FACT SHEET

May 11, 2009

The United States Environmental Protection Agency (EPA)
Proposes To Reissue
A National Pollutant Discharge Elimination System (NPDES) Permit to:

The City of Twin Falls
Wastewater Treatment Plant

NPDES Permit Number:	**ID0021270**
Public Notice Start Date:	May 15, 2009
Public Notice Expiration Date:	June 15, 2009
Technical Contact:	Sharon Wilson, 206-553-0325, wilson.sharon@epa.gov 1-800-424-4372 ext. 3-0325 (within Region 10)

EPA Proposes To Reissue NPDES Permit

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

This Fact Sheet includes:

- information on public comment, public hearing, and appeal procedures
- a listing of proposed effluent limitations, and other conditions for each facility
- a map and description of the discharge locations
- technical material supporting the conditions in the permit

State Certification for Facilities that Discharge to State Waters

EPA will request that the Idaho Department of Environmental Quality (IDEQ) certify the NPDES permit for this facility, under Section 401 of the Clean Water Act. This Notice also serves as Public Notice of the intent of the State of Idaho to consider certifying that the subject discharge will comply with the applicable provisions of Sections 208(e), 301, 302, 303, 306, and 307 of the Clean Water Act. The NPDES permit will not be issued until the certification requirements of Section 401 have been met.

Public Comment

Written comments receive as much consideration as oral comments at a public hearing. Persons wishing to comment on the draft permit or request a Public Hearing may do so in writing by the expiration date of the Public 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 a Public Hearing must be submitted in writing 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 Region 10's Director for the Office of Water and Watersheds will make a final decision regarding permit reissuance. If no substantive comments are received, the tentative conditions in the draft permit will become final, and the permit will become effective upon issuance. If comments are received, EPA will address the comments and issue the permit. In such a case, the permit will become effective at least 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 permit and fact sheet are posted on the Region 10 website at http://yosemite.epa.gov/r10/WATER.NSF/NPDES+Permits/DraftPermitsID Copies may also be requested by writing to EPA at the Seattle address below, by e-mailing washington.audrey@epa.gov, or by calling Audrey Washington at 206-553-0523 or (800) 424-4372 ext 0523 (within Alaska, Idaho, Oregon, & Washington). Copies may also be inspected and copied at the offices below between 8:30 a.m. and 4:00 P.M., Monday through Friday, except federal holidays. In Seattle, visitors report to the 12th floor Public Information Center.

EPA Region 10 1200 Sixth Avenue, Suite 900, OWW-130 Seattle, Washington 98101-3140	(206) 553-0523
EPA Idaho Operations Office 1435 North Orchard Street Boise, Idaho 83706	(208) 378-5746
Idaho Department of Environmental Quality Twin Falls Regional Office 1363 Fillmore Street Twin Falls, ID 83301	(208) 736-2190

For technical questions regarding the permit or fact sheet, contact Sharon Wilson at the phone number or e-mail address at the top of this fact sheet. Those with impaired hearing or speech may contact a TDD operator at 1-800-833-6384 and ask to be connected to the appropriate phone number. Persons with disabilities may request additional services by contacting Sharon Wilson.

TABLE OF CONTENTS

APPENDICES

LIST OF TABLES

I. APPLICANT

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

Facility Name:	City of Twin Falls Wastewater Treatment Plant
Mailing Address:	P.O. Box 1907, Twin Falls, Idaho 83303
Facility Address:	350 Canyon Springs Road West, Twin Falls, Idaho
Contact:	Jon Caton, Public Works Manager (208) 735-7270

II. FACILITY INFORMATION

A. Facility Description

The City of Twin Falls owns and operates a facility that treats wastewater from domestic, industrial, and commercial sources. The facility discharges secondarily treated wastewater throughout the year to the Snake River at approximately river mile 608.5. The discharge is approximately 10 feet from shore and 2 feet below the surface of the river.

The sewer system consists of separate, municipally-owned sewers that collect sewage from both the City of Twin Falls (population 35,633 (from permit application received in June 2006)) and the City of Kimberly (population 2,672) and treats the collected wastewater at the Twin Falls wastewater treatment plant (WWTP). The WWTP has a design flow rate of 8.56 million gallons per day (mgd) and a peak design flow of 10.92 mgd. The current average daily flow reported in the permit application was 7.13 mgd, while the maximum daily flow rate was 11.63 mgd. The facility estimates that it has approximately 4,000 gallons per day (gpd) infiltration and inflow into its sewer system. To address this problem, the City uses continuous video inspection of its sewer lines, repairs detected leaks, and disconnects any roof or area drains that are found to discharge into the sewer system.

The Twin Falls WWTP was upgraded in 2001 during Phase I of a planned three-phase upgrade. Phase I consisted of construction of a new aeration basin, a secondary clarifier, a gravity belt thickener (GBT), a retrofit of blowers to 500 horsepower (hp), W-3 utility water system for wash water at the GBT, and belt presses plus facility irrigation and a Supervisory Control and Data Acquisition System (SCADA) system. Phase II will include biological nutrient removal, an additional aeration basin, and a secondary clarifier. Phase III will include an additional aeration basin and a secondary clarifier.

The Twin Falls WWTP processes include screening and grit removal, followed by clarification with two primary clarifiers that remove solids (hydraulic retention time of 2.0 hours at present flows of 3.55 mgd each). Primary effluent flows to the bio-tower wet well where it is combined with return activated sludge (RAS) at an average flow of 6.0 mgd. Three 75 hp pumps lift the flow to the top of the tower where it is distributed onto the media by a series of fixed distribution pipes and nozzles at a rate of 9.8 gpm/ft^2.

The wastewater then flows into four aeration basins (each with an average flow of 3.3 mgd), entering into the basins in plug flow mode. Ammonia conversion is achieved in the aeration basins in order to meet NPDES limits. Air is supplied to the basins by three 500 hp blowers through over 1,900 fine bubble diffusers. The system is operated at a food to microorganism (F/M) ratio of between 0.28 during the summer months and 0.17 during the winter months. Solids inventories range from 60,000 lbs of volatile matter in the summer to 85,000 lbs volatile matter in the winter.

Aeration basin effluent flows to three secondary clarifiers. The two original plant clarifiers (each 4.2 mgd average) utilize draft tubes for removal of settled sludge from the clarifier bottom. The recently constructed third clarifier (average 4.7 mgd) utilizes the Clarifier Optimization Package (COP) system for sludge removal. NEFCO Stamford baffles are utilized on all three clarifiers The baffles help reduce solid loss to the effluent by redirecting clarifier flow back toward the center of the clarifier, resulting in better settling of the solids. RAS is pumped back to the bio-tower wet well by four 60 hp pumps. The effluent from the secondary clarifiers (average 7.1 mgd, combined) proceeds to the Trojan UV 4000 system, which uses ultraviolet light to disinfect and destroy disease-causing bacteria that survived previous treatment processes. There are two parallel sets of the UV system. Chlorine contact chambers would be used only in the event that the whole UV system is inoperable for an extended period of time.

Waste solids from both the primary and the secondary system are co-thickened with a gravity belt thickener. Solids are thickened to 6-8 percent solids. The concentrated solids (average 0.044 mgd) are pumped to the anaerobic digesters. The facility utilizes two anaerobic digesters and one sludge pump holding tank to digest the solids and meet volatile solids reduction criteria. The resulting sludge is pumped to two 2-meter filter belt presses for dewatering. The facility produces Class B biosolids, which are land-applied to agricultural land in Twin Falls County, Idaho, in cake form at 14-15 percent solids by three Knight Bed side slinger trucks. Application sites are set up using GPS for setbacks, boundaries, etc. with detailed maps printed out. Detailed records are kept of all biosolids applications.

A SCADA system is utilized to monitor all process units and provide an alarm call-out system when the facility is unmanned.

In the event of a power outage, all essential plant processes are powered by two emergency generators (1,400 kW combined).

B. Pretreatment Program

An extensive Industrial Pretreatment Program (IPP) is in place. Currently, the Twin Falls IPP oversees six industries and one satellite collection system (the City of Kimberly) that discharge into the collection system. Approximately 2,400 samples total are collected yearly for the industries and Kimberly and are tested for different pollutants by the WWTP.

Current major industrial dischargers include:

- Longview Fibre, which manufactures cardboard boxes and uses screen printing to label the boxes (approximately 20,000 gpd in process wastewater);
- Con Agra (formerly Lamb Weston, Inc.), which produces frozen potato products and discharges wastewater used to wash and process the potatoes (approximately 2,000,000 gpd in process wastewater);
- Keegan Inc., which produces fresh-pack potato products and discharges wastewater used to wash the potatoes (approximately 18,000 gpd in process wastewater; discharge from November 1st to March 1st annually);
- Independent Meat, a slaughterhouse and meat processor producing pork products (approximately 160,000 gpd in process wastewater);
- Glanbia Foods, which produces cheese and generates wastewater from wash and rinse cycles, as well as from whey reclamation (approximately 341,000 gpd in process wastewater);
- AmeriPride, a commercial laundry facility with washwater discharge (approximately 73,000 gpd in wastewater).

Typical pollutants that might be expected in discharges from these industrial processes include starch, ink, caustics, sulfuric acid, ammonia, chlorine, chlorine dioxide, solvents, metals, and grease.

C. Permit History

The facility's previous permit became effective on May 1, 2000 and expired on May 1, 2005. This permit incorporated applicable effluent limitations and conditions of the Middle Snake River Watershed Management Plan (IDEQ 1997). The most recent permit application was submitted on April 11, 2005 and resubmitted on June 26, 2006.

D. Compliance History

DMR monitoring data from May 2001 to April 2008 were reviewed to determine the facility's compliance with its current effluent limits. The data review indicated that, for the most part, the facility could consistently achieve all secondary treatment limits. However, the facility periodically exceeded its permit limits during the previous permit cycle. These exceedances are summarized below:

- 2 violations of BOD_5 concentrations (January and December 2002)
- 4 violations of TSS concentrations (January, July and December 2002 and March 2004)
- 1 violation of ammonia concentrations (June 2001)
- 2 violations of fecal coliform concentrations (April and December 2002)
- 1 violation of TSS percent removal (December 2002)

Specific information for this facility is provided in Appendix A

III. RECEIVING WATER

The City of Twin Falls discharges throughout the year to the Snake River approximately at river mile 608.5. The State of Idaho Water Quality Standards and Wastewater Treatment Requirements (16 IDAPA §58.01.02) protect this segment (HUC 17040212, Upper Snake-Rock Subbasin, segment US-20, Milner Dam to Twin Falls) for the following existing uses: cold water biota, salmonid spawning, primary contact recreation, agricultural and industrial water supply, wildlife habitat, and aesthetics.

A. Low Flow Conditions

Flows in the segment of the Snake River to which the Twin Falls wastewater treatment plant discharges are controlled by Milner Dam, located approximately 30 miles upstream of Twin Falls The United States Geological Survey (USGS) gage near Kimberly, ID (station #13090000, river mile 617.5) was determined to be the closest gage upstream of the facility with a data record long enough to produce the statistical measures needed for the permit calculations. Flow information from that gage, analyzed from 1987 to 2007, indicate that the river flow at the gage is characterized by a 7 day, 10 year low flow (7Q10) flow of 202 cfs (131 mgd), and a 1 day, 10 year low flow (1Q10) flow of 190 cfs (123 mgd).

The City has asserted that the low flows at the Twin Falls treatment plant vary significantly from those at the USGS gage at Kimberly. To gather more accurate information, we are proposing a compliance schedule for the City to establish a stream gage just upstream of its outfall to measure the streamflows to support calculations in reasonable potential analyses and limit calculations in future permit cycles.

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. Federal regulations in 40 CFR 122.4(d) prohibit the issuance of an NPDES permit which does not 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 (such as cold water biota, contact recreation, etc.) that each water body is expected to achieve. The numeric and/or narrative water quality criteria are the criteria deemed necessary, by the State, to support the beneficial use classification of each water body. The anti-degradation policy represents a three tiered approach to maintain and protect various levels of water quality and uses.

