Fact Sheet

NPDES Permit Number: AK-002144-0
Date: October 13, 2000
Public Notice Expiration Date: November 13, 2000
Technical Contact: Kelly Huynh 206/553-8414 or
1-800-424-4372 (within Region 10)
huynh.kelly@epa.gov

The U.S. Environmental Protection Agency (EPA) Plans To Reissue A Wastewater Discharge Permit To:

The City of Ketchikan
Charcoal Point Wastewater Treatment Plant
3921 Tongass Avenue
Ketchikan, Alaska 99901

and the State of Alaska proposes to Certify the Permit and Issue a Consistency Determination

EPA Proposes NPDES Permit Reissuance.

The EPA proposes to reissue a *National Pollutant Discharge Elimination System* (NPDES) permit to the City of Ketchikan. The draft permit sets conditions on the discharge of pollutants from the Charcoal Point wastewater treatment plant to the Tongass Narrows. 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.

This Fact Sheet includes:

- information on public comment, public hearing, and appeal procedures
- a description of the current discharge
- a listing of past and draft effluent limitations, monitoring requirements, and other conditions
- a description of the discharge location and a map and
- detailed technical material supporting the conditions in the permit and supporting the tentative determination to issue an NPDES permit incorporating a section 301(h) variance

Alaska State Certification.
The EPA requests that the Alaska Department of Environmental Conservation certify the NPDES permit to the City of Ketchikan, Charcoal Point Wastewater Treatment Plant under section 401 of the Clean Water Act. The EPA may not reissue the NPDES permit until the state has granted, denied, or waived certification. For more information concerning this review, please contact Abigail Ogbe at (907) 451-2136 or 610 University Avenue, Fairbanks, Alaska 99709 or Abigail_Obge@envircon.state.ak.us.

Consistency Determination.
The State of Alaska, Office of Management and Budget, Division of Governmental Coordination (DGC), intends to review this action for consistency with the approved Alaska Coastal Management Program (ACMP). For more information concerning this review, please contact Lorraine Marshall at (907) 465-8790 or P.O. Box 110030, Juneau, Alaska 99811-0030.

Public Comment.
The EPA will consider all comments before reissuing the final permit. Those wishing to comment on the draft permit or request a public hearing may do so in writing by the expiration date of the Public Notice. All comments should include name, address, phone number, a concise statement of basis of comment and relevant facts upon which it is based. A request for public hearing must state the nature of the issues to be raised as well as the requester's name, address and telephone number. All written comments should be addressed to the Office of Water Director at U.S. EPA, Region 10, 1200 6th Avenue, OW-130, Seattle, WA 98101; submitted by facsimile to (206) 553-0165; or submitted via e-mail at huynh.kelly@epa.gov.

After the Public Notice expires and all significant comments have been considered, EPA's regional Director for the Office of Water will make a final decision regarding permit reissuance. If no comments requesting a change in the draft permit are received, the tentative conditions in the draft permit will become final, and the permit will become effective upon issuance. If significant comments are received, the EPA will address the comments and reissue the permit along with a response to comments. The permit will become effective 33 days after the issuance date, unless a request for an evidentiary hearing is submitted within 33 days.

Persons wishing to comment on State Certification should submit written comments by the public notice expiration date to the Alaska Department of Environmental Conservation c/o Abigail Ogbe, 610 University Avenue, Fairbanks, Alaska 99709 or Abigail_Obge@envircon.state.ak.us.

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

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

The fact sheet and draft permit are also available at:

EPA Alaska Operations Office
222 W. 7th Avenue #19
Anchorage, Alaska 99513-7588

Alaska Department of Environmental Conservation
610 University Avenue
Fairbanks, Alaska 99709

For technical questions regarding the permit or fact sheet, contact Kelly Huynh at 206/553-8414 or huynh.kelly@epa.gov. Those with impaired hearing or speech may contact a TDD operator at 1-800-833-6384. Ask to be connected to Kelly Huynh at the above phone number. Additional services can be made available to persons with disabilities by contacting Kelly Huynh.

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LIST OF ACRONYMS

ACMP	Alaska Coastal Management Program
ADEC	Alaska Department of Environmental Conservation
AML	Average Monthly Limit
BMP	Best Management Practices
BIP	Balanced Indigenous Population
BOD_5	five day Biochemical Oxygen Demand
BPT	Best Practicable control Technology currently available
CFR	Code of Federal Regulations
cfs	Cubic feet per second
CV	Coefficient of Variation
CWA	Clean Water Act
DGC	Department of Governmental Coordination
DMR	Discharge Monitoring Report
DO	Dissolved Oxygen
EFH	Essential Fish Habitat
EPA	Environmental Protection Agency
FR	Federal Register
LTA	Long Term Average
MDL	Maximum Daily Limit or Method Detection Limit
mgd	Million gallons per day
mg/L	Milligrams per liter
MLLW	Mean Lower Low Water
NMFS	National Marine Fisheries Service
NPDES	National Pollutant Discharge Elimination System
O&M	Operation and Maintenance
POTW	Publicly Owned Treatment Works
QAP	Quality Assurance Plan
RP	Reasonable Potential
s.u.	Standard units
TMDL	Total Maximum Daily Load
TSD	Technical Support Document for Water Quality-based Toxics Control (EPA 1991)
TSS	Total Suspended Solids
TVS	Total Volatile Solids
Fg/L	Micrograms per liter
USFWS	United State Fish and Wildlife Service
USGS	United States Geological Survey
WET	Whole Effluent Toxicity
WLA	Wasteload Allocation
WWTP	Wastewater Treatment Plant
ZID	Zone of Initial Dilution

I. EXECUTIVE SUMMARY

On the basis of the conclusions presented in this fact sheet, the EPA has determined that the discharge from the City of Ketchikan, Charcoal Point Wastewater Treatment Plant, a publicly owned treatment works (POTW), will comply with the requirements of Section 301(h) of the Clean Water Act, as amended by the Water Quality Act of 1987, (the Act) and 40 CFR Part 125, Subpart G.

The City of Ketchikan (the permittee) is seeking a waiver of the secondary treatment requirements to discharge treated primary effluent from a treatment plant with a design flow of 4.0 million gallons per day (mgd). The outfall is to the Tongass Narrows and is 725 feet from shore at roughly 100 feet below mean lower low water (MLLW).

The EPA followed the guidance provided by the Amended Section 301(h) Technical Support Document, EPA 842-B-94-007, September 1994, (301(h) TSD) for the evaluation of the discharge. The Region relied on information in the draft 301(h) application (Small Applicant Questionnaire, City of Ketchikan), as well as the results of the monitoring conducted under the existing NPDES permit.

Available monitoring data and an evaluation of the discharge characteristics support this tentative decision because monitoring conducted under the current 301(h) permit has not shown any adverse impacts on solids accumulation, water quality standards, or the biological community in the vicinity of the discharge. Continuing water quality, biological, and effluent monitoring programs will determine future compliance with the 301(h) criteria.

The applicant's receipt of a Section 301(h) waiver from secondary treatment is contingent upon the following conditions:

- State certification under Section 401 of the Act regarding compliance with State law and water quality standards, including a basis for the conclusions reached. The state may grant, deny, or waive its right to certify the permit and

- State determination that the discharge will comply with the Alaska State Coastal Zone Management Program.

II. APPLICANT

City of Ketchikan, Charcoal Point Wastewater Treatment Plant

Mailing Address:
334 Front Street
P.O. Box 7300
Ketchikan, Alaska 99901

Facility Location:
3921 Tongass Avenue
Ketchikan, Alaska 99901

Contact: Charles MacKey, Superintendent
Permit No. AK-002144-0

III. BACKGROUND

Section 301(b)(1)(B) of the Clean Water Act (CWA) of 1972 required all POTWs to comply with effluent limitations based upon secondary treatment by July 1, 1977. Despite all reasonable and diligent efforts, the City of Ketchikan could not achieve secondary treatment limitations in accordance with the July 1, 1977 deadline. Section 301(h) of the 1977 amendments of the CWA provides that "The Administrator, with the concurrence of the State, may issue a permit under section 402 which modifies the requirements of Section 301(b)(1)(B) ... with respect to the discharge of any pollutant from a publicly owned treatment works into marine waters..."

On June 15, 1979 EPA published the 301(h) regulations (40 CFR 125) in the Federal Register (44 FR 34784) establishing the criteria the EPA would use for issuing an NPDES permit with a variance from secondary treatment requirements. On November 26, 1982, the EPA published final amendments to the 301(h) regulations (47 FR 53666) which clarify, simplify, and update the regulations and application requirements. The Act was amended again in 1987 to define primary treatment, add restrictions on discharges to impaired estuarine waters, and add urban area pretreatment requirements.

The City of Ketchikan was first issued an NPDES permit for the Charcoal Point Wastewater Treatment Plant (WWTP) on September 15, 1975 which expired on September 15, 1980. The City submitted its original 301(h) application on September 12, 1979. On April 29, 1983 the City submitted a revised application based on upgrades to the WWTP that included screening and a deep water outfall. On October 27, 1983 the EPA Regional Administrator made a tentative decision to grant the requested variance in accordance with specific terms and conditions. The NPDES permit implementing the tentative decision, was issued on August 13, 1984. The 1984 permit expired on August 14, 1989, however the City submitted a timely application for renewal on February 5, 1989, and therefore under the conditions of 40 CFR 122.6, the City is authorized to continue discharging under the terms of the existing permit until a new permit is issued.

