FACT SHEET

United States Environmental Protection Agency (EPA)
Region 10
Park Place Building, 13th Floor
1200 Sixth Avenue, OW-130
Seattle, Washington 98101
(206) 553-1214

Date:

Permit No.: ID-000078-7

PROPOSED REISSUANCE OF A NATIONAL POLLUTANT DISCHARGE ELIMINATION SYSTEM (NPDES) PERMIT TO DISCHARGE POLLUTANTS PURSUANT TO THE PROVISIONS OF THE CLEAN WATER ACT (CWA).

CONAGRA, INCORPORATED d/b/a
ARMOUR FRESH MEATS

has applied for reissuance of a NPDES permit to discharge pollutants pursuant to the provisions of the CWA. This Fact Sheet includes (a) the tentative determination of the EPA to reissue the permit, (b) information on public comment, public hearing and appeal procedures, (c) the description of the current discharge, (d) a listing of tentative effluent limitations, schedules of compliance and other conditions, and (e) a description of the discharge location. We call your special attention to the technical material presented in the latter part of this document.

Persons wishing to comment on the tentative determinations contained in the proposed permit reissuance may do so by the expiration date of the Public Notice. All written comments should be submitted to EPA as described in the Public Comments Section of the attached Public Notice.

After the expiration date of the Public Notice, the Director, Office of Water, will make final determinations with respect to the permit reissuance. The tentative determinations contained in the draft permit will become final conditions if no substantive comments are received during the public notice period.

The permit will become effective 30 days after the final determinations are made, unless a request for an evidentiary hearing is submitted within 30 days after receipt of the final determinations.

The proposed NPDES permit and other related documents are on file and may be inspected at the above address any time between 8:30 a.m. and 4:00 p.m., Monday through Friday. Copies and other information may be requested by writing to EPA at the above address to the attention of the NPDES Permits Unit, or by calling (206) 553-1214. This material is also available from the EPA Idaho Operations Office, 1435 N. Orchard Street, Boise, Idaho 83706.

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TECHNICAL INFORMATION

I. Applicant

ConAgra, Incorporated, d/b/a
Armour Fresh Meats
P.O. Box 470
Nampa, Idaho 83653

NPDES Permit No.: ID-000078-7
Facility contact: Sherman L. Galliher, Wastewater Manager

II. Activity

Armour Fresh Meats (Armour) operates a complex beef slaughter and boxed beef fabrication plant that results in the discharge of treated process wastewater and non-contact cooling water.

III. Receiving Water

A. Outfall location

Armour discharges its treated process wastewater to Indian Creek via outfall 010. Armour also discharges non-contact cooling water to Indian Creek via outfall 004. Outfall 010 and 004 are located at latitude 43° 33' 32" and longitude 116° 31' 33".

B. Water Quality Standards

Water Quality standards are composed of use classifications, and numeric and/or narrative water quality criteria.

The first part of a State's water quality standard is a classification system for water bodies based on the expected beneficial uses of those water bodies. The Idaho *Water Quality Standards and Wastewater Treatment Requirements* (IDAPA 16.01.0240.01.z.) protect Indian Creek (above Sugar Avenue in Nampa) for the following use classifications: cold water biota, primary and secondary contact recreation, agricultural water supply, and salmonid spawning.

The second part of the State's water quality standards is the water quality criteria deemed necessary to support the use classification of each water body. These criteria may be numeric or narrative.

The criteria that are necessary to protect cold water biota are found in:

- Idaho's *Water Quality Standards and Wastewater Treatment Requirements* at IDAPA 16.01.02200.,16.01.02250.02.a., and 16.01.02250.02.c.
- 40 CFR 131.36 (b)(1), columns B1, B2, and D2,

The criteria necessary to protect primary and secondary contact recreation are found in:

- Idaho's *Water Quality Standards and Wastewater Treatment Requirements* at IDAPA 16.01.02200., 16.01.02250.01.a; and 16.01.02250.01.b;
- 40 CFR 131.36(b)(1), column D2;

The criteria necessary to protect for agricultural use is found in:

- Idaho's *Water Quality Standards and Wastewater Treatment Requirements* at IDAPA 16.01.02200., and 16.01.02250.03.b.

The criteria necessary to protect for salmonid spawning use is found in:

- Idaho's *Water Quality Standards and Wastewater Treatment Requirements* at IDAPA 16.01.02250.02.d.

A summary of the water quality criteria applicable to Indian Creek are listed in Appendix A.

C. Water Quality Limited Segment

A water quality limited segment is any waterbody, or definable portion of water body, where it is known that water quality does not meet applicable water quality standards, and/or is not expected to meet applicable water quality standards. Indian Creek has been identified as a water quality limited segment. It has been listed for sediments, oil and grease, nutrients and dissolved oxygen.

Section 303(d) of the Clean Water Act (CWA) requires States to develop a Total Maximum Daily Load (TMDL) management plan for water bodies determined to be water quality limited. A TMDL documents the amount of a pollutant a waterbody can assimilate without violating a state's water quality standards and allocates that load capacity to known point sources and nonpoint sources. Idaho Division of Environmental Quality is proposing to complete a TMDL for Indian Creek by December 31, 2000. A condition has been included in the proposed permit which will allows the permit to be modified to incorporate the TMDL when it is completed.

IV. Description of Facility and Discharge

A. NPDES Permit History

Armour was initially issued an NPDES permit in June 1974. This permit was subsequently reissued effective October 29, 1979, to expire October 29, 1984. Due to repeated violations of initial ammonia and temperature limitations, an Administrative Order (x80-06-15-309) was issued to Armour on July 22, 1980. A June 16, 1981, permit modification deleted temperature and flow limitations for the cooling water discharge, while retaining monitoring requirements. This resulted in the added operational flexibility necessary at that time to resolve temperature and ammonia violations. The permit was reissued on June 27, 1985, to expire on June 26, 1990. The expired permit was extended in accordance with the Administrative Procedures Act [5 U.S.C. 558(c)] pending permit reissuance.

B. Treatment Process Description

The original wastewater treatment process at Armour, prior to 1977, consisted of two faculative lagoons. In order to achieve sufficient reduction in nitrogenous wastes necessary to comply with applicable water quality standards for Indian Creek and assure compliance with the best practicable control technology requirements of the 1977 CWA, Armour was to develop a Lignosulforic Acid (LSA) treatment process through an EPA Research Development and Demonstration Grant. This process, however, was eventually shown to be neither economically, nor technically feasible. A November 22, 1976, Stipulation of Settlement and Order issued by EPA required construction of a nitrifying biological treatment facility, in accordance with plans and specifications submitted by Armour and achievement of operational status by July 1, 1977.

The waste treatment process has been modified since 1977. The process currently consists of a 2.6 million gallon (MG) anaerobic lagoon, 0.38 and 0.15 MG aeration basins (activated sludge), two 80,000 gallon in-line secondary clarifiers, a 12,900 gallon chlorine contact chamber and anaerobic sludge digestion with land application as described in the permit application from Armour.

