Fact Sheet

The U.S. Environmental Protection Agency (EPA)
Proposes to Reissue a National Pollutant Discharge Elimination System (NPDES) Permit to Discharge Pollutants Pursuant to the Provisions of the Clean Water Act (CWA) to:

Naval Air Station Whidbey Island
Seaplane Base Lagoon Wastewater Treatment Plant

Public Comment Start Date: March 24, 2018
Public Comment Expiration Date: April 23, 2018

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The EPA Proposes to Issue NPDES Permit
The EPA proposes to issue the NPDES permit for 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 location
- technical material supporting the conditions in the permit

State Certification
The EPA is requesting that the Washington State Department of Ecology (Ecology) certify the NPDES permit for this facility, under Section 401 of the Clean Water Act. Comments regarding the certification should be directed to:

Department of Ecology, State of Washington
Northwest Regional Office
3190 - 160th Ave. SE
Bellevue, WA 98008-5452
Phone: 425-649-7000

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

After the Public Notice expires, and all comments have been considered, the EPA's regional Director for the Office of Water and Watersheds will make a final decision regarding permit issuance. 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 substantive comments are received, the EPA will address the comments and issue the permit. The permit will become effective no less than 30 days after the issuance date, unless an appeal is submitted to the Environmental Appeals Board within 30 days pursuant to 40 CFR 124.19.

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

United States Environmental Protection Agency
Region 10
1200 Sixth Avenue, OWW-190
Seattle, Washington 98101
(206) 553-0523 or
Toll Free 1-800-424-4372 (within Alaska, Idaho, Oregon and Washington)

The fact sheet and draft permits are also available at:

Department of Ecology, State of Washington
Northwest Regional Office 3190 - 160th Ave.
SE Bellevue, WA 98008-5452
Phone: 425-649-7000

Acronyms

1Q10	1 day, 10-year low flow
7Q10	7 day, 10 year low flow
30B3	Biologically-based design flow intended to ensure an excursion frequency of less than once every three years, for a 30-day average flow.
30Q10	30 day, 10 year low flow
ACR	Acute-to-Chronic Ratio
AML	Average Monthly Limit
ASR	Alternative State Requirement
AWL	Average Weekly Limit
BA	Biological Assessment
BAT	Best Available Technology economically achievable
BCT	Best Conventional pollutant control Technology
BE	Biological Evaluation
BO or BiOp	Biological Opinion
BOD_5	Biochemical oxygen demand, five-day
BOD_{5u}	Biochemical oxygen demand, ultimate
BMP	Best Management Practices
BPT	Best Practicable
°C	Degrees Celsius
C BOD_5	Carbonaceous Biochemical Oxygen Demand
CFR	Code of Federal Regulations
CFS	Cubic Feet per Second
COD	Chemical Oxygen Demand
CSO	Combined Sewer Overflow
CV	Coefficient of Variation
CWA	Clean Water Act
DMR	Discharge Monitoring Report
DO	Dissolved oxygen
EA	Environmental Assessment
Ecology	State of Washington Department of Ecology

EFH	Essential Fish Habitat
EIS	Environmental Impact Statement
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FDF	Fundamentally Different Factor
FR	Federal Register
gpd	Gallons per day
HUC	Hydrologic Unit Code
IC	Inhibition Concentration
ICIS	Integrated Compliance Information System
I/I	Infiltration and Inflow
LA	Load Allocation
lbs/day	Pounds per day
LC	Lethal Concentration
LC_{50}	Concentration at which 50% of test organisms die in a specified time period
LD_{50}	Dose at which 50% of test organisms die in a specified time period
LOEC	Lowest Observed Effect Concentration
LTA	Long Term Average
LTCP	Long Term Control Plan
mg/L	Milligrams per liter
ml	milliliters
ML	Minimum Level
µg/L	Micrograms per liter
mgd	Million gallons per day
MDL	Maximum Daily Limit or Method Detection Limit
MF	Membrane Filtration
MLLW	Mean Lower Low Water
MPN	Most Probable Number
N	Nitrogen
NEPA	National Environmental Policy Act
NOAA	National Oceanic and Atmospheric Administration
NOEC	No Observable Effect Concentration

NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NSPS	New Source Performance Standards
OWW	Office of Water and Watersheds
O&M	Operations and maintenance
POTW	Publicly owned treatment works
PSES	Pretreatment Standards for Existing Sources
PSNS	Pretreatment Standards for New Sources
QAP	Quality assurance plan
RP	Reasonable Potential
RPM	Reasonable Potential Multiplier
RWC	Receiving Water Concentration
SIC	Standard Industrial Classification
SPCC	Spill Prevention and Control and Countermeasure
SS	Suspended Solids
SSO	Sanitary Sewer Overflow
s.u.	Standard Units
TKN	Total Kjeldahl Nitrogen
TMDL	Total Maximum Daily Load
TOC	Total Organic Carbon
TRC	Total Residual Chlorine
TRE	Toxicity Reduction Evaluation
TSD	Technical Support Document for Water Quality-based Toxics Control (EPA/505/2-90-001)
TSS	Total suspended solids
TU_a	Toxic Units, Acute
TU_c	Toxic Units, Chronic
USFWS	U.S. Fish and Wildlife Service
USGS	United States Geological Survey
UV	Ultraviolet
WET	Whole Effluent Toxicity
WLA	Wasteload allocation

WQBEL	Water quality-based effluent limit
WQS	Water Quality Standards
WWTP	Wastewater treatment plant

I. Applicant

A. General Information

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

Naval Air Station Whidbey Island Seaplane Base
NPDES Permit # WA0026760

Physical Address:
1115 West Lexington Street Building 103
Oak Harbor, WA 98278

Mailing Address:
1115 West Lexington Street Building 103
Oak Harbor, WA 98278

Contact:
Dave M. Goodchild, P.E.
UEM Civil Engineer
NAS Whidbey Island
360-257-1481

B. Permit History

The Seaplane Base Waste Water Treatment Plant Lagoon (Seaplane Base WWTP) was historically operated by the US Navy to treat wastewater generated by Navy operations and housing areas at the Seaplane Base. The City of Oak Harbor (City) entered into a 50-year lease agreement with the Navy in 1990 that turned over operational control of the Seaplane Base WWTP to the City. In 1991, the City completed a project to transfer flows from the City's Rotating Biological Contactor Plant (RBC Plant) to the Seaplane Base WWTP. The project included construction of a diversion pump station at the RBC plant and a dedicated conveyance line to transfer flows in excess of the RBC Plant design flow (0.7 MGD) from the RBC Plant to the Seaplane Base WWTP. The City currently operates and maintains the Seaplane Base WWTP. Flows to the Seaplane Base WWTP include: all sewage flow from the City in excess of 0.7 mgd, domestic wastewater flows from the Seaplane Base and industrial wastewater from operations at the Seaplane Base.

The City is currently constructing a new plant at Windjammer Park that will replace the RBC and Seaplane Base Lagoon WWTP to provide sufficient treatment capacity for all of the City's sewage. Once the City completes construction and begins using the new treatment plant, they will terminate the lease to operate and maintain the Seaplane Base WWTP. The Navy will regain operation and maintenance of the Seaplane Base WWTP. The latest estimate of startup of the City's new wastewater treatment plant is mid-2018. The City plans to maintain connection with the Seaplane Base lagoons until December 2018.

The Seaplane Base WWTP is currently permitted by the Washington Department of Ecology (Ecology) under NPDES permit WA0020567. Because the City operates the Seaplane Base

WWTP, the City is the permittee. The permit expired on August 29, 2016 and is administratively extended.

In a letter dated December 27, 2016 the City notified the Navy of their intent to terminate the lease in two years, on December 27, 2018. After the City's lease is terminated, the Navy will regain operation and maintenance of the Seaplane Base WWTP. At that point, the Navy would require authorization to discharge from the Seaplane Base WWTP. Therefore, in the draft permit, EPA is proposing an effective date of December 27, 2018.

An NPDES application for permit issuance was submitted by the Navy on April 8, 2015. By letter of May 11, 2015 the EPA requested additional information to complete the application. The EPA determined that the application was complete on April 4, 2016.

II. Facility Information

A. Treatment Plant Description

Service Area

The service area consists of the Navy's Capeheart Housing Area; base support operations such as food service, training facilities, recreational facilities, retail facilities and public works and infrastructure functions for example utilities, road and building maintenance, vehicles maintenance and fuel storage. The collection system has no combined sewers. The facility will serve a resident population of 4,400. There are no major industries discharging to the facility.

Industrial Discharges

Industrial discharges to the treatment plant constitute less than 0.4 percent of the design flow. Industrial uses of the lagoon have changed since the last reissuance of the Ecology permit.

1) Navy Exchange Gas Station

This gas station includes a convenience store and a car wash. The convenience store was closed in 2015 with attendants and staff located in the Navy Exchange Building 17 to the east. The car wash is a closed-loop system equipped with an integral sand interceptor, oil water separator, and reclamation tank. There is very little overflow of wash water discharges from the closed-loop system into the sanitary sewer. The gas station contains six fuel dispensers. Within the dispenser area, staff clean up vehicle fueling spillage and water dripping from cars and wash down the area with fresh water daily.

The dispenser area is provided with a full-size overhead canopy cover, spill containment slab, a trench drain, and catch basin to contain and direct the wastewater generated in the area to an oil water separator prior to discharge to the sanitary sewer.

The separator consists of three compartments (two-baffle), which has a capacity of 450 gallons.

Overall, the separator could reasonably contain a 200-plus-gallon spill. The separator has a manual isolation valve on the effluent side of the system. It can be secured in the event of a major spill at the facility. The largest release was five gallons, and no fuel reached the sanitary sewer.

The gas station has three emergency switches that shut down the fuel dispenser pumps. Two are on the building exterior; the third is located at the customer counter. Either an attendant or a customer would have adequate time to activate the fuel pump emergency stop and close the valve at the separator. Each fuel dispensing nozzle/hose has a breakaway hose disconnect. If a customer leaves the nozzle in their tank and drives off, the breakaway disconnects and stops fuel from spilling out of the hose. The separator is inspected every six months and cleaned on a yearly basis. The cleaning removes accumulated debris and petroleum.

2) Fuel Farm 1

Fuel Farm 1 is no longer discharging.

3) Vessel Wash Pads in the Explosive Ordnance Detachment (EOD) and Morale Welfare and Recreation (MWR)

The covered wash pad in the EOD is located adjacent to Building 2795. The Navy directs washing wastewater to an oil water separator prior to discharge into the sanitary sewer. The vessels washed range in size from 22 to 27 feet. Additionally, inflatable Zodiac type boats and vessel tow vehicles are washed. Approximately one vessel and one vehicle are washed per week in the EOD. According to the facility, the EOD vessels have no anti-fouling paint on the underwater body.

The MWR wash pad is located between Buildings 81 and 2735. Prior to the fall of 2013 this wash pad was used by MWR to wash rental equipment, primarily small vessels. After the relocation of MWR to Ault Field the wash pad is used by the Fuel Response Team (FRT) to wash down their nine vessels. Each vessel is washed every time it is removed from the water (used approximately two times per month). Wastewater from the wash pad is directed to a settling basin (with integral oil water separator) prior to discharge into the sanitary sewer.

Washing removes salt water, sea growth, slime, dirt, and stains. Three vessels have two outboard motors; the other six have single outboard motors which are flushed with potable water over the wash pad. Flushing may result in small amounts of oil becoming entrained in the flush water. The FRT uses potable water at system pressure and rags to wash vessels. A dilute, biodegradable, detergent solution such as Simple Green is typically used to help remove stubborn stains on an as-needed basis.

4) Seabee Heavy Equipment Wash Rack

The Seabees are a Navy component that provides engineering support to the Navy, Marine Corps, and other forces in military operations; to conduct defensive operations as required; and to meet disaster preparedness and recovery missions. As a construction organization, the Seabees own and operate a variety of construction equipment such as trucks, earth moving equipment, pumps, generators, and compressors.

The Seabee's were relocated and the wash rack secured with their departure around 2006. Other Navy components may use the wash rack, such as the Explosive Ordnance Detachment (EOD), Security and Public Works by checking out a key from building 18. Due to low water pressure and being a locked facility this wash rack has not been used since the Seabee's departure.

Treatment Process

The design flow of the facility will be 0.57 mgd following the right-size of the existing unit processes at the current location by reducing the volume of the cells and effluent pumps to match treatment capabilities to actual flows requiring treatment.

- Effluent pumping is oversized and pumps will be replaced with smaller pumps with variable frequency drives.
- The anaerobic treatment lagoons will be down-sized if long term use will be required
- The SE Aerated Lagoon volumes will be reduced to avoid excessive algae growth.
- The NW Aerated Lagoon will not be needed for routine treatment use and will be placed in "standby mode"
- The NE Aerated Lagoon will be fully decommissioned.

The lagoon facility influent enters at the headworks, which consists of flow metering with a Parshall flume, a flat plate screen and a vortex grit chamber. From the headworks wastewater flows to an anaerobic pretreatment lagoon, aerated lined lagoons and a hypochlorite disinfection system. Disinfected effluent flows by gravity (or is pumped by an effluent pump station at high tides) to outfall #002 in Crescent Harbor.

The facility also includes a diversion structure to allow effluent polishing in a physical-chemical treatment system. The physical chemical system includes flash mix basins, flocculation basins, and rectangular clarifiers. The system is capable of feeding both ferric sulfate and polymer to enhance coagulation and settling. Since installation of the anaerobic lagoon has greatly minimized the production of algae, the use of the polymer polishing system has not been necessary.

Outfall Description

Treated effluent from the existing Seaplane Base Plant is discharged into Crescent Harbor though an 18-inch-diameter concrete outfall. The outfall is 3,284 feet long, terminating at a water depth of -41 feet Mean Lower Low Water (MLLW).

The first 990 feet from the shoreline out to approximately -15 feet MLLW consists of reinforced concrete pipe constructed in 1971. The outfall was extended in 1989 from that point to the current diffuser location shown in Figure 1 with concrete cylinder pipe. The concrete cylinder pipe portion of the outfall terminates in a diffuser section consisting of twenty-four, 2-1/4" ports spaced alternately on 8-foot centers. The diffuser ports discharge horizontally at the spring line of the outfall diffuser pipe.

The outfall is broken at the transition point between the reinforced concrete pipe and concrete cylinder pipe. In addition, sediment has collected around the diffuser causing the ports to not function properly.