IV. FACILITY AND OUTFALL DESCRIPTION

A. Wastewater Treatment Plant

The Charcoal Point WWTP serves the city of Ketchikan (approximately 8,000 people). Around 5,000 gallons per month of septage is also accepted by the WWTP from the Gateway Borough. Plant influent is entirely of domestic origin as there are no combined (i.e., sewage and stormwater) sewers. The existing WWTP is designed to treat an average flow of 4.0 mgd. The actual average daily discharge from 1991 through 1999 was approximately 3.15 mgd.

Existing treatment units provide screening using three 25 inch diameter by 72 inch long rotary screens with 0.04 inch openings prior to sedimentation/grit removal utilizing four tanks with an effective area of 5,000 ft^2 and discharge. The sludge from the primary sedimentation tanks (and septage received from the Gateway Borough) is aerated and dewatered using a belt filter press after stabilization with hydrated lime (CaOH). The sludge is then composted at the Deer Mountain landfill where it is used as cover. A process diagram for the WWTP is included in Appendix A.

B. Outfall/Diffuser

Pursuant to 40 CFR §125.62(a)(1), the outfall and diffuser must be located and designed to provide adequate initial dilution, dispersion, and transport of wastewater to meet all applicable water quality standards at and beyond the boundary of the zone of initial dilution (ZID) during periods of maximum stratification and during other periods when more critical situations may exist. Except as otherwise noted, dilution is expressed as the ratio of the total volume of sample (effluent plus dilution water) to the volume of effluent in that sample.

The outfall and diffuser are made of 24 inch diameter high density polyethylene pipe. The outfall is 725 feet in length and the trifurcated diffuser is 190 ft. The outfall is at 110 ft MLLW (i.e., on the bottom of the Tongass Narrows). The diffuser has six ports, one of which is 12 inches in diameter and located at the end of the pipe and the remaining five are six inches in diameter and spaced 40 ft apart on alternate sides of the pipe. A diagram of the outfall is included in Appendix A.

The City of Ketchikan's outfall is located at approximately 55E 21' 22." N, 131E 41' 46" W (Township 75 S., Range 90 E., Section 23). See Appendix B for a general map of the treatment plant and discharge location.

V. RECEIVING WATERS

A. Characteristics

The outfall discharges to the saline estuarine waters of the Tongass Narrows at Charcoal Point. Charcoal Point is at the smallest width of the Narrows at approximately 1,300 ft (400 m) wide and 110 ft (34 m) deep. The ocean bottom consists of coarse gravel and shell fragments overlying fine sand, indicative of a high current channel.

The Tongass Narrows has a net northwest seaward exchange (away from the City and Pennock Island) with the Gulf of Alaska. The average current velocity is 43.2 cm/sec (1.2 knots) and the water circulation patterns do not vary seasonally. Dilution modeling for the Tongass Narrows used the most conservative current speed of 1

cm/sec and no stratification. Strong currents provide vertical mixing, minimizing the vertical density gradient, and preventing stratification. The published mean tidal range from the Ketchikan tidal station (Tidal Current Tables, Pacific Coast of North America and Asia National Oceanic and Atmospheric Administration, National Ocean Survey) is 13.0 ft (3.4 m). In December 1988, the permittee collected tidal current data with a deck reading profiling current meter at the Ketchikan shipyard pier (southeast of the outfall). Based on the permittee's observations, the flood tide range was predicted to be 16.5 ft (5 m) while the ebb tide range was predicted to be 15.2 ft (4.6 m).

The Tongass Narrows is protected by the State of Alaska for marine water supply (aquaculture, seafood processing and industrial); water recreation (contact and secondary); growth and propagation of fish, shellfish, other aquatic life, and wildlife; and harvesting for consumption of raw mollusks or other raw aquatic life.

B. Initial Dilution and Zone of Initial Dilution

Initial dilution is the rapid, turbulent mixing of the effluent and receiving water. It results from the interaction between the buoyancy and momentum of the discharge and the density and momentum of the receiving water. Initial dilution is normally complete within several minutes after discharge. The zone of initial dilution (ZID) is the volume of receiving water surrounding the outfall or adjacent to the end of the outfall pipe or diffuser ports in which the initial dilution occurs.

The permittee estimated initial dilution for the effluent using EPA's dilution model UDKHDEN (Mullenhoff et al. 1985). Within 6.56 ft of the diffuser, the estimated dilutions were 71.20:1 (in August) and 158.22:1 (in September) during periods of slack water (i.e., no current). The permittee based their estimates on a maximum design discharge flow of 4.107 mgd. Additionally, the permittee estimated dilution at an unspecified trapping depth to be 50.44, based on a water column density profile taken in August 1987.

Initial dilutions and trapping depths have been recalculated using the UDKHDEN model based on design effluent flow, zero current speed, diffuser characteristics, and 29 water column profiles provided by the permittee. The minimum initial dilutions predicted were 27:1 for July and 38:1 for August, and 40:1 for September. The trapping depth was calculated as 81 ft from the surface (Tetra Tech, 1989).

The previously issued ZID (143:1 dilution) includes the Narrows floor within a horizontal distance equal to the water depth (30 m in this case) from any point on the diffuser and the water column above that area. The length of the previous ZID was 356 ft (109 m) with a width of 238 ft (72 m). The proposed ZID for biochemical oxygen demand and total suspended solids has a length of 387 ft (118 m) and a width of 200 ft (60 m), with a critical initial dilution of **27:1**.

Marine water quality criteria must be met at the edge of the ZID for those parameters to which the 301(h) modification applies (five day biochemical oxygen demand (BOD_5) and total suspended solids (TSS)). The state has also precertified a mixing zone for dissolved oxygen, nutrients, pH, temperature, metals and whole effluent toxicity. This is described as a column of water centered over the outfall diffuser with a radius of 130 meters and depth equal to the water column. The dilution is 100:1. The state has also precertified a mixing zone for fecal coliform described as the area contained 30 m above a 3,200 m long (1,600 m on each side of the diffuser running parallel to the shoreline), by 250 m wide rectangle (125 m on either side of the diffuser perpendicular to the shoreline) .

VI. EFFLUENT LIMITATIONS

The EPA followed the Clean Water Act, State and federal regulations, EPA's 1991 *Technical Support Document for Water Quality-Based Toxics Control (TSD)*, and EPA's 301(h) TSD to develop the draft effluent limits. In general, the Clean Water Act requires that the effluent limits for a particular pollutant be the more stringent of either the technology-based or water quality-based limits. Appendix C provides the basis for the development of effluent limits.

Technology-based limits are established according to the level of treatment achievable using available technology. The EPA evaluates the technology-based limits to determine whether they are adequate to ensure that water quality standards are met in the receiving water. If the limits are not sufficient, the EPA must develop water quality-based limits. These limits are designed to prevent exceedences of the Alaska water quality standards in the Tongass Narrows. The draft permit includes technology-based limits for the percent removal of BOD_5 and TSS and water quality-based limits for BOD_5, TSS, pH, fecal coliform, copper, silver, and zinc.

Table VI-1 contains the draft permit limits for outfall 001 as well as those found in the 1984 permit for comparison purposes.

Table VI-1: Outfall 001 Effluent Limits						
Parameter	**Average Monthly**		**Average Weekly**		**Maximum Daily**	
	1984	**Draft**	**1984**	**Draft**	**1984**	**Draft**
Flow, mgd	4.5	---	—	---	---	---
BOD_5[1] mg/L lbs/day	 198 7400	 126 4203	---	---	---	---
TSS[1] mg/L lbs/day	 234 8800	 129 4303	---	---	---	---
Fecal Coliform[2], colonies/100 ml	---	1.0×10^6	---	1.25×10^6	---	1.5×10^6
Total Copper, Fg/L lbs/day	---	 157 5.24	---	---	---	 290 9.67
Total Zinc, Fg/L lbs/day	---	 4682 156	---	---	---	 9384 313
Notes: 1 The average monthly percent removal shall be greater than or equal to 30 percent. 2 The average monthly test shall be based on a 5 tube decimal dilution test.						

The draft permit requires that the pH of the WWTP effluent be within the water quality-based range of **6.5 to 8.5 standard units** (s.u.), the 1984 permit requirement was between 6.0 and 9.0 s.u.

The draft permit prohibits the discharge of waste streams that are not part of the normal operation of the facility, as reported in the permit application. The draft permit also requires that the discharge be free from floating, suspended, or submerged matter in concentrations that cause/may cause a nuisance.

Disinfection of the discharge is not required at this time. Should future studies indicate that public health is endangered or that violations of water quality standards are occurring, disinfection may be required.

VII. MUNICIPAL SEWAGE SLUDGE/BIOSOLIDS MANAGEMENT

EPA Region 10 has recently decided to separate the permitting of wastewater discharges and the disposal of biosolids. Under the Act, the EPA has the authority to issue separate "sludge only" NPDES permits for the purposes of regulating biosolids. The EPA has historically implemented the biosolids standards by inclusion of the requirements in facility's NPDES wastewater permit, the other option authorized by the Act.

