Fact Sheet for NPDES Permit WA0031046

Pacific Fishermen Shipyard and Electric, LLC

Permit Effective Date: July 1, 2020

Purpose of this fact sheet

This fact sheet explains and documents the decisions the Department of Ecology (Ecology) made in drafting the proposed National Pollutant Discharge Elimination System (NPDES) permit for Pacific Fishermen Shipyard and Electric, LLC (Pacific Fishermen).

This fact sheet complies with Section 173-220-060 of the Washington Administrative Code (WAC), which requires Ecology to prepare a draft permit and accompanying fact sheet for public evaluation before issuing an NPDES permit.

Ecology makes the draft permit and fact sheet available for public review and comment at least thirty (30) days before issuing the final permit. Copies of the fact sheet and draft permit for Pacific Fishermen, NPDES permit WA0031046, were available for public review and comment from January 13, 2020, until February 12, 2020. For more details on preparing and filing comments about these documents, please see **Appendix A - Public Involvement Information**.

Pacific Fishermen reviewed the draft permit and fact sheet for factual accuracy. Ecology corrected any errors or omissions regarding the facility's location, history, discharges, or receiving water prior to publishing this draft fact sheet for public notice.

After the public comment period closes, Ecology will summarize substantive comments and provide responses to them. Ecology will include the summary and responses to comments in this fact sheet as **Appendix E - Response to Comments**, and publish it when issuing the final NPDES permit. Ecology generally will not revise the rest of the fact sheet. The full document will become part of the legal history contained in the facility's permit file.

Summary

Pacific Fishermen Shipyard and Electric, LLC operates a ship repair facility on the Lake Washington Ship Canal in Seattle, WA. Process water from hydroblasting is pretreated and discharged to sanitary sewer. Stormwater is collected, treated and discharged to the Ship Canal. Ecology issued the previous permit for this facility on October 10, 2014.

Effluent limits for total copper and zinc were reduced based on historic treatment performance to minimize the size of the mixing zone. Effluent limits for oil and grease (total petroleum hydrocarbons) were eliminated due to consist non-detects, and turbidity was changed to a 25 NTU limit for treated stormwater discharges. Effluent limits for pH have been changed to reflect the low pH of natural rainfall. Monitoring frequency is proposed to change from monthly to quarterly because the facility has consistently met permit limits. Ecology eliminated monitoring for total lead and arsenic due to a history of non-detects in the effluent.

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I. Introduction

The Federal Clean Water Act (FCWA, 1972, and later amendments in 1977, 1981, and 1987) established water quality goals for the navigable (surface) waters of the United States. One mechanism for achieving the goals of the Clean Water Act is the National Pollutant Discharge Elimination System (NPDES), administered by the federal Environmental Protection Agency (EPA). The EPA authorized the state of Washington to manage the NPDES permit program in our state. Our State Legislature accepted the delegation and assigned the power and duty for conducting NPDES permitting and enforcement to Ecology. The Legislature defined Ecology's authority and obligations for the wastewater discharge permit program in 90.48 RCW (Revised Code of Washington).

The following regulations apply to industrial NPDES permits:

- Procedures Ecology follows for issuing NPDES permits (chapter 173-220 WAC)
- Water quality criteria for surface waters (chapter 173-201A WAC)
- Water quality criteria for ground waters (chapter 173-200 WAC)
- Whole effluent toxicity testing and limits (chapter 173-205 WAC)
- Sediment management standards (chapter 173-204 WAC)
- Submission of plans and reports for construction of wastewater facilities (chapter 173-240 WAC)

These rules require any industrial facility owner/operator to obtain an NPDES permit before discharging wastewater to state waters. They also help define the basis for limits on each discharge and for performance requirements imposed by the permit.

Under the NPDES permit program and in response to a complete and accepted permit application, Ecology must prepare a draft permit and accompanying fact sheet, and make them available for public review before final issuance. Ecology must also publish an announcement (public notice) telling people where they can read the draft permit, and where to send their comments, during a period of thirty days (WAC 173-220-050). (See **Appendix A - Public Involvement Information** for more detail about the public notice and comment procedures). After the public comment period ends, Ecology may make changes to the draft NPDES permit in response to comment(s). Ecology will summarize the responses to comments and any changes to the permit in **Appendix E**.

II. Background Information

Table 1. General Facility Information

Facility Information	
Facility Name and Address	Pacific Fishermen Shipyard and Electric, LLC 5351 24th Ave Northwest Seattle, WA 98107-4196
Contact at Facility	Name: Cherie K. Berg Telephone #: 206-784-2562
Responsible Official	Name: Doug Dixon Title: General Manager Telephone #: 206-784-2562 FAX #: 206-784-1986
Industry Type	Ship Building and Repair
Type of Treatment	Stormwater Media Filtration
SIC Codes	3731
NAIC Codes	336611
Facility Location (NAD83/WGS84 reference datum)	Latitude: 47.667770 Longitude: -122.388026
Discharge Waterbody Name and Location (NAD83/WGS84 reference datum)	Lake Washington Ship Canal Latitude: 47.666518 Longitude: -122.388845

Permit Status	
Renewal Date of Previous Permit	October 10, 2014
Application for Permit Renewal Submittal Date	April 25, 2019
Date of Ecology Acceptance of Application	April 30, 2019

Inspection Status	
Date of Last Non-sampling Inspection	November 12, 2015

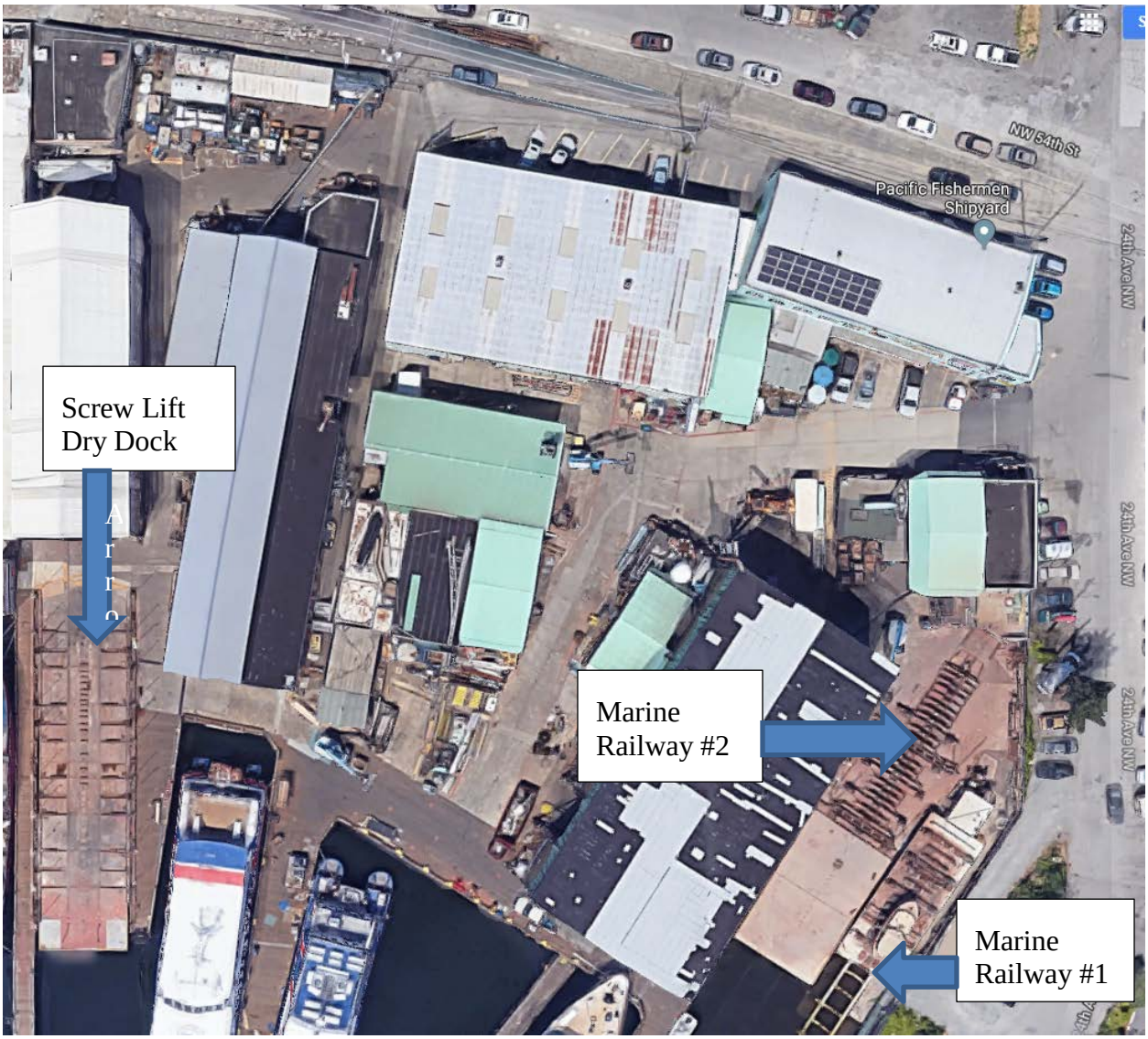

Figure 1. Facility Location Map

A. Facility description

History

Pacific Fishermen Shipyard and Electric, LLC was originally conceived as a fishermen's cooperative shipyard after WWII on the site of the old Ballard Marine Ways. The yard was subsequently incorporated in 1946 and has historically provided shipyard services, including new construction and repair of vessels. Pacific Fishermen purchased a small portion of its current property (i.e., the area in which the Screw Lift and Marine Railway No. 2 are currently located) from Rowe Manufacturing Company in 1985. The yard now only repairs vessels but converted vessels in the past. The facility repairs fishing vessels, tugs, cruise vessels, and yachts. It repairs vessels with wood, steel, aluminum, and fiberglass hulls and repairs about 70 vessels a year.

Industrial processes

The site includes two marine railways and a screw lift dry dock leading to a sidetrack. The small marine railway or Railway 001 consists of a steel platform with a steel bermed tray on wood rails. The carriage is pulled from the water over a concrete slab. The larger marine railway, Railway 002, consists of a steel carriage with a steel bermed tray on the water end which sits on steel rails. The facility pulls the carriage from the water over a concrete slab with a drain trench at the forward end of the tray. The screw lift dock is a steel platform supported with wood piling and a steel deck with an incorporated berm around the perimeter of the deck.

The facility uses the marine railways to repair ships and to clean and paint ships' bottoms, propellers, rudders, and the external parts below the water line. Marine railways are cradles which hold keel blocks positioned on the railway located next to the shoreline and extending into the water. The facility can move the cradle underwater and bring it inland far enough so that it is above the water level. The cradle is mobilized by a large chain attached to a pulley run by a large engine. The facility initially sets the keel blocks to a predetermined setting and slowly brings the cradle inland until the vessel is above the water level (or at least above the current water surface elevation) for servicing.

Shops providing services at Pacific Fishermen include a machine shop, steel storage and fabrication shed, welding shop, carpentry shop, pipe shop, paint shed, and sandblasting and pressure washing operations. The yard is paved and about three acres.

Pacific Fishermen uses ambient surface water at the screw lift dry dock that flows through the open ends of the deck and over the deck as the dock is lowered. It does not use ballast tanks. The quality of the return flow relative to the source is dependent upon the amount and type of debris that is present on the deck surface prior to submergence.

