Fact Sheet

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:

City of Caldwell Wastewater Treatment Plant
504 Johnson Lane
Caldwell, ID 83605

Public Comment Start Date: July 23, 2015
Public Comment Expiration Date: September 21, 2015

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206-553-6251
800-424-4372, ext. 6251 (within Alaska, Idaho, Oregon and Washington)
Nickel.Brian@epa.gov

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

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

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

Regional Administrator
Idaho Department of Environmental Quality
1445 North Orchard St.
Boise, ID 83706
(208) 373-0550

Public Comment

Persons wishing to comment on, or request a Public Hearing for the draft permit for this facility may do so in writing by the expiration date of the Public Comment period. A request for a 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 Public Hearings must be in writing and should be submitted to the EPA as described in the Public Comments Section of the attached Public Notice.

After the Public Notice expires, and all comments have been considered, the EPA's regional Director for the Office of Water and Watersheds will make a final decision regarding permit issuance. 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 substantive comments are received, the EPA will address the comments and issue the permit. 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 pursuant to 40 CFR 124.19.

Documents are Available for Review

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

United States Environmental Protection Agency
Region 10
1200 Sixth Avenue OWW-191
Seattle, Washington 98101
(206) 553-0523 or
Toll Free 1-800-424-4372 (within Alaska, Idaho, Oregon and Washington)

The fact sheet and draft permits are also available at:

EPA Idaho Operations Office
950 West Bannock
Suite 900
Boise, ID 83702

Idaho DEQ Boise Regional Office
1445 N. Orchard St.
Boise, ID 83706
(208) 373-0550

Caldwell Public Library
1010 Dearborn St.
Caldwell, ID 83605
(208) 459-3242

Nampa Public Library
101 11th Ave. S.
Nampa, ID 83651
(208) 468-5800

Cherry Lane Library
1326 W. Cherry Ln.
Meridian, ID 83642
(208) 888-4451

Silverstone Branch Library
3531 E. Overland Rd.
Meridian, ID 83642
(208) 884-2616

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Acronyms

1Q10	1 day, 10 year low flow
7Q10	7 day, 10 year low flow
30B3	Biologically-based design flow intended to ensure an excursion frequency of less than once every three years, for a 30-day average flow.
30Q10	30 day, 10 year low flow
30Q5	30 day, 5 year low flow
ACR	Acute-to-Chronic Ratio
AML	Average Monthly Limit
AWL	Average Weekly Limit
BOD_5	Biochemical oxygen demand, five-day
BMP	Best Management Practices
°C	Degrees Celsius
CFR	Code of Federal Regulations
CFS	Cubic Feet per Second
CV	Coefficient of Variation
CWA	Clean Water Act
DMR	Discharge Monitoring Report
DO	Dissolved oxygen
EFH	Essential Fish Habitat
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FR	Federal Register
HUC	Hydrologic Unit Code
IC	Inhibition Concentration
ICIS	Integrated Compliance Information System
IDEQ	Idaho Department of Environmental Quality
I/I	Infiltration and Inflow
LA	Load Allocation
lbs/day	Pounds per day
LTA	Long Term Average
mg/L	Milligrams per liter

ml	milliliters
ML	Minimum Level
µg/L	Micrograms per liter
mgd	Million gallons per day
MDL	Maximum Daily Limit or Method Detection Limit
N	Nitrogen
NOAA	National Oceanic and Atmospheric Administration
NOEC	No Observable Effect Concentration
NPDES	National Pollutant Discharge Elimination System
NWIS	National Water Information System
OWW	Office of Water and Watersheds
O&M	Operations and maintenance
POTW	Publicly owned treatment works
QAP	Quality assurance plan
RP	Reasonable Potential
RPM	Reasonable Potential Multiplier
RWC	Receiving Water Concentration
SS	Suspended Solids
SSO	Sanitary Sewer Overflow
STORET	STOrage and RETrieval
s.u.	Standard Units
TKN	Total Kjeldahl Nitrogen
TMDL	Total Maximum Daily Load
TRC	Total Residual Chlorine
TRE	Toxicity Reduction Evaluation
TSD	Technical Support Document for Water Quality-based Toxics Control (EPA/505/2-90-001)
TSS	Total suspended solids
TU_a	Toxic Units, Acute
TU_c	Toxic Units, Chronic
USFWS	U.S. Fish and Wildlife Service
USGS	United States Geological Survey

UV	Ultraviolet
WET	Whole Effluent Toxicity
WLA	Wasteload allocation
WQBEL	Water quality-based effluent limit
WQS	Water Quality Standards
WWTP	Wastewater treatment plant

I. Applicant

A. General Information

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

City of Caldwell
Wastewater Treatment Plant
NPDES Permit #ID0021504

Physical Address:
504 Johnson Lane
Caldwell, ID 83605

Mailing Address:
621 East Cleveland Blvd
Caldwell, ID 83605

Contact:
Salvador Arreola

B. Permit History

The most recent NPDES permit for the City of Caldwell Wastewater Treatment Plant (WWTP) was issued on December 29, 1998, became effective on February 1, 1999, and expired on February 2, 2004. An NPDES application for permit issuance was submitted by the permittee on June 10, 2003. The EPA determined that the application was timely and complete. Therefore, pursuant to 40 CFR 122.6, the permit has been administratively extended and remains fully effective and enforceable.

II. Facility Information

A. Treatment Plant Description

The City of Caldwell owns, operates, and maintains a WWTP located in Caldwell, Idaho. The secondary treatment plant discharges treated municipal wastewater to the Boise River. The collection system has no combined sewers. The facility serves a resident population of 30,000. The average design flow of the facility is 8.5 mgd. Details about the wastewater treatment process and a map showing the location of the treatment facility and discharge are included in Appendix A.

B. Compliance History

In the past five years, the permittee has generally been in compliance with the effluent limits in the 1999 permit with the following exceptions listed in Table 1 below.

Table 1: City of Caldwell Effluent Limit Violations 2008 - 2013

Parameter	Statistic	Units	Number of Instances
Total Ammonia as N	Daily Maximum	mg/L	7
Total Ammonia as N	Daily Maximum	lb/day	5
Total Ammonia as N	Monthly Average	mg/L	5
Total Ammonia as N	Monthly Average	lb/day	3
Total Suspended Solids	Monthly Average	mg/L	1
Total Suspended Solids	Weekly Average	mg/L	2
Total Suspended Solids	Weekly Average	lb/day	1

III. Receiving Water

This facility discharges to the Boise River near Caldwell, Idaho. The outfall is located downstream (west) of the Chicago Street bridge and upstream of Indian Creek.

A. Low Flow Conditions

The low flow conditions of a water body are used to assess the need for and develop water quality based effluent limits (see Appendix C of this fact sheet for additional information on flows).

A total of 95 river flow measurements were available for the Boise River near Caldwell from the USGS National Water Information System (NWIS) and the EPA's STOrage and RETrieval (STORET) Data Warehouse.[1] The EPA used these flow data to estimate the low flow conditions for the Boise River at Caldwell.

At the time the 1999 permit was developed, the low flow conditions were calculated for three seasons: March – June, July – October, and November – February. For the draft permit, the EPA has re-evaluated the seasons used to calculate low flows. The estimated low flows for April, May and June are relatively low. Flows during the rest of the year (July – March) are relatively high.

Therefore, the EPA has determined that the March – June season used in the previous permit should be changed to April – June, and the other two seasons used to develop effluent limits in the previous permit should be merged into one. Calculating the effluent limits based on two seasons instead of three simplifies the effluent limits without sacrificing water quality or flexibility for the permittee. Table 1, below, presents the estimated low flow values.

[1] The City of Caldwell was required under its prior permit to monitor the river flow from 1999 – 2001. However, only monthly average river flows were recorded in the EPA's Integrated Compliance Information System (ICIS) database. The monthly average flows cannot be used to estimate the critical low flows of the Boise River. The minimum monthly average river flow measured by the City was 512 CFS and the average of the monthly average flows was 859 CFS.

Table 1: Estimated Low Flows in the Boise River at Caldwell			
Season	**1Q10 (CFS)**	**7Q10 (CFS)**	**30Q5 (CFS)**
April – June	68	88	123
July – March	133	172	241

B. Water Quality Standards

Overview

Section 301(b)(1)(C) of the Clean Water Act (CWA) requires the development of limitations in permits necessary to meet water quality standards. 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.

The use classification system designates the beneficial uses that each water body is expected to achieve, such as drinking water supply, contact recreation, and aquatic life. The numeric and narrative water quality criteria are the criteria deemed necessary by the State to support the beneficial use classification of each water body. The anti-degradation policy represents a three-tiered approach to maintain and protect various levels of water quality and uses.

Designated Beneficial Uses

This facility discharges to the Boise River in the Lower Boise watershed (HUC 17050114), Water Body Unit SW-5 (river mile 50 to Indian Creek). At the point of discharge, the Boise River is protected for the following designated uses (IDAPA 58.01.02.140.12):

- cold water aquatic life
- salmonid spawning
- primary contact recreation

In addition, Water Quality Standards state that all waters of the State of Idaho are protected for industrial and agricultural water supply, wildlife habitats and aesthetics (IDAPA 58.01.02.100.03.b and c, 100.04 and 100.05).

Surface Water Quality Criteria

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 for this reach of the Boise River, for temperature and dissolved oxygen, can be found at IDAPA 58.01.02.278.

The numeric and narrative water quality criteria applicable to the Boise River at the point of discharge are summarized in Appendix B of this fact sheet.

Antidegradation

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 (see State Certification).

C. 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 a TMDL for the lower Boise River. The TMDL included wasteload allocations for TSS and bacteria for City of Caldwell facility. The permit includes water quality-based effluent limits for TSS and bacteria that are consistent with the wasteload allocations in the TMDL.

The State of Idaho's 2012 Integrated Report Section 5 (the 303(d) list) lists the segments of the Boise River from Middleton to Indian Creek and from Indian Creek to the mouth as impaired for temperature and total phosphorus (TP). IDEQ has completed a draft TMDL for TP, and the draft permit proposes effluent limits consistent with the assumptions and requirements of the WLAs in the draft TP TMDL. The EPA has determined that the discharge has the reasonable potential to cause or contribute to excursions above water quality standards for total phosphorus, therefore, the permit proposes water quality-based effluent limits for phosphorus. See Appendix F for more details about the proposed TP limits.

No TMDL has been completed for temperature. However, the EPA must nonetheless evaluate whether water quality-based effluent limits are necessary for temperature under CWA regulations at 40 CFR 122.44(d)(1)(i – iii), and assure that any such effluent limits are derived from and comply with applicable water quality standards (40 CFR 122.44(d)(1)(vii)(A)).

At this time, the EPA does not have sufficient data to determine whether or not the City of Caldwell's discharge of heat to the Boise River has the reasonable potential to cause or contribute to excursions above water quality standards for temperature. The permit proposes continuous monitoring of the effluent and the receiving waters, for temperature.

IV. Effluent Limitations

A. Basis for Effluent Limitations

In general, the CWA requires that the effluent limits for a particular pollutant be the more stringent of either technology-based limits or water quality-based limits. Technology-based limits are set according to the level of treatment that is achievable using available technology. A water quality-based effluent limit is designed to ensure that the water quality standards applicable to a waterbody are being met and may be more stringent than technology-based effluent limits. The basis for the effluent limits proposed in the draft permit is provided in Appendices D, E, F and G.

B. Proposed Effluent Limitations

The following summarizes the proposed effluent limits that are in the draft permit.

1. The permittee must not discharge floating, suspended, or submerged matter of any kind in concentrations causing nuisance or objectionable conditions or that may impair designated beneficial uses.
2. Removal Requirements for BOD_5 and TSS: The monthly average effluent concentration must not exceed 15 percent of the monthly average influent concentration. Percent removal of BOD_5 and TSS must be reported on the Discharge Monitoring Reports (DMRs). For each parameter, the monthly average percent removal must be calculated from the arithmetic mean of the influent values and the arithmetic mean of the effluent values for that month. Influent and effluent samples must be taken over approximately the same time period.

Table 2, below presents the proposed effluent limits.

Table 2: Proposed Effluent Limits

Parameter	Units	Effluent Limits		
		Average Monthly Limit	Average Weekly Limit	Maximum Daily Limit
Five-Day Biochemical Oxygen Demand (BOD_5)	mg/L	30	45	—
	lb/day	2127	3190	—
	% Removal	85% (min.)	—	—

Table 2: Proposed Effluent Limits				
Parameter	**Units**	**Effluent Limits**		
		Average Monthly Limit	**Average Weekly Limit**	**Maximum Daily Limit**
Total Suspended Solids (TSS)	mg/L	30	45	—
	lb/day	2125	3183	—
	% Removal	85% (min.)	—	—
pH	s.u.	6.5 – 9.0 at all times		
Dissolved Oxygen	mg/L	6.0 minimum		
	% of saturation	90% minimum		
E. coli	#/100 ml	126 (geometric mean)	—	406 (instantaneous maximum)
Total Phosphorus as P (May – September)	lb/day	7.1	17	—
Total Phosphorus as P (October – April)	lb/day	24.8	58.3	—
Total Ammonia as N (April – June)	mg/L	1.55	—	5.83
	lb/day	110	—	413
Total Ammonia as N (July – March)	mg/L	2.70	—	8.93
	lb/day	191	—	633
Copper, Total Recoverable (April – June)	µg/L	19.8	—	39.6
	lb/day	1.40	—	2.81
Copper, Total Recoverable (July – March)	µg/L	29.3	—	58.8
	lb/day	2.08	—	4.17
Nickel, Total Recoverable (April – June)	µg/L	79.2	—	253
	lb/day	5.61	—	17.9
Nickel, Total Recoverable (July – March)	µg/L	126	—	404
	lb/day	8.93	—	28.6
Whole Effluent Toxicity (April – June)	TU_c	1.61	—	4.81
Whole Effluent Toxicity (July – March)	TU_c	2.58	—	7.68

C. Schedules of Compliance

Schedules of compliance are authorized by federal NPDES regulations at 40 CFR 122.47 and by Section 400.03 of the Idaho Water Quality Standards. The Idaho water quality standards allow for compliance schedules "when new limitations are in the permit for the first time." The federal regulation allows schedules of compliance "when appropriate," and requires that such schedules require compliance as soon as possible. When the compliance schedule is longer than 1 year, federal regulations require that 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. Federal regulations also generally require that interim effluent limits be at least as stringent as the final limits in the previous permit (40 CFR 122.44(l)(1)).

EPA policy states that, in order to grant a compliance schedule, a permitting authority must make a reasonable finding that the permittee cannot comply with the effluent limit immediately upon the effective date of the final permit (see the *US EPA NPDES Permit*

Writers' Manual at Section 9.1.3). Some of the proposed effluent limits for copper, nickel, phosphorus, and whole effluent toxicity (WET) are new limits that are in the permit for the first time. The EPA has evaluated the City of Caldwell's effluent data to determine whether the City could consistently comply with the new water quality-based effluent limits in the draft permit. Table 3, below, summarizes this evaluation. The draft permit proposes schedules of compliance for those new water quality-based effluent limits that are not achievable immediately upon the effective date of the final permit.

Table 3: Immediate Achievability of New Water Quality-based Effluent Limits

Parameter	Season	Achievable Immediately?
Copper	April – June	Yes
	July – March	Yes
Nickel	April – June	Yes
	July – March	Yes
Phosphorus	May – September	No
Phosphorus	October – April	No
WET	April – June	No
	July – March	No

In its draft Clean Water Act Section 401 certification, the State of Idaho proposed to authorize compliance schedules for all of the effluent limits listed in Table 3, above, that the City could not comply with immediately. Consistent with federal regulations (40 CFR 122.47(a)(3)), the schedules of compliance include interim milestones and reports of progress. The State of Idaho also specified interim limits for phosphorus and WET, which apply during the terms of the compliance schedules.

D. Basis for Deleting Total Residual Chlorine Limits and for Less-Stringent Ammonia Limits

Statutory Prohibitions on Backsliding

Section 402(o) of the Clean Water Act (CWA) and 40 CFR 122.44(l) generally prohibit the establishment of effluent limits in a reissued NPDES permit that are less stringent than the corresponding limits in the previous permit (i.e. "backsliding") but provides limited exceptions. Section 402(o)(1) of the CWA states that a permit may not be reissued with less-stringent limits established based on Sections 301(b)(1)(C), 303(d) or 303(e) (i.e. water quality-based limits or limits established in accordance with State treatment standards) except in compliance with Section 303(d)(4). Section 402(o)(1) also prohibits backsliding on technology-based effluent limits established using best professional judgment (i.e. based on Section 402(a)(1)(B)), but in this case, the effluent limits being revised are water quality-based effluent limits (WQBELs).

Section 303(d)(4) of the CWA states that, for water bodies where the water quality meets or exceeds the level necessary to support the water body's designated uses, WQBELs may be revised as long as the revision is consistent with the State's antidegradation policy. Additionally, Section 402(o)(2) contains exceptions to the general prohibition on backsliding in 402(o)(1). According to the *U.S. EPA NPDES Permit Writers' Manual* (EPA-833-K-10-

001) the 402(o)(2) exceptions are applicable to WQBELs (except for 402(o)(2)(B)(ii) and 402(o)(2)(D)) and are independent of the requirements of 303(d)(4). Therefore, WQBELs may be relaxed as long as either the 402(o)(2) exceptions or the requirements of 303(d)(4) are satisfied.

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

Total Residual Chlorine

The draft permit proposes to remove the total residual chlorine effluent limits that were in the prior permit. After the prior permit became effective in 1999, the chlorine disinfection system was replaced with ultraviolet disinfection, and the upgraded facility does not have a backup chlorine disinfection system. There is no longer a source of chlorine in the discharge, therefore, the facility is not subject to any technology-based effluent limits for chlorine and the facility does not have the reasonable potential to cause or contribute to excursions above WQS for chlorine, thus it does not require water quality-based effluent limits for chlorine.

One of the exceptions to the general prohibition on less-stringent effluent limits is "material and substantial alterations or additions to the permitted facility occurred after permit issuance which justify the application of a less stringent effluent limitation" (CWA Section 402(o)(2)(A)). The replacement of the chlorine disinfection system with ultraviolet disinfection is a material and substantial alteration to the permitted facility, which occurred after the 1999 permit was issued, and which justifies the deletion of the chlorine effluent limits.

Total Ammonia as N

The draft permit proposes less-stringent effluent limits for Total Ammonia as N relative to the prior permit from March – June and from November – February. As shown in Table 1, above, the City has at times violated the ammonia effluent limits in the prior permit. When the EPA re-calculated effluent limits for ammonia based on current water quality criteria and recent effluent variability, the resulting limits were less stringent than those in the prior permit, except from July – October.

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

V. Monitoring Requirements

A. Basis for Effluent and Surface Water Monitoring

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 and/or to monitor effluent impacts on receiving water quality.

The permit also requires the permittee to perform effluent monitoring required by parts B.6 and D of the NPDES Form 2A application, so that these data will be available when the permittee applies for a renewal of its NPDES permit.