C. Compliance Review

A review of the discharge monitoring reports (DMRs) from 1992 through July 1997 gives an indication of whether the facility is meeting the requirements of its current NPDES permit limits. The following table lists the number of events (either monthly average or daily value) above the permit limitations as reported on the past DMRs submitted by Armour:

Table 1. Events Above Permit Limitations

Permit Limit	1992	1993	1994	1995	1996	'97(part)
Biochemical Oxygen Demand	0	1	2	3	0	0
Total Suspended Solids	1	2	2	1	0	0
Fecal Coliform Bacteria	6	3	0	2	3	0
Ammonia	8	1	0	1	0	0
Flow	1	0	0	0	1	0
Oil and Grease	2	0	0	0	0	0
pH	1	1	0	0	0	0
Total Residual Chlorine	3	1	0	0	0	0

The table demonstrates that the facility is generally meeting existing permit limitations in 1996 and 1997.

V. Basis for Permit Conditions

A. General Approach

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

In general, EPA first determines which technology-based limitations are required. The 1981 CWA amendments require the achievement of "Best Conventional Control Technology" (BCT) no later than July 1, 1984. Effluent limitations representing BCT may not be less stringent than limitations representing the 1977 CWA goal of "Best Practicable Control Technology" (BPT). The applicable control technology requirements are found in the Code of Federal Regulations (CFR) by industrial category. The Armour Fresh Meats facility falls into the "Complex Slaughterhouse Subcategory" and the effluent guidelines can be found at 40 CFR 432.20 through 432.27. 40 CFR 432.27 states that for this subcategory, BCT is equivalent to BPT. Effluent limitation guidelines representing BPT are found at 40 CFR 432.22 and are summarized in the following section.

In addition to technology-based limits the CWA also requires NPDES permitted discharges to demonstrate compliance with state water quality standards. EPA may find, by analyzing the effect of a discharge on the receiving water, that technology based permit limits are not sufficiently stringent to meet water quality standards. In such cases, EPA regulations at 40 CFR 122.44(d)(1) require the development of more stringent, water quality-based effluent limits (WQBELs)

designed to ensure that water quality standards are met. The proposed permit limits will reflect whichever limits (technology-based or water quality-based) are most stringent.

Under Section 308 of the CWA and 40 CFR 122.44(i), EPA must include monitoring requirements in the permit to determine compliance with effluent limitations. Effluent and ambient monitoring may also be required to gather data for future effluent limitations or to monitor effluent impacts on receiving water quality. 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.

For the most part, the discussion that follows in this section applies to the process wastewater outfall 010. The non-contact cooling water outfall 004 is discussed only in the water-quality based permit limit section relating to temperature and flow. Temperature (and associated flow) is the only pollutant of concern for outfall 004.

B. Technology-Based Evaluation

1. Effluent Limitation Guidelines

Federal regulations (40 CFR 432.22) require existing facilities in the complex slaughterhouse subcategory to comply with the following effluent limitations which represent both best conventional control technology (BCT) and best practicable control technology currently available (BPT):

Table 2. Effluent Limitation Guidelines
Complex Slaughterhouse Subcategory

	Effluent Limitations (units of pounds per 1,000 lb LWK)	
Effluent Characteristic	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed-
Biochemical oxygen demand (5 day)	0.42	0.21
Total suspended solids	0.50	0.25
Oil and Grease	0.16	0.08
Fecal coliform	Maximum at any time 400 mpn/100ml	
pH	Within the range 6.0 to 9.0	

The effluent limitations are based on actual production at the facility which is expressed in the units of pounds per "live weight killed (LWK)". LWK is defined as the total weight of the total number of animals slaughtered

during the time to which the effluent limitations apply. MPN is defined as the most probable number.

2. Technology-Based Limitations

As required on the NPDES application, Armour submitted an average daily production value of 1,097,593 lbs/day LWK. This value represents a daily average of actual production over the last five years. This production value was multiplied by the effluent limits in Table 2 above in order to determine the following technology-based effluent limitations:

Table 3. Technology-Based Effluent Limitations

	Effluent Limitations (units of pounds per day)	
Effluent Characteristic	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed-
Biochemical oxygen demand (5 day)	460	230
Total suspended solids	550	270
Oil and Grease	170	90
Fecal coliform	Maximum at any time 400 mpn/100ml	
pH	Within the range 6.0 to 9.0	

The following table shows the technology-based effluent limitations in the existing permit which was issued in 1985:

Table 4. Technology-Based Effluent Limitations of the 1985 NPDES Permit

Effluent Characteristic	Effluent Limitations (units of pounds per day)	
	Maximum for any 1 day	Average of daily values for 30 consecutive days shall not exceed-
Biochemical oxygen demand (5 day)	90	75
Total suspended solids	120	100
Oil and Grease	25	21
Fecal coliform	Maximum at any time 400 mpn/100ml	
pH	Within the range 6.0 to 9.0	

For BOD, TSS, and oil and grease, the technology-based effluent limitations derived from recent production and current BCT guidelines (Table 3) are 3-7 times greater than the existing permit limitations (Table 4). An explanation of how the 1985 limits were derived can be found in the May 16, 1985 Fact Sheet which accompanied the proposed 1985 permit. The 1985 Fact Sheet explains that the technology-based limits were carried forward from the 1979 permit. The 1985 Fact Sheet states that the limitations were based on "best engineering judgment of BCT based upon treatment information in the Development Document..."

Inclusion in the proposed permit of the technology-based limits derived from current production and the BCT guidelines (Table 3) would represent a significant weakening of the existing limits for BOD, TSS, and oil and grease. The "anti-backsliding" provisions of Section 402(o) of the CWA generally prohibit the inclusion of effluent limitations in a reissued permit that are less stringent than the comparable effluent limitations in the previous permit. These anti-backsliding provisions were cited in the 1985 fact sheet as a basis for carrying forward the effluent limitations of the 1979 permit.

While Section 402(o)(2) of the CWA contains a number of narrowly defined exceptions to the anti-backsliding rule, EPA is without sufficient information to conclude that any of these exceptions apply to the Armour facility. As a result, the existing technology-based effluent limitations outlined in Table 4 above are retained in this proposed permit for BOD, TSS and oil and grease. (Fecal coliform and pH are discussed further in the following section on water quality-based limitations).

As shown previously (Table 1), the Permittee has developed treatment processes to meet technology-based limitations and has clearly demonstrated the ability to meet existing BOD, TSS, and oil and grease limitations. Also, Indian Creek has been listed as water quality impaired for sediments, oil and grease, nutrients, and dissolved oxygen. Aside from the anti-backsliding provisions of the CWA, the fact that the facility can meet existing limits and that the receiving water is impaired lend further support to not allowing relaxation of the BOD, TSS, and oil and grease limitations.