The yard uses sandblasting, hydro blasting, and high/medium/low pressure washing for hull preparation. Employees conduct these activities in either the sandblasting shed or on the dry dock or marine railways. Currently, the facility strips 99 percent of the outside hulls of ships using pressure washing and strips the remaining one percent by dry blasting. No wet blasting is used in the yard. The facility reduced its sandblasting, as evident from the 586.7 tons of sand purchased in 1987 as compared to 135 tons purchased in 1995. In 2018, the facility used 25 tons of steel grit in the blast booth, and 4.5 tons of Green Diamond for aluminum vessels. Only about one percent of hulls at the yard need sandblasting. Sandblasting is propelling a metallic or nonmetallic grit by compressed air to forcibly impinge on the surface being cleaned. Metallic grit includes steel shot for the recycling blast booth and Green Diamond for aluminum blasting. The primary components of steel shot are carbon, sulfur and phosphorous. Green Diamond is fused magnesium othosilicate formed from quenched lateritic ore. Additional elements in these abrasive grits include iron oxide, aluminum oxide, calcium oxide, nickel, silicon and chromium. Nonmetallic constituents include recycled glass of various sizes and sodium bicarbonate. Dry blasting is only used to prepare hulls for paints such as polyethylene that require a new profile for paint adherence.

Pacific Fishermen employees pick up the debris from the sandblast operations by hand shovels or other method for transfer to hoppers or skip boxes. The facility keeps the spent sandblast grit under cover. The sandblasting booth is an enclosed steel structure. Ninety-nine percent of the sandblasting grit is used in the blast booth. Blast media is recycled for additional use. A disposal firm, Evergreen Recycling, picks up spent sandblast grit, and transports it to Waste Management.

Hydro blasting is conducted by 3000 to 5000 pounds per square-inch pressure wash water as Pacific Fishermen now operates one 5000-pound and two 3000-pound pressure washers. The facility collects hydro blast wastewater from the two marine railways and the sidetrack on a concrete pad. It routes the wastewater through an underground settling vault, pretreats it using an inclined plate clarifier, and then discharges it to the sanitary sewer. No acid solution is used in the hydroblast process. The facility holds a pretreatment permit for King County Industrial Waste.

Paint is stored in approved flammable steel containers. Employees mix paints on a table in the paint mixing shed and at project areas throughout the facility in drip trays. Engine repair services are not provided.

Bilge water, ballast water, hydraulic fluid, and oily wastes are collected for disposal on shore by a contract disposal firm. Ballast and bilge water are disposed of by the contractor at its facility. Spent oils, hydraulic fluids, antifreeze and coolants are stored in sealed drums in the waste storage shed and are picked up by Oil Re-Refining Company (ORRCO)

The facility uses portable toilets for certain ship repair projects or the black water is pumped from vessels holding tanks by a contract disposal firm.

Cooling water is not supplied to moored or dry docked vessels. The facility uses a portable steamer for steaming and bending wood planks. It has one part washing tank, which is a self-contained recycling unit using 140° F solvent. The waste sludge is placed with waste oils and disposed of with the waste oils. Hydraulic fluids are stored in closed drums in the waste storage shed and used oils are picked up by Certified Cleaning, Inc. Antifreeze and coolants are also stored in sealed drums in the waste storage shed and are picked up by Northwest Antifreeze for recycling.

Wastewater treatment processes

All of the industrial stormwater runoff drains to the stormwater lift station wet well for pumping to the stormwater treatment system which consists of equalization, primary settling, pH buffering, and enhanced filtration, i.e., gravity filtration plus selective media adsorption. Pacific Fishermen temporarily stores treated effluent prior to a batch discharge at a controlled rate through a submerged outfall diffuser which promotes mixing.

The stormwater treatment system described above uses Aquip Stormwater Filtration System Technology. It is a passive filtration technology designed specifically for reduction of stormwater pollutants such as suspended solids, turbidity, heavy metals, and organic compounds from industrial site runoff. It uses a pretreatment chamber followed by a series of inert and adsorptive filtration media to effectively trap pollutants in a flexible package. Pollutants within the pretreatment chambers are removed via gravity settling and within the filtration system via a combination of chemical complexion, adsorption, micro-sedimentation, and filtration. The system uses a passive pH compensation process in which the media causes a pH buffering effect within the system.

The facility routes all process wastewater to the sanitary sewer. Floodwater discharges from the marine railways and screw lift dry dock occur when ships are returned to the water.

Discharge outfall

The treated stormwater discharges through a submerged outfall diffuser positioned two feet above the bottom surface and located within the shipyard property boundary.

B. Description of the receiving water

Pacific Fishermen discharges to the Lake Washington Ship Canal. Other nearby point source outfalls include CSR Marine West and City of Seattle combined sewer overflow under the 24th Avenue NW landing dock. Significant nearby non-point sources of pollutants include marinas and urban stormwater runoff.

The ambient background data used for this permit includes the following pooled data from King County Lake Union stations 0512 and 0518:

Table 2. Ambient Background Data

Parameter	Value Used
pH (Maximum / Minimum)	9.0 / 6.3 standard units
Turbidity (average)	0.95 NTU
Hardness (geometric mean)	42.46 mg/L as CaCO3
Total Arsenic (90th percentile)	1.22 µg/L
Total Lead (90th percentile)	0.172 µg/L
Total Copper (90th percentile)	4.97 µg/L
Total Zinc (90th percentile)	8.76 µg/L

C. Wastewater characterization

Pacific Fishermen reported the concentration of pollutants in the discharge in the permit application and in discharge monitoring reports. The tabulated data represents the quality of the wastewater effluent discharged from November 2014 through May 2019. The wastewater effluent is characterized as follows:

Table 3. Wastewater Characterization

Parameter	Units	# of Samples	Average Value	Maximum Value
Total Arsenic	µg/L	45	Non-Detect (0.60) [1]	3.1
Total Copper	µg/L	45	10.8	44.4
Total Lead	µg/L	45	Non-Detect (0.51) [1]	1.08
Total Zinc	µg/L	45	36.7	115
Oil and Grease	mg/L	45	Non-Detect	Non-Detect
Turbidity	NTU	45	0.47	2.9

Parameter	Units	# of Samples	Minimum Value	Maximum Value
pH	Standard units	45	5.3	7.2

[1] Non-detect values are assigned a concentration of one-half the detection limit, 0.5 µg/L for total arsenic and total lead.

D. Summary of compliance with previous permit issued October 10, 2014

The previous permit placed effluent limits on oil and grease, pH, turbidity, total copper and total zinc.

Pacific Fishermen has largely complied with the effluent limits and permit conditions throughout the duration of the permit issued on October 10, 2014. Pacific Fishermen had two months in winter 2015 when pH was below effluent limits. Ecology assessed compliance based on its review of the facility's information in the Ecology Permitting and Reporting Information System (PARIS), discharge monitoring reports (DMRs), and on inspections.

E. State environmental policy act (SEPA) compliance

State law exempts the issuance, reissuance, or modification of any wastewater discharge permit from the SEPA process as long as the permit contains conditions that are no less stringent than federal and state rules and regulations (RCW 43.21C.0383). The exemption applies only to existing discharges, not to new discharges.

III. Proposed Permit Limits

Federal and state regulations require that effluent limits in an NPDES permit must be either technology- or water quality-based.

- Technology-based limits are based upon the treatment methods available to treat specific pollutants. Technology-based limits are set by the EPA and published as a regulation, or Ecology develops the limit on a case-by-case basis (40 CFR 125.3, and chapter 173-220 WAC).
- Water quality-based limits are calculated so that the effluent will comply with the Surface Water Quality Standards (chapter 173-201A WAC), Ground Water Standards (chapter 173-200 WAC), Sediment Quality Standards (chapter 173-204 WAC), or the Federal water quality criteria applicable to Washington (40 CFR 131.45).
- Ecology must apply the most stringent of these limits to each parameter of concern. These limits are described below.

The limits in this permit reflect information received in the application and from supporting reports (engineering, hydrogeology, etc.). Ecology evaluated the permit application and determined the limits needed to comply with the rules adopted by the state of Washington. Ecology does not develop effluent limits for all reported pollutants. Some pollutants are not treatable at the concentrations reported, are not controllable at the source, are not listed in regulation, and do not have a reasonable potential to cause a water quality violation.

Ecology does not usually develop limits for pollutants not reported in the permit application but may be present in the discharge. The permit does not authorize discharge of the non-reported pollutants. During the five-year permit term, the facility's effluent discharge conditions may change from those conditions reported in the permit application. The facility must notify Ecology if significant changes occur in any constituent [40 CFR 122.42(a)]. Until Ecology modifies the permit to reflect additional discharge of pollutants, a permitted facility could be violating its permit.

A. Design criteria

Under WAC 173-220-150 (1)(g), flows and waste loadings must not exceed approved design criteria. Ecology approved design criteria for this facility's treatment plant in the engineering report dated December 2008 prepared by CH2M Hill. The table below includes design criteria from the referenced report.

Storm events that exceed the hydraulic design criteria of stormwater treatment systems may bypass the treatment system when Ecology has determined the system meets AKART requirements. Ecology would not consider this a violation of the conditions of the permit, if the bypass can meet water quality criteria. AKART for stormwater is constantly progressing and, as technology advances, facilities will have more cost effective, more efficient, and higher capacity treatment system options available. Ecology expects the facility to meet AKART and make the necessary improvements to its treatment system as the treatment technology evolves.

Table 4. Design Criteria for Aquip System

Parameter	Design Quantity
Treatment Flow Range	Up to 50 gpm

B. Technology-based effluent limits

Ecology may base effluent limits on the technology available to treat the pollutants at a reasonable cost (technology-based) or it may base them on the effect of the pollutants in the receiving water (water quality-based), whichever is most stringent.

Table 5. Technology-based Limits

Parameter	Maximum Daily Limit
Oil and Grease (TPH)	5 mg/L

C. Surface water quality-based effluent limits

The Washington State surface water quality standards (chapter 173-201A WAC) are designed to protect existing water quality and preserve the beneficial uses of Washington's surface waters. Waste discharge permits must include conditions that ensure the discharge will meet the surface water quality standards (WAC 173-201A-510). Water quality-based effluent limits may be based on an individual waste load allocation or on a waste load allocation developed during a basin wide total maximum daily load study (TMDL).

Numerical criteria for the protection of aquatic life and recreation

Numerical water quality criteria are listed in the water quality standards for surface waters (chapter 173-201A WAC). They specify the maximum levels of pollutants allowed in receiving water to protect aquatic life and recreation in and on the water. Ecology uses numerical criteria along with chemical and physical data for the wastewater and receiving water to derive the effluent limits in the discharge permit. When surface water quality-based limits are more stringent or potentially more stringent than technology-based limits, the discharge must meet the water quality-based limits.

Numerical criteria for the protection of human health

In 1992, U.S. EPA published 91 numeric water quality criteria for the protection of human health that are applicable to dischargers in Washington State in its National Toxics Rule (40 CFR (EPA, 1992). Ecology submitted a standards revision for 192 new human health criteria for 97 pollutants to EPA on August 1, 2016. In accordance with requirements of CWA section 303(c)(2)(B), EPA finalized 144 new and revised Washington specific human health criteria for priority pollutants, to apply to waters under Washington's jurisdiction. EPA approved 45 human health criteria as submitted by Washington. The EPA took no action on Ecology submitted criteria for arsenic, dioxin, and thallium. The existing criteria for these three pollutants remain in effect and were included in 40 CFR 131.45, revision of certain federal water quality criteria applicable to Washington.

These newly adopted criteria, located in WAC 173-201A-240, are designed to protect humans from exposure to pollutants linked to cancer and other diseases, based on consuming fish and shellfish and drinking contaminated surface waters. The water quality standards also include radionuclide criteria to protect humans from the effects of radioactive substances.