A biosolids permit application (Form 2S) was submitted by the biosolids receiving facility on August 14, 2000. The application indicates that the WWTP's biosolids are dewatered and composted at the Deer Mountain Landfill. The compost is then used as cover material for the landfill. The EPA will issue a sludge-only permit to the WWTP at a later date. This will likely be in the form of a general permit through which the EPA can cover multiple facilities.

Meanwhile, the environment will be protected since 1) the permittees sludge activities will continue to be subject to the national sewage sludge standards at 40 CFR 503 and 2) ADEC conducts a program to review and approve biosolids activities. Part 503 contains provisions relating to pollutants in sewage sludge, the reduction of pathogens in sewage sludge, the reduction of the characteristics in sewage sludge that attract vectors, the quality of the exit gas from a sewage sludge incinerator stack, the quality of sewage sludge that is placed in a municipal solid waste landfill unit, the sites where sewage sludge is either land applied or placed for final disposal, and sewage sludge incinerators. The Act prohibits any use or disposal of biosolids not in compliance with these standards. The EPA has the authority under the Act to enforce these standards directly, including in the absence of a permit. The Act does not require the facility to have a permit prior to the use or disposal of its biosolids.

VIII. MONITORING REQUIREMENTS

Under 40 CFR § 125.63, which implements Section 301(h)(3) of the Act, the applicant must have a monitoring program designed to provide data to evaluate the impact of the discharge on the marine biota, demonstrate compliance with applicable water quality standards, and measure toxic substances in the discharge. The applicant must demonstrate the capability to implement these programs upon issuance of a 301(h) modified NPDES permit. In accordance with 40 CFR § 125.63(a)(2), the applicant's monitoring programs are subject to revision if required by the EPA.

A. Effluent Monitoring

Section 308 of the Act and federal regulation 40 CFR 122.44(i) require that monitoring be included in permits to determine compliance with effluent limitations. Monitoring may also be required to gather data for future effluent limitations or to monitor effluent impacts on receiving water quality. The permittee is responsible for conducting the monitoring and for reporting results on monthly Discharge Monitoring Reports (DMRs) to the EPA. Under Section 301(h)(3) of the Act, the

applicant must have in place, a system of monitoring the impact of the discharge on aquatic biota. 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.

Table VIII-1 presents the draft monitoring requirements as well as the monitoring requirements in the 1984 permit. Effluent monitoring for Outfall 001 shall occur after the last treatment unit and prior to discharge to the Tongass Narrows.

TABLE VIII-1: Outfall 001 Monitoring Requirements

Parameter[1]	Draft Sample Frequency	Draft Sample Type	1984 Sample Frequency
Flow, mgd	continuous	recording	continuous
BOD_5, mg/L[2]	1/week	24-hour composite	1/week
TSS, mg/L[2]	1/week	24-hour composite	1/week
Settleable Solids, mg/L	---	---	1/week
pH, standard units[3]	1/week	grab	1/week
Fecal Coliform Bacteria, colonies/100 ml	1/week[4]	grab	---
Enterococci Bacteria, colonies/100 ml	2/year[4]	grab	---
Total Ammonia as N, mg/L	1/month	24-hour composite	---
Total Copper, Fg/L[5]	2/month	24-hour composite	---
Total Silver, Fg/L[5]	2/month	24-hour composite	---
Total Zinc, Fg/L[5]	2/month	24-hour composite	---
Temperature. EC	1/month	grab	---
Dissolved Oxygen, mg/L	1/month[6]	grab	---
Chronic Whole Effluent Toxicity, TU_c	2/year	See section VIII.C	---

Parameter[1]	Draft Sample Frequency	Draft Sample Type	1984 Sample Frequency

Notes:

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

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

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

4 The monitoring for Fecal Coliform Bacteria and Enterococci Bacteria shall occur at the same time.

5 The permittee shall conduct analysis for total recoverable metals.

6 Monitoring is only required during the 1st, 3rd, and 4th years of the permit.

B. Representative Monitoring

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

C. Whole Effluent Toxicity Monitoring

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

The municipal application regulations (40 CFR Part 122.21(j)(1)) require POTWs with design flows equal to or greater than 1.0 mgd, and POTWs with approved pretreatment programs, to submit results of WET testing with their permit application. Additionally, EPA regulations at 122.44(d)(1) in effect require whole effluent data and criteria when characterizing effluents. The WET approach measures the aggregate effect of all toxicants in the effluent.

Federal regulation 40 CFR 122.44(d)(1) requires that permits contain limits on WET when a discharge has reasonable potential to cause or contribute to an exceedence of a water quality standard. Alaska State Water Quality Standard 18 AAC 70.030 states that "an effluent discharged to a water may not impart chronic toxicity to aquatic organisms, expressed as 1.0 chronic toxic unit, at the point of discharge (or if ADEC authorizes a mixing zone in a permit, approval, or certification, at or beyond the mixing zone boundary) based on the minimum effluent dilution achieved in the mixing zone. If the ADEC determines that an effluent has reasonable potential to cause or contribute to exceedance of this limit, the department will require whole effluent toxicity limitations as a condition of a permit, approval, or certification."

Because WET data is not available to evaluate whether or not the facility has achieved the state standard, the draft permit requires **semiannual** chronic WET testing of outfall 001. The WET testing is meant to characterize the total toxic effect of Ketchikan's WWTP effluent on the aquatic resources in the Tongass Narrows. Testing for larval survival, reproduction, and seven day growth shall be conducted using samples at or before the point-of-discharge to the Tongass Narrows. The results of the WET test shall be submitted with the DMR for the corresponding month and a final report will be due by the end of the following month. The results of the WET testing will be considered during permit re-issuance.

An effluent trigger of 100 TUc was established in the draft permit. If the effluent exceeds the trigger additional testing is required. If additional tests continue to demonstrate that the trigger is being exceeded, the permittee will be required to conduct a Toxicity Reduction Evaluation (TRE). A TRE is a site-specific study conducted to identify the cause of the toxicity and to evaluate toxicity control options.

D. Receiving Water Quality Monitoring

40 C.F.R. § 125.63(c) requires that the receiving water quality monitoring program provide data adequate to evaluate compliance with applicable water quality standards. The draft permit contains the ambient water quality monitoring requirements and locations established in the 1984 permit for water quality monitoring, except for the addition of enterococci and total ammonia monitoring. The ambient monitoring program was created based on the size of the facility, monitoring frequency for other 301(h) facilities, desire to track long-term trends,

determining compliance with Alaska water quality standards, and projected growth.

Ambient monitoring for turbidity, dissolved oxygen, pH, salinity, temperature, and total ammonia shall occur at two sampling stations on the zone of initial dilution (ZID) boundary and at two reference stations. The ZID for turbidity, dissolved oxygen, pH, salinity, temperature, and total ammonia is a column of water centered over the outfall diffuser with a radius of 130 meters and depth equal to the water column. Monitoring for fecal coliform and enterococci bacteria shall occur at a minimum of six stations (five of which are related to the fecal coliform ZID boundary). The fecal coliform and Enterococci bacteria ZID is defined as the area contained 30 m above a 3,200 m long (1,600 m on each side of the diffuser running parallel to the shoreline), by 250 m wide rectangle (125 m on either side of the diffuser perpendicular to the shoreline).

Both the procedures and equipment used to establish a navigational position contribute to errors that effect the overall accuracy[1] of the ambient monitoring program. For coastal positioning, the EPA recommends theodolites, sextants, electronic distance measuring instruments (EDMIs), total stations, and microwave and range-azimuth systems.

The ambient monitoring requirements are in Table VIII-2 as follows:

[1] Absolute or predictable accuracy is a measure of nearness to which a system can define a position by latitude and longitude. Repeatable or relative accuracy is a measure of a system's ability to return the user to a given position with coordinates that were previously measured with the same system.

Table VIII-2 Ambient Monitoring Requirements			
Parameter	**Station Location**	**Depth**	**Monitoring Frequency**
Turbidity, nephelometric turbidity units (NTU)	1000m NW of ZID 1000m SE of ZID <5m NW of ZID boundary <5m SE of ZID boundary	surface, mid-depth, and bottom	Once a month in July, August and September during 1st, 3rd, and 4th year of permit
Dissolved oxygen, mg/L	1000m NW of ZID 1000m SE of ZID <5m NW of ZID boundary <5m SE of ZID boundary	surface, mid-depth, and bottom	Once a month in July, August and September during 1st, 3rd, and 4th year of permit
pH, s.u.	1000m NW of ZID 1000m SE of ZID <5m NW of ZID boundary <5m SE of ZID boundary	surface, mid-depth, and bottom	Once a month in July, August and September during 1st, 3rd, and 4th year of permit
Salinity, ppt	1000m NW of ZID 1000m SE of ZID <5m NW of ZID boundary <5m SE of ZID boundary	every 3 m (w/one station at outfall depth)	Once a month in July, August and September during 1st, 3rd, and 4th year of permit
Temperature, EC	1000m NW of ZID 1000m SE of ZID <5m NW of ZID boundary <5m SE of ZID boundary	every 3 m (w/one station at outfall depth)	Once a month in July, August and September during 1st, 3rd, and 4th year of permit
Total Ammonia as N, mg/L	1000m NW of ZID 1000m SE of ZID <5m NW of ZID boundary <5m SE of ZID boundary	surface waters only (above 1.0 m)	Once a month in July, August and September during 1st, 3rd, and 4th year of permit
Copper, Fg/L	Background	surface waters only (above 1.0 m)	Once a month in July, August and September during 1st, 3rd, and 4th year of permit
Silver, Fg/L	Background	surface waters only (above 1.0 m)	Once a month in July, August and September during 1st, 3rd, and 4th year of permit

Parameter	Station Location	Depth	Monitoring Frequency
Zinc, Fg/L	Background	surface waters only (above 1.0 m)	Once a month in July, August and September during 1st, 3rd, and 4th year of permit
Fecal coliform, #/100ml	1000m NW of NW ZID boundary 1000m SE of SE ZID boundary 100m NW of NW ZID boundary 100m SE of SE ZID boundary on ZID boundary nearest STP on shoreline[1] any intertidal areas w/in 125m of ZID that's used for recreation	surface waters only (above 15-30 cm)	Once a month May through September for the life of the permit
Enterococci bacteria, #/100ml	1000m NW of NW ZID boundary 1000m SE of SE ZID boundary 100m NW of NW ZID boundary 100m SE of SE ZID boundary on ZOD boundary nearest STP on shoreline any intertidal areas w/in 125m of ZID that's used for recreation	surface waters only (above 15-30 cm)	Once a month May through September for the life of the permit

Note:
1 Fecal coliform shall not exceed 200 FC/100 ML at the shoreline, within the designated mixing zone.

