Fact Sheet

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

**Elk City Water and Sewer Association
P.O. Box 335
Elk City, Idaho 83525**

Public Comment Start Date: February 27, 2014
Public Comment Expiration Date: March 29, 2014

Technical Contact: Daniel Alejandro Haskell
206-553-1587
800-424-4372, ext. 1587 (within Alaska, Idaho, Oregon and Washington)
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The EPA Proposes To Issue NPDES Permit
The EPA proposes to issue the NPDES permit for the facility referenced above. The draft permit places conditions on the discharge of pollutants from the wastewater treatment facility to waters of the United States. In order to ensure protection of water quality and human health, the permit places limits on the types and amounts of pollutants that can be discharged from the facility.

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

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

IDEQ Lewiston Regional Office
1118 "F" Street
Lewiston, ID 83501
(208) 799-4370

Public Comment
Persons wishing to comment on, or request a Public Hearing for the draft permit for this facility may do so in writing by the expiration date of the Public Comment period. A request for a Public Hearing must state the nature of the issues to be raised as well as the requester's name, address and telephone number. All comments and requests for Public Hearings must be in writing and should be submitted to the EPA as described in the Public Comments Section of the attached Public Notice.

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

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

United States Environmental Protection Agency
Region 10
1200 Sixth Avenue, OWW-130
Seattle, Washington 98101
(206) 553-0523 or
Toll Free 1-800-424-4372 (within Alaska, Idaho, Oregon and Washington)

The fact sheet and draft permits are also available at:

EPA Idaho Operations Office
950 W Bannock, Suite 900
Boise, ID 83702
(208) 378-5746

IDEQ Lewiston Regional Office
1118 "F" Street
Lewiston, ID 83501
(208) 799-4370

Acronyms

1Q10	1 day, 10 year low flow
7Q10	7 day, 10 year low flow
30B3	Biologically-based design flow intended to ensure an excursion frequency of less than once every three years, for a 30-day average flow.
30Q10	30 day, 10 year low flow
AML	Average Monthly Limit
AWL	Average Weekly Limit
BOD_5	Biochemical Oxygen Demand, five-day
°C	Degrees Celsius
CFR	Code of Federal Regulations
CFS	Cubic Feet per Second
CV	Coefficient of Variation
CWA	Clean Water Act
DMR	Discharge Monitoring Report
DO	Dissolved Oxygen
EFH	Essential Fish Habitat
The EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FR	Federal Register
HUC	Hydrologic Unit Code
IDEQ	Idaho Department of Environmental Quality
LA	Load Allocation
lbs/day	Pounds per day
LTA	Long Term Average
mg/L	Milligrams per liter
mL	Milliliters
ML	Minimum Level
µg/L	Micrograms per liter
mgd	Million Gallons per day
MDL	Maximum Daily Limit or Method Detection Limit

N	Nitrogen
NOAA	National Oceanic and Atmospheric Administration
NPDES	National Pollutant Discharge Elimination System
OWW	Office of Water and Watersheds
POTW	Publicly Owned Treatment Works
RP	Reasonable Potential
RPM	Reasonable Potential Multiplier
SF CWR	South Fork Clearwater River
SS	Suspended Solids
SSO	Sanitary Sewer Overflow
s.u.	Standard Unit
TKN	Total Kjeldahl Nitrogen
TMDL	Total Maximum Daily Load
TRC	Total Residual Chlorine
TSD	Technical Support Document for Water Quality-based Toxics Control (EPA/505/2-90-001)
TSS	Total Suspended Solids
USFWS	U.S. Fish and Wildlife Service
USGS	United States Geological Survey
UV	Ultraviolet
WLA	Wasteload Allocation
WQBEL	Water Quality-Based Effluent Limit
WQS	Water Quality Standards
WWTF	Wastewater Treatment Facility

I. Applicant

A. General Information

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

Elk City Water and Sewer Association Wastewater Treatment Facility
NPDES Permit # ID-002201-2

Mailing Address:
P.O. Box 335
Elk City, Idaho 83525

Contact:
Tim Chaffee, (208) 842-2315

B. Permit History

The Elk City Water and Sewer Association owns and operates the municipal treatment facility located in Elk City, Idaho (hereinafter referred to as the Elk City WWTF or facility). Their most recent NPDES permit was issued on August 15th 2002, became effective on October 1st 2002**,** and expired on September 30th 2007. The EPA did not receive a permit application for renewal prior to the expiration date of the permit. Because a complete application for renewal was not received in a timely manner, as required under 40 CFR § 122.21(d), the previous permit expired and was not administratively extended. An NPDES application for permit issuance was submitted by the permittee on November 29, 2007.

II. Facility Information

A. Treatment Facility Description

The Elk City Water and Sewer Association own, operate, and maintain the Elk City WWTF located in Elk City, Idaho. The facility serves a resident population of approximately 500. The design flow of the facility is 0.120 mgd. Domestic wastewater from the city and some nearby incorporated areas is collected at the facility through gravity sewer collection systems and resides in the wet well. The alternating pump station automatically pumps the influent from the wet well to the lagoons. Historically, the facility discharges during the non-summer months. During the hotter months of July, August, September, and October there is sufficient natural evaporation to control lagoon levels and prevent discharge. However, the 2002 permit authorized the facility to discharge year round. The facility includes a waste stabilization pond and aeration fans which, are in need of replacement. The effluent is disinfected using total residual chlorine (chlorine or TRC). Thereafter, it is discharged to Elk Creek which leads to the South Fork Clearwater River. The collection system has no combined sewers. A schematic map showing the location of the treatment facility and discharge are included in Appendix A.

B. Outfall Description

The outfall is open ended, and falls approximately 18 inches into a small eddy at the bank of the stream when the water level is between low and normal flow. During periods of high flow, the outfall may become partially submerged.

C. Compliance History

A review of the discharge monitoring reports (DMRs) found that the facility did not meet the effluent limits of the 2002 permit for a number of parameters. A review of the facility's Discharge Monitoring Reports (DMR) in Table 1 compares the reported values from 07/31/07 to 07/31/12 with the previous 2002 Permit limits. In figure 1 the number of exceedances from the 2002 permit are also plotted temporally.

Additionally, the EPA issued a compliance order in March 2010 that requires the facility to comply with the limits in the previous 2002 permit and submit monthly DMRs until a new permit is issued. The EPA also took a penalty action against the facility which culminated in a Consent Agreement and Final Order.

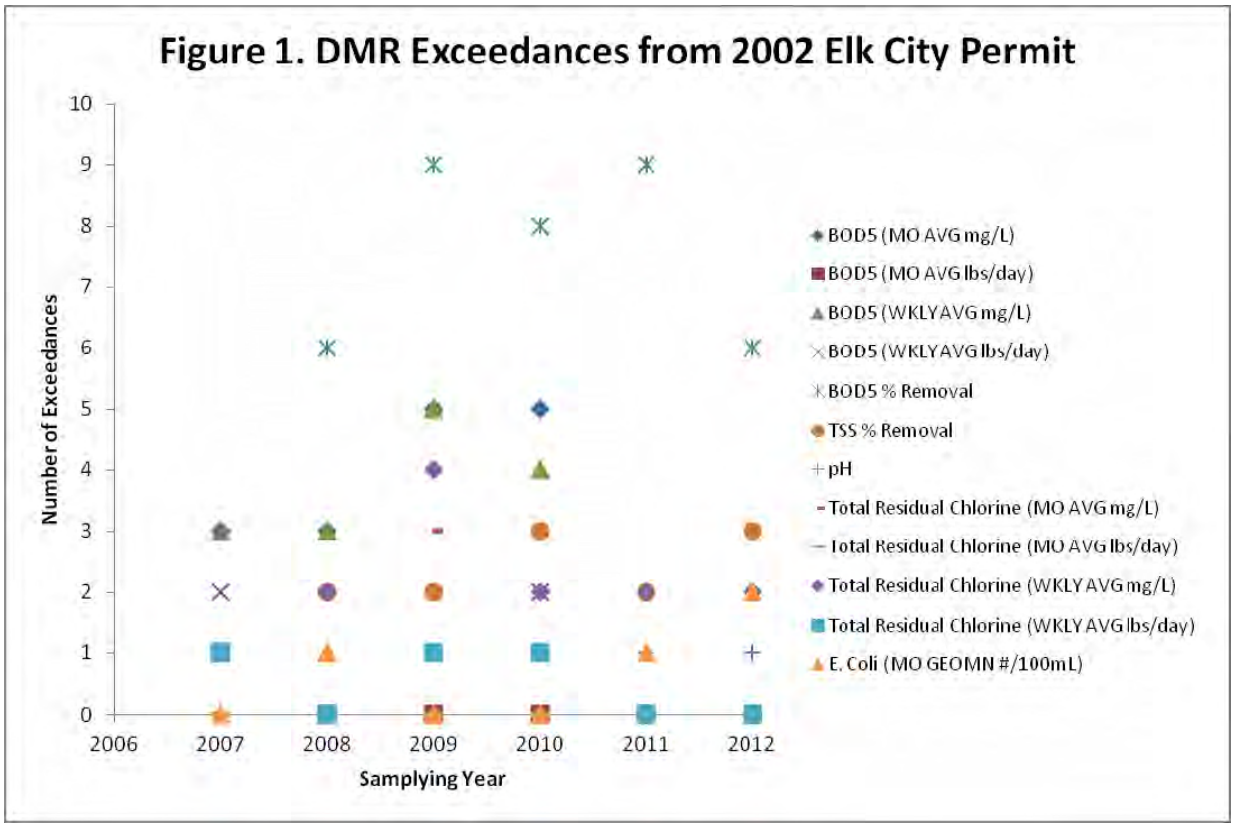
Table 1. Number of Elk City WWTF Effluent Violations from 2007 to 2012 from the Previous 2002 NPDES Permit

Year	Type and Number	
2007	BOD_5 (MO AVG mg/L)	3 exceedances
	BOD_5 (MO AVG lbs/day)	1 exceedance
	BOD_5 (WKLY AVG mg/L)	3 exceedances
	BOD_5 (WKLY AVG lbs/day)	2 exceedances
	BOD_5 Percent Removal	1 exceedance
	TSS Percent Removal	1 exceedances
	pH (standard units)	1 exceedance
	Total Residual Chlorine (MO AVG mg/L)	3 exceedances
	Total Residual Chlorine (WKLY AVG mg/L)	3 exceedance
	Total Residual Chlorine (WKLY AVG lbs/day)	1 exceedance
2008	BOD_5 (MO AVG mg/L)	3 exceedances
	BOD_5 (WKLY AVG mg/L)	3 exceedances
	BOD_5 Percent Removal	6 exceedances
	TSS Percent Removal	2 exceedances
	pH (standard units)	2 exceedances
	E. Coli (MO GEOMN #/100mL)	1 exceedances
	Total Residual Chlorine (MO AVG mg/L)	2 exceedances

Table 1. Number of Elk City WWTF Effluent Violations from 2007 to 2012 from the Previous 2002 NPDES Permit

Year	Type and Number	
	Total Residual Chlorine (WKLY AVG mg/L)	2 exceedances
2009	BOD_5 (MO AVG mg/L)	5 exceedances
	BOD_5 (WKLY AVG mg/L)	5 exceedances
	BOD_5 Percent Removal	9 exceedances
	TSS Percent Removal	2 exceedances
	pH (standard units)	1 exceedances
	Total Residual Chlorine (MO AVG mg/L)	3 exceedances
	Total Residual Chlorine (WKLY AVG mg/L)	4 exceedances
	Total Residual Chlorine (WKLY AVG lbs/day)	1 exceedances
2010	BOD_5 (MO AVG mg/L)	5 exceedances
	BOD_5 (WKLY AVG mg/L)	4 exceedances
	BOD_5 Percent Removal	8 exceedances
	BOD_5 (WKLY AVG lbs/day)	2 exceedances
	TSS Percent Removal	3 exceedances
	pH (standard units)	1 exceedance
	E. Coli (MO GEOMN #/100mL)	2 exceedances
	Total Residual Chlorine (MO AVG mg/L)	2 exceedances
	Total Residual Chlorine (WKLY AVG mg/L)	2 exceedances
	Total Residual Chlorine (WKLY AVG lbs/day)	1 exceedance
2011	BOD_5 Percent Removal	9 exceedances
	TSS Percent Removal	2 exceedances
	pH (standard units)	1 exceedance
	E. Coli (MO GEOMN #/100mL)	1 exceedance
	Total Residual Chlorine (WKLY AVG mg/L)	2 exceedances
2012	BOD_5 (MO AVG mg/L)	2 exceedances
	BOD_5 Percent Removal	6 exceedances
	TSS Percent Removal	3 exceedances
	pH (standard units)	1 exceedance
	E. Coli (MO GEOMN #/100mL)	2 exceedances

Key: MO AVG: Monthly Average, WKLY AVG: Weekly Average, MO GEOMN: Monthly Geometric Mean.



III. Receiving Water

The effluent from the Elk City WWTF is discharged from Outfall 001 to the Elk Creek, at latitude 45° 49' 18" N and longitude 115° 26' 59" W within the Elk City boundaries. Elk Creek begins at the confluence of Big Elk Creek and Little Elk Creek, which are upstream of the facility, and ultimately discharges to the South Fork Clearwater River at an approximate elevation of 6,382 feet in the headwaters of the South Fork Clearwater River watershed.

A. Low Flow Conditions

The low flow conditions of a water body are used to assess the need for and develop water quality based effluent limits. Recent flow data from Elk Creek were not available. Historical data generated by IDEQ is provided in Water Quality Status report No. 74, Elk Creek, Idaho County, Idaho, 1986. Using the information in this report, EPA estimated low flow conditions for Elk Creek. The low flow was estimated to be 1.62 cfs for the 30Q5, 1.13 cfs for the 1Q10, and 1.47 cfs for the 7Q10. See Appendix C of this fact sheet for additional information on generation of the flows.

