ALASKA POLLUTANT DISCHARGE ELIMINATION SYSTEM

FINAL PERMIT FACT SHEET

Permit Number: AK0053236

Ted Stevens Marine Research Institute

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

Public Comment Period Start Date: 11/2/2012
Public Comment Period Expiration Date: 12/1/2012
Alaska Online Public Notice System

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Proposed issuance of an Alaska Pollutant Discharge Elimination System (APDES) permit to

NATIONAL MARINE FISHERIES SERVICE

For wastewater discharges from:

Ted Stevens Marine Research Institute
17109 Point Lena Loop Road
Juneau, AK, 99801

The Alaska Department of Environmental Conservation (the Department or DEC) proposes to reissue an APDES individual permit (permit) to the National Marine Fisheries Service. The permit authorizes and sets conditions on the discharge of pollutants from this facility 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 and outlines best management practices to which the facility must adhere.

This fact sheet explains the nature of potential discharges from Ted Stevens Marine Research Institute and the development of the permit including:

- information on public comment, public hearing, and appeal procedures
- a listing of proposed effluent limitations and other conditions
- technical material supporting the conditions in the permit
- proposed monitoring requirements in the permit

Interested persons can review 18 AAC 15.185 for the procedures and substantive requirements regarding a request for an informal Department review.
See http://www.dec.state.ak.us/commish/InformalReviews.htm for information regarding informal reviews of Department decisions.

An adjudicatory hearing request must be delivered to the Commissioner of the Department within 30 days of the permit decision or a decision issued under the informal review process. An adjudicatory hearing will be conducted by an administrative law judge in the Office of Administrative Hearings within the Department of Administration. A written request for an adjudicatory hearing shall be delivered to the Commissioner at the following address:

Commissioner
Alaska Department of Environmental Conservation at
410 Willoughby Street, Suite 303
Juneau AK, 99811-1800.

Interested persons can review 18 AAC 15.200 for the procedures and substantive requirements regarding a request for an adjudicatory hearing. See http://www.dec.state.ak.us/commish/ReviewGuidance.htm for information regarding appeals of Department decisions.

Documents are Available

The permit, fact sheet, application, and related documents can be obtained by visiting or contacting DEC between 8:00 a.m. and 4:30 p.m. Monday through Friday at the addresses below. The permit, fact sheet, application, and other information are located on the Department's Wastewater Discharge Authorization Program website: http://www.dec.state.ak.us/water/wwdp/index.htm .

Alaska Department of Environmental Conservation Division of Water Wastewater Discharge Authorization Program 555 Cordova Street Anchorage, AK 99501 (907) 269-6285	Alaska Department of Environmental Conservation Division of Water Wastewater Discharge Authorization Program 410 Willoughby Avenue, Suite 310 Juneau, AK 99801 (907) 465-5180

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1.0 APPLICANT

This fact sheet provides information on the Alaska Pollutant Discharge Elimination System (APDES) permit for the following entity:

Name of Facility:	Ted Steven Marine Research Institute
APDES Permit Number:	AK0053236
Facility Location:	Lena Point area of Juneau, AK
Mailing Address:	17109 Pt. Lena Loop Road, Juneau, AK
Facility Contact:	Mr. Gordon P. Garcia

The map in Appendix A to the Fact Sheet shows the approximate locations of the treatment plant and the discharge.

2.0 FACILITY INFORMATION

The facility is shared by two marine biological research centers. The National Oceanic and Atmospheric Administration (NOAA) National Marine Fisheries Service (NMFS) installation is a federally owned research facility, also known as the Ted Stevens Marine Research Institute (TSMRI) at Lena Point. The other center is owned by the University of Alaska Fairbanks and houses their School of Fisheries and Ocean Sciences (SFOS). Both entities share a common seawater life support system as well as an onsite secondary domestic wastewater treatment plant, and are collectively referred to as TSMRI for the remainder of this document.

The TSMRI site is approximately 17-acres in size, which includes approximately 66,000 square feet of office and laboratory space. In addition to chemistry, genetics, and biology laboratories, the laboratory building also includes: a large wet lab; a necropsy room equipped to handle small marine mammals, large fish and sharks; an ichthyology laboratory for sorting and identification of specimens; two large walk-in freezers; and a large day room for contractors and transient project personnel. The wet lab has approximately 2,000 square feet of enclosed space, overhead electric power access, and 1,200 gallons per minute (gpm) of filtered seawater capacity. Another 4,000 square feet adjacent to the enclosed wet lab is available for outdoor wet lab work. Seawater is shared with the adjacent SFOS. The SFOS facility consists of 30,000 square feet of offices, classrooms and laboratories dedicated to graduate and undergraduate education and research.

2.1 Discharge and Treatment Systems

The 2.0 million gallons per day (MGD) total wastewater discharge from the TSMRI facility is transmitted through an 18-inch diameter outfall line extending approximately 400 feet from shore into Favorite Channel to a depth of 200 feet Mean Lower Low Water (MLLW). The outfall, referred to as Outfall 001 throughout the rest of this document, is not fitted with a diffuser at its terminus. A total of seven wastestreams are comingled prior to discharge through Outfall 001. In addition, TSMRI has an internal outfall, referred to as Internal Outfall 002. Internal Outfall 002 does not discharge directly into Favorite Channel, but serves as an internal monitoring point to monitor the treatment efficacy of the domestic wastewater discharge of the facility prior to mixing with the other wastestreams. The effluent discharged from Outfall 001 into Favorite Channel is made up of the following seven wastestreams:

2.1.1 Gravity Sand filtered seawater. The seawater system is a once-through supply and discharge system. During seawater systems operation, duplicate intake pipelines convey up to approximately 1.947 MGD of seawater using three 60 horsepower pumps from Favorite Channel into a wet well located onshore. The wet well is a deep well that extends below lower low water level constructed such that it is possible to pump seawater from the well at any tide level. The wet well seawater is pumped via two vertical turbine pumps to the sand filter building, a third pump is in place for emergencies. The incoming seawater is split into eight feeds. Six of the seawater feeds are directed to six sand filled vaults, and the filtered seawater collects in two holding tanks that gravity feed the seawater to the TSMRI facility. The two remaining feeds are unfiltered as subsequently discussed in section 2.1.2.

In the sand filter building, filtration is employed to remove sand, silt, larvae, eggs, juvenile fish and phytoplankton from the raw seawater. The system operates continuously and includes various controlling features such as no-flow switches, low-level alarms in the storage tanks and wet well, and sand tank water level sensors for automatically initiating filter backwash cycles. There is a standby emergency generator to maintain operation of the main seawater supply pumps in the event of a power failure.

The seawater flows by gravity from the storage tanks to the building laboratory facilities and supplies the research tanks through overhead supply lines. The seawater is used for research purposes as well as supplying seawater for NOAA's aquarium for public display that uses approximately 0.144 MGD of the total volume. All seawater used in the wet lab collects in a discrete drain system (floor trenches) that conveys water into a holding sump in the TSMRI basement. Waste seawater from SFOS (used for cooling and the wet lab) also collects here. The sump effluent is screened through basket strainer filters for large debris before it is pumped to the ozone treatment system.

Ozone is introduced into the waste seawater from three ozone generators as a side stream injection system using an eductor, which uses the flow of wastewater to create a vaccum that draws the ozone into the seawater wastestream. The ozonated seawater then passes into four contact tanks with a combined volume of 5,000 gallons. The size of the four tanks allows up to 10 minutes of contact time, at a normal flow of 500 gpm, prior to seawater release. From the contact tanks, the seawater wastestream enters another set of basket strainer filters. This second set of basket strainers contain a 200 micron insert that filters the wastestream before it passes to the heat exchange system that extracts heat for the heat pump system. From the heat exchange system, the seawater waste collection system discharges up to 1.706 MGD daily to the inspection sampling vault prior to being discharged back to Favorite Channel through Outfall 001. All of the seawater used in the laboratory facilities is classified as seawater wastewater requiring treatment prior to discharge into Favorite Channel.

2.1.1.1 Heating and cooling system. From the sand filter building, filtered and unfiltered seawater is distributed to the TSMRI and SFOS facilities. Up to 0.216 MGD of seawater is piped to the SFOS. Approximately 0.072 MGD of the seawater is used for research and approximately 0.144 MGD of the seawater is used to cool the Information Technology room in a heat exchange system at the SFOS facility. Flow rates and volumes vary with ambient outside temperature. The building uses a glycol loop to transfer the waste heat to the seawater via a plate-type heat exchange system. Typical temperature rise of returning seawater used for cooling is less than 0.5ºCelsius (C). The flow from the heat exchange system recombines in a holding tank with other used seawater from the SFOS. The used seawater, up to 0.216 MGD daily, is then pumped to the common holding sump in the TSMRI building where it receives further treatment.

