ALASKA POLLUTANT DISCHARGE ELIMINATION SYSTEM

PERMIT FACT SHEET

Permit Number: ___________________

DEPARTMENT OF ENVIRONMENTAL CONSERVATION
Wastewater Discharge Authorization Program
555 Cordova Street
Anchorage, AK 99501

Public Comment Start Date: [insert PN start date]
Public Comment Expiration Date: [insert PN exp date]

Technical Contact: [Insert Permit Writer's Name]
[Insert Permit Writer's Phone Number]
[Insert Permit Writer's e-Mail Address]

Proposed [select one: Issuance/Reissuance/Modification/Revocation and Reissuance] of a State of Alaska Wastewater Discharge Programs Authorization Permit.

[Insert Facility Name]
[Insert Secondary Facility Name]

The Alaska Department of Environmental Conservation (Department) Proposes To [select one: Issue/Reissue/Modify/Revoke and Reissue] a Permit
for the facility referenced above. The draft permit places conditions on the discharge of wastewater to waters and lands of the State of Alaska. In order to ensure protection of water quality and human health, the permit places limits on the types and amounts of pollutants that can be discharged from the facility.

This Fact Sheet includes:

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

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

After the close of the public review period and after a public hearing, if applicable, the Department will review the comments received on the draft permit and will make a final decision regarding permit issuance and prepare a proposed final permit. If no substantive comments are received, the tentative conditions in the draft permit will become the proposed final permit, and the permit will become effective upon issuance, following the procedures as described in the APDES Program Description.

The Department has both an informal review process and a formal administrative appeal process for waste disposal authorization decisions. Informal review request must be delivered to the Director of Water within 15 days of the permit decision. Adjudicatory hearing requests must be delivered to the Commissioner of the Department of Environmental Conservation within 30 days of the permit decision or a decision issued under the informal review process. Adjudicatory hearings will be conducted by an administrative law judge (ALJ) in the Office of Administrative Hearings within the Department of Administration.

Documents are Available for Review

The draft permit and related documents can be reviewed or obtained by visiting or contacting the Department between 8:00 a.m. and 4:30 p.m., Monday through Friday at the address below. The draft permits, fact sheet, and other information can also be located on the Departments public notice website http://www.dec.state.ak.us/public_notices.htm

Department of Environmental Conservation
Division of Water
Wastewater Discharge Authorizations Program
555 Cordova Street
Anchorage, AK 99501
(907) 269-6285

The fact sheet and draft permits are also available at:

[Insert Addresses of other locations where the permit and fact sheet are available: For example, other department offices or agencies, or, if prior arrangements are made, the local public library.]

1 Applicant

1.1 General Information

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

[Insert Facility Name]
[Insert Secondary Facility Name]
Permit # [**insert permit number]**
File number:

Physical Address:
[insert facility address]

Mailing Address:
[insert responsible party address]

Contact:
[Insert the name of the facility contact]

2 Facility Information

[Insert general information about the facility. *Example: CBJ owns, operates, and maintains the Mendenhall wastewater treatment plant (WWTP) located in Juneau, Alaska. The sequential batch reactor (SBR) secondary treatment plant discharges treated municipal wastewater to the Mendenhall River. CBJ incinerates the sludge off site. The collection system has no combined sewers. The facility serves a resident population of 20,000, but the City and Borough of Juneau is a tourist area, therefore, the actual population is higher during the summer months. The design flow of the facility is 4.9 mgd. Details about the wastewater treatment process and a map showing the location of the treatment facility and discharge are included in Appendices A and B, respectively.*]

3 Receiving Water

This facility discharges to the [insert Name of Receiving Water] in the [insert location]. The outfall is located [insert outfall location].

3.1 Low Flow Conditions

The *Technical Support Document for Water Quality-Based Toxics Control* (hereafter referred to as the TSD) (EPA, 1991) and the Alaska Water Quality Standards (WQS) recommend the flow conditions for use in calculating water quality-based effluent limits (WQBELs) using steady-state modeling. The TSD and the Alaska WQS state that WQBELs intended to protect aquatic life uses should be based on the lowest seven-day average flow rate expected to occur once every ten years (7Q10) for chronic criteria and the lowest one-day average flow rate expected to occur once every ten years (1Q10) for acute criteria. *[Example: The following table list the above mentioned flow rates by season.]*

Table 1: Seasonal Low Flows in the [Insert Name of Receiving Water] at the Point of Discharge

Season	***1Q10 (CFS)***	***7Q10 (CFS)***	***30B3 (CFS)***
example November through May			

example October			

3.2 Water Quality Standards

Regulations in 18AAC 15 require that the conditions in permits ensure compliance with the State Water Quality Standards. A State's water quality standards are composed of use classifications, numeric and/or narrative water quality criteria, and an anti-degradation policy. The use classification system designates the beneficial uses that each water body is expected to achieve. The numeric and/or narrative water quality criteria are the criteria deemed necessary by the State to support the beneficial use classification of each water body.

Waterbodies in Alaska are designated for all uses unless the water has been reclassified under 18 AAC 70.230 as listed under 18 AAC 70.230 (e). Some waters bodies in Alaska can also have site-specific water quality criterion per 18 AAC 70.235 such as those listed under 18 AAC 70.236(b). [Insert facility/waterbody specific information. *Example: The receiving water of this draft permit has not been reclassified and does not have site specific water quality criterion therefore has to be protected for all fresh designated uses listed in 18 AAC 70.020(b)]*

3.3 Mixing Zone Analysis

In accordance with state regulations at 18 AAC 70.240, as amended through June 23, 2003, the Department has authority to designate mixing zones in permits. A mixing zone is designated in [*water body*] for this discharge. The mixing zone is defined as [*insert dimensions and other specifications*].

The water quality criteria and limits for [*insert parameters]* may be exceeded within the authorized mixing zone. This mixing zone will ensure that the most stringent water quality standard limitations for [*insert parameters*] are met at all points outside the mixing zone.

Size. In accordance with 18 AAC 70.255(a), the size of the mixing zone was reduced by *[insert language explaining what was done*].

Technology. In accordance with 18 AAC 70.240(a)(3), the most effective technological and economical methods were used to disperse, treat, remove, and reduce pollutants by *[insert description of the methods]*.

Low Flow Design. In accordance with 18 AAC 70.255 (f), Appendix D describes the process used to determine if the discharge authorized in the draft permit has the reasonable potential to cause or contribute to a violation of the water quality standards. [Appendix D, Table D-1 summarizes the low flow calculations for: [*choose determination used and delete others]*

- *Toxic acute aquatic life criteria, 1Q10*
- *conventional and non toxic substances, 7Q10*
- *toxic chronic aquatic life criteria, 7Q10*

or the harmonic mean flow for carcinogens is ___

or the actual flow as determined by gauging data collected concurrent with the discharge is___. [Method for concurrent measurement should be delineated here.]

Existing Use. In accordance with 18 AAC 70.245 (a)(2), (a)(3), and (a)(4)…*Human Consumption.* In accordance with 18 AAC 70.250(b)(2) and (b)(3)…

Spawning Areas. In accordance with 18 AAC 70.255(h)…

Human Health. In accordance with 18 AAC 70.250(a)(1), 18 AAC 70.250(a)(1)(C), 18 AAC 70.255(b) and (c), 18 AAC 70.255(e)(3)(B)…

Aquatic Life. In accordance with 18 AAC 70.250(a)(2)(A-C), 18 AAC 70.250(b)(1), 18 AAC 70.255(g)(1) and (2), and 18 AAC 70.255(b)(1) and (2)…

Endangered Species. In accordance with 18 AAC 70.250(a)(2)(D)…

4 Effluent Limitations

4.1 Basis for Effluent Limitations

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

4.2 Proposed Effluent Limitations

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

[Example:

4.2.1 *Narrative limitations to protect Alaska's narrative criteria for residues and oil and grease.*

a. *The permittee must not discharge any floating solids, debris, sludge, deposits, foam, scum or other residues that cause a film, sheen, or discoloration on the surface of the water or adjoining shorelines; cause leaching of toxic or deleterious substances; or cause a sludge, solid, or emulsion to be deposited beneath or upon the surface of the water, within the water column, on the bottom, or upon adjoining shorelines.*

b. *The permittee must not discharge any petroleum hyrdrocarbons or oils and grease that cause a sheen, film or discoloration on the surface of the water or adjoining shorelines.*

4.2.2 *Narrative secondary treatment percent removal requirements for POTWs*

a. *Removal Requirements for BOD_5 and TSS: The monthly average effluent concentration must not exceed 15 percent of the monthly average influent concentration. Percent removal of BOD_5 and TSS must be reported on the Discharge Monitoring Reports (DMRs). For each parameter, the monthly average percent removal must be calculated from the arithmetic mean of the influent values and the* *arithmetic mean of the effluent values for that month. Influent and effluent samples must be taken over approximately the same time period.*

Table 2 (below) presents the proposed average monthly, average weekly, and maximum daily effluent limits.

