Fact Sheet

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Proposed Issuance of a National Pollutant Discharge Elimination System (NPDES) Permit to Discharge Pollutants Pursuant to the Provisions of the Clean Water Act (CWA)

Idaho Department of Fish and Game
Kootenai River Nutrient Injection Site

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

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

401 Certification
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:

Idaho Department of Environmental Quality
2110 Ironwood Parkway
Coeur d'Alene, ID 83814

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 EPA as described in the Public Comments Section of the attached Public Notice.

After the Public Notice expires, and all comments have been considered, EPA's regional Director for the Office of Water and Watersheds will make a final decision regarding permit issuance. If no substantive comments are received, the tentative conditions in the draft permit will become final, and the permit will become effective upon issuance. If substantive comments are received, 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.

Documents are Available for Review
The draft NPDES permit and related documents can be reviewed or obtained by visiting or contacting EPA's Regional Office in Seattle between 8:30 a.m. and 4:00 p.m., Monday through Friday at the address below. The draft 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
1435 North Orchard Street
Boise, Idaho 83706
(208) 378-5746

Idaho Department of Environmental Quality
2110 Ironwood Parkway
Coeur d'Alene, ID 83301
(208) 769-1422

Boundary County Public Library
6370 Kootenai Street
Bonners Ferry, ID 83805
(208) 267-3750

Acronyms

1Q10	1 day, 10 year low flow
7Q10	7 day average, 10 year low flow
30Q5	30 day average, 5 year low flow
BA	Biological Assessment
BMP	Best Management Practices
ºC	Degrees Celsius
CFR	Code of Federal Regulations
CFS	Cubic Feet per Second
CWA	Clean Water Act
DMR	Discharge Monitoring Report
EFH	Essential Fish Habitat
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
HUC	Hydrologic Unit Code
IDEQ	Idaho Department of Environmental Quality
IDFG	Idaho Department of Fish and Game
KTOI	Kootenai Tribe of Idaho
lb/day	Pounds per day
mg/L	Milligrams per liter
ML	Minimum Level
µg/L	Micrograms per liter
N	Nitrogen
NEPA	National Environmental Policy Act
NPDES	National Pollutant Discharge Elimination System
OWW	Office of Water and Watersheds
QAP	Quality assurance plan
RP	Reasonable Potential
RWC	Receiving Water Concentration
s.u.	Standard Units
TOC	Total Organic Carbon
TSD	*Technical Support Document for Water Quality-based Toxics Control*

	(EPA/505/2-90-001)
USFWS	U.S. Fish and Wildlife Service
USGS	United States Geological Survey
WQBEL	Water quality-based effluent limit
WQS	Water Quality Standards

I. Applicant

A. General Information

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

Idaho Department of Fish and Game
Kootenai River Nutrient Application
NPDES Permit # ID-002829-1

Physical Address:
Kootenai River immediately downstream of the Montana line, near Leonia, Idaho.

Mailing Address:
Idaho Department of Fish and Game
2885 West Kathleen Avenue
Coeur d'Alene, ID 83815

Contacts:
Charlie Holderman, Aquatic Research Biologist, Kootenai Tribe of Idaho
Ryan Hardy, Senior Fishery Research Biologist, Idaho Department of Fish and Game

II. Facility Information

The purpose of this discharge is to reverse the depletion of nutrients in the Kootenai River. Libby Dam and Lake Kookanusa are responsible for this depletion and the resulting decline in primary productivity in the river (Hardy and Holderman). Lake Kookanusa retains about 63% of its total phosphorus and about 25% of its total nitrogen. According to the Kootenai Tribe of Idaho (KTOI) and the Idaho Department of Fish and Game (IDFG), the addition of nutrients will stimulate food web production and help restore populations of trout, kokanee, mountain whitefish, and white sturgeon (Hardy and Holderman).

III. Receiving Water

This facility discharges to the Kootenai River near Leonia, Idaho and the Idaho-Montana border, at approximately river mile 171.5.