B. Water Quality Standards

Overview

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

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

Designated Beneficial Uses

This facility discharges to the Elk Creek in the South Fork Clearwater Subbasin (HUC 17060305), Water Body Unit C-56. At the point of discharge, Elk Creek is an undesignated surface water body. The Idaho Water Quality Standards states that such "undesignated waterways" are to be protected for the following (IDAPA 58.01.02.101.01):

- cold water aquatic life
- secondary contact recreation

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

Surface Water Quality Criteria

The relevant water quality criteria are found in the following sections of the Idaho Water Quality Standards:

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

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

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

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

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

The numeric and narrative water quality criteria applicable to Elk Creek at the point of discharge are provided in Appendix B of this fact sheet.

Antidegradation

The EPA is required under Section 301(b)(1)(C) of the Clean Water Act (CWA) and implementing regulations 40 CFR § 122.4(d) and 122.44(d) to establish conditions in NPDES permits that ensure compliance with State water quality standards, including antidegradation requirements.

The IDEQ has completed an antidegradation review which is included in the draft 401 certification for this permit. See Appendix F for the State's draft 401 water quality certification. Comments on the 401 certification including the antidegradation review can be submitted to the IDEQ as set forth above (see State Certification).

C. Water Quality Limited Waters

Any water body 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) for water bodies determined to be water quality limited segments. A TMDL is a detailed analysis of the water body to determine its assimilative capacity. The assimilative capacity is the loading of a pollutant that a water body can assimilate without causing or contributing to a violation of applicable water quality standards. Once the assimilative capacity of the water body has been determined, the TMDL will allocate that capacity among point and non-point pollutant sources, taking into account natural background levels and a margin of safety. Allocations for non-point sources are known as "load allocations" (LAs). The allocations for point sources, known as "waste load allocations" (WLAs), are implemented through effluent limitations in NPDES permits. Effluent limitations for point sources must be consistent with the assumptions and requirements of any applicable TMDL allocations.

The segment of the South Fork Clearwater River to which Elk Creek flows, is impaired for water temperature. The EPA approved a temperature TMDL and Sediment TMDL as specified in the South Fork Clearwater River Subbasin Assessment and TMDL, October 2003 (SF CWR TMDL, Oct 2003). The TMDL provided WLAs for temperature and sediment for the Elk City facility as described below.

Temperature [1]

The TMDL approved by EPA has two seasonal WLAs for temperature for the Elk City WWTF (SF CWR TMDL, Oct 2003) for discharge to Elk Creek. The first WLA is a maximum daily effluent temperature of 23°C and is applicable from May 15th to 31st. The WLA was intended to not increase temperatures in Elk Creek by more than 0.3 °C and to cap the facility at its current maximum temperature during the time period of May 15th to 31st. The value of 23°C was based on a review of maximum temperatures of small community wastewater treatment plants. This WLA is incorporated directly into the draft permit as a maximum daily limit and is applicable from May 1st to 31st to correspond to the monthly monitoring and reporting period.

The second temperature WLA is applicable from June 1st to Sept 30th. This WLA is intended to not increase temperatures in Elk Creek by more than 0.3 °C and protect for bull trout (40 CFR § 131.33(a)); these criteria apply to Elk Creek during the months of June 1st to September 30th. Eggs and larval stages of salmonids are most sensitive during this summer season, where effluent temperatures may be their warmest when receiving water flow is at its lowest. The WLA is dependent on both the effluent flow and the receiving water (Elk Creek) flow rate (Table 2).

Both of the seasonal temperature WLAs are incorporated directly into the draft permit, as maximum daily effluent limits and interpreted as end-of-pipe permit limits.

Table 2. Temperature WLA (°C), for the Elk City Wastewater Treatment Facility [A]

Elk Creek Flow Upstream of Outfall (cfs)	WWTF Effluent Discharge (cfs)							
	0.01	**0.02**	**0.03**	**0.04**	**0.05**	**0.1**	**0.15**	**0.20**
0 – 3	23.0	20.6	16.8	14.9	13.8	11.6	10.8	10.4
5	23.0	23.0	21.8	18.7	16.8	13.1	11.8	11.2
10	23.0	23.0	23.0	23.0	23.0	16.8	14.3	13.1
15	23.0	23.0	23.0	23.0	23.0	20.6	16.8	14.9
20	23.0	23.0	23.0	23.0	23.0	23.0	19.3	16.8
25	23.0	23.0	23.0	23.0	23.0	23.0	23.0	18.7
30	23.0	23.0	23.0	23.0	23.0	23.0	23.0	20.6
35	23.0	23.0	23.0	23.0	23.0	23.0	23.0	22.4
>35	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0

[A] Maximum daily effluent temperatures (°C) that would not increase temperatures in Elk Creek by more than 0.3 °C. Applicable between June 1 and Sept 30 when federal bull trout temperature criteria apply per 40 CFR § 131.33(a).

[1] The Elk City facility maximum daily effluent temperature WLAs are shown in Table 45 (SF CWR TMDL, Oct 2003). The TMDL additionally discusses in Section 2.3 of the subbasin assessment that a significant portion of heat loading to the South Fork Clearwater River is from tributaries, and that it is necessary to address elevated temperatures in the tributaries in order to reduce the South Fork Clearwater River's temperatures. The TMDL also states that the elevated stream temperatures are due to significant natural solar radiation, but stream contribution such as Elk Creek have a more significant human influence.

Sediment [2]

The South Fork Clearwater TMDL for sediment provided the Elk City facility with WLAs for total suspended solids (TSS) for discharge to Elk Creek. The WLAs for TSS are 45 mg/L monthly average, 60 mg/L weekly average, and an annual load of 8.2 tons/year. The annual load is incorporated as an annual average limit. The average monthly and average weekly WLAs are less stringent the technology-based effluent limits. See Appendix D for more background information regarding basis for effluent limits.

IV. Effluent Limitations

A. Basis for Effluent Limitations

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

B. Proposed Effluent Limitations

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

1. The permittee must not discharge floating, suspended, or submerged matter of any kind in concentrations causing nuisance or objectionable conditions or that may impair designated beneficial uses.
2. pH: pH must be within the range of 6.5 – 9.0 standard units.
3. Ammonia, BOD_5, TSS, *E. coli*, and chlorine must meet the limits in Table 3.
4. Temperature (May 1st to May 31st). The permittee must meet the 23°C maximum daily limit over a 24-hour period.
5. Temperature (June 1st to September 30th). The permittee must meet the maximum daily limit in Table 4 over a 24-hour period.
    a. The maximum daily effluent limit is dependent on flow in Elk Creek and the effluent flow from the Elk City WWTF.
    b. Each day the permittee must record:
        i. Elk Creek Upstream Flow.
        ii. Average Temperature of Elk City WWTF over 24 hour period.
        iii. Elk City WWTF Effluent Flow.
        iv. Temperature Limit (from Table 4) corresponding to Elk Creek Flow and WWTF Effluent Discharge.

[2] Sediment Wasteload Allocation for the Elk City Facility are shown in Table 58 (SF CWR TMDL, Oct 2003)

c. Results of the daily recordings must be provided in an electronic spreadsheet attached to the monitoring DMR.

Example of Daily Procedure to Determine Temperature WLA Limit

1. Elk Creek Upstream Flow = 5.1 cfs
2. Average Temperature of WWTF over 24 hour period = 17.0°C
3. Elk City WWTF Effluent Flow = 0.049 cfs
4. Temperature Limit (from Table 4) corresponding to Elk Creek Flow and WWTF Effluent Discharge = 23°C
5. The effluent temperature is below the temperature limit in this example.

6. Annual Average Limit for TSS

a. The annual average total TSS load must not exceed 45 lbs/day.

b. The annual average total TSS load must be calculated as the sum of all daily discharges measured for TSS during a calendar year, divided by the number of daily discharges measured for total TSS during that year.

c. The annual average total TSS load must be reported on the January DMR.

Table 3: Proposed Effluent Limits

Parameter	Units	Effluent Limits		
		Average Monthly Limit	Average Weekly Limit	Maximum Daily Limit
Biochemical Oxygen Demand, Five-Day (BOD_5)	mg/L	30	45	
	lbs/day	30	45	
BOD_5 Removal	Percent	85 (minimum)		
Total Suspended Solids (TSS)	mg/L	30	45	--
	lbs/day	30	45	
	Annual Average Limit - 45 lbs/day [A]			
TSS Removal	Percent	85 (minimum)		
E. coli	#/100 ml	126 (geometric mean)	--	576 (instantaneous)
Total Residual Chlorine [B]	µg/L	27	--	47
	lbs/day	0.027	--	0.047
Total Ammonia, as N	mg/L	7.7	--	24.1
	lbs/day	7.7	--	24
Temperature, (May 1st to May 31th)	°C	--	--	23
Temperature, (June 1st to September 30th)	°C	--	--	See Part IV.B (5)

[A] See Part IV.B.6

[B] The total residual chlorine effluent limits are not quantifiable using EPA-approved analytical methods. Therefore, EPA will use the minimum level of the most sensitive EPA-approved analytical method (50 µg/L) as the compliance evaluation level. The permittee will be considered in compliance with the total residual chlorine limits as long as the average monthly and maximum daily effluent chlorine concentrations are less than 50 µg/L and the average monthly and maximum daily chlorine loadings are less than 0.05 lbs/day.

Table 4. Maximum Daily Effluent Limit for Temperature (°C)

Elk Creek Flow Upstream of Outfall (cfs) [A]	Daily WWTF Effluent Discharge (cfs)							
	≤0.01	**>0.01-≤0.02**	**>0.02 -≤0.03**	**>0.03-≤0.04**	**>0.04-≤0.05**	**>0.05-≤0.1**	**>0.1-≤0.15**	**>0.15-≤0.2**
0 – 3	23.0	20.6	16.8	14.9	13.8	11.6	10.8	10.4
>3 – 5	23.0	23.0	21.8	18.7	16.8	13.1	11.8	11.2
>5 – 10	23.0	23.0	23.0	23.0	23.0	16.8	14.3	13.1
>10 – 15	23.0	23.0	23.0	23.0	23.0	20.6	16.8	14.9
>15 – 20	23.0	23.0	23.0	23.0	23.0	23.0	19.3	16.8
>20 – 25	23.0	23.0	23.0	23.0	23.0	23.0	23.0	18.7
>25 – 30	23.0	23.0	23.0	23.0	23.0	23.0	23.0	20.6
>30 – 35	23.0	23.0	23.0	23.0	23.0	23.0	23.0	22.4
>35	23.0	23.0	23.0	23.0	23.0	23.0	23.0	23.0

[A] The Permittee shall round the measured receiving water flow upward to the next highest flow volume (i.e. if recorded flow is 3.1 cfs, then “>3 – 5” tier applies).

V. Monitoring Requirements

A. Basis for Effluent and Surface Water Monitoring

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

The permit also requires the permittee to perform effluent monitoring required by part B.6 of the NPDES Form 2A application (EPA Form 3510-2A, revised 1-99), so that these data will be available when the permittee applies for a renewal of its NPDES permit.

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

B. Effluent Monitoring

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

Table 5 presents the proposed effluent monitoring requirements for the Elk City facility, as shown below. The sampling location must be after the last treatment unit and prior to discharge to the receiving water. The samples must be representative of the volume and nature of the monitored discharge. If no discharge occurs during the reporting period, “no discharge” shall be reported on the DMR.

Table 5: Effluent Monitoring Requirements				
Parameter	**Units**	**Sample Location**	**Sample Frequency**	**Sample Type**
Flow	mgd	Effluent	Continuous	Recording
BOD_5	mg/L	Influent & Effluent	1/week	8-hour composite
	lbs/day	Influent & Effluent	1/week	calculation[1]
	% Removal	--	1/month	calculation[2]
TSS	mg/L	Influent & Effluent	1/week	8-hour composite
	lbs/day	Influent & Effluent	1/week	calculation[1]
	% Removal	--	1/month	calculation[2]
pH	standard units	Effluent	1/week	Grab
E. Coli	#/100 ml	Effluent	5/month	Grab
Total Residual Chlorine	mg/L	Effluent	1/week	Grab
Total Ammonia as N	mg/L	Effluent	4/month	8-hour composite
	lbs/day	Effluent		calculation[1]
Total Kjeldahl Nitrogen	mg/L	Effluent	3/permit cycle[3]	8-hour composite
Nitrate plus Nitrite	mg/L	Effluent	3/permit cycle[3]	8-hour composite
Total Dissolved Solids	mg/L	Effluent	3/permit cycle[3]	8-hour composite
Oil and Grease	mg/L	Effluent	3/permit cycle[3]	grab
Dissolved Oxygen	mg/L	Effluent	3/permit cycle[3]	meter
Temperature (May 1st to Sept 30th)	°C	Effluent	Continuous	meter[4]

Notes:
1. Loading is calculated by multiplying the concentration in mg/L by the flow on the day sampling occurred in mgd and a conversion factor of 8.34.
2. Percent removal is calculated using the following equation:
(average monthly influent – average monthly effluent) ÷ average monthly influent.
3. See Part V.A.
4. Temperature data must be recorded using micro-recording temperature devices known as thermistors. Set the recording device to record device to record at one-hour intervals. Report the following temperature monitoring data on the DMR: monthly instantaneous maximum, maximum daily average, seven-day running average of the daily instantaneous maximum.