Table 2: Proposed Effluent Limits

Parameter	Units	Effluent Limits		
		Average Monthly Limit	Average Weekly Limit	Maximum Daily Limit
Flow	mgd			
Five-Day Biochemical Oxygen Demand (BOD_5)	mg/L	30	45	
	lb/day			
	% removal	85% (min)	—	—
Total Suspended Solids (TSS)	mg/L	30	45	60
	lb/day			
	% removal	85% (min)	—	—
Fecal Coliform Bacteria	#/100 ml	200[2]	400[2]	800
pH (November 1 – May 31)	s.u.			
pH (June 1 – June 30)	s.u.			
pH (July 1 – October 30)	s.u.			
Copper	µg/L			
	lb/day			
Lead	µg/L			
	lb/day			
Total Residual Chlorine[1]	µg/L			
	lb/day			
Total Ammonia as	mg/L			
	lb/day			

1. Effluent limits for total residual chlorine apply only if the permittee adds chlorine to the effluent for total or partial disinfection.
2. The permittee must report the geometric mean fecal coliform concentration. If any value used to calculate the geometric mean is less than 1, the permittee must round that value up to 1 for purposes of calculating the geometric mean.
3. No more than 10% of the fecal coliform samples analyzed during a calendar month may exceed 180 FC/100 ml.

4.3 Basis for Less Stringent Effluent Limits

[Example: The draft permit eliminates the current permit's effluent limits for silver and zinc, and eliminates the effluent limits for copper, lead and ammonia for part of the year. The draft permit contains less stringent effluent limits for copper, lead, pH, fecal coliform, and total residual chlorine, compared to the current permit. Effluent limitations for all other pollutants are as stringent as or more stringent than those in the current permit.]

4.3.1 Anti-backsliding

Section 402(o) of the Clean Water Act (CWA) prohibits "backsliding" in permits but provides limited exceptions to this prohibition. Section 402(o)(1) of the CWA states that a permit may not be reissued with less-stringent limits established based on Sections 301(b)(1)(C), 303(d) or 303(e) (i.e. water quality-based limits or limits established in accordance with State treatment standards) except in compliance with Section 303(d)(4). Section 402(o)(1) also prohibits backsliding on technology-based effluent limits established using best professional judgment (i.e. based on Section 402(a)(1)(B)).

Section 303(d)(4) of the CWA states that, for water bodies where the water quality meets or exceeds the level necessary to support the water body's designated uses, WQBELs may be revised as long as the revision is consistent with the State's antidegradation policy. Additionally, Section 402(o)(2) contains exceptions to the general prohibition on backsliding in 402(o)(1). According to the *U.S. EPA NPDES Permit Writers' Manual* (EPA-833-B-96-003) the 402(o)(2) exceptions are applicable to WQBELs (except for 402(o)(2)(B)(ii) and 402(o)(2)(D)) and are independent of the requirements of 303(d)(4). Therefore, WQBELs may be relaxed as long as either the 402(o)(2) exceptions or the requirements of 303(d)(4) are satisfied.

Even if the requirements of Sections 303(d)(4) or 402(o)(2) are satisfied, Section 402(o)(3) prohibits backsliding which would result in violations of water quality standards or effluent limit guidelines.

[Example: In this case, the effluent limits being revised are all water quality-based effluent limits (WQBELs). At a minimum, the 402(o) exceptions are met for all backsliding proposed in the draft permit.]

4.3.2 Clean Water Act Sections 303(d)(4) and 402(o)(3) Requirements

[Example: The Mendenhall River has not been listed on Alaska's "303(d) list" as not attaining, or not being expected to attain, water quality standards for any pollutants. Department believes that the less stringent effluent limits will continue to be protective of Alaska's federally approved water quality criteria for the Mendenhall River.

Because the less-stringent effluent limits and the deletion of certain limits will continue to ensure that water quality standards are met and do not violate the "secondary treatment" effluent limits, the limits are consistent with Section 402(o)(3) of the CWA.]

4.3.3 Antidegradation

[Example: The permit authorizes a mixing zone per 18 AAC 70.240 allowed under the Antidegradation Policy (18 AAC 70.015). Other examples are a zone of deposit under 18 AAC 70.210 and a mixing zone under 18 AAC 70.240.)]

4.3.4 Basis for Backsliding on Metals

[Example: Effluent limitations for metals in the current permit were calculated based on an effluent dilution factor of 10:1 and a receiving water hardness of 29 mg/L as $CaCO_3$. The permittee was required under the previous permit to monitor the receiving water for flow rate and hardness. The data show that the dilution factor of 10:1 is overly stringent (too low) for part of the year, however EPA found that the dilution factor could be less than (more stringent than) 10:1 under critical conditions from November through May.

However, the receiving water hardness monitoring shows that there is an inverse relationship between river flow and hardness in the Mendenhall River. That is, the receiving water is relatively "hard" when the river flows are low and relatively "soft" when the river flows are high. Because the metals of concern are less toxic in hard water than in soft water, the water quality criteria for these metals are less stringent when the water is hard. The fact that the receiving water is hard when the river flows are low therefore offsets the effect of the low dilution ratio from November through May.

The additional river flow and hardness data are considered "new information" under Section 402(o)(2)(B)(i) of the CWA (anti-backsliding) and 40 CFR 122.62(a)(2) (cause for modification). Taking into account the seasonal variations in the flow rate and hardness in the Mendenhall River, and using effluent data collected under the previous permit, EPA determined that the Mendenhall WWTP discharge did not have the reasonable potential to cause or contribute to water quality standards violations for silver or zinc, nor did it have reasonable potential to cause or contribute to such violations for copper or lead for part of the year. The permittee is required to continue monitoring the effluent and receiving water for *hardness, flow rate, and metals. Upon the next reissuance of the permit, EPA will use this monitoring data to re-evaluate the effluent limits in this permit and reasonable potential to exceed water quality criteria. See Appendices C, D, and F for further discussion on the determination of reasonable potential for and derivation of effluent metals limits.*

For those times of the year when copper and lead effluent limits are necessary, EPA re-calculated the effluent limits using seasonal low-flow rates in the receiving water and the ambient hardness values expected to occur during those seasons. The resulting copper and lead effluent limits are less stringent than those in the previous permit.]

5 Monitoring Requirements

5.1 Basis for Effluent and Surface Water Monitoring

In accordance with AS 46.03.110, (d), the Department may specify in a permit the terms and conditions under which waste material may be disposed of. Monitoring in permits is required to determine compliance with effluent limitations. Monitoring may also be required to gather effluent and surface water data to determine if additional effluent limitations are required and/or to monitor effluent impacts on receiving water quality.

The permit also requires the permittee to perform effluent monitoring required by the APDES Form 2A application, so that this data will be available when the permittee applies for a renewal of its APDES permit.

The permittee is responsible for conducting the monitoring and for reporting results on Discharge Monitoring Reports (DMRs) or on the application for renewal, as appropriate, to the Department.

5.2 Effluent Monitoring

Monitoring frequencies are based on the nature and effect of the pollutant, as well as a determination of the minimum sampling necessary to adequately monitor the facility's performance. Permittees have the option of taking more frequent samples than are required under the permit. These samples can be used for averaging if they are conducted using the Department-approved test methods (generally found in 18 AAC 70 and 40 CFR 136) and if the Method Detection Limits are less than the effluent limits.

Table 3 below, presents the proposed effluent monitoring requirements for the draft permit. The sampling location must be after the last treatment unit and prior to discharge to the receiving water. The samples must be representative of the volume and nature of the monitored discharge. If no discharge occurs during the reporting period, "no discharge" shall be reported on the DMR.

[Example:

Table 3: Effluent Monitoring Requirements

Parameter	Units	Sample Location	Sample Frequency	Sample Type
Flow	mgd	Effluent	Continuous	recording
Effluent Dilution Ratio[3]	dimensionless	Effluent	Daily	calculation
Turbidity	NTU	Effluent	Continuous	recording
BOD_5	mg/L	Influent & Effluent	2/month	24-hour composite
	lb/day	Influent & Effluent	2/month	calculation[1]
	% Removal	--	--	calculation[2]
TSS	mg/L	Influent & Effluent	2/month	24-hour composite
	lb/day	Influent & Effluent	2/month	calculation[1]
	% Removal	--	--	calculation[2]
pH	standard units	Effluent	5/week	grab

Table 3: Effluent Monitoring Requirements				
Parameter	***Units***	***Sample Location***	***Sample Frequency***	***Sample Type***
Fecal Coliform *(Nov. – May)*	*#/100 ml*	*Effluent*	*4/week*	*grab*
Fecal Coliform *(June – Oct.)*	*#/100 ml*	*Effluent*	*1/week*	*grab*
Total Residual Chlorine *(if chlorine is used for disinfection)*	*µg/L*	*Effluent*	*5/week*	*grab*
	lb/day	*Effluent*		*calculation*[1]
Total Residual Chlorine *(if chlorine is not used for disinfection)*	*µg/L*	*Effluent*	*3x/5 years*	*grab*
Total Ammonia as N	*mg/L*	*Effluent*	*1/month*	*24-hour composite*
	lb/day	*Effluent*		*calculation*[1]
Copper	*µg/L*	*Effluent*	*1/month*	*24-hour composite*
	lb/day	*Effluent*		*calculation*[1]
Lead	*µg/L*	*Effluent*	*1/month*	*24-hour composite*
	lb/day	*Effluent*		*calculation*[1]
Silver	*µg/L*	*Effluent*	*1/quarter*	*24-hour composite*
Zinc	*µg/L*	*Effluent*	*1/quarter*	*24-hour composite*
Hardness	*mg/L as* $CaCO_3$	*Effluent*	*1/quarter*	*24-hour composite*
Alkalinity	*mg/L as* $CaCO_3$	*Effluent*	*1/quarter*	*24-hour composite*
Oil and Grease	*Visual*	*Effluent*	*1/month*	*Visual*
Floating Solids or Visible Foam	*Visual*	*Effluent*	*1/month*	*Visual*
Oil and Grease	*mg/L*	*Effluent*	*3x/5 years*	*grab*
Total Dissolved Solids	*mg/L*	*Effluent*	*3x/5 years*	*24-hour composite*
Total Phosphorus	*mg/L*	*Effluent*	*3x/5 years*	*24-hour composite*
Total Kjeldahl Nitrogen	*mg/L*	*Effluent*	*3x/5 years*	*24-hour composite*
Nitrate plus Nitrite Nitrogen	*mg/L*	*Effluent*	*3x/5 years*	*24-hour composite*
Dissolved Oxygen	*mg/L*	*Effluent*	*3x/5 years*	*grab*
APDES Application Form 2A Expanded Effluent Testing	*---*	*Effluent*	*3x/5 years*	*---*
Whole Effluent Toxicity (WET)	TU_C	*Effluent*	*2/year*	*24-hour composite*