2.1.1.2 Satellite wet lab. This proposed facility, which is slated for completion in August of 2012, would split the seawater stream and provide another research structure that would use the existing plumbing and waste seawater piping of the TSMRI facility. Inlet filtered and unfiltered seawater will be intercepted at the piping that provides SFOS and TSMRI seawater.

The seawater wastewater would be filtered through small mesh screens to reduce passage of solids and the screened effluent would be directed through a low-pressure Ultra Violet (UV) system. The seawater treated by the UV system will be discharged into the line that presently carries the filter backwash wastewater to Outfall 001, up to 0.216 MGD daily.

2.1.2 Unfiltered seawater. Two of the incoming seawater feeds are routed to provide unfiltered seawater for research at TSMRI. Typically less than 0.1 MGD of the total seawater flow is used as unfiltered seawater.

2.1.3 Filter backwash. A maximum of 0.025 MGD of filtered seawater is used to backwash the gravity sand filters. The sand filters may go two to five days without needing to be backwashed. The backwash frequency is tied to the amount of silt and organisms in the influent seawater. The backwash cycle is automatic, although it can be triggered manually if the sand filter has a full unit. The cycle lasts approximately ten minutes with a three-minute seawater flush. During winter months it is rare for enough sediment to accumulate in the sand filter to conduct a backwash cycle. The filter backwash wastewater is directly discharged to the TSMRI marine outfall system, Outfall 001, without any further treatment. The backwash effluent connects into the seawater wastewater line, Outfall 001, at the inspection-sampling vault.

2.1.4 Domestic wastewater. The design capacity of the domestic wastewater system is 9,000 gallons per day (gpd) for all influent volumes. The total average flow of domestic wastewater at Internal Outfall 002 is approximately 3,000 gpd; of that, approximately 2,000 gpd is from the TSMRI and approximately 1,000 gpd is pumped from a holding tank at the SFOS. The domestic wastewater system is designed to handle the current volume of domestic wastewater generated onsite as well as potential future expansion of facilities at TSMRI. All domestic wastewater is treated using an onsite sewage treatment plant manufactured by Orenco Systems Incorporated. The treatment consists of pumps that collect the mid tank liquid and spray the domestic wastewater onto geotextile mats that harbor aerobic bacteria used to digest the solid wastes. After treatment, domestic waste is comingled with the other wastestreams discharged at TSMRI. Release of treated domestic effluent can occur manually but normally is cyclical and automatic, driven by the volume of the incoming waste stream. Sludge is pumped from the domestic treatment system approximately every three to five years as needed. The last sludge removal occurred in August 2012 .

2.1.5 Storm water from building roof drains. The actual amount of storm water is based upon precipitation, but the maximum discharge of 0.04 MGD has been carried over from the previous permit as it is reflective of the impervious area of the facility and the precipitation in the area. The new satellite wet lab does not contribute to the storm water flow that is discharged through Outfall 001. The parking lot onsite as well as access roads are paved and have drains. The roof is flat and is covered with a Polyvinyl Chloride (PVC) membrane that has drains that feed the storm drain system. Storm water from the building roof drains is discharged to the outfall system without further treatment. The storm drain water system drains towards the facility entrance into vegetated swales that line the entrance road; another portion of the storm drain system in the rear of the facility drains the parking area, of which, that portion of water drains to the back of the property toward tidal water. No other storm water sources are authorized to be discharged through the TSMRI marine outfall system without prior approval by the Department.

2.2 Background

NMFS first applied for a wastewater discharge permit in September 2000. DEC subsequently authorized the discharge through Wastewater Disposal permit No. 011DB002. Following the 011DB002 permit issuance, DEC reissued NMFS a permit (No. 2006DB0050) on November 8, 2006, which expired on November 7, 2011. NMFS submitted an administratively complete application for reissuance on October 7, 2011. The 2006 permit indicated that if NMFS submitted a complete application at least 30-days prior to the permit's expiration date, that the permit could be administratively extended (i.e. continue to be in effect and fully enforceable) until such time DEC reissued them a new permit. NMFS met their 30-day deadline and DEC accordingly provided administrative extension of their permit. NMFS submitted clarifying amendments to their administratively complete application in January and April of 2012. The aforementioned amendments discuss proposed changes to the wastestreams discharged through Outfall 001 since the 2006 permit issuance, which include the wastewater from the satellite wet lab and the use of the treated seawater water stream as a heat transfer medium for

the heat pump system. Table 1 presents historical discharge data for Outfall 001 and Internal Outfall 002.

Table 1: Historical Data for Ted Stevens Marine Research Institute

Parameter	Units	Outfall 001	Internal Outfall 002
Maximum Daily Flow	gpd	See Footnote a	454 – 8,719
Fecal Coliform (FC) Bacteria	FC/100 milliliters (mL)	< 1.0 - < 9.0	71.1 – 78,000
5-day Biochemical Oxygen Demand (BOD_5)	Milligrams per liter (mg/L)	N/A	< 2 – 252
Total Suspended Solids (TSS)	mg/L	N/A	< 4 – 130
pH	Standard Units (SU)	6.54 – 8.42	5.11 – 7.72
Dissolved Oxygen (DO)	mg/L	7.96 – 14.15	2.27 – 11.1

Notes:

a. Discharge Monitoring Report (DMR) flow data for Outfall 001 indicated that the DMRs were filled out incorrectly. The erroneous DMR data indicated maximum flows of 11,000 - 60,000 gpd though facility operators indicated that the facility performs at a minimum of 600,000 gpd.

3.0 COMPLIANCE HISTORY

Discharge Monitoring Reports (DMRs) available from October 2007 to March 2012 were reviewed to determine the facility's compliance with effluent limits. DMRs prior to October 2007 (the permit was issued in November of 2006) were not available for review as the permittee did not submit them to the Department. Additionally, the following DMRs were also not available for review, as they were not submitted to the Department: April 2012; May 2012; June 2012; July 2012; May 2011; September 2011; May 2010; August 2010; December 2009; February 2008; August 2008; November 2008; and December 2007. The permittee submitted late DMRs for the reporting periods of December 2011, and January-March 2012.

Table two presents permit limit exceedances documented for Internal Outfall 002. No permit limit exceedances were noted on the DMRs for Outfall 001, the final discharge to waters of the United States (U.S.). Noting permit limit exceedances in Table 2 revealed via a quarterly monitoring frequency, the Department has opted to require more frequent, monthly monitoring of the domestic discharge. This will help diagnose compliance issues with the domestic wastewater treatment system.

Table 2: Permit Limit Exceedances - Internal Outfall 002

Parameter	Units	Permit Limit	Monthly Average Violations	Daily Maximum Violations	Minimum Value Violations	Date of Violation
BOD_5	mg/L	60	N/A	61.6	N/A	October 2007
BOD_5	mg/L	30	61.6	N/A	N/A	October 2007
BOD_5	mg/L	60	N/A	252	N/A	September 2008
BOD_5	mg/L	30	252	N/A	N/A	September 2008
BOD_5	mg/L	60	N/A	64	N/A	December 2010
BOD_5	mg/L	30	64	N/A	N/A	December 2010
BOD_5	mg/L	30	35	N/A	N/A	March 2012
pH	SU	6.0 – 9.0	N/A	N/A	5.71	June 2009
pH	SU	6.0 – 9.0	N/A	N/A	5.67	September 2009
pH	SU	6.0 – 9.0	N/A	N/A	5.77	October 2009
pH	SU	6.0 – 9.0	N/A	N/A	5.64	June 2010
pH	SU	6.0 – 9.0	N/A	N/A	5.11	July 2010
pH	SU	6.0 – 9.0	N/A	N/A	5.72	December 2010
TSS	mg/L	60	N/A	130	N/A	September 2008
TSS	mg/L	30	130	N/A	N/A	September 2008

4.0 EFFLUENT LIMITS AND MONITORING REQUIREMENTS

4.1 Basis for Permit Effluent Limits

The Clean Water Act (CWA) requires that the limits for a particular pollutant be the more stringent of either technology-based effluent limits (TBELs) or water quality-based effluent limits (WQBELs). TBELs are set according to the level of treatment that is achievable using available technology. A WQBEL is designed to ensure that the Alaska Water Quality Standards (WQS) of a water body are met. WQBELs may be more stringent than TBELs. There are both TBELs and WQBELs in the permit. A more extensive discussion providing the basis for the proposed effluent limits in the permit is provided in Appendix B.

4.2 Basis for Effluent Monitoring

In accordance with AS 46.03.110(d), the Department may specify in a permit the terms and conditions under which waste material may be disposed of. Monitoring in a permit is required to determine compliance with effluent limits. Monitoring may also be required to gather effluent data to determine if additional effluent limits are required, or to complete special studies (e.g. receiving water studies, mixing zone studies, etc.).

