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:

United States Department of Defense, Department of the Navy
Naval Radio Station (Transmitter (T)) Jim Creek

Public Comment Start Date: February 21, 2015
Public Comment Expiration Date: March 23, 2015

Technical Contact: John Drabek, PE, 206-553-8257, drabek.john@epa.gov
1-800-424-4372 ext. 3-8257 (within Region 10)

The EPA Proposes To Issue an NPDES Permit
The EPA proposes to issue an 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 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
Att: Gerald Shervey, PE
Phone: 425-649-7293

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-130
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

AML	Average Monthly Limit
AWL	Average Weekly Limit
BAT	Best Available Technology economically achievable
BCT	Best Conventional pollutant control Technology
BMP	Best Management Practices
BPT	Best Practicable
°C	Degrees Celsius
CFR	Code of Federal Regulations
CFS	Cubic Feet per Second
CWA	Clean Water Act
DMR	Discharge Monitoring Report
EFH	Essential Fish Habitat
EPA	U.S. Environmental Protection Agency
ESA	Endangered Species Act
FR	Federal Register
gpd	Gallons per day
ICIS	Integrated Compliance Information System
LTA	Long Term Average
mg/L	Milligrams per liter
ml	milliliters
ML	Minimum Level
mgd	Million gallons per day
MDL	Maximum Daily Limit or Method Detection Limit
NOAA	National Oceanic and Atmospheric Administration
NOI	Notice of Intent
NPDES	National Pollutant Discharge Elimination System
NSPS	New Source Performance Standards
OWW	Office of Water and Watersheds
RP	Reasonable Potential
RPM	Reasonable Potential Multiplier
RWC	Receiving Water Concentration

SIC	Standard Industrial Classification
TSD	Technical Support Document for Water Quality-based Toxics Control (EPA/505/2-90-001)
USFWS	U.S. Fish and Wildlife Service
USGS	United States Geological Survey
WLA	Wasteload allocation
WQBEL	Water quality-based effluent limit
Water Quality Standards	Water Quality Standards

I. Applicant

A. General Information

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

United States Department of Defense, Department of the Navy
Naval Radio Station (Transmitter (T)) Jim Creek
NPDES Permit No. WA-002657-3

Physical Address:
21027 Jim Creek Road
Arlington, WA 98223

Mailing Address:
Naval Station Everett
Environmental Affairs Department
Building 2000, Room 225 W. Marine View Drive
Everett, WA 98207

Contact:
Steve Murphy
Environmental Engineer
425-304-3277

B. Permit History

This is the facility's first permit. An NPDES application for permit issuance was submitted by the permittee on August 5, 1999. The EPA determined that the application was timely and complete. The facility submitted a new updated application in July, 2008 and it was determined to be complete on August 28, 2008. The EPA opened a public comment period for a draft permit on April 22, 2009 requiring an All Known, Available, and Reasonable Methods of Prevention, Control, and Treatment (AKART) study to evaluate temperature control technology. A final permit was not issued.

II. Facility Information

A. Description of Facility

The United States Department of Defense, Department of the Navy, has applied to the EPA for an NPDES permit to discharge once-through cooling water to Jim Creek from the Naval Radio Station (Transmitter (T)) Jim Creek (Transmitter Building), where non-contact cooling water is used to cool a radio transmitter. The proposed permit will authorize the discharge of once-through cooling water, with no chemical addition, to Jim Creek.

The transmitting facility was established in 1953. This facility is near Oso, WA, in the foothills of the Cascade Mountains and is about 70 miles north-northeast of Seattle. The facility has roughly 5,000 largely forested acres and includes a Regional Outdoor

Recreational Area for active duty personnel, reservists, retirees, Department of Defense civilians, and sponsored guests.

The source of the discharge to Jim Creek from this facility is once-through non-contact cooling water. Raw water from East Creek, West Creek, and an unnamed third creek is diverted to a settling basin where sedimentation occurs before raw water is stored in a 150,000 gallon above-ground storage tank located on-site. The storage tank is not a source of potable water and any overflow from the storage tank goes to Jim Creek upstream of the transmitter building. Automatic controls based on temperature sensors, regulate cooling water flows from this tank by gravity to two shell-and-tube heat exchangers within the Transmitter Building where heat transfer occurs.

Outfall Description

Non-contact cooling water with a waste heat component is discharged to the west of the Transmitter Building and is combined with any stormwater from roof and area drains and with the Transmitter Building footing drains. Flow is to a 480 foot concrete 18 inch pipe then to a rip-rap lined infiltration channel followed by a natural bioswale. The discharge then continues to the Flats Road Area for infiltration. Small springs from the hillside combine with the wastewater before any water not infiltrated is discharged through Outfall 67 to Jim Creek (See Appendix A, Site Map).

B. Background Information

Effluent Characterization

In order to determine pollutants of concern for further analysis, the EPA evaluated the application form and additional discharge data.

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

Table 1. Naval Radio Station Jim Creek Effluent Quality

Parameter	No. of Measurements	Avg Daily Value	Max Daily Value
TSS (mg/L)	2	NA	< 5.0
Oil and Grease (mg/L)	2	NA	< 5.0
COD (mg/L)	2	NA	11
TOC (mg/L)	2	NA	3.3
Ammonia (mg/L N)	2	NA	0.02
pH (stnd units) (min-max)	6	NA	6.36 – 8.0
Copper	1	NA	ND
Nickel	1	NA	ND
Zinc	1	NA	ND

The report *Transmitter Building Discharge Water Monitoring Report June 2013 – September 2013* provided the following discharge temperature data from the newly constructed bioswale.

Table 2. Highest 7-DADMax Temperatures

Date Range	Highest 7-DADMax Flat Road	
	°C	°F
18 - 30 June, 2013	25.6	78.10
1 - 14 July, 2013	25.7	78.27
15 - 31 July 2013	24.9	76.88
2 - 14 August, 2013	25.5	77.92
16 - 31 August, 2013	25.6	78.10
1 - 14 September, 2013	25.6	78.10
15 - 30 September, 2013	25.1	77.23
Max- 7-DADMax	25.7	78.27

Outfall 67 was utilized only once since early 2014. This resulted in only one flow measurement for June, 2014. The maximum daily discharge rate was measured at 55 gpm (0.079 MGD). Although the non-contact cooling water is steady state the comingled small springs from the hillside are variable. June is a period of low hillside spring flow due to low precipitation. Spring flow from the hillside is proportional to precipitation. To develop the worst case critical flow rate the EPA compared the highest monthly precipitation to June precipitation.

Based on visual inspection, the flow rate from the springs appears to be higher than the non-contact cooling water discharge flow rate. The peak precipitation month at nearby Arlington is January and is approximately 2.2 times the precipitation of June. Assuming 55 percent of the discharge flow is from hillside spring flow then the worst case critical flow rate would be:

55 gpm total flow x 0.55 from hillside spring flow = 30 gpm from hillside spring flow

Leaving 55 – 30 = 25 gpm non-contact cooling water discharge flow

For worst case spring flow conditions

30 gpm x 2.2 = 66 gpm in January

Worst case (highest) discharge at Outfall 67:

25 + 66 = 91 gpm

To better characterize the discharge the permit requires continuous flow monitoring at Outfall 67 for use in the next permit cycle.

III. Receiving Water

This facility discharges to Jim Creek below its confluence with Little Jim Creek. Jim Creek is tributary to the South Fork of the Stillaguamish River. The South Fork joins the North Fork of the Stillaguamish River near Arlington, WA which then flows 22 miles to Puget Sound.

A. Low Flow Conditions

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

The 7Q10 is not available in the vicinity of the discharge. However the lowest seven day average over two years is available at a USGS station within the reservation (See Appendix A). The lowest seven day average over a two year period for Jim Creek is 6.43 cubic feet per second (cfs) based on USGS Station *Jim Creek near Oso #12163000*.

B. 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 7-DADMax is 15.0°C based on the Navy's monitoring of Jim Creek in 2010.

C. Water Quality Standards

Overview

Section 301(b)(1)(C) of the Clean Water Act (CWA) requires the development of limitations in permits necessary to meet water quality standards. Federal regulations at 40 CFR 122.4(d) require that the conditions in NPDES permits ensure compliance with the water quality standards of all affected States. A State's water quality standards are composed of use classifications, numeric and/or narrative water quality criteria and an anti-degradation policy.

The use classification system designates the beneficial uses that each water body is expected to achieve, such as drinking water supply, contact recreation, and aquatic life. The numeric and narrative water quality criteria are the criteria deemed necessary by the State to support the beneficial use classification of each water body. The anti-degradation policy represents a three-tiered approach to maintain and protect various levels of water quality and uses.

