FACT SHEET

October 12, 2007

NPDES Permit Number: **AK-0021393**

Public Notice Start Date: October 17, 2007
Public Notice Expiration Date: December 3, 2007

Technical Contact: Sharon Wilson, 206-553-0325, wilson.sharon@epa.gov
1-800-424-4372 ext. 3-0325 (within Region 10)

**The United States Environmental Protection Agency (EPA)
Proposes To Reissue,
and the State of Alaska plans to certify,
A National Pollutant Discharge Elimination System (NPDES) Permit to:**

City of North Pole
Wastewater Treatment Facility

EPA Proposes To Reissue NPDES Permit

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

This Fact Sheet includes:

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

Alaska State Certification

The City of North Pole Wastewater Treatment Facility discharges to State waters. EPA requests that State of Alaska Department of Environmental Conservation (ADEC) certify NPDES permits for those facilities that discharge to State waters, under Section 401 of the Clean Water Act.

The state has submitted preliminary Section 401 certification prior to this public notice. We have incorporated changes to the permit as a result of the State's pre-certification.

Before the permit is finalized, ADEC will have the opportunity to certify (approve) the permit under provisions of Section 401 of the CWA, 33 U.S.C. § 1341. ADEC may, as a condition of final certification, require that the proposed permit includes more stringent limitations or

monitoring requirements needed to comply with the CWA or State law. EPA is required to include any such limitation or requirement in the final permit.

The Alaska Department of Environmental Conservation (ADEC) proposes to certify this NPDES permit under Section 401 of the Clean Water Act.

Public Comment

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

Persons wishing to comment on state certification of the permit should submit written comments by the public notice expiration date to:

Marie Klingman
Alaska Department of Environmental Conservation
Division of Water
610 University Ave.
Fairbanks, AK 99709
marie.klingman@alaska.gov

After the Public Notice expires and all comments have been considered, EPA's Regional Director for the Office of Water and Watersheds will make a final decision regarding permit reissuance. If no substantive comments are received, the tentative conditions in the draft permit will become final, and the permit will become effective upon issuance. If comments are received, EPA will address the comments and issue the permit. Such a permit will become effective 30 days after the issuance date, unless an appeal is submitted to the Environmental Appeals Board within 30 days.

Documents are Available for Review.

The draft permit and fact sheet is posted on the Region 10 website at
http://yosemite.epa.gov/r10/WATER.NSF/NPDES+Permits/DraftPermitsAK

Copies may be requested by writing to EPA at the Seattle address below, by e-mailing washington.audrey@epa.gov, or by calling Audrey Washington at 206-553-0523 or (800) 424-4372 ext 0523 (within Alaska, Idaho, Oregon, & Washington). Copies may also be inspected and copied at the following federal and State offices any time between 8:30 a.m. and 4:00 P.M., Monday through Friday, except federal or State holidays.

United States Environmental Protection Agency
Region 10, OWW-130
1200 Sixth Avenue, Suite 900
Seattle, Washington 98101
(206) 553-0523 or
1-800-424-4372 (within Alaska, Idaho, Oregon and Washington)

EPA Anchorage Operations Office
222 West 7th Ave. #19
Anchorage, AK 99513-7588
(907) 271-5083

EPA Juneau Operations Office
709 W 9th Street
Room 223A
Juneau, AK 99802-0370
(907) 586-7619

Alaska Department of Environmental Conservation
610 University Drive
Fairbanks, AK 99709
907-451-2726

For technical questions regarding the permit or fact sheet, contact Audrey Washington at 206-553-0523 or by e-mail address at washington.audrey@epa.gov. Those with impaired hearing or speech may contact a TDD operator at 1-800-833-6384 and ask to be connected to the appropriate phone number. Additional services can be made available to a person with disabilities by contacting Audrey Washington.

Table of Contents

LIST OF TABLES

ACRONYMS

1Q10	1 day, 10 year low flow
7Q10	7 day, 10 year low flow
AML	Average Monthly Limit
AWL	Average Weekly Limit
BOD_5	Biochemical oxygen demand, five-day
°C	Degrees Celsius
cfs	Cubic feet per second
CFR	Code of Federal Regulations
CV	Coefficient of Variation
CWA	Clean Water Act
DMR	Discharge Monitoring Report
DO	Dissolved oxygen
EFH	Essential Fish Habitat
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
lbs/day	Pounds per day
LTA	Long Term Average
mg/l	Milligrams per liter
ml	milliliters
µg/L	Micrograms per liter
mgd	Million gallons per day

MDL	Maximum Daily Limit
N	Nitrogen
NMFS	National Marine Fisheries Service
NPDES	National Pollutant Discharge Elimination System
OWW	Office of Water and Watersheds
POTW	Publicly owned treatment works
RPM	Reasonable Potential Multiplier
s.u.	Standard Units
TMDL	Total Maximum Daily Load
TSD	Technical Support Document (EPA, 1991; see References in §IX))
TSS	Total suspended solids
USFWS	U.S. Fish and Wildlife Service
USGS	United States Geological Survey
WLA	Wasteload allocation
WQBEL	Water quality-based effluent limit
WWTP	Wastewater treatment plant

I. APPLICANT

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

Name of Facility:	City of North Pole Wastewater Treatment Plant
Mailing Address:	125 Snowman Lane, North Pole, AK 99705
Facility Location:	961 Shellinger Street, North Pole, AK 99705
Facility Contact:	James Remitz, Public Works Director, 907-488-2281

II. FACILITY INFORMATION

A. Facility Background

The City of North Pole operates a wastewater treatment plant (WWTP) that collects wastewater through a separate sanitary sewer system serving the City population of 1,700, plus three major industrial dischargers. The WWTP consists of an aerated lagoon system that is composed of four earthen-lined cells, each with a nominal liquid capacity of 5 million gallons, including volume occupied by seasonal ice and settled sludge. Piping at the facility enables the influent wastewater to be directed through each of the four cells in series. As it passes through each cell, the wastewater is aerated to promote biological stabilization of wastes. Sludge produced by the conversion of influent organics to biomass settles to the bottom of the lagoons along with inert solids carried into the lagoon facility. Effluent from the four aerated cells is disinfected by passing through a chlorine contact chamber prior to being discharged into the Tanana River. Dechlorination is not performed.

The design of the facility features bypass piping that allows each cell to be isolated from the series for maintenance or other purposes. Two positive-displacement air blowers provide compressed air to individually-valved, coarse-bubble, non-clog diffusers in each cell. The aeration pattern is tapered from the influent end of each cell from Cell 1 through Cell 4 to correlate to oxygen demand. A back-up generator, capable of providing power for the entire facility, is located in the Blower House and provides emergency power to the facility.

The WWTP's design flow rate is 0.5 million gallons per day (mgd). In the past three years, the average daily flow rates were 0.257 mgd (2006), 0.289 mgd (2005), and 0.273 (2004); the maximum daily flow rates were 0.364 mgd (2006), 0.658 mgd (2005), and 0.364 mgd (2004). The flow rates for the facility generally remain steady plus or minus precipitation and evaporation, except for times when the lagoons are being seasonally adjusted. The maximum flow rate of 0.658 mgd during 2005 was due to the draining of Cell 1 for sludge removal.

B. Facility Activity

The NPDES permit for the City of North Pole's wastewater treatment facility was initially issued on July 10, 1974, modified on March 18, 1977, and reissued on August 23, 1979. The city applied for a subsequent permit on January 23, 1985, which, when issued, became effective on May 31, 1988, and expired at midnight, May 31, 1993. The city applied for a subsequent permit on January 14, 1999. The current updated permit application was submitted November 1, 2006.

A review of the facility's Discharge Monitoring Reports for the past five years indicates that the facility has periodically failed to be in compliance with its permit effluent limits for five-day biochemical oxygen demand (BOD_5), pH, total residual chlorine, and fecal coliform. Table 1 presents permit exceedances.

Table 1 -- Permit Exceedances

Year	Parameter	Number of Permit Violations
2001	BOD_5 Concentration	1
	BOD_5 Percent Removal	1
	Total Residual Chlorine	1
	pH	2
	Fecal Coliform	1
2002	pH	1
2003	Fecal Coliform	1
2004	pH	4
2005	pH	1

Summary information and a process diagram for the treatment facility are provided in Appendix A.

III. RECEIVING WATER

Under the Alaska water quality standards at 18 AAC 70.020(a), the Tanana River is classified as protected for all uses, including drinking, agricultural, aquacultural, and industrial water supply; primary and secondary contact recreation; and growth and propagation of fish, shellfish, other aquatic life, and wildlife including water fowl and furbearers.

A. Low Flow Conditions

Flow information from the United States Geological Survey (USGS) was used to determine the flow conditions for the receiving water. The 1 day, 10 year low flow (1Q10) and the 7 day, 10 year low flow (7Q10) are used to do reasonable potential analyses and to calculate water quality based effluent limits (see Appendix C and Appendix D).

The 7-day low flow expected in a 10-year period (7Q10), measured for the Tanana River at Fairbanks (USGS gage 15485500: data evaluated from 1974 – 2006) is 4,288 cfs. The 1 day low flow expected in a 10 year period (1Q10) is 4,287 cfs. The 7Q10 and 1Q10 values are very similar because much of the low flow occurs during the winter months when the Tanana River is frozen over. It is difficult to accurately measure flows during these icy periods, and thus much of these data are estimated, which leads to minimal differences in the 7Q10 and 1Q10 calculations for the river. At the WWTP's maximum design flow of 0.5 mgd (0.774 cfs), the City of North Pole should receive an approximate dilution of 5,540:1 during low flow periods in the river.

B. Water Quality Standards

An NPDES permit must ensure that the discharge from the facility complies with the State water quality standards. A State's water quality standards are composed of use classifications, numeric and/or narrative water quality criteria, and an anti-degradation policy. The use classification system designates the beneficial uses (such as cold water biota, contact recreation, etc.) that each water body is expected to support. The numeric and/or narrative water quality criteria are the criteria deemed necessary, by the State, to support the beneficial use classification of each water body. The anti-degradation policy represents a three-tiered approach to maintain and protect various levels of water quality and uses.