Effluent Monitoring Changes from the Previous Permit:

Bacteria monitoring; the five samples per month monitoring frequency for *E. coli* is based on the IDEQ water quality criterion for *E. coli*. See Idaho Water Quality Standards (IDADA 58.01.02.251.01).

The draft permit require three samples per the permit cycle for the following parameters listed in Part B.6 of the application form for POTWs (EPA Form 3510-2A, revised 1-99, see also Appendix J to 40 CFR § Part 122): dissolved oxygen, nitrate/nitrite, Kjeldahl nitrogen, oil and grease, and total dissolved solids, so that these data are available when the permittee is required to reapply for the NPDES permit. These parameters are not subject to effluent limits in the permit. The DMR data showed concentrations for these parameters are not of concern.

Temperature effluent monitoring was adjusted from the previous permit to adequately monitor compliance with the new effluent temperature limits.

C. Surface Water Monitoring

Table 6 presents the proposed surface water monitoring requirements for the draft permit. The facility must monitor receiving water upstream of outfall 001in Elk Creek above the influence of the facility's effluent discharge. Surface water monitoring results must be submitted with the NetDMR and begin within 6 months of the effective date of this permit. If the facility is discharging intermittently, monitoring should occur during the same week in which the facility is discharging to Elk Creek.

Table 6. Surface Water Monitoring Requirements

Parameter	Sample Frequency	Sample Type
Flow, mgd (June 1st to Sept 30th)	Daily [A]	Measured
BOD_5, mg/L	1/month	Grab
TSS, mg/L	1/month	Grab
pH, standard units	1/month	Grab
E.coli bacteria, #/100mL	1/month	Grab
Temperature, C°	1/month	Meter
Total Ammonia as N, mg/L	1/month	Grab
Total Residual Chlorine, mg/L	1/month	Grab [B]

[A] See Section IV.B (5) of this Fact Sheet.
[B] The permittee must use a method that can achieve an ML less than or equal 50 ug/L. The permittee may request a different ML. The request must be in writing and must be approved by EPA.

In comparing the surface water monitoring requirement in the draft permit to the previous permit, the following changes were made:

Flow, BOD_5 and TSS, pH, *E. coli*, total ammonia as N, total residual chlorine, and temperature were increased from a 1/quarter sampling frequency in the previous permit to once per month.

D. Monitoring and Reporting

The draft permit requires the permittee to continue to submit DMR data electronically using NetDMR. NetDMR is a national web-based tool that allows DMR data to be submitted electronically via a secure Internet application. NetDMR allows participants to discontinue mailing in paper forms under 40 CFR § 122.41 and § 403.12.

Under NetDMR, all reports required under the permit are submitted to the EPA as an electronic attachment to the DMR. Once a permittee begins submitting reports using NetDMR, it is no longer required to submit paper copies of DMRs or other reports to the EPA and IDEQ.

Further information about NetDMR, including upcoming trainings and contacts, is provided on the following website: http://www.EPA.gov/netdmr.

VI. Sludge (Biosolids) Requirements

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

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

VII. Other Permit Conditions

A. Quality Assurance Plan

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

B. Operation and Maintenance Plan

The permit requires Elk City to properly operate and maintain all facilities and systems of treatment and control. Proper operation and maintenance is essential to meeting discharge limits, monitoring requirements, and all other permit requirements at all times. The permittee is required to develop and implement an operation and maintenance plan for their facility within 90 days of the effective date of the final permit. The plan must be retained on site and made available to the EPA and the IDEQ upon request.

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

Untreated or partially treated discharges from separate sanitary sewer systems are referred to as sanitary sewer overflows (SSOs). SSOs may present serious risks of human exposure when released to certain areas, such as streets, private property, basements, and receiving waters used for drinking water, fishing and shellfishing, or contact recreation. Untreated

sewage contains pathogens and other pollutants, which are toxic. SSOs are not authorized under this permit. Pursuant to the NPDES regulations, discharges from separate sanitary sewer systems authorized by NPDES permits must meet effluent limitations that are based upon secondary treatment. Further, discharges must meet any more stringent effluent limitations that are established to meet the EPA-approved state water quality standards.

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

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

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

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

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

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

The permittee may refer to the Guide for Evaluating Capacity, Management, Operation, and Maintenance (CMOM) Programs at Sanitary Sewer Collection Systems (EPA 305-B-05-002). This guide identifies some of the criteria used by the EPA inspectors to evaluate a collection systems management, operation and maintenance program activities. Owners/operators can review their own systems against the checklist (Chapter 3) to reduce the occurrence of sewer overflows and improve or maintain compliance.

D. Standard Permit Provisions

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

VIII. Other Legal Requirements

A. Endangered Species Act

The Endangered Species Act (ESA) and implementing regulations require federal agencies to consult with National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (US FWS) if their actions could adversely affect any threatened or endangered species.

The EPA compiled a list of species and critical habitat designations within the vicinity of the discharge. The following are threatened species in Idaho County, Idaho and in the South Fork Clearwater Subbasin:

THREATENED SPECIES

- Canada Lynx (*Lynx canadensis*)[1]
- MacFarlane's Four-O'Clock (*Mirabilis macfarlane*)[1]
- Spalding's Catchfly (*Silene spaldingii*)[1]
- Bull Trout (*Salvelinus confluentus*)[1]

Critical Habitat

Critical habitat is designated for areas that contain the physical and biological features essential for the conservation of a threatened or endangered species and that may require special management considerations. Under ESA, all federal agencies must ensure any action they authorize, fund or carry out does not destroy or adversely modify designated critical habitat. The designation of critical habitat does not affect land ownership or establish a refuge, wilderness, reserve, preserve or other conservation area.

USFWS designated the following species' critical habitat for Idaho County:

- Bull Trout (*Salvelinus confluentus*)[1]

EPA also identified the following NMFS-designated critical habitat within the area of discharge, Elk Creek:

- Critical habitat for Steelhead (*Oncorhynchus mykiss*)[2]

EPA has evaluated all the listed species and associated critical habitats from NMFS and the U.S. Fish and Wildlife that could be potentially impacted from this discharge. Based on this analysis, EPA determined that the reissuance of this NPDES permit will have no measurable impact (i.e., no effect) on threatened or endangered species or their critical habitat in the vicinity of the discharges. As such, consultation is not required for this action.

There are numerous site-specific factors supporting EPA's no effect determination. These factors are summarized below:

- The Elk City WWTF is a minor facility with a design flow of 120,000 gallons per day and an average flow of 54,000 gallons per day
- The facility is required to meet water quality criteria for *E. coli* at end-of-pipe
- Effluent pollutant concentrations were developed to ensure that the water quality standards applicable to Elk Creek, which include protection of aquatic life, are met.
- There is an approved TMDL for the watershed for TSS and temperature. The effluent limits are either more stringent or consistent with the WLAs from the TMDL[3].

B. Essential Fish Habitat

Essential fish habitat (EFH) includes the waters and substrate (sediments, etc.) necessary for fish to spawn, breed, feed or grow to maturity. The Magnuson-Stevens Fishery Conservation and Management Act (16 U.S.C. 1801, *et seq*.) and implementing regulations require the EPA to consult with NOAA Fisheries when a proposed discharge has the potential to adversely affect (reduce quality and/or quantity of) EFH. The EFH regulations define an adverse effect as any impact which reduces quality or quantity of EFH and may include direct (e.g., contamination or physical disruption), indirect (e.g., loss of prey, reduction in species' fecundity), site specific, or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions.

A review of Idaho EFHs in the vicinity of the facility reveals the South Fork Clearwater River is listed as an EFH for Chinook Salmon[4]. However, an EFH is not listed for Elk Creek, the receiving water to which the Elk City facility discharges. Therefore, the EPA has determined that issuance of this permit is not likely to adversely affect the Chinook EFH in the South Fork Clearwater River.

C. State Certification

Section 401 of the CWA requires the EPA to seek State certification before issuing a final permit. As a result of the certification, the State may require more stringent permit conditions or additional monitoring requirements to ensure that the permit complies with applicable water quality standards, or treatment standards established pursuant to any State law or regulation.

D. Permit Expiration

The permit will expire five years from the effective date.

IX. References

[1] U.S. Fish and Wildlife Service – Idaho Fish and Wildlife Office Endangered, Threatened, Proposed, and Candidate Species With Associated Proposed and Critical habitats in Idaho (March 20th 2013).

[2] 70 FR 52780 (September 2, 2005)

[3] IDEQ South Fork Clearwater River Subbasin Assessment and TMDL, October 2003

[4] 73 FR 60992 (October 15, 2008)

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

[6] Water Pollution Control Federation. 1976 Subcommittee on Chlorination of Wastewater. *Chlorination of Wastewater.* Water Pollution Control Federation. Washington, D.C.

[7] EPA. 2010. *NPDES Permit Writers' Manual.* Environmental Protection Agency, Office of Wastewater Management, EPA-833-K-10-001.

[8] IDEQ. 1986. Water Quality Status report No. 74, Elk Creek, Idaho County, Idaho.

Appendix A: Facility Information & Process Flow Schematic Map

General Information

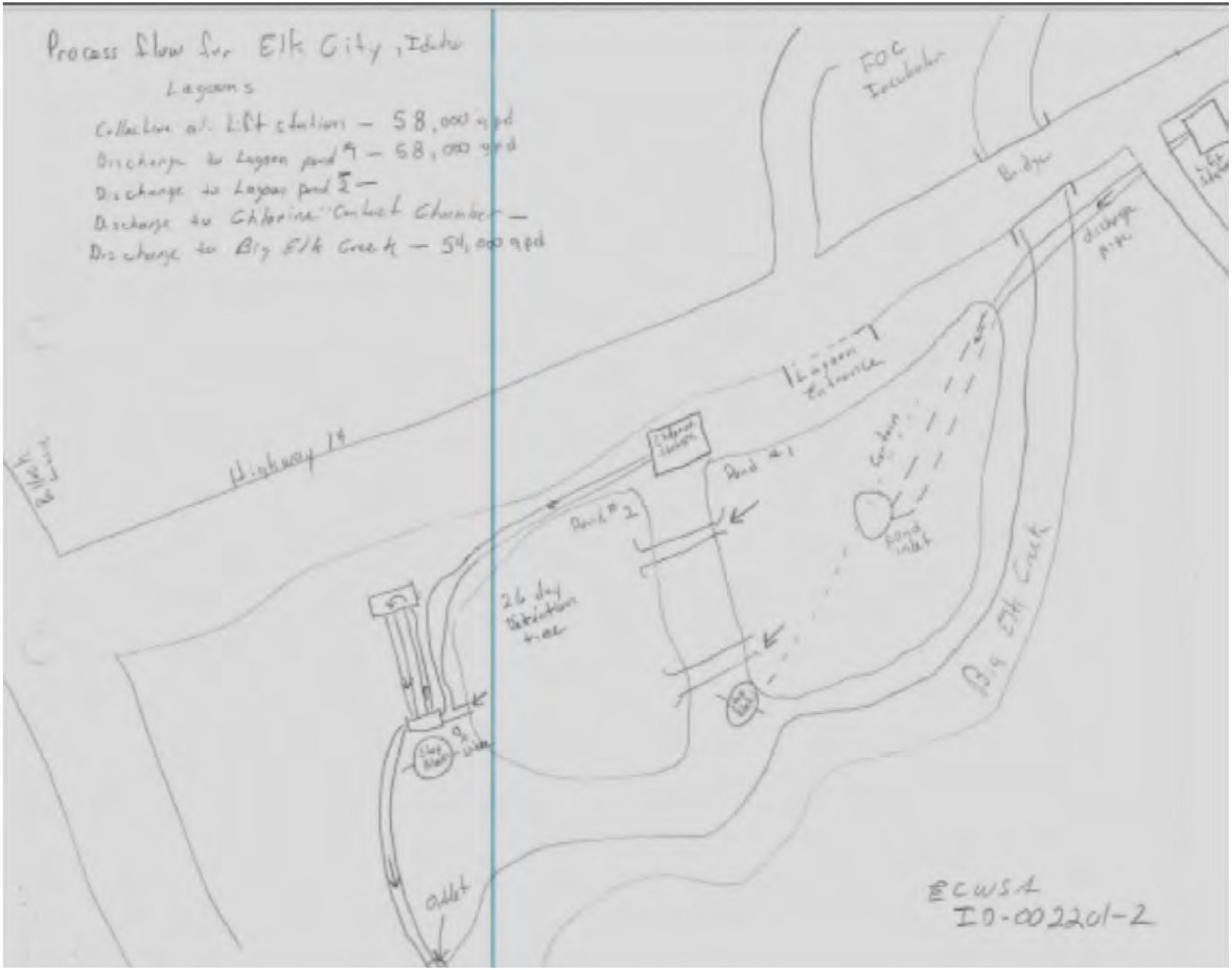
NPDES ID Number:	ID-002201-2
Physical Location:	Elk City Water and Sewer Association P.O. Box 335 Elk City, Idaho 83525
Mailing Address:	Elk City Water and Sewer Association P.O. Box 335 Elk City, Idaho 83525
Facility Background:	This is the second NPDES permit issued to this facility.

Facility Information

Type of Facility:	Publicly Owned Treatment Works (POTW)
Treatment Train:	The facility consists of gravity sewer collection systems. The facility provides treatment equivalent to secondary (TES); an aerated waste stabilization pond, then disinfected with total residual chlorine (chlorine) before it is discharged to the receiving water
Flow:	Design flow is 0.120 mgd.
Outfall Location:	Latitude: 45° 49' 18" N, Longitude: 115° 26' 59" W

Receiving Water Information

Receiving Water:	Elk Creek
Watershed:	South Fork Clearwater Subbasin (HUC 17060305)
Beneficial Uses:	Water quality appropriate for secondary contact recreation. These activities may include fishing, boating, wading, infrequent swimming, and other activities where ingestion of raw water is not likely to occur.
Aquatic Life Uses:	Aquatic life community for cold water species. Habitat for active self-propagating populations of salmonid fisheries.