Designated Beneficial Uses

WAC 173-201A-602 (Table 602) describes designated uses for surface waters of the State of Washington and establishes designated uses for Jim Creek within the Naval Reservation above its confluence with Little Jim Creek but does not establish specific uses within the Naval Reservation below the confluence. In accordance with WAC 173-201A-600 (1), all surface waters of the State not named in Table 602 are to be protected for salmonid spawning, rearing, and migration; primary contact recreation; domestic, industrial, and agricultural supply; stock watering; wildlife habitat; harvesting; commerce and navigation; boating; and aesthetic values.

Surface Water Quality Criteria

Water quality criteria, applicable to this receiving water, are summarized in the Table 3.

Table 3. Applicable Water Quality Criteria

Pollutant	Basis	Criteria
Temperature	Core Summer Salmonid Habitat	16° C Seven Day Average of the Daily Maximums (7-DADMax) Per WAC 173-201A-200 (1) (c) When the water body's temperature is warmer than 16ºC (or within 0.3º of 16ºC), then the human actions considered cumulatively may not cause the 7-DADMax temperature of the receiving water to increase more than 0.3.
Aesthetics	WAC 173-201A-200 (2 - 4) for protection of Recreational, Water Supply, and Miscellaneous Fresh Water Uses	Aesthetic values shall 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.

Supplemental Spawning Criteria of 13° C (7-DADMax) is applicable September 15 through July 1 approximately two miles downstream of the outfall (see Appendix A).

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 D), 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 Jim Creek and the analysis concluded that a Tier 2 review is not warranted.

D. 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 2010 Integrated Report Section 5 (section 303(d)) lists Jim Creek, near the point of discharge, as a Category 1 water body. The data show no biological degradation of aquatic life based on the River Invertebrate Prediction and Classification System (RIVPACS) score of 0.95. At the downstream boundary of the facility Jim Creek is listed as Category 2 for bioassessment.

There are no listings in Categories 4 or 5 in the vicinity of this facility's discharge. However, Jim Creek is listed in Category 5, as impaired for temperature, in three locations approximately five, nine and 14 miles downstream of the discharge. These locations are at Whites Road (approximately 7 miles downstream), Jim Creek at Jordan Road (approximately 9 miles downstream), and Jim Creek at the mouth (approximately 14 miles downstream).

The area of the outfall is within the State of Washington Stillaquamish River Watershed Temperature Total Maximum Daily Load: Water Quality Improvement Report, Vol. 2: Implementation Strategy, July 2006 (TMDL).

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 D.

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 Floating, Suspended or Submerged Matter

Section I.B of the permit establishes the following discharge prohibitions.

- The addition of chemicals to cooling water prior to discharge is prohibited.
- The discharge of cleaning solutions or solids, which are residuals of cooling system cleaning efforts, are prohibited.
- The discharge shall not contain floating solids, visible foam, or oily wastes that produce a sheen on the surface of the receiving stream

Numeric Limitations

Table 4: Proposed Effluent Limitations

		Effluent Limitation
Parameter	**Units**	**7-DADMAX**
Temperature	°C	27[1]
Temperature	°C	18.3[2]

[1]Interim limit lasting two years from the effective date of the permit
[2]Limit to be achieved within two years of the effective date of the permit

C. Compliance Schedules

Compliance schedules are authorized by federal NPDES regulations at 40 CFR 122.47 and Washington WQS WAC 173-201A-510(4). Compliance schedules allow a discharger to phase in, over time, compliance with water quality-based effluent limitations when limitations are in the permit for the first time. Additionally, the federal regulations at 40 CFR 122.47 require that the compliance schedules require compliance with effluent limitations as soon as possible and that, when the compliance schedule is longer than 1 year, the schedule shall set forth interim requirements and the dates for their achievement. The time between the interim dates shall generally not exceed 1 year, and when the time necessary to complete any interim requirement is more than one year, the schedule shall require reports on progress toward completion of these interim requirements. In order to grant a compliance schedule the permitting authority must make a reasonable finding that the discharger cannot immediately comply with the water quality-based effluent limit upon the effective date of the permit and that a compliance schedule is appropriate (see 40 CFR 122.47 (a).

The permittee cannot comply immediately upon the effective date of the permit. The permittee intends to comply with the effluent limit through elimination of the discharge during the period in which the discharge may exceed the final temperature limit. The permittee constructed the infiltration/bioswale to meet the final limit. The EPA has found that a 2-year compliance schedule is appropriate for temperature due to the following.

- It will take two years for the vegetation to cover the new bioswale.
- There is some remaining uncertainty all the non-contact cooling water will infiltrate during the critical summer period. Some adjustments in routing the discharge may be necessary.
- Only one flow measurement is available for the new outfall created in 2014. Although non-contact cooling water flow from the Transmitter Building is steady state the infiltration rate on the Flats Road Area is variable and comingled hillside spring flow is variable. Two years of continuous flow and temperature monitoring at the outfall will provide sufficient measurement of seasonal variability to verify the discharge flow rate, infiltration rate and allow the Navy to make adjustments to meet the effluent limitation.

Therefore, the EPA proposes a two year compliance schedule.

In addition to the interim requirements required by 40CFR122.47, WAC 173-201A-510(4), General allowance for compliance schedules states:

"(b) For the period of time during which compliance with water quality criteria is deferred, interim effluent limitations shall be formally established, based on the best professional judgment of the department. Interim effluent limitations may be numeric or nonnumeric (e.g., construction of necessary facilities by a specified date as contained in an ecology order or permit)."

Based on best professional judgment (BPJ) the EPA establishes an interim effluent limitation of 27°C consistent with the previous draft permit to ensure no increases in the discharges during the term of the compliance schedule.

The permit also requires an interim report of progress one year from the effective date of the permit.

V. Monitoring Requirements

A. Basis for Effluent and Surface Water Monitoring

Section 308 of the CWA and federal regulation 40 CFR 122.44(i) require monitoring in permits to determine compliance with effluent limitations. Monitoring may also be required to gather effluent and surface water data to determine if additional effluent limitations are required and/or to monitor effluent impacts on receiving water quality.

The permittee is responsible for conducting the monitoring and for reporting results on 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 5, 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.

Table 5: Effluent Monitoring Requirements

Parameter	Units	Sample Location	Sample Frequency	Sample Type
Flow[1]	gpd	Effluent	Continuous	recording
Temperature[1]	°C	Effluent	Continuous	recording

[1]Continuous monitoring shall begin within six months of the permit effective date.

C. Electronic Submission of Discharge Monitoring Reports

The draft permit requires that the permittee submit DMR data electronically using NetDMR within six months of the effective date of the permit. NetDMR is a national web-based tool that allows DMR data to be submitted electronically via a secure Internet application. NetDMR allows participants to discontinue mailing in paper forms under 40 CFR 122.41 and

403.12. Under NetDMR, all reports required under the permit are submitted to the EPA as an electronic attachment to the DMR. Once a permittee begins submitting reports using NetDMR, it is no longer required to submit paper copies of DMRs or other reports to the EPA.

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.

VI. 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 Navy 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 and Ecology upon request.

B. 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 the 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 the 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 facility 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.

C. 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.

VII. 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.

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.

On July 3, 2008, the EPA wrote to NOAA Fisheries and the USFWS to obtain a list of species that are endangered or threatened at the vicinity of the discharge subject to this NPDES permit. On July 23, 2008 (in verbal communication with Matt Longenbaugh) NOAA-Fisheries excluded Coho and Chum salmon from consideration at this location; however, Puget Sound Chinook salmon and Steelhead are threatened species which may be present in this location. The United States Department of the Interior (U.S. Fish and Wildlife Service) lists Bull Trout as threatened and present in the vicinity of the discharge.

The EPA has determined that issuance of this permit will have no effect on threatened Bull Trout, Chinook salmon or Steelhead populations for the following reasons:

- The permit is consistent with the TMDL allocation for the approved temperature water quality standard. The allocation "prohibited from discharging treated effluent at a temperature greater than that equivalent to the water quality criterion for the reach plus 0.3ºC times the chronic dilution factor" The permit prohibits any increase in temperature greater than 0.3°C at the edge of the mixing zone.
- Continuous effluent temperature monitoring to ensure compliance and to measure impacts to Jim Creek and to listed species.