The permittee is responsible for conducting the monitoring and for reporting results on DMRs or on the application for renewal, as appropriate, to the EPA.

B. Effluent Monitoring

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

Table 4, below, presents the proposed effluent monitoring requirements for the City of Caldwell. The sampling location must be after the last treatment unit and prior to discharge to the receiving water. The samples must be representative of the volume and nature of the monitored discharge. If no discharge occurs during the reporting period, "no discharge" shall be reported on the DMR.

Table 4: Effluent Monitoring Requirements

Parameter	Units	Sample Location	Sample Frequency	Sample Type
Flow	mgd	Effluent	Continuous	recording
Temperature	°C	Effluent	Continuous	recording
BOD_5	mg/L	Influent & Effluent	1/week	24-hour composite
	lb/day	Influent & Effluent		calculation[1]
	% Removal	% Removal	1/month	calculation[2]
TSS	mg/L	Influent & Effluent	2/week	24-hour composite
	lb/day	Influent & Effluent		calculation[1]
	% Removal	% Removal	1/month	calculation[2]
pH	standard units	Effluent	5/week	grab
E. Coli	#/100 ml	Effluent	10/month	grab
Total Phosphorus as P	mg/L	Effluent	2/week	24-hour composite
	lb/day	Effluent		calculation[1]
Total Phosphorus as P	mg/L	Influent	1/month	24-hour composite
Total Ammonia as N (July – March)	mg/L	Effluent	1/week	24-hour composite
	lb/day	Effluent		calculation[1]
Total Ammonia as N (April – June)	mg/L	Effluent	2/week	24-hour composite
	lb/day	Effluent		calculation[1]
Copper, total recoverable	µg/L	Effluent	1/month	24-hour composite
	lb/day	Effluent		calculation[1]
	µg/L	Influent	2/year[3]	24-hour composite
	mg/kg	Sludge	2/year[4]	24-hour composite
Nickel, total recoverable	µg/L	Effluent	1/month	24-hour composite
	lb/day	Effluent		calculation[1]
	µg/L	Influent	2/year[3]	24-hour composite
	mg/kg	Sludge	2/year[4]	24-hour composite
Whole Effluent Toxicity	TU_c	Effluent	1/quarter	24-hour composite
Nitrate + Nitrite	mg/L	Effluent	1/month	24-hour composite
Total Kjeldahl Nitrogen	mg/L	Effluent	1/month	24-hour composite
Soluble Reactive Phosphorus	mg/L	Effluent	1/month	24-hour composite

Table 4: Effluent Monitoring Requirements				
Parameter	**Units**	**Sample Location**	**Sample Frequency**	**Sample Type**
Arsenic, Total	µg/L	Influent & effluent	2/year[3]	24-hour composite
	mg/kg	Sludge	2/year[4]	
Cadmium, Total Recoverable	µg/L	Influent & effluent	2/year[3]	24-hour composite
	mg/kg	Sludge	2/year[4]	
Chromium, Total	µg/L	Influent & effluent	2/year[3]	24-hour composite
	mg/kg	Sludge	2/year[4]	
Chromium VI, Dissolved	µg/L	Influent & effluent	2/year[3]	24-hour composite
Conductivity	µmhos/ cm	Effluent	1/month	24-hour composite
Cyanide, weak acid dissociable	µg/L	Influent & effluent	2/year[3]	24-hour composite
	mg/kg	Sludge	2/year[4]	
Dissolved organic carbon	mg/L	Effluent	1/month	24-hour composite
Hardness	mg/L as $CaCO_3$	Effluent	1/month	24-hour composite
Lead, Total Recoverable	µg/L	Influent & effluent	2/year[3]	24-hour composite
	mg/kg	Sludge	2/year[4]	
Mercury, Total	µg/L	Effluent	1/quarter	24-hour composite
	µg/L	Influent	2/year[3]	24-hour composite
	mg/kg	Sludge	2/year[4]	24-hour composite
Molybdenum, Total	µg/L	Influent & effluent	2/year[3]	24-hour composite
	mg/kg	Sludge	2/year[4]	
Selenium	µg/L	Influent & effluent	2/year[3]	24-hour composite
	mg/kg	Sludge	2/year[4]	
Silver, Total Recoverable	µg/L	Influent & effluent	2/year[3]	24-hour composite
	mg/kg	Sludge	2/year[4]	
NPDES Application Form 2A Expanded Effluent Testing	—	Effluent	3x/5 years	—
Zinc, Total Recoverable	µg/L	Influent & effluent	2/year[3]	24-hour composite
	mg/kg	Sludge	2/year[4]	

Notes:

1. Loading is calculated by multiplying the concentration in mg/L by the flow in mgd and a conversion factor of 8.34. If the concentration is measured in µg/L, the conversion factor is 0.00834.
2. Percent removal is calculated using the following equation:
   (average monthly influent – average monthly effluent) ÷ average monthly influent.
3. Each twice yearly sampling event for these parameters must consist of three 24-hour composite samples taken within a calendar week.
4. Sludge sampling must be conducted once during the same time period that influent and effluent samples are being taken.
5. Effluent monitoring frequency for total mercury: The required effluent monitoring frequency for total mercury is quarterly, unless the effluent total mercury concentration exceeds 0.012 µg/L. The permittee must sample the effluent for total mercury once per month for 12 months following the receipt of any effluent total mercury result greater than 0.012 µg/L. If none of the 12 monthly effluent total mercury results exceeds 0.012 µg/L, the permittee may resume quarterly sampling.

Monitoring Changes from the Previous Permit

The draft permit proposes more frequent effluent monitoring for copper, nickel, and whole effluent toxicity, in order to determine compliance with the new water quality-based effluent limits for these pollutants. To the extent that these parameters were required to be monitored in the influent and sludge under the prior permit, the influent and sludge monitoring frequencies are unchanged.

Because the permittee has had difficulty complying with its ammonia and TSS limits during the past five years, the draft permit proposes more-frequent monitoring for TSS year-round and for ammonia during April – June, when the proposed ammonia limits are more stringent.

The prior permit had required monitoring of fecal coliform five times per week. The fecal coliform limits and monitoring requirements in the prior permit have been replaced with effluent limits and monitoring requirements for E. coli.

The Idaho WQS state that "waters designated for primary or secondary contact recreation are not to contain E. coli bacteria in concentrations exceeding a geometric mean of one hundred twenty-six (126) E. coli organisms per one hundred (100) ml based on a minimum of five (5) samples taken every three (3) to seven (7) days over a thirty (30) day period" (IDAPA 58.01.02.251.01.a). Sampling E. coli at a frequency of five times per week would require samples to be taken more frequently than once every three days. Therefore, the EPA has changed the E. coli sampling frequency to 10 times per month, which allows sampling at a frequency consistent with the WQS.

Continuous effluent monitoring for temperature is required in order to determine if the City of Caldwell's discharge of heat has the reasonable potential to cause or contribute to excursions above water quality standards for temperature. The applicable water quality criteria for temperature, for the Boise River, are stated as maximum allowable daily average, daily maximum and weekly maximum temperatures. Continuous monitoring for temperature will allow for accurate calculation of these statistics for the discharge.

Monitoring for conductivity and dissolved organic carbon is required so that, if the State of Idaho were to adopt water quality criteria for copper based on the biotic ligand model consistent with EPA recommendations, water quality criteria for copper can be evaluated.

C. Surface Water Monitoring

Table 5, below presents the proposed surface water monitoring requirements for the draft permit. Surface water monitoring results must be submitted with the DMR.

Table 5: Surface Water Monitoring Requirements

Parameter	Upstream Sampling Frequency	Downstream Sampling Frequency
Flow, CFS	1/week	—
BOD_5, mg/L	1/month	—
Dissolved Oxygen, mg/L	1/month	—
Total Phosphorus, mg/L	1/month	1/month
Total Nitrogen, mg/L	1/month	1/month
Chlorophyll a, µg/L	1/month	1/month
Temperature, °C	Continuous	Continuous
pH, standard units	1/week	1/week
Turbidity, NTU	1/week	1/week
Hardness as $CaCO_3$, mg/L	—	1/month
Arsenic, µg/L	1/quarter	—
Cadmium, dissolved µg/L	1/quarter	—
Chromium, all oxidation states, dissolved, µg/L	1/quarter	—
Chromium VI, dissolved, µg/L	1/quarter	—

Table 5: Surface Water Monitoring Requirements		
Parameter	**Upstream Sampling Frequency**	**Downstream Sampling Frequency**
Conductivity, µmhos/cm	—	1/quarter
Dissolved organic carbon, mg/L	—	1/quarter
Copper, dissolved, µg/L	1/quarter	—
Lead, dissolved, µg/L	1/quarter	—
Mercury, total, µg/L	1/quarter	1/quarter
Nickel, dissolved, µg/L	1/quarter	—
Silver, dissolved, µg/L	1/quarter	—
Zinc, dissolved, µg/L	1/quarter	—

VI. Sludge (Biosolids) Requirements

The EPA Region 10 separates wastewater and sludge permitting. The EPA has authority under the CWA to issue separate sludge-only permits for the purposes of regulating biosolids. The EPA may issue a sludge-only permit to each facility at a later date, as appropriate.

Until future issuance of a sludge-only permit, sludge management and disposal activities at each facility continue to be subject to the national sewage sludge standards at 40 CFR Part 503 and any requirements of the State's biosolids program. The Part 503 regulations are self-implementing, which means that facilities must comply with them whether or not a permit has been issued.

VII. Other Permit Conditions

A. Mercury Minimization Plan

The draft permit proposes to require the City to develop and implement a mercury minimization plan (MMP). The objective of the plan is to identify potential sources of mercury loading to the POTW, and, in turn, the receiving water.

On July 2, 2012, the Idaho Department of Health and Welfare issued a fish advisory for catfish caught from the lower Boise River, due to levels of mercury that could be dangerous to developing babies, children, and the general public, if eaten too often. In addition, the Snake River, in the Middle Snake-Payette watershed, downstream from the Boise River, is 303(d) listed in the State of Oregon's 2010 integrated report as being impaired for mercury due to high concentrations of mercury in fish tissue.

Quantifiable concentrations of mercury have been measured in the City's discharge. The EPA's *Guidance for Implementing the January 2001 Methylmercury Water Quality Criterion* ("EPA Methylmercury Guidance") recommends that, when there is a quantifiable discharge of mercury from a point source, and the concentration of methylmercury in fish tissue from the receiving water exceeds or is close to the criterion, the permitting authority should find that the discharge has the reasonable potential to cause or contribute to excursions the fish tissue criterion. If there is no TMDL for mercury for the receiving water and it is not feasible to translate the fish tissue criterion to a water column concentration, the EPA Methylmercury Guidance recommends a permit requirement to develop and implement an MMP, as well as effluent monitoring using a sufficiently sensitive analytical method to determine if the MMP is effective and a reopener clause to modify the permit conditions if the MMP is found to be ineffective or if a water column translation of the fish tissue criterion is developed.

The State of Idaho has also published guidance for the implementation of its methylmercury fish tissue criterion, the *Implementation Guidance for the Idaho Mercury Water Quality Criteria* ("Idaho Mercury Guidance"). According to the Idaho Mercury Guidance, a source that has the reasonable potential to cause or contribute to an excursion above the fish tissue criterion or that has been assigned a mercury WLA in a TMDL is a "significant source." As explained above, the City's discharge has the reasonable potential to cause or contribute to an excursion above the fish tissue criterion, according to the EPA Methylmercury Guidance. Furthermore, the Idaho Mercury Guidance states that, prior to the development of a TMDL for mercury, "permit conditions for major and minor NPDES dischargers can parallel 'significant' or 'de minimis' requirements, respectively" (see Table 6-1, Page 92). That is to say, major NPDES discharges that discharge mercury are generally considered "significant" and have the reasonable potential to cause or contribute to excursions above WQS. The recommended permit conditions for significant municipal sources include mandatory best management practices (BMPs) and both effluent and fish tissue monitoring requirements.

Consistent with the recommendations in the EPA Methylmercury Guidance and the Idaho Mercury Guidance, the EPA has proposed to require that effluent monitoring for mercury use sufficiently sensitive analytical methods. Furthermore, consistent with the recommendations of the Idaho Mercury Guidance, the draft permit proposes to require monitoring of fish tissue concentrations in the receiving water.

B. Quality Assurance Plan

The federal regulation at 40 CFR 122.41(e) requires the permittee to develop procedures to ensure that the monitoring data submitted is accurate and to explain data anomalies if they occur. The City of Caldwell is required to update the Quality Assurance Plan for the wastewater treatment plant within 90 days of the effective date of the final permit. The Quality Assurance Plan must include standard operating procedures the permittee will follow for collecting, handling, storing and shipping samples, laboratory analysis, and data reporting. The plan must be retained on site and be made available to the EPA and the IDEQ upon request.

C. Operation and Maintenance Plan

The permit requires the City of Caldwell 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 develop and implement an operation and maintenance plan for their facility within 90 days of the effective date of the final permit. The plan must be retained on site and made available to the EPA and the IDEQ upon request.

D. Emergency Response and Public Notification Plan for 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, tribal 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 describes 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 the 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.

E. Design Criteria

The permit includes design criteria requirements. This provision requires the permittee to compare influent flow and loading to the facility's design flow and loading and prepare a facility plan for maintaining compliance with NPDES permit effluent limits when the actual flow or influent BOD or TSS loading exceeds the facility planning values for any two months during any 12-month period.

F. Pretreatment Requirements

The City of Caldwell has an approved pretreatment program. According to the City's 2012 annual pretreatment report, the POTW serves three significant industrial users, two of which are categorical industrial users. The draft permit requires the permittee to continue to implement its pretreatment program and adds requirements to monitor for molybdenum and selenium, as recommended in the EPA's *Local Limits Development Guidance* (EPA 833-R-04-002A, July 2004).

G. Standard Permit Provisions

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

H. Environmental Justice

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, directs each federal agency to "make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities." EPA strives to enhance the ability of overburdened communities to participate fully and meaningfully in the permitting process for EPA-issued permits, including NPDES permits. "Overburdened" communities can include minority, low-income, tribal, and indigenous populations or communities that potentially experience disproportionate environmental harms and risks. As part of an agency-wide effort, EPA Region 10 will consider prioritizing enhanced public involvement opportunities for EPA-issued permits that may involve activities with significant public health or environmental impacts on already overburdened communities.[2]

As part of the permit development process, EPA Region 10 conducted a screening analysis to determine whether this permit action could affect overburdened communities using a nationally consistent geospatial tool that contains demographic and environmental data for the United States at the Census block group level. This tool is used to identify permits for which enhanced outreach may be warranted.

The WWTF is located within or near a Census block group that is potentially overburdened. In order to ensure that individuals who live near the facility are able to participate

[2] For more information, please visit www.epa.gov/compliance/ej/plan-ej/.

meaningfully in the permit process, EPA is conducting enhanced outreach activities. Specifically, the EPA has notified Spanish-language newspapers and radio stations of the availability of this draft permit and made EPA staff available for interviews.

To address environmental justice, the permit requires the City to post the same effluent data that it reports on its DMRs on its website, so that the public may easily access these data. This serves the additional purpose of discouraging noncompliance, as discussed under the "next generation compliance" section below.

In addition, the EPA encourages permittees to review (and to consider adopting, where appropriate) "Promising Practices for Permit Applicants Seeking EPA-Issued Permits: Ways To Engage Neighboring Communities."[3] Examples of promising practices include: thinking ahead about community's characteristics and the effects of the permit on the community, engaging the right community leaders, providing progress or status reports, inviting members of the community for tours of the facility, providing informational materials translated into different languages, setting up a hotline for community members to voice concerns or request information, follow up, etc.

I. Next Generation Compliance

This City's permit is part of a pilot project to update the way that the EPA monitors compliance with NPDES permits, as part of the EPA's "next generation compliance" effort.[4]

The EPA requires all major dischargers to report effluent data to the EPA electronically using NetDMR. Under NetDMR, all reports required under the permit are submitted to the EPA as an electronic attachment to the DMR. Once a permittee begins submitting reports using NetDMR, it is no longer required to submit paper copies of DMRs or most other reports to the EPA and IDEQ. However, because of their due dates, some reports must be submitted separately from the electronic DMRs. Further information about NetDMR, including upcoming trainings and contacts, is provided on the following website: http://www.EPA.gov/netdmr.

However, the effluent data reported directly in NetDMR is only a summary of the effluent data. The City's permit also requires the City to submit its complete effluent data for selected pollutants as attachments to its electronic discharge monitoring reports (DMRs). This will allow the EPA to identify any errors in the summary DMR data and will also provide the EPA with data necessary to reissue the permit.

The permit also requires the City to report the summary effluent data that is reported in NetDMR on its own website. Instances of noncompliance that are required to be reported to the EPA within 24 hours must also be posted the City's website within 24 hours. This requirement serves the additional purpose of furthering the EPA's environmental justice efforts, as discussed above.

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[3] For more information, please visit https://www.federalregister.gov/articles/2013/05/09/2013-10945/epa-activities-to-promote-environmental-justice-in-the-permit-application-process#p-104.

[4] For more information, please visit: www2.epa.gov/compliance/next-generation-compliance.

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 in the vicinity of the City of Caldwell's discharge. Therefore the issuance of this permit will have no effect on any threatened or endangered species, and consultation is not required for this action.

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).

The EFH regulations define an adverse effect as any impact which reduces quality and/or quantity of EFH and may include direct (e.g. contamination or physical disruption), indirect (e.g. loss of prey, reduction in species' fecundity), site specific, or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions.

The EPA has determined that issuance of this permit will not adversely affect EFH in the vicinity of the discharge. Neither the Boise River nor the Snake River within the Middle Snake-Payette (HUC 17050115) and Brownlee Reservoir (HUC 17050201) watersheds downstream from the Boise River are designated as EFH. The permit is conditioned to meet water quality standards in the Boise River. Thus, the discharge will not affect distant downstream reaches of the Snake River that are designated as EFH.

The EPA has provided NOAA Fisheries with copies of the draft permit and fact sheet during the public notice period. Any comments received from NOAA Fisheries regarding EFH will be considered prior to reissuance of this permit.

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, or treatment standards established pursuant to any State law or regulation.

D. Permit Expiration

The permit will expire five years from the effective date.

IX. References

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

EPA. 2010a. Guidance for Implementing the January 2001 Methylmercury Water Quality Criterion. Environmental Protection Agency. Office of Science and Technology. EPA-823-R-10-001. April 2010. http://water.epa.gov/scitech/swguidance/standards/criteria/health/upload/mercury2010.pdf

EPA. 2010b. *NPDES Permit Writers' Manual.* Environmental Protection Agency. Office of Wastewater Management. EPA-833-K-10-001. September 2010. http://www.epa.gov/npdes/pubs/pwm_2010.pdf

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

Appendix A: Facility Information

General Information

NPDES ID Number:	ID0021504
Physical Location:	504 Johnson Lane Caldwell, Idaho 83605
Mailing Address:	621 East Cleveland Blvd Caldwell, Idaho 83605
Facility Background:	The most recent NPDES for the City of Caldwell Wastewater Treatment Plant (WWTP) was issued on December 29, 1998, became effective on February 1, 1999, and expired on February 2, 2004. An NPDES application for permit issuance was submitted by the permittee on June 10, 2003. The EPA determined that the application was timely and complete. Therefore, pursuant to 40 CFR 122.6, the permit has been administratively extended and remains fully effective and enforceable.