Narrative criteria

Narrative water quality criteria (e.g., WAC 173-201A-240(1); 2006) limit the toxic, radioactive, or other deleterious material concentrations that the facility may discharge to levels below those which have the potential to:

- Adversely affect designated water uses.
- Cause acute or chronic toxicity to biota.
- Impair aesthetic values.
- Adversely affect human health.

Narrative criteria protect the specific designated uses of all fresh waters (WAC 173-201A-200, 2006) and of all marine waters (WAC 173-201A-210, 2006) in the state of Washington.

Antidegradation

Description--The purpose of Washington's Antidegradation Policy (WAC 173-201A-300-330; 2006) 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.

A facility must prepare a Tier II analysis when all three of the following conditions are met:

- The facility is planning a new or expanded action.
- Ecology regulates or authorizes the action.
- The action has the potential to cause measurable degradation to existing water quality at the edge of a chronic mixing zone.

Facility Specific Requirements--This facility must meet Tier I requirements.

- Dischargers must maintain and protect existing and designated uses. Ecology must not allow any degradation that will interfere with, or become injurious to, existing or designated uses, except as provided for in chapter 173-201A WAC.

Ecology's analysis described in this section of the fact sheet demonstrates that the proposed permit conditions will protect existing and designated uses of the receiving water.

Mixing zones

A mixing zone is the defined area in the receiving water surrounding the discharge port(s), where wastewater mixes with receiving water. Within mixing zones the pollutant concentrations may exceed water quality numeric standards, so long as the discharge doesn't interfere with designated uses of the receiving water body (for example, recreation, water supply, and aquatic life and wildlife habitat, etc.) The pollutant concentrations outside of the mixing zones must meet water quality numeric standards.

State and federal rules allow mixing zones because the concentrations and effects of most pollutants diminish rapidly after discharge, due to dilution. Ecology defines mixing zone sizes to limit the amount of time any exposure to the end-of-pipe discharge could harm water quality, plants, or fish.

The state's water quality standards allow Ecology to authorize mixing zones for the facility's permitted wastewater discharges only if those discharges already receive all known, available, and reasonable methods of prevention, control, and treatment (AKART). Mixing zones typically require compliance with water quality criteria within a specified distance from the point of discharge and must not use more than 25% of the available width of the water body for dilution [WAC 173-201A-400 (7)(a)(ii-iii)].

Ecology uses modeling to estimate the amount of mixing within the mixing zone. Through modeling Ecology determines the potential for violating the water quality standards at the edge of the mixing zone and derives any necessary effluent limits. Steady-state models are the most frequently used tools for conducting mixing zone analyses. Ecology chooses values for each effluent and for receiving water variables that correspond to the time period when the most critical condition is likely to occur (see Ecology's *Permit Writer's Manual*). Each critical condition parameter, by itself, has a low probability of occurrence and the resulting dilution factor is conservative. The term "reasonable worst-case" applies to these values.

The mixing zone analysis produces a numerical value called a dilution factor (DF). A dilution factor represents the amount of mixing of effluent and receiving water that occurs at the boundary of the mixing zone. For example, a dilution factor of 4 means the effluent is 25% and the receiving water is 75% of the total volume of water at the boundary of the mixing zone. Ecology uses dilution factors with the water quality criteria to calculate reasonable potentials and effluent limits. Water quality standards include both aquatic life-based criteria and human health-based criteria. The former are applied at both the acute and chronic mixing zone boundaries; the latter are applied only at the chronic boundary. The concentration of pollutants at the boundaries of any of these mixing zones may not exceed the numerical criteria for that zone.

Each aquatic life *acute* criterion is based on the assumption that organisms are not exposed to that concentration for more than one hour and more often than one exposure in three years. Each aquatic life *chronic* criterion is based on the assumption that organisms are not exposed to that concentration for more than four consecutive days and more often than once in three years.

The two types of human health-based water quality criteria distinguish between those pollutants linked to non-cancer effects (non-carcinogenic) and those linked to cancer effects (carcinogenic). The human health-based water quality criteria incorporate several exposure and risk assumptions. These assumptions include:

- A 70-year lifetime of daily exposures.
- An ingestion rate for fish or shellfish measured in kg/day.
- An ingestion rate of two and four tenths (2.4) liters/day for drinking water (increased from two liters/day in the 2016 Water Quality Standards update).
- A one-in-one-million cancer risk for carcinogenic chemicals.

This permit authorizes a small acute mixing zone (WAC 173-201A-400). The water quality standards impose certain conditions before allowing the discharger a mixing zone:

1. **Ecology must specify both the allowed size and location in a permit.**

   The proposed permit specifies the size and location of the allowed mixing zone (as specified below).

2. **The facility must fully apply "all known, available, and reasonable methods of prevention, control and treatment" (AKART) to its discharge.**

   Ecology has determined that the treatment provided at Pacific Fishermen meets the requirements of AKART (see "Technology-based Limits"). Pacific Fishermen routs process water to King County Sanitary Sewer via Seattle sewer system. They employ all appropriate source control methods. They have installed a stormwater treatment system that provides reliable treatment of pollutants of concern for this discharge.

3. **Ecology must consider critical discharge conditions.**

   Surface water quality-based limits are derived for the water body's critical condition (the receiving water and waste discharge condition with the highest potential for adverse impact on the aquatic biota, human health, and existing or designated waterbody uses). The critical discharge condition is often pollutant-specific or waterbody-specific.

Critical discharge conditions are those conditions that result in reduced dilution or increased effect of the pollutant. Factors affecting dilution include the depth of water, the density stratification in the water column, the currents, and the rate of discharge. Density stratification is determined by the salinity and temperature of the receiving water. Temperatures are warmer in the surface waters in summer. Therefore, density stratification is generally greatest during the summer months. Density stratification affects how far up in the water column a freshwater plume may rise. The rate of mixing is greatest when an effluent is rising. The effluent stops rising when the mixed effluent is the same density as the surrounding water. After the effluent stops rising, the rate of mixing is much more gradual. Water depth can affect dilution when a plume might rise to the surface when there is little or no stratification. Ecology's *Permit Writer's Manual* describes additional guidance on criteria/design conditions for determining dilution factors. The manual can be obtained from Ecology's website at: https://fortress.wa.gov/ecy/publications/documents/92109.pdf

CH2M Hill used the following critical conditions to model the discharge (CH2M Hill, Effluent Mixing Study, 2008):

1. The width, depth, and volume of the Ship Canal in the discharge area.
2. The temperature of the Ship Canal and the effluent as they affect the behavior of the discharge.
3. Water depth of 22 feet at the outfall.
4. Current speed in the vicinity of the outfall of 0.024 meter per second. This current speed yielded the least dilution in relation to other recorded speed.
5. Pumped flow rate of 75 gallons per minutes for acute mixing zone.
6. Maximum effluent temperature of 9 degrees C.

4. Supporting information must clearly indicate the mixing zone would not:

- Have a reasonable potential to cause the loss of sensitive or important habitat.
- Substantially interfere with the existing or characteristic uses.
- Result in damage to the ecosystem.
- Adversely affect public health.

Ecology established Washington State water quality criteria for toxic chemicals using EPA criteria. EPA developed the criteria using toxicity tests with numerous organisms and set the criteria to generally protect the species tested and to fully protect all commercially and recreationally important species.

EPA sets acute criteria for toxic chemicals assuming organisms are exposed to the pollutant at the criteria concentration for one hour. They set chronic standards assuming organisms are exposed to the pollutant at the criteria concentration for four days. Dilution modeling under critical conditions generally shows that both acute and chronic criteria concentrations are reached within minutes of discharge.

The discharge plume does not impact drifting and non-strong swimming organisms because they cannot stay in the plume close to the outfall long enough to be affected. Strong swimming fish could maintain a position within the plume, but they can also avoid the discharge by swimming away. Mixing zones generally do not affect benthic organisms (bottom dwellers) because the buoyant plume rises in the water column. Ecology has additionally determined that the effluent will not exceed 33 degrees C for more than two seconds after discharge; and that the temperature of the water will not create lethal conditions or blockages to fish migration.

Ecology reviewed the above information, the specific information on the characteristics of the discharge, the receiving water characteristics and the discharge location. Based on this review, Ecology concluded that the discharge does not have a reasonable potential to cause the loss of sensitive or important habitat, substantially interfere with existing or characteristics uses, result in damage to the ecosystem, or adversely affect public health if the permit limits are met.

5. The discharge/receiving water mixture must not exceed water quality criteria outside the boundary of a mixing zone.

Ecology conducted a reasonable potential analysis, using procedures established by the EPA and by Ecology, for each pollutant and concluded the discharge/receiving water mixture will not violate water quality criteria outside the boundary of the mixing zone if permit limits are met.

6. The size of the mixing zone and the concentrations of the pollutants must be minimized.

At any given time, the effluent plume uses only a portion of the acute and chronic mixing zone, which minimizes the volume of water involved in mixing. The plume mixes as it rises through the water column therefore much of the receiving water volume at lower depths in the mixing zone is not mixed with discharge. Similarly, because the discharge may stop rising at some depth due to density stratification, waters above that depth will not mix with the discharge. Ecology determined it is impractical to specify in the permit the actual, much more limited volume in which the dilution occurs as the plume rises and moves with the current.

Ecology minimizes the size of mixing zones by requiring dischargers to install diffusers when they are appropriate to the discharge and the specific receiving waterbody. When a diffuser is installed, the discharge is more completely mixed with the receiving water in a shorter time. Ecology also minimizes the size of the mixing zone (in the form of the dilution factor) using design criteria with a low probability of occurrence. For example, Ecology uses the expected 95th percentile pollutant concentration, the 90th percentile background concentration, the centerline dilution factor, and the lowest flow occurring once in every ten years to perform the reasonable potential analysis.

Because of the above reasons, Ecology has effectively minimized the size of the mixing zone authorized in the proposed permit.

7. Maximum size of mixing zone.

The authorized mixing zone does not exceed the maximum size restriction.

8. Acute mixing zone.

- **The discharge/receiving water mixture must comply with acute criteria as near to the point of discharge as practicably attainable.**

  Ecology determined the acute criteria will be met at 10% of the distance (or of the chronic mixing zone at the ten-year low flow).The system discharges in a 30 minutes on/30 minutes off pattern. Since this system is designed intermittently, acute criteria are the basis for the permit limits.

- **The pollutant concentration, duration, and frequency of exposure to the discharge will not create a barrier to migration or translocation of indigenous organisms to a degree that has the potential to cause damage to the ecosystem.**

  As described above, the toxicity of any pollutant depends upon the exposure, the pollutant concentration, and the time the organism is exposed to that concentration. Authorizing a limited acute mixing zone for this discharge assures that it will not create a barrier to migration. The effluent from this discharge will rise as it enters the receiving water, assuring that the rising effluent will not cause translocation of indigenous organisms near the point of discharge (below the rising effluent).

- **Comply with size restrictions.**

  The mixing zone authorized for this discharge complies with the size restrictions published in chapter 173-201A WAC.

9. Overlap of Mixing Zones.

This mixing zone does not overlap another mixing zone.

D. Designated uses and surface water quality criteria

Applicable designated uses and surface water quality criteria are defined in chapter 173-201A WAC. In addition, the U.S. EPA set human health criteria for toxic pollutants (EPA 1992). The table included below summarizes the criteria applicable to this facility's discharge.

- Aquatic Life Uses are designated based on the presence of, or the intent to provide protection for the key uses. All indigenous fish and non-fish aquatic species must be protected in waters of the state in addition to the key species. The Aquatic Life Uses for this receiving water are identified below.