- Continuous effluent flow monitoring to measure impacts to Jim Creek and to listed species.
- The *All Known, Available, and Reasonable Methods of Prevention, Control, and Treatment Study, Naval Radio Station Jim Creek Arlington, Washington* study (NAVFAC, May, 2011) and *Cooling Water Infiltration Study* NAVFAC, September, 2011found discharges will probably be eliminated during the critical summer period.
- The rapid dispersion of temperature discharges and that temperature effects from point source discharges generally diminish downstream quickly as heat is added and removed from a waterbody through natural equilibrium processes. The effects of temperature are unlike the effects of chemical pollutants, which may remain unaltered in the water column and/or accumulate in sediments and aquatic organisms. (EPA Region 10 Guidance for Pacific Northwest State and Tribal Temperature Water Quality Standards, April 2003).
- Prohibition of any added chemicals

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. In a verbal communication from NOAA-Fisheries (Matt Longenbaugh, July 23, 2008), NOAA Fisheries described Jim Creek as essential fish habitat (EFH) for Chinook and Coho salmon.

For the same reasons as listed for the EPA's determination of the discharges having no effect on threatened species, the EPA determines the discharges will have not effect on EFH. The EPA will provide NOAA Fisheries with copies of the draft permit and fact sheet during the public notice period. Any comments received from NOAA Fisheries regarding EFH will be considered prior to reissuance of this permit.

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.

VIII. References

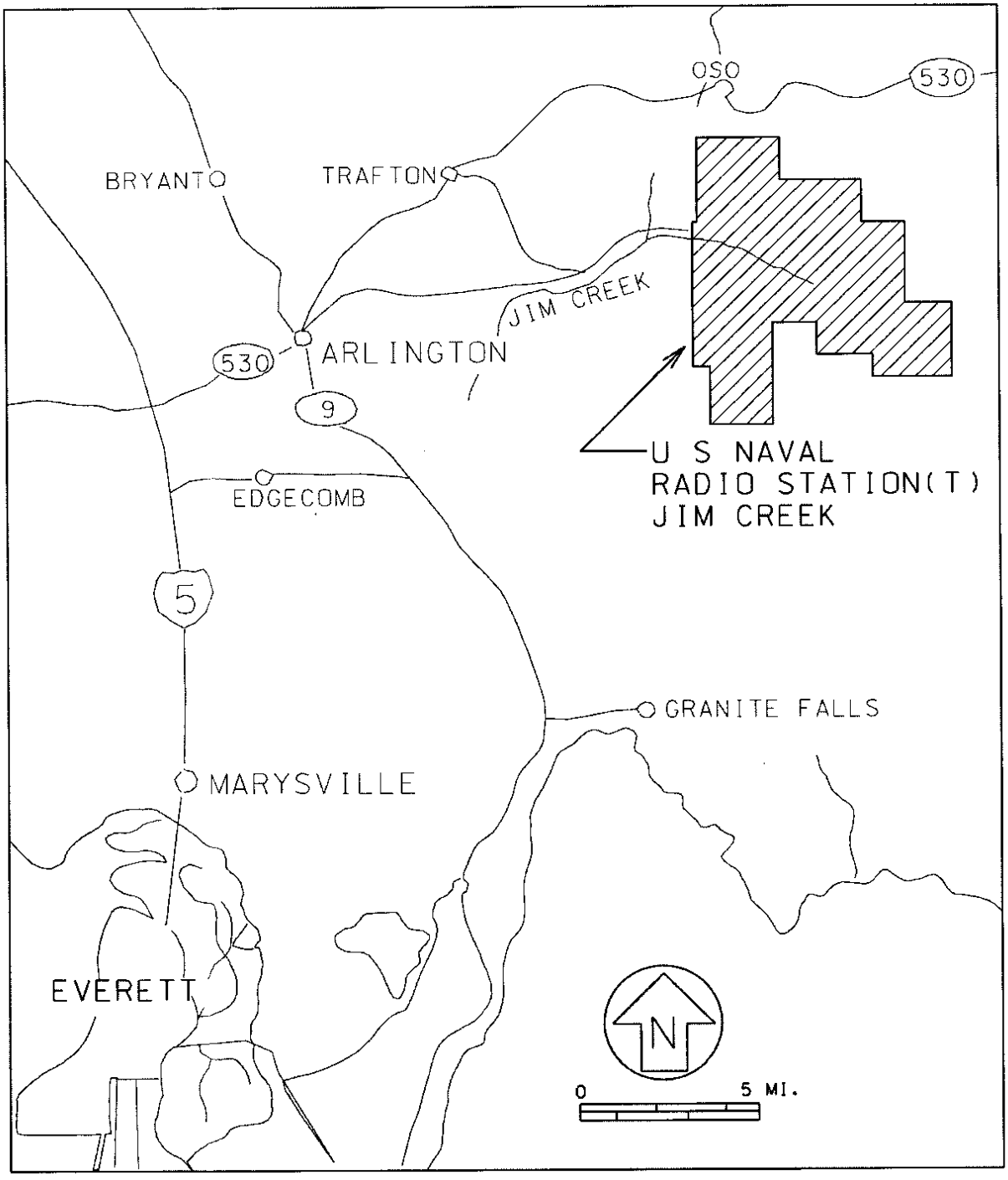
EPA. 1991. *Technical Support Document for Water Quality-based Toxics Control.* US Environmental Protection Agency, Office of Water, EPA/505/2-90-001.

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

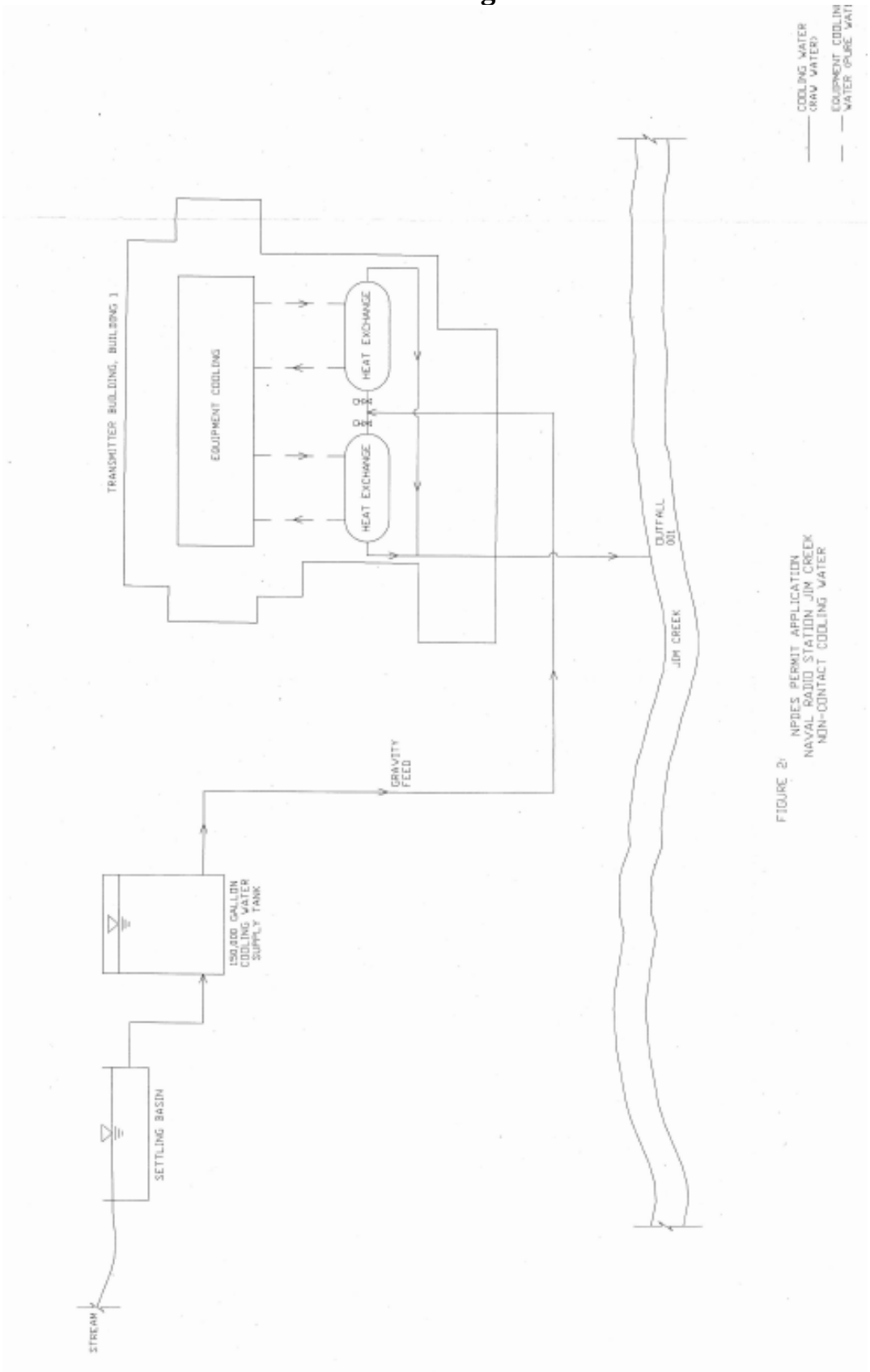
NAVFAC. May, 2011, *All Known, Available, and Reasonable Methods of Prevention, Control, and Treatment Study, Naval Radio Station Jim Creek Arlington, Washington,* Naval Facilities Engineering Command