Notes:
1. *Loading is calculated by multiplying the concentration in mg/L by the flow in mgd and a conversion factor of 8.34. If the concentration is measured in µg/L, the conversion factor is 0.00834.*
2. *Percent removal is calculated using the following equation: (average monthly influent – average monthly effluent) ÷ average monthly influent.*
3. *The permittee must report the minimum effluent dilution ratio observed during the month.*

5.3 Surface Water Monitoring

Table 4 presents the proposed surface water monitoring requirements for the draft permit. *[Example; [Insert Permittee Name] will continue receiving water monitoring at the established locations. Surface water monitoring results must be submitted with the renewal application.*

Table 4: Receiving Water Monitoring Requirements			
Parameter (units)	***Sample Locations***	***Sample Frequency***	***Sample Type***
pH (s.u.)	*Upstream and Downstream*	*Monthly*	*Grab*
Temperature, (ºC)	*Upstream*	*Monthly*	*Grab*
Total Ammonia as N (mg/L)	*Upstream*	*Quarterly*[2]	*Grab*
Copper[1] *(µg/L)*	*Upstream*	*Quarterly*[2]	*Grab*
Lead[1] *(µg/L)*	*Upstream*	*Quarterly*[2]	*Grab*
Silver[1] *(µg/L)*	*Upstream*	*2/year*	*Grab*
Zinc[1] *(µg/L)*	*Upstream*	*2/year*	*Grab*
Fecal Coliform Bacteria	*Upstream and Downstream*	*Monthly*	*Grab*

Hardness (mg/L as $CaCO_3$)	*Upstream and Downstream*	*Monthly*	*Grab*
Dissolved Oxygen (mg/L)	*Upstream and Downstream*	*Monthly*	*Grab*
Alkalinity (mg/L as $CaCO_3$)	*Upstream*	*Monthly*	*Grab*
Turbidity	*Upstream and Downstream*	*Quarterly[2]*	*Grab*
Flow	*USGS Station #15052900 (Brotherhood Bridge)*	*Daily*	*Discrete*
1. Monitoring for copper, lead, silver and zinc in the receiving water must be in dissolved metal. 2. Quarters are defined as January through March, April through June, July through September and October though December.			

6 Sludge (Biosolids) Requirements

The Department separates wastewater and sludge permitting. EPA has authority under the CWA to regulate biosolids. EPA may issue a separate sludge-only permit.

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

7 Other Permit Conditions

7.1 Quality Assurance Plan

Permittees are required to develop procedures to ensure that the monitoring data submitted is accurate and to explain data anomalies if they occur. The permittee is required to update the Quality Assurance Plan within [insert plan interval] of the effective date of the final permit. The Quality Assurance Plan shall consist of standard operating procedures the permittee must follow for collecting, handling, storing and shipping samples, laboratory analysis, and data reporting.

7.2 Operation and Maintenance Plan

The permit requires the permittee to properly operate and maintain all facilities and systems of treatment and control. Proper operation and maintenance is essential to meeting discharge limits, monitoring requirements, and all other permit requirements at all times. The permittee is required to develop and implement an operation and maintenance plan for their facility within [insert plan interval] of the effective date of the final permit. The plan shall be retained on site and made available to the Department.

7.3 Best Management Practices Plan

In accordance with AS 46.03.110, (d), the department may specify in a permit the terms and conditions under which waste material may be disposed of. This permit requires the permittee to develop a Best Management Practices (BMP) Plan in order to prevent or minimize the potential for the release of pollutants to waters and lands of the State of Alaska through plant site runoff, spillage or leaks, or erosion. The draft permit contains certain BMP conditions which must be included in the BMP plan. The draft permit requires the permittee to develop a BMP plan within [insert plan interval] of the effective date of the final permit and implement the plan within [insert bmp imp interval] of the effective date of the final permit. The Plan must be kept on site and made available to the Department upon request.

7.4 Design Criteria

The permit *[Example: retains the design criteria requirements from the previous permit. This provision requires the permittee to compare influent flow and loading to the facility's design flow and loading and* *prepare a facility plan for maintaining compliance with permit effluent limits when the annual average flow or loading exceeds 85% of the design criteria values for three consecutive months.]*

7.5 Standard Permit Provisions

Sections 3, 4, and 5 of the draft permit contain standard regulatory language that must be included in all permits. Because these requirements are based directly on regulations, they cannot be challenged in the context of a permit action. The standard regulatory language covers requirements such as monitoring, recording, and reporting requirements, compliance responsibilities, and other general requirements.

7.6 Pretreatment Requirements

[Example: The permit required the permittee to complete an industrial survey, to submit its sewer use ordinance to the Department, and to sample the influent waste stream. The results of the industrial user survey showed that the (insert facility name) wastewater treatment plant receives wastewater from only one significant industrial user (SIU). The design flow of the treatment plant is less than 5 mgd. As such, the Department does not believe it is necessary to develop a pretreatment program for the Department approval at this time. However, the permit contains conditions requiring the facility to monitor and control industrial users.]

8 Other Legal Requirements

8.1 Alaska Coastal Management Program

According to the Alaska Department of Natural Resources, Division of Coastal and Ocean Management (DCOM), renewals of this permit were reviewed for consistency with the Alaska Coastal Management Program (ACMP) *[Example: in 1993 under "AK 9308-13J" and in 2000 under "AK 0008-09J." In both cases, the project was found to be consistent with alternative measures.*

In a letter dated August 26, 2005, DNR informed the Department that it had determined that the modifications included in this revocation and issuance action will not result in any new significant coastal effects. Additional ACMP review is therefore not required for this action.]

8.2 Permit Expiration

The permit will expire five years from the effective date the permit which is the maximum length of a permit.

9 References

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

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

Acronyms

[remove acronyms not used]

1Q10	1 day, 10 year low flow
7Q10	7 day, 10 year low flow
30B3	Biologically-based design flow intended to ensure an excursion frequency of less than once every three years, for a 30-day average flow.
ACR	Acute-to-Chronic Ratio
ADEC	Alaska Department of Environmental Conservation
AML	Average Monthly Limit
ASR	Alternative State Requirement
AWL	Average Weekly Limit
BA	Biological Assessment
BAT	Best Available Technology economically achievable
BCT	Best Conventional pollutant control Technology
BE	Biological Evaluation
BO or BiOp	Biological Opinion
BOD_5	Biochemical oxygen demand, five-day
BOD_u	Biochemical oxygen demand, ultimate
BMP	Best Management Practices
BPT	Best Practicable
°C	Degrees Celsius
CBOD	Carbonaceous Biochemical Oxygen Demand
CFR	Code of Federal Regulations
CFS	Cubic Feet per Second
COD	Chemical Oxygen Demand
CSO	Combined Sewer Overflow
CV	Coefficient of Variation
CWA	Clean Water Act
DMR	Discharge Monitoring Report
DO	Dissolved oxygen
EA	Environmental Assessment
EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
the Department	Alaska Department of Environmental Conservation

ESA	Endangered Species Act
FDF	Fundamentally Different Factor
FR	Federal Register
gpd	Gallons per day
HUC	Hydrologic Unit Code
IC	Inhibition Concentration
I/I	Infiltration and Inflow
LA	Load Allocation
lbs/day	Pounds per day
LC	Lethal Concentration
LC_{50}	Concentration at which 50% of test organisms die in a specified time period
LD_{50}	Dose at which 50% of test organisms die in a specified time period
LOEC	Lowest Observed Effect Concentration
LTA	Long Term Average
LTCP	Long Term Control Plan
mg/L	Milligrams per liter
ml	milliliters
ML	Minimum Level
µg/L	Micrograms per liter
mgd	Million gallons per day
MDL	Maximum Daily Limit or Method Detection Limit
MF	Membrane Filtration
MPN	Most Probable Number
N	Nitrogen
NEPA	National Environmental Policy Act
NOAA	National Oceanic and Atmospheric Administration
NOEC	No Observable Effect Concentration
NOI	Notice of Intent
NSPS	New Source Performance Standards
O&M	Operations and maintenance
POTW	Publicly owned treatment works
PSES	Pretreatment Standards for Existing Sources
PSNS	Pretreatment Standards for New Sources
QAP	Quality assurance plan