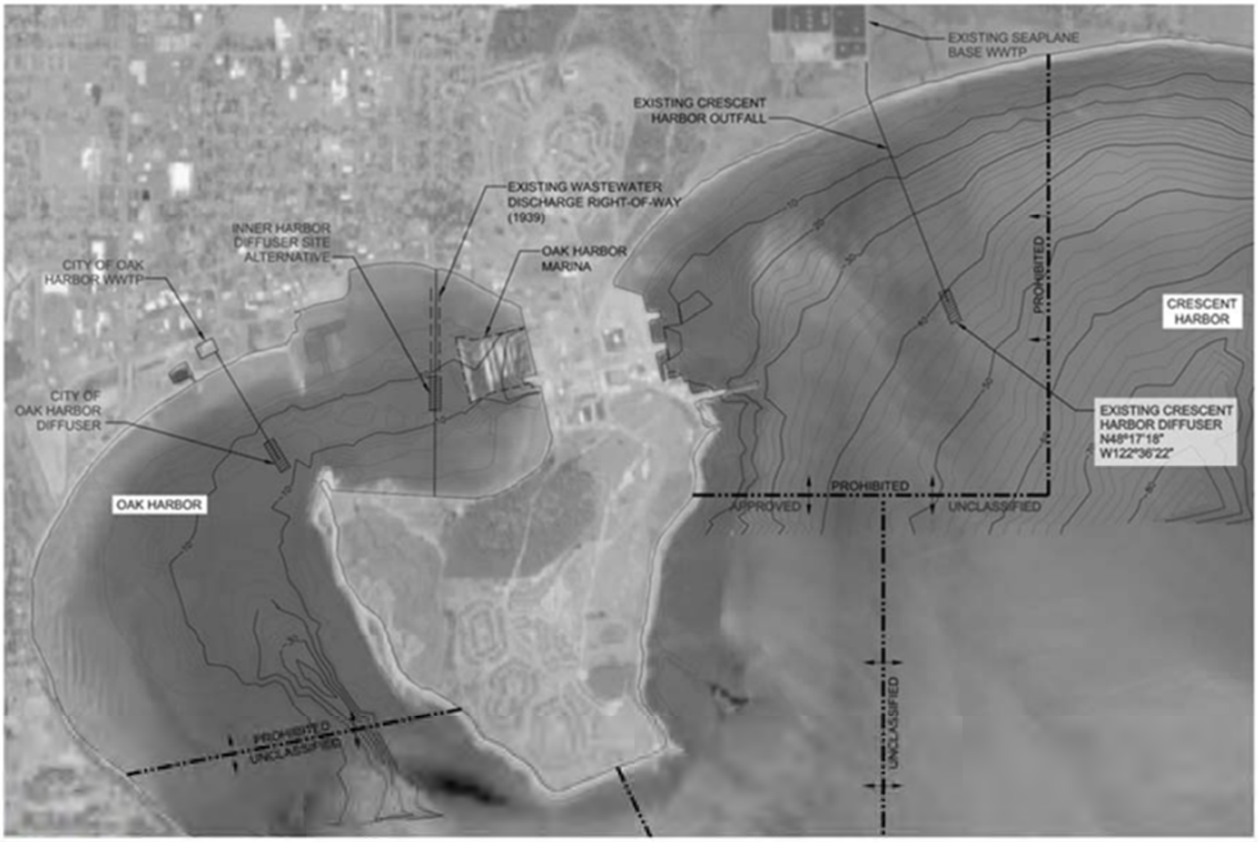


Figure 1: Oak Harbor and Crescent Harbor Outfalls

An inspection in 2008 identified a leak in the line leading to the outfall and that many of the diffuser ports were not functioning properly. The dive report estimated that up to 25% of the total effluent flow was discharging from the line break, only 10% of the flow was discharging through the diffusers and more than 50% of the flow was discharging at the end of the pipe around the loosened end cap. The nearshore section of the outfall is beyond its design life and should be replaced. A condition in the permit requires the Navy to develop recommendations for permanent repair or replacement of this outfall line and establishes a completion date of three years for the repair.

The Seaplane Base Plant outfall was again inspected in October 2010 (CME, 2010). The video and written report of the inspection were submitted to the City of Oak Harbor, who is the current operator of the Seaplane Base Plant and outfall. The summary conclusions and recommendations are summarized below:

- The older RCP section of the outfall has reported leaks near shore, and is not considered suitable for long-term wastewater discharge scenarios.
- The thrust block and coupling joining the RCP and CCP pipe is separated and leaking.

- The CCP section of the outfall constructed in 1989 is in good condition and may be considered in any long-term wastewater discharge scenario.
- The diffuser section is structurally in good condition, but enlargement and various repairs to diffuser ports and the end cap may be necessary.

B. Background Information

Effluent Characterization

In order to determine pollutants of concern for further analysis, the EPA evaluated the application form, additional discharge data, and the nature of the discharge. The wastewater treatment process for this facility includes both primary and secondary treatment, as well as disinfection with chlorination. Pollutants typical of a sewage treatment plant treating with chlorine would be expected in the discharge, including five-day carbonaceous biochemical oxygen demand ($CBOD_5$), total suspended solids (TSS), fecal coliform bacteria, total residual chlorine (TRC), pH, ammonia, temperature, phosphorus, and dissolved oxygen (DO). Based on this analysis, pollutants of concern are as follows:

- $CBOD_5$
- TSS
- Fecal Coliform bacteria
- TRC
- pH
- Copper
- Zinc
- Temperature
- DO
- Ammonia
- Mercury
- Lead
- Arsenic
- Nickel
- Selenium
- Phenols
- Chromium
- Antimony
- Bis(2-ethylhexyl)phthalate
- Cyanide
- Thallium
- Silver

The concentrations of pollutants in the discharge were reported in the NPDES application and in DMRs.

Compliance History

The EPA reviewed the last five years of effluent monitoring data (2011 – present) from the discharge monitoring report (DMR).

The facility has multiple violations in their compliance record.

III. Receiving Water

This facility discharges to Crescent Harbor on the east side of Whidbey Island at the Naval Air Station Whidbey Island Seaplane Base.

A. Receiving Water Quality

The EPA reviews receiving water quality data when assessing the need for and developing water quality based effluent limits. In granting assimilative capacity of the receiving water, the EPA must account for the amount of the pollutant already present in the receiving water. In situations where some of the pollutant is actually present in the upstream waters, an assumption of "zero background" concentration overestimates the available assimilative capacity of the receiving water and could result in limits that are not protective of applicable water quality standards.

The ambient background data, taken from the existing permit, used for this permit includes the following from Ecology's short-term monitoring station located in Penn Cove (Station ID: PNN001). Data in Table 1 is compiled from monitoring conducted during 2007 and are a composite from readings for the water column from the surface to 13.5 meter depth.

Table 1: Receiving Water Quality Data

Parameter	Units	Percentile	Value
Temperature	°C	Highest annual 1-DMax	12.9
pH	Standard units	average	7.70
Ammonia	mg/L	Maximum	0.09
Dissolved Oxygen	mg/L	minimum	6.6
Salinity	psu	--	28.06

B. Water Quality Standards

Overview

Section 301(b)(1)(C) of the CWA requires that NPDES permits include any effluent limitations necessary to meet water quality standards. Federal regulations found at 40 CFR 122.4(d) require that the conditions in NPDES permits ensure compliance with the water quality standards including narrative criteria for water quality for the receiving water and downstream waters of any affected State. A state or tribe's water quality standards protect surface waters by designated uses, numeric and narrative criteria, and an anti-degradation policy.

The first part of a state's water quality standards is a use classification system for water bodies based on the expected uses that each water body is expected to achieve, such as public water supply, recreation in and on the water, and propagation of fish. The uses in this system are called *designated uses*. States must also consider and ensure the attainment and maintenance of the water quality standards of downstream waters when establishing designated uses [40 CFR 131.10(b)].

The overall objective of CWA is to restore and maintain the chemical, physical, and biological integrity of the Nation's waters. Section 101(a)(2) of the CWA states that water quality should provide for the protection and propagation of fish, shellfish, and wildlife, and recreation in and on the water, wherever attainable. This provision is sometimes referred to as the "fishable/swimmable" goal of the CWA. Consistent with this goal, states are required to designate all waters of the U.S. within the state with fishable/swimmable use designations unless the state can meet the requirements found at 40 CFR 131.10 to remove or "downgrade" the fishable/swimmable uses through a use attainability analysis (UAA).

The second part of a state's water quality standards are the water quality criteria sufficient to support the designated uses of each water body.

The third part of the state's water quality standards is its antidegradation policy. Each state or tribe is required to adopt an antidegradation policy consistent with EPA's antidegradation regulations at 40 CFR Part 131.12. A state's antidegradation policy specifies the framework to be used in making decisions about proposed activities that will result in changes in water quality.

A state's antidegradation policy provides three levels of protection from degradation of existing water quality. Tier 1 of antidegradation protection applies to all water bodies under the CWA and requires that existing uses and the water quality necessary to protect those uses be maintained and protected. Tier II protection applies to any water bodies considered to be high quality waters (where the water quality exceeds levels necessary to support propagation of fish, shellfish, wildlife, and recreation in and on the water) and provides that water quality will be maintained and protected unless allowing for lower water quality is deemed by the state as necessary to accommodate important economic or social development in the area. In allowing any lowering of water quality, the state must ensure adequate water quality to protect existing uses fully and must assure that there will be achieved the highest statutory and regulatory requirements for all new and existing point sources. Tier III protection applies to water bodies that have been designated by the state as outstanding national resource waters and provides that water quality is to be maintained and protected.

In addition to the three required components of water quality standards, states may, at their discretion, include in their standards policies that generally affect how the standards are applied or implemented.

Designated Beneficial Uses and Surface Water Quality Criteria

This facility discharges to Crescent Harbor in Puget Sound. Applicable designated uses and surface water quality criteria are defined in chapter173-201A WAC including human health criteria. In addition, the U.S. EPA has established human health criteria for toxic pollutants.

The Washington State Water Quality Standards (WAC 173-201A-612) identifies all marine waters east of Whidbey Island, including Port Susan, Saratoga Passage, Skagit Bay and the northern portion of Possession Sound as "Excellent Quality" marine waters for aquatic life uses.

- Excellent quality beneficial uses are salmonid and other fish migration, rearing, and spawning; clam, oyster, and mussel rearing and spawning; crustaceans and other shellfish (crabs, shrimp, crayfish, scallops, etc.) rearing and spawning. The pH must be within the range of 7.0 to 8.5 with a human-caused variation within the above range of less than 0.5 units. The water quality standard for temperature is 16ºC. The lowest 1-day minimum for dissolved oxygen is 6.0 mg/L. Turbidity must not exceed 5 NTU over background when the background is 50 NTU or less; or a 10 percent increase in turbidity when the background turbidity is more than 50 NTU

- To protect shellfish harvesting, fecal coliform organism levels must not exceed a geometric mean value of 14 colonies/100 mL, and not have more than 10 percent of all samples (or any single sample when less than ten sample points exist) obtained for calculating the geometric mean value exceeding 43 colonies/100 mL.
- The water quality standards identify designated recreational uses for marine waters as either primary contact recreation or secondary contact recreation. Both categories set maximum levels of fecal coliform bacteria allowable to protect the designated use. Based on Table 612 in WAC 173-201A, designated recreational use for Crescent Harbor is "Primary Contact Recreation." The fecal coliform standard necessary to protect this use is the same standard listed above for shellfish harvesting.
- The miscellaneous marine water uses are wildlife habitat, harvesting, commerce and navigation, boating, and aesthetics.

Antidegradation

The proposed issuance of an NPDES permit triggers the need to ensure that the conditions in the permit ensure that Tier I, II and III of the State's antidegradation policy are met. An anti-degradation analysis was conducted by the EPA (see Appendix C), which concluded that the permit would not result in deterioration of water quality. This is because there is no measurable change caused to the water quality of Crescent Bay. The transfer from Ecology permit authorization to EPA permit authorization is a new action. Therefore a Tier 2 review is required.

C. Water Quality Limited Waters

Any waterbody 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 CWA requires states to develop a Total Maximum Daily Load (TMDL) management plan for water bodies determined to be water quality limited segments. A TMDL is a detailed analysis of the water body to determine its assimilative capacity. The assimilative capacity is the loading of a pollutant that a water body can assimilate without causing or contributing to a violation of water quality standards. Once the assimilative capacity of the water body has been determined, the TMDL will allocate that capacity among point and non-point pollutant sources, taking into account natural background levels and a margin of safety. Allocations for non-point sources are known as "load allocations" (LAs). The allocations for point sources, known as "waste load allocations" (WLAs), are implemented through effluent limitations in NPDES permits. Effluent limitations for point sources must be consistent with applicable TMDL allocations.

The State of Washington's Integrated Report Section 5 (section 303(d)) for Island County lists no water quality limited waters and therefore there are no WLAs for the Seaplane Base WWTP.

IV. Effluent Limitations

A. Basis for Effluent Limitations

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

B. Proposed Effluent Limitations

The following summarizes the proposed effluent limits that are in the draft permit.

Narrative Limitations to Implement Washington's Narrative Criteria for Aesthetic Values

The permittee must not discharge floating, suspended, or submerged matter of any kind in concentrations causing nuisance or objectionable conditions or that may impair designated beneficial uses.

Numeric Limitations

Table 2 below presents the proposed effluent limits for $CBOD_5$, TSS, fecal coliform, total residual chlorine and pH.

Table 2: Proposed Effluent Limits

Parameter	Units	Effluent Limits: Average Monthly Limit	Average Weekly Limit	Maximum Daily Limit
Carbonaceous Five-Day Biochemical Oxygen Demand ($CBOD_5$)	mg/L	25	40	---
	lb/day	118	190	---
$CBOD_5$ Removal	percent	85 minimum		---
Total Suspended Solids (TSS)	mg/L	45	65	---
	lb/day	214	309	---
TSS Removal	percent	65 minimum		---
Fecal Coliform[1]	#/100 ml	200	400	---
Total Residual Chlorine	mg/L	0.5	0.75	---
	lb/day	2.37	3.56	---
pH	Std. Units	6.0-9.0		
Whole Effluent Toxicity (WET)	TU_a	no acute toxicity detected in a test concentration representing the acute critical effluent concentration (ACEC) of 1.8 %.		

[1] Fecal coliform shall not exceed a monthly geometric mean of 200 organisms/100 milliliters (mL), and a weekly geometric mean of 400 organisms per 100 mL

C. Changes in Limits from the Existing Permit

Table 3 illustrates the changes in effluent limits from the existing Oak Harbor permit.

Table 3. Changes in Permit Effluent Limits		
Parameter	**Existing Permit**	**Draft Permit**
TSS monthly mg/L	75	45
TSS weekly mg/L	110	65
TSS monthly lbs/day	1564	214
TSS weekly lbs/day	2294	309
$CBOD_5$ monthly lbs/day	521	118
$CBOD_5$ weekly lbs/day	834	190
TRC lbs/day monthly	none	2.37
TRC lbs/day weekly	none	3.56

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

The permittee is responsible for conducting the monitoring and for reporting results on DMRs or on the application for renewal, as appropriate, to the EPA.

B. Effluent Monitoring

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

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

Ammonia is a parameter commonly monitored for POTWs to determine performance and will determine impacts to Crescent Harbor. It does not have a reasonable potential to violate the water quality standards of Crescent Harbor and a limit is not required. Alkalinity is added to improve the reasonable potential calculation for pH.

Table 3: Effluent Monitoring Requirements				
Parameter	**Units**	**Sample Location**	**Sample Frequency**	**Sample Type**
Flow	Mgd	Effluent	Continuous	recording
$CBOD_5$	mg/L	Influent & Effluent	2/week	24-hour composite
	lb/day	Influent & Effluent	2/week	calculation[1]
	% Removal	--	1/month	calculation[2]
TSS	mg/L	Influent & Effluent	2/week	24-hour composite
	lb/day	Influent & Effluent	2/week	calculation[1]
	% Removal	--	1/month	calculation[2]
pH	standard units	Effluent	daily	grab
Fecal Coliform	#/100 ml	Effluent	2/week	grab
Ammonia	mg/L	Effluent	1/month	grab
Alkalinity	mg/L	Effluent	1/month	grab
Total Residual Chlorine	µg/L	Effluent	Daily	grab
	lb/day	Effluent		calculation[1]
NPDES Application Form 2A, B6 Effluent Testing[3]	---	Effluent	3x/5 years	---
Acute WET Testing	---	Effluent	1/quarter	24-hour composite

Notes:
1. Loading is calculated by multiplying the concentration (in mg/L) by the flow (in mgd) on the day sampling occurred and a conversion factor of 8.34.
2. The monthly average percent removal must be calculated from the arithmetic mean of the influent values and the arithmetic mean of the effluent values for that month, i.e.:
   (average monthly influent – average monthly effluent) ÷ average monthly influent.
   Influent and effluent samples must be taken over approximately the same time period.
3. For Effluent Testing Data, in accordance with instructions in NPDES Application Form 2A, Part B.6.

C. Ground Water Monitoring

On November 30, 2016 Ecology stated the permit must continue the ground water monitoring and the permit needs to require the Navy to assess the condition of the lagoon liners and to demonstrate that the lagoons are not adversely impacting the marsh habitat through groundwater discharges. Ecology's 401 Certification is contingent on including the requirement for ground water monitoring and a seepage test of the lagoon liners to assess the impacts to the restored salt water marsh habitat. The Ecology certification of the permit is a requirement for the ground water monitoring and seepage test of the lagoon liners.

The City installed monitoring wells around the Seaplane Lagoon Facility in 2008, prior to the completion of the Crescent Harbor Marsh restoration project. Monitoring data from the wells showed that groundwater around the lagoons has elevated ammonia concentrations and high salinity. Testing also showed groundwater elevations were tidally influenced.

This facility is located in a saltwater marsh that is part of a salmon habitat restoration effort. Because the existing groundwater monitoring data show that the facility may potentially have an adverse impact on the marsh, the draft permit requires that the Navy to evaluate the impacts from the lagoons to the salt water marsh.