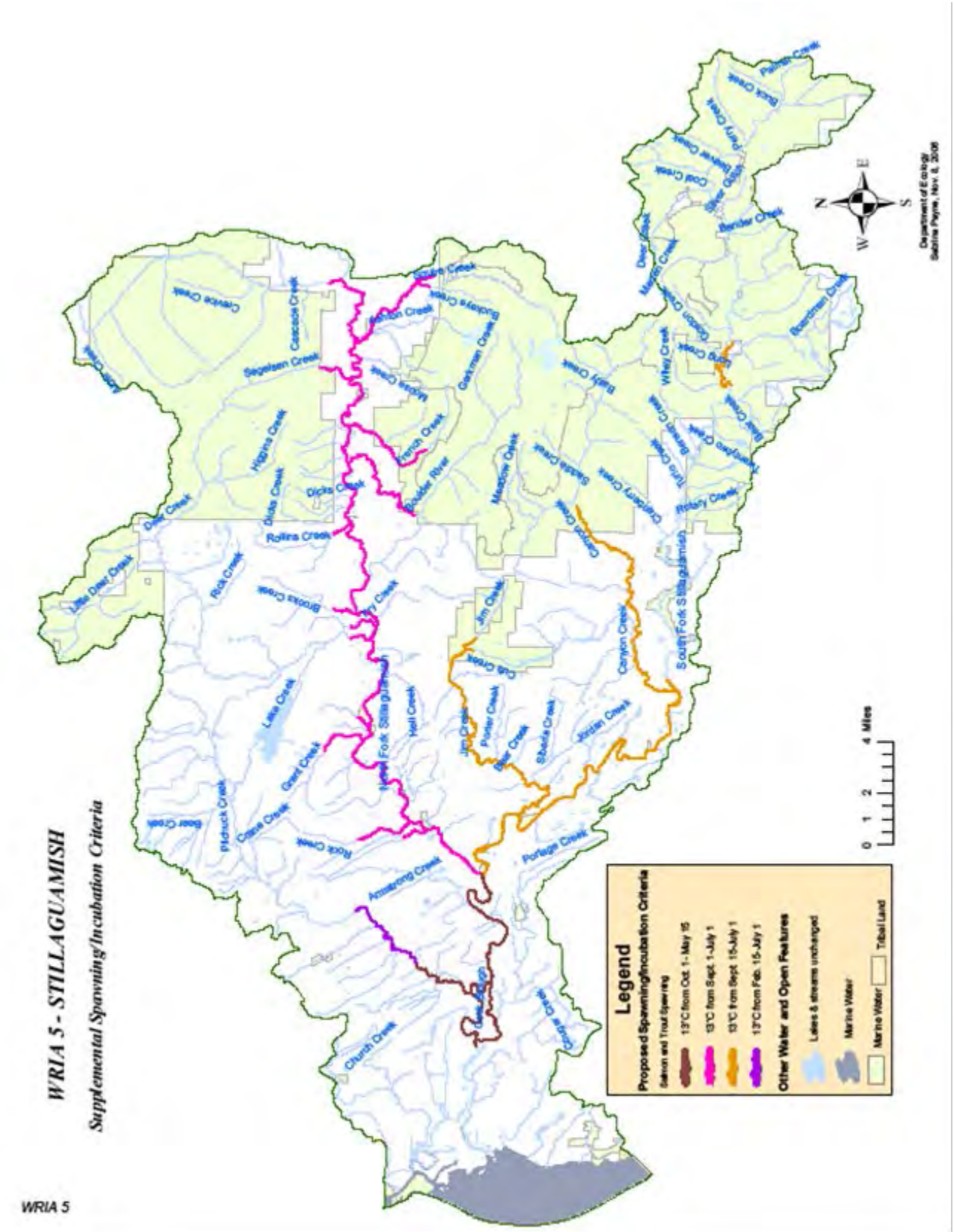
NAVFAC, September, 2011, *Cooling Water Infiltration Water, Naval Radio Station Jim Creek Arlington, Washington,*

