Fact Sheet

Public Comment Start Date: June 6, 2007
Public Comment Expiration Date: July 6, 2007

**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 the**

City of Hagerman
Wastewater Treatment Plant

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EPA Proposes to Reissue NPDES Permit
EPA proposes to reissue an NPDES permit to the City of Hagerman, Idaho. The draft permit places conditions on the discharge of pollutants from the wastewater treatment plant to the Snake River, a water 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 description of the discharge location
- technical material supporting the conditions in the permit

Idaho State Certification
EPA is requesting that the Idaho Department of Environmental Quality certify the NPDES permit for this facility, under section 401 of the Clean Water Act. The State provided preliminary comments on the draft permit, and those comments have been incorporated into this draft permit. Persons wishing to comment on the State's intent to certify this permit should submit written comments by the end date of this public comment period to the Regional Administrator, with a copy to EPA, at the following address:

Regional Administrator
Idaho Department of Environmental Quality
Twin Falls Regional Office
1363 Fillmore Street
Twin Falls, Idaho, 83301

Public Comment
Persons wishing to provide comment on, or request a public hearing on 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 EPA as described in the public comments section of the attached public notice.

After the public notice expires, and all comments have been considered, 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 conditions in the draft permit will become final and the permit will become effective upon issuance. If comments are received, EPA will address the comments and issue the permit. The permit will become effective 30 days after the issuance date, unless an appeal is submitted to the Environmental Appeals Board within 30 days.

Documents are Available for Review
The draft NPDES permit and related documents can be reviewed or obtained by visiting or contacting EPA's Regional Office in Seattle between 8:30 a.m. and 4:00 p.m., Monday through Friday at the address below. The draft permit, 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-130
Seattle, Washington 98101
(206) 553-6251 or
Toll Free 1-800-424-4372 (within Alaska, Idaho, Oregon and Washington)

The fact sheet and draft permits are also available at:

EPA Idaho Operations Office
1435 N. Orchard Street
Boise, Idaho 83706

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Acronyms

1Q10	1 day, 10 year low flow
7Q10	7 day, 10 year low flow
AML	Average Monthly Limit
AWL	Average Weekly Limit
BOD_5	Biochemical oxygen demand, five-day
$^{\circ}C$	Degrees Celsius
CFR	Code of Federal Regulations
cfs	Cubic feet per second
City	City of Hagerman
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
HUC	Hydrologic Unit Code
IDEQ	Idaho Department of Environmental Quality
lbs/day	Pounds per day
LTA	Long Term Average
mg/L	Milligrams per liter
ml	milliliters
ML	Minimum Level
µg/L	Micrograms per liter
mgd	Million gallons per day
MDL	Maximum Daily Limit or Method Detection Limit
N	Nitrogen
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
OWW	Office of Water and Watersheds
O&M	Operations and maintenance

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

I. Applicant

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

City of Hagerman
Wastewater Treatment Plant
NPDES Permit No. ID-002594-1

Mailing Address:
Post Office Box 158
Hagerman, Idaho 83332

Physical Address:
110 West Main
Hagerman, Idaho 83332

Facility contact: Kelly Casey, City Superintendent

II. Facility Information

A. General Information

The City of Hagerman is located in south central Idaho, in Gooding County. The City owns and operates a municipal wastewater treatment plant that provides secondary treatment and disinfection of wastewater prior to discharge to the Snake River. The facility discharges from September through June each year.

The plant receives domestic wastewater from residential sources; there are no significant industrial dischargers. The facility's design flow is 0.15 million gallons per day (mgd). The facility does not necessarily discharge every day, for example in February 2006 the facility discharged 12 out of 28 days and the monthly average discharge was 0.06 mgd. An inspection of the facility, conducted by the EPA, in 2006 recorded a daily flow of 0.691 mgd, and a 2004 EPA inspection recorded a daily flow of 0.479 mgd.

The Hagerman wastewater treatment plant serves approximately 660 residents. While the facility has three facultative lagoons, only two cells are used to provide secondary treatment to the influent. Part of the third cell contains a rock filter which the facility no longer uses. The facility does not receive septage pumped from septic tanks, sludge from other sewage treatment works, or other types of trucked-in waste. Sewage sludge generated by the facility has been stored in the lagoon. The effluent is chlorinated, at the lagoon site, for disinfection prior to discharge to the Snake River. Discharge to the Snake River occurs through an outfall pipe, 150 feet from shore and 20 feet below the water surface.

B. Facility History and Treatment Train

The current WWTP began operation in 1977. The treatment facility consists of influent lift station, two facultative lagoons of which only two are operational, a rock filter which is currently not in use, chlorine gas disinfection system, and effluent flow monitor. Aerators were added to the 1st lagoon in 2006. Effluent exits from the chlorine building and through an 8 inch pipe. Discharge to the Snake River occurs through an outfall pipe, 150 feet from shore and 20 feet below the water surface.

C. Compliance History

The City submits monthly discharge monitoring reports (DMRs) to EPA summarizing the results of effluent and ambient monitoring required by the permit. In 2006 the city added aerators to their 1st lagoon. A review of the DMRs from 2006 shows that the facility is well below its permit limits for BOD_5, and in fact, the City can easily comply with the secondary BOD_5 requirement (average monthly limit of 30 mg/L and average weekly limit of 45 mg/L), the City has violated its TSS limits on occasion, but frequently has very low TSS concentrations, and since May 2006 the TSS concentrations have been below 30 mg/L. The City is in compliance with its phosphorus, chlorine and fecal limits.

III. Receiving Water

A. Flow Conditions

The effluent from the City of Hagerman WWTP discharges to the Snake River at river mile 576 through outfall 001, located at latitude 42° 48' 40" and longitude 114° 54 '30". This portion of the Snake River is located in the Upper Snake - Rock River Basin. Flows in the segment of the Snake River that the wastewater treatment plant discharges to are controlled by Milner Dam, located approximately 30 miles upstream of Twin Falls. Data from the Kimberly USGS gage (station #13090000, river mile 617.5) indicate the river flow at this gage is characterized by a 7Q10 flow of 289 cfs (197 mgd), and a 1Q10 flow of 216 cfs (140 mgd).