C. Water Quality Limited Segments

Any water body for which the water quality does not and/or is not expected to meet applicable water quality standards is defined as a "water quality limited segment."

Section 303(d) of the Clean Water Act (CWA) requires states to develop a Total Maximum Daily Load (TMDL) management plan for water bodies determined to be water quality limited segments. The TMDL documents the amount of a pollutant a water body can assimilate without violating a state's water quality standards and allocates that load to known point sources and nonpoint sources. The allocations for point sources are then incorporated into the NPDES permit.

The Tanana River is on neither Alaska's 2004 impaired waters list nor on the proposed 2006 list. Therefore, we concluded that the Tanana River is not water quality limited.

IV. EFFLUENT LIMITATIONS

A. Basis for Permit Effluent Limits

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

NPDES regulation 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."

In general, the CWA requires that the limits for a particular pollutant be the more stringent of either technology-based effluent limits or water quality-based limits. Technology-based limits are set according to the level of treatment that is achievable using available technology. A water quality-based effluent limit is designed to ensure that the water quality standards of a water body are being met and they may be more stringent than technology-based effluent limits.

B. Proposed Effluent Limitations for Pollutants

The following summarizes the proposed effluent limitations that are in the draft permit. The basis for the proposed effluent limits in the draft permit is provided in Appendix B.

1. There must be no discharge of any pollutants that cause floating oil on the surface or produce discoloration or a film or visible sheen on the surface of the receiving water.

2. The discharge of chemicals in toxic amounts is prohibited pursuant to Section 101(a)(3) of the CWA and the Alaska water quality standards (18 AAC 70.020), which prohibits the discharge of toxic pollutants in amounts greater than those in the Alaska Water Quality Criteria Manual.

C. Proposed Effluent Limitation for Flow

The proposed limitation on discharge flow on 0.5 million gallons per day (MGD) as a daily maximum was one of the conditions imposed on the permit by ADEC in its pre-certification of this permit. In addition, ADEC certified the dissolved oxygen minimum limit.

Table 2 below presents the proposed effluent limitations.

Table 2 -- Effluent Limitations

Parameters	Average Monthly Limit	Average Weekly Limit	Average Monthly Minimum Removal	Daily Maximum Limit
BOD_5	30 mg/l	45 mg/l		60 mg/l
	125.1 lbs/day[1]	187.6 lbs/day[1]	85%[2]	250.2 lbs/day
TSS	30 mg/l	45 mg/l		60 mg/l
	125.1 lbs/day[1]	187.6 lbs/day[1]	85%[2]	250.2 lbs/day
pH	Between 6.0 and 8.5 standard units at all times			
Fecal coliform bacteria	200/100 ml		---	400/100 ml
Total Residual Chlorine	0.5 mg/l	0.75 mg/l	---	1.00 mg/l[3]
	2.1 lbs/day1	3.1 lbs/day1	--	4.2 lbs/day[1, 3]
Dissolved Oxygen	--	--	--	2.0 mg/l[4] minimum
Total Aqueous Hydrocarbons (TAqH)	--	--	--	15 µg/l[3]
Total Aromatic Hydrocarbons (TAH)	--	--	--	10 µg/l[3]
Discharge flow	--	--	--	0.5 MGD

Notes:
1 Loading (in lbs/day) = concentration (in mg/l) * concurrent flow (in mgd) * 8.34
2 Percent removal = (average monthly influent load – average monthly effluent load) / average monthly influent load.
3. Reporting is required within 24 hours of a maximum daily limit violation. See §§ I.B.1 and III.G of the permit.
4. The Dissolved oxygen limit is a minimum daily limit.

V. MONITORING REQUIREMENTS

A. Basis for Effluent and Surface Water Monitoring

Section 308 of the CWA and federal regulation 40 CFR §122.44(i) require monitoring in permits to determine compliance with effluent limitations. Monitoring may also be required

to gather effluent and surface water data to determine if additional effluent limitations are required and/or to monitor effluent impacts on receiving water quality. The permittee is responsible for conducting the monitoring and for reporting results on Discharge Monitoring Reports (DMRs) to the U.S. Environmental Protection Agency (EPA).

B. Effluent Monitoring

The draft permit requires monitoring of the effluent for BOD_5, TSS, fecal coliform, total residual chlorine, dissolved oxygen, total aqueous hydrocarbons, total aromatic hydrocarbons, and flow to determine compliance with the effluent limits; it also requires monitoring of the influent for BOD_5 and TSS to calculate average monthly removal rates for these parameters. At the request of ADEC, EPA reduced the monitoring for BOD_5 and TSS to twice per month, based on the low ratio of long term average values to the monthly average limits, in accordance with EPA's *Interim Guidance for Performance-based Reductions of NPDES Permit Monitoring Frequencies (April 19, 1996).*

In addition, the permit includes requirements to monitor the effluent for total ammonia as N in order to collect data to conduct a future reasonable potential analysis to determine if discharges of ammonia might cause an exceedance of the water quality standards in the receiving water. It also requires monitoring of whole effluent toxicity to help evaluate the toxicity of the effluent, given the amount of industrial flow into the treatment plant from industrial sources, including from petroleum refineries.

The permit requires influent and effluent monitoring for metals and hardness to meet requirements of the national pretreatment program. This data is needed in the development of local limits and the analysis of reasonable potential to exceed the water quality standards in the receiving water. During sampling reported in the most recent permit application, several of the pretreatment metals, including arsenic, chromium, copper, nickel, and selenium, were reported above method detection limits (MDLs). However, arsenic, chromium, and nickel did not approach the levels of the criteria. Copper and selenium were detected in the range of or above the criteria. Therefore, they are required to be monitored once per quarter in the influent and the effluent. The remaining pretreatment metals (cadmium, cyanide, lead, mercury, molybdenum, silver, zinc) were not reported above MDLs in the most recent permit application. Monitoring of the influent and effluent for these metals and for arsenic, nickel, and chromium will be required twice per year.

In addition, because of past discharges of sulfolane from the Flint Hills refinery that have caused enough interference with the operation of the publicly owned treatment works (POTW) to require increased aeration to keep effluent limits of BOD_5 within the required limits, we are requiring influent, internal, and effluent monitoring at the POTW for this parameter monthly and whenever the Flint Hills refinery reports that it is discharging sulfolane in concentrations above 100 mg/l.

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

Some of the monitoring is required to provide data that the permittee will need to submit with its next application for renewal of the permit at least 180 days before the expiration of this permit. In order to gather data representative of seasonal variations in the effluent parameters, the permit also requires that this sampling events for annual monitoring be conducted in different seasons as well as different years.

Table 3 presents the monitoring requirements in the draft permit. The sampling location must be after the last treatment unit and prior to discharge to the receiving water. If no discharge occurs during the reporting period, "no discharge" shall be reported on the DMR.

See notes at bottom of table on 3rd page.

Table 3 -- Effluent Monitoring Requirements

Parameter	Unit	Sample Location	Sample Frequency	Sample Type
Flow	mgd	Effluent	continuous	recording
BOD_5	mg/l	Influent and Effluent	2/month	Grab
TSS	mg/l	Influent and Effluent	2/month	Grab
pH	standard units	Effluent	5/week	grab
Fecal coliform bacteria	colonies/100 ml	Effluent	2/month	grab
Chlorine	mg/l	Effluent	5/week	grab
Dissolved Oxygen	mg/l	Effluent	1/week	grab
Total Ammonia as N	mg/l	Effluent	1/quarter	Grab
Oil & Grease	mg/l	Effluent	1/quarter	Grab
Arsenic[1]	mg/l	Influent and Effluent	2/year	Grab
Cadmium[1]	mg/l	Influent and Effluent	2/year	Grab
Chromium[1]	mg/l	Influent and Effluent	2/year	Grab

Table 3 -- Effluent Monitoring Requirements

Parameter	Unit	Sample Location	Sample Frequency	Sample Type
Copper[1]	mg/l	Influent and Effluent	1/quarter	Grab
Cyanide[1]	mg/l	Influent and Effluent	2/year	grab
Lead[1]	mg/l	Influent and Effluent	2/year	Grab
Mercury[1]	mg/l	Influent and Effluent	2/year	Grab
Molybdenum[1]	mg/l	Influent and Effluent	2/year	Grab
Nickel[1]	mg/l	Influent and Effluent	2/year	Grab
Selenium[1]	mg/l	Influent and Effluent	1/quarter	Grab
Silver[1]	mg/l	Influent and Effluent	2/year	Grab
Zinc[1]	mg/l	Influent and Effluent	2/year	Grab
Sulfolane[1]	mg/l	Effluent	1/month	Grab
Hardness (as $CaCO_3$)	mg/l	Effluent	1/quarter	Grab
Total Aqueous Hydrocarbons (TAqH)	µg/l	Effluent	2/month	grab
Total Aromatic Hydrocarbons (TAH)	µg/l	Effluent	2/month	grab
Form 2A §B6 Effluent Testing	mg/l	Effluent	3 in the 1st 4½ years[2]	Grab
Form 2A Expanded Effluent Testing	mg/l	Effluent	3 in the 1st 4½ years[3]	Grab
Form 2A Whole Effluent Toxicity	TU_c	Effluent	4 in the 1st 4½ years [4]	Grab

Table 3 -- Effluent Monitoring Requirements

Parameter	Unit	Sample Location	Sample Frequency	Sample Type

Notes:

1. Sampling for this pollutant is required under the pretreatment program; see additional requirements in §II.A.5 of the permit.
2. In accordance with instructions in NPDES Application Form 2A, Part B.6; each test must be conducted in a different calendar year and different season, including one each in winter (Dec-Feb), summer (Jun—Aug), and spring or fall (Mar-May or Sept-Nov)..
3. In accordance with instructions in NPDES Application Form 2A, Part D; each test is conducted in a different calendar year year and different season, including one each in winter (Dec-Feb), summer (Jun—Aug), and spring or fall (Mar-May or Sept-Nov)..
4. In accordance with instructions in NPDES Application Form 2A, Part E; each test must be conducted in a different calendar year and different season, including one each in winter (Dec-Feb), spring (Mar-May), summer (Jun—Aug), and fall (Sept-Nov).