Appendix A: Facility Information

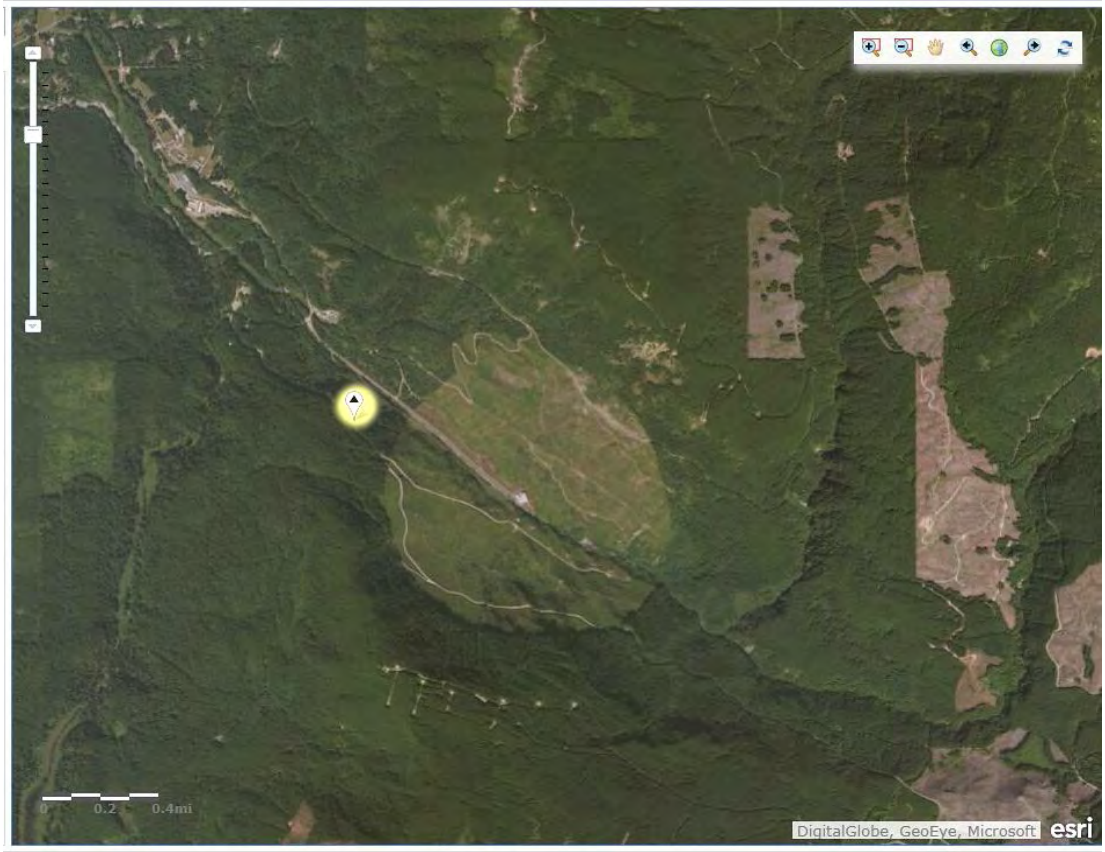


Raw Water and Original Outfall

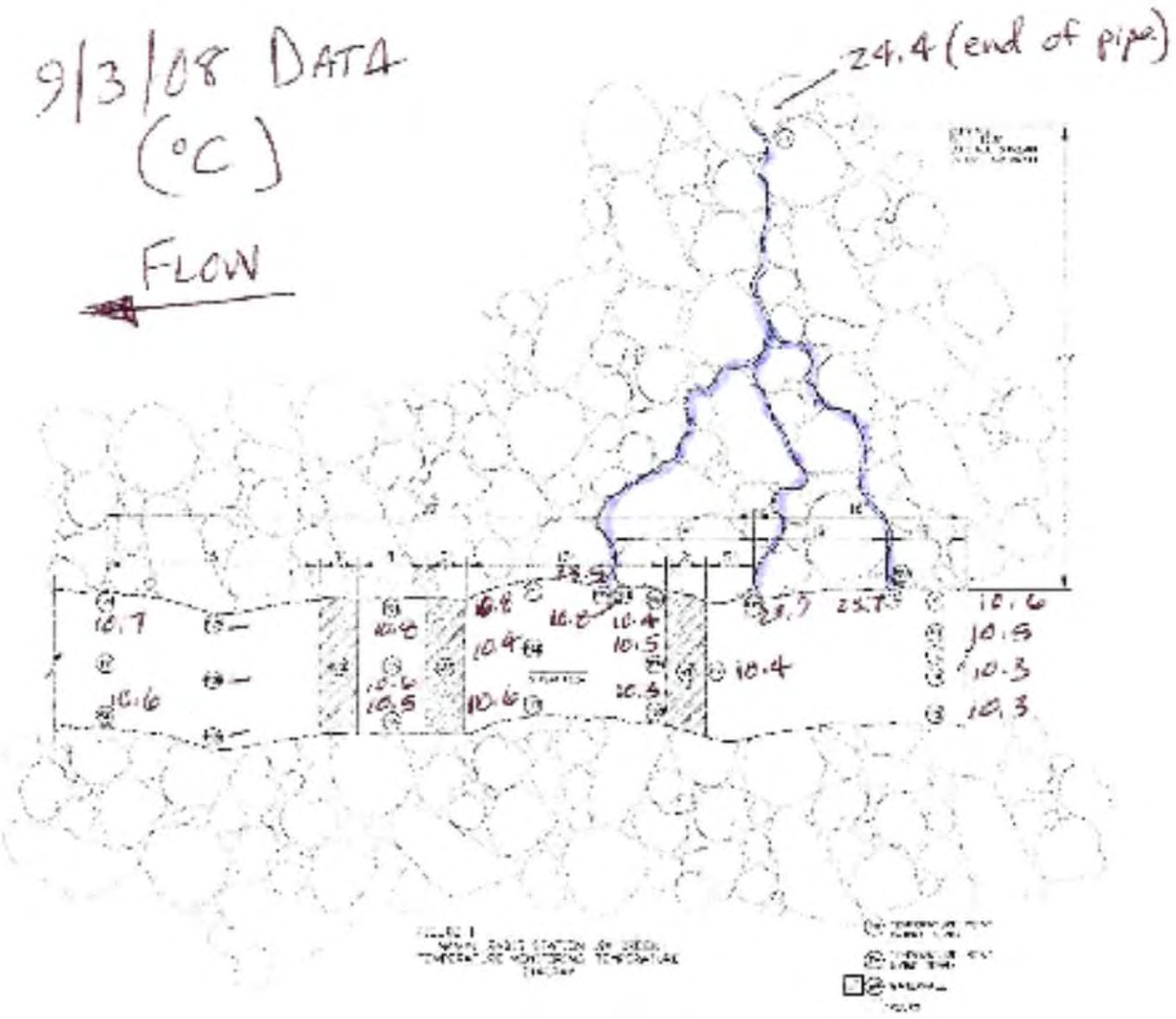



WRIA 5 - STILLAGUAMISH
Supplemental Spawning/Incubation Criteria
WRIA 5
Legend
Proposed Spawning/Incubation Criteria
Salmon and Trout Spawning
13°C from Oct. 1 - May 15
13°C from Sept. 1-July 1
13°C from Sept. 15-July 1
13°C from Feb. 15-July 1
Other Water and Open Features
Lakes & streams unchanged
Marine Water
Tribal Land
0 1 2 4 Miles
N
S
E
W
Department of Ecology
Sabrina Payne, Nov. 8, 2005
Boulder River
South Fork Stillaguamish
North Fork Stillaguamish
Jim Creek
Portage Creek
Church Creek

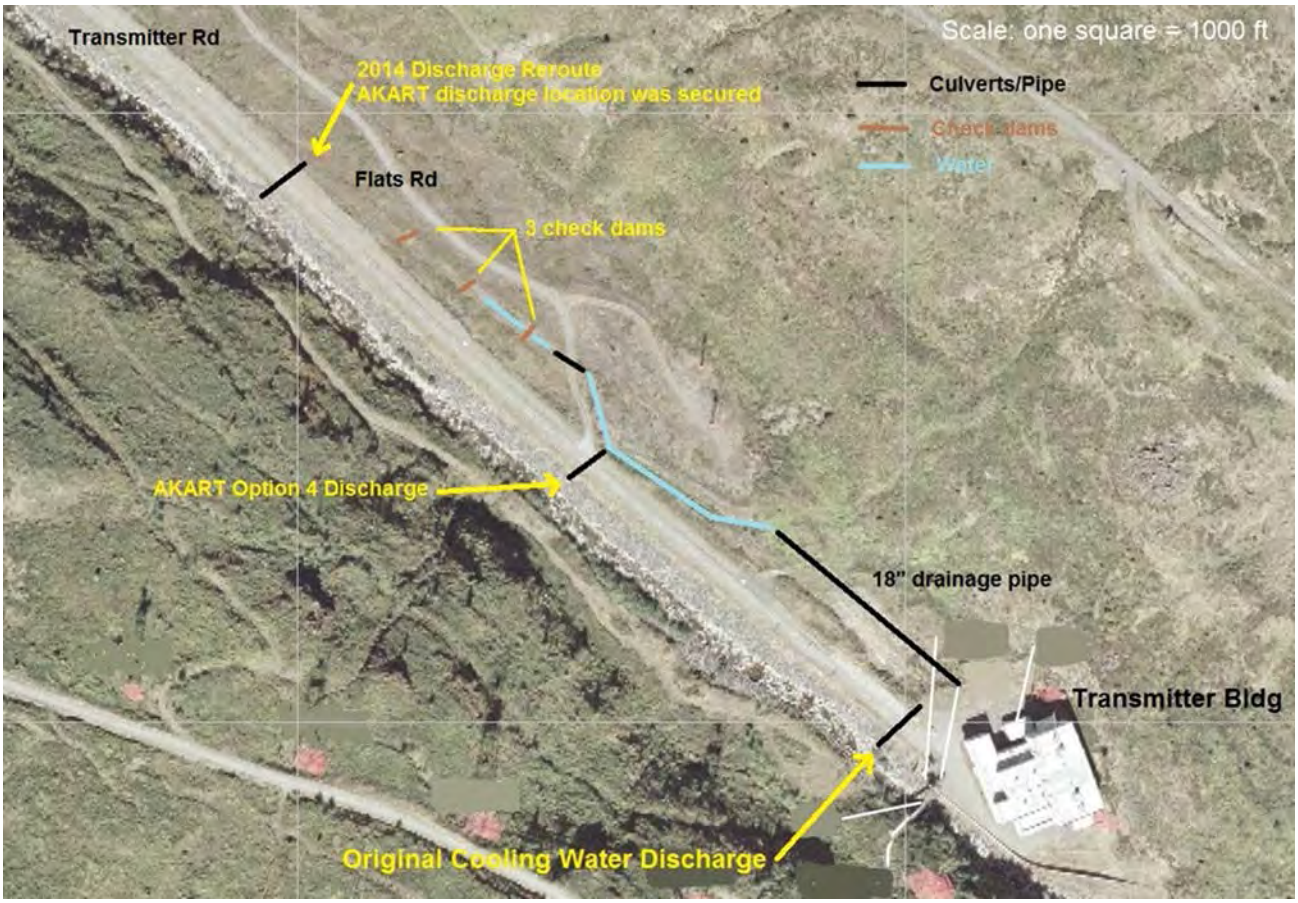
USGS Station



Navy Receiving Water Measurements September, 2008



Site Map


Transmitter Rd
Scale: one square = 1000 ft
2014 Discharge Reroute
AKART discharge location was secured
Culverts/Pipe
Check dams
Water
Flats Rd
3 check dams
AKART Option 4 Discharge
18" drainage pipe
Transmitter Bldg
Original Cooling Water Discharge

Appendix B: Water Quality Criteria Summary

This appendix provides a summary of water quality criteria applicable to Jim Creek Radio Transmission Station.

Washington State water quality standards include criteria necessary to protect designated beneficial uses. 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 Jim Creek. 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 water in Jim Creek.

Aquatic Life Uses: Core Summer Habitat; and,
Salmonid Spawning, Rearing and Migration.

Recreational Uses: Extraordinary Primary Contact

Water Supply Uses: Domestic Water; Industrial Water; Agricultural Water; Stock Water

Misc. Uses: Wildlife Habitat; Commerce/Navigation; Boating; and Aesthetics.

General Criteria

General criteria that apply to all aquatic life fresh water uses are described in WAC 173-201A-260 (2)(a) and (b), and are for:

(a) ***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).

Surface Water Criteria To Protect Aquatic Life Uses (WAC 173-201A-200)

Core Summer Salmonid Habitat Highest 7-DADMax

16°C (60.8°F)

When a water body's temperature is warmer than the criteria in Table 200 (1)(c) (or within 0.3°C (0.54°F) of the criteria) then human actions considered cumulatively may not cause the 7-DADMax temperature of that water body to increase more than 0.3°C (0.54°F).