RP	Reasonable Potential
RPM	Reasonable Potential Multiplier
RWC	Receiving Water Concentration
SIC	Standard Industrial Classification
SPCC	Spill Prevention and Control and Countermeasure
SS	Suspended Solids
SSO	Sanitary Sewer Overflow
s.u.	Standard Units
TKN	Total Kjeldahl Nitrogen
TMDL	Total Maximum Daily Load
TOC	Total Organic Carbon
TRC	Total Residual Chlorine
TRE	Toxicity Reduction Evaluation
TSD	Technical Support Document for Water Quality-based Toxics Control (the Department/505/2-90-001)
TSS	Total suspended solids
TU_a	Toxic Units, Acute
TU_c	Toxic Units, Chronic
USFWS	U.S. Fish and Wildlife Service
USGS	United States Geological Survey
UV	Ultraviolet
WET	Whole Effluent Toxicity
WLA	Wasteload allocation
WQBEL	Water quality-based effluent limit
WQS	Water Quality Standards
WWTP	Wastewater treatment plant

Definitions

Annual	Annual shall be once per calendar year
Aquaculture	The cultivation of aquatic plants or animals for human use or consumption
Average	An arithmetic mean obtained by adding quantities and dividing the sum by the number of quantities
Backwash	the wash water resulting from the backwashing of a water filter

Definitions

Biochemical Oxygen Demand (BOD)	A measure of the amount of oxygen consumed in the biological processes that break down organic matter in water. The greater the BOD, the greater the degree of pollution
Black Water	Water that contains animal, human, or food waste
Boundary	Line or landmark that serves to clarify, outline, or mark a limit, border, or interface
Chemical Oxygen Demand (COD)	A measure of the oxygen required to oxidize all compounds, both organic and inorganic, in water
Color	The condition that results in the visual sensations of hue and intensity as measured after turbidity is removed
Commissioner	The commissioner of the Alaska Department of Environmental Conservation, or the commissioner's designee
Composite Samples	Composite samples must consist of at least four equal volume grab samples; "24 hour composite" sample means a combination of at least 4 discrete samples of equal volume, collected at equal time intervals over a 24 hour period at the same location. A "flow proportional composite" sample means a combination of at least 4 discrete samples collected at equal time intervals over a 24 hour time with each sample volume proportioned according to the flow volume. The sample aliquots must be collected and stored in accordance in accordance with procedures prescribed in the most recent edition of *Standard Methods for the Examination of Water and Wastewater*.
Contact Recreation	Activities in which there is direct and intimate contact with water. Contact recreation includes swimming, diving, and water skiing; contact recreation does not include wading
Criterion	A set concentration or limit of a water quality parameter that, when not exceeded, will protect an organism, a population of organisms, a community of organisms, or a prescribed water use with a reasonable degree of safety; a criterion might be a narrative statement instead of a numerical concentration or limit
Datum	A datum defines the position of the spheroid, a mathematical representation of the earth, relative to the center of the earth. It provides a frame of reference for measuring locations on the surface of the earth by defining the origin and orientation of latitude and longitude lines.
Department	The Alaska Department of Environmental Conservation
Dissolved Oxygen	The concentration of oxygen in water as determined either by the Winkler (iodometric) method and its modifications or by the membrane electrode method, also The oxygen dissolved in water, wastewater, usually expressed in milligrams per liter, or percent saturation
Ecosystem	System made up of a community of animals, plants, and bacteria, and the system's interrelated physical and chemical environment
Effluent	The segment of a wastewater stream that follows the final step in a treatment process and precedes discharge of the wastewater stream to the receiving environment
Estimated	A way to estimate the discharge volume. Approvable estimations include but are not limited to, the number of persons per day at the facility, volume of potable water produced per day, lift station run time, etc.
Fecal Coliform Bacteria	Bacteria that can ferment lactose at 44.5° + 0.2°C to produce gas in a multiple tube procedure; "fecal coliform bacteria" also means all bacteria that produce blue colonies in a membrane filtration procedure within 24 ± 2 hours of incubation at 44.5° + 0.2°C in an M-FC broth. Also, bacteria found in the intestinal tracts of warm-blooded animals. Fecal Coliform's presence in water or sludge is an indicative measure of microbial pathogens and can serve as a warning mechanism for preventing potential human health risks.
Final Approval to Operate	A Final Approval to Operate is the approval that the Department issues after it has reviewed and approved the construction and operation of the engineered wastewater treatment works plans submitted to the Department in accordance with 18 AAC 72.210-285 or as amended.
Geometric Mean	The geometric mean is the N^{th} root of the product of N. All sample results of zero will use a value of 1 for calculation of the geometric mean. Example geometric mean calculation.

Definitions

$$\sqrt[4]{12x23x34x990} = 55.$$

Grab sample	A single instantaneous sample collected at a particular place and time that represents the composition of wastewater only at that time and place.
Gray Water	Wastewater from a laundry, kitchen, sink, shower, bath, or other domestic source that does not contain excrement, urine, or combined stormwater.
Influent	Untreated wastewater before it enters the first treatment process of a wastewater treatment works.
Mean	The average of values obtained over a specified period.
Mean Lower Low Water	The tidal datum plane of the average of the lower of the two low waters of each day, as would be established by the National Geological Survey, at any place subject to tidal influence
Measured	The actual volume of wastewater discharged using appropriate mechanical or electronic equipment to provide a totalizer reading. Does not provide a recorded measurement of instantaneous rates.
Micrograms per liter	The concentration at which one millionth of a gram (10^{-6} g) is found in a volume of one liter
Milligrams per liter (mg/l)	The concentration at which one thousandth of a gram (10^{-3} g) is found in a volume of one liter; it is approximately equal to the unit "parts per million (ppm)," formerly of common use
Mixing Zone	An area in a waterbody surrounding or downstream of, a discharge where the effluent plume is diluted by the receiving water within which specified water quality criteria may be exceeded
Month	Month shall be the time period from the 1^{st} of a calendar month to the last day in the month
Permittee	A company, organization, association, entity or person who is issued a wastewater permit and is responsible for ensuring compliance, monitoring and reporting as required by the permit
Primary Contact Recreation	Activities in which there is direct and intimate contact with water. Contact recreation includes swimming, diving, and water skiing; contact recreation does not include wading
Quality Assurance Project Plan	A system of procedures, checks, audits, and corrective actions to ensure that all research design and performance, environmental monitoring and sampling, and other technical and reporting activities are of the highest achievable quality.
Quarter	Quarter shall be the time period of three months based on the calendar year beginning with January
Receiving Body	Ocean, bay, marine area, tundra, river, stream, inlet etc. that an outfall line discharges into/onto
Recorded	A permanent record of volume using mechanical or electronic equipment to provide a totalized reading as well as a record of instantaneous readings.
Report	Report result of analysis
Residual Chlorine	Chlorine remaining in water or wastewater at the end of a specified contact period as combined or free chlorine
Secondary Contact Recreation	Activities in which incidental water use can occur. Secondary recreation includes boating, camping, hunting, hiking, wading, and recreational fishing. Recreational fishing, does not include fish consumption
Settleable Solids	Solid material of organic or mineral origin that is transported by and deposited from water, as measured by the volumetric Imhoff cone method and at the method detection limits specified in method 2540(F), Standard Methods for the Examination of Water and Wastewater, 18th edition (1992)
Sheen	An iridescent appearance on the water surface
Suspended Solids	Insoluble solids that either float on the surface of, or are in suspension in, water, wastewater, or other liquids. The quantity of material removed from wastewater in a laboratory test, as prescribed in "Standard Methods for the Examination of Water and Wastewater" and referred to as nonfilterable residue (See: total suspended solids).

Definitions

Total Suspended Solids	A measure of the suspended solids in wastewater, effluent, or water bodies, determined by tests for "total suspended non-filterable solids." (See: suspended solids.)
Twice per year	Twice per year shall consist of two time periods during the calendar year, (Oct. through April and May through Sept.)
Wastewater Treatment	Any process to which wastewater is subjected in order to remove or alter its objectionable constituents and make it suitable for subsequent use or acceptable for discharge to the environment
Water Recreation	See contact recreation or secondary recreation
Water Supply	Any of the waters of the state that are designated in 18 AAC 70 to be protected for fresh water or marine water uses; water supply includes waters used for drinking, culinary, food processing, agricultural aquacultural, seafood processing, and industrial purposes; "water supply" does not necessarily mean that water in a waterbody that is protected as a supply for the uses listed in this paragraph is safe to drink in its natural state
Week	Week shall be the time period of Sunday through Saturday

Appendix A: Facility Information (optional)

General Information

Permit ID Number:

File Number

Physical Address:

Mailing Address:

Facility Background:

Facility Information

Type of Facility:

Treatment Train:

Flow:

Outfall Location: **latitude ; longitude**

Receiving Water Information

Receiving Water:

Watershed: **Name of watershed (HUC in parentheses 00000000)**

Beneficial Uses:

Appendix B: Facility Map

Appendix C: Basis for Effluent Limits

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

1. Technology-Based Effluent Limits

[Example 1: POTW

Secondary Treatment Effluent Limits

The CWA requires POTWs to meet requirements based on available wastewater treatment technology. Section 301 of the CWA established a required performance level, referred to as "secondary treatment," which all POTWs were required to meet by July 1, 1977. The Department has adopted the "secondary treatment" effluent limitations, which are found in 40 CFR 133.102. These technology-based effluent limits apply to all municipal wastewater treatment plants and identify the minimum level of effluent quality attainable by application of secondary treatment in terms of BOD_5, TSS, and pH. In addition to the federal secondary treatment regulations in 40 CFR 133, the State of Alaska requires maximum daily limits of 60 mg/L for BOD_5 and TSS in its own secondary treatment regulations (18 AAC 72.990). The secondary treatment effluent limits are listed in Table C-1.