Process flow for Elk City, Idaho
Lagoons
Collection all lift stations – 58,000 gpd
Discharge to Lagoon pond 1 – 58,000 gpd
Discharge to Lagoon pond 2 –
Discharge to Chlorine Contact Chamber –
Discharge to Big Elk Creek – 54,000 gpd
FOC Incubator
Bridge
discharge pipe
Lagoon Entrance
Highway 14
Pond #1
Pond #2
26 day Detention time
Big Elk Creek
outlet
ECWSA
ID-002201-2

Appendix B: Water Quality Criteria Summary

This appendix provides a summary of water quality criteria applicable to Elk Creek.

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

A. General Criteria (IDAPA 58.01.02.200)

Surface waters of the state shall be free from:

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

Surface water level shall not exceed allowable level for:

- radioactive materials, or
- sediments

B. Numeric Criteria for Toxics (IDAPA 58.01.02.210)

This section of the Idaho Water Quality Standards provides the numeric criteria for toxic substances for waters designated for aquatic life, recreation, or domestic water supply use.

Monitoring of the effluent has shown that total residual chlorine is present at detectable levels in the effluent. The acute and chronic aquatic life criteria for chlorine is 19 and 11 ug/L, respectively. According to the DMRs, the 95th percentile for the monthly average and weekly average concentration of chlorine in the last 5 years of valid data are 1.03 and 1.27 mg/L, respectively.

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

1. pH: Within the range of 6.5 to 9.0

2. Total Dissolved Gas: <110% saturation at atm. pressure.

3. Dissolved Oxygen: Exceed 6 mg/L at all times.

4. Temperature: Water temperatures of 22°C or less with a maximum daily average of no greater than 19°C.

5. Ammonia:

Ammonia criteria are based on a formula which relies on the pH and temperature of the receiving water, because the fraction of ammonia present as the toxic, un-ionized form increases with increasing pH and temperature. Therefore, the criteria become more stringent as pH and temperature increase. Table B-1 below details the equations used to determine water quality criteria for ammonia.

Elk City collected pH and temperature data in the Elk Creek upstream of outfall 001 from May to September 1986. These data were used to determine the appropriate pH and temperature values to calculate the ammonia criteria. As with any natural water body the pH and temperature of the water will vary over time. Therefore, to protect water quality criteria it is important to develop the criteria based on pH and temperature values that will be protective of aquatic life at all times. The EPA used the maximum of the pH and temperature data on account that the receiving water data were limited. These measurements were 7.7 s.u. and 15.7 °C respectively.

Table B-1: Water Quality Criteria for Ammonia

	Acute Criterion	Chronic Criterion
Equations:	$\frac{0.275}{1+10^{7.204-pH}}+\frac{39}{1+10^{pH-7.204}}$	$\left(\frac{0.0577}{1+10^{7.688-pH}}+\frac{2.487}{1+10^{pH-7.688}}\right)\times MIN\left(2.85,1.45\times10^{0.028\times(25-T)}\right)$
Results:	9644 µg/L	3316 µg/L

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

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

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

b. Use of Single Sample Values. This section states that that a water sample that exceeds certain "single sample maximum" values indicates a likely exceedance of the geometric mean criterion, although it is not, in and of itself, a violation of water quality standards.

c. For waters designated for secondary contact recreation, the “single sample maximum” value is 576 organisms per 100 ml (IDAPA 58.01.02.251.01.b.i.). for secondary and contact recreation.

Appendix C: Low Flow Conditions

A. Low Flow Conditions

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

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

Idaho's water quality standards do not specify a low flow to use for acute and chronic ammonia criteria, however, the EPA's *Water Quality Criteria; Notice of Availability; 1999 Update of Ambient Water Quality Criteria for Ammonia; Notice* (64 FR 719769 December 22, 1999) identifies the appropriate flows to be used, shown in the table above. The 1Q10 and 30Q10/30Q5 (as opposed to the biologically based factors) must be used for seasonal limits.

The EPA calculated the critical low flow upstream of the discharge based on the limited flow data submitted by the facility during the summer low flow season. The data were collected from May to September 1986 for a total of 8 samples. Because these data are seasonal, and no long-term daily stream flow data were available for the point of discharge, nor could a correlation be developed (i.e. there are no long-term gauging stations with contemporaneous daily flow data, or there are too few data points available at the point of discharge to develop a correlation), the EPA calculated the following 1Q10 and 30Q5 as follows to represent low flows to determine water quality based effluent limits.

The acute (1Q10), and chronic (30Q10) low flow conditions may be calculated by first calculating the 7Q10 flow from the harmonic mean flow (Q_{hm}) and the arithmetic mean flow (Q_{am}) in accordance with the following equation (see Chapter 4, Section 4.6 of the TSD):

$$Q_{hm} = [1.194 * (Q_{am})^{0.473}] * [(7Q10)^{0.522}] \quad \text{(Equation 1)}$$

Equation 1 may also be rearranged to solve for the 7Q10 as shown in equation 2.

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

The 1Q10 and the 30Q5 can, in turn, be estimated for Elk Creek from the 7Q10 as follows:

1Q10 = 7Q10 ÷ 1.3

For streams with a 7Q10 less than or equal to 50 CFS:

30Q5 = 7Q10 × 1.1

Based on the flow data, the Q_{hm} and Q_{am} are calculated to be:

Q_{hm} = 6.29 cfs
Q_{am} = 21.4 cfs

The Resulting Low Flow Conditions are:

30Q5 (Chronic For Ammonia)	1.62 cfs
1Q10 (Acute)	1.13 cfs
7Q10 (Chronic for Chlorine)	1.47 cfs

B. Mixing Zones and Dilution

In some cases a dilution allowance or mixing zone is permitted. A mixing zone is an area where an effluent discharge undergoes initial dilution and is extended to cover the secondary mixing in the ambient water body. A mixing zone is an allocated impact zone where the water quality standards may be exceeded as long as acutely toxic conditions are prevented (the EPA, 1994). The federal regulations at 40 CFR § 131.13 states that "States may, at their discretion, include in their State standards, policies generally affecting their application and implementation, such as mixing zones, low flows and variances."

The Idaho Water Quality Standards at IDAPA 58.01.02.060 provides Idaho's mixing zone policy for point source discharges. The policy allows the IDEQ to authorize a mixing zone for a point source discharge after a biological, chemical, and physical appraisal of the receiving water and the proposed discharge. The IDEQ considers the following principles in limiting the size of a mixing zone in flowing receiving waters (IDAPA 58.01.02.060.01.e):

i. The cumulative width of adjacent mixing zones when measured across the receiving water is not to exceed 50% of the total width of the receiving water at that point;

ii. The width of a mixing zone is not to exceed 25% of the stream width or 300 meters plus the horizontal length of the diffuser as measured perpendicularly to the stream flow, whichever is less;

iii. The mixing zone is to be no closer to the 10 year, 7 day low-flow shoreline than 15% of the stream width;

iv. The mixing zone is not to include more than 25% of the volume of the stream flow.

In the State 401 Certification, the IDEQ proposes to authorize a mixing zone of 25% of the stream flow volume for ammonia and chlorine.

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

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

Where:

D = Dilution Factor
Q_e = Effluent flow rate (set equal to the design flow of the WWTF)
Q_u = Receiving water low flow rate upstream of the discharge (1Q10, 7Q10, 30B3, etc)
%MZ = Percent Mixing Zone

Using the design flow of the Elk City facility of 0.120 mgd, with the respective low flow conditions in section A of this appendix, the EPA calculated the following dilution factors:

Dilution Factors	
Chronic for Ammonia (30Q5)	3.19
Acute (1Q10)	2.53
Chronic for Chlorine (7Q10)	2.99

Appendix D: Basis for Effluent Limits

The following discussion explains in more detail the statutory and regulatory basis for the technology and water quality-based effluent limits in the draft permit. Part A discusses technology-based effluent limits, Part B discusses water quality-based effluent limits in general and Part C discusses facility specific water quality-based effluent limits.

A. Technology-Based Effluent Limits

The CWA requires POTWs to meet requirements based on available wastewater treatment technology. Section 301 of the CWA established a required performance level, referred to as "secondary treatment," which all POTWs were required to meet by July 1, 1977. The EPA has developed and promulgated "secondary treatment" effluent limitations, which are found in 40 CFR § 133.102. These technology-based effluent limits apply to all municipal wastewater treatment plants and identify the minimum level of effluent quality attainable by application of secondary treatment in terms of the 5-day Biological Oxygen Demand test (BOD_5), Total Suspended Solids (TSS) and pH. The federally promulgated secondary treatment effluent limits are listed in Table D-1.

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

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

The EPA also developed and promulgated regulations that include alternative less stringent standards that apply to facilities using "treatment equivalent to secondary" such as waste stabilization ponds and trickling filters. *See* 40 CFR § 133.105(a) - (c). Congress initially recognized that unless alternative limitations were set for these facilities, which often are in small communities, such facilities could be required to construct costly new treatment systems to meet the secondary treatment standards even though their existing treatment technologies could achieve significant biological treatment. These standards specify the maximum allowable discharge concentration of BOD_5, TSS, and a minimum percent removal requirement for qualified facilities as listed below in Table D-2.

Table D-2: Equivalent to Secondary Treatment Standards (40 CFR § 133.105)

Parameter	30-day average	7-day average
BOD_5	not to exceed 45 mg/L	not to exceed 65 mg/L
TSS	not to exceed 45 mg/L	not to exceed 65 mg/L
Removal for BOD_5 and TSS (concentration)	Not less than 65%	---
pH	6.0 - 9.0 s.u.	

Additionally, the regulations at 40 CFR § 133.105(f) require the EPA to include more stringent limitations when it determines through analysis that more stringent concentrations are achievable through proper operation and maintenance of the treatment works based on an analysis of past performance. The regulations at 40 CFR § 133.101(f), define effluent concentrations consistently achievable as the 95% value for the 30-day average. The 7-day average value is calculated by multiplying the 30-day average by 1.5.

A facility must meet all of the following criteria in order to qualify for application of the alternative less stringent standards set forth in 40 CFR § 133.105 (see Table D-2, above):

- Criterion #1 - "The BOD_5 and TSS effluent concentrations consistently achievable through proper operation and maintenance of the treatment works exceed the minimum level of the effluent quality for secondary treatment." 40 CFR § 133.101(g)(1). The regulations at 40 CFR § 133.101(f) define "effluent concentrations consistently achievable through proper operation and maintenance" as "(f)(1): For a given pollutant, the 95th percentile value for the 30-day average effluent quality achieved by a treatment works in a period of at least 2 years, excluding values attributable to upsets, bypasses, operational errors, or other unusual conditions, and (f)(2): a 7-day average value equal to 1.5 times the value derived under paragraph (f)(1) of this section."
- Criterion # 2 - "A trickling filter or waste stabilization pond is used as the principal treatment process." 40 CFR § 133.101(g)(2).
- Criterion # 3 - "The treatment works provide significant biological treatment of municipal wastewater." 40 CFR § 133.101(g)(3). "Significant biological treatment" is defined in 40 CFR § 133.101(k) as "The use of an aerobic or anaerobic biological treatment process in a treatment works to consistently achieve a 30-day average of a [sic] least 65 percent removal of BOD_5.

All effluent monitoring data was taken from Discharge Monitoring Reports (DMRs) from 07/31/2007 to 07/31/2012 for the Elk City facility as shown in Tables D-3, D-4, and D-5. Table D-6 provides a summary of the effluent averages representative of the 95^{th} or 5^{th} percentile. Moreover, Figures D-1 and D-2 spatially plot the change in BOD_5 and TSS seasonally.

Criterion # 1

The 95^{th} percentile value for the average monthly BOD_5 concentration is calculated to be 84.28 mg/L, and therefore is consistently over the minimal level for the 30-day average for the secondary treatment standard of 30 mg/L. The 7-day average BOD_5 value is calculated as 1.5 x the BOD_5 average monthly concentration as 126.42 mg/L which also exceeds the 45 mg/L secondary treatment standard for BOD_5 7-day average. For background comparison, the statistical 95^{th} percentile of the 7-day average effluent for BOD_5 is 195.1 mg/L. All 95^{th} percentile values are shown in Table D-6 below. Because BOD_5 effluent concentrations are consistently higher than the minimum level of effluent quality for secondary treatment standards, the facility meets criterion # 1 for BOD_5.

In contrast with TSS, the 95^{th} percentile average monthly concentration is calculated to be 24.6 mg/L, which does not exceed the 30 mg/L secondary treatment standard for the TSS 30-day. The 7-day average value is calculated to be 36.9 mg/L which also does not exceed the 45 mg/L secondary treatment standard for TSS 7-day average. For background comparison, the statistical 95^{th} percentile of the 7-day average effluent for TSS is 42.8 mg/L. All 95^{th} percentile

values are shown in Table D-6. Because TSS effluent concentrations are not consistently higher than the minimum level of effluent quality for secondary treatment standards, the facility does not meet criterion #1 for TSS.

Criterion # 2

For the Elk Creek facility, criterion #2 is met for alternative less stringent standards on account that the principal treatment process consists of aerated biological treatment through two facultative ponds (see Appendix A).

Criterion # 3

With regards to criterion #3, Table D-5 outlines the monthly percent removal from the DMRs from 2007 to 2012. The data indicate the facility does not consistently achieve a BOD_5 percent removal of at least 65 percent, and therefore, the facility is not providing significant biological treatment of the municipal wastewater. Therefore, the facility does not meet criterion # 3.

