Fact Sheet

NPDES Permit Number: ID-002659-0
Date: June 18, 1999
Public Notice Expiration Date: July 23, 1999
Technical Contact: Kelly Huynh 206/553-8414 or
1-800-424-4372 (within Region 10)
Huynh.Kelly@epamail.epa.gov

The U.S. Environmental Protection Agency (EPA) Proposes to Reissue a Wastewater Discharge Permit to:

Hayden Area Regional Sewer Board
10789 North Atlas Road
Rathdrum, Idaho 83858

and the State of Idaho proposes to Certify the Permit

EPA Proposes NPDES Permit Reissuance

EPA proposes to reissue a *National Pollutant Discharge Elimination System* (NPDES) permit to the Hayden Area Regional Sewer Board. The draft permit sets conditions on the discharge of pollutants from the Hayden wastewater treatment plant to the Spokane River from October to May and from June to September when the River flow is greater than 2,000 cfs. It also authorizes the facility to continue to use processed sewage sludge, called *biosolids,* as a fertilizer and soil amendment. 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, and places conditions on the use of biosolids.

This fact sheet includes:

- information on public comment, public hearing, and appeal procedures
- a description of the current and proposed discharge and biosolids practices
- a listing of past and proposed effluent limitations and other conditions
- a map and description of the discharge location and the biosolids use locations
- detailed background information supporting the conditions in the draft permit

Idaho State Certification

The Idaho Division of Environmental Quality proposes to certify the NPDES permit for the Hayden Area Regional Sewer Board, under section 401 of the Clean Water Act.

Public Comment

Persons wishing to comment on or request a public hearing for the draft permit may do so in writing by the expiration date of the public notice. A request for a public hearing must state the nature of the issues to be raised, as they relate to the permit, as well as the requester's name, address and telephone number. All comments and requests for public hearings must be in writing and submitted to EPA as described in the Public Comments section of the attached public notice. After the public notice expires, and all substantive comments have been considered, EPA's regional Director for the Office of Water will make a final decision regarding permit reissuance.

Persons wishing to comment on State certification should submit written comments by the public notice expiration date to the Idaho Division of Environmental Quality (IDEQ) at 2110 Ironwood Pkwy, Coeur d'Alene, Idaho 83814.

If no substantive comments are received, the tentative conditions in the draft permit will become final, and the permit will become effective upon issuance. If comments are received, EPA will address the comments and issue the permit. The permit will become effective 30 days after the issuance date, unless a request for an evidentiary hearing is submitted 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 (See address below).

United States Environmental Protection Agency
Region 10
1200 Sixth Avenue, OW-130
Seattle, Washington 98101
(206) 553-8414 or
1-800-424-4372 (within Alaska, Idaho, Oregon and Washington)

The fact sheet and draft permit are also available at:

EPA Idaho Operations Office
1435 North Orchard Street
Boise, Idaho 83706
(208) 378-5746

IDEQ Coeur d'Alene Office
2110 Ironwood Parkway
Coeur d'Alene, Idaho 83814
208/769-1422

Coeur d'Alene Public Library
201 East Harrison Avenue
Coeur d'Alene, Idaho 83814-3240
(208) 769-2315

Hayden Lake Library
8385 North Government Way
Hayden Lake, Idaho 83835-9280
(208) 772-5612

Post Falls Library
821 North Spokane Street
Post Falls, Idaho 83854-8698
(208) 773-1506

The draft permit and fact sheet can also be found by visiting the Region 10 website at www.epa.gov/r10earth/offices/water/npdes.htm.

For technical questions regarding the permit or fact sheet, contact Kelly Huynh at the phone number(s) or email address at the top of this fact sheet. Those with impaired hearing or speech may contact a TDD operator at 1-800-833-6384. Ask to be connected to Kelly Huynh at the above phone number(s). Additional services can be made available to persons with disabilities by contacting Kelly Huynh.

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LIST OF ACRONYMS

AML	Average Monthly Limit
BMP	Best Management Practices
BOD_5	five day Biochemical Oxygen Demand
BPT	Best Practicable control Technology currently available
CFR	Code of Federal Regulations
cfs	Cubic feet per second
CWA	Clean Water Act
DMR	Discharge Monitoring Report
CV	Coefficient of Variation
EPA	Environmental Protection Agency
HARSB	Hayden Area Regional Sewer Board
IDEQ	Idaho Division of Environmental Quality
LA	Load Allocation
LTA	Long Term Average
MDL	Maximum Daily Limit or Method Detection Limit
mgd	Million gallons per day
mg/L	Milligrams per liter
MSWLF	Municipal Solid Waste Landfill
%MZ	Percent Mixing Zone
NMFS	National Marine Fisheries Service
NPDES	National Pollutant Discharge Elimination System
O&M	Operation and Maintenance
POTW	Publicly Owned Treatment Works
RP	Reasonable Potential
TMDL	Total Maximum Daily Load
TSD	Technical Support Document for Water Quality-based Toxics Control (EPA 1991)
TSS	Total Suspended Solids
μg/L	Micrograms per liter
USFWS	United State Fish and Wildlife Service
USGS	United States Geological Survey
WLA	Wasteload Allocation
WWTP	Wastewater treatment plant

BACKGROUND INFORMATION

I. APPLICANT

Hayden Area Regional Sewer Board
10789 North Atlas Road
Rathdrum, Idaho 83858

NPDES Permit No.: ID-002659-0

Facility contact: Kent Helmer, Administrator

II. FACILITY ACTIVITY

The Hayden Area Regional Sewer Board owns, operates, and maintains the Hayden area regional wastewater treatment plant located in Hayden, Idaho, Kootenai County. The Hayden wastewater treatment plant primarily treats domestic sewage from the City of Hayden and Hayden Lake Recreational Water and Sewer District. The wastewater treatment plant also treats domestic sewage and minimal industrial wastes from the Coeur d'Alene Air Terminal including a surge suppressor and janitorial supplies manufacturer.

See Appendix A for a map of the location of the treatment plant and discharge. Details about the wastewater treatment processes and waste streams are included in Appendix B.

III. RECEIVING WATER

From October to May or when the river flow is greater than 2,000 cubic feet per second (cfs), the Hayden Area Regional Sewer Board transports treated effluent about 7 miles, via underground pipeline, to the Spokane River (latitude 47° 41' 54" and longitude: 116° 50' 03"). The outfall is located at approximately river mile 108.7.

The *1997 State of Idaho Water Quality Standards and Wastewater Treatment Requirements* designates beneficial uses for waters of the State. The Spokane River is designated under IDAPA 16.01.02110.01.pp as being protected for primary and secondary contact recreation, cold water biota, salmonid spawning, domestic water supply, and agricultural water supply.

This segment of the Spokane River has also been listed under Section 303(d) of the Clean Water Act as not attaining or not expected to meet the state water quality standards for temperature and metals (specifically, cadmium, lead, and zinc). Where the receiving water quality does not meet water quality standards after the imposition of technology-based effluent limitations, Section 303(d) of the Clean Water Act requires the development of a Total Maximum Daily Load (TMDL) plan to ensure that these waters will come into compliance. A TMDL is a determination of the amount of a pollutant, or property of a pollutant, from point, nonpoint, and natural background sources (including a margin of

safety) that may be discharged to a water body without causing the water body to exceed the water quality criterion for that pollutant. In addition, concerns regarding algal growth in the River prompted the formation of the Spokane River Technical Advisory Committee to address nutrients (phosphorus and nitrogen) in the Spokane River.

From June to September or when the river flow is less than 2,000 cfs, the treated effluent is transported, via underground pipeline, to an eight million gallon storage lagoon and land applied using a pivot irrigation system.

IV. FACILITY BACKGROUND

The Hayden Area Regional Sewer Board was first issued an NPDES discharge permit on November 20, 1989. This permit expired November 21, 1994. Because the application for renewal was not submitted prior to permit expiration, EPA could not administratively extend the permit. The EPA did receive an updated permit application for the Hayden wastewater treatment plant on December 12, 1994. The application indicates that the facility has upgraded its treatment system design capacity from 0.75 million gallons per day (mgd) to 1.5 mgd. The draft permit takes into account the new design capacity.

Although the treatment plant's design capacity has increased, a review of the facility's monthly discharge monitoring reports for the last five years shows that the facility's average flow is approximately 0.556 mgd. Review of the discharge monitoring reports also reveal that the facility has generally reported compliance with its 1989 permit effluent limits.

V. EFFLUENT LIMITATIONS

EPA followed the Clean Water Act, State and federal regulations, and EPA's 1991 *Technical Support Document for Water Quality-Based Toxics Control (TSD)* to develop the proposed effluent limits. In general, the Clean Water Act requires that the effluent limits for a particular pollutant be the more stringent of either the technology-based or water quality-based limits. Appendix C provides the basis for the development of effluent limits.

Technology-based limits are set based on the level of treatment that is achievable using available technology. In the case of this facility, technology-based limits have been included in the draft permit for five day Biochemical Oxygen Demand (BOD_5), total suspended solids (TSS), and fecal coliforn.

The EPA evaluates the technology-based limits to determine whether they are adequate to ensure that water quality standards are met in the receiving water. If the limits are not adequate, EPA must develop additional water quality-based limits. These limits are designed to prevent exceedences of the Idaho water quality standards in the Spokane

River. The draft permit includes water quality-based limits for fecal coliform, total ammonia, and zinc. Appendix D contains an example permit limit calculation for total ammonia.

Table V-1 contains the draft permit limits for outfall 001 as well as those found in the 1989 permit for comparison purposes.

Table V-1: Outfall 001 Effluent Limits

Parameter	Average Monthly Limit		Average Weekly Limit		Daily Maximum Limit	
	Draft	1989	Draft	1989	Draft	1989
BOD_5[1]	30 mg/L 375 lbs/day	30 mg/L 175 lbs/day	45 mg/L 563 lbs/day	45 mg/L 262 lbs/day	---	---
TSS[1]	30 mg/L 375 lbs/day	30 mg/L 175 lbs/day	45 mg/L 563 lbs/day	45 mg/L 262 lbs/day	---	---
Fecal Coliform,[2] May 1-Sep 30 [3] Oct 1-Apr 30 [4]	 50/100 ml 100/100 ml	 50/100 ml 100/100 ml	 200/100 ml 200/100 ml	 100/100 ml 200/100 ml	 500/100ml 800/100ml	---
Total Residual Chlorine[5]	0.5 mg/L	---	---	---	---	---
Total Ammonia (as N)	78.7 mg/L 985 lbs/day	---	---	---	250 mg/L 3128 lbs/day	---
Lead[6]	2.66 µg/L 0.033 lbs/day	---	---	---	3.76 µg/L 0.047 lbs/day	---
Zinc[6]	88.2 µg/L 1.10 lbs/day	---	---	---	112 µg/L 1.40 lbs/day	---

Notes:
1 The 1989 and draft permit require that the average monthly percent removal for BOD_5 and TSS be at least 85%.
2 Monthly and weekly averages shall be measured as a geometric mean.
3 Facility shall not exceed 200/100 ml in more than 10% of samples over a 30 day period.
4 Facility shall not exceed 400/100 ml in more than 10% of samples over a 30 day period.
5 Chlorine limits only apply when the treatment plant is discharging to the Spokane River.
6 The draft permit requires metals concentrations to be measured as total recoverable metal.