C. Whole Effluent Toxicity

Federal regulations at 40 CFR §122.44(d)(1) require that permits contain limits on whole effluent toxicity when a discharge has reasonable potential to cause or contribute to an exceedance of a water quality standard for toxicity.

Whole effluent toxicity tests are laboratory tests that measure total toxic effect of an effluent on living organisms. Whole effluent toxicity tests use small vertebrate and invertebrate species and/or plants to measure the aggregate toxicity of an effluent. There are two different types of toxicity test: acute and chronic. Acute toxicity tests measure survival over a 96-hour exposure. Chronic tests measure reductions in survival, growth, and reproduction over a 7-day exposure.

The North Pole facility conducted acute and chronic whole effluent toxicity tests with *Ceriodaphnia dubia* (the water flea) and *Pimpehales promelas* (the fathead minnow) in September 2006. For the acute tests, 100 percent of the test organisms survived in each of the replicates, resulting in a LC_{50} value of >100 percent effluent (i.e., it would require solutions more concentrated than 100 percent effluent to cause mortality in 50 percent of the test organisms). For the chronic tests, the No Observable Effect Concentration (NOEC) was 100 percent effluent, and the inhibition concentration at which 25 percent of the organisms are inhibited was more concentrated than 100 percent effluent.

Because of its characteristics and industrial dischargers, the North Pole effluent continues to have a reasonable potential to cause or contribute to an exceedance of a water quality standard for toxicity. In addition, Form 2A of the NPDES Permit Application, which the permittee will need to submit at least 180 days before the expiration of this permit, requires toxicity testing

for POTWs that are required to have a pretreatment program. Development of a pretreatment program is being required in this permit. Therefore, the proposed permit requires whole effluent toxicity testing of the North Pole effluent. The North Pole facility will be required to conduct chronic whole effluent toxicity testing four times in the first four and one half years of the permit term. The dilution series for the testing is to include the following dilutions of the effluent: 8.8, 4.4, 2.2, 1.1, and 0.55 %. This series is derived from the mixing zone certified by ADEC for WET, which allows a dilution of 91:1, corresponding to a concentration of the whole effluent at the edge of the mixing zone of 1.1%. If the results of any of these tests show statistically significant toxicity at the dilution of 1.1% effluent, the facility must implement its Toxics Reduction Evaluation including additional testing.

D. Surface Water Monitoring

As a result of ADEC's precertification of this draft permit, the draft permit requires downstream surface water monitoring at the edge of the mixing zone certified by the State.

The chronic mixing zone is defined during summer conditions (June 1 through September 30) as the area extending downstream from the end of the outfall line with a length of 9 meters and a maximum width of 2 meters. The chronic mixing zone during winter conditions (October 1 through May 31) is defined as the area extending downstream from the end of the outfall line with a length of 267 meters and a maximum width of 4 meters.

Table 4 presents the proposed downstream surface water monitoring requirements for the draft permit. The permittee should work with the ADEC Northern Regional Office to establish the appropriate monitoring location.

Table 4 -- Surface Water Monitoring Requirements

Parameter	Units	Downstream Sampling Frequency
Fecal Coliform	#/100 ml	2/year[1]
Total Residual Chlorine	mg/l	2/year[1]
pH	S.U.	2/year[1]
Dissolved Oxygen	mg/l	2/year[1]

[1] Once in the summer (June – September) at the edge of the summer mixing zone described above, and once in the winter (October – May) at the edge of the winter mixing zone described above.

VI. SLUDGE (BIOSOLIDS) REQUIREMENTS

EPA Region 10 separates wastewater and sludge permitting. Under the CWA, EPA has the authority to issue separate sludge-only permits for the purposes of regulating biosolids. EPA may issue a sludge-only permit to each facility at a later date, as appropriate.

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

VII. OTHER PERMIT CONDITIONS

A. Quality Assurance Plan

The federal regulation at 40 CFR §122.41(e) requires the permittee to develop procedures to ensure that the monitoring data submitted is accurate and to explain data anomalies if they occur. The permittee is required to develop and implement a Quality Assurance Plan within 90 days of the effective date of the final permit. The Quality Assurance Plan shall consist of standard operating procedures the permittee must follow for collecting, handling, storing and shipping samples, laboratory analysis, and data reporting. The plan shall be retained on site and made available to EPA and ADEC upon request.

B. Operation and Maintenance Plan

The permit requires the permittee to properly operate and maintain all facilities and systems of treatment and control. Proper operation and maintenance is essential to meeting discharge limits, monitoring requirements, and all other permit requirements at all times. Each permittee is required to develop and implement an operation and maintenance plan for its facility within 180 days of the effective date of the final permit. The plan shall be retained on site and made available to EPA and ADEC upon request.

C. Additional Permit Provisions

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

D. Pretreatment Program

The City of North Pole receives discharges to its sewer system from three industrial users—the Flint Hills refinery, the Petrostar refinery, and Golden Valley Electric Association steam electric power generating facility—each of which is subject to federal categorical standards. At times in the past, excess discharges of Sulfolane from the Flint Hills refinery have caused enough interference with the operation of the publicly owned treatment works (POTW) to require increased aeration to keep effluent limits of BOD_5 within the required limits.

Because of the possibility of interference and the presence of three categorical industrial users discharging into a relatively small POTW, EPA has determined that the City of North Pole must develop and implement an Industrial Pretreatment Program that enables the permittee to detect and enforce against violations of federal, state, and local standards for the protection of the wastewater treatment works, its operation, worker health and safety, and the aquatic environment in the receiving water. This program is required under the authority of Section 307 (b) and (c) and Section 402 (b)(8) of the Clean Water Act, and federal regulations at 40 CFR 403, the General Pretreatment Regulations for existing and New Sources of Pollution. Monitoring of the influent and effluent for the POTW is required to support the development of local limits for the pretreatment program.

Until and unless the State of Alaska becomes the approval authority, following EPA delegation of the NPDES program, including pretreatment, the permittee must submit all documents required for the Industrial Pretreatment Program to the EPA.

VIII. OTHER LEGAL REQUIREMENTS

A. Endangered Species Act

The Endangered Species Act requires federal agencies to consult with the NOAA Fisheries and the U.S. Fish and Wildlife Service (USFWS) if their actions could beneficially or adversely affect any threatened or endangered species. Both NOAA Fisheries (Smith, 2006) and USFWS (Swem, 2006) have indicated that there are no endangered or threatened species nor critical habitat in the area of the discharge. EPA has determined that the discharge from the City of North Pole **will have no effect** any threatened or endangered species in the vicinity of the discharge; therefore, consultation is not required for this action.

B. Essential Fish Habitat

Essential fish habitat (EFH) includes the waters and substrate (sediments, etc.) necessary for fish to spawn, breed, feed, or grow to maturity. The Magnuson-Stevens Fishery Conservation and Management Act (January 21, 1999) requires EPA to consult with the NOAA Fisheries when a proposed discharge has the potential to adversely affect (reduce quality and/or quantity of) EFH. The EPA has determined that the issuance of this permit **will have no**

effect on EFH species (chinook, coho, and chum salmon) in the vicinity of the discharge, since the mixing zones in which chlorine and fecal coliform may exceed the water quality criteria for protection of aquatic life are relatively small compared to the total flow of the Tanana River, an approximate dilution of 5,540:1 during low flow periods in the river. The greatest width of the mixing zone is 4 feet, while the minimum width of the river is 70 feet. Therefore, there is ample room for fish to migrate around the mixing zones for chlorine and for fecal coliform. Also, spawning usually occurs in tributaries rather than in the main stem of the Tanana River. Therefore, consultation with NMFS is not required for this action.

C. State Certification

Section 401 of the CWA requires EPA to seek State certification before issuing a final permit. As a result of the certification, the State may require more stringent permit conditions or additional monitoring requirements to ensure that the permit complies with water quality standards. On July 30, 2007, EPA received from ADEC pre-certification of the draft permit; most of the applicable provisions of that certification are noted elsewhere in this fact sheet.

One additional requirement in the State's pre-certification was the placement of a sign or signs on the shoreline near the mixing zone and outfall line stating that treated domestic wastewater is being discharged, the name and owner of the facility, as well as a phone number, and the approximate location and size of the mixing zone(s). The sign should state that certain activities, such as the harvesting of aquatic life for raw consumption should not take place in the mixing zone.

D. Permit Expiration

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

IX. REFERENCES

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EPA. 1999. NPDES Form 2A Application Overview, EPA Form 3510-2A (Rev. 1-99) OMB Number 2040-0086. http://www.epa.gov/npdes/pubs/final2a.pdf

Klingman, Marie. 2007. *E-mail to Sharon Wilson, EPA; ADEC, 4/25/07*

Klingman, Marie. July 30, 2007. Letter to Sharon Wilson, EPA: Preliminary Certificate of Reasonable Assurance for NPDES Permit No. AK-002139-3, City of North Pole, North Pole Wastewater Treatment Facility.