E. Biological Monitoring Program for Total Volatile Solids and Benthic Infauna

40 C.F.R. 125.63(b) requires permittees to implement a biological monitoring program that provides data adequate to evaluate the impact of the applicant's discharge on the marine biota.

Previous 301(h) applications indicate that there are kelp beds along the Tongass Narrows (mostly on the west side of the channel). The kelp beds are found at depths of 3 to 10 meters with the closest bed detected 0.8 km (0.5 mile) from the outfall. The permittee also indicates that there are no coral reefs in the vicinity of the outfall and there is little life on the bottom near the diffuser. The bottom substrate in the vicinity of the discharge reflects past dredging and filling operations (i.e., contains gravel and sand) and is not conducive to aquatic life. A baseline survey conducted in 1976 found that the undisturbed substrate surrounding the outfall contained small featherduster worms (*Phoronopsis spp.*), clam siphons (at $<1/m^2$), sun stars (*Pycnopodia*), and red sea urchins (*Strongylocentrotus franciscanus*).

The 1984 NPDES permit required benthic organism collection and sediment analyses at five locations. The sediment samples in 1984, 1987, and 1988 demonstrated no detrimental environmental impacts but were inconclusive regarding sediment enrichment. In order to meet the regulatory requirement to implement a biological monitoring program and in order to gather adequate data to evaluate the impact of the applicant's discharge on the marine biota, the draft permit requires the permittee conduct sediment analysis for total volatile solids (TVS) and benthic surveys during **years 1 and 4** of the permit. The TVS sediment testing will be useful in confirming whether the discharge continues to not have an adverse effect on the marine biota. The benthic surveys track whether populations are affected by the discharge and provide a record to evaluate long-term trends in the discharge area. The testing shall utilize similar methods and collection points as the 1984 permit. Samples shall continue be taken at the following five stations: the northwestern boundary of the ZID, the southeastern boundary of the ZID, inside the ZID near the middle of the diffuser, and two reference stations at least 1000 m northwest and southeast of the outfall. Sampling stations shall be located and referenced using whatever navigational aids will assure accurate reoccupation of the same site in subsequent years.

F. Effect of Discharge on Other Point and Nonpoint Sources

Under 40 CFR 125.64, which implements Section 301(h)(4) of the Act, the applicant's discharge must not result in the imposition of additional treatment requirements on any other point or nonpoint source. Prior to permit issuance, ADEC must determine that the discharge will not affect treatment requirements for any other point or nonpoint sources.

IX. OTHER PERMIT CONDITIONS

A. Toxics Control Program

1. Chemical Analysis and Identification of Sources

Under 40 CFR 125.66(a) and (b), applicants are required to submit a chemical analysis of their discharge that identifies any toxic pollutants and pesticides under both dry- and wet-weather conditions. An analysis of the sources of the identified toxic pollutants and pesticides is also required. Unless required by the state, these requirements do not apply to any small section 301(h) applicant which certifies that there are no known or suspected sources of toxic pollutants or pesticides and documents the certification with an industrial user survey as described by 40 CFR 403.8(f)(2).

The City of Ketchikan has submitted the required certification, will be submitting an updated industrial user survey, and is a small discharger

because it serves less than 50,000 people (the population is approximately 8,000 people) and the average dry weather flow is less than 5.0 mgd. Based on the permittees certification and the results of the priority pollutant scan, the applicant will not be required to conduct another priority pollutant analysis. The Permittee is required in the draft permit to submit an additional industrial user survey and priority pollutant scan with a reapplication package (See IV.F Duty to Reapply in the draft permit).

2. Nonindustrial Source Control Program

40 CFR 125.66(d), which implements Section 301(h)(6) of the Act, requires the applicant to implement a public education program designed to minimize the entrance of nonindustrial toxic pollutants and pesticides into the POTW and to develop a nonindustrial source control program. In addition, the permittee must have a schedule of activities for identifying nonindustrial sources of toxic pollutants and pesticides and for developing and implementing control programs, to the extent practicable.

This regulation allows small section 301(h) applicants that certify that there are no known or suspected water quality, sediment accumulation, or biological problems related to toxic pollutants or pesticides in its discharge, to develop a public education program. The identification of nonindustrial sources is not required. The City of Ketchikan has provided this certification and has implemented a public education program.. Elements of the program include publicizing:

- non-hazardous alternatives to hazardous household products and pesticides;
- proper and free disposal methods for hazardous wastes shall be identified in local newspapers, and
- information to the Gateway Borough as septage is collected.

In addition to the above elements, at least one sign shall be placed on the shoreline near the fecal coliform mixing zone and the outfall line. The sign shall state that primary treated domestic wastewater is being discharged, that mixing zones exist, and certain activities should not take place within the mixing zones. The sign shall also have the name and owner of the facility, approximate location and size of the mixing zone and give a facility contact phone number for additional information. A condition is included in the permit that requires Ketchikan to report to the EPA on the progress of the program **annually** (with the January DMR).

B. Effluent Volume and Amount of Pollutants Discharged

Under 40 CFR §125.67, which implements section 301(h)(7) of the Act, the permittee's discharge may not result in any new or substantially increased discharges of the pollutant to which the modification applies above the discharge specified in the 301(h) permit.

Ketchikan's draft permit is designed for an average flow of 4.0 mgd. The draft concentration and mass-based effluent limitations for BOD_5 and TSS and pH range are more stringent than the 1984 permit limits and therefore comply with the regulation.

C. Quality Assurance Plan

Federal regulation 40 CFR 122.41(e) requires the permittee to develop a Quality Assurance Plan (QAP) to ensure that the monitoring data submitted are accurate and to explain data anomalies if they occur. The permittee is required to complete and implement a QAP within **120 days of the effective date** of the permit. The QAP shall consist of standard operating procedures the permittee must follow for collecting, handling, storing and shipping samples, laboratory analysis, and data reporting.

D. Operation & Maintenance Plan

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

The draft permit requires the City of Ketchikan to incorporate appropriate BMPs into their O&M plan within **180 days of the effective date of the permit**. Specifically, the permittee must consider spill prevention and control and optimization of chemical use. The City's public education program is already currently aimed at controlling the introduction of household hazardous materials to the sewer system. The City should also consider ways to encourage the conservation of water as part of the O&M plan. The O&M plan must be revised as new practices are developed.

As part of proper O&M, the draft permit requires the City of Ketchikan to develop a facility plan when the annual average flow exceeds 85 percent of the design flow of the plant (4.0 mgd). This facility plan includes a strategy for remaining in compliance with effluent limits in the permit.

E. Additional Permit Provisions

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

X. OTHER LEGAL REQUIREMENTS

Pursuant to 40 CFR 125.59(b)(3), a modified NPDES permit may not be issued unless the discharge complies with applicable provisions of state, local, or other federal laws or Executive Orders, including the Coastal Zone Management Act, 16 U.S.C. 1451 et seq., the Endangered Species Act, 16 U.S.C. 1531 et seq., and the Marine Protection, Research, and Sanctuaries Act 16 U.S.C. 1431 et seq.

A. State Coastal Zone Management Program

The EPA has determined that the activities authorized by this permit are consistent with local and state Coastal Management Plans. The draft permit and Fact Sheet containing this consistency determination will be submitted to the State of Alaska Division of Governmental Coordination for state interagency review at the time of public notice. The requirements for State Coastal Zone Management Review and approval must be satisfied before the permit may be reissued.

B. Endangered and Threatened Species

The Endangered Species Act requires federal agencies to consult with the National Marine Fisheries Service (NMFS) and the U.S. Fish and Wildlife Service (USFWS) if the actions could beneficially or adversely affect any threatened or endangered species. The EPA has tentatively determined that the discharge has **no effect** on the listed threatened and endangered species identified by the services below.

The EPA requested lists of threatened and endangered species from the NMFS in a letter dated January 24, 2000 and from the USFWS in letters dated January 24, 2000 and March 16, 2000. On April 20, 2000 the EPA spoke with the USFWS and was told that there are no listed species within the discharge area under the USFWS's jurisdiction (consultation #00-13V). In a letter dated February 18, 2000 the NMFS indicated that of the listed species, the Steller sea lion (*Eumetopias jubatus*) and the Humpback whale (*Megaptera novaeangliae*) occur in the area of discharge.