Appendix C: Low Flow Conditions and Dilution

A. Low Flow Conditions

The low flow conditions of a water body are used to determine water quality-based effluent limits. In general, Washington's water quality standards require criteria be evaluated at the following low flow receiving water conditions as defined below:

Temperature for aquatic life	7-DADMax
The 7Q10 represents lowest average 7 consecutive day flow with an average recurrence frequency of once in 10 years.	

The EPA determined critical low flows upstream of the discharge from the following USGS Station:

USGS Station Jim Creek near Oso #12163000.

The estimated low flow for the station are presented in Table C-1.

Table C-1: Critical Flow

Flows	cfs
Maximum 7-DADMax	6.43

B. Mixing Zones and Dilution

In some cases a dilution allowance or mixing zone is permitted. A mixing zone is an area where an effluent discharge undergoes initial dilution and is extended to cover the secondary mixing in the ambient water body. A mixing zone is an allocated impact zone where the water quality standards may be exceeded as long as acutely toxic conditions are prevented (the EPA, 1994). The federal regulations at 40 CFR 131.13 states that "States may, at their discretion, include in their State standards, policies generally affecting their application and implementation, such as mixing zones, low flows and variances."

The Washington Water Quality Standards at WAC 173-201A-400 provides a mixing zone policy for point source discharges. The policy allows Ecology to authorize a mixing zone for a point source discharge if circumstances meet regulations in the Washington Water Quality Standards for granting a mixing zone. Pertaining to WAC 173-201A-400(7)(a), the following code states:

(7) The maximum size of a mixing zone shall comply with the following:
(a) In rivers and streams, mixing zones, singularly or in combination with other mixing zones, shall comply with the most restrictive combination of the following (this size limitation may be applied to estuaries having flow characteristics that resemble rivers):
(i) Not extend in a downstream direction for a distance from the discharge port(s) greater than three hundred feet plus the depth of water over the discharge port(s), or extend upstream for a distance of over one hundred feet;
(ii) Not utilize greater than twenty-five percent of the flow; and
(iii) Not occupy greater than twenty-five percent of the width of the water body.

The following formula is used to calculate a dilution factor based on the allowed mixing zone.

$$D = \frac{Q_e + Q_u \times \%MZ}{Q_e}$$

Where:

D = Dilution Factor
Q_e = Effluent flow rate (Maximum flow) = 91 gpm = 0.202 cfs
Q_u = Receiving water low flow rate downstream of the discharge (minimum 7 day average based on 599 measurements) minus the effluent flow rate = 6.31 cfs
%MZ = Percent Mixing Zone = 25 %

$$\text{Dilution ratio} = \frac{0.202 + 6.31(0.25)}{0.202} = 8.8$$

The EPA calculated dilution factors for year round critical low flow conditions. The dilution factor is calculated with the effluent flow rate set equal to the maximum flow of 91 gallons per minute. The dilution factor is listed in Table C-2.

Table C-2 Dilution Factor

Flows	
Maximum 7-DADMax	8.8

Appendix D: Basis for Effluent Limits

The following discussion explains the derivation of technology and water quality based effluent limits proposed in the draft permit. Part A discusses technology-based effluent limits, Part B discusses water quality-based effluent limits in general and Part C discusses the effluent limits imposed due to the State's anti-degradation policy.

A. Technology-Based Effluent Limits

Federal Secondary Treatment Effluent Limits

Because Jim Creek Radio Transmission station does not fit into an industrial category for which the EPA has developed technology-based requirements, the EPA may use best professional judgment (BPJ) to establish technology-based permit requirements, pursuant to authority established by CWA 301(b)(2), Section 402(a)(1)(B), and in accordance with requirements established at 40 CFR 125. Therefore, the EPA is using BPJ to determine technology based Best Available Technology (BAT) effluent limits for the Jim Creek Facility.

AKART

As part of the Clean Water Act authorization process, the Environmental Protection Agency (EPA) public noticed a draft National Pollutant Discharge Elimination System (NPDES) permit in 2009 (EPA 2009) for the Jim Creek Facility. The draft permit required the Navy to conduct an AKART Study to address the discharge of heated water into Jim Creek. AKART, as defined by the Washington State Department of Ecology (Ecology Permit Writer's Manual, 2011) The manual states the surface water quality standards, Chapter 173-201A, define AKART as, "represent(ing) the most current methodology that can be reasonably required for preventing, controlling, or abating the pollutants associated with a discharge."

The Navy provided an AKART Report to the EPA titled "*All Known, Available, and Reasonable Methods of Prevention, Control, and Treatment Study, Naval Radio Station Jim Creek Arlington, Washington*, Naval Facilities Engineering Command, May, 2011. The report, analyzed 13 methods to mitigate or eliminate the discharge into Jim Creek. A description of the methods and the conclusions are summarized below.

1. Increase Existing Air/Water Heat Exchanger Capacity

The current water/water heat exchanger cooling system is the primary Transmitter Building cooling system. The backup system is an air/water heat exchanger system which uses fans to transfer heat from the primary cooling water loop to the air. This option is to use this system as the primary heat exchange system rather than secondary.

Conclusion: The air/water heat exchanger system is 1950s era equipment, and switching to long-term usage would likely result in some (if not significant) equipment breakdown. O&M costs are high due to this likelihood. Energy usage is high since the fans are operated by electric motors. The potential future capital cost and related O&M cost risks are too high to make this a reasonable AKART option from a cost standpoint.

2. Cooling Tower

This option is to install a cooling tower(s) as the primary means of providing cooling. By spraying fine water droplets onto a fill material, a cooling tower exposes a large surface area to

the outdoor air, thereby promoting evaporation and cooling. This option would require procurement and installation of a cooling tower(s). See Appendix A for additional details.

Conclusion: A cooling tower(s) would need to be procured and installed along with a foundation, electrical connections, piping, and controls. O&M costs include regular water quality checks, chemical addition (for anti-scale and biocide), and regular and periodic maintenance evolutions. Energy usage would be roughly equivalent to that of the Air/Water Heat Exchanger. All cost categories indicate that this option is not a reasonable AKART option from a cost standpoint.

Further, the Associated Environmental Impact is high cost because there is a need to dispose of cooling tower blowdown which contains accumulated solids, and because the water is treated with biocide and anti-scale agents. Blowdown is typically discharged into a municipal sanitary sewer. This is not an option at Jim Creek and no other viable disposal option exists.

3. Cooling Pond

A cooling pond functions is a manner similar to a cooling tower. There would be an added benefit of infiltration if the constructed pond is not lined.

Conclusion: Depending on the size and type of cooling pond the capital cost is medium to high. A larger pond with high berms, liner, and drainage piping would be costly. Day-to-day O&M costs are likely low, but periodic maintenance would be required such as draining and cleaning. Also, if earthen berm construction is used weed and mosquito control may be required. From a cost standpoint this is a reasonable AKART option.

Further, a cooling pond has the same concerns a cooling tower would with regard to waste disposal. Additionally, the effectiveness of a cooling pond is difficult to accurately estimate. This engineering uncertainty reinforces a Not Reasonable determination.

4. Air-Cooled Chillers

Air cooled chillers use a refrigeration cycle to generate cold water for use as the primary means of cooling. To implement this option chillers would be procured and installed. The chillers would use refrigeration to generate cold water that can be circulated to provide cooling to the pure water loop.

Conclusion: The estimated capital cost for this option per the Cooling System Study is $1,140,980 (2000 $). Electrical usage would be highest of any option. All cost categories indicate that this option is not a reasonable AKART option from a cost standpoint.

5. Comfort Heating

This option is to install an additional heat exchanger to remove heat from the primary cooling system loop. The water-to-air heat exchanger would provide heat to the Transmitter Building. When operating this would remove some of the heat that would otherwise be transmitted into the cooling water, thereby reducing energy input into Jim Creek. The system would be used mainly during the winter months.

Conclusion: Equipment is already installed so capital expenditure is not required. O&M costs are medium since the operators, on a monthly basis, need to manually adjust the valve to ensure vibration free operation. If the supply of the cooling water became limited the operators would stop the flow through the non-operating heat exchanger to ensure enough cooling water is available for mission critical equipment cooling. The estimated cost to implement this option is

$1,500 per summer. No additional energy usage is required to implement this option. Capital and Energy cost categories indicate that this option is reasonable from a cost standpoint. The increase in O&M effort, while quantifiable, is not significant enough to make the option unreasonable.

However, effectiveness is medium since the system "cannot provide sufficient cooling when the outdoor air temperature is above 81°F." From an environmental standpoint eliminating the discharge only when it is cooler outside (when the creek temperature is also likely cooler) is only somewhat effective.