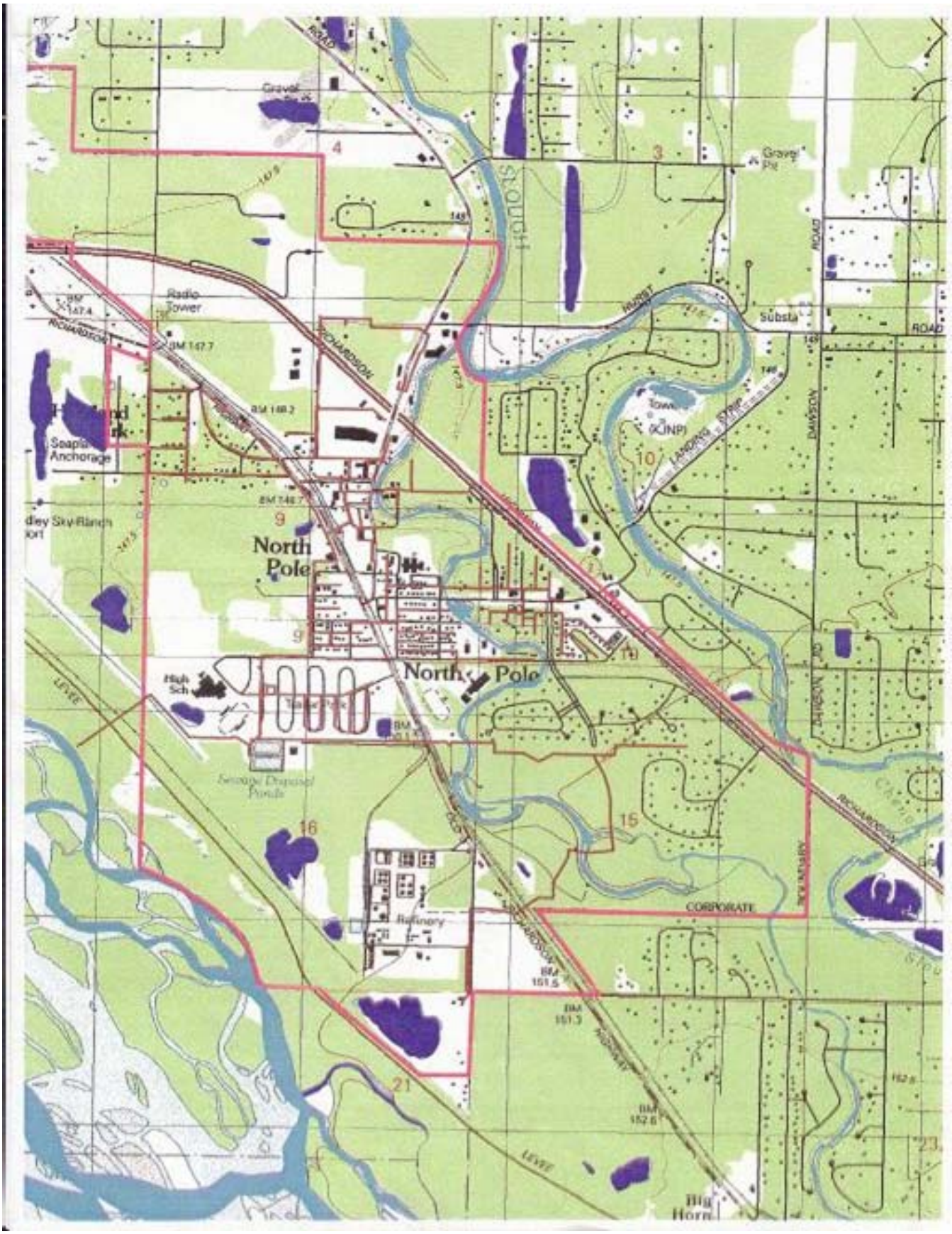
Smith, Brad. 2006. *E-mail to Sharon Wilson, EPA; NOAA Fisheries, 10/13/06.*

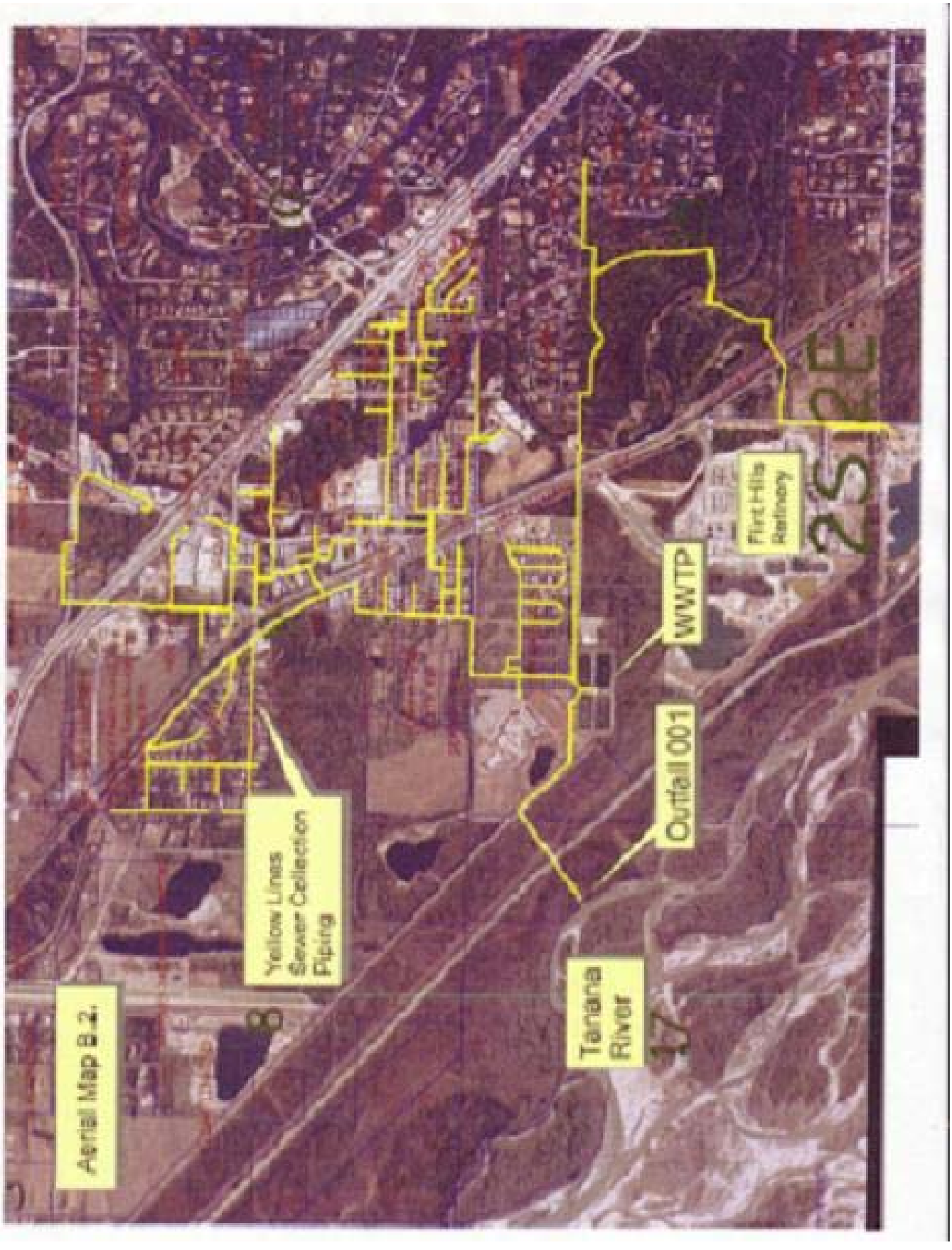
Swem, Ted. 2006. *Letter to Sharon Wilson, EPA; USFWS, 10/19/06.*

Water Pollution Control Federation. *Chlorination of Wastewater.* 1976.

Appendix A - Facility Information

Facility Information	
Facility Name	City of North Pole
NPDES ID Number:	AK-002139-3
Mailing Address: Facility Location:	125 Snowman Lane North Pole, AK 99705 961 Shellinger Street North Pole, AK 99705
Permit Background:	The facility's existing permit became effective May 31, 1988. The current permit application was received in November 2006.
Collection System Information	
Service Area:	City of North Pole
Service Area Population:	1700
Collection System Type:	100% separated sanitary sewer
Facility Information	
Treatment Train:	Lagoon system and chlorine disinfection
Design Flow:	0.5 mgd
Existing Flow:	0.257 mgd (average daily for 2006)
Months when Discharge Occurs:	Continuous throughout the year
Outfall Location:	Latitude: 64° 44' 38.042", longitude: 147° 22' 57.463"
Receiving Water Information	
Receiving Water:	Tanana River
Subbasin:	Tanana Flats (HUC 19040507)
Beneficial Uses:	Drinking, agricultural, aquacultural, and industrial water supply; primary and secondary contact recreation; and growth and propagation of fish, shellfish, other aquatic life, and wildlife including water fowl and furbearers.
Water Quality Limited Segment:	No
Low Flow:	1Q10 = 4,287 cfs (2771 mgd); 7Q10 = 4,288 cfs (2772 mgd)


North Pole
North Pole
Radio Tower
Substa
Gravel Pit
Gravel Pit
Seaplane Anchorage
High Sch
Refinery
Sewage Disposal Ponds
CORPORATE
LEVEE
LEVEE
RICHARDSON
RICHARDSON
DAVISON
DAVISON
ROAD
ROAD
HARRIS
LANDING STRIP
Big Horn


Aerial Map B.2.
Yellow Lines
Sewer Collection
Piping
Tanana
River
Outfall 001
WWTP
Flint Hills
Refinery
2S
2E
17
8

