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:

West Boise Wastewater Treatment Facility, City of Boise
11818 Joplin Road
Boise, ID 83714

NPDES Permit Number: ID-0023981

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)

The EPA Proposes NPDES Permit Reissuance
The EPA proposes to reissue a National Pollutant Discharge Elimination System (NPDES) permit to the West Boise Wastewater Treatment Facility, City of Boise. The draft permit sets conditions on the discharge of pollutants from the facility to the Boise River (South Channel around Eagle Island). 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

The EPA will consider all substantive comments before reissuing the final permit. 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.

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 an appeal is submitted to the Environmental Appeals Board within 30 days of the issuance date of the permit.

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

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I. Applicant

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

West Boise Wastewater Treatment Facility, City of Boise
NPDES Permit No. ID 002398-1

Facility Address:	11818 Joplin Road Boise, ID 83714
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 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 (South Channel around Eagle Island). This fact sheet addresses the West Boise facility only. The City submitted an application for the facility in April 2004 and submitted an updated application in January 2010.

A. Facility Description

The West Boise facility serves Boise City/Ada County, West Boise Sewer District, Garden City and Eagle Sewer District. The 2004 permit application identified the total population served as 110,000. The total population served according to the 2010 application is approximately 148,300. The population served by this facility has increased by 38,300 from 2004 to 2010.

The 2004 NPDES application identifies the design flow of the facility as 24 million gallons per day (mgd). The 2010 NPDES application identifies the design flow of the facility as 39 mgd. The City provided additional information with the 2010 NPDES permit application.

Chapter 12 of the additional information states that the West Boise facility is currently rated at 24 mgd capacity. The City's application identifies the design flow of the facility as 39 mgd because the City is in the process of developing an overall system-wide guidance document that prioritizes needs, balances available resources, identifies specific actions, and identifies uncertainties regarding wastewater management and uncertainties. According to the application materials, the City is considering either decommissioning the Lander Street facility or retaining the Lander Street facility to provide liquids-only treatment up to 15 mgd. If the Lander Street facility is decommissioned the West Boise facility will need to be upgraded to 32 mgd capacity to accommodate the flow that would have gone to the Lander Street facility. Additionally, if the Lander Street facility is decommissioned and the overall system-wide capacity must be increased to accommodate growth the West Boise facility may need to be upgraded to a capacity of 39 mgd. The City has not yet made any final decisions about decommissioning the Lander Street facility or upgrading the West Boise facility to greater than 24 mgd. Therefore, this fact sheet will use the current design flow of 24 mgd to analyze the need for water quality based effluent limits for this facility. The City may submit a request for a permit modification if the design capacity of the treatment plant increases during the term of this permit.

The current design removal rates for biochemical oxygen demand, suspended solids and ammonia are 90+ percent.

Treatment Process

Raw sewage entering the facility is screened to remove solids and then 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 Modified Ludzack-Ettinger (MLE) process 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 to the post aeration basin to increase the dissolved oxygen concentration and then 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.

Solids removed from the primary clarifiers and the waste activated sludge are thickened and anaerobically digested, blended with digested sludge from the Lander Street facility, dewatered and hauled to the City owned sludge application site.

Bypasses

Two emergency bypasses are incorporated into the facilities. They have not been used. The 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 does not have diffuser. It is located at the shoreline, and is 0 feet below the surface water at normal river stage.

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 DMRs for this facility found that the City is generally in compliance with the conditions of its existing permit.

III. RECEIVING WATER

A. General Information

The West Boise facility discharges continually to the Boise River (South Channel around Eagle Island) at approximately river mile 43.5. Flows in this segment of the Boise River are controlled by the dams located several miles upstream of the facility.

The presence of upper Boise River (Anderson Ranch and Arrowrock) and lower Boise River (Lucky Peak, 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 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 water quality based effluent limits (see Appendix C of this fact sheet for additional information on flows). 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 4 miles upstream from the West Boise facility and the EPA's DFLOW 3.1b model to calculate the low flow conditions 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)

A short distance below the Glenwood Bridge monitoring station the flow in the Boise River diverts around Eagle Island into the North Channel and the South Channel. The West Boise facility is located along the South Channel (River Mile 43.5). Ambient flow data in the South Channel was collected at USGS gaging station 13206305- Boise River South Channel at Eagle, ID. This monitoring station is located at River Mile 42.8, which is below the West Boise facility, therefore this gaging station takes into account the West Boise effluent discharge and any groundwater and/or diversion canal inputs or diversions. During the last permit issuance the City of Boise provided some information that resulted in the river flow being adjusted to account for groundwater inputs and irrigation diversions that occur between the Glenwood monitoring station and the West Boise outfall. These inputs and diversions are captured at the gaging station. Therefore, to accurately determine how much of the Boise River flow, above Eagle Island, is diverted to the South Channel, the flow results from the South Channel gaging station must be adjusted to account for inputs from ground water, the West Boise facility's effluent and diversions from irrigation canals.

Daily flow data has been collected at the South Channel monitoring station since 11/1/99. Additionally, the City of Boise provided the EPA with daily effluent flow data from

1/1/2001 through 12/31/09. The City also stated that from May – September a net total of 9 mgd are diverted from the South Channel, above the West Boise facility and from October – April 7.7 mgd are added to the South Channel by groundwater intrusion, above the West Boise facility.

The EPA had paired flow data from the Boise River South Channel at Eagle Island gaging station and the West Boise effluent discharge from 1/1/2001 to 7/31/2009. This data, as well as the net gains and losses to the river, was used to determine the average percentage of the total flow from the Glenwood gaging station that enters the South Channel. The table below provides the minimum, maximum and average percentage of the Glenwood flow that is diverted to the South Channel.

TABLE 2: Percentage of Boise River flow at Glenwood Gaging Station that is Diverted to the South Channel of the Boise River		
	May - September	**October - April**
Minimum	43 %	18 %
Maximum	80 %	88 %
Average	61 %	49%
Number of samples	1316	1818

Table 3 below presents the adjusted low flow values in the South Channel above the West Boise facility and above the effects of irrigation withdrawals and ground water intrusion. The flow split is based on the average flow split presented in Table 2.

TABLE 3: Flows South Channel		
Flows	**May 1 – September 30**	**October 1 – April 30**
1Q10	171.3 mgd X 0.61 = 104.5 mgd	71.8 mgd X 0.49 = 35.2 mgd
7Q10	184.2 mgd X 0.61 = 112.4 mgd	82.1 mgd X 0.49 = 40.2 mgd
30Q10	248.2 mgd X 0.61 = 151.4 mgd	90.5 mgd X 0.49 = 44.3 mgd
30Q5	295.4 mgd X 0.61 = 180.2 mgd	105.4 mgd X 0.49 = 51.6 mgd
Harmonic Mean	257.3 mgd X 0.61 = 157 mgd	252.7 mgd X 0.49 = 123.8 mgd

Finally, river flows were adjusted for groundwater intrusion and irrigation withdrawals between the Glenwood Monitoring Station and West Boise's outfall. During the irrigation season (May – September) groundwater inputs 9.7 mgd of flow to the river and irrigation diversions divert 18.7 mgd (29 cfs) of flow between Glenwood and West Boise WWTP, resulting in a loss of 9 mgd from the South Channel. During the non-irrigation season groundwater inputs 7.7 mgd (12 cfs) of flow between Glenwood and West Boise WWTP resulting in an increase in flow of 7.7 mgd to the South Channel (see the EPA's Response to Comments Document for the 2002 permit modification for the West Boise facility and the October 30, 2009 e-mail from Paul Woods, City of Boise to Kathleen Collins, EPA).

Based on the above information the low flows for the South Channel of the Boise River above the West Boise facility are presented in the table below.

TABLE 4: Flows South Channel		
Flows	**May 1 – September 30**	**October 1 – April 30**
1Q10	104.5 mgd – 9 mgd = 95.5 mgd	35.2 mgd + 7.7 mgd = 42.9 mgd
7Q10	112.4 mgd – 9 mgd = 103.4 mgd	40.2 mgd + 7.7 mgd = 47.9 mgd
30Q10	151.4 mgd – 9 mgd = 142.4 mgd	44.3 mgd + 7.7 mgd = 52 mgd
30Q5	180.2 mgd – 9 mgd = 171.2 mgd	51.6 mgd + 7.7 mgd = 59.3 mgd
Harmonic Mean	157 mgd – 9 mgd = 148 mgd	123.8 mgd + 7.7 mgd = 131.5 mgd

For this permit, the gaging station flow data from March 12, 1982 through December 31, 2009 were used. 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[1]. Additionally, the City of Boise requested that the flow seasons be changed to May through September and October through March (rather than April through September and October through March). The City stated in their 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 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.

[1] 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.

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 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/) which the EPA approved 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.

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

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 for the West Boise facility.

The *Lower Boise River TMDL* included load and wasteload allocations 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, line 2).

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. 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), total suspended solids (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. 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 limits in the draft permit:

1. 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.

2. pH must be within the range of 6.5 – 9.0 standard units.

3. Table 5 presents the proposed effluent limits for BOD, TSS, ammonia, mercury, total phosphorus, *E. coli* bacteria, and temperature

TABLE 5 - Proposed Numeric Effluent Limits

	Average Monthly Limit	Average Weekly Limit	Maximum Daily Limit	Monthly Geometric Mean	Average Daily Limit	Instantaneous Maximum Limit
BOD_5	20 mg/L 2000 lbs/day	30 mg/L 3000 lbs/day	---	---	---	---
TSS	30 mg/L 3000 lbs/day	45 mg/L 4500 lbs/day	---	---	---	---
Removal Rates for BOD_5 and TSS	85% minimum	---	---	---	---	---
Total Ammonia as N **May 1 – Sep 30**	788 µg/L 157.7 lbs/day	---	2435 µg/L 487 lbs/day	---	---	---
Total Ammonia as N **Oct 1 - Apr 30**	398 µg/L 80 lbs/day	---	1493 µg/L 299 lbs/day	---	---	---
Mercury Total Recoverable	0.009 µg/L 0.002 lbs/day	---	0.019 µg/L 0.004 lbs/day	---	---	---
Total Phosphorus	70 µg/L 14 lbs/day	84 µg/L 16.8 lbs/day	---	---	---	---
E. coli Bacteria	---	---	---	126 col/100 ml	---	406 col/100 ml
Temperature, **Dec 1 – Feb 29**	---	---	---	---	8.8 º C	15.5 º C
Temperature, **Mar 1 – Jul 15**	---	---	---	---	9.0º C	13.0 º C
Temperature, **Jul 16 – Sep 30**	---	---	---	---	19º C	22º C
Temperature, **Oct 1 – Nov 30**		---	---	---	9.0 º C	13.0 º C

NOTE: If the EPA approves the IDEQ's revisions to the temperature criteria, then the temperature limits are:

Date	MWMT	Average Daily Limit	Instantaneous Maximum Limit
November 1 – March 31	13.5 °C	NA	NA
April	13.3 °C	NA	NA
May	13.5 °C	NA	NA
June1 – July 15	NA	22.6°C	26.1°C
July 16 – September 30	NA	19.0°C	22.0°C
October	NA	20.3°C	24.2°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).			

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 facility's current permit contains a trigger for WET. The EPA believes that, in this case, a WET trigger is appropriate to measure the aggregate toxic effects of the effluent (see Appendix C *Reasonable Potential Analysis* for additional information on how the triggers were developed). The WET trigger is 2.0 TU_c from May to September and 1.5 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 TIE/TRE 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 and mercury 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 the permittee needs a compliance schedule for total phosphorus, temperature 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 January 3, 2001 to July 29, 2009 shows that phosphorus ranges from 2300 µg/L to 7600 µg/L, with an average of 5300 µg/L. The draft permit proposes an average monthly effluent limit of 70 µg/L. In order to achieve the phosphorus effluent limitation the facility must make physical modifications to its facility. Therefore, the discharge cannot be in compliance upon the effective date of the permit and a compliance schedule is appropriate. It should be noted that it is also possible that the City can meet the effluent limitations by installing treatment and participating in an offset trading project on the Boise River. The City, the IDEQ and the EPA are currently exploring the feasibility of the 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 an 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 all operations will be consolidated at the West Boise facility.

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 accept sludge from the Lander Street 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 from the Lander Street facility to the West Boise headworks.

Temperature
A review of the effluent temperature data at the facility from January 1, 2001 to July 31, 2009 shows that the temperature ranges from 10.3 °C to 25.3 °C, with an average temperature of 18.3 °C. The draft permit contains the following average daily effluent limits:

December 1 – February 29:	8.8 °C
March 1 – July 15:	9.0 °C
July 16 – September 30	19 °C
October 1 – November 30	9.0 °C

And if the EPA approves the Idaho revisions to the temperature criteria the effluent limits will be

November 1- March 31:	13.5 °C
April:	13.3 °C
May:	13.5 °C
June 1 – July 15:	22.6 °C
July 16 – September 30:	19 °C
October:	20.3 °C

The effluent data 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 19.3 °C -25.3 °C, with an average temperature value of 22.7 °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 the discussion on total phosphorus, above, for additional information).

Mercury
A review of the effluent mercury data from December 8, 2004 to July 15, 2009[2] shows that the effluent data ranged from 0.001µg/L to 0.0168 µg/L. Since February 2005 the facility has consistently met the proposed maximum daily limit of 0.019 µg/L and the average monthly limit of 0.009 µg/L. Additionally, mercury in the effluent is primarily controlled through source control rather than end-of-pipe treatment. Therefore, a compliance schedule is not appropriate.

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[2] EPA only reviewed the results from December 8, 2004 through July 15, 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 398 µg/L and the maximum daily limit is 1493 µg/L. From May – September the average monthly limit is 778 µg/L and the maximum daily limit is 2435 µg/L.

A review of the effluent ammonia data from January 2, 2001 to July 29, 2009 shows that for the time period of May through September the facility can consistently meet the proposed effluent limits. The data from October through April indicates that the facility has the capability to meet the proposed effluent limits, although there have been isolated incidents when the average monthly limits were exceeded. The permittee can reasonably be expected to comply with the proposed effluent limits upon permit issuance therefore a compliance schedule is not appropriate.

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 the 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, the EPA’s anti-backsliding regulations at 40 CFR 122.44(l)(1) prohibit 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 time the permits was issued and which would constitute a cause for permit modification pursuant to 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 effluent parameters are no longer necessary (e.g., fecal coliform bacteria is no longer a water quality standard, total residual chlorine is not used at the facility, total phosphorus is being limited rather than ortho-phosphorus, percent saturation for dissolved oxygen is not needed because it does not give any needed information), and 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., arsenic, cadmium, chromium, nickel, silver, oil and grease, total kjeldahl nitrogen, nitrate/nitrite and turbidity).