4.3 Effluent Limits and Monitoring Requirements

4.3.1 Outfall 001

The permit contains limits that are both technology-based and water quality-based. The following summarizes the proposed effluent limits (see Appendix B for more details).

Limits and monitoring requirements for flow, fecal coliform bacteria, pH, and dissolved oxygen have been retained from the previous permit. New monitoring requirements have been included for Enterococci bacteria and temperature.

Sampling of the discharge at Outfall 001 shall occur monthly while the discharge of the domestic treatment system is triggered manually. Sampling should also occur when the discharge of the sand filter backwash is triggered, when practicable, so that sampling is fully representative of the total discharge. Table 3 presents the effluent monitoring requirements for Outfall 001. Monitoring of the effluent must take place after all treatment has occurred and waste streams are comingled.

Table 3: Outfall 001 - Effluent Limits and Monitoring Requirements

Parameter	Effluent Limits				Monitoring Requirements		
	Daily Minimum	Monthly Average	Daily Maximum	Units	Sample Location	Sample Frequency	Sample Type
Total Discharge Flow	Report	Report	2.0 [a]	MGD	Effluent	Continuous	Measured or Recorded
Fecal Coliform Bacteria	N/A	14 [b,e]	43 [b,e]	FC /100 mL	Effluent	1/Month [d]	Grab
Enterococci Bacteria	N/A	Report[b]	N/A	#/100 mL	Effluent	1/Month (May-Sept) [c,d]	Grab
pH	6.5	N/A	8.5	SU	Effluent	1/Month	Grab
Dissolved Oxygen	6.0	N/A	17.0	mg/L	Effluent	1/Month	Grab
Temperature	N/A	Report	N/A	˚ Celsius	Effluent	1/Month	Grab
Chronic Toxicity	N/A	N/A	N/A	Toxic Units, Chronic (TUc)	Effluent	1/Permit term [f]	Grab
Expanded Effluent Testing	N/A	N/A	N/A	N/A	Effluent	1/Permit term [g]	Grab

Notes:

a. The wastewater discharge volume shall not exceed the maximum hydraulic design flow rate approved in the Final Approval to Operate issued by the Department. Final Approval to Operate means that the Department has reviewed and approved the wastewater treatment works engineered plans submitted to the Department in accordance with 18 AAC 72.210 through 18 AAC 72.285 or as amended.

b. All effluent fecal coliform and Enterococci average results must be reported as the geometric mean. When calculating the geometric mean, replace all results of zero, 0, with a one, 1. The geometric mean of "n" quantities is the "nth" root of the product of the quantities. For example the geometric mean of 100, 200, and 300 is $(100 \times 200 \times 300)^{1/3} = 181.7$.

c. Enterococci bacteria monitoring is required during the months of May – September.

d. Enterococci bacteria and fecal coliform bacteria monitoring must occur on the same day.

e. In a 30-day period, the geometric mean of all samples taken may not exceed 14 FC/100 mL and not more than 10 percent of samples may exceed 43 FC/100 mL.

f. To be performed and submitted with the application for permit reissuance 180 days prior to permit expiration.

g. To be performed and submitted within two years after the effective date of the final permit.

4.3.2 Internal Outfall 002

Limits for flow, fecal coliform bacteria, BOD_5, TSS, pH, and dissolved oxygen have been retained from the previous permit. New limits have been included for BOD_5 percent removal and TSS percent removal in accordance with secondary treatment standards (40 CFR §133.102 [adopted by reference at 18 AAC 83.010(e)]) as well as DEC minimum treatment standards in 18 AAC 72.050. This will necessitate sampling the influent BOD and TSS. Table 4 presents the influent and effluent limits and monitoring requirements for Internal Outfall 002. The permittee must collect effluent samples from Internal Outfall 002 after the last domestic wastewater treatment unit and before combining with any other waste stream authorized for discharge from Outfall 001. Influent must be monitored prior to treatment occurring. An internal monitoring point is justified because pollutants can be monitored prior to being diluted by other wastestreams to determine compliance with secondary treatment standards.

Table 4: Internal Outfall 002 - Domestic Wastewater Influent and Effluent Limits and Monitoring Requirements

Parameter	Effluent Limits					Monitoring Requirements		
	Daily Minimum	Monthly Average	Average Weekly	Daily Maximum	Units	Sample Location	Frequency of Analysis	Sample Type
Total Discharge Flow	N/A	Report	N/A	9,000 [a]	gpd	Effluent	1/Day [g]	Measured or Recorded
pH	6.0	N/A	N/A	9.0	SU	Effluent	3/Week	Grab
Fecal Coliform Bacteria	N/A	Report [b]	N/A	Report	FC /100 mL	Effluent	1/Month [h]	Grab
Enterococci Bacteria	N/A	Report [b]	N/A	Report	#/100 mL	Effluent	1/Month (May-Sept) [c, h]	Grab
BOD_5	N/A	30	45	60	mg/L	Effluent	1/Month [g]	Grab or Composite [d]
		2.3	3.4	4.5	Pounds (lbs)/day			
		Report	N/A	N/A	mg/L	Influent		
BOD_5 Percent Removal	N/A	85 [e]	N/A	N/A	%	Influent	1/Month [g]	Calculated
TSS	N/A	30	45	60	mg/L	Effluent	1/Month	Grab or Composite [d]
		2.3	3.4	4.5	lbs/day			
		Report	N/A	N/A	mg/L	Influent		
TSS Percent Removal	N/A	85 [e]	N/A	N/A	%	Influent	1/Month [g]	Calculated
Dissolved Oxygen	Report	N/A	N/A	N/A	mg/L	Effluent	1/Month	Grab
Dilution Ratio to Total Discharge	N/A	Report	N/A	N/A	N/A	N/A	1/Week	Calculated [f]

Notes:

a. The wastewater discharge volume shall not exceed the maximum hydraulic design flow rate approved in the Final Approval to Operate issued by the Department. Final Approval to Operate means that the Department has reviewed and approved the wastewater treatment works engineered plans submitted to the Department in accordance with 18 AAC 72.210 through 18 AAC 72.285 or as amended.

b. All effluent fecal coliform and Enterococci sampling average results must be reported as a geometric mean. When calculating the geometric mean, replace all results of zero, 0, with a one, 1. The geometric mean of "n" quantities is the "nth" root of the product of the quantities. For example the geometric mean of 100, 200, and 300 is $(100 \times 200 \times 300)^{1/3} = 181.7$.

c. Enterococci bacteria monitoring is required during the months of May – September.

d. See Appendix C for a definition.

e. Minimum percent removal = [(average monthly influent concentration in mg/L – average monthly effluent concentration in mg/L) / (average monthly influent concentration in mg/L)] x 100. Calculation required monthly.

f. The monthly average dilution ratio must be calculated using the following equation: Monthly average dilution ratio = (monthly average domestic wastewater flow through Outfall 002 + monthly average effluent flow through Outfall 001) ÷ monthly average effluent flow through Outfall 001.

g. Influent and effluent samples must be taken over approximately the same time period.

h. Enterococci bacteria and fecal coliform bacteria monitoring must occur on the same day.

4.4 Prohibited Discharges

A number of permit conditions pertaining to drugs, medication, and disease control chemicals used for the therapeutic treatment of fish were present in the previous permits. The Department consulted the Alaska Department of Fish and Game Principal Fish Pathologist to ensure these conditions were still applicable. Post this consultation, the Department has determined to carry these conditions forward in the current permit under the new heading "Prohibited Discharges."

4.5 Effluent Monitoring

The permit requires monitoring of the effluent at Outfall 001 for flow, fecal coliform bacteria, pH, and dissolved oxygen to determine compliance with the effluent limits. These monitoring requirements are being carried forward from the previous permit and have been determined acceptable frequencies to evaluate effluent quality and variability. New monitoring requirements have been included for Enterococci bacteria and temperature. Enterococci monitoring was added pursuant to the Beaches Environmental Assessment and Coastal Health Act (BEACH) act; Appendix B section 3.3.5 contains additional information. Temperature was included to confirm assumptions presented in the permit application that the heat exchange system only minimally alters the temperature of the wastestream without projected violation of the WQS.

The permit requires additional one-time effluent sample analysis for Outfall 001 that includes chronic Whole Effluent Toxicity (WET) testing and a Priority Pollutant Scan (priority pollutants are 126 pollutants identified in Appendix A to 40 CFR Part 423.) The WET test results must be submitted with the application for permit reissuance, which must be submitted 180 days before expiration of the final permit. The priority pollutant scan is required because the applicant has identified priority pollutants onsite used in trace amounts in the 2000 permit application. The results of this monitoring will be used to evaluate the constituents of the discharge and whether any further sampling is necessary. The priority pollutant scan must be submitted within two years of the effective date of the final permit. The permittee shall consult and review APDES Application Form 2C upon permit issuance to ensure that any monitoring required in the application will be completed prior to submitting an application for permit reissuance. A copy of Form 2C can be found at: http://dec.alaska.gov/water/wwdp/index.htm.