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

Parameter	Average Monthly Limit	Average Weekly Limit	Maximum Daily limits	Range
BOD_5	30 mg/L	45 mg/L	60 mg/L	---
TSS	30 mg/L	45 mg/L	60 mg/L	---
Removal Rates for BOD_5 and TSS	85% (minimum)	---	---	---
pH	---	---	---	6.0 - 9.0 s.u.

Chlorine

The [insert facility name] as well as many municipal wastewater plants use chlorine to disinfect wastewater prior to discharge.

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

The Department has determined that these effluent limits are sufficiently stringent to meet water quality standards from July through October. For the balance of the year, more-stringent water quality-based limits apply.

Mass-Based Limits

The federal regulation at 40 CFR 122.45(f) requires that effluent limits be expressed in terms of mass, if possible. The regulation at 40 CFR 122.45(b) requires that effluent limitations for POTWs be calculated based on the design flow of the facility. The mass based limits are expressed in pounds per day and are calculated as follows:

Mass based limit (lb/day) = concentration limit (mg/L) × design flow (mgd) × 8.34[1]

[Example 2: Industrial facility with federally-promulgated effluent limit guidelines:

Effluent Limit Guidelines

The Department has promulgated effluent limit guidelines (ELGs) for process wastewater discharges from this industry in 40 CFR Part 407. The McCain Foods USA Burley factory is an existing frozen potato products facility, therefore the effluent limit guidelines in 40 CFR 407.47, representing the level of effluent quality attainable through application of the best conventional pollutant control technology, are the applicable effluent limit guidelines.

These effluent limit guidelines are based on the level of production at the facility. The federal regulation at 40 CFR 122.45(b)(2), effluent limitations based on production or another measure of operation must be based on "a reasonable measure of actual production of the facility." McCain has indicated that its average production level is 3,031,580 pounds of raw material per day. The Department has calculated technology-based effluent limits based on this production figure and the effluent limit guidelines.

Table C-1: Technology-Based Effluent Limits ***(40 CFR 407.47, Frozen Potato Products Subcategory)***			
Parameter	***Average Monthly Limit*** *(lb/1000 lb of raw material)*	***Maximum Daily Limit*** *(lb/1000 lb of raw material)*	***Range***
BOD_5	*1.40*	*2.80*	*---*
TSS	*1.40*	*2.80*	*---*
pH	*---*	*---*	*6.0 - 9.0 s.u.*
Limits Based On Expected Production Levels			
BOD_5 (lb/day)	*4244*	*8488*	*---*
TSS (lb/day)	*4244*	*8488*	*---*

2. Water Quality-based Effluent Limits

Statutory and Regulatory Basis

18 AAC 70.10 prohibits conduct that causes or contributes to a violation of the State Water Quality Standards. 18 AAC 15.090 requires that permits include terms and conditions to ensure criteria are met, including operating, monitoring, and reporting requirements.

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

[1] 8.34 is a conversion factor with units (lb ×L)/(mg × gallon×10^6)

Reasonable Potential Analysis

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

[Example: Sometimes it is appropriate to allow a small area of the receiving water to provide dilution of the effluent. These areas are called mixing zones. Mixing zone allowances will increase the mass loadings of the pollutant to the water body and will decrease treatment requirements. Mixing zones can be used only when there is adequate receiving water flow volume and when the receiving water meets the criteria necessary to protect the designated uses of the water body. Based on the previous permit, the water quality-based effluent limits in this permit have been calculated using a mixing zone. If Department does not grant a mixing zone, the water quality-based effluent limits will be recalculated such that the criteria are met before the effluent is discharged to the receiving water.]

Procedure for Deriving Water Quality-based Effluent Limits

The first step in developing a water quality-based effluent limit is to develop a wasteload allocation (WLA) for the pollutant. A wasteload allocation is the concentration or loading of a pollutant that the permittee may discharge without causing or contributing to an exceedance of water quality standards in the receiving water.

In cases where a mixing zone is not authorized, either because the receiving water already exceeds the criterion, the receiving water flow is too low to provide dilution, or for some other reason, the criterion becomes the WLA. Establishing the criterion as the wasteload allocation ensures that the permittee will not cause or contribute to an exceedance of the criterion. The following discussion details the specific water quality-based effluent limits in the draft permit.

Once a WLA is developed, the Department calculates effluent limits which are protective of the WLA using statistical procedures described in Appendix F.

3. Facility-Specific Water Quality-based Limits

[Example: Hardness-Dependent Metals

The toxicities of some metals vary with the hardness of the water. Therefore, the water quality criteria for these metals also vary with hardness. The Department uses the hardness of the receiving water when mixed with the effluent to determine the water quality criteria for such metals. Since toxicity decreases (and numeric water quality criteria increase) as hardness increases, the Department has used the 5th percentile as a worst-case assumption for effluent and ambient hardness.

The hardness-dependent water quality criteria for the metals of concern are expressed as dissolved metal. The dissolved fraction of the metal is the fraction that will pass through a 0.45-micron filter. Total recoverable metal is the concentration of the metal in an unfiltered sample. To develop effluent limits for total recoverable metals which are protective of the dissolved metals criteria, "translators" are used in the equations to determine reasonable potential and derive effluent limits. Translators can either be site specific numbers or default numbers. EPA has published guidance related to the use of translators in permits in The Metals Translator: Guidance for Calculating a Total Recoverable Permit Limit from a Dissolved Criterion (EPA 823-B-96-007, June 1996). In the absence of site specific translators, this guidance recommends the use of water *quality criteria conversion factors as the default translators. Because site-specific translators were not available, the Department has used the conversion factors in* ***the (Alaska Water Quality Criteria Manual for Toxic and Other Deleterious Organic and Inorganic Substances (ADEC, 2003)*** *in the reasonable potential and effluent limit calculations for the [insert facility name] discharge. Tables C-3 and C-4, below, detail the calculations for water quality criteria for hardness-dependent metals in the [insert name of receiving water] downstream of the [insert facility name] discharge.*

Table C-3: Hardness-Dependent Metals Criteria Equations

Parameter	Equations for Metals Criteria (expressed as total recoverable)[1,2,3,4]		Equations or Values of Conversion Factors and Translators[5]	
	Acute	Chronic	Acute	Chronic
Copper	$e^{0.9422[\ln(hardness)]-1.7}$	$e^{0.8545[\ln(hardness)]-1.702}$	0.960	0.960
Lead	$e^{1.273[\ln(hardness)]-1.460}$	$e^{1.273[\ln(hardness)]-4.705}$	1.46203 - [ln(hardness) ×1.45702]	1.46203 - [ln(hardness) ×1.45702]
Silver	$e^{1.72[\ln(hardness)]-6.52}$	—	0.850	—
Zinc	$e^{0.8473[\ln(hardness)]+0.884}$	$e^{0.8473[\ln(hardness)]+0.884}$	0.978	0.986

Source: Alaska Water Quality Criteria Manual for Toxic and Other Deleterious Organic and Inorganic Substances. ADEC, 2003.
Notes:
1. *"e" is the exponential constant, approximately equal to 2.718*
2. *"ln" is the natural logarithm (log base "e")*
3. *hardness is measured in mg/L as $CaCO_3$*
4. *These equations compute the criteria as total recoverable metal*
5. *Multiplying the results of the equations by these conversion factors yields the dissolved criteria.*

Table C-4: Hardness-Dependent Metals Criteria Values

Parameter	**Acute Criterion (µg/L)[1]**	**Chronic Criterion (µg/L)[1]**
Copper		
Lead		
Silver		
Zinc		

1. *All metals criteria are expressed as dissolved metal.*

The Department has determined that the discharge does not have reasonable potential to cause or contribute to violations of Alaska's water quality criteria for silver or zinc. The discharge has reasonable potential to cause or contribute to water quality standards violations for copper except during the month of October and for lead (from November through May). Therefore, the permit contains water quality-based effluent limits for copper and lead for those seasons. See Appendices D and F for reasonable potential and effluent limit calculations for metals.

pH

The most stringent water quality criterion for pH is for the protection of aquatic life and aquaculture water supply. The pH criteria for these uses state that the pH must be no less than 6.5 and no greater than 8.5 *standard units, and may not vary more than 0.5 pH units from natural conditions. Since the pH of the effluent is similar to the pH of the receiving water, the Department does not expect the effluent to change the pH of (insert name of receiving water) by more than 0.5 standard units. Mixing zones are generally not granted for pH, therefore the most stringent water quality criterion must be met before the effluent is discharged to the receiving water. The draft permit requires that the effluent have a pH of no less than 6.5 and no greater than 8.5 standard units.*

The permittee has collected pH and alkalinity data for both the effluent and the receiving water. The Department has used these data to determine the discharge's effects on the pH of the receiving water. The Department believes that a mixing zone for pH is appropriate. The proposed pH limits are 6.5 to 9.0 from November through May, 6.4 to 9.0 during the month of June, and 6.3 to 9.0 from July through October. If the Department does not grant a mixing zone for pH then pH will be limited to a range of 6.5 to 8.5 standard units before the effluent is discharged to the receiving water. See Appendix E for effluent limit calculations for pH.