Idaho Water Quality Standards (WQS) summarize the surface water use designations for the State of Idaho: that all waters of the State of Idaho are protected for the uses of industrial and agricultural water supply (IDAPA 58.01.02.100.03.b and c), wildlife habitats (IDAPA 58.01.02.100.04) and aesthetics (IDAPA 58.01.02.100.05). The WQS in Sections 252.02, 252.03, and 253 require that industrial and agricultural water supply uses are to be protected by narrative criteria in IDAPA 58.01.02.200. These narrative criteria require that all surface waters of the State shall be free from hazardous materials, toxic substances, deleterious materials, radioactive materials; floating, suspended, or submerged matter; excess nutrients; oxygen-demanding materials; and sediment concentrations which would impair beneficial uses. The WQS state, in Section 252.02, that the criteria from Water Quality Criteria 1972, also referred to as the "Blue Book" (EPA R3-73-033), can be used to determine numeric criteria for the protection of water supply use.

The Snake River at Twin Falls is also protected for cold water biota, salmonid spawning, and primary contact recreation. (IDAPA 58.01.02.150.14)

Because the effluent limits in the draft permits are either based on current water quality criteria or are technology-based limits that have been shown to not cause or contribute to an exceedance of water quality standards, the discharge limited as proposed in the draft permit is not expected to result in or contribute to degradation of the receiving water.

C. Water Quality Limited Segment

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. The TMDL documents the amount of a pollutant a water body can assimilate without violating a state's water quality standards and allocates that load to known point sources and nonpoint sources.

A TMDL for total phosphorus (TP) and total suspended solids (TSS) was approved by EPA on August 25, 2000.

During permit reissuance in 1999, water quality based limits for phosphorus were added to the permit to implement the TMDL. The permit now being proposed continues these limits and implements the approved TMDL for both TP and TSS, as well as existing limits for BOD_5, ammonia, and pH. The WLA for total suspended solids has also been applied. *E. coli* limits have been proposed to replace previous fecal coliform bacteria limits in compliance with updated Idaho requirements. The permit also continues effluent monitoring requirements for parameters with effluent limitations and for other nutrients.

IV. EFFLUENT LIMITATIONS

A. Basis for Permit Effluent Limits

In general, the CWA requires that the limits for a particular pollutant be the more stringent of either technology-based effluent 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 of a waterbody are being met and they may be more stringent than technology-based effluent limits. The basis for the proposed effluent limits in the draft permit are provided in Appendix B of this document, as well as in the fact sheets, responses to comments, and Total Maximum Daily Load (TMDL) developed for the 1994 permit, the 1999 modification for phosphorus, and the 2005 updated TMDL. There have been no changes in the technology or water quality-based requirements that apply to the Twin Falls facility since the development of the 1994 permit other than the phosphorus conditions, which were addressed in 1999.

B. Proposed Effluent Limitations

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

1. There must be no discharge of any floating solids, visible foam in other than trace amounts, or oily wastes that produce a sheen on the surface of the receiving water.

2. Table 1 below presents the proposed effluent limits for 5-day biochemical oxygen demand (BOD_5), total suspended solids (TSS), *Escherichia coli* (*E. coli*), pH, total phosphorus, ammonia, and total residual chlorine, and the minimum percent removal requirements for BOD_5, and TSS.

Table 1
Proposed Effluent Limitations

Parameters	Average Monthly Limit	Average Weekly Limit	Minimum Percent Removal[1]	Maximum Daily Limit	Instantaneous Maximum Limit
Net BOD_5	30 mg/L	45 mg/L	85%	--	---
	2,142 lbs/day	3,213 lbs/day		--	---
Net TSS	30 mg/L	45 mg/L	85%	--	---
	2,142 lbs/day[2]	3,213 lbs/day[2]			
	980 lbs/day[3]	1390 lbs/day[3]		--	--
E. coli Bacteria	126 colonies /100mL [4]	---	--	--	406 colonies /100mL
Total Phosphorus	710 lbs/day	990 lbs/day	--	--	--
Total Ammonia as N (May 1- Sept. 30)	3.8 mg/L 247 lbs/day	--	--	5.4 mg/L 351 lbs/day	--
Total Ammonia as N (Oct. 1 – Apr. 30)	5.2 mg/L 338 lbs/day	--	--	7.5 mg/L 488 lbs/day	--
Total Residual Chlorine[5]	0.012 mg/L 0.86 lbs/day	--	--	0.033 mg/L 2.36 lbs/day	--
Ph	6.5 – 9.0 standard units				

[1] Percent removal is calculated using the following equation: (influent - effluent) / influent; this limit applies to the average monthly values.
[2] The interim mass based limits for total suspended solids apply only after June 30, 2014; see §IV.B.3, below.
[3] The final mass based limits for total suspended solids apply only after June 30, 2014; see §IV.B.3, below.
[4] The monthly average for *E. coli* is the geometric mean of all samples taken during the month.
[5] The chlorine limits apply only when chlorine is being used.

3. Total Suspended Solids limits.

a. Mass-based limits. The mass-based limits for TSS proposed in this draft permit are considerably lower than those in the last permit; they are now based on wasteload allocations in the Upper Snake Rock Total Maximum Daily Load. Idaho regulations at IDAPA 58.01.400.03 allow for a compliance schedule the first time a water quality based limitation is applied in a discharge permit. IDEQ has indicated that it intends to certify a schedule to allow the City time to upgrade its facility to meet the more stringent water quality based limits. In the meantime, the secondary treatment, technology based standards of 30 mg/l, monthly average, and 45 mg/l, weekly average, will assure that water quality in the Snake River does not deteriorate from the current condition.

b. Interim Requirements for the Schedule of Compliance

(1) By July 1, 2010, the permittee must provide written notice to EPA and IDEQ that the Chemical Enhancement Primary Treatment (CEPT) has been completed.

(2) By July 1, 2011, the permittee must provide written notice to EPA and IDEQ that a facility plan has been developed to achieve the final limits and must submit a summary report of the plan for implementation.

(3) By July 1, 2012, the permittee must provide written notice to EPA and IDEQ that it has chosen a design alternative and that contracts have been awarded to begin construction to achieve final effluent limitations.

(4) By July 1, 2014, the permittee must provide written notice to EPA and IDEQ that it has completed start up and optimization of its chosen design alternative and is achieving compliance with the final TSS mass-based effluent limitations of Table 1 of the permit.

V. MONITORING REQUIREMENTS

A. Basis for Effluent and Surface Water Monitoring Requirements

Section 308 of the CWA and federal regulation 40 CFR §122.44(i) require monitoring in permits to determine compliance with effluent limitations. Monitoring is also be required to gather effluent and surface water data to determine if additional effluent limitations are required and to monitor effluent impacts on receiving water quality.

B. Effluent Monitoring Requirements

1. Parameters

The draft permit requires monitoring of the effluent for BOD_5, TSS, *E. coli*, total phosphorus, total ammonia, total residual chlorine (when limits apply), and cyanide to determine compliance with the effluent limits; it also requires monitoring of the influent for BOD_5 and TSS to calculate monthly removal rates. In addition, the permit includes requirements to monitor the effluent for nitrate-nitrogen and total Kjeldahl nitrogen to collect data to assess potential nutrient contributions to the watershed. Because of temperature impairment in the receiving water, we have added temperature monitoring of the effluent and the receiving water.

Furthermore, because the City of Twin Falls WWTP is a major municipal NPDES facility (i.e., ≥1 MGD design flow), it is subject to expanded effluent and whole effluent toxicity

(WET) testing at its next application submittal. As indicated in Part D of NPDES application Form 2A, expanded effluent testing is required of all municipal WWTPs with design flow equal to or greater than 1 MGD. Expanded effluent testing includes a full priority pollutant scan (40 CFR §131.36) along with some additional parameters. Since the permit application requires reporting the results from a minimum of three expanded effluent testing events with the application submittal, the draft permit requires this monitoring in the second, third, and fourth years of the permit to avoid having three sampling events performed during a short time frame just prior to application submittal. Results from the expanded effluent testing must be submitted to EPA with the DMRs and concurrent WET test results.

2. Frequency

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

EPA's *Interim Guidance for Performance-Based Reductions of NPDES Permit Monitoring Frequencies* provides guidelines by which permit writers may reduce required monitoring frequencies based on past performance of a facility. Based on that guidance, we are proposing to reduce the sampling frequency for BOD_5 and TSS to four times a week instead of seven. This is based on long-term average (LTA) BOD_5 monthly discharges at 50% of the average monthly limit (AML) and on LTA TSS monthly discharges at 60% of the AML. We also confirmed that there were no violations of limits for either parameter in the last two years that we were analyzing (5/04—4/06).

Table 2 presents the effluent monitoring requirements for the permittee in the draft permit. Each of the effluent monitoring requirements from the previous permit (ID-002127-0) was evaluated to determine whether the requirements should be continued, updated, or eliminated. Based on this analysis, *E. coli* monitoring was set at 5/month at intervals of three to seven days in order to produce enough data points to calculate a geometric mean each month. The chronic water quality standard in the receiving water is stated as a geometric mean, so applying that limit at the end of pipe dictates that we must require five samples are collected each month.

The sampling location must be after the last treatment unit and prior to discharge to the receiving water. If no discharge occurs during the reporting period, "no discharge" shall be reported on the DMR.

.

Table 2 Effluent Monitoring Requirements				
Parameter	**Unit**	**Sample Location**	**Sample Frequency**	**Sample Type**
Flow	mgd	Effluent	Continuous	Recording
BOD_5	mg/L	Influent and Effluent[6]	4/week	24-hour composite
	lbs/day	Effluent	4/week	Calculation[7]
	% Removal	--	–	Calculation[8]
TSS	mg/L	Influent and Effluent[5]	4/week	24-hour composite
	lbs/day	Effluent	4/week	Calculation[7]
	% Removal	--	–	Calculation[8]
pH	standard units	Effluent	1/day	Grab
Temperature	ºC	Influent & effluent	Continuous	recording
E.coli	colonies/100 ml	Effluent	5/month[9]	Grab
Total Residual Chlorine	mg/L	Effluent	1/day[10]	Grab
Total Ammonia as N	mg/L	Effluent	1/week	24-hour composite
Nitrate-Nitrogen	mg/L	Effluent	1/week	24-hour composite
Total Kjeldahl Nitrogen	mg/L	Effluent	1/week	24-hour composite
Total Phosphorus as P	mg/L	Effluent	1/week	24-hour composite
Whole Effluent Toxicity	toxic units	Effluent	2/year [11]	24-hour composite
Expanded Effluent Testing	mg/L	Effluent	1 each in 2nd, 3rd, & 4th years of the permit	24-hr composite

[6] Influent and effluent composite samples shall be collected during the same 24-hour period.
[7] Loading is calculated by multiplying the concentration in mg/L by the flow (in mgd) recorded for that day and a conversion factor of 8.34.
[8] Percent removal is calculated using the following equation: (average monthly influent concentration – average monthly effluent concentration) ÷ average monthly influent concentration.
[9] Five samples taken every three (3) to seven (7) days over a thirty (30) day period.
[10] Chlorine monitoring is required only when chlorine is being used.
[11] in April and October

C. Whole Effluent Toxicity Testing Requirements

The previous permit required two toxicity tests per year- once each in April and October. Table 3 summarizes the results from chronic toxicity testing from the previous permit term.

Table 3
Whole Effluent Toxicity Testing Results

Date	Species	25% Inhibition Concentration (IC_{25}) (Percent Effluent)	No Observable Effect Concentration (NOEC) (Percent Effluent)
6/13/00	*Ceriodaphnia dubia*	30.3	25
6/13/00	*Ceriodaphnia dubia*	>50	50
6/13/00	Fathead Minnow	>50	50
4/24/01	*Ceriodaphnia dubia*	47.1	12.5
4/24/01	Fathead Minnow	100	50.0
4/24/01	*Ceriodaphnia dubia*	invalid	
10/23/01	Fathead Minnow	100	100
10/23/01	*Ceriodaphnia dubia*	66.7	50
10/23/01	*Ceriodaphnia dubia*	>50	50
4/11/02	Fathead Minnow	4.3	6.25
4/11/02	*Ceriodaphnia dubia*	>50	50
4/11/02	Fathead Minnow	4.3	50
10/7/03	*Ceriodaphnia dubia*	>50	50
10/7/03	Fathead Minnow	>50	50
10/7/03	*Ceriodaphnia dubia*	62.7	50
4/20/04	Fathead Minnow	>100	100
4/20/04	*Ceriodaphnia dubia*	>50	50
4/20/04	Fathead Minnow	>50	100

IC_{25} values represent the percentage of effluent at which 25 percent of the test organisms are inhibited relative to their normal activity, and the No Observable Effect Concentration (NOEC) indicates the highest percentage of effluent at which the test organisms suffer no effects from the effluent. At concentrations of effluent above the NOEC, effects were observed. NOEC values of 100 and IC_{25} values of > 100 indicate that the effluent is not toxic; IC_{25} and NOEC values of <100 indicate that the effluent has some toxic effect on the test organisms. The majority of the results above show that the facility effluent has some toxic effect (14 out of 17 samples had a NOEC < 100%).