A. Low Flow Conditions

The *Technical Support Document for Water Quality-Based Toxics Control* (hereafter referred to as the TSD) (EPA, 1991) and the Idaho Water Quality Standards (WQS) recommend the flow conditions for use in determining whether water quality-based effluent limits are necessary (this process is called a "reasonable potential analysis") calculating water quality-based effluent limits (WQBELs) using steady-state modeling. The TSD and the Idaho WQS state that WQBELs intended to protect aquatic life uses should be based on the lowest seven-day average flow rate expected to occur once every ten years (7Q10) for chronic aquatic life criteria, the lowest one-day average flow rate expected to occur once every ten years (1Q10) for acute aquatic life criteria, the harmonic mean for human health criteria for carcinogens,

and the lowest 30-day average flow rate expected to occur once every five years (30Q5) for human health criteria for non-carcinogens. For the proposed discharge season (June through September), the 1Q10 flow rate of the Kootenai River is 3,110 CFS, the 7Q10 flow rate is 3290 CFS, and the 30Q5 flow rate is 5260 CFS.

B. Water Quality Standards

Section 301(b)(1)(C) of the CWA requires the development of limitations in permits necessary to meet water quality standards by July 1, 1977. Federal regulations at 40 CFR 122.4(d) require that the conditions in NPDES permits ensure compliance with the water quality standards of all affected States. A State's water quality standards are composed of use classifications, numeric and/or narrative water quality criteria, and an anti-degradation policy. The use classification system designates the beneficial uses (such as drinking water supply, contact recreation, and aquatic life) that each water body is expected to achieve. The numeric and/or narrative water quality criteria are the criteria deemed necessary by the State to support the beneficial use classification of each water body. The anti-degradation policy represents a three-tiered approach to maintain and protect various levels of water quality and uses.

The segment of the Kootenai River to which the permittee discharges is designated in Section 110.02 of the WQS for the beneficial uses of cold water aquatic life habitat, salmonid spawning, primary contact recreation, and drinking water supply. This segment of the Kootenai River is also designated as a "Special Resource Water." This designation places additional restrictions on point source discharges through Section 400.01(b) of the WQS. It reads, in relevant part:

> "….No new point source can discharge pollutants, and no existing point source can increase its discharge of pollutants above the design capacity of its existing wastewater treatment facility, to any water designated as a special resource water or to a tributary of, or to the upstream segment of a special resource water: if pollutants significant to the designated beneficial uses can or will result in a reduction of the ambient water quality of the receiving special resource water as measured immediately below the applicable mixing zone."

EPA does not anticipate that the discharge will result in a reduction of the ambient water quality of this special resource water. On the contrary, EPA expects that IDFG's and KTOI's objectives to improve the Kootenai River ecosystem will be met, and the discharge will improve water quality downstream of the outfall, if the permittee maintains compliance with its NPDES permit.

In addition, WQS state, in Section 100, that all waters of the State of Idaho are protected for the uses of industrial and agricultural water supply (100.03.b. and c.), wildlife habitats (100.04.) and aesthetics (100.05.). The WQS state, in Sections 252.02, 252.03, and 253 that these uses are to be protected by narrative criteria which appear in Section 200. These narrative criteria state that all surface waters of the State shall be free from hazardous materials; toxic substances; deleterious materials; radioactive materials; floating, suspended or submerged matter; excess nutrients; oxygen-demanding materials; and sediment in concentrations which would impair beneficial uses. The WQS also state, in Section 252.02 that the criteria from Water Quality Criteria 1972, also referred to as the "Blue Book" (EPA-

R3-73-033) can be used to determine numeric criteria for the protection of the agricultural water supply use.

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

Below are the proposed effluent limits that are in the draft permit.

1. The permittee must not discharge excess nutrients in amounts that can cause visible slime growths or other nuisance aquatic growths impairing designated beneficial uses of the receiving water (see IDAPA 58.01.02.200.06).

Table 1: Proposed Effluent Limits

Parameter	Units	Minimum Monthly Average Limit
Effluent Dilution Ratio, Net, 10-34-0	Ratio	53,000,000:1

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 permittee is responsible for conducting the monitoring and for reporting results on Discharge Monitoring Reports (DMRs) or on the application for renewal, as appropriate, to the U.S. Environmental Protection Agency (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. Table 2, below, presents the proposed effluent monitoring requirements. If no discharge occurs during the reporting period, "no discharge" shall be reported on the DMR.