Additionally, 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 aluminum 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., copper and lead).

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. The table below presents the proposed monitoring requirements for the West Boise facility.

TABLE 6: 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
Zinc, µg/L	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
Copper, µg/L, see note 1	Effluent	1/month	24-hour composite
Lead, µg/L , see note 1	Effluent	1/month	24-hour composite
Hardness as $CaCO_3$, mg/L	Effluent	1/month	24-hour composite
Alkalinity as $CaCO_3$, mg/L	Effluent	1/month	24-hour composite
Total Organic Carbon, 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
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
Silver, 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	Grab
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

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 2^{nd}, 3^{rd} and 4^{th} 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 Receiving 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., ortho-phosphorus, percent saturation for dissolved oxygen, flow measurements for the South Channel), 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). 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, selenium, 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 West Boise Street facility. The West Boise "upstream" monitoring station should be the same station as the "downstream" station used in the Lander Street permit.

TABLE 7: Proposed Upstream and Downstream Monitoring

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

- Aircraft Rescue & Firefighting Training Facility – training facility that uses actual firefighting scenarios. Raw materials used include water, film forming firefighting foam and spent jet fuel (100 gpd of non process water).
- Ace Co Precision manufacturing – finished and/or coated metal parts (there is less than 1000 gpd discharge of process wastewater).
- Anodizers, Inc. – finished and/or coated metal parts. Raw materials include metal pieces and parts, acids and bases (2341 gpd of process water and < 100 gpd of non-process water).
- Boise State University (College of Engineering) – provides clean-room instruction and practicum relating to semiconductor microfabrication and manufacturing (200 gpd of process wastewater and < 100 gpd non process water).
- CORE Guard, LLC – conversion coating and associated cleaning/rinse steps (< 100 gpd of non-process water).
- Dairygold Inc (West Farm Foods) – dairy products including milk, cottage cheese, ice cream mix and soy milk products (126,000 gpd of process water and 1650 gpd of non-process water).
- Garden City Public Works Well #10 – potable water, green sand filter backwash wastewater (no discharge).
- Garden City Public Works Well #5 - potable water, green sand filter backwash wastewater (4563 gpd process water).
- Gem Meat Packing Company – fresh pork and beef, cured meat products, processed meats (7315 gpd process water and 300 gpd non-process water).
- Hewlett-Packard Company – printer head orifice plates and mandrels potable water, green sand filter backwash wastewater, and assembled ink printer cartridges (35,805 gpd of process water and 48,428 gpd of non process water).
- 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 and 1200 gpd in non-process water).
- Metalcraft, Inc. – finished and/or coated metal parts (697 gpd of process water and 300 gpd of non-process water)
- Micron Technology, Inc.- Research and development for dynamic random access memory, photovoltaics, and related electronic components (1,200,000 gpd of process water and 66,000 gpd of non-process water).

- MP Mask Technology Center, LLC – photo mask for lithographic processes in semiconductor manufacturing (86,005 gpd of process water and 1000 gpd of non process water).
- NxEdge, Inc. – finished and/or coated metal parts (2095 gpd of process water and 600 gpd of non-process water).
- Performance Design – machined metal parts for specialized paper processing machines (275 gpd of process wastewater and 420 gallons of non-process water).
- Photronics, Inc – manufacturing of semiconductor memory device peripheral products (109,516 gpd of process wastewater and 750 gpd of non-process water).
- Quality Thermistor, Inc. – temperature sensitive electronic sensors (189 gpd of process water and 450 gpd of non-process water).
- Univar USA, Inc.- treated groundwater (non discharge).
- Whiteman Industries, Inc. – concrete power trowels and screeds, light towers, compactors, concrete saws and frame trailers (260 gpd of process water and 1500 gpd of non-process water).

Process water flows from industrial users can potentially make up 9 - 16% of the City's current discharge[3]. 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)) and submit to the EPA the calculated local limits.

B. Design Criteria Requirements

The 1999 NPDES permit requires the facility to compare its annual average BOD and TSS loadings to the facility design loadings. When the BOD and TSS loadings are at 85% of the facility design loadings then the permittee must develop a facility plan which articulates the strategy for continuing to maintain compliance with effluent limits. 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 will be retained in the permit.

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[3] Percentages were determined based on the minimum (9.8 mgd) and maximum (18.5 mgd) flows that occurred from 7/31/2004 – 7/31/2009.

C. Operation & Maintenance Plan Review

The permit requires the Permittee 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 Permittee 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 the 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 Permittee 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 the 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 (hereafter referred to as biosolids) from the Lander Street facility is received at 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 purposes 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 each 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 Permittee 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 these 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, the EPA does not consider this anti-backsliding. However, there is a specific sludge condition that was incorporated into the 1999 permit which states:

> "Pollutants contained in sludge from other treatment works, or in sludge generated, processed or handled at this facility or land applied by this facility shall not be discharged to surface waters either directly or indirectly. Sludge from other facilities may not be received at this facility mixed with sewage, and may not be mixed with sewage within the plant. Sludge 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 the “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 discharged to the Boise River.

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 and 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 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 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 28 through 30 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
West Boise Facility

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 and the Boise River. Part III discusses the EPA's rationale for the hardness value used to develop hardness based metals criteria, 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. This matter does not include suspended sediment produced as a result of non-point source activities.

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. Subsection 350.02.b generally describes the best management practice (BMP) feedback loop for non-point source activities.

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

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	0.970	0.935	0.8	0.4
Chromium III[3]	1	0.316	0.860	344.0	44.7
Chromium VI[3]	1	0.982	0.962	15.7	10.6
Copper[3]	2.578	0.960	0.960	24.5	17.3
Lead[3]	2.049	0.881	0.881	67.2	2.6
Mercury[3,4]	1	NA	NA	2.1	0.012
Nickel[3]	1	0.998	0.997	278.0	30.9
Selenium[3]	NA	NA	NA	20	5
Silver[3]	1	0.850	NA	1.2	NA
Zinc[3]	1	0.978	0.986	69.5	70.1
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 54 mg/L. 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.B 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:

Ammonia criteria are based on a formula which relies on the pH and temperature of the receiving water. See Part IV of this appendix for a discussion on how the pH and temperature values were determined to develop the 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 8.8 standard units for the May - September period and 8.9 standard units for the October – April period results in the following acute criteria:

May - September: 1232 µg/L
October – April: 1039 µg/L

- The chronic criterion is based on the following formula:

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

May - September: pH= 8.8 standard units and temperature = 18.9 º C
October – April: pH = 8.9 standard units and temperature = 14.9 º C

Using the above equation the chronic criteria are:
May - September: 500 µg/L
October – April: 551 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.

<u>Note</u>: 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 per100 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 ambient and effluent hardness data. The effluent data shows that the effluent hardness is approximately three times higher than the ambient hardness of the Boise River at Glenwood Station, and the effluent discharge results in a slight increase in the hardness of the river, downstream of the West Boise facility. The following table provides the hardness data at Glenwood Monitoring Station, located upstream of the facility, and Eagle Monitoring Station, located downstream of the facility. As can be seen from the table below, the Eagle hardness values are slightly higher than the Glenwood hardness values.

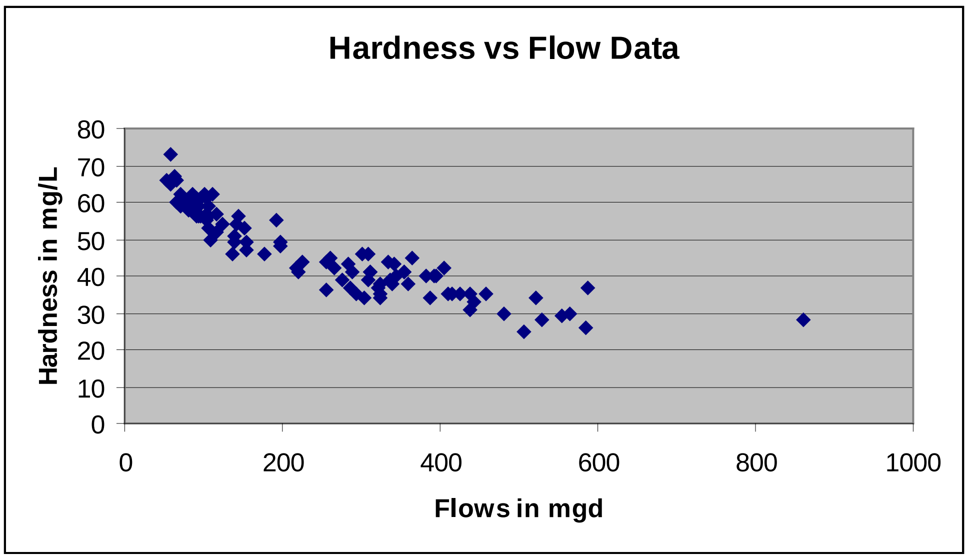
Table A-4: Comparison of hardness data at Glenwood Station and Eagle Station

	Glenwood Station[1] **May – Sep, 2001 – 2009**	Eagle Station[1] **May – Sep, 2001 – 2009**	Glenwood Station[1] **Oct – Apr, 2001 – 2009**	Eagle Station[1] **Oct – Apr, 2001 - 2009**
Minimum	22	25	23	26
Maximum	46	56	53	73
Samples collected	53	48	66	59
5th percentile of data set	24.2	28	28.2	29.8
25th percentile of data set	29	34	38	44
50th percentile of data set	33	35	45	55
75th percentile of data set	37	41	47	60

1. All hardness concentrations are in mg/L.

The downstream hardness is not overly influenced by the effluent from May through September. From October through April the downstream hardness is influenced by the effluent, however, the EPA believes it is reasonable to use the downstream hardness data set to determine the appropriate hardness value to use to calculate the hardness dependent metals criteria.

As stated previously, the 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. 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 is 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 Eagle Station.



Because the hardness of the river closely correlates with flow, in this specific case, the EPA believes that it is acceptable to use the 5th percentile of the hardness data associated with 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 data associated with all low flows near the 1Q10 and 7Q10 flows to approximate the worst case condition. The low flow values are approximations and ranged from 42.9 to 103.4 mgd. The EPA used the hardness values associated with flows between 54 and 111 mgd. The 5th percentile of this data set is 54mg/L. The data set used is provided below.

Hardness Values Associated with Low Flow at Eagle Station			
Date	S. Channel Flow	S. Channel flow	Hardness Data at Eagle
	CFS	MGD	mg/L
12/6/2005	83	54	66
12/4/2001	91	59	73
1/10/2006	92	59	65
3/5/2002	98	63	67
3/4/2003	101	65	66
2/1/2005	101	65	60
1/4/2005	102	66	60
3/8/2005	109	70	59
1/7/2003	111	72	62
12/10/2002	115	74	61
2/18/2003	122	79	60
12/9/2003	126	81	58
11/4/2003	129	83	60
1/6/2004	133	86	59
4/5/2005	134	87	62
1/8/2008	141	91	61
2/5/2008	141	91	60
12/4/2007	142	92	56
11/5/2002	144	93	59
11/6/2007	146	94	56
4/1/2008	148	96	61
3/4/2008	149	96	56
2/3/2004	157	101	62
3/9/2004	159	103	57
1/9/2001	162	105	61
3/20/2001	162	105	55
2/6/2001	164	106	53
3/6/2001	165	107	56
1/23/2001	166	107	59
4/3/2001	168	109	50
2/20/2001	172	111	62

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. ***Ammonia Criteria***

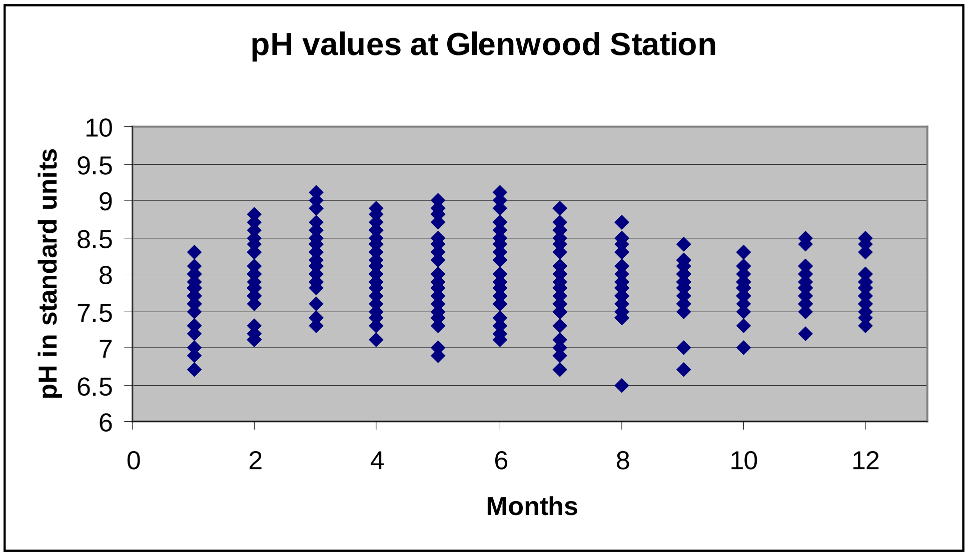
Ambient pH and temperature are factors used in the calculation of the ammonia criteria. The City has collected pH data in the Boise River upstream and downstream of the facility from January 2003 through July 2009. Temperature data was collected upstream of the facility from January 2001 through September 2009. This data was used to determine the appropriate pH and temperature values to calculate the ammonia criteria.

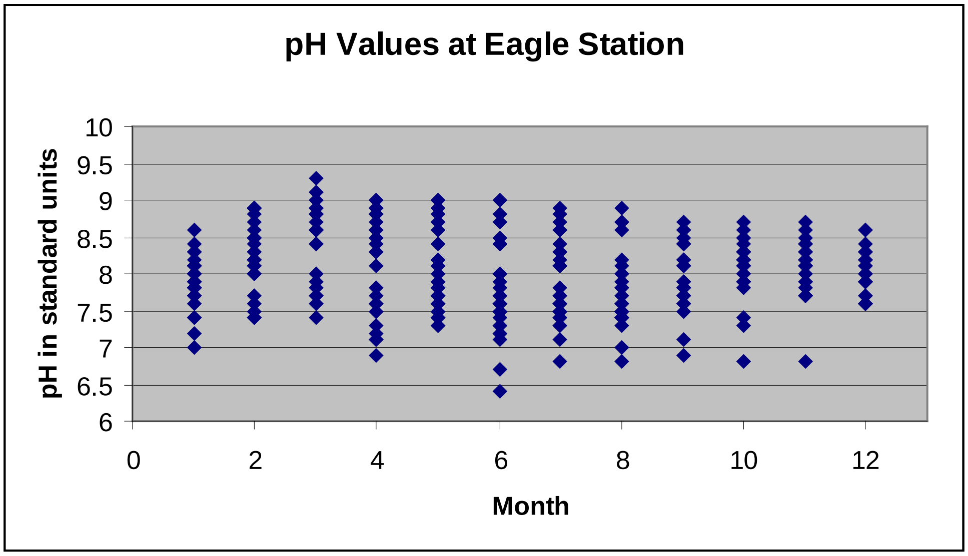
Ambient pH is the factor that determines the acute criterion. Ambient waters with a high pH value will have a stringent acute criterion because ammonia is more acutely toxic to aquatic life at high pH. Ambient pH and temperature are the factors necessary to calculate the chronic ammonia criterion. An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

As with any natural water body the pH and temperature of the water 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 Glenwood Monitoring Station, located upstream of the West Boise facility, and the Eagle monitoring Station, located downstream of the facility shows that the facility effluent slightly influences the pH of the downstream water. The graphs below show how pH data varies by month at the Glenwood and Eagle 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].

