unknown what the outcome of that process will be, DEQ is authorizing the following mixing zones based on the existing and the proposed water quality standards.

Existing Water Quality Standards:

- 25% of the critical flow volumes of the Boise River for water temperature (December); and a
- 25% mixing zone for dissolved oxygen (October 1 through July 15).

Proposed Water Quality Standards:

- 50% mixing zone for water temperature (November through April);
- 25% mixing zone for dissolved oxygen (October 1 through April 30);
- 25% mixing zone for water temperature (May 1 through July 15), and the month of October.

TEMPERATURE LIMITS

The permit contains alternative temperature limits set to achieve either Idaho's existing salmonid spawning criteria, or the proposed new site specific salmonid spawning criteria for the Boise River. DEQ certifies that there is a reasonable assurance that both sets of limits shall comply with applicable WQS.

ANTIDEGRADATION

Idaho WQS (IDAPA 58.01.02.051.01) provide that existing uses and the water quality necessary to protect the existing uses shall be maintained and protected (Tier 1 protection). In addition, where water quality exceeds levels necessary to support uses, that quality shall be maintained and protected unless the Department finds, after intergovernmental coordination and public participation, that allowing lower water quality is necessary to accommodate important economic or social development in the area in which the waters are located (Tier 2 protection).

The Lander Street WWTF discharges to the Boise River (assessment unit ID17050114SW005_06). This Boise River assessment unit (AU) has the following designated beneficial uses: cold water aquatic life; primary contact recreation; salmonid spawning, agricultural water supply, industrial water supply; wildlife habitat; and aesthetics. There is no available information indicating the presence of any existing beneficial uses aside from those that are already designated.

Idaho has established a water body-by-water body approach for identifying what level of antidegradation protection DEQ will provide when reviewing whether activities or discharges will comply with Idaho's antidegradation policy. This approach relies upon Idaho's most recent federally-approved Integrated Report (IR) of water quality status and its supporting data. The cold water aquatic life use in this Boise River AU is not fully supported due to excess sedimentation, temperature, habitat and flow alteration (DEQ, 2008 IR). The primary contact beneficial use is not fully supported due to bacteria. As such, DEQ will provide Tier 1 protection only for the aquatic life use and recreational use. (Idaho Code §39-3603(20(b)(i)).

In order to protect and maintain designated and existing beneficial uses, a permitted discharge must comply with the WQS, which contain narrative and numeric criteria. The numeric and narrative criteria are set at levels for the protection of existing and designated beneficial uses. Furthermore, a permitted discharge must comply with any applicable EPA-approved TMDLs The EPA-approved *Lower Boise TMDL* (DEQ 1999) establishes wasteload allocations for TSS, and bacteria. These allocations are designed to ensure the Boise River will achieve the quality necessary to support existing and designated aquatic life and recreational beneficial uses and comply with the applicable numeric and narrative criteria.

The effluent limitations and associated requirements contained in the Lander Street WWTF permit are set at levels that ensure compliance with the narrative and numeric criteria in the WQS as well as the wasteload allocations established in the *Lower Boise River TMDL*. Therefore, DEQ has determined the permit will ensure that existing beneficial uses and the water quality necessary to protect the existing uses shall be maintained and protected in compliance with IDAPA 58.01.02.051.01, IDAPA 58.01.02.052.05 and 40 CFR 131.12(a)(1). (Please see attached Antidegradation Review for more information).

OTHER CONDITIONS

This certification is conditioned upon the requirement that any material modification of the permit or the permitted activities, including without limitation, any modifications of the permit to reflect new or modified TMDLs, wasteload allocations, site specific criteria, variances, or other new information, shall first be provided to DEQ for review to determine compliance with Idaho WQS and to provide additional certification pursuant to §401.

RIGHT TO APPEAL FINAL CERTIFICATION

The final Section 401 Water Quality Certification may be appealed by submitting a petition to initiate a contested case, pursuant to Idaho Code § 39-107(5), and the Rules of Administrative Procedure Before the Board of Environmental Quality, IDAPA 58.01.23, within 35 days of the date of the final certification.

Questions regarding the actions taken in this certification should be directed to Pete Wagner, Boise Region, 208-373-0550, pete.wagner@deq.idaho.gov.

DRAFT

Pete Wagner, Regional Administrator
Boise Regional Office

ANTIDEGRADATION REVIEW

NPDES Permit # ID-0020443
Lander Street Wastewater Treatment Facility
City of Boise

Idaho Department of Environmental Quality
October 3, 2011

Antidegradation Overview

In March 2011, Idaho incorporated new provisions addressing antidegradation implementation in the Idaho Code. The new antidegradation provisions are in Idaho Code § 39-3603. At the same time, Idaho adopted antidegradation implementation procedures in the Idaho Water Quality Standards ("WQS"). DEQ submitted the antidegradation implementation procedures to EPA for approval on April 15, 2011.