1. The monthly average dilution ratio must be calculated as the mean of the daily average dilution factors recorded during a calendar month.
2. The daily average dilution ratio must be calculated using the following equation:

   Daily Avg. Dilution Ratio = (Daily Avg. River Flow + Daily Avg. Effluent Flow) ÷ Daily Avg. Effluent Flow

Table 2: Effluent Monitoring Requirements

Parameter	Units	Sample Frequency	Sample Type	Statistics to Report[1]
Flow, Net, 10-34-0	cubic feet/day	Daily	Measure	MA, DM
Flow, Gross	cubic feet/day	Daily	Measure	MA, DM
Effluent Dilution Ratio, Net, 10-34-0	ratio	Daily	Calculation	MA, Dm, DM
Effluent Dilution Ratio, Gross	ratio	Daily	Calculation	MA, Dm, DM
Total Phosphorus	lb/day	Daily	Calculation	MA, DM
Total Nitrogen	lb/day	Daily	Calculation	MA, DM
Total Ammonia as N	lb/day	Daily	Calculation	MA, DM

Notes:
1. MA means "Monthly Average," Dm means "Daily Minimum," DM means "Daily Maximum."

C. Surface Water Monitoring

Table 3, below, presents the proposed surface water monitoring requirements for the draft permit. Permittees have the option of taking more frequent samples than are required under the permit. Surface water monitoring results must be submitted with the application for permit renewal.

Upstream and downstream monitoring of total organic carbon (TOC) is required because of concerns that, if the TOC concentration in the receiving water exceeds 2 mg/L, the receiving water may be unsuitable as a drinking water source for the City of Bonners Ferry. The permit also requires that the permittee report to DEQ and to the City of Bonners Ferry within 24 hours of discovery if, at any time, TOC concentrations greater than 2 mg/L are observed at the City's drinking water intake.

Table 3: Receiving Water Monitoring Requirements

Parameter (units)	Units	Sample Locations	Sample Frequency	Sample Type
Flow	CFS	USGS Station #12305000	Daily[1]	Measure
Total Phosphorus	µg/L	Upstream and downstream	1/month[2]	Grab
Total Nitrate as N	mg/L	Upstream and downstream	1/month[2]	Grab
Nitrate + Nitrite as N	mg/L	Upstream and downstream	1/month[2]	Grab
Total Ammonia as N	mg/L	Upstream and downstream	1/month[2]	Grab
Total Organic Carbon	mg/L	Upstream and at the City of Bonners Ferry drinking water intake	1/week[3]	Grab
pH	s.u	Upstream	1/month[2]	Grab
Temperature	ºC	Upstream	1/month[2]	Grab

Table 3: Receiving Water Monitoring Requirements
Notes: 1. The permittee must obtain and record the daily mean receiving water flow rate for every day in which a discharge occurs. 2. The permittee must sample the receiving water once during every calendar month in which a discharge occurs. Receiving water sampling must be performed on a day in which a discharge occurs. 3. The permittee must sample the receiving water once during every calendar week in which a discharge occurs.

VI. Other Permit Conditions

A. Quality Assurance Plan

The federal regulation at 40 CFR 122.41(e) requires the permittee to develop procedures to ensure that the monitoring data submitted is accurate and to explain data anomalies if they occur. The Idaho Department of Fish and Game is required to complete the Quality Assurance Plan within 180 days of the effective date of the final permit. The Quality Assurance Plan shall consist of standard operating procedures the permittee must follow for collecting, handling, storing and shipping samples, laboratory analysis, and data reporting.

B. Best Management Practices Plan

The permit requires the Idaho Department of Fish and Game to properly operate and maintain all facilities and control systems. 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 a best management practices plan for their facility within 180 days of the effective date of the final permit. The plan shall be retained on site and made available to EPA and IDEQ upon request.

C. Standard Permit Provisions

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

VII. Other Legal Requirements

A. Endangered Species Act

The Endangered Species Act requires federal agencies to consult with National Oceanic and Atmospheric Administration Fisheries (NOAA Fisheries) and the U.S. Fish and Wildlife Service (USFWS) if their actions could beneficially or adversely affect any threatened or endangered species. On February 22, 2005, a Biological Assessment (BA) prepared by Ryan Hardy of the Idaho Department of Fish and Game and Charlie Holderman of the Kootenai Tribe of Idaho was submitted to USFWS. The BA contained findings of “not likely to

adversely affect" for white sturgeon, bull trout, bald eagle, grizzly bear, gray wolf, and Canada lynx. In a letter dated May 16, 2005, USFWS concurred with these findings.

EPA will provide copies of the fact sheet and draft permit to USFWS during the public comment period. EPA will consider any comments made by USFWS on the draft permit prior to issuance.