The Steller sea lion is distributed around the North pacific rim from the Channel Islands off Southern California to northern Hokkaido, Japan. Their distribution extends northward into the Bering Sea and along the eastern shore of the Kamchatka

Peninsula. The center of distribution is in the Gulf of Alaska and the Aleutian Islands. Within this distribution, the land sites used by the sea lions are referred to as rookeries and haulout sites. The City of Ketchikan does not discharge near any Steller sea lion rookeries (3 mile buffer included) or haulout sites.

The North Pacific humpback whale can be found during the summer migrating and feeding over the continental shelf and along the coasts of the Pacific Rim, from Point Conception, California north to the Gulf of Alaska, Prince William Sound and Kodiak Island. During the winter, the humpback whales are found in either Baja California/mainland Mexico, the main islands of Hawaii, or the islands south of Japan. The following factors have been identified as possibly influencing the recovery of the central stock North Pacific humpback whale: vessel traffic due to oil and gas exploration; whale watching, scientific research, photography, and associated vessel traffic; and entanglement in fishing gear. The overall impact of pollution on whale habitats is unknown and there is no conclusive evidence as to whether these stocks are declining, increasing, or stationary.

The EPA will provide NMFS and USFWS with copies of the draft 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.

C. Essential Fish Habitat

Section 305(b) of the Magnuson-Stevens Act (16 USC 1855(b)) requires federal agencies to consult with NMFS when any activity proposed to be permitted, funded, or undertaken by a federal agency may have an adverse effect on designated Essential Fish Habitat (EFH) as defined by the Act. The EFH regulations define an *adverse effect* as any impact which reduces quality and/or quantity of EFH and may include direct (e.g. contamination or physical disruption), indirect (e.g. loss of prey, reduction in species' fecundity), site-specific, or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions.

The EPA has tentatively determined that issuance of this permit is **not likely to adversely effect** EFH in the vicinity of the discharge. An EFH assessment has been prepared in Appendix E. The NMFS has been provided with copies of the draft permit and fact sheet during the public notice period. Any comments received from NMFS regarding EFH will be considered prior to reissuance of this permit.

D. Marine Protection, Research, and Sanctuaries Act

The discharge is not located in a federal marine sanctuary nor is it located in a sanctuary designated under Title III of the Marine Protection, Research, and Sanctuaries Act of 1972, as amended, or the Coastal Zone Management Act of 1972, as amended.

E. State Certification

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

Alaska State law (Title 18, Alaska Administrative Code, Section 72.050) requires secondary treatment for all POTWs that discharge to natural surface waters unless a modification of the secondary treatment requirement is granted in accordance with Section 301(h) of the Clean Water Act.

Section 301(h) of the Act and 40 CFR §125.59(i)(2) provides that a waiver from secondary treatment may not be granted until the State grants, denies, or waives it right to certify under section 401 of the Act. Certification indicates compliance with applicable provisions of local law. If ADEC waives certification, 40 CFR 125 Subpart G still allows EPA to issue a 301(h) permit with a zone of initial dilution (ZID).

F. Permit Expiration

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

REFERENCES

Tidal Current Table 1988, Pacific Coast of North America and Asia, National Oceanic and Atmospheric Administration, National Ocean Survey.

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

Amended Section 301(h) Technical Support Document, EPA 842-B-94-007, September 1994.

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

APPENDIX A - KETCHIKAN WASTEWATER TREATMENT PLANT PROCESS AND DIFFUSER DIAGRAM

The process and outfall diagrams have been included as a separate file due to the amount of memory required to download them.

APPENDIX B - KETCHIKAN WASTEWATER TREATMENT PLANT DISCHARGE LOCATION

The map has been included as a separate file due to the amount of memory required to download it.

APPENDIX C - STATUTORY AND REGULATORY BASIS FOR EFFLUENT LIMITATIONS

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

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

I. Technology-based Evaluation

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

More specifically, Section 301(b)(1)(B) of the Clean Water Act requires that EPA develop secondary treatment standards for POTWs as defined in Section 304(d)(1) of the Clean Water Act. Based on this statutory requirement, EPA developed secondary treatment regulations which are specified in 40 CFR Part 133.102. These technology-based regulations apply to all municipal WWTPs and identify the minimum level of effluent quality attainable by secondary treatment in terms of BOD_5, TSS, and pH. Section 301(h) of the Act provides for a waiver from secondary treatment, if the permittee meets several specific criteria, including a requirement to achieve primary treatment. Primary treatment is defined in the Act as 30 percent removal of BOD and TSS from the influent.

Applicants for 301(h) waivers request concentration and loading (i.e. in lbs/day) limits for BOD and TSS based on what the facility is capable of achieving. Therefore, the technology-based requirements for POTWs with 301(h) waivers are established on a case-by-case basis. The greatest concentration of BOD and TSS (from DMRs 1989 to 1999) and found in Table C-1. The applicant requested permit range for pH is also included.

Table C-1. Technology-Based Effluent Limitations for Outfall 001	
Parameter	**Average Monthly Limit**
Biochemical Oxygen Demand (BOD_5)	126 mg/L
Total Suspended Solids (TSS)	129 mg/L
pH	6.5 - 8.0

The BOD and TSS concentrations in Table C-1 and loadings of 4203 lbs/day of BOD_5 and 4303 lbs/day of TSS were included in the draft permit limit table (Table VI-1, Section VI). The loading limits were calculated by multiplying the concentration limitation by the design flow of 4.0 mgd, and by a unit conversion factor (8.34). A pH range from 6.5 to 8.5 s.u. is included in the draft permit consistent with Alaska's water quality standards.

II. Water Quality-based Evaluation

For 301(h) dischargers, water quality-based permit limits must consider the following four separate provisions which overlap to some extent.

- 40 CFR 122.44(d)(1) requires that permits include limits on 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." This provision applies to all NPDES permits.

- 40 CFR §125.62(a)(1) states that the permittee must demonstrate that its discharge will not result in exceedances of state water quality standards at the edge of the ZID. This provision is specific to permits with 301(h) waivers.

- Section 301(h)(9) of the Act requires that the discharge meet water quality criteria established under section 304(a)(1) of the Act at the edge of the ZID. Section 304(a)(1) of the Act establishes water quality criteria for toxic pollutants. Where a state has adopted numeric criteria for a given pollutant, that criterion can be used in place of the 304(a)(1) criteria. On December 22, 1992, EPA promulgated numeric criteria for toxic pollutants for the State of Alaska in the National Toxics Rule (40 CFR 131.36). Therefore, compliance with 40 CFR 122.44(d)(1) also results in compliance with this provision.

- **!** 40 CFR § 125.61 implements Section 301(h)(1) of the Act. This provision applies only to those parameters for which a modification is requested (i.e., BOD and TSS). Under this provision, there must be a water quality standard applicable to each pollutant for which the modification is requested (i.e., BOD and TSS or surrogates) and the applicant must demonstrate that the proposed modified discharge will result in compliance with these standards at the edge of the ZID.

III. Pollutant-specific Analysis

The following section outlines the basis for each of the effluent limitations, or lack of limitations, in the draft permit.

A. Dissolved Oxygen

The Alaska State Water Quality Standards applicable to marine waters provide that for estuarine water, the concentration of dissolved oxygen (DO) shall not be less than 5.0 mg/L except where natural conditions cause this value to be depressed. Monitoring conducted by the permittee in 1988 and 1989 shows that the receiving water DO generally complies with water quality standards. Of the 84 ambient samples taken, only five samples showed DO between 4.3 mg/L and 4.9 mg/L.

The amended 301(h) TSD provides the following equation for determining the DO depletion caused by the BOD of the effluent. This equation was used by the permittee to calculate the DO concentration (DO_f) in the waste field at the completion of initial dilution, using the following recommended worst-case assumptions.

$DO_f = DO_a + (DO_e - IDOD - DO_a)/S_a$
$6.84 + (0 - 2 - 6.84)/27$
6.51 mg/L

DO_a =	Ambient DO concentration (minimum average water column DO concentration measured in the vicinity of the outfall) 6.84 mg/L
DO_e =	Effluent DO concentration 0.0 mg/L (represents the worst possible case effluent, monitoring data is not available)
IDOD =	Immediate DO demand 2.0 mg/L (from Table B-3 in the amended 301(h) TSD, page B-15)
S_a =	Initial dilution (27:1)

The minimum DO concentration of the receiving water immediately following initial dilution (DO_f) is 6.51 mg/L, a depletion of 0.33 mg/L from the ambient DO. This represents a DO depression of less than 1 percent and is greater than the 5 mg/L standard.

The permittee did not calculate a farfield DO concentration based on equations from the TSD. They did however, take eight DO profiles in August and September of 1984, and again in July, August, and September of 1987 and 1988. Based on these profiles, the permittee asserts that DO depression will not significantly affect the water quality since no DO readings were less than 5 mg/L. There appears to be an average 0.45 mg/L DO drop at the bottom depth between station 12 and station 1. Ambient monitoring for DO has been included in the draft permit to assure future compliance with the water quality standards.