B. Water Quality Standards

Section 301(b)(1)(C) of the CWA requires the development of limitations in permits necessary to meet water quality standards by July 1, 1977. Federal regulations at 40 CFR 122.4(d) require that the conditions in NPDES permits ensure compliance with the water quality standards of all affected states. A state's water quality standards are composed of use classifications and numeric and/or narrative water quality. The use classification system designates the beneficial uses (e.g., aquatic life, drinking water supply, contact recreation) that each water body is expected to achieve. The numeric and/or narrative water quality criteria are the criteria deemed necessary by the state to support the beneficial use classification of each water body. The State's water quality standards protect this section of the Snake River for cold water communities, salmonid spawning, and primary contact recreation (IDAPA 58.01.02150.14).

C. Water Quality Limited Waters

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

Section 303(D) of the CWA requires States to develop a Total Maximum Daily Load (TMDL) management plan for water bodies determined to be "water quality limited segments." The TMDL documents the amount of a pollutant a water body can assimilate without violating a State's water quality standards. The TMDL then allocates that pollutant load to point and non-point sources. TMDL allocations for point sources are then incorporated into NPDES permits.

The *Middle Snake River Watershed Management Plan* (Idaho Department of Environmental Quality, Twin Falls Regional Office, 1998) established a phosphorus waste load allocation for the City. This allocation was included in the City's 1999 NPDES permit and will be retained in the draft permit. The *Upper Snake Rock Watershed Management Plan* (Idaho Department of Environmental Quality, 1999), and the supplementary information provided by IDEQ in July 2000 was approved by EPA in August 2000 and contains total suspended solids and fecal coliform wasteload allocations for the City. Federal regulations (40 CFR 122.44(d)(1)(vii)) require effluent limits in NPDES permits to be consistent with a TMDL that has been prepared by the State when it is based on the State's water quality standards and approved by EPA, therefore, the requirements of the TMDL have been incorporated into the draft permit as appropriate.

D. Mixing Zones

A mixing zone is a limited area or volume of water where initial dilution of an effluent discharge takes place. States may, at their discretion, adopt certain policies in their water quality standards affecting the application and implementation of standards (40 CFR 131.13). Mixing zones are an example of such a policy. A mixing zone should not impair designated uses or the integrity of the water body as a whole, must not allow lethality to passing organisms, and must be as small as practicable. Mixing zones are only available for the development of water quality based effluent limits. In general, Idaho limits the size of its mixing zones to 25% of the 1Q10 and 7Q10 flows of the receiving water.

IV. Effluent Limitations

A. Basis for Effluent Limitations

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 minimum 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 these limits may be more stringent than technology-based effluent limits. The statutory, regulatory and scientific basis for the proposed effluent limits in the draft permit are provided in Appendix A.

B. Proposed Effluent Limitations.

The proposed effluent limits are provided below:

1. The permittee must not discharge any floating solids, visible foam in other than trace amounts, oily wastes or petroleum hydrocarbons that produce a sheen, film or discoloration on the surface of the receiving water or adjoining shorelines.
2. pH must be between 6.5 and 9.0 standard units at all times.
3. Table 1, below, provides additional proposed effluent limits.

Table 1: Proposed Effluent Limits

Parameter	Units	Effluent Limits			
		Average Monthly Limit	Average Weekly Limit	Maximum Daily Limit	Instantaneous Maximum Limit
BOD_5	mg/L	30	45	---	---
	lbs/day	37.5	56.3	---	---
TSS[1]	mg/L	30	45	---	---
	lbs/day	7.7	15.5	---	---
Total Residual Chlorine [2]	µg/L	481	---	794	---
	lbs/day	0.6	---	1.0	---
Total Phosphorus	lbs/day	5.7	11.4	---	---
E. Coli Bacteria[3]	#/100 mL	126 [2]	---	---	406

Footnotes:
1. See IV.B.4.for the interim effluent limits for TSS.
2. Reporting is required within 24-hours if the maximum daily limit is violated.
3. Based on the geometric mean of a minimum of 5 samples must be taken every 3 – 7 days over a 30 day period.

4. Compliance Schedule and Interim Limits TSS
   a. Compliance dates: The permittee must achieve compliance with the effluent limitations for TSS established in Part IV.B.3, Table 1 no later than January 1, 2010.
   b. Beginning on the effective date of this permit and continuing to, no later than December 31, 2009 the permittee must achieve the following interim limits for TSS:

      TSS:
      Average Monthly Limit: 38 lbs/day
      Average Weekly Limit: 56 lbs/day

5. 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.

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 in the future, and/or to monitor effluent impacts on receiving water quality. Therefore, receiving water and effluent monitoring have been incorporated into the draft permit.

B. Effluent Monitoring

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

Table 2, below, presents the proposed influent and effluent monitoring requirements for the City of Hagerman WWTP. The effluent sampling location must be after the last treatment unit and prior to discharge to the receiving water. The monitoring samples must not be influenced by combination with other effluent. If no discharge occurs during the reporting period, "no discharge" must be reported on the DMR.

IDEQ is in the process of developing a temperature TMDL for the Snake River. To support TMDL development IDEQ recommends that continuous temperature monitoring be done for the influent and effluent, and upstream and downstream of the effluent discharge. IDEQ defines continuous monitoring to mean the use of a thermistor logger that records temperature in a liquid environment. The time segment set up would be every 15 minutes over a 24 hour period, 7 days a week, 28-31 days a month (depending on the month), and 12 months per year. The recorded temperature data would be downloaded monthly with the DMRs in an electronic format (Excel file) and submitted by email or disk to EPA and IDEQ.

The reasons for this level of monitoring is three-fold: (1) to ascertain the increase or decrease in temperature from the effluent discharge; (2) to ascertain the increase or decrease in temperature in the receiving waterbody as a result of the discharge; and (3) to ascertain the annual seasonal component. IDEQ's perspective is that this level of monitoring for this parameter is crucial for the self-protection of the permittee, especially where temperature gradient effects from nonpoint sources in the system may play a dominant role. This municipality is situated in a receiving waterbody where nonpoint source impacts play a dominant role. It is IDEQ's professional opinion that temperature impacts from these small type municipalities do not necessarily impair the beneficial uses

of the receiving waterbody because of temperature alone because the greater bulk of thermal impacts are coming from nonpoint source type activities.