Table 6. Freshwater Aquatic Life Uses and Associated Criteria

Temperature Criteria – Highest 7-DAD MAX	16°C (60.8°F)
Dissolved Oxygen Criteria	9.5 mg/L
Turbidity Criteria	• 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.
Total Dissolved Gas Criteria	Total dissolved gas must not exceed 110 percent of saturation at any point of sample collection.
pH Criteria	The pH must measure within the range of 6.5 to 8.5, with a human-caused variation within the above range of less than 0.2 units.

- The *recreational uses* for this receiving water are identified below.

Table 7. Recreational Uses and Associated Criteria

Recreational Use	Criteria
Extraordinary Primary Contact Recreation (expires 12/31/2020)	Fecal coliform organism levels must not exceed a geometric mean value of 50 colonies/100 mL, with not 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 100 colonies/100 mL.
Primary Contact Recreation (effective 1/1/2021)	*E. coli* organism levels must not exceed a geometric mean value of 100 CFU or MPN per 100 mL, with not more than 10 percent of all samples (or any single sample when less than ten sample points exist) obtained within the averaging period exceeding 320 CFU or MPN per100 mL.

- The *water supply uses* are domestic, agricultural, industrial, and stock watering.
- The *miscellaneous freshwater uses* are wildlife habitat, harvesting, commerce and navigation, boating, and aesthetics.

E. Water quality impairments

Salmon Bay (Lake Washington Ship Canal) is listed on the current 303(d) and is impaired for Lead, high pH, Aldrin, and Bacteria. Ecology is not currently conducting a Total Maximum Daily Load (TMDL) Analysis for any of these parameters, nor is one planned.

F. Evaluation of surface water quality-based effluent limits for narrative criteria

Ecology must consider the narrative criteria described in WAC 173-201A-160 when it determines permit limits and conditions. Narrative water quality criteria limit the toxic, radioactive, or other deleterious material concentrations that the facility may discharge which have the potential to adversely affect designated uses, cause acute or chronic toxicity to biota, impair aesthetic values, or adversely affect human health.

Ecology considers narrative criteria when it evaluates the characteristics of the wastewater and when it implements all known, available, and reasonable methods of treatment and prevention (AKART) as described above in the technology-based limits section. When Ecology determines if a facility is meeting AKART it considers the pollutants in the wastewater and the adequacy of the treatment to prevent the violation of narrative criteria.

In addition, Ecology considers the toxicity of the wastewater discharge by requiring whole effluent toxicity (WET) testing when there is a reasonable potential for the discharge to contain toxics. Ecology's analysis of the need for WET testing for this discharge is described later in the fact sheet.

G. Evaluation of surface water quality-based effluent limits for numeric criteria

Pollutants in an effluent may affect the aquatic environment near the point of discharge (near-field) or at a considerable distance from the point of discharge (far-field). Toxic pollutants, for example, are near-field pollutants; their adverse effects diminish rapidly with mixing in the receiving water. Conversely, a pollutant such as biological oxygen demand (BOD) is a far-field pollutant whose adverse effect occurs away from the discharge even after dilution has occurred. Thus, the method of calculating surface water quality-based effluent limits varies with the point at which the pollutant has its maximum effect.

With technology-based controls (AKART), predicted pollutant concentrations in the discharge exceed water quality criteria. Ecology therefore authorizes a mixing zone in accordance with the geometric configuration, flow restriction, and other restrictions imposed on mixing zones by chapter 173-201A WAC.

The diffuser at Outfall # 14 is installed at a depth of -20 feet, 2 feet above the sediment surface. The diffuser is a single 2-inch diffuser port. Ecology obtained this information from the Dilution Ratio Study Report submitted in November 2007.

Chronic Mixing Zone--WAC 173-201A-400(7)(a) specifies that mixing zones must not extend in a downstream direction from the discharge ports for a distance greater than 300 feet plus the depth of water over the discharge ports or extend upstream for a distance of over 100 feet, not utilize greater than 25% of the flow, and not occupy greater than 25% of the width of the water body.

The horizontal distance of the chronic mixing zone was calculated to be 100 feet in the November 2007 report. The mixing zone extends from the bottom to the top of the water column. The chronic dilution factor (87:1) was based on this distance.

Acute Mixing Zone--WAC 173-201A-400(8)(a) specifies that in rivers and streams a zone where acute toxics criteria may be exceeded must not extend beyond 10% of the distance towards the upstream and downstream boundaries of the chronic zone, not use greater than 2.5% of the flow and not occupy greater than 25% of the width of the water body.

The horizontal distance of the acute mixing zone is 100 feet less than 15% of the ship canal width in this area. The acute mixing zone extends 10 feet from the diffuser, from the river bottom to the top of the water surface. The acute dilution factor (25:1) is based on this distance.

pH--The Permittee has had difficulty consistently meeting pH limits. Rainwater is naturally low in pH and alkalinity. This information was not understood during development of the original permit. The poorly buffered effluent (soft water with low ion content) is not a problem when discharged and mixed into the receiving water. See mixing zone calculations in Appendix D documenting compliance with Water Quality Standards of pH $\geq$ 6.5 at acute boundary, with a human-caused variation of less than 0.2 units at chronic boundary. Requiring the Permittee to add chemicals to increase their pH is not advisable. The revised pH effluent limit is consistent with the benchmarks in the Industrial Stormwater General Permit.

Turbidity--Ecology evaluated the impact of turbidity based on the range of turbidity in the effluent and turbidity of the receiving water. Based on visual observation of the facility's effluent, Ecology expects no violations of the turbidity criteria outside the designated mixing zone.

Toxic Pollutants—Federal regulations (40 CFR 122.44) require Ecology to place limits in NPDES permits on toxic chemicals in an effluent whenever there is a reasonable potential for those chemicals to exceed the surface water quality criteria. Ecology does not exempt facilities with technology-based effluent limits from meeting the surface water quality standards.

The following toxic pollutants (copper and zinc) are present in the discharge. Arsenic was detected in 3/45 samples and lead was detected in 1/45 samples.

Valid ambient background data was available for copper and zinc (see Table 8). Ecology used all applicable data to evaluate reasonable potential for this discharge to cause a violation of water quality standards.

Table 8. Dilution Factors (DF)

Criteria	Acute	Chronic
Aquatic Life	25	87
Human Health, Carcinogen		87
Human Health, Non-carcinogen		87

Valid ambient background data, pooled from King County Monitoring stations 0512 and 0518, were available for arsenic, copper, hardness, lead and zinc (see Table 2). Ecology used all applicable data to evaluate reasonable potential for this discharge to cause a violation of water quality standards.

In the previous permit, Ecology derived effluent limits for the toxic pollutants copper and zinc, determined to have a reasonable potential to cause a violation of the water quality standards. Ecology calculated effluent limits using methods from EPA, 1991 as shown in **Appendix D**. Using monitoring data from the previous permit cycle, Ecology determined the discharge no longer has a reasonable potential to cause a violation. In order to minimize the size of the mixing zone, effluent limits for copper and zinc have been reduced in this permit to performance-based limits that reflect the historic treatment performance.

The resultant effluent limits are as follows:

Total Copper = 62 µg/L , Total Zinc = 332 µg/L

Temperature--The state temperature standards (WAC 173-201A-200-210 and 600-612) include multiple elements:

- Annual summer maximum threshold criteria (June 15 to September 15)
- Supplemental spawning and rearing season criteria (September 15 to June 15)
- Incremental warming restrictions
- Protections against acute effects

Ecology evaluates each criterion independently to determine reasonable potential and derive permit limits.

- Annual summer maximum and supplementary spawning/rearing criteria

  Each water body has an annual maximum temperature criterion [WAC 173-201A-200(1)(c), 210(1)(c), and Table 602]. These threshold criteria (e.g., 12, 16, 17.5, 20°C) protect specific categories of aquatic life by controlling the effect of human actions on summer temperatures.

  Some waters have an additional threshold criterion to protect the spawning and incubation of salmonids (9°C for char and 13°C for salmon and trout) [WAC 173-201A--602, Table 602]. These criteria apply during specific date-windows.

  The threshold criteria apply at the edge of the chronic mixing zone. Criteria for most fresh waters are expressed as the highest 7-Day average of daily maximum temperature (7-DADMax). The 7-DADMax temperature is the arithmetic average of seven consecutive measures of daily maximum temperatures. Criteria for marine waters and some fresh waters are expressed as the highest 1-Day annual maximum temperature (1-DMax).

- Incremental warming criteria

  The water quality standards limit the amount of warming human sources can cause under specific situations [WAC 173-201A-200(1)(c)(i)-(ii), 210(1)(c)(i)-(ii)]. The incremental warming criteria apply at the edge of the chronic mixing zone.

  At locations and times when background temperatures are cooler than the assigned threshold criterion, point sources are permitted to warm the water by only a defined increment. These increments are permitted only to the extent doing so does not cause temperatures to exceed either the annual maximum or supplemental spawning criteria.

  At locations and times when a threshold criterion is being exceeded due to natural conditions, all human sources, considered cumulatively, must not warm the water more than 0.3°C above the naturally warm condition.

  When Ecology has not yet completed a TMDL, our policy allows each point source to warm water at the edge of the chronic mixing zone by 0.3°C. This is true regardless of the background temperature and even if doing so would cause the temperature at the edge of a standard mixing zone to exceed the numeric threshold criteria. Allowing a 0.3°C warming for each point source is reasonable and protective where the dilution factor is based on 25% or less of the critical flow. This is because the fully mixed effect on temperature will only be a fraction of the 0.3°C cumulative allowance (0.075°C or less) for all human sources combined.

- Protections for temperature acute effects

  Instantaneous lethality to passing fish: The upper 99th percentile daily maximum effluent temperature must not exceed 33°C, unless a dilution analysis indicates ambient temperatures will not exceed 33°C two seconds after discharge.

General lethality and migration blockage: Measurable (0.3°C) increases in temperature at the edge of a chronic mixing zone are not allowed when the receiving water temperature exceeds either a 1DMax of 23°C or a 7DADMax of 22°C.

Lethality to incubating fish: Human actions must not cause a measurable (0.3°C) warming above 17.5°C at locations where eggs are incubating.

Pacific Fishermen only discharges treated stormwater and floodwater from launches. Ecology has determined that temperature is not a significant stormwater pollutant parameter. Therefore, the proposed permit does not include a temperature limit and it does not require the facility to monitor temperature in the stormwater discharges. Ecology may elect to develop procedures and guidance for regulating the effects of stormwater to comply with temperature water quality criteria in the future.

H. Human health

Washington's water quality standards include numeric human health-based criteria for 97 priority pollutants that Ecology must consider when writing NPDES permits.

Ecology determined the applicant's discharge does not contain chemicals of concern based on existing effluent data or knowledge of discharges to the system. Ecology will reevaluate this discharge for impacts to human health at the next permit reissuance.

I. Sediment quality

The aquatic sediment standards (chapter 173-204 WAC) protect aquatic biota and human health. Under these standards Ecology may require a facility to evaluate the potential for its discharge to cause a violation of sediment standards (WAC 173-204-400). You can obtain additional information about sediments at the Aquatic Lands Cleanup Unit website. https://ecology.wa.gov/Spills-Cleanup/Contamination-cleanup/Sediment-cleanups

Through a review of the discharger characteristics and of the effluent characteristics, Ecology determined that this discharge has no reasonable potential to violate the sediment management standards.

J. Groundwater quality limits

The groundwater quality standards (chapter 173-200 WAC) protect beneficial uses of groundwater. Permits issued by Ecology must not allow violations of those standards (WAC 173-200-100).