C. Water Quality-Based Evaluation

1. Statutory Basis for Water Quality-Based Limits

Section 301(b)(1)(C) of the CWA requires the development of limitations in permits necessary to meet water quality standards by July 1, 1977. Discharges to state waters must also comply with limitations imposed by the state as part of its certification of NPDES permits under section 401 of the CWA.

The NPDES regulation (40 CFR 122.44(d)(1)) implementing Section 301 (b)(1)(C) of the CWA requires that permits include limits for all pollutants or parameters which "are or may be discharged at a level which will cause, have the reasonable potential to cause , or contribute to an excursion above any state water quality standard, including state narrative criteria for water quality."

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

The regulations also address when whole effluent toxicity (WET) and chemical-specific limits are required. A WET limit is required whenever the toxicity of the effluent has the reasonable potential to cause or contribute to an excursion above either a numeric or narrative standard for toxicity. The only exception is where chemical-specific limits will fully achieve the narrative standard. A chemical-specific limit is required whenever an individual pollutant is at a level of concern (as defined at 40 CFR 122.44(d)(1)) relative to the numeric standard for that pollutant.

2. Reasonable Potential Determination/Derivation of Water Quality Based Effluent Limits

When evaluating the effluent to determine if water quality based effluent

limits (WQBELs) are needed based on chemical specific numeric criteria, a projection of the receiving water concentration (downstream of where the effluent enters the receiving water) for each pollutant of concern is made. If the projected concentration of the receiving water exceeds the applicable numeric criterion for a specific chemical, then there is a reasonable potential that the discharge may cause or contribute to an excursion above the applicable water quality standards, and a WQBEL is required.

The effluent limits in the current permit for fecal coliform, and pH were compared with water quality standards to determine whether more stringent limits were necessary to ensure compliance with water quality standards. Additionally, ammonia, total residual chlorine, temperature, dissolved oxygen, and turbidity discharged by the facility were compared with water quality standards to determine if effluent limits needed to be incorporated into the proposed permit to ensure compliance with water quality standards. See Appendix B for details of the reasonable potential determination for chlorine and ammonia.

In deriving the chlorine and ammonia WQBELs, Region 10 applied the statistical permit limit derivation approach described in Chapter 5 of the EPA document entitled, "Technical Support Document for Water Quality-based Toxics Control" (TSD), dated March 1991. This approach takes into account effluent variability, sampling frequency, and the difference in time frames between the water quality standards and monthly average and daily maximum limits. In addition to the State of Idaho numeric water quality criteria and dilution values, EPA used the procedures of the TSD document along with the following assumptions:

Probability value for long-term average calculation	99%
Probability value for monthly average limit calculation	95%
Probability value for daily maximum limit calculation	99%
Coefficient of variation for parameters of concern	Variable, see Appendix B
Frequency of monitoring for parameters of concern	4/month

The limits which EPA is proposing in the draft permit for each parameter are discussed below.

(a) pH

The state water quality standard for pH is 6.5 - 9.5 standard units for the protection of aquatic life (IDAPA 16.01.02250.02.i.). In the current permit, the effluent is required to be between 6.0 - 9.0 standard units. The technology requirement requires the pH to be between 6.0 to 9.0 (see Part V.B.1. of this Fact Sheet). As discussed previously, the permit will reflect the most stringent limitation between technology-based and water-quality based, therefore, the proposed permit will require the effluent pH to be

between 6.5 - 9.0 standard units. The lower end of the range reflects the state requirement for the protection of water quality standards while the upper end of the range reflects the federal technology based requirement of 9.0 standard units.

(b) Fecal Coliform Bacteria

The current permit contains a monthly limit of 200 colonies/100 ml and a daily maximum of 400 colonies/100ml during October 1 - April 30. For May 1 through September 30, the monthly limit is 50 colonies/100 ml and a daily limit of 400 colonies/100 ml.

The state water quality standards limit fecal coliform bacteria for waters protected for primary and secondary contact recreation. For secondary contact recreation, waters are not to contain fecal coliform bacteria in concentrations exceeding 800/100 ml at any time, and a geometric mean of 200/100 ml based on a minimum of 5 samples taken over a thirty day period (IDAPA 16.01.02250.01.b.). For primary contact recreation, during the period of May 1 through September 30, waters are not to contain fecal coliform bacteria in concentrations exceeding 500/100ml at any time, and a geometric mean of 50/100 ml based on a minimum of 5 samples taken over a thirty day period (IDAPA 16.01.02250.01.a.). As discussed previously, the technology-based requirement for fecal coliform bacteria states that the effluent must not exceed 400 colonies/100 ml at any time (see Part V.B.1. of this Fact Sheet).

The proposed permit incorporates the most stringent of the water-quality based or technology based requirements. The most stringent daily maximum requirement is the technology requirement of 400 colonies/100 ml at any time. The proposed permit incorporates the monthly limit of 50/100 ml for May 1 through September 30 (primary contact requirement) and 200/100 ml for October 1 through April 30 (secondary contact requirement) in order to comply with Idaho water quality standards. Both of the monthly values are based on a geometric mean of a minimum of 5 samples taken over a 30 day period as specified in the Idaho Water Quality Standards.

The State of Idaho is contemplating changing the criteria for contact recreation. As such, the State has recommended that the effluent be monitored for E.Coli bacteria. The draft permit will require once per month monitoring for E.Coli bacteria.

(c) Total Residual Chlorine

The current permit contains an average monthly chlorine limit of 1.0 mg/L, and a maximum daily limit of 1.5 mg/L. A reasonable potential analysis indicates that the current discharge has the potential to violate the State

water quality standards (see Appendix B). The proposed permit will include an average monthly limit of 45 µg/L and an maximum daily limit of 58 µg/L. For additional information on developing the effluent limitation see Appendix C.

(d) Total Ammonia

The current permit has an average monthly ammonia limit of 15 pounds/day, and a maximum daily limit of 30 pounds/day. A reasonable potential analysis indicates that the current discharge has the potential to violate the state water quality standards (see Appendix B). The proposed permit will include an average monthly ammonia limit of 8 pounds/day and a maximum daily limit of 15 pounds/day. The ammonia limitation is water-quality based developed to protect the ammonia water quality criteria which is expressed in units of concentration. Therefore, the proposed permit will also include an average monthly limit of 1.3 mg/L and an maximum daily limit of 2.5 mg/L. For additional information on developing the effluent limitation see Appendix C.

(e) Dissolved Oxygen/Biochemical Oxygen Demand (BOD)

The State water quality standards requires the level of dissolved oxygen (DO) to exceed 6.0 mg/L at all times for water bodies that are protected for aquatic life use. For water protected for salmonid spawning the criteria is a one day minimum of not less than 6.0 mg/L or 90% of saturation, whichever is greater.

Armour monitors upstream DO concentrations weekly and reports the minimum value for each month as required by the existing NPDES permit. The existing permit does not require effluent DO monitoring. The upstream data indicates Indian Creek often does not comply with the DO water quality standards upstream from the facility. The average value from the last two years of data reported by Armour on the monthly monitoring report is 5.9 mg/L. The range of values is 2.5 to 8.2 mg/L. Over half of the values reported in the last two years were below the minimum of 6.0 mg/L.