Facility Information

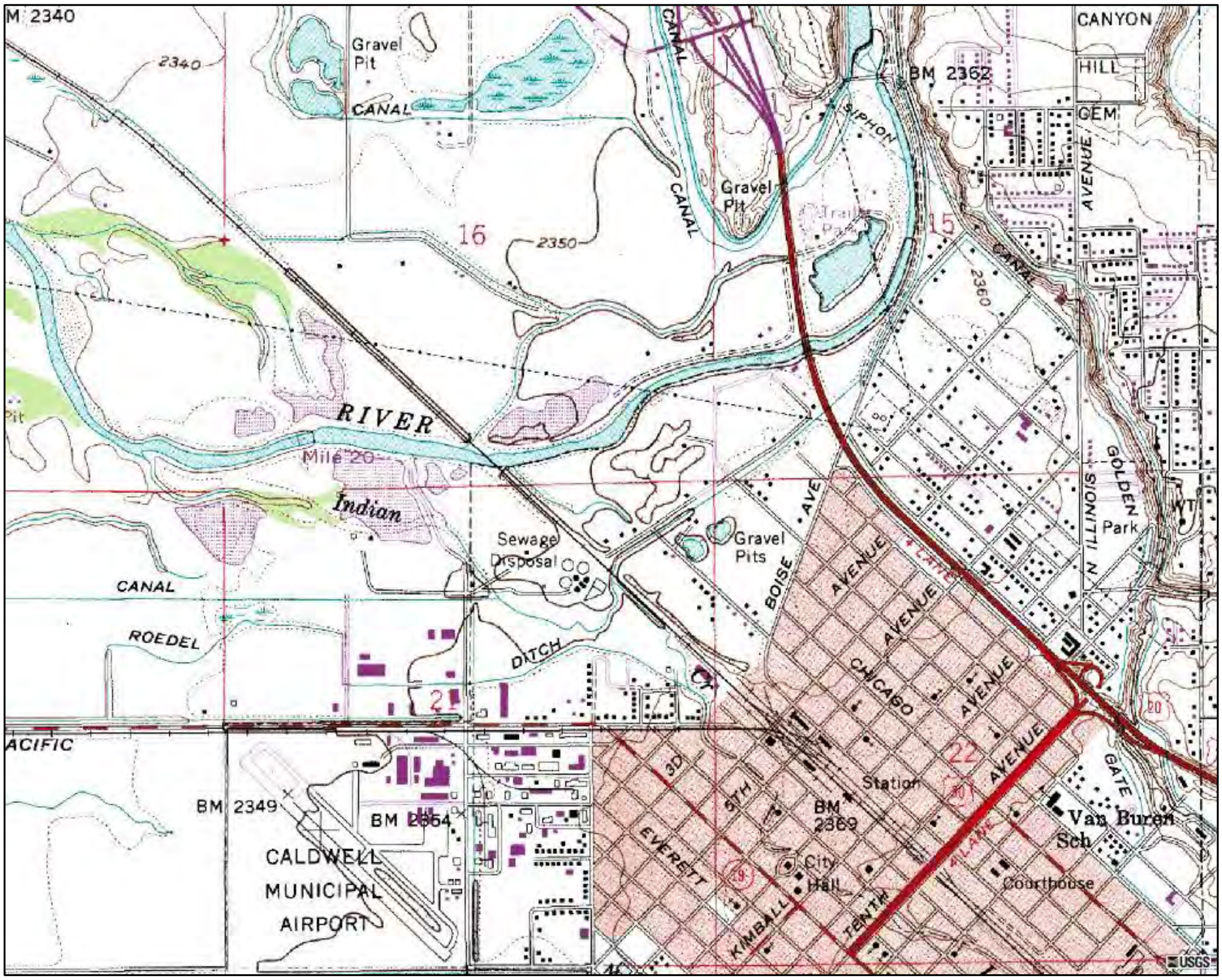
Type of Facility:	Publicly Owned Treatment Works (POTW)
Treatment Train:	Preliminary treatment is by screening and grit removal. Two primary clarifiers accomplish solids removal. The effluent from the primary clarifiers proceeds to the intermediate pump station. From there, the wastewater flows to an organic treatment and nitrification system comprised of a selector basin with four individual cells. Denitrification occurs in the first cell of the selector basin. The remaining three cells are utilized for biological phosphorus removal. The flow from the selector basin then proceeds to two aeration basins where nitrification (removal of ammonia) then takes place. Flows from the aeration basins then proceed to two final clarifiers. Return activated sludge (RAS) pumps then return this sludge back to the activated sludge system. The effluent from the final clarifiers then proceeds to the ultraviolet (UV) system which uses UV light to disinfect and destroy disease causing bacteria that survive previous treatment processes. Thickening of waste solids is accomplished with a dissolved air flotation (DAF) unit. The concentrated solids are then pumped to the anaerobic digesters and are stored and thickened in two sludge storage lagoons. The facility produces Class B biosolids which are applied to agricultural land in Canyon County.
Flow:	The average design flow is 8.5 mgd and the maximum monthly design flow is 14.2 mgd. The average flow measured between February 1999 and February 2013 was 5.84 mgd and the maximum monthly average flow during that time span was 9.39 mgd.

Outfall Location:	latitude 43° 40’ 39” north, longitude 116° 42’ 3” west

Receiving Water Information

Receiving Water:	Boise River
Watershed:	Lower Boise (HUC 17050114)
Beneficial Uses:	Cold water aquatic life, salmond spawning, primary contact recreation, agricultural and industrial water supply, wildlife habitats, and aesthetics.

Figure A-1: Map



Appendix B: Water Quality Criteria Summary

This appendix provides a summary of water quality criteria applicable to the Boise River.

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 at the point of discharge. 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 permittee, and (4) the quality of the water in the Boise River.

A. General Criteria (IDAPA 58.01.02.200)

Surface waters of the state shall be free from:

- hazardous materials,
- toxic substances in concentrations that impair designated beneficial uses,
- deleterious materials,
- radioactive materials,
- floating, suspended, or submerged matter of any kind in concentrations causing nuisance or objectionable conditions or that may impair designated beneficial uses,
- excess nutrients that can cause visible slime growths or other nuisance aquatic growths impairing designated beneficial uses,
- oxygen demanding materials in concentrations that would result in an anaerobic water condition

Surface water level shall not exceed allowable level for:

- radioactive materials, or
- sediments

B. Numeric Criteria for Toxics (IDAPA 58.01.02.210)

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. Monitoring of the effluent has shown that the following toxic pollutants have been present at detectable levels in the effluent.

- Ammonia
- Arsenic (total)
- Cadmium (total recoverable)
- Chromium (total)
- Copper (total recoverable)
- Cyanide
- Lead (total recoverable)
- Mercury (total)
- Nickel (total recoverable)

- Silver (total recoverable)[1]
- Zinc (total recoverable)

Hardness-Dependent Metals

The toxicities of some metals vary with the hardness of the water. Therefore, the water quality criteria for these metals also vary with hardness. EPA uses the hardness of the receiving water when mixed with the effluent to determine the water quality criteria for such metals.

The City of Caldwell collected hardness data in the Boise River upstream and downstream of the facility between July 1999 and December 2000. Toxicity decreases (and numeric water quality criteria increase) as hardness increases, and effluents can influence the hardness of the receiving water. Therefore, the EPA has used the 5th percentile hardness measured by the City downstream from the outfall (56.17 mg/L as $CaCO_3$) as a worst-case assumption for hardness, which reflects the discharge's influence upon the hardness of the Boise River.

The hardness-dependent water quality criteria for the metals of concern are expressed as dissolved metal. The dissolved fraction of the metal is the fraction that will pass through a 0.45-micron filter. However, the federal regulation at 40 CFR 122.45(c) requires that NPDES permit effluent limits must be expressed as total recoverable metal. Total recoverable metal is the concentration of the metal in an unfiltered sample. To develop effluent limits for total recoverable metals which are protective of the dissolved metals criteria, "translators" are used in the equations to determine reasonable potential and derive effluent limits. Translators can either be site specific numbers or default numbers. EPA has published guidance related to the use of translators in NPDES permits in *The Metals Translator: Guidance for Calculating a Total Recoverable Permit Limit from a Dissolved Criterion* (Metals Translator Guidance).

In the absence of site specific translators, the Metals Translator Guidance recommends the use of water quality criteria conversion factors as the default translators. In this case, a site-specific translator study for copper, lead, nickel, silver and zinc was completed by Keller Associates for the City of Caldwell (see Appendix H). The EPA has reviewed the translator study and found that it is consistent with the Metals Translator Guidance. The City did not measure quantifiable levels of silver in the Boise River or in the effluent during the study period, so a site-specific translator could not be developed for silver. For copper, lead, nickel, and zinc, Table B-1, below, lists the site-specific translators instead of the conversion factors from the water quality criteria.

[1] Silver was last detected in the effluent in February 2009.

Table B-1: Hardness-Dependent Metals Criteria Values

Parameter	**Acute Conversion Factor**	**Chronic Conversion Factor**	**Site-Specific Translator**	**Acute Criterion (µg/L)**[1]	**Chronic Criterion (µg/L)**[1]
Cadmium	0.968	0.933	—	0.83	0.41
Chromium III	0.316	0.860	—	355	46
Copper	0.960	0.960	**0.505**	9.87	6.93
Lead	0.875	0.875	**0.082**	34.2	1.3
Nickel	0.998	0.997	**0.546**	287	32
Silver	0.850	—	—	1.28	—
Zinc	0.978	0.986	**0.705**	71.8	72.4

1. All metals criteria in this table are expressed as dissolved metal.

C. Surface Water Criteria To Protect Aquatic Life Uses (IDAPA 58.01.02.250, 278)

1. pH: Within the range of 6.5 to 9.0
2. Total Dissolved Gas: <110% saturation at atm. pressure.
3. 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 (IDAPA 58.01.02.278.01).
   - Dissolved Oxygen Concentrations exceeding six (6) mg/l at all times (IDAPA 58.01.02.250.02.a).
4. Temperature:
   - A maximum weekly maximum temperature of thirteen degrees C (13ºC) to protect brown trout, mountain whitefish, and rainbow trout spawning and incubation applies from November 1 through May 30 (IDAPA 58.01.02.278.04).
   - Water temperatures of twenty-two (22) °C or less with a maximum daily average of no greater than nineteen (19) °C (IDAPA 58.01.02.250.02.b). These criteria apply from June 1 – October 31.
5. Ammonia:

Ammonia criteria are based on a formula which relies on the pH and temperature of the receiving water, because the fraction of ammonia present as the toxic, un-ionized form increases with increasing pH and temperature. Therefore, the criteria become more stringent as pH and temperature increase. The table below details the equations used to determine water quality criteria for ammonia.

The City of Caldwell collected pH data in the Boise River upstream and downstream of the facility between July 1999 and May 2001. Continuous temperature data were collected upstream of the facility by the USGS between March 1998 and September 1999. These data were used to determine the appropriate pH and temperature values to calculate the ammonia criteria.

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. The EPA used the maximum pH and 95% percentile of the daily average temperature data for the calculations. The maximum upstream pH is 8.4 standard units. The 95th percentile upstream temperatures are 15.5 °C from April – June and 20.0 °C from July – March.

Table B-1: Water Quality Criteria for Ammonia

	Acute Criterion[1]	**Chronic Criterion**
Equations:	$\frac{0.275}{1+10^{7.204-pH}}+\frac{39}{1+10^{pH-7.204}}$	$\left(\frac{0.0577}{1+10^{7.688-pH}}+\frac{2.487}{1+10^{pH-7.688}}\right)\times MIN\left(2.85, 1.45\times 10^{0.028\times(25-T)}\right)$
Results April – June	2.59	1.20
Results July – March	2.59	0.906

1. No seasonal variation was assumed for pH, therefore, there is no seasonal variation in the acute criterion (which is a function of pH only).

6. Turbidity: 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.

D. Surface Water Quality Criteria For Recreational Use Designation (IDAPA 58.01.02.251)

a. Geometric Mean Criterion. Waters designated for primary or secondary contact recreation are not to contain *E. coli* 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: This section states that 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.). for primary and contact recreation.

Appendix C: Low Flow Conditions and Dilution

A. Low Flow Conditions

The low flow conditions of a water body are used to determine water quality-based effluent limits. In general, Idaho's water quality standards require criteria be evaluated at the following low flow receiving water conditions (See IDAPA 58.01.02.210.03) as defined below:

Table C-1: Critical Low Flows for use in Wasteload Allocation

Acute aquatic life	1Q10 or 1B3
Chronic aquatic life	7Q10 or 4B3
Non-carcinogenic human health criteria	30Q5
Carcinogenic human health criteria	harmonic mean flow
Ammonia	30B3, 30Q5 or 30Q10

1. The 1Q10 represents the lowest one day flow with an average recurrence frequency of once in 10 years.
2. The 1B3 is biologically based and indicates an allowable exceedence of once every 3 years.
3. The 7Q10 represents lowest average 7 consecutive day flow with an average recurrence frequency of once in 10 years.
4. The 4B3 is biologically based and indicates an allowable exceedance for 4 consecutive days once every 3 years.
5. The 30Q5 represents the lowest average 30 consecutive day flow with an average recurrence frequency of once in 5 years.
6. The 30Q10 represents the lowest average 30 consecutive day flow with an average recurrence frequency of once in 10 years.
7. The harmonic mean is a long-term mean flow value calculated by dividing the number of daily flow measurements by the sum of the reciprocals of the flows.

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 appropriate flows to be used.

There were not enough flow data for the Boise River at Caldwell to directly calculate the critical low flows. Therefore, the EPA estimated critical low flows of the Boise River upstream of the discharge from 95 flow measurements obtained from the EPA's STOrage and RETrieval (STORET) Data Warehouse and the USGS National Water Information System (NWIS). All of the flow measurements were taken at or near the Interstate 84 (US Highway 30) bridge over the Boise River.[1]

First, for each season, the harmonic and arithmetic mean flows were calculated directly from the available data. The arithmetic and harmonic mean flows are shown in table 2, below.

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[1] The City of Caldwell was required under its prior permit to monitor the river flow from 1999 – 2001. However, only monthly average river flows were recorded in the EPA's Integrated Compliance Information System (ICIS) database. The monthly average flows cannot be used to estimate the critical low flows of the Boise River. The minimum monthly average river flow measured by the City was 512 CFS and the average of the monthly average flows was 859 CFS.

Table C-2: Seasonal Arithmetic and Harmonic Mean flows for the Boise River at Caldwell			
Season	Harmonic Mean (CFS)	Arithmetic Mean (CFS)	Number of Measurements
April – June	622	2979	20
July – March	430	623	75

The seasonal 7Q10 flows were then estimated from the seasonal harmonic and arithmetic mean flows. According to the TSD (Page 89), the harmonic mean flow (Q_{hm}) can be estimated from a known 7Q10 and arithmetic mean (Q_{am}) using the following equation:

$$Q_{hm} = [1.194 * (Q_{am})^{0.473}] * [(7Q10)^{0.552}],$$ (Equation 1)

This equation can be solved for the 7Q10 as follows, in order to estimate a 7Q10 flow from a known harmonic mean and arithmetic mean.

$$7Q10 = \left(\frac{Q_{hm}}{1.194 Q_{am}{}^{0.473}}\right)^{1/0.552}$$ (Equation 2)

The TSD states that "in the comparisons of flows for smaller rivers (i.e., low flow of 50 CFS), the 30Q5 flow was, on the average, only 1.1 times that of the 7Q10. For larger rivers (i.e., low flow of 600 CFS), the factor was, on the average, 1.4 times" (Page 89). The chapter on "Stream Design Flow For Steady-State Modeling" from the *Technical Guidance Manual for Performing Wasteload Allocation: Book VI* (EPA 1986) states that the average ratio of the 7Q10 to the 1Q10 is 1.3:1 (Page 2-3).

Thus, once the 7Q10 has been estimated as described above, the 1Q10 and the 30Q5 can, in turn, be estimated from the 7Q10 as follows:

$$1Q10 = 7Q10 \div 1.3$$ (Equation 4)

$$30Q5 = 7Q10 \times 1.4$$ (Equation 5)

The estimated low flows for the Boise River at Caldwell are summarized in Table C-2.

Table C-2: Estimated Low Flows in the Boise River at Caldwell				
Season	**1Q10 (CFS)**	**7Q10 (CFS)**	**30Q5 (CFS)**	**Harmonic Mean**
April – June	68	88	123	N/A
July – March	133	172	241	N/A
Year Round	N/A	N/A	N/A	460

To verify that these estimated flow rates are reasonable, the EPA compared these estimated flow rates to those calculated using the DFLOW computer program, version 3.1b, from daily flow data measured at USGS stations on the Boise River at Middleton (upstream from Caldwell) and Parma (downstream from Caldwell). These flow rates are provided in Table C-3, below.

Table C-3: Low Flows in the Boise River at Middleton and Parma					
Season	**1Q10 (CFS)**	**7Q10 (CFS)**	**30Q5 (CFS)**	**7Q10:1Q10**	**30Q5:7Q10**
USGS Station #13210050 Boise River Near Middleton, ID 1975 – 1997					
April – June	43.3	61.9	122	1.43:1	1.97:1
July – March	56.4	66.9	116	1.19:1	1.73:1
USGS Station #13213000 Boise River Near Parma, ID 1972 – 2012					
April – June	139	173	460	1.24:1	2.66:1
July – March	209	256	440	1.22:1	1.72:1

In all cases, the estimated critical low flows at Caldwell (Table C-2) are greater than the critical low flows at Middleton (upstream) and less than the critical low flows at Parma (downstream). Also, the 1Q10 and 7Q10 low flows at both Middleton and Parma are lower from April – June than they are from July – March, which is consistent with the estimates for Caldwell. The ratios between the 7Q10 and 1Q10 flows at Middleton and Parma (1.19:1 – 1.43:1) are close to the ratio used to estimate the 1Q10 flows at Caldwell (1.3:1). The ratios between the 30Q5 and 7Q10 flows at Middleton and Parma (1.72:1 – 2.66:1) are greater than the ratio used to estimate the 30Q5 flow rates at Caldwell (1.4:1). This suggests that the estimated flows at Caldwell are reasonable, although the higher ratios of the 30Q5 to the 7Q10 at the Parma and Middleton gauges suggest that the estimated 30Q5 flow rates for Caldwell may be conservative.