The permit also requires monitoring of the secondary treated domestic wastewater at Internal Outfall 002 for flow, fecal coliform bacteria, BOD_5, TSS, pH, and dissolved oxygen. These monitoring requirements were carried forward from the previous permit. New monitoring requirements have been included for the influent for BOD_5 and TSS to calculate monthly removal rates for these parameters. New effluent Enterococci monitoring was added pursuant to the BEACH act; Appendix B section 3.3.5 contains additional information.

The monitoring for Internal Outfall 002 was changed from tiered monitoring (<5,000 gallons/quarterly; 5,000-11,000 gallons/monthly) to monitoring that more adequately reflects the design flow of the plant, which has been confirmed via an engineering plan review to be 9,000 gpd (as opposed to 11,000 gpd as referenced in the previous permit).

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. The permittee has the option of taking more frequent samples than required under the permit. These additional samples must be used for averaging if they are conducted using the Department – approved test methods (generally found in 18 AAC 70 and 40 CFR Part 136

[adopted by reference in 18 AAC 83.010]), and if the Method Detection Limits (MDLs) are less than the effluent limits. Table 3 presents the effluent monitoring requirements for Outfall 001. Table 4 presents the influent and effluent monitoring requirements for Internal Outfall 002.

4.6 Whole Effluent Toxicity Monitoring

WET tests are laboratory tests that measure total toxic effect of an effluent on living organisms. The tests use small vertebrate and invertebrate species and/or plants to measure the aggregate toxicity of an effluent. Chronic toxicity tests measure reductions in survival, growth, and reproduction over a 7-day exposure. Chronic toxicity monitoring shall be conducted by the permittee once during the permit term according to the methods and species approved by EPA in *Short Term Methods for Estimating the Chronic Toxicity of Effluents and Receiving Waters to West Coast Marine and Estuarine Organisms*, 1995, EPA 600-R-95-136.

WET testing of the effluent is not mandatory via regulation, as the domestic wastewater portion of the effluent flow is less than 1.0 MGD, and an effluent limitation guideline (ELG) requiring WET testing has not been promulgated for this sector of wastewater discharges. Additionally, the nature of aquatic research and the keeping of fish at the facility provide a continuous toxicity evaluation of the facility's water quality. However, the Department has implemented a one-time chronic WET test for Outfall 001 as a component of the permit reissuance process to evaluate any aggregate toxicity potentially present in the total wastestream.

5.0 RECEIVING WATER BODY

5.1 Water Quality Standards

Regulations in 18 AAC 70 require that the conditions in permits ensure compliance with the WQS. The state's WQS are composed of use classifications, numeric and/or narrative water quality criteria, and an antidegradation policy. The use classification system designates the beneficial uses that each water body is expected to achieve. The numeric and/or narrative water quality criteria are the criteria deemed necessary by the state to support the beneficial use classification of each water body.

Water bodies in Alaska are designated for all uses unless the water has been reclassified under 18 AAC 70.230 as listed under 18 AAC 70.230(e). Some water bodies in Alaska can also have site–specific water quality criterion per 18 AAC 70.235, such as those listed under 18 AAC 70.236(b).

The permittee discharges effluent into Favorite Channel, which has not been reclassified, at a depth of approximately 200 feet below MLLW at latitude 58° 23' 26" North, longitude -134° 46' 34" West. Accordingly, the WQS at 18 AAC 70.020(a) classifies Favorite Channel as protected for all marine uses, which are comprised of the following: aquaculture, seafood processing, and industrial water supply; contact and secondary water recreation; the growth and propagation of fish, shellfish, other aquatic life, and wildlife; and, the harvesting for consumption of raw mollusks or other raw aquatic life.

5.2 Ocean Discharge Criteria

Section 403(a) of the CWA, Ocean Discharge Criteria, prohibits the issuance of a permit under Section 402 of the CWA for a discharge into the territorial sea, the water of the contiguous zone,

or the oceans except in compliance with Section 403. Permits for discharges seaward of the baseline of the territorial seas must comply with the requirements of Section 403, which include development of an Ocean Discharge Criteria Evaluation.

Charts depicting Alaska's baseline plus additional boundary lines are available at http://www.charts.noaa.gov/OnLineViewer/AlaskaViewerTable.shtml. The charts are provided for information purposes only. The U.S. Baseline Committee makes the official determinations of baseline.

A review of the charts revealed that a baseline has been established west of Cross Sound between the southern portion of Cape Spencer and the northern portion of Yakobi Island. This is approximately 70 miles from the TSMRI discharge point. The TSMRI discharges landward of this baseline; therefore, Section 403 of the CWA does not apply to the permit, and an Ocean Discharge Criteria Evaluation is not required.

5.3 Water Quality Status of Receiving Water

Any part of a water body for which the water quality does not or is not expected to meet applicable WQS is defined as a "water quality limited segment" and placed on the state's impaired water body list. Favorite Channel is not included in *Alaska's Final 2010 Integrated Water Quality Monitoring and Assessment Report*, July 15, 2010.

5.4 Mixing Zone

In accordance with state regulations 18 AAC 70.240, as amended through June 23, 2003, the Department has authority to authorize a mixing zone in a permit. The applicant did not request a mixing zone. Accordingly, the Department has not considered authorization of a mixing zone for this permitting action.

6.0 PERMIT REISSUANCE (ANTIBACKSLIDING)

18 AAC 83.480 requires that "effluent limitations, standards, or conditions must be at least as stringent as the final effluent limitations, standards, or conditions in the previous permit." 18 AAC 83.480(c) also states that a permit may not be reissued "to contain an effluent limitation that is less stringent than required by effluent guidelines in effect at the time the permit is renewed or reissued." The effluent limitations in this permit reissuance are consistent with 18 AAC 83.430. The permit effluent limitations, standards, and conditions are as stringent as in the previous permit.

7.0 ANTIDEGRADATION

Section 303(d)(4) of the CWA states that, for water bodies where the water quality meets or exceeds the level necessary to support the water body's designated uses, WQBELs may be revised as long as the revision is consistent with the State's Antidegradation policy. The Antidegradation Policy of the WQS (18 AAC 70.015) states that the existing water uses and the level of water quality necessary to protect existing uses must be maintained and protected. This section analyzes and provides rationale for the Department's decisions in the permit issuance with respect to the Antidegradation Policy.

The Department's approach to implementing the Antidegradation Policy, found in 18 AAC 70.015, is based on the requirements in 18 AAC 70 and the Department's *Policy and Procedure Guidance for*

Interim Antidegradation Implementation Methods, dated July 14, 2010. Using these procedures and policy, the Department determines whether a water body, or portion of a water body, is classified as Tier 1, Tier 2, or Tier 3, where a higher numbered tier indicates a greater level of water quality protection. At this time, no Tier 3 waters have been designated in Alaska. Favorite Channel is not listed as impaired on DEC's most recent *Alaska's Final 2010 Integrated Water Quality Monitoring and Assessment Report*; therefore, a Tier 1 designation is not warranted. In addition, little other baseline receiving water data exists. Accordingly, this Antidegradation analysis conservatively assumes that the discharge is to a Tier 2 water body.

The State's Antidegradation Policy in 18 AAC 70.015(a)(2) states that if the quality of water exceeds levels necessary to support propagation of fish, shellfish, and wildlife and recreation in and on the water (i.e. Tier 2 waters), that quality must be maintained and protected. The Department may allow a reduction of water quality only after finding that five specific requirements of the Antidegradation policy at 18 AAC 70.015(a)(2)(A)-(E) are met. The Department's findings follow:

1. **18 AAC 70.015 (a)(2)(A).** Allowing lower water quality is necessary to accommodate important economic or social development in the area where the water is located.

   The facility is situated on a former commercial rock quarry. Because of the site-specific factors subsequently elaborated on in finding 4 below, and to support the research conducted by the facility, a large volume of seawater is constantly required, which requires the facility to be located within close proximity to the ocean. As such, the lowering of water quality is necessary in order for the facility to operate and continue providing social and educational benefits.

   The TSMRI is a marine research facility that conducts important scientific research on fish stocks, fish habitats, tsunami debris, and the chemistry of marine environments. Information from this research is widely used all over Alaska and internationally by interests such as commercial, subsistence and sport fishery industries and governmental agencies involved in managing natural resources. The NMFS manages the long-term health of commercial, recreational, subsistence and environmental resources of the North Pacific. Additionally, the SFOS facility is located at TSMRI and shares research space. The SFOS facility consists of classrooms and laboratories dedicated to graduate and undergraduate marine education and research.