Ammonia

The Alaska water quality standards contain criteria for the protection of aquatic life from the toxic effects of ammonia. Because the [insert name of receiving water] is known to be a migrational corridor for salmonids, the Department has applied ammonia criteria which are protective of salmonids, including early life stages. The criteria are dependent on pH and temperature, because the fraction of ammonia present as the toxic, un-ionized form increases with increasing pH and temperature. Therefore, the criteria become more stringent as pH and temperature increase. The following table details the equations used to determine water quality criteria for ammonia, and the values of these equations at the 95th percentile pH (for the entire year), which is 7.6 standard units, and the maximum seasonal temperature observed in the (insert name of receiving water) upstream from the discharge.

A reasonable potential calculation showed that the [insert facility name] discharge would have the reasonable potential to cause or contribute to a violation of the water quality criteria for ammonia from November through May. Therefore, the draft permit contains a water quality-based effluent limit for ammonia for this season. The draft permit requires that the permittee monitor the receiving water for ammonia, pH and temperature. See Appendices D and F for reasonable potential and effluent limit calculations for ammonia. The equations used calculated ammonia water quality criteria are and the criteria presented in Table C-5.

Table C-5: Water Quality Criteria for Ammonia		
	Acute Criterion[1]	***Chronic Criterion***[2]
Equations:	$\frac{0.275}{1+10^{7.204-pH}}+\frac{39}{1+10^{pH-7.204}}$	$\left(\frac{0.0577}{1+10^{7.688-pH}}+\frac{2.487}{1+10^{pH-7.688}}\right)\times MIN\left(2.85, 1.45\times10^{0.028\times(25-T)}\right)$
Results:	*xx*	*xx*
1. No seasonal variation was assumed for pH, therefore, there is no seasonal variation in the acute criterion (which is a function of pH only).		

Petroleum Hydrocarbons, Oil and Grease

The Alaska water quality standards require that surface waters and adjoining shorelines designated for aquaculture water supply or the growth and propagation of fish, shellfish, aquatic life and wildlife be virtually free from floating oil, film, sheen or discoloration. Waters designated for recreation and for drinking, culinary and food processing water supply have similar criteria. Therefore, the Department has included a narrative limitation prohibiting the discharge of petroleum hydrocarbons or oils and grease that cause a sheen, film or discoloration on the surface of the water or adjoining shorelines. The permittee must visually inspect the effluent for oil and grease once per month. In addition, the permittee must perform quantitative oil and grease *analysis on grab samples of the effluent* ***[insert frequency]*** *during the first 4-1/2 years of the next permit cycle and report all results to the Department.*

Residues

The Alaska water quality standards require that surface waters designated the growth and propagation of fish, shellfish, aquatic life and wildlife or for drinking, culinary and food processing water supply not contain residues that cause a film, sheen, or discoloration on the surface of the water or adjoining shorelines; cause leaching of toxic or deleterious substances; or cause a sludge, solid, or emulsion to be deposited beneath or upon the surface of the water, within the water column, on the bottom, or upon adjoining shorelines. Therefore, the Department has included a narrative limitation prohibiting the discharge of such residues. The permittee must visually inspect the effluent for floating solids and visible foam once per month and report the results to the Department.]

Appendix D: Reasonable Potential Calculations

The following describes the process the Department has used to determine if the discharge authorized in the draft permit has the reasonable potential to cause or contribute to a violation of Alaska water quality standards. The Department uses the process described in the *Technical Support Document for Water Quality-based Toxics Control* (EPA, 1991) to determine reasonable potential.

To determine if there is reasonable potential for the discharge to cause or contribute to an exceedance of water quality criteria for a given pollutant, the Department compares the maximum projected receiving water concentration to the criteria for that pollutant. If the projected receiving water concentration exceeds the criteria, there is reasonable potential, and a water quality-based effluent limit must be included in the permit. This section discusses how the maximum projected receiving water concentration is determined.

1. Mass Balance

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

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

where,

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

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

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

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

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

Where MZ is the fraction of the receiving water flow available for dilution. In this case, the mixing zone is based on complete mixing of the effluent and the receiving water, and MZ is equal to unity (1). Therefore, in this case, Equation D-3 is equal to Equation D-2.

If a mixing zone is not allowed, dilution is not considered when projecting the receiving water concentration and,

$$C_d = C_e \qquad \text{(Equation D-4)}$$

Equation D-2 can be simplified by introducing a "dilution factor,"

$$D = \underline{Q_e + Q_u} \qquad \text{(Equation D-5)}$$

Q_e

For each season of the year, there are three values for the dilution factor: one based on the 1Q10 flow rate in the receiving stream and used to determine reasonable potential and wasteload allocations for acute aquatic life criteria, one based on the 7Q10 flow rate to determine reasonable potential and wasteload allocations chronic aquatic life criteria (except for ammonia) and conventional pollutants, and one based on the 30B3 flow rate to determine reasonable potential and wasteload allocations for the chronic ammonia criterion. All dilution factors are calculated with the effluent flow rate set equal to the design flow of

[Example: 4.9 mgd. This results in a total of twelve different dilution factors under consideration. The dilution factors are listed in Table D-1, below.

Table D-1: Dilution Factors

Season	***Acute Dilution Factor***	***Chronic Dilution Factor***	***Chronic Ammonia Criterion Dilution Factor***
November through May			
June			
July through September			
October			

After the dilution factor simplification, Equation D-2 becomes:

$$C_d = \frac{C_e - C_u}{D} + C_u \qquad \textit{(Equation D-6)}$$

If the criterion is expressed as dissolved metal, the effluent concentrations are measured in total recoverable metal and must be converted to dissolved metal as shown in Equation D-7.

$$C_d = \left[\frac{CF \times C_e - C_u}{D}\right] + C_u \qquad \textit{(Equation D-7)}$$

Where C_e is expressed as total recoverable metal, C_u and C_d are expressed as dissolved metal, and CF is a conversion factor used to convert between dissolved and total recoverable metal.

Equations D-6 and D-7 are the forms of the mass balance equation which were used to determine reasonable potential and calculate wasteload allocations.]

2. Maximum Projected Effluent Concentration

To calculate the maximum projected effluent concentration, the Department has used the procedure described in section 3.3 of the TSD, "Determining the Need for Permit Limits with Effluent Monitoring Data." In this procedure, the 99^{th} percentile of the effluent data is the maximum projected effluent concentration in the mass balance equation.

[Example: For chlorine, the Department has used the technology-based limit as the maximum projected effluent concentration. The technology-based effluent limit is used in this manner because water quality-based effluent limits are required only when a discharge of the pollutant at the technology-based limit has the reasonable potential to cause or contribute to water quality standards violations.

Since there are a limited number of data points available, the 99^{th} percentile is calculated by multiplying the maximum reported effluent concentration by a "reasonable potential multiplier" (RPM). The RPM is the ratio *of the 99th percentile concentration to the maximum reported effluent concentration. The RPM is calculated from the coefficient of variation (CV) of the data and the number of data points. The CV is defined as the ratio of the standard deviation of the data set to the mean, but when fewer than 10 data points are available, the TSD recommends making the assumption that the CV is equal to 0.6.]*

Using the equations in section 3.3.2 of the TSD, the reasonable potential multiplier (RPM) is calculated based on the CV and the number of samples in the data set as follows. The following discussion presents the equations used to calculate the RPM, and also works through the calculations for the RPM for copper as an example. Reasonable potential calculations for all pollutants can be found in Table D-2.

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

$p_n = (1 - \text{confidence level})^{1/n}$ (Equation D-8)

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

[Example: The data set contains 51 copper samples collected from the effluent, therefore:

$p_n = (1-0.99)^{1/51}$
$p_n = 0.914$

This means that we can say, with 99% confidence, that the maximum reported effluent copper concentration is greater than the 91st percentile.]

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

$RPM = C_{99}/C_p$ (Equation D-9)

Where,
$C = \exp(z\sigma - 0.5\sigma^2)$ (Equation D-10)

Where,
$\sigma^2 = \ln(CV^2 +1)$ (Equation D-11)
$\sigma = \sqrt{\sigma^2}$
CV = coefficient of variation = (standard deviation) ÷ (mean)
z = the inverse of the normal cumulative distribution function at a given percentile

[Example: In the case of copper:

CV = coefficient of variation = 0.699
$\sigma^2 = \ln(CV^2 +1) = 0.398$
$\sigma = \sqrt{\sigma^2} = 0.631$
z = 2.326 for the 99th percentile = 1.364 for the 91st percentile

$C_{99} = \exp(2.326 \times 0.631 - 0.5 \times 0.398) = 3.554$
$C_{91} = \exp(1.364 \times 0.631 - 0.5 \times 0.398) = 1.937$

$RPM = C_{99}/C_{91} = 3.554/1.937$

RPM = 1.84]

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

C_e = (RPM)(MRC) (Equation D-12)

where MRC = Maximum Reported Concentration

[Example: In the case of copper,

C_e = (1.84)(72.0 µg/L) = 132 µg/L]

3. Maximum Projected Receiving Water Concentration

The discharge has reasonable potential to cause or contribute to an exceedance of water quality criteria if the maximum projected concentration of the pollutant at the edge of the mixing zone exceeds the most stringent criterion for that pollutant. The maximum projected receiving water concentration is calculated from Equation D-6:

$$C_d = \frac{C_e - C_u}{D} + C_u \qquad \text{(Equation D-6)}$$

[Example: Or, if the criterion is expressed as dissolved metal, the maximum projected receiving water concentration is calculated from Equation D-7:

$$C_d = \left[\frac{CF \times C_e - C_u}{D}\right] + C_u \qquad \textit{(Equation D-7)}$$

Where C_e is expressed total recoverable metal, C_u and C_d are expressed as dissolved metal, and CF is the conversion factor.