The permit requires quarterly groundwater monitoring both up gradient and down-gradient of the lagoons. Monitoring includes ground water elevation, pH, salinity, nitrate-nitrogen, ammonia, and fecal coliform.

Within one year and six months of the effective date of the permit, the permittee must perform an evaluation and seepage test of the lagoon liners and with the groundwater monitoring submit to the EPA an assessment of the conditions of the liners.

Within two years and six months of the effective date of the permit the Navy must determine the impact of any leaks from the lagoons on the surrounding salt water marsh based on two years of ground water sampling and a ground water investigation considering fate and transport of contaminants.

D. Electronic Submission of Discharge Monitoring Reports (DMRs)

The draft permit requires that the permittee submit DMR data electronically using NetDMR. NetDMR is a national web-based tool that allows DMR data to be submitted electronically via a secure Internet application.

The EPA currently conducts free training on the use of NetDMR. Further information about NetDMR, including upcoming trainings and contacts, is provided on the following website: http://www.epa.gov/netdmr. The permittee may use NetDMR after requesting and receiving permission from EPA Region 10.

E. Whole Effluent Toxicity Testing Requirements

Whole effluent toxicity (WET) tests are laboratory tests that measure the 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. An acute toxicity test is a test to determine the concentration of effluent or ambient waters that causes an adverse effect (usually death) on a group of test organisms during a short-term exposure (e.g., 24, 48, or 96 hours). A chronic toxicity test is a short-term test, usually 96 hours or longer in duration, in which sublethal effects (e.g., significantly reduced growth or reproduction) are usually measured in addition to lethality. Both acute and chronic toxicity are measured using statistical procedures such as hypothesis testing (i.e., no observable effect concentration, NOEC and lowest observable effect concentration, LOEC) or point estimate techniques (i.e., lethal concentration to 50 percent of organisms, LC_{50}; and inhibition concentration in a biological measurement to 25 percent of organisms, IC_{25}).

Federal regulations at 40 CFR 122.44(d) (1) require that NPDES permits contain limits on whole effluent toxicity when a discharge causes, has the reasonable potential to cause, or contributes to an excursion above a State’s numeric or narrative water quality criteria for toxicity. Per WAC 173-205, an effluent demonstrates a reasonable potential for acute toxicity when the median survival rate for a series of tests is less than 80% survival in 100% effluent or if any single test results in less than 65% survival in 100% effluent. Per WAC 173-205, an effluent demonstrates reasonable potential for chronic toxicity when a statistically significant difference is observed between a control group and the acute critical effluent concentration of 1.8% effluent.

The available acute WET data demonstrates the effluent has reasonable potential for acute toxicity.

Test Date	Organism	Endpoint	Percent Survival
8/2005	*Ceriodaphnia dubia*	48-hour Survival	100%
8/2005	*Pimephales promelas*	96-hour Survival	95%
11/2005	*Ceriodaphnia dubia*	48-hour Survival	75%
2/2006	*Pimephales promelas*	96-hour Survival	3%**
5/2006	*Ceriodaphnia dubia*	48-hour Survival	0%**
8/2006	*Pimephales promelas*	96-hour Survival	90%
11/2006	*Ceriodaphnia dubia*	48-hour Survival	100%
2/2007	*Pimephales promelas*	96-hour Survival	38%**
6/2007	*Ceriodaphnia dubia*	48-hour Survival	10%**
8/2007	*Pimephales promelas*	96-hour Survival	95%
1/2007	*Ceriodaphnia dubia*	48-hour Survival	45%**
2/2008	*Pimephales promelas*	96-hour Survival	0%**
5/2008	*Ceriodaphnia dubia*	48-hour Survival	50%**
5/2008	*Ceriodaphnia dubia*	48-hour Survival	5%**
9/2008	*Pimephales promelas*	96-hour Survival	100%
11/2008	*Ceriodaphnia dubia*	48-hour Survival	100%
2/2009	*Ceriodaphnia dubia*	48-hour Survival	25%**
5/2009	*Ceriodaphnia dubia*	48-hour Survival	0%**
8/2009	*Pimephales promelas*	96-hour Survival	95%
12/2009	*Ceriodaphnia dubia*	48-hour Survival	0%**
2/2010	*Pimephales promelas*	96-hour Survival	0%**
12/2011	*Ceriodaphnia dubia*	48-hour Survival	75 %
2/2012	*Pimephales promelas*	96-hour Survival	37.5%**
5/2014	*Ceriodaphnia dubia*	48-hour Survival	85%
6/2014	*Ceriodaphnia dubia*	48-hour Survival	85%
3/2015	*Pimephales promelas*	96-hour Survival	42.5%**
6/2015	*Ceriodaphnia dubia*	48-hour Survival	20%**
8/2015	*Daphnia pulex*	96-hour Survival	0%**
8/2015	*Pimephales promelas*	96-hour Survival	66 %**

10/2015	*Ceriodaphnia dubia*	48-hour Survival	85%

** The effluent has demonstrated reasonable potential to violate Washington State's criteria for acute toxicity. Per WAC 173-205, if the median survival in one hundred percent effluent is less than eighty percent, or if any individual test result shows less than sixty-five percent survival in one hundred percent effluent, then a reasonable potential for acute conditions in the receiving water has been demonstrated.

The available chronic WET data demonstrates the effluent does not have reasonable potential for chronic toxicity.

Test Date	Organism	Endpoint	Reasonable Potential**
6/2015	*Americamysis bahia*	7-day Survival and Growth	No
6/2015	*Atherinops affinis*	7-day Survival and Growth	No
8/2015	*Americamysis bahia*	7-day Survival and Growth	No
8/2015	*Atherinops affinis*	7-day Survival and Growth	No

** Per WAC 173-205, reasonable potential for chronic toxicity is demonstrated when a statistically significant difference is observed between a control group and the acute critical effluent concentration of 1.8% effluent.

Therefore, the proposed permit will retain the acute toxicity limit, which is defined as: **No acute toxicity detected in a test sample representing the acute critical effluent concentration (ACEC).** The acute critical effluent concentration (ACEC) is the concentration of effluent at the boundary of the acute mixing zone during critical conditions. The ACEC is 1.8%.

Compliance with an acute toxicity limit is measured by an acute toxicity test comparing test organism survival in the ACEC (using a sample of effluent diluted to equal the ACEC) to survival in nontoxic control water. The Seaplane Lagoon Facility is in compliance with the acute toxicity limit if there is no statistically significant difference in test organism survival between the ACEC sample and the control sample.

The EPA is requiring the same species for acute toxicity as required in the existing permit for Oak Harbor. These are Fathead minnow and Ceriodaphnia dubia.

VI. Sludge (Biosolids) Requirements

The EPA Region 10 separates wastewater and sludge permitting. The EPA has authority under the CWA to issue separate sludge-only permits for the purposes of regulating biosolids. The 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 facilities must comply with them whether or not a permit has been issued.

VII. Other Permit Conditions

A. Quality Assurance Plan

In order to ensure compliance with the federal regulation at 40 CFR 122.41(e) for proper operation and maintenance, the draft permit requires the permittee to develop procedures to ensure that the monitoring data submitted is accurate and to explain data anomalies if they occur. The Seaplane Base is required to update the Quality Assurance Plan within 180 days of the effective date of the final permit. The Quality Assurance Plan must include of standard operating procedures the permittee must follow for collecting, handling, storing and shipping samples, laboratory analysis, and data reporting. The plan must be retained on site and be made available to the EPA upon request.

B. Operation and Maintenance Plan

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

C. Sanitary Sewer Overflows and Proper Operation and Maintenance of the Collection System

Untreated or partially treated discharges from separate sanitary sewer systems are referred to as sanitary sewer overflows (SSOs). SSOs may present serious risks of human exposure when released to certain areas, such as streets, private property, basements, and receiving waters used for drinking water, fishing and shellfishing, or contact recreation. Untreated sewage contains pathogens and other pollutants, which are toxic. SSOs are not authorized under this permit. Pursuant to the NPDES regulations, discharges from separate sanitary sewer systems authorized by NPDES permits must meet effluent limitations that are based upon secondary treatment. Further, discharges must meet any more stringent effluent limitations that are established to meet the EPA-approved state water quality standards.

The permit contains language to address SSO reporting and public notice and operation and maintenance of the collection system. The permit requires that the permittee identify SSO occurrences and their causes. In addition, the permit establishes reporting, record keeping and third party notification of SSOs. Finally, the permit requires proper operation and maintenance of the collection system. The following specific permit conditions apply:

Immediate Reporting – The permit requires 24 hour reporting to EPA of an SSO at the time the permittee becomes aware of the collection system overflow. (See 40 CFR 122.41(l)(6))

Written Reports – The permittee is required to provide the EPA a written report within five days of the time it became aware of any overflow that is subject to the immediate reporting provision. (See 40 CFR 122.41(l)(6)(i)).

Third Party Notice – The permit requires that the permittee establish a process to notify specified third parties of SSOs that may endanger health due to a likelihood of human exposure; or unanticipated bypass and upset that exceeds any effluent limitation in the permit or that may endanger health due to a likelihood of human exposure. The permittee is required to develop, in consultation with appropriate authorities at the local, county, tribal and/or state level, a plan that describes how, under various overflow (and unanticipated bypass and upset) scenarios, the public, as well as other entities, would be notified of overflows that may endanger health. The plan should identify all overflows that would be reported and to whom, and the specific information that would be reported. The plan should include a description of lines of communication and the identities of responsible officials. (See 40 CFR 122.41(l)(6)).

Record Keeping – The permittee is required to keep records of SSOs. The permittee must retain the reports submitted to the EPA and other appropriate reports that could include work orders associated with investigation of system problems related to a SSO, that describes the steps taken or planned to reduce, eliminate, and prevent reoccurrence of the SSO. (See 40 CFR 122.41(j)).

Proper Operation and Maintenance – The permit requires proper operation and maintenance of the collection system. (See 40 CFR 122.41(d) and (e)). SSOs may be indicative of improper operation and maintenance of the collection system. The permittee may consider the development and implementation of a capacity, management, operation and maintenance (CMOM) program.

The permittee may refer to the Guide for Evaluating Capacity, Management, Operation, and Maintenance (CMOM) Programs at Sanitary Sewer Collection Systems (EPA 305-B-05-002). This guide identifies some of the criteria used by the EPA inspectors to evaluate a collection system's management, operation and maintenance program activities. Owners/operators can review their own systems against the checklist (Chapter 3) to reduce the occurrence of sewer overflows and improve or maintain compliance.

D. Environmental Justice

Executive Order 12898, *Federal Actions to Address Environmental Justice in Minority Populations and Low-Income Populations*, directs each federal agency to "make achieving environmental justice part of its mission by identifying and addressing, as appropriate, disproportionately high and adverse human health or environmental effects of its programs, policies, and activities." The EPA strives to enhance the ability of overburdened communities to participate fully and meaningfully in the permitting process for EPA-issued permits, including NPDES permits. "Overburdened" communities can include minority, low-income, tribal, and indigenous populations or communities that potentially experience disproportionate environmental harms and risks. As part of an agency-wide effort, the EPA Region 10 will consider prioritizing enhanced public involvement opportunities for EPA-issued permits that may involve activities with significant public health or environmental impacts on already overburdened communities. For more information, please visit http://www.epa.gov/compliance/ej/plan-ej/ .

As part of the permit development process, the EPA Region 10 conducted a screening analysis to determine whether this permit action could affect overburdened communities. The EPA used a nationally consistent geospatial tool that contains demographic and environmental data for the United States at the Census block group level. This tool is used to identify permits for which enhanced outreach may be warranted.

The Seaplane Base is not located within or near a Census block group that is potentially overburdened. The draft permit does not include any additional conditions to address environmental justice.

Regardless of whether a facility is located near a potentially overburdened community, the EPA encourages permittees to review (and to consider adopting, where appropriate) Promising Practices for Permit Applicants Seeking EPA-Issued Permits: Ways To Engage Neighboring Communities (see https://www.federalregister.gov/articles/2013/05/09/2013-10945/epa-activities-to-promote-environmental-justice-in-the-permit-application-process#p-104). Examples of promising practices include: thinking ahead about community's characteristics and the effects of the permit on the community, engaging the right community leaders, providing progress or status reports, inviting members of the community for tours of the facility, providing informational materials translated into different languages, setting up a hotline for community members to voice concerns or request information, follow up, etc.

E. Standard Permit Provisions

Sections **III, IV and V** of the draft permit contain standard regulatory language that must be included in all NPDES permits. The standard regulatory language covers requirements such as monitoring, recording, and reporting requirements, compliance responsibilities, and other general requirements.

VIII. Other Legal Requirements

A. Endangered Species Act

The Endangered Species Act requires federal agencies to consult with National Oceanic and Atmospheric Administration Fisheries (NOAA Fisheries) and the U.S. Fish and Wildlife Service (USFWS) if their actions could beneficially or adversely affect any threatened or endangered species.

A review of the threatened and endangered species regulated under the USFWS finds that Bull Trout (Salvelinus confluentus) listed as threatened.

A review of the threatened and endangered species regulated under NOAA Fisheries finds that Puget Sound Chinook (Oncorhynchus tshawytscha) salmon and Puget Sound Steelhead (O. mykiss), the Southern District Population Segment of green sturgeon (acipenser medirostris) are listed as threatened. The Southern Resident killer (Orcinus orca) whale Humpback Whale are listed as endangered, and the Steller sea lions (Eumetopoias jubatus) are listed as threatened. The yelloweye rockfish is listed as threatened and the boccaccio is listed as endangered. The marbled murrelet and Southern Pacific Eulachon are threatened, not in the action area but have the potential to occur in the aquatic habitat.

The U.S. Fish and Wild Service *Species Fact Sheet* for the bull trout states:

"The following activities or types of land use have contributed to the bull trout's decline: dams, forest management practices, livestock grazing, agricultural practices, transportation networks, mining, residential development and urbanization, fisheries management activities, and any of a host of general practices as well as some natural events (e.g., fire or flood under certain circumstances) that may contribute to historical and current isolation and habitat fragmentation. Nonnative species, forest management practices, and fish passage issues are the top factors limiting bull trout populations at the range-wide level, both currently and historically."

Recovery Plan for the Coterminous United States Population of Bull Trout, Pacific Region, U.S. Fish and Wildlife Service, Portland Oregon, September 28, 2015, provides a similar list of activities and land use contributions to the bull trout's decline.

The EPA concludes the Seaplane Base WWTP permit may affect but is not likely to adversely affect Bull Trout regulated by the USFWS because of the following:

- Point source discharges such as the Seaplane Base WWTP are not mentioned in either the *Recovery Plan for the Coterminous United States Population of Bull Trout*, or the *Species Fact Sheet* as causes of the bull trout's or Dolly Varden's decline
- The removal of the City of Oak Harbor's wastewater will reduce the amount of pollutants discharged
- This permit requires compliance with the State of Washington Surface Water Quality Standards, that protect aquatic organisms including threatened and endangered species
- Secondary treatment consisting of aerobic and anaerobic treatment.
- Utilization of an outfall diffuser
- High dilution rates into the Puget Sound receiving water and the relatively small size of the mixing zone
- The relatively low levels of pollutants discharged
- Few juveniles and adult salmonids and other fish will enter the mixing zone because of its small size.

With regard to the species under NOAA jurisdiction the EPA concludes the Seaplane Base WWTP permit may affect but is not likely to adversely affect these species for the following reasons:

- The southern resident killer whale is a resident marine mammal in Puget Sound. Considering the size of the Seaplane Base WWTP action area in comparison to the large range of the southern resident killer whale, it is unlikely that the killer whale would spend a significant portion of time within the action area or consume a significant portion of its prey from the action area.