The draft permit requires that the pH of the waste water treatment plant effluent be within the technology-based range of 6.0 and 9.0 standard units (s.u.), consistent with the 1989 requirement. The draft permit prohibits the discharge of waste streams that are not part of the normal operation of the facility, as reported in the permit application. The draft permit also requires that the discharge be free from floating, suspended, or submerged matter in concentrations that cause/may cause a nuisance.

VI. MUNICIPAL SEWAGE SLUDGE/BIOSOLIDS MANAGEMENT

Biosolids resulting from the Hayden wastewater treatment plant are distributed as *Class B* biosolids for use on agricultural land within Kootenai County. Class B biosolids are a soil amendment product. The permittee has submitted land application plans to EPA for sites where biosolids are currently being applied as a fertilizer or soil amendment and for additional sites in Kootenai County that are west of Highway 95 and north of Interstate 90. See Appendix E for further discussion of biosolid management requirements and Appendix F for a map of the current land application sites located between halfway between the City of Rathdrum and the Coeur d'Alene Airport.

VII. MONITORING REQUIREMENTS

A. Effluent Monitoring

Section 308 of the Clean Water Act and federal regulation 40 CFR 122.44(i) requires that monitoring be included in permits to determine compliance with effluent limitations. Monitoring may also be required to gather data for future effluent limitations 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) to EPA.

Table VII-1 presents the proposed monitoring requirements based on the minimum sampling necessary to adequately monitor the facility's performance as well as the monitoring requirements in the 1989 permit. Effluent monitoring for Outfall 001 shall occur after the last treatment unit and prior to discharge to the Spokane River.

TABLE VII-1: Outfall 001 Monitoring Requirements

Parameter[1]	Draft Sample Frequency	1989 Sample Frequency
Flow, mgd	continuous	continuous
Spokane River Flow, cfs	Daily when discharging	Daily when discharging
BOD_5, mg/L[2]	2/week	2/week
TSS, mg/L[2]	2/week	2/week
pH, standard units[3]	5/week	5/week
Fecal Coliform Bacteria, colonies/100 ml[4]	3/week	3/week
Total Residual Chlorine, mg/L[5]	1/day	5/week
Temperature, °C	2/week	N/A

Parameter[1]	Draft Sample Frequency	1989 Sample Frequency
Total Ammonia as N, mg/L	2/week	N/A
Cadmium, μg/L[6]	1/month	N/A
Lead, μg/L[6]	1/month	N/A
Zinc, μg/L[6]	1/month	N/A
Whole Effluent Toxicity, TU_c	Semi-annually for 5 years	N/A

Notes:

1 If the discharge concentration falls below the method detection limit, the permittee shall report the effluent concentration as "less than {numerical MDL}" on the DMR. Actual analytical results shall be reported on the DMR when the results are greater than the MDL. For averaging, samples below the MDL shall be assumed equal to zero. See Section VII.D for the MDLs. The permittee shall report the number of non-detects for the month in the "Comments Section" of the DMR.

2 Influent and effluent monitoring is required. The percent BOD_5 and TSS removal will be reported on each monthly DMR form.

3 The permittee shall report the number and duration of pH excursions during the month with the DMR for that month.

4 The permittee shall report exceedences of the requirement that not more than 10% of the samples exceed 200/100 ml (from May 1-Sept 30) and 400/100 ml (Oct 1-Apr 30) over a 30 day period.

5 Monitoring is only required when the treatment facility is discharging to the Spokane River.

6 The permittee shall conduct analysis for total recoverable metals.

B. Spokane River Flow Monitoring

The original permit condition, requiring reporting of Spokane River flow when the facility is discharging to the river, can be found in the 1989 permit. The condition was based on past EPA flow/dissolved oxygen studies (Yearsley J.R. 1980 and Yearsley J.R. 1989) on the Spokane River that indicate stress to the Spokane River during critical low flow periods. The critical low flow is based on the 1980 EPA study that shows the river will be protected for dissolved oxygen if the river flow is greater than 2000 cfs. The circulation in the river and cooler upstream water available from October through May eliminates stratification that naturally occurs from June through September. This stratification can cause dissolved oxygen deficiencies. Because the Hayden wastewater treatment plant generally only discharges to the river October through May, when the river flow is greater than 2000 cfs, the reporting condition remains in the draft permit. The permittee shall report, on the monthly DMR, the daily flow of the Spokane River in cfs when discharging to the Spokane River through outfall 001. The monitoring location shall be at the Post Falls Dam.

C. Representative Sampling

The draft permit has expanded the requirement in the federal regulations regarding monitoring (40 CFR 122.41[j]). This provision now specifically requires representative sampling whenever a bypass, spill, or non-routine discharge of pollutants occurs, if the discharge may reasonably be expected to cause or contribute to a violation of an effluent limit under the permit. This provision is included in the draft permit because routine monitoring could easily miss permit violations and/or water quality standards exceedences that could result from bypasses, spills, or non-routine discharges. This requirement directs the permittee to conduct additional, targeted monitoring to quantify the effects of these occurrences on the final effluent discharge.

D. Method Detection Limits

Some of the water quality-based effluent limits in the draft permit are close to the capability of current analytical technology to detect and/or quantify. To address this concern, the permit contains a provision requiring the Hayden Area Regional Sewer Board to use methods that can achieve a method detection level (MDL) equal to 0.1 times the effluent limitation or the most sensitive EPA approved method, whichever is greater. Method Detection Limits (MDLs) are the minimum levels that can be accurately detected by current analytical technology. For purposes of averaging results, the draft permit requires the Hayden Area Regional Sewer Board to use 0 for all values below the MDL.

E. Whole Effluent Toxicity

Whole effluent toxicity is a term used to describe the aggregate toxic effect of an aqueous sample (e.g., whole effluent wastewater discharge or ambient receiving water) as measured according to an organism's response upon exposure to the sample. Whole effluent toxicity tests are laboratory tests that replicate to the greatest extent possible the total effect and actual environmental exposure of aquatic life to effluent toxicants without requiring the identification of specific toxicants. The tests use small vertebrate and invertebrate species, and/or plants. The effluent concentration that results in the survival of 50% of test organisms during a 96-hour exposure determines the short-term (acute) toxicity. The highest effluent concentration that causes reduced growth or reduced reproduction of test organisms and/or plants during a 7-day exposure determines the long-term (chronic) toxicity.

Federal regulation 40 CFR 122.44(d)(1) requires that permits contain limits on whole effluent toxicity when a discharge has reasonable potential to cause or contribute to an exceedence of a water quality standard. Idaho regulation (IDAPA 16.01.02200.02) states that surface waters of the state shall be free from toxic substances in concentrations that impair designated beneficial uses. Because whole

effluent toxicity data is not available to evaluate whether or not the facility has achieved the state standard, the draft permit requires semi-annual chronic whole effluent toxicity testing of the outfall 001 discharge for five years. The whole effluent toxicity testing is meant to characterize the total toxic effect of Hayden's wastewater treatment plant effluent on the aquatic resources in the Spokane River. Testing for larval survival, reproduction, and seven day growth shall be conducted using samples at or before the point-of-discharge to the Spokane River.

VIII. OTHER PERMIT CONDITIONS

A. Quality Assurance Plan

Federal regulation 40 CFR 122.41(e) requires the permittee to develop a Quality Assurance Plan to ensure that the monitoring data submitted is accurate and to explain data anomalies if they occur. The permittee is required to complete and implement a Quality Assurance Plan within 120 days of the effective date of the 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. Operation & Maintenance Plan

Section 402 of the Clean Water Act and federal regulations 40 CFR 122.44(k)(2) and (3) authorize EPA to require best management practices, or BMPs, in NPDES permits. BMPs are measures for controlling the generation of pollutants and their release to waterways. For municipal facilities, these measures are typically included in the facility's Operation & Maintenance (O&M) plan. These measures are important tools for waste minimization and pollution prevention.

The draft permit requires the Hayden Area Regional Sewer Board to incorporate appropriate BMPs into their O&M plan within 180 days of permit issuance. Specifically, the permittee must consider spill prevention and control, optimization of chlorine and other chemical use, public education aimed at controlling the introduction of household hazardous materials to the sewer system, and water conservation. To the extent that any of these issues have already been addressed, the permittee need only reference the appropriate document in its O&M plan. The O&M plan must be revised as new practices are developed.

As part of proper operation and maintenance, the draft permit requires the Hayden Area Regional Sewer Board to develop a facility plan when the annual average flow exceeds 85 percent of the design flow of the plant (1.5 mgd). This plan requires the Hayden Area Regional Sewer Board to develop a strategy for remaining in compliance with effluent limits in the permit.

C. Additional Permit Provisions

In addition to facility-specific requirements, sections III, IV, and V of the draft permit contain "boilerplate" requirements. Boilerplate is standard regulatory language that applies to all permittees and must be included in NPDES permits. Because they are regulations, they cannot be challenged in the context of an NPDES permit action. The boilerplate covers requirements such as monitoring, recording, reporting requirements, compliance responsibilities, and general requirements.

IX. OTHER LEGAL REQUIREMENTS

A. Modification of Pemit Limits

EPA has developed a plan for the Spokane River to assure that the River will meet Idaho's water quality standards for metals. The plan, called a Total Maximum Daily Load or TMDL, specifies waste load allocations (WLAs) for cadmium, lead and zinc for the Hayden wastewater treatment plant. If the final TMDL WLA for zinc is different than that used to develop the limits in the draft permit, EPA may modify the permit. EPA may also reopen the permit to include the WLAs for cadmium and lead and/or to include Whole Effluent Toxicity limits if the tests demonstrate toxicity to the aquatic life. According to federal regulation 40 CFR 122.62, new information provides cause for modification of a permit.

B. Endangered Species Act

The Endangered Species Act requires federal agencies to consult with the National Marine Fisheries Service and the U.S. Fish and Wildlife Service if their actions could beneficially or adversely affect any threatened or endangered species. EPA has determined that issuance of this permit will not affect any of the threatened or endangered species in the vicinity of the discharge or current sludge land application sites. See Appendix G for further details.

C. State Certification

Section 401 of the Clean Water Act requires EPA to seek certification from the state that the permit is adequate to meet State water quality standards before issuing the final permit. The regulations allow for the State to stipulate more stringent conditions in the pemit, if the certification sites the Clean Water Act or State law upon which that condition is based. In addition, the regulations require a certification to include statements of the extent to which each condition of the permit can be made less stringent without violating the requirements of State law.

Part of the State's certification is authorization of a mixing zone. The draft permit was developed using the assumption that 25 percent of the low flow would be authorized as a mixing zone. If the State authorizes a different mixing zone in its final certification, EPA will recalculate the effluent limitations based on the dilution available in the final mixing zone. If the state does not certify a mixing zone, EPA will recalculate the permit limitations based on meeting water quality standards at the point of discharge (rather than at the point of discharge back-calculated from the edge of the mixing zone).