Pacific Fishermen does not discharge wastewater to the ground. No permit limits are required to protect groundwater.

K. Whole effluent toxicity

The water quality standards for surface waters forbid discharge of effluent that has the potential to cause toxic effects in the receiving waters. Many toxic pollutants cannot be measured by commonly available detection methods. However, laboratory tests can measure toxicity directly by exposing living organisms to the wastewater and measuring their responses. These tests measure the aggregate toxicity of the whole effluent, so this approach is called whole effluent toxicity (WET) testing. Some WET tests measure acute toxicity and other WET tests measure chronic toxicity.

Using the screening criteria in chapter 173-205-040 WAC, Ecology determined that toxic effects caused by unidentified pollutants in the effluent are unlikely. Therefore, this permit does not require WET testing. Ecology may require WET testing in the future if it receives information indicating that toxicity may be present in this effluent.

L. Comparison of effluent limits with the previous permit issued on October 10, 2014.

Table 9. Comparison of Previous and Proposed Effluent Limits

		Previous Effluent Limits: Outfall # 001	Proposed Effluent Limits: Outfall # 001
Parameter	**Basis of Limit**	**Maximum Daily**	**Maximum Daily**
Oil and Grease (TPH)	Technology	5 mg/L	5 mg/L
pH	Technology	6.0 – 9.0 std. units	5.0 – 9.0 std. units
Total Copper	Water Quality	71 µg/L	62 µg/L
Total Zinc	Water Quality	1091 µg/L	332 µg/L
Turbidity	Water Quality	5 NTU over background	5 NTU over background

IV. Monitoring Requirements

Ecology requires monitoring, recording, and reporting (WAC 173-220-210 and 40 CFR 122.41) to verify that the treatment process is functioning correctly and that the discharge complies with the permit's effluent limits.

If a facility uses a contract laboratory to monitor wastewater, it must ensure that the laboratory uses the methods and meets or exceeds the method detection levels required by the permit. The permit describes when facilities may use alternative methods. It also describes what to do in certain situations when the laboratory encounters matrix effects. When a facility uses an alternative method as allowed by the permit, it must report the test method, detection level (DL), and quantitation level (QL) on the discharge monitoring report or in the required report.

A. Wastewater monitoring

Pacific Fishermen monitors for total petroleum hydrocarbons, pH, turbidity, total copper, and total zinc to further characterize the effluent. These pollutants could have a significant impact on the quality of the surface water.

The monitoring schedule is detailed in the proposed permit under Special Condition S.2. Specified monitoring frequencies take into account the quantity and variability of the discharge, the treatment method, past compliance, significance of pollutants, and cost of monitoring.

Pacific Fishermen has always met their effluent limits for copper and zinc during their previous permit cycle, and routinely measured non-detectable concentrations of arsenic and lead in the effluent. For these reasons, monitoring for copper and zinc has been reduced to quarterly, and monitoring for arsenic and lead is being discontinued.

B. Lab accreditation

Ecology requires that facilities must use a laboratory registered or accredited under the provisions of chapter 173-50 WAC, Accreditation of Environmental Laboratories, to prepare all monitoring data (with the exception of certain parameters).

V. Other Permit Conditions

A. Reporting and record keeping

Ecology based Special Condition S3 on its authority to specify any appropriate reporting and record keeping requirements to prevent and control waste discharges (WAC 173-220-210).

B. Spill plan

This facility stores a quantity of chemicals on-site that have the potential to cause water pollution if accidentally released. Ecology can require a facility to develop best management plans to prevent this accidental release [Section 402(a)(1) of the Federal Water Pollution Control Act (FWPCA) and RCW 90.48.080].

Pacific Fishermen developed a plan for preventing the accidental release of pollutants to state waters and for minimizing damages if such a spill occurs. The proposed permit requires the facility to update this plan and submit it to Ecology.

C. Solid waste control plan

Pacific Fishermen could cause pollution of the waters of the state through inappropriate disposal of solid waste or through the release of leachate from solid waste.

This proposed permit requires this facility to update the approved solid waste control plan designed to prevent solid waste from causing pollution of waters of the state. The facility must submit the updated plan to Ecology. You can obtain an Ecology guidance document, which describes how to develop a Solid Waste Control Plan, at:
https://fortress.wa.gov/ecy/publications/documents/0710024.pdf

D. Outfall evaluation

The proposed permit requires Pacific Fishermen to conduct an outfall inspection and submit a report detailing the findings of that inspection (Special Condition S.9). The inspection must evaluate the physical condition of the discharge pipe and diffusers, and evaluate the extent of sediment accumulations in the vicinity of the outfall.

E. Operation and maintenance manual

Ecology requires industries to take all reasonable steps to properly operate and maintain their wastewater treatment system in accordance with state and federal regulations [40 CFR 122.41(e) and WAC 173-220-150 (1)(g)]. The facility has prepared and submitted an operation and maintenance manual as required by state regulation for the construction of wastewater treatment facilities (WAC 173-240-150). Implementation of the procedures in the operation and maintenance manual ensures the facility's compliance with the terms and limits in the permit.

F. Stormwater pollution prevention plan

In accordance with 40 CFR 122.44(k) and 40 CFR 122.44 (s), the proposed permit includes requirements for updating and implementation of a SWPPP along with BMPs to minimize or prevent the discharge of pollutants to waters of the state. BMPs constitute Best Conventional Pollutant Control Technology (BCT) and Best Available Technology Economically Achievable (BAT) for stormwater discharges. Ecology has determined that Pacific Fishermen must continue to implement adequate BMPs in order to meet the requirements of "all known, available, and reasonable methods of prevention, control, and treatment" (AKART). A SWPPP requires a facility to implement actions necessary to manage stormwater to comply with the state's requirement under chapter 90.48 RCW to protect the beneficial uses of waters of the state.

The SWPPP must identify potential sources of stormwater contamination from industrial activities and identify how it plans to manage those sources of contamination to prevent or minimize contamination of stormwater. Pacific Fishermen must continuously review and revise the SWPPP as necessary to assure that stormwater discharges do not degrade water quality. It must retain the SWPPP on-site or within reasonable access to the site and available for review by Ecology.

Best management practices (BMPs)

BMPs are the actions identified in the SWPPP to manage, prevent contamination of, and treat stormwater. BMPs include schedules of activities, prohibitions of practices, maintenance procedures, and other physical, structural and/or managerial practices to prevent or reduce the pollution of waters of the state. BMPs also include treatment systems, operating procedures, and practices used to control plant site runoff, spillage or leaks, sludge or waste disposal, and drainage from raw material storage. Pacific Fishermen must ensure that its SWPPP includes the operational and structural source control BMPs listed as "applicable" in Ecology's stormwater management manuals. Many of these "applicable" BMPs are sector-specific or activity-specific, and are not required at facilities engaged in other industrial sectors or activities.

Ecology-approved stormwater management manuals

Consistent with RCW 90.48.555 (5) and (6), the proposed permit requires the facility to implement BMPs contained in the *Stormwater Management Manual for Western Washington* (*2019* edition), or any revisions thereof, or practices that are demonstrably equivalent to practices contained in stormwater technical manuals approved by Ecology. This should ensure that BMPs will prevent violations of state water quality standards, and satisfy the state AKART requirements and the federal technology-based treatment requirements under 40 CFR part 125.3. The SWPPP must document that the BMPs selected provide an equivalent level of pollution prevention, compared to the applicable Stormwater Management Manuals, including: The technical basis for the selection for all stormwater BMPs (scientific, technical studies, and/or modeling) which support the performance claims for the BMPs selected.

An assessment of how the BMPs will satisfy AKART requirements and the applicable technology-based treatment requirements under 40 CFR part 125.3.

Operational source control BMPs

Operational source control BMPs include a schedule of activities, prohibition of practices, maintenance procedures, employee training, good housekeeping, and other managerial practices to prevent or reduce the pollution of waters of the state. These activities do not require construction of pollution control devices but are very important components of a successful SWPPP. Employee training, for instance, is critical to achieving timely and consistent spill response. Pollution prevention is likely to fail if the employees do not understand the importance and objectives of BMPs. Prohibitions might include eliminating outdoor repair work on equipment and certainly would include the elimination of intentional draining of crankcase oil on the ground. Good housekeeping and maintenance schedules help prevent incidents that could result in the release of pollutants. Operational BMPs represent a cost-effective way to control pollutants and protect the environment. The SWPPP must identify all the operational BMPs and how and where they are implemented. For example, the SWPPP must identify what training will consist of, when training will take place, and who is responsible to assure that employee training happens.

Structural source control BMPs

Structural source control BMPs include physical, structural, or mechanical devices or facilities intended to prevent pollutants from entering stormwater. Examples of source control BMPs include erosion control practices, maintenance of stormwater facilities (e.g., cleaning out sediment traps), construction of roofs over storage and working areas, and direction of equipment wash water and similar discharges to the sanitary sewer or a dead end sump. Structural source control BMPs likely include a capital investment but are cost effective compared to cleaning up pollutants after they have entered stormwater.

Treatment BMPs

Operational and structural source control BMPs are designed to prevent pollutants from entering stormwater. However, even with an aggressive and successful program, stormwater may still require treatment to achieve compliance with water quality standards. Treatment BMPs remove pollutants from stormwater. Examples of treatment BMPs are detention ponds, oil/water separators, biofiltration, and constructed wetlands.

G. General conditions

Ecology bases the standardized General Conditions on state and federal law and regulations. They are included in all individual industrial NPDES permits issued by Ecology.

VI. Permit Issuance Procedures

A. Permit modifications

Ecology may modify this permit to impose numerical limits, if necessary, to comply with water quality standards for surface waters, with sediment quality standards, or with water quality standards for groundwaters, after obtaining new information from sources such as inspections, effluent monitoring, outfall studies, and effluent mixing studies.

Ecology may also modify this permit to comply with new or amended state or federal regulations.

B. Proposed permit issuance

This proposed permit includes all statutory requirements for Ecology to authorize a wastewater discharge. The permit includes limits and conditions to protect human health and aquatic life, and the beneficial uses of waters of the state of Washington. Ecology proposes to issue this permit for a term of 5 years.

VII. References for Text and Appendices

Environmental Protection Agency (EPA)

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Laws and Regulations (http://leg.wa.gov/LawsAndAgencyRules/Pages/default.aspx)

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February 2007. *Focus Sheet on Solid Waste Control Plan, Developing a Solid Waste Control Plan for Industrial Wastewater Discharge Permittees*, Publication Number 07-10-024. https://fortress.wa.gov/ecy/publications/documents/0710024.pdf

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1979. *In-stream Deoxygenation Rate Prediction*. Journal Environmental Engineering Division, ASCE. 105(EE2). (Cited in EPA 1985 op.cit.)

Appendix A--Public Involvement Information

Ecology proposes to reissue a permit to Pacific Fishermen Shipyard and Electric, LLC. The permit includes wastewater discharge limits and other conditions. This fact sheet describes the facility and Ecology's reasons for requiring permit conditions.

Ecology placed a Public Notice of Draft on January 13, 2020 in the *Seattle Times* to inform the public and to invite comment on the proposed draft National Pollutant Discharge Elimination System permit and fact sheet.

The notice:

- Told where copies of the draft Permit and Fact Sheet were available for public evaluation (a local public library, the closest Regional or Field Office, posted on our website).
- Offered to provide the documents in an alternate format to accommodate special needs.
- Urged people to submit their comments, in writing, before the end of the Comment Period.
- Told how to request a public hearing of comments about the proposed NPDES permit.
- Explained the next step(s) in the permitting process.