- The Steller sea lion is a resident marine mammal in Puget Sound, however, the size of the Seaplane Base WWTP is significantly smaller than their range within Puget Sound and it is unlikely that the Steller sea lion would spend a significant portion of time within the action area or consume a significant portion of its prey from the action area. The potential effects due to bioconcentration of the effluent through the food chain from Seaplane Base WWTP would be insignificant and discountable to the Steller sea lion. Therefore, EPA has determined that the Seaplane Base WWTP will have no effect on the Steller sea lion.
- The yelloweye and boccaccio rockfish and the marbled murrelet and Southern Pacific Eulachon are rarely in the action area, not in the action area but have the potential to occur in the aquatic habitat. Puget Sound is not known to support an established population of eulachon. Green sturgeon, eulachon, and humpback whale, occur only rarely in the Action Area and exposure would be unlikely or very limited.
- The Seaplane Base WWTP effluent concentration of zinc of 28 ug/L is less than one tenth the values reported as having chronic effects on biota. The highest copper concentration was measured at 15 ug/L which is below the level affecting aquatic life at the edge of the mixing zone for Outfall 002. There is no reasonable potential to cause or contribute to a violation of the water quality criteria at the edge of the mixing zone for mercury, lead, arsenic, nickel, selenium, phenols, chromium, antimony, 2-dicloronapthalene, cyanide, silver, thallium and bis(2-ethylhexyl) phthalate. Most of these are less than one percent of the water quality standards at the point of discharge to Crescent Harbor. The EPA anticipates that these levels will decrease because the City's effluent will no longer flow into the Seaplane Base WWTP.
- All other pollutants on Form 2A Part D comprising 126 pollutants were non detect even with Oak Harbor discharges. The effect of removing the discharges from the lagoons will likely be to reduce discharges of these pollutants.

The *Biological Assessment for Naval Air Station Whidbey Island, Seaplane Base Final Report, Contract No. N62470-15-D-4002 JP01 AE Study for SBP, Wastewater Treatment Plant, NASWI, August 2017* (BA) effects analysis reached the same conclusion as shown below. In a letter dated November 17, 2017 USFW concurred with the findings of the BA.

Table 6-1. Effects Determination for Listed Species in the Action Area

Evolutionarily Significant Unit or Distinct Population Segment ***Scientific Name***	**Effect Determination**
Puget Sound Chinook Salmon ESU *Oncorhynchus tshawytscha*	May affect, not likely to adversely affect
Puget Sound Steelhead DPS *O. mykiss*	May affect, not likely to adversely affect
Salvelinus confluentus	
Puget Sound/Georgia Basin Bocaccio Rockfish DPS *Sebastes paucispinis*	May affect, not likely to adversely affect
Puget Sound/Georgia Basin Yelloweye Rockfish DPS *Sebastes ruberrimus*	May affect, not likely to adversely affect
Southern DPS of N. American Green Sturgeon *Acipenser medirostris*	May affect, not likely to adversely affect
Southern DPS of Pacific Eulachon *Thaleichthys pacificus*	May affect, not likely to adversely affect
Marbled Murrelet *Brachyramphus marmoratus*	May affect, not likely to adversely affect
Southern Resident DPS of Killer Whale *Orcinus orca*	May affect, not likely to adversely affect
North Pacific Humpback Whale *Megaptera novaeangliae*	May affect, not likely to adversely affect

The BA provided the following justifications in the Executive Summary for the may affect, not likely to adversely affect determinations.

"For the listed species with potential to occur in the Action Area, there is very low potential for exposure to contaminants in the effluent discharge. Some of these species, including green sturgeon, eulachon, and humpback whale, occur only rarely in the Action Area and exposure would rockfish, marbled murrelet, and killer whales may enter the mixing zone during migration and/or foraging, but would not be expected to spend extended amounts of time in one location. Therefore, exposure to contaminants in the effluent discharge is expected to be insignificant for adults of all listed species be unlikely or very limited. Adult Chinook salmon, steelhead, bull trout, yelloweye and boccaccio Juveniles using nearshore and shallow waters for migration and foraging could be in the mixing zone for short periods of time and could be exposed to pollutants (e.g., chlorine, ammonia, and metals) that exceed water quality standards. They could also be exposed to low levels of unregulated contaminants. There would be some potential for exposed juvenile salmonids to accumulate these pollutants. However, due to the relatively small size of the mixing zone, its distance off shore, and the depth of the mixing zone, the duration of any exposure is expected to be short and only affect a few individuals. Due to this short period of exposure and the relatively low levels of pollutants discharged, effects on juvenile Chinook salmon and rockfish are expected to be insignificant.

The proposed action will not affect the quantity of salmonids and other prey available to marbled murrelets, killer whales, or humpback whales for the reasons summarized above. Effects on the quality of prey for these higher trophic-level species would not be significant because very few salmonids would be exposed to metals, PBDEs, or other bioaccumulative contaminants in the small mixing zone and the levels of bioaccumulated contaminants in tissues would not be significant due to the absence or low levels of these contaminants expected in the effluent discharge and the short period of time the prey species would be feeding in the area. Furthermore, the Action Area represents a very small part of the foraging habitat for top predator species. It is unlikely that these species would spend a significant portion of time within the Action Area or consume a significant portion of their prey from the Action Area.

Section 4.1.1.1 of the BA evaluated the potential impacts through exposure from the groundwater pathway of potentially leaking lagoons.

4.1.1 Crescent Harbor Salt Marsh

The WWTP ponds are located within the Crescent Harbor Salt Marsh, which provides important rearing habitat for juvenile Chinook salmon. Inspections conducted by Ecology in 2009 noted that, based on observation, there was reason to believe that the Crescent Harbor Salt Marsh restoration project increased the flooding risk at the Seaplane Base WWTP and likely increased the local groundwater elevation to a point where there was no longer adequate separation from the lagoon liners (Ecology 2011).

Based on monitoring conducted around the perimeter of the WWTP, the groundwater has elevated concentrations of ammonia, high salinity, and a clear tidal influence on groundwater elevations. This suggests the WWTP may be discharging ammonia-laden groundwater into the surrounding salt marsh. However, the monitoring well with the highest concentration of ammonia is located nearest to aerobic lagoons, which are not a significant source of ammonia because these lagoons act to oxidize ammonia to nitrate or nitrite via the process of biological treatment nitrification. The observed monitoring well data may be due to a leak from the anaerobic lagoon (where ammonia concentrations are highest), storm water run-off into the lagoon, or another interaction with natural ammonia producing marsh processes. At present, the exact cause for the elevated concentrations noted in the well data is unknown.

Within a marsh system there may be ammonia oxidizing bacteria that catalyze the oxidation of ammonia (NH_3) to nitrite, and there could be nitrite-oxidizing bacteria, which catalyze the oxidation of nitrite to nitrate (aka “nitrifiers”). The presence of these nitrifying bacteria generally would lower the amount of ammonia naturally found in sediments, but ammonia can also be released from sediments under certain conditions. It is not expected that there would be much background ammonia in the water column from natural sources because nitrogen is typically limiting and is taken up quickly by plants. Therefore, the concentrations of ammonia as measured in groundwater monitoring wells would not necessarily be the same as the ammonia concentrations in the marsh water column.

Based on the evaluation presented herein and summarized above, the proposed action "may affect" but is "not likely to adversely affect" federally listed species and designated critical habitat with the potential to occur in the action area."

More information can be found in the BA available from the Navy listed above or the EPA.

B. Essential Fish Habitat

Essential fish habitat (EFH) is 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 the EPA to consult with NOAA Fisheries when a proposed discharge has the potential to adversely affect EFH (i.e., reduce quality and/or quantity of EFH).

The EFH regulations define an adverse effect as any impact which reduces quality and/or quantity of EFH and may include direct (e.g. contamination or physical disruption), indirect (e.g. loss of prey, reduction in species' fecundity), site specific, or habitat-wide impacts, including individual, cumulative, or synergistic consequences of actions.

Concerning EFH BA concluded:

"This BA includes an assessment of the potential effects on Essential Fish Habitat (EFH), as required under the Magnuson-Stevens Fishery Conservation and Management Act (MSA). The MSA requires an evaluation of effects on EFH for federally managed fishery species. Based on the evaluation presented herein, potential effects on Pacific coast salmon, Pacific groundfish, and coastal pelagic EFH are limited to the water and substrate immediately around the diffuser and within the approximately 4.2 acre mixing zone. In addition, there may be adverse effects on salmonids if raw sewage, treated effluent, process fluids, or untreated stormwater runoff is accidentally released to the Crescent Harbor Salt Marsh.

Given that the area represented by the outfall mixing zone and the salt marsh habitat surround the WWTP is a small fraction of the rearing habitat for juveniles and foraging/migrating habitat for adults in the project Action Area, potential effects would have no overall effect on the Pacific coast salmon, Pacific groundfish, and coastal pelagic EFH. The determination of effect to EFH is no adverse effect."

The EPA concurs with this determination of no adverse effect.

C. State Certification

Section 401 of the CWA requires the 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, or treatment standards established pursuant to any State law or regulation.

D. Permit Expiration

The permit will expire five years from the effective date.

IX. References

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

Water Pollution Control Federation. Subcommittee on Chlorination of Wastewater. *Chlorination of Wastewater.* Water Pollution Control Federation. Washington, D.C. 1976.

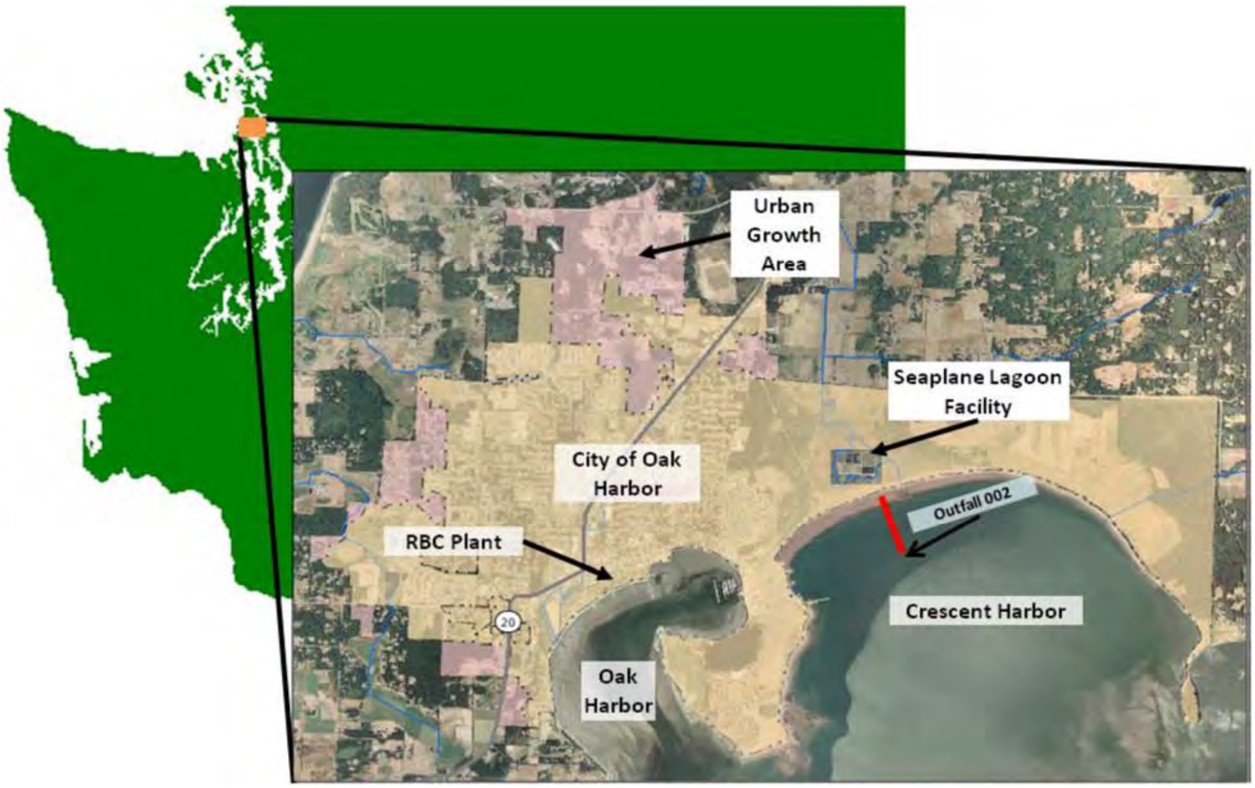
EPA. 2010. *NPDES Permit Writers' Manual.* Environmental Protection Agency, Office of Wastewater Management, EPA-833-K-10-001.

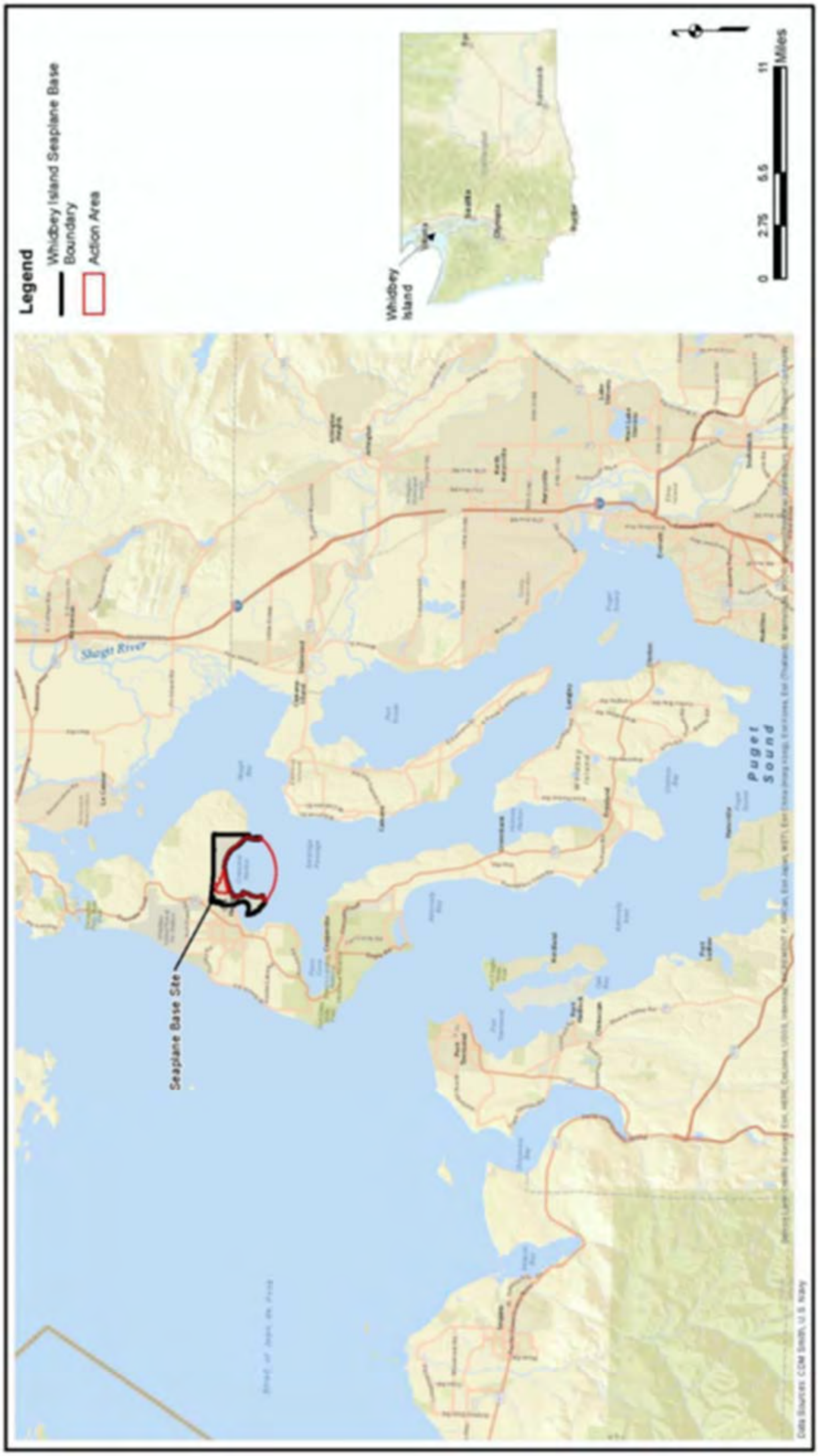
EPA, 2007. *EPA Model Pretreatment Ordinance*, Office of Wastewater Management/Permits Division, January 2007.