D. Permit Expiration

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

REFERENCES

Yearsley, J.R. 1980. Water Quality Studies of the Spokane River Between Coeur d'Alene, Idaho and Post Falls, Idaho 1978-1979. EPA 910/9-80-072, U.S. EPA, Region 10, Seattle, Washington, p. 53 July 1980.

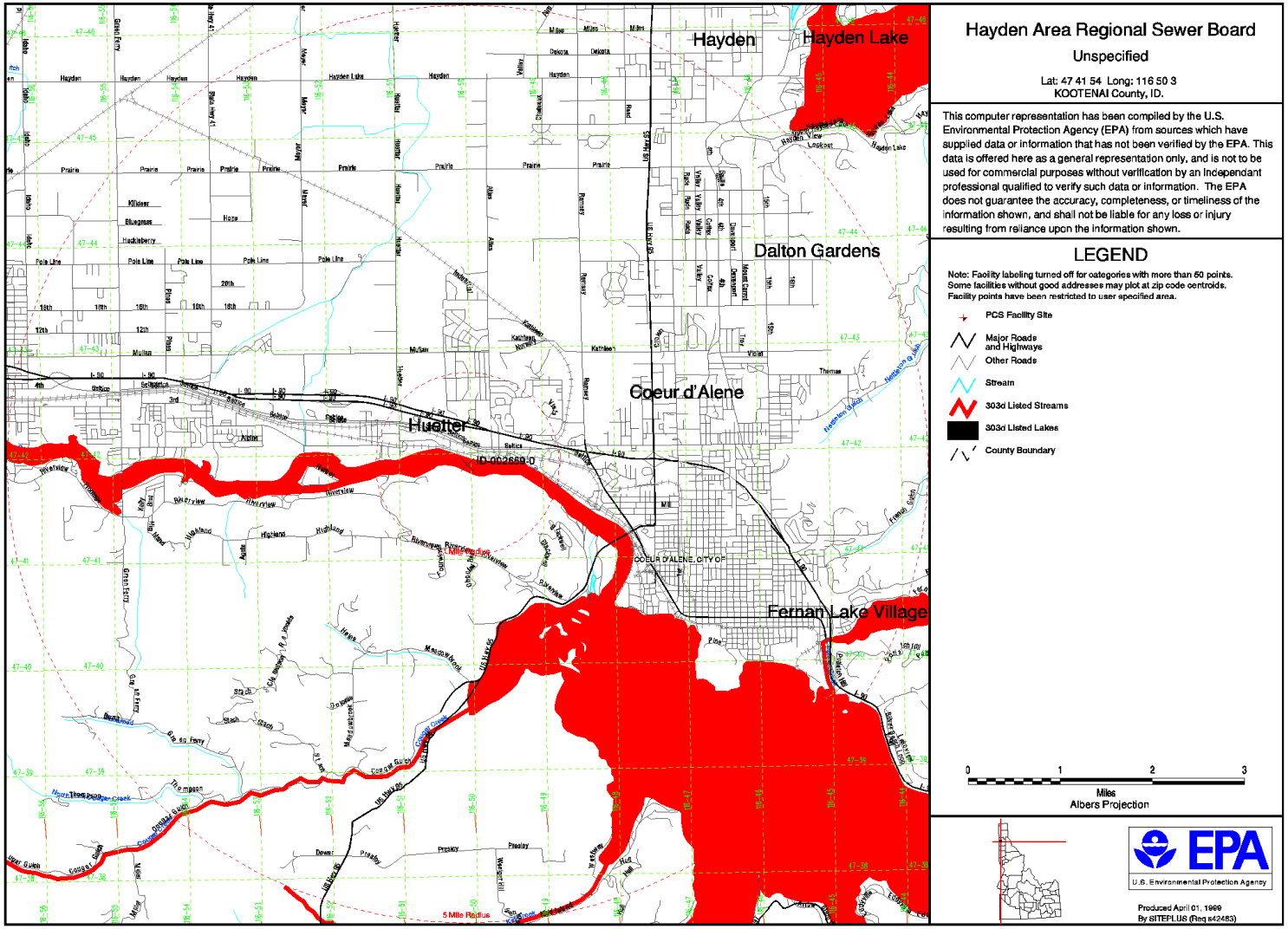
Yearsley, J.R. 1989. Water Quality Studies of the Spokane River Between Coeur d'Alene, Idaho and Post Falls, Idaho 1988. U.S. EPA, Region 10, Seattle, Washington, In Press, 1989.

EPA 1991. Technical Support Document for Water Quality-based Toxics Control. Office of Water Enforcement and Permits, Office of Water Regulations and Standards. Washington, D.C., March 1991. EPA/505/2-90-001.

Pelletier, Greg. 1996. Applying Metals Criteria to Water Quality-Based Discharge Limits. Washington State Department of Ecology, Environmental Investigations and Laboratory Services Program. Olympia, Washington. September, 1996.

EPA, 1996a. EPA Region 10 Guidance For WQBELs Below Analytical Detection/Quantitation Level. NPDES Permits Unit, EPA Region 10, Seattle, WA, March, 1996.

APPENDIX A - HAYDEN WASTEWATER TREATMENT PLANT MAP



APPENDIX B - HAYDEN WASTEWATER TREATMENT PLANT DESCRIPTION AND PROCESS DIAGRAM

Preliminary treatment:
- Flow measurement and recording
- Solids removal (rotating fine screen)
- Dewatering and landfilling removed solids

Primary treatment:
- Grit removal (grit chamber)
- Biological treatment (aerated oxidation ditches)

Secondary treatment:
- Secondary clarification
- Chlorination
- Flow measurement

Discharge:
- Effluent discharge rate is an average of 0.8 mgd (based on monitoring April 1999) and a maximum of 1.5 mgd
- October through May
    - Spokane River through a diffuser
    - 105 feet from shore
    - 5 feet below surface
- June through September or river flow less than 2,000 cfs
    - 8,000,000-gallon storage lagoon
    - land applied on 220 acres

Biosolids (sludge) handling:
- treatment by aerobic digestion
- Polymer addition
- Dewatering (gravity table/belt filter)
- Stockpiling for land application on 470 acres (northwest of Coeur d'Alene Airport)

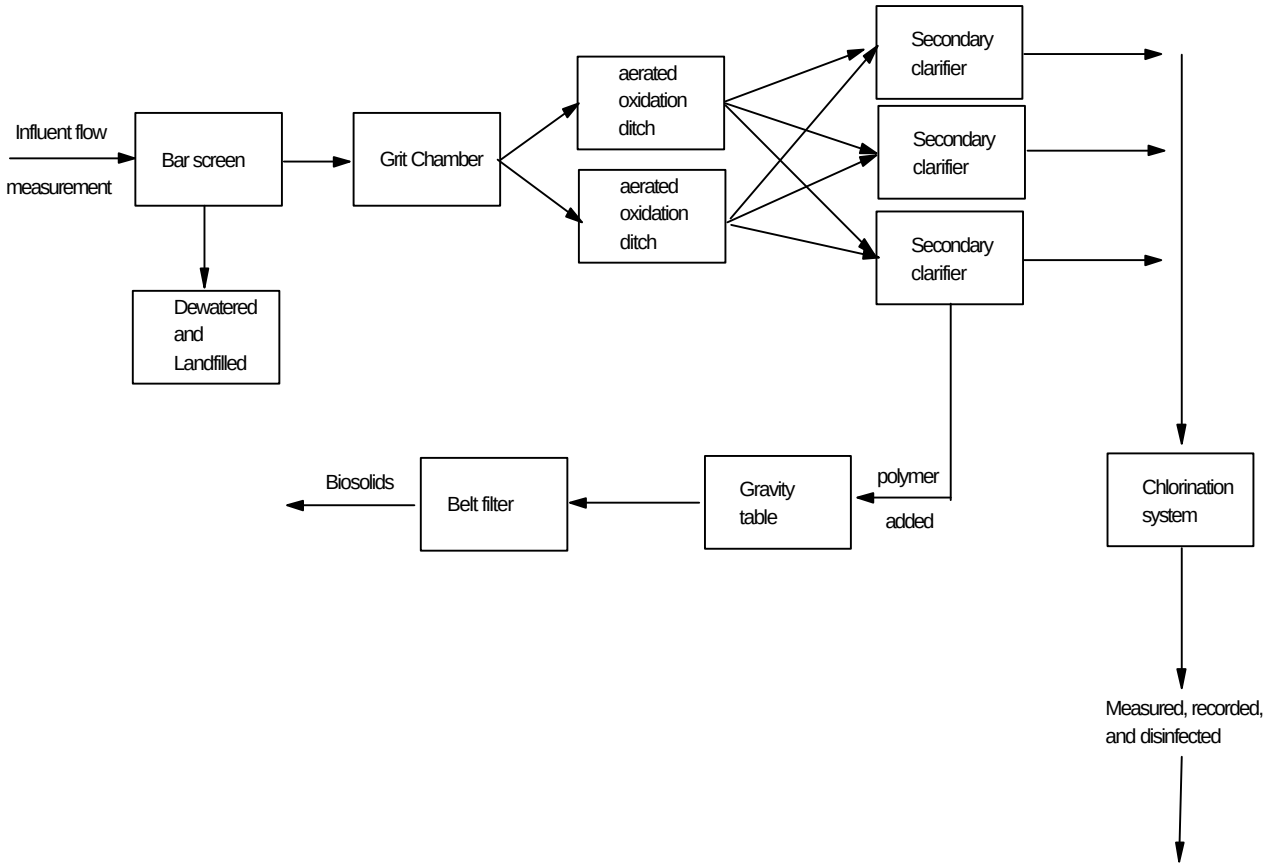


Figure B-1 Process Diagram

APPENDIX C - BASIS FOR EFFLUENT LIMITATIONS

I. Statutory and Regulatory Basis for Limits

Sections 101, 301(b), 304, 308, 401, 402, and 405 of the Clean Water Act provide the basis for the effluent limitations and other conditions in the draft permit. The EPA evaluates discharges with respect to these sections of the CWA and the relevant NPDES regulations to determine which conditions to include in the draft permit.

In general, the EPA first determines which technology-based limits must be incorporated into the permit. EPA then evaluates the effluent quality expected to result from these controls, to see if it could result in any exceedences of the water quality standards in the receiving water. If exceedences could occur, EPA must include water quality-based limits in the permit. The draft permit limits reflect whichever requirements (technology-based or water quality-based) are more stringent. The limits that EPA is proposing in the draft permit are found in Section V.A of this fact sheet. This Appendix describes the technology-based and and water quality-based evaluation for the Hayden wastewater treatment plant.

II. Technology-based Evaluation

The 1972 Clean Water Act required Publically Owned Treatment Works (POTWs) to meet performance-based requirements based on available wastewater treatment technology. Section 301 of the Clean Water Act established a required performance level, referred to as "secondary treatment," that all POTWs were required to meet by July 1, 1977.