Table 2. Effluent Monitoring Requirements

Parameter	Units	Monitoring Requirements		
		Monitoring Location	Monitoring Frequency	Sample Type
BOD_5	mg/L lbs/day	effluent and influent	2/month	24 hr composite
TSS	mg/L Lbs/day	effluent and influent	1/week	24 hr composite
E. Coli Bacteria	#/100 mL	effluent	5/month	grab
Flow	mgd	effluent or influent	continuous	recording
pH	s.u.	effluent	3/week	grab
Total Residual Chlorine	µg/L lbs/day	effluent	3/week	grab
Phosphorus	lbs/day	effluent	1/week	24 hr composite
Ammonia (as N)	mg/L	effluent	1/month	24 hr composite
Temperature[1]	C°	effluent and influent	Continuous for 5 years	recording

1. Continuous monitoring for temperature means recording temperature every 15 minutes, 24 hours per day. Results of continuous temperature monitoring should be downloaded monthly to an electronic format (excel file) and submitted to IDEQ.

C. Surface Water Monitoring

Table 3 presents the proposed surface water (i.e., receiving water) monitoring requirements for the draft permit. Surface water monitoring results should be submitted on the appropriate Discharge Monitoring Report. Results of continuous temperature monitoring should be downloaded monthly to an electronic format (excel file) and submitted to IDEQ.

Surface water monitoring is required to assess whether additional effluent limits may be needed to protect the designated uses of the waterbody. Ammonia, pH and temperature data is required to determine if the facility will need ammonia limits in order to protect water quality. Additionally, as stated previously, the State is in the process of developing a temperature TMDL and continuous monitoring is required for the TMDL development.

Table 3. Surface Water Monitoring Requirements

Parameter	Units	Sample Frequency	Sample Location[1]	Sample Type
Ammonia, total (as N)	mg/L	1/month for 2 years	Upstream of outfall	grab
pH	s.u.	1/month for 2 years	Upstream of outfall	grab
Temperature[2]	°C	Continuous recording for 5 years	Upstream & downstream of outfall	recording

Footnotes:
1. Monitoring must occur downstream of the discharge at a location where the effluent and receiving water are completely mixed. Upstream and downstream sample locations must be approved by IDEQ.

2. Continuous monitoring for temperature means recording temperature every 15 minutes, 24 hours per day. Results of continuous temperature monitoring should be downloaded monthly to an electronic format (excel file) and submitted to IDEQ.

VI. Sludge (Biosolids) Requirements

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

Until future issuance of a sludge-only permit, sludge management and disposal activities at the Hagerman WWTP will 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. 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 complete, accurate and representative of the environmental or effluent condition. The facility is required to update the Quality Assurance Plan (QAP) for the City of Hagerman WWTP within 90 days of the effective date of the final permit. The QAP shall be prepared in accordance with EPA guidance documents (*EPA Requirements for Quality Assurance Project Plans*, EPA/QA/R-5, and (*Guidance for Quality Assurance Project Plans*, EPA/QA/G-5), and consist of standard operating procedures the permittee must follow for collecting, handling, storing and shipping samples, laboratory analysis, and data reporting. The QAP must be retained on site and made available to EPA and IDEQ upon request.

B. Operation and Maintenance Plan

The permit requires the City to properly operate and maintain all facilities and systems of treatment and control in accordance with industry accepted engineering practices (in accordance with 40 CFR 122.41(e)). Proper operation and maintenance is essential to meeting discharge limits, monitoring requirements, and all other permit requirements at all times. The City is required to update its Operation and Maintenance Plan for their WWTP within 90 days of the effective date of the final permit. The plan shall be retained on site and made available to EPA and IDEQ upon request.

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

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.

The following federally-listed endangered and threatened species may be located in the vicinity of the discharge. This list was developed from the *County by County Species List* found on the U.S. Fish and Wildlife Services-Pacific Region web page at: http://www.fws.gov/idahoes/TESpecies.htm and NOAA's National Marine Fisheries Services website at www.nmfs.noaa.gov/pr/species/esa. There are no federally-listed endangered and threatened species under the jurisdiction of NOAA's National Marine Fisheries Services within the vicinity of these discharges.

Endangered Species:

- Gray wolf (*Canis lupus*) - experimental
- Utah valvata snail (*Valvata utahensis*)
- Snake River physa snail (*Physa natricina*)

Threatened Species:

- Bald eagle (*Haliaeetus leucocephalus*)
- Bliss Rapids snail (*Taylorconcha serpenticola*)

EPA has determined that issuance of this permit will have no effect on the Gray wolf or the Bald eagle, and it is not likely to adversely affect the Utah valvata snail, Snake River Physa snail or the Bliss Rapids snail. EPA has completed a biological assessment and submitted it to the USFWS. The final permit may be modified as a result of consultation.

B. Essential Fish Habitat

Essential fish habitat (EFH) are the waters and substrates (sediments, etc.) necessary for fish to spawn, breed, feed, or grow to maturity. The Magnuson-Stevens Fishery Conservation and Management Act (January 21, 1999) requires EPA to consult with NOAA Fisheries when a proposed discharge has the potential to adversely affect 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.

According to information from the NOAA Fisheries website, there is no designated EFH in the vicinity of the Hagerman wastewater treatment facility.

C. State Certification

Section 401 of the CWA requires EPA to seek state certification before issuing a final NPDES permit to assure the permit meets state water quality standards, including the antidegradation policy.

D. Permit Expiration

The permit will expire five years from the effective date.

IX. References

Idaho Code. 2007. *Water Quality Standards and Wastewater Treatment Requirements.* Idaho Department of Environmental Quality, IDAPA 58.01.02.

EPA. 1991. *Technical Support Document for Water Quality-based Toxics Control.* US Environmental Protection Agency, Office of Water, EPA/505/2-90-001.

EPA. 2001. EPA Requirements for Quality Assurance Project Plans, EPA QA/R-5. EPA/240/B-01/003. March 2001.

EPA. 2002. *Guidance for Quality Assurance Project Plans*, EPA QA/G-5. EPA/240/R-02/009. December 2002.

EPA. 2007. EPA letter from David Croxton, Manager, Office of Water and Watersheds, Watershed Unit, to Michael McIntyre, Water Quality Program, Idaho Department of Environmental Quality. Re: The Upper Snake Rock TMDL Modification. March 13, 2007.