   The Department concludes that the operation of the facility and the authorization of the discharge accommodate important economic and educational development and that the finding is met.

2. **18 AAC 70.015 (a)(2)(B).** Except as allowed under this subsection, reducing water quality will not violate the applicable criteria of 18 AAC 70.020 or 18 AAC 70.235 or the whole effluent toxicity limit in 18 AAC 70.030.

   Discharge allowed by the permit at Outfall 001 conforms to the requirements of 18 AAC 70.020. No water quality variance in the form of a mixing zone is authorized and all water quality criteria will be met at the end of pipe prior to discharge. Site-specific criteria as allowed by 18 AAC 70.235 have not been established for Favorite Channel and are therefore not applicable. It is not expected that the discharge is toxic, as the nature of the aquatic research at the facility provides a continuous toxicity evaluation of the water at the facility. As such, reducing water quality is not expected to violate the whole effluent toxicity limit in 18 AAC 70.030. However, chronic toxicity monitoring is required during this permit cycle to validate this expectation.

3. **18 AAC 70.015(a)(2)(C).** The resulting water quality will be adequate to fully protect existing uses of the water.

   The permit reissuance application does not propose any changes that would likely result in wastewater of lower quality to be discharged than has been discharged under the previously issued permit. The WQS, upon which the permit effluent limits are based, serve the specific purposes of protecting the existing and designated uses. No water quality variance in the form of a mixing zone is authorized and all water quality criteria will be met at the end of pipe prior to discharge. After a review of the expected volume of discharge, the types and amounts of regulated pollutants, and the effluent limits imposed in this permit, the Department concludes that the resulting water quality will be adequate to fully protect existing uses and that the finding is met.

4. **18 AAC 70.015(a)(2)(D).** The methods of pollution prevention, control, and treatment found by the department to be most effective and reasonable will be applied to all wastes and other substances to be discharged.

   The exposed bedrock at the site of the facility, which is impervious to water except in fractured zones, creates a drainage issue, as large volumes of water such as those generated by the facility cannot penetrate the bedrock. As such, land application of the treated domestic and used seawater discharges is not a feasible alternative to surface water discharge from the facility. Sanitary sewer service is also not available in the vicinity of Lena Point, which necessitates the facility's onsite package treatment plant and surface water discharge.

   The Department finds that the methods of prevention, control, and treatment to be most effective are the practices and requirements set out in the APDES permit. This type of treatment (e.g. biological treatment) and associated discharge is similar in nature to other like facilities and their discharges located throughout the United States. The permittee is required to follow a Quality Assurance Project Plan and a Chemical Hygiene Plan. The permittee is required to annually review best management practices (BMP) that include pollution prevention measures and controls appropriate for the facility. This permit requires specific, new BMPs adapted from federal technology-based effluent limit guidelines (ELGs). These BMPs (permit section 2.2.4.2.1-2.2.4.2.8) include requirements such as employing efficient feeding strategies to reduce discharges to waters of the U.S., cleaning tanks to minimize discharge of accumulated solids, etc. Adherence to the limits in the permit will assure that the treatment will be the most effective and reasonable, and the Department concludes that the finding to address pollution prevention, control, and treatment is met.

5. **18 AAC 70.015(a)(2)(E).** All wastes and other substances discharged will be treated and controlled to achieve (i) for new and existing point sources, the highest statutory and regulatory requirements; and (ii) for nonpoint sources, all cost-effective and reasonable best management practices.

   The applicable "highest statutory and regulatory treatment requirements" are defined in 18 AAC 70.990(30) (as amended June 26, 2003) and in the July 14, 2010, DEC guidance titled *Interim Antidegradation Implementation Methods*. Accordingly, there are three parts to the definition, which are:

- (A) any federal technology-based effluent limitation guidelines (ELG) identified in 40 CFR § 125.3 and 40 CFR §122.29, as amended through August 15, 1997, adopted by reference;
- (B) minimum treatment standards in 18 AAC 72.040; and
- (C) any treatment requirements imposed under another state law that is more stringent than a requirement of this chapter.

The first part of the definition includes all federal technology-based ELGs. Upon Department review, no federal technology-based ELGs directly apply to these types of discharges; however, per 40 CFR §125.3(c)(2), the Department is also using best professional judgment (BPJ) under section 402(a)(1) of the CWA to implement case-by-case technology-based secondary treatment requirements for non-POTWs (i.e. privately-owned treatment facilities) authorized to discharge domestic wastewater under this permit. The Department has also implemented BMPs from TBELs found in the Concentrated Aquatic Animal Production (CAAP) Point Source Category. See Appendix B for additional technical and legal information regarding these case-by-case TBELs.

The second part of the definition 18 AAC 70.990(B) (2003) appears to be in error, as 18 AAC 72.040 describes discharges to sewers and not minimum treatment. The correct reference appears to be the minimum treatment standards found at 18 AAC 72.050, which refers to domestic wastewater discharges only. The authorized domestic wastewater discharge is in compliance with the minimum treatment standards found in 18 AAC 72.050 as reflected by the permit limits specifying secondary treatment standards.

The third part includes any more stringent treatment required by state law, including 18 AAC 70 and 18 AAC 72. The correct operation of equipment, water quality monitoring, implementation of secondary treatment standards for the domestic wastewater discharge (18 AAC 72.050), and implementation of applicable BMPs, will control the discharge and satisfy all applicable federal and state permit conditions and requirements. See the rationale detailed above in item 2. This achieves the highest statutory and regulatory requirements.

After review of the applicable statutory and regulatory requirements, including 18 AAC 70, 18 AAC 72, and 18 AAC 83, the Department finds that the discharge from the existing point source meets the highest applicable statutory and regulatory requirements and that this finding is met.

8.0 OTHER PERMIT CONDITIONS

8.1 Quality Assurance Project Plan

The permittee is required to develop procedures to ensure that the monitoring data submitted are accurate and to explain data anomalies if they occur. The permittee is required to develop or update the Quality Assurance Project Plan (QAPP) within 60 days of the effective date of the final permit. Additionally, the permittee must submit a letter to the Department within 60 days of the effective date of the permit stating that the plan has been fully developed and implemented within the required time frame. The QAPP shall consist of standard operating procedures the permittee must follow for collecting, handling, storing and shipping samples; laboratory analysis; and data reporting. This requirement is carried forward from the previous permit as recent

sampling events at the facility have indicated a need for an updated plan to handle sampling result anomalies if they occur. Additionally, the permit requires new and modified sampling regimes that need to be included in the QAPP. The QAPP shall be retained onsite and made available to the Department upon request.

8.2 Best Management Practices Plan

In accordance with AS 46.03.110 (d), the Department may specify in a permit the terms and conditions under which waste material may be disposed of. This permit carries forward a requirement from the previous permit that directs the permittee to develop a Best Management Practices (BMP) Plan in order to prevent or minimize the potential for the release of pollutants to waters of the U.S. located in the State of Alaska through plant site runoff, spillage or leaks, or erosion. The permit also contains new BMP conditions such as employing efficient feeding strategies to reduce discharges to waters of the U.S., cleaning tanks to minimize discharge of accumulated solids, as well as others that must be included in the BMP plan. The permit requires the permittee to develop or update and implement a BMP plan within 180 days of the effective date of the final permit. The permittee must submit written notice to DEC that the plan has been fully developed and implemented within 180 days of the effective date of the permit. The permittee must review the BMP plan annually and submit a certified statement indicating the review was completed to DEC on or before January 31 of each year of operation, starting in 2014. The BMP plan must be kept onsite and made available to the Department upon request.

8.3 Chemical Hygiene Plan

The permit carries forward a requirement from the previous permit that the permittee develop and implement a Chemical Hygiene Plan (CHP). The CHP sets forth procedures, equipment, personal protective equipment and work practices that are capable of protecting employees from the health hazards presented by hazardous chemicals used in the workplace. The permittee is required to develop or update and implement a CHP for each laboratory connected to the TSMRI marine outfall line (Outfall 001), within 120 days of the effective date of the final permit. Each CHP shall be reviewed by the permittee annually by January 31 during each year of the permit starting in 2014 and modified as necessary to accurately reflect the current practices in the facility. The permittee shall create an annual summary of the chemical inventory by January 31, starting in 2014, for each laboratory for the calendar year. The permittee must submit written notice to DEC that the CHP, including the chemical inventory, has been fully developed and implemented within 120 days of the effective date of the permit. The CHP, including the annual chemical inventory, must be kept onsite and made available to the Department upon request.

8.4 Standard Conditions

Appendix A of the permit contains standard regulatory language that must be included in all APDES permits. These requirements are based on regulations and cannot be challenged in the context of an individual APDES permit action. The standard regulatory language covers requirements such as monitoring, recording, reporting requirements, compliance responsibilities, and other general requirements.