Miller, John A., Zodrow, Jeanmarie, Ph.D. 2009, *Biological Assessment, Naval Air Station Whidbey Island, Reissuance of the National Pollutant Discharge Elimination System Permit, Ault Field Wastewater Treatment Plant,* Naval Facilities Engineering Command Northwest, U.S. Environmental Protection Agency Region 10, Office of Environmental Assessment

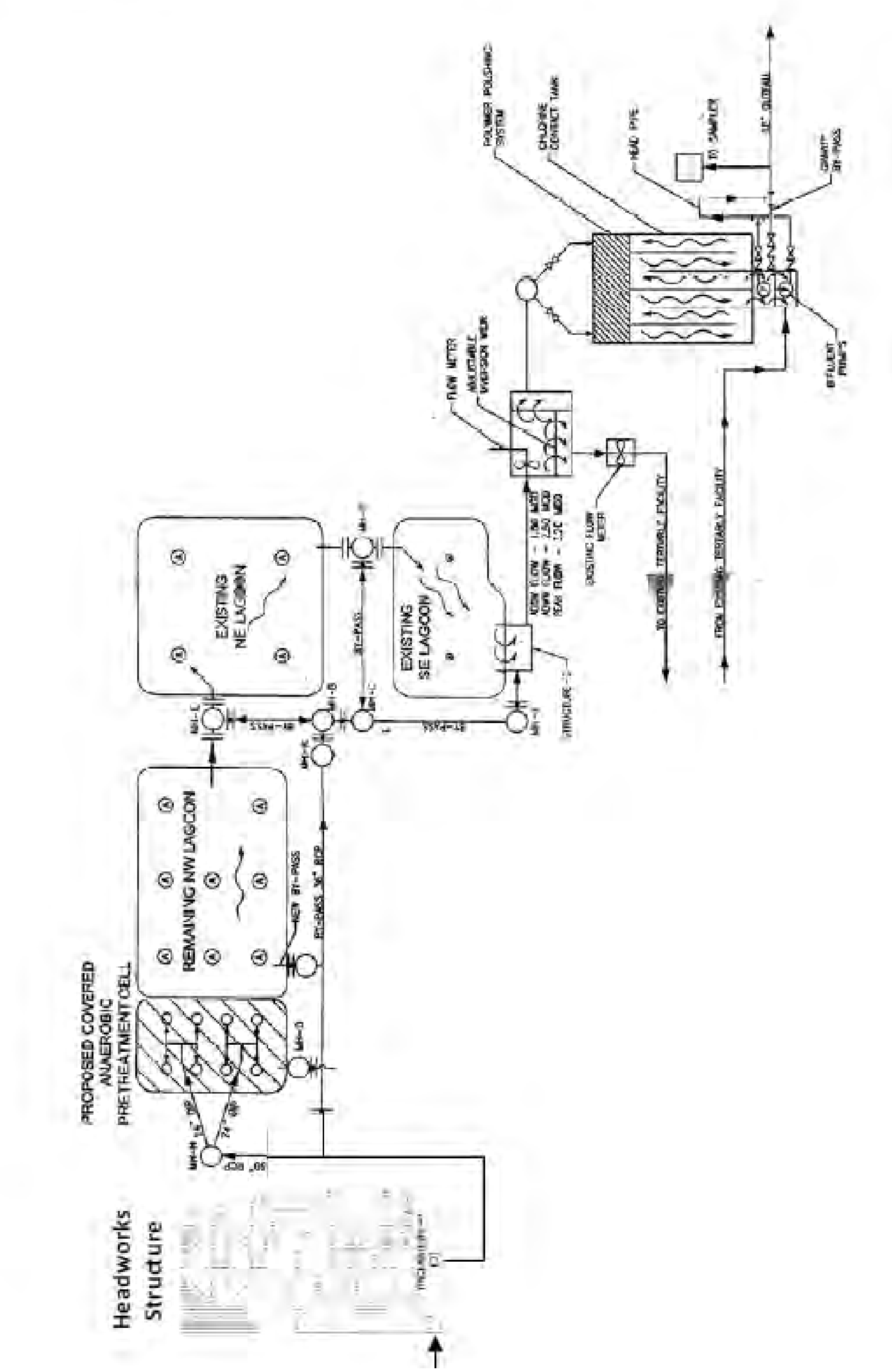
Biological Assessment for Naval Air Station Whidbey Island, Seaplane Base Final Report, Contract No. N62470-15-D-4002 JP01 AE Study for SBP, Wastewater Treatment Plant, NASWI, August 2017

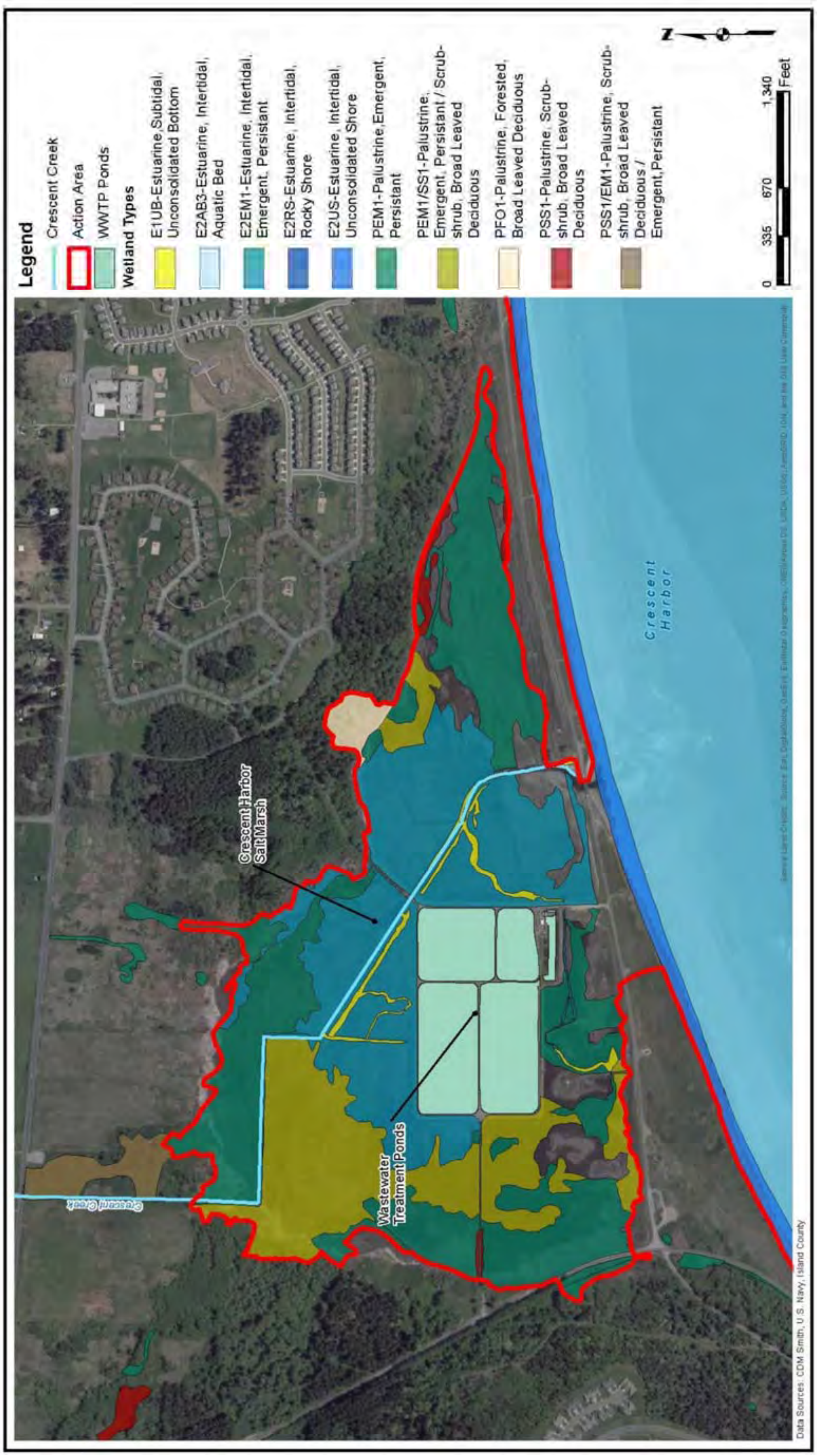
Appendix A: Facility Information




Legend
Whidbey Island Seaplane Base Boundary
Action Area
Whidbey Island
0
2.75
5.5
11
Miles
Skagit River
Puget Sound
Seaplane Base Site

Seaplane Lagoon Facility:




Legend
Crescent Creek
Action Area
WWTP Ponds
Wetland Types
E1UB-Estuarine,Subtidal, Unconsolidated Bottom
E2AB3-Estuarine, Intertidal, Aquatic Bed
E2EM1-Estuarine, Intertidal, Emergent, Persistant
E2RS-Estuarine, Intertidal, Rocky Shore
E2US-Estuarine, Intertidal, Unconsolidated Shore
PEM1-Palustrine,Emergent, Persistant
PEM1/SS1-Palustrine, Emergent, Persistant / Scrub-shrub, Broad Leaved Deciduous
PFO1-Palustrine, Forested, Broad Leaved Deciduous
PSS1-Palustrine, Scrub-shrub, Broad Leaved Deciduous
PSS1/EM1-Palustrine, Scrub-shrub, Broad Leaved Deciduous / Emergent,Persistant
0 335 670 1,340 Feet
N
Crescent Harbor
Crescent Harbor Salt Marsh
Wastewater Treatment Ponds
Crescent Creek
Data Sources: CDM Smith, U.S. Navy, Island County

Appendix B: Water Quality Criteria Summary

This appendix provides a summary of water quality criteria applicable to Crescent Harbor.

Washington State water quality standards include criteria necessary to protect designated beneficial uses (WAC 173-201A-010). The standards are divided into three sections: General Water Quality Criteria, Surface Water Quality Criteria for Use Classifications, and Site-Specific Surface Water Quality Criteria. The EPA has determined that the criteria listed below are applicable to Crescent Harbor. This determination was based on (1) the applicable beneficial uses (2) the type of facility, (3) a review of the application materials submitted by the permittee, and (4) the quality of the receiving water. The EPA is applying Washington State's Water Quality Standards for marine water as follows:

Aquatic Life Uses: Excellent Quality
Shellfish Harvesting:
Recreational Uses: Primary Contact Recreation
Water Supply Uses: Domestic Water; Industrial Water; Agricultural Water; Stock Water
Misc. Uses: Wildlife Habitat; Harvesting; Commerce/Navigation; Boating; and Aesthetics.

A. General Criteria

General criteria that apply to all aquatic life fresh and marine water uses are described in WAC 173-201A-260 (2)(a) and (b), and are for:
(i) Toxic, radioactive, and deleterious materials; and
(ii) Aesthetic values.
(2) ***Toxics and aesthetics criteria.*** *The following narrative criteria apply to all existing and designated uses for fresh and marine water:*
(a) Toxic, radioactive, or deleterious material concentrations must be below those which have the potential, either singularly or cumulatively, to adversely affect characteristic water uses, cause acute or chronic conditions to the most sensitive biota dependent upon those waters, or adversely affect public health (see WAC 173-201A-240, toxic substances, and 173-201A-250, radioactive substances).
(b) Aesthetic values must not be impaired by the presence of materials or their effects, excluding those of natural origin, which offend the senses of sight, smell, touch, or taste (see WAC 173-201A-230 for guidance on establishing lake nutrient standards to protect aesthetics).

B. Applicable Specific Water Quality Criteria

For the Seaplane Base WWTP, the discharge characteristics require the following water quality criteria that are necessary for the protection of the beneficial uses of the receiving waters in Crescent Harbor.

1. WAC 173.201A.210 (2)(b), bacteria criteria to protect shellfish harvesting, and WAC173.201A.210 (3)(b), bacteria criteria to protect primary contact recreation: fecal coliform organism levels must not exceed a geometric mean value of 14 colonies/100 mL, and not have more than 10 percent of all samples (or any single sample when less than ten sample points exist) obtained for calculating the geometric mean value exceeding 43 colonies/100 mL.

2. WAC 173.201A.210(1)(f), pH must be within the range of 7.0 to 8.5 with a human-caused variation within the above range of less than 0.5 units.

3. WAC 173.201A.210(1)(c), Aquatic life temperature criteria Highest 1-day max 16ºC

4. WAC 173.201A.240, Table 240(3), Toxics Substances Criteria. For ammonia, copper, lead, mercury, nickel, phenol, selenium, zinc, chlorine, 2-chloronaphthalene, antimony, arsenic, bis(2-ethylhexylphthalate, cyanide, silver and thallium to meet numeric water quality standards described for marine water Acute and Chronic criteria.

5. WAC 173.201A.210 (1)(d), Excellent quality aquatic life criteria for dissolved oxygen (DO), lowest 1-day minimum is 6.0 mg/L; concentrations of DO are not to fall below this criterion at a probability frequency of more than once every ten years on average. When the water body's DO is lower than this criterion, or within 0.2 mg/L of this criterion, and that condition is due to natural conditions, then human actions cumulatively may not cause the DO of that water body to decrease more than 0.2 mg/L.

6. WAC 173.201A.210 (1)(e), Excellent quality aquatic life criteria for turbidity. Turbidity must not exceed:

- 5 NTU over background when the background is 50 NTU or less; or
- A 10 percent increase in turbidity when the background turbidity is more than 50 NTU.

Appendix C: Basis for Effluent Limits

The following discussion explains in more detail the derivation of the technology- and water quality-based effluent limits in the draft permit. Part A discusses technology-based effluent limits, Part B discusses water quality-based effluent limits in general, Part C discusses the effluent limits imposed due to the State's anti-degradation policy, and Part D presents a summary of the facility-specific limits.

A. Technology-Based Effluent Limits

Federal Secondary Treatment Effluent Limits

The CWA requires POTWs to 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," which POTWs were required to meet by July 1, 1977. The EPA has developed and promulgated "secondary treatment" effluent limitations, which are found in 40 CFR 133.102. These technology-based effluent limits apply to certain municipal WWTPs and identify the minimum level of effluent quality attainable by application of secondary treatment in terms of $CBOD_5$, TSS, and pH. The federally promulgated secondary treatment effluent limits are listed in Table C-1.

Table C-1: Secondary Treatment Effluent Limits (40 CFR 133.102)		
Parameter	**30-day average**	**7-day average**
$CBOD_5$	25 mg/L	40 mg/L
TSS	30 mg/L	45 mg/L
Removal for $CBOD_5$ and TSS (concentration)	85% (minimum)	---
pH	within the limits of 6.0 - 9.0 s.u.	

EPA has additionally established effluent limitations (40 CFR 133.105) that are considered "equivalent to secondary treatment" which apply to facilities meeting certain conditions established under 40 CFR 133.101(g).

On September 20, 1984, EPA revised the Secondary Treatment Regulations (40CFR 133.102) for facilities that use waste stabilization ponds as the principal process. These revisions established effluent limitations for Treatment Equivalent to Secondary Treatment (40 CFR 133.105). These provisions allow alternative limits for $CBOD_5$ and TSS for such facilities, provided all three of the following criteria are met (40 CFR 133.101(g) and 40 CFR 133.105(d)):

(1) The $CBOD_5$ and TSS effluent concentrations consistently achievable through proper operation and maintenance (§ 133.101(f)) of the treatment works exceed the minimum level of the effluent quality set forth in §§ 133.102(a) and (b).

The regulation at 133.101(f) defines effluent concentrations consistently achievable through proper operation and maintenance as the 95^{th} percentile value for a given pollutant for the 30-day average effluent quality achieved by a treatment works in a period of at least two years and a 7-day average value equal to 1.5 times the value derived from that value.

Also, 40 CFR133.105(f) states:

Furthermore, permitting authorities shall require more stringent limitations when adjusting permits if: (1) For existing facilities the permitting authority determines that the 30-day average and the 7- day average $CBOD_5$ and TSS effluent values that could be achievable through proper operating and maintenance of the treatment work, based on an analysis of the past performance of the treatment works, would enable the treatment works to achieve more stringent limitations

(2) A trickling filter or waste stabilization pond (lagoon) is used as the principal process, and

(3) The treatment works provide significant biological treatment of municipal wastewater. The regulations at § 133.101(k) defines *significant biological treatment* as the use of an aerobic or anaerobic biological treatment process in a treatment works to consistently achieve a 30-day average of at least 65 percent removal of $CBOD_5$.