[1] Veteran Station is located 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.

pH Data at Veterans, Glenwood, and Eagle Monitoring Station

As can be seen from the box and whisper plot, the West Boise facility slightly increases the downstream pH levels at the Eagle monitoring station. 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 previously, the EPA is dividing the flow periods into the May – September period and the October – April period.

- **pH value for Acute and Chronic Criteria**

  The acute and chronic criteria are dependent upon the pH of the water body. The EPA uses the 95th percentile of the data set to ensure the protection of aquatic life. The 95th percentile of the Eagle Station data set results in the following pH values:

  May – September: 8.8 standard units
  October – April: 8.9 standard units

(Note: See page 4 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. Downstream temperature values should be used to develop the ammonia criteria because the effluent discharge significantly affects the stream temperature. There is no temperature data at the Eagle station, therefore an estimate of the downstream temperature must be made using readily available date.

To estimate the 95th percentile of the average daily temperatures, the EPA used daily flow data and average daily temperature data at Glenwood Station from January 2001 through September 2009, and daily effluent flow data and temperature data from the West Boise facility from January 2001 through September 2009. The following mass balance equation was used to estimate the temperature downstream of the facility.

$Q_d \times T_d = (Q_u \times T_u) + (Q_e \times T_e)$ **(Equation 1)**

$T_d = \frac{(Q_u \times T_u) + (Q_e \times T_e)}{Q_u + Q_e}$ **(Equation 2)**

Q_d = Flow downstream of facility, mgd = $Q_u + Q_e$
T_d = Temperature downstream of facility in °C
Q_u (May – Sept) = (Glenwood Station flow X Flow Split around Eagle Island)
Q_u (Oct -Apr) = (Glenwood Station flow X Flow Split around Eagle Island)
T_u = Temperature at Glenwood Station in °C
Q_e = Effluent flow, mgd
T_e = Temperature of effluent in °C

May – September: 18.9 °C
October – April: 14.9 °C

(Note: see page 4 for the ammonia equations)

APPENDIX B
BASIS FOR EFFLUENT LIMITATIONS
West Boise Facility

The following discussion explains the derivation of secondary treatment requirements and water quality based effluent limits proposed in the draft permit. 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 24 mgd, the technology based mass limits for BOD_5 and TSS are calculated as follows:

Average Monthly Limit = 30 mg/L × 24 mgd × 8.34 = 6004.8 lbs/day

Average Weekly Limit = 45 mg/L × 24 mgd × 8.34 = 9007.2 lbs/day

3. Final Secondary Treatment Effluent Limits

The following table provides a summary of the secondary treatment requirements applicable to the West Boise facility.

Table B-2
Secondary Treatment Effluent Limits

Parameter	Average Monthly Limit	Average Weekly Limit	Range
BOD_5	30 mg/L (6004.8 #/day)	45 mg/L (9007.2 #/day)	---
TSS	30 mg/L (6004.8 #/day)	45 mg/L (9007.2 #/day)	---
Removal Rates for BOD_5 and TSS	85% (minimum)	---	---
pH	---	---	6.0 - 9.0 s.u.

II. Water Quality Based Effluent Limits

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:

- Copper: 10%
- Zinc: 25% of low flows from October – April
  10% of low flows from May - September
- 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

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 – March – 50%
- April – June 16 - 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. The reasonable potential analysis found that water quality based effluent limits were necessary for mercury, ammonia, temperature, pH and total phosphorus. 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 West Boise 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. <u>Mixing zone based WLA</u>

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, and temperature (for some months) were derived using a mixing zone. A mixing zone was also used when determining the allowable induced temperature variation due to a point source (from December-February only).

3. <u>Criterion as the Wasteload Allocation</u>

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, pH, total phosphorus, and temperature (July 16 – September 30) 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 table provides a summary of the water quality based effluent limits derived in Appendix D. See Appendix D for more information.

TABLE B-3 – 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	31 mg/L 6200 lbs/day	46.5 mg/L 9300 lbs/day	---	---	---	---	---	---
Total Ammonia as N **May 1 – Sep 30**	788 µg/L 157.7 lbs/day	---	2435 µg/L 487.4 lbs/day	---	---	---	---	---
Total Ammonia as N **Oct 1 - Apr 30**	398 µg/L 80 lbs/day	---	1493 µg/L 299 lbs/day	---	---	---	---	---
Mercury Total Recoverable	0.009 µg/L 0.002 lbs/day	---	0.019 µg/L 0.004 lbs/day	---	---	---	---	---
Total Phosphorus **May 1 – September 30**	70 µg/L 14 lbs/day	84 µg/L 16.8 lbs/day	---	---	---	---	---	---
E. coli Bacteria	---	---	---	126 col/100 ml	---	406 col/100 ml	---	
pH	---	---	---	---		---	---	6.5 – 9.0 s.u.
Temperature, see note 1 **Dec 1 – Feb 29**	---	---	---	---	8.8 ° C	15.5 ° C	---	---
Temperature, see note 1 **Mar 1 – Jul 15**	---	---	---	---	9.0º C	13.0 ° C	---	---
Temperature, see note 1 **Jul 16 – Sep 30**	---	---	---	---	19º C	22 ° C	---	---
Temperature, see note 1 **Oct 1 – Nov 30**	---	---	---	---	9.0 ° C	13.0 ° C	---	---

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

Date	**MWMT**	**Average Daily Limit**	**Instantaneous Maximum Limit**
November 1 – March 31	13.5 °C	NA	NA
April	13.3 °C	NA	NA
May	13.5 °C	NA	NA
June1 – July 15	NA	22.6°C	26.1°C
July 16 – September 30	NA	19.0°C	22.0°C
October	NA	20.3°C	24.2°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).			

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 antidegradation requirements.

After calculating the applicable technology-based effluent limits, and water quality-based effluent limits, the permit writer must determine the final effluent limits that will be included in the NPDES permit for each pollutant. For reissued permits, that determination must also include an assessment of whether the revised effluent limitations or conditions are consistent with the Clean Water Act (CWA) requirements and NPDES regulations related to anti-backsliding.

An anti-backsliding analysis was done for biochemical oxygen demand (BOD), total suspended solids (TSS), narrative conditions (i.e., aesthetic conditions; collected screening, solids and grit; and sludge conditions), lead, and dissolved oxygen. As a result of the analysis the limitations in the 1999 permit for TSS, BOD, and the narrative conditions are being retained in the proposed permit based; the effluent limitations for DO and Lead are not being retained in the proposed permit. The anti-backsliding analysis for each limit or condition is discussed in more detail below.

1. Biochemical Oxygen Demand

The federally required secondary treatment effluent limits for BOD are:

Average Monthly Limit:	30 mg/L (6004.8 lbs/day)
Average Weekly Limit:	45 mg/L (9007.2 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 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 State's analysis looked at the cumulative impact of the Lander Street facility and the West Boise facility wastewater treatment plants (as well as other wastewater treatment facilities downstream of the City of Boise).
The BOD limits in the 1999 permit are:

Average Monthly Limit	20 mg/L (2000 lbs/day)
Average Weekly Limit	30 mg/L (3000 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) or 303(d) 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 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. It should also be noted that the reasonable potential analysis did not look at the cumulative effects of all the treatment plants on the Boise River as did the1979 evaluation conducted by the IDEQ).

2. Total Suspended Solids

The 1999 permit requires the effluent to meet TSS loading limitations that are more restrictive than the federally required technology based limits. The 1999 limits were based on a staff evaluation provided by the IDEQ in March 1979. Additionally, as discussed in Appendix D, the *Lower Boise River TMDL* was completed for the Boise River in 1998 and provides a TSS waste load allocation for the West Boise facility. The limits in the 1999 permit, the technology based limits, and the limits based on the TMDL are provided below:

	1999 Permit	Technology Based Limits	TMDL Limits
AML	30 mg/L (3000 #/day)	30 mg/L (6004.8 #/day)	31 mg/L (6200 #/day)
AWL	45 mg/L (4500 #/day)	45 mg/L (9007.2 #/day)	46.5 mg/L (9300 #/day)

Note: AML means average monthly limit, and AWL means average weekly limit.

The effluent loading limits in the TMDL exceeds the allowable technology based limits, therefore, they cannot be incorporated into the draft permit. Additionally, the technology based limits are less stringent than the water quality based limits in the 1999 permit. The CWA at Section 402(o) prohibits the relaxation of water quality based effluent limitations unless it is consistent with the provisions in CWA Section 303(d)(4) or 402(o)(2). In this case, CWA Section 303(d)(4) allows the establishment of a less stringent effluent limit when the receiving water has been identified as not meeting applicable water quality standards if two conditions are met. First, the existing permit limit must have been based on a TMDL or WLA established under Clean Water Act 303 and secondly, the relaxation of the effluent limit is only allowed if attainment of water quality standards will be assured.

In this case, the effluent limits in the 1999 permit limit were established by the IDEQ to ensure that water quality standards were achieved. Additionally the 1998 *Lower Boise River TMDL* evaluated the Lower Boise River watershed and found that non-point sources (i.e., agricultural land, irrigated pasture, combined animal feeding operations/animal feeding operations) were the most significant sources of sediment loading to the watershed. The TMDL found that water quality standards would be achieved if point sources and non-point sources achieved their wasteload allocations and load allocations (respectively). The TMDL also states that if appropriate load reductions are not achieved from non-point sources through existing regulatory and voluntary programs, then reductions must come from point sources.

In December 2003 the *Implementation Plan for the Lower Boise River Total Maximum Daily Load* was completed. This document states that implementation of control strategies to reduce discharges from irrigated lands is voluntary, and presents a timeline for completion of best management practices. The overall timeline requires 103 years for the watershed to come into compliance with water quality standards (see Appendix D of *Implementation Plan for the Lower Boise River Total Maximum Daily Load*).

The EPA also reviewed available TSS data gathered in the Boise River at the USGS Stations at Glenwood Bridge (USGS Station 13206000) and near Parma (USGS Station 13213000). Data gathered at Glenwood Bridge shows that the river is well within the target of 50 mg/L stated in the TMDL, however, data collected at the Parma Station showed that the Boise River is still significantly out of compliance with the TMDL target. Additionally, in 2009 the IDEQ reviewed available information on the Boise River and determined that the river was not meeting water quality standards (see *Lower Boise River, Five Year Review*, Idaho Department of Environmental Quality, February 2009).

Because the Boise River is not meeting the TSS TMDL target, and the implementation plan estimates that the timeline to meet TSS in the river is 103 years, the EPA is not increasing the TSS load for the West Boise facility because it cannot ensure that water quality standards will be met as required by CWA 303(d)(4)(A). Therefore, the proposed permit limits will retain the limits in the 1999 permit.

AML: 30 mg/L (3000 #/day)
AWL: 45 mg/L (4500 #/day)

3. <u>Dissolved Oxygen</u>

The 1999 permit required the DO of the effluent to be at 75% saturation or 6 mg/L whichever is greater. The 1999 permit limits were derived without the use of a mixing zone. The reasonable potential analysis in Appendix C found that the effluent does not have the reasonable potential to cause or contribute to an exceedance of the State's dissolved oxygen criteria (even without a mixing zone). Generally, when there is no reasonable potential to cause or contribute to an exceedance of water quality standards, water quality based effluent limits do not need to be incorporated into the permit. However, in this case, the 1999 permit contained effluent limits for DO, therefore if the draft permit contains less stringent effluent limitations than the 1999 permit, the less stringent limits must be consistent with the antibacksliding statutes and regulations.

The CWA at Section 402(o) prohibits the relaxation of water quality based effluent limitations unless it is consistent with the provisions in CWA Section 303(d)(4) or 402(o)(2). In this case, CWA Section 303(d)(4)(B) allows the establishment of a less stringent effluent limit, when the receiving water has been identified as meeting applicable water quality standards, if relaxing the limit is consistent with the State's anti-degradation policy. In this case, the available data indicates that the Boise River is attaining water quality standards for dissolved oxygen. Additionally, the IDEQ has completed an antidegradation review which is included in the draft 401 certification for this permit(see Appendix G). The EPA has reviewed this antidegradation review and finds that it is consistent with the State's 401 certification requirements and the State's antidegradation implementation procedures. Therefore, the proposed permit will not contain effluent limits for DO, however, monitoring will be required so that a reasonable potential analysis, and an anti-degradation analysis can be done during the next permit cycle.

4. Lead

The 1999 permit had an average monthly permit limit of 5.78 µg/L. This limit was based on a 25% mixing zone and is applicable from October to March. The reasonable potential analysis in Appendix C found that, even with no mixing zone, the effluent does not have the reasonable potential to cause or contribute to an exceedance of the State's water quality standards. Generally, when there is no reasonable potential to cause or contribute to an exceedance of water quality standards, water quality based effluent limits do not need to be incorporated into the permit. However, in this case, the 1999 permit contained effluent limits for Lead, therefore if the draft permit contains less stringent effluent limitations than the 1999 permit, the less stringent limits must be consistent with the anti-backsliding statutes and regulations.

The CWA at Section 402(o) prohibits the relaxation of water quality based effluent limitations unless it is consistent with the provisions in CWA Section 303(d)(4) or 402(o)(2). In this case, CWA Section 303(d)(4)(B) allows the establishment of a less stringent effluent limit, when the receiving water has been identified as meeting applicable water quality standards, if relaxing the limit is consistent with the State's anti-degradation policy. The available data indicates that the Boise River is attaining water quality standards for Lead. Additionally, the IDEQ has completed an antidegradation review which is included in the draft 401 certification for this permit(see Appendix G). The EPA has reviewed this antidegradation review and finds that it is consistent with the State's 401 certification requirements and the State's antidegradation implementation procedures. Therefore, the proposed permit will not contain effluent limits for Lead, however, monitoring will be required so that a reasonable potential analysis, and an anti-degradation analysis can be done during the next permit cycle.