The Streeter-Phelps DO model was run in an attempt to determine the impact of the Armour discharge on in-stream DO concentrations. The model was run using worst-case assumptions for DO background, stream flow, biochemical oxygen demand (BOD) loading, stream dimensions, and temperature. Effluent DO is also an input to the model and had to be estimated since no effluent DO data was available. Based on the results of this modeling exercise, with worst case conditions, it appears that Armour's discharge may further suppress DO levels in Indian Creek, due largely to the facility's BOD load, however, more data is needed determine this result with confidence.

Since the receiving water immediately upstream of the facility does not comply with the DO water quality criteria, any discharge from the facility that is not in compliance with the criteria will also contribute to noncompliance (ie, mixing zone is not available for dilution). Therefore, the effluent must meet the DO criteria at the discharge point. An effluent limit of 6 mg/L DO is included in the permit. It is not possible to quantify the effect of the BOD load from the facility on DO levels in Indian Creek due to a lack of data, therefore, monitoring requirements are incorporated into the proposed draft permit (DO and BOD). The data collected will be used during the next permitting cycle (five year life of the permit or as appropriate if reopened for a TMDL) to determine if more stringent requirements are necessary for BOD.

(f) Metals

There are no metals of concern in either outfall 010 or 004. The Permittee indicated on the permit application that metals were believed to be absent and there is no reason to expect the presence of metals in the discharge from this activity.

(g) Whole Effluent Toxicity/No Toxics Substances in Concentrations that Impair Designated Uses

The State water quality standards require surface waters of the State to be free from toxic substances in concentrations that impair use classifications. Data does not exist to support the development of a whole effluent toxicity (WET) limit at this time. The proposed permit will require the Permittee to monitor for WET, and this information will be used in the next permitting cycle to determine if a limit is required. In order to develop a data base which will permit evaluation of the need for a WET limit, the proposed permit requires two WET tests per year during the five years of the permit for a total of ten test results.

The WET test requires the following dilution series: one dilution at the instream waste concentration (IWC) and two above and two below the IWC. The IWC is the inverse of the dilution factor or the effluent flow divided by the total stream flow (upstream plus effluent). (The IWC for this facility is 1.14 cfs/(15.3 cfs(0.25) + 1.14 cfs) = 23%. See Appendix C for further derivation of flow rates.)

(h) Temperature for outfalls 010 and 004

The State water quality standards for cold water biota require water temperatures of 22 degrees C (72 °F) or less with a maximum daily average of no greater than 19 degrees C (66°F). The standards also require that the induced temperature variation must not exceed plus one degree C. The State water quality standard for salmonid spawning, which

applies to Indian Creek above Sugar Avenue, Nampa, also specifies a temperature requirement. During the time period for salmonid spawning and incubation the standard requires water temperatures of 13 degree C (55°F) or less with a maximum daily average no greater than 9 degrees C (48°F). Idaho DEQ recommends using the rainbow trout as the species to identify the spawning and incubation time period for this stream so the salmon spawning temperature requirements apply from January 15 through July 15.

The existing permit requires weekly monitoring of temperature for both outfall 010 and cooling water outfall 004. The permit also requires instream temperature monitoring above the first discharge and below the last discharge. The downstream monitoring site must be between 45 and 60 meters below discharge 004. The Fact Sheet for the 1985 permit states that the original Armour NPDES permit contained temperature and flow limitations for outfall 004 (cooling water): "In order to allow operational flexibility to utilize cooling water for heating wastewater, or wastewater as cooling water, subsequently increasing nitrification capabilities, previous temperature effluent limitations were deleted in a June 16, 1981, permit modification. Upstream and downstream temperature monitoring were retained however, to assure compliance with applicable State water quality standards."

Data collected over the period of August 1995 through July 1997 was analyzed to determine the impact on the receiving water from the existing discharge. The data is summarized in the following table:

Table 5. Temperature Data, August 1995-July 1997

Date	Temp. of outfall 004 (°C)	Temp. of Outfall 010 (°C)	Temp. Upstream (°C)	Temp. Downstream (°C)	Downstream minus Upstream Temp. (°C)
8/95	19.6	26.7	17.2	17.8	0.6
9/95	20.0	29.8	16.1	15.0	-1.1
10/95	35.0	21.9	13.4	13.9	0.5
11/95	24.4	21.8	12.6	12.2	-0.4
12/95	18.3	18.3	9.2	6.7	-2.6
1/96	22.2	16.2	9.0	7.2	-1.8
2/96	22.5	17.0	8.3	8.0	-0.3
Date	Temp. of outfall 004 (°C)	Temp. of Outfall 010 (°C)	Temp. Upstream (°C)	Temp. Downstream (°C)	Downstream minus Upstream Temp. (°C)
3/96	24.8	18.2	8.3	9.1	0.8
4/96	20.5	19.6	10.1	9.6	-0.5

5/96	24.9	23.1	13.8	13.0	-0.8
6/96	21.4	25.0	14.3	13.7	-0.6
7/96	23.7	27.7	16.7	16.4	-0.3
8/96	24.8	26.8	17.5	16.3	-1.2
9/96	21.0	24.4	15.1	13.9	-1.2
10/96	21.0	21.7	13.1	13.7	0.6
11/96	19.4	18.9	10.6	11.6	0.9
12/96	27.0	17.5	10.1	11.7	1.6
1/97	19.7	18.4	6.9	7.4	0.6
2/97	19.7	18.7	10.5	9.6	-0.9
3/97	20.6	22.3	9.0	9.2	0.2
4/97	20.9	23.0	11.8	11.2	-0.6
5/97	21.9	25.4	14.4	15.2	0.8
6/97	23.4	25.2	17.7	16.7	-1.0
7/97	24.6	26.5	18.8	18.2	-0.6

Outfall 004 temperature ranged from 18 to 35°C during this time with an average flow of 0.05 million gallons per day (mgd). Outfall 010 temperature ranged from 16 to 30°C with an average flow of 0.36 mgd. The instream temperatures ranged from 6.7 to 18.8°C. As shown in the table, the downstream temperature was always in compliance with the in-stream cold water biota criteria of daily maximum no greater than 22°C and daily average of 19°C. The salmonid spawning criteria of daily maximum no greater than 13°C, however, was exceeded during May, June, and July of both years that were analyzed. During this time, both the upstream and downstream temperatures were above criteria. Looking at the change in temperature during the six months that the criteria were exceeded, the downstream temperature was actually slightly lower than the upstream temperature during five of the six months, even though discharge temperatures were above stream temperatures. This suggest that at 45 to 60 meters below the discharge, the effluent did not demonstrate a significant adverse impact on the receiving water temperature, during this time period.