Requirements for Treatment Equivalent to Secondary

For $CBOD_5$ the Seaplane Base WWTP does not meet all three criteria for Treatment Equivalent to Secondary. In addition, the Seaplane Base WWTP does meet all three criteria for TSS.

(1) The Seaplane Base WWTP does not meet the first criteria for treatment equivalent to secondary treatment. The Seaplane Base WWTP $CBOD_5$ effluent concentrations do not consistently exceed the minimum level of effluent quality set forth in 40 CFR § 133.102(a) and (b) shown in Table C-1.

Based on an analysis of past performance of the treatment works the Seaplane Base WWTP can achieve more stringent limitations than Treatment Equivalent to Secondary Treatment. An analysis of the monitoring data reported from 2011 to 2016 found the 95th percentile 30-day average effluent quality achieved by the treatment works for $CBOD_5$ was 24 mg/L. Therefore, the Seaplane Base WWTP $CBOD_5$ effluent concentration does not exceed the minimum 30-day average of 25 mg/L.

The 7-day average $CBOD_5$ value is equal to:

1.5 x 19 mg/L = 28.5 mg/L

Therefore, the Seaplane Base WWTP does not exceed the minimum level of effluent quality for the 7-day average of 40 mg/L. The proposed permit will require secondary treatment concentration limits for $CBOD_5$ as shown in Table C-1.

An analysis of the monitoring data reported from 2011 to 2016 found the 95th percentile 30-day average effluent quality achieved by the treatment works for TSS was 43 mg/L.

The 7-day average TSS value is equal to:

1.5 x 43 mg/L = 65 mg/L

Therefore, the Seaplane Base WWTP does exceed the effluent quality for the 30-day and 7-day average of 30 mg/L and 45 mg/L for TSS, thus meets the first criteria for TSS.

(2) Because a waste stabilization pond (lagoon) is used as the primary process, the facility meets the second criteria for both $CBOD_5$ and TSS.

(3) The facility meets the third criteria for $CBOD_5$.

Based on past performance over the last five years the facility does provide significant biological treatment. Over the last four years the Seaplane Base WWTP achieved a 30-day average of at least 65 percent of $CBOD_5$. In fact, the facility achieved a minimum removal of 94 percent during the last four years. However, because the facility does not meet all of the criteria set forth in 40 CFR § 133.105, the facility does not qualify for Treatment Equivalent to Secondary Treatment and therefore, the technology-based limits for $CBOD_5$ in the draft permit are based on Secondary Treatment as shown in Table C-1.

For TSS the Seaplane Base WWTP meets the third criteria by achieving a minimum removal of 75 percent. Therefore, the Seaplane Base cannot meet secondary treatment limits for TSS, and the proposed permit requires Treatment Equivalent to Secondary for TSS. These values are a monthly average limit of 45 mg/L, a weekly average limit of 65 mg/L, and a minimum removal of 65%.

The City's current permit's TSS monthly limit of 75 mg/L and weekly limit of 110 mg/L were based on alternative state requirements (ASR) in WAC 173-221. The State of Washington eliminated these ASRs.

The Chapter 173-221-040 WAC includes the following fecal coliform technology-based limits:

"Fecal coliform limits shall not exceed a monthly geometric mean of 200 organisms/100 milliliters (mL), and a weekly geometric mean of 400 organisms per 100 mL."

Mass-Based Limits

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

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

Since the design flow for this facility is 0.57 mgd, the technology based mass limits for $CBOD_5$ and TSS are calculated as follows:

Average Monthly Limit = 25 mg/L × 0.57 mgd × 8.34 = 118 lbs/day

Average Weekly Limit = 40 mg/L × 0.57 mgd × 8.34 = 190 lbs/day

Chlorine

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

Since the federal regulations at 40 CFR 122.45 (b) and (f) require limitations for POTWs to be expressed as mass based limits using the design flow of the facility, mass based limits for chlorine are calculated as follows:

Monthly average Limit= 0.5 mg/L x 0.57 mgd x 8.34 = 2.37 lbs/day

Weekly average Limit = 0.75 mg/L x 0.57 mgd x 8.34 = 3.56 lbs/day

B. Water Quality-based Effluent Limits

Statutory and Regulatory Basis

Section 301(b)(1)(C) of the CWA requires the development of limitations in permits necessary to meet water quality standards. Discharges to State or Tribal waters must also comply with limitations imposed by the State or Tribe 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 or Tribal water quality standard, including narrative criteria for water quality. Effluent limits must also meet the applicable water quality requirements of affected States other than the State in which the discharge originates, which may include downstream States (40 CFR 122.4(d), 122.44(d)(4), see also CWA Section 401(a)(2)).

The regulations require the permitting authority to make this evaluation using procedures which account for existing controls on point and nonpoint sources of pollution, the variability of the pollutant in the effluent, species sensitivity (for toxicity), and where appropriate, dilution in the receiving water. The limits must be stringent enough to ensure that water quality standards are met, and must be consistent with any available wasteload allocation for the discharge in an approved TMDL. There are no approved TMDLs that specify wasteload allocations for this discharge; all of the water quality-based effluent limits are calculated directly from the applicable water quality standards.

Reasonable Potential Analysis

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

In some cases, a dilution allowance or mixing zone is permitted. A mixing zone is a limited area or volume of water where initial dilution of a discharge takes place and within which certain water quality criteria to be exceeded (EPA, 2014). While the criteria may be exceeded within the mixing zone, the use and size of the mixing zone must be limited such that the waterbody as a whole will not be impaired, all designated uses are maintained and acutely toxic conditions are prevented.

Mixing Zone

Washington Administrative Code (WAC) 173-201A establishes numerical water quality criteria, including provisions for mixing zones around permitted wastewater discharges where the criteria are suspended. The mixing zone dimensions for estuarine waters are a distance of 200 feet plus the discharge water depth at MLLW. Thus, the mixing zone for the existing outfall diffuser is a horizontal distance of 241 feet from all ports, at which point chronic water quality standards must be achieved.

A smaller mixing zone equal to ten percent of the full mixing zone dimension is also allowed for acute toxicants. The acute mixing zone for the existing diffuser is a horizontal distance of 24.1 feet from all ports.

The following discussion details the specific water quality-based effluent limits in the draft permit with the expectation that Ecology will certify the final permit with an acute dilution factor of 54.2 to 1 and a chronic dilution factor of 214 to 1.

Dilution modeling was conducted using Visual Plumes (VP), which is a Windows-based graphical user interface to a suite of numerical plume models. VP provides a platform for simplified input of model parameters and provides summary text output of results. Consistent with previous Ecology model analyses, the numerical model UM3 was selected as the most appropriate model within VP with which to evaluate the various discharge alternatives. UM3 is a three-dimensional Lagrangian initial dilution plume model that is applicable to submerged single and multi-port diffusers, and capable of modeling both positively and negatively buoyant plumes.

UM3 was used to predict dilution up to the point where the effluent plume was projected to rise (via momentum and buoyancy affects) to the water surface or to its trapping level where mixed effluent and ambient receiving water are of neutral buoyancy. Additional dilution due to far field dispersion effects was modeled using Brook's far field mixing algorithm integral to the VP suite of models.

Model Results

Table C-2 summarizes model predicted acute and chronic dilution for the modification to the existing outfall. Effluent discharges to Crescent Bay through existing pipe separations at the nearshore coupling and end flange of diffuser, as established by Ecology in the current NPDES Permit and Fact Sheet.

For the Outfall in which the existing outfall would be continued with no repairs or improvements the outfall would continue to discharge at two locations (pipe break nearshore and end cap of existing diffuser), separate model runs are required for each location. The model assumed effluent flow split per diver observation is 25 percent through nearshore break and 75 percent through diffuser end. Both locations include unusual discharge orifice configurations. The opening geometry at the nearshore break has not been characterized, and the diffuser end is a large crescent shape that has not been measured. The VP model requires an equivalent port diameter. To be conservative, the equivalent port diameter for each location was set at 12 inches, which produced a densimetric Froude number of approximately 1, which is the minimum that can occur. The governing dilution factor is the lowest of either the nearshore pipe break model runs or the offshore diffuser end model runs.

The permittee requires the Navy to repair damage and restore to proper operation the Outfall 002 diffuser within three years of the effective date of the permit. This includes all leaks and line breaks, returning the diffuser ports to proper operation and restoring full flow through the diffusers including preventing any flow out the end cap. Alternatively the outfall may be replaced.

Also shown are model results of the repair consisting of a proposed slipline for the entire outfall with new diffuser. The entire reinforced concrete pipe and concrete cylinder pipe sections of the existing outfall including diffuser would be sliplined with an HDPE liner with new 6-port diffuser at the current diffuser site. There is a wide range of possible diffuser configurations (number, size, and spacing of ports). A baseline configuration of six 4.5-inch ports at 12-foot spacing has been developed for mixing zone modeling. The existing reinforced concrete pipe and concrete cylinder pipe outfall pipes would remain intact for anchoring and protection of the HDPE pipe. For acute model runs, the values below use the lesser of the model results for the 10th and 90th percentile current speeds.

Table C-2 Dilution Factors

	Unrepaired Diffuser and Line		**Repaired Diffuser and Sliplined**	
Criteria	**Acute**	**Chronic**	**Acute**	**Chronic**
Aquatic Life	**54.2**[a] 94.5[b]	302[a] **214**[b]	163	386

[a] Model result for nearshore leak at -15 ft MLLW, 25% of effluent flow.

[b] Model result for existing diffuser discharge, 75% of effluent flow.

Bold is the most conservative and selected dilution factor

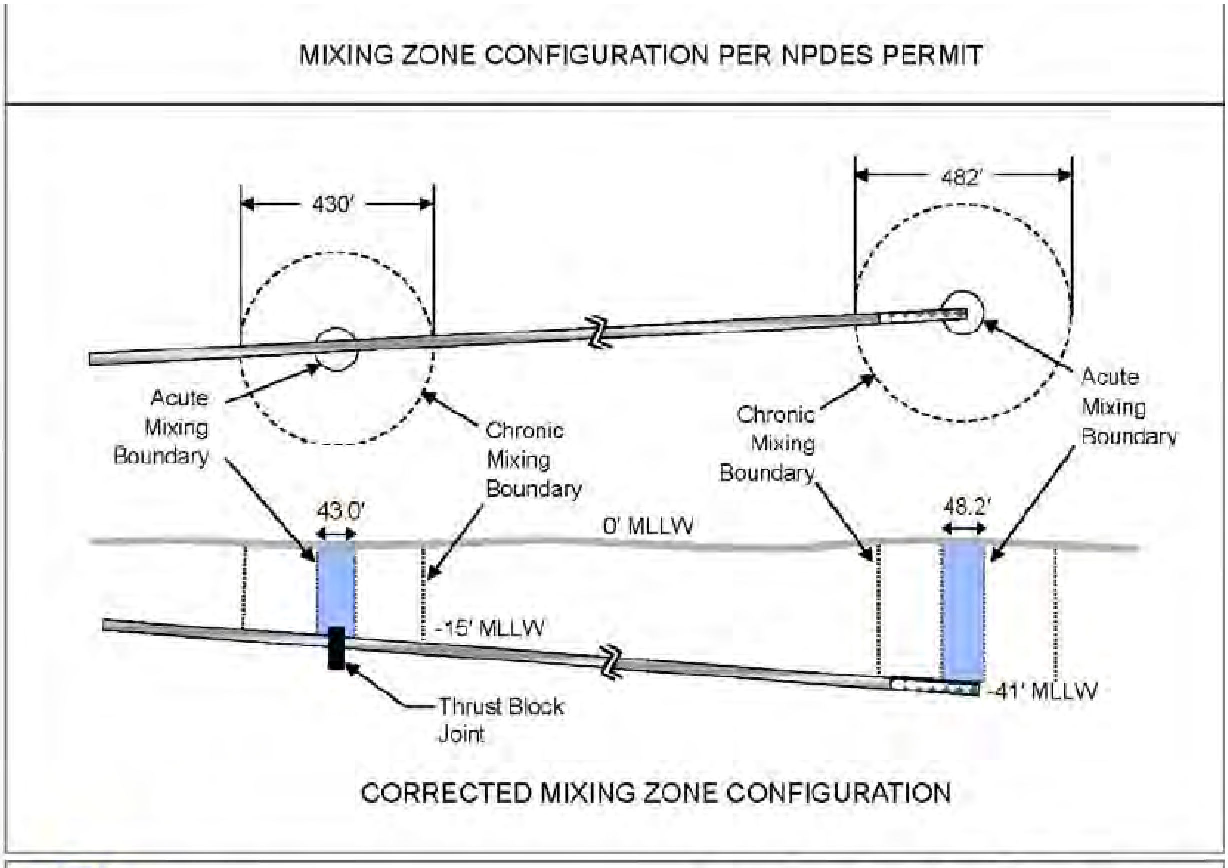


Figure 2: Mixing Zone Configuration

The existing NPDES Permit and Fact Sheet included incorrect assumptions in establishing the current mixing zones. The existing permit establishes two mixing zones, one at the diffuser terminus and one at the nearshore break, both at depths of -41 feet MLLW. However, the nearshore discharge point occurs at a depth of -15 feet MLLW. In addition, Ecology assumed a 50% split in the effluent flow between the two discharge points, whereas the 2010 dive report estimated less than 25 percent of effluent flow is discharged at the nearshore location. These assumptions are corrected for the mixing zone modeling presented herein. Figure 2 shows the mixing zone configuration included in the current NPDES permit, and the corrected configuration used in this study.

Procedure for Deriving Water Quality-based Effluent Limits

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

1. TMDL-Based Wasteload Allocation

   Where the receiving water quality does not meet water quality standards, the wasteload allocation is generally based on a TMDL developed by the State. A TMDL is a determination of the amount of a pollutant from point, non-point, and natural background sources that may be discharged to a water body without causing the water body to exceed the criterion for that pollutant. Any loading above this capacity risks violating water quality standards.

   To ensure that these waters will come into compliance with water quality standards Section 303(d) of the CWA requires States to develop TMDLs for those water bodies that will not meet water quality standards even after the imposition of technology-based effluent limitations. The first step in establishing a TMDL is to determine the assimilative capacity (the loading of pollutant that a water body can assimilate without exceeding water quality standards). The next step is to divide the assimilative capacity into allocations for non-point sources (load allocations), point sources (wasteload allocations), natural background loadings, and a margin of safety to account for any uncertainties. Permit limitations are then developed for point sources that are consistent with the wasteload allocation for the point source.

2. Mixing zone based WLA

   When the State authorizes a mixing zone for the discharge, the WLA is calculated by using a simple mass balance equation. The equation takes into account the available dilution provided by the mixing zone, and the background concentrations of the pollutant.

3. Criterion as the Wasteload Allocation

   In some cases a mixing zone cannot be authorized, either because the receiving water is already at, or exceeds, the criterion, the receiving water flow is too low to provide dilution, or the facility can achieve the effluent limit without a mixing zone. In such cases, the criterion becomes the wasteload allocation. Establishing the criterion as the wasteload allocation ensures that the effluent discharge will not contribute to an exceedance of the criteria.

Once the wasteload allocation has been developed, the EPA applies the statistical permit limit derivation approach described in Chapter 5 of the *Technical Support Document for Water Quality-Based Toxics Control* (EPA/505/2-90-001, March 1991, hereafter referred to as the TSD) to obtain monthly average, and weekly average or daily maximum permit limits. This approach takes into account effluent variability, sampling frequency, and water quality standards.

Summary - Water Quality-based Effluent Limits

The water quality based effluent limits in the draft permit are summarized below. Spreadsheet input and output for temperature, dissolved oxygen, and pH analyses are provided in Appendix A, which has the lowest chronic dilution factor.

<u>Ammonia</u>

A reasonable potential calculation showed that the Seaplane Base would not have a reasonable potential to cause or contribute to a violation of the water quality criteria for ammonia.

Ammonia criteria are based on a formula which relies on the pH and temperature of the receiving water, because the fraction of ammonia present as the toxic, un-ionized form increases with increasing pH and temperature. Therefore, the criteria become more stringent as pH and temperature increase. The table below details the equations used to determine water quality criteria for ammonia.