5. Narrative Conditions

(a) Aesthetics Conditions

The current 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-degradation 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. Additionally none of the causes for permit modification in 40 CFR 122.62 are applicable in this case. Therefore, it is not permissible to backslide from the 1999 permit and the provision will be retained in the draft permit.

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

The current 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-degradation 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. Additionally none of the causes for permit modification in 40 CFR 122.62 are applicable in this case. Therefore, it is not permissible to backslide from the 1999 permit and the provision will be retained in the permit.

(c) Sludge Condition

The current permit contains the following narrative condition for sludge (see 1999 permit, I.D.8):

> "Pollutants contained in sludge from other treatment works, or in sludge generated, processed or handled at this facility or land applied by this facility shall not be discharged to surface waters either directly or indirectly. Sludge from other facilities may not be received at this facility mixed with sewage, and may not be mixed with sewage within the plant. Sludge 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-degradation 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. Additionally none of the causes for permit modification in 40 CFR 122.62 are applicable in this case. Therefore, it is not permissible to backslide from the 1999 permit and the provision will be retained in the permit (see Fact Sheet for additional information).

6. <u>Summary of Effluent Limitations in Draft Permit Based on Anti-backsliding Provisions</u>

The following provides a summary of the effluent limitations that are being retained in the draft permit based on anti-backsliding provisions.

TABLE B-4 –Effluent Limits Based on Anti-backsliding Requirements

Parameter	Average Monthly Limit	Average Weekly Limit	Narrative Conditions
BOD	20 mg/L (2000 #/day)	30 mg/L (3000 #/day)	
TSS	30 mg/L (3000 #/day)	45 mg/L (4500 #/day)	
Aesthetics	---	---	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.
Collects Grit and Screenings	---	---	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.
Sludge	---	---	Pollutants contained in sludge from other treatment works, or in sludge generated, processed or handled at this facility or land applied by this facility shall not be discharged to surface waters either directly or indirectly. Sludge from other facilities may not be received at this facility mixed with sewage, and may not be mixed with sewage within the plant. Sludge 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.

IV. Antidegradation

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 antidegradation policy are met. An anti-degradation analysis was conducted by the IDEQ. See Appendix G for the antidegradation analysis.

V. Facility Specific Limits

Table B-5 summarizes the numeric effluent limits that are in the proposed permit. The final limits are the more stringent of the secondary treatment requirements, the water quality based effluent limits or the anti-backsliding or anti-degradation requirements. Additionally, the proposed permit will contain the following narrative 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 sludge from other treatment works, or in sludge generated, processed or handled at this facility or land applied by this facility shall not be discharged to surface waters either directly or indirectly. Sludge from other facilities may not be received at this facility mixed with sewage, and may not be mixed with sewage within the plant. Sludge 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) pH should be within 6.5 – 9.0 standard units.

TABLE B-5 - Proposed Numeric Effluent Limits

	Average Monthly Limit	Average Weekly Limit	Maximum Daily Limit	Monthly Geometric Mean	Average Daily Limit	Instantaneous Maximum Limit
BOD_5	20 mg/L 2000 lbs/day	30 mg/L 3000 lbs/day	---	---	---	---
TSS	30 mg/L 3000 lbs/day	45 mg/L 4500 lbs/day	---	---	---	---
Removal Rates for BOD_5 and TSS	85% minimum	---	---	---	---	---
Total Ammonia as N **May 1 – Sep 30**	788 µg/L 157.7 lbs/day	---	2435 µg/L 487 lbs/day	---	---	---
Total Ammonia as N **Oct 1 - Apr 30**	398 µg/L 80 lbs/day	---	1493 µg/L 299 lbs/day	---	---	---
Mercury Total Recoverable	0.009 µg/L 0.002 lbs/day	---	0.019 µg/L 0.004 lbs/day	---	---	---
Total Phosphorus	70 µg/L 14 lbs/day	84 µg/L 16.8 lbs/day	---	---	---	---
E. coli Bacteria	---	---	---	126 col/100 ml	---	406 col/100 ml
Temperature, **Dec 1 – Feb 29**	---	---	---	---	8.8 ° C	15.5 ° C
Temperature, **Mar 1 – Jul 15**	---	---	---	---	9.0° C	13.0 ° C
Temperature, **Jul 16 – Sep 30**	---	---	---	---	19° C	22° C
Temperature, **Oct 1 – Nov 30**		---	---	---	9.0 ° C	13.0 ° C

NOTE: If the EPA approves the IDEQ's revisions to the temperature criteria, then the temperature limits are:

Date	MWMT	Average Daily Limit	Instantaneous Maximum Limit
November 1 – March 31	13.5 °C	NA	NA
April	13.3 °C	NA	NA
May	13.5 °C	NA	NA
June1 – July 15	NA	22.6°C	26.1°C
July 16 – September 30	NA	19.0°C	22.0°C
October	NA	20.3°C	24.2°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).			

APPENDIX C
REASONABLE POTENTIAL ANALYSIS
West Boise Facility

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 reasonable potential analysis 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.

TABLE C-1: Summary of Reasonable Potential Analysis

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

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

TABLE C-2: Mixing Zones Used in Reasonable Potential Calculations

Parameter	**Mixing zone size**
Arsenic, Cadmium, Chromium III and VI, Lead, Nickel, Selenium, Silver, Cyanide	0%
Copper	10%
Mercury	0%
Zinc	25% (Oct – Apr) 10% (May – Sept)
Total Phosphorus	0%
pH	0%
Ammonia	25%
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
Temperature, allowable induced temperature variation due to a point source discharge	25% Dec – Feb 0% Mar – July 15 0% Oct - Nov
Whole Effluent Toxicity	25%
Dissolved Oxygen – near field **Dissolved Oxygen – far field**	0% 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 March – 50%
April through July 15 – 25%
October – 25%

I. REASONABLE POTENTIAL ANALYSIS FOR METALS, CYANIDE, AND AMMONIA

The Reasonable Potential Analysis determined that effluent limitations are required for the protection of aquatic life 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	1232 µg/L	1039 µg/L
Chronic aquatic life criterion	500 µg/L	551 µg/L

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

Table C-3, 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-3 Criteria for Aquatic Life and Human Health

Parameter	Aquatic Life Criteria		Human Health Criteria	
	Acute Criteria	Chronic Criteria	Water and Organisms	Organisms Only
Arsenic, µg/L	340	150	10	10
Cadmium, µg/L	0.8	0.4	NA	NA
Chromium III, µg/L	344.0	44.7	NA	NA
Chromium VI, µg/L	15.7	10.6	NA	NA
Copper, µg/L	24.5	17.3	NA	NA
Lead, µg/L	67.2	2.6	NA	NA
Methylmercury in mg/kg See note 4	NA	NA	NA	0.3
Mercury, µg/L	2.1	0.012	NA	NA
Nickel, µg/L	278	30.9	610	4600
Selenium, µg/L	20	5	170	4200
Silver, µg/L	1.2	NA	NA	NA
Zinc, µg/L	69.5	70.1	7400	26000
Cyanide, µg/L	22	5.2	140	140

NOTES:
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 so that this parameter may be evaluated during the next permit cycle.

General Equation Used to 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):

$$C_d \times Q_d = (C_e \times Q_e) + (C_u \times Q_u)$$ **(Equation 1)**

$$C_d = \frac{(C_e \times Q_e) + (C_u \times Q_u)}{Q_d}$$ **(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:

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

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

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

The IDEQ proposes to authorize mixing zones for some pollutants at the facility. The EPA has used these mixing zone in its reasonable potential analysis. The mixing zone sizes are for critical low flow conditions and are as follows:

Copper:	10% (applies year round to the chronic aquatic life criterion only)
Zinc:	25% (applies from October – April for the acute and chronic aquatic life criteria)
Zinc:	10% (applies May – September for the acute and chronic aquatic life criteria)
Ammonia:	25% (applies year round to the acute and chronic aquatic life criteria)

Boise River 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, and low flow conditions for chronic aquatic life criteria as the 7Q10 or 4B3 flow, the 30Q5 for non-carcinogenic human health criteria and the harmonic mean flow for carcinogenic human health criteria (see IDAPA 58.01.02210.03). Idaho's water quality standards do not specify a low flow to use for acute and chronic ammonia criteria, however, the EPA's *Water Quality Criteria; Notice of Availability; 1999 Update of Ambient Water Quality Criteria for Ammonia; Notice* (64 FR 719769 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 facility are presented in Table C-4 (see Part III.B of the fact sheet for a discussion on how the low flows were estimated).

TABLE C-4: Estimated Low Flows Upstream of the West Boise Facility

Flows	May 1 – September 30	October 1 – April 30
1Q10	95.5 mgd	42.9 mgd
7Q10	103.4 mgd	47.9 mgd
30Q10	142.4 mgd	52 mgd
30Q5	171.2 mgd	59.3 mgd
Harmonic Mean	148 mgd	131.5 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

$$RPM = \frac{C99}{C\delta n} = \frac{\exp(Z_{99}\,\sigma - 0.5\,\sigma^2)}{\exp(Z_{\delta n}\,\sigma - 0.5\,\sigma^2)}$$ **(Equation 6)**

where,

$\sigma^2 = \ln(CV^2 + 1)$
Z_{99} = 2.36 (z-score for the 99th percentile)
$Z_{\delta n}$ = is the z-score 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 172 samples were collected. The maximum observed concentration is 4.3 µg/L, the standard deviation of the data set is 0.6, the average of the data set is 2.7, and the CV of the data set is 0.2.

$\delta n \geq (1 - .99)^{1/172} = 0.97$ (i.e., 97th percentile)

$\sigma^2 = \ln(CV^2 + 1) = 0.0392$
$\sigma = 0.1980$

The z-score for the 99th percentile is 2.36
The z-score for the 97th percentile is 1.88

$$\frac{C99}{C97} = \frac{\exp(2.36\sigma - 0.5\,\sigma^2)}{\exp1.88\sigma - 0.5\,\sigma^2)} = 1.09$$

Maximum projected effluent concentration = RPM X Maximum Observed Concentration
= 1.09 X 4.3 µg/L = 4.7 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-5: Maximum Projected Effluent Concentration

Parameter See note 1	CV	Number of Samples (n)	Reasonable Potential Multiplier	Maximum Observed Effluent Concentration	Maximum Projected Effluent Concentration
Arsenic	0.2	172	1.09	4.3	4.7
Cadmium see note 2	NA	173	NA	NA	0.03
Chromium III see note 3	0.4	170	1.19	0.8	0.95
Chromium VI see note 3	0.4	170	1.19	0.8	0.95
Copper	0.2	193	1.06	27.7	29.23
Lead	0.5	189	1.14	1.7	1.93
Mercury	0.6	96	1.46	0.0168	0.025
Nickel	0.6	172	1.28	18.6	23.81
Selenium	0.3	156	1.14	1.0	1.14
Silver	1.0	172	1.45	0.28	0.41
Zinc	0.15	170	1.05	100	104.5
Cyanide see note 4	NA	107	NA	NA	5
Ammonia Oct-April	2.5	263	1.47	9000	13,198
Ammonia May-Sept	1.1	192	1.27	1100	1401

Notes:

1. All effluent metals concentrations are expressed at total recoverable, all concentrations are expressed as µg/L.
2. All concentrations of Cadmium collected since 1/10/01 were less than the analytical method detection limit, therefore the highest concentration was assumed to be ½ of the highest analytical detection method (i.e., ½ of 0.06 µg/L).
3. 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.
4. 107 samples of CN were collected and all concentrations of cyanide were less than the analytical method detection limit except 1 sample collected in June 2004. Since June 2004 only one other sample collected had CN detected at the analytical detection level (i.e., 5 µg/L). So the highest value was assumed to be at the analytical detection level.

<u>Background Concentration of Pollutant (C_u)</u>

The following table provides the background concentrations of each pollutant. The background samples were collected in the Boise River at Glenwood Monitoring Station located upstream of the West Boise facility at river mile (RM) 47.5. 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-6: Background Concentration at Glenwood Monitoring Station

Parameter	**Background Concentration[2]**
Arsenic (total recoverable)	3.7
Cadmium (dissolved)	0.1
Chromium III[1] (dissolved)	0.25
Chromium VI[1] (dissolved)	0.25
Copper (dissolved)	1.1
Lead (dissolved)	0.3
Mercury (total recoverable)	0.0043
Nickel (dissolved)	0.7
Selenium (total recoverable)	0.21
Silver (dissolved)	0.08
Zinc (dissolved)	6.0
Cyanide	0 (no data collected for this parameter)
Ammonia	22.5 Oct – Apr 22.5 May-Sept
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, mercury, 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, 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.

The EPA used the procedures outlined in Appendix A of the Metals Translator document to develop site specific translators for copper, and zinc. There was no side-by-side dissolved and total recoverable data collected at the monitoring station below the West Boise facility so the EPA assumed that the results would be similar to those at the Glenwood Monitoring Station which is below the City of Boise's Lander Street wastewater treatment plant. A translator of 0.7 was developed for copper, and a translator of 0.9 was developed for zinc. These values represent the geometric mean of the ratio of the dissolved to total recoverable data.

When using a translator, Equation 3 becomes

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

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.

<u>Reasonable Potential Analysis for Aquatic Life Criteria</u>

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

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

$$C_d = \frac{(0.7 \text{ X } 29.23 \text{ X } 24) + (1.1 \text{ X } (95.5 \text{ X } 0)}{24 + (95.5 \text{ X } 0)} = 20.46 \ \mu g/L$$

Since 20.46 µg/L is less than the acute criterion of 24.5 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-7: 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	95.5	24	3.7	4.70	0	1	4.70	340 (dissolved)	No
Cadmium	95.5	24	0.1	0.03	0	1	0.03	0.8 (dissolved)	No
Chrom III	95.5	24	0.25	0.95	0	1	0.95	344 (dissolved)	No
Chrom VI	95.5	24	0.25	0.95	0	1	0.95	15.7 (dissolved)	No
Copper	95.5	24	1.1	29.23	0	0.7	20.46	24.5 (dissolved)	No
Lead	95.5	24	0.3	1.93	0	1	1.93	67.2(dissolved)	No
Mercury	95.5	24	0.0043	0.025	0	1	0.025	2.1 (dissolved)	No
Nickel	95.5	24	0.7	23.81	0	1	23.81	278. (dissolved)	No
Selenium	95.5	24	0.21	1.14	0	NA	1.14	20 (total recoverable)	No
Silver	95.5	24	0.08	0.41	0	1	0.41	1.2(dissolved)	No
Zinc	95.5	24	6.0	104.54	0	0.9	94.06	69.5 (dissolved)	**YES**
Cyanide	95.5	24	0	5.00	0	NA	5.00	22 (WAD)	No
Ammonia	95.5	24	22.5	1401.48	0	NA	1401.48	1232	**YES**

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.