B. Mixing Zones and Dilution

In some cases a dilution allowance or mixing zone is permitted. 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 (EPA 1994). 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 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.

The following formula is used to calculate a dilution factor based on the allowed mixing.

$$D = \frac{\mathrm{Q_e} + \mathrm{Q_u} \times \%\mathrm{MZ}}{\mathrm{Q_e}}$$

Where:

D = Dilution Factor

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

Q_u = Receiving water low flow rate upstream of the discharge (1Q10, 7Q10, 30B3, etc)

%MZ = Percent Mixing Zone

The IDEQ proposes to authorize 25% mixing zones for ammonia, arsenic, cadmium, chromium III, chromium VI, copper, cyanide, lead, mercury, nickel, silver, zinc and whole effluent toxicity (WET). The EPA calculated dilution factors for seasonal critical low flow conditions. All dilution factors are calculated with the effluent flow rate set equal to the design flow of 8.5 mgd (13.2 CFS). The dilution factors are listed in Table C-4, below.

Table C-4 Dilution Factors				
Season	**Acute DF**	**Chronic DF**	**Chronic Ammonia and Human Health Non-Carcinogen DF**	**Human Health Carcinogen DF**
March – June	2.29	2.67	3.34	N/A
July – October	3.53	4.27	5.58	N/A
Year Round	N/A	N/A	N/A	9.74

C. References

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

EPA. 1994. *Water Quality Standards Handbook: Second Edition*. Environmental Protection Agency. Office of Water. Washington, DC. August 1994. EPA 823-B-94-005a. http://water.epa.gov/scitech/swguidance/standards/handbook/index.cfm

Appendix D: Basis for Effluent Limits

The following discussion explains the derivation of technology and water quality based effluent limits proposed in the draft permit. Part A discusses technology-based effluent limits; Part B discusses water quality-based effluent limits.

A. Technology-Based Effluent Limits

Federal Secondary Treatment Effluent Limits

The CWA requires 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," which all POTWs were required to meet by July 1, 1977. The EPA has developed and promulgated "secondary treatment" effluent limitations, which are found in 40 CFR 133.102. These technology-based effluent limits apply to all municipal wastewater treatment plants and identify the minimum level of effluent quality attainable by application of secondary treatment in terms of BOD_5, TSS, and pH. The federally promulgated secondary treatment effluent limits are listed in Table C-1.

Table D-1: Secondary Treatment Effluent Limits
(40 CFR 133.102)

Parameter	30-day average	7-day average
BOD_5	30 mg/L	45 mg/L
TSS	30 mg/L	45 mg/L
Removal for BOD_5 and TSS (concentration)	85% (minimum)	—
pH	within the limits of 6.0 - 9.0 s.u.	

Mass-Based Limits

The federal regulation at 40 CFR 122.45(f) requires that effluent limits be expressed in terms of mass, if possible. The regulation at 40 CFR 122.45(b) requires that effluent limitations for POTWs be calculated based on the design flow of the facility. The mass based limits are expressed in pounds per day and are calculated as follows:

Mass based limit (lb/day) = concentration limit (mg/L[1]) × design flow (mgd) × 8.34[2]

Since the design flow for this facility is 8.5 mgd, the technology based mass limits for BOD_5 and TSS are calculated as follows:

Average Monthly Limit = 30 mg/L × 8.5 mgd × 8.34 = 2,127 lbs/day

Average Weekly Limit = 45 mg/L × 8.5 mgd × 8.34 = 3,190 lbs/day

[1] mg/L is equivalent to parts per million.
[2] 8.34 is a conversion factor equal to the density of water in lb/gallon.

Chlorine

The Caldwell WWTP uses ultraviolet (UV) disinfection. Therefore, there are no technology-based chlorine limits applicable to the discharge.

B. Water Quality-based Effluent Limits

Statutory and Regulatory Basis

Section 301(b)(1)(C) of the CWA requires the development of limitations in permits necessary to meet water quality standards. Discharges to State or Tribal waters must also comply with limitations imposed by the State or Tribe as part of its certification of NPDES permits under section 401 of the CWA. Federal regulations at 40 CFR 122.4(d) prohibit the issuance of an NPDES permit that does not ensure compliance with the water quality standards of all affected States.

The NPDES regulation (40 CFR 122.44(d)(1)) implementing Section 301(b)(1)(C) of the CWA requires that permits include limits for all pollutants or parameters which are or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any State or Tribal water quality standard, including narrative criteria for water quality, and that the level of water quality to be achieved by limits on point sources is derived from and complies with all applicable water quality standards.

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

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/Tribal 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 will 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 must be authorized by the State. The dilution provided by a mixing zone may be considered in a reasonable potential analysis when appropriate (40 CFR 122.44(d)(1)(ii)).

The reasonable potential analysis for ammonia, arsenic, cadmium, chromium III, chromium VI, copper, cyanide, lead, mercury, nickel, silver, zinc and whole effluent toxicity (WET) was based on a mixing zone of 25%, which was proposed in the IDEQ's draft certification. If IDEQ revises the allowable mixing zone in its final certification of this permit, reasonable potential analysis will be revised accordingly.

Procedure for Deriving Water Quality-based Effluent Limits

The first step in developing a water quality-based effluent limit is to develop a wasteload allocation (WLA) for the pollutant. A wasteload allocation is the concentration or loading of a pollutant that the permittee may discharge without causing or contributing to an exceedance of water quality standards in the receiving water. Wasteload allocations are determined in one of the following ways:

<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 a TMDL for the lower Boise River. The TMDL included wasteload allocations for TSS and bacteria for the facility. The wasteload allocations for TSS for the City of Caldwell are 2125 lb/day average monthly and 3183 lb/day average weekly (see the TMDL at Table 15, on Page 62). The EPA has included loading limits for TSS that are identical to these wasteload allocations.

The Lower Boise River TMDL included monthly, weekly, and daily wasteload allocations for bacteria for the City of Caldwell facility. The WLAs were based on fecal coliform concentrations because, at the time 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 effluent limits apply the current Idaho water quality criteria for E. coli at the end-of-pipe. 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.

The State of Idaho’s 2012 Integrated Report Section 5 (the 303(d) list) lists the segments of the Boise River from Middleton to Indian Creek and from Indian Creek to the mouth as impaired for temperature and total phosphorus (TP). IDEQ has completed a draft TMDL for TP, and the draft permit proposes effluent limits consistent with the assumptions and requirements of the WLAs in the draft TP TMDL. The EPA has determined that the discharge has the reasonable potential to cause or contribute to excursions above water quality standards for total phosphorus, therefore, the permit proposes water quality-based effluent limits for phosphorus. See Appendix F for more details about the proposed TP limits.

No TMDL has been completed for temperature. However, the EPA must nonetheless evaluate whether water quality-based effluent limits are necessary for temperature under CWA regulations at 40 CFR 122.44(d)(1)(i – iii), and assure that any such effluent limits are derived from and comply with applicable water quality standards (40 CFR 122.44(d)(1)(vii)(A)).

At this time, the EPA does not have sufficient data to determine whether or not the City of Caldwell’s discharge of heat to the Boise River has the reasonable potential to cause or contribute to excursions above water quality standards for temperature. The permit proposes continuous monitoring of the effluent and the receiving waters, for temperature.

Mixing zone based WLA

When the State authorizes a mixing zone for the discharge, the WLA is calculated by using a simple mass balance equation. The equation takes into account the available dilution provided by the mixing zone and the background concentrations of the pollutants. The WLAs for ammonia, copper, nickel, and WET were derived using a mixing zone.

Criterion as the Wasteload Allocation

In some cases a mixing zone cannot be authorized, either because the receiving water is already at, or exceeds, the criterion, the receiving water flow is too low to provide dilution, or the facility can achieve the effluent limit without a mixing zone. In such cases, the criterion becomes the wasteload allocation. Establishing the criterion as the wasteload allocation ensures that the effluent discharge will not contribute to an exceedance of the criteria.

Calculation of Effluent Limits from the Wasteload Allocation

Once the wasteload allocation has been developed, the EPA generally 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.

Summary - Water Quality-based Effluent Limits

The water quality based effluent limits in the draft permit are summarized below.

Total Phosphorus

As described in Appendix F, EPA has proposed water quality-based effluent limits for total phosphorus in the draft permit, which are consistent with the assumptions and requirements of the draft *Lower Boise River TMDL: 2015 Total Phosphorus Addendum*.

Ammonia

The City's 1999 permit included water quality-based effluent limits for ammonia. When the EPA re-calculated ammonia effluent limits based on current water quality criteria and recent effluent variability, the resulting limits were less stringent than those in the 1999 permit, except from July – October. Because the less-stringent re-calculated ammonia limits are subject to and consistent with the State of Idaho's antidegradation policy, the re-calculated ammonia limits are allowed under the anti-backsliding provisions of the Clean Water Act (Section 303(d)(4)(B)).

Therefore, the draft permit proposes revised water quality-based effluent limits for ammonia. See Appendix E for reasonable potential and effluent limit calculations for ammonia.

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.

The upper bound of Idaho's pH criterion is identical to the upper bound of the technology-based effluent pH limit for pH (9.0). Thus, the upper bound pH limit must be met at the point of discharge.

The minimum pH measured upstream from the discharge is 6.6 standard units, which is very close to the lower bound of the pH criterion (6.5). Thus, the receiving water has very little capacity to dilute effluent discharges with a pH of less than 6.5 standard units. Therefore, no mixing zone is proposed for pH, and the pH criteria must be met before the effluent is discharged to the receiving water.

Dissolved Oxygen and BOD_5

The EPA has carried forward the effluent limits for dissolved oxygen (DO) that were in the prior permit, consistent with the anti-backsliding provisions of the Clean Water Act (CWA Sections 303(d)(4) and 402(o)). These were a minimum DO concentration of 6.0 mg/L and a minimum DO saturation of 90%.

In the 1998 fact sheet, the EPA made a finding that the technology-based effluent limits for BOD_5 would ensure compliance with Idaho's water quality criteria for DO. With respect to BOD_5, the circumstances on which the previous effluent limits were based have not materially changed since the time the permit was issued. Therefore, similar to the 1999 permit, the draft permit proposes technology-based effluent limits for BOD_5.

Hardness-Dependent Metals

The EPA has determined that the City of Caldwell's discharge has the reasonable potential to cause or contribute to excursions above water quality standards for copper and nickel. Therefore, the draft permit proposes water quality-based effluent limits for these metals.

Silver has not been measured at quantifiable concentrations in the City of Caldwell's effluent since February 2009. Therefore, the City does not have the reasonable potential to cause or contribute to excursions above water quality standards for silver and no effluent limits are proposed for silver.

See Appendix E for reasonable potential and effluent limit calculations for hardness-dependent metals.

Mercury

On December 12, 2008, the EPA disapproved Idaho's removal of its aquatic life criteria for mercury in the water column. Therefore, the aquatic life water column criteria for total recoverable mercury that the EPA had approved in 1997 remain effective for Clean Water Act purposes (40 CFR 131.21). These are an acute criterion of 2.1 μg/L and a chronic criterion of 0.012 μg/L.

The EPA has determined that the City of Caldwell's discharge does not have the reasonable potential to cause or contribute to excursions above water quality standards for mercury in the water column. See Appendix E for reasonable potential calculations for the water column mercury criterion.

However, because the City discharges quantifiable concentrations of mercury and there are elevated concentrations of mercury in fish tissue in the Boise and Snake rivers, the discharge has the reasonable potential to cause or contribute to excursions above water quality criteria for methylmercury in fish tissue. Therefore, the City of Caldwell is required to develop a mercury minimization plan and to sample fish tissue for mercury.

Whole Effluent Toxicity

The EPA has determined that the City of Caldwell's discharge has the reasonable potential to cause or contribute to excursions above Idaho's narrative criterion for toxic substances (IDAPA 58.01.02.200.02). Therefore, consistent with 40 CFR 122.44(d)(1)(v), the draft permit proposes water quality-based effluent limits for whole effluent toxicity (WET).

The EPA has interpreted the State of Idaho's narrative criterion for toxic substances using the recommendations in the TSD. The TSD recommends that the chronic criterion for WET be set at 1.0 chronic toxic units (TU_c) and that the acute criterion be set at 0.3 acute toxic units (TU_a) (Section 2.3.3). Acute toxic units can be converted to chronic toxic units using the acute-to-chronic ratio (ACR). If data are not available to develop an ACR, the TSD recommends using an ACR of 10 (Section 1.3.4). Thus, the recommended acute criterion of 0.3 TU_a is equivalent to 3.0 TU_c.

See Appendix E for reasonable potential and effluent limit calculations for WET.

Residues

The Idaho water quality standards require that surface waters of the State be free from floating, suspended or submerged matter of any kind in concentrations impairing designated beneficial uses. The draft permit contains a narrative limitation prohibiting the discharge of such materials.

Temperature

Because there are no recent continuous receiving water data for temperature in the Boise River in the vicinity of the discharge and no continuous temperature data for the discharge, the EPA cannot determine if the City of Caldwell's discharge of heat has the reasonable potential to cause or contribute to excursions above water quality criteria for temperature in the Boise River. The draft permit proposes to require continuous monitoring of the effluent and the Boise River (both upstream and downstream of the outfall) for temperature. These data will be used to determine if the discharge has the reasonable potential to cause or contribute to excursions above water quality standards for temperature when the permit is reissued.

Summary of Effluent Limit Bases

The following table summarizes the general statutory and regulatory bases for the limits in the draft permit.

Table D-4: Summary of Effluent Limit Bases

Limited Parameter	Basis for Limit
BOD_5	Clean Water Act (CWA) Section 301(b)(1)(B), 40 CFR 122.45(f), 40 CFR 133 (technology-based, mass limits)
TSS Concentration and Removal Rate	CWA Section 301(b)(1)(B), 40 CFR 122.45(f), 40 CFR 133 (technology-based)
TSS Load	CWA Section 301(b)(1)(C), 40 CFR 122.44(d)(1)(vii)(B) (water quality-based, TMDL)
Floating, Suspended or Submerged Matter	CWA Section 301(b)(1)(C), 40 CFR 122.44(d), IDAPA 58.01.02.200.05 (water quality-based)
pH	CWA Section 301(b)(1)(C), 40 CFR 122.44(d), IDAPA 58.01.02.250.01.a (water quality-based)
E. Coli	CWA Section 301(b)(1)(C), 40 CFR 122.44(d)(1)(vii)(B), IDAPA 58.01.02.251.01 (water quality-based, TMDL)
Ammonia	CWA Section 301(b)(1)(C), 40 CFR 122.44(d), IDAPA 58.01.02.060, IDAPA 58.01.02.250.02.d (water quality-based, with mixing zone)

Table D-4: Summary of Effluent Limit Bases	
Limited Parameter	**Basis for Limit**
Total Phosphorus	CWA Section 301(b)(1)(C), 40 CFR 122.44(d)(1)(vii)(B) (water quality-based, TMDL)
Copper, nickel, and sliver	CWA Section 301(b)(1)(C), 40 CFR 122.44(d), IDAPA 58.01.02.060, IDAPA 58.01.02.210.01 (water quality-based, with mixing zone)
Mercury Minimization Plan	40 CFR 122.44(k)(3 – 4), IDAPA 58.01.02.210.01 (best management practices)
Whole effluent toxicity	CWA Section 301(b)(1)(C), 40 CFR 122.44(d)(1)(vi), IDAPA 58.01.02.060, IDAPA 58.01.02.200.02 (water quality-based, narrative criteria, with mixing zone)

C. References

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

Appendix E: Reasonable Potential and Water Quality-Based Effluent Limit Calculations

Part A of this appendix explains the process the EPA has used to determine if the discharge authorized in the draft permit has the reasonable potential to cause or contribute to a violation of Idaho's federally approved water quality standards. Part B demonstrates how the water quality-based effluent limits (WQBELs) in the draft permit were calculated.

A. Reasonable Potential Analysis

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

Mass Balance

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

$$C_dQ_d = C_eQ_e + C_uQ_u \qquad \text{Equation 1}$$

where,

C_d = Receiving water concentration downstream of the effluent discharge (that is, the concentration at the edge of the mixing zone)

C_e = Maximum projected effluent concentration

C_u = 95th percentile measured receiving water upstream concentration

Q_d = Receiving water flow rate downstream of the effluent discharge = Q_e+Q_u

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

Q_u = Receiving water low flow rate upstream of the discharge (1Q10, 7Q10 or 30Q5)

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

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

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

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

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

Where:

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

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

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

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

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

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

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

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

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

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

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

Maximum Projected Effluent Concentration

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

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

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

where,

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

and

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

Where,

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

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

$$C_e = (\text{RPM})(\text{MRC}) \qquad \text{Equation 10}$$

where MRC = Maximum Reported Concentration

Human Health Criterion for Arsenic

The EPA has used the 95th percentile effluent concentration to determine if the discharge has the reasonable potential to cause or contribute to excursions above the State of Idaho's human health criterion for arsenic, instead of the more conservative 99th percentile, which was used for other parameters. The EPA believes this is appropriate because the available effluent data for arsenic were reported as total recoverable arsenic, whereas the criterion is expressed as the inorganic form only.

In Section 3.3.2, the TSD states that, "although (the 99th percentile) does represent a measure of the upper bound of an effluent distribution, other percentiles could be selected by a regulatory agency." The EPA believes it is appropriate to use a lower (i.e., less conservative) effluent percentile value in the reasonable potential analysis for the human health criterion for arsenic, because there is conservatism inherent in using the total arsenic effluent data in the reasonable potential analysis. The TSD provides a table of reasonable potential multipliers for both the 95th and 99th percentiles (Tables 3-1 and 3-2). Therefore, the EPA believes, in this case, it is appropriate to use the 95th percentile effluent concentration as the maximum projected effluent concentration for the human health criterion for arsenic, instead of the 99th percentile.

Reasonable Potential

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

Results of Reasonable Potential Calculations

It was determined that both chlorine and ammonia have reasonable potential to cause or contribute to an exceedance of water quality criteria at the edge of the mixing zone. The results of the calculations are presented in Tables E-1 and E-2 of this appendix.

B. WQBEL Calculations

The following calculations demonstrate how the water quality-based effluent limits (WQBELs) in the draft permit were calculated. The WQBELs for ammonia, copper, nickel, and WET are intended to protect aquatic life criteria. The following discussion presents the general equations used to calculate the water quality-based effluent limits. The calculations for all WQBELs based on aquatic life criteria are summarized in Table E-3.

Calculate the Wasteload Allocations (WLAs)

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

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

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

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

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

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

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

where,

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

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

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

where,

σ_{30}^2 = $\ln(CV^2/30 + 1)$

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

Derive the maximum daily and average monthly effluent limits

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

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

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

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

σ_n^2 = $\ln(CV^2/n + 1$

z_a = 1.645 (z-score for the 95^{th} percentile probability basis)

z_m = 2.326 (z-score for the 99^{th} percentile probability basis)

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

Table E-3, below, details the calculations for water quality-based effluent limits.