Ecology has published a document entitled *Frequently Asked Questions about Effective Public Commenting* which is available on our website at https://fortress.wa.gov/ecy/publications/SummaryPages/0307023.html

You may obtain further information from Ecology by telephone, 425-649-7201, or by writing to the address listed below.

Water Quality Permit Coordinator
Department of Ecology
Northwest Regional Office
3190 160th Avenue SE
Bellevue, WA 98008-5452

The primary author of this permit and fact sheet is Robert Nolan.

Appendix B--Your Right to Appeal

You have a right to appeal this permit to the Pollution Control Hearing Board (PCHB) within thirty (30) days of the date of receipt of the final permit. The appeal process is governed by chapter 43.21B RCW and chapter 371-08 WAC. "Date of receipt" is defined in RCW 43.21B.001(2) (see glossary).

To appeal you must do the following within 30 days of the date of receipt of this permit:

- File your appeal and a copy of this permit with the PCHB (see addresses below). Filing means actual receipt by the PCHB during regular business hours.
- Serve a copy of your appeal and this permit on Ecology in paper form - by mail or in person. (See addresses below.) E-mail is not accepted.

You must also comply with other applicable requirements in chapter 43.21B RCW and chapter 371-08 WAC.

ADDRESS AND LOCATION INFORMATION

Street Addresses	Mailing Addresses
Department of Ecology Attn: Appeals Processing Desk 300 Desmond Drive SE Lacey, WA 98503	**Department of Ecology** Attn: Appeals Processing Desk PO Box 47608 Olympia, WA 98504-7608
Pollution Control Hearings Board 1111 Israel RD SW STE 301 Tumwater, WA 98501	**Pollution Control Hearings Board** PO Box 40903 Olympia, WA 98504-0903

Appendix C--Glossary

1-DMax or 1-day maximum temperature -- The highest water temperature reached on any given day. This measure can be obtained using calibrated maximum/minimum thermometers or continuous monitoring probes having sampling intervals of thirty minutes or less.

7-DADMax or 7-day average of the daily maximum temperatures -- The arithmetic average of seven consecutive measures of daily maximum temperatures. The 7-DADMax for any individual day is calculated by averaging that day's daily maximum temperature with the daily maximum temperatures of the three days prior and the three days after that date.

Acute toxicity -- The lethal effect of a compound on an organism that occurs in a short time period, usually 48 to 96 hours.

AKART -- The acronym for "all known, available, and reasonable methods of prevention, control and treatment." AKART is a technology-based approach to limiting pollutants from wastewater discharges, which requires an engineering judgment and an economic judgment. AKART must be applied to all wastes and contaminants prior to entry into waters of the state in accordance with RCW 90.48.010 and 520, WAC 173-200-030(2)(c)(ii), and WAC 173-216-110(1)(a).

Alternate point of compliance -- An alternative location in the groundwater from the point of compliance where compliance with the groundwater standards is measured. It may be established in the groundwater at locations some distance from the discharge source, up to, but not exceeding the property boundary and is determined on a site specific basis following an AKART analysis. An "early warning value" must be used when an alternate point is established. An alternate point of compliance must be determined and approved in accordance with WAC 173-200-060(2).

Ambient water quality -- The existing environmental condition of the water in a receiving water body.

Ammonia -- Ammonia is produced by the breakdown of nitrogenous materials in wastewater. Ammonia is toxic to aquatic organisms, exerts an oxygen demand, and contributes to eutrophication. It also increases the amount of chlorine needed to disinfect wastewater.

Annual average design flow (AADF) -- The average of the daily flow volumes anticipated to occur over a calendar year.

Average monthly (intermittent) discharge limit -- The average of the measured values obtained over a calendar month's time taking into account zero discharge days.

Average monthly discharge limit -- The average of the measured values obtained over a calendar month's time.

Background water quality -- The concentrations of chemical, physical, biological or radiological constituents or other characteristics in or of groundwater at a particular point in time upgradient of an activity that has not been affected by that activity [WAC 173-200-020(3)]. Background water quality for any parameter is statistically defined as the 95% upper tolerance interval with a 95% confidence based on at least eight hydraulically upgradient water quality samples. The eight samples are collected over a period of at least one year, with no more than one sample collected during any month in a single calendar year.

Best management practices (BMPs) -- Schedules of activities, prohibitions of practices, maintenance procedures, and other physical, structural and/or managerial practices to prevent or reduce the pollution of waters of the state. BMPs include treatment systems, operating procedures, and practices to control plant site runoff, spillage or leaks, sludge or waste disposal, or drainage from raw material storage. BMPs may be further categorized as operational, source control, erosion and sediment control, and treatment BMPs.

BOD5 -- Determining the five-day Biochemical Oxygen Demand of an effluent is an indirect way of measuring the quantity of organic material present in an effluent that is utilized by bacteria. The BOD5 is used in modeling to measure the reduction of dissolved oxygen in receiving waters after effluent is discharged. Stress caused by reduced dissolved oxygen levels makes organisms less competitive and less able to sustain their species in the aquatic environment. Although BOD_5 is not a specific compound, it is defined as a conventional pollutant under the federal Clean Water Act.

Bypass -- The intentional diversion of waste streams from any portion of a treatment facility.

Categorical pretreatment standards -- National pretreatment standards specifying quantities or concentrations of pollutants or pollutant properties, which may be discharged to a POTW by existing or new industrial users in specific industrial subcategories.

Chlorine -- A chemical used to disinfect wastewaters of pathogens harmful to human health. It is also extremely toxic to aquatic life.

Chronic toxicity -- The effect of a compound on an organism over a relatively long time, often 1/10 of an organism's lifespan or more. Chronic toxicity can measure survival, reproduction or growth rates, or other parameters to measure the toxic effects of a compound or combination of compounds.

Clean water act (CWA) -- The federal Water Pollution Control Act enacted by Public Law 92-500, as amended by Public Laws 95-217, 95-576, 96-483, 97-117; USC 1251 et seq.

Compliance inspection-without sampling -- A site visit for the purpose of determining the compliance of a facility with the terms and conditions of its permit or with applicable statutes and regulations.

Compliance inspection-with sampling -- A site visit for the purpose of determining the compliance of a facility with the terms and conditions of its permit or with applicable statutes and regulations. In addition it includes as a minimum, sampling and analysis for all parameters with limits in the permit to ascertain compliance with those limits; and, for municipal facilities, sampling of influent to ascertain compliance with the 85 percent removal requirement. Ecology may conduct additional sampling.

Composite sample -- A mixture of grab samples collected at the same sampling point at different times, formed either by continuous sampling or by mixing discrete samples. May be "time-composite" (collected at constant time intervals) or "flow-proportional" (collected either as a constant sample volume at time intervals proportional to stream flow, or collected by increasing the volume of each aliquot as the flow increased while maintaining a constant time interval between the aliquots).

Construction activity -- Clearing, grading, excavation, and any other activity, which disturbs the surface of the land. Such activities may include road building; construction of residential houses, office buildings, or industrial buildings; and demolition activity.

Continuous monitoring -- Uninterrupted, unless otherwise noted in the permit.

Critical condition -- The time during which the combination of receiving water and waste discharge conditions have the highest potential for causing toxicity in the receiving water environment. This situation usually occurs when the flow within a water body is low, thus, its ability to dilute effluent is reduced.

Date of receipt -- This is defined in RCW 43.21B.001(2) as five business days after the date of mailing; or the date of actual receipt, when the actual receipt date can be proven by a preponderance of the evidence. The recipient's sworn affidavit or declaration indicating the date of receipt, which is unchallenged by the agency, constitutes sufficient evidence of actual receipt. The date of actual receipt, however, may not exceed forty-five days from the date of mailing.

Detection limit -- The minimum concentration of a substance that can be measured and reported with 99 percent confidence that the pollutant concentration is above zero and is determined from analysis of a sample in a given matrix containing the pollutant.

Dilution factor (DF) -- A measure of the amount of mixing of effluent and receiving water that occurs at the boundary of the mixing zone. Expressed as the inverse of the percent effluent fraction, for example, a dilution factor of 10 means the effluent comprises 10% by volume and the receiving water 90%.

Distribution uniformity -- The uniformity of infiltration (or application in the case of sprinkle or trickle irrigation) throughout the field expressed as a percent relating to the average depth infiltrated in the lowest one-quarter of the area to the average depth of water infiltrated.

Early warning value -- The concentration of a pollutant set in accordance with WAC 173-200-070 that is a percentage of an enforcement limit. It may be established in the effluent, groundwater, surface water, the vadose zone or within the treatment process. This value acts as a trigger to detect and respond to increasing contaminant concentrations prior to the degradation of a beneficial use.

E. Coli -- "*E. coli*" is a bacterium in the family Enterobacteriaceae named Escherichia coli and is a common inhabitant of the intestinal tract of warm-blooded animals, and its presence in water samples is an indication of fecal pollution and the possible presence of enteric pathogens.

Enforcement limit -- The concentration assigned to a contaminant in the groundwater at the point of compliance for the purpose of regulation, [WAC 173-200-020(11)]. This limit assures that a groundwater criterion will not be exceeded and that background water quality will be protected.

Engineering report -- A document that thoroughly examines the engineering and administrative aspects of a particular domestic or industrial wastewater facility. The report must contain the appropriate information required in WAC 173-240-060 or 173-240-130.

Fecal coliform bacteria -- Fecal coliform bacteria are used as indicators of pathogenic bacteria in the effluent that are harmful to humans. Pathogenic bacteria in wastewater discharges are controlled by disinfecting the wastewater. The presence of high numbers of fecal coliform bacteria in a water body can indicate the recent release of untreated wastewater and/or the presence of animal feces.

Grab sample -- A single sample or measurement taken at a specific time or over as short a period of time as is feasible.

Groundwater -- Water in a saturated zone or stratum beneath the surface of land or below a surface water body.

Industrial user -- A discharger of wastewater to the sanitary sewer that is not sanitary wastewater or is not equivalent to sanitary wastewater in character.

Industrial wastewater -- Water or liquid-carried waste from industrial or commercial processes, as distinct from domestic wastewater. These wastes may result from any process or activity of industry, manufacture, trade or business; from the development of any natural resource; or from animal operations such as feed lots, poultry houses, or dairies. The term includes contaminated stormwater and, also, leachate from solid waste facilities.

Interference -- A discharge which, alone or in conjunction with a discharge or discharges from other sources, both:

- Inhibits or disrupts the POTW, its treatment processes or operations, or its sludge processes, use or disposal; and

- Therefore is a cause of a violation of any requirement of the POTW's NPDES permit (including an increase in the magnitude or duration of a violation) or of the prevention of sewage sludge use or disposal in compliance with the following statutory provisions and regulations or permits issued thereunder (or more stringent State or local regulations): Section 405 of the Clean Water Act, the Solid Waste Disposal Act (SWDA) (including title II, more commonly referred to as the Resource Conservation and Recovery Act (RCRA), and including State regulations contained in any State sludge management plan prepared pursuant to subtitle D of the SWDA), sludge regulations appearing in 40 CFR Part 507, the Clean Air Act, the Toxic Substances Control Act, and the Marine Protection, Research and Sanctuaries Act.

Local limits -- Specific prohibitions or limits on pollutants or pollutant parameters developed by a POTW.

Major facility -- A facility discharging to surface water with an EPA rating score of > 80 points based on such factors as flow volume, toxic pollutant potential, and public health impact.

Maximum daily discharge limit -- The highest allowable daily discharge of a pollutant measured during a calendar day or any 24-hour period that reasonably represents the calendar day for purposes of sampling. The daily discharge is calculated as the average measurement of the pollutant over the day.