For copper, from November though May, the acute receiving water concentration is, in micrograms per liter:

$$C_d = \left[\frac{0.960 \times 132 - 2.58}{5.09}\right] + 2.58 = 27.0$$

For copper, from November through May, the chronic receiving water concentration is, in micrograms per liter:

$$C_d = \left[\frac{0.960 \times 132 - 2.58}{5.35}\right] + 2.58 = 25.8$$

The acute and chronic water quality criteria for this season are 16.2 and 10.6 µg/L, respectively. Because the projected receiving water concentrations are greater than the criteria, a water quality-based effluent limit is necessary for copper from November through May.

Table D-2, below, summarizes the reasonable potential calculations for copper, lead, silver, zinc, chlorine and ammonia.]

Table D-2: Reasonable Potential Calculations – [insert facility name]				
Common to All Parameters				
Confidence Level				
Z-Score of Confidence Level				
Dilution Factors	**Acute**	**Chronic**	**Ammonia**	
Nov-May				
June				

Parameter	Copper	Lead	Silver	Zinc	Chlorine	Ammonia (mg/L)
	Calculation of Maximum Projected Effluent Concentration (Common to All Seasons)					
	All Concentrations in µg/L Unless Otherwise Noted					
Data Source	**Effluent**	**Effluent**	**Effluent**	**Effluent**	**TBEL[1]**	**Effluent**
Maximum Reported Effluent Conc. (metals as total recoverable)						
Average Effluent Conc. (metals as total recoverable)						
Standard Deviation of Effluent Conc. (metals as total recoverable)						
Number of samples (n)						
Coefficient of Variation (CV, assume 0.6 if n<10)						
σ						
σ^2						
Percentile of Largest Value						
Z-Score of Percentile of Largest Value						
C_{99}						
C_n						
Reasonable Potential Multiplier (RPM)						
Maximum Projected Effluent Conc. (metals as total recoverable)						

1. For chlorine, the Department has used the technology-based effluent limit (TBEL) as a basis for the maximum projected effluent concentration.

Parameter	Copper	Lead	Silver	Zinc	Chlorine	Ammonia (mg/L)
Data Source	**Effluent**	**Effluent**	**Effluent**	**Effluent**	**TBEL[1]**	**Effluent**
	November thru May					
Ambient Concentration (metals as dissolved)						
Acute Conversion Factor						
Chronic Conversion Factor						
Maximum Acute RWC (metals as dissolved)						
Maximum Chronic/Single Value RWC (metals as dissolved)						
Acute Aquatic Life Criterion (metals as dissolved)						
Chronic Aquatic Life Criterion (metals as dissolved)						
Most Stringent Single-Value Criterion (metals as total recoverable)						
Reasonable Potential?						

Appendix E: *[Example: Effluent Limit Calculations for pH]*

The following tables demonstrate how appropriate effluent limitations were determined for pH.

The pH at the edge of the mixing zone is a function of effluent and ambient pH, temperature, and alkalinity. The critical alkalinity is the minimum for the ambient water and the maximum for the effluent. The critical pHs for the upper pH limit are the maximum effluent pH limit and the 95th percentile ambient pH. The critical pHs for the lower pH limit are the minimum effluent pH limit and the 5th percentile ambient pH. The critical temperatures are the minimum ambient temperature and 95th percentile effluent temperature for the high pH critical condition and the maximum ambient temperature and the 5th percentile effluent temperature for the low pH critical conditions. Once the ambient pH, temperature and alkalinity and effluent temperature and alkalinity were input into the spreadsheet, the Department adjusted the effluent pH in 0.1 standard unit intervals until the pH at the edge of the mixing zone was between 6.5 and 8.5 standard units, as required by the water quality standards.

Table E-1: pH Effluent Limit Calculation for High pH Critical Condition				
Season	***Nov-May***	***June***	***Jul-Sep***	***Oct***
Input				
1. Dilution Factor at Mixing Zone Boundary				
2. Upstream/Background Characteristics				
Temperature (deg C):				
pH:				
Alkalinity (mg CaCO3/L):				
3. Effluent Characteristics				
Temperature (deg C):				
pH:				
Alkalinity (mg CaCO3/L):				
Output				
1. Ionization Constants				
Upstream/Background pKa:				
Effluent pKa:				
2. Ionization Fractions				
Upstream/Background Ionization Fraction:				
Effluent Ionization Fraction:				
3. Total Inorganic Carbon				
Upstream/Background Total Inorganic Carbon (mg $CaCO_3$/L):				
Effluent Total Inorganic Carbon (mg $CaCO_3$/L):				
4. Conditions at Mixing Zone Boundary				
Temperature (deg C):				
Alkalinity (mg CaCO3/L):				
Total Inorganic Carbon (mg CaCO3/L):				
pKa:				
pH at Mixing Zone Boundary:				

Table E-2: pH Effluent Limit Calculation for Low pH Critical Condition				
Season	***Nov-May***	***June***	***Jul-Sep***	***Oct***
Input				
1. Dilution Factor at Mixing Zone Boundary				
2. Upstream/Background Characteristics				
Temperature (deg C):				
pH:				
Alkalinity (mg CaCO3/L):				
3. Effluent Characteristics				
Temperature (deg C):				
pH:				
Alkalinity (mg CaCO3/L):				
Output				
1. Ionization Constants				
Upstream/Background pKa:				
Effluent pKa:				
2. Ionization Fractions				
Upstream/Background Ionization Fraction:				
Effluent Ionization Fraction:				
3. Total Inorganic Carbon				
Upstream/Background Total Inorganic Carbon (mg CaCO3/L):				
Effluent Total Inorganic Carbon (mg CaCO3/L):				
4. Conditions at Mixing Zone Boundary				
Temperature (deg C):				
Alkalinity (mg CaCO3/L):				
Total Inorganic Carbon (mg CaCO3/L):				
pKa:				
pH at Mixing Zone Boundary:				

Appendix F: WQBEL Calculations - Aquatic Life Criteria

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

[Example: The WQBELs for copper, lead, ammonia and chlorine are intended to protect aquatic life criteria. The following discussion presents the general equations used to calculate the water quality-based effluent limits, then works through the calculations for the November-May copper WQBEL as an example.]

The calculations for all WQBELs based on aquatic life criteria are summarized in Table F-1.

1. Calculate the Wasteload Allocations (WLAs)

Wasteload allocations (WLAs) are calculated using the same mass balance equations used to calculate the concentration of the pollutant at the edge of the mixing zone in the reasonable potential analysis (Equations D-6 and D-7). To calculate the wasteload allocations, C_d is set equal to the acute or chronic criterion and the equation is solved for C_e. The calculated C_e is the acute or chronic WLA. Equation D-6 is rearranged to solve for the WLA, becoming:

$$C_e = WLA = D \times (C_d - C_u) + C_u \qquad \text{(Equation F-1)}$$

Alaska's water quality criteria for some metals are expressed as the dissolved fraction, but the Federal regulation at 40 CFR 122.45(c) requires that effluent limits be expressed as total recoverable metal. Therefore, the Department must calculate a wasteload allocation in total recoverable metal that will be protective of the dissolved criterion. This is accomplished by dividing the WLA expressed as dissolved by the criteria translator, as shown in equation F-2. As discussed in Appendix C, the criteria translator (CT) is equal to the conversion factor, because site-specific translators are not available for this discharge.

$$C_e = WLA = \frac{D \times (C_d - C_u) + C_u}{CT} \qquad \text{(Equation F-2)}$$

[Example: In the case of copper, for the acute criterion,

$$WLA_a = [5.09 \times (16.2 - 2.58) + 2.58]/0.960$$
$$\mathbf{WLA_a = 74.9\ \mu g/L}$$

For the chronic criterion,

$$WLA_c = [5.35 \times (10.6 - 2.58) + 2.58]/0.960$$
$$\mathbf{WLA_c = 47.4\ \mu g/L]}$$

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

$$LTA_a = WLA_a \times \exp(0.5\sigma^2 - z\sigma) \qquad \text{(Equation F-3)}$$
$$LTA_c = WLA_c \times \exp(0.5\sigma_4^2 - z\sigma_4) \qquad \text{(Equation F-4)}$$

where,

$$\sigma^2 = \ln(CV^2 + 1)$$
$$\sigma = \sqrt{\sigma}$$
$$\sigma_4^2 = \ln(CV^2/4 + 1)$$

$\sigma = \sqrt{\sigma}$
z = 2.326 for 99th percentile probability basis

[Example: In the case of copper, for the season of November though May,

$\sigma^2 = \ln(0.699^2 + 1) = 0.398$
$\sigma = \sqrt{\sigma} = 0.631$
$\sigma_4^2 = \ln(0.699^2/4 + 1) = 0.115$
$\sigma = \sqrt{\sigma} = 0.339$
z = 2.326 for 99th percentile probability basis

Therefore,

$LTA_a = 74.9\ \mu g/L \times \exp(0.5 \times 0.398 - 2.326 \times 0.631)$
$LTA_a = 21.1\ \mu g/L$

$LTA_c = 47.4\ \mu g/L \times \exp(0.5 \times 0.115 - 2.326 \times 0.339)$
$LTA_c = 22.8\ \mu g/L$]

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

[Example: For copper, from November through May, the acute LTA of 21.1 µg/L is more stringent.]