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

CHRONIC	Qu(chronic)	Qe	Cu	Ce	% MZ	Translator	Cd (chronic)	Chronic Criterion	Does Cd exceed the criterion
Arsenic	103.4	24	3.7	4.70	0	1	4.70	150 (dissolved)	No
Cadmium	103.4	24	0.1	0.03	0	1	0.03	0.4 (dissolved)	No
Chrom III	103.4	24	0.25	0.95	0	1	0.95	44.7 (dissolved)	No
Chrom VI	103.4	24	0.25	0.95	0	1	0.95	10.6 (dissolved)	No
Copper	103.4	24	1.1	29.23	0	0.7	20.46	17.3 (dissolved)	**YES**
Lead	103.4	24	0.3	1.93	0	1	1.93	2.6 (dissolved)	No
Mercury	103.4	24	0.0043	0.025	0	1	0.025	0.012 (total recoverable)	**YES**
Nickel	103.4	24	0.7	23.81	0	1	23.81	30.9 (dissolved)	No
Selenium	103.4	24	0.21	1.14	0	NA	1.14	5 (total recoverable)	No
Silver	103.4	24	0.08	0.41	0	1	0.41	NA	NA
Zinc	103.4	24	6.0	104.54	0	0.9	94.06	70.1 (dissolved)	**YES**
Cyanide	103.4	24	0	5.00	0	NA	5.00	5.0 WAD	No
Ammonia	142.4	24	22.5	1401.48	0	NA	1401.48	500	**YES**

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.

Table C-9: Acute Reasonable Potential Analysis for October - April Time Period – No Mixing Zone

Parameter	Qu (acute)	Qe	Cu	Ce	% MZ	Translator (T)	Cd(acute)	Acute criterion	Does Cd exceed the criterion
Arsenic	42.9	24	3.7	4.70	0	1	4.70	340 (dissolved)	No
Cadmium	42.9	24	0.1	0.03	0	1	0.03	0.8 (dissolved)	No
Chrom III	42.9	24	0.25	0.95	0	1	0.95	344 (dissolved)	No
Chrom VI	42.9	24	0.25	0.95	0	1	0.95	15.7 (dissolved)	No
Copper	42.9	24	1.1	29.23	0	0.7	20.46	24.5 (dissolved)	No
Lead	42.9	24	0.3	1.93	0	1	1.93	67.2(dissolved)	No
Mercury	42.9	24	0.0043	0.025	0	1	0.025	2.1 (dissolved)	No
Nickel	42.9	24	0.7	23.81	0	1	23.81	278 (dissolved)	No
Selenium	42.9	24	0.21	1.14	0	NA	1.14	20 (total recoverable)	No
Silver	42.9	24	0.08	0.41	0	1	0.41	1.2(dissolved)	No
Zinc	42.9	24	6.0	104.54	0	0.9	94.06	69.5 (dissolved)	**YES**
Cyanide	42.9	24	0	5.00	0	NA	5.00	22 (WAD)	No
Ammonia	42.9	24	22.5	1401.48	0	NA	13198	1039	**YES**

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.

Table C-10: Chronic Reasonable Potential Analysis for October - April Time Period – No Mixing Zone

Parameter	Qu (chronic)	Qe	Cu	Ce	% MZ	Translator	Cd (chronic)	Chronic Criterion	Does Cd exceed the criterion
Arsenic	47.9	24	3.7	4.70	0	1	4.70	150 (dissolved)	No
Cadmium	47.9	24	0.1	0.03	0	1	0.03	0.4 (dissolved)	No
Chrom III	47.9	24	0.25	0.95	0	1	0.95	44.7 (dissolved)	No
Chrom VI	47.9	24	0.25	0.95	0	1	0.95	10.6 (dissolved)	No
Copper	47.9	24	1.1	29.23	0	0.7	20.46	17.3 (dissolved)	**YES**
Lead	47.9	24	0.3	1.93	0	1	1.93	2.6 (dissolved)	No
Mercury	47.9	24	0.0043	0.025	0	1	0.025	0.012 (total recoverable)	**YES**
Nickel	47.9	24	0.7	23.81	0	1	23.81	30.9 (dissolved)	No
Selenium	47.9	24	0.21	1.14	0	NA	1.14	5 (total recoverable)	No
Silver	47.9	24	0.08	0.41	0	1	0.41	NA	NA
Zinc	47.9	24	6.0	104.54	0	0.9	94.05	70.1 (dissolved)	**YES**
Cyanide	47.9	24	0	5.00	0	NA	2.5	5.2 WAD	No
Ammonia	52	24	22.5	1401.48	0	NA	13198	551	**YES**

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.

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-11: 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**
Copper	No	**YES**	No	**YES**
Mercury	No	**YES**	No	**YES**
Zinc	**YES**	**YES**	**YES**	**YES**
Ammonia	**YES**	**YES**	**YES**	**YES**

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

Copper: 10% (applies year round to the chronic aquatic life criterion only)
Zinc: 25% (applies from October – April for the acute and chronic aquatic life criteria)
Zinc: 10% (applies May – September for the acute and chronic aquatic life criteria)
Ammonia: 25% (applies year round to the acute and chronic aquatic life criteria)

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 water body. 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 water body. 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 copper, 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-12, C-13, C-14, and C-15). 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-12: 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
Zinc	95.5	24	6.0	104.54	0.10	0.9	69.01	69.5 (dissolved)	No
Ammonia	95.5	24	22.5	1401.48	0.25	NA	713.79	1232	No

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-13: 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
Copper	103.4	24	1.1	29.23	0.10	0.7	14.63	17.3 (dissolved)	No
Mercury	103.4	24	0.0043	0.025	0	NA	0.025	0.012 (total recoverable)	Yes
Zinc	103.4	24	6.0	104.54	0.10	0.9	67.56	70.1 (dissolved)	No
Ammonia	142.4	24	22.5	1401.48	0.25	NA	577.79	500	**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-14: 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
Zinc	42.9	24	6.0	104.54	0.25	0.9	66.88	69.5 (dissolved)	No
Ammonia	42.9	24	22.5	13198	0.25	NA	9128.7	1039	**YES**

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

Table C-15: 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
Copper	47.9	24	1.1	29.23	0.1	0.7	17.24	17.3	No
Mercury	47.9	24	0.0043	0.025	0	NA	0.025	0.012 (total recoverable)	**YES**
Zinc	47.9	24	6.0	104.5	0.25	0.9	64.74	70.1 (dissolved)	No
Ammonia	52	24	22.5	13198	0.25	NA	8568.6	551	**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-16: Reasonable Potential Analysis for Arsenic – No Mixing Zone

	Qu	Qe	Cu	Ce	% MZ	Cd	HH criterion	Does Cd exceed the criterion
Arsenic	131.5	24	3.7	4.7	0	4.7	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. <u>*EPA's Gold Book Recommendation*</u>

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. <u>*Ambient Water Quality Criteria Recommendations: Rivers and Streams in Nutrient Ecoregion III*</u>

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. <u>*Nutrient Criteria Technical Guidance Manual, Rivers and Streams*</u>

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 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.

Throughout the Boise River there are numerous tributaries, agricultural drains, and municipal wastewater treatment plants discharging to 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 West Boise facility all the way to river mile 3.8 near the mouth of the Boise River. Table C-17 provides a summary of all of the total phosphorus data collected at different points along the Boise River. Table C-18 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-17 – 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	2	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-18 – 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	235	238 (100%)

1. The data for the Veterans Station (RM 50) 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 (RM 47.5) 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 (RM 42.8) 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 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:

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

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

$C_d = C_e$

A review of the West Boise effluent data from January 3, 2001 through July 29, 2009 (321 samples) found that the facility's lowest total phosphorus discharge was 2310 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 West Boise facility from January 2001 through July 2009, a total of 3129 samples were collected. The data ranged from 6.8 – 8.0 standard units, with an average value of 7.4 standard units.

The current permit requires the facility to discharge within a range of 6.5 – 9.0 standard units. The pH range of the effluent is well within the State's water quality criterion of 6.5 – 9.0 standard units, therefore no mixing zone is necessary for this discharge. The EPA is retaining the water quality based limits in the permit because the NPDES regulations require that the permit include the more stringent of either technology based limits or water quality based effluent limits. The federal regulations at 40 CFR 133 specify a technology based effluent limit (6.0 -9.0 s.u). Since there is no mixing zone the effluent must meet the water quality criterion for pH prior to mixing with the receiving water. If the technology based limits are included in the permit, the lower end of the water quality criterion (i.e., 6.5 s.u.) could be violated. Therefore the water quality based effluent limits (6.5 – 9.0 s.u.) will be retained in the permit.

IV. <u>REASONABLE POTENTIAL ANALYSIS FOR TEMPERATURE</u>

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 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 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.
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

[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

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."

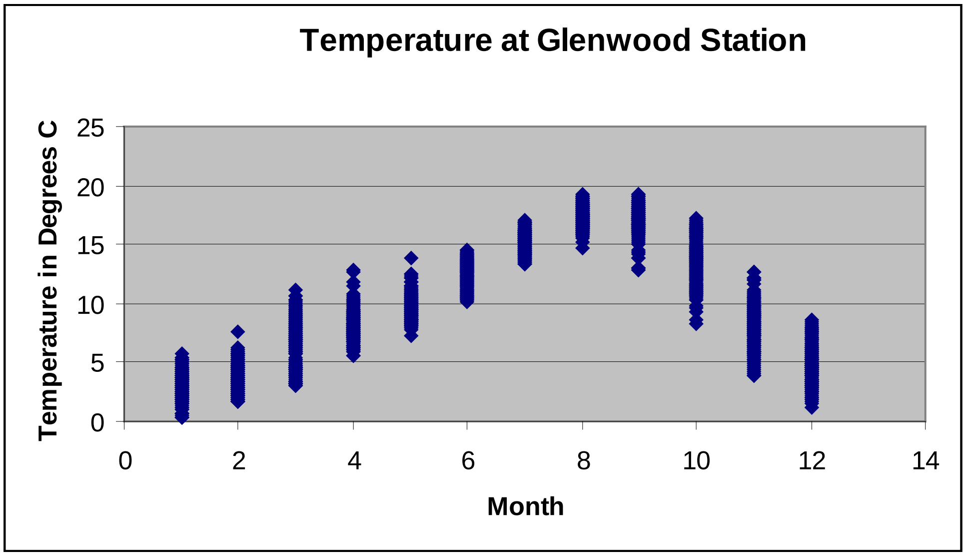
The federal regulation 40 CFR 122.44(d)(1)(ii) states that:

> "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 at Veterans Monitoring

Station, RM 50 (this station is located upstream of the Lander Street facility), and at the Glenwood Monitoring Station, RM 47.5 (this station is located downstream of the Lander Street facility and upstream of the West Boise facility). Daily temperature data was collected from January 1, 2001 through September 9, 2009. The City provided 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 Glenwood Station.



Because the temperatures at Glenwood station vary so much, the year was broken into the following time periods which will then be 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 and Max Daily = 13°C

For temperature the mass balance equation (equation 3) 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 November from 2001 to 2008 at Glenwood Station:

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

	Range	50th percentile	75th percentile	95th percentile	Number of Samples
Daily Maximum Temperature	4.5 – 14.2 °C	9.3 °C	10.5 °C	12.6 °C	240
Daily Average Temperature	3.8 – 13.2 °C	8.4 °C	9.6 °C	11.8 °C	240

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 over 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 in November at the West Boise facility from 2003 – 2008. Data collected prior to 2003 was not used because the effluent temperature was significantly lower than the effluent temperatures that occur from 2003 onward, therefore, EPA has determined that they do not adequately represent the current temperature of the effluent.

Table C-20 – Effluent Temperature Data, November

	Range	50th percentile	75th percentile	95th percentile	Number of Samples
Daily Maximum Temperature	14.9 – 20.5 °C	18.7 °C	19.3 °C	20.1 °C	181

As can be seen from the data above the effluent temperature is always greater than the average daily numeric temperature criterion of 9 °C and the maximum daily criterion of 13 °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.

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

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

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

	Range	50th percentile	75th percentile	95th percentile	Number of Samples
Daily Average Temperature	0.3 – 11.2 °C	4.1 °C	5.1 °C	7.3 °C	796
Daily Maximum Temperature	1.1 -12.6 °C	5.0 °C	6.1 °C	7.9 °C	796

As can be seen from the above data, the 95^{th} percentile of the data (which EPA Region 10 uses to represent the ambient data) is well below the salmonid spawning criteria, therefore it may be appropriate to allow a mixing zone.

The table below presents a summary of the daily maximum temperature data collected during the months December through February from 2003 to 2009, at the facility. Data collected prior to 2003 was not used because the effluent temperature was significantly lower than the effluent temperatures that occur from 2003 onward, therefore, EPA has determined that they do not adequately represent the current temperature of the effluent.

Table C 22 – Effluent Temperature Data, December - February

	Range	50th percentile	75th percentile	95th percentile	Number of Samples
Daily Maximum Temperature	12.9 – 18.5 °C	15.3 °C	15.9 °C	17.4 °C	600

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

C_e = maximum effluent temperature December-February = 18.5 °C
Q_e = maximum effluent flow = 24 mgd
C_u = upstream daily average temperature (95^{th} percentile) = 7.3 °C
Q_u = upstream flow = Oct – April: 47.9 mgd (7Q10 flow)
MZ = assume the State will allow a 25%

$$C_d = \frac{(18.5 \text{ X } 24) + (7.3 \text{ X } (47.9 \text{ X } 0.25))}{24 + (47.9 \text{ X } 0.25)} = 14.8\ °C$$

Since 14.8 °C is greater than the average daily criterion of 9 °C, a water quality based effluent limits is needed.

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

C_e = maximum effluent temperature December-February = 18.5 °C
Q_e = maximum effluent flow = 24 mgd
C_u = upstream daily maximum temperature (95^{th} percentile) = 7.9 °C
Q_u = upstream flow = Oct – April: 47.9 mgd (7Q10 flow)
MZ = assume the State will allow a 25%

$$C_d = \frac{(18.5 \times 24) + (7.9 \times (47.9 \times 0.25))}{24 + (47.9 \times 0.25)} = 15.0\ °C$$

15.0°C is greater than the daily max criterion of 13 °C, therefore the maximum daily criterion is exceeded, and a water quality based effluent limit is required.