Maximum day design flow (MDDF) -- The largest volume of flow anticipated to occur during a one-day period, expressed as a daily average.

Maximum month design flow (MMDF) -- The largest volume of flow anticipated to occur during a continuous 30-day period, expressed as a daily average.

Maximum week design flow (MWDF) -- The largest volume of flow anticipated to occur during a continuous 7-day period, expressed as a daily average.

Method detection level (MDL) -- See Detection Limit.

Minor facility -- A facility discharging to surface water with an EPA rating score of < 80 points based on such factors as flow volume, toxic pollutant potential, and public health impact.

Mixing zone -- An area that surrounds an effluent discharge within which water quality criteria may be exceeded. The permit specifies the area of the authorized mixing zone that Ecology defines following procedures outlined in state regulations (chapter 173-201A WAC).

National pollutant discharge elimination system (NPDES) -- The NPDES (Section 402 of the Clean Water Act) is the federal wastewater permitting system for discharges to navigable waters of the United States. Many states, including the state of Washington, have been delegated the authority to issue these permits. NPDES permits issued by Washington State permit writers are joint NPDES/State permits issued under both state and federal laws.

pH -- The pH of a liquid measures its acidity or alkalinity. It is the negative logarithm of the hydrogen ion concentration. A pH of 7 is defined as neutral and large variations above or below this value are considered harmful to most aquatic life.

Pass-through -- A discharge which exits the POTW into waters of the State in quantities or concentrations which, alone or in conjunction with a discharge or discharges from other sources, is a cause of a violation of any requirement of the POTW's NPDES permit (including an increase in the magnitude or duration of a violation), or which is a cause of a violation of State water quality standards.

Peak hour design flow (PHDF) -- The largest volume of flow anticipated to occur during a one-hour period, expressed as a daily or hourly average.

Peak instantaneous design flow (PIDF) -- The maximum anticipated instantaneous flow.

Point of compliance -- The location in the groundwater where the enforcement limit must not be exceeded and a facility must comply with the Ground Water Quality Standards. Ecology determines this limit on a site-specific basis. Ecology locates the point of compliance in the groundwater as near and directly downgradient from the pollutant source as technically, hydrogeologically, and geographically feasible, unless it approves an alternative point of compliance.

Potential significant industrial user (PSIU) --A potential significant industrial user is defined as an Industrial User that does not meet the criteria for a Significant Industrial User, but which discharges wastewater meeting one or more of the following criteria:

a. Exceeds 0.5 % of treatment plant design capacity criteria and discharges <25,000 gallons per day; or

b. Is a member of a group of similar industrial users which, taken together, have the potential to cause pass through or interference at the POTW (e.g. facilities which develop photographic film or paper, and car washes).

Ecology may determine that a discharger initially classified as a potential significant industrial user should be managed as a significant industrial user.

Quantitation level (QL) -- Also known as Minimum Level of Quantitation (ML) – The lowest level at which the entire analytical system must give a recognizable signal and acceptable calibration point for the analyte. It is equivalent to the concentration of the lowest calibration standard, assuming that the lab has used all method-specified sample weights, volumes, and cleanup procedures. The QL is calculated by multiplying the MDL by 3.18 and rounding the result to the number nearest to (1, 2, or 5) x 10^n, where n is an integer (64 FR 30417).
ALSO GIVEN AS:
The smallest detectable concentration of analyte greater than the Detection Limit (DL) where the accuracy (precision & bias) achieves the objectives of the intended purpose. (Report of the Federal Advisory Committee on Detection and Quantitation Approaches and Uses in Clean Water Act Programs Submitted to the US Environmental Protection Agency, December 2007).

Reasonable potential -- A reasonable potential to cause a water quality violation, or loss of sensitive and/or important habitat.

Responsible corporate officer -- A president, secretary, treasurer, or vice-president of the corporation in charge of a principal business function, or any other person who performs similar policy- or decision-making functions for the corporation, or the manager of one or more manufacturing, production, or operating facilities employing more than 250 persons or have gross annual sales or expenditures exceeding $25 million (in second quarter 1980 dollars), if authority to sign documents has been assigned or delegated to the manager in accordance with corporate procedures (40 CFR 122.22).

Sample Maximum -- No sample may exceed this value.

Significant industrial user (SIU) --

1) All industrial users subject to Categorical Pretreatment Standards under 40 CFR 403.6 and 40 CFR Chapter I, Subchapter N; and

2) Any other industrial user that: discharges an average of 25,000 gallons per day or more of process wastewater to the POTW (excluding sanitary, noncontact cooling, and boiler blow-down wastewater); contributes a process wastestream that makes up 5 percent or more of the average dry weather hydraulic or organic capacity of the POTW treatment plant; or is designated as such by the Control Authority* on the basis that the industrial user has a reasonable potential for adversely affecting the POTW's operation or for violating any pretreatment standard or requirement [in accordance with 40 CFR 403.8(f)(6)].

   Upon finding that the industrial user meeting the criteria in paragraph 2, above, has no reasonable potential for adversely affecting the POTW's operation or for violating any pretreatment standard or requirement, the Control Authority* may at any time, on its own initiative or in response to a petition received from an industrial user or POTW, and in accordance with 40 CFR 403.8(f)(6), determine that such industrial user is not a significant industrial user.

   * The term "Control Authority" refers to the Washington State Department of Ecology in the case of non-delegated POTWs or to the POTW in the case of delegated POTWs.

Slug discharge -- Any discharge of a non-routine, episodic nature, including but not limited to an accidental spill or a non-customary batch discharge to the POTW. This may include any pollutant released at a flow rate that may cause interference or pass through with the POTW or in any way violate the permit conditions or the POTW's regulations and local limits.

Soil scientist -- An individual who is registered as a Certified or Registered Professional Soil Scientist or as a Certified Professional Soil Specialist by the American Registry of Certified Professionals in Agronomy, Crops, and Soils or by the National Society of Consulting Scientists or who has the credentials for membership. Minimum requirements for eligibility are possession of a baccalaureate, masters, or doctorate degree from a U.S. or Canadian institution with a minimum of 30 semester hours or 45 quarter hours professional core courses in agronomy, crops or soils, and have 5, 3, or 1 year(s), respectively, of professional experience working in the area of agronomy, crops, or soils.

Solid waste -- All putrescible and non-putrescible solid and semisolid wastes including, but not limited to, garbage, rubbish, ashes, industrial wastes, swill, sewage sludge, demolition and construction wastes, abandoned vehicles or parts thereof, contaminated soils and contaminated dredged material, and recyclable materials.

Soluble BOD_5 -- Determining the soluble fraction of Biochemical Oxygen Demand of an effluent is an indirect way of measuring the quantity of soluble organic material present in an effluent that is utilized by bacteria. Although the soluble BOD_5 test is not specifically described in Standard Methods, filtering the raw sample through at least a 1.2 um filter prior to running the standard BOD_5 test is sufficient to remove the particulate organic fraction.

State waters -- Lakes, rivers, ponds, streams, inland waters, underground waters, salt waters, and all other surface waters and watercourses within the jurisdiction of the state of Washington.

Stormwater -- That portion of precipitation that does not naturally percolate into the ground or evaporate, but flows via overland flow, interflow, pipes, and other features of a stormwater drainage system into a defined surface water body, or a constructed infiltration facility.

Technology-based effluent limit -- A permit limit based on the ability of a treatment method to reduce the pollutant.

Total coliform bacteria -- A microbiological test, which detects and enumerates the total coliform group of bacteria in water samples.

Total dissolved solids -- That portion of total solids in water or wastewater that passes through a specific filter.

Total maximum daily load (TMDL) -- A determination of the amount of pollutant that a water body can receive and still meet water quality standards.

Total suspended solids (TSS) -- Total suspended solids is the particulate material in an effluent. Large quantities of TSS discharged to a receiving water may result in solids accumulation. Apart from any toxic effects attributable to substances leached out by water, suspended solids may kill fish, shellfish, and other aquatic organisms by causing abrasive injuries and by clogging the gills and respiratory passages of various aquatic fauna. Indirectly, suspended solids can screen out light and can promote and maintain the development of noxious conditions through oxygen depletion.

Upset -- An exceptional incident in which there is unintentional and temporary noncompliance with technology-based permit effluent limits because of factors beyond the reasonable control of the Permittee. An upset does not include noncompliance to the extent caused by operational error, improperly designed treatment facilities, lack of preventative maintenance, or careless or improper operation.

Water quality-based effluent limit -- A limit imposed on the concentration of an effluent parameter to prevent the concentration of that parameter from exceeding its water quality criterion after discharge into receiving waters.

Appendix D--Technical Calculations

Several of the Excel® spreadsheet tools used to evaluate a discharger's ability to meet Washington State water quality standards can be found in the PermitCalc workbook on Ecology's webpage at: https://ecology.wa.gov/Regulations-Permits/Guidance-technical-assistance/Water-quality-permits-guidance

Simple Mixing:

Ecology uses simple mixing calculations to assess the impacts of certain conservative pollutants, such as the expected increase in fecal coliform bacteria at the edge of the chronic mixing zone boundary. Simple mixing uses a mass balance approach to proportionally distribute a pollutant load from a discharge into the authorized mixing zone. The approach assumes no decay or generation of the pollutant of concern within the mixing zone. The predicted concentration at the edge of a mixing zone (C_{mz}) is based on the following calculation:

$$C_{mz} = Ca + \frac{(Ce - Ca)}{DF}$$

where: Ce = Effluent Concentration
Ca = Ambient Concentration
DF = Dilution Factor

Reasonable Potential Analysis:

The spreadsheets Input 2 – Reasonable Potential, and LimitCalc in Ecology's PermitCalc Workbook determine reasonable potential (to violate the aquatic life and human health water quality standards) and calculate effluent limits. The process and formulas for determining reasonable potential and effluent limits in these spreadsheets are taken directly from the *Technical Support Document for Water Quality-based Toxics Control*, (EPA 505/2-90-001). The adjustment for autocorrelation is from EPA (1996a), and EPA (1996b).

Reasonable Potential Calculation

Facility	Pacific Fishermen
Water Body Type	Freshwater
Rec. Water Hardness	42.46 mg/L

Dilution Factors:	Acute	Chronic
Aquatic Life	25.0	87.0
Human Health Carcinogenic		87.0
Human Health Non-Carcinogenic		87.0

Pollutant, CAS No. & NPDES Application Ref. No.			ARSENIC (inorganic)	COPPER - 744058 6M Hardness dependent	LEAD - 7439921 7M Dependent on hardness	ZINC- 7440666 13M hardness dependent						
Effluent Data	# of Samples (n)		45	45	45	45						
	Coeff of Variation (Cv)		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)		1.63	39.96	0.5	107.7						
	Calculated 50th percentile Effluent Conc. (when n>10)		0.5	6.24	0.5	34.6						
Receiving Water Data	90th Percentile Conc., ug/L		1.186	4.97	0.172	8.76						
	Geo Mean, ug/L		0.89	2.6	0.058	2.98						
Water Quality Criteria	Aquatic Life Criteria, ug/L	Acute	-	7.5918	25.128031	55.385						
		Chronic	-	5.4593	0.9792033	50.575						
	WQ Criteria for Protection of Human Health, ug/L		0.018	1300	-	1000						
	Metal Criteria Translator, decimal	Acute	-	0.996	0.466	0.996						
		Chronic	-	0.996	0.466	0.996						
	Carcinogen?		Y	N	N	N						

Aquatic Life Reasonable Potential												
Effluent percentile value				0.950	0.950	0.950						
s	$s^2=\ln(CV^2+1)$			0.555	0.555	0.555						
Pn	$Pn=(1\text{-confidence level})^{1/n}$			0.936	0.936	0.936						
Multiplier				1.00	1.00	1.00						
Max concentration (ug/L) at edge of...		Acute		6.363	0.174	12.700						
		Chronic		5.370	0.173	9.892						
Reasonable Potential? Limit Required?				NO	NO	NO						

Calculation of Water Quality-Based Effluent Limits:

Water quality-based effluent limits are calculated by the two-value wasteload allocation process as described on page 100 of the TSD (EPA, 1991) and shown below.