6. Increase Contact Cooling Capacity, Upgrade Catchment 93

As a general AKART option, increasing the flow of cooling water would result in lower effluent temperatures. Of the three spring catchments, Catchment 93 was the most inefficient at diverting water and therefore the focus of this option. By upgrading Catchment 93 more water is available to provide cooling. Efforts to upgrade Catchment 93 to divert more water into the cooling water system consisted of installing a new, more efficient valve with greater holding capacity to prevent overflow (water would overflow the old valve). Option 6 was completed in November 2010 at a cost of $21,545.

Conclusion: O&M and energy costs are low.

7. Increase Contact Cooling Capacity, Bypass Using the Non-Operating Heat Exchanger

The Transmitter Building has two heat exchangers that transfer heat from the primary loop (pure water) to the cooling water which is discharged into Jim Creek. The typical operation is to alternate heat exchanger use on a monthly basis. Since only one heat exchanger is in use at any one time, this option is to allow water to flow through the non-operating heat exchanger during the summer. Data taken during the summer of 2010 show that if the raw cold water flow rate is increased and allowed to flow through the non-operating heat exchanger, the discharge water is cooled due to the mixing effect that that occurs downstream of the heat exchangers. This option resulted in an effluent temperature decrease of roughly 5° to 10° F. This option has two concerns.

a. Flow through the non-operating heat exchanger is limited due to physical properties of the piping system (i.e., when flow was increased above a certain level the pipes started vibrating which could lead to piping fracture).

b. If cooling water levels get too low the operators would stop the flow of water through the non-operating heat exchanger to ensure mission critical cooling would continue. The estimated cost to implement this option is $1,500 per summer.

Conclusion: Effectiveness and impacts to operations are medium since flow must be limited to ensure vibration free operation. This both limits effectiveness and increases operator involvement. Service life is questionable due to the vibration and potential for premature failure. No construction effort is required to accomplish this option.

8. Increase Contact Cooling Capacity, Internal Bypass Piping

This option is to upgrade the other two spring catchments, install bypass piping in the Transmitter Building sub-basement, and install controls/alarms to regulate bypass flow and ensure adequate cooling water supply. This option is similar to that described above, however; instead of using the non-operating heat exchanger, piping would be installed to bypass the heat

exchangers allowing a higher bypass flow rate then using the nonoperating heat exchanger. Upgrading the two other catchments would further increase the supply of cooling water.

Conclusion: Installation of this option would increase the bypass flow rate compared to the option above. Construction would have to be carefully coordinated to ensure continuity of the cooling system. Additionally, start-up of the system would be disruptive until the various components operate as intended. Day-to-day impacts to operations would be low to medium. Balancing valves may require adjustment, sensors may need cleaning or replacement, and the controller may need software adjustment/changes.

An Engineering Report estimates a capital cost of $236,000. O&M costs are medium since the system would require new piping, sensors, automatic control valves and controller, all of which would require maintenance. Energy usage would remain unchanged if this option were implemented.

This option is not reasonable from an AKART cost standpoint due to the high capital cost.

9. Increase Contact Cooling Capacity, External Bypass Piping

This option is similar to the one above except the bypass piping location would be external to the Transmitter Building.

Conclusion: Capital cost would be higher than for the Internal Bypass piping described above. Other costs would be roughly equivalent. This option is more costly than the Internal Bypass Piping (above) which is not reasonable.

10. Ground Heat Sink

In this option the heated cooling water would be directed to a new underground/covered piping system near the Transmitter Building. The piping would be in contact with soil and heat transfer between the water and soil would occur. The soil would heat up and the water would be cooled. Notkin Mechanical Engineers, contractors for the Navy, estimated that the length of piping required to remove sufficient heat would be in the range of 20,000 to 70,000 linear feet**.**

Conclusion: The cost of piping alone (20,000 to 70,000 feet) puts this option in the high capital cost category. Additionally, significant earth work and fill would be required to accomplish the option. While day-to-day O&M costs would be low, the chance of significant repair cost is reasonable. An earthquake could damage the system. No additional energy use would be required to implement this option. Capital cost is too high to make this option reasonable from an AKART cost standpoint.

11. Ground Surface Discharge onto Flat Road Area (AKART Option 4)

The Navy reduced the selection of AKART options for further evaluation and named this option "AKART Option 4". This option was to redirect the discharge from its current location to a large infiltration area in the Flats Road Area, where more of the cooling water would infiltrate. See Appendix A. The remainder of the cooling water would enter Jim Creek; however, some cooling from ground contact is expected to occur as the water transits to Jim Creek.

This was Jim Creek's natural drainage coarse before the antenna array was constructed. Several small drainage springs from the hillside, upstream of the 18 inch drainage pipe flow through the Flat Road Area and combine with the foundation drainage system and the non-contact cooling

water. The springs appear to be seasonal and would most likely be dry in the summer months reducing the volume of water to infiltrate.

During a Navy sight visit on November 19, 2010 no water was flowing through the 48 inch culvert indicating that the water had infiltrated to the ground prior to reaching the 48 inch culvert. Based on visual inspection, the flow rate from the springs appears to be higher than the non-contact cooling water discharge flow rate. This indicates the non-contact cooling will also infiltrate during this period.

Further, the monthly average precipitation for August (between 1948 and 2007) in Arlington, Washington was 1.62 inches. The actual precipitation for November 2010, the month of the inspection, was 1.89 inches. Since the 48 inch culvert that allows water from the Flat Road Area into Jim Creek was dry it is likely it will also be dry and there will be no discharge of non-contact cooling water during the lower precipitation rate of August or the summer critical period.

The *Cooling Water Infiltration Study, Naval Radio Station Jim Creek Arlington, Washington,* NAVFAC, September, 2011 concluded that diverting the cooling water into the Flats Road area at a rate of 80 gallons per minute would likely completely infiltrate into the soil during the summer.

Conclusion: The capital and O&M costs are low. Perhaps some vegetation management would be required due to the increased water supply. No additional energy usage is anticipated. Use of existing infrastructure keeps costs in the reasonable range and O&M and energy costs are low.

Implementation of AKART Option 4 - Ground Surface Discharge onto Flat Road Area

In 2013 the Navy implemented this AKART option which was to reroute the discharge to a new rip-rap lined infiltration channel followed by a natural bioswale. The discharge to Jim Creek was through a 48-inch culvert located near Flats Road, identified on the Site Map as AKART Option 4. It is located at the Transmitter Rd/Flats Rd intersection. In the summer roughly half the effluent infiltrated into the ground prior to reaching Jim Creek.

In 2014, to further cool the effluent and increase infiltration the Navy decided to block the 48 inch culvert and rerouted the cooling water underneath Flats Rd to a larger infiltration area further to the west in the Flats Road Area. Outfall 67, identified on the Site Map as “2014 Discharge Reroute”, is 750 feet away from the Flats Rd culvert in the event 100% infiltration is not achieved.

12. Evaporative Cooling (Spray/Mist)

This option would route the water downstream of the Transmitter Building and discharge it at multiple above-grade locations through nozzles to form a mist/spray. As the mist/spray moves through the air evaporative cooling would occur. Additionally, once the water contacts the ground some heat transfer could occur along with infiltration.

Conclusion: Capital cost is in the medium to high range since achieving effective cooling requires a mist system (vice spray such as with agricultural equipment). This would require pumping and controls. A simpler but less effective agricultural spray system might fall into the medium cost range. O&M costs are high due to maintenance requirements of the nozzles, which would need to be cleaned on a regular basis. Also the system may need to be inactivated in the winter due to potential icing concerns. The medium energy rating is due to the installation of a new pump(s). This option was deemed not reasonable from cost standpoint due to generally

elevated costs in all categories. The O&M burden was the primary reason for the not reasonable rating.

13. Manicured Landscape Irrigation Water Source

This option would use the water to irrigate NRS Jim Creek grounds and discharge any unused water into Jim Creek at a downstream location.

Conclusion: Effectiveness is low since the irrigation requirements at NRS Jim Creek are low. Unused water would be either directly or indirectly discharged back into Jim Creek. In essence, this option is not too different from the Ground Surface Discharge option. Since the Ground Surface Discharge option is as effective as this one and uses no energy it is the better relative option.

AKART Determination

The EPA determined that Ground Surface Discharge onto the Flat Road Area and complete or partial infiltration is AKART.

The AKART study stated that during the winter months (and high-intensity summer storms), rain events significant enough to introduce flow into the outfall appear to be adequate to bring the temperature of the discharge water below 16 °C prior to reaching Jim Creek. During the drier summer months, little if any runoff from the slopes to the north of the transmitter building would be present, thus allowing the non-contact cooling water tempered by the building foundation drainage to infiltrate into the Flat Road Area with little likelihood of flow reaching the outfall. Also, with the ground drier, there is more storage for discharge water to infiltrate before it reaches Jim Creek.