As with any natural water body the pH and temperature of the water will vary over time. Therefore, to protect water quality criteria it is important to develop the criteria based on pH and temperature values that will be protective of aquatic life at all times. The EPA used the 95th percentile of the pH and temperature data for the calculations, which were calculated to be 7.8 and 21.

See Appendix D for reasonable potential for ammonia.

<u>pH</u>

The EPA modeled the technology limits for pH by simple mixing analysis using the technology-based limit of 6.0 and 9.0 and a dilution factor of 214 and found no violation of the water quality criterion for pH (see Appendix D). Therefore, the proposed permit includes the technology-based effluent limit for pH.

<u>Fecal Coliform</u>

The EPA modeled the numbers of fecal coliform by simple mixing analysis using the technology-based limit of 400 organisms per 100 ml and a dilution factor of 214. Modeling demonstrates no violation of the water quality criterion for fecal coliform under critical conditions. Therefore, the proposed permit includes the technology-based effluent limit for fecal coliform bacteria.

Regulations at 40 CFR 122.45(d)(2) require that effluent limitations for continuous discharges from POTWs be expressed as average monthly and average weekly limits, unless impracticable. Additionally, the terms “average monthly limit” and “average weekly limit” are defined in 40 CFR 122.2 as being arithmetic (as opposed to geometric) averages. It is impracticable to properly implement a 30-day geometric mean criterion in a permit using monthly and weekly arithmetic average limits. The geometric mean of a given data set is equal to the arithmetic mean of that data set if and only if all of the values in that data set are equal. Otherwise, the geometric mean is always less than the arithmetic mean. In order to ensure that the effluent limits are “derived from and comply with” the geometric mean water quality criterion, as required by 40 CFR 122.44(d)(1)(vii)(A), it is necessary to express the effluent limits as a monthly geometric mean and a weekly geometric mean. Ecology provides directions to calculate the monthly and the 7-day geometric mean in publication No. 04-10-020, Information Manual for Treatment Plant Operators available at: https://fortress.wa.gov/ecy/publications/documents/0410020.pdf

<u>Chlorine</u>

The Washington State Water Quality Standards at WAC 173-201A establish an acute criterion of 13 µg /L, and a chronic criterion of 7.5 µg/L for the protection of aquatic life. A reasonable potential calculation showed that the discharge from the facility would not have the reasonable potential to cause or contribute to a violation of the water quality criteria for chlorine. Therefore, the draft permit does not contain a water quality-based effluent limit. See Appendix D.

Temperature

A reasonable potential calculation showed that the Seaplane Base WWTP discharge would not have the reasonable potential to cause or contribute to a violation of the water quality criteria for temperature at the edge of the mixing zone and an effluent limit is not required. See Appendix D.

Dissolve Oxygen

The dissolved oxygen assessment at the chronic mixing zone boundary accounts for total biochemical oxygen demand (carbonaceous and nitrogenous from ammonia), assumes critical ambient dissolved oxygen equal to the standard of 6.0 mg/L, Streeter-Phelps decay and initial oxygen deficit. Using conservative values, the maximum potential dissolved oxygen depletion of 0.02 mg/L is well below the water quality criterion of 0.20 mg/L. Results of the analyses show that conventional water quality criteria will be met for all outfall discharge alternatives.

As stated in the Ecology (2011) NPDES Fact Sheet, based on the large amount of dilution in the receiving water at critical conditions, technology based effluent limits for CBOD are sufficient to ensure that water quality criteria for dissolved oxygen are met.

Other Parameters

A reasonable potential calculation showed that the Seaplane Base WWTP discharge would not have the reasonable potential to cause or contribute to a violation of the water quality criteria at the edge of the mixing zone for zinc, copper, mercury, lead, arsenic, nickel, selenium, phenols, chromium, antimony, 2-dicloronapthalene, cyanide, silver, thallium and bis(2-ethylhexyl) phthalate. Therefore, an effluent limitation is not required for these parameters. See Appendix D.

Aesthetic Values

The Washington water quality standards require aesthetic values not be impaired by the presence of materials or their effects, which offend the senses of sight, smell, touch, or taste. The draft permit contains a narrative limitation prohibiting the discharge of such materials.

C. Antidegradation

The EPA is required under Section 301(b)(1)(C) of the Clean Water Act (CWA) and implementing regulations (40 CFR 122.4(d) and 122.44(d)) to establish conditions in NPDES permits that ensure protection of the downstream State water quality standards, including antidegradation requirements. EPA has prepared an antidegradation analysis consistent with Ecology's antidegradation implementation procedures. The EPA referred to Washington's antidegradation policy (WAC 173-201A-300) and Ecology's 2011 Supplemental Guidance on Implementing Tier II Antidegradation (https://fortress.wa.gov/ecy/publications/documents/1110073.pdf)

The purpose of Washington's Antidegradation Policy is to:

- Restore and maintain the highest possible quality of the surface waters of Washington.
- Describe situations under which water quality may be lowered from its current condition.
- Apply to human activities that are likely to have an impact on the water quality of surface water.

- Ensure that all human activities likely to contribute to a lowering of water quality, at a minimum, apply all known, available, and reasonable methods of prevention, control, and treatment (AKART).
- Apply three tiers of protection (described below) for surface waters of the state.
  - Tier I ensures existing and designated uses are maintained and protected and applies to all waters and all sources of pollutions.
  - Tier II ensures that waters of a higher quality than the criteria assigned are not degraded unless such lowering of water quality is necessary and in the overriding public interest. Tier II applies only to a specific list of polluting activities.
  - Tier III prevents the degradation of waters formally listed as "outstanding resource waters," and applies to all sources of pollution.

Washington's antidegradation policy states that Tier II reviews will conducted for new or expanded actions conducted under certain authorizations, including NPDES permits and Federal Clean Water Act (CWA) Section 401 water quality certifications (WAC 173-201A-320(2)). The transfer from Ecology permit authorization to EPA permit authorization is a new action. A new action is also the CWA Section 401 certification issued by Ecology.

To determine that a lowering of water quality is necessary and in the overriding public interest, an analysis must be conducted for new or expanded actions when the resulting action has the potential to cause a measurable change in the physical, chemical, or biological quality of a water body. Measurable changes will be determined based on an estimated change in water quality at a point outside the source area, at the edge of the mixing zone. In the context of this regulation, a measurable change includes a:

(a) Temperature increase of 0.3°C or greater;

(b) Dissolved oxygen decrease of 0.2 mg/L or greater;

(c) Bacteria level increase of 2 cfu/100 mL or greater;

(d) pH change of 0.1 units or greater;

(e) Turbidity increase of 0.5 NTU or greater; or

(f) Any detectable increase in the concentration of a toxic or radioactive substance.

As explained previously the Seaplane Base WWTP will be physically de-rated from 2.5 mgd to 0.57 mgd by removal and downsizing lagoons, placing lagoons on "standby mode" and reducing pumping capacity by replacing existing pumps with smaller pumps. The outfall pipe leading to the diffuser is broken and will be repaired. Also, the diffuser is partially plugged and will be repaired to a fully functioning condition. This will have the effect of increasing mixing and reducing the temperature, increasing dissolved oxygen, decreasing bacteria, and reducing turbidity at the edge of the mixing zone. The variation in pH will be reduced.

Further, the effluent limits in the reissued permit are as stringent as or more stringent than the corresponding limits in the previous permit for the facility for all parameters. The reissuance of the Seaplane Base WWTP permit is therefore consistent with WAC 173-201A-320 and 40 CFR 131.12(a)(2).

The EPA's analysis demonstrates that the existing and designated uses of the receiving water will be protected under the conditions of the proposed permit.

Antidegradation Summary

As explained above, the effluent limits in the draft reissued permit and permit conditions to repair the line to the outfall and the requirement to increase the mixing of the diffuser are adequately stringent to ensure that existing uses are maintained and protected, in compliance with WAC 173-201A-310 and 40 CFR 131.12(a)(1).

D. Facility Specific Limits

Table B-3 summarizes the numeric effluent limits that are in the proposed permit. The final limits are the more stringent of technology treatment requirements, water quality based limits or limits retained as the result of anti-backsliding analysis or to meet the State's anti-degradation policy.

Table C-3: Proposed Effluent Limits

Parameter	Units	Effluent Limits			Basis for Effluent Limits
		Average Monthly Limit	Average Weekly Limit	Maximum Daily Limit	
$CBOD_5$	mg/L	25	40		ELG
	lb/day	118	190		
$CBOD_5$ Removal	percent	85 minimum			
Total Suspended Solids (TSS)	mg/L	45	65		ELG
	lb/day	214	309		
TSS Removal	percent	65 minimum			
Fecal Coliform	#/100 ml	200	400		WQS
Total Residual Chlorine	mg/L	0.5	0.75		BAT
	lb/day	2.37	3.56		

Appendix D: Reasonable Potential Calculations

Part A of this appendix explains the process the EPA has used to determine if the discharge authorized in the draft permit has the reasonable potential to cause or contribute to a violation of Washington's federally approved water quality standards. Part B demonstrates how the water quality-based effluent limits (WQBELs) in the draft permit were calculated.

A. Reasonable Potential Analysis

The 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, the EPA compares the maximum projected receiving water concentration to the water quality criteria for that pollutant. If the projected receiving water concentration exceeds the criteria, there is reasonable potential, and a water quality-based effluent limit must be included in the permit. This following section discusses how the maximum projected receiving water concentration is determined

Mass Balance

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

$$C_dQ_d = C_eQ_e + C_uQ_u \qquad \text{Equation 1}$$

where,

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

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

$$C_d = \frac{C_e \times Q_e + C_u \times Q_u}{Q_e + Q_u} \qquad \text{Equation 2}$$

The above form of the equation is based on the assumption that the discharge is rapidly and completely mixed with 100% of the receiving stream.

If the mixing zone is based on less than complete mixing with the receiving water, the equation becomes:

$$C_d = \frac{C_e \times Q_e + C_u \times (Q_u \times \%MZ)}{Q_e + (Q_u \times \%MZ)} \qquad \text{Equation 3}$$

Where:

% MZ = the percentage of the receiving water flow available for mixing.

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

$$C_d = C_e \qquad \text{Equation 4}$$

A dilution factor (D) can be introduced to describe the allowable mixing. Where the dilution factor is expressed as:

$$D = \frac{Q_e + Q_u \times \%MZ}{Q_e} \qquad \text{Equation 5}$$

After the dilution factor simplification, the mass balance equation becomes:

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

If the criterion is expressed as dissolved metal, the effluent concentrations are measured in total recoverable metal and must be converted to dissolved metal as follows:

$$C_d = \frac{CF \times C_e - C_u}{D} + C_u \qquad \text{Equation 7}$$

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

The above equations for C_d are the forms of the mass balance equation which were used to determine reasonable potential and calculate wasteload allocations.

Maximum Projected Effluent Concentration

When determining the projected receiving water concentration downstream of the effluent discharge, the EPA's Technical Support Document for Water Quality-based Toxics Controls (TSD, 1991) recommends using the maximum projected effluent concentration (Ce) in the mass balance calculation (see equation 3, page C-5). To determine the maximum projected effluent concentration (Ce) the EPA has developed a statistical approach to better characterize the effects of effluent variability. The approach combines knowledge of effluent variability as estimated by a coefficient of variation (CV) with the uncertainty due to a limited number of data to project an estimated maximum concentration for the effluent. Once the CV for each pollutant parameter has been calculated, the reasonable potential multiplier (RPM) used to derive the maximum projected effluent concentration (Ce) can be calculated using the following equations:

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

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

where,

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

and

$$RPM = \frac{C_{99}}{C_{P_n}} = \frac{e^{Z_{99} \times \sigma - 0.5 \times \sigma^2}}{e^{Z_{P_n} \times \sigma - 0.5 \times \sigma^2}}$$ Equation 9

Where,

σ^2 = $\ln(CV^2 + 1)$
Z_{99} = 2.326 (z-score for the 99th percentile)
Z_{Pn} = z-score for the P_n percentile (inverse of the normal cumulative distribution function at a given percentile)
CV = coefficient of variation (standard deviation ÷ mean)

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

$C_e = (RPM)(MRC)$ Equation 10

where MRC = Maximum Reported Concentration

Maximum Projected Effluent Concentration at the Edge of the Mixing Zone

Once the maximum projected effluent concentration is calculated, the maximum projected effluent concentration at the edge of the acute and chronic mixing zones is calculated using the mass balance equations presented previously.

Reasonable Potential

The discharge has reasonable potential to cause or contribute to an exceedance of water quality criteria if the maximum projected concentration of the pollutant at the edge of the mixing zone exceeds the most stringent criterion for that pollutant.

Results of Reasonable Potential Calculations

Using Ecology spreadsheets and the 99th percentile effluent discharge it was determined that the discharge does not have a reasonable potential to cause or contribute to an exceedance of water quality criteria at the edge of the mixing zone for any of the pollutants of concern. The results of the calculations are shown below.

Reasonable Potential Calculation

Facility	Seaplane Base
Water Body Type	Marine

Dilution Factors:	Acute	Chronic
Aquatic Life	54.2	214.0
Human Health Carcinogenic		214.0
Human Health Non-Carcinogenic		214.0

Pollutant, CAS No. & NPDES Application Ref. No.			AMMONIA, Criteria as Total NH3	LEAD - 7439921 7M Dependent on hardness	MERCURY 7439976 8M	NICKEL - 7440020 9M - Dependent on hardness	PHENOL 108952 10A	SELENIUM 7782492 10M	ZINC- 7440666 13M hardness dependent	COPPER - 744058 6M Hardness dependent	CHLORINE (Total Residual) 7782505	2-CHLORONAPTHALENE 91587 16B	ANTIMONY (INORGANIC) 7440360 1M
Effluent Data	# of Samples (n)		52	4	4	4	4	4	4	3	34	4	4
	Coeff of Variation (Cv)		0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
	Effluent Concentration, ug/L (Max. or 95th Percentile)		38,000	0.5	0.00463	2.72	116	1	28	14	0.58	0.3	1
	Calculated 50th percentile Effluent Conc. (when n>10)												
Receiving Water Data	90th Percentile Conc., ug/L		0.09	0	0	0	0	0	0	0	0		0
	Geo Mean, ug/L												
Water Quality Criteria	Aquatic Life Criteria, ug/L	Acute	19,314	210	1.8	74	-	290	90	4.8	13	-	-
		Chronic	2,901	8.1	0.025	8.2	-	71	81	3.1	7.5	-	-
	WQ Criteria for Protection of Human Health, ug/L		-	-	0.15	100	70000	200	1000	-	-	100	90
	Metal Criteria Translator, decimal	Acute	-	0.951	0.85	0.99	-	-	0.946	0.83	-	-	-
		Chronic	-	0.951	-	0.99	-	-	0.946	0.83	-	-	-
	Carcinogen?		N	N	N	N	N	N	N	N	N	N	N

Aquatic Life Reasonable Potential

		AMMONIA	LEAD	MERCURY	NICKEL	PHENOL	SELENIUM	ZINC	COPPER	CHLORINE	2-CHLORONAPTHALENE	ANTIMONY
Effluent percentile value	99%	0.99	0.99	0.99	0.99		0.99	0.99	0.99	0.99		
s	$s^2=\ln(CV^2+1)$	0.555	0.555	0.555	0.555		0.555	0.555	0.555	0.555		
$Pn=(1\text{-confidence level})^{1/n}$	99%	0.915	0.316	0.316	0.316		0.316	0.316	0.215	0.873		
Multiplier		1.00	4.74	4.74	4.74		4.74	4.74	5.62	1.00		
Max concentration (ug/L) at edge of…	Acute	701.195	0.042	0.000	0.235		0.087	2.315	1.205	0.011		
	Chronic	177.660	0.011	0.000	0.060		0.022	0.586	0.305	0.003		
Reasonable Potential? Limit Required?		**NO**	**NO**	**NO**	**NO**		**NO**	**NO**	**NO**	**NO**		

Reasonable Potential Calculation - Page 2

Facility	Seaplane Base
Water Body Type	Marine

Dilution Factors:	Acute	Chronic
Aquatic Life	54.2	214.0
Human Health Carcinogenic		214.0
Human Health Non-Carcinogenic		214.0