Due to the multiple dams on the Columbia and Kootenai Rivers downstream of the discharge, there are no endangered anadromous fish species in the vicinity of the discharge. Therefore the discharge will have no effect on any such species.

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 (January 21, 1999) requires 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 and/or quantity of EFH and may include direct (e.g. contamination or physical disruption), indirect (e.g. loss of prey, reduction in species' fecundity), site specific, or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions.

EPA has determined that issuance of this permit will not affect EFH in the vicinity of the discharge. Therefore, consultation is not require for this action.

C. State Certification

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

D. Permit Expiration

The permit will expire five years from the effective date.

VIII. References

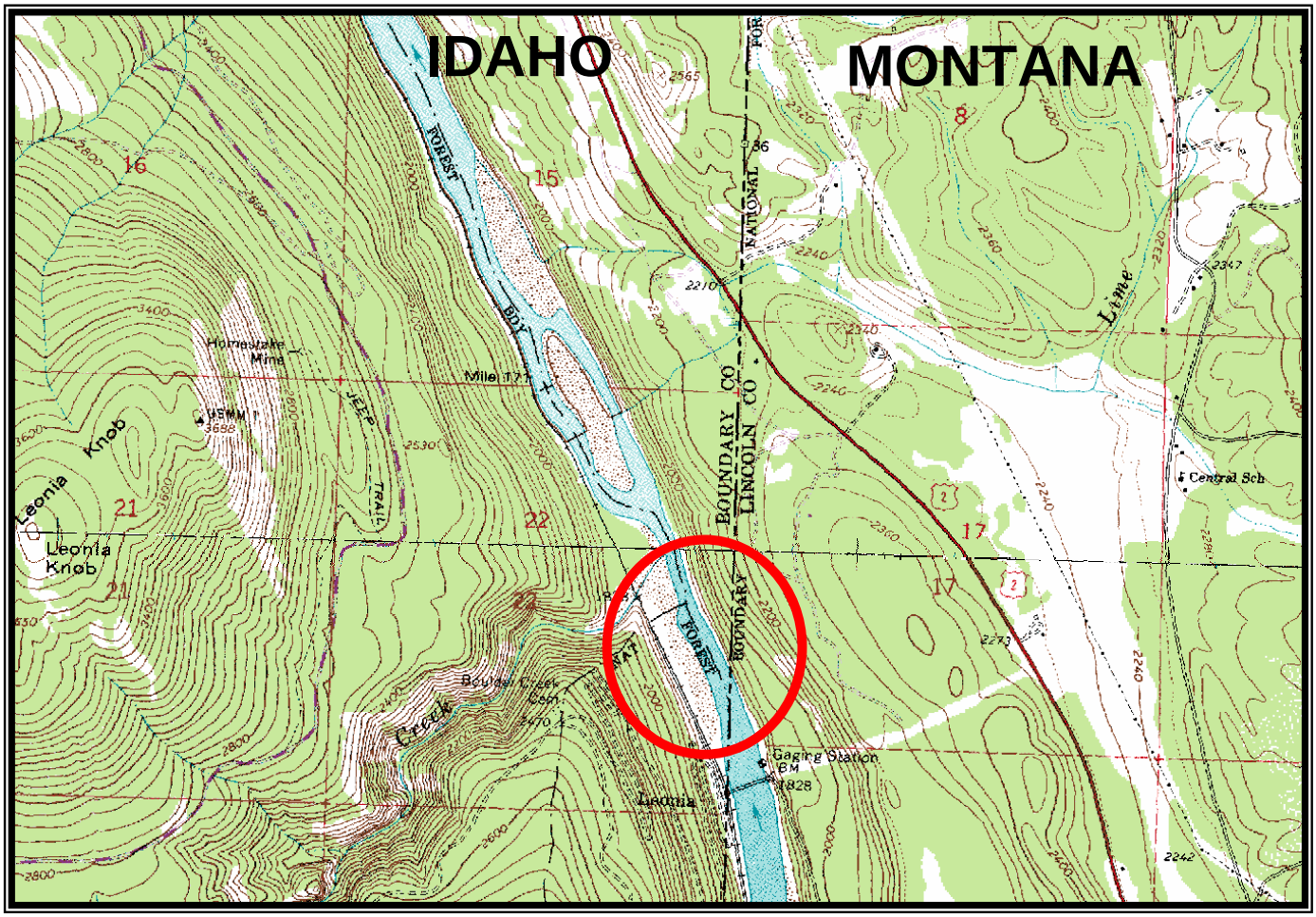
EPA. 1991. *Technical Support Document for Water Quality-based Toxics Control.* US Environmental Protection Agency, Office of Water, EPA/505/2-90-001.