Adding support for the infiltration option as AKART is the goal of the National Pollutant Discharge *Elimination* System permit (emphasis added). This option will fully or partially eliminate discharges to Jim Creek.

The conclusion of the AKART study is it *appears* that 16°C is achievable. Due to this uncertainty, the lack of effluent monitoring, the fact the Navy has only recently installed the bioswale and moved the non-contact cooling water to the Flats Road Area for a higher rate of infiltration the EPA cannot establish 16°C as a technology based BPJ final temperature limit in this permit cycle. The EPA will reconsider establishing the technology based limit of 16°C in the next reissuance of the permit when more information is available on the Ground Surface Discharge option.

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. Federal regulations at 40 CFR 122.4(d) prohibit the issuance of an NPDES permit that does not ensure compliance with the water quality standards of all affected States.

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, and that the level of water quality to be achieved by limits on point sources is derived from and complies with all applicable water quality standards.

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.

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.

Sometimes it may be appropriate to allow a small area of the receiving water to provide dilution of the effluent. These areas are called mixing zones. Mixing zone allowances will increase the mass loadings of the pollutant to the water body and will decrease treatment requirements. Mixing zones can be used only when there is adequate receiving water flow volume and the concentration of the pollutant in the receiving water is less than the criterion necessary to protect the designated uses of the water body. Mixing zones must be authorized by the State.

The reasonable potential analysis for temperature was based on a mixing zone of 25%. If Ecology revises the allowable mixing zone in its final certification of this permit, reasonable potential analysis will be revised accordingly.

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 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. The WLAs for temperature were derived using a mixing zone.

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.

4. Aesthetics Criteria WAC 173-201A-260(2)(b)

The Washington WQS states 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 or touch, 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. The 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 (http://www.ecy.wa.gov/biblio/1110073.html)

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.

For the purpose of the anti-degradation analysis, the EPA made the following assumption:

- Worst case temperature data, and low receiving water flows and maximum discharge flows are used to simulate conservatively representative conditions for anti-degradation analysis.

The 7Q2 low flow in Jim Creek (USGS Station Jim Creek near Oso #12163000 results in a chronic dilution factor of 8.8 using a 25% mixing zone and the facilities flow rate of 0.0.202 cfs.

Based on a review of the water quality data for Jim Creek, the receiving water qualifies for both Tier I and Tier II protection (explained in more detail below).

Tier I Protection

A facility must first meet Tier I requirements. Existing and designated uses must be maintained and protected. No degradation may be allowed that would interfere with, or become injurious to, existing or designated uses, except as provided for in Chapter 173-201A WAC. Jim Creek at the point of discharge has the following designated beneficial uses:

Aquatic Life Uses: Salmonid Spawning, Rearing, and Migration

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.

The effluent limits in the draft permit ensure compliance with applicable numeric and narrative water quality criteria. The numeric and narrative water quality criteria are set at levels that ensure protection of the designated uses. As there is no information indicating the presence of existing beneficial uses other than those that are designated, the draft permit ensures a level of water quality necessary to protect the designated uses and, in compliance with WAC 173-201A-310 and 40 CFR 131.12(a)(1), also ensures that the level of water quality necessary to protect existing uses is maintained and protected.

If the EPA receives information during the public comment period demonstrating that there are existing uses for which Jim Creek is not designated, the EPA will consider this information before issuing a final permit and will establish additional or more stringent permit conditions if necessary to ensure protection of existing uses.

Tier II Protection

A facility must prepare a Tier II analysis when the facility is planning a new or expanded action that has the potential to cause measurable degradation to existing water quality at the edge of a chronic mixing zone. A Tier II analysis consists of an evaluation of whether or not the proposed degradation of water quality that would be associated with a new or expanded action would be both necessary and in the overriding public interest. A Tier II analysis focuses on evaluating feasible alternatives that would eliminate or significantly reduce the level of degradation. The analysis also includes a review of the benefits and costs associated with the lowering of water quality. New discharges and facility expansions are prohibited from lowering water quality without providing overriding public benefits.

The EPA evaluated whether a Tier II analysis would be necessary. If a discharge has the potential to cause measurable degradation to existing water quality at the edge of the chronic mixing zone, the facility would then need to conduct a full Tier II analysis.

Ecology water quality standards define a measurable change to include:

(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.

Temperature

To determine what is measurable, the EPA evaluated the expected change for each parameter at the edge of the chronic mixing zone, using a chronic dilution factor of 8.8 and monitoring by the Navy (See Appendix B). The EPA determined that a Tier II analysis is not required because this facility will not cause measurable change to existing water quality at the edge of the chronic mixing zone. An explanation of the EPA's Tier II eligibility analysis is below which concluded that a Tier II analysis is not required because the draft permit would not cause measurable change in accordance with Washington State Water Quality Standards.

The allocation "prohibited from discharging treated effluent at a temperature greater than that equivalent to the water quality criterion for the reach plus 0.3ºC times the chronic dilution factor" That is based on the temperature allocation the permit effluent limitation limits the increase in temperature so that there is no increase in receiving water temperature of 0.3ºC at the edge of the mixing zone. Also, according to "EPA Region 10 Guidance For Pacific Northwest State and Tribal Temperature Water Quality Standards" (EPA 910-B-03-002) temperature impacts are primarily from non-point sources and temperature quickly dissipates. Further, monitoring by the Navy in 2010 shows no measurable difference within 50 feet of the discharge (See Appendix A). Thus, the discharge will not cause or contribute to a temperature increase of 0.3°C or greater and therefore this parameter does not trigger the Tier II antidegradation analysis.

Dissolved Oxygen, Bacteria, pH, Turbidity, Toxic or Radioactive Substance.

The source water is the water from Jim Creek. The permit prohibits any additives to the non-contact cooling water preventing changes in dissolved oxygen, bacteria, pH, turbidity or toxic or radioactive substances in the discharge. Thus, the discharge will not cause or contribute to an increase in these parameters and these parameters do not trigger the Tier II antidegradation analysis.

Appendix E: Reasonable Potential and Water Quality-Based Effluent Limit 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 following method from the Department of Ecology '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

Maximum Projected Effluent Concentration

The EPA determined the projected receiving water temperature downstream of the effluent discharge using procedures in Ecology's Permit Writer's Manual, December, 2011, and using Ecology's spreadsheet for temperature as shown below.

Freshwater Temperature Reasonable Potential

WAC 173-201A-200(1)(a)(ii)
Core Summer Salmonid Habitat 7-DADMax

	Cold Water Criteria	
INPUT		**Data Source**
Chronic Dilution Factor at Mixing Zone Boundary	8.8	USGS Jim Creek Oso Facility Monitoring
Ambient Temperature (T) (Upstream Background)	15.0 °C	Highest 7-DADMax
Effluent Temperature	25.7 °C	Maximum 7-DADMax based on facility monitoring
Aquatic Life Temperature WQ Criterion in Fresh Water	16.0 °C	Lowest daily max criteria
OUTPUT		
Temperature at Chronic Mixing Zone Boundary:	16.2 °C	
Incremental Temperature Increase or decrease:	1.2 °C	WQS 201A-200(1)(c)(i) - allows for maximum of 0.3ºC rise in receiving water temperature.

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

It is determined that temperature has a reasonable potential to cause or contribute to an exceedance of water quality criteria at the edge of the mixing zone. WAC 201A-200(1)(c)(i) allows for a maximum of 0.3^0C rise in receiving water temperature if the receiving water is greater than 16^0C. Under critical conditions the discharge will cause an increase of 1.2^0C over the receiving water temperature that exceeds the 0.3^0C criteria.

B. WQBEL Calculations

The following calculation demonstrates how the water quality-based effluent limit (WQBEL) in the draft permit is calculated. The draft permit includes WQBEL for temperature.

In a November 12, 2008 email the Department of Ecology interpreted the TMDL to apply an allocation to Jim Creek similar to the one applied to the Indian Ridge Corrections Facility. The allocation for the Indian Ridge facility is on page 16 of the TMDL and states:

"Like the Arlington WWTP, Indian Ridge will be prohibited from discharging treated effluent at a temperature greater than that equivalent to the water quality criterion for the reach plus 0.3ºC times the chronic dilution factor for the facility."

The equation for the Arlington WWTP, and thus Jim Creek, is shown on page 14 of the TMDL and below:

Temperature waste load allocation = TWLA

TWLA = (summer maximum criterion – 0.3) + (chronic dilution factor x 0.3)

For the Jim Creek facility:

TWLA = (16 ºC – 0.3ºC) + (8.8 x 0.3) = 18.3 ºC