Because the facility does not meet all of the criteria set forth in 40 CFR § 133.105, the facility does not qualify for Treatment Equivalent to Secondary Standards, and therefore will be required to meet Secondary Treatment Standards for BOD_5 and TSS technology-based limits.

In developing effluent limits, the EPA also considered the Reduced Percent Removal Requirements for Less Concentrated Influent Wastewater. In accordance with 40 CFR 133.103(d), treatment works that receive less concentrated wastes from separate sewer systems can qualify to have their percent removal limits reduced provided that all of the following conditions are met:

- The facility can consistently meet its permit effluent concentration limits but cannot meet its percent removal limits because of less concentrated influent water;
- The facility achieves significantly more stringent limitations than would otherwise be required by the concentration-based standards; and,
- The less concentrated influent is not the result of excessive inflow/infiltration (I/I).

The Elk City WWTF does not meet all conditions in 40 CFR 133.103(d) for a treatment works that receive less concentrated wastes. The facility does not meet the first criteria, as shown on Table D-6. This is because effluent concentrations exceed secondary effluent concentrations limits for BOD_5.

With regards to the third criteria the facility appears to have excessively high Inflow and Infiltration (I/I) during springtime. The determination of whether the less concentrated wastewater is the result of excessive I/I uses the definition of excessive I/I at § 35.2005(b)(16), plus the additional criterion that flow is nonexcessive if the total flow to the POTW (i.e., wastewater plus inflow plus infiltration) is less than 275 gallons per capita per day. The regulation at § 35.2005(b)(16) defines excessive I/I as the quantities of I/I that can be economically eliminated from a sewer system as determined in a cost-effectiveness analysis that compares the costs for correcting the I/I conditions to the total costs for transportation and treatment of the I/I. This regulation also refers to definitions of nonexcessive I/I in §§ 35.2005(b)(28) and 35.2005(b)(29). The flow to the facility exceeds 275 gallons/person per day.

The permittee has attributed this to potentially degrading PVC pipes, and leaks and possible side streaking on the inside of the concrete barrels of the manholes. Furthermore, the facility lacks the instruments to accurately characterize the amount of I/I. Because the facility does not meet the criteria, the facility does not qualify for Reduced Percent Removal Requirements for Less Concentrated Influent Wastewater under 40 CFR 133.103(d).

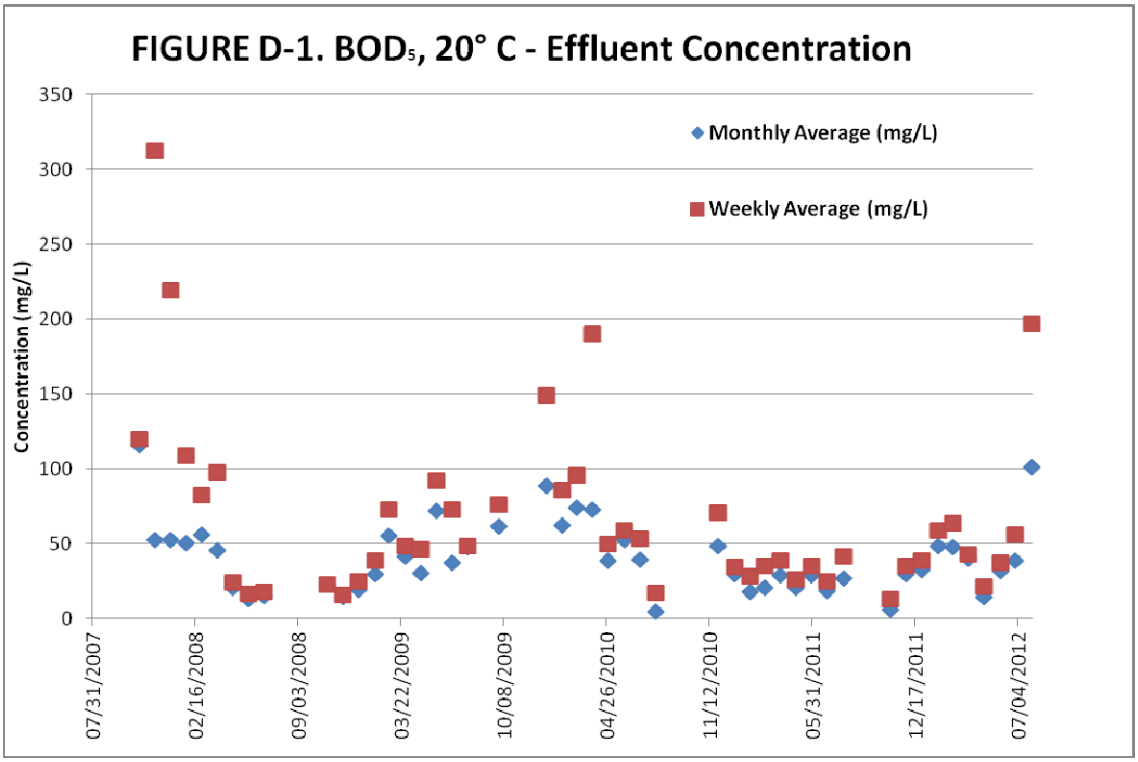
Table D-3. Sum of the BOD5 at 20°C Effluent DMR Values		
Monitoring Period End Date	Monthly Average (mg/L)	Weekly Average (mg/L)
07/31/2007		
08/31/2007		
09/30/2007		
10/31/2007	115.9	120
11/30/2007	53.1	312.7
12/31/2007	52.8	219.2
01/31/2008	50.7	109
02/29/2008	56.2	82.9
03/31/2008	45.7	97.6
04/30/2008	20.6	24.6
05/31/2008	13.3	16.6
06/30/2008	15.6	17.9
07/31/2008		
08/31/2008		
09/30/2008		
10/31/2008	22.7	22.7
11/30/2008	14.9	16.2
12/31/2008	19.3	25
01/31/2009	29.8	38.9
02/28/2009	55.6	72.9
03/31/2009	41.7	48.9
04/30/2009	30.3	46.5
05/31/2009	72.4	92.1
06/30/2009	37.2	72.8
07/31/2009	48.3	48.6
08/31/2009		
09/30/2009	61.8	76.2
10/31/2009		
11/30/2009		
12/31/2009	88.6	149.2
01/31/2010	62.7	86.2
02/28/2010	74.2	95.8
03/31/2010	72.9	190.2
04/30/2010	39.1	50.1
05/31/2010	53	59
06/30/2010	39.9	53.2
07/31/2010	5.1	17.5
08/31/2010		
09/30/2010		
10/31/2010		
11/30/2010	48.9	70.8
12/31/2010	29.7	34.8
01/31/2011	18.2	28.8
02/28/2011	21.1	35.2
03/31/2011	28.9	39.1
04/30/2011	20.8	26.7
05/31/2011	29	35.5
06/30/2011	19.1	24.7
07/31/2011	27.1	42
08/31/2011		
09/30/2011		
10/31/2011	6.3	12.9
11/30/2011	30.2	35.4
12/31/2011	32.6	39.2
01/31/2012	48.4	59
02/29/2012	47.8	63.7
03/31/2012	40	42.8
04/30/2012	14.7	21.3
05/31/2012	32.2	37.8
06/30/2012	39.2	56.4
07/31/2012	101.2	197.2

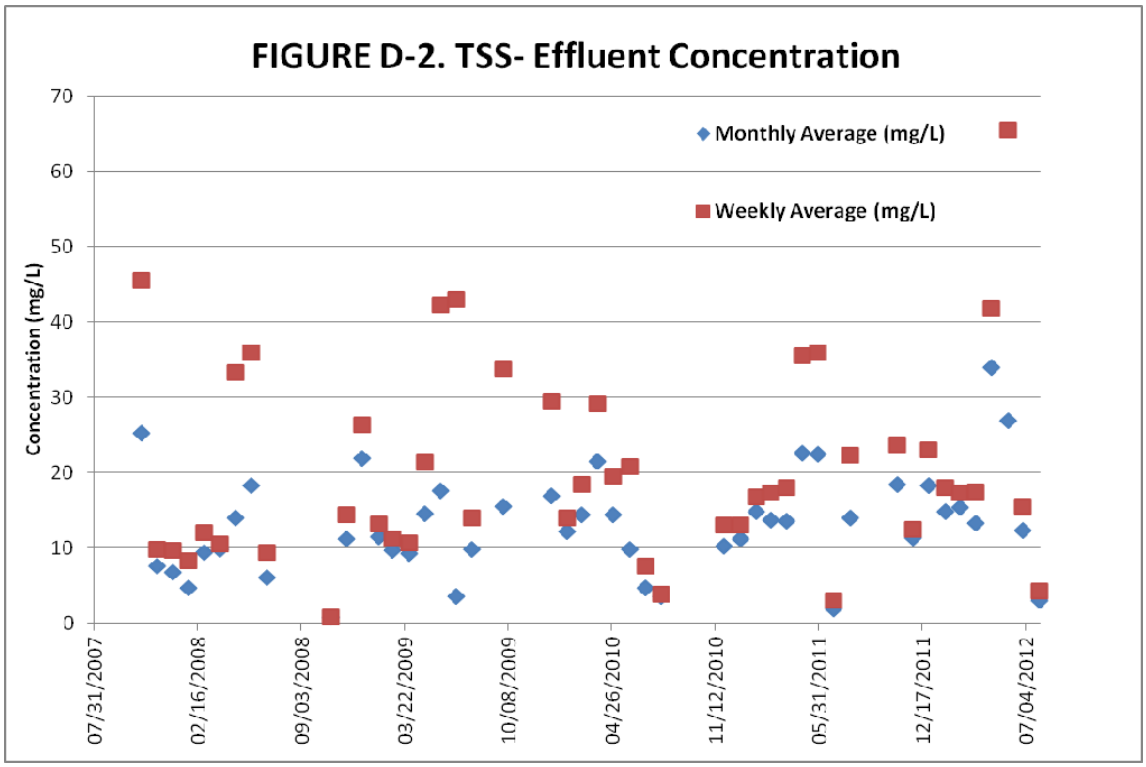
Table D-4. Sum of the TSS Effluent DMR Values		
Monitoring Period End Date	Monthly Average (mg/L)	Weekly Average (mg/L)
07/31/2007		
08/31/2007		
09/30/2007		
10/31/2007	25.3	45.5
11/30/2007	7.6	9.9
12/31/2007	6.8	9.7
01/31/2008	4.8	8.4
02/29/2008	9.4	12.1
03/31/2008	9.8	10.5
04/30/2008	14.1	33.4
05/31/2008	18.3	36
06/30/2008	6.1	9.5
07/31/2008		
08/31/2008		
09/30/2008		
10/31/2008	0.9	0.9
11/30/2008	11.2	14.5
12/31/2008	21.9	26.4
01/31/2009	11.6	13.2
02/28/2009	9.7	11.3
03/31/2009	9.3	10.7
04/30/2009	14.6	21.4
05/31/2009	17.6	42.3
06/30/2009	3.6	43
07/31/2009	9.9	14.1
08/31/2009		
09/30/2009	15.5	33.7
10/31/2009		
11/30/2009		
12/31/2009	16.9	29.5
01/31/2010	12.2	14
02/28/2010	14.4	18.5
03/31/2010	21.6	29.2
04/30/2010	14.5	19.6
05/31/2010	9.9	20.8
06/30/2010	4.8	7.7
07/31/2010	3.6	3.9
08/31/2010		
09/30/2010		
10/31/2010		
11/30/2010	10.3	13
12/31/2010	11.2	13
01/31/2011	14.9	16.8
02/28/2011	13.8	17.3
03/31/2011	13.6	18
04/30/2011	22.6	35.5
05/31/2011	22.5	36
06/30/2011	1.9	3.1
07/31/2011	14.1	22.3
08/31/2011		
09/30/2011		
10/31/2011	18.5	23.7
11/30/2011	11.4	12.5
12/31/2011	18.3	23
01/31/2012	14.8	18
02/29/2012	15.4	17.3
03/31/2012	13.4	17.5
04/30/2012	34	41.8
05/31/2012	26.9	65.5
06/30/2012	12.4	15.5
07/31/2012	3	4.3

Table D-5. Sum of BOD_5 Percent Removal DMR Values	
Monitoring Period	% Removal
07/31/2007	
08/31/2007	
09/30/2007	
10/31/2007	0
11/30/2007	63
12/31/2007	66
01/31/2008	63
02/29/2008	44
03/31/2008	-23
04/30/2008	0
05/31/2008	49
06/30/2008	58
07/31/2008	
08/31/2008	
09/30/2008	
10/31/2008	91
11/30/2008	89
12/31/2008	79
01/31/2009	63
02/28/2009	16
03/31/2009	-145
04/30/2009	-31967
05/31/2009	-69
06/30/2009	19
07/31/2009	59
08/31/2009	
09/30/2009	68
10/31/2009	
11/30/2009	
12/31/2009	-25
01/31/2010	-38
02/28/2010	-32
03/31/2010	-292
04/30/2010	-28
05/31/2010	-224
06/30/2010	-946
07/31/2010	82
08/31/2010	
09/30/2010	
10/31/2010	
11/30/2010	41
12/31/2010	-34
01/31/2011	-96
02/28/2011	-52
03/31/2011	-292
04/30/2011	9
05/31/2011	-43
06/30/2011	21
07/31/2011	56
08/31/2011	
09/30/2011	
10/31/2011	91
11/30/2011	63
12/31/2011	47
01/31/2012	65
02/29/2012	24
03/31/2012	-37
04/30/2012	61
05/31/2012	34
06/30/2012	14
07/31/2012	0

Table D-6: Maximum Effluent Averages Representative of DMRs				
Parameter	**Units**	**Monthly Average 95th Percentile**	**Weekly Average 95th Percentile**	**% Removal 5th Percentile**
BOD_5	mg/L	84.28	195.1	--
	lb/day	32.17	83.05	--
	% Removal	--	--	-292
TSS	mg/L	24.5	42.8	--
	lb/day	9.78	22.74	--
	% Removal	--	--	-34.7
TRC	mg/L	1.03	1.27	--
	lb/day	0.3	0.85	--

TRC = Total Residual Chlorine





Determination of 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. Loading is calculated by multiplying the concentration (in mg/L) by the flow (in million gallons per day [mgd]) and a conversion factor of (8.34 lbs x L)/(mg x 10^6 gallons) which, reflects the following conversions:

- 8.34 lbs = 1 gallon of H_2O
- 1 m^3 = 1000L
- 1000mg = 1g

The mass-based limits, expressed in lbs/day, are calculated as follows based on the design flow:

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

The mass limits for BOD_5 are calculated as follows:

Average Monthly Limit = 30 mg/L × 0.120 mgd × 8.34 = 30 lbs/day

Average Weekly Limit = 45 mg/L × 0.120 mgd × 8.34 = 45 lbs/day

The mass limits for TSS are calculated as follows:

Average Monthly Limit = 30 mg/L × 0.120 mgd × 8.34 = 30 lbs/day

Average Weekly Limit = 45 mg/L × 0.120 mgd × 8.34 = 45 lbs/day

All mass-based limits for BOD_5 and TSS were incorporated into the permit as required per 40 CFR § 122.45(f)(1). The annual average total mass-based loading was based on the EPA-approved SF CWR TMDL, Oct 2003.