IDEQ. 1998. *Middle Snake River Watershed Management Plan.*Division of Environmental Quality, Twin Falls Regional Office. January 29, 1998.

IDEQ. 1999. *The Upper Snake RockWatershed Management Plan*. Idaho Division of Environmental Quality – Twin Falls Office. December 20, 1999

IDEQ. 2000. Letter from David Mabe, Idaho Department of Environmental Quality to Randall Smith, the Environmental Protection Agency. Executive Summary of Upper Snake Rock (HUC 17040212) Subbasin TMDL. July 31, 2000.

Pacific Fishery Management Council. 1999. *Ammendment 14, Appendix A: Identification and Description of Essential Fish Habitat, Adverse Impacts and Recommended Conservation Measures for Salmon, Amendment 14 to the Pacific Coast Salmon Plan*. Pacific Fishery Management Council. August 1999.

Appendix A: Basis for Effluent Limits

Effluent limitations were summarized in Section IV. of this fact sheet. The following discussion explains in more detail the statutory and regulatory basis for the technology and water quality-based effluent limits in the draft permit. Part A discusses technology-based effluent limits, Part B discusses water quality-based effluent limits (WQBELs) in general, and Part C discusses facility specific WQBELs.

A. Technology-Based Effluent Limits

Secondary Treatment Requirements (40 CFR 133.102)

The CWA requires publicly owned treatment works (POTWs) to meet 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. Technology based secondary treatment requirements are found in 40 CFR 133.102. These technology-based effluent limits 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 for POTW's are listed in Table A-1.

Table A-1. Secondary Treatment Effluent Limits (40 CFR 133.102)

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

The federal regulations also include special considerations which allow an alternate effluent limits for BOD and TSS. These exceptions are discussed below:

1) Treatment Equivalent to Secondary Requirements (40 CFR 133.105)

Federal regulations include special considerations, referred to as "treatment equivalent to secondary," for waste stabilization ponds and trickling filters. The regulations allow alternative limits for BOD_5 and TSS for facilities using trickling filters or waste stabilization ponds provided the requirements established in 40 CFR 133.101(g) and 40 CFR 133.105(d) are met. These requirements are:

- The BOD_5 and TSS effluent concentrations consistently achievable through proper operation and maintenance of the treatment works exceed the minimum level of the effluent quality described for "secondary treatment requirements."
- A trickling filter or waste stabilization pond is used as the principal treatment process.

- The treatment works provide significant biological treatment of municipal wastewater (i.e., a minimum of 65% reduction of BOD_5 is consistently attained).

The minimum level of treatment in terms of BOD_5, TSS, and pH for "treatment equivalent to secondary" is presented in Table A-2.

Table A-2. Treatment Equivalent to Secondary Effluent Limits (40 CFR 133.105)

Parameter	Average Monthly Limit	Average Weekly Limit	Range
BOD_5 (see Note 1)	45 mg/L	65 mg/L	---
TSS (See Note 1)	45 mg/L	65 mg/L	---
Removal Rates for BOD_5 and TSS	65% (minimum)	---	---
pH	---	---	6.0 – 9.0 su

NOTES
1. The average monthly and average weekly limits for a specific facility are based on the performance data of the facility. Data should, at a minimum, include the last two years of operation. Data due to upset conditions at the plant can not be included in the data set. Additionally, effluent limits must be more stringent if an analysis of past performance of the treatment works shows that the facility can achieve more stringent limits (see 40 CFR 133.105(f)).

2) Waste Stabilization Ponds (40 CFR 133.103(c))

The federal regulations also allow an exception to "secondary treatment requirements" for TSS for facilities that use waste stabilization ponds for treatment. However, this exception is not applicable in the State of Idaho and was erroneously applied in the City of Hagerman's 1999 NPDES permit. This is explained in more detail below.

The "secondary treatment regulation" (40 CFR 133.102) was originally promulgated on August 17, 1973 and established levels of effluent quality for the BOD, TSS, fecal coliform bacteria, and pH. Special consideration was provided for facilities subject to wet weather flows from combined sanitary and storm sewers, and facilities receiving high strength industrial waste.

Two subsequent amendments to the regulation, promulgated on July 26, 1976 (41 FR 30788) and October 7, 1977 (42 FR 5665), provided for: (1) deletion of the fecal coliform bacteria limitations and clarification of the pH requirement, and (2) special considerations for TSS effluent limitations applicable to waste stabilization ponds (40 CFR 133.103(c)). In this promulgation, the acceptable TSS limit, for waste stabilization ponds, was defined as the effluent concentration achieved 90% of the time by waste stabilization ponds that are achieving the BOD requirements established in 133.102(a) (i.e., an average monthly limit of 30 mg/L, average weekly limit of 45 mg/L, and a 30 day average percent removal of 85%).

When developing the acceptable TSS limits each State was considered separately, and appropriate contiguous geographic areas within a State or group of States

were also considered. The analysis was done by the State or by EPA regional offices in cooperation with the State. The results of the analysis were published in the November 15, 1978 federal register (FR43, No. 221, page 53161). This federal register notice published "no change" to the existing TSS limitations for the State of Idaho. Therefore, this exception is not applicable in the State of Idaho.

On September 20, 1984 (49 FR 36987), EPA again amended the regulations for secondary treatment requirements. This promulgation included: (1) definitions for "significant biological treatment" and "facilities eligible for treatment equivalent to secondary treatment;" (2) new provisions for "treatment equivalent to secondary" (40 CFR 133.105); and (3) new provision for "alternative state requirements" (40 CFR 133.105(d)).

As a result of the September 1984 promulgations there were three options for setting TSS limits for waste stabilization ponds. These options are:

(1) use the existing values previously set under 133.103(c) (i.e., for the State of Idaho this was "no change from secondary treatment requirements")

(2) re-evaluate the TSS data for waste stabilization ponds and request EPA approval to use a different value than indicated (i.e., use the Alternative State requirement provision under 40 CFR 133.105(d). Idaho did not pursue this option) or

(3) set limitations at any value between 30 mg/L and 45 mg/L (assuming that the facility meets the eligibility requirements for "treatment equivalent to secondary treatment" found at 40 CFR 133.101(g)).