9.0 OTHER LEGAL REQUIREMENTS

9.1 Endangered Species Act

The Endangered Species Act (ESA) requires federal agencies to consult with the NOAA/NMFS and the U.S. Fish and Wildlife Service if their actions could beneficially or adversely affect any threatened or endangered species. As a state agency, DEC is not required to consult with these federal agencies regarding permitting actions; however, DEC voluntarily contacted the agencies to notify them of the issuance of this permit and to obtain listings of threatened and endangered species near the proposed discharge to Favorite Channel.

The following is the response from NMFS; however, no response was received from USFWS regarding potential effects to threatened or endangered species in the vicinity of the TSMRI discharge:

- In phone communication on March 7, 2012 NMFS identified the following threatened and endangered species in the vicinity of TSMRI discharge:
    - Humpback Whale (*Megaptera novaeangliae*) [Endangered]
    - Eastern Stellar Sea Lion (*Eumetopias jubatus*) east of 144° [Threatened]
- NMFS also indicated on March 7, 2012 that critical habitat exists in the vicinity of the discharge. There is a major haulout of Steller sea lion located on Benjamin Island, which is located about 12 miles north-northwest of TSMRI.

9.2 Essential Fish Habitat

Essential fish habitat (EFH) includes the waters and substrate (sediments, etc.) necessary for fish from commercially-fished species to spawn, breed, feed, or grow to maturity. The Magnuson-Stevens Fishery Conservation and Management Act (January 21, 1999) requires federal agencies to consult with NOAA when a proposed discharge has the potential to adversely affect (reduce quality and/or quantity of) EFH. As a state agency, DEC is not required to consult with federal agencies regarding permitting actions; however, DEC contacted NMFS to notify them of the issuance of this permit and to obtain listings of EFH near the subject discharge.

NMFS was contacted on February 3, 2012 and no response was received (specific to EFH). The Department will notify NMFS that the permit is available for their review during the public comment period.

9.3 Sludge (Biosolids) Requirements

Sludge means any solid, semi-solid, or liquid residue removed during the treatment of municipal wastewater or domestic sewage. State and federal requirements regulate the management and disposal of sewage sludge (biosolids). The permittee must consult both state and federal regulations to ensure proper management of the biosolids and compliance with applicable requirements.

9.3.1 State Requirements

The Department separates wastewater and biosolids permitting. The permittee should contact the Department's Solid Waste Program for information regarding state

regulations for biosolids. The permittee can access the Department's Solid Waste Program web page for more information and who to contact.

9.3.2 Federal Requirements

EPA is the permitting authority for the federal sewage sludge regulations at 40 CFR Part 503. Biosolids management and disposal activities are subject to the federal requirements in Part 503. The Part 503 regulations are self-implementing, which means that a permittee must comply with the regulations even if no federal biosolids permit has been issued for the facility.

The permittee should ensure that a biosolids permit application has been submitted to EPA. In addition, the permittee is required to submit a biosolids permit application to EPA for the use or disposal of sewage sludge at least 180 days before this APDES permit expires in accordance with 40 CFR §122.21(c)(2) and 122.21(q) [see also 18 AAC 83.110(c) and 18 AAC 83.310, respectively]. The application form is NPDES Form 2S and can be found on EPA's website, www.epa.gov, under NPDES forms. A completed NPDES Form 2S should be submitted to:

U.S. Environmental Protection Agency
Region 10, NPDES Permits Unit OWW-130
Attention: Biosolids Contact
1200 Sixth Avenue, Suite 900
Seattle, WA 98101-3140
The EPA Region 10 telephone number is 1-800-424-4372.

Information about EPA's biosolids program and CWA Part 503 is available at www.epa.gov and either search for 'biosolids' or go to the EPA Region 10 website link and search for 'NPDES Permits'.

9.4 Permit Expiration

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

10.0 References

1. Alaska Department of Environmental Conservation, 2008. *Alaska Water Quality Criteria Manual for Toxics and Other Deleterious Organic and Inorganic Substances*, as amended through December 12, 2008.
2. Alaska Department of Environmental Conservation, 2010. *Alaska's Final 2010 Integrated Water Quality Monitoring and Assessment Report*. July 15, 2010.
3. Alaska Department of Environmental Conservation, 2008b. 18 AAC 83: *Alaska Pollutant Discharge Elimination System*. October 31, 2008.
4. Alaska Department of Environmental Conservation, 2009. 18 ACC 72. *Wastewater Disposal*, as Amended Through April 8, 2012.
5. Alaska Department of Environmental Conservation, 2003. 18 ACC 70. *Water Quality Standards*, as Amended Through June 26, 2003.
6. Environmental Protection Agency, 1991, *Technical Support Document For Water Quality-based Toxics Control*, US Environmental Protection Agency, Office of Water, the Department/505/2-90/001
7. Environmental Protection Agency, 2004. 40 CFR Part 451. *Concentrated Aquatic Animal Production Point Source Category*. August 23, 2004.