The objective is to have no toxic effect in the receiving stream. Therefore, testing at the concentration of the effluent in the receiving stream at the edge of the mixing zone, 25% of the 7Q10, is the starting point for design of the dilution series for toxicity testing. In logical terms, the receiving water is protected outside the mixing zone if:

$$\text{RWC} \leq \text{NOEC}$$

Where RWC = the percentage of effluent in the receiving water at the edge of the mixing zone under critical low flow conditions, i.e 7Q10 ,

NOEC = the no observable effect concentration (highest percentage dilution of effluent at which no toxic effects are observed)

The chronic RWC is calculated from the maximum design flow of the treatment plant (10.92 mgd) and the river flow (7Q10) (131 mgd) using the following formula:

$$\text{Chronic RWC} = \frac{Q_{effluent}}{(25\%)(Q_{stream}) + Q_{ffluent}} = \frac{10.92}{(0.25)(131) + 10.92} = 25\ \%$$

The proposed permit requires the chronic testing of the effluent twice a year to determine the toxicity of the effluent. If the toxicity is greater than 3.5 TU_a or 4.0 TU_c, the permittee must conduct accelerated testing.

If acute toxicity is demonstrated (test organisms are killed) during the chronic tests, the permittee must report the LC_{50} , the pollutant concentration at which 50% of the test organisms are killed. The acute RWC calculated using the above formula, but substituting the 1Q10 (123 mgd), is 26.2 % $\approx$ 26%. If acute toxicity is shown at a dilution of lower than 26% effluent, the permittee must conduct accelerated testing.

If accelerated testing confirms the toxic effects of the effluent, the permittee must develop and submit Toxicity Reduction Evaluation (TRE) workplan

D. Pretreatment Program Requirements

Under the pretreatment program requirements of the previous permit, the Twin Falls WWTP conducted sampling of its influent, effluent, and final sludge twice per year (in April and October) to track the potential for pollutants from industrial dischargers to affect the plant effluent, sludge quality, treatment processes, and worker health and safety. Table 4 below summarizes the results from that effluent monitoring. Only the data collected after the facility was upgraded in 2001 are included below.

Table 4
Summary of Effluent Sampling of Metals and Cyanide

	Parameter (mg/L)									
	Arsenic	**Cadmium**	**Chromium**	**Copper**	**Cyanide**	**Lead**	**Mercury**	**Nickel**	**Silver**	**Zinc**
Method Detection Limit	**0.005**	**0.0005**	**0.002**	**0.01**	**0.005**	**0.005**	**0.0002**	**0.02**	**0.005**	**0.005**
Date										
10/21/01	0.009	ND	ND	0.01	0.007	ND	0.0008	ND	0.006	0.028
10/23/02	0.01	ND	ND	0.01	0.065	ND	ND	ND	ND	0.031
10/25/02	0.008	ND	ND	ND	0.008	ND	ND	ND	ND	0.033
4/9/02	0.006	ND	ND	ND	0.011	ND	ND	ND	0.005	0.038
4/11/02	0.006	ND	ND	ND	0.074	ND	ND	ND	ND	0.042
4/14/02	0.005	ND	ND	ND	0.006	ND	ND	ND	0.005	0.035
10/6/02	0.006	ND	ND	ND	ND	ND	ND	ND	ND	0.042
10/8/02	0.006	ND	ND	ND	ND	0.005	ND	ND	ND	0.042
10/10/02	0.007	ND	0.002	ND	0.062	0.005	ND	ND	ND	0.045
4/13/03	0.006	ND	ND	ND	0.006	ND	ND	ND	ND	0.029
4/15/03	0.005	ND	ND	ND	0.005	ND	ND	ND	ND	0.030
4/17/03	0.006	ND	ND	ND	ND	ND	ND	ND	0.005	0.033
10/5/03	0.005	ND	ND	ND	ND	ND	ND	ND	ND	0.022
10/7/03	ND	ND	ND	ND	ND	ND	ND	ND	ND	0.022
10/9/03	ND	ND	ND	ND	0.005	ND	ND	ND	ND	0.027
4/18/04	0.006	ND	0.002	ND	ND	ND	ND	ND	0.009	0.034
4/20/04	0.006	ND	ND	ND	ND	ND	ND	ND	0.01	0.031
4/22/04	0.007	ND	ND	ND	ND	ND	ND	ND	0.008	0.033
10/17/04	0.008	ND	ND	ND	ND	ND	ND	ND	0.008	0.017
10/19/04	0.008	ND	ND	ND	ND	ND	ND	ND	0.008	0.017
10/21/04	0.009	ND	ND	ND	ND	ND	ND	ND	0.008	0.030
4/17/05	0.008	ND	ND	ND	ND	ND	ND	ND	ND	0.040
4/19/05	0.007	ND	ND	ND	ND	ND	ND	ND	0.006	0.033
4/21/05	0.005	ND	ND	ND	ND	ND	ND	ND	0.006	0.033
10/2/05	0.007	ND	ND	ND	0.005	ND	ND	ND	0.005	0.026

Table 4 Summary of Effluent Sampling of Metals and Cyanide										
	Parameter (mg/L)									
	Arsenic	**Cadmium**	**Chromium**	**Copper**	**Cyanide**	**Lead**	**Mercury**	**Nickel**	**Silver**	**Zinc**
Method Detection Limit	**0.005**	**0.0005**	**0.002**	**0.01**	**0.005**	**0.005**	**0.0002**	**0.02**	**0.005**	**0.005**
Date										
10/4/05	0.007	ND	ND	ND	ND	ND	ND	ND	ND	0.034
10/6/05	0.006	ND	ND	ND	0.006	ND	ND	ND	0.005	0.039
4/9/06	0.005	ND	ND	ND	0.006	ND	ND	ND	ND	0.040
4/11/06	0.006	ND	0.007	ND	0.006	ND	ND	ND	0.005	0.042
4/13/06	0.006	ND	ND	ND	0.006	ND	ND	ND	0.005	0.048
10/15/06	0.006	ND	ND	ND	ND	ND	ND	ND	ND	0.01
10/17/06	0.006	ND	ND	0.01	ND	ND	ND	ND	ND	0.029
10/19/06	0.006	ND	ND	0.01	ND	ND	ND	ND	ND	0.019
4/1/07	0.009	ND	ND	ND	ND	ND	ND	ND	ND	0.036
4/3/07	0.008	ND	ND	ND	ND	ND	ND	ND	ND	0.046
4/5/07	0.008	ND	ND	0.01	ND	ND	ND	ND	ND	0.052
10/7/07	0.007	ND	ND	ND	ND	ND	ND	ND	ND	0.03
10/9/07	0.008	ND	ND	ND	ND	ND	ND	ND	ND	0.04
10/11/07	0.008	ND	ND	0.01	ND	ND	ND	ND	ND	0.04
4/6/08	0.007	ND	ND	ND	ND	ND	ND	ND	ND	0.06
4/8/08	0.007	ND	ND	ND	ND	ND	ND	ND	ND	0.06
4/10/08	0.008	ND	ND	ND	ND	ND	ND	ND	ND	0.06

These data show that arsenic, silver, and zinc were consistently present above detection limits and cyanide to a lesser degree. Therefore, reasonable potential analyses were run for these pollutants to determine if water quality-based effluent limits were needed for them. Chromium, lead, and mercury were also detected periodically in the effluent. However, because these metals were not consistently detected in the effluent and there was not enough data on which to base the analyses, no reasonable potential analyses were run for these metals.

Reasonable potential analyses were conducted using the most stringent criteria for each parameter (see Table B-1, below).

The reasonable potential analyses showed that there was not a reasonable potential for arsenic, cyanide, silver, or zinc to exceed water quality standards in the Snake River; as mentioned above, the analysis for arsenic addressed both the aquatic life criteria and the human health criteria. Therefore, water quality-based effluent limits are not proposed for these parameters.

The proposed permit includes requirements to continue implementation of the approved pretreatment program. In particular, it continues the pretreatment sampling requirements from the previous permit and adds requirements to monitor for ammonia, molybdenum, and selenium, as required in EPA's updated Local Limits Development Guidance (EPA 833-R-04-002A, July 2004).

E. Receiving Water Monitoring Requirements

1. Pollutants

Receiving water monitoring is needed to evaluate if the effluent is causing or contributing to an in-stream exceedance of the water quality criteria and to provide data to conduct reasonable potential analyses in the next permit cycle.

Receiving water monitoring was required under the previous permit to monitor the receiving water for the parameters shown in Table 5, which shows the results of receiving water monitoring for 2000 – 2004 (no data were reported in 2002). Sampling consisted of one grab sample at each location (upstream, effluent, and downstream). Samples were taken in June 21, 2000; May 24, 2001; April 2, 2003; and March 24, 2004.

Table 5
Summary of Receiving Water Monitoring Results

	2000			2001			2003			2004		
Parameter (Units)	**Up**[12]	**Eff.**[13]	**Down**[14]	**Up**[12]	**Eff.**[13]	**Down**[14]	**Up**[12]	**Eff.**[13]	**Down**[14]	**Up**[12]	**Eff.**[13]	**Down**[14]
Dissolved Oxygen (mg/L)	8.2	4.14	9.82	8.9	5.81	10.39	9.30	4.96	9.66	8.97	5.62	9.40
Temp. (C)	19.5	25	18.7	16.4	21.4	16.5	10.0	22.0	10.8	11.1	23.2	11.0
pH (su)	8.19	7.52	7.74	11.7	15.7	12.1	8.6	7.4	8.5	8.47	7.36	8.87
Suspended solids (mg/L)	20.0	21.7	22.1	11.7	15.7	12.1	14.1	29.8	14.9	18.4	33.8	18.9
Fecal coliform (Col./100ml)	15.5	33.4	27.7	3.5	56.0	11.2	11.0	187.6	17.1	2.8	474.6	26.3

Table 5
Summary of Receiving Water Monitoring Results

	2000			2001			2003			2004		
Parameter (Units)	**Up**[12]	**Eff.**[13]	**Down**[14]	**Up**[12]	**Eff.**[13]	**Down**[14]	**Up**[12]	**Eff.**[13]	**Down**[14]	**Up**[12]	**Eff.**[13]	**Down**[14]
Ammonia-N (mg/L)	0.03	0.95	0.02	0.008	0.13	0.008	0.03	0.073	0.032	0.068	0.287	0.051
Nitrite-N (mg/L)	0.02	4.48	0.03	0.045	0.555	0.065	0.02	0.12	0.01	0.06	0.17	0.05
Nitrate-N (mg/L)	1.24	33.31	1.18	0.675	25.75	0.57	1.54	35.71	2.00	1.65	24.14	1.58
Total Phosphorus-P (mg/L)	0.05	10.0	0.05	0.05	5.03	0.05	0.61	13.5	0.34	0.17	12.91	0.25

[12] Up = upstream
[13] Eff. = effluent
[14] Down = downstream

These results indicate that all pollutant parameters are within acceptable ranges downstream of the WWTP.

Total residual chlorine is only required to be monitored if the WWTP uses chlorine for disinfection. Since the UV disinfection system has some redundancy built into its system, it is very unlikely that the WWTP will need to fall back on chlorine disinfection. Only if it does will monitoring of the effluent and receiving water be required; in such a case, both upstream and downstream samples would be required in order to assess background levels and immediate effects on the receiving water.

Because annual sampling does not yield enough data points to conduct a reasonable potential analysis in the next permit cycle, EPA increased the frequency of the receiving water monitoring requirements in the proposed permit to quarterly. EPA also proposes to add monitoring requirements for metals (arsenic, cadmium, chromium, copper, cyanide, lead, mercury, nickel, silver, and zinc) in order to conduct reasonable potential analyses during the next permit cycle to determine potential impact on the environment. Table 6 shows these requirements.