Hardy, Ryan S. and Charlie Holderman. *Kootenai River Fisheries Investigations Ecosystem Rehabilitation Project: Nutrient Restoration Work Plan.*

Hardy, Ryan S. and Charlie Holderman. *Biological Assessment for Proposed Nutrient Restoration of the Kootenai River, Idaho.* Submitted to USFWS on February 22, 2005.

IDAPA 58. 2004. *Water Quality Standards and Wastewater Treatment Requirements.* Idaho Department of Environmental Quality Rules., Title 01, Chapter 02.

Appendix A: Facility Map



Appendix B: 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

There are no Federal effluent limit guidelines for facilities of this type, and it is not feasible for EPA to develop "best professional judgment" technology-based effluent limits for this discharge. Therefore, no technology-based effluent limits have been imposed on this discharge.

B. Water Quality-based Effluent Limits

Statutory and Regulatory Basis

Section 301(b)(1)(C) of the CWA requires the development of limitations in permits necessary to meet water quality standards by July 1, 1977. Discharges to State or Tribal waters must also comply with limitations imposed by the State or Tribe as part of its certification of NPDES permits under section 401 of the CWA. Federal regulations at 40 CFR 122.4(d) prohibit the issuance of an NPDES permit that does not ensure compliance with the water quality standards of all affected States. The NPDES 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.

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

Reasonable Potential Analysis

When evaluating the effluent to determine if water quality-based effluent limits are needed, based on numeric criteria, EPA projects the receiving water concentration (downstream of where the effluent enters the receiving water) for each pollutant of concern. EPA uses the concentration of the pollutant in the effluent and receiving water and, if appropriate, the dilution available from the receiving water, to project the receiving water concentration. If the projected concentration of the pollutant in the receiving water exceeds the numeric criterion for that specific chemical, then the discharge has the reasonable potential to cause or contribute to an exceedance of the applicable water quality standard, and a water quality-based effluent limit is required.

Sometimes it is appropriate to allow a small area of the receiving water to provide dilution of the effluent. These areas are called mixing zones. Mixing zone allowances will increase the mass loadings of the pollutant to the water body and will decrease treatment requirements. Mixing

zones can be used only when there is adequate receiving water flow volume and when the receiving water meets the criteria necessary to protect the designated uses of the water body. Mixing zones must be authorized by IDEQ. If IDEQ does not grant a mixing zone, the water quality-based effluent limits will be recalculated such that the criteria are met before the effluent is discharged to the receiving water. EPA believes that a mixing zone would be appropriate for this discharge, due to the purpose of the discharge (to increase nutrient concentrations in the Kootenai River above their current ultra-oligotrophic levels) and because the effluent flow rate will be extremely small compared to the river flow rate (the minimum ratio of river flow to effluent flow is expected to be 2.2 million to 1).

Procedure for Deriving Water Quality-based Effluent Limits

The procedure EPA followed to develop water quality-based effluent limits for this permit is decribed in Appendix D.

C. Facility-Specific Water Quality-based Limits

Effluent Dilution Ratio for 10-34-0 Fertilizer

EPA has determined that the phosphorus in the discharge has the reasonable potential to cause or contribute to violations of Idaho's narrative criteria for nutrients. However, reducing the effluent phosphorus loading or concentration would be counter to the discharge's intended purpose, which is to increase in-stream nitrogen and phosphorus concentrations in order to stimulate production in the Kootenai River's depleted food web. EPA has determined that the discharge will not cause or contribute to violations of Idaho's narrative water quality criteria for nutrients or metals as long as the effluent dilution ratio for 10-34-0 ammonium polyphosphate fertilizer is at least 53 million to 1 on a monthly average basis.

EPA has determined that the discharge of urea ammonium nitrate fertilizer (32-0-0) will not cause or contribute to water quality standards violations even under critical conditions for dilution (maximum effluent flow paired with low receiving water flow), therefore there are no effluent limits on the discharge of 32-0-0 fertilizer, or on the combined effluent of 32-0-0 and 10-34-0 fertilizers.