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

Applicable criteria in March through May are Salmonid Spawning Criteria
Daily Average = 9°C and 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 March – May from 2001 to 2009 at Glenwood Station:

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

	Range	50th percentile	75th percentile	95th percentile	Number of Samples
Daily Maximum Temperature	3.6-17.9 °C	10.3 °C	11.6 °C	13.7 °C	757
Daily Average Temperature	3-13.8 °C	8.5 °C	9.7 °C	11.4 °C	757

As can be seen from the above data, the receiving stream exceeds the average daily salmonid spawning criterion of 9° C more than 25% 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 facility:

Table C 24, Effluent Temperature Data, March – May

	Range	50th percentile	75th percentile	95th percentile	Number of Samples
Daily Maximum Temperature	10.8 - 20.7 °C	16.6 °C	18 °C	19.7 °C	827

As can be seen from the data above the effluent temperature is always greater than the daily average criterion of 9 °C, and generally higher than the daily max numeric temperature criteria of

13 °C, 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) <u>June – October</u>

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

(a) June – July 15

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

The table below presents a summary of the daily temperature data gathered June 1– July 15 from 2001 to 2009 at Glenwood Station:

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

	Range	**50th percentile**	**75th percentile**	**95th percentile**	**Number of Samples**
Daily Maximum Temperature	10.8 – 19.3 °C	15.7 °C	16.7 °C	18.2 °C	402
Daily Average Temperature	9.9 – 16.8 °C	13.4 °C	14.3 °C	15.7 °C	402

From June 1 through July 15th 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 from June 1- July 15 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 15th from 2001 to 2009, at the facility:

Table C 26 – Effluent Temperature Data

	Range	50th percentile	75th percentile	95th percentile	Number of Samples
Daily Maximum Temperature	16.5 – 23.1 °C	21.1 °C	22.0 °C	22.8 °C	405

As can be seen from the data above the effluent temperature is always greater than the average daily (9°C) and maximum daily (13°C) 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 15th to ensure that water quality standards are met.

(b) July 16 – September 30

From July 16 through September 30 the cold water biota criteria are in effect. A summary of the water temperature at Glenwood Station during this time period is presented below:

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

	Range	50th percentile	75th percentile	95th percentile	Number of Samples
Daily Average Temperature	12.8 – 20.3 °C	17.2 °C	18.0 °C	19.2 °C	665
Daily Maximum Temperature	15.3 – 31.9 °C	19.1 °C	19.9 °C	21.2 °C	665

During this time period the receiving water exceeds the average daily criterion (19°C) more than 5% of the time, so a mixing zone is not appropriate. When a mixing zone is not authorized the equation above becomes:

$C_d = C_e$

Table C-28 presents a summary of the daily maximum temperature data collected from July 16 – September 30 2001 to 2009, at the facility. As can be seen from the table the effluent exceeds the average daily temperature criterion (19 °C) all of time, and the effluent exceeds the maximum daily temperature criterion (22 °C) at least 50 % of the time, therefore a water quality based effluent limit is needed.

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

	Range	50th percentile	75th percentile	95th percentile	Number of Samples
Daily Maximum Temperature	19.3 -25.3 °C	23.0 °C	23.5 °C	24.0 °C	630

(c) October

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

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

Table C 29 – Boise River Temperature Data, October

	Range	50th percentile	75th percentile	95th percentile	Number of Samples
Daily Maximum Temperature	7.5 – 19.4 °C	14.4 °C	15.7 °C	17.7 °C	248
Daily Average Temperature	6.7 – 18.0 °C	13.4 °C	14.6 °C	16.4 °C	248

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 in October from 2001 to 2009, at the facility:

Table C 30 – Effluent Temperature Data

	Range	50th percentile	75th percentile	95th percentile	Number of Samples
Daily Maximum Temperature	15.7 – 23.0 °C	20.6 °C	21.4 °C	22.1 °C	247

As can be seen from the data above the effluent temperature is always greater than the average daily (9°C) and maximum daily (13°C) 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 to ensure that water quality standards are met.

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

	Salmonid Spawning Criteria		Coldwater Biota Criteria	
	Daily Max	**Average Daily**	**Daily Max**	**Average Daily**
November	**Yes**	**Yes**	NA	NA
December-February	**Yes**	**Yes**	NA	NA
March-May	**Yes**	**Yes**	NA	NA
June - October				
July 1 – July 16	**Yes**	**Yes**	NA	NA
July 16 – Sept 30	NA	NA	**Yes**	**Yes**
Oct 1 – Oct 30	**Yes**	**Yes**	NA	NA

D. Proposed Revisions to the State's 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 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 West Boise effluent (Table C-32) and for Glenwood Station (Table C-33). In this case, the entire salmonid spawning season (i.e., November 1 – May 31) was reviewed when summarizing the temperature data.

[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.

TABLE C-32: West Boise Summary of Effluent Temperature in °C

	Minimum	Maximum	Median	95th percentile
Nov - May, MWMT	13.4	20.9	7.4	12.5
June – July 15	18.8	23.1	20.9	22.5
July 16- Sept 30	19.3	25.3	23.0	23.9
Oct	12.9	23.0	18.7	23.6

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

	Minimum	Maximum	Median	95th percentile	Mixing Zone Size
Nov - May, MWMT	1.4	14.5	7.4	12.5	Nov-Mar: 50% Apr-May:25%
June – July 15	9.9 (daily avg) 10.8 (daily max)	16.8 (daily avg) 19.3 (daily max)	13.4 (daily avg) 15.7 (daily max)	15.7 (daily avg) 18.2 (daily max)	25%
July 16 – Sept 30	12.8 (daily avg) 15.3 (daily max)	20.3 (daily avg) 31.9 (daily max)	17.2 (daily avg) 19.1 (daily max)	19.2 (daily avg) 21.2 (daily max)	0%
Oct	6.7 (daily avg) 7.5 (daily max)	18.0 (daily avg) 19.4 (daily max)	13.4 (daily avg) 14.4 (daily max)	16.4 (daily avg) 17.7 (daily max)	25%

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

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

C_e = represented by the maximum MWMT effluent data for salmonid spawning periods (November 1 – May 30), and the maximum of the data set for cold water biota periods (June 1 – Oct 31)
Q_e = maximum effluent flow = 24 mgd
C_u = represented by the 95th percentile of the MWMT data set at Glenwood Station for salmonid spawning periods, and the 95th percentile of the data set at Glenwood Station for cold water biota periods.
Q_u = upstream flow = Oct – April: 47.9 mgd (7Q10 flow): and May – Sept: 103.4 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 throughout the year. Therefore effluent limitations are needed year round.

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 draft 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 West Boise 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.

The WET tests performed with fathead minnow showed no toxicity was detected in any of the tests.

WET tests were performed on *Ceriodaphnia dubia*. The 1999 permit included a "trigger" (i.e., level at which toxicity occurs) of 2.0 TUc from April – September, and a trigger of 1.7 TUc from October - March. A summary of the *Ceriodaphnia dubia* results are provided in Table C-34, below. As can be seen from the table, there were 7 sampling events where the toxicity of the sample exceeded the applicable trigger.

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

Date	Survival[1]	Reproduction[1]	Comments
September 2001	1.0	1.0	
December 2001	1.0	1.0	
March 2002	1.0	1.0	
June 2002	6.45	7.25	
July 2002	<1.0	<1.0	
September 2002	<1.0	<1.0	
December 2002	1.0	1.0	
March 2003	1.0	1.0	
June 2003	3.8	>6.6	Accelerated testing and Toxicity Identification Evaluation (TIE) started [2]
July 2003	<1.0	<1.0	
September 2003	<1.0	<1.0	
December 2003	<1.0	<1.0	
June 2004	<1.0	<1.0	

September 2004	<1.0	<1.0	Untreated sample[2]
	<1.0	<1.0	Chlorinated/dechlorinated sample[2]
December 2004	<1.0	<1.0	
March 2005	<1.0	1.47	
July 2005	<1.0	<1.0	
September 2005	<1.0	<1.0	
December 2005	1.5	1.6	
March 2006	<1.0	1.5	
July 2006	<1.0	<1.0	
September 2006	<1.0	1.2	
January 2007	<1.0	<1.0	
March 2007	<1.0	<1.0	
July 2007	14.4	6.9	Untreated sample[2]
	<1.0	<1.0	Chlorinated/dechlorinated sample[2]
September 2007	<1.0	12.6	Untreated sample[2]
	<1.0	<1.0	Chlorinated/dechlorinated sample[2], result triggered accelerated testing, see October 2007 results
January 2008	<1.0	<1.0	Untreated sample[2]
	<1.0	<1.0	Chlorinated/dechlorinated sample[2]
March 2008	<1.0	<1.0	Untreated sample[2] QA problems, sample to be re-run, see April 2008 results
	<1.0	<1.0	Chlorinated/dechlorinated sample[2]
July 2008	<1.0	<1.0	Untreated sample[2]
	<1.0	<1.0	Chlorinated/dechlorinated sample[2]
	<1.0	<1.0	UV treated sample[3]
September 2008	<1.0	<1.0	Untreated sample[2]
	<1.0	<1.0	Chlorinated/dechlorinated sample[2]
	<1.0	<1.0	UV treated sample[3]
December 2008	<1.0	<1.0	Untreated sample[2]
	<1.0	<1.0	Chlorinated/dechlorinated sample[2]
March 2009	<1.0	<1.0	Untreated sample[2]
	<1.0	<1.0	Chlorinated/dechlorinated sample[2]
July 2009	<1.0	1.3	Untreated sample[2]
	<1.0	<1.0	Chlorinated/dechlorinated sample[2]
September 2009	<1.0	<1.0	Untreated sample[2]
	<1.0	<1.0	Chlorinated/dechlorinated sample[2]
March 2010	<1.0	<1.0	Untreated sample[2]
	<1.0	<1.0	Chlorinated/dechlorinated sample[2]
July 2010	<1.0	<1.0	

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 >6.6 chronic toxic units (TUc) for reproduction and 3.8 TUc for survival. 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 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 survival and 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.

The effluent has not had an elevated toxicity result (i.e., toxicity results greater than the toxicity triggers) since September 2007. 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 25%**,** which has been retained in this permit. The trigger for May – September is 2.0 TUc and the trigger for October – April is 1.5 TUc. It should be noted that the October to April trigger is slightly lower than the previous permit because ambient flow monitoring in the South Channel has provided more accurate flow results. The triggers were developed using the following mass balance equation:

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

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 = 24 mgd
C_u = upstream concentration of pollutant = 0 (no data available)
Q_u = upstream flow = 103.4 mgd (May – Sept); 47.9 mgd (Oct – April)
MZ = 25% =0.25

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

<u>May – Sept</u>

$$C_e = \frac{(C_d \text{ X } Q_d) - (C_u \text{ X } Q_u)}{Q_e} = \frac{(1 \text{ X } ((103.4 \text{ X } 0.25) + 24)) - (0 \text{X } 103.4 \text{ X } 0.25)}{24} = 2.0 \text{ TUc}$$

<u>October – March</u>

$$C_e = \frac{(C_d \text{ X } Q_d) - (C_u \text{ X } Q_u)}{Q_e} = \frac{(1 \text{ X } ((47.9 \text{ X } 0.25)+24)) - (0 \text{ X } 47.9 \text{ X } 0.25)}{24} = 1.5 \text{ TUc}$$

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

Additionally, 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. 48% from May through September and 67% 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 not needed for dissolved oxygen. 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 58.01.02.250.02.a requires surface waters to exceed dissolved oxygen concentrations of 6 mg/L at all times (i.e., July 16 – September 30).

D.O. saturation depends on the temperature of the river and the elevation of the facility. Temperature at the Glenwood Monitoring Station shows that the average daily temperature of the river varies from 0.34°C to 18.0 °C, with a median temperature of 8.2 °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 mass balance equation is used:

$$C_dQ_d = C_eQ_e + C_uQ_u$$

to determine the downstream concentration, the equation is solved for Cd:

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

If a mixing zone is not authorized, then the equation becomes:

$$C_d = C_e$$

In this case a mixing zone is not necessary because the effluent is well oxygenated.

(a) *October 1 – July 15*

The criterion is 7.9 mg/L. Effluent D.O. data was collected from 2001 – 2009. During this time period 280 samples were collected during the October 1 – July 15 time frame. The data ranged from 6.7 mg/L to 11.2 mg/L, with a median value of 9.2 mg/L. There were four samples that were less than 7.9 mg/L. These samples were as follows:
10/1/02 – 6.7 mg/L
10/7/03 – 7.4 mg/L
11/12/03 – 7.7 mg/L
1/13/03 – mg/L – 7.7 mg/L

Because the D.O. values are not significantly less than the criterion, are not acutely toxic, and less than 1.5 % of the samples were below the criterion, EPA is making the determination that the effluent is not causing or contributing to an exceedance of the water quality standard.

(b) *July 16 – September 30*

The criterion is 6.0 mg/L. Effluent D.O. data was collected from 2001 – 2009. During this time frame 168 samples were collected. The data ranged from 6.2 mg/L to 10.0 mg/L, with a median value of 8.0 mg/L. All values were greater than the criterion of 6.0 mg/L Therefore, the effluent is not causing or contributing to an exceedance of the water quality criterion.

(2) Revisions to the State Water Quality Standards

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:

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

Where,
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 = 8.3 mg/L
June - October = 7.3 mg/L

Q_e = maximum effluent flow = 24 mgd

C_u = minimum upstream D.O. concentration (5th percentile at Glenwood Monitoring Station)
November - May = 10.4 mg/L
June - October = 8.3 mg/L

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

In this case, a mixing zone is not needed. Because the effluent concentration always exceeds the applicable criterion therefore effluent limitations are not needed for dissolved oxygen.

(3) Far Field Analysis

When organic matter decomposes aerobic bacteria feed on it. 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 publicly owned wastewater treatment facilities allow the facilities to discharge BOD up to 45 mg/L in a day. However, the 1999 permit requires this facility to meet a maximum BOD concentration of 30 mg/L. In order 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 Facility:

- Flow – 103 mgd (7Q10)
- Temperature – 18.7° C, this value is the 95th percentile of the temperature data collected during the May – September time frame from 2001 to 2009 at the Glenwood monitoring station (upstream of the facility).
- BOD – 2.0 mg/L (assumed worst case value)
- Dissolved oxygen – 8.3 mg/L (5th percentile of the weekly data collected at Glenwood monitoring station from January 2001 – July 2009)

Effluent Characteristics:

- Flow – 24 mgd
- BOD – 30 mg/L (highest allowable BOD concentration)
- Dissolved oxygen – 6.2 mg/L (lowest observed effluent concentration using January 2001-July 2009 data)

Values Used to Estimate Dissolved Oxygen Saturation

- Temperature – 18.7° C (95th percentile of data collected at Glenwood monitoring station)
- Elevation – 2600 (from City of Boise 2010 NPDES application).