Of these three options, only the last option (i.e., set limitations at any value between 30 mg/L and 45 mg/L) is applicable in the state of Idaho. However, to be considered the facility must be properly operated and maintained (40 CFR 133.101(g). In the case of Hagerman, the city has stopped using its rock filter for treatment, therefore, it cannot be considered to be properly operating and maintaining its facility. Additionally, the facility can easily meet the secondary treatment requirements for BOD.

Proposed technology based effluent limits

The following is a description of each of the technology-based effluent limits applicable to this facility.

BOD_5

Historical data for the facility indicates that the facility can comply with BOD_5 limits established for secondary treatment requirements, therefore the average monthly limit will be set at 30 mg/L and the average weekly limit will be set at 45 mg/L. The monthly average removal requirement is 85%.

TSS

Historical data for the facility indicates that the facility has not been able to comply with TSS limits established for secondary treatment requirements. However, as stated above, the facility is bypassing its rock filter, therefore, it is not eligible for "treatment equivalent to secondary treatment." Therefore the average monthly limit will be set at 30 mg/L and the average weekly limit will be set at 45 mg/L. The monthly average removal requirement is 85%.

Mass-Based Limits for BOD_5 and TSS

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) × design flow (mgd) × 8.34[1]

Average monthly BOD_5 mass limit = 37.5 lbs/day

Average weekly BOD_5 mass limit = 56.3 lbs/day

Average monthly TSS mass limit = 37.5 lbs/day

Average weekly TSS mass limit = 56.3 lbs/day

Note: The *Upper Snake Rock Watershed Management Plan* established water quality based TSS loading limits for the City. The technology based limits must be compared with the water quality based limits and the more stringent must be incorporated into the final permit. See section B for information on water quality based limits for TSS.

pH

The technology based effluent limits for pH are 6.0 – 9.0 standard units. These limits are based on the treatment requirements established in 40 CFR 133.102(c). The technology based limits must be compared with the water quality based limits and the more stringent must be incorporated into the final permit. See sSction B for information on water quality based limits for pH.

Chlorine

The Water Pollution Control Federation's *Chlorination of Wastewater* (1976) states that a properly designed and maintained wastewater treatment plant can achieve adequate disinfection if a 0.5 mg/L chlorine residual is maintained for 15 minutes of contact time. A treatment plant that provides adequate chlorination contact time can meet the 0.5 mg/L limit on an average monthly basis. In addition to average monthly limits (AMLs), NPDES regulations require effluent limits for POTWs to be expressed as average weekly

[1] 8.34 is a conversion factor with units (lb × L)/(mg × gallon × 106)

limits (AWLs) unless impracticable. The AWL is derived as 1.5 times the AML, resulting in an AWL for chlorine of 0.75 mg/L.

B. Water Quality-based Effluent Limits

Statutory and Regulatory Basis

Section 301(b)(1)(C) of the CWA requires effluent limitations in permits necessary to meet and protect State water quality standards by July 1, 1977. 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 regulations (40 CFR 122.44(d)(1)) which implement Section 301(b)(1)(C) of the CWA require permits to 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 exceedance above any state or tribal water quality standard, including narrative criteria for water quality.

The NPDES 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 water quality-based effluent limits are needed based on numeric criteria, EPA projects the receiving water concentration (downstream of where the effluent enters the receiving water) for each pollutant of concern. 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 chemical, then the discharge has the reasonable potential to cause or contribute to an exceedance of the applicable water quality standard, and a water quality-based effluent limit is required.

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

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:

(1) Wasteload Allocations from Total Maximum Daily Load Management Plans

Where the receiving water quality does not meet water quality standards, the wasteload allocation is generally based on a total maximum daily load management plan which is developed by the State. The management plan is a determination of the amount of a pollutant from point, non-point, and natural background sources, including a margin of safety, that may be discharged to a water body without causing the water body to exceed the criterion for that pollutant. Any loading above this capacity risks violating water quality standards.

Section 303(d) of the CWA requires states to develop management plans for water bodies that will not meet water quality standards after the imposition of technology-based effluent limitations to ensure that these waters will come into compliance with water quality standards. The first step in establishing a management plan 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 (called load allocations), point sources (called wasteload allocations), natural background loadings, and a margin of safety to account for any uncertainties. Federal regulations (40 CFR 122.44(d)(1)(vii)) require effluent limits in NPDES permits to be consistent with a TMDL that has been prepared by the State when it is based on the State's water quality standards and approved by EPA.

The *Middle Snake River Watershed Management Plan* (March 1997) established a phosphorus waste load allocation for the City. The *Upper Snake Rock Watershed Management Plan*, and the supplementary information provided by IDEQ in July 2000 was approved by EPA in August 2000, and contains total suspended solids and fecal coliform wasteload allocations for the City of Hagerman. In August 2005 IDEQ submitted the *Upper Snake Rock TMDL Modification* to EPA for review and approval. The TMDL modification contained total suspended solids and total phosphorus wasteload allocations for aquaculture facilities, as well as revised total suspended solids wasteload allocations for several municipal wastewater treatment plants, including the City of Hagerman. On September 14, 2005 EPA approved the wasteload allocations for the aquaculture facilities, but did not approve the revised total suspended solids wasteload allocation for the municipal wastewater treatment plants, therefore, the WLAs in the *Upper Snake Rock Watershed Management Plan*, and the supplementary information provided by IDEQ in July 2000 are the applicable WLAs for this permit.

(2) Mixing zone based WLA

When the State authorizes a mixing zone for the discharge, the WLA is calculated by using a simple mass balancing equation. The equation takes into account the available dilution provided by the mixing zone and the background concentrations of the pollutant.

(3) Criterion as the Wasteload Allocation:

In some cases a mixing zone cannot be authorized, either because the receiving water already exceeds the criteria or the receiving water flow is too low to provide dilution, or information is not available to develop a mixing zone. In such cases, the criterion becomes the wasteload allocation. Establishing the criterion as the wasteload allocation ensures that the discharge will not contribute to an exceedance of the criteria.

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

C. Facility-Specific Water Quality-based Effluent Limits

1) Sediment/TSS

The Idaho water quality standards state that sediment shall not exceed quantities which impair designated beneficial uses. The *Upper Snake Rock Watershed Management Plan* interpreted this water quality standard and established a TSS wasteload allocation for the City of Hagerman of 1.4 tons/year of TSS which is equal to 7.7 lbs/day.