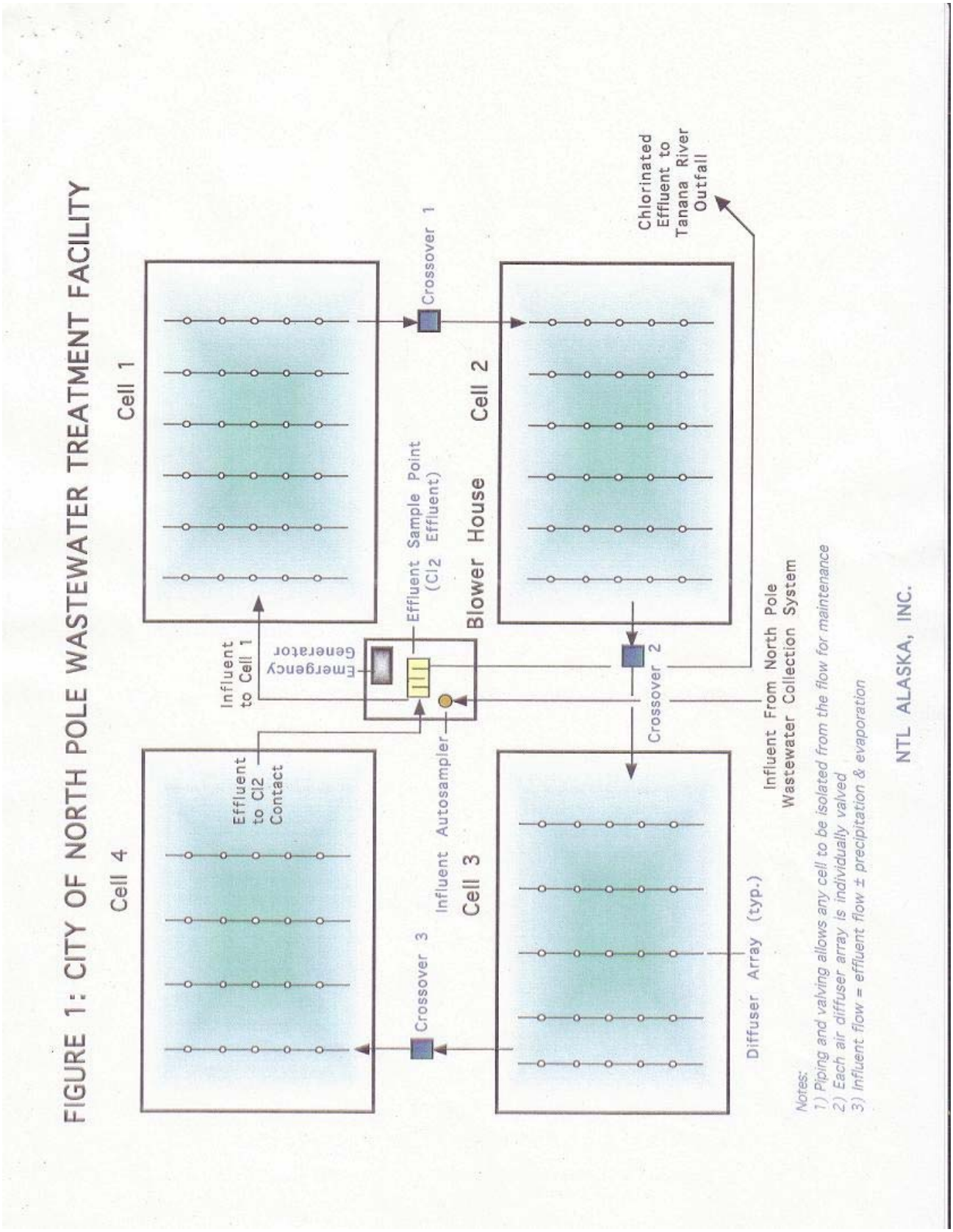


FIGURE 1: CITY OF NORTH POLE WASTEWATER TREATMENT FACILITY
Cell 1
Cell 2
Cell 3
Cell 4
Blower House
Crossover 1
Crossover 2
Crossover 3
Chlorinated Effluent to Tanana River Outfall
Effluent Sample Point (Cl2 Effluent)
Influent to Cell 1
Emergency Generator
Influent Autosampler
Effluent to Cl2 Contact
Influent From North Pole Wastewater Collection System
Diffuser Array (typ.)
Notes:
1) Piping and valving allows any cell to be isolated from the flow for maintenance
2) Each air diffuser array is individually valved
3) Influent flow = effluent flow ± precipitation & evaporation
NTL ALASKA, INC.

Appendix B - Basis for Effluent Limitations

Effluent limitations were summarized in Section IV of this fact sheet. The following explanation gives more detail the statutory and regulatory basis for the technology-based and water quality-based effluent limits in the draft permit. Part A discusses technology-based effluent limits (TBELs), Part B discusses water quality-based effluent limits (WQBELs), and Part C compares the two and gives the reasoning behind the choice of those proposed in the permit.

The Clean Water Act (CWA) requires Publicly Owned Treatment Works (POTWs) to meet effluent limits based on available wastewater treatment technology. These types of effluent limits are called secondary treatment effluent limits. EPA may find, by analyzing the effect of an effluent discharge on the receiving water, that secondary treatment effluent limits are not sufficiently stringent to meet water quality standards. In such cases, EPA is required to develop more stringent water quality-based effluent limits, which are designed to ensure that the water quality standards of the receiving water are met.

Secondary treatment effluent limits may not limit every parameter that is in an effluent. For example, secondary treatment effluent limits for POTWs have only been developed for five-day biochemical oxygen demand (BOD_5), total suspended solids (TSS), and pH, yet effluent from a POTW may contain other pollutants such as bacteria, chlorine, ammonia, or metals depending on the type of treatment system used and the type of influent to the POTW (i.e., industrial facilities as well as residential areas discharge into the POTW). When technology based effluent limits do not exist for a particular pollutant expected to be in the effluent, EPA must determine if the pollutant may cause or contribute to an exceedance of the water quality standards for the water body (reasonable potential analysis). If a pollutant may cause or contribute to an exceedance of a water quality standard, water quality-based effluent limits for the pollutant must be incorporated into the permit.

A. Technology Based Effluent Limits

1. BOD_5, TSS and pH

Secondary Treatment:

The CWA requires that POTWs meet performance-based requirements based on available wastewater treatment technology. Section 301 of the CWA established a required performance level, referred to as "secondary treatment," that all POTWs were required to meet by July 1, 1977. EPA developed "secondary treatment" regulations, which are specified in 40 CFR §133. These technology-based effluent limits for average monthly and average weekly limits apply to all municipal wastewater treatment plants, and identify the minimum level of effluent quality attainable by secondary treatment in terms of BOD_5, TSS, and pH. In addition, the Alaska state regulations at 18 AAC §72.990 (59) define secondary

treatment similarly, but add the limit of 60 mg/l for the arithmetic mean of all samples for BOD_5 and TSS collected in a 24-hour period. These limits are added as the maximum daily limits for these pollutants. ADEC also pre-certified the pH limits of 6.0 to 9.0. The secondary treatment effluent limits are listed in Table B-1.

Table B-1 -- Secondary Treatment Effluent Limits

Parameter	Average Monthly Limit	Average Weekly Limit	Maximum Daily Limit	Average Monthly Minimum Removal
BOD_5	30 mg/l	45 mg/l	60 mg/l	85%
TSS	30 mg/l	45 mg/l	60 mg/l	85%
pH	6.0 – 9.0 s.u. at all times			

Evaluation for Alternative Limits

The past five years of monitoring data were examined to determine if the data justified any alternative limits for BOD_5 and TSS (such as treatment equivalent to secondary limits or reduced percent removal requirements). However, the facility has been achieving the secondary treatment limits, and so these were retained as the TBELs for this permit.

2. Total Residual Chlorine

Using best professional judgment, a technology-based average monthly chlorine effluent limitation of 0.5 mg/l for wastewater treatment plants is derived from standard operating practices. The Water Pollution Control Federation's *Chlorination of Wastewater (1976)* states that a properly designed and maintained wastewater treatment plant can achieve adequate disinfection if a chlorine residual of 0.5 mg/l is maintained after 15 minutes of contact time. Therefore, a treatment plant that provides adequate chlorination contact time can be expected meet an average monthly chlorine limit of 0.5 mg/l. Under 40 CFR §122.45(d), limits for POTWs should be average monthly and average weekly limits unless impracticable. Following the precedent of AWLs being 1.5 times the AML, which is set by the secondary treatment standards at 40 CFR §133 for BOD_5 and TSS, the AWL for chlorine is derived as follows:

$$AWL = 0.5 \text{ mg/l} \times 1.5 = 0.75 \text{ mg/l}.$$

In its pre-certification of this permit, ADEC certified a maximum daily limit technology-based limit of 1.0 mg/l.

3. Fecal Coliform

Alaska regulations at 18 AAC 72.990(21) define "disinfect" as "to treat by means of a chemical, physical, or other process, such as chlorination, ozonation, application of ultraviolet light, or sterilization, designed to eliminate pathogenic organisms, and producing an effluent with the following characteristics: (A) an arithmetic mean of the values for a minimum of five effluent samples collected in 30 consecutive days that does not exceed 200 fecal coliform per 100 milliliters; and (B) an arithmetic mean of the values for effluent samples collected in seven consecutive days that does not exceed 400 fecal coliform per 100 milliliters." Since these limits are dependent on the use of specific technological processes, under best professional judgment, we apply these limits as the technology-based limit.

In its pre-certification of this permit, ADEC specified *"that the number of fecal coliform bacteria in the secondary treated effluent discharged from the North Pole Wastewater Treatment Facility shall not exceed a 30 day geometric mean of 200 per 100 milliliters of sample, a weekly average of 400 per 100 milliliters of sample, and the daily maximum shall not exceed 800 per 100 milliliters of sample."* Since these limits are derived from the technological capability of similar facilities and coincide with the limits in the 18 AAC 72.990(21), these limits are used as the technology-based limits.

B. Water Quality-Based Effluent Limits

1. Statutory Basis for Water Quality-Based Limits

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

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

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

in an approved Total Maximum Daily Load.