B. Biochemical Oxygen Demand

In addition to the water quality-based concentration limits requested by the permittee, 40 CFR 122.45(f) requires that NPDES permits contain mass-based limits for most pollutants. The draft permit establishes loading limits based on Ketchikan current design capacity of 4.0 mgd (40 CFR 122.45(b)) and a ZID described as the volume of water centered beneath the diffuser with a width of 60 meters (across the Narrows) and a length of 118 meters (along the length of the Narrows). The loading limits are calculated by multiplying the concentration limits by the design flow and a conversion factor of 8.34 pound•liter/milligram•million gallons, as shown below:

Monthly Average Load: = (4.0 mgd)(126 mg/L)(8.34)
= **4,203 lbs/day**

Pursuant to Section 301(h)(9) of the Act and 40 CFR 125.60, the applicant must be discharging effluent that has received at least primary or equivalent treatment by the time the modified permit becomes effective. Primary or equivalent treatment is defined as "...treatment by screening, sedimentation, and skimming adequate to remove 30 percent of the biochemical oxygen demanding material and of the suspended solids in the treatment works influent..." The existing plant meets the primary or equivalent treatment requirements as required by federal regulations. Discharge Monitoring Report data from June 1993 through October 1999 demonstrates a range of BOD percent removal from 28 - 88%. A **30% removal** of BOD is included in the draft permit.

C. Turbidity and/or Light Attenuation

Alaska water quality standards applicable to marine waters of the Tongass Narrows in the vicinity of Charcoal Point provide that turbidity shall not exceed 25 nephelometric turbidity units (NTU) and shall not reduce the depth of the compensation point for photosynthetic activity by more than 10%. In addition, the turbidity shall not reduce the maximum Secchi disc depth by more than 10%.

Water quality monitoring in 1994, 1997, and 1998 has shown that receiving water turbidities range from 0.25 to 15.9 NTU. Additionally, there does not appear to be any significant differences in turbidity or Secchi disc measurements between the nearfield stations and the reference stations. Secchi disc measurements showed values ranging from 2.0 to 8.5 m, and averages 6.1 m.

D. Total Suspended Solids

The change in suspended solids in the water column is indirectly related to turbidity measurements. The increase in receiving water suspended solids concentration following initial dilution can be calculated from the formula in the 301(h) TSD:

$SS = SS_e/S_a$ where,
SS = change in suspended solids concentration following initial dilution
SS_e = effluent suspended solids concentration
S_a = initial dilution

Therefore, suspended solids increase by 4.8 mg/L based upon the critical initial dilution of 27:1 and the draft effluent SS limit of 129 mg/L. The dilution is found within the ZID described as the volume of water centered beneath the diffuser with a width of 60 meters (across the Narrows) and a length of 118 meters (along the length of the Narrows). The increase in suspended solids is not expected to have a substantial effect of turbidity.

Therefore, the average monthly suspended solids concentration of 129 mg/L is included in the draft permit as a water quality-based limit. In addition to the concentration limits, 40 CFR 122.45(f) requires that NPDES permits contain mass based limits for most pollutants. The water quality-based limit is calculated by multiplying the concentration limits by the design flow and a conversion factor of 8.34 pound•liter/milligram•million gallons, as shown below:

Monthly Average Load: = (4.0 mgd)(129 mg/L)(8.34)
= **4,303 lbs/day**

The existing plant meets the primary or equivalent treatment requirements as required by federal regulations. Discharge Monitoring Report data from June 1993 through October 1999 demonstrates a range of TSS percent removal from 31% - 92%. Therefore, the **30% removal** technology-based requirement is included in the draft permit.

E. pH

40 CFR 133.102 requires that effluent pH be within the technology-based range of 6.0 to 9.0 standard units (s.u.) for POTWs. In addition, the Alaska water quality standards for the protection of aquatic life requires that ambient pH be in the range of 6.5 to 8.5 s.u. and that pH not vary more than 0.1 standard unit from natural conditions. The permittee's 301(h) application requested a range of from 6.5 to 8.0 s.u.

The effluent pH from 1996 through 1999 ranged between 6.4 and 8.5 s.u. The readings are based on plant records and indicate considerable infiltration from City drinking water, with associated low pH.. The draft permit incorporates a range limit from **6.5 to 8.5 s.u.** consistent with Alaska's water quality standards.

D. Fecal Coliform Bacteria

Alaska's most restrictive criterion for fecal coliform (FC) bacteria concentrations is for areas protected for shellfish harvesting. The criterion specifies that the median fecal coliform value not exceed 14 Most Probable Number (MPN)/100 mL, and that not more than 10 percent of the samples shall exceed 43 MPN/100 mL. Because the Tongass Narrows is protected for shellfish harvesting, the discharge in the current permit must result in this standard being met at the edge of the ZID, if a ZID is certified by ADEC.

Available effluent data from the facility has been evaluated. The facility reported monthly average fecal coliform concentrations of 1.87 million fecal coliform per 100 ml. The Alaska Department of Environmental Conservation has provided the permittee with a mixing zone for fecal coliform that is defined as the area contained 30 m above a 3,200 m long (1,600 m on each side of the diffuser running parallel to the shoreline), by 250 m wide rectangle (125 m on either side of the diffuser perpendicular to the shoreline). This mixing zone provides a dilution of 100:1. The state has indicated that an average monthly limit of 1.0×10^6 FC/100 ml, an average weekly limit of 1.25×10^6 FC/100 ml, and a maximum daily limit of 1.5×10^6 FC/100 ml would comply with state water quality standards and has been included in the draft permit.

ADEC expects that during its next tri-annual review the fecal coliform criteria will be replaced with E. coli and/or enterococci bacteria criteria. Draft EPA

Guidance (*Implementation Guidance for Ambient Water Quality Criteria for Bacteria 1986*, EPA-823-D-00-001) recommends enterococci criteria for marine discharges. Therefore, monitoring of enterococci has been included in the permit in preparation for this replacement.

In addition to the fecal coliform and enterococci effluent monitoring, the draft permit includes a water column, intertidal (shoreline), and offshore fecal coliform and enterococci monitoring requirement. The ambient monitoring program will provide information to evaluate compliance with Alaska fecal coliform water quality standards. The offshore sampling program shall include sampling stations within the ZID, 4 at the ZID boundary, and at nearfield stations. Ambient monitoring of fecal coliform from 1987 through 2000 at six water quality stations has shown median values of 9/100 ml. The maximum reported value is 200+/100ml for station B6 in August 1998.

E. Toxic Pollutants

As discussed above, water quality-based limits must be established that result in compliance with water quality standards at the edge of the ZID, if a ZID is available.

The regulations at 40 CFR 122.44(d)(1) implement section 301(b)(1)(C) of the Clean Water Act. These regulations require that NPDES permits include limits for all pollutants or parameters which "are or may be discharged at a level which will cause, have the reasonable potential to cause, or contribute to an excursion above any State water quality standard, including State narrative criteria for water quality." The limits must be stringent enough to ensure that water quality standards are met, and must be consistent with any available wasteload allocation (WLA).

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

a. Determine the appropriate water quality criteria
b. Determine whether there is "reasonable potential" to exceed the criteria
c. If there is "reasonable potential", develop a WLA
d. Develop effluent limitations based on the WLA

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

EPA used the recommendations in Chapter 3 of the *Technical Support Document for Water Quality-based Toxics Control* (TSD, EPA 1991) to conduct this "reasonable potential" analysis for the City of Ketchikan WWTP.

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

$C_r = (C_e \text{ X } D) + C_b$ where,

C_r = receiving water concentration of the effluent at the edge of the ZID
C_e = maximum projected effluent concentration
= maximum reported effluent value X reasonable potential multiplier
C_b = background concentration of pollutant
D = dilution factor (27:1 for BOD and TSS; 100:1 for copper, lead, silver, and zinc)

The maximum projected effluent concentration (C_e) in the mass balance equation is represented by the highest reported concentration measured in the effluent multiplied by a reasonable potential multiplier. The reasonable potential multiplier accounts for uncertainty in the data. The multiplier decreases as the number of data points increases and variability of the data decreases. Variability is measured by the coefficient of variation (CV) of the data. When there is not enough data to reliably determine a CV, the TSD recommends using 0.6 as a default value. A partial listing of reasonable potential multipliers can be found in Table 3-1 of the TSD.

The resulting maximum projected effluent concentration is then divided by the minimum critical dilution. This product represents the maximum effluent concentration at the edge of the ZID. The maximum effluent concentration at the edge of the ZID is then added to the background concentration, $C_{b,}$ which is represented by the 95th percentile value from the background data set (the 5th percentile value is used for DO). The sum, C_r, represents the projected maximum receiving water concentration at the edge of the ZID. This concentration is compared to the water quality criterion to determine whether a water-quality based effluent limitation is needed. If the receiving water concentration exceeds the water-quality criteria then a water-quality based effluent limitation is developed.

Table C-2 shows the values used to calculate a maximum potential receiving water concentration and compared to the most stringent criteria for toxics.