Appendix C: Reasonable Potential Calculations

The following describes the process 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. EPA uses the process described in the *Technical Support Document for Water Quality-based Toxics Control* (EPA, 1991) to determine reasonable potential.

To determine if there is reasonable potential for the discharge to cause or contribute to an exceedance of water quality criteria for a given pollutant, EPA compares the maximum projected receiving water concentration to the criteria for that pollutant. If the projected receiving water concentration exceeds the criteria, there is reasonable potential, and a water quality-based effluent limit must be included in the permit. This discussion shows the general procedure and equations EPA followed to determine reasonable potential, and works through the specific case of total phosphorus

A. Mass Balance

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

$$C_dQ_d = C_eQ_e + C_uQ_u \qquad \text{(Equation C-1)}$$

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

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

$$C_d = \frac{C_eQ_e + C_uQ_u}{Q_e + Q_u} \qquad \text{(Equation C-2)}$$

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

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

Where MZ is the fraction of the receiving water flow available for dilution. Idaho's mixing zone rules (IDAPA 58.01.02.060.01.e.iv.) require that mixing zones not exceed 25% of the volume of the stream flow. Therefore, in this case, MZ is equal to 25%, or 0.25 except when evaluating the reasonable potential to cause or contribute to violations of Idaho's narrative criteria for nutrients.

This is because the deleterious effects of excess nutrients are generally observed over large areas and over long periods of time. EPA has therefore evaluated the impact of the discharge of nutrients on the river based on 100% mixing. This is in contrast to the toxic effects of metals and other toxic compounds on aquatic life, where the effects can be observed near the outfall and over short periods of time (e.g. 1 hour for acute toxicity).

Dilution Factors

Equation C-3 can be simplified by introducing a "dilution factor,"

$$D = \frac{Q_e + (MZ \times Q_u)}{Q_e} \qquad \text{(Equation C-4)}$$

There are eight different values for the dilution factor. Four of these are based on the gross effluent flow rate, and another four are based only on the net effluent flow rate of only the 10-34-0 fertilizer. This is because certain pollutants are expected be present in significant amounts only in the 10-34-0 fertilizer, notably metals and phosphorus.

The acute dilution factor is based on the dilution expected after initial mixing, approximately 2.2 meters downstream from the outfall, where the width of the effluent plume is expected to be approximately 1.5 meters. The *Nutrient Restoration Work Plan* states that the gross dilution at this point is expected to be 60,000:1 (Hardy and Holderman). Since the net flow of the 10-34-0 fertilizer is diluted in the gross effluent by a factor of 6.95:1, the net acute dilution ratio for the total effluent is equal to 417,000:1 (60,000 × 6.95 = 417,000).

The chronic and human health dilution factors are based on mixing of the effluent with 25% of the 7Q10 and 30Q5 flow rates, respectively. The nutrient dilution factor is based on mixing of the effluent with 100% of the 30Q5 flow rate. All dilution factors are calculated with the effluent flow rate set equal to the maximum expected flow rates of 146 liters/hour for the total effluent and 21 liters/hour for the 10-34-0 fertilizer. The dilution factors are listed in Table C-1, below. However, since only the 10-34-0 fertilizer contains pollutants which can cause acute or chronic toxicity to aquatic life (i.e. metals), the total effluent dilution factors for acute and chronic toxicity were not used in the reasonable potential calculations.

Table C-1: Dilution Factors

Type	Acute Dilution Factor[1]	Chronic Dilution Factor[2]	Human Health Dilution Factor[3]	Nutrient Dilution Factor[4]
Total Effluent (gross)	60,000	574,000	918,000	3,670,000
10-34-0 Only (net)	417,000	3,990,000	6,380,000	25,500,000

Notes:
1. The acute dilution factor is based on the dilution expected in the near-field, 2.2 meters downstream of the outfall (see Table 1, Page 15 of the *Nutrient Restoration Work Plan*).
2. The chronic dilution factor is based on the maximum effluent flow mixing with 25% of the 7Q10 river flow.
3. The human health dilution factor is based on the maximum effluent flow mixing with 25% of the 30Q5 river flow.
4. The nutrient dilution factor is based on the maximum effluent flow mixing with 100% of the 30Q5 river flow.