The maximum instream temperature above and below the facility were compared for each month during the two year period in order to determine if the induced temperature is less than plus one degree C as required by the standards. The upstream temperature was subtracted from the downstream temperature to arrive and the net change in temperature shown in the last column of table 5. A positive value represents an increase in temperature

below the facility, a negative value represents a decrease in temperature below the facility.

For 15 of the 24 data points the temperature was lower below the facility relative to above the first outfall. For the other 9 data points the temperature was higher below the facility. One value was greater than the plus one °C increase allowed in the water quality standard. The data suggest the facility has not caused a measurable detrimental effect on temperatures within the 45 to 60 meters below the facility for flows regimes observed during the past two years and that the stream is generally in compliance with the induced temperature standard.

Due to the findings above, temperature limitations will not be developed for the proposed permit. However, concerns exist regarding discharge temperature due to the fact that the effluent is often above water quality criteria, flows from the facility could increase, and the stream has been out of compliance for salmonid spawning criteria for part of the year. Flow limitations will be developed in the proposed permit in part to protect temperature and other water quality criteria (see flow section below) and monitoring of temperature will also be required in the effluent and receiving waters. Existing upstream and downstream temperature monitoring will be retained in the permit. IDEQ has also requested that temperature be monitored hourly for a twenty four period once per month in order to evaluate daily average conditions. As discussed in the monitoring section of this fact sheet, ambient temperature monitoring will be discontinued after two years of sampling.

(i) Turbidity

The state water quality standards require that turbidity not exceed background turbidity by more than fifty (50) NTU instantaneously or more than twenty five (25) NTU for more than ten (10) consecutive days. Data does not exist either in the effluent nor in-stream to support the development of a turbidity limit at this time. The proposed permit will require the Permittee to monitor for turbidity (upstream, downstream, and effluent), and this information will be used in the next permitting cycle (five year life of the permit or as appropriate if reopened for a TMDL) to determine if a limit is required.

(j) Floating, Suspended or Submerged Matter

The state water quality standards 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 requirement is a condition of the current permit and will be retained in the proposed permit.

(k) Flow

The existing permit limits flow for outfall 010 to a monthly average of 0.416 million gallons per day (mgd) and a daily maximum of 0.475 mgd. There is no limitation of flow for the cooling water discharge 004 in the existing permit. The facility has largely been in compliance with the flow limitation for outfall 010 during the past two years. The monthly maximum flow value over the last two years has averaged 0.44 mgd. The NPDES permit application submitted by Armour in November 1997 lists an average flow for outfall 010 of 0.74 mgd. This value appears high relative to existing flows but was used as reported in determining the water quality based limits derived in this Fact Sheet. Using a potentially high estimate of effluent flow during water quality based permit analysis tends toward a conservative analysis since this will represent the maximum impact of the effluent on the receiving water. Since this flow was used in the derivation of water quality based permit limits it will also be a limitation of the proposed permit in order to protect water quality standards including temperature as cited above. Because the application value is high relative to actual flows (0.74 mgd versus 0.44 mgd), and since the water quality based effluent limits are determined in order to protect acute and chronic criteria, the application value is interpreted as a maximum daily limitation. Similarly, the permit application flow limit of 0.10 mgd for outfall 004 will be incorporated as a permit limitation. The average flow for outfall 004 over the last two years is 0.056 mgd. The 0.10 mgd shall also be incorporated as a daily maximum value.

(l) Nutrients

The state water quality standards require surface waters of the State to be free from excess nutrients that can cause visible slime growths or other nuisance aquatic growths impairing designated uses. Data does not exist to support the development of nutrient (i.e. phosphorus) limits at this time. The proposed permit will require the permittee to monitor for nutrients, and to develop a study to determine if excess nutrients are impairing water quality. Additionally, IDEQ requested that nutrient monitoring be weekly upstream and downstream of the discharge. This information will be used in the next permitting cycle (five year life of the permit or as appropriate if reopened for a TMDL) to determine if a limit is required.

D. Monitoring Requirements

The following monitoring requirements have been included in the proposed permit pursuant to Section 308 of the CWA and 40 CFR 122.44(I). Monitoring frequencies are based on the nature and effect of the pollutants, as well as a determination of the minimum sampling necessary to adequately monitor the facility's performance.

1. Effluent Monitoring

The proposed permit requires monitoring for the following parameters.

Table 6. Outfall 010 Monitoring

Parameter	Sample Frequency	Sample Type
Flow, mgd	Continuous	Recording
Temperature, °F	1/week	grab
$BOD_{5,}$ lbs/day	1/week	24 hour composite
TSS, lbs/day	1/week	24 hour composite
Oil and Grease, lbs/day	1/week	24 hour composite
Ammonia-Nitrogen, lbs/day and mg/L	1/week	24 hour composite
Fecal Coliform Bacteria, #/100 ml	5/month	grab
E. Coli Bacteria	1/month	grab
Total Residual Chlorine, mg/L	1/week	grab
pH, standard units	1/week	grab
Dissolved Oxygen, mg/L	1/week	grab
WET, TU_c	2/year	24 hour composite
Turbidity[1], NTU	1/week	24 hour composite
Total Kjeldahl Nitrogen[1], mg/L	1/week	24 hour composite
Nitrate-Nitrite as N[1], mg/L	1/week	24 hour composite
Total Phosphorus[1], mg/L	1/week	24 hour composite
Ortho-phosphate[1], mg/L	1/week	24 hour composite
1. These parameters shall be analyzed for 2 years starting 90 days after the effective date of the permit.		

Table 7. Outfall 004 Monitoring

Parameter	Sample Frequency	Sample Type
Flow, mgd	Continuous	Recording
Temperature, °F	1/week	grab

2. Ambient Monitoring

The Permittee shall implement a receiving water monitoring program. The data collected will be used to support state TMDL development and in the next permitting cycle to ensure water quality standards are being achieved. All of the parameters (except flow) shall be analyzed for 2 years starting 90 days after the effective date of the permit. All parameters are related to TMDL development and/or parameters for which Indian Creek has been listed. Flow shall be sampled weekly, upstream, for the life of the permit since flow is integral to water-quality based permitting and a number of years of data is needed in order to determine statistical flow parameters (1Q10, 7Q10).

Table 8. Ambient Monitoring

Parameter[1]
Total Ammonia as N, mg/L
$BOD_{5,}$ mg/L
Dissolved Oxygen, mg/L
pH, standard units
Fecal Coliform Bacteria,#/100 ml
Temperature, °F
Nitrate + Nitrite, mg/L
Total Kjeldahl Nitrogen, mg/L
Total Phosphorus, mg/L
Ortho-Phosphorus, mg/L
Total Suspended Solids, mg/L
Turbidity, NTU
Oil and Grease, mg/L
Stream Flow, cfs[2]
1. These parameters (except flow) shall be analyzed for 2 years starting 90 days after the effective date of the permit, grab samples, monitored both upstream and downstream, 1/week. 2. Flow shall be monitored weekly, upstream only, for the life of the permit.