Table C-2. Determination of Need for Water-Quality Based Limits

Parameter	Background (Fg/l), C_b	Max Report Effluent (Fg/l)	Reasonable Potential Multiplier	Dilution Ratio	Max Potential RWC, C_r	Most Stringent WQ Criteria[2]	WQ Based Limit Required?
Copper past data recent data	0	 8900 270[1]	 2.3 1.68	 100:1 100:1	 205 4.5	 2.9 2.9	 Yes Yes
Lead	0	5.7[1]	1.17	100:1	0.07	5.6	No
Silver	0	15[1]	6.8	100:1	1.02	2.3	No
Zinc	0	1300	4.7[2]	100:1	61.1	58	Yes

Note:
1 Monitoring conducted in 2000 was used in the calculations
2 When less than 10 data points are available, the TSD recommends using a coefficient of variation of 0.6.

Maximum potential receiving water concentrations for copper and zinc exceed the most stringent Alaska water quality criteria, therefore effluent limitations are necessary for this discharge.

F. Ammonia

Total ammonia data is unavailable in the NPDES renewal application for ammonia. The existing 1984 permit did not require effluent monitoring of ammonia. Although ammonia is a common constituent of POTW effluent, it is reasonable to expect that this facility would not cause exceedances of the State criteria given the dilution available within the ZID. Therefore, EPA has included total ammonia monitoring in the draft permit in order to assess the discharge from outfall 001.

G. Floating, Suspended or Submerged Matter

The state water quality standard 18 AAC 70.020(b)(2) requires that the permittee not discharge floating solids, debris, sludge, foam, scum, or other residues which produce a film, sheen, or discoloration on the surface of the receiving water. This condition was included in the 1984 permit and has been retained in the draft permit.

IV. Antidegradation

In addition to water quality-based limitations for pollutants that could cause or contribute to exceedences of standards, EPA must consider the State's antidegradation policy. This policy is designed to protect existing water quality when the existing quality is better than that required to meet the standard and to prevent water quality from being degraded below the standard when existing quality just meets the standard. For high quality waters, antidegradation requires that, before any degradation is authorized, the State must find that allowing lower water quality is necessary to accommodate important economic or social development. This means that, if water quality is better than necessary to meet the water quality standards, increased permit limits can be authorized only if they do not cause degradation or if the State makes the determination that it is necessary. Reissuance of this permit will not result in additional pollutant loading to the receiving water. Therefore, reissuance is consistent with the State of Alaska's antidegradation policy (18 AAC 70.010(c)].

V. Maintenance of that Water Quality which Assures Protection of Public Water Supplies, a Balanced Indigenous Population of Shellfish, Fish, and Wildlife, and Recreational Activities in and on the Water [40 CFR § 125.62]

A. Transport and Dispersion of Diluted Wastewater and Particulates

40 CFR § 125.62 states that wastewater and particulates must be adequately dispersed following initial dilution so as not to adversely affect water use areas. Assuring compliance with this section requires an analysis of solids accumulation.

The accumulation of suspended solids may lower dissolved oxygen concentrations in near-bottom waters and cause changes in the benthic communities. Accumulation of suspended solids in the vicinity of a discharge is influenced by the amount of solids discharged, the settling velocity distribution of the particles in the discharge, the plume height-of-rise, and current velocities. A August 4, 1997 inspection of outfall 001 showed no accumulation of solids on the ocean floor. This is not surprising since sedimentation of suspended solids is generally of little concern for discharges into very well-flushed receiving waters.

The discharge of Ketchikan's effluent has not caused, and is not expected to cause, adverse solids accumulation or have a significant impact on sediment dissolved oxygen demand. The permittee estimated a steady-state sediment accumulation of less than 25 g/m^2 for particles from the outfall using Figure B-2 of the amended TSD. The estimate is based on an annual effluent flow of 0.142 m^3/sec (3.24 mgd) and an annual average suspended solids effluent concentration of 46 mg/L to calculate mass emission rate. Recalculations using a suspended solids concentration of 129 mg/L resulted in a steady state sediment accumulation

of less than 25 g/m^2. At less than 25 g/m^2, the amended TSD indicates that no biological impacts are expected to occur.

B. Impact of the Discharge on Public Water Supplies

40 C.F.R. § 125.62(b) requires that the applicant's discharge allow for the attainment or maintenance of water quality which assures protection of public water supplies and not interfere with the use of planned or existing public water supplies. There are no existing or planned public water supply intakes in the vicinity of the discharge. The major source of water for the city of Ketchikan is a lake east of the city.

C. Biological Impact of Discharge

40 CFR § 125.62(c) requires that in addition to complying with applicable water quality standards, the discharge must comply with any additional requirements necessary to maintain water quality which provides for the protection and propagation of a balanced indigenous population (BIP) of fish, shellfish, and wildlife. Specifically, this requirement means that a BIP must exist immediately beyond the boundary of the ZID and in all areas beyond the ZID that are actually or potentially affected by the applicant's discharge.

The applicants discharge has complied in the past and is expected to continue complying with the State of Alaska water quality standards for DO, turbidity, and pH. Other water quality standards applicable to the discharge include fecal coliform, temperature, ammonia, and toxic and deleterious substances.

The guidelines in the TSD indicate that the potential for adverse biological impacts due to the sewage effluent is low since the outfall is located in relatively deep water (110 ft) and strong, fairly steady currents provide adequate dilution. Additionally, the mass emission rate of suspended solids is low, and distinctive habitats of limited distribution are absent in the immediate outfall vicinity. Transport and dispersion of the diluted wastewater following initial dilution should continue to prevent accumulation of sewage-derived solids which could have adverse effects on benthic communities.

Ketchikan’s existing permit requires sediment analyses for TVS as an approximation of the amount of organic matter in the solid fraction of the discharge. The existing permit requires the sampling and archiving of benthic infauna at the same time that the TVS samples were collected. In the event that TVS concentrations increased, Ketchikan would have been required to statistically analyze the benthic infauna to show whether the composition of the benthic communities changed significantly in response to organic enrichment, indicated by TVS.

The TVS and benthic infauna monitoring program in the existing permit should have provided data adequate to evaluate the effects of the discharge on the biological community. However, due to difficulties that Ketchikan had with sampling and analyses, the TVS and benthic infauna data neither supports or refutes a determination regarding the effects of diluted wastewater and particulates on the marine biota within or at the boundary of the ZID. The TVS data Ketchikan collected showed increased concentrations with time with no particular spatial relationship to the outfall. TVS concentrations increased from 1984 to 1987 and again from 1987 to 1988 at all stations, including reference sites which should not have shown any effect from the discharge. The TVS concentration at the sampling stations near the ZID boundary (160 - 886 m) were lower than TVS concentrations at reference stations (>1000 m from the ZID boundary).

The overall increase of TVS from 1984 to 1988 is unexpected because primary treatment began in 1986 and the effluent contained less organic material after 1986. The monitoring report for 1988 states that sediment from Station 1 (reference station) contained black mud. It is possible that the sampling vessel drifted off-site into a nearshore depositional area, where TVS values would be expectedly high. It was noted that Station 12 (beyond the ZID boundary) contained sawdust, which would cause high TVS concentrations due to its organic nature.

The unreliability of analyses and overall discrepancies in TVS values from one year to the next are likely due to the inaccurate reoccupation of sampling stations (reoccupation was by sighting land reference points and cross ties) and the different protocols that were used to determine TVS concentrations. Therefore, in order to conduct a useful analysis the draft permit retains the TVS and benthic infauna monitoring program. Controls on location and reoccupation of sampling sites and analytical protocols should be ensured so that the data collected will be complete and accurate.

D. Biological Impacts for Saline Estuaries Regarding Benthic Populations within the ZID, Migratory Pathways within the ZID, and Accumulation of Toxic Pollutants or Pesticides within the ZID

40 C.F.R. § 125.62(c)(4) requires that for discharges within a saline estuary, the benthic populations within the ZID may not differ from the BIP immediately beyond the ZID. The discharges may also not interfere with estuarine migratory pathways within the ZID, and the discharge may not result in the accumulation of toxic pollutants or pesticides at levels which exert adverse effects on the biota within the ZID.

The existence of a BIP within the ZID has not conclusively been established. However, a BIP does exist at least 500 m beyond the boundary of the ZID. Additionally, the permittee has not supplied any data regarding migratory pathways in the proximity of the ZID because such data for fish and wildlife in this area is lacking.

With respect to the accumulation of toxic pollutants or pesticides within the ZID, Ketchikan stated in their application that there are no known or suspected sources of toxic pollutants or pesticides detected in the effluent. Therefore, no bioaccumulation is anticipated among biota within the ZID. Analysis conducted in December 1988 showed the following pollutants in a composite sample of the effluent at concentrations above detection levels:

Table C-3 - Monitoring Results	
Parameter	**Effluent Concentration (Fg/L)**
Phenol	1.9
Benzyl alcohol	3.3
4-Methyl Phenol	13.0
Napthalene	22.0
2-Methyl Napthalene	23.0
Diethyl Phthalate	4.4
Di-n-butyl Phthalate	1.1
Bis (2-ethylhexyl) Phthalate	12.0
Di-n-octyl Phthalate	1.3
Acetone	14.0
Methylene Chloride	6.3
2-butanone	6.8
Chloroform	5.1
Copper	220-270
Lead	2.0
Silver	29.0
Zinc	60-70

Of the reported pollutants, only silver, zinc, copper, mercury and phthalate esters were present at levels exceeding their respective marine water quality criteria. In addition, none of the pollutants exceeded human health criteria. Assuming a dilution of 100:1, all parameters except copper and zinc meet water quality standards. Ketchikan has been working on resolving the copper in the effluent by adding a buffer (sodium bicarbonate or soda ash) to the drinking water to prevent copper leaching from the pipes. Draft effluent limits have been included for these parameters.