The WQS contain an antidegradation policy providing three levels of protection to water bodies in Idaho (IDAPA 58.01.02.051). The first level of protection applies to all water bodies subject to Clean Water Act jurisdiction and assures that existing uses of a water body and the level of water quality necessary to protect the existing uses will be maintained and protected. (Tier 1 protection). (IDAPA 58.01.02.051.01; 58.01.02.052.01) A Tier 1 review is performed for all new or reissued permits or licenses. (IDAPA 58.01.02.052.05). The second level of protection applies to those water bodies that are considered high quality and assures that no lowering of water quality will be allowed unless it is deemed necessary to accommodate important economic or social development (Tier 2 protection).(IDAPA 58.01.02.051.02; 58.01.02.052.06). The third level of protection applies to water bodies that have been designated outstanding resource waters and requires activities to not cause a lowering of water quality (Tier 3 protection). (IDAPA 58.01.02.03; 58.01.02.052.07).

DEQ is employing a waterbody-by-waterbody approach to implementing Idaho's antidegradation policy. This approach to antidegradation implementation means that any water body fully supporting its beneficial uses will be considered high quality and provided Tier 2 protection. (Idaho Code §39-3603(20(b)(i)). Any waterbody not fully supporting its beneficial uses will be provided Tier 1 protection for that use, unless specific circumstances warranting Tier 2 protection are met. (Idaho Code §39-3603(2)(b)(iii)). The most recent federally-approved Integrated Report and supporting data are used to determine support status and the tier of protection. (Idaho Code §39-3603(2)(b)).

Pollutants of Concern

The City of Boise, Lander Street Wastewater Treatment Facility (Lander Street WWTP) discharges the following pollutants of concern: biological oxygen demand (BOD), total suspended solids (TSS), *E. coli*, pH, ammonia, mercury, arsenic, cadmium, chromium III and IV, lead, nickel, selenium, silver, cyanide, total phosphorus, , zinc and temperature. Effluent limitations have been developed for BOD, TSS, *E. coli*, pH, ammonia, mercury, total phosphorus and temperature.

Receiving Water Body Level of Protection

The Lander Street WWTP discharges to the Boise River (assessment unit ID17050114SW005_06). This Boise River assessment unit (AU) has the following designated beneficial uses: cold water aquatic life; primary contact recreation; salmonid spawning, agricultural water supply, industrial water supply; wildlife habitat; and aesthetics. There is no available information indicating the presence of any existing beneficial uses aside from those that are already designated.

Idaho has established a water body-by-water body approach for identifying what level of antidegradation protection DEQ will provide when reviewing whether activities or discharges will comply with Idaho's antidegradation policy. This approach relies upon Idaho's most recent federally-approved Integrated Report (IR) of water quality status and its supporting data. The cold water aquatic life use in this Boise River AU is not fully supported due to excess sedimentation, temperature, habitat and flow alteration (DEQ, 2008 IR). The primary contact beneficial use is not fully supported due to bacteria. As such, DEQ will provide Tier 1 protection only for the aquatic life use and recreational uses. (Idaho Code §39-3603(20(b)(i)).

Protection and Maintenance of Existing Uses (Tier 1 Protection)

As noted above, a Tier 1 review is performed for all new or reissued permits or licenses, applies to all waters subject to the jurisdiction of the CWA, and requires a showing that existing uses and the level of water quality necessary to protect existing uses shall be maintained and protected. In order to protect and maintain designated and existing beneficial uses, a permitted discharge must comply with Idaho water quality standards (WQS), which contain narrative and numeric criteria as well as other provisions of the WQS such as Section 054 which addresses water quality limited waters. The numeric and narrative criteria in the WQS are set at levels which ensure protection of designated beneficial uses.

The effluent limitations and associated requirements contained in the Lander Street WWTP permit are set at levels that ensure compliance with the narrative and numeric criteria in the WQS. Because there is no available information indicating the presence of any existing uses other than the designated uses discussed above, the permit ensures that the level of water quality necessary to protect both designated and existing uses is maintained and protected, in compliance with IDAPA 58.01.02.051.01, IDAPA 58.01.02.052.05 and 40 CFR 131.12(a)(1).

Water bodies not supporting existing or designated beneficial uses must be identified as water quality limited, and a total maximum daily load (TMDL) must be prepared for any water quality limited water body. A central purpose of TMDLs is to establish wasteload allocations for point source discharges, which are set at levels designed to help restore the water body to a condition that supports existing and designated beneficial uses. Discharge permits must contain limitations that consistent with WLAs in the approved TMDL.

The EPA-approved *Lower Boise TMDL* (DEQ 1999) establishes wasteload allocations for TSS, and bacteria. These allocations are designed to ensure the Boise River will achieve the quality necessary to support existing and designated aquatic life and recreational beneficial uses and comply with the applicable numeric and narrative criteria. The effluent limitations and associated requirements contained in the Lander Street WWTP permit are set at levels that are consistent with these WLAs.

In sum, the effluent limitations and associated requirements contained in the Lander Street WWTP permit are set at levels that ensure compliance with the narrative and numeric criteria in the WQS as well as the wasteload allocations established in the *Lower Boise River TMDL*. Therefore, DEQ has determined the permit will protect and maintain existing and designated beneficial uses in the Boise River.