Based on the above inputs into the model, the model predicts that the lowest downstream concentration is 7.9 mg/L (within one mile of the facility), and the D.O concentration starts to increase after one mile. Because the downstream concentration is not less 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) EPA has determined that more stringent BOD limits are not needed at this time.

(b) *October - April*

River Conditions Upstream of the Facility:

- Flow – 47.9 mgd (7Q10)
- Temperature – 14.1° C, this value is the 95th percentile of the temperature data collected during the October to April time frame (2001 to 2009) at the Glenwood monitoring station (upstream of the facility).
- BOD – 2.0 mg/L (assumed worst case value)
- Dissolved oxygen – 9.8 mg/L (5th percentile of the data collected during the October – April time frame at Glenwood monitoring station (2001 –2009).

Effluent Characteristics:

- Flow – 24 mgd
- BOD – 30 mg/L (highest allowable BOD concentration)
- Dissolved oxygen – 6.7 mg/L (lowest observed effluent concentration during the October – April time frame (2001 to 2009)

Values Used to Estimate Dissolved Oxygen Saturation

- Temperature – 14.1 ° C (95th percentile of temperature data at Glenwood monitoring station)
- Elevation – 2600 (from City of Boise 2010 NPDES application)

Based on the above inputs into the model, the model predicts that the lowest downstream concentration is 8.7 mg/L, which is above both the salmonid spawning criterion and the cold water biota criterion. 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.

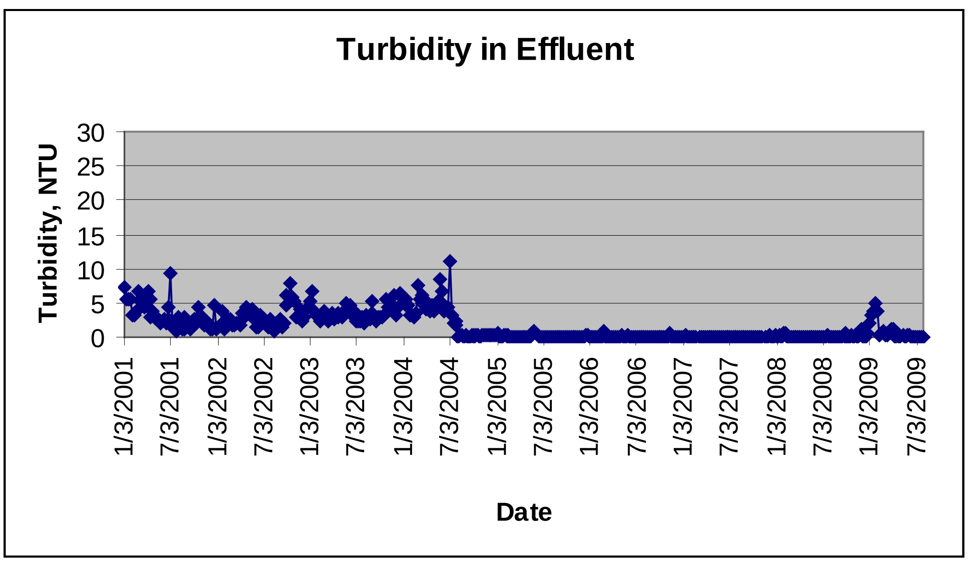
Applicable Water Quality Criterion

The Idaho water quality standards at IDAPA 58.01.02.250.02.e states 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 ambient turbidity data upstream of the West Boise facility from January 2001 to July 2009. During this time 88 turbidity samples were collected and they ranged from 1.2 NTU to 13.6 NTU with an average value of 3.3 NTU. To reflect a worst case scenario, the EPA used the 5^{th} percentile of the data set, 1.5 NTU, to represent the background turbidity level. Assuming no mixing zone will be authorized, the effluent should not exceed 50 NTU + 1.5 NTU = 51.5 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 445 samples which ranged from <0.045 NTU to 10.9 NTU with an average value of 1.6 NTU. The 99^{th} percentile of the effluent data is 7.4 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 50.5 NTU, and is always below 10 NTU with one exception in 2004, 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
West Boise Facility

As a result of either a TMDL 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, and temperature.

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).

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, and Part V discusses the development of the water quality based effluent limits for temperature.

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 West Boise 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 1998 *Lower Boise River TMDL* included the following WLAs for total suspended solids for the West Boise facility:

Monthly WLA	6200 lbs/day
Weekly WLA	9300 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 based on the TMDL are:

Average Monthly Limit	6200 lbs/day
Average Weekly Limit	9300 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:

Average Monthly Limit	31 mg/L (6200 lbs/day)
Average Weekly Limit	46.5 mg/L (9300 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. <u>Ammonia</u>

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.

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

C_d = water quality criterion
C_e = WLA
C_u = Maximum measured receiving water 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:

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

An example calculation is provided below for ammonia.

(1) <u>Ammonia, Outfall 001 (discharge to Boise River from May through September)</u>

C_d (acute) = 1232 µg/L
C_d (chronic) = 500 µg/L
$Q_{u(acute)}$ = 95.5 mgd from May - Sept
$Q_{u(chronic)}$ = 142.4 mgd from May – Sept
C_u = 22.5 µg/L
Q_e = 24 mgd
$C_{e(acute)} = WLA_{(acute)}$
$C_{e(chronic)} = WLA_{(chronic)}$
MZ (acute) = 25% (0.25)
MZ(chronic) = 25% (0.25)

$$WLA_{acute} = \frac{1232(95.5 \text{ X } 0.25) + (1232 \text{ X } 24)}{24} - \frac{[(22.5 \text{ X } (95.5 \text{ X } 0.25)]}{24} = 2435.2 \text{ µg/L}$$

$$\text{WLA}_{\text{chronic}} = \frac{500\ (142.4 \text{ X } 0.25) + (500 \text{ X } 24)}{24} - \frac{[(22.5 \text{ X } (142.4 \text{ X } 0.25)]}{24} = 1208.3\ \mu\text{g/L}$$

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 99th percentile probability basis

For Ammonia,

$CV = 1.1$
$\sigma^2 = \ln(1.1^2 + 1) = 0.79$
$\sigma = \sqrt{\sigma^2} = 0.89$
$\sigma_{30}^2 = \ln(1.1^2/30 + 1) = 0.04$
$\sigma_{30} = \sqrt{\sigma_4^2} = 0.2$
$z = 2.326$ for 99th percentile probability basis

Therefore,

$LTA_a = 456.2\ \mu g/L$
$LTA_c = 776.04\ \mu g/L$

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

$\sigma_n^2 = \ln(CV^2/n + 1) = 0.14$
$\sigma_n = \sqrt{\sigma_n^2} = 0.38$
$z_a = 1.645$ for 95^{th} percentile probability basis
$z_m = 2.326$ for 99^{th} percentile probability basis
n = number of sampling events required per month = 8
CV = 1.1

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

MDL = 456.2 X 5.34 = 2435 µg/L
AML = 456.2 X 1.73 = 788 µg/L

The associated mass based limits are derived as follows:

MDL = 2.435 X 8.34 X 24 = 487.4 lbs/day
AML =0.788 X 8.34 X 24 = 157.7 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) Ammonia, Outfall 001 (discharge to Boise River from October through April)

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

Acute criterion = 1039 µg/L
Chronic criterion = 551µg/L

WLA acute = 1493.3 µg/L
WLA chronic = 837.3 µg/L

LTA acute = 152.2 µg/L
LTA chronic = 334.6 µg/L

From October through April the water quality based effluent limits are:
MDL = 1493 µg/L (299 lbs/day)
AML = 398 µg/L (79.7 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)
$Q_{u(acute)}$ = 95.5 mgd from May - Sept; 42.9 mgd from Oct - Apr
$Q_{u(chronic)}$ = 103.4 mgd from May –Sept; 47.9 mgd from Oct - Apr
C_u = 0.0043 µg/L
Qe = 24 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,

$LTA_a = 0.67$ 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 24 = 0.004 lbs/day

AML = (0.009 ÷1000) X 8.34 X 24 = 0.002 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. In this case a mixing zone is not authorized, therefore the criteria are applied directly as the water quality based effluent limits (i.e., the pH of the effluent must be within the range of 6.5 – 9.0 standard units.

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 86.1 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 = 0.15 (CV of total phosphorus data collected at the West Boise facility from May through September 2001-2009)

n = number of samples required to be collected in a month = 4

$\sigma_n^2 = \ln(CV^2/n + 1) = \ln(0.15^2/4 + 1) = 0.006$ $\quad\sigma_n = 0.075$

$\sigma^2 = \ln(CV^2 + 1) = \ln(0.15^2 + 1) = 0.022$ $\quad\sigma = 0.15$

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

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

AML = 70 µg/L

AWL = 1.2 X 70 µg/L = 84 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 14 lbs/day, and the AWL mass load is 16.8 lbs/day.

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.

$C_dQ_d = C_eQ_e + C_uQ_u$ in this case,

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:

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

When no mixing zone is authorized then the equation becomes:

$C_e = WLA = C_d$

Because temperature is not a toxicant, the 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:

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

C_d = downstream average daily temperature
C_e = maximum allowable effluent temperature (i.e., proposed effluent limitation)
Q_e = maximum effluent flow = 24 mgd
C_u = upstream daily average temperature (95th percentile)
Q_u = upstream flow = Oct – April: 47.9 mgd (7Q10 flow); May - Sept: 103.4 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 is calculated as follows:

C_d = water quality criterion (allowable 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 below 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

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

C_d = water quality criterion = 9 °C
C_e = WLA
C_u = Maximum ambient daily average temperature measured upstream of facility (the 95th percentile of the data set is used) = 7.3 °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) = 24 mgd
Q_u = Receiving water low flow rate upstream of the discharge = 47.9 mgd
MZ = 25%

$$C_e = \text{WLA} = \frac{9\ (47.9 \times 0.25) + (9 \text{ X } 24)}{24} - \frac{(7.3 \times (47.9 \times 0.25))}{24}$$

C_e = WLA = 9.8 °C

(2) Aquatic Life Criteria, Maximum Daily Limit

C_d = 13 °C
C_e = WLA
Cu = 7.9 °C
Q_d = Qe + Qu
Q_e = 24 mgd
Q_u = 47.9 mgd
MZ = 25%

$$C_e = WLA = \frac{13(47.9 \times 0.25) + (13 \text{ X } 24)}{24} - \frac{(7.9 \times (47.9 \times 0.25))}{24}$$

C_e = WLA= 15.5 °C

Table D 1 - Summary of Effluent Limitation Calculation Based on Aquatic Life Criteria

Time Frame	Limitation	Cd	Qu	Mixing Zone	Qe	Cu	Ce (effluent limit)
December –February Salmonid Spawning	Avg Daily	9 °C	47.9 mgd	25 %	24 mgd	7.3 °C	9.8 °C
	Max Daily	13 °C	47.9 mgd	25 %	24 mgd	7.9 °C	15.5 °C
March – April 30 Salmonid Spawning	Avg Daily	9 °C	47.9 mgd	0 %	24 mgd	11.4 °C	9.0 °C
	Max Daily	13 °C	47.9 mgd	0 %	24 mgd	13.7 °C	13.0 °C
May 1- May 31 Salmonid Spawning	Avg Daily	9 °C	103.4 mgd	0 %	24 mgd	11.4 °C	9.0 °C
	Max Daily	13 °C	103.4 mgd	0 %	24 mgd	13.7 °C	13.0 °C
June 1 – July 15 Salmonid Spawning	Avg Daily	9 °C	103.4 mgd	0 %	24 mgd	18.8 °C	9.0 °C
	Daily Max	13 °C	103.4 mgd	0 %	24 mgd	20.7 °C	13.0 °C
July l6 – September 30 Cold Water Biota	Avg Daily	19 °C	103.4 mgd	0 %	24 mgd	18.8 °C	19 °C
	Max Daily	22 °C	103.4 mgd	0 %	24 mgd	20.7 °C	22 °C
October 1 – October 31 Salmonid Spawning	Avg Daily	9 °C	47.9 mgd	0 %	24 mgd	18.8 °C	9.0 °C
	Max Daily	13 °C	47.9 mgd	0 %	24 mgd	20.7 °C	13.0 °C
November 1 – November 30	Avg Daily	9 °C	47.9 mgd	0 %	24 mgd	11.8 °C	9.0 °C
	Max Daily	13 °C	47.9 mgd	0 %	24 mgd	12.6 °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 limits established in Table D 1 are sufficient to ensure that the temperature of the downstream water will not increase by more than 1 °C.

As seen in Table D 1, 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 = 9.8 °C
Q_e = maximum effluent flow = 24 mgd
C_u = upstream daily average temperature (95^{th} percentile) = 7.3 °C
Q_u = upstream flow = Oct – April: 47.9 mgd (7Q10 flow)
MZ = 25%

$$C_d = \frac{(9.8 \text{ X } 24) + (7.3 \text{ X } (47.9 \text{ X } 0.25)}{24 + (47.9 \text{ X } 0.25)} = 9.0\ °C$$

9.0 – 7.3 = 1.7 °C

The temperature increase of 1.7 °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:

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

$$C_e = \frac{(1+ 7.3) \text{ X } ((47.9 \text{ X } 0.25) + 24) – (7.3 \text{ X } (47.9 \text{ X } 0.25))}{24} = 8.8\ °C$$

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 limitation 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-2 – Proposed Effluent Limitations for Temperature

Date	Average Daily Limit	Maximum Daily Limit
December 1 – February 29	8.8 °C	15.5 °C
March 1 – July 15	9.0 °C	13.0 °C
July 16 – September 30	19 °C	22 °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 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-3 presents a summary of the effluent limit calculations, and Table D-4 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 3 - Summary of Effluent Limitation Calculation Based on Aquatic Life Criteria

Time Frame	Metric	Cd	Qu	Mixing Zone	Qe	Cu	Ce
November 1 – March 31 Salmonid Spawning	MWMT	13 °C	47.9 mgd	50 %	24 mgd	12.5 °C	13.5 °C
April Salmonid Spawning	MWMT	13 °C	47.9 mgd	25%	24 mgd	12.5 °C	13.3 °C
May Salmonid Spawning	MWMT	13 °C	103.4 mgd	25%	24 mgd	12.5	13.5 °C
June 1- July 15 Cold Water Biota	Avg Daily	19 °C	103.4 mgd	25%	24 mgd	15.7	22.6 °C
	Instantaneous Max	22 °C	103.4 mgd	25%	24 mgd	18.2	26.1 °C
July l6 – September 30 Cold Water Biota	Avg Daily	19 °C	103.4 mgd	0 %	24 mgd	19.2 °C	19.0 °C
	Instantaneous Max	22 °C	103.4 mgd	0 %	24 mgd	21.2 °C	22.0 °C
October Cold Water Biota	Avg Daily	19 °C	47.9 mgd	25%	24 mgd	16.4	20.3 °C
	Instantaneous Max	22 °C	47.9 mgd	25%	24 mgd	17.7	24.2 °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 = 95th percentile of the temperature data set when calculating limits from June 1-July 15, July 15 – September 30, and October; and the 95 percentile of the MWMT temperature data set for the salmonid spawning season (Nov 1 – May 31).