More specifically, Section 301(b)(1)(B) of the Clean Water Act requires that EPA develop secondary treatment standards for POTWs as defined in Section 304(d)(1) of the Clean Water Act. Based on this statutory requirement, EPA developed secondary treatment regulations which are specified in 40 CFR Part 133.102. These technology-based regulations apply to all municipal wastewater treatment plants and identify the minimum level of effluent quality attainable by secondary treatment in terms of five day biochemical oxygen demand (BOD_5), total suspended solids (TSS) and pH. In addition to the federal technology requirements, the State of Idaho also has technology-based requirements for fecal coliform bacteria for municipal sewage treatment plants (See section IV for a complete discussion of the limits based on these requirements).

III. Water Quality-based Evaluation

In addition to the technology-based limits discussed above, EPA evaluated the discharge to determine compliance with Section 301(b)(1)(C) of the Clean Water Act. This section

requires the establishment of limitations in permits necessary to meet water quality standards by July 1, 1977.

The regulations at 40 CFR 122.44(d)(1) implement section 301(b)(1)(C) of the Clean Water Act. These regulations require that NPDES 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 water quality standard, including state narrative criteria for water quality." The limits must be stringent enough to ensure that water quality standards are met, and must be consistent with any available wasteload allocation (WLA).

In determining whether water quality-based limits are needed and developing those limits when necessary, EPA uses the approach outlined below:

1. Determine the appropriate water quality criteria
2. Determine whether there is "reasonable potential" to exceed the criteria
3. If there is "reasonable potential" develop a WLA
4. Develop effluent limitations based on WLAs

The following sections below provide a detailed discussion of each step. Appendix D provides example calculations to illustrate how these steps are implemented.

A. Determine Water Quality Criteria

The first step in developing water quality-based limits is to determine the applicable water quality criteria. For Idaho, the State water quality standards are found at IDAPA 16, Title 1, Chapter 2. The applicable criteria are determined based on the beneficial uses of the receiving water as identified in Section III of the Fact Sheet. For any given pollutant, different uses may have different criteria. To protect all beneficial uses, "reasonable potential" and the permit limits are based on the most stringent of the water quality criteria applicable to those uses (See Table C-2).

Table C-1 lists the criteria applicable to the Hayden wastewater discharge. These criteria are found in Idaho's Water Quality Standards (IDAPA 16.01.02).

TABLE C-1 Applicable Water Quality Criteria			
Parameter	**Aquatic Acute**	**Aquatic Chronic**	**Human Health**
Total Residual Chlorine, mg/L	0.019	0.011	N/A
Total Ammonia as N, mg/L[1]	5.93	0.98	N/A
Arsenic, μg/L	360	190	50
Cadmium, μg/L[2/4]	[1.136672-(lnH)(0.041838)][$e^{1.128(lnH)-3.828}$] OR 3.4	[1.101672-(lnH)(0.041838)]$e^{0.7852(lnH)-3.49}$ OR 0.99	N/A
Chromium VI, μg/L[4]	(0.982)16 OR 16	(0.962)11 OR 11.0	N/A
Copper, μg/L[3/4]	(0.96)[$e^{(0.9422(lnH)-1.46)}$] OR 3.8	(0.96)[$e^{(0.8545(lnH)-1.465)}$] OR 2.9	N/A
Lead, μg/L[2]	$e^{1.273(lnH)-1.46}$ OR 76.8	$e^{1.273(lnH)-4.705}$ OR 3.0	N/A
Nickel, μg/L[2/4]	(0.998)[$e^{0.846(lnH)+3.3612}$] OR 1400	(0.997)[$e^{0.846(lnH)+1.1645}$] OR 150	4600
Selenium, μg/L	20	5	N/A
Silver, μg/L[3/4]	(0.85)[$e^{1.72(lnH)-6.52}$] OR 0.2166	N/A	N/A
Zinc, μg/L[2/4]	(0.978)$e^{0.8473(lnH)+0.8604}$ OR 110	(0.986)$e^{0.8473(lnH)+0.7614}$ OR 100	N/A

TABLE C-1 Applicable Water Quality Criteria			
Parameter	**Aquatic Acute**	**Aquatic Chronic**	**Human Health**

Notes:
1 Based on an ambient (edge of mixing zone) acute pH of 7.79 standard units and acute temperature of 23.8°C and an chronic pH of 7.80 standard units and chronic temperature of 23.9°C.
2 A 5th percentile effluent hardness of 95.3 mg/L was used to determine criteria.
3 An ambient hardness value of 20 mg/L was used to determine criteria.
4 These metals have been converted to dissolved by the use of a conversion factor.

B. Reasonable Potential Evaluation

To determine if there is "reasonable potential" to cause or contribute to an exceedence of the water quality criteria for a given pollutant, the EPA compares applicable water quality criteria to the maximum expected receiving water concentrations for a particular pollutant. If the expected receiving water concentration exceeds the criteria, there is "reasonable potential" and a water quality-based effluent limit must be included in the permit.

EPA used the recommendations in Chapter 3 of the *Technical Support Document for Water Quality-based Toxics Control* (TSD, EPA 1991) to conduct this "reasonable potential" analysis for the Hayden wastewater treatment plant (WWTP). An example reasonable potential (RP) analysis for total ammonia is found in Appendix D.

The maximum expected receiving water concentration C_d is determined using the following mass balance equation.

$$C_d \text{ X } Q_d = (C_e \text{ X } Q_e) + (C_u \text{ X } Q_u) \quad \text{or}$$

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

where,
C_d = receiving water concentration downstream of the effluent discharge
C_e = maximum projected effluent concentration
= maximum reported effluent value X reasonable potential multiplier
Q_e = maximum effluent flow
C_u = upstream concentration of pollutant
Q_d = receiving water flow downstream of the effluent discharge
= $Q_e + Q_u$
Q_u = upstream flow

= upstream flow X %MZ (if a mixing zone is available)

Sections 1 through 4 below discuss each of the factors used in the mass balance equation to calculate C_d. Section 4 discusses the actual "reasonable potential" calculation for Hayden's discharge.

1. Effluent Concentration

   The maximum projected effluent concentration (C_e) in the mass balance equation is represented by the 99th percentile, calculated using the statistical approach recommended in the TSD. The 99th percentile effluent concentration is calculated by multiplying the maximum reported effluent concentration by a reasonable potential multiplier. The reasonable potential multiplier accounts for uncertainty in the data. The multiplier decreases as the number of data points increases and variability of the data decreases. Variability is measured by the coefficient of variation (CV) of the data. When there are not enough data to reliably determine a CV, the TSD recommends using 0.6 as a default value. A partial listing of reasonable potential multipliers can be found in Table 3-1 of the TSD. EPA evaluated Hayden Area Regional Sewer Board's permit application and discharge monitoring reports (DMRs) from January 1993 through December 1998 to determine the maximum reported effluent concentrations. See Table C-2 in section 5, below, for a summary of maximum reported effluent concentrations, reasonable potential multipliers, and maximum projected effluent concentrations.

2. Effluent Flow

   The effluent flow used in the equation is the design flow of the facility. The design flow used in the 1989 permit was 0.75 million gallons per day (mgd). The plant has since expanded, and the design flow used to calculate the limits in the draft permit is 1.5 mgd (2.3 cfs).

3. Upstream (Ambient) Concentration

   The ambient concentration in the mass balance equation is based on a reasonable worst-case estimate of the pollutant concentration upstream from the Hayden Area Regional Sewer Board discharge. For criteria that are expressed as maxima (for example, zinc, ammonia), the 95th percentile of the ambient data is generally used as an estimate of worst-case. For criteria that are expressed as minima (for example, dissolved oxygen) the 5th percentile of the ambient data is generally used as an estimate of worst-case. These percentiles were calculated based on data submitted by the

Hayden Area Regional Sewer Board, data collected by the Department of Ecology, and data collected as part of a study of water quality in the Spokane River between 1990 and 1991 (Falter 1992). Where there were no data to determine the ambient concentration, zero was used in the mass balance equation. See Table C-2 in section 5, below, for a summary of ambient concentrations for specific pollutants.

4. Upstream Flow

Under Idaho's water quality standards, dischargers are generally not authorized to use the entire upstream flow for dilution of their effluent. Instead, the standards contain the following restrictions on mixing zones for determining compliance with chronic criteria:

The size may be up to 25 percent of the stream width or 300 meters plus the horizontal length of the diffuser, whichever is less;

The mixing zone may be no closer to the 7-day, 10-year low flow (7Q10)[1] than 15 percent of the stream width; and

The mixing zone may not be more than 25 percent of the volume of the stream flow.

In addition to these restrictions, the standards specify that an acute mixing zone may be authorized inside the chronic mixing zone. The size of that mixing zone is limited to the "zone of initial dilution." Typically, EPA and the State have interpreted the acute mixing zone to be 25 percent of the 1-day, 10-year low flow (1Q10)[2].

Flows in the Spokane River vary significantly with season. In its precertification, the State indicated that it would authorize mixing zones for the City's discharge based on seasonal flows. Furthermore, the State indicated that the flow record prior to 1968 was not representative of

[1]The 7-day, 10-year low flow is the 7-day average low flow that has a 10 percent chance of occurring in any given year. The 7Q10 was calculated based on the Log Pearson Type III distribution using United States Geological Survey (USGS) data (station # 12419000) from 1968 through 1998.

[2]The 1-day, 10-year low flow is the 1-day low flow that has a 10 percent chance of occurring in any given year. The 1Q10 was calculated based on the Log Pearson Type III distribution using United States Geological Survey (USGS) data (station # 12419000) from 1968 through 1998.

current flows in the River. The 1Q10 and 7Q10 flows are 163 cfs and 329 cfs from July 1 through September 30 and 728 cfs and 1042 cfs from October through June, respectively. Based on the above standards, twenty five percent of these flows were used in the mass balance equations for copper to determine whether there was reasonable potential to cause exceedences of the acute and chronic criteria.

In accordance with state water quality standards, only the Idaho Division of Environmental Quality (IDEQ) may authorize mixing zones. If IDEQ authorizes a different size mixing zone in its final 401 certification, EPA will recalculate the reasonable potential and effluent limits based on the final mixing zone. If the State does not authorize a mixing zone in its 401 certification, EPA will recalculate the permit limits based on meeting water quality standards at the point of discharge.

5. "Reasonable Potential" Calculation

Table C-2 summarizes the data, multipliers, and criteria used to determine "reasonable potential" to exceed criteria. When all effluent data for a particular pollutant were below the detection limit (for example, mercury), EPA assumed that there was no reasonable potential. Section IV, below, provides a detailed discussion of the development of water quality-based effluent limitations for specific pollutants.