After the dilution factor simplification, Equation C-3 becomes:

$$C_d = \frac{C_e - C_u}{D} + C_u \qquad \text{(Equation C-5)}$$

Dissolved Metals

The criteria for cadmium, chromium, copper and zinc are expressed as dissolved metal, and are dependent on the hardness of the receiving water. EPA has made the conservative assumption that 100% of the metal in the effluent will manifest itself in the receiving water as dissolved metal. EPA has also assumed that the hardness of the receiving water was equal to the 5th percentile of the available USGS data. This is a conservative assumption, because metals criteria become less stringent as hardness increases. EPA evaluated only the 10-34-0 fertilizer for its reasonable potential to cause or contribute to water quality standards violations for metals, because data submitted by the permittee show that the 32-0-0 fertilizer contains low concentrations of metals relative to the 10-34-0 fertilizer.

B. Maximum Projected Effluent Concentration

EPA has used the data presented in the Kootenai River Fisheries Investigations Ecosystem Rehabilitation Project Nutrient Restoration Work Plan and other data submitted by the permittee to establish the maximum projected effluent concentrations.

C. Maximum Projected Receiving Water Concentration

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. The maximum projected receiving water concentration is calculated from Equation D-6:

$$C_d = \frac{C_e - C_u}{D} + C_u \qquad \text{(Equation C-5)}$$

For phosphorus, for the discharge season of June through September, the receiving water concentration is receiving water concentration is, in micrograms per liter:

$$C_d = \left[\frac{231{,}400{,}000 - 3.64}{25{,}500{,}000}\right] + 3.64 = 12.7\,\mu\text{g/L}$$

The receiving water concentration, 12.7 µg/L, is greater than the value EPA has used to interpret Idaho's narrative nutrient criterion, which is 8 µg/L. This is the "reference condition" for Level III Ecoregion 15 listed in Table 3h of EPA's *Ambient Water Quality Criteria Recommendation: Information Supporting the Development of State and Tribal Nutrient Criteria: Rivers and Streams in Nutrient Ecoregion II* (EPA 822-B-00-015). The receiving water upstream total phosphorus concentration of 3.65 µg/L represents the average total phosphorus concentration that has been observed at USGS station #12301933 (Kootenai River below Libby Dam near Libby, Montana) between June and September since 1990.

Table C-2, below, summarizes the reasonable potential calculations for arsenic, cadmium, chromium, copper, lead, zinc, phosphorus, nitrate and ammonia. EPA has determined that the

discharge does not have the reasonable potential to cause or contribute to water quality standards violations for arsenic, cadmium, chromium, copper, lead, zinc, nitrate or ammonia. This determination is supported by the permittee's own analysis of the discharge's effects on metals and nitrogen concentrations. See Tables 2 and 3 of *Evaluation Criteria for Proposed Nutrient Restiration Project of the Kootenai River, Idaho.* (Hardy, Walters and Holderman).

No reasonable potential analysis was performed for pH because the pH of the discharge is expected to be within the range of 6.5 to 7.0 standard units (10-34-0 MSDS, UN32 MSDS). This is within the range allowed by the Idaho water quality standards, which is 6.5 to 9.0 standard units (IDAPA 58.01.02.250.01.a.). Even if the pH of the effluent is less than 6.5 standard units or greater than 9.0 standard units, the discharge will not cause or contribute to water quality standards violations due to the large amount of dilution available. Therefore, the permit does not contain water quality-based effluent limits for pH.

Table C-2: Reasonable Potential Calculations

Dilution Factors	
Total Effluent Acute	60,000
Total Effluent Chronic	574,268
Total Effluent Human Health	918,130
10-34-0 Acute	417,143
10-34-0 Chronic	3,992,526
10-34-0 Human Health	6,383,186
10-34-0 Nutrient	25,532,742

Pollutant	**Arsenic**	**Cadmium**	**Chromium**	**Copper**	**Lead**	**Zinc**	**Phosphorus**	**Nitrate**	**Ammonia**
Data Source	Lab Report	Work Plan	Work Plan	Work Plan	Lab Report	Work Plan	Lab Report	Work Plan	Lab Report
Maximum Ambient Concentration	2.50	0.04	27.50	1.53	0.35	30.00	3.64	1.10	0.20
Maximum Projected Effluent Conc.	4690	98,000	464,000	18,000	11,600	1,090,000	231,400,000	180,000	107,850
Maximum Acute RWC	2.51	0.27	28.61	1.57	0.38	32.61	N/A	N/A	2.00
Maximum Chronic RWC	2.50	0.06	27.62	1.53	0.35	30.27	N/A	N/A	0.39
Maximum Human Health RWC	2.50	0.06	27.57	1.53	N/A	30.17	N/A	1.30	N/A
Maximum Nutrient RWC	N/A	N/A	N/A	N/A	N/A	N/A	12.7	N/A	N/A
Acute Aquatic Life Criterion	340	3.70	549	17.0	64.6	114	N/A	N/A	2.59
Chronic Aquatic Life Criterion	150	1.03	178	11.4	2.5	105	N/A	N/A	1.29
Drinking Water or Human Health Criterion	50	5.00	100	1300	N/A	N/A	N/A	10.0	N/A
Nutrient Criterion	N/A	N/A	N/A	N/A	N/A	N/A	8.00	N/A	N/A
Reasonable Potential?	**NO**	**NO**	**NO**	**NO**	**NO**	**NO**	**YES**	**NO**	**NO**