In translating the wasteload allocation into permit limits, EPA followed procedures in the TSD. The first step in developing limits is to determine the time frame over which the WLAs apply. In general, the period over which a criterion applies is based on the length of time the target organism can be exposed to the pollutant without having an adverse effect. For example, aquatic life criteria generally apply as one-hour averages (acute criteria) or four-day averages (chronic criteria). In the case of total suspended solids, the target organisms are aquatic organisms and TSS affects them by (1) killing them directly, (2) reducing growth rates and resistance to disease, by preventing successful development of eggs and larvae, (3) modifying natural movement or migration patterns, or (4) reducing the natural availabilities of food (page 101 *Upper Snake Rock Watershed Management Plan*). The period over which this effect occurs is uncertain. However, since TSS is not a toxic EPA believes that applying the WLA as monthly averages is appropriate.

The NPDES regulations at 40 CFR 122.45(d) require that permit limits for POTWs be expressed as average monthly limits (AMLs) and average weekly limits (AWLs) unless impracticable. The WLA must be statistically converted to average weekly and average monthly permit limits. In this case, because the averaging period for the pollutant is monthly, no conversion is necessary and the monthly average permit limit is equal to the WLA. Therefore, the AML = 7.7 lbs/day.

The objective in setting effluent limits is to establish limits that will result in the effluent meeting the WLA under normal operating conditions virtually all the time. Developing both an AML and AWL for POTWs is consistent with the requirements of EPA regulations and also assures that the long-term average loading requirements of TSS to the river system, as specified in the management plan, is being met. Having both an AML and AWL also ensures good performance of the treatment system. Setting an AWL establishes an upper bound on effluent values used to determine the monthly average and provides a measure of effluent compliance during operational periods between monthly sampling.

The average weekly limit (AWL) was developed as follows:
The AWL is calculated by multiplying the AML by the following relationship (see Table 5-3 of the TSD):

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

CV = 0.6 (this assumption is based on the recommendation in EPA's *Technical Support Document for Water Quality-based Toxics Control*. In general, EPA's uses facility specific data to calculate the CV, however, in this case, it is not clear that the data reported in the facility Discharge Monitoring Reports are correct).

n = 4

σ_n^2 = $\ln(CV^2/n + 1) = \ln(.6^2/4 + 1) = 0.09$

σ^2 = $\ln (CV^2 + 1) = \ln(.6^2 + 1) = 0.3$

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

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

AWL ÷ AML = 2.01

AWL = 2.01 X 7.7 lbs/day = 15.5 lbs/day

These water quality based loading limits are more stringent than the technology based effluent limits and will be incorporated into the draft permit. Idaho's water quality standards at IDAPA 58.01.02.400.03 allow compliance schedules to be incorporated into

NPDES permits when water quality based effluent limits are being incorporated into the permit for the first time. A compliance schedule has been included in the permit and requires compliance with the final effluent limits by January 1, 2010. Until that time, the permittee will be required to achieve the following technology based loading limits:

Average monthly limit: 38 lbs/day

Average weekly limit: 56 lbs/day

2) Phosphorus

WLAs for phosphorus are contained in chapter 3 of the *Middle Snake River Watershed Management Plan*. Federal regulations at 40 CFR §122.44(d)(vii)(B) require EPA to incorporate effluent limits based on WLAs from the State's watershed management plan into NPDES permits. Phosphorus limits were incorporated into the 1999 NPDES permit and the same limits will be retained in the draft permit (average monthly limit is 5.7 lbs/day, and average weekly limit is 11.4 lbs/day).

3) Bacteria

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, and a minimum sampling frequency of five grab samples in 30 days (IDAPA 58.01.02.251.01.a.).

The Idaho water quality rules 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.i.).

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 (EPA, 1991). Because a single sample value exceeding 406 organisms per 100 ml may indicate an exceedance of the geometric mean criterion, EPA has included 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 the geometric mean criterion for E. coli and provide warning of and opportunity to avoid possible non-compliance with the geometric mean criterion.

Regulations at 40 CFR 122.45(d)(2) require that effluent limitations for continuous discharges from POTWs be expressed as average monthly and average weekly limits, unless impracticable. The 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.

4) pH

The water quality criteria for pH are expressed as a range between 6.5 – 9.0 standard units. The current permit requires the pH of the discharge to be in within the range of 6.5 – 9.0 standard units. This limit will be retained in the draft permit.

5) Ammonia, Total (as Nitrogen)

The Idaho water quality standards contain criteria for the protection of aquatic life from the toxic effects of ammonia (IDAPA 58.01.02.250.01.d.). The water quality standards apply the criteria for early life stages to water bodies (IDAPA 58.01.02.250.01.d.(3)). The criteria are dependent on pH and temperature, 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. Fresh water ammonia criteria are calculated according to the equations in Table C-1.

Table C-1. Water Quality Criteria for Ammonia

Acute Criterion	Chronic Criterion
$\frac{0.275}{1+10^{7.204-pH}}+\frac{39}{1+10^{pH-7.204}}$	$\left(\frac{0.0577}{1+10^{7.688-pH}}+\frac{2.487}{1+10^{pH-7.688}}\right)\times MIN\left(2.85,1.45\times10^{0.028\times(25-T)}\right)$

Ambient ammonia, temperature and pH data are available for the Snake River, upstream of facility discharge, and the 95th percentile of pH and temperature data (i.e., pH = 8.5 s.u. and temperature = 18°C) was used to derive the acute (2.16 mg/L) and chronic (0.9 mg/L) criteria. The ambient data shows that the Snake River is always well below these values. The reasonable potential analysis shows that there is not a reasonable potential for the facility's discharge to cause or contribute to an exceedance to either the acute or chronic criterion, therefore, effluent limits are not required in the draft permit. The draft permit will contain monitoring so that ammonia can be re-evaluated in the future.

6) Chlorine

The water quality criteria for total residual chlorine requires that concentrations not exceed 19 µg/L to protect against acute effects to aquatic life and 11.0 µg/L to protect against chronic effects to aquatic life [IDAPA 58.01.02.210.01].

The 1999 NPDES permit contained an average monthly and maximum daily technology based effluent limits for chlorine. A reasonable potential analysis has shown that the discharge does have a reasonable potential to cause or contribute to an exceedance of the

water quality standards. Therefore, water quality-based effluent limits will be incorporated into the draft permit. The average monthly water quality-based effluent limit is 481 μg/L (see Appendix C).