2. Flow

EPA needs a flow record with enough data (at least ten years) to support calculation of low flow statistics-- 1Q10, 7Q10, 1B3, 30B3--which are needed for reasonable potential analyses and for limit calculations when the State grants a mixing zone. These low flow design discharge conditions derive from the requirements in the Idaho water quality standards (IDAPA 58.01.02.210.03.b). For this and previous permits, we used data from the USGS gaging station near Kimberly, Idaho, #13090000, which is about 8 miles upstream of the City's outfall, to evaluate reasonable potential of various pollutants to exceed water quality standards. The result of those calculations did not show reasonable potential to violate. Therefore, no additional limits were added in this draft permit because of these evaluations.

Even so, the City and the State have proposed that we use average annual low flow levels that the State used in the development of the Upper Snake Rock TMDL instead of the low flow statistics from the Kimberly gage that we have used. The levels recommended by the City and State were derived by adding the average annual flows of springs, streams, and agricultural return flows that enter the Snake River in the miles between Milner Dam and the City of Twin Falls outfall. They make a case that the flow is higher at Twin Falls compared with that at the Kimberly gage because of these added flows. We recognize that these additional in-flows appear to add to the total flow that is experienced at Twin Falls. However, lacking daily flow information about those additional in-flows, we cannot quantify the combined low flow statistics that we need for the permit calculations.

We are proposing in the draft permit to require the City to establish a stream gage just upstream of its outfall on the Snake River in consultation with the US Geological Survey. According to Greg Clark, USGS Boise, the cost installation would be about $15,000 and the cost annual operation would be about $15,000. We are inviting comments on the proposed requirement for the City to establish such a gage to gather streamflow data.

Table 6
Proposed Receiving Water Monitoring Requirements

Parameter	Unit	Sample Location	Sample Frequency	Sample Type
Flow	mgd	upstream	4/year	recording
TSS	mg/L	upstream	4/year	grab
E. coli Bacteria	colonies/100 mL	upstream	4/year	grab
Dissolved Oxygen	mg/L	upstream	4/year	grab
pH	standard units	upstream	4/year	grab
Temperature	ºC	upstream	4/year	grab
Total Ammonia as N	mg/L	Upstream & downstream	4/ year	grab
Total Nitrate as N	mg/L	upstream	4/year	grab
Total Nitrite as N	mg/L	upstream	4/year	grab
Total Phosphorus as P	mg/L	upstream	4/year	grab

Table 6 Proposed Receiving Water Monitoring Requirements				
Parameter	**Unit**	**Sample Location**	**Sample Frequency**	**Sample Type**
Total Residual Chlorine	mg/L	Upstream & downstream[15]	4/year	grab
Arsenic[16]	mg/L	upstream	4/year	grab
Cadmium[16]	mg/L	upstream	4/year	grab
Chromium[16]	mg/L	upstream	4/year	grab
Copper[16]	mg/L	upstream	4/year	grab
Cyanide[16]	mg/L	upstream	4/year	grab
Lead[16]	mg/L	upstream	4/year	grab
Mercury[16]	mg/L	upstream	4/year	grab
Nickel[16]	mg/L	upstream	4/year	grab
Silver[16]	mg/L	upstream	4/year	grab
Zinc[16]	mg/L	upstream	4/year	grab
Molybdenum[16]	mg/L	upstream	4/year	grab
Selenium[16]	mg/L	upstream	4/year	grab
Hardness	mg/L	upstream	4/year	grab

[15] Downstream chlorine monitoring is only required if chlorine is being used.
[16] Arsenic, cadmium, chromium, copper, cyanide, lead, nickel, silver, zinc, molybdenum, and selenium must be analyzed as dissolved. Mercury must be analyzed as total.

F. Phosphorus Trading Requirements

In the Upper Snake Rock Subbasin, stakeholders, including aquaculture and fish processing facilities, municipalities, the State of Idaho, and EPA, have developed a trading scheme for buying and selling of total phosphorus credits among the dischargers. This scheme allows some dischargers to increase their average monthly discharges of total phosphorus above the average monthly limit in their permits if others are reducing their discharge by a similar amount. However, the overall effect of implementing the TMDL for total phosphorus is a net benefit because it reduces the loading of this pollutant to the watershed. Pollutant trading allows this to be accomplished more economically than might otherwise be the case.

The ability to participate in trading is limited by several factors, which are listed below.

- Only average monthly discharges for total phosphorus are eligible to be modified by trades; maximum daily discharges are not.

- A buyer cannot increase its average monthly discharge of total phosphorus above the monthly average applicable technology-based limit for its facility.

The City of Twin Falls is eligible to buy and sell total phosphorus credits. For more detail on the procedures, see Appendix D.

This proposed permit authorizes the City of Twin Falls to sell phosphorus credits to other point sources in the Upper Snake Rock Subbasin consistent with IDEQ's November 2003 draft *Pollutant Trading Guidance* ("Guidance"). The Guidance limits the point sources that can trade and anticipates allowing trades with nonpoint sources (NPS) only after specific actions and adjustments have been made. The permittee may request that EPA modify the permit to allow for pollutant trading with NPS only if the following elements in the Guidance have been completed:

- Install a Best Management Practice (BMP) from the applicable BMPs listed in the Guidance[1];
- Characterize, quantify and document the pollutant reduction according to the BMP's requirements;
- Determine the amount of the credit from the pollutant reduction, applying the appropriate ratios for the pollutant and water body, listed in the Appendices of the Guidance[2,3].
- Adjust the amount of the credit by subtracting the water quality contribution, the amount of reduction required to meet the water quality standards or load allocation[4];
- Make the BMP available for inspection by the NPDES permit holder that buys the credits, the NPDES authorities, and the Soil Conservation Commission to confirm proper installation and operation of the BMP as well as the correct amount of credits produced[5].

VI. SLUDGE (BIOSOLIDS) REQUIREMENTS

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

---

[1] The BMP List and the process that must be followed to develop one are described in Section V (Best Management Practices List) of the Guidance.
[2] The Ratios are described in Section II.C.1 of the Guidance and are specific to pollutants and water bodies.
[3] The pollutant trading ratios developed specifically for the Upper Snake Rock Subbasin – Middle Snake River Watershed are contained in Appendix C of the Guidance.
[4] The water quality contribution is described in the Reduction Credit Certificate and must be subtracted from the initial amount as the first step in calculating the amount of marketable credits.
[5] The inspections to be conducted by the regulatory authorities are described in Section III (Forms and Reports) and Section IV.B (Review of Best Management Practices) of the Guidance.

In the absence 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. Since the 40 CFR Part 503 regulations are self-implementing, the permittees must comply with them whether or not a permit has been issued.

VII. OTHER PERMIT CONDITIONS

A. Quality Assurance Plan Implementation

The federal regulation at 40 CFR §122.41(e) requires the permittee to develop procedures to ensure that the monitoring data submitted to EPA are accurate and to explain data anomalies if they occur. The permittee is required to develop or update and implement a Quality Assurance Plan within 180 days of the effective date of the final permit. The Quality Assurance Plan shall consist of standard operating procedures that the permittee must follow for collecting, handling, storing and shipping samples, laboratory analysis, and data reporting. The plan shall be retained on site and be made available to EPA and IDEQ upon request.

B. Operation and Maintenance Plan Implementation

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

C. Best Management Practices Plan

The previous permit required the Permittee to develop and implement a Best Management Practices Plan by February 28, 2000. This BMP Plan that was developed includes measures which prevent or minimize the potential for release of excess nutrients to the Snake River. The facility has not yet installed biological nutrient removal (BNR) to control phosphorus. Therefore, the proposed permit retains the requirement to update the BMP Plan. The plan shall be retained on site and made available to EPA and IDEQ upon request.

D. Emergency Response and Public Notification Plan

In order to address growing problems of threat to public health arising from sewer overflows or treatment plant bypasses and upsets, a section is included in the permit to require development of a plan to respond in such emergencies including notification of the public.

E. Additional Permit Provisions

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

VIII. OTHER LEGAL REQUIREMENTS

A. Endangered Species Act

The Endangered Species Act requires federal agencies to consult with the National Oceanographic and Atmospheric Administration (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 Biological Evaluation (BE) analyzing the effects of the discharge from the treatment facility on listed endangered and threatened species in the vicinity of the facilities was prepared. It concluded that the reissuance of this NPDES permit is not likely to adversely affect two endangered species (the Snake River physa snail (*Physa natricina*) and the Utah valvata snail (*Valvata utahensis*)) and one threatened species (the Bliss Rapids snail (*Taylorconcha serpenticola*)) that could potentially be in the area. The BE is available upon request.

B. State Certification

Section 401 of the CWA requires EPA to seek State certification before issuing a final permit. As a part of the certification, the State may require more stringent permit conditions or additional monitoring requirements to ensure that the permit complies with State water quality standards. The State has pre-certified the draft permit.

C. Permit Expiration

The permit will expire five years from the effective date of the permit.

IX. DEFINITIONS AND ACRONYMS

1Q10	1 day, 10 year low flow
1B3	biologically based 1 day, 3 year low flow
7Q10	7 day, 10 year low flow
30B3	biologically based 1 day, 3 year low flow
AML	Average Monthly Limit
BOD_5	Biochemical oxygen demand, five-day
ºC	Degrees Celsius
cfs	Cubic feet per second
CFR	Code of Federal Regulations
CV	Coefficient of Variation

CWA	Clean Water Act
DMR	Discharge Monitoring Report
DO	Dissolved oxygen
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
lbs/day	Pounds per day
LTA	Long Term Average
mg/L	Milligrams per liter
ml	milliliters
µg/L	Micrograms per liter
mgd	Million gallons per day
MDL	Maximum Daily Limit or Method Detection Limit (depending on the context)
NOAA	National Oceanographic 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
s.u.	Standard Units
TMDL	Total Maximum Daily Load
TRE	Toxicity Reduction Evaluation
TSD	Technical Support Document (EPA, 1991)
TSS	Total suspended solids
USFWS	U.S. Fish and Wildlife Service
USGS	United States Geological Survey
UV	Ultraviolet radiation
WLA	Wasteload allocation
WQBEL	Water quality-based effluent limit
WWTP	Wastewater treatment plant