TABLE C-2: Reasonable Potential Calculations

Parameter	Max. Reported Effluent Conc.	CV	RP Multiplier	Max. Projected Effluent Conc (C_e)	Upstrm Conc (C_u)	Projected Downstrm Conc. (C_d)	Most Stringent Criterion
Arsenic, μg/L	2.57	0.6	5.6	14.4	0	1.01	50.0
Cadmium, μg/L	0.207[3]	0.44	2.2	0.455	2.0	N/A[4]	1.01[5/6]
Chromium (VI), μg/L	1.13[3]	0.6	5.6	6.33	0	0.06	11[6]
Copper, μg/L	5.76[3]	0.6	5.6	32.3	0.72	0.99[1]	2.9[6]
Lead, μg/L	1.88	0.25	1.6	3.01	41	N/A[2/4]	3.0[5]
Nickel, μg/L	1.2[3]	0.6	5.6	6.72	0	0.06	40[5/6]
Selenium, μg/L	0.19	0.6	5.6	1.1	0	0.009	5
Silver, μg/L	0.431[3]	0.6	5.6	2.41	0.107[4]	0.131	0.217[5/6]
Zinc, μg/L	81.6[3]	0.17	1.34	109	111[4]	N/A[2/4]	100[5/6]

TABLE C-2: Reasonable Potential Calculations							
Parameter	**Max. Reported Effluent Conc.**	**CV**	**RP Multiplier**	**Max. Projected Effluent Conc (C_e)**	**Upstrm Conc (C_u)**	**Projected Downstrm Conc. (C_d)**	**Most Stringent Criterion**
Total Ammonia as N, mg/L	51.4	2.37	7.24	372	0	3.26[1/2]	0.98
Total Residual Chlorine, mg/L	0.62	2.35	6.36	3.94	0	0.012[1]	0.019

Notes:
1 A mixing zone of 25% of the Spokane River flow was assumed.
2 Maximum projected ambient concentration indicates "reasonable potential" to exceed water quality standards
3 Effluent metals concentrations were reported as total recoverable metal and converted (via translators) to dissolved.
4 Dilution (%MZ) was not considered. The projected downstream concentration is actually at the point of discharge and is represented by the maximum projected effluent concentration.
5 The criterion for this parameter is based on effluent hardness (See Table C-1).
6 the criteria for metals (except arsenic and lead) are expressed as dissolved.

C. Wasteload Allocation Development

Once EPA has determined that a water quality-based limit is required for a pollutant, the first step in developing a permit limit is development of a wasteload allocation (WLA) for the pollutant. A WLA is the concentration (or loading) of a pollutant that the permittee may discharge without causing or contributing to an exceedence of water quality standards in the receiving water. WLAs for this permit were calculated in two ways: based on a mixing zone for ammonia and pH and based on meeting water quality criteria at "end-of-pipe" for fecal coliform, lead, and zinc.

1. Mixing zone-based WLA

Where the state authorizes a mixing zone for the discharge, the WLA is calculated as a mass balance, based on the available dilution, background concentrations of the pollutant(s) and the water quality criteria. The mass balance equation is the same as that used to calculate reasonable potential, with the acute or chronic criterion substituted for C_d and the WLA substituted for C_e.

Because acute aquatic life and chronic aquatic life apply over different time frames and may have different mixing zones, it is not possible to compare them directly to determine which criterion results in the most stringent

limits. The acute criteria are applied as a one-hour average and have a smaller mixing zone, while the chronic criteria are applied as a four-day average and have a larger mixing zone. To allow for comparison, the acute and chronic WLAs are is statistically converted to a long-term average WLAs. The most stringent long-term average WLA is used to calculate the permit limits.

2. "End-of-Pipe" WLA

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

D. Permit Limit Derivation

Once the WLA has been developed, EPA applies the statistical permit limit derivation approach described in Chapter 5 of the TSD to obtain daily maximum and monthly average permit limits. This approach takes into account effluent variability (through the CV), sampling frequency, and the difference in time frames between the monthly average and daily maximum limits.

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

E. Antidegradation

In addition to water quality-based limitations for pollutants that could cause or contribute to exceedences of numeric or narrative criteria, EPA must consider the State's antidegradation policy (found at IDAPA 16.01.02051.01). Under the policy, waterbodies are considered Tier 1, 2, or 3. The Spokane River is a Tier 1 waterbody and thus shall be protected for "existing water quality uses." Tier 2

Special Resource waters are those where the existing quality exceeds that required to meet the standards. Tier 2 water quality may be lowered to the level of "fishable/swimable" and other existing uses if the provisions of 40 CFR 131.12(a)(2) are met which include the finding that lower water quality is necessary to accommodate important economic or social development. Tier 3 Outstanding National Resource Waters are high quality waters where only limited activities are allowed. The activities may only result in short term and temporary changes in water quality. Because the limits in the draft permit are protective of the Spokane River's designated uses, the draft permit complies with the State's antidegradation policy.

IV. Pollutant-specific Analysis

This section outlines the basis for each of the effluent limitations in the HARSB draft permit.

A. Biochemical Oxygen Demand and Total Suspended Solids

The Hayden WWTP is a publically owned treatment works (POTW). As such, the facility is subject to the technology-based requirements for BOD_5 and TSS of 40 CFR 133.102, as outlined in Table C-3.

Table C-3: Secondary Treatment Requirements

Parameter	Monthly Average (mg/L)	Weekly Average (mg/L)	Percent Removal (%)
BOD_5	30	45	85
TSS	30	45	85

In addition to the concentration limits, 40 CFR 122.45(f) requires that NPDES permits contain mass-based limits for most pollutants. The monthly and weekly loading limitations for BOD_5 and TSS in the 1989 permit were based on a 1994 design population. The draft permit establishes loading limits based on Hayden's current design capacity of 1.5 mgd (40 CFR 122.45(b)). The limits are calculated by multiplying the concentration limits by the design flow and a conversion factor of 8.34 pound•liter/milligram•million gallons, as shown below:

Monthly Average Load: = (1.5 mgd)(30 mg/L)(8.34)
= **375 lbs/day**

Weekly Average Load: = (1.5 mgd)(45 mg/L)(8.34)
= **563 lbs/day**

B. Fecal Coliform Bacteria

In establishing fecal coliform limits for HARSB's draft permit, EPA considered three requirements: 1) Idaho's technology-based requirement for POTWs; 2) Idaho's water quality standard for primary recreation; and 3) Idaho's water quality standard for secondary recreation. Table C-4 provides a summary of the requirements and the times of year that the requirements are applicable.

Table C-4: Idaho Fecal Coliform Standards

Basis	Period of Applicability	Daily Maximum (#/100 ml)	Weekly Average (#/100 ml)[1]	Monthly Average (#/100 ml)[1]
Technology standard for POTWs (IDAPA 16.01.02420.05)	Year-round	---	200	---
Water Quality Criterion for Primary Recreation (IDAPA 16.01.02250.01.a)[2]	May 1-September 30	500	---	50
Water Quality Criterion for Secondary Recreation (IDAPA 16.01.02250.01.b)[2]	Year-round	800	---	200

Notes:
1 For fecal coliform bacteria, the average is defined as the geometric mean, based on a minimum of 5 samples.
2 Facility shall not exceed 200/100 ml (May 1-Sept 30) and 400/100 ml (year round) in more than 10% of samples over a 30 day period.

The 1989 permit required meeting criteria at the point of discharge. Therefore, in evaluating reasonable potential for this discharge, EPA did not consider a mixing zone. The draft permit incorporates the most stringent of the fecal coliform requirements for each season. Because the average weekly and average monthly limits are the same from October 1 through April 30th, EPA included the more conservative average weekly limit only. Table C-5 presents the draft permit limits for fecal coliform.

Table C-5: Fecal Coliform Limits			
Time Period	**Average Monthly**	**Average Weekly**	**Maximum Daily**
Fecal Coliform Bacteria[1] May 1 - Sept 30	50/100 ml	200/100 ml	500/100 ml
Fecal Coliform Bacteria[2] Oct 1 - Apr 30	---	200/100 ml	800/100 ml

Notes:
1 Facility shall not exceed 200/100 ml in more than 10% of samples over a 30 day period.
2 Facility shall not exceed 400/100 ml in more than 10% of samples over a 30 day period.

C. Total Residual Chlorine

The Hayden WWTP uses chlorine disinfection and therefore, must meet total residual chlorine limits when discharging to waters of the United States. Permit limits are usually based on the more stringent of either water quality standards or technology. However, because the WWTP does not have the reasonable potential to violate the Idaho water quality standards for chlorine, the draft permit contains monitoring and an average monthly limit based on technology. The technology-based effluent limitation of 0.5 mg/L is derived from standard operating practices. The Water Pollution Control Federation's Chloration of Wastewater (1976) states that a properly designed and maintained wastewater treatment plant can achieve adequate disinfection if a 0.5 mg/L chlorine residual is maintained after 15 minutes of contact time. A treatment plant that provides adequate chlorination contact time can meet the 0.5 mg/L limit on an average monthly basis.

D. Total Ammonia (as N)

Low concentrations of ammonia can be toxic to freshwater fish, particularly salmonids. Un-ionized ammonia (NH_3) is the principal toxic form of ammonia. The ammonium ion (NH_4^+) is much less toxic. The relative percentages of these two forms of ammonia in the water vary as the temperature and pH vary. As the pH and temperature increase, the percentage of ammonia that is in the un-ionized form increases, causing increased toxicity.

As effluent mixes with receiving water, the temperature and pH change, making it difficult to predict how much of the total ammonia in the discharge will convert to

the un-ionized form. Therefore, the limits in the draft permit are expressed as total ammonia, not un-ionized ammonia.

Because the toxicity of ammonia is dependent upon pH and temperature, the criteria are also pH and temperature dependent. EPA calculated the total ammonia criteria using pH and temperature values at the edge of the mixing zone. The 95th percentile temperature (15°C) and pH (8.1 s.u.) were used to represent reasonable worst-case conditions. Based on this analysis, the acute and chronic criteria for the protection of cold water biota and salmonid spawning (IDAPA 16.01.02250.02.c.iii) are 5.71 mg/L and 1.3 mg/L, respectively. Using the statistical permit derivation method in the TSD, EPA calculated daily maximum and monthly average limits of 250 mg/L (3128 lbs/day) and 78.7 mg/L (985 lbs/day), respectively.

E. Metals (Lead and Zinc)

In Idaho, the most stringent metals standards, other than arsenic, are for the protection of aquatic life. For arsenic, the most stringent criterion is for protection of human health. This section discusses the calculation of the metals criteria and the conversion of these criteria to limits in the draft permit (when reasonable potential is found).

1. Criteria calculation

Idaho's aquatic life criteria for the metals of concern (cadmium, copper, lead, nickel, silver, and zinc) are calculated as a function of hardness, measured in milligrams per liter calcium carbonate (mg/L $CaCO_3$). As the hardness of the receiving water increases, the toxicity decreases.

In addition to the calculation for hardness, Idaho's criteria include a "conversion factor" to convert from total recoverable to dissolved criteria. Conversion factors were developed by EPA and adopted by the State to address the relationship between the total amount of metal in the water column and the fraction of that metal that causes toxicity. Total recoverable metals analysis measures both the particulate and the dissolved fraction of the metal. EPA's criteria for metals were originally expressed as total recoverable. Further research showed that it is the dissolved metals that are "bioavailable," meaning that they can be taken up by aquatic organisms and cause toxicity. Multiplying the total recoverable criteria by the conversion factors adjusts the criteria to reflect the fraction of metal that was dissolved in the toxicity tests used to develop the criteria. Table C-1 presented the criteria equations, including the conversion factors.