Table E-1: Reasonable Potential Calculations

Effluent Percentile value	99%																
				State Water Quality Standard		Max concentration at edge of...											
	Metal Criteria Translator as decimal	Metal Criteria Translator as decimal	Ambient Concentration (metals as dissolved)	Acute	Chronic	Acute Mixing Zone	Chronic Mixing Zone	LIMIT REQ'D?		Max effluent conc. measured (metals as total recoverable)	Coeff Variation		# of samples	Multiplier	Acute Dil'n Factor	Chronic Dil'n Factor	
Parameter	Acute	Chronic	ug/L	ug/L	ug/L	ug/L	ug/L		Pn	ug/L	CV	s	n				COMMENTS
Ammonia Apr - June (mg/L)	1.00	1.00	0.079	2.59	1.20	1.00	0.714	NO	N/A	2.20	N/A	N/A	N/A	1.00	2.29	3.34	Previous Max Daily Limit
Ammonia July - Mar (mg/L)	1.00	1.00	0.079	2.59	0.906	2.87	1.84	YES	N/A	9.92	N/A	N/A	N/A	1.00	3.53	5.58	Previous Max Daily Limit
Arsenic (Aquatic Life) Apr - June	1.00	1.00	7.1100	340	150	12.27	11.54	NO	0.945	16	0.25	0.25	81	1.20	2.29	2.67	
Arsenic (Aquatic Life) July - Mar	1.00	1.00	7.1100	340	150	10.46	9.88	NO	0.945	16	0.25	0.25	81	1.20	3.53	4.27	
Cadmium Apr - June	0.97	0.93	0.1620	0.827	0.408	0.16	0.16	NO	0.942	0.096	0.69	0.62	77	1.60	2.29	2.67	
Cadmium July - Mar	0.97	0.93	0.1620	0.827	0.408	0.16	0.16	NO	0.942	0.096	0.69	0.62	77	1.60	3.53	4.27	
Chromium III Apr - June	0.32	0.86	2.1600	355	46.2	4.68	9.4	NO	0.945	13.0	1.12	0.90	81	1.93	2.29	2.67	
Chromium III July - Mar	0.32	0.86	2.1600	355	46.2	3.80	6.72	NO	0.945	13.0	1.12	0.90	81	1.93	3.53	4.27	
Chromium VI Apr - June	0.98	0.96	2.1600	15.7	10.6	12.0	10.4	NO	0.945	13.0	1.12	0.90	81	1.93	2.29	2.67	
Chromium VI July - Mar	0.96	0.96	2.1600	15.7	10.6	8.38	7.30	NO	0.945	13.0	1.12	0.90	81	1.93	3.53	4.27	
Copper Apr - June	0.505	0.505	2.0400	9.88	6.93	17.49	15.29	YES	0.953	38.0	1.355	1.02	95	1.95	2.29	2.67	
Copper July - Mar	0.505	0.505	2.0400	9.88	6.93	12.08	10.33	YES	0.953	38.0	1.355	1.02	95	1.95	3.53	4.27	
Cyanide Apr - June	1.00	1.00		22.00	5.20	1.61	1.38	NO	0.905	1.3	1.364	1.03	46	2.84	2.29	2.67	2008 and later effluent data
Cyanide July - Mar	1.00	1.00		22.00	5.20	1.05	0.86	NO	0.905	1.3	1.364	1.03	46	2.84	3.53	4.27	2008 and later effluent data
Lead Apr - June	0.082	0.082	0.1490	34.3	1.34	0.36	0.33	NO	0.951	4.00	1.30	1.00	92	1.95	2.29	2.67	
Lead July - Mar	0.082	0.082	0.1490	34.3	1.34	0.29	0.26	NO	0.951	4.00	1.30	1.00	92	1.95	3.53	4.27	
Mercury Apr - June	1.00	1.00	0.0055	2.1000	0.0120	0.013	0.0119	NO	0.853	0.010	0.71	0.64	29.00	2.26	2.29	2.67	
Mercury July - Mar	1.00	1.00	0.0055	2.1000	0.0120	0.010	0.0095	NO	0.853	0.010	0.71	0.64	29.00	2.26	3.53	4.27	
Nickel Apr - June	0.546	0.546	0.4100	287	31.9	60.33	51.80	YES	0.952	98.00	2.56	1.42	93	2.57	2.29	2.67	
Nickel July - Mar	0.546	0.546	0.4100	287	31.9	39.34	32.58	YES	0.952	98.00	2.56	1.42	93	2.57	3.53	4.27	
Nitrate + Nitrite (mg/L)	1.00	1.00	3.0200		100		26.56	NO	0.825	13.85	0.50	0.47	24	1.92		1.00	
WET Apr - June	1.00	1.00		3.00	1.00	36.59	31.39	YES	0.819	16.00	1.71	1.17	23	5.24	2.29	2.67	
WET July - Mar	1.00	1.00		3.00	1.00	23.78	19.65	YES	0.819	16.00	1.71	1.17	23	5.24	3.53	4.27	
Zinc Apr - June	0.705	0.705	4.1495	71.9	72.5	54.37	47.23	NO	0.952	112	0.69	0.63	94	1.51	2.29	2.67	
Zinc July - Mar	0.705	0.705	4.1495	71.9	72.5	36.78	31.12	NO	0.952	112	0.69	0.63	94	1.51	3.53	4.27	

Table E-2: Reasonable Potential Calculations for Human Health Criteria for Arsenic

Effluent Percentile value	95%																
				State Water Quality Standard		Max concentration at edge of...											
	Metal Criteria Translator as decimal	Metal Criteria Translator as decimal	Ambient Concentration (metals as dissolved)	Acute	Chronic	Acute Mixing Zone	Chronic Mixing Zone	LIMIT REQ'D?		Max effluent conc. measured (metals as total recoverable)	Coeff Variation		# of samples	Multiplier	Acute Dil'n Factor	Chronic Dil'n Factor	
Parameter	Acute	Chronic	ug/L	ug/L	ug/L	ug/L	ug/L		Pn	ug/L	CV	s	n				COMMENTS
Arsenic (Human Health) Apr - June	1.00	1.00	7.1100		10		9.54	NO	0.964	16	0.25	0.25	81	0.96		3.34	
Arsenic (Human Health) July - Mar	1.00	1.00	7.1100		10		8.56	NO	0.964	16	0.25	0.25	81	0.96		5.58	

Table E-3: Water Quality-based Effluent Limit Calculations

Statistical variables for permit limit calculation	
LTA Probability Basis	99%
MDL Probability Basis	99%
AML Probability Basis	95%

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

Permit Limit Calculation Summary											Waste Load Allocation (WLA) and Long Term Average (LTA) Calculations						
PARAMETER	Acute Dil'n Factor	Chronic Dil'n Factor	Metal Criteria Translator Acute	Metal Criteria Translator Chronic	Ambient Concentration µg/L	Water Quality Standard Acute µg/L	Water Quality Standard Chronic µg/L	Average Monthly Limit (AML) µg/L	Maximum Daily Limit (MDL) µg/L	Comments	WLA Acute µg/L	WLA Chronic µg/L	LTA Acute µg/L	LTA Chronic µg/L	Limiting LTA µg/L	Coeff. Var. (CV) decimal	# of Samples per Month n
Ammonia April - June (mg/L)	2.29	2.67	1.00	1.00	0.079	2.59	1.20	**1.55**	**5.83**		5.83	3.08	0.52	0.98	0.52	3.32	8
Ammonia July - Mar (mg/L)	3.53	5.58	1.00	1.00	0.079	2.59	0.91	**2.70**	**8.93**		8.93	4.69	0.79	1.49	0.79	3.32	4
Copper April - June	2.29	2.67	0.505	0.505	2.040	9.88	6.93	**19.8**	**39.6**		39.6	29.9	6.21	8.66	6.21	1.36	1
Copper July - Mar	3.53	4.27	0.505	0.505	2.040	9.88	6.93	**29.3**	**58.8**		58.8	45.4	9.21	13.13	9.21	1.36	1
Nickel April - June	2.29	2.67	0.546	0.546	0.41	287	31.9	**79.2**	**253**		1206	155.0	121.2	25.4	25.4	2.56	4
Nickel July - Mar	3.53	4.27	0.546	0.546	0.41	287	31.9	**126**	**404**		1856	247	187	40.6	40.6	2.56	4
WET April - June (TUc)	2.29	2.67	1.00	1.00		3.00	1.00	**1.61**	**4.81**		6.88	2.67	0.90	0.63	0.63	1.71	4
WET July - Mar (TUc)	3.53	4.27	1.00	1.00		3.00	1.00	**2.58**	**7.68**		10.6	4.27	1.38	1.00	1.00	1.71	4

C. References

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

Appendix F: Total Phosphorus Reasonable Potential and Limits

A. Limits Consistent with the draft Lower Boise River TMDL 2015 Total Phosphorus Addendum

Federal regulations state that NPDES permits must include effluent limits consistent with the assumptions and requirements of any available wasteload allocation (WLA) in a total maximum daily load (TMDL) for the discharge prepared by the State and approved by the EPA pursuant to 40 CFR 130.7 (40 CFR 122.44(d)(1)(vii)(A)).

At this time, there is no approved TMDL for total phosphorus in the Lower Boise River. However, the Idaho Department of Environmental Quality has prepared the draft *Lower Boise River TMDL: 2015 Total Phosphorus Addendum*, ("2015 Draft TP TMDL") which was issued for public review and comment on June 5th, 2015. The 2015 Draft TP TMDL includes WLAs for the City of Caldwell. The EPA anticipates that IDEQ will finalize the 2015 Draft TP TMDL in the near future, and that the final TMDL will subsequently be approved by the EPA. Thus, in the draft permit, the EPA is proposing effluent limits for TP that are consistent with the proposed WLAs in the 2015 Draft TP TMDL.

The EPA intends to issue a final NPDES permit to the City of Caldwell after the 2015 Draft TP TMDL is finalized by IDEQ and approved by the EPA. The WLAs in the final, approved TMDL may be different from those in the 2015 Draft TP TMDL. The EPA intends to establish TP limits in the final permit that are consistent with the assumptions and requirements of the WLAs in the final, approved TMDL.

The WLAs are 7.1 lb/day from May 1 – September 30 (see Table 28, Page 94) and 24.8 lb/day from October 1 – April 30 (see Table 35, Page 110). Federal regulations state that effluent limits for publicly owned treatment works (POTWs) that discharge continuously shall be stated as average weekly and average monthly discharge limitations, unless impracticable (40 CFR 122.45(d)(2)). For both the May – September and October – April WLAs, the 2015 Draft TP TMDL states that "DEQ intends that wasteload allocations are to be expressed as average monthly limits, with higher weekly average limits based on the coefficient of variation, in NPDES permits." Thus, the proposed average monthly limits for TP are identical to the WLAs.

Average weekly limits for TP were calculated by adapting the ratio shown in Table 5-3 of the EPA's *Technical Support Document for Water Quality-based Toxics Control* or "TSD" (EPA 1991) to calculate an average weekly limit instead of a maximum daily limit, using the required sampling frequency of twice per week, the 95th percentile probability basis for the average monthly limit, the 99th percentile probability basis for the average weekly limit. Attainment of the proposed average monthly effluent limits for TP will require upgrades to the POTW. The coefficient of variation, based on recent effluent data, is 1.31. Attainment of the proposed average monthly effluent limits for TP will require upgrades to the POTW. Therefore, the historic effluent variability for TP may not be representative of future effluent variability. The TSD states that typical values of the CV for effluent data usually range from 0.2 to 1.2 (see TSD at Page E-3). Because the recent effluent data indicate relatively high variability, the EPA has assumed that the coefficient of variation (CV) is equal to 1.2, which is the upper bound of the typical range. This results in a ratio between the average monthly and average weekly limit of 2.35:1. Thus, the proposed average weekly limits are:

May – September: 7.1 lb/day × 2.35 = 17 lb/day

October – April: 24.8 lb/day × 2.35 = 58.3 lb/day

B. Potential Alternative Limits based on Idaho's Narrative Water Quality Criterion for Nutrients

As explained above, IDEQ has completed the 2015 Draft TP TMDL, which includes wasteload allocations for the City of Caldwell facility. However, unless and until the TMDL is finalized by IDEQ and approved by the EPA, the regulation requiring that the EPA establish effluent limits that are "consistent with the assumptions and requirements of any available wasteload allocation for the discharge prepared by the State *and approved by EPA pursuant to 40 CFR 130.7"* (emphasis added) is inapplicable to the City of Caldwell's permit.

If the TMDL is not finalized by IDEQ and approved by the EPA, effluent limits for nutrients would need to be derived directly from Idaho's narrative criterion for excess nutrients (IDAPA 58.01.02.200.06). Such limits would also need to comply with applicable federal regulations, notably 40 CFR 122.44(d)(1)(vi – vii).

Since modeling shows that nuisance levels of periphyton (> 150 mg/m^2 chlorophyll a) can occur under existing phosphorus loading conditions in at least one Boise River segment in every month of the year except May, June and July (see the 2015 Draft TP TMDL at Figure 32, Page 120), when reductions in TP in the Boise River are necessary to meet the 70 µg/L load allocation in the Snake River Hells Canyon TMDL (IDEQ and ODEQ 2004), TP limits would need to be established for all times of the year.

In addition, such limits would likely be more stringent than the limits consistent with the WLA in the 2015 Draft TP TMDL (described above). The 2015 Draft TP TMDL establishes load and wasteload allocations for numerous point and nonpoint sources in the Lower Boise watershed. Unless and until the TMDL is finalized by IDEQ and approved by the EPA, there is no assurance that the other point and nonpoint sources of TP in the Lower Boise watershed will reduce their TP loading, as planned by the TMDL. If the other sources of TP in the watershed do not reduce TP loading, effluent limits more stringent than limits consistent with the WLA in the 2015 Draft TP TMDL (described above) would likely for be necessary for any specific NPDES permit, in order to ensure a level of water quality that is derived from and complies with all applicable water quality standards, as required by 40 CFR 122.44(d)(1)(vii)(A).

The EPA is not proposing specific effluent limits for TP derived directly from Idaho's narrative criterion for excess nutrients at this time. Should the EPA decide to do so in the future, the EPA will reopen the public comment period for this draft permit to propose and take comments on such limits.

C. References

EPA. 1986. *Quality Criteria for Water 1986*. Environmental Protection Agency. Office of Water. Regulations and Standards. Washington, DC. May 1, 1986. EPA-440-5-86-001. http://water.epa.gov/scitech/swguidance/standards/criteria/aqlife/upload/2009_01_13_criteria_goldbook.pdf

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IDEQ and ODEQ. 2004. *Snake River – Hells Canyon Total Maximum Daily Load (TMDL).* Idaho Department of Environmental Quality and Oregon Department of Environmental Quality. Revised June 2004.
http://www.deq.state.or.us/wq/tmdls/docs/snakeriverbasin/tmdlrev.pdf

IDEQ. 2015. *Lower Boise River TMDL: 2015 Total Phosphorus Addendum.* Idaho Department of Environmental Quality. Boise, ID. Draft. June 2015.
http://www.deq.idaho.gov/media/60176655/lower-boise-river-tmdl-total-phosphorus-addendum-draft-0615.pdf

Appendix G: Draft Clean Water Act Section 401 Certification

Idaho Department of Environmental Quality
Draft §401 Water Quality Certification

June 5, 2015

NPDES Permit Number(s): ID-0021504, City of Caldwell Wastewater Treatment Plant (WWTP)

Receiving Water Body: Boise River

Pursuant to the provisions of Section 401(a)(1) of the Federal Water Pollution Control Act (Clean Water Act), as amended; 33 U.S.C. 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 (NPDES) 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, 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.

Antidegradation Review

The WQS contain an antidegradation policy providing three levels of protection to water bodies in Idaho (IDAPA 58.01.02.051).

- Tier 1 Protection. The first level of protection applies to all water bodies subject to Clean Water Act jurisdiction and ensures that existing uses of a water body and the level of water quality necessary to protect those existing uses will be maintained and protected (IDAPA 58.01.02.051.01; 58.01.02.052.01). Additionally, a Tier 1 review is performed for all new or reissued permits or licenses (IDAPA 58.01.02.052.07).

- Tier 2 Protection. The second level of protection applies to those water bodies considered high quality and ensures that no lowering of water quality will be allowed unless deemed necessary to accommodate important economic or social development (IDAPA 58.01.02.051.02; 58.01.02.052.08).

- Tier 3 Protection. The third level of protection applies to water bodies that have been designated outstanding resource waters and requires that activities not cause a lowering of water quality (IDAPA 58.01.02.051.03; 58.01.02.052.09).

DEQ is employing a water body by water body approach to implementing Idaho's antidegradation policy. This approach means that any water body fully supporting its beneficial uses will be considered high quality (IDAPA 58.01.02.052.05.a). Any water body not fully supporting its beneficial uses will be provided Tier 1 protection for that use, unless specific circumstances warranting Tier 2 protection are met (IDAPA 58.01.02.052.05.c). The most recent federally approved Integrated Report and supporting data are used to determine support status and the tier of protection (IDAPA 58.01.02.052.05).

Pollutants of Concern

The City of Caldwell WWTP discharges the following pollutants of concern: five day biochemical oxygen demand (BOD_5), TSS, pH, *E. coli*, total phosphorus (TP), orthophosphate, ammonia, nitrate + nitrite, total Kjeldahl nitrogen (TKN), temperature (heat), arsenic, cadmium, chromium, copper, cyanide, lead, mercury, nickel, silver, zinc, and whole effluent toxicity (WET). Effluent limits have been developed for BOD_5, TSS, pH, *E. coli*, TP, ammonia, copper, nickel, and WET. No effluent limits are proposed for orthophosphate, nitrate + nitrite, TKN, temperature, arsenic, cadmium, chromium, cyanide, lead, mercury, silver, or zinc; however monitoring requirements are included in the permit to determine WQS compliance and future permit limits, where needed.

Receiving Water Body Level of Protection

The City of Caldwell WWTP discharges to the Boise River within the lower Boise assessment unit (AU) 17050114SW005_06b (Boise River – Middleton to Indian Creek). This AU has the following designated beneficial uses: cold water aquatic life, salmonid spawning and primary contact recreation. In addition to these uses, all waters of the state are protected for agricultural and industrial water supply, wildlife habitat, and aesthetics (IDAPA 58.01.02.100).

The cold water aquatic life use in the Boise River AU is not fully supported due to excess sedimentation/siltation, water temperature, total phosphorus (TP), low flow alterations, and physical substrate habitat alterations (2012 Integrated Report). The primary contact recreation beneficial use is not fully supported due to excess *E. coli* bacteria. As such, DEQ will provide Tier 1 protection only for the aquatic life use and recreation beneficial uses (IDAPA 58.01.02.051.02; 58.01.02.051.01).