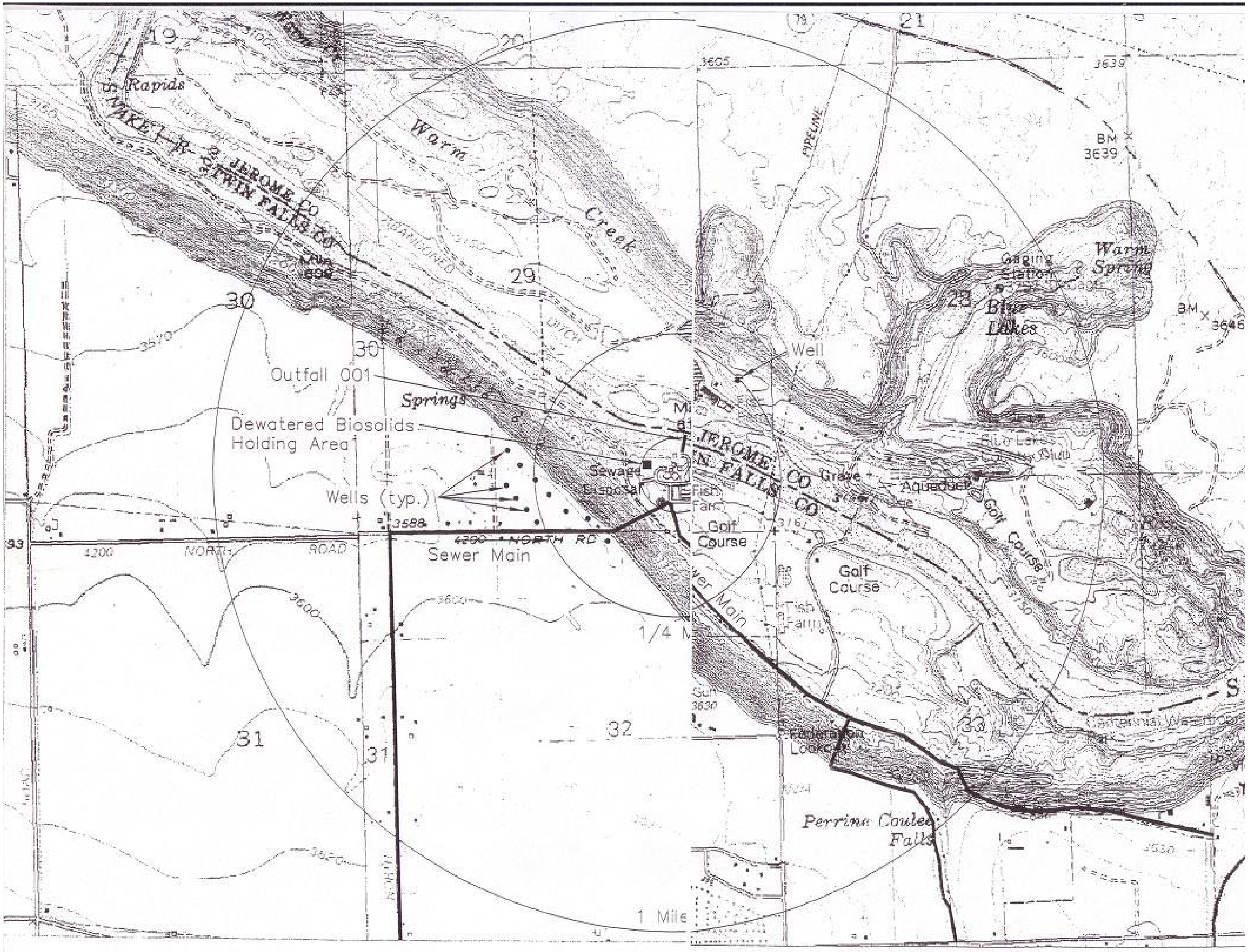
X. REFERENCES

1. City of Twin Falls, ID, 1994. NPDES permit, effective May 1, 2000 to May 1, 2005.
2. Idaho Administrative Procedures Act (IDAPA), 2006. Section 58, Water Quality Standards and Wastewater Treatment Requirements. Idaho Department of Environmental Quality Rules, Title 01, Chapter 02.
3. U.S. EPA, 1973. *Water Quality Criteria 1972* (EPA R3-73-033).
4. EPA. 1991. Technical Support Document for Water Quality-based Toxics Control. US Environmental Protection Agency, Office of Water, EPA/505/2-90-001.

Appendix A -- Facility Information

Summary Data for Twin Falls Facility	
NPDES ID Number:	ID-002127-0
Mailing Address:	PO Box 1907, Twin Falls, ID 83303-1907
Facility Address:	350 Canyon Springs Road West, Twin Falls, Idaho
Permit Background:	The previous permit was effective May 1, 2000 – May 1, 2005. The permit application was received in June 2006.
Collection System Information	
Service Area:	City of Twin Falls and Kimberly
Service Area Population:	38,305
Collection System Type:	100% separated sanitary sewer
Facility Information	
Treatment Train:	Screening and grit removal, primary clarification, aeration, secondary clarification, disinfection.
Design Flow:	8.56 mgd
Design Peak Flow:	10.92 mgd
Existing Flow:	7.13 mgd (average daily flow rate)
Months when Discharge Occurs:	Year round
Outfall Location:	latitude: 42E 36' 35" N, longitude: -114E 29' 06" W
Receiving Water Information	
Receiving Water:	Snake River
Subbasin:	Middle Snake River (HUC 17040212)
Beneficial Uses:	cold-water biota, salmonid spawning, and primary contact recreation.
Water Quality Limited Segment:	A TMDL for total phosphorus and TSS was updated in 2005. Total phosphorus and TSS limits have been included in the proposed permit to comply with the TMDL requirements.
Low Flow[6]:	1Q10 = 190 cfs (123 mgd); 7Q10 = 202 cfs (131 mgd) 1B3 = 218 cfs (141 mgd); 30B3 = 257 cfs (166 mgd)

[6] Data from the USGS gage near Kimberly, ID [station #13090000, river mile 617.5]


Outfall 001
Dewatered Biosolids
Holding Area
Wells (typ.)
Sewer Main
Sewage Disposal
Fish Farm
Golf Course
Well
Gaging Station
Warm Spring
Blue Lakes
Aquaduct
Perrine Coulee Falls
Federation Lookout
Warm Creek
Springs
Rapids
JEROME CO
TWIN FALLS CO
4200 NORTH ROAD
1/4 Mi
1 Mile
Centennial Waterfront Park
PIPELINE

Appendix B -- Basis for Effluent Limitations

The Clean Water Act (CWA) requires Publicly Owned Treatment Works (POTWs) to meet effluent limits based on available wastewater treatment technology. These types of effluent limits are called secondary treatment effluent limits. EPA may find, by analyzing the effect of an effluent discharge on the receiving water, that secondary treatment effluent limits are not sufficiently stringent to meet water quality standards. In such cases, EPA is required to develop more stringent water quality-based effluent limits, which are designed to ensure that the water quality standards of the receiving water are met.

Secondary treatment effluent limits may not limit every parameter that is in an effluent. For example, secondary treatment effluent limits for POTWs have only been developed for five-day biochemical oxygen demand (BOD_5), total suspended solids (TSS), and pH, yet effluent from a POTW may contain other pollutants, such as bacteria, chlorine, ammonia, nutrients, or metals, depending on the type of treatment system used and the quality of the influent from the service area of the POTW (i.e., industrial facilities as well as residential areas discharge into the POTW). When technology-based effluent limits do not exist for a particular pollutant expected to be in the effluent, EPA must determine if the pollutant may cause or contribute to an exceedance of the water quality standards for the receiving water body. If a pollutant may cause or contribute to an exceedance of a water quality standard, water quality-based effluent limits for the pollutant must be incorporated into the permit.

The following discussion explains in more detail the derivation of technology-based effluent limits and water quality based effluent limits. Part A discusses technology-based effluent limits, Part B discusses water quality-based effluent limits, and Part C discusses facility specific limits.

I. Technology-Based Effluent Limits

A. BOD_5, TSS and pH

Secondary Treatment:

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," that all POTWs were required to meet by July 1, 1977. EPA developed "secondary treatment" regulations, which are specified in 40 CFR Part 133. These technology-based effluent limits apply to all municipal wastewater treatment plants and identify the minimum level of effluent quality attainable by secondary treatment in terms of BOD_5, TSS, and pH.

Table B-1 below lists the technology based effluent limits:

Table B-1 Secondary Treatment Effluent Limits			
Parameter	**Average Monthly Limit**	**Average Weekly Limit**	**Range**
BOD_5	30 mg/L	45 mg/L	---
TSS	30 mg/L	45 mg/L	---
Removal Rates for BOD_5 and TSS	85% (minimum)	---	---
pH	---	---	6.0 - 9.0 s.u.

The past five years of monitoring data were examined to determine if any modifications in effluent limits for BOD_5 and TSS (such as treatment equivalent to secondary limits or reduced percent removal requirements) were warranted. We determined that the facility has been achieving secondary treatment limits, and so the secondary treatment limits were retained in the draft permit.

2. Mass-based Limits

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

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

Since the design flow for this facility is 8.56 mgd, the mass limits for BOD_5 and TSS are calculated as follows:

Average Monthly Limit = 30 mg/L × 8.56 mgd × 8.34 = 2,142 lbs/day

Average Weekly Limit = 45 mg/L × 8.56 mgd × 8.34 = 3,213 lbs/day

II. Water Quality-Based Effluent Limits

A. Statutory Basis for Water Quality-Based Limits

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. Discharges to state/tribal waters must also comply with limitations imposed by the state/tribe as part of its certification of NPDES permits under Section 401 of the CWA.

The NPDES regulation 40 CFR §122.44(d)(1), implementing Section 301 (b)(1)(C) of the

CWA, requires that permits include limits for all pollutants or parameters which are or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any state/tribal water quality standard, including state/tribal narrative criteria for water quality.

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

B. Evaluating the Need for Water-quality Based Limits

When evaluating the effluent to determine if water quality-based effluent limits based on chemical specific numeric criteria are needed, a projection of the receiving water concentration downstream of where the effluent enters the receiving water for each pollutant of concern is made. The chemical-specific concentration of the effluent and receiving water and, if appropriate, the dilution available from the receiving water are factors used to project the receiving water concentration. If the projected concentration of the receiving water exceeds the numeric criterion for a limited parameter, then there is a reasonable potential that the discharge may cause or contribute to an excursion above the applicable water quality standard, and a water quality-based effluent limit is required.

Sometimes it is appropriate to allow a volume of receiving water to provide dilution of the effluent; these volumes are called mixing zones. Mixing zone allowances will increase the allowable mass loadings of the pollutant to the water body and decrease treatment requirements. Mixing zones can be used only when there is adequate receiving water flow volume and the concentration of the pollutant of concern in the receiving water is below the numeric criterion necessary to protect the designated uses of the water body. Mixing zones must be authorized by the State. IDEQ has indicated in its pre-certification of this permit that it would authorize a 25% mixing zone for ammonia, cyanide, silver, arsenic, zinc and nitrate-nitrogen.

Toxicity of some metals (e.g., zinc, silver) is dependent on the hardness of the receiving water. The toxicity of these metals increases with lower hardness. The *Technical Support Document for Water Quality-based Toxics Control* (EPA 1991) (TSD) recommends using the 5^{th} percentile of the ambient water hardness when conducting reasonable potential analyses of hardness-dependent metals. Hardness data were available from the USGS gage near Kimberly, ID (station #13090000, river mile 617.5). The 5^{th} percentile of these data was 190 mg/L hardness, and this value was used in the reasonable potential analyses. We used metals effluent data gathered under the pretreatment requirements during the last permit cycle. These data are summarized in Table 4, above.

Based on the data submitted in the permit application, as well as DMR and other monitoring data available for the Twin Falls facility, EPA determined that it was necessary to evaluate the reasonable potential to exceed water quality standards for ammonia, arsenic, cyanide, silver, and zinc. That analysis is presented in Appendix C. The standards used in that analysis are discussed below.

C. Applicable Water Quality Standards

1. Ammonia

Ammonia criteria are set for protection of aquatic life; there are no criteria to protect human health. Ammonia toxicity rises with higher pH and temperature; reasonable potential analyses were conducted for both summer months (May through September), when the temperatures are higher, and winter (October through April), when the temperatures are lower. Because there were insufficient ambient data to calculate distributions of the ambient temperature and pH, the highest upstream summer (19.5º C, recorded June 21, 2000) and winter temperatures (10.0 º C, recorded April 2, 2003) from the ambient monitoring data were used in the reasonable potential analyses. In addition, the highest pH (8.6, recorded May 24, 2001, for summer; 8.6, recorded April 2, 2003 for winter) from the ambient monitoring data were also used, because higher pH values result in more stringent standards.

a. Summer ammonia standards

(1) *Acute ammonia standard at pH = 8.6:*

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

$$= 1.77 \text{ mg N/L}$$

(2) *Chronic ammonia standard at pH = 8.6 and T = 19.5º C:*

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

$$= 0.66 \text{ mg N/L}$$

b. Winter ammonia standards:

(1) *Acute ammonia standard at pH = 8.6:*

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

$$= 1.77 \text{ mg N/L}$$

(2) *Chronic ammonia standard at pH = 8.6 and T = 10.0º C:*

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

$$= 7.25 \text{ mg N/L}$$

2. Chlorine

Chlorine has a chronic aquatic life criterion of 19 μg/L and an acute aquatic life criterion 11 μg/L.

3. Arsenic

Arsenic has a chronic aquatic life criterion of 150 μg/L and acute aquatic life criterion of 340 μg/L and a human health criteria of 50 μg/L (inorganic form only), none of which is dependent on hardness. Since the human health criterion is the most stringent, reasonable potential analyses were run using the human health criteria.

4. Cyanide

Cyanide has both a chronic aquatic life criterion (5.2 μg/L (weak acid dissociable)) and acute aquatic life criterion (22 μg/L (weak acid dissociable)) and a human health criteria (140 μg/L), none of which is dependent on hardness. Since the chronic aquatic life criterion is the most stringent, reasonable potential analyses were run using that criterion.

5. Silver

Silver has only an acute aquatic life criterion; it is dependent on hardness.