D. References

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

Hardy, Ryan S. and Charlie Holderman. *Kootenai River Fisheries Investigations Ecosystem Rehabilitation Project: Nutrient Restoration Work Plan.*

Hardy, Ryan S., Jody Walters, and Charlie Holderman. *Evaluation Criteria for Proposed Nutrient Restoration Project of the Kootenai River, Idaho.*

Material Safety Data Sheet. Product trade name: Ammonium Polyphosphate Solution 10-34-0. J.R. Simplot Company AgriBusiness. June 2001.

Material Safety Data Sheet. Product trade name: UN-32. J.R. Simplot Company AgriBusiness. June 2001.

Appendix D: Explanation of Minimum Monthly Average Effluent Limit for Effluent Dilution Ratio

The following discussion explains how the water quality-based effluent limit for the effluent dilution ratio for ammonium polyphosphate fertilizer was calculated. EPA determined that, under the critical condition of a maximum effluent flow rate and river flow rate equal to the lowest 30-day average flow rate expected to occur once every five years, the discharge had the reasonable potential to cause or contribute to a violation of Idaho's narrative water quality criteria for nutrients.

NPDES regulations at 40 CFR 122.44(d)(1)(i) require that NPDES permits contain effluent limits for all pollutants which "are or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality." Normally, this would require EPA to establish a water quality-based effluent limit for total phosphorus, expressed in terms of mass.

Given that the purpose of the ammonium polyphosphate discharge is to maintain a certain concentration of phosphorus in the river in order to stimulate food web production, while not causing or contributing to water quality standards violations, EPA does believes it is not appropriate to impose a mass limit on total phosphorus from this discharge. Instead, EPA has chosen to impose another condition, which will ensure that the discharge no longer has the reasonable potential to cause or contribute to water quality standards violations for total phosphorus, thereby eliminating the need for a water quality-based effluent limit on total phosphorus expressed in terms of mass. This condition is a minimum effluent dilution ratio.

To determine the minimum dilution ratio, EPA used the Solver utility in the Microsoft Excel spreadsheet program to determine what dilution ratio would be necessary to ensure that the receiving water concentration of total phosphorus did not exceed the reference condition for Level III Ecoregion 15 (see Table 3h, Page 23, of EPA-822-B-00-015), which is 8 µg/L. The Solver utility returned a dilution ratio for 10-34-0 fertilizer of 53,050,244:1. EPA rounded this figure to 53,000,000:1 for the purposes of expressing the minimum dilution ratio as an effluent limit. Because the deleterious effects of nutrients are determined by the average loading, EPA has expressed the minimum effluent dilution ratio as a minimum monthly average. See Table D-1, below, for a summary of the calculation of the minimum monthly average dilution ratio.

Because the discharge does not have the reasonable potential to cause or contribute to water quality standards violations for any pollutant other than total phosphorus under critical conditions, EPA has not included any other numeric effluent limitations.

Table D-1: Dilution Ratio Limit Calculations	
Dilution Factor for 10-34-0	**53,050,244**
Pollutant	**Phosphorus (ug/L)**
Data Source	Work Plan
Maximum Ambient Concentration	3.64
Maximum Projected Effluent Conc.	231,400,000
Maximum Acute RWC	N/A
Maximum Chronic RWC	N/A
Maximum Human Health RWC	N/A
Maximum Nutrient RWC	8.0
Acute Aquatic Life Criterion	N/A
Chronic Aquatic Life Criterion	N/A
Drinking Water or Human Health Criterion	N/A
Nutrient Criterion	8
Reasonable Potential?	**NO**