Annual Average Total Limit = 8.2 tons/yr × 2000lb/ton × 1 yr/365 days = 44.9 lbs/day

Chlorine

Chlorine is often used to disinfect municipal wastewater prior to discharge. The Elk City facility uses chlorine disinfection.

A 0.5 mg/L average monthly limit for chlorine is derived from standard operating practices. The Water Pollution Control Federation's *Chlorination of Wastewater* (1976) states that a properly designed and maintained wastewater treatment facility can achieve adequate disinfection if a 0.5 mg/L chlorine residual is maintained after 15 minutes of contact time. Therefore, a wastewater treatment facility that provides adequate chlorine contact time can meet a 0.5 mg/L total residual chlorine limit on a monthly average basis. In addition to average monthly limits (AMLs), NPDES regulations require effluent limits for POTWs to be expressed as average weekly limits (AWLs) unless impracticable. For technology-based effluent limits, the AWL is calculated to be 1.5 times the AML, consistent with the "secondary treatment" limits for BOD_5 and TSS. This results in an AWL for chlorine of 0.75 mg/L.

Since the federal regulations at 40 CFR § 122.45 (b) and (f) require limitations for POTWs to be expressed as mass based limits using the design flow of the facility, mass based limits for chlorine are calculated as follows:

Monthly average Limit= 0.5 mg/L x 0.120 mgd x 8.34 = 0.50 lbs/day

Weekly average Limit = 0.75 mg/L x 0.120 mgd x 8.34 = 0.75 lbs/day

These technology-based effluent limits (TBELS) for chlorine are compared to the water quality based effluent limits (WQBELS) calculations for chlorine (see Appendix E). The WQBELs for chlorine are more stringent. Therefore, these TBELs will not be incorporated into the permit as effluent limits.

B. Water Quality-based Effluent Limits

Statutory and Regulatory Basis

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

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

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

Reasonable Potential Analysis

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

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

The reasonable potential analysis for ammonia and chlorine were based on a mixing zone of 25% per IDEQ's draft certification. If the IDEQ does not grant the allowable mixing zone in its final certification of this permit, the water quality based effluent limit will be recalculated such that the criteria are met before the effluent is discharged to the receiving water.

Procedure for Deriving Water Quality-based Effluent Limits

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

1. TMDL-Based Wasteload Allocation

   Where the receiving water quality does not meet water quality standards, the wasteload allocation is generally established by a TMDL. A TMDL is a determination of the

amount of a pollutant from all contributing sources that may be discharged to a water body without causing the water body to exceed the water quality standards for that pollutant.

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

2. Mixing zone based WLA

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

3. Criterion as the Wasteload Allocation

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

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

Summary - Water Quality-based Effluent Limits

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

Ammonia

A reasonable potential calculation showed the Elk City facility discharge would have the reasonable potential to cause or contribute to a violation of the water quality criteria based on DMR data from November/December 31st through June 31st each calendar year from 2007 to 2012. There were limited to no data for ammonia during the months of July, August, September and October. See also Appendix E for the reasonable potential analysis for ammonia.

pH

The Idaho water quality standards at IDAPA 58.01.02.250.01.a, require pH values of the river to be within the range of 6.5 to 9.0. Mixing zones are generally not granted for pH; therefore the most stringent water quality criterion must be met before the effluent is discharged to the

receiving water. The effluent pH data was analyzed from 2007 to 2012, with a total of 47 samples. The 5th and 95 percentile data ranged from 6.5 – 9.68 standard units. The effluent pH range is within the State's water quality criterion of 6.5 – 9.0 standard units with the exception of one exceedance. The EPA is retaining the water quality based limits in the permit because the NPDES regulations require that the permit include the more stringent of either technology based limits or water quality based effluent limits.

TSS

The EPA-approved TMDL (SF CWR TMDL, Oct 2003) provided the Elk City facility with WLAs for total suspended solids (TSS) of 45 mg/L (monthly average) and 60 mg/L (weekly average), and an annual load of 8.2 tons/year based on a 0.12 mgd design flow. These WLAs for concentration are less stringent than the secondary treatment standards. However, the annual mass-based loading WLA of 8.2 ton/yr was incorporated into the permit and adjusted as an average annual daily limit, on account that there are no annual mass-based TBEL loading values. In general, the CWA requires that the effluent limits for a particular pollutant be the more stringent of either technology-based limits or water quality-based limits. Therefore, the secondary treatment standards (technology-based) for average monthly and average weekly concentration were incorporated as proposed effluent limits, with the WLA average annual limit.

E. coli Bacteria

The federal regulations at 40 CFR § 122.44(d)(vii) states:

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

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

The Idaho water quality standards also state that a water sample that exceeds certain "single sample maximum" values indicates a likely exceedance of the geometric mean criterion, although it is not, in and of itself, a violation of water quality standards. For waters designated for secondary contact recreation, the "single sample maximum" value is 576 organisms per 100 ml (IDAPA 58.01.02.251.01.b.i.).

The goal of a water quality-based effluent limit is to ensure a low probability that water quality standards will be exceeded in the receiving water as a result of a discharge, while considering the variability of the pollutant in the effluent. Because a single sample value exceeding 576 organisms per 100 ml indicates a likely exceedance of the geometric mean criterion, the EPA has imposed an instantaneous (single grab sample) maximum effluent limit for *E. coli* of 576 organisms per 100 ml, in addition to a monthly geometric mean limit of 126 organisms per 100

ml, which directly implements the water quality criterion for *E. coli*. This will ensure that the discharge will have a low probability of exceeding water quality standards for *E. coli*.

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

Chlorine

The water quality standards for chlorine are reflected in the acute and chronic numeric criteria for toxic substances for waters designated for aquatic life, recreation, or domestic water supply use (IDAPA 58.01.02.210). These standards were used to determine effluent limits as shown in Appendix E. However, the limits as shown in Table 3 are not quantifiable using EPA-approved analytical methods. Therefore, EPA will use the minimum level of the most sensitive EPA-approved analytical method (50 μg/L) as the compliance evaluation level. The permittee will be considered compliant with the total residual chlorine limits as long as the average monthly and maximum daily effluent chlorine concentrations are less than 50 μg/L and the average monthly and maximum daily chlorine loadings are less than 0.05 lbs/day.

Residues

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

Temperature

The EPA-approved TMDL (SF CWR TMDL, Oct 2003) provided the Elk City facility with two WLAs for temperature. The first WLA requires the permittee to meet the 23°C maximum daily limit over a 24-hour period from May 1st to May 31st. The second WLA requires the permittee to meet the maximum daily limit as specified in Table 4 over a 24-hour period from June 1st to September 30th. The temperature limit from Table 4 will need to correspond to both the Elk Creek flow and the WWTF effluent discharge.

C. Antidegradation

The proposed issuance of an NPDES permit triggers the need to ensure that the conditions in the permit ensure that Tier I, II, and III of the State's antidegradation policy are met. An anti-degradation analysis was conducted by the IDEQ as part of the CWA 401 Certification. See Appendix F.

D. Facility Specific Limits

Table D-8 summarizes the numeric effluent limits that are in the proposed permit. The final limits are the more stringent of technology treatment requirements, water quality based limits or limits retained as the result of anti-backsliding analysis or to meet the State's anti-degradation policy.

Table D-8. Basis for Proposed Facility Specific Effluent Limits

Parameter	Units	Effluent Limits			Basis for Permits Limit
		Average Monthly Limit	Average Weekly Limit	Maximum Daily Limit	
Total Ammonia as N	mg/L	7.7	--	24.1	WQBELs were based on the Idaho WQS (IDAPA 58.01.02.250.02(d)) and Appendix E
	lbs/day	7.7	--	24	
Biochemical Oxygen Demand, Five-Day (BOD_5)	mg/L	30	45	--	Each concentration and loading with, % removal were based on secondary treatment limits; see Appendix D.
	lbs/day	30	45	--	
BOD_5 Removal	Percent	85 (minimum)	--	--	
Total Suspended Solids (TSS)	mg/L	30	45	--	Each concentration and loading with, % removal were based on secondary treatment limits; Tons/yr mass-based loading was based on EPA-approved SF CWR TMDL, Oct 2003; see Appendix D.
	lbs/day	30	45	--	
	tons/yr	8.2			
TSS Removal	Percent	85 (minimum)	--	--	
E. coli Bacteria	#/100 ml	126 (geometric mean)	--	576	WQBELs based on Idaho WQS (IDAPA 58.01.02.251.01(a) and (b)(i))
Temperature, (May 1st to May 31st)	°C	--	--	23	Both maximum daily limits for temperature were based on EPA-approved SF CWR TMDL, Oct 2003 and were incorporated as limits. See Part IV.B (5) for background information.
Temperature, (June 1st to Sept 30th)	°C	--	--	See Part IV.B (5)	
Total Residual Chlorine	µg/L	27	--	47	See Appendix D *Summary - Water Quality-based Effluent Limit* above; see Appendix E for calculations
	lbs/day	0.027	--	0.047	
pH	s.u	6.5 – 9.0			WQBEL with no mixing zone based on Idaho WQS (IDAPA 58.01.02.250)

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

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

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

A. WQBEL Calculations

Mass Balance

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

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

where,

- C_d = Receiving water concentration downstream of the effluent discharge (that is, the concentration at the edge of the mixing zone)
- C_e = Maximum projected effluent concentration
- C_u = 95th percentile measured receiving water upstream concentration
- Q_d = Receiving water flow rate downstream of the effluent discharge = Q_e+Q_u
- Q_e = Effluent flow rate (set equal to the design flow of the WWTF)
- Q_u = Receiving water low flow rate upstream of the discharge (1Q10, 7Q10 or 30B3)

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

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

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

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

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

Where:

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

If a mixing zone is not allowed, dilution is not considered when projecting the receiving water concentration and, the receiving water concentration downstream of the effluent discharge, that is at the edge of the mixing zone, is set equal to the maximum projected effluent concentration

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

Maximum Projected Effluent Concentration

When determining the projected receiving water concentration downstream of the effluent discharge, the EPA's Technical Support Document for Water Quality-based Toxics Controls (TSD, 1991) recommends using the maximum projected effluent concentration (Ce) in the mass balance calculation (see equation 3). To determine the maximum projected effluent concentration (Ce) the EPA has developed a statistical approach to better characterize the effects of effluent variability. The approach combines knowledge of effluent variability as estimated by a coefficient of variation (CV) with the uncertainty due to a limited number of data to project an estimated maximum concentration for the effluent. Once the CV for each pollutant parameter has been calculated, the reasonable potential multiplier (RPM) used to derive the maximum projected effluent concentration (Ce) can be calculated using the following equations:

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

$$p_n = (1 - \text{confidence level})^{1/n} \qquad \text{Equation 5}$$

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

The data set contains 45 ammonia samples collected from the effluent, therefore:

$$p_n = (1 - 0.99)^{1/45}$$
$$p_n = 0.903$$

This means that we can say, with 99% confidence, that the maximum reported effluent ammonia concentration is greater than the 90^{th} percentile.

The data set contains 47 chlorine samples collected from the effluent, therefore:

$p_n = (1 - 0.99)^{1/47}$
$p_n = 0.907$

This means that we can say, with 99% confidence, that the maximum reported effluent chlorine concentration is greater than the 91st 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:

$$RPM = \frac{C_{99}}{C_{P_n}} = \frac{e^{Z_{99} \times \sigma - 0.5 \times \sigma^2}}{e^{Z_{P_n} \times \sigma - 0.5 \times \sigma^2}}$$ Equation 6

Where,

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

B. WQBEL Results and Reasonable Potential Analysis

In the case of ammonia:

CV = coefficient of variation = 2.24
$\sigma^2 = \ln(CV^2 + 1) = 1.79$
$\sigma = \sqrt{\sigma^2} = 1.34$
z = 2.326 for the 99th percentile; 1.281 for the 90th percentile.