At hardness = 190 mg/L and WER =1.0,

$$\textit{Acute silver standard} = WER \times e^{\{1.72[\ln(\text{hardness})]-6.52\}} \times 0.85$$

$$= 10.40 \text{ μg/L}$$

6. Zinc

At hardness = 190 mg/L and WER =1.0:

a. *Acute zinc standard*

$$= WER \times [e^{\{[0.8473\times [\ln(\text{hardness})]+0.884\}}] \times 0.978$$
$$= 201.9\ \mu g/L$$

b. *Chronic zinc standard*

$$= WER \times [e^{\{0.8473\times[\ln(\text{hardness})]+0.884\}}] \times 0.986$$
$$= 203.5\ \mu g/L$$

D. Development of Water-quality based Permit Limits

1. Wasteload Allocation Development

If EPA determines that a water quality-based limit is required for a pollutant, the first step in calculating a permit limit is development of a wasteload allocation (WLA) for the pollutant. A WLA is the concentration (or loading) of a pollutant that the permittee may discharge without causing or contributing to an exceedance of WQS in the receiving water. The WLAs were calculated based on meeting water quality criteria at "end-of-pipe" for *E. coli* and pH.

a. "End-of-Pipe" WLAs

In cases where there is no dilution available, either because the receiving water exceeds the criteria or because the state does not to authorize a mixing zone for a particular pollutant. When there is no dilution, the criterion becomes the WLA. Establishing the criterion as the WLA ensures that the permittee does not contribute to an exceedance of the criterion. The acute and chronic criteria must be converted to long-term averages (LTAs) and compared to determine which one is more stringent. The more stringent LTA is then used to develop permit limits.

b. WLAs in Total Maximum Daily Loads (TMDLs)

The State assigned WLAs in the Upper Snake Rock TMDL for the City of Twin Falls for total suspended solids (tons/year) and total phosphorus (lbs/day).

2. Permit Limit Derivation

Once the WLA has been developed, EPA applies the statistical permit limit derivation approach described in Chapter 5 of the TSD to obtain daily maximum and monthly average permit limits. This approach takes into account effluent variability (using the

CV), sampling frequency, and the difference in time frames between the monthly average and daily maximum limits.

The daily maximum limit is based on the CV of the data and the probability basis, while the monthly average limit is dependent on these two variables and the monitoring frequency. As recommended in the TSD, EPA used a probability basis of 95 percent for monthly average limit calculation and 99 percent for the daily maximum limit calculation. As with the reasonable potential calculation, when there were not enough data to calculate a CV, EPA assumes a CV of 0.6 for both monthly average, weekly average, and daily maximum calculations.

3. Specific Water Quality-Based Effluent Limits

a. Toxic Substances

The Idaho Water Quality Standards (IDAPA 58.01.02.200.02) require surface waters of the State to be free from toxic substances in concentrations that impair designated uses. Reasonable potential analyses were conducted for a number of toxic substances, including ammonia, arsenic, cyanide, silver, and zinc. None of these showed a reasonable potential to violate water quality standards, based on past effluent data.

(1) Total Residual Chlorine

There was no chlorine data to analyze, so no reasonable potential calculation was possible. Because the facility may use chlorine only infrequently as a back-up if its UV disinfection is off-line for an extended period of time, we have continued the water-quality-based total residual chlorine limits of 0.012 mg/l AML and 0.033 mg/l MDL from the previous permit. In this permit, they will only apply to the effluent during periods of chlorination, during which the City will be required to monitor its effluent for total residual chlorine.

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

Chlorine Maximum Daily Limit

$$0.033 \text{ mg/L} \times 8.56 \text{ mgd} \times 8.34 = 2.36 \text{ lbs/day}$$

Chlorine Average Monthly Limit

$$0.012 \text{ mg/L} \times 8.56 \text{ mgd} \times 8.34 = 0.86 \text{ lbs/day}$$

(2) Ammonia

IDEQ has developed water quality criteria to protect aquatic life against short term and long term adverse impacts from ammonia. Reasonable potential analyses were conducted for ammonia for both the summer months (May – September) and the winter months (October - April), and it was found that more stringent limits did not need to be developed. For additional information on this reasonable potential analysis, see Appendix C. Under anti-backsliding requirements of CWA §401(o), the previous limits in the permit must be retained.

(3) Metals

IDEQ has established numeric criteria for toxic substances, including metals, under IDAPA 58.010.02.210.01. Because of the number of positive data points from effluent monitoring for arsenic, cyanide, silver, and zinc in the previous permit cycle, we conducted reasonable potential analyses for these parameters. None of them were found to have a reasonable potential to violate water quality standards. See Appendix C for details.

b. Floating, Suspended or Submerged Matter/Oil and Grease

The Idaho Water Quality Standards (IDAPA 58.01.02.200.05) 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. A narrative condition is proposed for the draft permit that states there must be no discharge of floating solids or visible foam or oil and grease other than trace amounts.

c. Sediment/Total Suspended Solids (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 Twin Falls of 146.4 tons/year of TSS (mean annual load).

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 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 pollutant, EPA believes that using the WLA as a long term annual average (LTA) is appropriate.

The NPDES regulations at 40 CFR §122.45(d) require that permit limits for publicly owned treatment works (POTWs) be expressed as average monthly limits (AMLs) and average weekly limits (AWLs), unless impracticable. The WLA must be statistically converted to average monthly and average weekly permit limits.

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, are 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.

Calculating the Average Monthly Limit

The WLA in the TMDL is 146.4 tons per year.

146.4 tons/year × 2000 lbs/ton ÷ 365 days/year = 802 lbs/day (annual average)

Assume LTA = 802 lbs/day:

$AML = LTA \times \exp[z\sigma_n - 0.5\sigma_n^2]$ *(from Table 5-2 of the TSD)*

Where:

CV = coefficient of variation = 0.51 (based on facility data from May 2003 – May 2008)

n = 16 (number of samples in a month)

σ_{16}^2 = $\ln(CV^2/n + 1) = \ln(0.51^2/16 + 1) = 0.016$

σ_{16} = 0.127

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

$AML = 802 \times \exp[(1.645 \times 0.127) - (0.5 \times 0.016)]$

AML = 980 lbs/day

Calculating the Average Weekly Limit

The AWL is calculated by multiplying the AML by the following relationship (from Table 5-3 of the TSD):

$$AWL = \frac{\exp[Z_m\, \sigma_4 - .5\sigma_4^2]}{\exp[Z_a\, \sigma_{16} - .5\sigma_{16}^2]} \times AML$$

Where:

CV = coefficient of variation = 0.51 (based on facility data from May 2003 – May 2008)

σ_4^2 = $\ln(CV^2/n + 1) = \ln(0.51^2/4 + 1) = 0.063$

σ_4 = 0.251
Z_m = percentile exceedance probability for AWL (99%) = 2.326
Z_a = percentile exceedance probability for AML (95%) = 1.645

$$AWL = \frac{\exp[(2.326 \times 0.251) - (0.5 \times 0.063)]}{\exp[(1.645 \times 0.127) - (0.5 \times 0.016)]} \times 980$$

AWL = 1392 lbs/day ~ 1,390 lbs/day

These water quality based loading limits are compared with the technology based effluent limits in Table B-2, below

Table B-2
Comparison of Technology-based and Water quality-based Limits for TSS

Parameter	**Average Monthly Limit**	**Average Weekly Limit**
Technology-based	2,142 lbs/day	3,213 lbs/day
Water quality-based	980 lbs/day	1,390 lbs/day
Most stringent	**980 lbs/day**	**1,390 lbs/day**

The water quality-based mass limits are selected and applied in the draft permit as the final effluent limits. The concentration-based technology-based standards are retained; the facility must meet both. If it is discharging at flows that approach or exceed the design flow rate of 8.56, the mass based limit will be more stringent and limiting.

The TSS effluent data from 2003 -- 2008 were examined to see if the historical performance indicated that it could meet the more stringent water-quality based mass limits; it was determined that the facility could not consistently meet the proposed limits. The 95^{th} percentile of the data was 32.4 mg/l, considerably above the 13.5 mg/l needed to meet the monthly average mass limit at the design flow or 20. 2 mg/l needed to meet the weekly average mass limit.

Idaho regulations at IDAPA 58.01.400.03 allow for a compliance schedule the first time a water quality based limitation is applied in a discharge permit. IDEQ has indicated that it intends to certify a schedule for the City to upgrade its facility to meet the more stringent water quality based limits. In the meantime, the secondary treatment, technology based standards of 30 mg/l monthly average and 45 mg/l weekly average and the technology-based mass limits of 2,142 lbs/day monthly average and 3213 lbs/day weekly average will assure that water quality in the Snake River does not deteriorate from the current condition.

d. pH

The Idaho Water Quality Standards (IDAPA 58.01.02.250.01.a) require surface waters of the State to have a pH value within the range of 6.5 - 9.5 standard units. IDEQ will not authorize a mixing zone for the water quality-based criterion for pH. Therefore, this criterion must be met when the effluent is discharged to the receiving water. The technology-based effluent limits for pH are 6.0 - 9.0 standard units. To ensure that both water quality-based requirements and technology-based requirements are met, the draft permit incorporates the more stringent lower limit of the water quality standards (6.5 standard units) and the more stringent upper limit of the technology-based limits (9.0 standard units).

e. *Escherichia coli* (*E. coli*) Bacteria

The Snake River at Twin Falls is designated for primary contact recreation. EPA policy requires that the criteria for bacteria must be met as the effluent is discharged to the receiving water if the facility discharges to waters designated for primary contact recreation. 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 as a geometric mean 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 for primary contact recreation a single water sample that exceeds 406 organisms/100 ml indicates a likely exceedance of the geometric mean criterion, although it is not, in and of itself, a violation of water quality standards. (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 (EPA, 1991). Because a single sample value exceeding 406 organisms/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/100 ml, in addition to a monthly geometric mean limit of 126 organisms/100 ml, which directly applies the water quality criterion for *E. coli* to the discharge at the end of pipe. 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. Except when all of the values in that data set are equal, 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.

f. Excess Nutrients

The Idaho state water quality standards require surface waters of the State be free from excess nutrients that can cause visible slime growths or other nuisance aquatic growths impairing designated beneficial uses.

(1) Total phosphorus

A TMDL for total phosphorus was modified and approved by EPA in 2005. The wasteload allocation of 710 pounds/day was incorporated in the previous permit as the average monthly limit (AML). A maximum daily limit of 1400 pounds/day had originally been derived from the AML and was proposed in the last permit cycle; in response to comments, that limit was changed to an average weekly limit and included in that permit.

Under best professional judgment, we decided that we should use a CV based on more current data and recalculate the average weekly limit directly from the average monthly limit. Using the total phosphorus effluent data from May 2003 to May 2008, we calculated a CV of 0.24.

The AWL is calculated by multiplying the AML by the following relationship (from Table 5-3 of the TSD):

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

Where:

CV = 0.24

n = 4 (ratio of number of samples in a month to the number of samples in a week)

σ_4^2 = $\ln(CV^2/n + 1) = \ln(0.24^2/4 + 1) = 0.014$

σ_4 = 0.120

σ^2 = $\ln(CV^2 + 1) = \ln(0.24^2 + 1) = 0.056$

σ = 0.237

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

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

$$AWL = \frac{\exp[(2.326 \times 0.237) - (0.5 \times 0.056)]}{\exp[(1.645 \times 0.120) - (0.5 \times 0.014)]} \times 710$$

$$AWL = 1.395 \times 710$$

AWL = 991 lbs/day ~ 990 lbs/day *(rounded to two significant digits as the 710 lbs/day AML had been rounded from 707 lbs/day, originally calculated as the WLA for City of Twin Falls)*

(2) Nitrogen

In the last permit cycle, the City collected effluent data weekly on nitrate and total Kjeldahl nitrogen. The State has no water quality criteria for these pollutants except a reference under agricultural uses to EPA's "Water Quality Criteria 1972. Using the standard for livestock watering of 100 mg/l as a chronic standard, we evaluated reasonable potential to exceed this standard and found that this discharge is not likely to exceed it.

Appendix C -- Reasonable Potential Calculation

I. Analysis Factors

A. Effluent Flow

The effluent flow used in the equation is the design flow of the facility: 8.56 mgd (13.2 cfs).

B. Upstream (Ambient) Concentration

The ambient concentration in the mass balance equation is based on a reasonable worst-case estimate of the pollutant concentration upstream from the discharge. For criteria that are expressed as maxima, such as ammonia, the 95^{th} percentile of the ambient data is generally used as an estimate of worst-case. Limited monitoring data for ambient ammonia concentrations was available from the ambient surface water monitoring conducted by the facility (see Table 5, above, for a summary of these data). Because of the limited amount of data, the highest ambient ammonia concentration observed during the ambient surface water monitoring (0.068 mg/L ammonia in 2004) was used in the reasonable potential analysis.