APPENDIX A. FACILITY INFORMATION

Figure 1: Ted Stevens Marine Research Institute Map

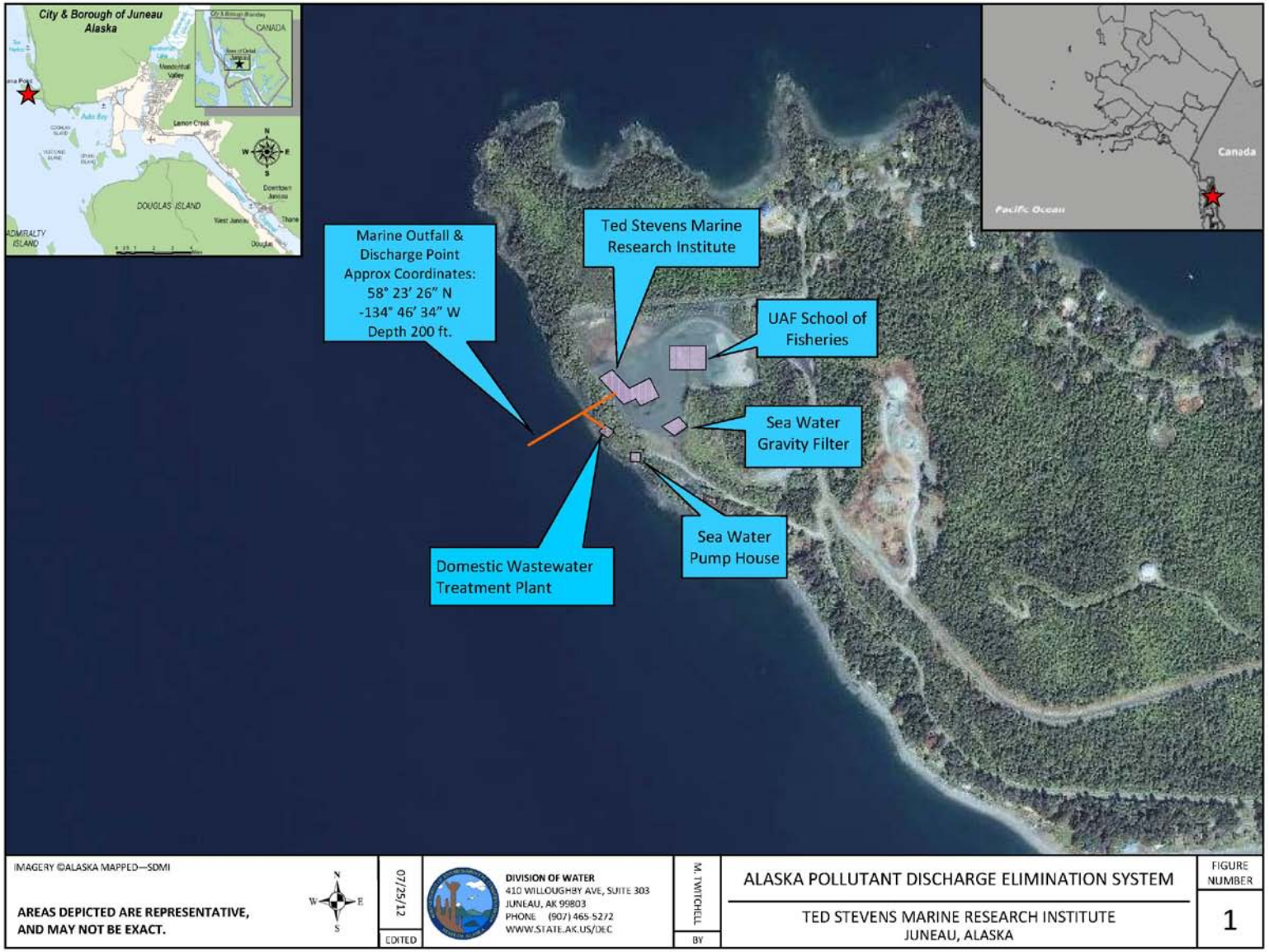
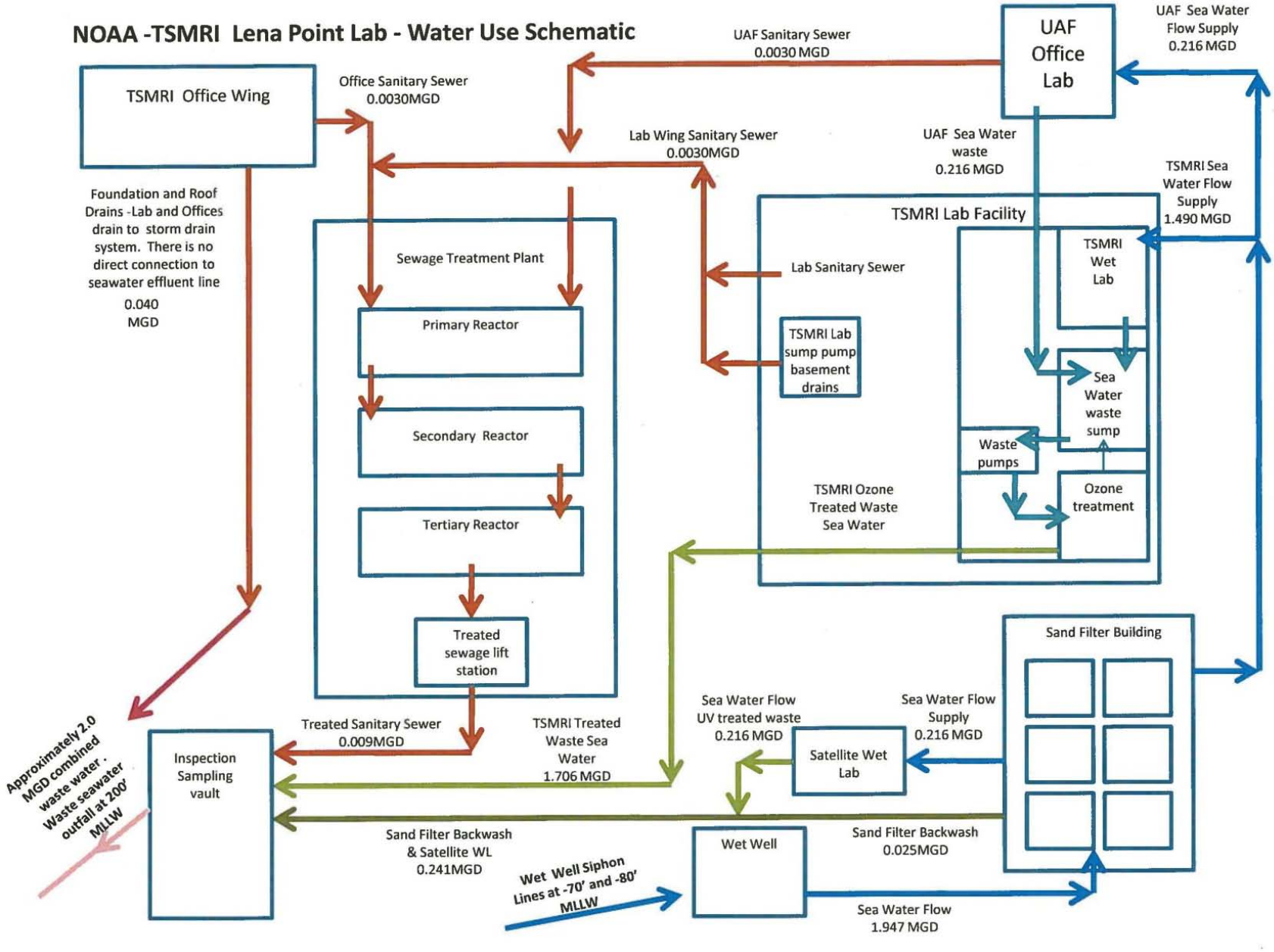


Figure 2: Ted Stevens Marine Research Institute Process Flow Diagram



APPENDIX B. BASIS FOR EFFLUENT LIMITS

The Clean Water Act (CWA) requires that the effluent limit for a particular pollutant be the more stringent of either technology-based effluent limits (TBEL) or water quality-based effluent limits (WQBEL). TBELs are established by the Environmental Protection Agency (EPA) for many industries in the form of effluent limitation guidelines (ELG) and are based on available pollution control technology.

In accordance with Alaska Pollutant Discharge Elimination System regulations at 18 AAC 83.475, best management practices (BMPs) can be used to control or abate the discharge of pollutants in several circumstances, including, when numeric effluent limits are infeasible. BMPs are defined at 18 AAC 83.990(9) as schedules of activities, prohibitions of practices, maintenance procedures, and other management practices to prevent or reduce the pollution of waters of the United States (U.S.). CWA Section 304 (e) authorizes the inclusion of BMPs as requirements in discharge permits.

The Department may find, by analyzing the effect of an effluent discharge on the receiving water body, that secondary treatment effluent limits or other TBELs are not sufficiently stringent to meet water quality standards (WQS). In such cases, the Department is required to develop more stringent WQBELs, which are designed to ensure that the WQS of the receiving water body are met.

Secondary treatment effluent limits do not limit every parameter that may be present in the effluent. Limits have been developed for 5 Day Biochemical Oxygen Demand (BOD_5), Total Suspended Solids (TSS), and pH. Effluent may contain other pollutants, such as bacteria or metals, depending on the type of treatment system used and the characteristics of the influent to the treatment system. When TBELs do not exist for a particular pollutant expected to be in the effluent, the Department must determine if the pollutant may cause or contribute to an exceedance of a WQS for the water body. If a pollutant causes or contributes to an exceedance of a WQS, a WQBEL for the pollutant must be established in the permit.

B.1 Technology-Based Effluent Limits

Section 301 of the CWA established a required performance level, referred to as “secondary treatment,” that all Publically Owned Treatment Works (POTWs) were required to meet by July 1, 1977. The Department has adopted the “secondary treatment” effluent requirements by reference in 18 AAC 83.010(e). The TBELs apply to all municipal wastewater treatment plants and identify the minimum level of effluent quality attainable by application of secondary treatment in terms of BOD_5, TSS, and pH. In addition to having adopted the federal secondary treatment regulations in 40 CFR Part 133, the State of Alaska requires maximum daily limitations of 60 mg/L for BOD_5 and TSS in its own secondary treatment regulations (18 AAC 72.990).

The secondary treatment standards are not directly applicable to Ted Stevens Marine Research Institute (TSMRI) Internal Outfall 002 since the facility is not a municipal wastewater treatment plant. The wastewater characteristics are similar, however, and the TBELs are being established as Best Professional Judgment (BPJ) case-by-case effluent limits consistent with the requirements found in 40 CFR §133.102 (adopted in 18 AAC 83.010) and 18 AAC 72.990. The TBELs are applicable to Internal Outfall 002, domestic wastewater discharge, before any mixing with the total TSMRI marine outfall and are listed in Table B-1. Application of secondary treatment standards at Internal Outfall 002 rather than the final marine discharge Outfall 001 to Favorite Channel is appropriate because the domestic wastewater at Internal Outfall 002 is treated separately then combined with other waste streams prior to final marine discharge.

18 AAC 83.550(a) states: “When permit effluent limitations or standards imposed at the point of discharge are impractical or infeasible, effluent limitations or standards for dischargers of pollutants may be imposed on internal wastestreams before mixing with other wastestreams…” As such, and as in previous permits, Internal Outfall 002 is established to apply the secondary treatment standards and to ensure that other wastestreams do not dilute the domestic waste stream to the point where the pollutants are not analytically detectable. The permit contains some new treatment requirements from 18 AAC 83.010(e), specifically, BOD5 and percent removal requirements of 18 AAC 83.010(e) and the 45 mg/L weekly average permit limits for BOD5 and TSS.

In August 2004, for facilities such as hatcheries, fish farms, or other facilities that contain, grow or hold aquatic animals such as cold water fish species facilities that produced 100,000 pounds or more of aquatic animals per year, EPA promulgated an ELG, 40 CFR Part 451. The ELG regulations establish national technology-based effluent discharge requirements for flow-through/re-circulating systems and net pens, based on Best Practicable Control Technology Currently Available (BPT); Best Control Technology for Conventional Pollutants (BCT); Best Available Technology Economically Achievable (BAT) and New Source Performance Standards (NSPS).

The ELG does not directly apply to the TSMRI facility, which currently holds approximately 300 pounds of aquatic animals (and would hold no more than 1500 pounds of aquatic animals), however the wastewater characteristics are similar. Because the requirements of 40 CFR Part 451 are not directly applicable to the TSMRI for Outfall 001, the Department has used BPJ for narrative TBEL requirements in the form of BMPs pursuant to authority requirements established by CWA Section 402 (a) (1) (B), and in accordance with requirements established at 40 CFR§ 125.3.