EPA used two approaches to calculating the metals criteria for the Spokane River. For copper and silver where the upstream concentration does not exceed the criteria, EPA used 25% of the river flow for the mixing zone. In this case, the hardness used to calculate the acute and chronic criteria was the ambient hardness of 20 mg/L $CaCO_3$.

For cadmium, lead, and zinc, the 95th percentile upstream concentration exceeds the criteria. Therefore, there is no "clean" upstream water to dilute the effluent, so criteria must be met at the point of discharge. In this case, the hardness used to calculate the criteria was the effluent hardness of 95.3 mg/L $CaCO_3$.

Because the hardness vs. dissolved metal curves for lead, silver, and the acute cadmium criterion are convex, the effluent may contribute to an exceedence of the criteria as the effluent and receiving water mix. To address the problem, EPA calculated "substitute criteria" (i.e., an allowable 4-day or 1-hour concentration, as appropriate) as tangents to the criteria curves at the receiving water hardness, as shown for the chronic lead criterion in Figure C-1. The tangent is a straight line that touches the criterion curve at the receiving water hardness and is always below the curve. Use of the tangent as a substitute criterion ensures that the mixture of effluent and receiving water will not exceed the criteria.

Based on the above analysis, lead and zinc showed reasonable potential to contribute to exceedances in the receiving water. Therefore, limits were developed for these metals.

2. Permit Limit Calculation

Although the metals criteria are based on dissolved metal, 40 CFR 122.45(c) requires that metals limits be based on total recoverable metals. This is because changes in water chemistry as the effluent and receiving water mix could cause some of the particulate metal in the effluent to dissolve.

To account for the difference between total recoverable effluent concentrations and dissolved criteria, "translators" are used in performing the effluent limits calculations. "Translators" are based on the fraction of the total recoverable metals that is predicted to be in the dissolved form. The dissolved wasteload allocation is multiplied by the translator, resulting in a total recoverable value.

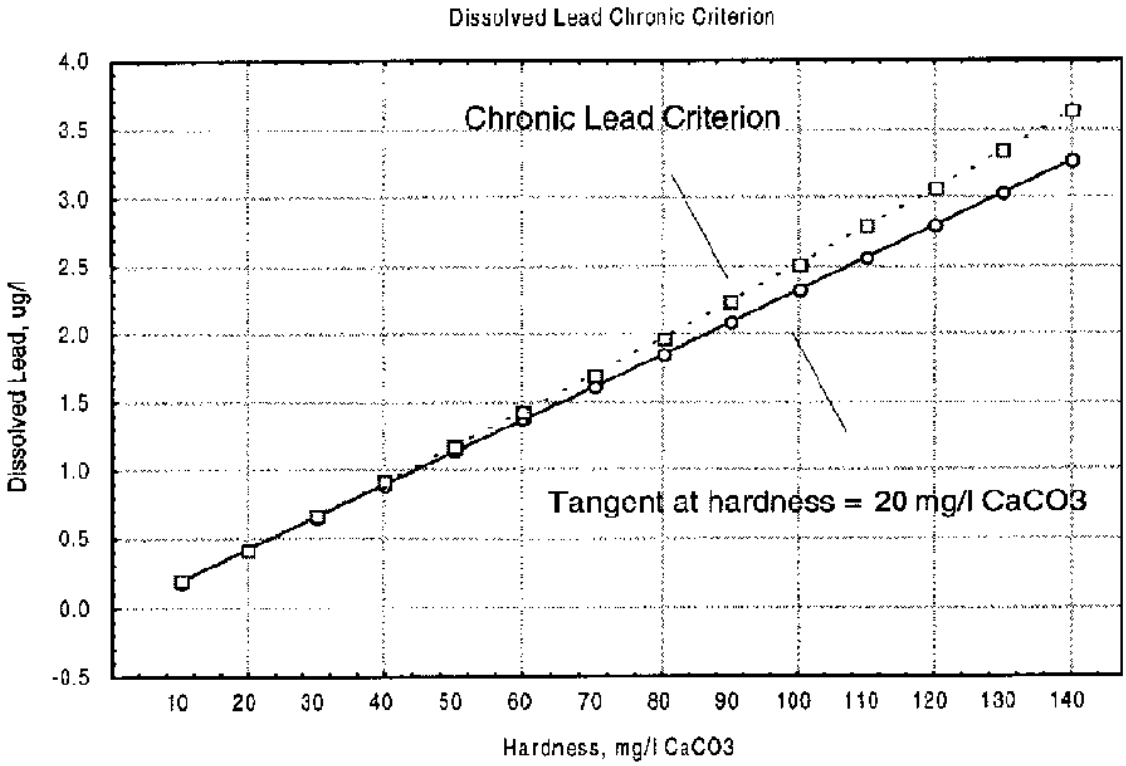


Figure C1 - Chronic Lead Criterion

Translators can either be site-specific numbers based on data collected using effluent and receiving water, or default numbers recommended by EPA in *The Metals Translator: Guidance for Calculating a Total Recoverable Permit Limit from a Dissolved Criterion* (EPA 823-B-96-007, June 1996). The default translators recommended by EPA are the inverse of the conversion factors in Table C-1. These translators are based on the fraction of the metal that would be in the dissolved form in water with no particulate matter, which is a worst-case assumption. In waters in which there is particulate matter, the dissolved fraction, and therefore the toxicity, would be much lower. Using these translators is equivalent to converting the dissolved criteria back to total recoverable.

While the use of default translators is appropriate for most of the metals, it creates difficulties in the case of lead. For lead, use of the default translator results results in some exceedances of the criteria as the effluent and receiving water mix. To address this problem, EPA used the total recoverable acute and chronic equations and developed tangents to those

curves. The total recoverable criteria were then used to develop the permit limits.

Table C-6 shows the limits for lead and zinc.

Table C-6: Metals Limits for the Hayden Wastewater Treatment Plant

Parameter	Average Monthly Limit	Maximum Daily Limit
Lead (total recoverable), μg/L lbs/day	 2.66 0.033	 3.76 0.047
Zinc (total recoverable), μg/L lbs/day	 88.2 1.10	 112.0 1.40

EPA and the State of Idaho have proposed a TMDL for cadmium, lead, and zinc. When the TMDL is finalized, EPA may reopen this permit to incorporate the WLAs in the permit.

E. pH

In addition to limits on BOD_5 and TSS, 40 CFR 133.102 requires that effluent pH be within the range of 6.0 to 9.0 standard units (s.u.) for POTWs. In addition, the State water quality standards for protection of aquatic life (IDAPA 16.01.02250.02) requires that ambient pH be in the range of 6.5 to 9.5 s.u.

Because pH is a logarithmic scale, the statistical approach in the TSD cannot be used to establish reasonable potential. Instead a steady state pH model (based on DESCON) was used to determine the effluent pH values that would result in meeting the criteria at the edge of the mixing zone. For the upper end of the pH range, the technology-based limit is clearly protective of water quality at the edge of the mixing zone. Therefore, EPA only modeled the low end of the range to determine whether the technology-based limit was adequate.

Ambient pH is a function of effluent and ambient pH, flow, alkalinity (buffering capacity), and temperature. The most conservative scenario is a warm, highly buffered, acidic effluent being discharged into a warm, poorly buffered, acidic stream. The analysis shows that dilution is available year round for pH. The water quality standards can be met from October through June if the effluent pH is from 5.7 - 9.0 s.u. and from 6.0 - 9.0 s.u. from July through September.

The draft permit includes the more stringent technology-based range of from 6.0 - 9.0 s.u. This range is more stringent than the 1989 permit requirement of 6.0 - 9.0 s.u.

F. Floating, Suspended or Submerged Matter

The state water quality standards (IDAPA 16.01.02200.05) requires surface waters of the State to be free from floating, suspended, or submerged matter of any kind in concentrations causing nuisance or objectionable conditions or that may impair designated beneficial uses. This condition was included in the 1989 permit and has been retained in the draft permit.

APPENDIX D - EXAMPLE EFFLUENT LIMIT CALCULATION FOR TOTAL AMMONIA

This appendix describes how the water quality-based effluent limits were calculated for total ammonia. The calculations were performed according to procedures outlined in Chapter 5 of the TSD. Effluent limits for lead and zinc were developed in a similar manner (without a mixing zone), although the specific calculations are not included herein.

In calculating water quality-based limits, EPA used the following assumptions:

1Q10 = 728 cfs (based on USGS data from 1968 to 1998, October through June)
7Q10 = 1042 cfs (based on USGS data from 1968 to 1998, October through June)
Mixing zone = 25% of Spokane River (based on state water quality standards)

Step 1 - Determine the appropriate water quality criteria

The water quality criteria is determined based on the use of the receiving water. The Spokane River is protected for primary and secondary contact recreation, cold water biota, salmonid spawning, domestic water supply, and agricultural water supply. Tables III and IV of the Idaho standards (IDAPA 16.01.02250.02.c.iii) require that ammonia be protective of aquatic life. These tables are based on pH and temperature. EPA used the edge of mixing zone pH and temperature to calculate the total ammonia criteria as determined below:

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

$$C_{d\text{-acute temperature}} = \frac{(20.5°C \text{ X } 2.3 \text{ cfs}) + (15°C \text{ X } (728\text{cfs X } 0.25))}{2.3 \text{ cfs} + (728\text{cfs X } 0.25)} = 15.1°C$$

$$C_{d\text{-chronic temperature}} = \frac{(20.5°C \text{ X } 2.3 \text{ cfs}) + (15°C \text{ X } (1042\text{cfs X } 0.25))}{2.3 \text{ cfs} + (1042\text{cfs X } 0.25)} = 15.0°C$$

$$C_{d\text{-acute pH}} = \frac{(7.2 \text{ su X } 2.3 \text{ cfs}) + (8.1 \text{ su X } (728\text{cfs X } 0.25))}{2.3 \text{ cfs} + (728\text{cfs X } 0.25)} = 8.1 \text{ su}$$

$$C_{d\text{-chronic pH}} = \frac{(7.2 \text{ X } 2.3 \text{ cfs}) + (8.1 \text{ X } (1042\text{cfs X } 0.25))}{2.3 \text{ cfs} + (1042\text{cfs X } 0.25)} = 8.1 \text{ su}$$

where,
C_d = receiving water downstream of the effluent discharge
$Q_d = Q_e + (Q_u \text{ X } \%MZ)$, receiving water flow downstream of the effluent discharge
C_e = maximum effluent value (95th percentile)
Q_e = maximum effluent flow (2.3 cfs)
C_u = upstream value of pollutant (95th percentile)

Q_u = upstream flow (1Q10 for acute and 7Q10 for chronic)

Using the tables, the acute criteria is **5.71 mg/L** as N and chronic criteria is **1.3 mg/L** as N.