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 Clean Water Act, and requires demonstration 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 narrative and numeric criteria of the Idaho WQS, as well as other provisions of the WQS such as Section 055, which addresses water quality limited waters. The numeric and narrative criteria in the WQS are set at levels that ensure protection of designated beneficial uses. The effluent limitations and associated requirements contained in the City of Caldwell WWTP permit are set at levels that ensure compliance with the narrative and numeric criteria in the WQS.

Ammonia

While both the current and proposed water quality effluent limits for ammonia were developed to protect cold water aquatic life from acute and chronic exposure, the proposed limits are less stringent than the 1999 permit. Three factors contributed to the change in the permit limits for ammonia: 1) The methodology for calculating ammonia criteria in Idaho's WQS was revised in 2002; and, 2) current receiving water temperature and pH data used to calculate ammonia limits varied substantially from data available in 1999; and 3) Re-evaluation of data and seasonality for low flow conditions. The proposed limits for ammonia will protect and maintain existing and designated beneficial uses in Boise River. These limits do not exceed narrative or numeric criteria in the Idaho WQS and meet the requirements for Tier 1 protection (IDAPA 58.01.02.051.01.).

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 those pollutants causing impairment. 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 are consistent with wasteload allocations in the approved TMDL.

Temperature

The Caldwell WWTP discharges to the Boise River, which is impaired for temperature; however a TMDL has not yet been completed. Prior to the development of the TMDL, the WQS require the application of the antidegradation policy and implementation provisions to maintain and protect uses (IDAPA 58.01.02.055.04). At this time, there is not sufficient data to determine whether or not the City of Caldwell's discharge of heat to the Boise River has a reasonable potential to cause or contribute to excursions above the water quality standards for temperature. Continuous temperature monitoring of the effluent and receiving water are permit requirements. This monitoring will facilitate an assessment of whether the discharge will negatively impact the temperature of the lower Boise River.

Total Phosphorus

The Boise River, at this location (AU 17050114SW005_06b), is also impaired for TP. The City of Caldwell WWTP discharge has the potential to cause or contribute to excursions above water quality standards for excess nutrients. Total phosphorus has been identified as the limiting nutrient. Therefore, the permit proposes water quality based effluent limits for total phosphorus. A draft *2015 Total Phosphorus TMDL Addendum to the Lower Boise River Subbasin Assessment and Total Maximum Daily Loads TP TMDL* is under development to address TP impairment in the Lower Boise River. Water quality monitoring and modeling completed since 2012 have determined the extent of impairment in the Boise River as well as WLAs expected to restore beneficial uses in the Boise River. The WLAs developed in the TMDL for the City of Caldwell WWTP are proposed as limits in this NPDES permit. The effluent limitations in the permit will result in a decrease of TP in the Boise River.

The Hells Canyon segment of the Snake River is also impaired due to excess nutrients. The *Snake River Hells Canyon* (SR-HC) *TMDL* (DEQ 2003) established a load allocation for the Boise River based upon a total phosphorus concentration of 0.07 mg/l at the mouth of the Boise

River. The draft TMDL for TP under development for the Boise River includes a target TP concentration at the Mouth of the Boise River that ensures that the Boise River load allocation for the SR-HC TMDL will be achieved. DEQ believes the permit will ensure compliance with the TMDL and the applicable narrative criteria.

Sediment and *E. coli* Bacteria

The Boise River, at this location (AU 17050114SW005_06b), is also impaired for sediment and bacteria. The EPA-approved *Lower Boise River TMDL* (1999) and TMDL Addendum (2008) establishes wasteload allocations for sediment and bacteria. These wasteload allocations are designed to ensure the Boise River will achieve the water 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 City of Caldwell WWTP permit are set at levels that comply with these wasteload allocations.

In sum, the effluent limitations and associated requirements contained in the City of Caldwell WWTP permit are set at levels that ensure compliance with the narrative and numeric criteria in the WQS and the wasteload allocations established in the draft *Lower Boise River TMDL 2015 Total Phosphorus TMDL Addendum,* and EPA-approved *Lower Boise River TMDL* and *SR-HC TMDL.* Therefore, DEQ has determined the permit will protect and maintain existing and designated beneficial uses in the Boise River in compliance with the Tier 1 provisions of Idaho's WQS (IDAPA 58.01.02.051.01 and 58.01.02.052.07).

Conditions Necessary to Ensure Compliance with Water Quality Standards or Other Appropriate Water Quality Requirements of State Law

Compliance Schedules

Pursuant to IDAPA 58.01.02.400.03, DEQ may authorize compliance schedules for water quality–based effluent limits issued in a permit for the first time. City of Caldwell WWTP cannot immediately achieve compliance with the effluent limits for TP and WET; therefore, DEQ authorizes compliance schedules and interim requirements as set forth below. These compliance schedules provide the permittee a reasonable amount of time to achieve the final effluent limits as specified in the permit. At the same time, the schedules ensure that compliance with the final effluent limits is accomplished as soon as possible.

While the schedules of compliance are in effect, the City of Caldwell WWTP must meet the following interim requirements:

1) The City of Caldwell WWTP must comply with the interim effluent limitations (Table 1) and monitoring requirements in Part I.B. of the Permit.
2) Until compliance with the final effluent limitations are achieved, the City of Caldwell WWTP must complete the tasks listed below in Table 1 and 2, as required under the schedules of compliance.

3) In addition, the City of Caldwell must submit an annual progress report outlining progress made towards reaching the final compliance dates for the effluent limitations. The annual progress report based on data gathered through December 31st must be submitted to the EPA and DEQ annually by February 15th of the subsequent year. The first report through December 31, 2015 is due on February 15, 2016 and annually thereafter, until compliance with effluent limitations is achieved. See also the Permit Part III.K., "Compliance Schedules." At a minimum, the annual progress report must include:

   i) An assessment of the previous year's TP and WET effluent data and comparison to the final effluent limitations in the permit.

   ii) A description of progress made towards meeting the final effluent limitations, including the applicable deliverables required under in Table 1 and 2. Include any exceedances of interim permit limits or anticipated challenges for compliance within the next year. This may include a technological explanation and/or a request to modify the permit.

   iii) A description of actions and milestones targeted for the upcoming year towards meeting the final effluent limitations.

4) The permittee must comply with the Interim Effluent Limits, Compliance Tasks and Compliance Dates in Table 1 and Table 2:

Table 1. WET Effluent Limits and Compliance Dates.

<table>
<tr><th colspan="3">Effluent Limits</th></tr>
<tr><th colspan="2">Period</th><th>Effluent Limit</th></tr>
<tr><td colspan="2">For 2 years and 11 months after Effective Date of NPDES Permit (EDP)</td><td>Average Monthly Limit (year round): 8 Chronic Toxic Units (TU_c)
Maximum Daily Limit (year round): 16 TU_c</td></tr>
<tr><td colspan="2">3 years from EDP</td><td>See Final Permit Part I.B.1, Table 1</td></tr>
<tr><th>Task No.</th><th>Completion Date</th><th>Task Activity</th></tr>
<tr><td>1</td><td>Quarterly after EDP</td><td>Conduct WET testing per permit.</td></tr>
<tr><td>2</td><td>EDP +
0.5 Years</td><td>Update the City's Pretreatment Program Plan (Pretreatment Program for the City of Caldwell, Idaho; approved by EPA in November 1993).

Deliverable: The permittee will submit an amended plan to EPA and provide the EPA-approved plan to DEQ.</td></tr>
<tr><td>3</td><td>EDP +
3 Years</td><td>Implementation of City's Updated Pretreatment Program and Achieve Final Effluent Limitation

Deliverable: The permittee must achieve compliance with the final effluent limitations within 3 years of the EDP.</td></tr>
</table>

Table 2. Total Phosphorus Effluent Limits and Compliance Dates

Effluent Limits	
Period	**Effluent Limit**
For 9 years and 11 months from the Effective Date of the NPDES Permit (EDP)	Interim Limit not to exceed 5.8 mg/L, seasonal average
10 years from EDP	See Final Permit Part I.B.1, Table 1

Task No.	Completion Date	Task Activity
1	February 15, 2016 and annually thereafter	Deliverable: The permittee will provide DEQ and EPA with a written Progress Report.
2	EDP + 3 Years	Complete Facility Planning Study that evaluates phosphorus removal and trading or offsets and submit the Study to DEQ for approval. Deliverable: The permittee will provide EPA with written notice that the facility Planning Study has been submitted to DEQ.
3	EDP + 5.5 Years	Evaluate and Obtain Financing for Facility Improvements Recommended in Facility Planning Study Deliverable: The permittee will provide DEQ and EPA with written notice that the necessary funding has been obtained.
4	EDP + 6 Years	Complete Preliminary Design Report and submit the Report to DEQ for approval. Deliverable: The permittee will provide EPA with written notice that the preliminary design report has been submitted to DEQ.
5	EDP + 7 Years	Complete Final Design Deliverable: The permittee will submit the final design to DEQ for approval and provide EPA with written notice that the final design documents are completed.
6	EDP + 7.25 Years	Complete Bidding Deliverable: The permittee will provide DEQ and EPA with written notice that the Bid has been awarded.
7	EDP + 7.5 Years	Start Construction Deliverable: The permittee will provide DEQ and EPA with a copy of the Notice to Proceed with construction.
8	EDP + 9.5Years	Complete Construction Deliverable: The permittee will provide DEQ and EPA with written notice that the construction is completed.
9	EDP + 9 Years and 11 months	Process Optimization and Achieve Final Effluent Limitation Deliverable: The permittee must achieve compliance with the final effluent limitations and provide DEQ and EPA with written notice of compliance with final effluent limitations.

Note: This compliance schedule may be adjusted based on the final EPA-approved Lower Boise River Subbasin Assessment and Total Maximum Daily Load –Total Phosphorus Addendum (TMDL) that is currently under development.

Mixing Zones

Pursuant to IDAPA 58.01.02.060, DEQ authorizes the mixing zones summarized in Table 3.

Table 3. Authorized Mixing Zones.

Pollutant	Season	Authorized % Critical Flow Mixing Zone
Ammonia	Year Round	25%
Arsenic	April-June	20%
Arsenic	July-March	10%
Chromium IV	April-June	25%
Chromium IV	July-March	13%
Copper	Year round	25%
Mercury	April-June	25%
Mercury	July-March	13%
Nickel	Year round	25%
Zinc	April-June	14%
Zinc	July-March	7%
Whole Effluent Toxicity (WET)	Year Round	25%

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 Section 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 or comments regarding the actions taken in this certification should be directed to Lance Holloway, DEQ Boise Regional Office at 208.373.0564 or Lance.Holloway@deq.idaho.gov .

DRAFT

Aaron Scheff
Regional Administrator
Boise Regional Office

Appendix H: Site-Specific Metals Translator Study

CITY OF CALDWELL
NPDES PERMITTING

Effluent Monitoring & Metals Translator Study

TECHNICAL MEMORANDUM

September 2, 2014

PROFESSIONAL ENGINEER
REGISTERED
12122
9/2/2014
STATE OF IDAHO
GLEN HOLDREN

KELLER
associates

213094/Translator Study/14-295

Technical Memorandum

TO: Lauri Monnot, DEQ
Brian Nickel, EPA

FROM: Glen Holdren, PE
Larry Rupp, PE

DATE: September 2, 2014

SUBJECT: **Effluent Monitoring & Metals Translator Study**
City of Caldwell NPDES Permitting

INTRODUCTION

In response to a preliminary draft National Pollutant Discharge Elimination System (NPDES) permit provided to the City of Caldwell by Idaho Department of Environmental Quality (DEQ) and United States Environmental Protection Agency (EPA), the City elected to conduct some additional effluent monitoring for metals and cyanide and to conduct a metals translator study. The Effluent Cyanide and Metals Monitoring Plan and Metals Translator Study Plan are attached as Appendix A and B, respectively.

The objective of the effluent cyanide and metals monitoring was to provide additional data to EPA for determining effluent limits and to the City for determining the ability of the plant to meet proposed limits. A second objective was to use new and improved monitoring equipment and sampling protocols that the City will continue to utilize in the future, and to employ analytical methods that meet the requirements of the new permit.

The objective of the metals translator study is to provide accurate site-specific translator values for the metals of concern (copper, lead, nickel, and zinc) to use in the reasonable potential analysis for determining effluent limits.

EFFLUENT MONITORING

Additional effluent monitoring was conducted in 2014 using the Effluent Cyanide and Metals Monitoring Plan on April 8, 15, 22, and 29; May 6, 13, 20, and 27, June 3, 10, 17, and 24; and July 1 and 8. The samples were 24-hour flow-weighted composite samples. The samples were collected and taken to the Boise City Public Works Water Quality Laboratory (Boise Lab) for analysis for weak acid dissociable cyanide, and total recoverable copper, lead, mercury, nickel, silver and zinc. Boise Lab used EPA Method 200.8 for copper, lead, nickel, silver and zinc; Method 1631 E for mercury and Lachat Instruments 102040001WX for cyanide. Field blanks were collected each day except July 8 when a duplicate sample was analyzed for each metal. A copy of the laboratory results is contained in Appendix C.

A summary of the monitoring results is provided in Table 1. As indicated in the table, the first few field blank samples contained detectable copper, lead, mercury, and zinc. In early May, the City added an outside vent to the composite sampler so that air from the Ultra Violet Disinfection Room where the effluent sampler is located was not used for venting. This change to the sampling protocol eliminated all metal detections in the field blank except for trace amounts of mercury present in the outside air.

Summary

Based on the additional effluent data it would appear that effluent limits are not required for cyanide, mercury or silver as the effluent is at least an order of magnitude lower than the proposed limits.

Table 1 – Summary of Caldwell WWTP Effluent Data

Date	Cyanide (mg/L)	Cu (ug/L)	Pb (ug/L)	Hg (ug/L)	Ni (ug/L)	Ag (ug/L)	Zn (ug/L)
4/7/2014	0.0012						
4/8/2014		2.1	0.15	0.00204	0.69	<0.02	35.3
4/14/2014	0.0013						
4/15/2014		2.7	0.14	0.00141	0.68	<0.02	32.5
4/22/2014	<.0011	2.6	0.14	0.00115	0.69	<0.02	32.6
4/29/2014	<.0011	2.5	0.12	0.00127	0.70	<0.02	29.8
5/6/2014	0.0012	2.5	0.12	0.00132	0.83	<0.02	28.4
5/13/2014	<.0011	1.9	0.12	0.00150	0.75	<0.02	28.8
5/20/2014	<.0011	2.7	0.13	0.00151	0.90	<0.02	32.0
5/27/2014	<.0011	2.3	0.13	0.00139	0.86	<0.02	30.5
6/3/2014	<.0011	2.8	0.16	0.00226	0.89	<0.02	31.1
6/10/2014	<.0011	3.6	0.19	0.00349	1.10	<0.02	32.9
6/17/2014	<.0011	3.0	0.18	0.00286	0.97	<0.02	31.3
6/24/2014	<.0011	3.1	0.15	0.00209	0.88	<0.02	29.9
7/1/2014	<.0011	3.5	0.16	0.00276	0.94	<0.02	30.5
7/8/2014	<.0011	2.8	0.13	0.00148	0.82	<0.02	30.3
7/8/2014 dup.	<.0011	2.8	0.13	0.00155	0.77	<0.02	29.9
BLANK SAMPLES							
4/8/2014		0.27	<0.02	<0.000200	<0.10	<0.02	<0.90
4/15/2014		0.74	0.02	0.00028	<0.10	<0.02	<0.90
4/22/2014		0.33	<0.02	0.00023	<0.10	<0.02	1.30
4/29/2014		0.42	<0.02	0.00026	<0.10	<0.02	<0.90
5/6/2014		0.23	<0.02	0.00024	<0.10	<0.02	<0.90
5/13/2014		0.11	<0.02	0.00020	<0.10	<0.02	<0.90
5/20/2014		<0.10	<0.02	<0.000200	<0.10	<0.02	<0.90
5/27/2014		<0.10	<0.02	<0.000200	<0.10	<0.02	<0.90
6/3/2014		<0.10	<0.02	0.000598	<0.10	<0.02	<0.90
6/10/2014		<0.10	<0.02	0.00029	<0.10	<0.02	<0.90
6/17/2014		<0.10	<0.02	<0.000200	<0.10	<0.02	<0.90
6/24/2014		<0.10	<0.02	0.00023	<0.10	<0.02	<0.90
7/1/2014		<0.10	<0.02	0.00024	<0.10	<0.02	<0.90

METALS TRANSLATOR STUDY

The Metals Translator Study was conducted using the Metals Translator Study Monitoring Plan on April 8, 15, 22, and 29; May 6, 13, 20, and 27, June 3, 10, 17, and 24; and July 1 and 8. Effluent and upstream receiving water grab samples were collected for dissolved and total metals. The samples were immediately taken to Boise Lab, where the total and dissolved effluent samples mixed with upstream receiving water to provide a 25% dilution (3 parts effluent to one part receiving stream). The mixed samples were analyzed for total recoverable and dissolved copper, lead, nickel, silver and zinc. Boise Lab used EPA Method 200.8 for copper, lead, nickel, silver and zinc. In addition, the total sample was analyzed for total suspended solids (TSS), total organic carbon (TOC), dissolved organic carbon (DOC), and pH. The TOC and DOC values for each sample are nearly the same, indicating that most of the organic carbon present is dissolved. Field blanks were collected each day except July 8 when a duplicate sample was analyzed for each metal.

The flow at the closest United States Geological Survey (USGS) monitoring station (Parma) for each day of monitoring was obtained from the USGS website. The flow rates shown in the table are provisional results that are not yet approved by USGS. It may take another month or two for all the data to be approved. The approved flow data will be provided to DEQ and EPA by the City when it has been finalized.

A summary of the raw data is provided in Table 2. A copy of the laboratory results is contained in Appendix C.

The field blanks showed some detectable metals. The duplicate sample results indicate that Boise Lab Quality Assurance/Quality Control (QA/QC) program provides sufficient quality control to provide reproducible results and that the sampling methods were consistent.

As indicated in the table, all the total and dissolved silver samples were below the detection level of 0.02 ug/L. Thus the metals translator study cannot provide a metal translator for silver.