2. Reasonable Potential Analysis

When evaluating the effluent to determine if water quality-based effluent limits are needed based on chemical specific numeric criteria, when enough data exists, EPA projects the receiving water concentration (downstream of where the effluent enters the receiving water) for each pollutant of concern. The chemical specific concentration of the effluent and receiving water and, if appropriate, the dilution available from the receiving water are factors used to project the receiving water concentration. If the projected concentration of the receiving water exceeds the numeric criterion for a specific chemical, then there is a reasonable potential that the discharge may cause or contribute to an excursion above the applicable water quality standard. In such cases, a water quality-based effluent limit must be developed.

Sometimes it is appropriate to allow a small area of receiving water to provide dilution of the effluent; these areas are called mixing zones. Mixing zone allowances will allow greater mass loadings of the pollutant to the water body and decrease treatment requirements for the discharger. Mixing zones can be used only when there is adequate receiving water flow volume and the level of the pollutant in the receiving water is below the chemical specific numeric criterion necessary to protect the designated uses of the water body. Mixing zones must be authorized by ADEC.

3. Procedure for Deriving Water Quality-Based Effluent Limits

The first step in developing a water quality based permit limit is to develop a wasteload allocation (WLA) for the pollutant. A wasteload allocation is the concentration or loading of a pollutant that the permittee may discharge without causing or contributing to an exceedance of water quality standards or a total maximum daily load in the receiving water. If a mixing zone is provided by the state, this requirement applies at all points outside the mixing zone.

In its pre-certification of this permit, ADEC specified a mixing zone of 91 to 1 for fecal coliform bacteria, dissolved oxygen, pH, total chlorine, metals, nutrients, temperature, and whole effluent toxicity.[1] The chronic mixing zone is defined during summer conditions (June 1 through September 30) as the area extending downstream from the end of the outfall line with a length of 9 meters and a maximum width of 2 meters.

The chronic mixing zone for this discharge during winter conditions (October 1 through May 31) has a dilution of 91:1 and is defined as the area extending downstream from

[1] Letter from Marie Klingman (ADEC) to Sharon Wilson (EPA), 7/30/07.

the end of the outfall line with a length of 267 meters and a maximum width of 4 meters.

In cases where a mixing zone is not authorized, either because the receiving water already exceeds the standard, the receiving water flow is too low to provide dilution, or the state or tribe does not authorize one, the criterion becomes the WLA. Establishing the standard as the wasteload allocation ensures that the permittee will not contribute to an exceedance of the standard.

Alaska Water Quality Standards 18 AAC 70.020(a) designate classes of waters for beneficial uses of water supply, of water recreation, and of growth and propagation of fish, shellfish, other aquatic life, and wildlife. Because the Tanana River is protected for all uses, the North Pole WWTP must adhere to the most stringent of the standards for these designated uses.

4. Specific Water Quality-Based Effluent Limits

a. Toxic Substances

The discharge of chemicals in toxic amounts is prohibited pursuant to Section 101(a)(3) of the CWA and the Alaska water quality standards at 18 AAC 70.020(b)(11)(C), which states that in fresh waters, "the concentration of substances in water may not exceed the criteria shown in Table III and in Table V, column B of the *Alaska Water Quality Criteria Manual*, or any chronic and acute criteria established in this chapter, for a toxic pollutant of concern to protect sensitive and biologically important life stages of resident species of this state. There may be no concentrations of toxic substances in water or in shoreline or bottom sediments, that, singly or in combination, cause, or reasonably can be expected to cause, adverse effects on aquatic life or produce undesirable or nuisance aquatic life, except as authorized by this chapter. Substances may not be present in concentrations that individually or in combination impart undesirable odor or taste to fish or other aquatic organisms, as determined by either bioassay or organoleptic tests."

Since metals and other pollutants that could cause toxicity have previously been reported in the facility's effluent, as well as in the industrial dischargers' pretreated effluent to the facility, it is anticipated that toxicity may be a problem in the facility's effluent. However, because there is insufficient data to conduct a reasonable potential analysis, we cannot determine if limits are actually needed. Therefore, effluent monitoring for metals and ammonia has been proposed for the draft permit. In addition, we are proposing to require Whole Effluent Toxicity (WET) monitoring to evaluate the facility's effluent. Collection of the effluent data will give us the information needed to conduct a reasonable potential analysis in the next permit cycle.

b. Floating, Suspended or Submerged Matter, including Oil and Grease

For floating, suspended or submerged matter, including oil and grease, the standards are narrative; the most stringent standards, at 18 AAC 70.020(b)(8)(A)(i), require that fresh waters, "may not, alone or in combination with other substances or wastes, make the water unfit or unsafe for the use; cause a film, sheen, or discoloration on the surface of the water or adjoining shorelines; cause leaching of toxic or deleterious substances; or cause a sludge, solid, or emulsion to be deposited beneath or upon the surface of the water, within the water column, on the bottom, or upon adjoining shorelines."

Since oil and grease have previously been reported in the facility's effluent, it is anticipated that suspended or submerged matter, including oil and grease could be a problem in the facility's effluent. Therefore, effluent monitoring for oil and grease is proposed for the draft permit.

c. pH

The standards for water supply, aquaculture, water contact recreation, and growth and propagation of fish, shellfish, other aquatic life, and wildlife are the most stringent standards for pH. These standards state that fresh waters, "may not be less than 6.5 or greater than 8.5. May not vary more than 0.5 pH unit from natural conditions." In its pre-certification of this permit, ADEC provided a mixing zone with a dilution of 91:1. However, without information on the pH and buffering capacity of the receiving water, we cannot calculate pH at the edge of the mixing zone. Therefore, we are applying the certified end-of-pipe limits of pH between 6.0 and 9.0, which are identical to the technology-based limits in the secondary treatment standards..

d. Dissolved Oxygen (DO)

The standards for agricultural water supply are the most stringent standards for dissolved oxygen (DO). The standards at 18 AAC 70.020(b)(3)(A)(iii) require that "DO must be greater than 7 mg/l in surface waters; the concentration of total dissolved gas may not exceed 110% of saturation at any point of sample collection."; those at 18 AAC 70.020(b)(3)(C) require that "DO must be greater than 7 mg/l in waters used by anadromous or resident fish. In no case may DO be less than 5 mg/l to a depth of 20 cm in the interstitial waters of gravel used by anadromous or resident fish for spawning. For waters not used by anadromous or resident fish, DO must be greater than or equal to 5 mg/l. In no case may DO be greater than 17 mg/l. The concentration of total dissolved gas may not exceed 110% of saturation at any point of sample collection." There is no data available to indicate that there is a DO problem in the Tanana River. However, in its pre-certification of this draft permit, ADEC certified to a minimum daily effluent limit of 2.0 mg/l DO. .

e. Fecal Coliform Bacteria

The Alaska water quality standards at 18 AAC §70.020(b)(2) for waters designated for use as water supply for drinking, culinary, and food processing purposes are the most stringent standards for fecal coliform bacteria. They require that in a 30-day period, the geometric mean of samples may not exceed 20 fecal coliforms/100mL, and not more than 10 percent of the total samples may exceed 40 fecal coliforms/100 mL. See §C.3, below, for further discussion of this pollutant.

ADEC has specified in its pre-certification of this permit that "*Fecal Coliform limits(!) at all points outside of the mixing zone shall not exceed a 30 day geometric mean of 20 colony forming units per 100 milliliters of sample, and the daily maximum shall not exceed 40 colony forming units per 100 milliliters of sample.*"

Applying the mixing zone dilution allowed of 91:1 to the 20/100 mL and 40/100 mL standards at the edge of the mixing zone, the 30 day limit at end of pipe would be 1820 FC/100 ml and the MDL would be 3640 FC/100 ml.

f. Total Residual Chlorine

The most stringent state water quality for total residual chlorine to protect designated uses requires that concentrations may not exceed 19 µg/L for acute aquatic life and 11.0 µg/L for chronic aquatic life [18AAC 70.020(b)(11)(c)]. In its pre-certification of this permit, ADEC authorized a mixing zone with a dilution factor of 91:1 for meeting chronic and acute chlorine criteria. The reasonable potential analysis in Appendix C, below, takes into account these dilution factors. Based on the water quality standards of 19 µg/L for protection from acute effects on aquatic life and 11 µg/L for protection from chronic effects on aquatic life and on a maximum projected effluent concentration of 4.98 mg/l, it indicates that total residual chlorine has reasonable potential to violate water Alaska quality standards at the edge of the allowed mixing zone. The calculation of the water quality based effluent limit for chlorine, detailed in Appendix D, produces an average monthly limit of 0.63 mg/l and a maximum daily limit of 1.69 mg/l. See §C.4, below, for further discussion of this pollutant.

g. Total Aqueous Hydrocarbons (TAqH) and Total Aromatic Hydrocarbons (TAH)

In the previous permit, monitoring for benzene, ethylbenzene, toluene, and xylene (BTEX) was required twice per month, but no limit for these parameters was imposed.

In its pre-certification of this draft permit, ADEC requested that the BTEX sampling be replaced with maximum daily limits and sampling twice a month for total aqueous hydrocarbons (TAqHs) (MDL =15 µg/l) and total aromatic hydrocarbons (TAHs) (MDL=10 µg/l). These limits and sampling frequency are proposed in the draft permit.

C. Selection of Most Stringent Limits

1. Total Suspended Solids and BOD_5

Since there are only technology-based limits proposed for these two pollutants, those are included in the draft permit.

2. pH

In the absence of a calculated water quality based limit based on the dilution allowed in the state-certified mixing zone, the technology-based limits are chosen.

3. Fecal Coliform Bacteria

The technology-based limits and water-quality based limits are compared and the most stringent chosen to apply in the permit.

Table B-2
Selection of Fecal Coliform Permit Limits

	Average Monthly (#/100 ml)	Average Weekly (#/100 ml)	Maximum Daily (#/100 ml)
Technology Based limits	200	400	800
Water Quality based limits	1820	--	3640
Selected Limits	**200**	**400**	**800**

4. Total Residual Chlorine

The technology-based limits and water-quality based limits are compared and the most stringent chosen to apply in the permit.