Step 2 - Determine whether there is "reasonable potential" to exceed the criteria

There is RP to exceed water quality criteria if the maximum projected concentration of the pollutant at the edge of the mixing zone exceeds the criterion. The maximum projected concentration is calculated using the mass-based equation provided in step 1.

Where,
C_d = receiving water concentration downstream of the effluent discharge
C_e = maximum projected effluent concentration (372.1 mg/L)
= maximum reported effluent concentration (51.4 mg/L) X reasonable potential multiplier (7.24)
In calculating the reasonable potential multiplier, EPA assumed a sampling frequency of four per month, and used a coefficient of variation of 2.37 based on monthly data reported between 1994 through 1997.
C_u = upstream concentration of pollutant (0 mg/L)

$C_{d\text{-}Acute}$ = 4.64 mg/L < acute criteria of 5.71 mg/L
$C_{d\text{-}Chronic}$ = 3.26 mg/L > chronic criteria of 1.3 mg/L

Because the chronic downstream concentration is greater than the criterion, a total ammonia limit must be included in the permit.

Step 3 - Calculate Wasteload Allocations

Acute and chronic waste load allocations (WLA_{acute} or $WLA_{chronic}$) are calculated using the same mass balance equation used to calculate the concentration of the pollutant at the edge of the mixing zone. However, C_d becomes the criterion and C_e is replaced by the WLA_{acute} or $WLA_{chronic}$. The WLAs define the appropriate concentration of pollutant allowed in the effluent.

$$WLA = \frac{C_d(Q_u \text{ X } \%MZ) + (C_dQ_e)}{Q_e} - \frac{Q_uC_u(\%MZ)}{Q_e}$$

WLA_{acute} = 457 mg/L
$WLA_{chronic}$ = 149 mg/L

Step 4 - Develop Permit Limits

a) Convert the WLAs to Long Term Averages (LTAs)

The acute and chronic WLAs are converted to acute and chronic LTA concentrations (LTA_{acute} and $LTA_{chronic}$) using the following equations from Section 5.4 of EPA's TSD:

$LTA_{acute} = WLA_{acute} \times e^{[0.5\sigma^2 - z\sigma]}$ where,

CV = coefficient of variation of the effluent concentration, standard deviation/mean = 2.37
σ^2 = $\ln(CV^2 + 1) = 1.89$
z = 2.326 for 99th percentile probability basis

LTA_{acute} = 48.0 mg/L

$LTA_{chronic} = WLA_{chronic} \times e^{[0.5\sigma^2 - z\sigma]}$ where,

CV = coefficient of variation of the effluent concentration= 2.37
σ^2 = $\ln(CV^2/4 + 1) = 0.877$
z = 2.326 for 99th percentile probability basis

$LTA_{chronic}$ = 26.2 mg/L

b) Calculate Average Monthly and Maximum Daily Permit Limits

To protect a water body from both acute and chronic effects, the more limiting of the calculated LTA_{acute} and $LTA_{chronic}$ is used to derive the effluent limitations. The TSD recommends using the 95th percentile for the Average Monthly Limit (AML) and the 99th percentile for the Maximum Daily Limit (MDL).

To derive the MDL and the AML for ammonia the calculations would be as follows:

$MDL = LTA_{chronic} \times e^{(z\sigma - 0.5\sigma^2)}$ where,
CV = coefficient of variation = 2.37
σ^2 = $\ln(CV^2 + 1) = 1.89$
z = 2.326 for 99th percentile probability basis
MDL = 26.2 mg/L X $e^{(2.255)}$ = **250 mg/L**

$AML = LTA_{chronic} \times e^{(z\sigma - 0.5\sigma^2)}$ where,
CV = coefficient of variation = 2.37
σ^2 = $\ln(CV^2/n + 1) = 0.877$
z = 1.645 for 95th percentile probability basis
n = number of sampling events required per month = 4
AML = 26.2 mg/L X $e^{(1.10)}$ = **78.7 mg/L**

Mass based concentration limits were calculated by multiplying the concentration limit by the design flow (1.5 mgd) and the 8.34 conversion factor.

MDL = (1.5 mgd) X (8.34) X (250mg/L) = **3128 lbs/day**

AML = (1.5 mgd) X (8.34) X (78.7mg/L) = **985 lbs/day**

APPENDIX E - SLUDGE/BIOSOLIDS

The sludge management regulations of 40 CFR 503 were designed so that the standards are directly enforceable against most users or disposers of sewage sludge (biosolids), whether or not they obtain a permit. Therefore, the publication of Part 503 in the *Federal Register* on February 19, 1993 served as notice to the regulated community of its duty to comply with the requirements of the rule, except those requirements that indicate that the permitting authority shall specify what has to be done.

Even though Part 503 is largely self-implementing, Section 405(f) of the CWA requires the inclusion of sewage sludge use or disposal requirements in any NPDES permit issued to a Treatment Works Treating Domestic Sewage. In addition, the sludge permitting regulations in 40 CFR Section 122 and 124 have been revised to expand its authority to issue NPDES permits with these requirements. This includes all sewage sludge generators, sewage sludge treaters and blenders, surface disposal sites and sewage sludge incinerators. Therefore, the requirements of 40 CFR 503 have to be met when sewage sludge is applied to the land, placed on a surface disposal site, placed in a municipal solid waste landfill (MSWLF) unit, or fired in a sewage sludge incinerator.

Requirements are included in Part 503 for selected pollutants in sewage sludge, the reduction of pathogens in sewage sludge, the reduction of the characteristics in sewage sludge that attract vectors, the quality of the exit gas from a sewage sludge incinerator stack, the quality of sewage sludge that is placed in a MSWLF unit, the sites where sewage sludge is either land applied or placed for final disposal, and for a sewage sludge incinerator. The sections of the federal standards at 40 CFR 503 applicable to this facility's practice of land application are Section A (General Provisions, 503.1-9), Section B (Land Application, 503.10-18), and Section D (Pathogen & Vector Control, 503.30-33).

For land application sites being used for the distribution of biosolids the draft permit (1) defines the area where biosolids may be distributed, (2) establishes limitations for metals, (3) establishes pathogen reduction requirements, and (4) establishes vector control requirements.

To ensure compliance with the CWA and the federal standards for the use or disposal of biosolids (40 CFR 503), the draft permit contains the following requirements:

A. State Laws and Future Federal Standards: Pursuant to 40 CFR 122.41(a), a condition has been incorporated into the draft permit requiring the permittee to comply with all existing federal and state laws, and all regulations applying to biosolids use and disposal. These standards shall be interpreted using the permit and the following EPA guidance documents. These documents are used by EPA Region 10 as the primary technical references for both permitting and enforcement activities: Part 503 Implementation Guidance, EPA 833-R-95-001, and

Environmental Regulations and Technology: Control of Pathogens and Vector Attraction in Sewage Sludge, EPA/625/R-92/013.

B. Health and Environmental General Requirement: The CWA requires that the environment and public health be protected from toxic effects of any pollutants in biosolids. Therefore, the permittee must handle and use/dispose of biosolids in such a way as to protect human health and the environment. Under this requirement the permittee is responsible for being aware of all pollutants allowed to accumulate in the sludge, and for preventing harm to the public from those pollutants.

The U.S. Department of Agriculture can assist the facility in evaluating potential nutrient or micronutrient problems. Additionally, EPA has published the following guidance to assist facilities in evaluating their biosolids for pollutants other than those listed in 40 CFR 503: Technical Support Document for Land Application of Sewage Sludge, NTIS number PB93-110575.

C. Protection of Surface Waters from Biosolids Pollutants: Section 405(a) of the CWA prohibits any practice where biosolids pollutants removed in a treatment works at one location would ultimately enter surface waters at another location unless the release is specifically authorized in a permit. Therefore the permittee must protect surface waters from metals, nutrients, and pathogens contained in the biosolids.

D. Responsibility for Land Application: 40 CFR 503.7 of the biosolids regulations specify that generators are responsible for correct use or disposal of their biosolids. For purposes of this draft permit and for purposes of compliance with the 40 CFR 503 regulations, the permittee is considered the "person who applies sewage sludge to the land" under the land application regulations. All haulers, contractors, farmers, or others who might be involved in the land application process or in post-application control of the land and the crops are considered agents for the permittee, for determination of compliance with the permit and for determination of compliance with the 40 CFR 503 regulations (which are self-implementing).

E. Control of Pathogens, Vectors, and Metals: The regulations allow alternative methods and measurements for preparing Class B biosolids. The draft permit establishes basic standards that the biosolids must meet for metals, pathogens, and vector control. Additionally, the draft permit allows the permittee to use alternative standards which are available under the regulations. The permittee must submit written notice to EPA 30 days in advance of using most alternative standards. A few major changes require approval.

F. Biosolids Management: The Hayden Area Regional Sewer Board produces biosolids from the primary sedimentation process and from secondary activated sludge process. The facility treats and stabilizes the biosolids in an aerobic digestor after which they are dewatered using a belt press and stored for land application. The permit allows the biosolids to be applied between April 1 and September 15 of each year in accordance with the nitrogen demands of the particular crop grown on that land. The biosolids may only be applied if it can be demonstrated that the nitrogen in the biosolids will be utilized by the crop or stubble within the growing season (April 1 to October 15). The permittee has submitted to EPA, a biosolids management plan, January 1998, which describes the procedures used for the recycling/reuse of biosolids through land application. The plan indicates that the facility does not receive biosolids from other treatment works, therefore the permit prohibits this activities. The draft permit defines the area where biosolids may be distributed, establishes limitations for metals, establishes pathogen reduction requirements, and establishes vector control requirements.

The permittee currently land applies its sludge on 470 acres northwest of the Coeur d'Alene Airport. A map of the current land application sites can be found in Appendix F. The current sites include the area within the box excluding the land south of the Spokane International Railway Company.

The permittee may also land apply its biosolids to new sites within Kootenai County, north of I-90 and west of Highway 95. These new sites shall exclude federal lands, lands within an Indian reservation, or unincorporated areas. The permittee must notify interested parties prior to application at new sites. Part of the notification process will include a site map, and directions on how to obtain a copy of the site management plan and how to comment on the site or plan. The operating criteria for biosolids reuse on new sites shall be identical to the criteria used on existing sites.

G. Contingency Biosolids Use/Disposal Practices: In the event the facility can not land apply its biosolids within the designated areas of Kootenai County, the permitte has indicated that it will be either disposed of in a MSWLF unit or stored.