Pollutant, CAS No. & NPDES Application Ref. No.			ARSENIC (dissolved) 7440382 2M	BIS(2-ETHYLHEXYL) PHTHALATE 117817 13B	CYANIDE 57125 14M	SILVER - 7740224 11M dependent on hardness.	THALLIUM 7440280 12M						
Effluent Data	# of Samples (n)		4	4	4	4	4						
	Coeff of Variation (Cv)		0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
	Effluent Concentration, ug/L (Max. or 95th Percentile)		0.9	1.4	10	2	1						
	Calculated 50th percentile Effluent Conc. (when n>10)												
Receiving Water Data	90th Percentile Conc., ug/L		0	0	0	0							
	Geo Mean, ug/L												
Water Quality Criteria	Aquatic Life Criteria, ug/L	Acute	69	-	1	1.9	-						
		Chronic	36	-	1	-	-						
	WQ Criteria for Protection of Human Health, ug/L		-	0.046	100	-	6.3						
	Metal Criteria Translator, decimal	Acute	1	-	-	0.85	-						
		Chronic	-	-	-	-	-						
	Carcinogen?		Y	Y	N	N	N						

Aquatic Life Reasonable Potential

			ARSENIC	BIS(2-ETHYLHEXYL) PHTHALATE	CYANIDE	SILVER	THALLIUM
Effluent percentile value		99%	0.99		0.99	0.99	
s	$s^2=\ln(CV^2+1)$		0.555		0.555	0.555	
$Pn=(1\text{-confidence level})^{1/n}$		99%	0.316		0.316	0.316	
Multiplier			4.74		4.74	4.74	
Max concentration (ug/L) at edge of…		Acute	0.079		0.874	0.149	
		Chronic	0.020		0.221	0.044	
Reasonable Potential? Limit Required?			**NO**		**NO**	**NO**	

Aquatic Life Limit Calculation

# of Compliance Samples Expected per month		
LTA Coeff. Var. (CV), decimal		
Permit Limit Coeff. Var. (CV), decimal		
Waste Load Allocations, ug/L	Acute	
	Chronic	
Long Term Averages, ug/L	Acute	
	Chronic	
Limiting LTA, ug/L		
Metal Translator or 1?		
Average Monthly Limit (AML), ug/L		
Maximum Daily Limit (MDL), ug/L		

Human Health Reasonable Potential

			ARSENIC	BIS(2-ETHYLHEXYL) PHTHALATE	CYANIDE	SILVER	THALLIUM
s	$s^2=\ln(CV^2+1)$			0.55451	0.55451		0.55451
Pn=(1-confidence level)1/n		99%		0.316	0.316		0.316
Multiplier				1.3037	1.3037		1.3037
Dilution Factor				214	214		214
Max Conc. at edge of Chronic Zone, ug/L				0.00853	0.06092		0.00609
Reasonable Potential? Limit Required?				**NO**	**NO**		**NO**

Reasonable Potential Calculation

Facility	Seaplane Base
Water Body Type	Marine

Dilution Factors:	Acute	Chronic
Aquatic Life	163.0	386.0
Human Health Carcinogenic		386.0
Human Health Non-Carcinogenic		386.0

Pollutant, CAS No. & NPDES Application Ref. No.			AMMONIA, Criteria as Total NH3	LEAD - 7439921 7M Dependent on hardness	MERCURY 7439976 8M	NICKEL - 7440020 9M - Dependent on hardness	PHENOL 108952 10A	SELENIUM 7782492 10M	ZINC- 7440666 13M hardness dependent	COPPER - 744058 6M Hardness dependent	CHLORINE (Total Residual) 7782505	2-CHLORONAPTHALENE 91587 16B	ANTIMONY (INORGANIC) 7440360 1M
Effluent Data	# of Samples (n)		52	4	4	4	4	4	4	3	34	4	4
	Coeff of Variation (Cv)		0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
	Effluent Concentration, ug/L (Max. or 95th Percentile)		38,000	0.5	0.00463	2.72	116	1	28	14	0.58	0.3	1
	Calculated 50th percentile Effluent Conc. (when n>10)												
Receiving Water Data	90th Percentile Conc., ug/L		0.09	0	0	0	0	0	0	0	0		0
	Geo Mean, ug/L												
Water Quality Criteria	Aquatic Life Criteria, ug/L	Acute	19,314	210	1.8	74	-	290	90	4.8	13	-	-
		Chronic	2,901	8.1	0.025	8.2	-	71	81	3.1	7.5	-	-
	WQ Criteria for Protection of Human Health, ug/L		-	-	0.15	100	70000	200	1000	-	-	100	90
	Metal Criteria Translator, decimal	Acute	-	0.951	0.85	0.99	-	-	0.946	0.83	-	-	-
		Chronic	-	0.951	-	0.99	-	-	0.946	0.83	-	-	-
	Carcinogen?		N	N	N	N	N	N	N	N	N	N	N

Aquatic Life Reasonable Potential

			AMMONIA	LEAD	MERCURY	NICKEL	PHENOL	SELENIUM	ZINC	COPPER	CHLORINE	2-CHLORONAPTHALENE	ANTIMONY
Effluent percentile value		99%	0.99	0.99	0.99	0.99		0.99	0.99	0.99	0.99		
s	$s^2=\ln(CV^2+1)$		0.555	0.555	0.555	0.555		0.555	0.555	0.555	0.555		
$Pn=(1\text{-confidence level})^{1/n}$		99%	0.915	0.316	0.316	0.316		0.316	0.316	0.215	0.873		
Multiplier			1.00	4.74	4.74	4.74		4.74	4.74	5.62	1.00		
Max concentration (ug/L) at edge of...		Acute	233.218	0.014	0.000	0.078		0.029	0.770	0.401	0.004		
		Chronic	98.535	0.006	0.000	0.033		0.012	0.325	0.169	0.002		
Reasonable Potential? Limit Required?			NO	NO	NO	NO		NO	NO	NO	NO		

Facility	Seaplane Base
Water Body Type	Marine

Dilution Factors:	Acute	Chronic
Aquatic Life	163.0	386.0
Human Health Carcinogenic		386.0
Human Health Non-Carcinogenic		386.0

Pollutant, CAS No. & NPDES Application Ref. No.			ARSENIC (dissolved) 7440382 2M	BIS(2-ETHYLHEXYL) PHTHALATE 117817 13B	CYANIDE 57125 14M	SILVER - 7740224 11M dependent on hardness.	THALLIUM 7440280 12M						
Effluent Data	# of Samples (n)		4	4	4	4	4						
	Coeff of Variation (Cv)		0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6	0.6
	Effluent Concentration, ug/L (Max. or 95th Percentile)		0.9	1.4	10	2	1						
	Calculated 50th percentile Effluent Conc. (when n>10)												
Receiving Water Data	90th Percentile Conc., ug/L		0	0	0	0							
	Geo Mean, ug/L												
Water Quality Criteria	Aquatic Life Criteria, ug/L	Acute	69	-	1	1.9	-						
		Chronic	36	-	1	-	-						
	WQ Criteria for Protection of Human Health, ug/L		-	0.046	100	-	6.3						
	Metal Criteria Translator, decimal	Acute	1	-	-	0.85	-						
		Chronic	-	-	-	-	-						
	Carcinogen?		Y	Y	N	N	N						

Aquatic Life Reasonable Potential

			ARSENIC	BIS(2-ETHYLHEXYL) PHTHALATE	CYANIDE	SILVER	THALLIUM
Effluent percentile value		99%	0.99		0.99	0.99	
s	$s^2=\ln(CV^2+1)$		0.555		0.555	0.555	
$Pn=(1\text{-confidence level})^{1/n}$		99%	0.316		0.316	0.316	
Multiplier			4.74		4.74	4.74	
Max concentration (ug/L) at edge of…	Acute		0.079		0.874	0.149	
	Chronic		0.020		0.221	0.044	
Reasonable Potential? Limit Required?			**NO**		**NO**	**NO**	

Aquatic Life Limit Calculation

# of Compliance Samples Expected per month		
LTA Coeff. Var. (CV), decimal		
Permit Limit Coeff. Var. (CV), decimal		
Waste Load Allocations, ug/L	Acute	
	Chronic	
Long Term Averages, ug/L	Acute	
	Chronic	
Limiting LTA, ug/L		
Metal Translator or 1?		
Average Monthly Limit (AML), ug/L		
Maximum Daily Limit (MDL), ug/L		

Human Health Reasonable Potential

			ARSENIC	BIS(2-ETHYLHEXYL) PHTHALATE	CYANIDE	SILVER	THALLIUM
s	$s^2=\ln(CV^2+1)$			0.55451	0.55451		0.55451
Pn=(1-confidence level)1/n		99%		0.316	0.316		0.316
Multiplier				1.3037	1.3037		1.3037
Dilution Factor				214	214		214
Max Conc. at edge of Chronic Zone, ug/L				0.00853	0.06092		0.00609
Reasonable Potential? Limit Required?				**NO**	**NO**		**NO**

The EPA modeled pH by simple mixing analysis using the technology-based limit of 6.0 and 9.0 and a dilution factor of 214. As shown below modeling predicts no violation of the water quality criterion for pH under critical conditions. Therefore, the proposed permit includes the technology-based effluent limit for pH.

Effluent pH of 9.0

Calculation of pH of a Mixture in Marine Water

Based on the CO2SYS program (Lewis and Wallace, 1998), http://cdiac.esd.ornl.gov/oceans/co2rprt.html

INPUT	
1. MIXING ZONE BOUNDARY CHARACTERISTICS	
Dilution factor at mixing zone boundary	214.0
Depth at plume trapping level (m)	2.600
2. BACKGROUND RECEIVING WATER CHARACTERISTICS	
Temperature (deg C):	16.30
pH:	7.77
Salinity (psu):	28.06
Total alkalinity (meq/L)	2.00
3. EFFLUENT CHARACTERISTICS	
Temperature (deg C):	21.50
pH:	9.00
Salinity (psu)	0.05
Total alkalinity (meq/L):	3.00
4. CLICK THE 'Calculate" BUTTON TO UPDATE OUTPUT RESULTS -->	Calcula
OUTPUT	
CONDITIONS AT THE MIXING ZONE BOUNDARY	
Temperature (deg C):	16.32
Salinity (psu)	27.93
Density (kg/m^3)	1020
Alkalinity (mmol/kg-SW):	1.96
Total Inorganic Carbon (mmol/kg-SW):	2
pH at Mixing Zone Boundary:	**7.78**

Effluent pH of 6.0

Calculation of pH of a Mixture in Marine Water

Based on the CO2SYS program (Lewis and Wallace, 1998), http://cdiac.esd.ornl.gov/oceans/co2rprt.html

INPUT	
1. MIXING ZONE BOUNDARY CHARACTERISTICS	
Dilution factor at mixing zone boundary	214.0
Depth at plume trapping level (m)	2.600
2. BACKGROUND RECEIVING WATER CHARACTERISTICS	
Temperature (deg C):	16.30
pH:	7.77
Salinity (psu):	28.06
Total alkalinity (meq/L)	2.00
3. EFFLUENT CHARACTERISTICS	
Temperature (deg C):	21.50
pH:	6.00
Salinity (psu)	0.05
Total alkalinity (meq/L):	3.00
4. CLICK THE 'Calculate" BUTTON TO UPDATE OUTPUT RESULTS -->	Calculat
OUTPUT	
CONDITIONS AT THE MIXING ZONE BOUNDARY	
Temperature (deg C):	16.32
Salinity (psu)	27.93
Density (kg/m^3)	1020
Alkalinity (mmol/kg-SW):	1.96
Total Inorganic Carbon (mmol/kg-SW):	2
pH at Mixing Zone Boundary:	**7.70**

Calculation of Fecal Coliform at Chronic Mixing Zone

INPUT	
Chronic Dilution Factor	214.0
Receiving Water Fecal Coliform, #/100 ml	0
Effluent Fecal Coliform - worst case, #/100 ml	400
Surface Water Criteria, #/100 ml	*14*
OUTPUT	
Fecal Coliform at Mixing Zone Boundary, #/100 ml	**2**
Difference between mixed and ambient, #/100 ml	2

Conclusion: At design flow, the discharge has no reasonable potential to violate water quality standards for fecal coliform.

Marine Temperature Reasonable Potential and Limit Calculation

Based on WAC 173-201A-200(1)(c)(i)--(ii) and Water Quality Program Guidance. All Data inputs must meet WQ guidelines. The Water Quality temperature guidance document may be found at: http://www.ecy.wa.gov/biblio/0610100.html

INPUT		
1. Chronic Dilution Factor at Mixing Zone Boundary	214.0	
2. Annual max 1DADMax Ambient Temperature (Background 90th percentile)	12.9 °C	
3. 1DADMax Effluent Temperature (95th percentile)	21.5 °C	
4. Aquatic Life Temperature WQ Criterion	16.0 °C	
OUTPUT		
5. Temperature at Chronic Mixing Zone Boundary:	12.94 °C	
6. Incremental Temperature Increase or decrease:	0.04 °C	
7. Incremental Temperature Increase 12/(T-2) if T≤ crit:	1.10 °C	
8. Maximum Allowable Temperature at Mixing Zone Boundary:	14.00 °C	
A. If ambient temp is warmer than WQ criterion		
9. Does temp fall within this warmer temp range?	NO	
10. Temp increase allowed at mixing zone boundary, if required:	---	
B. If ambient temp is cooler than WQ criterion but within 12/(T_{amb}-2) and within 0.3 °C of the criterion		
11. Does temp fall within this incremental temp. range?	NO	
12. Temp increase allowed at mixing zone boundary, if required:	---	
C. If ambient temp is cooler than (WQ criterion-0.3) but within 12/(T_{amb}-2) of the criterion		
13. Does temp fall within this Incremental temp. range?	NO	
14. Temp increase allowed at mixing zone boundary, if required:	---	
D. If ambient temp is cooler than (WQ criterion - 12/(T_{amb}-2))		
15. Does temp fall within this Incremental temp. range?	YES	
16. Temp increase allowed at mixing zone boundary, if required:	NO LIMIT	
RESULTS		
17. Do any of the above cells show a temp increase?	**NO**	
18. Temperature Limit if Required?	**NO LIMIT**	

Marine Un-ionized Ammonia Criteria Calculation

Calculation of seawater fraction of un-ionized ammonia from Hampson (1977). Un-ionized ammonia criteria for salt water are from EPA 440/5-88-004. Revised 19-Oct-93.

INPUT	
1. Receiving Water Temperature, deg C (90th percentile):	12.9
2. Receiving Water pH, (90th percentile):	7.7
3. Receiving Water Salinity, g/kg (10th percentile):	28.1
4. Pressure, atm (EPA criteria assumes 1 atm):	1.0
5. Unionized ammonia criteria (mg un-ionized NH_3 per liter) from EPA 440/5-88-004:	
Acute:	0.233
Chronic:	0.035
OUTPUT	
Using mixed temp and pH at mixing zone boundaries?	No
1. Molal Ionic Strength (not valid if >0.85):	0.575
2. pKa8 at 25 deg C (Whitfield model "B"):	9.312
3. Percent of Total Ammonia Present as Unionized:	1.0%
4. Total Ammonia Criteria (mg/L as NH_3):	
Acute:	23.48
Chronic:	3.53
RESULTS	
Total Ammonia Criteria (mg/L as N)	
Acute:	**19.31**
Chronic:	**2.90**

Calculation of BOD_5 Oxidation with Temperature Adjustment

INPUT	
Effluent BOD_5 (mg/L)	45
Effluent Dissolved Oxygen (DO) (mg/L)	4.5
Receiving Water Temperature (deg C)	15
Receiving Water DO (mg/L)	8.5
DO WQ Standards (mg/L)	6
Chronic Mixing Dilution Factor	214.0
Time for effluent to travel from outfall to chronic mixing boundary (days)	0.016
Oxidation rate of BOD, base e at 20 deg C, k_1 (day^-1)*	0.23
OUTPUT	
Effluent Ultimate BOD (mg/L)	65.85
Oxidation rate of BOD at ambient temperature, base e (day^-1)	0.18
BOD oxidized between outfall and chronic mixing zone (mg/L)	0.19
RESULTS	
DO at chronic mixing zone	8.48
Difference between ambient DO and DO at chronic mixing boundary	0.02
There is no reasonable potential of not meeting the DO criteria under these conditions.	