Table B-3
Selection of Chlorine Permit Limits

	Average Monthly	Average Weekly	Maximum Daily
Technology Based limits	0.5 mg/l	0.75 mg/l	1.0 mg/l
Water Quality based limits	0.63 mg/l	--	1.69 mg/l
Selected Limits	**0.5 mg/l**	**0.75 mg/l**	**1.0 mg/l**

5. Total Aqueous Hydrocarbons (TAqH) and Total Aromatic Hydrocarbons (TAH)

There are no technology-based limits for these pollutants, so the water-quality based maximum daily limits, requested by ADEC are applied in the draft permit.

Table B-4

Total Aqueous Hydrocarbon and Total Aromatic Hydrocarbon Permit Limits

	Maximum Daily
TAqH	**15 µg/l**
TAH	**10 µg/l**

D. Anti-backsliding

1. Anti-backsliding requirements in Section 402(o) of the CWA and of 40 CFR §122.44(l)(1) prohibit relaxation of effluent limitations in a prior NPDES permit except in the following cases:

   a. There have been material and substantial alterations or additions to the permitted facility which justify the relaxation;

   b. New information (other than revised regulations, guidance, or test methods) is available that was not available at the time of permit issuance which would have justified a less stringent effluent limitation;

   c. Technical mistakes or mistaken interpretations of the law were made in issuing the permit under Section 402(a)(1)(b);

   d. Good cause exists due to events beyond the permittee's control (e.g.,acts of God) and for which there is no reasonably available remedy;

   e. The permit has been modified under 40 CFR §122.62, or a variance has been granted; or

   f. The permittee has installed and properly operated and maintained required treatment facilities but still has been unable to meet the permit limitations (relaxation may only be allowed to the treatment levels actually achieved).

2. Prior Permit Limits – EPA has determined that none of the exceptions listed in §D.1, above, apply. Therefore, the prior NPDES limits are compared with the

selected limits. Prior limits are the same as the technology-based limits for the monthly average and weekly average limits; they are less than the water quality based daily maximum limit allowed by the state in its pre-certification of this permit. Therefore, the prior limit of 800 FC/100 ml. is chosen as the daily maximum limit.

Table B-5

Comparison of Prior Permit Limits and Proposed Limits

Pollutant	Type of limit	Prior Limits	Proposed Limits	Most Stringent Limits
BOD_5	AML	30 mg/l	30 mg/l	**30 mg/l**
	AWL	45 mg/l	45 mg/l	**45 mg/l**
	MDL	60 mg/l	60 mg/l	**60 mg/l**
	% removal	≥85% mo. avg.	≥85 % mo. avg.	**≥85% mo. avg.**
TSS	AML	70 mg/l	30 mg/l	**30 mg/l**
	AWL	--	45 mg/l	**45 mg/l**
	MDL	--	60 mg/l	**60 mg/l**
	% removal	--	≥85% mo. avg.	**≥85% mo. avg.**
Total Residual Chlorine	AML	--	0.5 mg/l	**0.5 mg/l**
	AWL	--	0.75 mg/l	**0.75 mg/l**
	MDL	2.0 mg/l	1.0 mg/l	**1.0 mg/l**
Fecal Coliform	AML	200/100 ml[2]	200/100 ml[3]	**200/100 ml[4]**
	AWL	400/100 ml	400/100 ml	**400/100 ml**
	MDL	800/100 ml	800/100 ml	**800/100 ml**
pH	Min/Max	6.0/8.5	6.0/9.0	**6.0/8.5**

[2] Monthly average limit.
[3] The proposed monthly limit is based on a 30 day geometric mean.
[4] Because the geometric mean is higher (less stringent) than the monthly average in all cases except when all the data points are equal, the monthly average is deemed to be the more stringent limit.

E. Mass-based Limits

The federal regulation at 40 CFR §122.45 (f) requires BOD_5, TSS, and chlorine limitations to be expressed as mass based limits using the design flow of the facility. The mass based limits are expressed in lbs/day and are calculated as follows:

Mass limit (lbs/day) = concentration limit (mg/l) x design flow (mgd) x 8.34 (Equation B-2)

Using a design flow of 0.5 million gallons per day for the City of North Pole treatment plant, the following mass limits are derived from the corresponding concentration based limits.

Table B-6

Derivation of Mass Based Limits

Pollutant		Concentration limit	Mass Limit
BOD_5	average monthly	30 mg/l	125.1 lbs/day
	average weekly	45 mg/l	187.6 lbs/day
	maximum daily	60 mg/l	250.2 lbs/day
TSS	average monthly	30 mg/l	125.1 lbs/day
	average weekly	45 mg/l	187.6 lbs/day
	maximum daily	60 mg/l	250.2 lbs/day
Total Residual Chlorine – average monthly		0.5 mg/l	2.1 lbs/day
	average weekly	0.75 mg/l	3.1 lbs/day
	maximum daily	1.0 mg/l	4.2 lbs/day

Appendix C -- Reasonable Potential Determination For Total Residual Chlorine

This section describes the process EPA has used to determine if the discharge from North Pole's WWTP has the reasonable potential to cause or contribute to a violation of Alaska's federally approved water quality standards. EPA uses the process described in the *Technical Support Document for Water Quality-based Toxics Control* (EPA, 1991) to determine reasonable potential.

To determine if there is reasonable potential for the discharge to cause or contribute to an exceedance of water quality criteria for a given pollutant, EPA compares the maximum projected receiving water concentration to the criteria for that pollutant. If the projected receiving water concentration exceeds the criteria, there is reasonable potential, and a water quality-based effluent limit must be included in the permit [40 CFR §122.44(d)(1)(i)]. This section discusses how the maximum projected receiving water concentration is determined.

Maximum Projected Effluent Concentration

To calculate the maximum projected effluent concentration, EPA used the procedure described in section 3.3 of the TSD, "*Determining the Need for Permit Limits with Effluent Monitoring Data*." In this procedure, the 99th percentile of the effluent data is the maximum projected effluent concentration which is used in the calculation of the maximum projected receiving water concentration.

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

Using the equations in Section 3.3.2 of the TSD, the reasonable potential multiplier (RPM) for chlorine is calculated as follows.

The percentile represented by the highest reported concentration is calculated.

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

where,

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

The data set contains 64 chlorine effluent samples; therefore:

$p_{64} = (1\text{-}0.99)^{1/64}$
$p_{64} = 0.9306$

This means that we can say, with 99% confidence that the maximum reported effluent chlorine concentration is greater than the 93rd percentile.

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

$RPM = C_{99}/C_p$ (Equation C-2)

Where,

$C = \exp(z\sigma - 0.5\sigma^2)$ (Equation C-3)

Where,

$\sigma^2 = \ln(CV^2 + 1)$ (Equation C-4)

$\sigma = \sqrt{\sigma^2}$

CV = coefficient of variation = standard deviation ÷ mean

z = the inverse of the normal cumulative distribution function at a given percentile

In the case of chlorine:

CV = coefficient of variation = 0.6615
$\sigma^2 = \ln(CV^2 + 1) = 0.3630$
$\sigma = \sqrt{\sigma^2} = 0.6025$

$z_{.99} = 2.326$ for the 99th percentile
$z_{.9306} = 1.480$ for the 93.06 percentile (from z-table)

$C_{99} = \exp(2.326 \times 0.6025 - 0.5 \times 0.3630) = 3.387$
$C_{93.06} = \exp(1.480 \times 0.6025 - 0.5 \times 0.3630) = 2.034$

$RPM = C_{99}/C_{93.06} = 3.387/2.034$
RPM = 1.66

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

$C_e = (RPM) \times (MRC)$ (Equation C-5)

where MRC = Maximum Reported Concentration

In the case of chlorine,

C_e = (1.66)(3.0 mg/l) = **4.98 mg/l** (maximum predicted effluent concentration)

Determination of Maximum Projected Receiving Water Concentration

For discharges to flowing water bodies, the maximum projected receiving water concentration is determined using a steady state model represented by the following mass balance equation:

$$C_dQ_d = C_eQ_e + C_uQ_u \qquad \text{(Equation C-6)}$$

where,

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

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

$$C_d = \frac{C_eQ_e + C_uQ_u}{Q_e + Q_u} \qquad \text{(Equation C-7)}$$

The above form of the equation is based on the assumption that the discharge is rapidly and completely mixed with the receiving stream. If a mixing zone based on a percentage of the critical flow in the receiving stream is allowed based on the assumption of incomplete mixing with the receiving water, the equation becomes:

$$C_d = \frac{C_eQ_e + C_u(Q_u \times MZ)}{Q_e + (Q_u \times MZ)} \qquad \text{(Equation C-8)}$$

where MZ is the fraction of the receiving water flow available for dilution. Where mixing is rapid and complete, MZ is equal to 1 and equation D-2 is equal to equation D-3 (i.e., all of the critical low flow volume is available for mixing)

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

$$C_d = C_e \qquad \text{(Equation C-9)}$$

In other words, if a mixing zone is not allowed (either because the stream already exceeds water quality standards or the State does not allow one), EPA considers only the concentration of the pollutant in the effluent regardless of the upstream flow and concentration. If the concentration of the pollutant in the effluent is less than the water quality standard, the discharge cannot cause or contribute to a water quality violation for that pollutant. In this case the mixing or dilution factor (%MZ) is equal to zero and the mass balance equation is simplified to $C_d = C_e$.

Equation C-7 can be simplified by introducing a "dilution factor,"

$$D = \frac{Q_e + Q_u}{Q_e} \qquad \text{(Equation C-10)}$$

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

$$C_d = \frac{C_e - C_u}{D} + C_u \qquad \text{(Equation C-11)}$$

Equation D-6 is the form of the mass balance equation which was used to determine reasonable potential and calculate wasteload allocations for the North Pole WWTP.