3. Temperature Monitoring: To evaluate daily average temperature conditions

IDEQ requested that the permittee monitor temperature hourly for a twenty four hour period. Monitoring shall occur once per month at the effluent, the upstream monitoring station and the downstream monitoring station. This monitoring shall start 90 days from the effective date of the permit and last for a period of two years.

E. Quality Assurance Plan

Under 40 CFR 122.41(e), the Permittee must properly operate and maintain all facilities which it uses to achieve compliance with the conditions of the permit. This regulation also requires the Permittee to ensure adequate laboratory controls and appropriate quality assurance procedures. Quality assurance requirements apply to all permit required monitoring, including sample collection, handling, and shipment, on-site continuous and daily measurements, laboratory analysis, and data reporting and storage.

The draft permit requires the Permittee to submit a quality assurance project plan to EPA within 90 days of the effective date of the permit. The plan is intended to address sampling techniques, sample preservation and shipment procedures, instrument calibration and preventive maintenance procedures, personnel qualifications and training, and analytical methods.

VI. Antidegradation

Indian Creek is a Tier I waterbody. In proposing to reissue this permit, EPA has considered Idaho's antidegradation policy (IDAPA 16.01.02051.01). This provision states that "the existing instream water uses and the level of water quality necessary to protect the existing uses shall be maintained and protected." The issuance of this permit will not result in the increase of loading of pollutants for those pollutant parameters which are determined on a technology basis. Other limitations in the permit are determined on a water-quality basis and are derived so as to protect water quality standards. Therefore, the limits in the permit are consistent with Idaho's antidegradation policy.

VII. Other Legal Requirements

A. Endangered Species Act

Section 7 of the Endangered Species Act (ESA) requires federal agencies to request a consultation with the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USF&WS) regarding potential effects an action may have on listed endangered species. In a letter dated October 24, 1997, the U.S. Fish and Wildlife Service identified the peregrine falcon as being a federally-listed endangered species likely to occur within the project area (letter addressed Nampa wastewater treatment plant discharge which is a approximately three miles downstream from the Armour outfalls thus applicable to Armour). There are no

proposed or candidate species in the area of the discharge.

In a letter dated October 21, 1997, the National Oceanic and Atmospheric Administration, National Marine Fisheries Service stated that the proposed discharge from the Nampa wastewater treatment plant (located approximately three miles downstream from the Armour discharge) is not within the designated critical habitat for listed Snake River Salmon, and critical habitat has not yet been designated for Snake River steelhead. There are no threatened species in the area of the discharge.

It is not likely that the proposed permit will affect the peregrine falcon, Snake River salmon or Snake River steelhead. EPA will provide NMFS and USF&WS with copies of the proposed permit and Fact Sheet during the public notice period. Any comments received from these agencies regarding this determination will be considered prior to reissuance of this permit.

B. State Certification

Because state waters are involved in this permitting action, the provisions of Section 401 of the CWA apply. In accordance with 40 CFR 124.10(c)(1), public notice of the draft permit has been provided to the State of Idaho agencies having jurisdiction over fish, shellfish, and wildlife resources.

As part of the certification, the State will be asked to certify the mixing zone used in calculating the effluent limitations in the proposed permit. If certification of the mixing zone is not provided, the limitations in the permit will be recalculated based on meeting water quality standards at the point of discharge.

C. Length of Permit

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

APPENDIX A

Criteria Applicable To Indian Creek

Criteria for the protection of cold water biota:

1.

Parameter	Aquatic Life Criteria[1]		Human Health Criteria[2]
	Acute criteria	Chronic criteria	
Chlorine (µg/L)	19	11	NA
Ammonia[1] (mg/L)	4.65	0.9	NA

1. The ammonia criteria are dependent on ambient pH and temperature. The 95th percentile of the data collected upstream of the Armour facility between August 1995 and July 1997 was used to determine the appropriate criteria. The 95th percentile of temperature and pH is 17.7° C and 8.1 standard units respectively. With pH and temperature the ammonia criteria were determined from the Idaho Water Quality Standards, cold water biota criteria, Tables 3 and 4.

2. pH values must be within the range of 6.5 - 9.5.

3. The total concentration of dissolved gas not exceeding 110% of saturation at atmospheric pressure at the point of sample collection.

4. Dissolved Oxygen Concentrations must exceed 6 mg/L at all times.

5. Water temperature must be 22°C or less with a maximum daily average of no greater than 19 °C .

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

7. Surface waters shall be free from floating, suspended or submerged materials.

8. Surface waters shall be free from toxic substances in concentration that impair designated beneficial uses.

Criteria for the protection of primary and secondary contact recreation:

1. Fecal Coliform Bacteria.

a. Primary contact recreation. Between May 1 and September 30 of each calendar year, fecal coliform bacteria are not to exceed:

i. 500 colonies/100ml at any time; and

ii. 200 colonies/100 ml in more than 10% of the samples taken over 30 days; and
iii. a geometric mean of 50 colonies/100 ml based on a minimum of 5 samples taken over a thirty day period.

b. Secondary contact recreation. Fecal coliform bacteria are not to exceed:

i. 800 colonies/100ml at any time; and
ii. 400 colonies/100 ml in more than 10% of the samples taken over 30 days; and
iii. a geometric mean of 200 colonies/100 ml based on a minimum of 5 samples taken over a thirty day period.

2. Surface waters shall be free from floating, suspended or submerged materials.

3. Surface waters shall be free from toxic substances in concentration that impair designated beneficial uses.

Criteria for the protection of agricultural use:

1.

Parameter	Livestock Criteria	Irrigation Criteria
Nitrates & Nitrites (mg/L)	100	NA
Nitrites (mg/L)	10	NA
NOTE: NA = not applicable		

2. Surface waters shall be free from floating, suspended or submerged materials.

3. Surface waters shall be free from toxic substances in concentration that impair designated beneficial uses.

Criteria for the protection of salmonid spawning:

1. Waters designated for salmonid spawning are to exhibit the characteristics listed below during the spawning period and incubation for the particular species inhabiting those waters. Time periods for each species are found in the Idaho Water Quality Standards. Idaho DEQ recommends using rainbow trout as the species inhabiting Indian Creek. The time period for salmonid spawning and incubation for rainbow trout is January 15 through July 15.

2. Dissolved Oxygen. Intergravel dissolved oxygen shall have a one day minimum of not less than 5.0 mg/l; seven day average mean of not less than 6.0 mg/l. Water-column dissolved oxygen shall have a one day minimum of not less than 6.0 mg/l or 90% of saturation,

whichever is greater.

3. Water temperatures of 13 degrees C or less with a maximum daily average no greater than 9 degrees C.

4. The ammonia criteria established for cold-water biota apply for protection of salmonid spawning.

APPENDIX B
Reasonable Potential Determination

To determine if a water quality based effluent limitation is required, the receiving water concentration of pollutants is determined downstream of where the effluent enters the receiving water with an allowance made for a mixing zone. If the projected receiving water concentration is greater than the applicable numeric criterion for a specific pollutant, there is reasonable potential that the discharge may cause or contribute to an excursion above the applicable water quality standard and an effluent limit must be incorporated into the NPDES permit.