It was assumed that ambient concentrations of metals were zero.

C. Upstream Flow

In accordance with Idaho's water quality standards, a mixing zone of 25 percent of the volume of the stream flow is proposed for this permit.

The 1Q10, 7Q10, 1B3, and 30B3 flows from the USGS gage near Kimberly, Idaho, (station #13090000, river mile 617.5) were calculated based on the 1987—2007 time period. Although the historical data are available from 1925, the flow regime has tended toward lower flows in recent decades. These trends are impacted strongly by reservoir operations upstream, which control releases to this stretch of the Snake River; long-term climate trends may also be a factor. Based on our examination of the historical record and these factors, under best professional judgment, we calculated the critical low flows based on a 20 year record; we reasoned that the more recent record was more representative of future conditions than was the whole of the 80+ year record.

Using EPA's D-flow program, we calculated the 1Q10 at 190 cfs and the 7Q10 at 202 cfs. Based on the above standards, twenty five percent of these flows (47.5 and 50.5 cfs, respectively) were used in the mass balance equations for metals and cyanide to determine whether there was reasonable potential to cause exceedances of the acute and chronic criteria.

<u>Ammonia Low Flows</u>

Because the state chronic water quality criteria for ammonia is based on a 30 day average concentration not to be exceeded more than once every three years, the critical low flow that is used for the ammonia chronic calculation is the 30B3, which was calculated at 257 cfs for both the summer (May – September) and winter (October – April) parts of the year. For acute, the 1B3 flow is needed; it was calculated at 218 cfs for both parts of the year.

Mixing Zone

In accordance with state water quality standards, only IDEQ may authorize mixing zones. IDEQ has authorized a mixing zone of 25% for ammonia, cyanide, silver, arsenic, zinc and nitrate-nitrogen in its pre-certification of the permit.

II. Pollutant Specific Calculations

The calculations performed to obtain the predicted downstream concentrations for each pollutant are shown below.

A. Ammonia

1. Summer Ammonia

In the summer months, the maximum reported effluent value out of 112 available measurements was **1.69 mg/L ammonia** (reported 9/18/05). The coefficient of variation (CV) from the summer ammonia monitoring data was 0.99.

Reasonable Potential Multiplier

The "reasonable potential" multiplier is based on the coefficient of variation (CV) of the data and the number of data points. Where there are fewer than 10 data points to calculate a CV, the TSD recommends using 0.6 as a default value. Using the equations in § 3.3.2 of the TSD, the "reasonable potential" multiplier (RPM) is calculated as follows:

$$p_n = (1 - confidence\ level)^{1/n}$$

where,

p_n = the percentile represented by the highest concentration
n = the number of samples

This means that the largest value in the data set of *n* data points is greater than the p_n^{th} percentile.

Confidence level = 99% = 0.99

The summer data set contains 112 ammonia effluent samples; therefore:

$$p_{112} = (1-0.99)^{1/112}$$
$$p_{112} = 0.960$$

This means that we can say, with 99% confidence that the maximum reported effluent ammonia concentration in the summer (based on 112 samples) is greater than the 96th percentile.

The reasonable potential multiplier (RPM) is the ratio of the 99th percentile concentration (at the 99% confidence level) to the maximum reported effluent concentration. This is calculated as follows:

$$RPM = C_{.99}/C_{.960} \qquad \text{(Equation C-1)}$$

Where,

$C_n = \exp(z_n\sigma - 0.5\sigma^2)$

Where,

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

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

CV = coefficient of variation = standard deviation ÷ mean

For the summer ammonia dataset, the following calculations were made:

Given:

Standard Deviation	=	0.226
Mean:	=	0.227
CV	=	0.994

Then:

$\sigma^2 = \ln[(CV^2+1] = 0.687$

$\sigma = \sqrt{\sigma^2} = 0.829$

$z_{0.99} = 2.33$ for the 99th percentile[7]

$z_{0.96} = 1.75$ for the 96th percentile (from z-table)

$C_n = \exp(z_n\sigma - 0.5\sigma^2)$

$C_{99} = \exp([2.33 \times 0.829] - [0.5 \times 0.687]) = 4.89$

$C_{0.96} = \exp([1.75 \times 0.829] - [0.5 \times 0.687]) = 3.03$

$RPM = C_{0.99}/C_{0.96} = 4.89/3.03$ (Equation C-1)

RPM = 1.61

The maximum projected effluent concentration (C_e) is estimated by applying the reasonable potential multiplier (RPM) to the maximum reported effluent concentration.

For summer ammonia dataset, this is calculated as follows:

C_e = RPM × Maximum Reported Effluent Concentration

$C_e = 1.61 \times 1.69$ mg/L

C_e = 2.7 mg/L

---

[7] z = the inverse of the normal cumulative distribution function at a given percentile

Chronic Summer Ammonia

For the chronic mixing zone, the maximum expected receiving water concentration C_d is determined using the following mass balance equation:

$$C_d * Q_d = (C_e \times Q_e) + (C_u \times Q_u) \qquad \text{(Equation C-2)}$$

or

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

where,

C_d = receiving water concentration downstream of the effluent discharge
C_e = maximum projected effluent concentration
= 2,700 µg/L for summer ammonia
Q_e = maximum effluent flow
= 8.56 mgd
C_u = upstream concentration of pollutant
= 68 µg/L
Q_u = upstream flow (30B3)
= 257 cfs (or 166 mgd)

When a mixing zone (%MZ) is allowed, the mass balance equation becomes:

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

A mixing zone of 25% of the Middle Snake River flow was assumed, therefore the equation is:

.

$$C_d = \frac{(2{,}700\ \mu g/L \times 8.56\ mgd) + (68\ \mu g/L \times (166\ mgd \times 0.25))}{8.56\ mgd + (166\ mgd \times 0.25)}$$

C_d = 518 µg/L *(highest projected summer concentration of ammonia at the edge of the chronic mixing zone)*

Acute Summer Ammonia

For the **acute mixing zone**, the maximum expected receiving water concentration C_d is determined using the same mass balance equation:

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

where

Q_u = upstream flow (1B3)

= 218 cfs (or 141 mgd)

$$C_d = \frac{(2{,}700\ \mu g/L \times 8.56\ mgd) + (68\ \mu g/L \times (141\ mgd \times 0.25))}{8.56\ mgd + (141\ mgd \times 0.25)}$$

C_d = 582 µg/L *(highest projected summer concentration of ammonia at the edge of the acute mixing zone)*

2. Winter Ammonia

In the winter months, the maximum reported effluent value out of 152 available measurements was 5.02 mg/L ammonia (reported 1/8/06). The CV from the winter ammonia monitoring data was 1.665.

The winter ammonia data set contains 152 individual samples; therefore:

$p_{152} = (1\text{-}0.99)^{1/152}$

$p_{152} = 0.9701$

CV = 1.665

$\sigma^2 = \ln(CV^2 + 1) = 1.33$

$\sigma = \sqrt{\sigma^2} = 1.15$

$z_{.99}$ = 2.33 for the 99th percentile

$z_{0.9701}$ = 1.88 for the 97.01st percentile (from z-table)

$C_n = \exp(z_n\sigma - 0.5\sigma^2)$

$C_{0.99} = \exp([2.33 \times 1.15] - [0.5 \times 1.33]) = 7.50$

$C_{0.97} = \exp([1.88 \times 1.15] - [0.5 \times 1.33]) = 4.47$

$RPM = C_{0.99}/C_{0.97} = 7.50/4.47$ (Equation C-1)

RPM = 1.68

C_e = RPM × Maximum Reported Effluent Concentration

C_e = 1.68 × 5.02 mg/L

C_e = 8.4 mg/L

Chronic Winter Ammonia

For the **chronic mixing zone**, the maximum expected receiving water concentration C_d is determined using the following mass balance equation:

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

Where:

C_e = 8,400 µg/L
Q_e = 8.56 mgd
C_u = 68 µg/L
Q_u = 30B3 upstream flow
= 257 cfs (or 166 mgd)
%MZ = 0.25

The resulting maximum projected downstream concentration is:

$$C_d = \frac{(8400 \times 8.56) + (68 \times (166 \times .25))}{8.56 + (166 \times .25)}$$

C_d = 1493 µg/L *(highest projected winter concentration of ammonia at the edge of the chronic mixing zone)*

Acute Winter Ammonia

For the **acute mixing zone**, the maximum expected receiving water concentration C_d is determined using the same mass balance equation:

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

Where:

C_e = 8,400 µg/L
Q_e = 8.56 mgd
C_u = 68 µg/L
Q_u = upstream flow (1B3)
= 218 cfs (or 141 mgd)
%MZ = 0.25

The resulting maximum projected downstream concentration is:

$$C_d = \frac{(8400 \times 8.56) + (68 \times (141 \times .25))}{8.56 + (141 \times .25)}$$

C_d = 1,695 µg/L *(highest projected winter concentration of ammonia at the edge of the acute mixing zone)*

B. Cyanide

Out of 30 available data points of cyanide in the effluent, the maximum concentration reported in the effluent was 6 µg/L. Because there were only six data points above the detection level, we used the default CV of 0.6, which is recommended in the TSD.

The data set contains 30 cyanide effluent samples; therefore:

$$p_{30} = (1\text{-}0.99)^{1/30}$$

$$p_{30} = 0.8577$$

where:

CV = 0.6

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

$\sigma = \sqrt{\sigma^2} = 0.555$

$z_{.99} = 2.33$ for the 99th percentile

$z_{0.8577} = 1.07$ for the 85.77 percentile (from z-table)

$C_n = \exp(z_n\sigma - 0.5\sigma^2)$

$C_{0.99} = \exp(2.33 \times .555 - 0.5 \times 0.307) = 3.12$

$C_{0.8577} = \exp(1.07 \times .555 - 0.5 \times 0.307) = 1.55$

$$RPM = C_{0.99}/C_{0.8577} = 3.12/1.55 \qquad \text{(Equation C-1)}$$

$$\boldsymbol{RPM = 2.01}$$

C_e = RPM × Maximum Reported Effluent Concentration

$C_e = 2.01 \times 6$ µg/L

C_e = 12 µg/L

Chronic Cyanide

For the **chronic mixing zone**, the maximum expected receiving water concentration C_d is determined using the following mass balance equation:

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

Where:

C_e = 12 µg/L

Q_e = 8.56 mgd

C_u = 0 µg/L

Q_u = upstream flow (7Q10)

= 202 cfs (or 131 mgd)

%MZ = 0.25

The resulting maximum projected downstream concentration in the chronic mixing zone is:

$$C_d = \frac{(12 \times 8.56) + (0 \times (131 \times .25))}{8.56 + (131 \times 0.25)}$$

C_d = 2.5 µg/L *(highest projected concentration of cyanide at the edge of the chronic mixing zone)*

Acute Cyanide

For the **acute mixing zone**, the maximum expected receiving water concentration C_d is determined using the same mass balance equation.

C_e = 12 µg/L
Q_e = 8.56 mgd
C_u = 0 µg/L
Q_u = 190 cfs (or 123 mgd)
%MZ = 0.25

The resulting maximum projected downstream concentration in the acute mixing zone is:

$$C_d = \frac{(12 \times 8.56) + (0 \times (123 \times 0.25))}{8.56 + (123 \times 0.25)}$$

C_d = 2.6 µg/L *(highest projected concentration of cyanide at the edge of the acute mixing zone)*

C. Silver

Out of 30 available measurements of silver in the effluent, the maximum concentration reported in the effluent was 10 µg/L (reported in April 2004). The CV from the silver monitoring data was 0.258.

The data set contains 30 silver effluent samples; therefore:

$p_{30} = (1-0.99)^{1/30}$
$p_{30} = 0.8577$

CV = 0.258
$\sigma^2 = \ln(CV^2 + 1) = 0.064$
$\sigma = \sqrt{\sigma^2} = 0.254$
$z_{.99} = 2.33$ for the 99th percentile
$z_{0.8577} = 1.467$ for the 85.77 percentile (from z-table)

$C_n = \exp(z_n\sigma - 0.5\sigma^2)$

$C_{0.99}$ = exp (2.33 × 0.254- 0.5 × 0.064) = 1.75
$C_{0.8577}$ = exp (1.07 × 0.254- 0.5 × 0.064) = 1.27

$RPM = C_{0.99}/C_{0.8577} = 1.75/1.27$ (Equation C-1)
RPM = 1.38

C_e = RPM × Maximum Reported Effluent Concentration
C_e = 1.38× 10 µg/L
C_e = 14 µg/L

Chronic Silver

There is no chronic criterion for silver.