$C_{99} = \exp(2.326 \times 1.34 - 0.5 \times 1.79) = 9.19$
$C_{90} = \exp(1.281 \times 1.34 - 0.5 \times 1.79) = 2.26$

$RPM = C_{99}/C_{90} = 9.19/2.26$
RPM = 4.05

In the case of chlorine:

CV = coefficient of variation = 0.46
$\sigma^2 = \ln(CV^2 + 1) = 0.19$
$\sigma = \sqrt{\sigma^2} = 0.44$
z = 2.326 for the 99th percentile; 1.30 for the 90th percentile.

$C_{99} = \exp(2.326 \times 0.44 - 0.5 \times 0.19) = 2.51$

C_{90} = exp (1.30× 0.44 - 0.5 × 0.19) = 1.61

RPM = C_{99}/C_{90} = 2.53/1.61
RPM = 1.57

The maximum projected effluent concentration is determined by simply multiplying the reported 95th percentile effluent concentration by the RPM:

$$C_e = (RPM)(MRC) \qquad \text{Equation 7}$$

where the Maximum Reported Concentration (MRC) is the 95th percentile. Given the DMR (effluent) data submitted by the facility, the daily maximum for ammonia and the weekly average for chlorine were used to calculate reasonable potential using the maximum projected effluent concentrations below.

The maximum projected effluent concentration C_e

For ammonia,

$C_e = (4.07)(83.34\ mg/L) = 339\ mg/L$

For chlorine,

$C_e = (1.57)(1.273\ mg/L) = 2\ mg/L$

Maximum Projected Receiving Water Concentration

As described earlier in this section, if the mixing zone is based on less than complete mixing with the receiving water, the mass-balance equation becomes:

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

This equation allows the permit writer to determine Reasonable Potential at the edge of the acute and chronic mixing zone for both ammonia and chlorine.

Acute Criteria for ammonia,

where,

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

C_e = 339 mg/L

C_u = 0.157 mg/L
Q_e = 0.120 mgd * (1.54 cfs/1 mgd) = 0.185 cfs
Q_u = 1.13 cfs (1Q10)
with a 25% Mixing Zone

$$C_d = \frac{339 \text{ mg/L} \times 0.185 \text{ cfs} + 0.157 \text{ mg/L} \times (1.13 \text{ cfs} \times 25\%)}{0.185 \text{ cfs} + (1.13 \text{ cfs} \times 25\%)} = 134.2 \text{ mg/L}$$

Chronic Criteria for ammonia,

where,
C_d = Receiving water concentration downstream of the effluent discharge (that is, the concentration at the edge of the mixing zone)
C_e = 339 mg/L
C_u = 0.157 mg/L
Q_e = 0.120 mgd * (1.54 cfs/1 mgd) = 0.185 cfs
Q_u = 1.62 cfs (30Q5)
with a 25% Mixing Zone

$$C_d = \frac{339 \text{ mg/L} \times 0.185 \text{ cfs} + 0.157 \text{ mg/L} \times (1.62 \text{ cfs} \times 25\%)}{0.185 \text{ cfs} + (1.62 \text{ cfs} \times 25\%)} = 106.4 \text{ mg/L}$$

The calculations indicate that the receiving water ammonia concentration downstream of the effluent discharge (that is, the concentration at the edge of the mixing zone) for the non-summer season is 134.2 mg/L and 106.4 mg/L for the acute and chronic criteria, respectively.

Acute Criteria for chlorine,

where,
C_d = Receiving water concentration downstream of the effluent discharge (that is, the concentration at the edge of the mixing zone)
C_e = 2 mg/L
C_u = 0 mg/L
Q_e = 0.120 mgd * (1.54 cfs/1 mgd) = 0.185 cfs
Q_u = 1.13 cfs (1Q10)
with a 25% Mixing Zone

$$C_d = \frac{2 \text{ mg/L} \times 0.185 \text{ cfs} + 0 \text{ mg/L} \times (1.13 \text{ cfs} \times 25\%)}{0.185 \text{ cfs} + (1.13 \text{ cfs} \times 25\%)} = 0.79 \text{ mg/L}$$

Chronic Criteria for chlorine,

where,

C_d = Receiving water concentration downstream of the effluent discharge (that is, the concentration at the edge of the mixing zone)
C_e = 2 mg/L
C_u = 0 mg/L
Q_e = 0.120 mgd * (1.54 cfs/1 mgd) = 0.185 cfs
Q_u = 1.47 cfs (7Q10)
with a 25% Mixing Zone

$$C_d = \frac{2\ \text{mg/L} \times 0.185\ \text{cfs} + 0\ \text{mg/L} \times (1.47\ \text{cfs} \times 25\%)}{0.185\ \text{cfs} + (1.47\ \text{cfs} \times 25\%)} = 0.67\ \text{mg/L}$$

The calculations indicate that the receiving water chlorine concentration downstream of the effluent discharge (that is, the concentration at the edge of the mixing zone) for the non-summer season is 0.79 mg/L and 0.67 mg/L for the acute and chronic criteria, respectively.

Reasonable Potential

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

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

The following calculations demonstrate how the water quality-based effluent limits (WQBELs) in the draft permit were calculated.

WQBEL calculations are intended to protect all designated uses. The following discussion presents the general equations used to calculate the water quality-based effluent limits.

Calculate the Wasteload Allocations (WLAs)

Wasteload allocations (WLAs) are calculated using the same mass balance equations used in the beginning of this Appendix to calculate the concentration of the pollutant at the edge of the mixing zone in the reasonable potential analysis. To calculate the wasteload allocations, C_d is set equal to the acute or chronic criterion and the equation is solved for C_e. The calculated C_e is the acute or chronic WLA. Equations 3 and 5 are rearranged to solve for the WLA, becoming:

$$C_e = WLA = \frac{C_d (Q_u \times MZ) + C_d Q_e - (C_u \times (Q_u \times MZ))}{Q_e} \qquad \text{Equation 8}$$

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

$$LTA_{acute} = WLA_{acute} \times e^{(0.5\sigma^2 - z\,\sigma)} \qquad \text{Equation 9}$$

$$LTA_{chronic} = WLA_{chronic} \times e^{(0.5\sigma_4^2 - z\sigma_4)} \qquad \text{Equation 10}$$

where,

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

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

$$LTA_{chronic} = WLA_{chronic} \times e^{(0.5\sigma_{30}^2 - z\sigma_{30})} \qquad \text{Equation 11}$$

where,

σ_{30}^2 = $\ln(CV^2/30 + 1)$

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

Derive the maximum daily and average monthly effluent limits

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

$$MDL = LTA \times e^{(z_m\sigma - 0.5\sigma^2)} \qquad \text{Equation 12}$$

$$AML = LTA \times e^{(z_a\sigma_n - 0.5\sigma_n^2)} \qquad \text{Equation 13}$$

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

σ_n^2 = $\ln(CV^2/n + 1)$
z_a = 1.645 (z-score for the 95th percentile probability basis)
z_m = 2.326 (z-score for the 99th percentile probability basis)
n = number of sampling events required per month; see section A of this appendix above.

For chronic aquatic life criteria, the duration is typically 96-hrs (4-days). As recommended by the TSD, if the AML is based on the LTA_c, (i.e., $LTA_{min} = LTA_c$), the value of ''n'' is set no lower than 4 (corresponding to the 4-day chronic criteria) to ensure that the AML does not exceed the WLA_c. For ammonia however, the criterion is expressed as a 30-day average (i.e., the WLA_c needs to be met on average over a 30-day period). Therefore, if the AML is based on the LTA_c, the value of ''n'' is set no lower than 30.

Calculation is provided below for ammonia.

(1) Ammonia, Outfall 001 (discharge to Elk Creek)

C_d (acute) = 9644µg/L
C_d (chronic) = 3316µg/L
$Q_{u(acute)}$ = 1.13 * (1mgd/1.54 cfs) = 0.73 mgd
$Q_{u(chronic)}$ = 1.62 cfs * (1mgd/1.54 cfs) = 1.04 mgd
C_u = 157 µg/L
Q_e = 0.120 mgd
$C_{e(acute)} = WLA_{(acute)}$
$C_{e(chronic)} = WLA_{(chronic)}$
MZ (acute) = 25% (0.25)
MZ(chronic) = 25% (0.25)

$$WLA_{acute} = \frac{9644 \text{ X } (0.73 \text{ X } 0.25) + (9644 \text{ X } 0.120) - [(157 \text{ X } (0.73 \text{ X } 0.25)]}{0.120} = 24{,}072 \mu g/L$$

$$WLA_{chronic} = \frac{3316 \text{ X } (1.04 \text{ X } 0.25) + (3316 \text{ X } 0.120) - [(157 \text{ X } (1.04 \text{ X } 0.25)]}{0.120} = 10{,}160 \mu g/L$$

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

$LTA_a = WLA_{acute} \times \exp(0.5\sigma^2 - z\,\sigma)$
$LTA_c = WLA_{chronic} \times \exp(0.5\,\sigma_{30}^2 - z\,\sigma_{30})$

where,

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

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

z = 2.326 for 99th percentile probability basis

For Ammonia,

CV = 2.24

$\sigma^2 = \ln(2.24^2 + 1) = 1.79$

$\sigma = \sqrt{\sigma^2} = 1.33$

$\sigma_{30}^2 = \ln(2.24^2/30 + 1) = 0.154$

$\sigma_{30} = \sqrt{\sigma_{30}^2} = 0.39$

z = 2.326 for 99th percentile probability basis

Therefore,

LTA_a = 2618 µg/L

LTA_c = 4399 µg/L

The acute and chronic LTAs are compared and the more stringent is used to develop the daily maximum (MDL) and average monthly (AML) permit limits as shown below. The acute LTA of 2,618 µg/L is more stringent. Therefore, the number of sampling events required per month for ammonia equals 4.

Derive the maximum daily and average monthly effluent limits

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

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

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

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

$\sigma_n^2 = \ln(CV^2/n + 1) = 0.81$

$\sigma_n = \sqrt{\sigma^2} = 0.90$

z_a = 1.645 for 95th percentile probability basis

z_m = 2.326 for 99th percentile probability basis

n = for ammonia the number of sampling events required per month equals 4

CV = 2.24

The water quality based effluent limits for ammonia are:

$$MDL = 2618\ \mu g/L \times \frac{1mg}{1000\mu g} \times 9.19 = 24.1\ mg/L$$
$$AML = 2618\ \mu g/L \times \frac{1mg}{1000\mu g} \times 2.93 = 7.7\ mg/L$$

The associated mass based limits are derived as follows:
MDL = 24.1 × 8.34 × 0.120 = 24 lbs/day
AML = 7.7 × 8.34 × 0.120 = 7.7 lbs/day

Calculation is provided below for chlorine.

(1) Chlorine, Outfall 001 (discharge to Elk Creek)

C_d (acute) = 19 µg/L
C_d (chronic) = 11 µg/L
$Q_{u(acute)}$ = 1.13 cfs* (1mgd/1.54 cfs) = 0.73 mgd
$Q_{u(chronic)}$ = 1.47 cfs * (1mgd/1.54 cfs) = 0.95 mgd
C_u = 0.00 µg/L
Q_e = 0.120 mgd
$C_{e(acute)} = WLA_{(acute)}$
$C_{e(chronic)} = WLA_{(chronic)}$
MZ (acute) = 25% (0.25)
MZ(chronic) = 25% (0.25)

$$WLA_{acute} = \frac{19 \text{ X } (0.73 \text{ X } 0.25) + (19 \text{ X } 0.120) - [(0.00 \text{ X } (0.73 \text{ X } 0.25)]}{0.120} = 47.9\ \mu g/L$$

$$WLA_{chronic} = \frac{11 \text{ X } (0.95 \text{ X } 0.25) + (11 \text{ X } 0.120) - [(0.00 \text{ X } (0.95 \text{ X } 0.25)]}{0.120} = 32.8\ \mu g/L$$

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

$LTA_a = WLA_{acute} \times \exp(0.5\sigma^2 - z\,\sigma)$
$LTA_c = WLA_{chronic} \times \exp(0.5\,\sigma_4^2 - z\,\sigma_4)$

where,

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

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

$\sigma_4 = (\sigma_4^2)^{1/2}$

z = 2.326 for 99th percentile probability basis

For Chlorine,

CV = 0.46

$\sigma^2 = \ln(0.46^2+1) = 0.19$

$\sigma = \sqrt{\sigma^2} = 0.44$

$\sigma_4^2 = \ln(0.46^2/4 + 1) = 0.05$

$\sigma_4 = \sqrt{\sigma_4^2} = 0.23$

z = 2.326 for 99th percentile probability basis

Therefore,

LTA_a = 19.0 µg/L

LTA_c = 19.8 µg/L

The acute and chronic LTAs are compared and the more stringent is used to develop the daily maximum (MDL) and average monthly (AML) permit limits as shown below. The acute LTA of 19.0 µg/L is more stringent. Therefore, the number of sampling events required per month for ammonia equals 4.