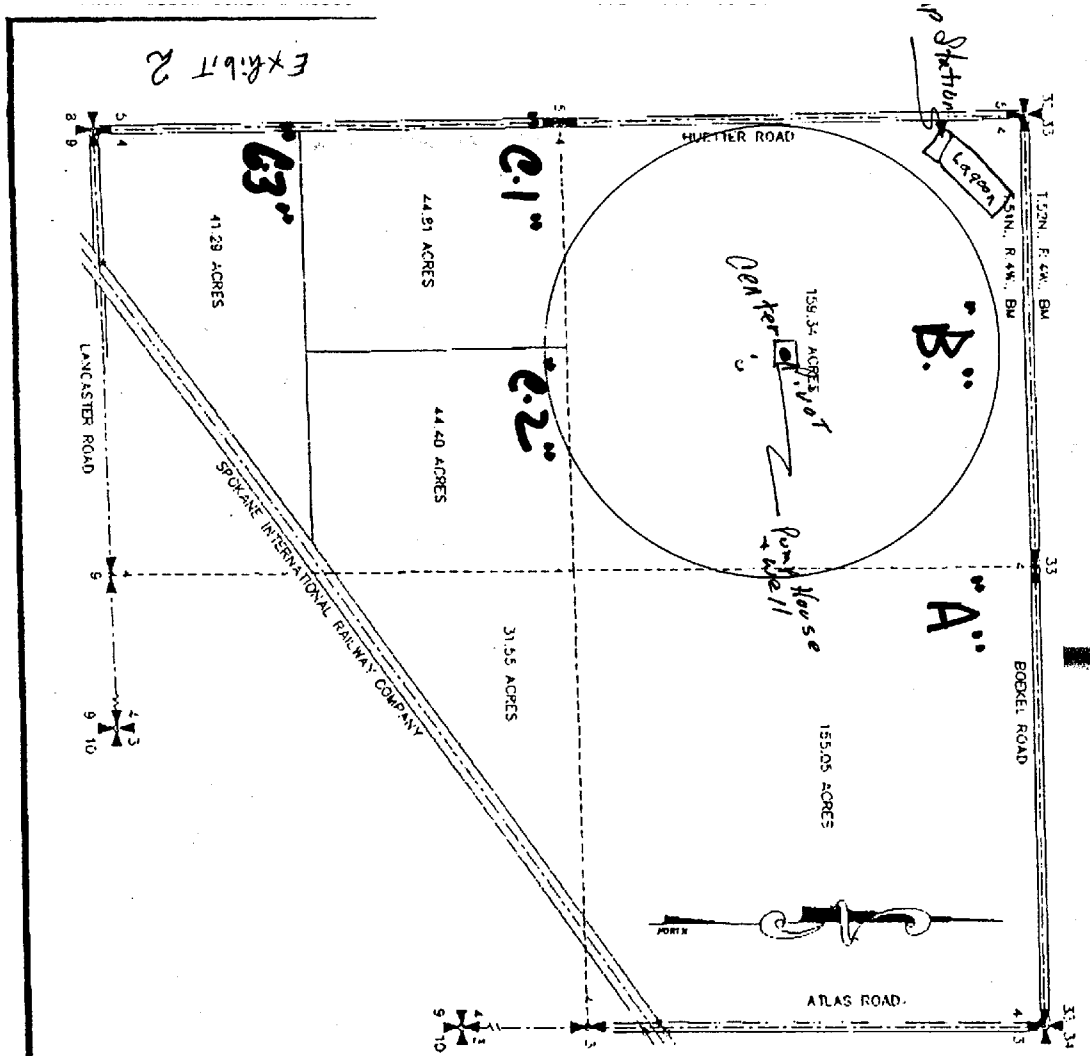
H. Crop Trials: Optimum loading rates, application methods, crop responses, environmental impacts, cost-effectiveness, and other agricultural practices may vary with different crops and from site to site when using biosolids as a soil amendment. Applying biosolids to areas of land two acres or less facilitates the development of appropriate agricultural practices when using biosolids as a soil amendment.

The permit authorizes the distribution of biosolids on areas of land two acres or less for the purpose of optimizing agricultural practices. The land used for crop trials does not need to be within the authorized land application sites.

The permittee must notify the EPA - Idaho Operations Office, the IDEQ, and the Natural Resources Conservation Service of the U.S. Department of Agriculture nearest the area of the site when distributing biosolids for crop trials outside the authorized land application sites.

I. Reporting: At a minimum, 40 CFR 503.18 specifies that certain facilities report annually the information that they are required to develop and retain under the recordkeeping requirements (40 CFR 503.17). The requirement applies to permittees defined as Class I management facilities, POTW's with a flow rate equal to or greater than on mgd, and POTW's serving a population of 10,000 or greater. The following information should be included to improve the reliability of the report: units for reported concentrations, dry weight concentrations, number of samples collected during the monitoring period, number of excursions during the moitoring period, sample collection techniques, and analytical methods.

APPENDIX F - CURRENT LAND APPLICATION SITES



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Designed By:	
Drawn By:	RDB
Checked By:	DB
Date:	09/27/95
Plot Scale:	NOT TO SCALE
Drwg Name	1073EX01
View Name	VP1
Sheet 1 of 1	

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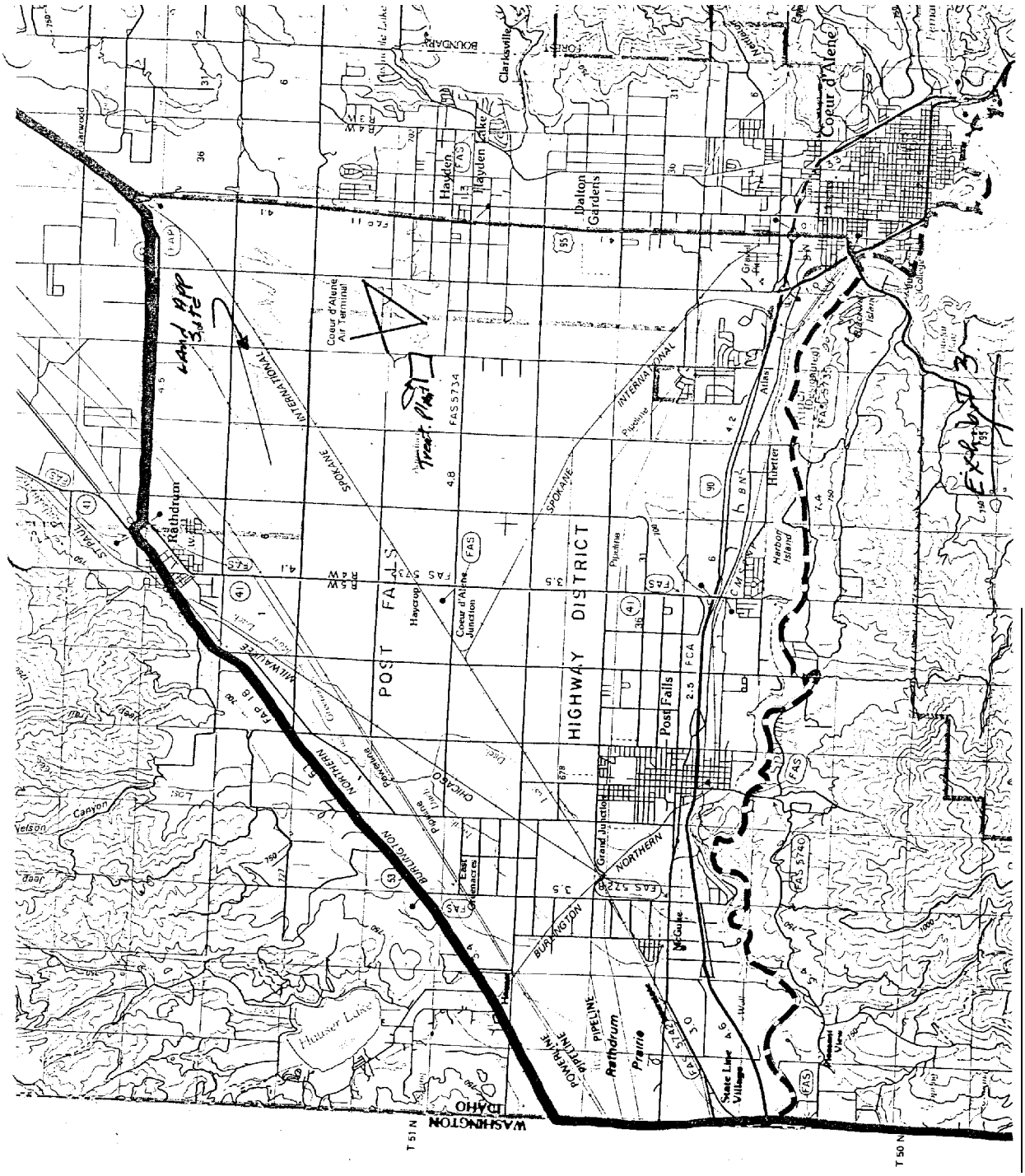
Coeur d'Alene
Dalton Gardens
Hayden
Hayden Lake
Clarksville
Coeur d'Alene Air Terminal
INTERNATIONAL
SPOKANE
Rathdrum
Prairie
Post Falls
HIGHWAY DISTRICT
Hayden
Coeur d'Alene Junction
Harbor Island
Huetter
Grand Junction
NORTHERN
PACIFIC
BURLINGTON
CHICAGO
MILWAUKEE
POWERLINE PIPELINE
Hauser Lake
IDAHO
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T 51 N
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FAS 5734
FAS 5740
FAS 5722
FAP 18

APPENDIX G - ENDANGERED SPECIES ACT

In a letter dated November 28, 1997, the US Fish and Wildlife Service (USFWS) identified the following federally-listed species in the area of discharge:

1. Endangered Species
   - Gray Wolf (*Canis lupus*)
   - Bald Eagle (*Haliaeetus leucocephalus*)

2. Proposed Species
   - Bull trout (*Salvelinus confluenus*)

In a letter dated January 21, 1998, the National Marine Fisheries Service (NMFS) stated that there are currently no threatened or endangered species under its jurisdiction in the Spokane River. There are however, several species of salmonids that are proposed or candidate species located in the Columbia River, downstream from the Spokane River.

EPA has determined that the draft permit will not impact the gray wolf, bald eagle, or bull trout. Hunting and habitat destruction are the primary causes of the gray wolf's decline. Issuance of NPDES permits for the HARSB will not result in habitat destruction, nor will it result in changes in population that could result in increased habitat destruction. Furthermore, issuance of this draft permit will not impact the food sources of the gray wolf. The primary reasons for decline of the bald eagle are destruction of their habitat and food sources and widespread historic application of DDT. This draft permit will have no impact on any of these issues. Although bull trout was listed for the Spokane River, the Interior Columbia Ecosystem Management Project lists bull trout as "known absent" on the River. USFWS stated that based on their information, bull trout cannot get past the Post Falls Dam and any bull trout in the Spokane River are probably transients from Lake Coeur d'Alene[3]. Therefore, EPA has determined that the HARSB discharge will not impact bull trout.

In a letter dated January 15, 1998 the USFWS stated that there are currently no endangered or threatened species likely to occur within the current land application sites. Procedures are required within the draft permit to ensure that endangered species and their habitat are identified by the permittee each time a new site is established within Kootenai County. If potential endangered species are found within the new sites, EPA will become involved to ensure the Endangered Species Act requirements are satisfied.

[3] Personal conversation, Carla Fisher (EPA) with Suzanne Audet (USFWS). February 25, 1998.