E. Impact of Discharge on Recreational Activities

40 C.F.R. § 125,62(d) requires that the City of Ketchikan's discharge allow for the attainment and maintenance of water quality protective of recreational activities outside the ZID. The applicant identified the main form of secondary recreational activities in the Tongass Narrows as boating (with some waterskiing)

and fishing. Although fishing is found in the Narrows, salmon trolling is restricted in the vicinity of the discharge because Carlanna Creek is a salmon spawning stream. No swimming or recreational diving (i.e., primary contact) occurs in the Narrows. The outfall is located away from nearshore activity and the discharge plume is carried northwest and away from shore by strong currents.

The permittee measured fecal coliform levels at seven stations in the Narrows. Monitoring was in August and September of 1984; from April through September in 1987, 1988, 1989, 1994, 1997, 1998; and in May of 1999. The current permit specified monitoring for these months near areas of recreational activity to assure protection of public health. Fecal coliform data shows no apparent spatial relationship between sampling locations, the current outfall, or the ZID. Fecal coliform levels dropped distinctly after the initiation of primary treatment in 1984.

The fecal coliform standard for the protection of contact recreation states that "... the mean may not exceed 100 FC/100 ml, and not more than 10% of the samples shall exceed 200 FC/100 ml." On June 30, 1994 and August 27, 1998 the fecal coliform levels at station B6 exceeded 100 FC/100 ml. Effluent limits have been placed in the permit that protect for the most stringent designated use of the Tongass Narrows (shellfish harvesting).

APPENDIX D - SAMPLE EFFLUENT LIMIT CALCULATION
NPDES Permit Limit Calculation for Total Copper

This appendix describes how the water quality-based effluent limits were calculated for total copper. The calculations were performed according to procedures outlined in Chapter 5 of the TSD.

Step 1 - Determine the appropriate water quality criteria

The State water quality criteria is determined based on the designated use of the receiving water. The Tongass Narrows is protected by the State of Alaska for the following uses: marine water supply (aquaculture, seafood processing and industrial); water recreation (contact and secondary); growth and propagation of fish, shellfish, other aquatic life, and wildlife; and harvesting for consumption of raw mollusks or other raw aquatic life.

The acute total recoverable copper criterion of 2.9 Fg/L was adopted by reference by ADEC from EPA's July 29, 1985 *Water Quality Criteria*. The chronic criterion of 4.0 F*g/L* was adopted by reference from EPA's November 28, 1980 *Ambient Water Quality Criteria*.

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

There is reasonable potential (RP) to exceed water quality criteria if the maximum projected downstream concentration of the pollutant exceeds the criterion. The maximum projected copper concentration is calculated using the following mass-based equation. Chronic and acute mixing zones (i.e., areas of dilution) of 27:1 were used.

$$C_d = \frac{C_e}{\text{Dilution}} + C_u$$ where,

C_d = receiving water concentration downstream of the effluent discharge
C_e = maximum projected effluent concentration (454 Fg/L)
maximum reported effluent concentration (270 Fg/L) X reasonable potential multiplier (1.68)
(In calculating the reasonable potential multiplier EPA used a coefficient of variation of 0.50 based on monitoring conducted in 1988 and 2000).
C_u = upstream concentration of pollutant (0 mg/L)
Dilution = the mixing zone dilution allowed by the state (100:1)

4.54 Fg/L > chronic criteria of 4.0 Fg/L
4.54 Fg/L > acute criteria of 2.9 Fg/L

Because the acute and chronic downstream concentrations are greater than the criterion, total copper limits must be included in the permit.

Step 3 - Calculate Wasteload Allocations

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

$WLA = (C_d - C_u) * Dilution$

$WLA_{acute} = 290$ Fg/L
$WLA_{chronic} = 400$ Fg/L

Step 4 - Develop Permit Limits

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

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

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

CV = coefficient of variation of the effluent concentration, standard deviation/mean = 0.50
F^2 = $\ln(CV^2 + 1) = 0.223$
z = 2.326 for 99th percentile probability basis

$LTA_{acute} = 108.1$ Fg/L

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

CV = coefficient of variation of the effluent concentration= 0.50
F^2 = $\ln(CV^2/4 + 1) = 0.06$
z = 2.326 for 99th percentile probability basis

$LTA_{chronic} = 233.1$ Fg/L

b) Calculate Average Monthly and Maximum Daily Permit Limits

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

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

MDL = LTA_{acute} X $e^{(zF-0.5F^2)}$ where,

CV = coefficient of variation
0.50
F^2 = $\ln(CV^2 + 1)$
0.223
z = 2.326 for 99th percentile probability basis

MDL = **290 Fg/L**

AML = LTA_{acute} X $e^{(zF- 0.5F^2)}$ where,
CV = coefficient of variation
0.50
F^2 = $\ln(CV^2/n + 1)$
0.06
z = 1.645 for 95th percentile probability basis
n = number of sampling events required per month
4
AML = **157 Fg/L**

Mass-based concentration limits were calculated by multiplying the concentration limit by the design flow (4.0 mgd) and the 8.34 conversion factor.

MDL = (4.0 mgd) X (8.34) X (0.29 mg/L) = **9.67 lbs/day**
AML = (4.0 mgd) X (8.34) X (0.157 mg/L) = **5.24 lbs/day**

APPENDIX E - ESSENTIAL FISH HABITAT ASSESSMENT

Pursuant to the requirements for Essential Fish Habitat (EFH) assessments, this appendix contains the following information:

(1) Listing of EFH Species in the Facility Area
(2) Description of the Facility and Discharge Location
(3) EPA's Evaluation of Potential Effects to EFH

1. Listing of EFH Species in the Facility Area

All waterbodies used by anadromous[2] salmon throughout Alaska must be considered for EFH identification. There are four streams on the Ketchikan side of the Tongass Narrows (including Carlanna, Hoadley, and Ketchikan Creeks) and three streams on the Gravina Island side (including Government Creek). According to the National Marine Fisheries Service (NMFS), the creek mouth at Carlanna Creek is used by Pacific salmon [coho (*O. kisutch*), chum, and pink salmon (*Oncorhynchus gorbuscha*)]. Adjacent deeper water habitats are used by flatfish and rockfish.

2. Description of the Facility and Discharge Location

The activities and sources of wastewater at the Charcoal Point WWTP are described in detail in Part IV ("Facility and Outfall Description") of this fact sheet. The location of the outfall is described in Part V ("Receiving Water").

3. EPA's Evaluation of Potential Effects to EFH

Water quality is an important component of aquatic life habitat. NPDES permits are developed to protect water quality in accordance with state water quality standards. The standards protect the beneficial uses of the waterbody, including all life stages of aquatic life. The development of permit limits for an NPDES discharger include the basic elements of ecological risk analysis. The underlying technical process leading to NPDES permit requirements incorporates the following elements of risk analysis:

Effluent Characterization

Characterization of Ketchikan's effluent was accomplished using a variety of sources, including:
Permit application monitoring
Permit compliance monitoring
Effluent variability
Quality assurance evaluations

[2] Fish that migrate up the rivers, from the sea, to breed.

Identification of Pollutants of Concern and Threshold Concentrations

Identification of pollutants of concern, including:

Pollutants with aquatic life criteria in the Alaska Water Quality Standards
Other pollutants of concern based on available information (NMFS identified BOD as a pollutant of special concern)

Exposure and Wasteload Allocation

Analysis of the transport of pollutants near the discharge point with respect to the following:

Mixing zone policies in the Alaska Water Quality Standards
Dilution modeling and analysis
Exposure considerations (e.g., prevention of lethality to passing organisms)
Consideration of multiple sources and natural background concentrations

Statistical Evaluation for Permit Limit Development

Calculation of permit limits using statistical procedures addressing the following:

Effluent variability and non-continuous sampling
Fate/transport variability
Duration and frequency thresholds identified in the water quality criteria

Monitoring Programs

Development of monitoring requirements, including:

Compliance monitoring of the effluent
Ambient monitoring

EPA's approach to aquatic life protection is outlined in detail in the Technical Support Document for Water Quality-based Toxics Control (EPA/505/2-90-001, March 1991).

EPA and states evaluate toxicological information from a wide range of species and life stages in establishing water quality criteria for the protection of aquatic life. For example, the criteria for ammonia in saltwater adopted by the State of Alaska are based on bioassays (predominantly acute tests) of 21 marine species in 18 genera.

The NPDES program evaluates a wide range of chemical constituents (as well as whole effluent toxicity testing results) to identify pollutants of concern with respect to the criteria values. When

a facility discharges a pollutant at a level that has a “reasonable potential” to exceed the water quality criteria, permit limits are established to prevent exceedences of the criteria in the receiving water (outside any authorized mixing zone).

Since the draft permit has been developed to protect aquatic life species in the Tongass Narrows in accordance with the Alaska water quality standards, the EPA has tentatively determined that issuance of this permit is **not likely to adversely affect** any EFH in the vicinity of the discharge. The EPA will provide NMFS with copies of the draft permit and fact sheet during the public notice period. Any recommendations received from NMFS regarding EFH will be considered prior to reissuance of this permit.