Acute Silver

For the **acute mixing zone**, the maximum expected receiving water concentration C_d is determined using the following mass balance equation:

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

Where:

C_e = 12 µg/L
Q_e = 8.56 mgd
C_u = 0 µg/L
Q_u = 190 cfs (or 123 mgd)
%MZ = 0.25

The resulting maximum projected downstream concentration in the acute mixing zone is:

$$C_d = \frac{(14 \times 8.56) + (0 \times (123 \times 0.25))}{8.56 + (123 \times 0.25)}$$

C_d = 3.0 µg/L *(highest projected concentration of silver at the edge of the acute mixing zone)*

D. Arsenic

Out of 30 available measurements of arsenic in the effluent, the maximum concentration reported in the effluent was 9 µg/L (reported in October 2004 and April 2007). The CV from the arsenic monitoring data was 0.166.

The data set contains 30 arsenic effluent samples; therefore:

$p_{30} = (1\text{-}0.99)^{1/30}$
$p_{30} = 0.8577$

CV = 0.166

$\sigma^2 = \ln(CV^2 + 1) = 0.027$
$\sigma = \sqrt{\sigma^2} = 0.165$
$z_{.99} = 2.33$ for the 99th percentile
$z_{0.8577} = 1.07$ for the 85.77th percentile (from z-table)

$C_n = \exp(z_n\sigma - 0.5\sigma^2)$
$C_{0.99} = \exp(2.33 \times 0.165 - 0.5 \times 0.027) = 1.45$
$C_{0.8577} = \exp(1.07 \times 0.165 - 0.5 \times 0.027) = 1.18$

$RPM = C_{0.99}/C_{0.8577} = 1.45/1.18$ (Equation C-1)
$\boldsymbol{RPM = 1.49}$

C_e = RPM × Maximum Reported Effluent Concentration
C_e = 1.49 × 9 µg/L
C_e = 13 µg/L

Chronic Arsenic

For the **chronic mixing zone**, the maximum expected receiving water concentration C_d is determined using the following mass balance equation:

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

Where:
C_e = 13 µg/L
Q_e = 8.56 mgd
C_u = 0 µg/L
Q_u = upstream flow = 202 cfs (or 131 mgd)
%MZ = 0.25

The resulting maximum projected downstream concentration at the edge of the chronic mixing zone is:

$$C_d = \frac{(13 \times 8.56) + (0 \times (131 \times .25))}{8.56 + (131 \times 0.25)}$$

C_d = 2.7 µg/L *(highest projected concentration of arsenic at the edge of the chronic mixing zone)*

Acute Arsenic

For the **acute mixing zone**, the maximum expected receiving water concentration C_d is determined using the following mass balance equation:

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

Where:

C_e = 13 µg/L
Q_e = 8.56 mgd
C_u = 0 µg/L
Q_u = 190 cfs (or 123 mgd)
%MZ = 0.25

The resulting maximum projected downstream concentration in the acute mixing zone is:

$$C_d = \frac{(13 \times 8.56) + (0 \times (123 \times 0.25))}{8.56 + (123 \times 0.25)}$$

C_d = 2.8 µg/L *(highest projected concentration of arsenic at the edge of the acute mixing zone)*

E. Zinc

Out of 30 available measurements of zinc in the effluent, the maximum concentration reported in the effluent was 60 µg/L (reported in April 2008). The CV from the zinc monitoring data was 0.366.

$p_{30} = (1\text{-}0.99)^{1/30}$
$p_{30} = 0.8577$

CV = 0.366

$\sigma^2 = \ln(CV^2 + 1) = 0.126$
$\sigma = \sqrt{\sigma^2} = 0.354$
$z_{.99} = 2.33$ for the 99th percentile

$z_{0.8577}$ = 1.07 for the 85.77th percentile (from z-table)

$C_n = \exp(z_n\sigma - 0.5\sigma^2)$

$C_{0.99} = \exp(2.33 \times 0.354 - 0.5 \times 0.126) = 2.14$
$C_{0.8577} = \exp(1.07 \times 0.354 - 0.5 \times 0.126) = 1.37$

$RPM = C_{0.99}/C_{0.8577} = 2.14/1.37$ (Equation C-1)
RPM = 1.56

C_e = RPM × Maximum Reported Effluent Concentration
C_e = 1.56× 60 µg/L
C_e = 94 µg/L

Chronic Zinc

For the **chronic mixing zone**, the maximum expected receiving water concentration C_d is determined using the following mass balance equation:

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

Where:
C_e = 94 µg/L
Q_e = 8.56 mgd
C_u = 0 µg/L
Q_u = upstream flow
= 202 cfs (or 131 mgd)
%MZ = 0.25

The resulting maximum projected downstream concentration is:

$$C_d = \frac{(94 \times 8.56) + (0 \times (131 \times .25))}{8.56 + (131 \times 0.25)}$$

C_d = 19 µg/L *(highest projected concentration of zinc at the edge of the chronic mixing zone)*

Acute Zinc

For the **acute mixing zone**, the maximum expected receiving water concentration C_d is determined using the following mass balance equation:

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

Where:

C_e = 94 µg/L
Q_e = 8.56 mgd
C_u = 0 µg/L
Q_u = upstream flow
= 190 cfs (or 123 mgd)
%MZ = 0.25

The resulting maximum projected downstream concentration is:

$$\boldsymbol{C_d} = \frac{(94 \times 8.56) + (0 \times (123 \times 0.25))}{8.56 + (123 \times 0.25)}$$

C_d = 20 µg/L *(highest projected concentration of zinc at the edge of the acute mixing zone)*

F. Nitrate—Nitrogen

Out of 263 available measurements of nitrate-nitrogen in the effluent, the maximum concentration reported in the effluent was 90 mg/L (reported in September 2007). The CV from the nitrate-nitrogen monitoring data was 0.321.

$p_{263} = (1\text{-}0.99)^{1/263}$
$p_{263} = 0.9826$

CV = 0.321

$\sigma^2 = \ln(CV^2 + 1) = 0.098$
$\sigma = \sqrt{\sigma^2} = 0.313$
$z_{.99}$ = 2.33 for the 99th percentile
$z_{0.9826}$ = 2.11 for the 98.26th percentile (from z-table)

$C_n = \exp(z_n\sigma - 0.5\sigma^2)$

$C_{0.99} = \exp(2.33 \times 0.313 - 0.5 \times 0.098) = 1.97$
$C_{0.9826} = \exp(2.11 \times 0.313 - 0.5 \times 0.098) = 1.84$

$RPM = C_{0.99}/C_{0.9826} = 1.97/1.84$ (Equation C-1)
RPM = 1.07

C_e = RPM × Maximum Reported Effluent Concentration
C_e = 1.07× 90 mg/L
C_e = 96 mg/L

Chronic Nitrate-nitrogen

For the **chronic mixing zone**, the maximum expected receiving water concentration C_d is determined using the following mass balance equation:

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

Where:

C_e = 96 mg/L
Q_e = 8.56 mgd
C_u = 1.65 mg/L
Q_u = upstream flow
= 202 cfs (or 131 mgd)
%MZ = 0.25

The resulting maximum projected downstream concentration is:

$$\mathbf{C_d} = \frac{(96 \times 8.56) + (1.65 \times (131 \times .25))}{8.56 + (131 \times 0.25)}$$

C_d = 21 mg/L *(highest projected concentration of nitrate-nitrogen at the edge of the chronic mixing zone)*

G. Evaluation of Reasonable Potential

In Table C-1, below, the highest projected concentrations at the edge of the mixing zone are compared with the most stringent criterion to see if they exceed the criteria. In none of these comparisons does the projected concentration exceed the criterion, so we have determined that there is not a reasonable potential to violate any of the standards evaluated.

Table C-1

Reasonable Potential Calculation

Pollutant	Max. Reported Effluent Concentration (µg/L)	Reasonable Potential Multiplier	Max. Projected Effluent Concentration (µg/L)	Upstream concentration (µg/L)	Highest Projected Downstream Concentration (µg/L)		Most Stringent Criterion (µg/L)[17]	Reasonable Potential to exceed most stringent criterion?
					Acute	Chronic		
Ammonia (summer)[18]	1690	1.61	2700	68	582	518	660	no
Ammonia (winter)[19]	5020	1.68	8400	68	1695	1493	1770	no
Cyanide	6	2.01	12	0	2.6	2.5	5.2	no
Silver	10	1.38	14	0	3.0	--[20]	10.4	no
Arsenic	9	1.49	13	0	2.8	2.7	50	no
Zinc	60	1.56	94	0	20	19	201.9	no
Nitrate-Nitrogen	90,000	1.07	96,000	1650	--	21,000	100,000	no

---

[17] From §II.C in Appendix B, above.
[18] May 1 – September 30
[19] October 1 – April 30
[20] There is no chronic criterion for silver

Appendix D – Upper Snake Rock Watershed Pollutant Trading

1. How to Sell Credits for Pollutant Trading

The city of Twin Falls is authorized under this permit to trade total phosphorus (TP) credits with other eligible facilities, pursuant to the requirements in Idaho's Water Quality Pollutant Trading Guidance 2003; the Upper Snake Rock Watershed Management Plan, Modification, August 2005; and the conditions contained within this permit.

2. Timing of Pollutant Trade

A facility may sell available phosphorus credits (in lbs/day for a specified month) to a downstream facility using the Trade Tracking System operated by the Idaho Clean Water Cooperative to officially record the credit transaction. The seller's effective discharge is increased for that month by adding the credit amount to its reported average monthly phosphorus discharge so that its adjusted discharge is higher. The seller may not sell so many credits that its adjusted average monthly discharge exceeds its average monthly limit.

3. Procedure for Transferring Credits

Credits can only be traded for the calendar month in which the credit was generated (when the seller decreased its discharge of phosphorus below its average monthly limit to establish the amount of the credit). The selling of phosphorus credits affects only the average monthly limit and does not affect the facility's maximum daily phosphorus limit.

4. Reporting Pollutant Trades to EPA and IDEQ

To create a valid transfer of a credit, the authorized buyer and seller must complete a Trade Notification Form, available from the Idaho Clean Water Cooperative. The buyer must submit it to the Cooperative by the last day of the month following the generation of the credit. The Cooperative records the trade in the accounts for the buyer and seller in accordance with the information reported on the Trade Notification Form.

The permittee shall submit to EPA (with copies to IDEQ) a phosphorus-specific discharge monitoring report (DMR) and the Trade Summary Report provided by the Idaho Clean Water Cooperative. The Trade Summary Report will provide (A) the permittee's actual average monthly phosphorus discharge; (B) the total amount of credits (in lbs/day) bought, if any; (C) the total amount of credits (in lbs/day) sold, if any; and (D) the permittee's adjusted discharge, which is equal to A – B + C. The Permittee shall record both (A) and (D) on the DMR.

All DMRs must be submitted in accordance with Section III.B of the permit. The phosphorus-specific DMR which reports a trade provides the actual phosphorus and "adjusted discharge" and must be submitted by the 10th day of the second month following sampling.

If a Trade Notification Form is provided by the buyer and seller but the credits are not available for transfer to the buyer, then the trade is not recorded in the Trade Tracking System and the buyer is subject to noncompliance penalties for any actual discharge over its permit limit. The amount of credits that are available for purchase is not the responsibility of EPA. Compliance with the permittee's effluent limit shall only be affected by credits that have been validly transferred by the last day of the month following the generation of the credit.

5. Recordkeeping System

No trade is valid unless it is recorded through the Trade Tracking System operated by the Idaho Clean Water Cooperative (or alternatively, IDEQ). The Idaho Clean Water Cooperative records all trades and generates a monthly summary report of all trades valid for each calendar month. The Trade Notification Form must be submitted to the Cooperative by the last day of the month following the generation of the credit in order for it to be recorded in the Trade Tracking System in time to be reported in the monthly Trade Summary Report and submitted with DMR postmarked by the 10^{th} of the second month following the generation of the credit.