Federal regulations require permit limits for publicly owned treatment works to be expressed as an average monthly limit and an average weekly limit unless impracticable. The regulations do not prohibit a permittee from increasing their sampling events above what is required in an NPDES permit. This is significant because a permittee may collect as many samples as necessary during a week to bring the average of the data set below the average weekly effluent limit. In such cases, spikes of a pollutant could be masked by the increased sampling. While this is not a concern with pollutants that are not toxic, such as total suspended solids or phosphorus, it is a significant concern when toxic pollutants, such as chlorine or ammonia, are being discharged. Using a maximum daily limit instead of an average weekly limit will ensure that spikes do not occur, and will be protective of aquatic life. For these reasons EPA, Region 10 considers it impracticable to develop an average weekly limit for chlorine. The maximum daily water quality-based limit is 794 μg/L. This limit is more stringent than the technology-based effluent limit, therefore, it will be incorporated into the permit (see Appendix C). A review of the facility's DMRs indicates the facility can meet these limits so a compliance schedule will not be necessary.

Floating, Suspended or Submerged Matter

The Idaho state water quality standards require surface waters of the state to be free from floating, suspended, or submerged matter of any kind in concentrations causing nuisance or objectionable conditions that may impair designated beneficial uses. Therefore, a narrative condition is proposed for the draft permit that states there must be no discharge of floating solids or visible foam in other than trace amounts, or oily wastes that produce a sheen on the surface of the receiving water.

Appendix B: Reasonable Potential Calculations

This Section describes the process EPA has used to determine if the discharge from the Hagerman WWTP has the reasonable potential to cause or contribute to a violation of Idaho's federally approved water quality standards. 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, EPA compares the maximum projected receiving water concentration to the 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 [40 CFR 122.44(d)(1)(i)]. This section discusses how the maximum projected receiving water concentration is determined.

A. Mass Balance

For discharges to flowing water bodies, the maximum projected receiving water concentration is determined using a steady state model represented by the following mass balance equation:

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

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 highest recorded flow of the WWTP, or 0.69 mgd)
Q_u = Receiving water low flow rate upstream of the discharge (1Q10, 7Q10) For acute criteria the 1Q10 flow (140 mgd) is used; for chronic criteria the 7Q10 flow (197 mgd) is used.

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

$$C_d = \frac{C_e Q_e + C_u Q_u}{Q_e + Q_u} \qquad \text{(Equation B-2)}$$

The above form of the equation is based on the assumption that the discharge is rapidly and completely mixed with the receiving stream. If the mixing zone is based on less than complete mixing with the receiving water, the equation becomes:

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

where MZ is the fraction of the receiving water flow available for dilution. In general, the Idaho water quality standards do not allow a mixing zone to include more than 25% of the stream volume for mixing.

B. Maximum Projected Effluent Concentration (C_e)

To calculate the maximum projected effluent concentration, EPA used the procedure described in section 3.3 of the TSD, "*Determining the Need for Permit Limits with Effluent Monitoring Data*." In this procedure, the 99th percentile of the effluent data is the maximum projected effluent concentration in the mass balance equation.

The 99th percentile is calculated by multiplying the maximum reported effluent concentration by a "reasonable potential multiplier" (RPM). The RPM is the ratio of the 99th percentile concentration to the maximum reported effluent concentration, and accounts for the statistical uncertainty in the effluent data. The RPM is calculated from the coefficient of variation (CV) of the data and the number of data points. The CV is defined as the ratio of the standard deviation of the data set to the mean. When fewer than 10 data points are available, the TSD recommends making the assumption that the CV is equal to 0.6.

Using the equations in Section 3.3.2 of the TSD, the reasonable potential multiplier (RPM) and maximum projected effluent concentration is as follows:

Ammonia:
Using effluent data from January 2002 – February 2006 the CV is 0.6 and the maximum reported effluent concentration is 6.6 mg/L. The RPM is approximately 2.3. The maximum projected effluent concentration is determined by simply multiplying the maximum reported effluent concentration by the RPM:

C_e = (RPM)(MRC) (Equation B-4)
where MRC = Maximum Reported Concentration

In the case of ammonia,

C_e = (2.3)(6.6 mg/L) = **15.2 mg/L** (maximum projected effluent concentration)

Chlorine:
In the case of chlorine, the 1999 permit allows the facility to discharge chlorine up to 1 mg/L. Because the permit does not allow this value to be exceeded, this value will be used as the maximum projected effluent concentration

C_e = **1.0 mg/L** (maximum projected effluent concentration)

C. Maximum Projected Receiving Water Concentration (C_d)

The discharge has reasonable potential to cause or contribute to an exceedance of water quality criteria if the maximum projected receiving water concentration of the pollutant exceeds the criteria for that pollutant. The maximum projected receiving water concentration for ammonia is calculated from Equation D-3:

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

Ammonia: Equation B-3 is used to determine the receiving water concentration in milligrams per liter. The upstream concentration of ammonia is determined using data gathered by IDEQ, upstream of the discharge at Gridley Bridge (data collected from January 2000 through

December 2004, approximately 60 data points). The 95th percentile value of this data is 0.2 mg/L. In general, Idaho will allow up to 25% of the stream flow for a mixing zone, however, mixing zones should be as small as practicable. A 25% mixing zone will be used to determine if there is reasonable potential. The following values were used in the equation:

C_d = Receiving water concentration downstream of the effluent discharge (that is, the concentration at the edge of the mixing zone)
C_e = 15.2 mg/L
C_u = 0.2 mg/L
Q_e = 0.69 mgd
$Q_{u\ (acute)}$= 140 mgd
$Q_{u\ (chronic)}$= 197 mgd
MZ =

$$C_{d\ (acute)} = \frac{(15.2 \text{ X } 0.69) + [0.2(140 \text{ X } 0.25)]}{0.69 + (140 \text{ X } 0.25)} = 0.5 \text{ mg/L}$$

$$C_{d\ (chronic)} = \frac{(15.2 \text{ X } 0.69) + [0.2(197 \text{ X } 0.25)]}{0.69 + (197 \text{ X } 0.25)} = 0.4 \text{ mg/L}$$

The acute and chronic water quality criteria for ammonia established in the Idaho water quality standards are **2.16 mg/L** and **0.9 mg/L**, respectively. The projected acute receiving water concentration (i.e., 0.5 mg/L) is less than the acute criterion (2.16 mg/L) and the projected chronic receiving water concentration (i.e., 0.4 mg/L) is less than the chronic criteria (0.9 mg/L), therefore, a water quality based effluent limit for chlorine is not necessary.