B.2 Mass-Based Limitations

The regulation at 18 AAC 83.540 requires that effluent limits be expressed in terms of mass, if possible. The regulation at 18 AAC 83.520 requires that effluent limits be calculated based on the design flow of the facility. The mass based limits are expressed in pounds per day and are calculated as follows:

Mass based limit (lbs/day) = concentration limit (mg/L) × design flow (mgd) × 8.341[1]

[1] 8.341 is a conversion factor with units (lb x L) / (mg x gallon x 10^6)

Table B-1: Technology-Based Effluent Limits – Internal Outfall 002
(40 CFR §133.102 & 18 AAC 83.010(e))

Parameter	Average Monthly Limit	Average Weekly Limit	Maximum Daily Limit	Range
BOD_5	30 mg/L	45 mg/L	60 mg/L	N/A
	2.3 lbs/day	3.4 lbs/day	4.5 lbs/day	
TSS	30 mg/L	45 mg/L	60 mg/L	N/A
	2.3 lbs/day	3.4 lbs/day	4.5 lbs/day	
Removal Rates for BOD_5 & TSS	85% (minimum)	N/A	N/A	N/A
pH	N/A	N/A	N/A	6.0 – 9.0 SU

B.3 Water Quality Based Effluent Limits for Outfall 001

B.3.1 Statutory and Regulatory Basis

18 AAC 70.010 prohibits conduct that causes or contributes to a violation of the WQS.
18 AAC 70.090 requires that permits include terms and conditions to ensure criteria are met, including operating, monitoring, and reporting requirements.

The regulations require the permitting authority to make this evaluation using procedures that 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 body. The limits must be stringent enough to ensure that WQS are met and must be consistent with any available wasteload allocation (WLA).

B.3.2 Reasonable Potential Analysis

When evaluating the effluent to determine if WQBELs based on chemical-specific numeric criteria are needed, the Department projects the receiving water body concentration for each pollutant of concern downstream of where the effluent enters the receiving water body. The chemical-specific concentration of the effluent and receiving water body and, if appropriate, the dilution available from the receiving water body, are factors used to project the receiving water body concentration. If the projected concentration of the receiving water body exceeds the numeric criterion for a limited parameter, then there is a reasonable potential that the discharge may cause or contribute to an excursion above the applicable water quality standard, and a WQBEL must be developed.

The discharge is required to meet water quality standards at the end-of-pipe for flow, dissolved oxygen, fecal coliform bacteria and pH. No documented WQS exceedances were noted for dissolved oxygen, fecal coliform bacteria or pH at Outfall 001, so a reasonable potential analysis was not performed for this permit.

According to 18 AAC 70.990(38), a mixing zone is an area in a water body surrounding, or downstream of, a discharge where the effluent plume is diluted by the receiving water within which specified water quality criteria may be exceeded. Water quality criteria and limits may be exceeded within a mixing zone. A mixing zone can be authorized only when adequate receiving water body flow exists, and the concentration of the pollutant of concern in the receiving water body is below the numeric criterion necessary to protect the designated uses of the water body.

The applicant has not requested a mixing zone so the discharge is required to meet water quality standards at the end-of-pipe.

B.3.3 Specific Water Quality-Based Effluent Limits

B.3.3.1 Floating, Suspended or Submerged Matter, including Oil and Grease

The Alaska WQS require surface waters to be free from floating solids, debris, sludge deposits, foam, scum, or other residues of any kind in concentrations causing nuisance, objectionable, or detrimental conditions or that make the water unfit or unsafe for the use. The permit requires that the facility meet a narrative standard for floating solids, visible foam, and oily wastes, which is similar to a requirement in the previous permit.

B.3.3.2 pH

The criteria for water supply, aquaculture, and growth and propagation of fish, shellfish, other aquatic life, and wildlife are the most stringent standards for pH. These standards at 18 AAC 70.020(b)(18) state that marine waters, "May not be less than 6.5 or greater than 8.5." To ensure WQS are met, the permit establishes pH effluent limits of a daily maximum of 8.5 SU and a daily minimum of 6.5 Significant Units (SU), which is consistent with the previous permit.

B.3.3.3 Dissolved Oxygen

The criteria for water supply, aquaculture are the most stringent standards for dissolved oxygen (DO). The standards at 18 AAC 70.020(b)(15)(A)(i) require that "Surface DO concentration in coastal water may not be less than 6.0 mg/L for a depth of one meter except when natural conditions cause this value to be depressed. DO may not be reduced below 4 mg/l at any point beneath the surface. DO concentrations in estuaries and tidal tributaries may not be less than 5.0 mg/l except where natural conditions cause this value to be depressed. In no case may DO levels exceed 17 mg/l. The concentration of total dissolved gas may not exceed 110% of saturation at any point of sample collection." To ensure WQS are met, the permit establishes DO effluent limits of a daily minimum of 6.0 mg/L and a daily maximum of 17.0 mg/L, which are carried forward as the same DO limit as the previous permit.

B.3.3.4 Fecal Coliform Bacteria

Fecal coliform bacteria is a non-pathogenic indicator species whose presence suggests the likelihood that pathogenic bacteria are present. The WQS at 18 AAC 70.020(b)(14)(D) for harvesting of raw mollusk or other aquatic life for consumption is the most stringent criterion applicable for this discharge. This criterion specifies that the fecal coliform bacteria concentration shall not exceed 14 FC/100 mL and not more than 10% of samples shall exceed a fecal coliform bacteria concentration of 43 FC/100 mL. To ensure WQS are met, the permit carries forward the same fecal coliform bacteria limit as the previous permit.

B.3.3.5 Enterococci

Enterococci bacteria monitoring has been added to the permit based on the EPA promulgation of Enterococci bacteria standards for marine waters to protect primary

contact recreation. On October 10, 2000, the Beaches Environmental Assessment and Coastal Health Act (BEACH Act) was signed into law, amending the CWA. The BEACH Act addressed pathogens and pathogen indicators in coastal recreation water.

Water quality criteria for bacteria are based on levels of indicator bacteria, which demonstrate the presence of pathogens in fecal pollution. Fecal coliform bacteria have been the recommended indicator organism in the past. The Department of Environmental Conservation (DEC or the Department) has not adopted WQS for Enterococci bacteria in 18 AAC 70. Therefore, as a delegated program, the Department must apply the federal standard, as provided in 40 CFR §131.41. In this permit, monitoring the effluent for both fecal coliform bacteria and Enterococci bacteria are required to evaluate which organism will ultimately be monitored and what limits will be applied in the next permit.

Due to a lack of data on Enterococci concentrations on which to base limits during this permit cycle, monitoring and reporting test results for Enterococci bacteria from the effluent will be required. Sampling will be required during the months of May through September when the receiving water would most likely be used for primary contact recreation. Sampling for fecal coliform and Enterococci bacteria shall occur on the same day.

B.3.4 Selection of Most Stringent Limitations

B.3.4.1 BOD_5 and TSS

The permit proposes TBELs for BOD_5 and TSS at Internal Outfall 002.

B.3.4.2 pH

The previous permit pH limits of between 6.5 SU and 8.5 SU are identical to the more stringent WQS and shall apply at the end-of-pipe, Outfall 001. The permit proposes TBELs for pH for Internal Outfall 002.

Table B-2: Selection of pH Permit Limits

Selection of pH Permit Limits	Minimum Daily (SU)	Maximum Daily (SU)
Technology Based Limits	6.0	9.0
Water Quality Standard	6.5	8.5
Selected Limits Outfall 001	**6.5**	**8.5**
Selected Limits Internal Outfall 002	**6.0**	**9.0**

B.3.4.3 Fecal Coliform Bacteria

The previous permit fecal coliform bacteria limits are identical to the WQS and shall apply at the end-of-pipe, Outfall 001.

Table B-3: Selection of Fecal Coliform Permit Limits

Selection of Fecal Coliform Permit Limits	Average Monthly (#/100 mL)	Average Weekly (#/100 mL)	Maximum Daily (#/100 mL)
Previous Permit Limits	14	N/A	43
Water Quality Standard	14	N/A	43
Selected Limits	14	N/A	43

B.3.4.4 Dissolved Oxygen

The previous permit DO limits of between 6.0 mg/L and 17 mg/L are identical to the more stringent WQS and shall apply at the end-of-pipe, Outfall 001.

Table B-4: Selection of Dissolved Oxygen Permit Limits

Selection of Dissolved Oxygen Permit Limits	Minimum Value (mg/L)	Maximum Daily (mg/L)
Previous Permit Limits	6.0	17.0
Water Quality Standard	6.0	17.0
Selected Limits	6.0	17.0