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

Q_e = Effluent flow rate (set equal to the design discharge of the facility)

Q_u = Receiving water low flow rate upstream of the discharge; 7Q10 flows were used. From October-April the 7Q10 is 47.9 mgd, and from May through September the 7Q10 is 103.4 mgd.

Table D-4 – Temperature Limitations Based on Revised Water Quality Standards

Date	MWMT	Average Daily Limit	Instantaneous Maximum Limit
Nov 1 – March 31	13.5	NA	NA
April	13.3 °C	NA	NA
May	13.5 °C	NA	NA
June – July 15	NA	22.6 °C	26.1 °C
July 16 – September 30	NA	19°C	22°C
October	NA	20.3 °C	24.2 °C

APPENDIX E

Summary of Effluent Data for Metals, Cyanide, and Ammonia
West Boise Facility

Note: All effluent metal 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	0.9	4.3	2.7	0.6	0.2	172	172 samples were collected between 3/7/01 – 7/15/09.
Cadmium	<0.02	0.6	NA	NA	NA	NA	Data was collected from 1/10/01 – 7/15/09. 17 samples collected from 1/10/01
							to 4/3/02 had a method detection level of 0.5. One of 17 samples detected
							cadmium at 0.6 µg/L. From 5/18/02 – 6/11/04, 56 samples were collected, the
							detection level was 0.02 µg/L and all samples were non-detect. From 7/7/04 –
							5/6/05, 16 samples were collected and all were non-detect at a detection
							level of 0.04 µg/L.
							From 6/8/05 – 1/11/06, 15 samples were collected and all were non-detects at
							the detection level of 0.06 µg/L . From 3/8/06 – 7/15/09 the
							detection level was 0.02 µg/L; 71 samples were collected and all were non
							detect. There was only one effluent sample (1/10/01) that had a detectable
							amount of cadmium. Since 1/10/01 all samples have had no detectable
							amount of cadmium.
Chromium	<0.05	0.8	0.37	0.16	0.4	170	Samples were collected from 3/7/01 – 7/15/09. Data collected from 3/7/01 to
							8/7/02 has a detection level of 0.5 µg/L. Data collected from 10/9/02 – 4/14/04
							had a detection level of 1.0 µg/L. Dala collected from 5/12/04-7/15/09 had
							a detection level of 0.5 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. Twenty five samples
							had detectable amounts of chromium.

Parameter	Min	Max	Average	Stddev	CV	Count	Comments
Copper	7.8	27.7	14.3	3.4	0.2	193	Samples were collected from 1/10/01 – 7/15/09.
Lead	0.21	1.7	0.5	0.2	0.5	189	Data was collected from 1/10/01 to 7/15/09. Samples that were less than the
							detection level were set to ½ of the detection level to derive the average,
							standard deviation, and CV. There were 7 samples that were non-detectable
							at a detection level of 0.3 µg/L.
Mercury	<0.001	0.0168	0.004	0.0025	0.6	96	Samples that were collected from 3/7/01 – 11/3/04 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 12/8/04 - 7/15/09 they used a method with a detection level
							of 0.002 µg/L (there were only 9 non-detects out of 96 samples).
							Only data from 12/8/04 - 7/15/09 was used for statistics and RP because the
							data is representative of the mercury concentrations in the effluent.
Nickel	1.0	18.6	3.2	2.0	0.6	172	Samples were collected from 3/7/01 to 7/15/09. Samples less than the
							detection level were set to ½ of the detection level in order to calculate the
							average, standard deviation and CV. Nine samples were non-detect at
							a detection level of 2 µg/L.
Selenium	<0.16	1.0	0.58	0.17	0.3	156	Data was collected from 2/6/02 to 7/15/09. Data collected from 2/6/02 to
							4/3/02 was not used because the detection level was so high (5 µg/L). Two of
							the sample results had detectable amounts of Se (i.e., 5 and 6 µg/L).
							However, since 4/3/02 the Se concentrations in the effluent have been
							significantly lower. Therefore, only sample results collected after 4/3/02
							were used to develop average, standard deviation, CV, and in the
							reasonable potential analysis. Samples less than the detection level were set
							to ½ the detection level to derive the average, standard deviation, CV
							There were 3 non-detect samples where the detection level was 0.16 µg/L
Silver	<0.02	0.28	0.08	0.08	1	172	Data was collected from 3/7/01 to 7/15/09.

Parameter	Min	Max	Average	Stddev	CV	Count	Comments
Zinc	43	100	60.2	9.1	0.15	170	Samples were collected from 3/7/01 – 7/15/09.
Cyanide	< 5.0	12	NA	NA	NA	107	Samples were collected 3/7/01 – 12/11/2010. There were only two samples
							that had detectable amounts of cyanide. One was collected on 6/9/04 and
							Was 12 µg/, and the other was collected on 12/6/07 and was 5 µg/L.
Ammonia	<45	9000	380	960	2.5	263	Samples were collected from 1/3/01 to 7/29/09.
(Oct-Apr)							
Ammonia	<45	1100	130	140	1.1	192	Samples were collected from 1/3/01 to 7/29/09.
(May-Sept)							

APPENDIX F

Concentration of Metals, Cyanide and Ammonia in the Boise River at Glenwood Monitoring Station

West Boise Facility

All sample results are in micrograms/Liter

Parameter	Background Concentration	Comments
Arsenic	3.7	100 samples were collected from Mar 6, 2001 - Jul 14, 2009.
(total recoverable)		The 95th percentile of the data set 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, even
		though one sample had a value of 5.1 µg/L (collected on March 6, 2001).
		This value was not used because the 99 samples
		collected since March 6, 2001 were all significantly less than this value. There were only two
		other samples that had detectable amounts of cadmium. One sample was detected at
		0.09 µg/L. on 10/10/02, and the other was 0.08 µg/L on 1/7/03.
		4 samples were non detect where the sample detection level was 0.05 µg/L
		28 samples were non detect at 0.12 µg/L
		66 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. 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)		All 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. The 95th
		percentile of this data set was used to represent the background concentration.
Copper	1.1	114 samples were collected from Jan 9, 2001 - Jul 14, 2009. 4 samples were non-detect
(dissolved)		where the sample detection level was 1.0 µg/L; 11 samples were non-detect where the
		sample detection level was 1.1 µg/L; all other samples were detects because the detection level
		was 0.2 µg/L. Each of the non-detects was set at a value equal to 1/2 of the detection level.
		The 95^{th} 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.
(dissolved)		21 samples were non-detect where the sample detection level was 0.6 µg/L.
		28 samples were collected where the sample detection level was 0.19 µg/L. There were 3
		samples where lead was detected (2/18/03 had 0.24 µg/L; 10/21/03 had 0.19 µg/L; and 3/9/04
		had 0.23 µg/L of lead).
		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. The 95th
		percentile of this data set was used to represent the background concentration.
Mercury	0.0043	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 21 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. The 95th
		percentile of this data set was used to represent the background.
Nickel	0.7	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. The 95th
		percentile of this data set was used to represent the background.
Selenium	0.21	46 samples were collected from Jun 4, 2002-Jun 2, 2009.
(total recoverable)		24samples were non detect where the sample detection level was 0.11 µg/L
		2 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. The 95th
		percentile of this data set was used to represent the background.

Parameter	Background Concentration	Comments
Silver	0.08	95 samples were collected from June 4, 2002 to July 14, 2009.
(dissolved)		6 samples were non-detect at 0.04 µg/L
		28 samples were non-detect at 0.16µg/L
		52 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. The 95th
		percentile of this data set was used to represent the background.
Zinc	6.0	98 samples were collected from March 6, 2001 to July 14, 2009
(dissolved)		26 samples were non detect at 5.0 µg/L
		7 samples were non detect at 1.0 µg/L
		11 samples were non detect at 3.0 µg/L
		7 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. The 95th
		percentile of this data set was used to represent the background.
Cyanide	0	No data was collected, use zero as background.
Ammonia		447 samples were collected from Jan 2, 2001 to Jul 28, 2009; 22 samples detected
May - Sept	22.5	ammonia. The highest value detected was 167 µg/L.
Oct - Apr	22.5	Each of the non-detects was set at a value equal to 1/2 of the detection level, then the 95th
		percentile of the 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-0023981, West Boise 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 West Boise WWTF effluent with regard to WQS 58.01.02.250.02 (b), upstream and downstream water temperature should 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.

Zinc Permit Limit

The permit establishes an average monthly limit for zinc that is based on an antidegradation analysis that was done prior to DEQ's adoption of antidegradation implementation procedures in the WQS. The EPA analysis regarding zinc is based on the determination that the Boise River is afforded Tier 2 protection for zinc using a pollutant-by-pollutant application of DEQ's antidegradation policy. DEQ, however, has adopted a waterbody-by-waterbody approach in its WQS, and under this approach, the level of protection applicable to the Boise River at the location of the West Boise WWTF effluent is Tier I. Therefore, the appropriate antidegradation review is to determine whether the limits protect existing uses through compliance with the applicable criteria. (See attached antidegradation review). Using a 25% mixing zone for the October through April time period, and a 10% mixing zone for May through September, there is no reasonable potential to exceed Idaho WQS for zinc. Therefore, the permit can be made less stringent by the removal of the zinc effluent limit and still comply with WQS.

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's modeling of natural temperatures needs to be updated and agreed upon by DEQ and EPA before natural conditions and their appropriate time of application could become the basis for alternate thermal effluent limits. The interim effluent limits for temperature are intended to be consistent with Idaho WQS.

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.

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. West Boise WWTF cannot immediately achieve compliance with the effluent limits for total phosphorus and temperature; 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 following limitations must be achieved by the dates cited.

TABLE 1: Effluent Limitation

Date	Effluent Limit
May 1 through September 30, 2013	Interim Limit not to exceed 5.8 mg/L, seasonal average
May 1 through September 30, 2014	Interim Limit not to exceed 5.8 mg/L, seasonal average
May 1 through September 30, 2015	Interim Limit not to exceed 5.8 mg/L, seasonal average
May 1 through September 30, 2016	Interim Limit not to exceed 600 µg/L, seasonal average
May 1 through September 30, 2017	Interim Limit not to exceed 500 µg/L, **monthly** average
10 years from effective date of permit	See Table 1, Part I.B.3

   b) The permitee must complete the tasks and reports described below.

(i) No later than April 26, 2013 the permittee must complete construction of the Struvite Production Facility. The permittee must submit a letter to EPA and IDEQ stating when construction is complete.

(ii) No later than July 1, 2013 UV Disinfection improvements must be complete. The permittee must submit a letter to IDEQ and EPA stating when construction is complete and when it is operational.

(iii) No later than April 30, 2016 the Enhanced Biological Nutrient Removal Modifications must be complete and operational. These modifications include the following:

- Modifications to chemical addition facility
- South plant primary clarifier mechanism replacements and modifications
- South plant secondary clarifier mechanisms and weirs
- New 400,000 gallon primary sludge fermentation tank
- New 250,000 gallon phosphate release tank
- Four new rotary drum thickeners

- Piping interconnects for return activated sludge, mixed liquor, primary influent, and primary effluent

(iv) The permittee must submit a letter to IDEQ and EPA stating when construction is complete and when it is operational.

(v) Evaluate options available to achieve the final effluent limitation, including, but not limited to, treatment plant upgrades, seasonal re-use of effluent, effluent trading projects, and the decommissioning the Lander Street wastewater treatment facility and consolidating all operations at the West Boise wastewater treatment facility.

(vi) Starting in 2013 and continuing through 2017 the permittee must submit a Report of Progress to IDEQ and EPA detailing the evaluation of each available option. Reports must be submitted by December 31 of each year.

(vii) No later than December 31, 2018 the permittee must decide on the final option that will be used to achieve the final effluent limits. At this time, the permittee must provide, to IDEQ and EPA, a preliminary schedule of design upgrades and a preliminary construction schedule that will be used to achieve compliance with the final limits.

Thereafter, by December 31st of each year, the permittee must provide a Report of Progress to IDEQ and 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.

(viii) 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 IDEQ and 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 Maximum Daily Average and final limitations must be achieved by the dates cited.

   - Interim Limits[1]:

January – March:	17.2 ° C
April – June:	22.1 ° C
July – September:	24.1 ° C

[1] Interim Temperature limits were developed based on the last nine years of operational and climatic conditions and the assumption that conditions during the Schedule of Compliance would be consistent with observed conditions during the last decade. These limits are not applicable if the Boise Airport Temperature for the annual, seasonal, or monthly period observed and reported by NOAA (http://www.wrh.noaa.gov/boi/climo.php) establishes a new high temperature record.

October –December: 22.4 ° 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 of 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 EPA and IDEQ detailing the evaluation of each available option. The 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. By December 31st of each year thereafter the permittee must provide a Report of Progress to IDEQ and 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.

(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 IDEQ and 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:

- 25% mixing zone for zinc (October through April);
- 10% mixing zone for zinc (May through September);
- 25% mixing zone for ammonia and whole effluent toxicity (year round); and a
- 10% mixing zone for copper (year round).

Temperature

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 volume of the Boise River for water temperature (December through February).

Proposed Water Quality Standards:

- 50% of the critical flow volumes of the Boise River for water temperature (November through March); and a
- 25% mixing zone for water temperature (April 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 West Boise 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 West Boise 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-0023981
West Boise 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, West Boise Wastewater Treatment Facility (West Boise 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, copper, zinc and temperature. Effluent limitations have been developed for BOD, TSS, *E. coli*, pH, ammonia, mercury, zinc, total phosphorus and temperature.

Receiving Water Body Level of Protection

The West Boise 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 (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 West Boise WWTP permit are set at levels that ensure compliance with the narrative and numeric criteria in the WQS. [The effluent limitation for zinc is stringent enough to meet WQS, but may be made less stringent and still comply with 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 wasteload allocations are designed to ensure the Boise River will achieve the quality necessary to support its existing and designated aquatic life beneficial uses and comply with the applicable numeric and narrative criteria. The effluent limitations and associated requirements contained in the West Boise WWTP permit are set at levels that are consistent with these WLAs.

In sum, the effluent limitations and associated requirements contained in the West Boise 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.