1. Calculate the acute wasteload allocation WLA_a by multiplying the acute criteria by the acute dilution factor and subtracting the background factor. Calculate the chronic wasteload allocation (WLA_c) by multiplying the chronic criteria by the chronic dilution factor and subtracting the background factor.

WLA_a = (acute criteria x DF_a) – [(background conc. x (DF_a - 1)]

WLA_c = (chronic criteria x DF_c) – [(background conc. x (DF_c -1)]

where: DF_a = Acute Dilution Factor

DF_c = Chronic Dilution Factor

2. Calculate the long term averages (LTA_a and LTA_c) which will comply with the wasteload allocations WLA_a and WLA_c.

$LTA_a = WLA_a \times e^{[0.5\sigma^2 - z\sigma]}$

where: $\sigma^2 = \ln[CV^2 + 1]$

$z = 2.326$

CV = coefficient of variation = std. dev/mean

$LTA_c = WLA_c \times e^{[0.5\sigma^2 - z\sigma]}$

where: $\sigma^2 = \ln[(CV^2 \div 4) + 1]$

$z = 2.326$

3. Use the smallest LTA of the LTA_a or LTA_c to calculate the maximum daily effluent limit and the monthly average effluent limit.

MDL = Maximum Daily Limit

$MDL = LTA \times e^{(Z\sigma - 0.5\sigma^2)}$

where: $\sigma^2 = \ln[CV^2 + 1]$

z = 2.326 (99th percentile occurrence)

LTA = Limiting long term average

AML = Average Monthly Limit

$AML = LTA \times e^{(Z\sigma_n - 0.5\sigma_n^2)}$

where: $\sigma^2 = \ln[(CV^2 \div n) + 1]$

n = number of samples/month

z = 1.645 (95^{th} % occurrence probability)

LTA = Limiting long term average

Calculation of Performance-Based Effluent Limits:

Instructions: Enter data on 'Input 1' tab and below with yellow fields.
-- Click here for more details --

Performance-based Effluent Limits - Zinc

INPUT	
LogNormal Transformed Mean:	3.1460
LogNormal Transformed Variance:	1.3060
Number of Samples per month for compliance monitoring:	1
Autocorrelation factor (n_e) (use 0 if unknown):	0
OUTPUT	
E(X) =	44.6565
V(X) =	5367.157
VARn	1.3060
MEANn=	3.1460
VAR(Xn)=	5367.157
RESULTS	
Maximum Daily Effluent Limit:	**331.7**
Average Monthly Effluent Limit:	**152.3**
152.3090793	165.1706547

Use spreadsheet on right to calculate the log-normal transformed mean and variance.

LogNormal Transformed Mean and Variance
Enter data in yellow cells.
Insert / delete rows as needed.

Data	Ln()
41.8	3.73289634
68.7	4.229749199
19.4	2.965273066
34.6	3.543853682
47.5	3.860729711
64.5	4.166665224
108	4.682131227
45.4	3.815512105
39.3	3.671224519
50.4	3.919991175
35.7	3.575150689
40.8	3.708682081
59	4.077537444
42.8	3.756538103
101	4.615120517
51.6	3.943521672
115	4.744932128
107	4.672828834
64.4	4.165113633
19	2.944438979
19.2	2.954910279
21.1	3.04927304
35.3	3.563882964
9.15	2.213753879
9.21	2.22028985
21.9	3.086486637
16.6	2.809402695
36.7	3.602776755
19.7	2.980618636
26.8	3.288401888
14.8	2.694627181
12.9	2.557227311
29.7	3.391147046
38.8	3.658420247
67.8	4.216562195
18.2	2.901421594
23	3.135494216
56.9	4.041295341
2.5	0.916290732
2.5	0.916290732
2.5	0.916290732
2.5	0.916290732
2.5	0.916290732
2.5	0.916290732
2.5	0.916290732
Mean	**3.146**
Variance	**1.306**

Performance Limit Description and User Instructions

Revised 2012

This spreadsheet calculates performance-based effluent limits. It will account for autocorrelation if the autocorrelation factor is known. Effluent data are typically non-normally distributed the permit manager should use EXCEL to transform the data using a lognormal transformation. If the permit manager suspects the effluent data *may* be normally distributed, use the Norm spreadsheet to test for normality.	
Procedure for lognormal data transformation: Transform data to lognormal by using LN( ) function in Excel. The table on the right above contains the proper formula. Enter values under Data. Add or delete rows as needed. Use the calculated Mean and Variance to populate values in the table on the left above.	
Input cells include the lognormal transformed mean and variance, the number of samples per month that will be required for compliance monitoring, and the autocorrelation factor if it is known.	
Output contains calculated intermediate values.	
Results are the calculated maximum daily and average monthly effluent limits.	

-- Click here to return to spreadsheet --

Instructions: Enter data on 'Input 1' tab and below with yellow fields.
-- Click here for more details --

Performance-based Effluent Limits - Copper

INPUT	
LogNormal Transformed Mean:	1.9390
LogNormal Transformed Variance:	0.8820
Number of Samples per month for compliance monitoring:	1
Autocorrelation factor (n_e) (use 0 if unknown):	0
OUTPUT	
E(X) =	10.8049
V(X) =	165.280
VARn	0.8820
MEANn=	1.9390
VAR(Xn)=	165.280
RESULTS	
Maximum Daily Effluent Limit:	**61.8**
Average Monthly Effluent Limit:	**32.6**
	32.5865415 31.95324968

Use spreadsheet on right to calculate the log-normal transformed mean and variance.

LogNormal Transformed Mean and Variance

Enter data in yellow cells.
Insert / delete rows as needed.

Data	Ln()
2.5	0.916290732
6.49	1.870262531
21.8	3.08190997
10	2.302585093
11	2.397895273
5.8	1.757857918
27.9	3.328626689
8.75	2.1690537
19.6	2.975529566
8.98	2.194999882
5.83	1.763017
8.81	2.17588744
5.02	1.613429934
8.43	2.131796772
20.3	3.010620886
20.5	3.020424886
27.5	3.314186005
43.8	3.779633817
22	3.091042453
2.5	0.916290732
5.72	1.743968805
2.5	0.916290732
18.3	2.90690106
2.5	0.916290732
2.5	0.916290732
2.5	0.916290732
2.5	0.916290732
14.9	2.701361213
5.19	1.646733697
44.4	3.793239469
2.5	0.916290732
2.5	0.916290732
5.67	1.735189118
6.24	1.830980182
16.2	2.785011242
7.23	1.978239036
7.83	2.05796251
31	3.433987204
2.5	0.916290732
2.5	0.916290732
2.5	0.916290732
2.5	0.916290732
2.5	0.916290732
2.5	0.916290732
2.5	0.916290732
Mean	**1.939**
Variance	**0.882**

Calculation of pH of a Mixture of Two Flows

Based on the procedure in EPA's DESCON program (EPA, 1988. Technical Guidance on Supplementary Stream Design Conditions for Steady State Modeling. USEPA Office of Water, Washington D.C.)

INPUT		
	@ Acute Boundary	@ Chronic Boundary
1. Dilution Factor at Mixing Zone Boundary	25.0	87.0
2. Ambient/Upstream/Background Conditions		
Temperature (deg C):	8.00	8.00
pH:	7.00	7.00
Alkalinity (mg CaCO3/L):	40.00	40.00
3. Effluent Characteristics		
Temperature (deg C):	8.00	8.00
pH:	5.00	5.00
Alkalinity (mg CaCO3/L):	15.00	15.00
4. Aquatic Life Use Designation	Char spawning & rearing and/or core summer habitat	
OUTPUT		
1. Ionization Constants		
Upstream/Background pKa:	6.48	6.48
Effluent pKa:	6.48	6.48
2. Ionization Fractions		
Upstream/Background Ionization Fraction:	0.77	0.77
Effluent Ionization Fraction:	0.03	0.03
3. Total Inorganic Carbon		
Upstream/Background Total Inorganic Carbon (mg CaCO3/L):	52	52
Effluent Total Inorganic Carbon (mg CaCO3/L):	471	471
4. Condtions at Mixing Zone Boundary		
Temperature (deg C):	8.00	8.00
Alkalinity (mg CaCO3/L):	39.00	39.71
Total Inorganic Carbon (mg CaCO3/L):	68.94	56.99
pKa:	6.48	6.48
5. Allowable pH change	NA	0.20
RESULTS		
pH at Mixing Zone Boundary:	**6.60**	**6.84**
pH change at Mixing Zone Boundary:	0.40	0.16
Is permit limit needed?	NO	NO

Appendix E--Response to Comments

Ecology received one comment from Doug Lyons of Poulsbo, WA: Again I would like you all to extend all possible latitude to the permitting process for this small business. We need there employees and business base for the economy and the tax base that pays your salary.

Response: Ecology has reduced the monitoring requirements from the previous permit due to the exemplary compliance history of this facility. See comment and response below.

Ecology received one comment from Pacific Fishermen:

Pacific Fishermen Shipyard was formed by 400 Nordic Heritage fishermen in 1946 with the purchase of the Ballard Marine Railway. This facility has been a shipyard since the 1870s. As the name Pacific Fishermen indicates, the company owners have made their living from the sea and have been in the forefront of conservation and protection of marine resources. This attitude continues with the company they formed to this day.

Pacific Fishermen was the first shipyard in the state in the 1980s to install an on-site heavy metal coagulant process water treatment plant containing their drydocks.

Pacific Fishermen was then again the first shipyard in the state to install a StormwateRx passive filtration stormwater treatment system. The system removes heavy metals and sediment from rain water, permitting discharge to our mixing zone diffuser in the Salmon Bay Lake Washington Ship Canal. Other carbon reduction improvements continue to solidify our corporate commitment to operate our business in an ecologically friendly manner.

Over the years Pacific Fishermen has consistently been below the turbidity, oil and grease sampling limits set forth in our NPDES Permits and often at non-detect levels.

We respectfully request the requirement for sampling turbidity, oil and grease be reduced to annually or removed altogether.

Thank you for your consideration.

Response: Ecology appreciates the investment in treatment technology, best management practices, maintenance, and leadership in environmental stewardship that Pacific Fishermen has demonstrated over the decades.

Monitoring results over the last permit cycle for drydock and marine railway launches have shown no detectable discharges of oil and grease and no increase in turbidity in the receiving water. It is not practical to monitor these discharges from drydock and railway launches into the receiving water. Ecology will eliminate quarterly laboratory monitoring of oil and grease and turbidity, and require visual monitoring for oil and grease and turbidity for each launch of the drydock and marine railways.

Monitoring results of the last permit cycle for stormwater discharges from the treatment system have shown no discharges of oil and grease nor increases in turbidity in the receiving water. Ecology will eliminate laboratory monitoring of oil and grease from the stormwater treatment and replace with visual monitoring. Turbidity monitoring for stormwater discharges will be changed to a 25 NTU limit for the stormwater discharge, which is consistent with other shipyard permits in the area, and eliminate the background turbidity monitoring and in-water turbidity monitoring.