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

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

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

where,
C_d = receiving water concentration downstream of the effluent discharge
Q_d = receiving water flow downstream of the effluent discharge
C_e = maximum projected effluent concentration
Q_e = maximum effluent flow
C_u = upstream concentration of pollutant
Q_u = upstream flow

Mixing Zone/Flow Conditions

The Idaho water quality standards at IDAPA 16.01.02060 allow twenty-five percent (25%) of the receiving water to be used for dilution for aquatic life criteria. One hundred percent (100%) of the receiving water can be used for dilution for human health criteria. The flows (source:USGS site in Nampa, Idaho) used to evaluate compliance with the criteria are:

- The 1 day, 10 year low flow (1Q10) is used for the protection of aquatic life from acute effects. It represents the lowest daily flow that is expected to occur once in 10 years. The 1Q10 for Indian Creek is 14.7 cfs.

- The 7 day, 10 year low flow (7Q10) is used for the protection of aquatic life from chronic effects. It the lowest 7 day average flow expected to occur once in 10 years. The 7Q10 for Indian Creek is 15.3 cfs.

- The harmonic mean flow is used for the protection of human health from carcinogens. It is the number of daily flow measurements divided by the sum of the reciprocals of the flows. The harmonic mean flow is 37.3 cfs.

- The 30 day, 5 year low flow (30Q5) is used for the protection of human health from non carcinogens. It represents the 30 day average flow expected to occur once in 5 years. The 30Q5 for Indian Creek is 16.8 cfs.

In accordance with state water quality standards, only the Idaho Department of Health and Welfare, Division of Environmental Quality (IDHW-DEQ) may authorize mixing zones. The reasonable potential calculations are based on a mixing zone of 25% for aquatic life and 100% for human health and agriculture. If the State does not authorize a mixing zone in its 401 certification, the permit limits will be re-calculated to ensure compliance with the standards at the point of discharge.

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

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

Maximum Projected Effluent Concentration

When determining the projected receiving water concentration, EPA's *Technical Support Document for Water Quality-based Toxics Controls (1991)* recommends using the maximum projected effluent concentration. To determine the maximum projected effluent concentration (C_e) EPA has developed a statistical approach to better characterize the effects of effluent variability. The approach combines knowledge of effluent variability as estimated by a coefficient of variation (CV) with the uncertainty due to a limited number of data to project an estimated maximum concentration for the effluent. Once the CV's for each parameter have been calculated, the reasonable potential multiplier used to derive the maximum projected effluent concentration (C_e) can be found in Table 3-1 of EPA's *Technical Support Document for Water Quality-based Toxic Control* (TSD).

The maximum projected concentration (C_e) for the effluent is equal to the 95th percentile observed concentration value (or the highest observed value if the 95th percentile cannot be calculated) of the data set multiplied by the reasonable potential multiplier.

The following table summarizes the CV's, reasonable potential multipliers, 95th percentile effluent concentration and maximum projected concentration (C_e) for ammonia and chlorine.

TABLE 1

Parameter	Coefficient of Variation (CV)	Reasonable Potential Multiplier	95th Percentile effluent concentration	Maximum Projected Effluent Concentration (C_e)
Ammonia	0.51	2.0	9.94 lbs/day	19.88 lbs/day
Chlorine	0.18	1.3	1.47 mg/L	1.91 mg/L

The CV and 95th percentile concentration were calculated using effluent data collected from August 1995 through July 1997.

Reasonable Potential Calculations

1. AMMONIA

(a) Determine if there is reasonable potential for the acute aquatic life criterion to be violated. The upstream flow used to make the determination is the 1Q10 (9.50 mgd). Assume the State will allow a 25% mixing zone. The Q_e is 0.475 mgd which is the 95th percentile flow from outfall 010 from August 1995 through July 1997. The effluent concentration (C_e) of 19.88 lbs/day is converted from a load basis to a concentration basis (mg/L) by dividing the load by the effluent flow and by a conversion factors to arrive at 5.02 mg/L (C_e = 19.88/.475 mgd/8.34). Q_u is the 95 percentile of upstream ammonia concentration from data collected between August 1995 to July 1997.

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

$$C_d = \frac{(5.02 \times 0.475) + (0.68 \times (9.50 \times .25)}{0.475 + (9.50 \times .25)} = 1.40 \text{ mg/L}$$

Since 1.40 mg/L is less than the acute aquatic life criterion (4.65 mg/L), there is not a reasonable potential for the effluent to cause an exceedance to the acute water quality standard.

(b) Determine if there is reasonable potential for the chronic aquatic life criterion to be violated. The upstream flow used to make the determination is the 7Q10 (9.89 mgd). Assume the State will allow a 25% mixing zone.

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

$$C_d = \frac{(5.02 \times 0.475) + (0.68 \times (9.89 \times .25)}{} = 1.38 \text{ mg/L}$$

$$0.475 + (9.89 \times .25)$$

Since 1.38 is greater than the chronic aquatic life criterion (0.90 mg/L), there is a reasonable potential for the effluent to cause an exceedance to the water quality standard, and a water quality based effluent limit is needed.

2. CHLORINE

(a) Determine if there is reasonable potential for the acute aquatic life criterion to be violated. The upstream flow used to make the determination is the 1Q10 (9.50 mgd). Assume the State will allow a 25% mixing zone. The Q_e is 0.475 mgd which is the 95th percentile flow over the last two years. The upstream concentration of chlorine is assumed to be zero.

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

$$C_d = \frac{(1.91 \times 0.475) + (0 \times (9.50 \times .25)}{0.475 + (9.50 \times .25)} = 318\ \mu g/L$$

Since 318 µg/L is greater than the acute aquatic life criterion (19 µg/L), there is a reasonable potential for the effluent to cause an exceedance to the water quality standard. Therefore, a water quality based effluent limit is required.

(b) Determine if there is reasonable potential for the chronic aquatic life criterion to be violated. The upstream flow used to make the determination is the 7Q10 (9.89 mgd). Assume the State will allow a 25% mixing zone.

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

$$C_d = \frac{(1.91 \times 0.475) + (0 \times (9.89 \times .25)}{0.475 + (9.89 \times .25)} = 308\ \mu g/L$$

Since 308 is greater than the chronic aquatic life criterion (11 µg/L) , there is a reasonable potential for the effluent to cause an exceedance to the water quality standard. Therefore, a water quality based effluent limit is required.

APPENDIX C
Derivation of Water Quality Based Effluent Limitations

To support the implementation of EPA's national policy for controlling the discharge of toxicants, EPA developed the "Technical Support Document for Water Quality-Based Toxics Control" (EPA/505/2-90-001, March 1991). The following is a summary of the procedures recommended in the TSD in deriving water quality-based effluent limitations for toxicants. This procedure translates water quality criteria for chlorine and ammonia to "end of the pipe" effluent limits.