Table 2 – Summary of Metal Translator Study Data

DATE	Cu, tot (ug/L)	Cu, Dis (ug/L)	Pb, tot (ug/L)	Pb, dis (ug/L)	Ni, tot (ug/L)	Ni dis (ug/L)	Ag tot (ug/L)	Ag dis (ug/L)	Zn tot (ug/L)	Zn dis (ug/L)	TSS (mg/L)	TOC (mg/L)	DOC (mg/L)	pH (su)	Flow (cfs)
4/8/2014	1.90	0.76	0.61	0.05	0.77	0.38	<0.02	<0.02	15.80	10.40	28.4	3.07	2.94	7.3	2,030
4/15/2014	2.10	0.98	0.61	0.05	0.79	0.38	<0.02	<0.02	13.60	10.60	28.3	2.86	2.85	7.4	1,910
4/22/2014	2.10	1.10	0.51	0.05	0.80	0.46	<0.02	<0.02	13.70	10.80	22.2	3.37	3.31	7.4	867
4/29/2014	1.90	1.00	0.49	0.04	0.77	0.46	<0.02	<0.02	12.20	8.50	22.1	3.27	3.29	7.4	1,190
5/6/2014	1.90	1.20	0.47	0.07	0.81	0.52	<0.02	<0.02	10.70	8.20	22.4	3.41	3.38	7.5	574
5/13/2014	2.30	1.10	0.70	0.05	1.00	0.54	<0.02	<0.02	13.70	9.10	34.9	3.69	3.64	7.6	549
5/20/2014	2.30	1.30	0.64	0.06	0.99	0.54	<0.02	<0.02	13.00	9.60	34.0	3.43	3.52	7.6	541
5/27/2014	2.80	1.40	0.74	0.06	1.10	0.55	<0.02	<0.02	13.20	8.80	35.6	3.60	3.55	7.7	481
6/3/2014	2.50	1.30	0.73	0.05	1.10	0.58	<0.02	<0.02	13.70	9.30	32.4	3.98	3.91	7.8	389
6/10/2014	2.80	1.20	0.82	0.06	1.20	0.65	<0.02	<0.02	14.10	9.10	38.3	4.13	3.96	7.7	346
6/17/2014	2.20	1.20	0.76	0.05	0.88	0.53	<0.02	<0.02	12.30	8.70	34.5	3.33	3.33	7.5	1,200
6/24/2014	2.30	1.10	0.64	0.05	1.00	0.50	<0.02	<0.02	12.40	8.10	32.4	3.34	3.28	7.0	1,100
7/1/2014	2.10	1.10	0.56	0.05	0.85	0.51	<0.02	<0.02	12.40	8.90	30.4	3.64	3.57	7.4	1,140
7/8/2014	2.40	1.20	0.67	0.04	1.00	0.48	<0.02	<0.02	13.1	9.5	32.3	3.06	3.19	7.5	963
7/8/2014 dup.	2.30	1.30	0.64	0.05	0.94	0.49	<0.02	<0.02	12.8	9.4	34.2	3.18	3.17	7.6	
BLANK SAMPLES															
4/8/2014	<0.10	0.12	<0.02	<0.02	<0.10	<0.10	<0.02	<0.02	<0.90	<0.90	<1.0	0.14	0.16	5.1	
4/15/2014	0.14	0.22	<0.02	<0.02	<0.10	<0.10	<0.02	<0.02	<0.90	<0.90	<1.0	0.32	0.24	5.1	
4/22/2014	0.13	0.14	<0.02	<0.02	<0.10	<0.10	<0.02	<0.02	2.3	1.2	<1.0	0.32	0.24	5.1	
4/29/2014	0.11	0.14	<0.02	<0.02	<0.10	<0.10	<0.02	<0.02	<0.90	<0.90	<1.0	0.25	0.17	5.1	
5/6/2014	<0.10	<0.10	<0.02	<0.02	<0.10	<0.10	<0.02	<0.02	<0.90	<0.90	<1.0	0.10	0.13	5.7	
5/13/2014	<0.10	<0.10	<0.02	<0.02	<0.10	<0.10	<0.02	<0.02	<0.90	<0.90	<1.0	0.19	0.15	4.5	
5/20/2014	0.11	<0.10	<0.02	<0.02	<0.10	<0.10	<0.02	<0.02	<0.90	<0.90	<1.0	0.13	0.18	5.1	
5/27/2014	<0.10	<0.10	<0.02	<0.02	<0.10	<0.10	<0.02	<0.02	<0.90	<0.90	<1.0	0.24	0.18	5.2	
6/3/2014	<0.10	<0.10	<0.02	<0.02	<0.10	<0.10	<0.02	<0.02	<0.90	<0.90	<1.0	0.09	0.10	4.9	
6/10/2014	<0.10	<0.10	<0.02	<0.02	<0.10	<0.10	<0.02	<0.02	<0.90	<0.90	<1.0	0.22	0.14	4.8	
6/17/2014	<0.10	<0.10	<0.02	<0.02	<0.10	<0.10	<0.02	<0.02	<0.90	<0.90	<1.0	0.27	0.14	5.3	
6/24/2014	<0.10	<0.10	<0.02	<0.02	<0.10	<0.10	<0.02	<0.02	<0.90	<0.90	<1.0	0.15	0.20	4.7	
7/1/2014	<0.10	<0.10	<0.02	<0.02	<0.10	<0.10	<0.02	<0.02	<0.90	<0.90	<1.0	0.19	0.21	4.4	

Sample Size

Appendix D of the EPA's metal translator guidance indicates that the necessary sample size is not a fixed number, but rather is the number of samples required to demonstrate that the null hypothesis is false. The null hypothesis is that the dissolved and total concentrations are equal. Thus it is the number of samples necessary to demonstrate a statistically significant difference between the mean dissolved concentration and the mean total recoverable concentration for each metal. That will depend on the difference between the two means and the variability of the data. The Metals Translator Study Monitoring Plan assumed that 20 samples would be required, but analysis of already collected data indicated that sufficient data had been collected to demonstrate a statistically significant difference between the mean dissolved concentration and the mean total recoverable concentration of each metal and the sampling was ceased. During the study a total of 14 samples were collected.

A summary of the statistical hypothesis tests comparing the mean dissolved and total metal concentrations for each metal is shown in Table 3.

Table 3 – Summary Statistical Hypotheses Tests

Constituent	Mean	Std. Dev.	Variance	SEM	P	t	df	Std. Err.
Copper, dissolved	1.139	0.1591	0.0235	0.0425				
Copper, total	2.250	0.2981	0.0825	0.0797	**<0.0001**	18.5953	13	0.060
Lead, dissolved	0.052	0.0080	0.0001	0.0021				
Lead, total	0.639	0.1059	0.0104	0.0283	**<0.0001**	20.7668	13	0.028
Nickel, dissolved	0.506	0.0723	0.0049	0.0193				
Nickel, total	0.933	0.1414	0.0186	0.0378	**<0.0001**	17.3994	13	0.025
Zinc, dissolved	9.257	0.8501	0.6710	0.227				
Zinc, total	13.136	1.1705	1.2723	0.313	**<0.0001**	17.4381	13	0.222

Notes:
SEM = standard error of the mean
P = probability of the null hypothesis being true
T, df, Std.Err. = intermediate values used in calculations

The P column shows values that are less than 1/100th of a percent. This indicates that there is a statistically significant difference between the mean dissolved concentration and the mean total recoverable concentration of each metal. Thus, the 14 samples collected are sufficient to provide valid metal translator study results.

Data Analysis

The site-specific metal translator is found by measuring the total and dissolved concentrations of each metal and calculating the ratio of dissolved/total to develop the dissolved fraction, f_D. The metal translator is calculated as the geometric mean of the dissolved fractions from each sample. The geometric mean is the appropriate estimate of the central tendency of the data if the data are log-normally distributed. If the data are not log-normal then the data must be evaluated for correlations with TSS, TOC, or DOC. Since DOC and TOC are approximately equal values (indicating that most of the organic carbon is dissolved), the evaluation was done using TOC as well as TSS.

A summary of the analysis of the data and determination of the dissolved fraction is provided in Table 4.

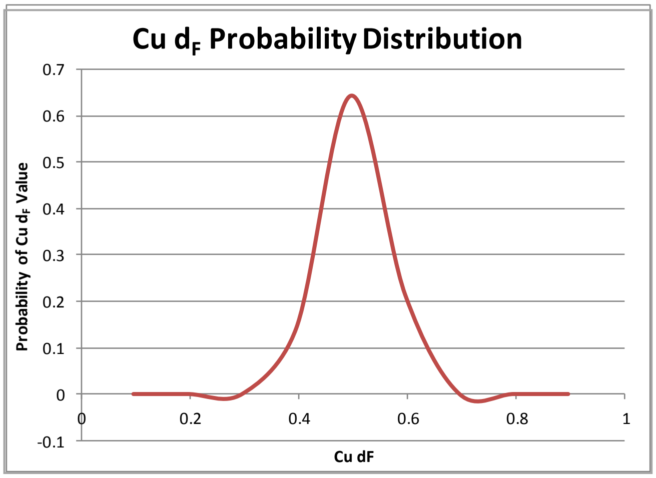
Table 4 – Summary of Metal Translator Study Data Analysis

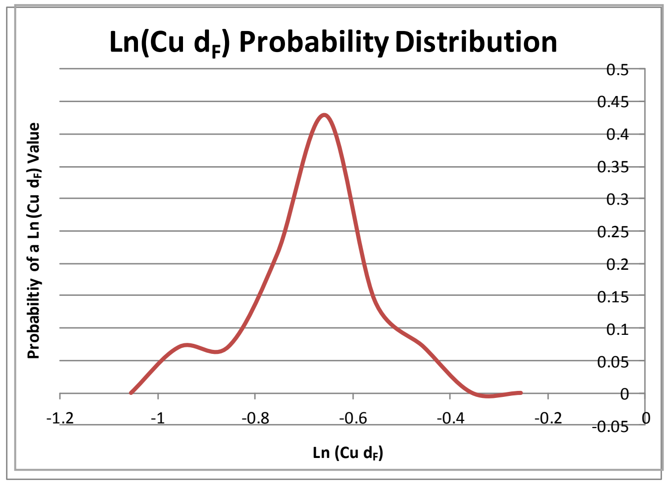
Constituent	Sample Number Units	1 4/8/2014	2 4/15/2014	3 4/22/2014	4 4/29/2014	5 5/6/2014	6 5/13/2014	7 5/20/2014	8 5/27/2014	9 6/3/2014	10 6/10/2014	11 6/17/2014	12 6/24/2014	13 7/1/2014	14 7/8/2014	Geo. Mean	90th Percentile	95% Percentile	Mean (u)
River Flow	**cfs**	**2,030**	**1,910**	**867**	**1,190**	**574**	**549**	**541**	**481**	**389**	**346**	**1,200**	**1,100**	**1,140**	**963**				
Copper, dissolved	ug/l	0.76	0.98	1.10	1.00	1.20	1.10	1.30	1.40	1.30	1.20	1.20	1.10	1.10	1.20	1.127	1.300	1.335	1.139
Copper, total	ug/l	1.90	2.10	2.10	1.90	1.90	2.30	2.30	2.80	2.50	2.80	2.10	2.30	2.10	2.40	2.232	2.710	2.800	2.250
Copper, particulate	ug/l	1.14	1.12	1.00	0.90	0.70	1.20	1.00	1.40	1.20	1.60	0.90	1.20	1.00	1.20	1.090	1.340	1.480	1.111
Copper, dissolved fraction		0.40	0.47	0.52	0.53	0.63	0.48	0.57	0.50	0.52	0.43	0.57	0.48	0.52	0.50	**0.505**	**0.570**	**0.595**	**0.508**
ln(d_F)		-0.92	-0.76	-0.65	-0.64	-0.46	-0.74	-0.57	-0.69	-0.65	-0.85	-0.56	-0.74	-0.65	-0.69				
Plant effluent	ug/l	2.10	2.70	2.60	2.50	2.5	1.9	2.7	2.3	2.8	3.6	3.0	3.1	3.5	2.8				
Lead, dissolved	ug/l	0.05	0.05	0.05	0.04	0.07	0.05	0.06	0.06	0.05	0.06	0.05	0.05	0.05	0.04	0.052	0.060	0.064	0.052
Lead, total	ug/l	0.61	0.61	0.51	0.49	0.47	0.70	0.64	0.74	0.73	0.82	0.76	0.64	0.56	0.67	0.631	0.754	0.781	0.639
Lead, particulate	ug/l	0.56	0.56	0.46	0.45	0.40	0.65	0.58	0.68	0.68	0.76	0.71	0.59	0.51	0.63	0.578	0.701	0.728	0.587
Lead, dissolved fraction		0.08	0.08	0.10	0.08	0.15	0.07	0.09	0.08	0.07	0.07	0.07	0.08	0.09	0.06	**0.082**	**0.097**	**0.116**	**0.084**
ln(d_F)		-2.50	-2.50	-2.32	-2.51	-1.90	-2.64	-2.37	-2.51	-2.68	-2.61	-2.72	-2.55	-2.42	-2.82				
Plant effluent	ug/l	0.15	0.14	0.14	0.12	0.12	0.12	0.13	0.13	0.16	0.19	0.18	0.15	0.16	0.13				
Nickel, dissolved	ug/l	0.38	0.38	0.46	0.46	0.52	0.54	0.54	0.55	0.58	0.65	0.53	0.50	0.51	0.48	0.511	0.571	0.605	0.506
Nickel, total	ug/l	0.77	0.79	0.80	0.77	0.81	1.00	0.99	1.10	1.10	1.20	0.88	1.00	0.85	1.00	0.936	1.100	1.135	0.933
Nickel, particulate	ug/l	0.39	0.41	0.34	0.31	0.29	0.46	0.45	0.55	0.52	0.55	0.35	0.50	0.34	0.52	0.420	0.541	0.550	0.427
Nickel, dissolved fraction		0.49	0.48	0.58	0.60	0.64	0.54	0.55	0.50	0.53	0.54	0.60	0.50	0.60	0.48	**0.546**	**0.602**	**0.616**	**0.545**
ln(d_F)		-0.71	-0.73	-0.55	-0.52	-0.44	-0.62	-0.61	-0.69	-0.64	-0.61	-0.51	-0.69	-0.51	-0.73				
Plant effluent	ug/l	0.69	0.68	0.69	0.70	0.83	0.75	0.90	0.86	0.89	1.10	0.97	0.88	0.94	0.82				
Silver, dissolved	ug/l	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02				
Silver, total	ug/l	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02				
Silver, particulate	ug/l	na	na	na	na	na	na	na	na	na	na	na	na	na	na				
Silver, dissolved fraction		na	na	na	na	na	na	na	na	na	na	na	na	na	na				
Plant effluent	ug/l	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02	<0.02				
Zinc, dissolved	ug/l	10.40	10.60	10.80	8.50	8.20	9.10	9.60	8.80	9.30	9.10	8.70	8.10	8.90	9.50	9.222	10.540	10.670	9.257
Zinc, total	ug/l	15.80	13.60	13.70	12.20	10.70	13.70	13.00	13.20	13.70	14.10	12.30	12.40	12.40	13.10	13.087	13.980	14.695	13.136
Zinc, particulate	ug/l	5.40	3.00	2.90	3.70	2.50	4.60	3.40	4.40	4.40	5.00	3.60	4.30	3.50	3.60	3.795	4.880	5.140	3.879
Zinc, dissolved fraction		0.66	0.78	0.79	0.70	0.77	0.66	0.74	0.67	0.68	0.65	0.71	0.65	0.72	0.73	**0.705**	**0.775**	**0.783**	**0.706**
ln(d_F)		-0.42	-0.25	-0.24	-0.36	-0.27	-0.41	-0.30	-0.41	-0.39	-0.44	-0.35	-0.43	-0.33	-0.32				
Plant effluent	ug/l	35.3	32.5	32.6	29.8	28.4	28.8	32	30.5	31.1	32.9	31.3	29.9	30.5	30.3				
TSS	mg/L	28.4	28.3	22.2	22.1	22.4	34.9	34.0	35.6	32.4	38.3	34.5	32.4	30.4	32.3		35.4	36.5	30.586
TOC	mg/L	3.07	2.86	3.37	3.27	3.41	3.69	3.43	3.60	3.98	4.13	3.33	3.34	3.64	3.06		3.89	4.03	3.441
DOC	mg/L	2.94	2.85	3.31	3.29	3.38	3.64	3.52	3.55	3.91	3.96	3.33	3.28	3.57	3.19		3.83	3.93	3.409
pH	su	7.3	7.4	7.4	7.4	7.5	7.6	7.6	7.7	7.8	7.7	7.5	7	7.4	7.5		7.7	7.7	7.486

The proposed metal translator for each metal is the geometric mean of the dissolved fraction calculated for each metal and for each sample.

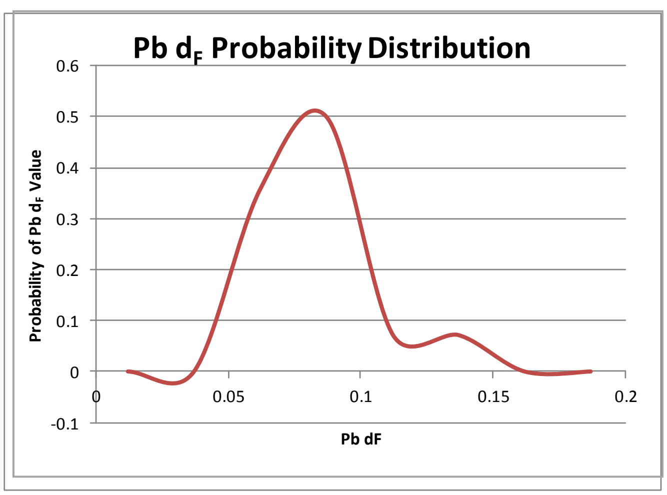
The geometric mean is appropriate as long as the data is log-normal and not correlated to TSS, TOC, or DOC present in the water body. The data set was evaluated for its distribution and each dissolved fraction was found to be normally distributed and log-normally distributed. Graphs of the probability distribution for each metal follow.