2. Derive the maximum daily and average monthly effluent limits

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

$MDL = LTA \times \exp(z_m\sigma - 0.5\sigma^2)$ (Equation F-5)
$AML = LTA \times \exp(z_a\sigma_n - 0.5\sigma_n^2)$ (Equation F-6)

where σ, and σ^2 are defined as they are for the LTA equations (F-2 and F-3) and,

$\sigma_n^2 = \ln(CV^2/n + 1)$
$\sigma = \sqrt{\sigma}$
$z_a = 1.645$ for 95th percentile probability basis
$z_m = 2.326$ for 99th percentile probability basis
n = number of sampling events required per month (minimum of 4)

[Example: In the case of copper,

$$MDL = 21.1\ \mu g/L \times \exp(2.326 \times 0.631\ - 0.5 \times 0.398)$$
$$\mathbf{MDL = 74.9\ \mu g/L}$$

$$AML = 21.1\ \mu g/L \times \exp(1.645 \times 0.339\ - 0.5 \times 0.115)$$
$$\mathbf{AML = 34.8\ \mu g/L}$$

Table F-1, below, details the calculations for water quality-based effluent limits based on two-value aquatic life criteria.]

Table F-1: Calculation of Effluent Limits Based on 2-Value Aquatic Life Criteria

Statistical Variables for Permit Limit Calculation

Parameter	*Season*	*Occurrence Probability*			*# of Samples per Month*	*Dilution Factor*		
		AML	*MDL*	*LTA*		*Acute*	*Chronic*	*Ammonia*
All	*Nov-May*							
	June							
	July-Sep							
	October							

Wasteload Allocations and Long Term Averages

Parameter	***Season***	*WLA Acute*	*WLA Chronic*	*LTA Acute*	*LTA Chronic*	*LTA Coeff. Var. (CV)*	*Limiting LTA*
		µg/L	*µg/L*	*µg/L*	*µg/L*	*decimal*	*µg/L*
Copper	*Nov-May*						
	June						
	July-Sep						
Lead	*Nov-May*						
Chlorine	*Nov-May*						
	June						
Ammonia (mg/L)	*Nov-May*						

Water Quality Criteria, Ambient Conditions, and Effluent Limits

Parameter	*Season*	*Metal Criteria Translator*		*Ambient Conc.*	*Water Quality Criterion Acute*	*Water Quality Criterion Chronic*	***Average Monthly Limit (AML)***	***Maximum Daily Limit (MDL)***
		Acute	*Chronic*	*µg/L*	*µg/L*	*µg/L*	***µg/L***	***µg/L***
Copper	*Nov-May*							
	June							
	July-Sep							
Lead	*Nov-May*							
Chlorine	*Nov-May*							
	June							
Ammonia (mg/L)	*Nov-May*							

Appendix G: Mixing Zone Analysis Check List

Mixing Zone Authorization Check List
based on Alaska Water Quality Standards (2003)

The purpose of the Mixing Zone Check List is to guide the permit writer through the mixing zone regulatory requirements to determine if all the mixing zone criteria at 18 AAC 70.240 through 18 AAC 70.270 are satisfied, as well as provide justification to establish a mixing zone in an APDES permit. In order to establish a mixing zone, all criteria must be met. The permit writer must document all conclusions in the permit Fact Sheet; however, if the permit writer determines that one criterion can not be met, then a mixing zone is prohibited, and the permit writer need not include in the Fact Sheet the conclusions for when other criteria were met.

Criteria	Description	Resources	Regulation	MZ Approved Y/N
Size	Is the mixing zone as small as practicable? - Applicant collects and submits water quality ambient data for the discharge and receiving water body (e.g. flow and flushing rates) - Permit writer performs modeling exercise and documents analysis in Fact Sheet at: ►Appendix D, Table D-2: Reasonable Potential Analysis ►Section 3.3 Mixing Zone Analysis - describe what was done to reduce size.	•Technical Support Document for Water Quality Based Toxics Control •Fact Sheet Template, Appendix C •Fact Sheet Template, Appendix D • DEC's RPA Guidance (draft / pending) • EPA Permit Writers' Manual	18 AAC 70.240 (a)(2) 18 AAC 7-.245 (b)(1) - (b)(7) 18 AAC 70.255 (3) 18 AAC 70.255 (d)	
Technology	Were the most effective technological and economical methods used to disperse, treat, remove, and reduce pollutants? **If yes,** describe methods used in Fact Sheet at section 3.3. Attach additional documents if necessary.		18 AAC 70.240 (a)(3)	

Low Flow Design	***For river, streams, and other flowing fresh waters...*** - Determine low flow calculations or documentation for the applicable parameters. Justify in Fact Sheet	• Fact Sheet Template, Appendix D, Table D-1	18 AAC 70.255(f)	
Existing use	Does the mixing zone…			
	(1) partially or completely eliminate an existing use of the water body outside the mixing zone? **If yes, mixing zone prohibited.**		18 AAC 70.245(a)(1)	
	(2) impair overall biological integrity of the water body? **If yes, mixing zone prohibited.**		18 AAC 70.245(a)(2)	
	(3) provide for adequate flushing of the water body to ensure full protection of uses of the water body outside the proposed mixing zone? **If no, then mixing zone prohibited.**		18 AAC 70.250(a)(3)	
	(4) cause an environmental effect or damage to the ecosystem that the department considers to be so adverse that a mixing zone is not appropriate? **If yes, then mixing zone prohibited.**		18 AAC 70.250(a)(4)	
Human consumption	Does the mixing zone…			
	(1) produce objectionable color, taste, or odor in aquatic resources harvested for human consumption? **If yes, mixing zone prohibited.**		18 AAC 70.250(b)(2)	
	(2) preclude or limit established processing activities of commercial, sport, personal use, or subsistence shellfish harvesting? **If no, mixing zone prohibited.**		18 AAC 70.250(b)(3)	
Spawning Areas	Does the mixing zone…			

	(1) discharge in a spawning area for anadromous fish or Arctic grayling, northern pike, rainbow trout, lake trout, brook trout, cutthroat trout, whitefish, sheefish, Arctic char (Dolly Varden), burbot, and landlocked coho, king, and sockeye salmon? **If yes, mixing zone prohibited**.		18 AAC 70.255 (h)	
Human Health	Does the mixing zone…			
	(1) contain bioaccumulating, bioconcentrating, or persistent chemical above natural or significantly adverse levels? **If yes, mixing zone prohibited**.		18 AAC 70.250 (a)(1)	
	(2) contain chemicals expected to cause carcinogenic, mutagenic, tetragenic, or otherwise harmful effects to human health? **If yes, mixing zone prohibited**.			
	(3) Create a public health hazard through encroachment on water supply or through contact recreation? **If yes, mixing zone prohibited.**		18 AAC 70.250(a)(1)(C)	
	(4) meet human health and aquatic life quality criteria at the boundary of the mixing zone? **If no, mixing zone prohibited.**		18 AAC 70.255 (b),(c)	
	(5) occur in a location where the department determines that a public health hazard reasonably could be expected? **If yes, mixing zone prohibited**.		18 AAC 70.255(e)(3)(B)	
Aquatic Life	Does the mixing zone…			
	(1) create a significant adverse effect to anadromous, resident, or shellfish spawning or rearing? **If yes, mixing zone prohibited.**		18 AAC 70.250(a)(2)(A-C)	
	(2) form a barrier to migratory species? **If yes, mixing zone prohibited.**			

	(3) fall to provide a zone of passage? **If yes, mixing zone prohibited**.			
	(4) result in undesirable or nuisance aquatic life? **If yes, mixing zone prohibited.**		18 AAC 70.250(b)(1)	
	(5) result in permanent or irreparable displacement of indigenous organisms? **If yes, mixing zone prohibited.**		18 AAC 70.255(g)(1)	
	(6) result in a reduction in fish or shellfish population levels? **If yes, mixing zone prohibited.**		18 AAC 70.255(g)(2)	
	(7) prevent lethality to passing organisms by reducing the size of the acute zone? **If yes, mixing zone prohibited.**		18 AAC 70.255(b)(1)	
	(8) cause a toxic effect in the water column, sediments, or biota outside the boundaries of the mixing zone? **If yes, mixing zone prohibited.**		18 AAC 70.255(b)(2)	
Endangered Species	Are there threatened or endangered species at the location of the mixing zone?If yes, are there likely to be adverse effects to T/E spp based on comments received from USFWS or NOAA. If yes, will conservation measures be included in the permit to avoid adverse effects? **If yes, explain conservation measures in Fact Sheet. If no, mixing zone prohibited**.	Applicant or permit writer requests list of T/E spp from USFWS prior to drafting permit conditions.	Program Description, 6.4.1 #518 AAC 70.250(a)(2)(D)	