Derive the maximum daily and average monthly effluent limits

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

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

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

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

$\sigma_n^2 = \ln(CV^2/n + 1) = 0.05$

$\sigma_n = \sqrt{\sigma^2} = 0.23$

z_a = 1.645 for 95th percentile probability basis

z_m = 2.326 for 99th percentile probability basis

n = for chlorine the number of sampling events required per month equals 4

CV = 0.46

The water quality based effluent limits for chlorine are:

$$\text{MDL} = 19.0\ \mu g/L \times \frac{1mg}{1000\mu g} \times 2.51 = 0.047\ mg/L$$

$$\text{AML} = 19.0\ \mu g/L \times \frac{1mg}{1000\mu g} \times 1.41 = 0.027\ mg/L$$

The associated mass based limits are derived as follows:
MDL = 0.047 × 8.34 × 0.120 = 0.047 lbs/day
AML = 0.027 × 8.34 × 0.120 = 0.027 lbs/day

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

TABLE E-1

This spreadsheet calculates the reasonable potential to exceed state water quality standards for a small number of samples. The procedure and calculations are done per the procedure in Technical Support Document for Water Quality-based Toxics Control, U.S. EPA, March, 1991 (EPA/505/2-90-001) on page 56. User input columns are shown with red headings. Corrected formulas in col G and H on 5/98 (GB)

CALCULATIONS

		State Water Quality Standard		Max concentration at edge of...												
Parameter	Ambient conc. *ug/L*	Acute *ug/L*	Chronic *ug/L*	Acute Mixing Zone *ug/L*	Chronic Mixing Zone *ug/L*	LIMIT REQ'D?	Effluent percentile value	See Footnote A *Pn*	Max effluent conc. measured *ug/L*	Coeff Variation *CV*	See Footnote B *s*	# of samples *n*	Multiplier (See Footnote C)	Acute Dil'n Factor	Chronic Dil'n Factor	COMMENTS
Ammonia	157.00	9644 00	3316.00	134164.04	106438.45	YES	0.99	0 903	83340.00	2.24	1 34	45	4.07	2.53	3.19	
Chlorine	0.00	19.00	11.00	788.21	666.94	YES	0.99	0 907	1273.00	0.46	0.44	47	1.57	2.53	2.99	

A The percentile represented by the highest reported concentration pn = (1 - effluent confidence level)1/n

B Sigma repsented by the formula $\ln(CV^2 + 1)$ with CV equal to the coefficient of variation (standard deviation ÷ mean)

C See Appendix E, equation 8 of the Fact Sheet

Appendix F: Clean Water Act Section 401 Certification

Idaho Department of Environmental Quality

Draft §401 Water Quality Certification

February 19, 2014

NPDES Permit Number(s): Elk City Water and Sewer Association Wastewater Treatment Facility NPDES Permit # ID-002201-2

Receiving Water Body: Elk Creek

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

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

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

Antidegradation Review

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

- Tier 1 Protection. The first level of protection applies to all water bodies subject to Clean Water Act jurisdiction and ensures that existing uses of a water body and the level of water quality necessary to protect those existing uses will be maintained and protected (IDAPA 58.01.02.051.01; 58.01.02.052.01). Additionally, a Tier 1 review is performed for all new or reissued permits or licenses (IDAPA 58.01.02.052.07).
- Tier 2 Protection. The second level of protection applies to those water bodies considered high quality and ensures that no lowering of water quality will be allowed unless deemed necessary to accommodate important economic or social development (IDAPA 58.01.02.051.02; 58.01.02.052.08).
- Tier 3 Protection. The third level of protection applies to water bodies that have been designated outstanding resource waters and requires that activities not cause a lowering of water quality (IDAPA 58.01.02.051.03; 58.01.02.052.09).

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

Pollutants of Concern

The Elk City Water and Sewer Association Wastewater Treatment Facilitydischarges the following pollutants of concern: biochemical oxygen demand (BOD_5), total suspended solids (TSS), *Escherichia coli* (*E. coli*), total residual chlorine, pH, total ammonia, temperature, dissolved oxygen, total nitrogen, nitrate plus nitrite, total dissolved solids, and oil and grease. Effluent limits have been developed for BOD_5, TSS, *E. coli*, total residual chlorine, pH, temperature and total ammonia. No effluent limits are proposed for dissolved oxygen, total nitrogen, nitrate plus nitrite, total dissolved solids, and oil and grease.

Receiving Water Body Level of Protection

The Elk City Water and Sewer Association Wastewater Treatment Facilitydischarges to Elk Creek within the South Fork Clearwater assessment unit (AU) ID17060305CL056_03 (Elk Creek – confluence of Big Elk & Little Elk Creeks to mouth). Elk Creek is undesignated. DEQ presumes undesignated waters in the state will support cold water aquatic life and secondary contact recreation beneficial uses; therefore, undesignated waters are protected for these uses (IDAPA 58.01.02.101.01.a). In addition to these uses, salmonid spawning has been identified as an existing use based on the *South Fork Clearwater River Subbasin Assessment and Total Maximum Daily Loads* (2004).

The cold water aquatic life and salmonid spawning uses in the Elk Creek AU are not fully supported due to excess temperature (2010 Integrated Report). The secondary contact recreation beneficial use is fully supported. As such, DEQ will provide Tier 1 protection only for the aquatic life use and salmonid spawning and Tier 2 protection, in addition to Tier 1, for the recreation beneficial use (IDAPA 58.01.02.051.02; 58.01.02.051.01).

Protection and Maintenance of Existing Uses (Tier 1 Protection)

As noted above, a Tier 1 review is performed for all new or reissued permits or licenses, applies to all waters subject to the jurisdiction of the Clean Water Act, and requires demonstration that existing uses and the level of water quality necessary to protect existing uses shall be maintained and protected. In order to protect and maintain designated and existing beneficial uses, a permitted discharge must comply with narrative and numeric criteria of the Idaho WQS, as well as other provisions of the WQS such as Section 055, which addresses water quality limited waters. The numeric and narrative criteria in the WQS are set at levels that ensure protection of designated beneficial uses. The effluent limitations and associated requirements contained in the Elk City Water and Sewer Association Wastewater Treatment Facilitypermit are set at levels that ensure compliance with the narrative and numeric criteria in the WQS.

Water bodies not supporting existing or designated beneficial uses must be identified as water quality limited, and a total maximum daily load (TMDL) must be prepared for those pollutants causing impairment. A central purpose of TMDLs is to establish wasteload allocations for point source discharges, which are set at levels designed to help restore the water body to a condition that supports existing and designated beneficial uses. Discharge permits must contain limitations that are consistent with wasteload allocations in the approved TMDL.

In the absence of a TMDL and depending upon the priority status for development of a TMDL, the WQS stipulate that either there be no further impairment of the designated or existing beneficial uses or that the total load of the impairing pollutant remains constant or decreases (IDAPA 58.01.02.055.04 and 58.01.02.055.05). Discharge permits must comply with these provisions of Idaho WQS.

The EPA-approved *South Fork Clearwater River Subbasin Assessment and Total Maximum Daily Loads* (2004) establishes wasteload allocations for temperature. These wasteload allocations are designed to ensure Elk Creek will achieve the water quality necessary to support its existing and designated aquatic life beneficial uses and comply with the applicable numeric and narrative criteria. The effluent limitations and associated requirements contained in the Elk City Water and Sewer Association Wastewater Treatment Facilitypermit are set at levels that comply with these wasteload allocations.

In sum, the effluent limitations and associated requirements contained in the Elk City Water and Sewer Association Wastewater Treatment Facilitypermit are set at levels that ensure compliance with the narrative and numeric criteria in the WQS and the wasteload allocations established in the *South Fork Clearwater River Subbasin Assessment and Total Maximum Daily Loads*. Therefore, DEQ has determined the permit will protect and maintain existing and designated beneficial uses in Elk Creek in compliance with the Tier 1 provisions of Idaho's WQS (IDAPA 58.01.02.051.01 and 58.01.02.052.07).

High-Quality Waters (Tier 2 Protection)

Elk Creek is considered high quality for recreation beneficial uses. As such, the water quality relevant to recreation beneficial uses of Elk Creek must be maintained and protected, unless a lowering of water quality is deemed necessary to accommodate important social or economic development.

To determine whether degradation will occur, DEQ must evaluate how the permit issuance will affect water quality for each pollutant that is relevant to recreation beneficial uses of Elk Creek (IDAPA 58.01.02.052.05). This includes *E. coli* bacteria**.** Effluent limits are set in the proposed and existing permit for this pollutant.

For a reissued permit or license, the effect on water quality is determined by looking at the difference in water quality that would result from the activity or discharge as authorized in the current permit and the water quality that would result from the activity or discharge as proposed in the reissued permit or license (IDAPA 58.01.02.052.06.a). For a new permit or license, the effect on water quality is determined by reviewing the difference between the existing receiving water quality and the water quality that would result from the activity or discharge as proposed in the new permit or license (IDAPA 58.01.02.052.06.a).

Pollutants with Limits in the Current and Proposed Permit

For pollutants that are currently limited and will have limits under the reissued permit, the current discharge quality is based on the limits in the current permit or license (IDAPA 58.01.02.052.06.a.i), and the future discharge quality is based on the proposed permit limits (IDAPA 58.01.02.052.06.a.ii). For the Elk City Water and Sewer Association Wastewater Treatment Facility permit, this means determining the permit's effect on water quality based upon the limits for biochemical oxygen demand (BOD_5), total suspended solids (TSS), *E. coli*, total residual chlorine, and pH in the current and proposed permits. Table 1 provides a summary of the current permit limits and the proposed or reissued permit limits.

Table 1. Comparison of current and proposed permit limits for pollutants of concern.

Pollutant	Units	Current Permit			Proposed Permit			Change[a]
		Average Monthly Limit	Average Weekly Limit	Single Sample Limit	Average Monthly Limit	Average Weekly Limit	Single Sample Limit	
Pollutants with limits in both the current and proposed permit								
Five-Day BOD	mg/L	45	65	—	30	45	—	D
	lb/day	45	65	—	30	45	—	
TSS	mg/L	70	105	—	30	45	—	D
	lb/day	70	105	—	30	45	—	
pH	standard units	6.5–9.0 all times			6.5–9.0 all times			NC
E. coli	no./100 mL	126		406	126		576	I
Total Residual Chlorine (final)		0.5 mg/L	0.75 mg/L	—	27 µg/L	—	47 µg/L	D
	lb/day	0.5	0.75	—	0.027	—	0.047	
Pollutants with new limits in the proposed permit								
Temperature	°C	—	—	—	—	—	23	New, TMDL
	Btu (million)/day	—	—	—	—	—	—	
Total Ammonia	mg/l	—	—	—	7.7	—	24.1	New
	lbs/day	—	—	—	7.7		24	

[a] NC = no change, I = increase, D = decrease.

The proposed permit limits for pollutants of concern that have limits in Table 1, BOD_5, TSS, total residual chlorine, and pH, are the same as, or more stringent than, those in the current permit ("NC" or "D" in change column). *E. coli* is shown to have an increase because the current permit used the surface water quality criteria for *E. coli* for primary contact recreation. Elk Creek is presumed to support secondary contact recreation; therefore the permit was changed to reflect the single sample maximum of 576 *E. coli* organisms per 100ml for surface water quality criteria for secondary contact recreation (IDAPA 58.01.02.251.01.b). Therefore, no adverse change in water quality and no degradation will result from the discharge of these pollutants.

New Permit Limits for Pollutants Currently Discharged

When new limits are proposed in a reissued permit for pollutants in the existing discharge, the effect on water quality is based upon the current discharge quality and the proposed discharge quality resulting from the new limits. Current discharge quality for pollutants that are not currently limited is based upon available discharge quality data (IDAPA 58.01.02.052.06.a.i). Future discharge quality is based upon proposed permit limits (IDAPA 58.01.02.052.06.a.ii).

The proposed permit for Elk City Water and Sewer Association Wastewater Treatment Facility includes new limits for temperature and total ammonia (Table 1). Temperature limits were

included in the permit to be consistent with the wasteload allocations in the approved *South Fork Clearwater River Subbasin Assessment and Total Maximum Daily Loads*. Ammonia limits were included in the permit to be consistent with surface water quality criteria for cold water aquatic life use designations (IDAPA 58.01.02.250.02.d). The temperature and ammonia limits in the proposed permit reflect a maintenance or improvement in water quality from current conditions. Therefore, no adverse change in water quality and no degradation will occur with respect to these pollutants.

Pollutants with No Limits

No effluent limits are proposed for dissolved oxygen, total nitrogen, nitrate plus nitrite, total dissolved solids, and oil and grease. However, monitoring is being required to gather effluent and surface water data to determine the nature and effect of these pollutants on the water quality of the receiving water and determine if additional effluent limitations are needed in the future.

In sum, DEQ concludes that this discharge permit complies with the Tier 2 provisions of Idaho's WQS (IDAPA 58.01.02.051.02 and IDAPA 58.01.02.052.06).

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

Additional Monitoring

The permit requires the Elk City Water and Sewer Association Wastewater Treatment Facility to conduct temperature monitoring upstream from the WWTF outfall. This certification does not require any additional monitoring than those set for in the draft NPDES permit.

Mixing Zones

Pursuant to IDAPA 58.01.02.060, DEQ authorizes a mixing zone that utilizes 25% of the critical flow volume of Elk Creek for ammonia and chlorine as is proposed in the draft NPDES permit.

Other Conditions

This certification is conditioned upon the requirement that any material modification of the permit or the permitted activities—including without limitation, any modifications of the permit to reflect new or modified TMDLs, wasteload allocations, site-specific criteria, variances, or other new information—shall first be provided to DEQ for review to determine compliance with Idaho WQS and to provide additional certification pursuant to Section 401.

Right to Appeal Final Certification

The final Section 401 Water Quality Certification may be appealed by submitting a petition to initiate a contested case, pursuant to Idaho Code § 39-107(5) and the "Rules of Administrative

Procedure before the Board of Environmental Quality" (IDAPA 58.01.23), within 35 days of the date of the final certification.

Questions or comments regarding the actions taken in this certification should be directed to Sujata Connell, Lewiston Regional Office at 208-799-4370 or Sujata.Connell@deq.idaho.gov.

DRAFT

John Cardwell
Regional Administrator
Lewiston Regional Office