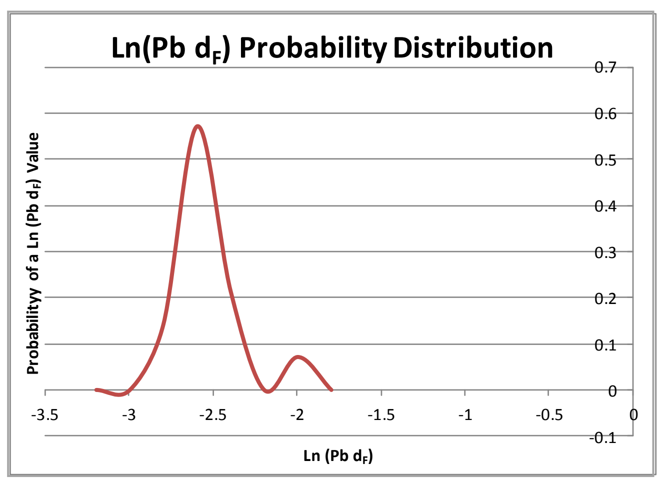
Copper



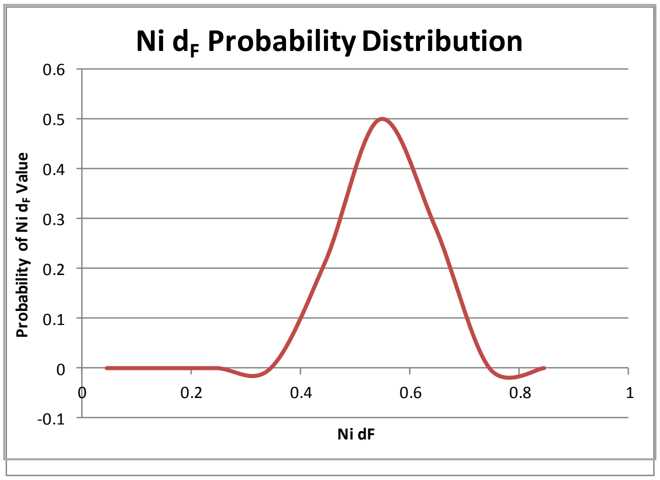


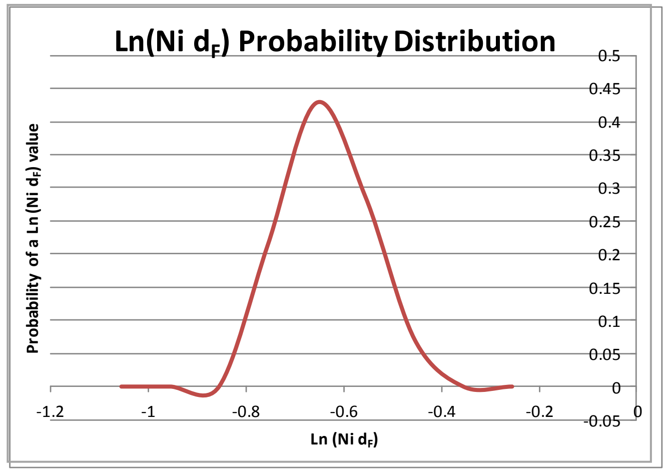
Lead



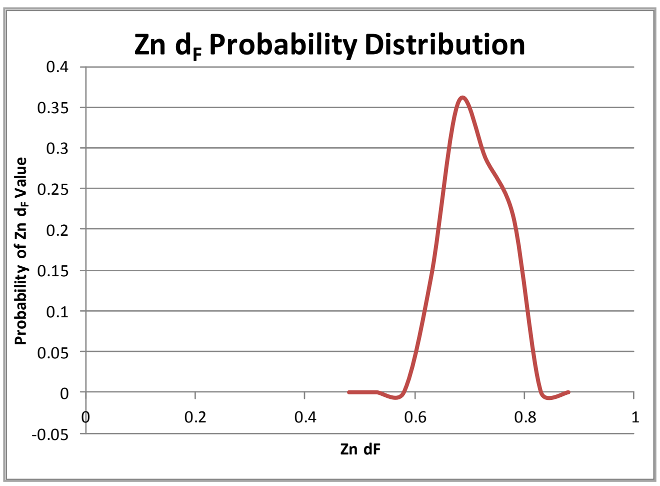


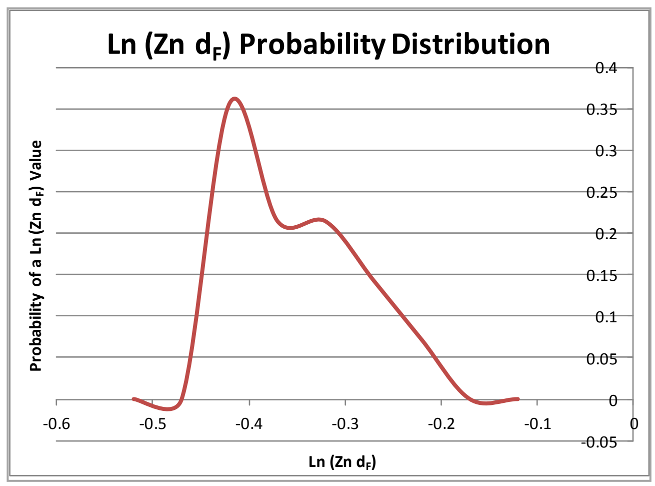
Nickel



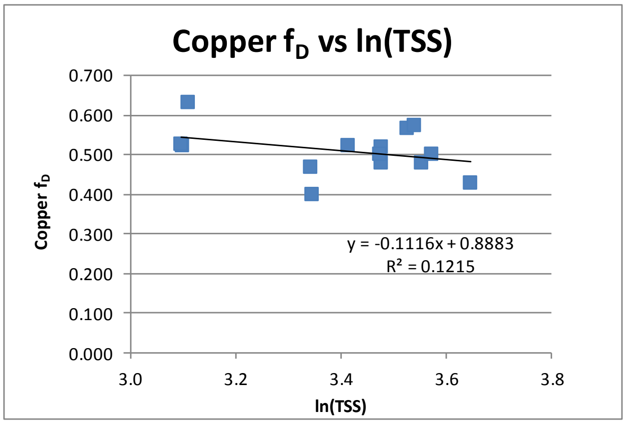


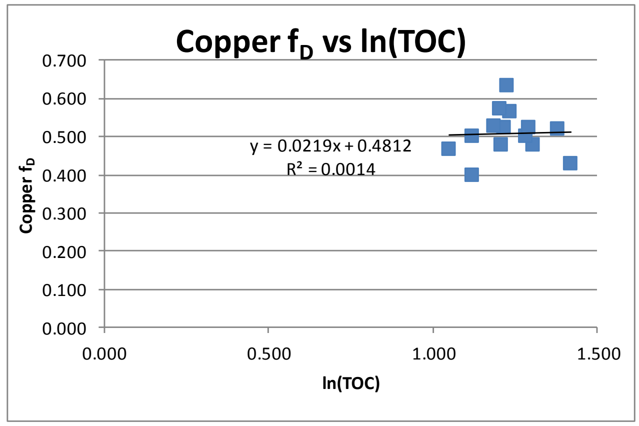
Zinc

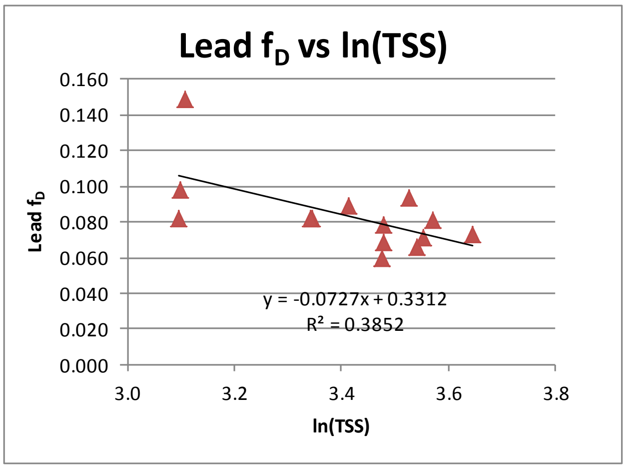


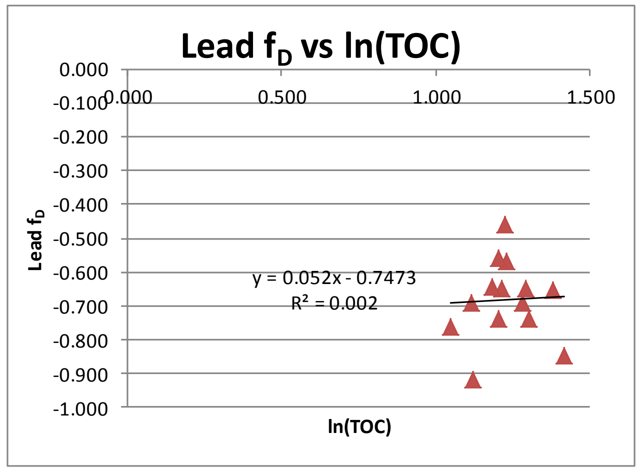


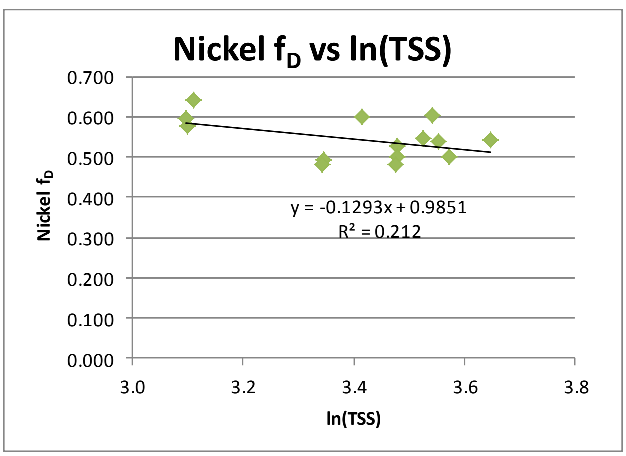
The data was evaluated to determine if there is a correlation between TSS and TOC and the dissolved fraction. The following graphs provide a summary of the evaluation, showing that there is not a correlation between the dissolved fraction and TSS or TOC and thus a transformation is not required. The low R^2 value indicates that the correlation is poor. As expected, there is virtually no correlation between the dissolved fraction and TOC (or DOC) since the organic carbon is dissolved. The expectation is interference/correlation with particulates that provide a surface for adsorption.

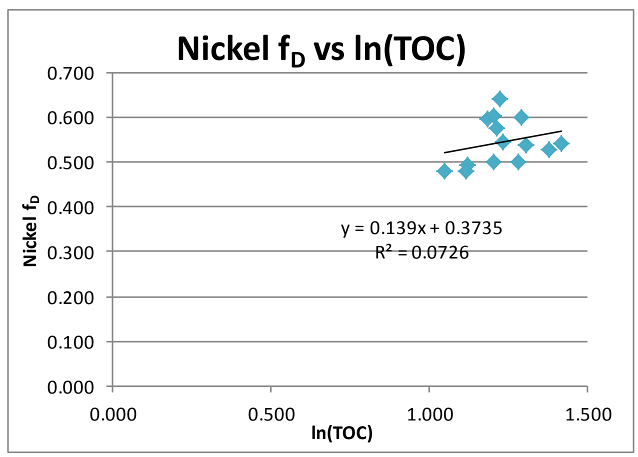

Copper fD vs ln(TSS)
y = -0.1116x + 0.8883
R² = 0.1215
Copper fD
ln(TSS)

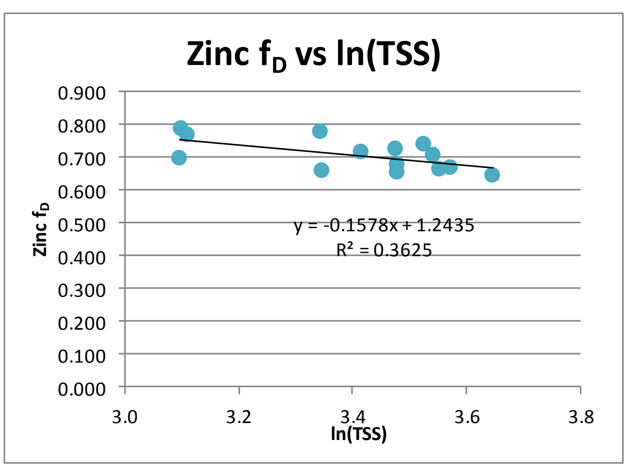

Copper fD vs ln(TOC)
y = 0.0219x + 0.4812
R² = 0.0014
Copper fD
ln(TOC)

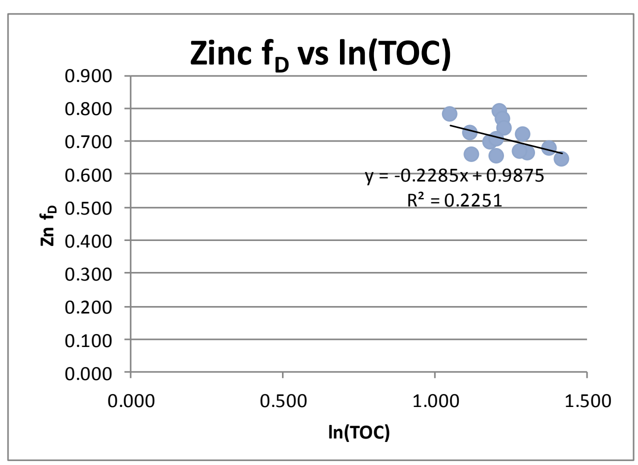

Lead fD vs ln(TSS)
y = -0.0727x + 0.3312
R² = 0.3852
Lead fD
ln(TSS)


Lead fD vs ln(TOC)
y = 0.052x - 0.7473
R² = 0.002
Lead fD
ln(TOC)


Nickel fD vs ln(TSS)
y = -0.1293x + 0.9851
R² = 0.212
Nickel fD
ln(TSS)


Nickel fD vs ln(TOC)
y = 0.139x + 0.3735
R² = 0.0726
Nickel fD
ln(TOC)


Zinc fD vs ln(TSS)
y = -0.1578x + 1.2435
R² = 0.3625
Zinc fD
ln(TSS)

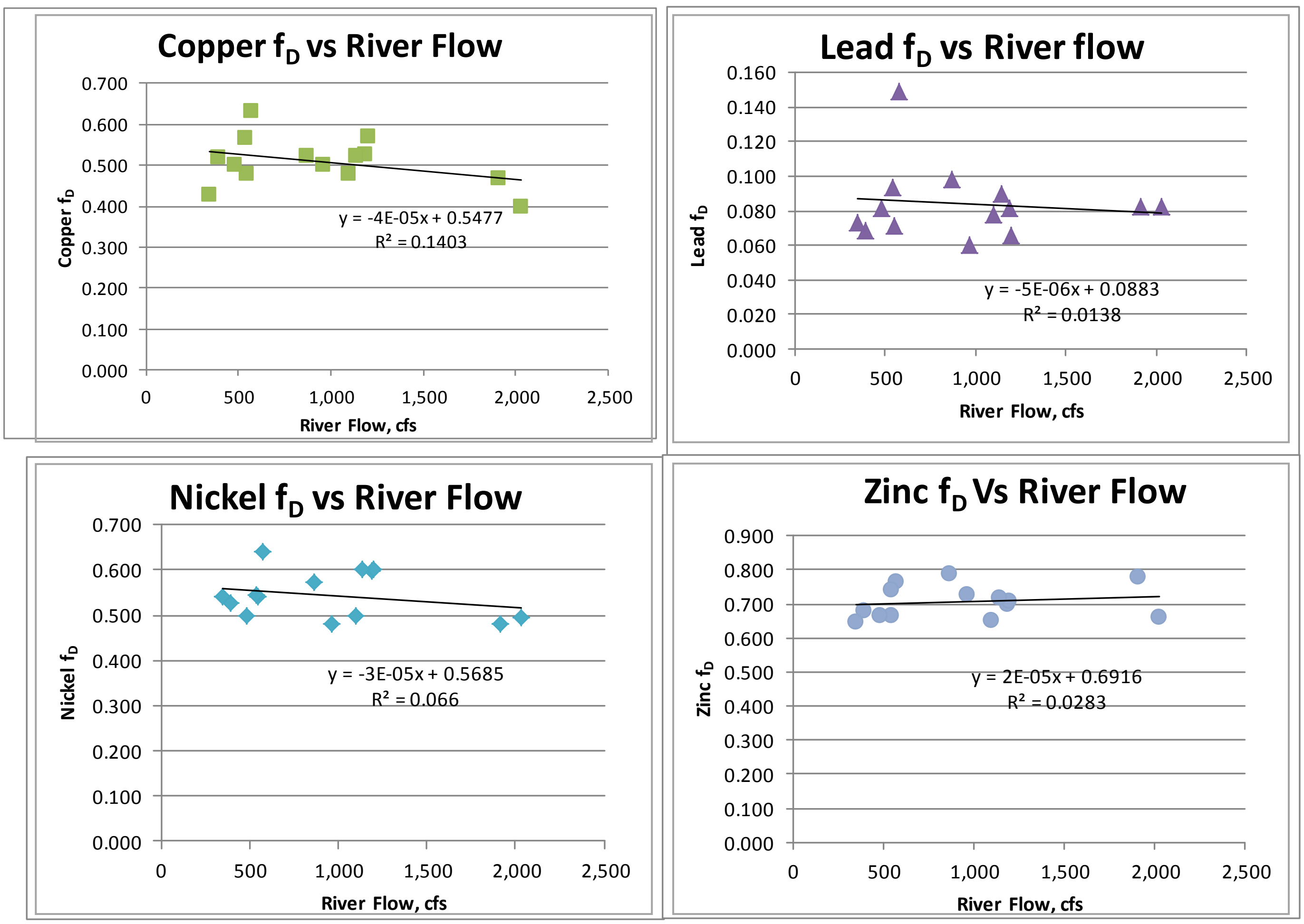

Zinc fD vs ln(TOC)
y = -0.2285x + 0.9875
R² = 0.2251
Zn fD
ln(TOC)

River Flow

The Metals Translator Study Guidance Document assumes that "low flow is the critical flow for metals." The flow in the Boise River is variable due to the release of water from Lucky Peak dam for irrigation. The harmonic mean flow at the Parma gauge is 819 cfs. Thus it was hoped that more than half the samples would be collected at flows less than 819 cfs. Of the fourteen samples collected, 6 were at flows less than 819 cfs. However, the flow data is still provisional and the flows may be adjusted lower.

The dissolved fraction for each metal was plotted against the flow to see if there was a correlation between the dissolved fraction and flow. As shown in the following graphs the correlation is very poor.

Correlation of Dissolved Fraction vs River Flow



Thus, it appears that the data collected during the study is representative of the river from low flows to high flows.

Summary

The metals translator study was conducted by the City of Caldwell between April and July 2014. Fourteen effluent and receiving stream samples were collected, mixed, and analyzed for total and dissolved copper, lead, nickel, silver and zinc. Six of the fourteen samples were collected at flow rates below the harmonic mean flow of 819 cfs. A statistical analysis of the data showed that the number of samples was sufficient to demonstrate that the null hypothesis (the mean of the dissolved and total concentrations are equal) is false. The dissolved fraction was calculated for each sample and metal, and the geometric mean of the dissolved fractions was calculated. The dissolved fraction data was shown to be log-normal. The dissolved fraction was shown to not be correlated with either TSS, TOC or river flow. Thus it is recommended that the geometric mean of the dissolved fraction be used by EPA in the reasonable potential analysis for effluent permit limits for copper, lead, nickel, and zinc.

RECOMMENDATIONS

On the basis of the study, the City requests that:

1. Effluent limits for silver be deleted from the permit, based on additional effluent monitoring.

2. Effluent limits for cyanide be deleted from the permit based on additional effluent monitoring.

3. Effluent limits for mercury be re-evaluated based on the new effluent data that was collected with better sampling equipment and sampling protocols and analyzed with methods that provided a much lower MDL than previous data. The new data appears to indicate that effluent limits are not required for mercury.

4. EPA conducts the RPA and new effluent limits calculations with the geometric mean for the metals translator for each metal determined in the Metal Translator Study:
    a. Copper: 0.505
    b. Lead: 0.082
    c. Nickel: 0.546
    d. Zinc: 0.705

5. If there is no reasonable potential for exceeding the newly calculated limits based on the effluent data, then effluent limits should be deleted from the permit for those metals.

APPENDICES

Appendix A – Effluent Cyanide and Metals Monitoring Plan

Appendix B – Metals Translator Study Plan

Appendix C – Lab Reports