Step 1

The acute and chronic aquatic life criteria are converted to acute and chronic waste load allocations (WLA_{acute} or $WLA_{chronic}$) for the receiving waters based on the following mass balance equation:

$$Q_dC_d = Q_eC_e + Q_uC_u$$

where,
- Q_d = downstream flow = $Q_u + Q_e$
- C_d = aquatic life criteria that cannot be exceeded downstream (see Appendix A)
- Q_e = effluent flow = 0.74 mgd = 1.14 cfs (from permit application)
- C_e = concentration of pollutant in effluent = WLA_{acute} or $WLA_{chronic}$
- Q_u = upstream flow
  - = 1Q10 for WLA_{acute} determinations = 14.7 cfs (Appendix B)
  - = 7Q10 for $WLA_{chronic}$ determinations = 15.3 cfs (Appendix B)
- C_u = upstream background concentration of pollutant
  - = 0.0 for chlorine (assumption)
  - = 0.68 mg/L, ammonia concentration upstream, monitored 95th percentile for period August 1995 through July 1997

Rearranging the above equation to determine the effluent concentration (C_e) or the wasteload allocation (WLA) results in the following:

$$C_e = WLA = \frac{Q_dC_d - Q_uC_u}{Q_e}$$

when a mixing zone is allowed, this equation becomes:

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

where, %MZ is the mixing zone[1] allowable by the state standards. The Idaho water quality standards at IDAPA 16.01.02060 allow twenty-five percent (25%) of the receiving water to be used for dilution for aquatic life criteria. The effluent limits have been derived using Idaho's guidelines for mixing zone. However, establishing a mixing zone is a State discretionary function, if the State does not certify a mixing zone in the 401 certification process the effluent limits will be recalculated without a mixing zone.

$$\text{Chlorine } WLA_{acute} = \frac{C_d(Q_u \text{ X } \%MZ) + C_d Q_e}{Q_e} - \frac{Q_u C_u (\%MZ)}{Q_e}$$

$$= \frac{19(14.7 \text{ X } .25) + (19 \text{ X } 1.14)}{1.14} - \frac{14.7 \text{ X } 0\ (.25)}{1.14} = 80\ \mu g/L$$

$$\text{Chlorine } WLA_{chronic} = \frac{11(15.3 \text{ X } .25) + (11 \text{ X } 1.14)}{1.14} - \frac{15.3 \text{ X } 0\ (.25)}{1.14} = 48\ \mu g/L$$

$$\text{Ammonia } WLA_{acute} = \frac{4.65(14.7 \text{ X } .25) + (4.65 \text{ X } 1.14)}{1.14} - \frac{14.7 \text{ X}0.68\ (.25)}{1.14} = 17.5\ mg/L$$

$$\text{Ammonia } WLA_{chronic} = \frac{0.9(15.3 \text{ X } .25) + (0.9 \text{ X } 1.14)}{1.14} - \frac{15.3 \text{ X } .68\ (.25)}{1.14} = 1.6\ mg/L$$

Step 2

The acute and chronic WLAs are then converted to Long Term Average concentrations (LTA_a and LTA_c) using the following equations (or use Table 5-1, page 102 of TSD):

$LTA_{acute} = WLA_{acute} \text{ X } e^{[0.5\sigma^2 - z\sigma]}$
where,
σ^2 = $\ln(CV^2 + 1)$
z = 2.326 for 99th percentile probability basis
CV = coefficient of variation = standard deviation/mean; $CV_{chlorine}$ = .18; $CV_{ammonia}$= .51 (see Appendix B)

$LTA_{chronic} = WLA_{chronic} \text{ X } e^{[0.5\sigma^2 - z\sigma]}$

where,
σ^2 = $\ln(CV^2/4 + 1)$
z = 2.326 for 99th percentile probability basis
CV = coefficient of variation = standard deviation/mean; $CV_{chlorine}$ = .18; $CV_{ammonia}$= .51

[1] Mixing zone - is an allocated impact zone where water quality criteria can be exceeded as long as acutely toxic conditions are prevented. Only the State of Idaho has the regulatory authority to grant a mixing zone.

Calculate the LTA_{acute} and the $LTA_{chronic}$:

Chlorine LTA_{acute} = 0.671(80 µg/L) = 54 µg/L
Chlorine $LTA_{chronic}$ = 0.815(48 µg/L) = 39 µg/L

Ammonia LTA_{acute} = 0.367(17.5 mg/L) = 6.42 mg/L
Ammonia $LTA_{chronic}$ = 0.576(1.6 mg/L) = 0.92 mg/L

Step 3

To protect a waterbody 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).

Step 4

1. The MDL and the AML would be calculated (or use Table 5-2 of the TSD) as follows:

$MDL = LTA_{chronic} \times e^{[z\sigma - 0.5\sigma^2]}$
where,
$\sigma^2 = \ln(CV^2 + 1)$
z = 2.326 for 99th percentile probability basis
CV = coefficient of variation

$AML = LTA_{chronic} \times e^{[z\sigma - 0.5\sigma^2]}$
where,
$\sigma^2 = \ln(CV^2/n + 1)$
z = 1.645 for 95th percentile probability basis
CV = coefficient of variation = standard deviation/mean
n = number of sampling events required per month = 4

The exponential term is also called the MDL or AML multiplier and can also be found in Table 5-2 of the Technical Support Document.

With CV = 0.18 for chlorine results in the following multipliers:
Chlorine: MDL multiplier of 1.49, AML multiplier of 1.16
Chlorine MDL = $LTA_{chronic}$ x 1.49 = 39ug/L x 1.49 = 58ug/L
Chlorine AML = $LTA_{chronic}$ x 1.16 = 39 ug/L x 1.16 = 45ug/L

With CV = 0.51 for ammonia results in the following multipliers:
Ammonia: MDL multiplier of 2.73, AML multiplier of 1.46

Ammonia MDL = $LTA_{chronic}$ x 2.73 = 0.92 mg/L x 2.73 = 2.5 mg/L
Ammonia AML = $LTA_{chronic}$ x 1.46 = 0.92 mg/L x 1.46 = 1.3 mg/L

The following table lists the effluent limitations for Outfall 001:

TABLE 2

OUTFALL 001	WATER QUALITY-BASED LIMITATIONS	
	Maximum Daily Limit	Average Monthly Limit
Chlorine	58 µg/L	45 µg/L
Ammonia	2.5 mg/L	1.3 mg/L

Ammonia Loads:

lbs/day = flow (mgd) x concentration (mg/L) x 8.34 (conversion factors)
use flow of 0.74 mgd (from permit application)

Maximum daily pounds = 0.74 x 2.5 x 8.34 = 15.4 lbs/day
Monthly average = 0.74 x 1.3 x 8.34 = 8.0 lbs/day