Mixing Zones

The CWA allows mixing zones (or zones of dilution in the receiving water body) at the discretion of the State when its water quality standards allow them. Only the State can authorize a mixing zone, which is an allocated impact zone where the water quality criteria can be exceeded, as long as acutely toxic conditions are prevented. The State of Alaska water quality standards allow the exceedance of water quality criteria within a mixing zone authorized by ADEC when the receiving water quality meets or exceeds State water quality standards (18 AAC §70.240). The allowed mixing zone must not impair designated uses or the integrity of the water body as a whole, must not allow lethality to passing organisms, and must be as small as practicable. Mixing zones are only available for WQBELs and cannot be authorized in stream reaches where anadromous fish spawning is occurring during that specific time of the year [18 AAC §70.225(h)(1)]. The State has pre-certified a mixing zone with a dilution of 91:1.

Critical Low Flows in the Receiving Water

The flows used to evaluate compliance with the criteria are:

- The 1 day, 10 year low flow (1Q10). This flow is used to protect aquatic life from acute effects. It represents the lowest daily flow that is expected to occur once in 10 years.

- The 7 day, 10 year low flow (7Q10). This flow is used to protect aquatic life from chronic effects. It the lowest 7 day average flow expected to occur once in 10 years.

Reasonable Potential Calculations

The following calculation is used to determine if chlorine has the reasonable potential to cause or contribute to an exceedance of the water quality standard.

Assumptions:

- The maximum reported effluent concentration of chlorine is 3.0 mg/l.

- The maximum predicted effluent concentration of chlorine is 4.98 mg/l.
- Wastewater Treatment Plant Design Flow = 0.50 mgd
- Low Flow Conditions:
  1Q10 = 2771 mgd (used to evaluate acute conditions)
  7Q10 = 2772 mgd (used to evaluate chronic conditions)
- The upstream concentration of chlorine is assumed to be zero since there are no known sources of chlorine upstream of the discharge.
- ADEC is allowing a dilution ratio of 91:1 for meeting both chronic and acute chlorine standards. (The size of the mixing zone is 267 m x 4 m in the winter, and 9 m x 2 m in the summer (June 1 — September 30).)

(1) Calculating projected downstream concentration using the acute dilution allowed by ADEC.

Acute Dilution = 91:1
C_e = 4.98 mg/l
Q_e = 0.50 mgd
C_u = 0 mg/l
Q_u = 2771 mgd

$$C_d = \frac{C_e - C_u}{D} + C_u \qquad \text{(Equation C-11)}$$

$$C_d = \frac{(4.98 \text{ mg/l} - 0 \text{ mg/l})}{91} + 0 \text{ mg/l} = 0.055 \text{ mg/l}$$

(2) Calculating projected downstream concentration using the chronic dilution allowed by ADEC.

Chronic Dilution = 91:1
C_e = 4.98 mg/l
Q_e = 0.50 mgd
C_u = 0 mg/l
Q_u = 2772 mgd

$$C_d = \frac{C_e - C_u}{D} + C_u \qquad \text{(Equation C-11)}$$

$$C_d = \frac{(4.98 \text{ mg/l} - 0 \text{ mg/l})}{91} + 0 \text{ mg/l} = 0.055 \text{ mg/l}$$

Comparison with ambient criteria for chlorine

In order to determine if there is a reasonable potential for this discharge to violate the ambient criteria, the highest projected concentrations at the edge of the mixing zones are compared with the ambient criteria.

Acute:	0.055 mg/l	>	0.019 mg/l (acute criteria)	–	**YES**, there is reasonable potential to violate
Chronic:	0.055 mg/l	>	0.011 mg/l (chronic criteria)	**–**	**YES**, there is reasonable potential to violate

Since there is a reasonable potential for the effluent to cause an exceedance of both the acute and chronic water quality standards for protection of aquatic life, water quality based effluent limits for chlorine are required. See Appendix D for that calculation.

Appendix D -- Calculation for the Water Quality Based Effluent Limit for Total Residual Chlorine

To support the implementation of EPA's regulations for controlling the discharge of toxicants, EPA developed the *Technical Support Document for Water Quality-Based Toxics Control (TSD)* (EPA/505/2-90-001, March 1991). It recommends the following procedures to derive water quality-based effluent limitations from water quality criteria.

Step 1- Determining the Wasteload Allocations (WLAs)

A wasteload allocation (WLA) is the maximum allowable pollutant concentration that can be discharged in the effluent (after accounting for available dilution) without causing an in-stream water quality violation. Where the state does not authorize a mixing zone, or when dilution is not available, the criteria becomes the wasteload allocation. Wasteload allocations are calculated using the same mass balance equations used to calculate the concentration of the pollutant at the edge of the mixing zone in the reasonable potential analysis (in this case, Equation C-11, above).

$$C_d = \frac{C_e - C_u}{D} + C_u \qquad \text{(Equation C-11)}$$

where

C_d = aquatic life criteria that cannot be exceeded downstream
C_e = concentration of pollutant in effluent = WLA_{acute} or $WLA_{chronic}$
C_u = upstream background concentration of pollutant
D_{acute} = dilution allowed in the acute mixing zone (91:1 for chlorine)
$D_{chronic}$ = dilution allowed in the chronic mixing zone (91:1 for chlorine)

To calculate a wasteload allocation, C_d is set equal to the acute or chronic criterion and the equation is solved for C_e (i.e., the acute or chronic WLA). Equation C-11, rearranged, to solve for the C_e (WLA), becomes:

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

In the case of chlorine, for the acute WLA:

$$C_e = WLA_{acute} = 0 \text{ mg/l} + (.019 \text{ mg/l} - 0 \text{ mg/l}) \times 91$$
$$WLA_{acute} = 1.729 \text{ mg/l}$$

In the case of chlorine, for the chronic WLA:

$C_e = WLA_{chronic} = 0 \text{ mg/l} + (.011 \text{ mg/l} - 0 \text{ mg/l}) \times 91$
$WLA_{chronic} = 1.001 \text{ mg/l}$

Step 2 - Determining the Long-Term Average (LTA) Effluent Concentrations

The next step computes the long term average (LTA) effluent concentrations which will be protective of the WLAs. This is done using the following equations from Section 5.4 of the TSD:

$$LTA_{acute} = WLA_{acute} \times \exp(0.5\sigma^2 - z\sigma) \quad \text{(Equation D-2)}$$

$$LTA_{chronic} = WLA_{chronic} \times \exp(0.5\sigma_4^2 - z\sigma_4) \quad \text{(Equation D-3)}$$

where,

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

In the case of chlorine,

$CV = 0.6615$
$\sigma^2 = \ln(0.6615^2 + 1) = 0.3630$
$\sigma = \sqrt{\sigma^2} = 0.6025$
$\sigma_4^2 = \ln(0.6615^2/4 + 1) = 0.1038$
$\sigma = \sqrt{\sigma_4^2} = 0.3222$
$z = 2.326$ for 99th percentile probability basis

Therefore,

Acute LTA

$LTA_{acute} = WLA_{acute} \times \exp(0.5\sigma^2 - z\sigma)$ (Equation D-2)

$LTA_{acute} = 1.729 \text{ mg/l} \times \exp(0.5 \times 0.3630 - 2.326 \times 0.6025)$
LTA_{acute} = 0.510 mg/l

Chronic LTA

$LTA_{chronic} = WLA_{chronic} \times \exp(0.5\sigma_4^2 - z\sigma_4)$ (Equation D-3)

$LTA_{chronic} = 1.001 \text{ mg/l} \times \exp(0.5 \times 0.1038 - 2.326 \times 0.3222)$
$LTA_{chronic}$ = 0.498 mg/l

Step 3 – Choosing the Most Limiting LTA

To protect a waterbody from both acute and chronic effects, the more limiting of the calculated LTA_{acute} and $LTA_{chronic}$ is used to derive the effluent limitations.

LTA_{acute} = 0.510 mg/l
$LTA_{chronic}$ = 0.498 mg/l

0.498 mg/l < 0.510 mg/l

In this case, the $LTA_{chronic}$ of 0.498 mg chlorine/l is more stringent.

Step 4 - Calculating the Permit Limits

Using the equations in Section 5.4 of the TSD, the maximum daily limit (MDL) and the average monthly limit (AML) are calculated as shown below. The TSD recommends using the 95th percentile for the Average Monthly Limit (AML) and the 99th percentile for the Maximum Daily Limit (MDL). The z- values used are based on these recommendations.

$MDL = LTA \times \exp(z_m \sigma - 0.5 \sigma^2)$ (Equation D-4)

$AML = LTA \times \exp(z_a \sigma_n - 0.5 \sigma_n^2)$ (Equation D-5)

where

$\sigma^2 = \ln(CV^2 + 1) = 0.3630$
$\sigma = \sqrt{\sigma^2} = 0.6025$
$\sigma_{n^2} = \ln(CV^2/n + 1) = \ln((0.6615^2 / 20) + 1) = .0216$
$\sigma_n = \sqrt{\sigma_n^2} = 0.147$
$z_a = 1.645$ for 95th percentile probability basis
$z_m = 2.326$ for 99th percentile probability basis
n = number of sampling events required per month (minimum of 4, regardless of the frequency required) (for chlorine = 20/month)

In the case of total chlorine:

$$MDL = LTA_{chronic} \times \exp(z_m \sigma - 0.5 \sigma^2) \quad \text{(Equation D-4)}$$

MDL = 0.498 mg/l × exp(2.326 × 0.6025 - 0.5 × 0.3630)
MDL = 1.69 mg/l

$$AML = LTA_{chronic} \times \exp(z_a \sigma_n - 0.5 \sigma_n^2) \quad \text{(Equation D-5)}$$

AML = 0.498 mg/l × exp(1.645 × 0.147 - 0.5 × 0.0216)
AML = 0.63 mg/l