Chlorine: Equation B-3 is used to determine the receiving water concentration in micrograms per liter. There is no upstream data for chlorine, therefore it is assumed to zero. The following values were used in the equation:

C_d = Receiving water concentration downstream of the effluent discharge (that is, the concentration at the edge of the mixing zone)
C_e = 1 mg/L = 1000 μg/L
C_u = 0 μg/L
Q_e = 0.69 mgd
$Q_{u\ (acute)}$= 140 mgd
$Q_{d\ (chronic)}$= 197 mgd

$$C_{d\ (acute)} = \frac{(1000 \text{ X } 0.69) + [0.0(140 \text{ X } 0.25)]}{0.69 + (140 \text{ X } 0.25)} = 19.3\ \mu\text{g/L}$$

$$C_{d\ (chronic)} = \frac{(1000 \text{ X } 0.69) + [0.0(197 \text{ X } 0.25)]}{0.69 + (197 \text{ X } 0.25)} = 13.8\ \mu\text{g/L}$$

The acute and chronic water quality criteria for ammonia established in the Idaho water quality standards are **19 μg/L** and **11 μg/L**, respectively. The projected acute receiving water concentration (i.e., 19.3 μg/L) is greater than the acute criterion (19 μg/L) and the projected chronic receiving water concentration (i.e., 13.8 μg/L) is greater than the chronic criteria (11 μg/L), therefore, a water quality based effluent limit for chlorine is necessary.

Appendix C: WQBEL Calculations - Aquatic Life Criteria

At this point, the reasonable potential analysis has determined the need to derive a water quality-based effluent limit (WQBEL) for total residual chlorine. The following calculations demonstrate how the WQBELs in the draft permit were calculated. The WQBELs for total residual chlorine are intended to protect aquatic life criteria. The following discussion presents the general equations used to calculate the water quality-based effluent limits, then works through the calculations for the total residual chlorine WQBEL.

A. Calculate the Wasteload Allocations (WLAs)

A wasteload allocation is the maximum allowable pollutant concentration that can be discharged in the effluent (after accounting for available dilution, if allowable) without causing an instream water quality exceedance. 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 D-4). To calculate a wasteload allocation, C_d is set equal to the acute or chronic criterion and the equation is solved for C_e (i.e., the WLA). The calculated C_e is the acute or chronic WLA. Equation B-3 is rearranged to solve for the WLA, becoming:

$$C_e = WLA = \frac{C_d\,(Q_u \times MZ) + C_d Q_e}{Q_e} - \frac{(C_u Q_u \times MZ)}{Q_e} \qquad \text{(Equation C-1)}$$

where C_d is the concentration of the pollutant (i.e., the criterion) that can never be exceeded in the receiving water. As stated previously, the State can allow up to 25% of the receiving water volume for mixing, however, mixing zones should be as small as practicable. In this case, the facility can operate their system and achieve compliance with water quality based effluent limits using a 20% mixing zone. The calculations are as follows:

Acute criterion:

$$WLA_{acute} = \frac{19\,(140 \text{ X } 0.20) + (19 \text{ X } 0.69)}{0.69} - \frac{[(0 \text{ X } 140) \text{ X } 0.20]}{0.69}$$

WLA_a = 790 μg/l

Chronic criterion:

$$WLA_{acute} = \frac{19\,(197 \text{ X } 0.20) + (19 \text{ X } 0.69)}{0.69} - \frac{[(0 \text{ X } 197) \text{ X } 0.20]}{0.69}$$

WLA_c = 1104 μg/l

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

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

$$LTA_c = WLA_c \times \exp(0.5\,\sigma_4^2 - z\,\sigma_4) \qquad \text{(Equation C-3)}$$

where,

$\sigma^2 = \ln(CV^2 + 1)$
$\sigma = \sqrt{\sigma^2}$
$\sigma_4^2 = \ln(CV^2/4 + 1)$
$\sigma = \sqrt{\sigma_4^2}$
$z = 2.326$ for 99th percentile probability basis

In the case of chlorine,

$\sigma^2 = \ln(0.3^2 + 1) = 0.086$
$\sigma = \sqrt{\sigma^2} = 0.29$
$\sigma_4^2 = \ln(0.3^2/4 + 1) = 0.02$
$\sigma_4 = \sqrt{\sigma_4^2} = 0.149$
$z = 2.326$ for 99th percentile probability basis

Therefore,

$LTA_a = 790\ \mu g/L \times \exp^{((0.5 \times 0.086) - (2.326 \times 0.29))}$
LTA_a = 418 μg/L

$LTA_c = 1104\ \mu g/L \times \exp^{((0.5 \times 0.02) - (2.326 \times 0.149))}$
LTA_c = 784 μg/L

The LTAs are compared and the more stringent is used to develop the daily maximum (MDL) and monthly average (AML) permit limits as shown below. The acute LTA of 522 μg/L is more stringent.

B. Derive the maximum daily and average monthly effluent limits

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

$MDL = LTA \times \exp(z_m \sigma - 0.5 \sigma^2)$ (Equation C-4)
$AML = LTA \times \exp(z_a \sigma_n - 0.5 \sigma_n^2)$ (Equation C-5)

where σ, and σ^2 are defined as they are for the LTA equations (E-2 and E-3) and,

$\sigma_n^2 = \ln(CV^2/n + 1)$
$\sigma_n = \sqrt{\sigma_n^2}$
$z_a = 1.645$ for 95th percentile probability basis
$z_m = 2.326$ for 99th percentile probability basis
n = number of sampling events required per month =12

In the case of chlorine,

$$MDL = 418\ \mu g/L \times \exp^{((2.326 \times 0.29) - (0.5 \times 0.086))}$$
MDL = 794 μg/L

$$AML = 418\ \mu g/L \times \exp^{((1.645 \times 0.086) - (0.5 \times 0.007))}$$
AML = 481 μg/L